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

VOLUME I OF II
PARTIAL POST-CLOSURE MAINTENANCE PLAN

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
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1 February 1994

CROSS-REFERENCE TABLE
PREAMBLE TO FCP AND FCMP
LOPEZ CANYON SANITARY LANDFILL

SECTIONS, DRAWINGS, DETAILS TO BE SUBSTITUTED/AMENDED		SUBSTITUTED/ AMENDED BY	SECTIONS, DRAWINGS, DETAILS WHICH SUBSTITUTE/AMEND THE ORIGINAL ONES		COMMENTS
Section 3,	"Final Cover" of Volume I of FCP	Amended by	Section 2,	"Revised Final Cover Design" of Volume IV of the FCP	Includes use of geosynthetics in Area C cover.
Section 4,	"Final Grading" (with the exception of Subsections 4.7 and 4.8) Volume I of the FCP	Amended by	Section 3,	"Revised Final Grading Design" of Volume IV of the FCP	Revised final grading presented for Areas AB+ and C to address closure in 1996.
Section 4.7,	"Erosion Potential and Soil Loss Analysis" of Volume I of the FCP	Amended by	Section 6,	"Revised Soil Loss Estimates" of Volume IV of the FCP	Revised soil loss estimates presented as a result of revised grading.
Section 4.8,	"Settlement Analyses" of Volume I of the FCP	Amended by	Section 4,	"Revised Post-Closure Settlements" of Volume IV of the FCP	Revised settlement in Area C due to revised grading.
Section 5,	"Final Drainage" of Volume I of the FCP	Amended by	Section 5,	"Revised Surface-Water Drainage System" of Volume IV of the FCP	Describes revised drainage system resulting from modified grading.
Section 6,	"Landfill Gas Control System" of Volume I of the FCP	Amended by	Section 7,	"Revised Landfill Gas Control System" of Volume IV of the FCP	Describes revised gas system resulting from modified grading.
Section 10,	"Closure Implementation" (with the exception of Subsection 10.3.4) of Volume I of the FCP	Amended by	Section 9,	"Updated Closure Implementation Schedule" of Volume IV of the FCP	Updates the previous schedule.
Section 10.3.4,	"QA/QC for Lower Placement" of Volume I of the FCP	Amended by	Section 10,	"Revised Construction Quality Assure Plan" of Volume IV of the FCP	Addresses the addition of geosynthetics in the final cover.
Section 11,	"Cost Estimate" of Volume I of the FCP	Amended by	Section 8,	"Revised Closure Cost Estimate" of Volume IV of the FCP	See the revised cost worksheet presented herein for details.
Section A.1,	"Final Closure Maintenance Procedures" of Volume I of the FPCMP	Amended by	Section 2,	"Revised Final Cover Maintenance Procedures" of Volume II of the FPCMP	Describes revised final cover maintenance due to addition of geomembrane in final cover.
Section B.1,	"Groundwater Monitoring Procedure" of Volume I of the FPCMP	Amended by	Section 3,	"Updated Ground-Water Monitoring Network" of Volume II of the FPCMP	Describes the addition of new ground water wells.
Section D,	"Cost Estimate" of Volume I of the FPCMP	Amended by	Section 4,	"Revised Post-Closure Maintenance Cost Estimate" of Volume II of the FPC	See the revised cost worksheet presented herein for details.
Figure A.8.1, of Volume I of the FCP		Amended by	Figure 4-2,	"Revised Settlement Monument Locations" of Volume IV of the FPC	Indicates revised monument locations resulting from modified grading.

CROSS-REFERENCE TABLE (continued)

SECTIONS, DRAWINGS, DETAILS TO BE SUBSTITUTED/AMENDED		SUBSTITUTED/ AMENDED BY	SECTIONS, DRAWINGS, DETAILS WHICH SUBSTITUTE/AMEND THE ORIGINAL ONES		COMMENTS
Drawings	"Proposed Final Grading Plan" of Volume III of the FCP	Amended by	Drawings No. 1,	"Revised Final Grading and Surface-Water Drainage Plan" of Volume IV of the FCP	Presents revised final grading and drainage for Areas AB+ and C; other areas not changed.
Drawing	"Survey Monumentation Plan" of Volume III of the FCP	Amended by	Drawing No. 3,	"Revised Survey Monument Locations" of Volume IV of the FCP	Presents revised monument locations to reflect changes in grading.
Drawing	"Final Elevation Gas Control System-Disposal Area C" of Volume III of the FCP	Amended by	Drawing No. 4,	"Revised Landfill Gas Control System Layout" of Volume IV of the FCP	Presents revised gas control system to reflect changes in grading.
Figure 4-11,	"50-Year Elevation Contours-Disposal Area C" of Volume III of the FCP	Amended by	Figure 4-1 and Drawing No.4,	"Revised Post-Closure Settlement Contours" of Volume IV of the FCP	Presents revised settlement contours for Area C; other areas not changed.
Appendix K,	"Initial Cost Estimate Worksheet", Volume II of the FCP	Amended by	Appendix K,	"Revised Initial Cost Estimate Worksheet" Volume II of the FCP	Revised costs reflect previous changes.
Table 4-1,	"Revised Summary of Post Closure Maintenance Cost Estimate", Amendment to Partial Post-Closure Maintenance Plan, Volume II of II	Amended by	Appendix K,	"Revised Initial Cost Estimate Worksheet" Volume II of the FCP	Revised costs reflect previous changes.

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SECTION I

INTRODUCTION

I. INTRODUCTION

I.1 BACKGROUND

The Lopez Canyon Class III Landfill is divided into four distinct areas known as Disposal Areas A, B, AB+ and C. As discussed in the Closure Plan, closure of the landfill will be implemented in two phases. Phase I closure includes the slopes of Disposal Areas A and B and will be implemented upon approval of the Plan. Phase II closure includes the decks of Disposal Areas A, B and AB+ and all of Disposal Area C to be implemented in February, 1996. It should be noted that Disposal Area C refuse will be filled up against the slopes of Disposal Area AB+.

As a result of the phased closure, post-closure maintenance will also be performed in phases. This post-closure maintenance plan discusses all maintenance and monitoring procedures to be performed for both phases of closure.

I.2 PURPOSE AND CONTENT

The purpose of the Final Post-Closure Plan for the Lopez Canyon Landfill is described in Section 18265 of Title 14, Chapter 3 of the California Code of Regulations as follows:

- o To provide a basis for an accurate cost estimate for post-closure maintenance.
- o To provide a detailed plan for post-closure inspection, maintenance and monitoring at the landfill, and;
- o To enable regulatory agencies to monitor post-closure activities to determine that maintenance and monitoring are being done in accordance with an approved plan.

The contents of the Post-Closure Plan are specified in Section 18265.3 to contain at least the following:

- o To provide a detailed plan for post-closure inspection, maintenance and monitoring at the landfill, and;

- o To enable regulatory agencies to monitor post-closure activities to determine that maintenance and monitoring are being done in accordance with an approved plan.

The contents of the Post-Closure Plan are specified in Section 18265.3 to contain at least the following:

- o Identification of persons or organizations responsible for each aspect of post-closure maintenance and monitoring.

- o An as-built description of the current monitoring and collection systems at the landfill including at least those for landfill leachate, groundwater, and landfill gas.

- o A listing and scheduling of the monitoring tasks for the above identified systems.

- o A description and schedule of how each collection and recovery system is to be operated and how collected materials are to be stored, treated and disposed.

- o A summary of requirements for reporting the results of monitoring and collection.

- o A general description of the procedures that will be used to maintain, monitor and inspect the features of the closed landfill including:

    - final cover
    - surface drainage system
    - vegetative cover
    - leachate control system
    - gas monitoring and control systems
    - groundwater monitoring system
    - final grading

- o Proposed post-closure land use.

- o Cost estimates for post-closure maintenance and monitoring.
- o An emergency response plan.

This Post-Closure Plan is divided into five sections. Section A, covers maintenance; Section B, describes monitoring; Section C, includes the Emergency Response Plan; Section D, contains estimates for equipment, labor, materials, and costs; and Section E, contains the full-size drawings referenced as figures throughout the document.

I.3 RESPONSIBLE PERSONS AND ORGANIZATIONS

The following is a listing of organizations and responsible people who will be involved in post-closure maintenance and monitoring activities at the Lopez Canyon Landfill. Questions pertaining to this Post-Closure Plan should be directed to the City of Los Angeles, Bureau of Sanitation Project Manager.

LANDFILL OPERATOR:

City of Los Angeles
Department of Public Works
Bureau of Sanitation
Executive Office
200 North Main Street
Room 1400, City Hall East
Los Angeles, CA 90012
Delwin Biagi, Director
(213) 485-5112

City of Los Angeles
Department of Public Works
Bureau of Sanitation
419 South Spring Street
Los Angeles, CA 90013
Stephen A. Fortune, Project Manager
(213) 893-8211

PROPERTY OWNER

City of Los Angeles
100 North Spring Street
Los Angeles, CA 90012

Individuals and organizations which will be responsible for specific post-closure activities will be identified during the closure construction period. These activities will begin after the completion of Closure construction.

I.4 REVISION OF POST-CLOSURE PLANS

Section 18276 of Title 14 states that changes to the Post-Closure Plan, after approval, shall be limited to those events which the operator reasonably could not have expected.

This Post-Closure Plan has been prepared on the basis of the current site conditions at the landfill. Before the completion of closure construction, there will be numerous changes and modifications to the landfill facilities as described in the Final Closure Plan. A final cover will be placed, the landfill gas collection and monitoring systems will be modified and surface drainage structures will be built or modified.

It will therefore be necessary to review the approved Post-Closure Plan near the end of closure construction to conform the plan to the actual as-built facilities. This review will involve the City of Los Angeles Bureau of Sanitation (Owner/Operator) and any other interested parties. At the time of this review, responsible parties will be identified as required by Section 18265 of Title 14. The modified Post-Closure Plan will be submitted to the California Integrated Waste Management Board and the local enforcement agency for approval and subsequent implementation during the post-closure period.

SECTION A

MAINTENANCE PROCEDURES

SECTION A.1

FINAL COVER MAINTENANCE PROCEDURES

A.1 FINAL COVER MAINTENANCE PROCEDURES

A.1.1 INTRODUCTION

The purpose of the completed final cover is to minimize liquid infiltration into and through the closed landfill, control the venting of gas generated in the facility, isolate the buried wastes from the surface, promote drainage and minimize erosion or abrasion, and accommodate settlement and subsidence so that the cover integrity is maintained.

The primary purpose of these maintenance procedures is to assure that the integrity of the completed final cover is maintained over the long-term and to provide maintenance scheduling and documentation so that materials and maintenance practices are consistent with the final cover design specifications. Deviations from the design or these specifications should be reported to the Site Engineer in order that the effects with respect to the ultimate performance of the final cover may be evaluated.

Long-term maintenance activities are anticipated as a result of the following conditions:

- o Elective intrusion into or through the final cover associated with maintenance of gas collection or liquid management systems.
- o Settlement related sags and drainage interruptions which interfere with the controlled flow and discharge of surface waters from the closed landfill surface.
- o Surface erosion as a result of drainage channel "overspill" associated with intense rains or malfunctioning irrigation systems.
- o Vertical and near vertical cracking of cover soils as a result of landfill settlement.
- o Local surficial slumping on slopes resulting from intense seasonal rainfall or malfunctioning irrigation, together with the high expansion/low-permeability character of the cover soils.

A.1.2 INSPECTION PROCEDURES

Routine inspection of the cover, drainage, and irrigation facilities should be conducted to minimize the effect and extent of the above conditions. The following inspection procedures are recommended:

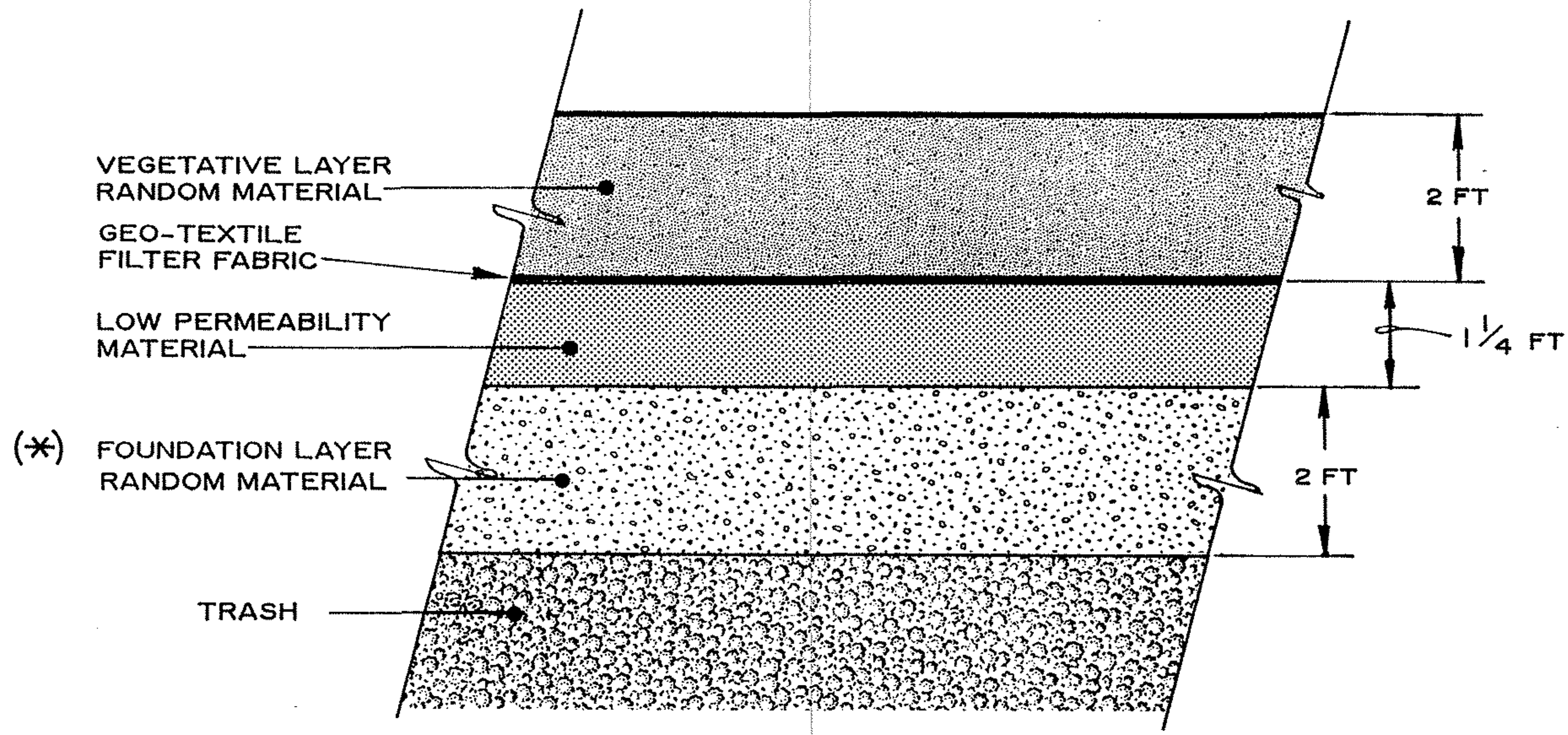
- A cover performance officer should be designated by the City of Los Angeles Bureau of Sanitation (Operator). This individual will be made responsible for inventorying, monitoring, and coordinating repair of cover irregularities.
- All employees with access to the site should be instructed to notice and report in writing to the cover performance officer any surface cracking, ponding or unusual surface conditions at the time they are observed.
- All surface drainage facilities and slopes should be visually inspected in detail by grid walking on a quarterly basis. A formal report of findings should be presented to the cover performance officer.

A.1.3 REPAIR PROCEDURES

The final cover for the deck areas (areas of less than 4:1 grade), as shown on Figure A.1.1, will consist of a minimum of two-foot thick foundation layer composed of random soils; a low-permeability layer ($k = 1 \times 10^{-6}$ cm/sec or less) 15 inches thick comprised of "select" fine-grained soils; a geotextile filter fabric; and a two-foot thick vegetative layer composed of random soils. The final cover for slope areas (gradients steeper than 4:1), as shown on Figures A.1.2A and A.1.2B, consists and/or will consist of a three foot thick low-permeability and vegetative layer of selected materials placed over the existing foundation layer which will be a minimum of two feet thick.

All final cover repair and/or reconstruction activities must be conducted in a manner to maintain the integrity of the as-built final cover system. "Repair" fill materials should be placed in layers consistent with the layers placed during the original final cover construction.

The following methods of repair are recommended for the maintenance of the cover.



NOTE (*) AN AVERAGE 2 FT OF FOUNDATION EXISTS AS LANDFILL INTERIM COVER.

FIGURE A. I. I

BAS (714) 860-7777

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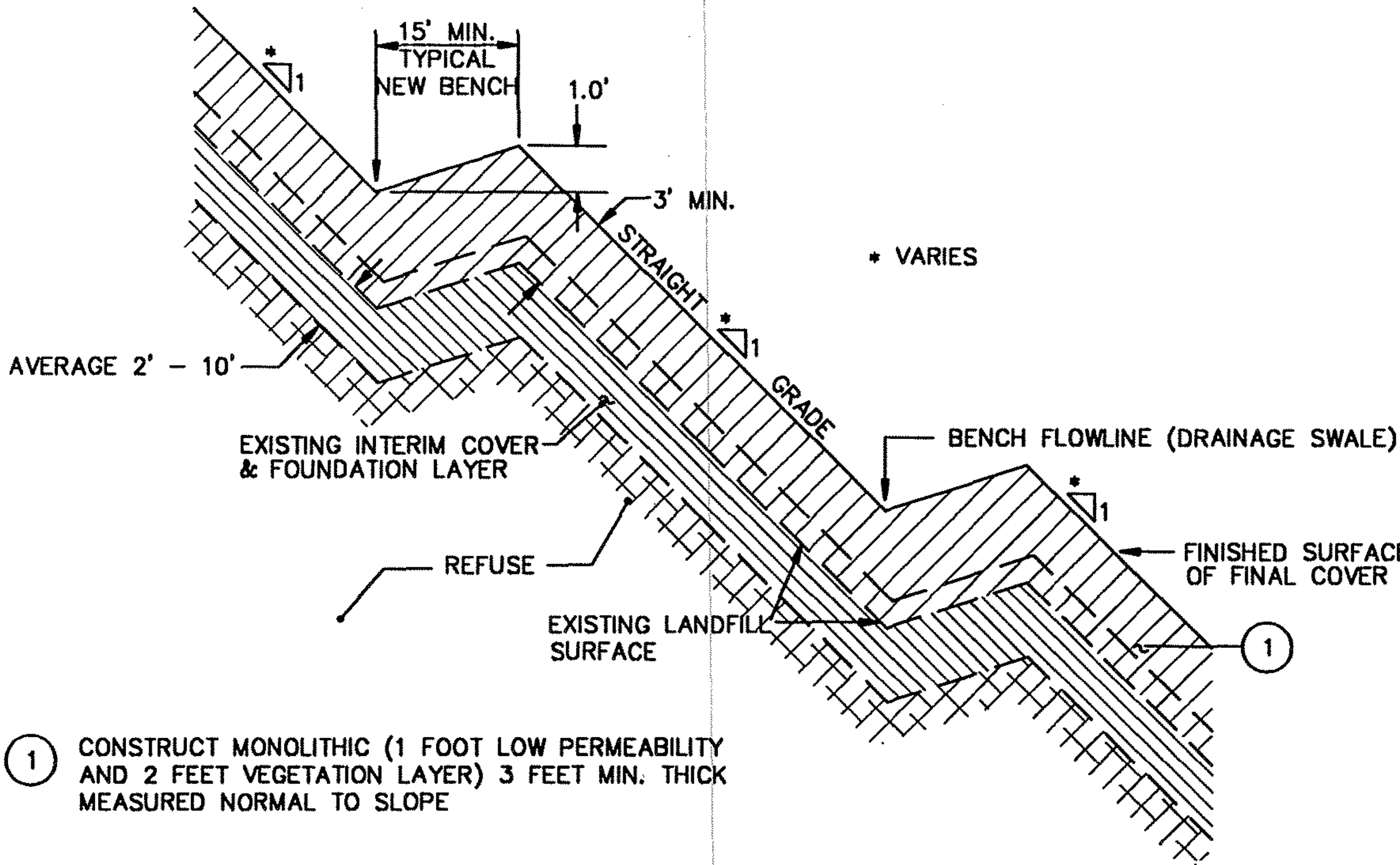
DECK AREA FINAL COVER CROSS-SECTION

JOB NO.	9258-134
DATE	NOV. 1991
DRAWN BY	PTN
CHECKED BY	VB



(1) CONSTRUCT MONOLITHIC (1 FOOT LOW PERMEABILITY AND 2 FEET VEGETATION LAYER) 3 FEET MIN. THICK MEASURED NORMAL TO SLOPE

FIGURE A.I.2A

(714) 860-7777

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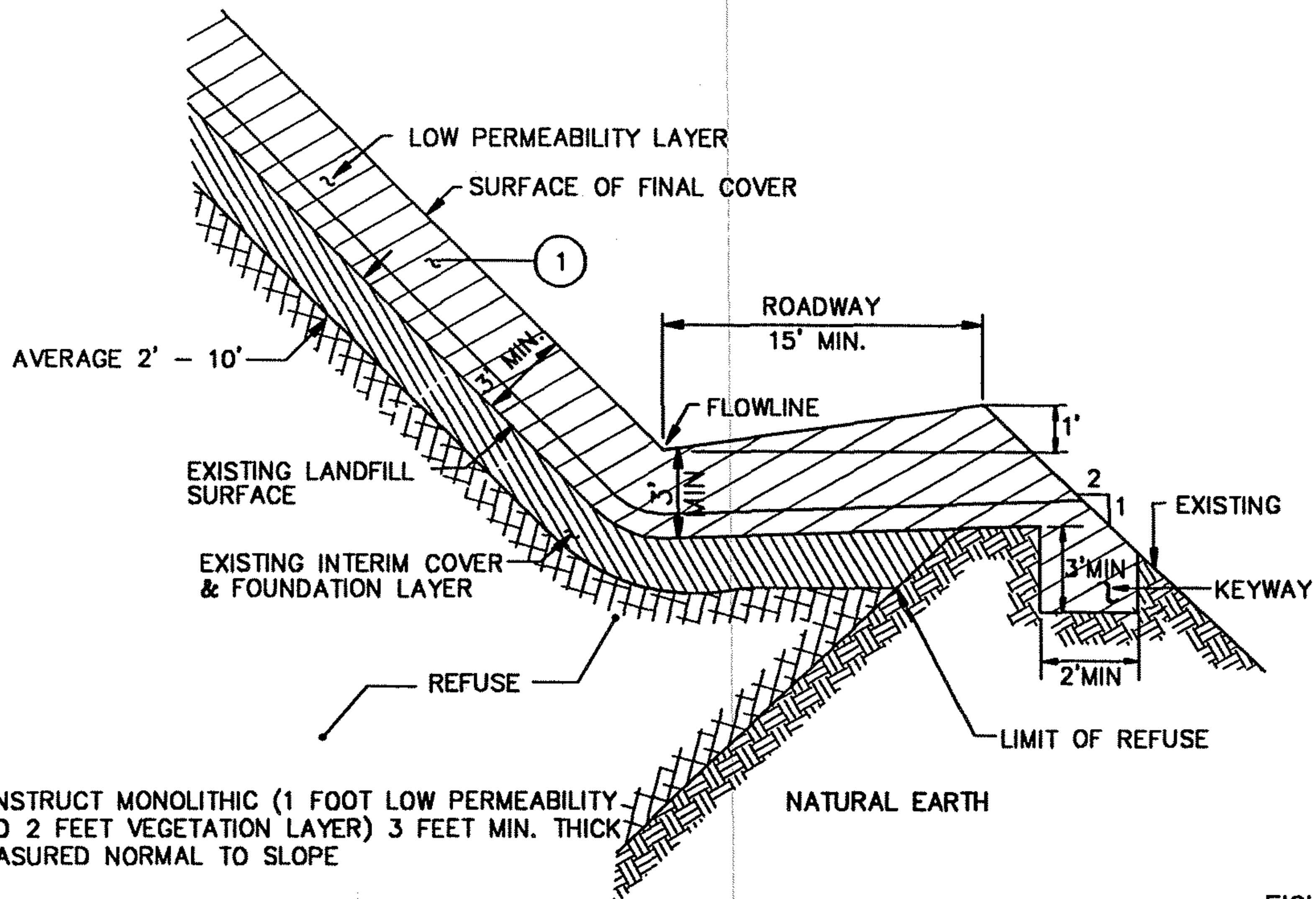
TYPICAL FINAL COVER SLOPE CROSS SECTION

NTS

JOB NO.	9303-134
DATE	JAN. 1993
DRAWN BY	KK
CHECKED BY	SPD



(1) CONSTRUCT MONOLITHIC (1 FOOT LOW PERMEABILITY AND 2 FEET VEGETATION LAYER) 3 FEET MIN. THICK MEASURED NORMAL TO SLOPE

FIGURE A.I.2B

BAS (714) 860-7777
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PERIPHERY ROADWAY FINAL COVER SECTION

NTS

JOB NO.	9303-134
DATE	JAN. 1993
DRAWN BY	KK
CHECKED BY	SPD

A.1.3.1 ELECTIVE INTRUSION

Elective disturbance of the final cover should be avoided whenever possible. If intrusion into or through the cover cannot be avoided, it should be undertaken in accordance with procedures contained in the Earthwork Specifications in Appendix A.1.1. Excavation should be initiated only after receiving approval from the cover performance officer and should be conducted under the full-time observation of the Site Engineer.

Additionally, cover excavation which may have the possibility of exposing refuse will be conducted in coordination with the regulatory agencies in accordance with applicable regulations.

The annular space in boring excavations between the well casing and the boring wall should be filled with hole plug bentonite (or equivalent) for the full vertical depth of the cover regardless of whether the boring is on a slope or deck area.

Care should be taken during conventional excavations not to damage the geotextile fabric. Damaged fabric will need to be replaced with new fabric placed and overlapped in accordance with the specifications in Appendix A.1.1.

A.1.3.2 SAGS, PONDS, DRAINAGE INTERRUPTIONS AND SURFACE EROSION

Sags, ponds, surface erosion, or other settlement features which could interfere with drainage along the top of the low-permeability layer should be repaired immediately following the procedures presented in Appendix A.1.1.

All sags and ponds in the deck area final cover should be repaired by excavating to the geotextile, cutting and rolling back the geotextile and rebuilding grades by placing additional low-permeability material. In no event should grade recovery be completed solely by placement of additional vegetative (random) soils. In areas of drainage interception and surface erosion, reconstruction should be consistent with the materials and practices utilized in original construction.

The Site Engineer should inspect all fill placed in the foundation or low-permeability layer of the deck areas and in the slope areas where volume exceeds 20 cubic yards or vertical thickness exceeds one foot.

A.1.3.3 VERTICAL CRACKING

The low-permeability materials placed as part of the final cover are expected to gradually dry over time and, as a result, some shrinkage cracking is anticipated. The materials are expected, however, to be essentially "self-healing" when wet. As a result, the first response to cover cracking will be moderate water applications at the ground surface by irrigation or water truck. In areas where significant cracking is observed and the soil does not anneal upon wetting, recompaction of the low-permeability material will be performed.

All observed surface cracks which exceed a 1/2-inch horizontal separation and do not anneal on water application should be repaired as soon as possible. The cover soils will be excavated to the geotextile, cutting and rolling back the geotextile and filling cracks by placing additional low-permeability material and recompacting. The geotextile will then be replaced and the vegetative layer replaced and recompacted. See appendix A.1.1 for earthwork specifications.

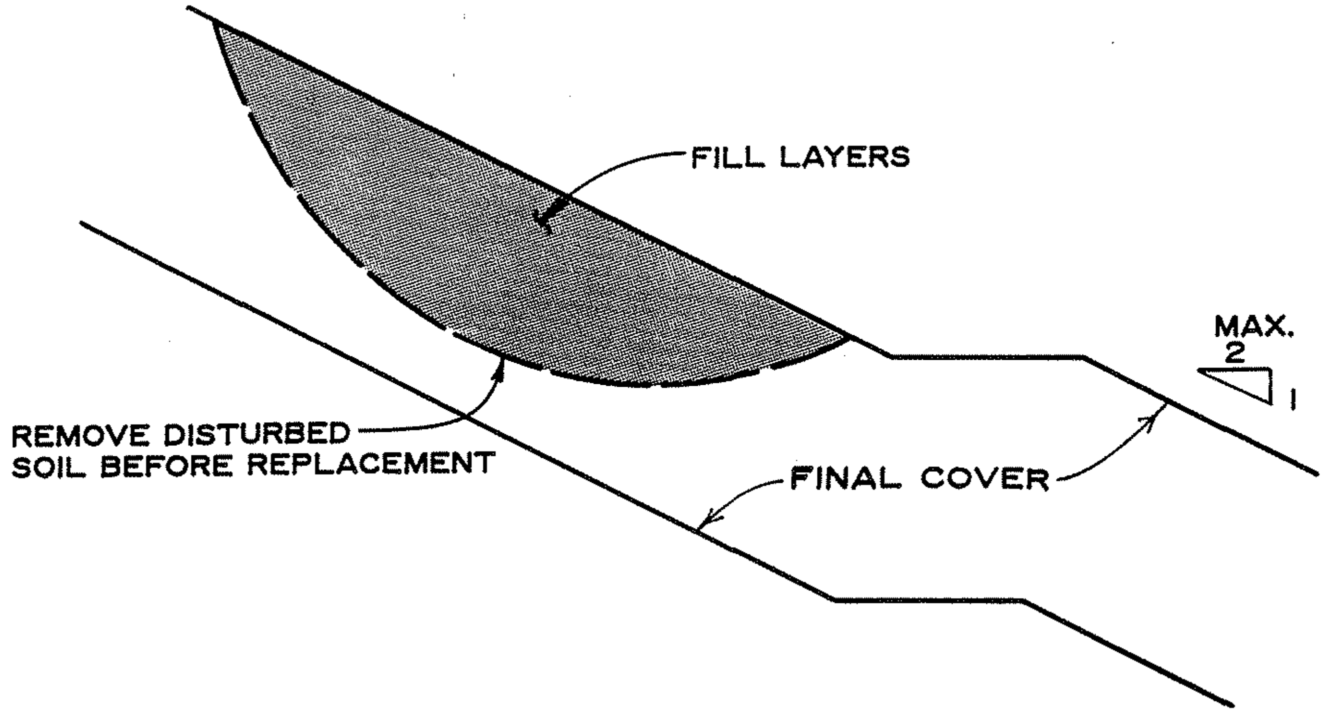
A.1.3.4 LOCAL SURFICIAL SLUMPING

After the annual rainy season, all surficial slumping will be repaired in conformance with recommendations presented below. Earthwork will conform to specifications included in Appendix A.1.1.

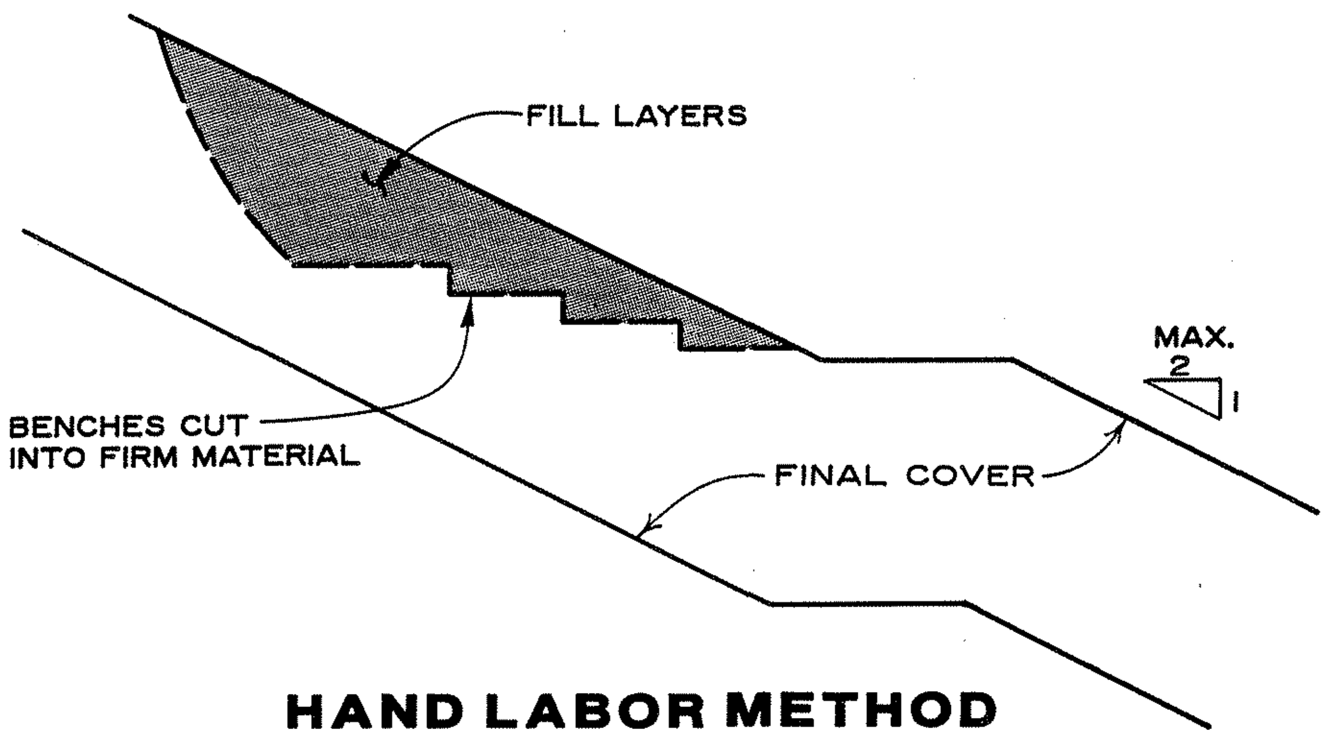
In order to reconstruct surficial slope failures, slide debris should be removed to firm undisturbed soil and recompacted. Soil removal may need to be extended beyond the visibly disturbed limits of the slump in order to include distressed but unfailed areas. Any distressed areas which are in contact with filter fabric material must be repaired in conformance with the specifications set forth in Appendix A.1.1.

If the area is accessible to track-type equipment, the loose soils can be removed and the exposed area track walked to obtain compaction. The removed soils should be dried or watered to the design moisture content, as required, and placed in thin lifts parallel to the angle of the slope. Each lift should be compacted by the equipment to at least 90 percent of maximum density. When grade is reached, track walking of the final lift should extend beyond the perimeters of the distressed area (Figure A.1.3).

In lieu of using large construction grading equipment, hand labor for restoration of the slope may be used. The loose or saturated soils should be cleaned out and a level bench cut into competent material at the base of the slump. The removed soils should then be brought to the design moisture content (wetting or drying, as required), placed in horizontal lifts of about 6 to 8 inches and compacted by hand operated mechanical tampers. As the fill is raised, it should be keyed into competent material with a series of level benches (Figure A.1.3). Tractors could also be used in this horizontal lift method.



TRACK-WALKING METHOD



HAND LABOR METHOD

FIGURE A.I.3

(714) 860-7777

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LOPEZ CANYON LANDFILL

COMPACTION PROCEDURES

JOB NO.	9035-1008
DATE	MAR. 1991
DRAWN BY:	PTN
CHECKED BY:	VS

APPENDIX A.1.1

EARTHWORK SPECIFICATIONS

APPENDIX A.1.1

EARTHWORK SPECIFICATIONS

INTRODUCTION

The following sections detail the general construction practices and inspection requirements to be followed in the event that repair of the final cover is required.

SITE PREPARATION

A. Mechanical or hand equipment used in the repair/installation and compaction of cover materials will be a standard practice of equipment which is suitable for performing the required work in a timely and efficient manner.

B. Excess vegetation and all deleterious material shall be disposed as required by the Site Engineer, in accordance with applicable regulations. This removal must be concluded prior to fill placement or excavation in the repair area.

C. Where the total repair volume exceeds 20 cubic yards or one vertical foot in maximum thickness on the slope or when any repair involves the low-permeability layer on the decks, all materials incorporated as a part of compacted fill repair must be inspected and observed by the Site Engineer. All compaction operations in excess of these limits should be under the direct observation of the Site Engineer.

D. The ground surface prepared to receive fill should be scarified, disced, or bladed until it is uniform and free of uneven features which may prevent uniform compaction. The scarified ground surface should be brought to at least 110 or 120 percent of optimum moisture content, mixed as required, and compacted as specified. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts of 6 to 8 inches in thickness.

E. Where the area to be repaired includes removal of the filter fabric material, the old filter fabric will be removed beyond the limits of the excavation so that a minimum overlap of one-foot can be maintained with undisturbed filter fabric material. The area of overlap must be cleaned of all loose soil to assure good contact between the old and new filter fabric materials. Any repair involving the filter fabric material must be inspected by the Site Engineer.

COMPACTED FILL CONSTRUCTION

A. Additional materials necessary to complete repair will be selected from already designated or future tested and approved borrow areas consistent with the soil characteristics of the layer being repaired.

B. Irreducible rock or rock fragments passing a three-inch screen may be utilized in the construction of the "random" section of final cover, provided they are not placed in concentrated pockets and clustering does not occur.

C. During the grading operations, no soil types other than those previously analyzed may be used for the foundation, low-permeability or vegetative layer unless the Site Engineer documents the suitability of these soils, with appropriate additional testing.

D. The fill material should be placed in thin lifts with a maximum uncompacted thickness of eight inches. In areas requiring hand compaction, the maximum uncompacted lift thickness shall be 5 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition of material in each layer. The minimum compaction is specified in the original closure plan document.

E. Prior to placement of fills, the active fill pad will be inspected. Desiccated soils will be thoroughly watered and processed in preparation for receiving additional fill lifts.

F. Where the filter fabric material is damaged or removed due to excavation of soil materials, it will be replaced with an equivalent filter fabric material and overlapped with new filter fabric material a minimum of 1-foot at the limits of the excavation.

COMPACTED FILL INSPECTION

Inspection of fill placement in the foundation or low-permeability layer of deck areas or where it exceeds 20 cubic yards or one foot in vertical thickness in the slope areas will be provided by the Site Engineer during regrading. This inspection will consist of at least the following:

A. Field tests will be made by the Site Engineer to evaluate the moisture content, relative compaction and when appropriate, the permeability of the fill.

B. Where tests indicate the density and/or moisture content or permeability of any layer of fill or portion thereof is below the project requirements the particular layer or portion shall be retested and if necessary reworked until the required density, moisture content and/or permeability has been attained. No additional fill shall be placed over an area until the underlying fill has been tested and found to meet the project requirements. For the purposes of cross checking, the following schedule will be maintained:

   Compaction - Compaction testing is applicable to all soil layers in the cover design. If a compaction test yields results of less than the requisite relative compaction or is outside the specified moisture window to ASTM D1557-70, two additional compaction tests will be taken. If either of these tests fail to meet the moisture content or compaction minimum requirement, the area of the cover will be considered inadequate and will be reworked.

   Permeability - Permeability testing is applicable to the low-permeability soil layer only. The permeability requirement in the layer is specified as $K = 1.0 \times 10^{-6}$ cm/sec or less. If a permeability test yields results greater than the specified $K = 1.0 \times 10^{-6}$, two additional tests of the same type will be taken in the immediate vicinity. If either of these "check" tests fail to meet the specified requirements, this area of the cover will be considered inadequate and will be removed or reprocessed.

The permeability characteristics of all fill placed within the low-permeability zone of the final cover will be tested according to the following schedule.

1. At least one BAT Permeability Tests (BAT) will be conducted in every repair area requiring inspection and additional BAT tests will be conducted for every additional 50 cubic yards of repair volume.

2. Where the total repair volume exceeds 500 cubic yards, four-inch drive ring permeability tests will be conducted on relatively undisturbed samples taken directly from the low-permeability layer of the cover repair area. Additional 4-inch tests will be taken in every 1,000 cubic yards of additional repair volume.

3. Acceptable limits for the BAT and 4-inch drive ring permeabilities will be 1.0×10^{-6} cm/sec. Materials having BAT or 4-inch permeability test results greater than 1.0×10^{-6} cm/sec will be considered unacceptable and appropriate recheck procedures, as outlined above, will be conducted.

C. Inspection by the Site Engineer shall be conducted continuously during the fill placement and compaction operation to ensure that all filled areas are repaired in accordance with the project specifications.

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

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

F. The Site Engineer on the 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 which exceed 25 percent of the loaded volume.

Number of Tests - Inspection of the fill placement will be performed by the Site Engineer during the process of fill placement. Field tests will be made by the Site Engineer to evaluate the compaction of the fill. The following testing schedule will be implemented.

1. Where total soil repair volumes are between 20 and 100 cubic yards, a minimum of three relative density tests will be taken at intervals not to exceed one and one-half foot of fill height. Where total soil repair volumes exceed 100 cubic yards, a minimum of two relative density tests will be taken in each soil layer (i.e., foundation, low-permeability or vegetative layer) at intervals not to exceed one and one-half foot of fill height or every 50 cubic yards of fill placement.

2. Fill density testing will be completed using either sand cone (ASTM D1556), drive cylinder (ASTM D1297) or nuclear densometer (ASTM 2922) methods. At a minimum, sand cone tests will constitute 20 percent of the specified density testing.

3. Five layer moisture density curves (ASTM D1557) will be conducted at least every 2,000 cubic yards; within each repair area or at any time a new soil type is encountered.

PROTECTION OF WORK

During construction, all excavated surfaces shall be graded to provide good drainage and prevent ponding of water. Surface water shall be controlled to avoid damage to adjoining properties or to finished work on site.

In addition, to minimize the potential for "shrinkage" cracks developing in finished cover areas, the slope faces will be kept moist until permanent vegetation and moisture control procedures can be re-implemented.

SECTION A.2

DRAINAGE FACILITIES MAINTENANCE PROCEDURES

A.2 DRAINAGE FACILITIES MAINTENANCE PROCEDURES

A.2.1 INTRODUCTION

It will take several years to develop a site specific maintenance program for the landfill drainage system. Conveyance systems tend to have historic trouble spots which often require more attention than other areas. Problems tend to arise in locations where a conduit or channel makes severe directional change, differential settlement occurs and drainage patterns change. Erosion and sediment build-up occurs more rapidly in the earlier years prior to the establishment of landscaping materials.

After the system has been in service for several years, a more definitive inspection schedule can be developed identifying those areas that must be inspected annually, those areas that must be inspected prior to an ensuing storm and those areas that need to be inspected both before and after a storm.

The following sections delineate the various maintenance activities to be performed on the landfill drainage facilities. For reference, Figure A.2.1 shows the location of the drainage facilities and Figures A.2.2, A.2.3 and A.2.4 show the details of the described drainage facilities.

A.2.2 BENCH DRAINS AND INLET STRUCTURES

The design of the sloped areas of the landfill provides for fifteen-foot wide benches (terraces) approximately every forty feet of vertical elevation. Benches are covered with a minimum depth of three feet of compacted low-permeability soil in the same manner as the sloped areas of the landfill. Benches collect drainage from the slopes above and also provide access for maintenance and repair.

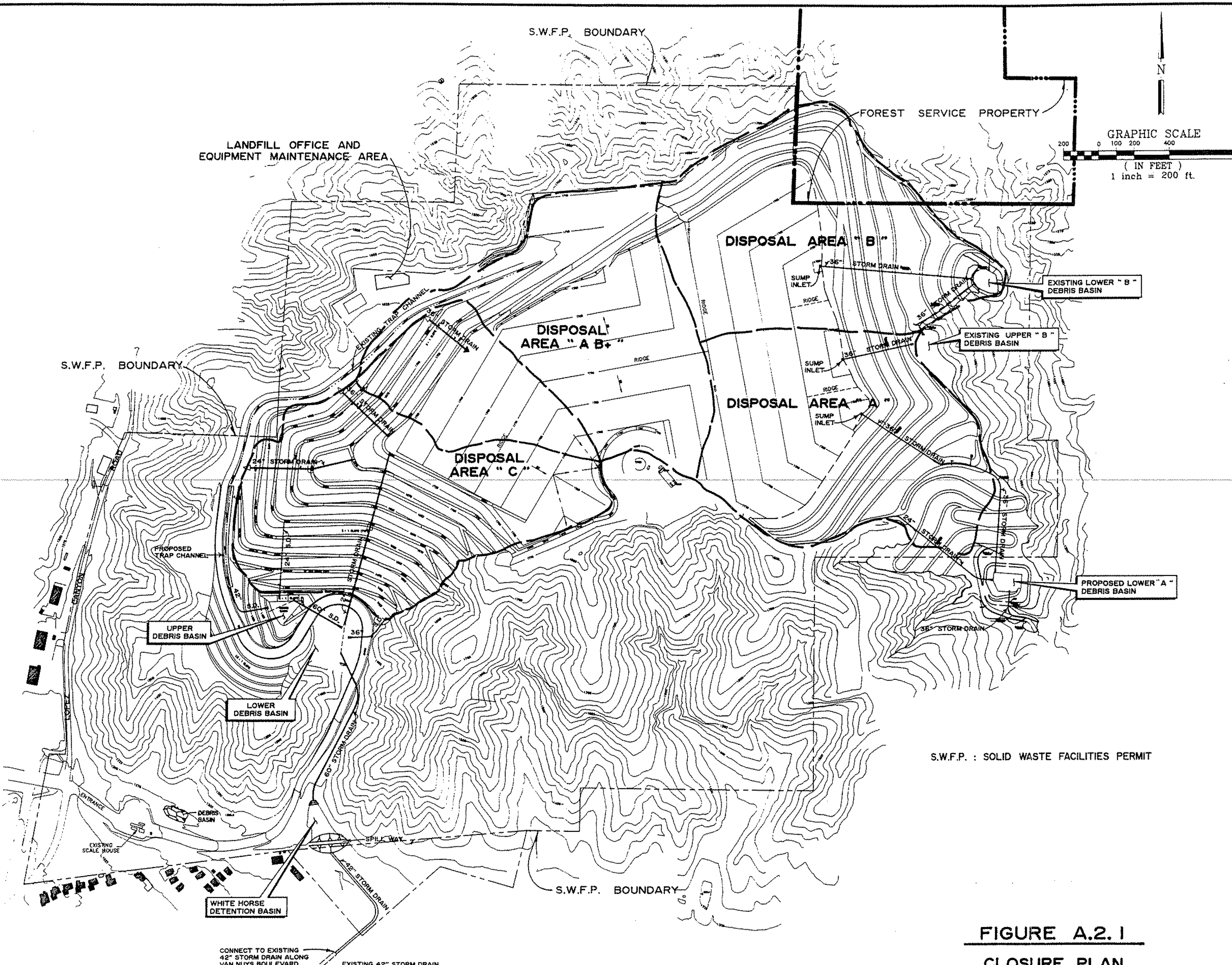


FIGURE A.2.1

CLOSURE PLAN

PROPOSED FINAL DRAINAGE PLAN

SCALES 1" = 200'	SHEET	OF	INDEX NUMBER

DESIGNED	
DRAWN	PTN
CHECKED	
SUPERVISED	
PROJECT ENGR.	R.E. NO.
ASST. DIV./DIST. ENGR.	R.E. NO.
DATE	DEC. 1992

BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 SOUTH VALLEY VISTA DRIVE
DIAMOND BAR, CA. 91765

NO.	REVISION DESCRIPTION	DIV./DIST. ENGR.	DATE
1	GENERAL REVISIONS	BPD / CS	JAN 93

CITY OF LOS ANGELES
BUREAU OF SANITATION DELWIN A. BIAGI, DIRECTOR
DATE ______ 19__
DIV/DIST. ENGR. R.E. NO.

SCALE 1" = 200'
SHEET NO.
DWG. NO.
JOB NO. 9258
11-24-92

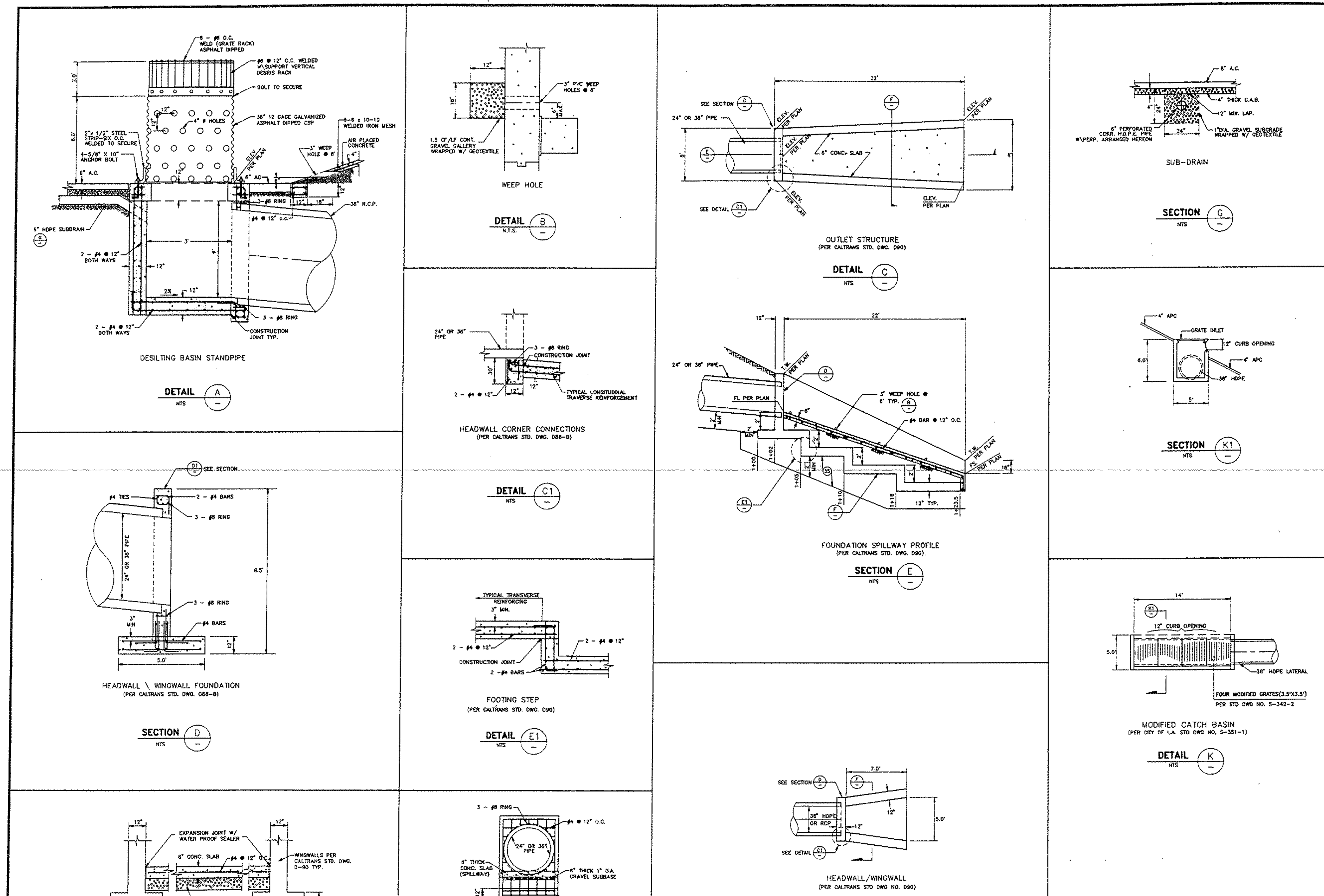


FIGURE A.2.2

CLOSURE PLAN
DRAINAGE DETAILS

DESIGNED	A.C.R.	6/11/92
DRAWN	J.M.	6/19/92
CHECKED	E.L.S.	7/14/92
SUPERVISED		
PROJECT ENGR.		R.E. NO.
ASST. DIV./DIST. ENGR.		R.E. NO.

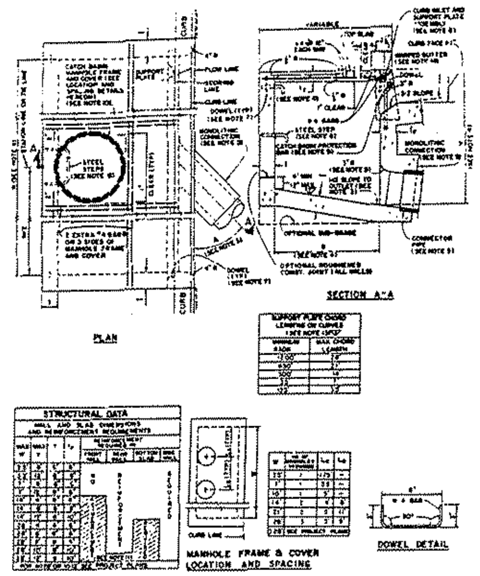
BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA. 91765
(714)860-7777

LOPEZ CANYON LANDFILL

NO. 1 GENERAL REVISIONS — REVISION DESCRIPTION — DIV./DIST. ENGR. — DATE

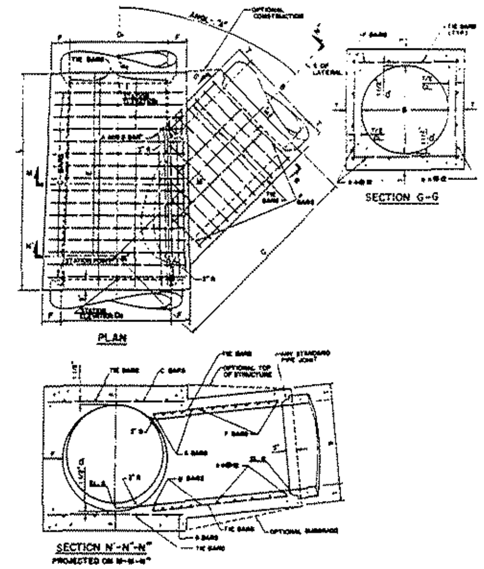
CITY OF LOS ANGELES
BUREAU OF SANITATION DELWIN A. BIAGI, DIRECTOR
DATE ______ 19__
DIV./DIST. ENGR. R.E. NO.

SCALE AS SHOWN
SHEET NO.
DWG. NO.
JOB NO. 9258-108
11/19/92
C:\DWG\LOPEZ\CLOSE1



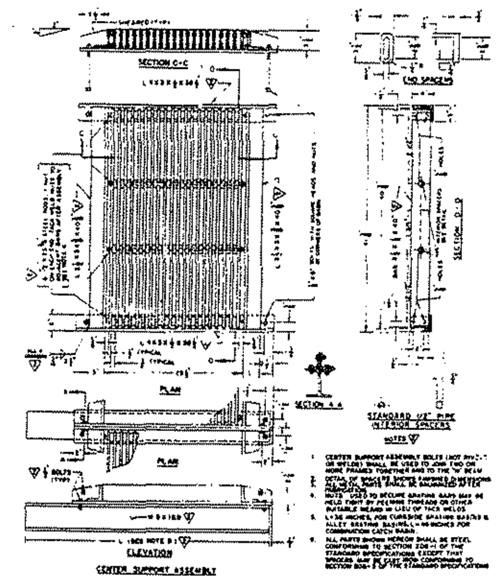
SIDE OPENING CATCH BASIN

(PER CITY OF L.A. STD PLAN S-351-1)



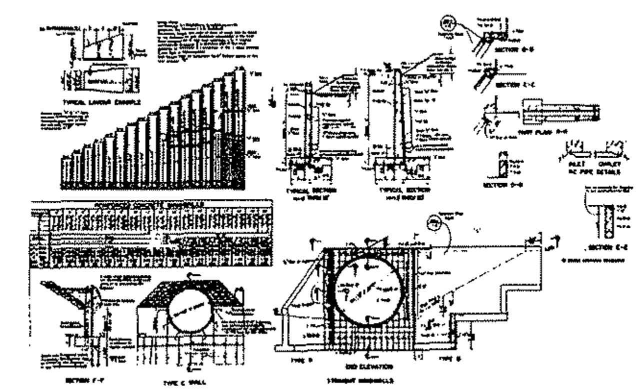
JUNCTION STRUCTURE " C "

(PER CITY OF L.A. STD PLAN S-303-0)



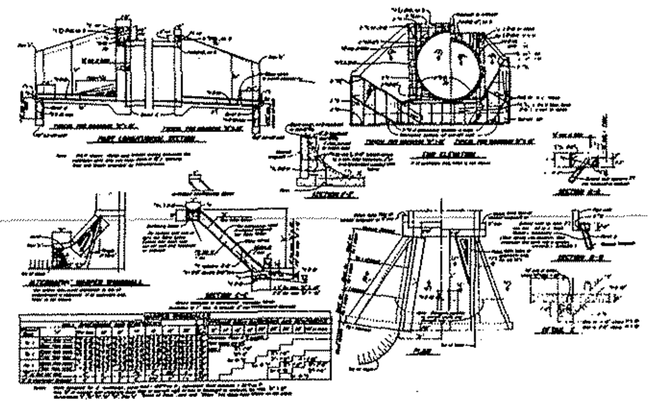
FRAME AND GRATING FOR CATCH-BASIN

(PER CITY OF L.A. STD PLAN S-342-2)



PIPE CULVERT HEADWALL, ENDWALL, & WINGWALL TYPES " A ", " B ", AND " C "

(PER CAL-TRANS STD DWG D-90)



PIPE CULVERT HEADWALL, ENDWALL, & WARPED WINGWALL

(PER CAL-TRANS STD DWG D86-B)

FIGURE A.2.3

CLOSURE PLAN DRAINAGE DETAILS

SCALES HORIZ. 1"= VERT. 1"= SHEET OF INDEX NUMBER

DESIGNED	PTN	DEC. 92
DRAWN		
CHECKED	SPD / KG	DEC. 92
SUPERVISED		
PROJECT ENGR.		R.E. NO.
ASST. DIV./DIST. ENGR.		R.E. NO.

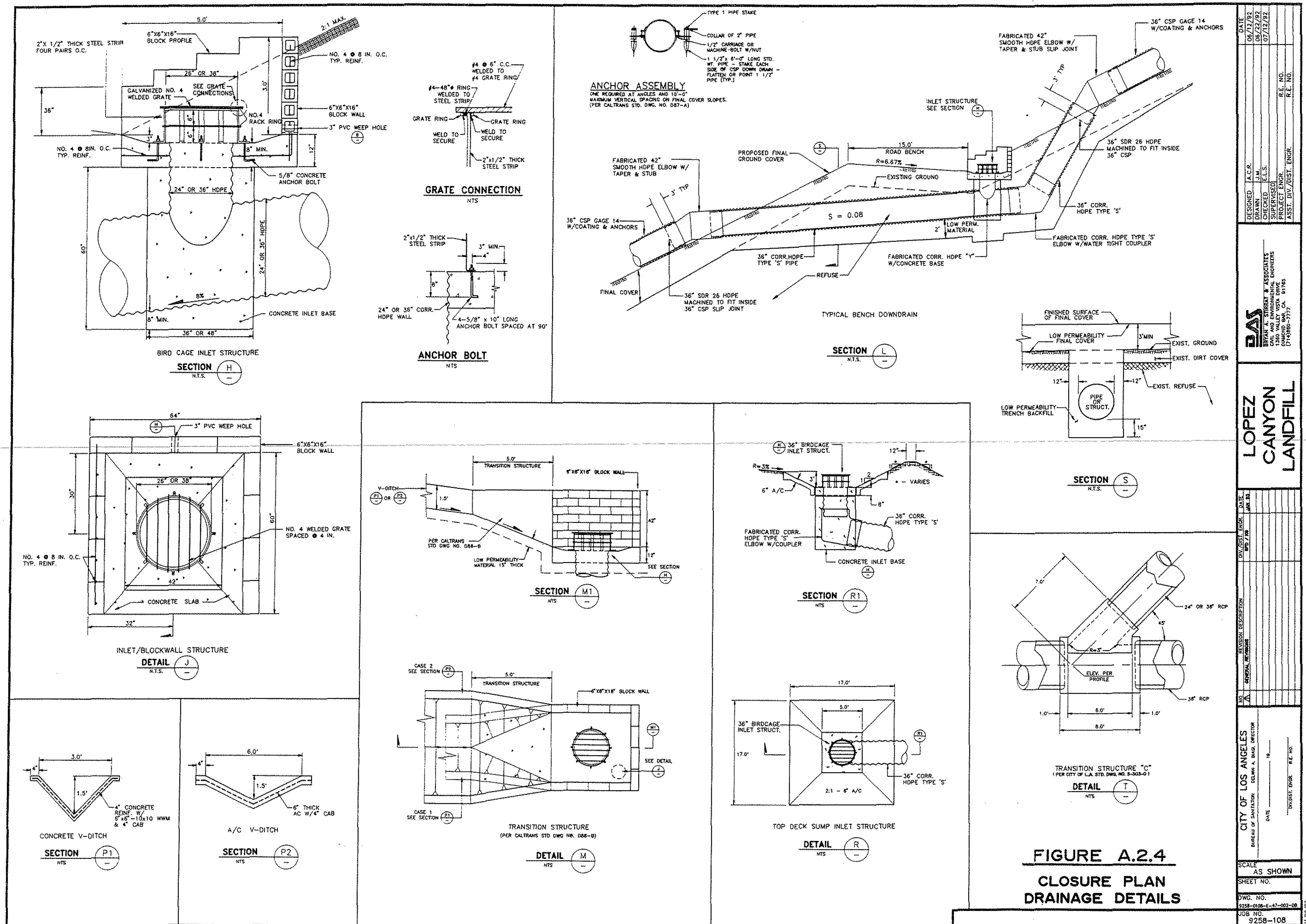
BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA. 91765

LOPEZ CANYON LANDFILL

NO.	REVISION DESCRIPTION	DIV./DIST. ENGR.	DATE
1	GENERAL REVISIONS	SPD / KG	JAN 93

CITY OF LOS ANGELES
BUREAU OF SANITATION

SCALE NOT TO SCALE
SHEET NO.
DWG. NO.
JOB NO. 9258-108


BIRD CAGE INLET STRUCTURE
SECTION H
N.T.S.
5.0'
6"X6"X16" BLOCK PROFILE
2"X 1/2" THICK STEEL STRIP FOUR PAIRS O.C.
2:1 MAX.
NO. 4 @ 8 IN. O.C. TYP. REINF.
26" OR 38"
SEE GRATE CONNECTIONS
GALVANIZED NO. 4 WELDED GRATE
NO.4 RACK RING
6"X6"X16" BLOCK WALL
3" PVC WEEP HOLE
NO. 4 @ 8IN. O.C. TYP. REINF.
8" MIN.
5/8" CONCRETE ANCHOR BOLT
24" OR 36" HDPE
24" OR 36" HDPE
8%
CONCRETE INLET BASE
8" MIN.
36" OR 48"
GRATE CONNECTION
NTS
#4 @ 6" C.C. WELDED TO #4 GRATE RING
#4-48"# RING WELDED TO STEEL STRIP
GRATE RING
WELD TO SECURE
2"x1/2" THICK STEEL STRIP
ANCHOR BOLT
NTS
2"x1/2" THICK STEEL STRIP
3" MIN.
24" OR 36" CORR. HDPE WALL
4-5/8" x 10" LONG ANCHOR BOLT SPACED AT 90°
ANCHOR ASSEMBLY
ONE REQUIRED AT ANGLES AND 10'-0" MAXIMUM VERTICAL SPACING ON FINAL COVER SLOPES. (PER CALTRANS STD. DWG. NO. D87-A)
TYPE 1 PIPE STAKE
COLLAR OF 2" PIPE
1/2" CARRIAGE OR MACHINE-BOLT W/NUT
TYPICAL BENCH DOWNDRAIN
SECTION L
N.T.S.
FABRICATED 42" SMOOTH HDPE ELBOW W/ TAPER & STUB SLIP JOINT
36" CSP GAGE 14 W/COATING & ANCHORS
INLET STRUCTURE SEE SECTION H
15.0' ROAD BENCH
R=6.67%
PROPOSED FINAL GROUND COVER
EXISTING GROUND
FABRICATED 42" SMOOTH HDPE ELBOW W/ TAPER & STUB
36" SDR 26 HDPE MACHINED TO FIT INSIDE 36" CSP
S = 0.08
LOW PERM. MATERIAL
36" CORR. HDPE TYPE 'S'
FABRICATED CORR. HDPE TYPE 'S' ELBOW W/WATER TIGHT COUPLER
FABRICATED CORR. HDPE "Y" W/CONCRETE BASE
36" CORR.HDPE TYPE 'S' PIPE
REFUSE
FINAL COVER
36" SDR 26 HDPE MACHINED TO FIT INSIDE 36" CSP SLIP JOINT
SECTION S
N.T.S.
FINISHED SURFACE OF FINAL COVER
LOW PERMEABILITY FINAL COVER
3'MIN
EXIST. GROUND
EXIST. DIRT COVER
EXIST. REFUSE
PIPE OR STRUCT.
LOW PERMEABILITY TRENCH BACKFILL
INLET/BLOCKWALL STRUCTURE
DETAIL J
N.T.S.
64"
3" PVC WEEP HOLE
6"X6"X16" BLOCK WALL
26" OR 38"
NO. 4 WELDED GRATE SPACED @ 4 IN.
NO. 4 @ 8 IN. O.C. TYP. REINF.
42"
CONCRETE SLAB
32"
SECTION M1
NTS
5.0' TRANSITION STRUCTURE
6"X6"X16" BLOCK WALL
V-DITCH
PER CALTRANS STD DWG NO. D88-B
LOW PERMEABILITY MATERIAL 15" THICK
SEE SECTION H
SECTION R1
NTS
36" BIRDCAGE INLET STRUCT.
6" A/C
VARIES
36" CORR. HDPE TYPE 'S'
FABRICATED CORR. HDPE TYPE 'S' ELBOW W/COUPLER
CONCRETE INLET BASE
TRANSITION STRUCTURE
(PER CALTRANS STD DWG NO. D88-B)
DETAIL M
NTS
CASE 2 SEE SECTION P2
CASE 1 SEE SECTION P1
SEE DETAIL J
TOP DECK SUMP INLET STRUCTURE
DETAIL R
NTS
17.0'
5.0'
36" BIRDCAGE INLET STRUCT.
2:1 - 6" A/C
36" CORR. HDPE TYPE 'S'
TRANSITION STRUCTURE "C"
(PER CITY OF L.A. STD. DWG. NO. S-303-0)
DETAIL T
NTS
24" OR 36" RCP
45°
36" RCP
ELEV. PER PROFILE
8.0'
CONCRETE V-DITCH
SECTION P1
NTS
3.0'
4" CONCRETE REINF. W/ 6"x6"-10x10 WWM & 4" CAB
A/C V-DITCH
SECTION P2
NTS
6.0'
6" THICK AC W/4" CAB
FIGURE A.2.4
CLOSURE PLAN DRAINAGE DETAILS
LOPEZ CANYON LANDFILL
BAS BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS
CITY OF LOS ANGELES
BUREAU OF SANITATION
DESIGNED A.C.R.
DRAWN J.M.
CHECKED E.L.S.
SUPERVISED
PROJECT ENGR.
ASST. DIV./DIST. ENGR.
DATE 06/12/92 06/22/92 07/12/92
GENERAL REVISIONS
SCALE AS SHOWN
SHEET NO.
DWG. NO.
JOB NO. 9258-108
11/19/92
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Rainfall which lands on the slopes will be collected at the inside edge of the benches and will be directed along the benches to inlet structures located at low spots. The benches are sloped horizontally to drain inward to the toe of the slope and laterally along the toe to the inlet structures of the downdrains.

A.2.2.1 MAINTENANCE PROCEDURES

Bench maintenance will consist of erosion control along the toe of the slope, and regrading of differential settlement to prevent ponding and maintain drainage into the inlet structures. A grader and compactor will be utilized to grade the benches, repair erosional ruts, and maintain the integrity and compaction of the final clay cover. In areas where landfill settlement adversely affects the bench gradient, additional final cover material will be placed and compacted to ensure proper drainage.

Inlet structures consisting of a cast iron grate over the corrugated metal pipe inlet will provide for rapid removal of storm water with minimal maintenance. A concrete apron and concrete block wall will be constructed to protect the inlet.

A.2.2.2 INSPECTION SCHEDULE

Inspection of these inlet structures will be required during the rainy season to ensure proper functioning. All benches will be inspected annually during the summer and necessary repairs made prior to the rainy season. Bench inspections will include checking for erosional ruts and settlement cracks, improper grades along the benches, and for the integrity of the inlet structures and toe drains. In addition, inspections will be made after each major storm to ensure that all benches are functioning properly and that there is no ponding.

It should be noted that overwatering or malfunction of the irrigation system may have erosional effects on the benches and should be considered during inspections.

A.2.3 DOWNDRAIN SYSTEMS

The storm drains traversing down the surface of the slopes of the landfill are comprised of corrugated steel pipe (CSP) ranging in diameter from 18 to 48 inches. These downdrains are constructed on the exterior face of the finished slopes utilizing a combination band coupler and pipe anchor support system. The complete exposure of the full round CSP facilitates visual inspection for separations, perforations, leakage, and corrosion.

The downdrain system serves two functions: 1) conveyance of storm flow from the top deck drains, and 2) collection of runoff from the terrace benches. Each downdrain outlets into a main line storm drain.

As each downdrain crosses underneath the finished benches, a vertical riser with an open grated top, located at the toe of the slope, will be used to collect bench runoff. A 14-foot winged concrete apron will be constructed around each inlet to provide support for the grate and protection for the downdrain piping. This concrete apron will also serve as a non-erodable approach for bench runoff.

Corrugated steel "slip collars" are employed at both ends of the exposed segment of downdrain pipe between benches. This allows for landfill settlement to occur without causing pipe buckling.

A.2.3.1 <u>INSPECTION AND MAINTENANCE PROCEDURES</u>

Maintenance for the downdrain system will depend largely upon the findings derived from the inspections. The frequency of the required inspections is described below:

- o All bench drain inlets shall be inspected annually in September prior to the rainy season (October 15 - April 15) for debris build-up.

- o Spot checks at suspected trouble locations will also be required annually.

- o A full-scale inspection of the complete downdrain system shall be conducted every three years.

A visual inspection of each downdrain will be conducted to identify any of the following deficiencies:

- o Joint separation
- o Invert failure
- o Structural failure
- o Perforations
- o Presence of silt and/or debris

An inspection report shall be prepared giving a detailed description and approximate location of deficiencies. Corrective measures taken to remedy each deficiency shall also be described.

Typical corrective measures for the deficiencies are:

<u>Joint Separation</u>

- o Use wider CSP band couplers with mastic or pumped grout
- o Attach patches with self drilling/self tapping screws or welds

<u>Invert Failure</u>

- o Replace piping
- o Rotate pipe 180 degrees and patch as required

<u>Coatings (Zinc or Asphalt)</u>

- o Clean to bare metal and repair
- o Replace coating with asphalt mastic or polymer repair compound

Structural Failure

- o Reinstall pipe anchor supports
- o Replace section of drain

Clogging by Silt/Debris

- o Vacuum pumps
- o Waterjet spray
- o Bucket line
- o Fire hose flushing

Access to the buried section of the downdrain under each bench can be gained through the removable inlet grate. Mirrors can then be lowered into this section and, with sufficient lighting, a visual inspection can be conducted. The pipe fittings at the upper end of the exposed portion of each downdrain can also be removed for inspection and cleaning.

A.2.3.2 REMOVAL OF SILT/DEBRIS

Small amounts of silt and debris may be removed by buckets or fire hose flushing. Extensive clogging may require either vacuum pump or waterjet spray.

Vacuum Pump

This device is used to remove sediment from pipes and can be mounted on a vehicle. It requires a 200 to 300 gallon holding tank and a vacuum pump that has a 10-inch diameter flexible hose with a serrated metal end for breaking up caked sediment. This system can remove stones, leaves, litter, and sediment deposits. Normal working depth is up to 20 feet.

Waterjet Spray

This equipment is usually mounted on a self-contained vehicle with a high-pressure pump and a 200 to 300 gallon water supply. A 3-inch flexible hose line with a metal nozzle that directs jets of water out in front is used to loosen debris in pipes or trenches. The nozzle can also emit umbrella-like jets of water at a reverse angle, which propels the nozzle forward as well as blasting debris backwards. As the hose line is reeled in, the jetting action forces all debris downstream where it is removed by the vacuum pump equipment. The normal length of hose is approximately 200 feet.

A.2.4 DECK DRAINAGE SYSTEM

The deck area of the landfill slopes gently towards the outside perimeters from a ridge created down the middle of the landfill. Due to the gentle slope and large surface areas of the deck, special consideration has been given to the selection of drainage methods.

The deck areas will be graded to form a ridge, which will allow sheet flow away from the center of the deck area to the edges of the slope. Along the edges of the slope, a drainage swale and berm will be constructed to intercept the flow and direct the storm water into the downdrains placed along the top of the slope. This prohibits run-off from breaching the top edge of the slopes thereby reducing potential erosional effects. These downdrains will carry the flow down the slope into the debris basins and eventually into perimeter drainage structures and waterways located along the east and west sides of the landfill.

The inlet structures to the downdrain system will be constructed with corrugated steel pipe inlet fittings and a concrete apron. Inclined trash racks will be installed to protect the inlet from clogging with debris and silt. The runoff that is not collected by these downdrain inlet structures will be picked up by open channel ditches or main drains that are located along the perimeter of the landfill. The alignment and grade for the channels and drains was designed in conjunction with the landfill grading plan. Runoff will sheet flow into these channels.

Maintenance of the finished deck surface will be in accordance with Section A.1, Final Cover Maintenance, and maintenance of the deck drain inlet structures will be in accordance with Section A.2.2.

Access roads for maintenance will be provided on the decks to reduce interference with any surface flows. It is important that maintenance vehicles utilize access roads and benches whenever possible to reduce surface rutting which could interfere with normal drainage patterns.

A.2.5 CONCRETE DRAINAGE CHANNELS, AND DEBRIS BASINS

The two types of improved drainage structures along the perimeter of the landfill are drainage channels and debris and detention basins. The primary drainage structure consists of trapezoidal channels which handles storm water run-off from the site. The channels are constructed of reinforced concrete or gunite.
The channels and debris basins are placed in original ground or properly compacted engineered fill to minimize the potential for settlement damage.

A.2.5.1 INSPECTION AND MAINTENANCE PROCEDURES

All open channels and debris basins shall be inspected annually for debris build-up prior to the rainy season (October 15 - April 15). A complete inspection of these facilities shall be conducted every three years.

A visual inspection of each open channel and debris basin will be conducted to identify any of the following deficiencies:

- Surface cracking
- Spalling
- Structural failure

The following corrective measures can be taken for deficiencies identified during the inspection.

Cracking

- o Construction of expansion/control joints
- o Placement of sealants such as epoxy resins, asphaltic material, thermoplastics or silicones

Settlement

- o Grout injection
- o Complete replacement with subgrade rework

Spalling

- o Sandblast affected area and resurface with epoxy or mortar
- o Sawcut and remove affected area, dowel into existing undamaged section, and remortar

A.2.6 OVERALL DRAINAGE MAINTENANCE SCHEDULE

The onsite drainage facilities must be operational and free of debris in order to provide the desired protection against flooding and erosive damage. In order to ensure proper operation of the system, it is important to provide the frequency of inspections as delineated below. For certain essential components of the system such as inlet structures and bench drainage, spot inspections shall be conducted after every heavy rainfall.

	After Each Heavy Rain	Annually In Summer	Every Three Years
Drain Inlets	X		
Bench Drainage	X		
Debris Basins	X	X	
Detention Basin	X	X	
Trapezoidal Channels		X	
Rectangular Channels			X
Downdrain Piping		X	

A written report shall be prepared for all scheduled inspections and shall be kept on file with the Site Engineer. Exhibit A.2.1 is a standard inspection form which will be used for this purpose.

A.2.7 EQUIPMENT, LABOR, AND MATERIAL

Equipment, material, and labor requirements for the maintenance of the drainage system depends to a large extent on the results of the inspection program. The following estimates are based on engineering experience.

A.2.7.1 EQUIPMENT REQUIREMENTS

The following is a summary list of the equipment and hand tools required to maintain the drainage structures described within this section:

Heavy Equipment

- o backhoe
- o compactors
- o motor graders
- o dump trucks
- o small loaders

Light Equipment

- o pickup truck
- o flatbed truck
- o trench supports
- o sand blasting unit
- o concrete mixer
- o air compressor
- o power generator

EXHIBIT A.2.1
LOPEZ CANYON LANDFILL
DRAINAGE INSPECTION REPORT

PROJECT DESCRIPTION ____________________

____

CREW MEMBERS ____________________

____

____

WEATHER CONDITIONS ____________________

____

DATE ____________________

	YES	NO
TEST FOR GASES	______	______
TEST FOR OXYGEN	______	______
VENTILATION REQ'D	______	______
RESPIRATORS REQ'D.	______	______
CONTINUOUS INSP.	______	______
SPOT INSP.	______	______

DESCRIPTION & LOCATION OF DEFICIENCY	DATE REPAIRED

____
INSPECTOR

(Lopez Canyon Landfill Partial Post-Closure Plan:DRAININS:11-16-92)

Tools

- o wrenches
- o welding torch
- o cutting torch
- o hacksaws
- o drills
- o shovels
- o winches
- o cable pullers
- o ropes
- o grinders

Pipe Cleaning Equipment

- o vacuum pump-tank vehicle
- o flexible rope
- o waterjet spray unit
- o fire hydrant hose
- o nozzles
- o rotating nozzle cutters

Inspection Equipment

- o Drainage Inspection Report Form
- o safety belt and life line
- o radios and repeater units
- o respirators
- o blowers for ventilation
- o combustible gas/oxygen deficiency meters
- o hydrogen sulfide/carbon monoxide detectors
- o hoist
- o first aid materials
- o coveralls
- o ear protection devices

- o hard hats
- o whistle
- o hand held lights
- o safety boots

A.2.7.2 LABOR AND MATERIAL REQUIREMENTS

A minimum of four (4) trained personnel will be required for the periodic inspection of the storm drains and for the periodic repair and cleaning of the onsite drainage facilities. Each of these individuals shall be qualified to work within confined spaces. The use of heavy equipment will require the services of qualified operators.

The following materials will be required for maintenance of the drainage system:

- o cement
- o asphalt mastic compound
- o cement grout
- o CSP pipe fittings
- o backfill material
- o pipe struts and couplers
- o corrosion resistant paint
- o pipe anchors
- o epoxy resins
- o asphaltic material
- o thermoplastics
- o silicones

SECTION A.3

LIQUIDS MANAGEMENT SYSTEM MAINTENANCE PROCEDURES

A.3 LIQUID MANAGEMENT SYSTEM MAINTENANCE PROCEDURES

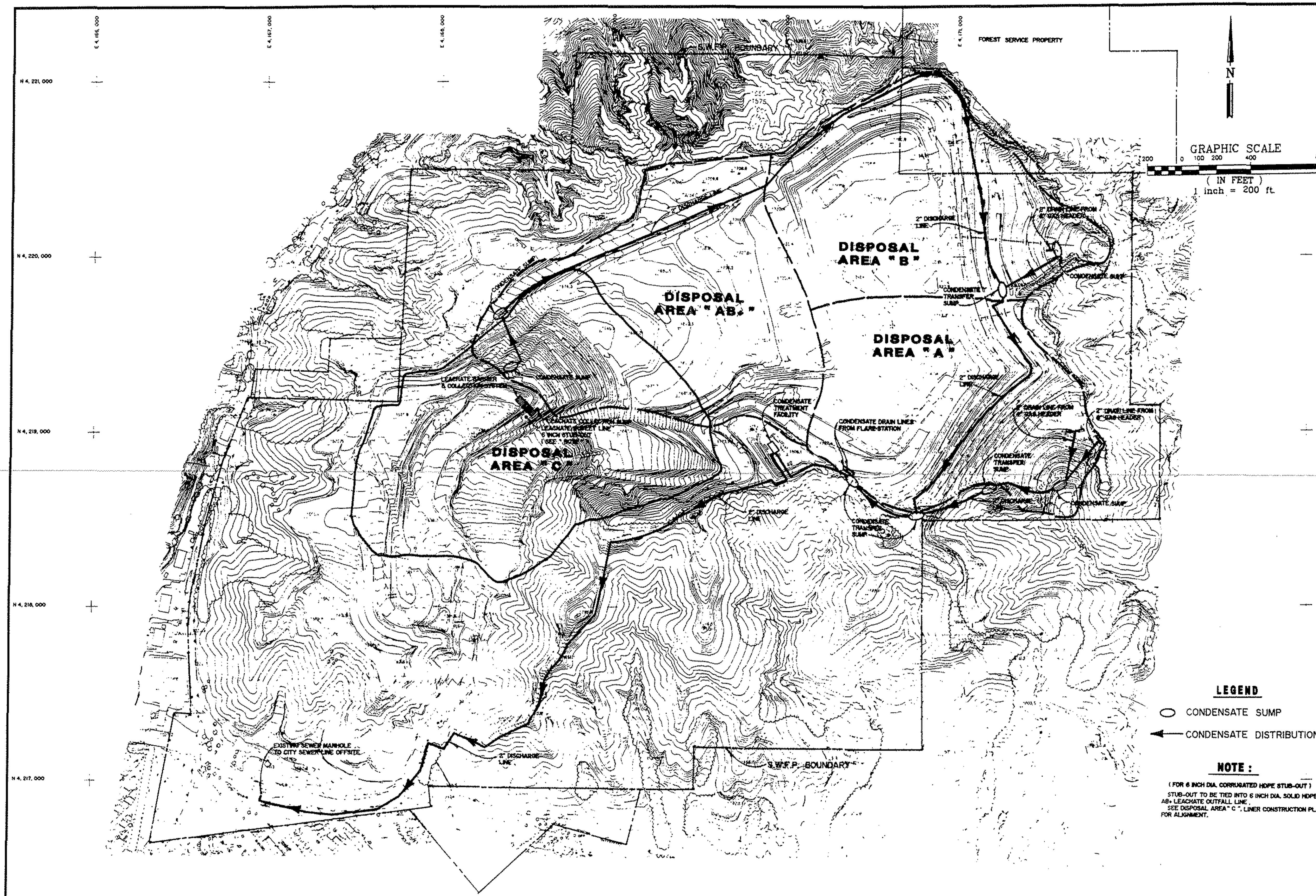
A.3.1 INTRODUCTION

The liquid management system covers the collection of liquids originating in the subsurface regions of the landfill. Potential sources of subsurface liquids are landfill leachate and gas condensate.

The liquid management systems for Disposal Area A, B, AB+ and C consist of the various liquid management systems and drain lines that convey collected liquids from sources in the landfill to sumps and temporary storage facilities. Collection facilities include a gas condensate collection system and a leachate cut-off barrier wall located at the toe of Disposal Area AB+ and a leachate collection and removal system in Disposal Area C. The potential maintenance problems associated with liquid collection systems include pipe blockage, pipe breakage due to subsidence or settlement of the landfill, liquid transfer pump malfunctions, and tank and sump maintenance.

A.3.1.1 GAS CONDENSATE COLLECTION SYSTEM

The gas condensate collection system drains by gravity flow to sumps strategically located at low spots around the landfill. The collected condensate is then pumped via the main condensate collection lines into a storage tank near the flare station between Disposal Areas A and AB+. The condensate collected in the main storage tank will be treated and discharged as required. These condensate collection systems are shown on Figure A.3.1. The system utilized in Disposal Area C will be similar in design to the current system in Disposal Areas A, B, and AB+. The treated effluent will be discharged to the City sewer system in accordance with applicable regulations.



LEGEND

CONDENSATE SUMP

CONDENSATE DISTRIBUTION

NOTE :

(FOR 6 INCH DIA. CORRUGATED HDPE STUB-OUT)

STUB-OUT TO BE TIED INTO 6 INCH DIA. SOLID HDPE AB+ LEACHATE OUTFALL LINE .

SEE DISPOSAL AREA " C ", LINER CONSTRUCTION PLAN FOR ALIGNMENT.

FIGURE A.3.1

CLOSURE PLAN
EXISTING GAS CONDENSATE / LEACHATE MANAGEMENT SYSTEM

SCALES HORIZ. 1"= VERT. 1"=	SHEET OF	INDEX NUMBER

DESIGNED	D.S.		1/92
DRAWN	D.S.		1/92
CHECKED	G.G.		1/92
SUPERVISED	G.A.		1/92
PROJECT ENGR.		R.E. NO.	
ASST. DIV./DIST. ENGR.		R.E. NO.	

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LOPEZ CANYON LANDFILL

NO.	REVISION DESCRIPTION	DIV./DIST. ENGR.	DATE
1	GENERAL REVISIONS PER CITY COMMENTS	S.D.	JUNE 1992
2	GENERAL REVISIONS	BPD / KB	JAN 1993

CITY OF LOS ANGELES
BUREAU OF SANITATION DELWIN A. BIAGI, DIRECTOR
DATE ________ 19__
DIV/DIST. ENGR. R.E. NO.

SCALE
SHEET NO.
DWG. NO.
JOB NO.

A.3.1.2 LEACHATE COLLECTION AND REMOVAL SYSTEMS

Currently, the leachate cut-off barrier wall (located at the toe of Disposal Area AB+) has a gravel collector upgradient of the wall which directs liquids into a drain line flowing to a downgradient sump. However, once the liner system has been completed, the drain line will be connected to the leachate collection and removal system in Disposal Area C.

A leachate collection and removal system (LCRS) is proposed as part of the liner system for Disposal Area C (Figure A.3.2). The LCRS will consist of a drainage blanket on the liner with an integrated drainage system on the canyon bottom. The drainage blanket on the canyon bottom will consist of a minimum two-foot-thick layer of processed conglomerate or approved imported drainage material over the high-density polyethylene (HDPE) liner. The slope gradient of the liner and drainage systems on the canyon bottom will be three percent descending toward drainage collectors located at the mouth of the canyon.

Intercepting lateral drainage pipes are spaced up to a maximum of 200 feet. The lateral drainage pipes will discharge to a main collector along the canyon bottom.

The LCRS will continuously drain the liquids from the landfill at the bottom. This system is anticipated to collect liquids squeezed out of the compacted refuse and rainwater percolating through the decks and running off the side slopes. The LCRS includes a piping network to test and clean out the system as a part of routine maintenance.

The proposed LCRS was designed in accordance with performance criteria recommended in EPA SW-869, April 1983, Revised Edition.

A.3.2 LEACHATE COLLECTION AND RECOVERY SYSTEM (LCRS) MAINTENANCE

The LCRS includes a piping network which transfers the collected liquid to a main collector along the canyon bottom. At times these pipes may become blocked with debris. In order to maintain these pipes and the LCRS, high pressure water injection into the two collection system clean-out ports should be performed periodically to loosen and remove any debris causing blockage in the drainage pipes.

A.3.3 PUMP MAINTENANCE

The gas condensate collection system pumping equipment consists of liquid transfer pumps designed to transfer liquids from sumps to the main storage tank when the electric centrifugal pump has malfunctioned, the following items will be checked:

- o Motor/pump electrical control panel for tripped breakers and improperly sized heaters.
- o Float switch for proper calibration.
- o Pump motor for proper rotation, bearings and seals, and electrical continuity to motor.
- o Pump impeller and housing for excessive wear.
- o Pump bearings and seals for excessive wear.
- o Discharge piping for clogging or buildup of particulate matter on pipe wall.
- o Sump for excessive debris buildup.

Worn or malfunctioning items will be replaced with the proper size components.

A.3.4 LIQUID SUMPS AND STORAGE TANK MAINTENANCE

Sump and tank maintenance will be conducted on a monthly basis. The sumps and the storage tanks are above-ground installations. Each has different inspection procedures as follows:

<u>Sump Inspection</u>

- o Sumps require physical inspection, which consists of the following:
  - Check inside of sump for cracks and separations.

- Check for proper operation of all inlet and discharge valves. Valves must properly seat and show no signs of leakage through the valve stem.

o Any liquids found outside of sump from leakage will require taking the sump out of service for repair.

o The results of the inspections will be recorded on forms as shown in Exhibit A.3.1

Sump Removal and Reinstallation

The following procedures for sump removal and reinstallation will be used:

o The sump will be isolated from service by closing all inlet and discharge valves.
o A vacuum truck will be used to remove all liquids.
o All plumbing and pumps will be disconnected.
o The sump will be pressure washed inside and out so necessary repairs can be made.
o All repairs will be recorded on a maintenance record sheet as shown in Exhibit A.3.2.

Tank Inspection

A visual inspection of the tank will be made which will involve the external condition of the tanks, the ground around the tanks, and any visible signs of leakage. Inspection of any associated piping, meter flow and fittings will also be made.

A.3.5 GAS CONDENSATE DRAIN LINE

Maintenance problems in the condensate drain line system are readily detectable in most cases by visual observation and odor detection during the weekly inspections of the system.

EXHIBIT A.3.1
LOPEZ CANYON LANDFILL
MONTHLY TANK INSPECTION FORM

DATE: ____________ SUPERVISOR: ____________ INSPECTED BY: ____________

TANK ID #	EXTERNAL CONDITIONS	VISIBLE SIGNS OF LEAKS	CONDITION OF GROUND	HYDROSTATIC LEAK CHECKS	DESCRIPTION OF STORAGE MATERIAL	TANK TYPE	OBSERVATION & MAINTENANCE REQUIRED
Condensate Storage Tanks							
Condensate Sump South Canyon							

(Lopez Canyon Landfill Partial Post-Closure:MONTHLY:11-5-92)

EXHIBIT A.3.2
LOPEZ CANYON LANDFILL

TANK/SUMP MAINTENANCE RECORD

DATE: ______________________

TANK ID: ______________________

W.O. #: ______________________

HOUR METER READING ON PUMP: __________

TYPE OF WORK

- Tank ☐
- Sump ☐
- Pump ☐
- Piping ☐
- Valve ☐
- Electrical ☐

WORK PERFORMED: ______________________________

SKETCH:

SIGNED BY: ______________________________

(Lopez Canyon Landfill Partial Post-Closure:TANKSUMP:11-5-92)

Condensate piping maintenance is part of routine weekly operations. The piping may be subjected to ground movement from settlement and expansion.

Expansion and contraction of the piping system is minimized by using HDPE pipe.

Liquid leaks in the lines will be visible and cause obvious odor. Upon detection of such leaks, that area of pipe will be removed and repair or replacement of fittings or pipe sections will be made.

Any maintenance performed on the condensate piping will be logged and recorded on the form shown on Exhibit A.3.3.

A.3.6 MAINTENANCE SCHEDULE

A quarterly inspection of the liquid management system will be made by the maintenance crews. If repairs to the system are required, the necessary personnel will be notified. Exhibit A.3.4 is a condensed maintenance/inspection schedule for the various components of the liquid management system.

A.3.7 EQUIPMENT, LABOR, AND MATERIAL REQUIREMENTS

The equipment to be used for the sump pump removal is listed below:

- Maintenance truck
- Assorted hand tools including pipe wrenches, screw drivers, combination wrenches, and a voltage meter.
- Vacuum truck

The various pieces of safety equipment to be kept on location for the maintenance and repair operations of the liquid management system are listed below:

- Hard hat, safety glasses, rubber gloves, rubber boots, Tyvec suit, and a respirator.

EXHIBIT A.3.3
LOPEZ CANYON LANDFILL

CONDENSATE PIPING MAINTENANCE RECORD

DATE: ____________________

LINE ID: ____________________

LOCATION: ____________________

W.O. #: ____________________

TYPE OF WORK

Pipeline ☐

Fitting ☐

Valve ☐

WORK PERFORMED: ____________________

SKETCH:

SIGNED BY: ____________________

(Lopez Canyon Landfill Partial Post-Closure:PIPING:11-5-92)

EXHIBIT A.3.4
LOPEZ CANYON LANDFILL
FREQUENCY OF INSPECTION/MAINTENANCE
LIQUID MANAGEMENT SYSTEMS

ITEM	SPECIFIC INSPECTION REQUIREMENTS	INSPECTION MAINTENANCE FREQUENCY	REQUIRED REMEDIAL ACTION		RESPONSIBILITY
			IMMEDIATE	PREVENTIVE	
Condensate Drain Lines	Proper operation, pipe connections, obstrucitons, leaks etc.	Weekly/As Required	Repair/Replace	Maintenance/Repair	Maintenance Crew
Liquid Management Tanks, Sumps, and Pumps	As Required	Weekly/Monthly	Repair/Replace	Maintenance/Repair	Maintenance Crew

(Lopez Partial Post-Closure:LIQDMGMT:12-4-92)

- Depending upon conditions, a self-contained breathing apparatus or a Rhine-air breathing unit may also be utilized to perform the work.

All of the maintenance activities outlined in this section will be performed by a general maintenance crew consisting of:

- Two (2) laborers
- One (1) equipment operator

The following materials will be kept in stock for expected maintenance or repair of the leachate collection system:

- PVC pipe and fittings
- HDPE and ADS pipe and fittings
- silicone sealant
- flexible couplings
- wire-rope
- sump pumps and associated spare parts
- float switch

SECTION A.4

LANDFILL LIQUIDS DISPOSAL SYSTEM MAINTENANCE PROCEDURES

A.4 LANDFILL LIQUIDS DISPOSAL SYSTEM MAINTENANCE PROCEDURES

For the purpose of these maintenance procedures, landfill liquid disposal involves the facilities associated with the disposal of gas condensate from the gas collection system and leachate collected and conveyed to the outfall system storage tanks from Disposal Area C and the AB+ cut-off wall.

Leachate will be disposed of by one of two alternative methods depending primarily on the quality of the liquid as determined by testing. The primary method will be discharge into the sewer system.

If test results deem the leachate as non-sewerable, the second method will be to truck the leachate offsite for proper disposal in accordance with applicable regulations.

The condensate will be collected at the condensate treatment facility located at the flare station. The condensate will be treated by a batch mix process and then released into the sewer.

Maintenance of the storage tanks and associated valves and connection pipes is covered in Section A.3. Maintenance of monitoring and treatment equipment, such as flow meters, and pH control devices, will be done on a regular basis following manufacturer requirements.

SECTION A.5

LANDFILL GAS CONTROL SYSTEM MAINTENANCE PROCEDURES

A.5 LANDFILL GAS CONTROL SYSTEM MAINTENANCE PROCEDURES

A.5.1 INTRODUCTION

One of the principal concerns with gas generation in landfills is the inherent potential for vertical and horizontal migration of gas . The rate of gas movement or migration through the landfill cover varies with changes in atmospheric pressure. As barometric pressure increases above the landfill, the internal gas pressure also increases until a pressure equilibrium is reached. When the barometric pressure decreases, however, the pressure of the gases in the landfill does not decline at the same rate and the gases are thus able to migrate through the surface. Typically the rate at which the gas vents from the landfill during periods of decreasing barometric pressure dictates the rate of gas extraction. A gas extraction rate higher than this tends to cause air to be drawn into the landfill, a condition which is most conducive to elevated subsurface temperatures.

Maintenance of the gas control system and the monitoring procedures described in Section B.2, are necessary in order to maintain minimum gas emissions relative to SCAQMD Rule 1150.1.

A.5.2 DESCRIPTION OF GAS CONTROL SYSTEM

The gas control system at the Lopez Canyon Landfill (see Figure A.5.1) is a gas management system used to extract, collect and effectively dispose of gases produced by the deposited wastes.

The system consists of numerous vertical and horizontal gas extraction wells, and horizontal trench gas wells which intercept and remove gas from the landfill. The interior gas collection system relieves the internal landfill gas pressure, thus reducing the potential for gas to travel to the landfill surface or perimeter.

A.5.2.1 GAS EXTRACTION WELLS

The Bureau of Sanitation has installed, to date, 211 shallow and 42 deep vertical gas extraction wells in the landfill. These wells are drilled into refuse to depths ranging from 20-feet to the bottom of refuse.

The vertical gas extraction wells are constructed of 4-inch diameter PVC pipe perforated to within 30 feet of ground surface. The pipes are set in a 12-inch diameter hole with gravel packs consisting of 1/2-inch rock. The wells are connected by a 4-inch diameter connector pipe to an above-ground gas collection lateral. Each well head connection assembly has a flexible hose and gas sampling port. A portion of the well connection assemblies have a slide gate valve.

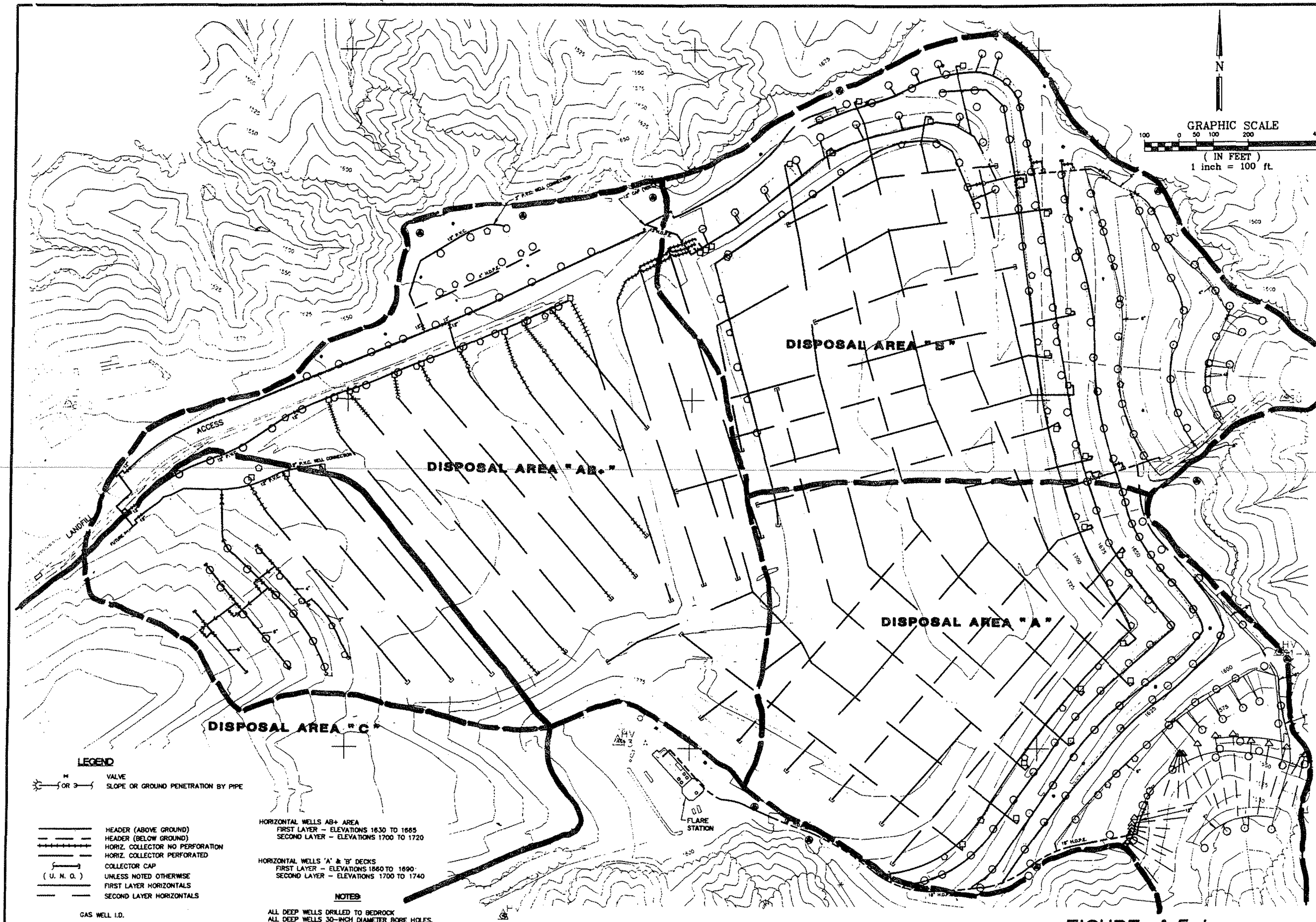
The landfill gas and gas condensate are transported through the connector pipe to the gas collection lateral. The gas flows from the lateral to the main gas collection header system. The gas condensate drains to the gas condensate collection system as described in Section A.5.2.4.

A.5.2.2 GAS PIPING SYSTEM

The gas piping system (see Figure A.5.1) conveys the recovered gas from the extraction wells to the flare station. In addition, the pipes also serve as conduits for liquid which condenses from the saturated landfill gas. The landfill gas piping system transports the collected gas in a 12-inch diameter main header to the Flare Station. The gas condensate drains by gravity to sumps located in low spots around the site. The condensate collection network is connected to the low points on the laterals and collection headers of the gas collection system.

The gas extraction wells installed in the landfill are constructed of PVC. The piping connecting the gas extraction well to the gas collection lateral consists of PVC pipe and a flexible hose. The flexible hose will reduce the potential for pipe separation which could occur due to landfill settlement or subsidence.

Piping used for the gas collection headers installed on the landfill and the condensate collection system is also PVC.



LEGEND

	VALVE
	SLOPE OR GROUND PENETRATION BY PIPE
	HEADER (ABOVE GROUND)
	HEADER (BELOW GROUND)
	HORIZ. COLLECTOR NO PERFORATION
	HORIZ. COLLECTOR PERFORATED
	COLLECTOR CAP
(U. N. O.)	UNLESS NOTED OTHERWISE
	FIRST LAYER HORIZONTALS
	SECOND LAYER HORIZONTALS
	GAS WELL I.D.
□	HORIZONTAL WELL
△	ANGLE WELL
○	SHALLOW VERTICAL WELL
⬠	DEEP VERTICAL WELL
⬤	GAS COLLECTION INDICATOR PROBES

HORIZONTAL WELLS AB+ AREA
FIRST LAYER – ELEVATIONS 1630 TO 1665
SECOND LAYER – ELEVATIONS 1700 TO 1720

HORIZONTAL WELLS 'A' & 'B' DECKS
FIRST LAYER – ELEVATIONS 1660 TO 1690
SECOND LAYER – ELEVATIONS 1700 TO 1740

NOTES:

ALL DEEP WELLS DRILLED TO BEDROCK
ALL DEEP WELLS 30-INCH DIAMETER BORE HOLES.
DEEP WELLS 4-INCH DIAMETER H.D.P.E.
SHALLOW WELLS 4-INCH SCH. 40 P.V.C.

ABOVE GROUND HEADERS = 12" (U.N.O.)

FIGURE A.5.1

CLOSURE PLAN
EXISTING GAS COLLECTION SYSTEM

SCALE 1" = 100' | SHEET OF | INDEX NUMBER

		DATE
DESIGNED	G.G.	1/92
DRAWN	G.G.	1/92
CHECKED	G.A.	1/92
SUPERVISED	G.A.	1/92
PROJECT ENGR.	R.E. NO.	
ASST. DIV./DIST. ENGR.	R.E. NO.	

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(714)860-7777

LOPEZ CANYON LANDFILL

NO.	REVISION DESCRIPTION	DIV./DIST. ENGR.	DATE
1	GENERAL REVISIONS PER CITY COMMENTS	S.D.	JUNE 1992
2	GENERAL REVISIONS	BPD / KG	JAN 1993

CITY OF LOS ANGELES
BUREAU OF SANITATION DELWIN A. BIAGI, DIRECTOR
DATE ________ 19__
DIV/DIST. ENGR. R.E. NO.

SCALE 1" = 100'
SHEET NO. 1 OF 1
DWG. NO. 9035-1021-E-86-020
JOB NO. 9035-1021

Special consideration must be given to gas and condensate collection pipes (see Figure A.3.1) which must be installed underground to traverse an access road or bench crossing. Collection pipes will either be installed through a corrugated steel pipe casing with a minimum of 18 inches of soil cover or by burying the collection pipe directly beneath a minimum of 24 inches of soil cover. The method selected will largely be influenced by the anticipated vehicle and heavy equipment loads which may be transmitted to the pipes.

A.5.2.3 HORIZONTAL TRENCH GAS WELLS

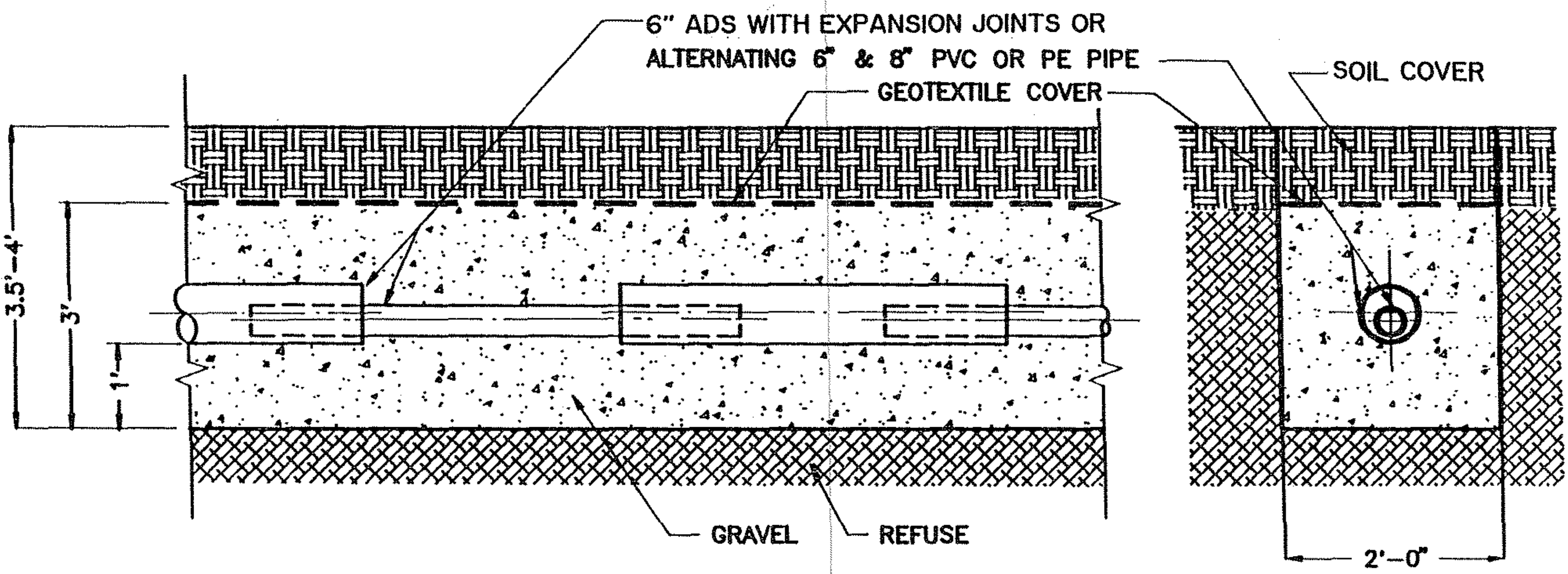
Two levels of horizontal gas collection wells were installed under the entire deck of Disposal Areas A and B. One level of horizontal collection wells has been installed in Disposal Area AB+ to date. The second level of horizontal collection wells is currently being installed. BOS plans to install a third level as Disposal Area AB+ develops. Vertical spacing between each level is approximately 40 to 50 feet.

As Disposal Area C is filled, a system of horizontal trench gas wells (see Figure A.5.2) will be installed. A total of ten levels are proposed for Disposal Area C. The horizontal spacing between adjacent gas well lines will be approximately 100 feet. Lines will be installed so that each layer of horizontal trench wells will be installed perpendicular to the previous layer. In addition, each level of horizontal wells will be staggered above the previous set of horizontal wells. Vertical spacing between each level will be approximately 40 to 50 feet. Each outlet line will be individually valved and connected to a gas collection header.

A.5.2.4 FLARE STATION

The flare station is located on the southern ridge between Canyons A and C next to the water tank, as shown on Figure A.5.1.

The landfill gas flare system consists of four flare stacks fed by two gas blowers. One blower is operating and one is on standby. The gas is drawn by a blower under vacuum from the gas collection system through a fuel filter/knockout



TRENCH PROFILE
NTS

TRENCH SECTION
NTS

FIGURE A.5.2

BAS (714) 860-7777

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LOPEZ CANYON LANDFILL

TYPICAL GAS COLLECTION TRENCH DETAIL

JOB NO. 9035-1008
DATE DEC. 1991
DRAWN BY: PTN
CHECKED BY: VB

drum to remove particulates and liquid condensate. It is then forced under pressure through a flame arrestor to the flare where it is burned at temperatures exceeding 1,400 degrees Fahrenheit. See Appendix A.5.1 for details on maintenance of the flare station.

Additional SCAQMD permits have been obtained to allow for the gas flare station to be expanded in order to facilitate the increased landfill gas production resulting from Disposal Area C development. With a refuse capacity of 4.5 million tons, Disposal Area C will add significantly to the total volume of landfill gas produced. The proposed expansion of the landfill gas flare system will increase the total inflow capacity to 8750 SCFM. This maximum inflow capacity level will handle the expected peak landfill gas generation over the life of the landfill and through the post-closure period.

The BOS is currently in construction to increase the site's gas treatment capability. The landfill gas flare system modifications will consist primarily of four additional flares fed by two gas blowers. One blower will be primary and one will be on standby. Additionally, two oxygen monitors will be installed on the discharge side of the two operational blowers. Design of the expanded portion of the system will be similar to the existing flare system. The primary operating blowers for the entire flare station (nine flares) will be fed by one main header line for each blower.

A.5.3 GAS CONTROL SYSTEM MAINTENANCE

The potential problems inherent in landfill gas collection system operations include pipe breakage due to the subsidence or settlement of the landfill, blockage due to liquid condensation and elevated gas temperatures due to elevated subsurface temperatures.

The following sections cover maintenance requirements for the landfill gas extraction system and associated piping system. Identification, prevention and control of elevated subsurface temperatures is delineated in Section A.5.4.

A.5.3.1 GAS COLLECTION SYSTEM

The general maintenance of the landfill gas extraction system involves inspections by operating personnel of all wells, pipelines, vacuum balance lines, sumps, mainline valves, and mainline sample points. Because the horizontal gas well connection lines are buried, any unusual ground surface seeps, odors or landscape distress that appear along the pipe alignments will be investigated. Daily general inspection of the gas extraction system will be performed as aprt of the final cover inspection. Any deficiencies in the gas extraction system will be noted and corrected on a as required basis. In depth inspections of the gas extraction system will be performed on a weekly basis.

Operating personnel will be provided with all of the necessary equipment to perform these services. This includes dedicated vehicles, measuring and monitoring equipment, tools and other necessary supplies. A daily operations log will be kept to provide a continuous record of system operations. Entries will be made on all routine maintenance activities, emergency repairs, major and minor modifications and adjustments. In addition, all equipment failures, temporary shutdowns, line separations, and blockages will also be documented.

Gas Collection Well Maintenance

One of the principal problems affecting vertical wells is breakage or shearing of the well casing caused by settlement, subsidence of the landfill or damage by heavy equipment.

Even if a vertical well is broken or sheared, it may not reduce the well performance relative to gas extraction. The well bore and down hole piping may continue to provide a functional conduit for gas extraction. The historic flow characteristics of each well will enable the operator to determine when a sudden drop occurs, indicating a new well may be required.

Another problem encountered in vertical well systems is the settlement of the landfill around the well casing. As settlement occurs periodic adjustment of the well casing will be required.

Maintenance of the horizontal gas collection wells will require inspection of the well head assembly for cracks and leaks which will be repaired upon detection.

If a problem is discovered with a vertical gas well, the following maintenance procedures will be initiated.

- o The damaged well or well to be adjusted to grade will be isolated from the gas collection lateral to avoid excess dilution of the gas in the header with outside air.
- o Necessary replacement parts will be installed or the well will be adjusted to grade as required.
- o The well will then be reconnected to the lateral and returned to service.

All necessary maintenance and/or repairs will be documented using the sample form included as Exhibit A.5.1.

Drilling

- o Gas extraction wells may be redrilled or replaced for various reasons. The following are the most common:
  - The well may be rendered useless due to high temperatures or subsurface fires.
  - The well may be sheared off underground due to landfill subsidence and settlement.
  - The well may be a low producer of landfill gas because of plugged perforations in the casing.
  - Additional coverage in an area is required and more wells are necessary.

EXHIBIT A.5.1
LOPEZ CANYON LANDFILL

GAS EXTRACTION WELL MAINTENANCE RECORD

DATE: ______________________

WELL#: ______________________

W.O.#: ______________________

TYPE OF WORK

- Seal ☐
- Casing ☐
- Discharge ☐
- Valves ☐
- Probes ☐

WORK PERFORMED: ______________________

SKETCH:

SIGNED BY: ______________________

(Lopez Canyon Landfill Partial Post-Closure:GASEXTRN:11-5-92)

- o Procedures for redrilling, adding or replacing a gas well are as follows:

  - Choosing the location will be based upon the need for environmental emissions control and the need for additional landfill gas extraction.

  - The drill rig will be set up on the location chosen by the Site Engineer. The drilling procedure will meet all SCAQMD requirements.

  - The well design, casing diameter, perforations, gravel packs, borehole diameter, and well seals will be selected by the Site Engineer.

  - The maintenance crew will construct the proper bentonite seal and install the valve vault.

  - The crew will also connect the well to the gas collection lateral.

<u>Abandonment</u>

- o The gas extraction wells are made of PVC casing and were drilled approximately 20 to 120 feet in depth.

- o When abandoning the well, the following procedures will be followed:

  - The annular space of the well will be filled with sand to 25 feet below ground surface.

  - An attempt will be made to pull the top joint of the well casing. If this cannot be accomplished, the dirt will be removed around the casing to a depth of 3 feet and the casing cut.

  - The annular space of the well will be filled from 25 feet to ground surface with natural sodium bentonite chips. The well will then be filled with clean water.

EXHIBIT A.5.2
LOPEZ CANYON LANDFILL

WELL ABANDONMENT RECORD

DATE: ______________________

WELL#: ______________________

W.O.#: ______________________

TYPE OF WORK

Clay Seal Installed ☐

Casing Removed ☐

Water Added ☐

Well Back Filled ☐

WORK PERFORMED: ____

SKETCH:

SIGNED BY: ____

(Lopez Canyon Landfill Partial Post-Closure:WELABAND:11-5-92)

- The area will then be covered with final cover in accordance with Appendix A.1.1.

o Well abandonment will be recorded on a form as shown in Exhibit A.5.2.

A.5.3.2 PIPING SYSTEM

Operational problems in the piping system require consistent monitoring to identify the problem area. Well connector pipes may break or separate from the gas lateral, control valves may clog or lose adjustment and need to be reset, and liquid accumulation in headers or drains may cause blockage or restriction.

Piping

Gas collection header and condensate drain line maintenance will be part of the routine weekly operation. The buried pipelines will be exposed to landfill settlement and movement, construction activities, and heavy equipment operations.

Leaks in lines will cause a noticeable odor in the area. Vacuum leaks will cause an audible hissing sound. Pipeline breaks or separations, if not discovered in normal field inspections, will produce secondary effects which are easily diagnosed. For example, methane concentrations drop as the oxygen content of the collected gas increases due to air intrusion.

Gas collection headers and some laterals are constructed of PVC. This material is very resistant to fracture by ground movement. The condensate drain system is also constructed of PVC.

Any pipeline maintenance conducted will be recorded on the form as shown in Exhibit A.5.3.

Well Head Connection

The gas well head connections, more so than other components of the piping system, are susceptible to landfill settlement. If the header connection to the

EXHIBIT A.5.3
LOPEZ CANYON LANDFILL

PIPELINE MAINTENANCE RECORD

DATE: ______________

LINE ID: ______________

LOCATION: ______________

W.O. #: ______________

TYPE OF WORK

Pipeline	☐
Fitting	☐
Valve	☐
Support	☐

WORK PERFORMED: ______________

SKETCH:

SIGNED BY: ______________

(Lopez Canyon Landfill Partial Post-Closure:PIPELINE:11-5-92) well does not allow for flexibility, then a rupture or crack could occur allowing outside air to dilute the gas in the header and diminish the well's performance.

This maintenance problem, which can be costly in repairs and down time, has been minimized by the use of a high-strength, silicone rubber, flexible coupling. The coupling is chemically compatible with the landfill gases and will allow differential settlement between well head and lateral piping.

A.5.4 ELEVATED SUBSURFACE TEMPERATURES

Elevated subsurface temperatures present a special problem. These rises in temperatures ordinarily occur because of excessive vacuum on the system, which draws in ambient air causing combustion or oxygen fueling.

Prevention of these elevated temperatures is both a function of initial design (which emphasizes proper sealing of wells) and adequate cover and compaction. In addition, operation and maintenance of optimal system vacuums is also necessary. Weekly inspection of the landfill surface for cracks along with immediate covering and compacting are important preventative measures. In addition, weekly monitoring of gas temperatures at the well heads enables early detection. Wells in the immediate area of a hot spot can then be throttled back or even shut off for a period of time to reduce the air intrusion.

The actual creation of elevated subsurface temperatures is complex and is a function of many factors including waste composition, moisture content, available oxygen, and aerobic or anaerobic activity. In general, as combustible material undergoes biological or chemical reactions heat is generated. If these temperatures become high enough, combustion may occur. Combustion will continue unless one of the following is removed; a) the combustible material is consumed; b) the oxidizing agent (atmospheric oxygen) is depleted; or c) the heat acting as the ignition source is removed faster than it is produced.

A rigorous program of surface inspection and gas well monitoring for temperature, methane, and oxygen can control elevated subsurface temperatures. These measures, along with sealing/compacting of surfaces and tuning of gas wells to minimize aerobic activity, can prevent propagation of elevated subsurface temperatures.

A.5.4.1 DETECTION OF SUBSURFACE HOT SPOTS

Inspection of the landfill surface will be conducted weekly for unusual settlement, cracks, odors or smoke. Distinguishing unusual settlement from normal settlement in the landfill may be difficult and needs to be correlated with the gas well monitoring data.

Gas wells will be monitored weekly for elevated temperatures. Methane and oxygen will be monitored for any indication of aerobic activity. Any measurements indicating low methane (<40 percent), high oxygen (>4 percent) or high temperature (>130° F) will be rechecked and appropriate steps will be taken as outlined in Section A.5.4.3 "Prevention and Mitigation of Subsurface Hot Spots".

Monitoring of temperatures at extraction well heads can aid in locating general regions of subsurface hot spots. In cases of wells adjacent to these areas, gas temperatures 20° F above baseline will be more closely observed.

A.5.4.2 PREVENTION AND MITIGATION OF SUBSURFACE HOT SPOTS

Control of subsurface hot spots requires either removal of combustible materials, elimination of the oxidizing agent (air supply) or cooling of the zones. The technique used at the Lopez Canyon Landfill will employ elimination of air supply. If excessive settlement is observed, repair of final cover will be performed according to Section A.1.

Gas extraction well heads will be monitored for temperature on a weekly basis and methane and oxygen on a monthly basis. In some locations a higher frequency of monitoring will be conducted due to factors such as unusual settlement on adjacent slopes or high temperatures in the well or adjacent wells. Generally temperatures that are higher than the average gas temperature at other wells in the same area by 20°F are indicative of a subsurface hot spot. In each case the well will be throttled to reduce vacuum or even shutoff and gas temperatures monitored daily until the temperature is reduced. In addition, measurement of oxygen is also used as an indication of potential conditions for generating elevated subsurface temperatures. In general, all wells will be adjusted to minimize oxygen concentrations. The combination of temperature and oxygen measurements at each well head is a powerful tool in early detection of combustion and can be used to prevent subsurface combustion.

Sealing of cracks and fissures through routine maintenance and grading will limit the passive influx of air. The operation of the gas extraction system at optimum vacuums for surface emissions and migration control may conflict with subsurface combustion control. However, in these areas, three approaches will be utilized. Repair of the final cover to prevent air infiltration, additional gas wells requiring less overall vacuum may be drilled, or in some areas a shallow surface emission control well system may be installed. These shallow wells, drilled to a maximum of 40 feet, would have negligible effect on combustion or hot spots within the landfill cells and would exert a small negative pressure allowing trapped gas to be collected from under the final cover.

A.5.5 MAINTENANCE SCHEDULE

The majority of the components of the landfill gas control system will be inspected on a daily basis. Maintenance for these systems is as required and as described in Section A.5.3. A full stock of spare parts will be kept on site which will allow for timely repairs and/or replacements of components such as piping, valves, fittings, etc. Exhibit A.5.4 shows a condensed schedule on the frequency of inspection and maintenance to be performed on the gas control system.

A.5.6 EQUIPMENT, LABOR & MATERIAL REQUIREMENTS

A.5.6.1 EQUIPMENT

The following equipment will be utilized as needed for maintenance and repair of the landfill gas migration control system. This includes drilling, replacing and abandonment of gas wells.

EXHIBIT A.5.4
LOPEZ CANYON LANDFILL
FREQUENCY OF INSPECTION/MAINTENANCE
GAS COLLECTION SYSTEM

ITEM	SPECIFIC INSPECTION REQUIREMENTS	INSPECTION/ MAINTENANCE FREQUENCY	REQUIRED REMEDIAL ACTION		RESPONSIBILITY
			IMMEDIATE	PREVENTIVE	
A. Laterals, Headers, Gas Wells, and Well Head Connections	Proper operation, pipe connections.	Daily/Weekly	Replace/Repair	Maintenance/Repair	Maintenance Crew
B. Gas Condensate Piping	Proper operation, pipe connections.	Daily/Weekly	Replace/Repair	Maintenance/Repair	Maintenance Crew

(Lopez Canyon Landfill Partial Post-Closure Plan:FREQINSP:11-5-92)

General maintenance requires the following equipment:

- o Boom truck
- o Grade checking equipment
- o Various hand tools including, lifting chairs, come along chain binders, hand saws, power saws, wrenches, and hammers
- o HDPE thermal heating unit
- o Backhoe

Gas Well Maintenance Equipment

The following equipment will be utilized as needed for repair, depending on the severity of damage to the gas well.

- o Backhoe
- o Various hand tools, wrenches, hand saw, caulking gun, generator, PVC primer, cement, silicone sealant and shovels

Well Drilling Equipment

The equipment needed to perform well installations is as follows:

- o Auger drilling rig
- o SCAQMD environmental box
- o Front end loader
- o Dump truck
- o Drillers maintenance truck
- o Drillers flatbed truck
- o Various hand tools needed to perform work, shovels, temporary support blocks

Well Abandonment

The equipment needed for abandonment of gas wells includes:

- o Backhoe
- o Flatbed truck

- o Various hand tools, saws and pointed shovels
- o Electric high flow fan
- o Electric generator

Safety Equipment

The safety equipment needed on location during drilling, abandonment and maintenance of gas wells is as follows:

- o Hard hat, goggles, gloves, steel toe rubber boots, overalls, safety belt with Lanyard and respirator.

- o Additional equipment needed due to certain environmental conditions, include a Tyvek safety suit, full face respirator, self contained breathing apparatus, Thine-air breathing machine, rubber gloves and a full rain suit.

A.5.6.2 LABOR REQUIREMENTS

All of the maintenance activities outlined in this section will be performed by the on-site general maintenance crew consisting of:

- o Three laborers
- o One equipment operator
- o One supervisor

Drilling activities will be conducted by a private drilling contractor.

A.5.6.3 MATERIALS

The materials required for maintenance of the gas control system is difficult to determine at this time; however, the following items will be kept in stock:

- o PVC piping and fittings
- o HDPE piping and fittings
- o Valves
- o Silicone sealant
- o Flexible couplings

SECTION A.6

GAS MIGRATION MONITORING SYSTEM MAINTENANCE PROCEDURES

A.6 GAS MIGRATION MONITORING SYSTEM MAINTENANCE PROCEDURES

A.6.1 INTRODUCTION

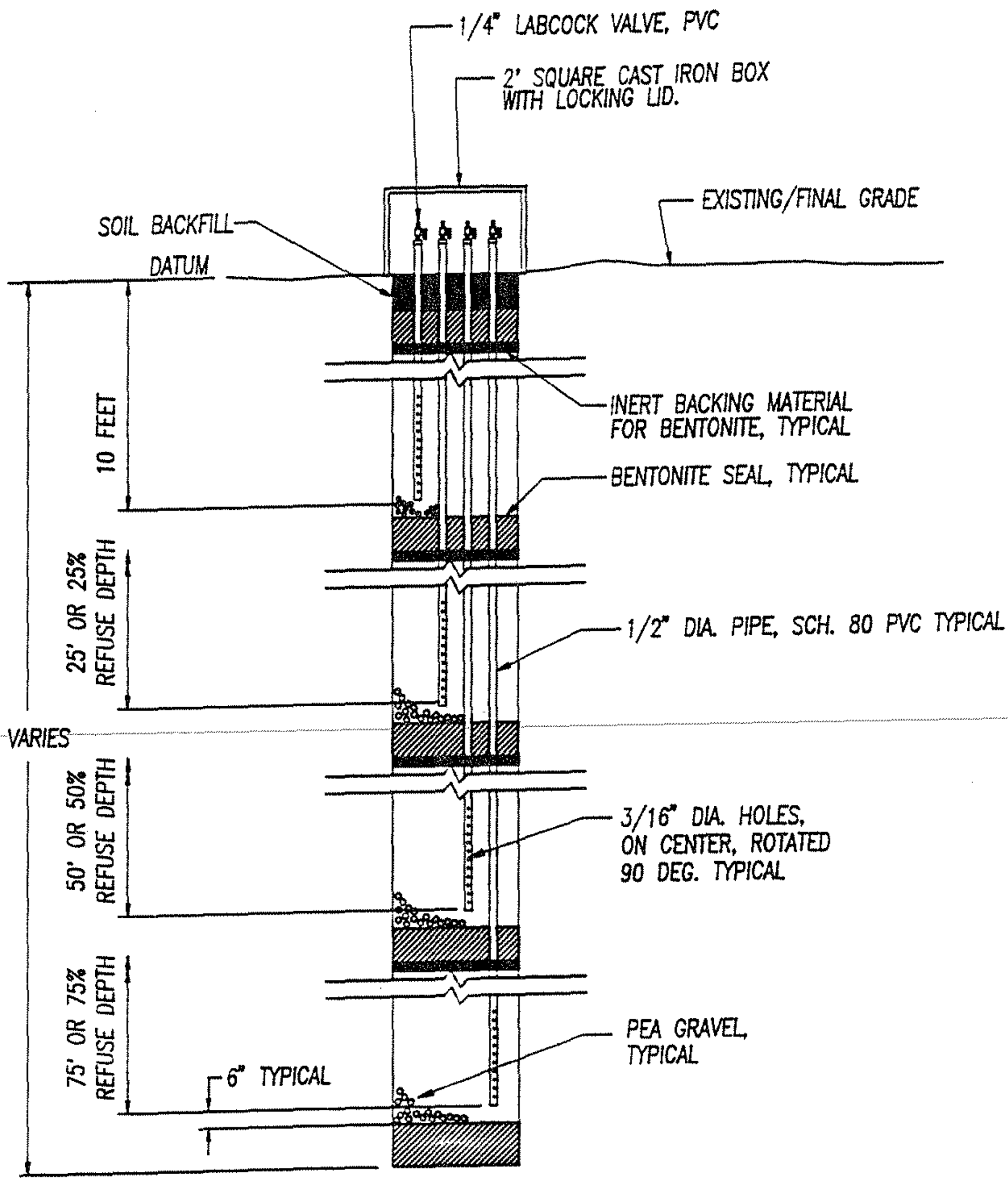
The Lopez Canyon Landfill has two types of subsurface landfill gas monitoring probe systems installed around the facility, Gas Collection Indicator Probes (GCIP) and Gas Migration Monitoring Probes. The GCIPs are monitored to evaluate the gas control systems efficiency and the gas migration monitoring probes are monitored to detect off-site migration of landfill gas. Both of these systems will be routinely monitored throughout closure and post-closure.

A.6.1.1 GAS COLLECTION INDICATOR PROBE SYSTEM

The primary objective of the GCIP system is to assist the operator in the proper adjustment and limitation of the gas control system. The GCIPs are located outside of the refuse cell adjacent to the side slopes. The GCIPs are multiple depth probes, the various depths are based on the depth of refuse near the probes. Currently ten (10) GCIPs have been installed around Disposal Areas A, B and AB+. Additional probes will be installed as Disposal Area C is developed. See Figure A.6.1 for typical construction details of the GCIP. The location of the current GCIPs is shown on Figure A.6.2

A.6.1.2 GAS MIGRATION MONITORING PROBE SYSTEM

The gas migration monitoring probes are regularly monitored to determine whether landfill gas is migrating off-site. Currently, 41 probes have been installed around the landfill boundary. The depth of these probes varies from 6 to 10 feet. Future probes will be installed according to the depth of refuse adjacent to the proposed probe location. A typical construction detail for the gas migration monitoring probe is shown on Figure A.6.3. Locations of the gas migration monitoring probes are shown on Figure A.6.4.



NOTE:
THE NUMBER OF PROBES INSTALLED CAN VARY FROM 3 TO 4 DEPENDING ON THE DEPTH OF REFUSE ADJACENT TO THE PROBE.

FIGURE A.6.1

BAS
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LOPEZ CANYON LANDFILL

TYPICAL DETAIL GAS COLLECTION INDICATOR PROBE

JOB NO.	9035-1008
DATE	NOV, 1991
DRAWN BY:	HMG
CHECKED BY:	JRB

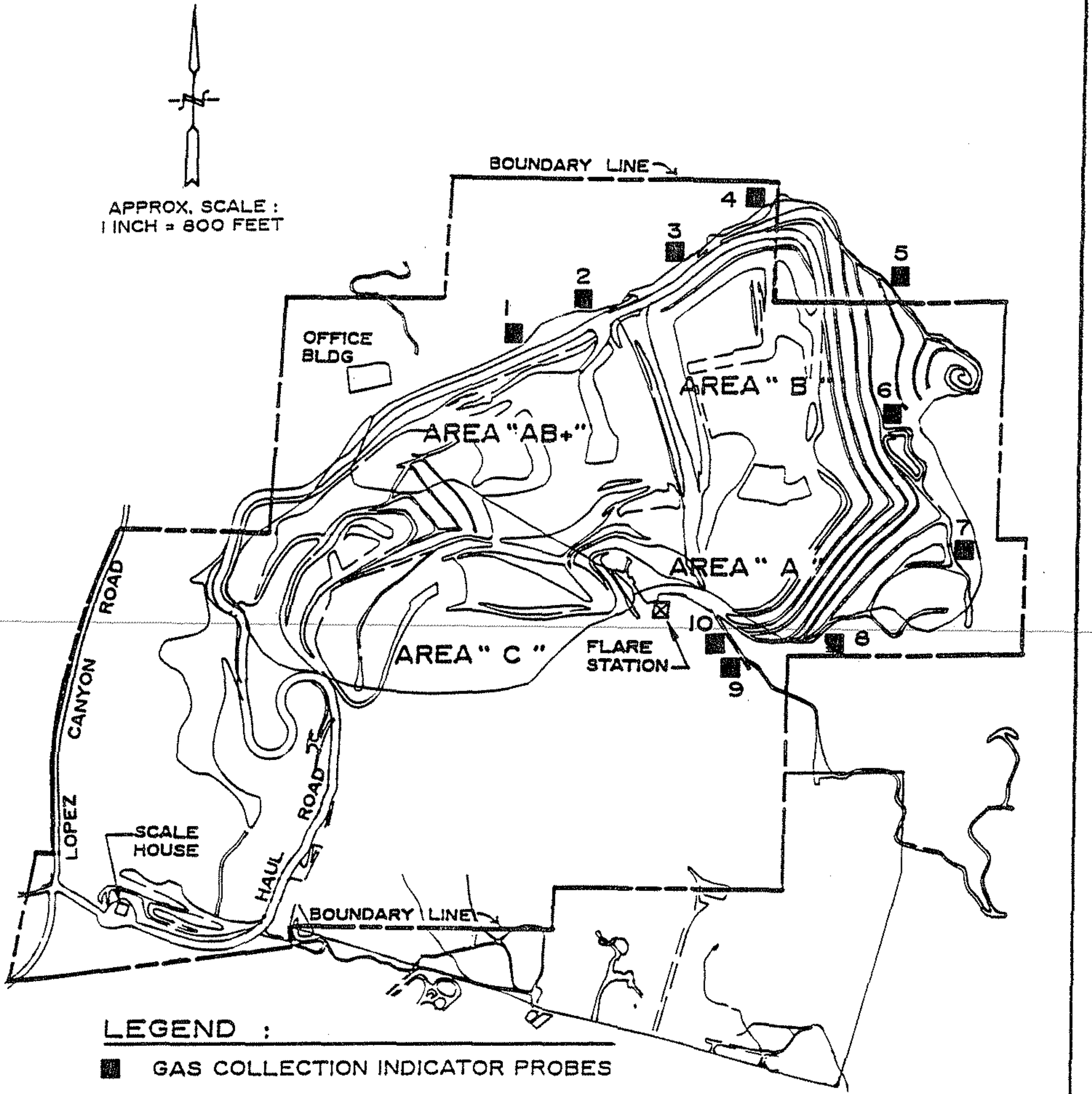

FIGURE A.6.2

BAS

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LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE LOCATION MAP

JOB NO.	9035-1008
DATE	NOV. 1991
DRAWN BY:	HMG
CHECKED BY:	JRB

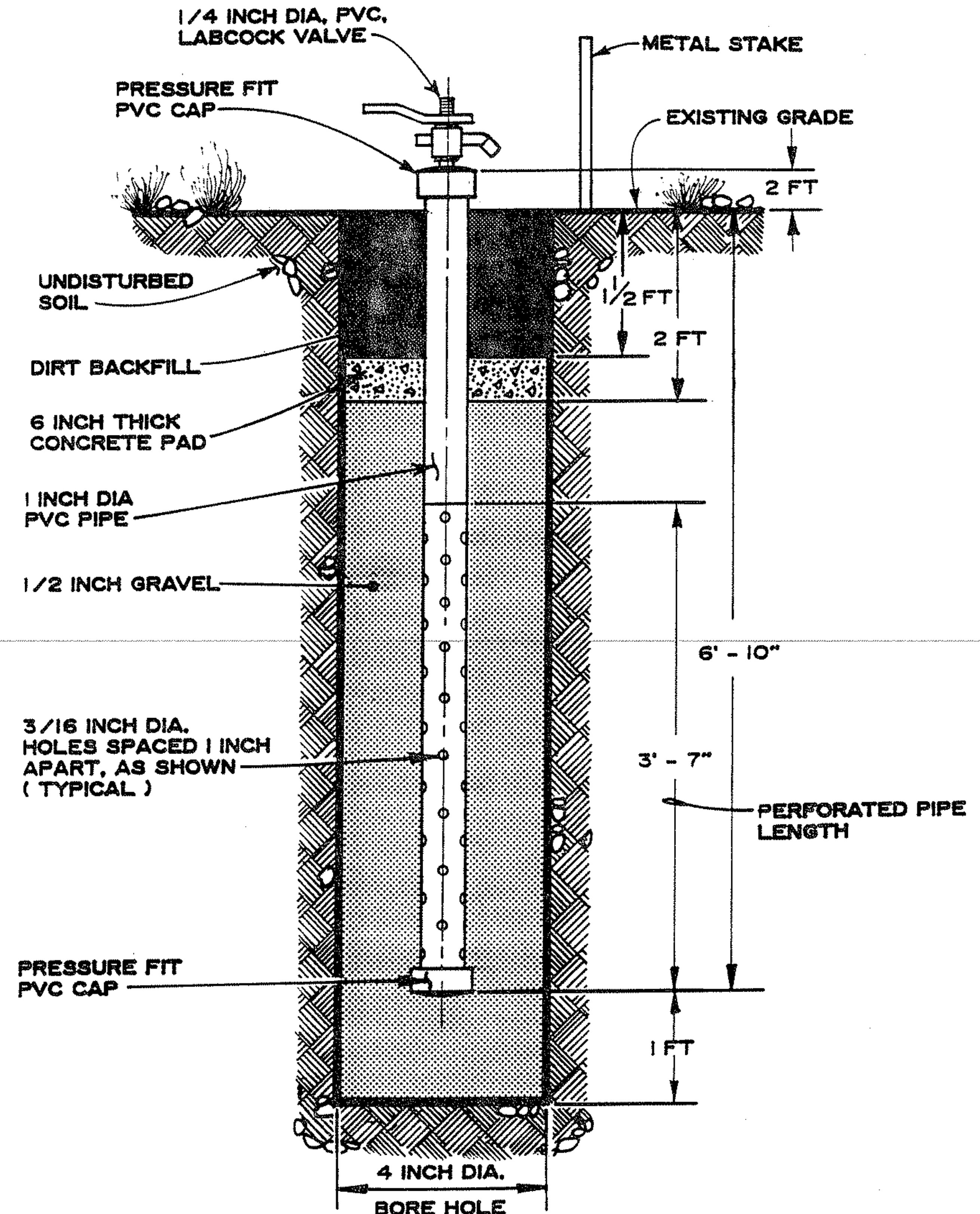

FIGURE A.6.3

BAS

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1360 VALLEY VISTA DRIVE • DIAMOND BAR, CA 91765

LOPEZ CANYON LANDFILL

GAS MIGRATION MONITORING PROBE

TYPICAL DETAIL

JOB NO. 9035-1008

DATE NOV. 1991

DRAWN BY: PTN

CHECKED BY: VB

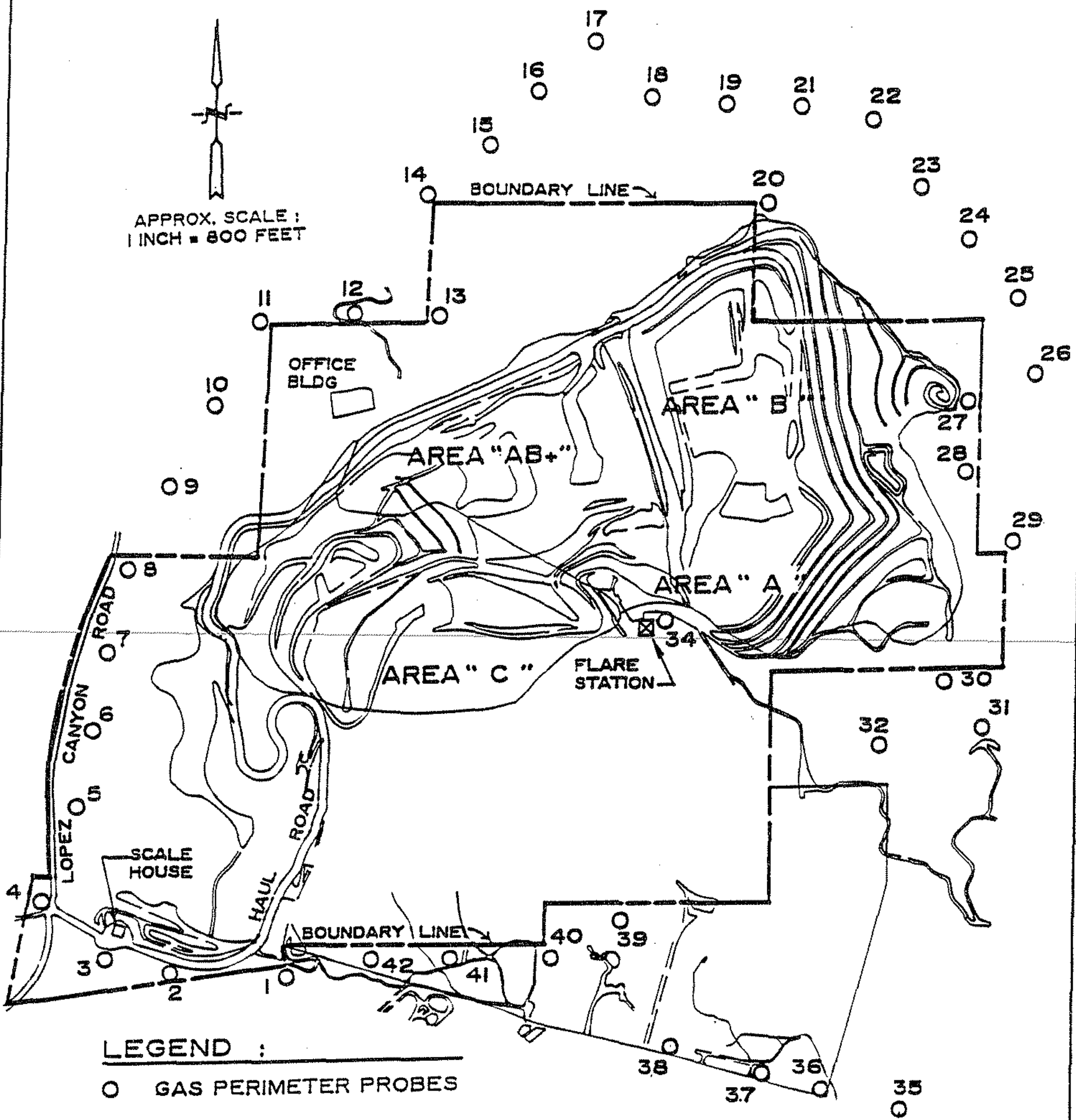

FIGURE A.6.4

BAS (714) 860-7777 **BRYAN A. STIRRAT & ASSOCIATES** CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE • DIAMOND BAR, CA 91765	LOPEZ CANYON LANDFILL **GAS MIGRATION MONITORING PROBE LOCATION MAP**	JOB NO. 9035-1008 DATE NOV. 1991 DRAWN BY: HMG CHECKED BY: JRB	

A.6.2 GAS MONITORING PROBE MAINTENANCE

The general maintenance requirements for the gas probes is limited to replacing broken valves and fittings. Gas probes will be inspected monthly to ensure proper operation. Any deficiencies will be corrected immediately. If a gas probe cannot be repaired, it will be redrilled to ensure gas control is being monitored effectively and that no gas migration is occurring.

The gas system will be inspected on a monthly basis as described in Section A.5.5. A full supply of spare parts will be kept at the landfill for timely repairs. Exhibit A.6.1 shows the frequency of inspection and maintenance to be performed on the GCIP and gas monitoring probe system.

A.6.3 EQUIPMENT, LABOR AND MATERIALS REQUIREMENTS

The equipment, labor and materials required for maintenance of the landfill gas migration control system is the same as that outlined in Section A.5.6.

EXHIBIT A.6.1
LOPEZ CANYON LANDFILL
FREQUENCY OF INSPECTION/MAINTENANCE
GAS MIGRATION CONTROL SYSTEM

ITEM	SPECIFIC INSPECTION REQUIREMENTS	INSPECTION MAINTENANCE FREQUENCY	REQUIRED REMEDIAL ACTION		RESPONSIBILITY
			IMMEDIATE	PREVENTIVE	
A. Gas Control System	Proper operation, pipe connections, obstructions, etc.	Daily/As Required	Repair/Replace	Maintenance/Repair	Maintenance Crew
B. GCIP and Gas Monitoring Probes	Proper operation, obstructions, dirt build up, etc.	Monthly/As Required	Repair	Maintenance/Repair	Maintenance Crew

GCIP = Gas Collection Indicator Probes

(Lopez Partial Post-Closure Plan:GASMIGR:11-10-92)

SECTION B

SECTION B.1

GROUNDWATER MONITORING PROCEDURES

B.1 GROUNDWATER AND SURFACE WATER MONITORING PROCEDURES

The monitoring program described in this section will ensure the detection of contaminants migrating into the groundwater, surface water and the unsaturated zone. The monitoring program described herein is in accordance with the recently approved monitoring program issued for the landfill by the Regional Water Quality Control Board (RWQCB) Los Angeles Region on October 26, 1992 (WDR Order No. 91-122, Appendix B.1.1). The City of Los Angeles Bureau of Sanitation monitoring staff will be responsible for conducting this program during the entire post-closure period.

B.1.1 GROUNDWATER MONITORING

A network of four (4) wells are utilized at the Lopez Canyon Landfill for the implementation of the groundwater monitoring program. The well locations reflect anticipated groundwater flow directions and shallow water discharge patterns. Well construction details are shown in Figure B.1.1.

As part of the revisions to the WDR's, two (2) new groundwater monitoring wells (MW 92-1 and MW 92-2) are to be constructed at the Lopez Canyon Landfill. The wells are to be located near the eastern edge of the existing service road, downgradient of the toe of proposed Disposal Area C. One of these wells will replace monitoring well MW-6 which is located within the proposed Disposal Area C refuse fill area. This monitoring well will be decommissioned in accordance with applicable regulations. A third well (MW 92-3) is to be constructed as a replacement for well MW-8 which was approved for abandonment and replacement by the RWQCB in a letter dated June 3, 1992. This well is to be located in Bartholomaus Canyon and will serve as an upgradient well to well MW-5. The location of the existing and proposed monitoring wells are shown on Figure B.1.2.

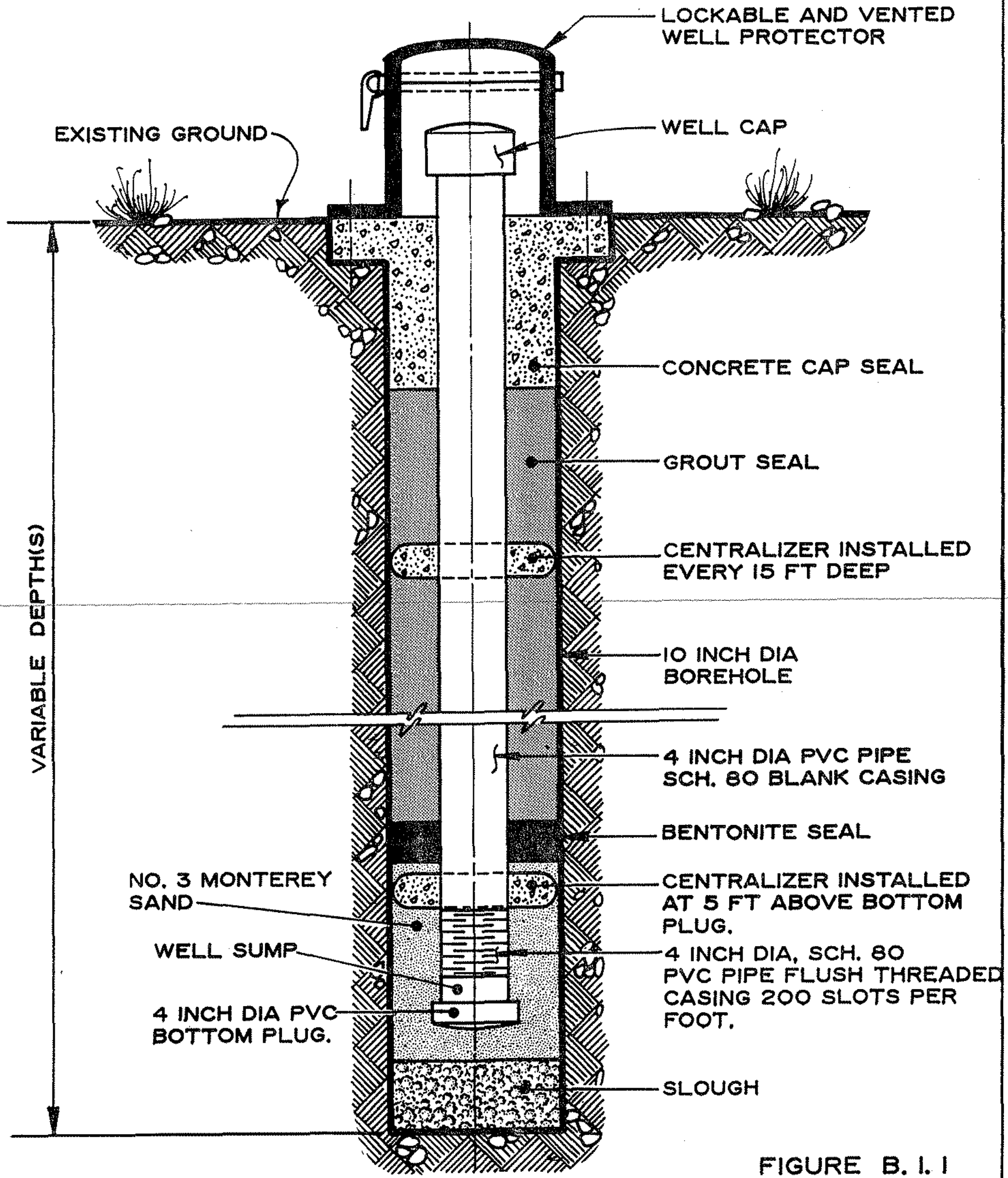

FIGURE B. I. I

BAS (714) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE • DIAMOND BAR, CA 91765	LOPEZ CANYON LANDFILL **GROUNDWATER MONITORING WELL** CONSTRUCTION DETAILS	JOB NO. 9035-1008 DATE DEC. 1991	DRAWN BY: PTN CHECKED BY: VB

B.1.2 SURFACE WATER MONITORING

Surface water is monitored at the Lopez Canyon Landfill site in accordance with the WDR's and the CUP. The WDR requires a Monitoring and Reporting Program (M&RP 5636) which specifies that surface and storm water be monitored at the following points.

Point	Location
1.)	Disposal Area A Canyon Outlet
2.)	Disposal Area B Canyon Outlet
3.)	Disposal Area C Canyon Outlet
4.)	Sub-drain C Pipe Outlet

Representative surface water samples are and will be obtained semi-annually during the rainy season (October through April). One sample is to be taken at each of the four (4) sampling locations during the first half of the rainy season (Fall) and once during the second half (Winter).

In addition to the above, a subdrain collection system will be installed under the bottom liner in Disposal Area C. The primary function of this system is the collection of surface water seepage between the liner and natural ground which may occur during periods of precipitation. However, in the event that groundwater does reach the lowest elevation of the liner system, it will be intercepted by the subdrain collection system and prevented from inundating the refuse cell. Surface water monitoring will be performed twice a year during the rainy months at the Canyon C basin outlet.

B.1.3 UNSATURATED ZONE MONITORING

Unsaturated zone monitoring at the site, as required by the RWQCB, will be conducted using two lysimeters (LYS-1 and LYS-2), which are installed in Canyon A. The location of the existing lysimeters is shown on Figure B.1.2. An additional lysimeter will be added in the canyon below Disposal Area C. Liquid samples will be collected and analyzed as outlined in Appendix B.1.1.

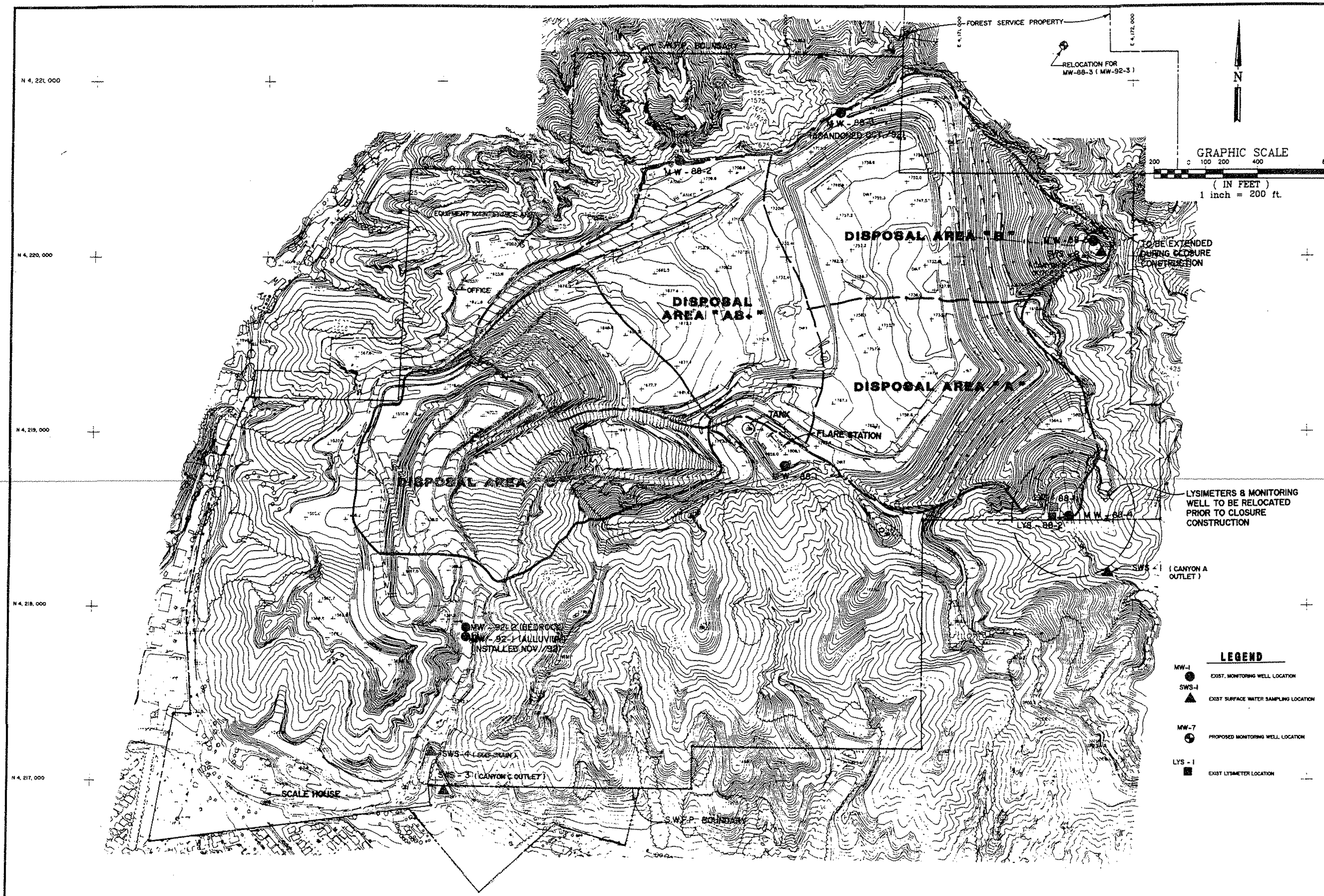

FIGURE B. 1.2

CLOSURE PLAN : SURFACE WATER SAMPLING & GROUNDWATER MONITORING WELL LOCATION MAP

SCALES	HORIZ. 1"= VERT. 1"=	SHEET OF	INDEX NUMBER

DESIGNED	E.L.S.		12/91
DRAWN	H.M.G.		12/91
CHECKED	E.L.S.		12/91
SUPERVISED	E.L.S.		12/91
PROJECT ENGR.		R.E. NO.	
ASST. DIV./DIST. ENGR.		R.E. NO.	

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LOPEZ CANYON LANDFILL

NO.	REVISION DESCRIPTION	DIV./DIST. ENGR.	DATE
1	GENERAL REVISIONS PER CITY COMMENTS		JUNE 1992
2	UPDATED		NOV. 1992
3	GENERAL REVISIONS		JAN 1993

CITY OF LOS ANGELES
BUREAU OF SANITATION DELWIN A. BIAGI, DIRECTOR
DATE ____ 19__
DIV/DIST. ENGR. R.E. NO.

SCALE
SHEET NO.
DWG. NO.
JOB NO.

B.1.4 SAMPLING PARAMETERS, PROCEDURES AND REPORTING

The anticipated groundwater, surface water, and unsaturated zone monitoring program performed during post-closure is to be a detection monitoring program. Groundwater, surface water and unsaturated zone samples collected will be analyzed for those parameters listed in Table B.1.1.

In addition to those parameters listed in Table B.1.1, the following are also required to be monitored annually:

Volatiles, semi-volatiles, pesticides* and PCBs *(EPA Methods 624, 625, and 8080)	Manganese
Antimony	Nickel
Arsenic	Mercury
Barium	Potassium
Beryllium	Selenium
Cadmium	Silver
Total Chromium	Zinc
Cobalt	Total Cyanide
Copper	Total Sulfides *
Lead	Acrolein *
Magnesium	Acrylonitrile *

* Groundwater only

Sampling protocol and chain-of-custody procedures are detailed in the attached Appendix B.1.2.

The monitoring reports will include analytical data, a statistical analysis of that data, and a determination of the velocity and direction of groundwater flow beneath the waste management unit. Per the Monitoring and Reporting Program, monitoring reports shall be submitted quarterly to the RWQCB within 15 days following the monitoring period.

TABLE B.1.1
GROUNDWATER/SURFACE WATER
QUARTERLY MONITORING PARAMETERS

PARAMETERS	UNITS	GROUND WATER	SURFACE WATER
pH	pH units	X	X
Electrical conductivity	umhos/cm	X	X
BOD5 20° C	mg/l	X	X
COD	mg/l	X	X
Total dissolved solids	mg/l	X	X
Boron	mg/l	X	X
Alkalinity	mg/l	X	X
Ammonia (as N)	mg/l	X	X
Bicarbonate (HCO_3)	mg/l	X	X
Calcium	mg/l	X	X
Chloride	mg/l	X	X
Iron (total and dissolved)	mg/l	X	X
Total Hardness (as $CaCO_3$)	mg/l	X	X
CO_2	mg/l	X	X
Sulfate	mg/l	X	X
Sodium	mg/l	X	X
Potassium	mg/l	X	X
Nitrate (as N)	mg/l	X	X
Total organic carbon	mg/l	X	X
Oil and Grease	mg/l		X
Total organic halogens	ug/l	X	X
Benzene	ug/l	X	X
Carbon tetrachloride	ug/l	X	X
Methylene Chloride	ug/l	X	X
1,1-Dichloroethane	ug/l	X	X
1,2-Dichloroethane	ug/l	X	X
1,1-Dichloroethene	ug/l	X	X
1,2-Dichloroethene	ug/l	X	X
Trichloroethylene	ug/l	X	X
Perchloreothylene	ug/l	X	X
Vinyl chloride	ug/l	X	X
Acetone	ug/l		X

(Lopez Partial Post-Closure :TBL-B11:12-7-92)

APPENDIX B.1.1

REGIONAL WATER QUALITY CONTROL BOARD
WASTE DISCHARGE REQUIREMENTS ORDER NO. 91-122
(FILE 69-68)
AND
MONITORING AND REPORTING PROGRAM

COMPLIANCE FILE NO. 5636
ADOPTED OCTOBER 26, 1992

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

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

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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 <u>less</u> 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).

<u>H. General Provisions</u>

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
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October 26, 1992

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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

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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

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[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 B.1.2

SAMPLE COLLECTION, PRESERVATION AND CHAIN OF CUSTODY PROCEDURES

APPENDIX B.1.2

SAMPLE COLLECTION, PRESERVATION, AND CHAIN-OF-CUSTODY PROCEDURES

Prior to purging and sampling, groundwater monitoring wells and piezometers will be sounded for water depth. Total depth of the well will also be sounded at each sampling with a rigid or weighted sounder. All readings will be significant to .01 foot. Wells and piezometers will be sounded utilizing electric continuity sounders, which have meters to indicate contact with water. Measurements of depth to water will be subtracted from a surveyed measuring point to determine water surface elevations. Measurement of casing or sounding tube elevations for use above will be obtained from survey information.

To the extent practicable, three well volumes will be removed from each well or piezometer prior to sample collection. Samples will be collected after the well has recovered sufficiently. During purging and immediately prior to sampling pH, temperature and electrical conductivity (EC) of the groundwater will be measured to verify that these parameters have stabilized. In low yielding wells and piezometers, one well volume will suffice; all standing water will be evacuated and the samples collected after the well has recovered sufficiently. In no case will a well be purged at a rate which will excessively agitate the water within the well, or cause groundwater to vigorously cascade down the sides of the screen. No evacuation will be required for continuously pumped wells.

After evacuation is completed, samples will be collected in order of their volatility (i.e., VOC and TOX first). All well samples will be collected with bailers or bladder pumps. Potential field contamination will be minimized by avoiding contact of sample bottles and caps with anything but sample water and by rinsing with sample water if such contact occurs.

Samples will be collected in the containers with appropriate preservation whenever necessary. Containers will be of a known quality, i.e., laboratory prepared with quality control check.

Dedicated equipment, such as gloves and ropes, will be discarded after use. Non-dedicated equipment, such as sounders, will be decontaminated before reuse by washing with non-phosphate detergent and rinsing in hexane and then deionized water.

For sampling volatiles, the pump discharge rate will be reduced to minimize potential for aeration.

Collected samples will be packed with blue ice for thermal preservation and shipped by overnight carrier on the day they were collected and will arrive at the laboratory by the next morning. Photo-sensitive samples (i.e., those in amber glass containers) will be placed in ice chests immediately upon collection to minimize exposure to sunlight.

Field measurements will include pH, EC, and temperature and will be taken with calibrated instruments.

The Field Sampling Log, Exhibit B.1.2.1, will include the following:

- Samplers' identity.
- Description of sample source.
- Date and time of sampling.
- Depth to water.
- Correction factor for water level measuring device.

    - Sampling method - bailed, pumped, etc. (include approximate volume of water purged).
    - Field pH, EC, and temperature.
    - Number and type of containers collected.
    - Appearance of sample (color, turbidity, sediment, oil on surface, odor, etc.).
    - Name of laboratory performing analysis.
    - Thermal preservation used.
    - Chemical preservation used.
    - Atmospheric conditions (temperature and weather).

All sample containers will have sample labels and sample seals.

A Chain-of-Custody record (Exhibit B.1.2.2) will accompany the samples when transferring possession of samples. The transferee will sign and record the date and time on the Chain-of-Custody record. The field sampler will be responsible for the care and custody of the samples collected until properly dispatched to the receiving laboratory or turned over to an assigned custodian. He shall assure that each container is in his physical possession or in his view at all times or stored in a secure place where no one can tamper with it.

EXHIBIT B.1.2.1
LOPEZ CANYON LANDFILL
FIELD SAMPLING LOG

NAME OF SAMPLING PERSONNEL ON SITE ______________________________

NAME OF ACTUAL SAMPLE COLLECTOR ______________________________

SAMPLE IDENTIFICATION NUMBER (S) ______________________________

PHYSICAL CONDITIONS DURING SAMPLING ______________________________

____

____

CLIMATIC CONDITIONS ______________________________

____

____

DATE AND TIME OF COLLECTION ______________________________

SAMPLE COLLECTION PROCEDURE/EQUIPMENT ______________________________

NUMBER AND VOLUME OF SAMPLE (S) ______________________________

LOCATION SAMPLING SEQUENCE ______________________________

____

TYPES OF SAMPLE CONTAINERS USED ______________________________

PRESERVATIVE (S) USED ______________________________

____

EXHIBIT B.1.2.1
LOPEZ CANYON LANDFILL
FIELD SAMPLING LOG

(CONTINUED)

IDENTIFICATION NUMBER OF ______________________________

DUPLICATES COLLECTED

IDENTIFICATION NUMBER, AND ______________________________
TYPE OF BLANKS COLLECTED

FIELD OBSERVATIONS ______________________________

DECONTAMINATION PROCEDURES ______________________________

____

____

NAME OF COURIER AND LABORATORY ______________________________

____

COPIES OF APPROPRIATE COMPLETED FORMS ______________________________

CONDITION OF SAMPLES PRIOR TO TRANSPORT ______________________________
AND PHOTOGRAPH OF SAME

____

EXHIBIT B.1.2.2
LOPEZ CANYON LANDFILL
CHAIN-OF-CUSTODY

PROJECT NUMBER: ____________
DATE: ____________
PAGE ________ OF ________

PROJECT: ______________________
MANAGER: ______________________
ADDRESS/LOCATION: ______________________

SAMPLER'S SIGNATURE: ______________________

SAMPLE I.D.	DATE	TIME	MATRIX	# OF CONTAINERS	ANALYSES														

-1- RELINQUISHED BY	-2- RELINQUISHED BY	-3- RELINQUISHED BY	SAMPLE INFORMATION	COMMENTS
Signature Time:	Signature Time	Signature Time:	BILLING NUMBER: ____________	
Printed Name Date:	Printed Name Date	Printed Name Date:	TURN AROUND TIME: ____________	
Company	Company	Company	SAMPLES INTACT? Y / N / NA	
RECEIVED BY	**RECEIVED BY**	**RECEIVED BY**	SAMPLES CONDITION GOOD? Y / N / NA	
Signature Time:	Signature Time	Signature Time:	SAMPLES RECEIVED ON ICE? Y / N / NA	
Printed Name Date:	Printed Name Date	Printed Name Date:	**DISPOSAL**	
Company	Company	Company	LAB DISPOSAL ____ RETURN ____ PICK-UP ____	Pink copy to Originator White & Canary copies to Laboratory

For each shipment of samples to be analyzed for volatile compounds, one trip blank shall be included. The trip blank will be prepared using commercially available distilled water.

A minimum of one field blank will be made per sampling episode. Field blanks will consist of sample bottles, of each type to be used, filled with deionized water in the field and will remain with the sampler during sampling.

All samples collected for volatile analysis such as purgeable priority pollutants and TOX will be in teflon-lined septum bottles and with no headspace or air bubbles.

If any equipment is to be reused, it will be cleaned by washing with detergent and rinsing with deionized water and then washing with hexane and triple-rinsing with deionized water.

Prior to leaving for the field, the Groundwater Sampling Field Checklist (Exhibit B.1.2.3) will be filled out by the monitoring crew to ensure all equipment is assembled.

EXHIBIT B.1.2.3
LOPEZ CANYON LANDFILL
GROUNDWATER SAMPLING CHECKLIST

- ________ TEFLON BAILERS (w/teflon coated cords)
- ________ SARANEX OVERALLS
- ________ GLOVES & GLOVE LINERS
- ________ RESPIRATORS
- ________ PVC BOOTS
- ________ D. I. WATER & SQUIRT BOTTLES
- ________ PAPER TOWELS
- ________ ICE CHESTS
- ________ ICE
- ________ SAMPLE CONTAINERS
- ________ pH/EC/TEMPERATURE METER
- ________ SAMPLE LABELS
- ________ CHAIN OF CUSTODY FORMS
- ________ PERMANENT MARKERS
- ________ DRUMS
- ________ PAINT
- ________ WELL KEYS
- ________ WRENCH (for drums)
- ________ TRUCK
- ________ TOOL BOX

SECTION B.2

GAS CONTROL SYSTEM SAMPLING AND MONITORING PROCEDURES

SECTION B.2

GAS CONTROL SYSTEM SAMPLING AND MONITORING PROCEDURES

B.2 GAS CONTROL SYSTEM SAMPLING AND MONITORING PROCEDURES

B.2.1 INTRODUCTION

The gas control system monitoring program described in this section conveys the field procedures and methods used to monitor the performance of the gas control system.

The intent of the monitoring program is to minimize uncontrolled releases of landfill gas; monitor intrusion of air into the landfill and consequent degradation of gas quality; maximize quality and quantity of extracted landfill gas and monitor for elevated subsurface temperatures.

B.2.2 GAS COLLECTION SYSTEM

The current landfill gas collection system in Disposal Area A, B, and AB+ consists of a series of horizontal and vertical gas collection wells and collection header lines for an active gas control system. In addition, as Disposal Area C is filled, a system of horizontal trench gas wells will be installed. A total of ten levels are proposed for Disposal Area C. Sample points at each gas well, as well as at specific points along the headers and laterals, will access the gas control system for testing specific parameters such as methane, oxygen, temperatures, and pressures.

The Bureau of Sanitation will conduct the monitoring program during the post-closure period. The personnel involved will include field technicians, quality control specialists, field supervisors and engineers.

It is expected that modifications to the program frequencies and protocols will take place in the future, depending upon changing conditions, results of monitoring, and advanced technology.

The gas collection system operates 24 hours a day, 365 days a year. The flare station located on the southern ridge between Canyons A and C, burns the extracted landfill gas at approximately 1400 degrees Fahrenheit. Under normal operating conditions, the maintenance and monitoring team will work 5 days a week and will be on call for emergencies 24 hours a day. Should field conditions change, the work schedule may change.

Inspections and monitoring of the entire gas control system will be done on a daily basis (5 days a week). This includes regular inspection of the field collection system (headers, laterals, and wells) for verification of proper operation. Well adjustments will also be made as required to maintain a consistently high quality methane gas for adequate flare temperatures and steam turbine operations.

B.2.2.1 GAS WELLS/HEADERS/LATERALS

Monitoring of interior gas wells on a monthly basis includes measurements of the following parameters at each well head.

- o Gas flow rate
- o Static pressure
- o Methane and oxygen concentrations
- o Temperature

Monitoring of laterals and headers for the above parameters will be conducted weekly. Appendix B.2.1 contains the miscellaneous forms to be used by crews for daily, weekly, and monthly inspection of the gas control system. Appendix B.2.2 contains procedures and forms for daily, weekly, and monthly monitoring.

Flow measurements at the well head and in the piping system will be obtained by using a pitot tube and the appropriate range magnehelic gauge. The measurement of differential pressure will be adjusted for temperature and static pressure and converted to standard cubic feet per minute by a computer data base management system.

Static pressure will be measured in inches of water column utilizing a magnehelic gauge.

Methane and oxygen concentrations will be measured utilizing a combustible/oxygen gas indicator by connecting to the inserted pitot tube.

In addition, samples will also be collected periodically for more detailed analyses in the laboratory. The parameters to be analyzed are methane, oxygen, nitrogen, and the major volatile priority pollutants present in the gas stream.

All the main gas collection headers to the flare stations will also be sampled. Samples will be collected over a ten-minute period utilizing an SCAQMD style Tedlar bag sampler with only Teflon or stainless steel contacting the sample during collection. Samples will be analyzed for methane and permanent gases, In addition, all samples will be analyzed for volatile priority pollutants. See Figure B.2.1 for details of the sampling train.

Procedures for sampling and analysis of landfill gas in the collection system relative to SCAQMD Rule 1150.1 as well as procedures for monitoring conditions of the gas control system are included in Appendix B.2.2.

B.2.2.2 QUALITY CONTROL

Quality control sheets will be utilized for every sample collected. These forms will indicate the date, time, location, sample number, flow rate and other pertinent information about the sample collection. In addition, a chain of custody form will be utilized if the sample is to be analyzed at an off-site laboratory. These forms are included in Appendix B.2.2.

B.2.3 GAS MIGRATION CONTROL SYSTEM

The gas migration control system monitoring program described in this section gives the methods and procedures required to monitor the effectiveness of controlling migrating landfill gas outside the limits of the landfill.

Perimeter gas migration detection probes and gas collection indicator probes (GCIP) have been installed around the landfill in native soil in order to monitor

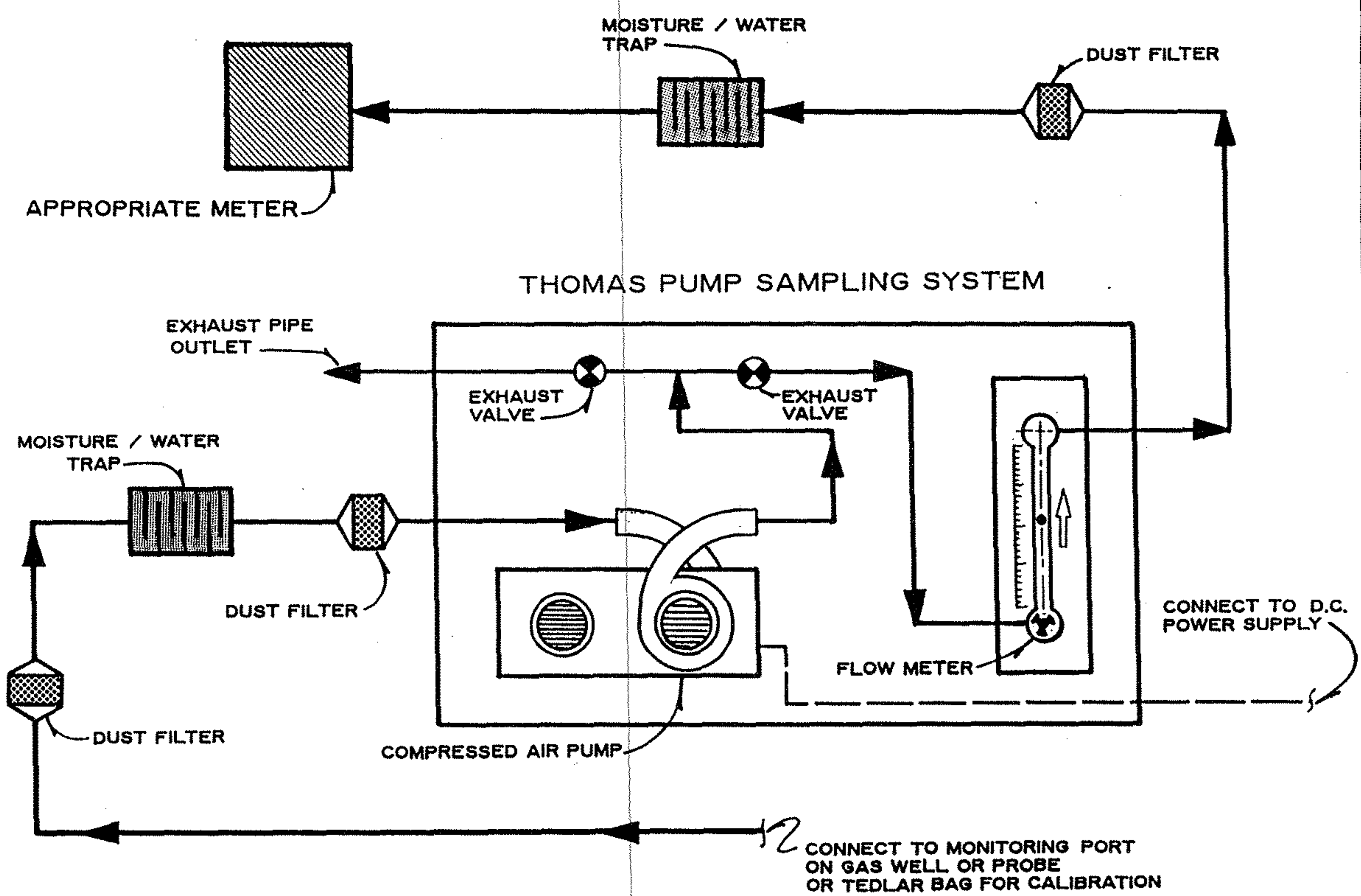

EXHIBIT B.2.1

BAS BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE • DIAMOND BAR, CA 91765 (714) 860-7777	LOPEZ CANYON LANDFILL **SAMPLE TRAIN FOR MONITORING GAS EXTRACTION WELLS OR PROBES**	JOB NO. 9035-1008 DATE MAR. 1991 DRAWN BY: PTN CHECKED BY: VS

BRYAN A. STIRRAT & ASSOCIATES

off-site migration. Additional probes will be installed when readings of the existing probes exceed Title 14 CCR, Section 17783 requirements.

There are no perimeter gas migration control wells presently installed in native soils at the landfill. Perimeter wells may have to be installed at a future date to control migrating gases. Because of this possibility, this section also addresses the procedures and methods of monitoring perimeter gas migration control wells. However, gas monitoring data has indicated no migration of landfill gas from the site and the LEL has not been detected at the property boundary.

The following program will be conducted by a maintenance/monitoring team which will be on the landfill five days a week and on call for emergencies 24 hours a day.

B.2.3.1 PROBES

New probes that are installed in the future will be monitored daily for 20 business days. If detected gas concentrations exceed 5% total hydrocarbons on any two consecutive days, the probe will then be classified as a targeted probe and monitored daily. Probes that will be monitored daily include probes adjacent to targeted probes. Once classified as a targeted probe, an engineering analysis will be made to determine mitigation methods. This analysis will include as a minimum the following tasks:

- o A thorough review of targeted probe and adjacent probe monitoring data.
- o Review of geology.
- o Examination of possible liquid impacts.
- o Review of control well influences, if any, in the area of the affected probe.
- o Review of records on system operation for the previous two-week period.

Declassified probes are targeted probes that have exhibited for 20 consecutive business days gas concentrations less than 5%. The monitoring frequency will then be reduced to once a week. If at any time a gas reading should exceed 5%, then this reading will be confirmed by daily monitoring for two consecutive days and the probe will then be reclassified as a targeted probe.

Each new monitoring probe will be incorporated into the existing on-going daily monitoring program. If a declassified probe has no gas readings exceeding 2.5% for a period of three months, then it will be reclassified as a monthly probe and the monitoring frequency will be reduced to once a month.

Actual monitoring involves measurement of static pressure and total hydrocarbons at each depth of each probe location by the measurement of static pressure levels using appropriate magnehelic gauges. At least one (1) void volume will be evacuated from the probe cavity before gas concentrations are measured.

The level of total hydrocarbons in probes and in wells will be obtained by using the following equipment:

- o For low range measurements a portable Flame Ionization Detector (FID) such as an Organic Vapor Analyzer (OVA) will be used (0-1000 ppm).

- o For high-range measurements, a combustible Gas Analyzer will be utilized (0-100% by volume).

Additional monitoring will include testing for selected volatile organics and methane which will be measured by collecting a Tedlar bag sample from the probe and utilizing Gas Chromatography/Mass Spectroscopy analysis in a laboratory. The Tedlar bag sample will be collected utilizing Teflon pumps and stainless steel tubing to ensure the nonabsorption of species of interest.

Procedures for monitoring the condition of the gas migration system and the miscellaneous forms to be used by the monitoring crew are included in Appendix B.2.2.

B.2.3.2 WELLS/HEADERS

Monitoring of the perimeter gas migration control wells will be performed by the same procedure as described in Appendix B.2.2.

Monitoring of the perimeter wells includes measurement of the following parameters at each well head on the same frequency as the adjacent probes.

- o Gas flow rate
- o Static pressure
- o Methane and oxygen concentration

B.2.3.3 QUALITY CONTROL

Quality control sheets will be utilized for every sample collected. These forms will indicate the date, time, location, sample number, flow rate and other pertinent information about the sample collection. In addition, a chain of custody form will be utilized if the sample is to be analyzed at an off-site laboratory. These forms are included in Appendix B.2.2.

B.2.3.4 PERIMETER GAS MONITORING REPORTS

Title 14 CCR, Section 17783.13 requires that monitoring reports include the following information: the concentrations of methane at each monitoring probe; the concentrations of specified trace gases, if required; the date, time, barometric pressure, atmospheric temperature, general weather conditions, and monitoring probe pressures; and the names of sampling personnel, apparatus utilized, and a description of the methods used. Monitoring reports shall be prepared and submitted within 90 days of sampling to the CIWMB and the Local Enforcement Agency, provided that compliance levels are maintained. More frequent submittal of monitoring reports may be required when results of monitoring indicate that landfill gas is migrating off-site.

B.2.4 SURFACE EMISSIONS MONITORING PROCEDURES

The surface emissions monitoring program described in this section gives the methods and sampling procedures required to monitor the effectiveness of controlling migrating landfill gas through the final cover in accordance with SCAQMD Rule 1150.1. The existing gas control system is the primary mechanism for controlling surface gas emissions.

Information has been included to determine what types of samples will be collected and the constituents that will be analyzed. Details of sampling protocols and analytical methods are included in Appendix B.2.2.

B.2.4.1 INTEGRATED SURFACE EMISSIONS SAMPLING

Integrated air samples from the surface of the landfill will be collected over the entire landfill area annually, utilizing a grid system as shown in Appendix B.2.2. This sampling will identify any areas where excessive landfill gas emissions or odors are occurring which may require additional gas control wells or adjustments in the vacuum of existing systems.

The objectives of the overall surface air sampling is to identify areas where surface gas emissions exceed 50 ppm as outlined in SCAQMD Rule 1150.1 and to design and install systems to reduce these emissions to acceptable levels. Included in Appendix B.2.2 is the detailed sampling procedure to be utilized. Analytical methods will be approved prior to use.

B.2.4.2 INSTANTANEOUS SURFACE EMISSIONS SAMPLING

Instantaneous sampling of the surface of the landfill will be collected over the entire landfill area utilizing the same grid system as shown in Appendix B.2.2. This sampling will identify specific locations where excessive landfill gas emissions occur and where repair of the final cover is required.

The objectives of the surface sampling is to identify specific areas where surface gas emissions exceed 500 ppm as outlined in SCAQMD Rule 1150.1 and to measure the effective operation of the gas collection system and final cover. Included in Appendix B.2.2 is the detailed sampling procedure to be used.

B.2.4.3 AMBIENT AIR SAMPLES AT THE PERIMETER OF THE SITE

Ambient air samples will be collected at the perimeter of the landfill in locations of known downslope wind drainage. All samples will be 24-hour composite and will be collected by SCAQMD style Tedlar bag samplers. These samples will be collected seasonally during stable meteorological conditions for the winter and summer seasons. All samples will be analyzed for volatile priority pollutants. Procedures for sampling and analysis are included in Appendix B.2.2.

B.2.4.4 QUALITY CONTROL

Quality control sheets will be utilized for every sample collected. These forms will indicate the date, time, location, sample number, flow rate, and other pertinent information about the sample collection. In addition, a Chain-of-Custody form will be utilized if the sample is to be analyzed at an off-site laboratory. These forms are included in Appendix B.2.2.

B.2.5 GAS COLLECTION SYSTEM PERFORMANCE REPORTS

SCAQMD regulations require that emissions monitoring reports include sampling results from the following:

- Perimeter Probe Sampling
- Integrated Surface Sampling
- Gas Collection System Sampling
- Perimeter Ambient Air Sampling
- Instantaneous Surface Monitoring
- Flare Source Testing

B.2.6 MIGRATION MONITORING AROUND ON-SITE STRUCTURE

Facilities which will be utilized by on-site personnel during the post-closure maintenance period are mobile home type trailers which sit above ground.

These trailers are located away from the fill areas. However, monitoring for landfill gas migration into and around all structures (including maintenance structures and any utility vaults) will be conducted throughout post-closure on a monthly basis. If monitoring data indicates a build-up of gas within any on-site structure methane alarms and/or ventilation systems will be installed.

APPENDIX B.2.1

MISCELLANEOUS INSPECTION FORMS

BRYAN A. STIRRAT & ASSOCIATES

LOPEZ CANYON LANDFILL

Inspection Checklist

Sumps/Tanks

Technician: ____________________

N = Normal

Date: ____________________

X = Abnormal

Time: ____________________

	N	X	COMMENTS
A. Sumps			
1.	____	____	____________________
2.	____	____	____________________
3.	____	____	____________________
4.	____	____	____________________
B. 1.	____	____	____________________
2.	____	____	____________________
3.	____	____	____________________
4.	____	____	____________________
5.	____	____	____________________

(Lopez Partial Post-closure::INSPCHK:12-4-92)

LOPEZ CANYON LANDFILL

Inspection Checklist

Gas Lines and Wells

Technician: ____________

N = Normal

Date: ____________

X = Abnormal

Time: ____________

	N	X	COMMENTS
A. Lateral			
1. Lateral Line	___	___	________
2. Wells	___	___	________
3. Vaults	___	___	________
4. Ground surface	___	___	________
5. Flexible hoses	___	___	________
6. Valve positions	___	___	________
7. Number of wells operations	___	___	________
B. Lateral			
1. Lateral Line	___	___	________
2. Wells	___	___	________
3. Vaults	___	___	________
4. Ground surface	___	___	________
5. Flexible hoses	___	___	________
6. Valve positions	___	___	________
7. Number of wells operations	___	___	________
C. Lateral			
1. Lateral Line	___	___	________
2. Wells	___	___	________
3. Vaults	___	___	________
4. Ground surface	___	___	________
5. Flexible hoses	___	___	________
6. Valve positions	___	___	________
7. Number of wells operations	___	___	________

LOPEZ CANYON LANDFILL

Inspection Checklist

Main Collection Headers

Technician: ____________________

N = Normal

Date: ____________________

X = Abnormal

Time: ____________________

	N	X	COMMENTS
A. Headers			
1. Header Line	___	___	____________________
2. Vaults	___	___	____________________
3. Valve position	___	___	____________________
4. Ground surface	___	___	____________________
B. Headers			
1. Header Line	___	___	____________________
2. Vaults	___	___	____________________
3. Valve position	___	___	____________________
4. Ground surface	___	___	____________________
C. Headers			
1. Header Line	___	___	____________________
2. Vaults	___	___	____________________
3. Valve position	___	___	____________________
4. Ground surface	___	___	____________________

APPENDIX B.2.2

REVISED DRAFT PLAN FOR INSPECTION, REPAIR AND MAINTENANCE

REVISED DRAFT PLAN FOR LANDFILL INSPECTION, REPAIR AND MAINTENANCE PROCEDURES

CASE NO. 1212-9

CITY SAN

REVISED DRAFT PLAN
FOR
LANDFILL INSPECTION, REPAIR
MAINTENANCE PROCEDURES
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LIST OF APPENDICES

SECTION 1.0

INTEGRATED SURFACE EMISSION SAMPLING

1.0 INTEGRATED LANDFILL SURFACE EMISSION SAMPLING

1.1 OBJECTIVE

The objective of integrated landfill surface emission sampling is to determine the efficiency of both the gas control system and the existing landfill cover material by measuring the concentration of the total organic compounds in the collected sample. If the concentration exceeds 50 ppm/v, it would indicate that the gas collection system and/or the cover material in the grid area needs adjustment and/or repair.

1.2 PROTOCOL REQUIREMENT

The Bureau of Sanitation (Bureau) shall conduct integrated landfill surface emission sampling in such a manner that the entire fill area of the landfill shall be monitored at least once a month. The following procedure for sampling surface emissions will be a direct adaptation of the method developed by the South Coast Air Quality Management District (SCAQMD). Should the monitoring procedure detect methane concentrations higher than 50 ppm/v, it shall be considered an exceedance. Each exceedance shall be repaired per the repair procedure described in Section 3.0 and/or have the gas wells adjusted in the area. Furthermore, each exceedance shall be documented as described in Section 1.5.

1.3 NUMBER OF SAMPLES

One sample shall be collected from each grid. The entire landfill disposal area shall be divided into approximately 50,000 square foot grids or other representative grids approved by the Executive Officer of the SCAQMD. The current grids are illustrated on the Lopez Canyon Surface Emissions Sampling Grid, Figure 1.1 (102 Grids). The grid pattern and numbering system shall be the same for all monitoring programs to maintain a consistent identification/location system throughout the landfill's operation and monitoring programs. The Bureau shall file a written request with the Executive Officer to use a grid size other than 50,000 square feet. Such a request shall be supported with sampling results and other documentation which demonstrates that the proposed grid system will provide equivalent results. The Executive Officer will notify the Bureau of any related decision in writing. To exclude an area, which the Bureau deems inaccessible or dangerous for a Technician to enter, a written request shall be filed with the Executive Officer. Such a request shall include an explanation of the requested exclusion and photographs of the area. The Executive Officer will notify the Director of the Bureau of any related decision in writing. An area may also become inaccessible because of temporary construction activity or long term landfill operations. Any area, which is temporarily excluded from sampling due to construction or landfill activities, shall be identified in each report with an explanation of the activities. The exclusion, when granted, shall apply only for the monitoring requirement. A revised grid map shall be developed to include the proposed Disposal Area "C". Within three months after the final grading plan is approved by the Bureau, Figure 1.1 shall be revised to include the new area and submitted to the Executive Officer for approval. Expansion into the new area will occur in phases. Sampling of new grids shall begin within 6 months after initial disposal of refuse in that area. The 50 ppm/v limit shall apply to excluded areas in all cases. Grids 1, 2, 3, and 4 of Figure 1.1 are areas currently approved by the Executive Officer as excluded from surface monitoring.

1.4 SAMPLING FREQUENCY

The Bureau shall conduct integrated landfill surface emission sampling covering the entire fill area of the landfill once per month or at less frequent intervals to be determined by the Executive Officer. The Bureau must file a written request with the Executive Officer to sample less frequently. Such a request shall be supported with previous sampling results and other related documentation. The Executive Officer will notify the Director of the Bureau in writing of his approval or disapproval of said request. Unless approval is granted, the Bureau must continue its monthly monitoring of the entire fill area of the landfill.

1.5 SAMPLING PROCEDURE

A portable integrated bag sampler, as described in Section 1.7, shall be used to collect a surface sample from each grid. The running time shall be 30 minutes for a 50,000 square feet grid, provided that the entire grid is sampled. The interval of time required to collect each sample and each grid walking pattern must be submitted to and approved by the Executive Officer. The time to sample a grid on a slope versus a grid on flat ground will generally take longer because of the terrain conditions. During sampling, the probe shall be placed no greater than 3 inches from the landfill surface. A separate gas sample of approximately eight (8) to ten (10) liters shall be collected from each grid. When the typical 50,000 square foot grid is used, the sampler shall be set at a flow rate of approximately 333 cubic centimeters per minute and the monitoring technician shall walk through a course of approximately 2,600 linear feet (one-half mile) over a continuous 30 minute period. All of the collected integrated samples shall be returned to the support facility to be measured with an Organic Vapor Analyzer (OVA) and the results will be recorded on the Quality Control Data Sheet, Exhibit 1.1.

Figure 1.3, Grid Area Sampling Pattern, shows a typical walking pattern for a rectangular grid. Requests for changes in grid sizes, shapes, collection rates and walk patterns shall be filed with the Executive Officer prior to use. Such requests must be supported with sample results and other related documentation which demonstrates that the proposed alternative will provide equivalent results. The Executive Officer will notify the Director of the Bureau of any decision related in writing.

All readings of 50 ppm/v or greater measured on the OVA shall be noted on the Integrated Surface Emissions Sampling Field Report, Exhibit 1.5. In addition, to the Field Report Form the technician shall complete the Exceedance Notification Log to be signed by the Chief Monitoring Technician, Operation Manager and Site Engineer when they are notified of the exceedance, as shown in Exhibit 1.7. This document shall be returned to the Chief Monitoring Technician upon completion. The technician shall identify the location by grid designation. In addition to the reading, a description of the suspected cause of the reading, (i.e., cracking, thin cover, exposed waste) shall be recorded on the field report. Survey stakes with blue ribbon and labeled appropriately shall be placed in the field marking the location of the grid boundary. Once a grid is identified, the Field Report, Exhibit 1.5, is given to Field Operations. Field Operations is responsible for cover and repair and/or adjustment to the gas control system, as described in Section 3.0.

Permanent wind speed monitors, with continuous recorder, shall be installed on the landfill at locations specified by the District. The wind velocity shall be recorded throughout the sampling period. The wind direction transmitter must be oriented to true north using a compass. The monitor closest to the grid being sampled shall be used to determine if wind velocity is within the stated guidelines. The average and maximum instantaneous wind speeds for each monitoring event shall be recorded on the Grid Survey, Exhibit 1.9.

1.6 SAMPLING CONDITIONS

The average wind speed suitable for integrated surface emission sampling shall be less than ten (10) miles per hour. Integrated sampling shall be terminated when the average wind speed exceeds ten (10) miles per hour or the instantaneous wind speed exceeds twenty (20) miles per hour. Average wind speed shall be determined on a ten (10) minute average. Integrated sampling shall be conducted when the landfill is dry and no rain is falling. The landfill shall be considered dry when there has been no rain greater than 0.1 inch for the preceding 72 hours prior to sampling.

1.7 EQUIPMENT DESCRIPTION

The integrated surface sampler shall be a portable self-contained unit with its own internal power source. The integrated sampler shall consist of a stainless steel collection probe, a pump, and a 10-liter Tedlar bag enclosed in a light-sealed cardboard box. The physical layout of the Integrated Emissions Sampler (portable bag sampler) is shown on Figure 1.2.

1.8 EQUIPMENT SPECIFICATIONS

The integrated landfill surface emission sampling equipment shall meet the following specifications:

- Power: 110 VAC. 60 Hz battery charger. Eight (8) 1-volt Ni-Cad rechargeable batteries.
- Pump: One 12 VDC pump. Flow rate set by combination of mechanically adjustable pump stroke and electronic potentiometer control. The maximum pump unloaded flow rate is 2.0 liters per minute.
- Bag: One 10-liter Tedlar bag with a valve. Tedlar bag shall be contained in a light-sealed cardboard box to prevent photochemical reactions from occurring during sampling and transportation. The valve shall be a push-pull type constructed of aluminum and stainless steel, with a Viton O-ring seal.
- Air flow control orifice: Delrin orifice.
- Funnel: 316 stainless steel or approved plastic.
- Fittings, tubing and connectors: 316 stainless steel or Teflon.
- Wind speed monitor with a continuous recorder: 3 cup assembly, range 0 - 50 miles per hour, with a threshold limit of 0.75 miles per hour or less.

1.9 EXCEEDANCE ACTION

An operations response is required should a methane concentration level exceed 50 ppm/v during the integrated monitoring procedure. Landfill operation shall have the option of repairing the ground cover, as described in Section 3.0 and/or adjusting the gas wells in the immediate area of the exceedance. Surface cracking is a normal indicator that cover repair should be done. Evaluating the monitoring data obtained from gas well monitoring procedure, Section 9.0, in the area would give an indication that gas well adjustment would be beneficial.

1.10 QUALITY CONTROL PROCEDURE

The following quality control procedure shall be implemented during the integrated landfill surface emission sampling operation.

Field Sampling QA/QC Procedure

- Each Integrated Surface Emission sample bag (Tedlar bag) shall be identified with "INTEGRATED SURFACE SAMPLE" label.

- Assign a number to each Tedlar bag.

- Tedlar bags shall be isolated and used only for this sampling event until they are removed from service.

- Tedlar bags previously used for other landfill gas sampling events shall NOT be reused for the Integrated Surface Emission Sampling.

- Prior to use, the new and used Tedlar bags shall be evacuated and filled with high purity nitrogen three times to flush out any contaminants. Twenty-four hours before each bag is to be used in the field, it shall be filled with high purity nitrogen. The following morning the bag shall be checked for leakage. Each bag then shall be flushed with zero hydrocarbon air and checked with an OVA for contamination. Any bag having leakage or contamination shall be removed from service.

- Before sending the monitoring equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Check whether or not the pump is running.

- Check the pump calibration. The flow rate should be approximately 333 cubic centimeters per minute if the 50,000 square foot grid size is used.

- Grid samples with readings over 50 ppm/v require notification of exceedances to operations per procedure in Section 1.5 and implementation of repair procedure per Section 3.0.

- Clearly mark and identify each grid location on an integrated surface emissions location map of the landfill drawn to scale, Figure 1.1.
- Assign a sample identification number to each bag sample sent to the laboratory.
- Document the date and time that the Tedlar bag was put into operation, check whether the bag valve is in the open position. If the valve is in the closed position, open the valve and record the time on the Quality Control Data Sheet. If the valve is open, replace the bag and start the procedure over, recording the time it was removed from service on the Quality Control Data Sheet.
- Calibrate and maintain the air sampler and the OVA or other approved instruments as detailed in the Instrument Calibration and Maintenance Frequency, Table 1.1.

Data for each sample collected shall be entered on a Quality Control Data Sheet, Exhibit 1.1.

Sampling Event/Logbook Documentation

The Chief Monitoring Technician shall maintain a thorough, accurate logbook record for all samples sent to the laboratory. Entries in the logbook shall be made in waterproof ink and corrections shall consist of line-out deletions that are initialed and dated. Entries must include the following information:

- Name of personnel
- Name of actual sample collector
- Sample identification number(s)
- Physical condition during sampling
- Climatic conditions
- Date and time of sample collection
- Sample collection procedure and equipment
- Number and volume of samples(s)
- Parameters requested for analysis
- Identification number(s) of any duplicates collected
- Field observations
- Decontamination procedures
- Name of courier and laboratory
- Condition of samples prior to transport

Documentation must provide sufficient information to reconstruct the sampling event without relying on the monitoring technician's memory.

Laboratory QA/QC Procedure

- Record the activity name, field log book number, sample I.D., sample volume, date, time, sample location, sample type, number of containers, analysis method and any remarks on the Chain of Custody record and attach to each sampling bag.

- Submit one trip blank (Nitrogen) sample with every batch of integrated surface emissions samples to be analyzed by the laboratory to ensure analytical accuracy.

- The analyses for methane and selected VOCs shall be done by an SCAQMD approved laboratory.

1.11 ANALYTICAL PROCEDURE

Bag samples collected shall be analyzed within 72 hours of collection, or sooner if specified by the Executive Officer. Bag Samples shall be analyzed for total organic compounds, chlorinated hydrocarbons, methane, vinyl chloride, and toxic air contaminants using analytical methods identified in Table 1.2, in accordance with Analytical Procedures, Guidelines for Implementation of Rule 1150.1, SCAQMD, October 1985, or by equivalent methods approved by the Executive Officer.

The number of samples to be submitted to the laboratory is according to the following criteria:

- Ten percent of all samples which have a concentration of total organic compounds greater than 50 ppm/v as methane, or

- Two samples if all samples are 50 ppm/v or less of total organic compounds, or

- Two samples if there are less than 20 samples above 50 ppm/v.

The above samples must be selected at random, but in such a manner that with time the entire landfill surface is analyzed for toxic air contaminants. The Bureau shall file a written request with the Executive Officer, to either composite samples or test fewer samples. Such a request shall be supported with sampling results and other documentation which characterize the toxic emissions. The Executive Officer will notify the Director of the Bureau of any related decision in writing.

Upon request, samples shall be split to allow confirmation of the analysis by the SCAQMD. All bag samples shall be kept in light-sealed containers to avoid photochemical reactions. Laboratory reports shall contain the following information:

- Laboratory name
- Sample identification
- Laboratory identification number
- Type of media analyzed (air, gas, etc.)
- Parameters analyzed
- Concentrations
- Units and limits of detection
- Analytical method used
- Sample date
- Dilution factors, if necessary
- Chain of Custody Record

The analytical laboratory shall also provide QA/QC information for results of trip blanks, duplicates and calibrations, as well as laboratory sample custody information.

1.12 CHAIN OF CUSTODY

A Chain of Custody Record, Exhibit 1.2, shall accompany all bag samples. The Chain of Custody (COC) shall be employed as physical evidence of a sample custody. The COC record system provides the means to identify, track and monitor each individual sample from the point of collection through final data analysis reporting. A COC record shall be required for each shipment of samples. Laboratory personnel shall also record the condition of the sample. Corrections shall consist of line-out deletions that are initialed and dated. No erasures shall be permitted. The following information shall appear on the COC record:

- Name of site
- Activity name and reference number
- Sample identification(s) and sample bag numbers
- Sampling date(s) and times for all sample(s)
- Sample type(s)
- Number of sample(s) and number of container(s)
- Analyses requested

- Name of courier and shipping number
- Name of laboratory
- Signatures of sampler, Chief Monitoring Technician, courier and laboratory receiver.

The sampler and Chief Monitoring Technician shall complete a COC record to accompany each sample shipment from the field to the laboratory. After completion of the COC, one copy shall be attached to each sample. One copy shall be retained by the Chief Monitoring Technician. The courier does need to sign the COC.

The laboratory representative who accepts the incoming sample shipment shall sign and date the COC to acknowledge receipt of samples. This signed copy shall then be returned with the analytical reports.

1.13 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained on site, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771 Foothill Blvd., Tujunga, CA 91042.

- Surface Emissions Sampling Grid map showing the topographic map of the landfill, drawn to scale, with the sampling grids clearly marked and numbered, Figure 1.1.

- Quality Control Data Sheet reporting grid identification number, sample identification number, sampling time, methane concentration for each grid, flow rate, sample volume, and if submitted for analysis for each grid sampled, Exhibit 1.1.

- Chain of Custody Record for each grid(s) sampled submitted to the laboratory for analysis, Exhibit 1.2.

- Wind Speed Data Summary reporting average and maximum instantaneous wind speed in miles per hour for the day and hour each integrated sample was taken, Exhibit 1.3.

- Grid Summary reporting grid identification number, date sampled, methane concentration and if submitted for analysis for each grid sampled, Exhibit 1.4.

- Exceedance Summary resulting from methane concentration readings over 50 ppm/v reporting the record number, date, time, grid number, inspector name, methane concentration; repair date and time and recheck date, time and methane concentration, Exhibit 1.5.

- Analytical Data Sheet reporting volume concentration of total organic compounds (reported as methane and total non-methane hydrocarbons) for grids chosen for analysis, Exhibit 1.8.

1.14 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to Integrated Surface Emission Sampling onsite. Such records shall be retained for a minimum of two (2) years.

- Quality Control Data Sheet: Exhibit 1.1
- Chain of Custody Record: Exhibit 1.2
- Wind Speed Data Summary: Exhibit 1.3
- Sampling Summary: Exhibit 1.4
- Sampling Field Report: Exhibit 1.5
- Exceedance Summary: Exhibit 1.6
- Exceedance Notification Log: Exhibit 1.7
- Grid Survey: Exhibit 1.9
- Laboratory Analyses
- Notification Sheets
- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets

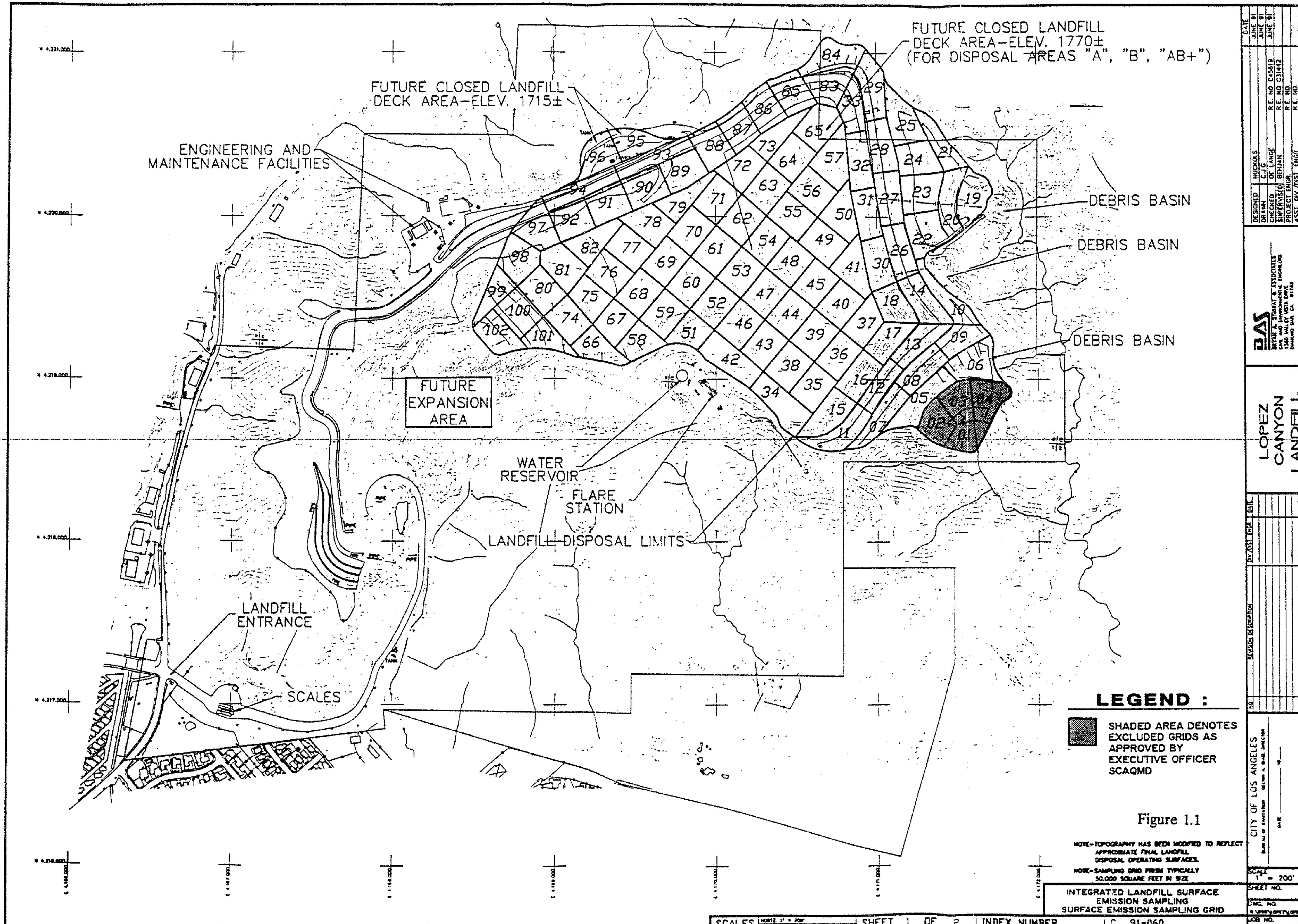
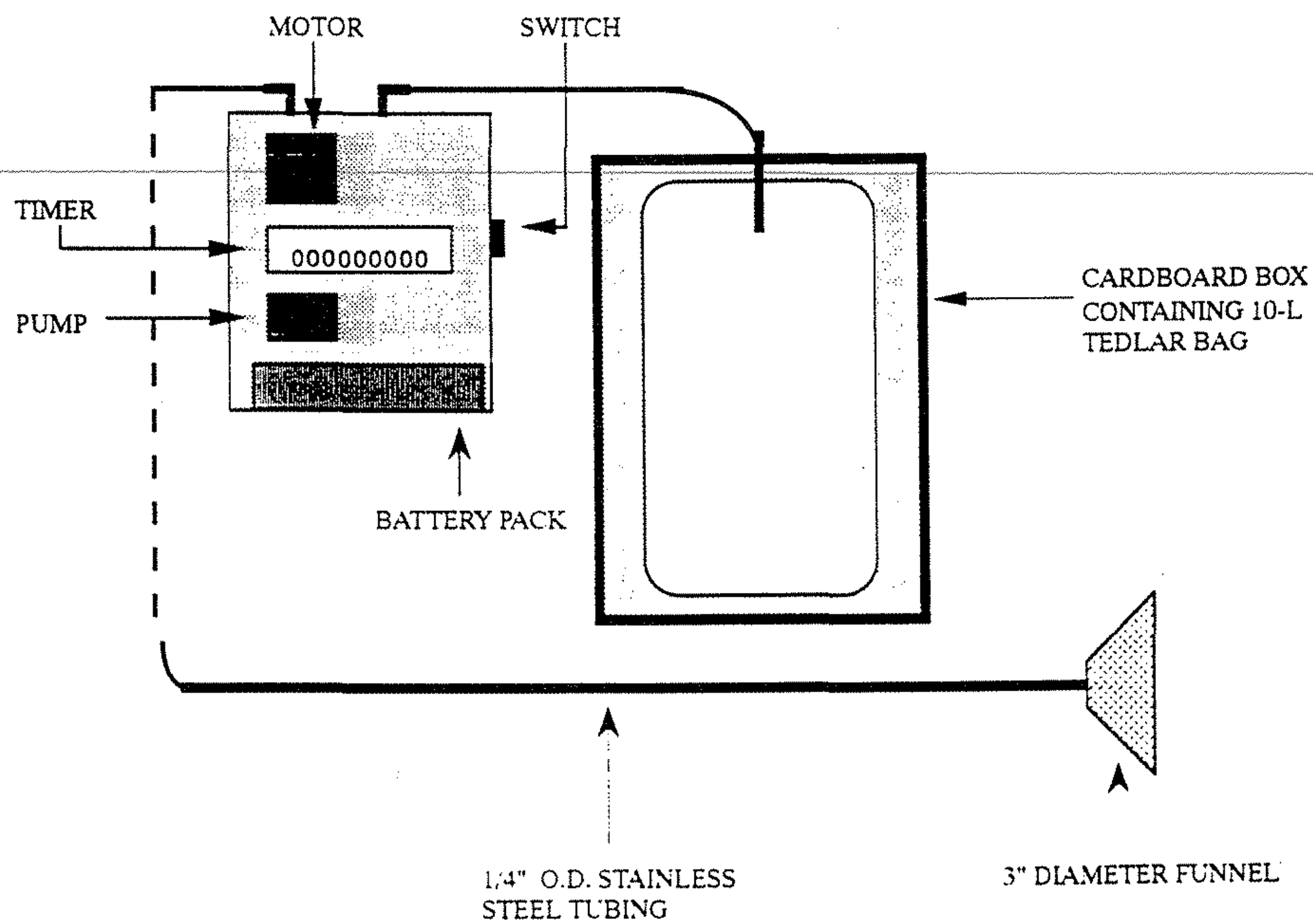

FUTURE CLOSED LANDFILL DECK AREA-ELEV. 1770± (FOR DISPOSAL AREAS "A", "B", "AB+")
FUTURE CLOSED LANDFILL DECK AREA-ELEV. 1715±
ENGINEERING AND MAINTENANCE FACILITIES
DEBRIS BASIN
DEBRIS BASIN
DEBRIS BASIN
FUTURE EXPANSION AREA
WATER RESERVOIR
FLARE STATION
LANDFILL DISPOSAL LIMITS
LANDFILL ENTRANCE
SCALES
LEGEND :
SHADED AREA DENOTES EXCLUDED GRIDS AS APPROVED BY EXECUTIVE OFFICER SCAQMD
NOTE-TOPOGRAPHY HAS BEEN MODIFIED TO REFLECT APPROXIMATE FINAL LANDFILL DISPOSAL OPERATING SURFACES.
NOTE-SAMPLING GRID PRISM TYPICALLY 50,000 SQUARE FEET IN SIZE
INTEGRATED LANDFILL SURFACE EMISSION SAMPLING SURFACE EMISSION SAMPLING GRID
SCALES
SHEET 1 OF 2
INDEX NUMBER LC 91-060
LOPEZ CANYON LANDFILL
CITY OF LOS ANGELES
SCALE 1" = 200'
JOB NO. 9035-1027
DESIGNED NUCKOLS
DRAWN C.J.G.
CHECKED DE LANGE
SUPERVISED BEHJAN
PROJECT ENGR.
ASST. DIV./DIST. ENGR.
R.E. NO. C45619
R.E. NO. C31442
JUNE 91
JUNE 91
JUNE 91

Figure 1.1

FIGURE 1.2
LOPEZ CANYON LANDFILL
INTEGRATED EMISSIONS SAMPLER

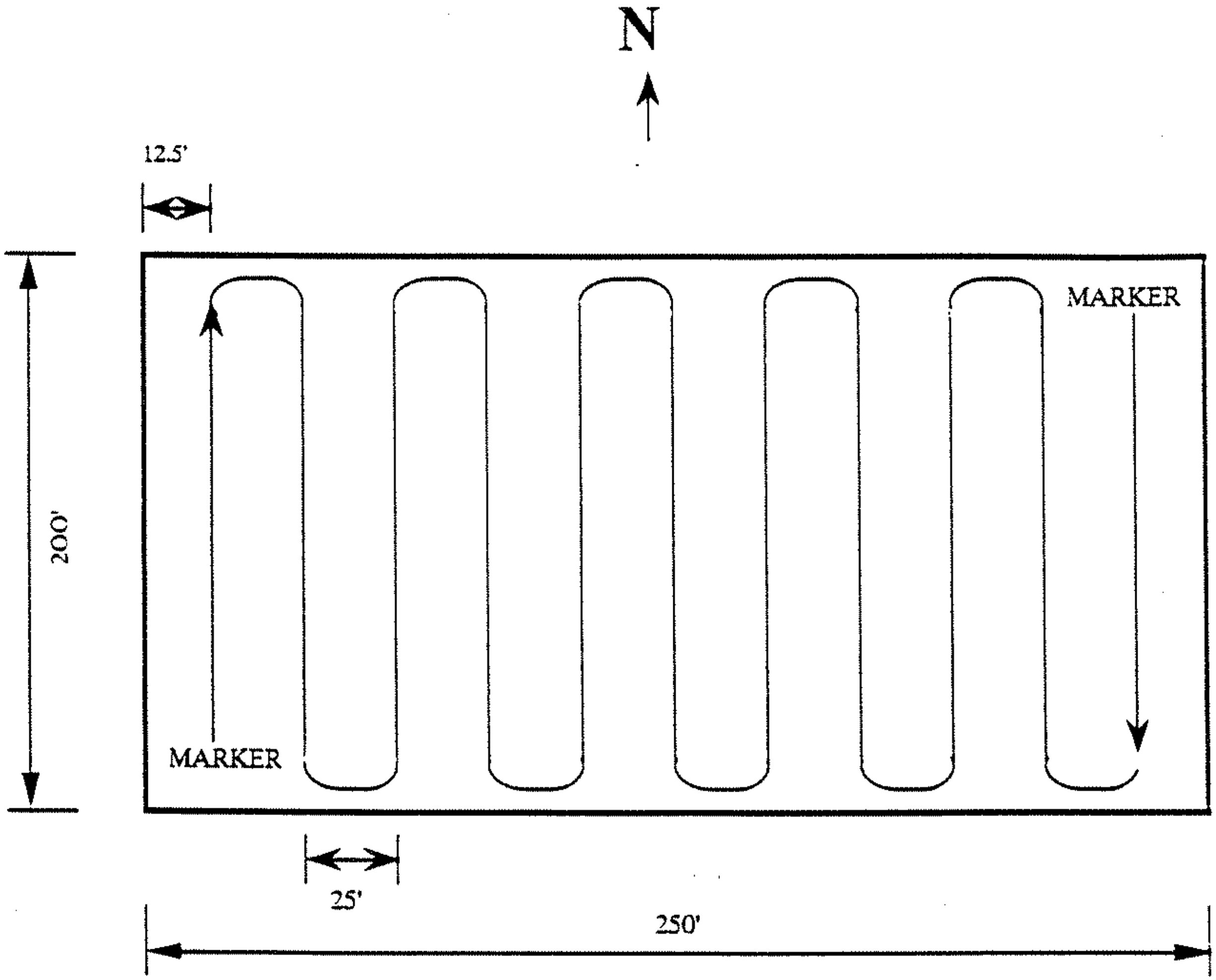
PARTS LIST

1. Stainless steel tubing, 1/4" O.D.
2. Cardboard box to hold Tedlar bag.
3. 10-Liter Tedlar bag with open and close tube valve.
4. PAS-3000 8 - 11 VDC adjustable stroke pump with potentiometer control.
5. Rotameter with valve (calibrated with bubble meter).
6. Eight (8) 1.5 volt Ni-Cad rechargeable batteries.
7. 3" diameter stainless steel or teflon funnel used as a close area probe.
8. Misc.: electrical switch, wire, hardware and timer/pump assembly.



Revised: August 22, 1991

FIGURE 1.3
LOPEZ CANYON LANDFILL
GRID AREA SAMPLING PATTERN



Sampler will make 10 passes and each will be approximately 25 feet apart. He will pace himself with the second hand sweep on his watch so that he will walk 100 feet per minute (one pass takes 3.0 minutes). Therefore, a 30-minute integrated gas sample will be taken per grid section. The pump flow rate will be 333 cubic centimeters per minute so that a minimum 8-liter gas sample will be collected.

EXHIBIT 1.1
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: **Inspector:** **Instrument Serial No.:** ____________________

Grid ID	Sample ID	Bag No.	Sampling Time (min)	Initial Flow (cc/min)	Final Flow (cc/min)	Sample Volume (Liters)	THC (PPM)	Sample sent to Lab ? (Y or N)

Notes:

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

EXHIBIT 1.2
LOPEZ CANYON LANDFILL

CHAIN OF CUSTODY RECORD

Field Log Book

ACTIVITY: ____________________

Reference No.________

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks

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

SAMPLED BY:
(SIGN) Chief Monitoring Technician /__________________ / __________________ /
____

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
______________	______________	______________	(______/______

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
______________	______________	(______/______

Revised: August 24, 1991

Form: LC

EXHIBIT 13
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
WIND SPEED DATA SUMMARY
MONTH: YEAR:

	AVERAGE												INSTANTANEOUS											
Sampling Date	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

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.

Revision: August 24, 1991

Form: LC - 042

EXHIBIT 1.4
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE SAMPLING SUMMARY

	DATE SAMPLED	SUBMITTED FOR ANALYSIS	METHANE (PPM/V)	REMARKS
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				

EXHIBIT 1.5
INTEGRATED SURFACE EMISSIONS SAMPLING FIELD REPORT
FOR READINGS GREATER THAN 50 ppm/v
DATE OF ORIGINAL REPORT:
RECORD NUMBER:

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)

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.

EXHIBIT 1.6
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
EXCEEDANCE 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

EXHIBIT 1.7
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
EXCEEDANCES NOTIFICATION LOG

RECORD NUMBER:

	EXCEEDANCE NOTIFICATION	EXCEEDANCE RECHECKS
INSPECTOR NAME (IWI)		
DATE		
TIME		
GRID ID		
INSTRUMENT SER. NO.		
CH_4 CONCENTRATION (ppm/v)		
PERSON NOTIFIED (CMT)		
TIME/INITIALS		
PERSON NOTIFIED (OM)		
TIME/INITIALS		
PERSON NOTIFIED (SE)		
TIME/INITIALS		
COMMENTS:		

NOTES:

1. The forms shall be submitted for notification in the following order:

   - Industrial Waste Inspector (IWI)
   - Chief Monitoring Technician (CMT)
   - Operations Manager (OM)
   - Site Engineer (SE)

2. A copy of the Instantaneous Monitoring Field Report must remain attached to this sheet until the problem is corrected and submitted to the Chief Monitoring Technician. The original must be submitted to the Operations Manager within four hours of detection for repair procedures.

Performance Analytical Inc.

EXHIBIT 1.8

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: ISLC-TD15-7 (Bag #307)

PAI Sample ID: 9102512

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

Matrix: Tedlar Bag
Date Received: 07/17/91
Date Analyzed: 07/18/91
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	90	10	17	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	19	10	4.4	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

Performance Analytical Inc.

PERFORMANCE ANALYTICAL INC.

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

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3380

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #3
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/17/91
Date Analyzed: 07/17/91

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v			
		Carbon Monoxide	Carbon Dioxide	Methane	Total Non-Methane Organics (as Methane)
GM-LC-33-7-3	9102511	ND < 1.0	N/A	N/A	ND < 100
ISLC-TD15-7	9102512	ND < 1.0	420	2.4	ND < 1.0
N/A (07/17/91)	METHOD BLANK	ND < 1.0	ND < 1.0	ND < 1.0	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

N/A = Not Applicable

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/17/91
Date Analyzed: 07/18/91

Client Sample ID	PAI Sample ID	Carbon Dioxide (ppm)	Methane (ppm)	Nitrogen (ppm)	Oxygen (ppm)
GM-LC-33-7-3	9102511	310000	470000	220000	21000
ISLC-TD15-7	9102512	N/A	N/A	780000	220000
N/A (07/18/91)	METHOD BLANK	ND < 100	ND < 100	ND < 500	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

N/A = Not Applicable

LOPEZ CANYON LANDFILL
SURFACE EMISSIONS
GRID SURVEY

☐ INTEGRATED

☐ INSTANTANEOUS

GRID #:____________________

NAME OF INSPECTOR:________________ DATE:____________________

Model Number: ______________________ Instrument Serial Number: ______________________________________

Barometric Pressure: ____________ Average Wind Speed: _____________ Instantaneous Wind Speed: _________

I. General Description of Area Surveyed (Include 50' scale map identifying area surveyed):

____

____

II. Indicate OVA reading in space provided and/or sampling pattern for grid.

Start time: ______________________ **Finish time:** ______________________

25 Ft.

Bench Number Above:________

25 Ft.

o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o

o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o

o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o

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o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o

o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o ______ o

____ Ft.

Indicate Direction

____ Ft.

Bench Number Below: ______________

Grid Number: ______________________

Average Reading: ___________________

Pump Flow Rate:____________cc/min

Sample Bag Readings:________ppm/v or %

Exceedances: Yes________ **No** _________

IME: ________________________________

REMARKS: ____

____

____

EXHIBIT 1.9

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS
GRID SURVEY

NAME OF TECH: ______________ DATE: ________________

Model Number: ____________________ Instrument Serial Number: ______________________________

Barometric Pressure: __________ Average Wind Speed: __________ Instantaneous Wind Speed: __________

I. General Description of Area Surveyed (Include 50' scale map identifying area surveyed):

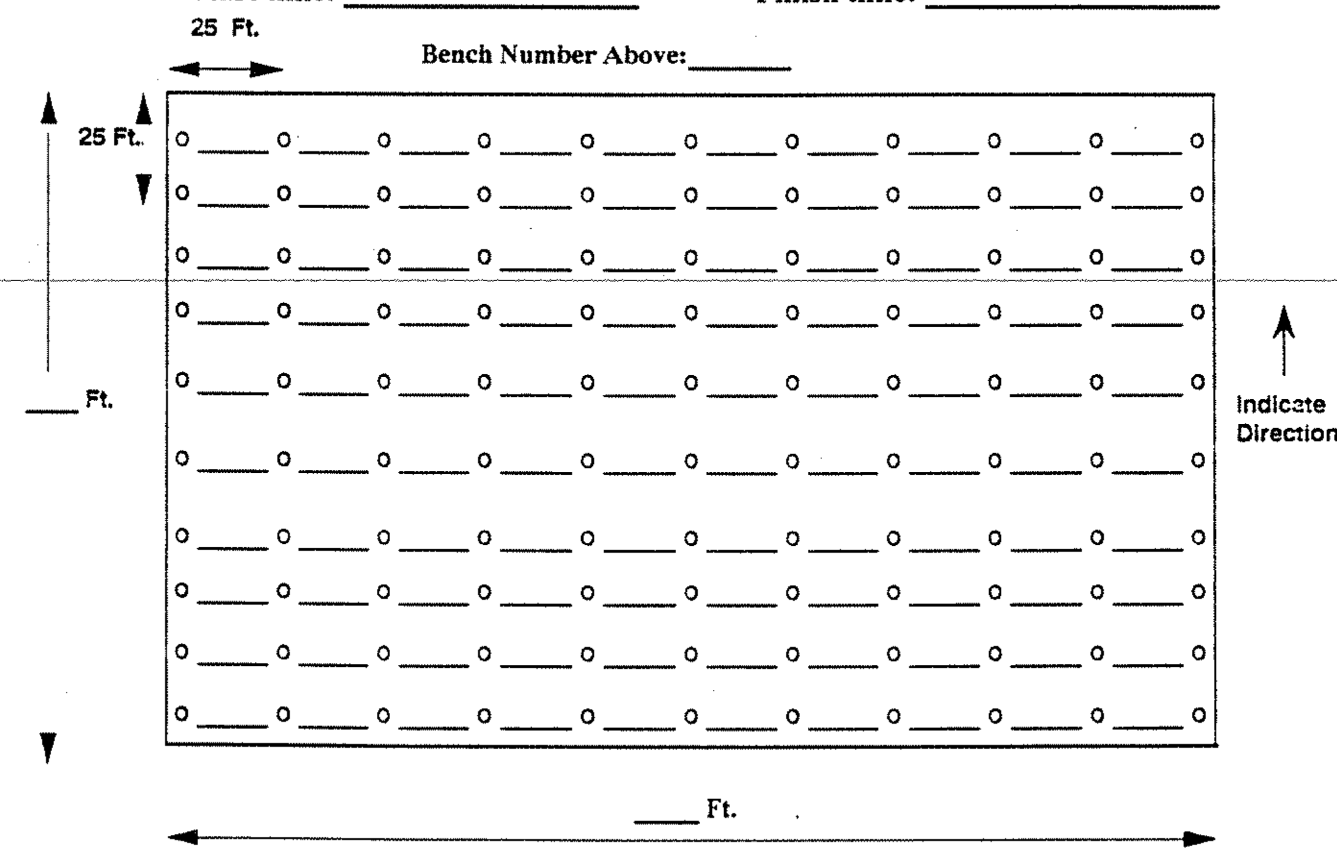
____

____

II. Indicate sampling pattern for grid.

Start time: ____________________ **Finish time:** ____________________

Bench Number Above: _______



Bench Number Below: ______________________

Grid Number: ____________________________

Pump Flow Rate ______________________ cc/min

Sample Bag Reading: __________ ppm/v or percent

Revised: August 22, 1991

Form: LC - 044

TABLE 1.1
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Ambient Air Sampler

TEST	CALIBRATION/TYPE	FREQUENCY
Flow Rate	Bubble Flow Meter	1/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Voltage Supply	Internal	1/Per Day
Maintenance and Cleaning		1/Per Week

Organic Vapor Analyzer 128 & 108

TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	1/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Leak Check	Hydrogen Supply System	1/Per Day
Voltage Supply	Internal	1/Per Day
High and Low Calibration	Internal	2/Per Day
Hydrogen Fill-Up	Hydrogen Supply	2/Per Day
Gas Calibration	10 PPM Methane	2/Per Day
Gas Calibration	100 PPM Methane	2/Per Day
Gas Calibration	500 PPM Methane	2/Per Day
Gas Calibration	2% Methane in Air	2/Per Day
Electrical Calibration	Internal	1/Per Week
Flow Rate	Flow Meter	1/Per Week
Maintenance and Cleaning		1/Per Day

Revised: August 24, 1991

TABLE 1.2
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
METHANE	GC/FID (EPA METHOD 25.2) GC/TCD	1.0 ppmv
TGNMHC	GC/FID (EPA METHOD 25.1) GC/FID (EPA METHOD 25.2)	2.0 ppmv
ACETONITRILE	GC/MS MODIFIED EPA TO-14	2.0 ppbv
BENZYL CHLORIDE	GC/ELCD & PID MODIFIED CARB 102 & 103	2.0 ppbv
CHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv
CHLOROETHENE (VYNIL CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	1.5 ppbv
DICHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	2.0 ppbv
1,1-DICHLOROETHANE (ETHYLIDENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	1.0 ppbv
1,2-DICHLROETHANE (ETHYLENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	1.0 ppbv
1,1-DICHLOROETHENE (VINYLIDENE CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv
DICHLOROMETHANE	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv
HYDROGEN SULFIDE	GC/FID & ELCD(S)	TESTING
TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	GC/ELCD & PID MODIFIED CARB 102 & 103	0.5 ppbv
TETRACHLOROMETHANE (CARBON TETRACHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv

TABLE 1.2
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppb)
TOLUENE	GC/PID MODIFIED CARB 102 & 103	1.0 ppbv
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	TESTING
TRICHLOROETHYLENE	GC/ELCD & PID MODIFIED CARB 102 & 103	0.5 ppbv
TRICHLOROMETHANE (CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	0.5 ppbv
XYLENE	GC/PID MODIFIED CARB 102 & 103	1.0 ppbv

SECTION 2.0

INSTANTANEOUS SURFACE EMISSION MONITORING

2.0 INSTANTANEOUS LANDFILL SURFACE EMISSION MONITORING

2.1 OBJECTIVE

The objective of instantaneous landfill surface emission monitoring is to identify specific locations or areas of the landfill surface with elevated gas emission rates greater than the SCAQMD 500 PPM total hydrocarbon standard for any point on the landfill surface. If the concentration exceeds 500 ppm/v, it would indicate that the gas collection system and/or the cover material in the area need adjustment and/or repair.

2.2 PROTOCOL REQUIREMENT

The Bureau shall conduct instantaneous surface emission monitoring at least twice each week and structure such monitoring in a manner that the entire surface of the landfill's disposal areas shall be monitored completely at least once a month. The following procedure for monitoring surface emissions will be a direct adaptation of the method developed by the SCAQMD. Should the monitoring procedure detect methane concentrations higher than 500 ppm/v, it shall be considered an exceedance. Each exceedance shall be repaired per the repair procedure described in Section 3.0 and/or have the gas wells adjusted in the area. Furthermore, each exceedance shall be documented as described in Section 2.5.

2.3 EXTENT OF MONITORING AREA

The entire landfill disposal area shall be divided into approximately 50,000 square foot grids or other representative grids approved by the Executive Officer. The current grids are illustrated on the Lopez Canyon Surface Emissions Monitoring Grid. Figure 2.1 (102 - Grids). The grid pattern and numbering system shall be the same for all monitoring programs to maintain a consistent identification/location system throughout the landfill operation and monitoring programs. The Bureau shall file a written request with the Executive Officer to use a grid size other than 50.000 square feet. Such a request shall be supported with sampling results and other documentation which demonstrates that the proposed grid system will provide equivalent results. The Executive Officer will notify the Bureau of any related decision in writing. To exclude an area, which the Bureau deems inaccessible or dangerous for a Technician to enter, a written request shall be filed with the Executive Officer. Such a request shall include an explanation of the requested exclusion and photographs of the area. The Executive Officer will notify the Director of the Bureau of any related decision in writing. An area may also become inaccessible because of temporary construction activity or long term landfill operations. Any area which is temporarily excluded from monitoring due to construction or landfill activities shall be identified in each report with an explanation of the activities. The exclusion, when granted, shall apply only for the monitoring requirement. A revised grid map shall be developed to include the proposed Disposal Area "C" area. Within three months after the final grading plan is approved by the Bureau, Figure 2.1 shall be revised to include the new area and submitted to the Executive Officer for approval. Expansion into the new area will occur in phases. Sampling of new grids shall begin within six (6) months after initial disposal of the refuse in that area. The 500 ppm/v limit shall apply to the excluded areas in all cases. Grids 1, 2, 3 and 4 of Figure 2.1 are the landfill exclusion areas currently approved by the Executive Officer.

2.4 MONITORING FREQUENCY

The Bureau shall conduct instantaneous landfill surface emission monitoring covering the entire fill area of the landfill once per month or at less frequent intervals to be determined by the Executive Officer. The Bureau must file a written request with the Executive Officer to sample less frequently. Such a request shall be supported with previous sampling results and other related documentation. The Executive Officer will notify the Director of the Bureau in writing of his approval or disapproval of said request. Unless approval is granted, the Bureau must continue its monthly monitoring of the entire fill area of the landfill.

2.5 MONITORING PROCEDURE

The Bureau shall monitor the entire landfill disposal area for organic compounds using the subsequently described portable equipment. The monitoring probe shall be placed at approximately one (1) inch above the ground surface during monitoring. If a reading exceeds a level of 500 ppm/v, hold the probe steady for one minute to see if reading stabilizes at a level above 500 ppm/v. Readings shall be taken on a ten-pace grid (approximately twenty-five (25) feet grid) and at any crack or fissure in the landfill surface and the highest reading at any given location shall be recorded for that location on the Grid Survey, Exhibit 2.6. The exact configuration of the route will be dependent on upon the shape of the grid. The area monitored shall be recorded on a Surface Emissions Monitoring Grid map at a scale of 200' = 1 " to ensure compliance with the monitoring frequency. The grid shall overlay a 200 scale topographic map of the landfill that will permit each sample point to be recorded and numbered, an 11" x 17" reduction is shown on Figure 2.1. All readings of 500 ppm or greater shall be noted on the Instantaneous Monitoring Field Report, Exhibit 2.3. In addition to the Field Report Form the technician shall complete an Exceedances Notification Log to be signed by the Chief Monitoring Technician, Operations Manager and Site Engineer when they are notified of an exceedance, as shown in Exhibit 2.5. This document shall be returned to the Chief Monitoring Technician upon completion. The technician shall identify the location by grid designation. A permanent record number will be assigned to each exceedance that allows historic tracking of instantaneous exceedances. A description of the suspected cause of the exceedance reading, (i.e., cracking, thin cover, exposed waste) is recorded on the Field Report. A survey stake is placed in the field marking the location with a blue ribbon flag and labeled appropriately. Once identified, measures can be taken to rework the landfill cover through the closing of cracks and the addition of clean fill or the gas system in the area can be evaluated to recommend gas well adjustment to control emissions.

Permanent wind speed monitors, with continuous recorders, shall be installed on the landfill at locations approved by the District. The wind velocity shall be recorded for each sampling period on Grid Survey, Exhibit 2.6. The wind direction transmitter must be oriented to true north using a compass. The monitor closest to the grid being sampled shall be used to determine if wind velocity is within the stated guidelines.

2.6 MONITORING CONDITIONS

The average wind speed suitable for Instantaneous Surface Emission monitoring shall be less than fifteen (15) miles per hour. Instantaneous monitoring shall be terminated when the average wind speed exceeds fifteen (15) miles per hour or the instantaneous wind speed exceeds twenty-five (25) miles per hour. Average wind speed shall be determined on a fifteen (15) minute average. Instantaneous monitoring shall be conducted when the landfill is dry and no rain is falling. The landfill shall be considered dry when there has been no rain greater than 0.1 inch for the preceding 72 hours prior to sampling.

2.7 EQUIPMENT DESCRIPTION

The Bureau shall use a portable Organic Vapor Analyzer (OVA) to instantaneously measure the concentration of organic compounds (measured as methane) on the landfill surface. The OVA shall meet the following specifications:

Organic Vapor Analyzer (Model 128 or 108)

- Range: 0 - 1,000 ppm (v/v) linear scale or
0 - 10,000 ppm (v/v) logarithmic scale
- Minimum detectable limit: 5 ppm (or lower)
- Response time: 15 seconds (or shorter)
- Flame out indicator: audible and visual

- Accuracy: $\pm$ 4% (or better)
- Precision: $\pm$ 3% (or better)
- Ambient temperature: 0 - 50 °C

Calibrate and maintain the flame ionization detector or other approved instruments as detailed in Table 2.1.

Field Equipment

- Grid Plot Plan - 200 Scale
- Survey Stakes, Blue Survey Ribbon, Marking Pen and Hatchet
- Clipboard

To deviate from the above specifications, the Director of the Bureau shall file a written request with the Executive Officer for his approval prior to conducting surface monitoring.

2.8 EXCEEDANCE ACTION

An operations response is required should a methane concentration level exceed 500 ppm/v during the instantaneous monitoring procedure. Landfill operations shall repair the ground cover, as described in Section 3.0 and/or adjust the gas wells in the immediate area of the exceedance. Surface cracking is a normal indicator that cover repair should be done. Evaluating the monitoring data obtained from gas well monitoring procedure, Section 9.0, in the area would give an indication that gas well adjustment would be beneficial.

2.9 QUALITY CONTROL PROCEDURE

The following quality control procedures shall be implemented during the Instantaneous Surface Emissions monitoring operations:

Field Monitoring Q/Q Procedures

- Before sending the monitoring equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Calibrate and maintain the flame ionization detector or other approved instruments as detailed in Table 2.1.

- A spacer shall be placed on the end of the monitoring probe to ensure monitoring distance compliance from the landfill surface.

- Clearly mark and identify each grid location on a Surface Emissions Monitoring location map of the landfill drawn to scale, Figure 2.1.

Data for each grid monitored shall be entered on a Grid Survey, Exhibit 2.6.

2.10 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained on site, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771 Foothill Blvd., Tujunga, CA 91042.

- Surface Emissions Monitoring Grid map showing the topographic map of the landfill, drawn to scale, the grids clearly marked and numbered, Figure 2.1.

- Survey Summary, reporting the inspection date, time, grid number, average methane concentration (ppm/v), Exhibit 2.1.

- Wind Speed Data Summary reporting average and instantaneous wind speed in miles per hour for the day and hour the instantaneous monitoring was performed, Exhibit 2.2.

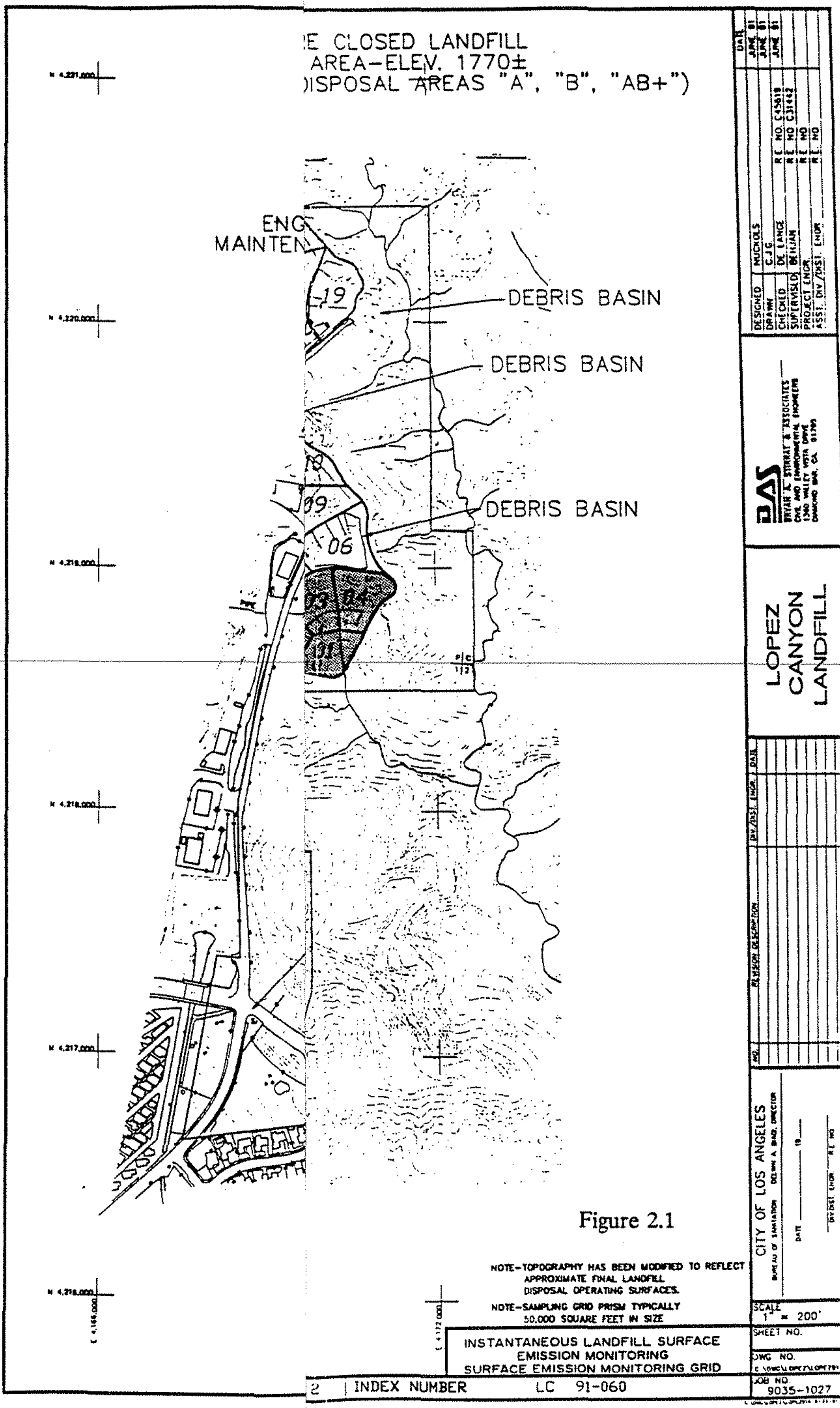
- Exceedance Summary resulting from methane concentration readings over 500 ppm/v reporting the record number, date, time, grid number, inspector name, methane concentration of initial exceedance; date and time of repair; date time and methane concentration of initial recheck and date, time and methane concentration of 10-day recheck. Exhibit 2.4.

2.11 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to Instantaneous Emission monitoring onsite. Such records shall be retained for a minimum of two (2) years.

- Survey Summary: Exhibit 2.1
- Wind Speed Data Summary: Exhibit 2.2
- Monitoring Field Report: Exhibit 2.3
- Exceedance Summary: Exhibit 2.4
- Exceedance Notification Log: Exhibit 2.5
- Grid Survey: Exhibit 2.6
- Notification Sheets

- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets



E CLOSED LANDFILL
AREA-ELEV. 1770±
ISPOSAL AREAS "A", "B", "AB+")
N 4,221,000
N 4,220,000
N 4,219,000
N 4,218,000
N 4,217,000
N 4,216,000
E 4,166,000
E 4,172,000
ENG
MAINTEN
DEBRIS BASIN
DEBRIS BASIN
DEBRIS BASIN
19
09
06
03
04
NOTE-TOPOGRAPHY HAS BEEN MODIFIED TO REFLECT APPROXIMATE FINAL LANDFILL DISPOSAL OPERATING SURFACES.
NOTE-SAMPLING GRID PRISM TYPICALLY 50,000 SQUARE FEET IN SIZE
INSTANTANEOUS LANDFILL SURFACE
EMISSION MONITORING
SURFACE EMISSION MONITORING GRID
INDEX NUMBER
LC 91-060
LOPEZ
CANYON
LANDFILL
CITY OF LOS ANGELES
BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA 91765
DESIGNED
DRAWN
CHECKED
SUPERVISED
PROJECT ENGR.
ASST. DIV./DIST. ENGR.
NICHOLS
C.J.G.
DE LANGE
BENJAN
DATE
JUNE 91
JUNE 91
JUNE 91
SCALE
1" = 200'
SHEET NO.
DWG NO.
JOB NO.
9035-1027

Figure 2.1

EXHIBIT 2.1
LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
SURVEY SUMMARY

DATE	START TIME	FINISH TIME	GRID ID	GRID AVERAGE CH_4 (PPM/V)

EXHIBIT 2.2
LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
WIND SPEED DATA SUMMARY
MONTH: JUNE YEAR: 1991

Sampling Date	AVERAGE												INSTANTANEOUS											
	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

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.

EXHIBIT 2.3

INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v
DATE OF ORIGINAL REPORT:
RECORD NUMBER:

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RE-CHECK				10 DAY RE-CHECK [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)

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 recheck 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 re-check value. Instantaneous readings measured as methane.

EXHIBIT 2.4
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

EXHIBIT 2.5
LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
EXCEEDANCES NOTIFICATION LOG

RECORD NUMBER: ________

	EXCEEDANCE NOTIFICATION	EXCEEDANCE RECHECKS	10-DAY EXCEEDANCE RECHECKS
INSPECTOR NAME (IWI)			
DATE			
TIME			
GRID ID			
INSTRUMENT SER. NO.			
CH_4 CONCENTRATION (ppm/v)			
PERSON NOTIFIED (OM)			
TIME/INITIALS			
PERSON NOTIFIED (SE)			
TIME/INITIALS			
PERSON NOTIFIED			
TIME/INITIALS			
COMMENTS:			

NOTES:

1. The forms shall be submitted for notification in the following order:

   - Industrial Waste Inspector (IWI)
   - Chief Monitoring Technician (CMT)
   - Operations Manager (OM)
   - Site Engineer (SE)

2. A copy of the Instantaneous Monitoring Field Report must remain attached to this sheet until the problem is corrected and submitted to the Chief Monitoring Technician. The original must be submitted to the Operations Manager within four hours of detection for repair procedures.

EXHIBIT 2.6

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS
GRID SURVEY

NAME OF TECH: ______________ DATE: ________________

Model Number: ____________________ **Instrument Serial Number:** ______________________________

Barometric Pressure: ___________ **Average Wind Speed:** ___________ **Instantaneous Wind Speed:** __________

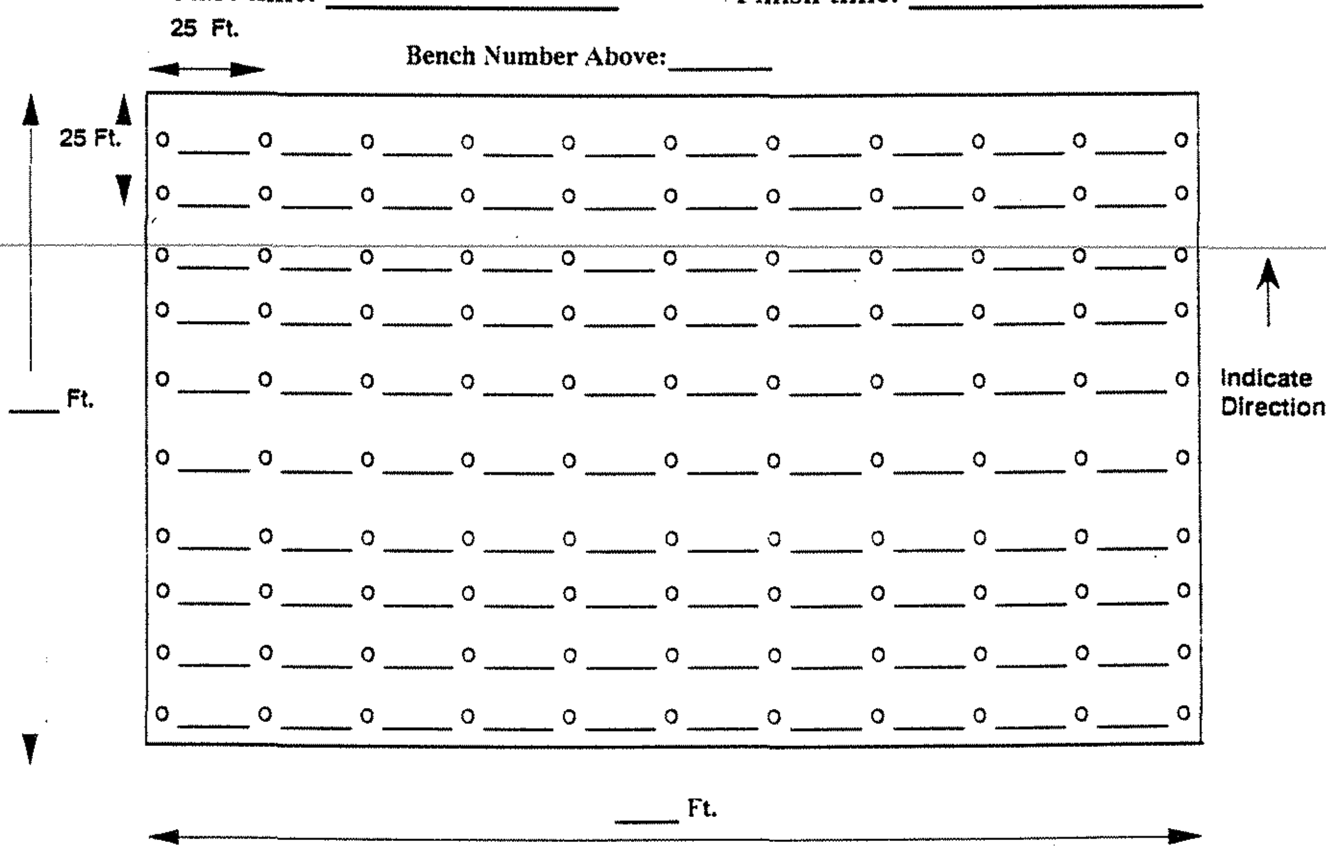
I. General Description of Area Surveyed (Include 50' scale map identifying area surveyed):

____

____

II. Indicate OVA reading in space provided.

Start time: ____________________ **Finish time:** ____________________



Bench Number Below: ___________
Grid Reading: _________________
Average Reading: ______________

TABLE 2.1
LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Organic Vapor Analyzer 128 & 108		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	1/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Leak Check	Hydrogen Supply System	1/Per Day
Voltage Supply	Internal	1/Per Day
High and Low Calibration	Internal	2/Per Day
Hydrogen Fill-Up	Hydrogen Supply	2/Per Day
Gas Calibration	10 PPM Methane	2/Per Day
Gas Calibration	100 PPM Methane	2/Per Day
Gas Calibration	500 PPM Methane	2/Per Day
Gas Calibration	2% Methane in Air	2/Per Day
Electrical Calibration	Internal	1/Per Week
Flow Rate	Flow Meter	1/Per Week
Maintenance and Cleaning		1/Per Day

Revised: July 18, 1991

SECTION 3.0

MAINTENANCE AND REPAIR OF LANDFILL COVER

3.0 MAINTENANCE AND REPAIR OF LANDFILL COVER

3.1 OBJECTIVE

The objective of the maintenance and repair of the landfill cover, where required, is to reduce gaseous emissions from the refuse disposal fill areas to prevent public nuisance and possible detriment to public health caused by exposure to such emissions.

3.2 PROTOCOL REQUIREMENT

The Bureau shall maintain the landfill cover and repair all landfill surface area(s), including surface cracks and fissures, where gas emissions monitored during instantaneous surface emissions monitoring exceed 500 ppm/v and integrated surface emission sampling exceed 50 ppm/v. Said area(s) shall be repaired within 24 hours after detection of the exceedance. The Guidelines of Rule 1150.1, Section 9.6, allow up to fourteen (14) calendar days to complete required repairs. Based on this allowance, the Bureau reserves the right to re-evaluate and revise the following procedures if approved by the Executive Officer.

3.3 NATURE OF THE REPAIR

Repair of surface cracks and fissures, where gas emissions exceed the limits stated in Section 3.2 above, where necessary shall include, but not be limited to, the addition of no less than two (2) feet of clean soil, followed by watering down and subsequent mechanical compaction of the area. In the event said repair(s) are extraordinary and/or extensive requiring special procedures, the Bureau shall set forth a proposal in writing outlining procedure(s) which will bring the area(s) into compliance. The procedures shall be submitted to SCAQMD's Directors of Engineering and Enforcement for either an approval or a written alternate proposal(s) with the goal of reaching a mutual agreement on the appropriate procedure(s) to be undertaken.

3.4 ACTIONS SUBSEQUENT TO REPAIR

Instantaneous Exceedance

All areas of repair shall be retested with an OVA per procedure described in Section 2.5 for further surface emissions within four (4) business hours after repair completion or, if exceedance is on a Friday after 12:00 noon, said retest shall be before 5:00 p.m. on Saturday. If 500 ppm/v is still exceeded, the above repair and retesting shall be repeated until surface gas emissions concentration is below 500 ppm/v. If after three (3) attempts to repair, 500 ppm/v is still exceeded, the

Bureau shall confer with SCAQMD Division Managers for a special repair solution, see Section 3.5 below. After the recheck on the repair is below the 500 ppm/v exceedance level, the area shall be retested between seven and ten days after repairs are completed.

Integrated Exceedance

All areas of repair shall be retested with a portable bag sampler per procedure described in Section 1.5 for further surface emissions within four (4) business hours after repair completion or, if exceedance is on Friday after 12:00 noon, said retest shall be before 5:00 pm on Saturday. If 50 ppm/v is still exceeded, the above repair and retesting shall be repeated until surface gas emissions concentration is below 50 ppm/v. If after three (3) attempts to repair, 50 ppm/v is still exceeded, the Bureau shall confer with the SCAQMD Division Managers for a special repair solution, see Section 3.5 below.

3.5 SPECIAL REPAIR PROCEDURES

If after the initial cover and repair the surface, emissions concentration still exceeds 500 ppm/v for instantaneous and 50 ppm/v for integrated, SCAQMD Enforcement Division Air Toxics Control Branch Manager and Engineering Division Manager for landfills shall be notified by phone by the landfill manager or his designee within four (4) business hours. Said notification shall be followed up in writing to said managers within two (2) business days. If said notification is required, it shall be at the discretion of SCAQMD's Engineering Division Manager for Landfills to require a meeting to confer with the Bureau to discuss special repair solutions(s) for the designated problem area(s).

3.6 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to landfill cover maintenance and repair on-site. Such records shall be retained for a minimum of two (2) years.

- Instantaneous Monitoring Field Report reporting the grid number, date, time, description of landfill surface condition, inspector name, methane concentration over 500 ppm/v; description of repair, date and time; recheck methane concentration, date and time, and 10-day recheck methane concentration, date and time, Exhibit 3.1.

- Integrated Monitoring Repair Field Report reporting the grid number, date, time, description of landfill surface condition, inspector name, methane concentration over 50 ppm/v; description of repair, date and time, recheck methane concentration, date and time, Exhibit 3.2.

- Exceedance Notification Log (Instantaneous) reporting the exceedance record number grid number, date, time, methane concentration and person notified for the initial notification, recheck and 10-day repair recheck, Exhibit 3.3.

- Exceedance Notification Log (Integrated) reporting the exceedance record number, grid number, date, time, methane concentration and person notified for the initial notification and recheck, Exhibit 3.4.

EXHIBIT 3.1

INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v
DATE OF ORIGINAL REPORT:
RECORD NUMBER:

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RE CHECK				10 DAY RE CHECK [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)

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 recheck 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 re-check value. Instantaneous readings measured as methane.

E IBIT 3.2

INTEGRATED SURFACE EMISSIONS SAMPLING FIELD REPORT
FOR READINGS GREATER THAN 50 ppm/v
DATE OF ORIGINAL REPORT:
RECORD NUMBER:

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)

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.

EXHIBIT 3.3
LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
EXCEEDANCES NOTIFICATION LOG

RECORD NUMBER:

	EXCEEDANCE NOTIFICATION	EXCEEDANCE RECHECKS
INSPECTOR NAME (IWI)		
DATE		
TIME		
GRID ID		
INSTRUMENT SER. NO.		
CH_4 CONCENTRATION (ppm/v)		
PERSON NOTIFIED (CMT)		
TIME/INITIALS		
PERSON NOTIFIED (OM)		
TIME/INITIALS		
PERSON NOTIFIED (SE)		
TIME/INITIALS		
COMMENTS:		

NOTES:

1. The forms shall be submitted for notification in the following order:
   - Industrial Waste Inspector (IWI)
   - Chief Monitoring Technician (CMT)
   - Operations Manager (OM)
   - Site Engineer (SE)

2. A copy of the Instantaneous Monitoring Field Report must remain attached to this sheet until the problem is corrected and submitted to the Chief Monitoring Technician. The original must be submitted to the Operations Manager within four hours of detection for repair procedures.

EXHIBIT 3.4

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
EXCEEDANCES NOTIFICATION LOG

RECORD NUMBER:

	EXCEEDANCE NOTIFICATION	EXCEEDANCE RECHECKS	10-DAY EXCEEDANCE RECHECKS
INSPECTOR NAME (IWI)			
DATE			
TIME			
GRID ID			
INSTRUMENT SER. NO.			
CH_4 CONCENTRATION (ppm/v)			
PERSON NOTIFIED (OM)			
TIME/INITIALS			
PERSON NOTIFIED (SE)			
TIME/INITIALS			
PERSON NOTIFIED			
TIME/INITIALS			
COMMENTS:			

NOTES:

1. The forms shall be submitted for notification in the following order:

   - Industrial Waste Inspector (IWI)
   - Chief Monitoring Technician (CMT)
   - Operations Manager (OM)
   - Site Engineer (SE)

2. A copy of the Instantaneous Monitoring Field Report must remain attached to this sheet until the problem is corrected and submitted to the Chief Monitoring Technician. The original must be submitted to the Operations Manager within four hours of detection for repair procedures.

SECTION 4.O

MONITORING OF GAS PERIMETER PROBES

4.0 MONITORING OF GAS PERIMETER PROBES

4.1 OBJECTIVE

The objective of the installation and monitoring of the gas perimeter probes is to determine whether off-site gas migration exists. Gas samples extracted from the probes are analyzed to determine the concentrations of total organic compounds and any toxic air contaminants to assess the effectiveness of the landfill gas control system.

4.2 PROTOCOL REQUIREMENT

The Bureau shall monitor the gas perimeter probes for off-site landfill gas migration at least once each month.

4.3 LOCATION OF GAS PERIMETER PROBES

The locations of the gas perimeter probes are shown on Figure 4.1. Currently, forty-one (41) gas perimeter probes have been installed.

Additional gas perimeter probes shall comply with the following guidelines unless site specific conditions dictate otherwise and then as approved by the Executive Officer:

- The probes shall be installed outside of the refuse deposited area and within the perimeter of the landfill property.

- Whenever accessible, the probes shall be located within 100 ft. of the landfill property line. Any other distances require prior approval by the District. Requests for other distances shall include the reasons for the request with all supporting information for the District's evaluation.

- The spacing between gas probes shall be determined based upon the adjacent land use up to 1000 feet from the boundary of the refuse disposal area.

  Resident/Commercial - 100 feet
  Undeveloped Open Space - 650 feet
  Landfill with liners - 1000 feet

- The depth of the gas perimeter probes shall be based on the depth of the refuse adjacent to the proposed probe locations as follows:

First Depth	10 feet below surface
Second Depth	25% of refuse depth or 25 feet below surface, whichever is deeper
Third Depth	50% of refuse depth or 50 feet below surface, whichever is deeper
Fourth Depth	75% of refuse depth or 75 feet below surface, whichever is deeper

Second, third and fourth depth gas probes may be deleted if the first depth is deeper than the depth of refuse. If drilling to the required depth fails, the Bureau shall document all attempts with drilling logs and submit this information to the District for approval.

4.4 DESIGN OF GAS PERIMETER PROBES

Design and construction details shall be submitted to the Executive Officer for his approval prior to installation. Employees involved in the construction of the gas perimeter probes shall have completed the instruction program on landfill safety procedures. To minimize odor and health problems if at anytime work is interrupted, the bore hole shall be immediately covered with plastic sheeting and secured by an earth berm to hold the plastic sheet firmly in place.

4.5 MONITORING FREQUENCY

The Bureau shall monitor each gas perimeter probe for off-site landfill gas migration at least once each month. The Director of the Bureau shall file a written request with the Executive Officer to monitor less frequently. Such a request will be supported with previous monitoring results and any other pertinent/related data. The Executive Officer will notify the Director of the Bureau of his decision in this matter in writing. Unless District approval is granted, the City must continue its monthly monitoring for all gas perimeter probes.

4.6 MONITORING PROCEDURE

All gas perimeter probes shall be monitored for the following:

- Static gas pressure with pressure gauge using a Dwyer Series 2000 Magnehelic. Venting of the probe, or any action which would allow a potential pressure change in the probe, shall not be permitted prior to measuring pressure. A leak-tight connection shall be made between the pressure gauge and the gas perimeter probe, then the labcock valve shall open and the pressure or vacuum measured and the value recorded.

- Total organic compounds, measured as methane, in zero to one hundred percent (0 to 100%) range with a Gas Tech Model NP-204 explosimeter equipped with both catalytic oxidation and thermal conductivity detectors. The gas perimeter probes shall be evacuated with a vacuum pump until the total organic compounds concentration remains constant for at least 30 seconds, then the total organic compounds shall be measured and record the value.

- If this value is less than 1 percent, then monitor total organic compounds with an OVA, Model 128 and record the value.

- The barometric pressure shall be recorded with a barometer that has a range of 28.3 inches to 32.0 inches of mercury.

Instruments shall be approved in writing by the Executive Officer. If any gas perimeter probe reading is greater than five hundred parts per million by volume (500 ppm/v), the Bureau shall implement the contingency plan in Section 4.7.

4.7 CONTINGENCY PLAN

The following procedures shall be undertaken if total organic compounds are detected in a gas perimeter probe at a concentration equal to or greater than five hundred parts per million by volume (500 ppm/v) or a positive gas pressure is detected in a gas perimeter probe.

- Review historical gas perimeter probe monitoring data to determine if total organic compounds at 500 ppm/v or positive gas pressure have been detected previously in the probe.

- Identify all gas collection wells with a radius of influence on the probe.

- Review data from gas perimeter probes in the area to determine if gas migration is occurring offsite.

- Increase vacuum to adjacent gas collection wells within the radius of influence of the probe, if possible.

- Review Barometric Pressure Data.

- Compare previous gas perimeter probe data to probe monitoring data collected within 48 hours after the contingency procedures, submit the data to the Site Engineer for further evaluation or corrective action.

4.8 SAMPLING PROCEDURE

If the total organic compounds concentration does not exceed five (5) percent by volume in any of the gas perimeter probes, the Bureau shall collect one bag sample from one probe with the highest concentration. If the total organic compounds concentration for any of the gas perimeter probes exceeds five (5) percent by volume, one bag sample per probe from the gas perimeter probes with the highest concentrations above five (5) percent by volume (up to a maximum of five probes) shall be taken by the Bureau.

Bag samples shall be collected after the probes have been properly evacuated in the same manner described in Section 4.9. Once a probe is evacuated, a gas sample shall be collected in a 10-liter Tedlar bag over a continuous ten minute period using the evacuated container sampling procedure described in Section 7.1.1 of EPA Method 18 or direct pump sampling procedure described in Section 7.1.2 of EPA Method 18.

4.9 QUALITY CONTROL PROCEDURE

The following quality control procedure shall be implemented during the gas perimeter probe monitoring and sampling operations:

Field Monitoring and Sampling QA/QC Procedure

Monitoring

- Before sending the monitoring equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Calibrate and maintain the flame ionization detector, explosimeter, differential pressure gauges or other approved instruments as detailed in Table 4.1.

- Clearly mark and identify each probe location on a gas perimeter probe location map of the landfill drawn to scale, Figure 4.1.

Data for each probe monitored shall be entered on a Field Sheet, Exhibit 4.4.

Sampling

- Before sending the sampling equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Prior to use, the new and used Tedlar bags shall be evacuated and filled with purified nitrogen three times to flush out any contaminants. Twenty-four hours before each bag is to be used in the field, it shall be filled with purified nitrogen. The following morning the bag shall be checked for leakage. Each bag then shall be flushed with zero hydrocarbon air or ultra pure nitrogen and checked with an OVA for contamination. Any bag having leakage or contamination shall be removed from service.

- Assign an identification number to each sampling bag.

- Document the date and time that the bag was put into operation, check whether the bag valve is in the open position. If the valve is in the closed position, open the valve and record the time on the Quality Control Data Sheet. If the valve is open, replace the bag and start the procedure over, recording the time it was removed from service on the Quality Control Data Sheet.

- Clearly mark and identify each sample location on a gas perimeter probe location map of the landfill drawn to scale, Figure 4.1.

- All samples shall be collected with an approved sampler that is calibrated and maintained in accordance with the Instrument Calibration and Maintenance Frequency, Table 4.1.

Data for each sample collected shall be entered on a Quality Control Data Sheet, Exhibit 4.1.

Sampling Event/Logbook Documentation

The Chief Monitoring Technician shall maintain a thorough, accurate logbook record for all samples sent to the laboratory. Entries in the logbook shall be made in waterproof ink and corrections shall consist of line-out deletions that are initialed and dated. Entries must include the following information:

- Name of personnel
- Name of actual sample collector
- Sample identification number(s)

- Physical condition during sampling
- Climatic conditions
- Date and time of sample collection
- Sample collection procedure and equipment
- Number and volume of samples(s)
- Parameters requested for analysis
- Identification number(s) of any duplicates collected
- Field observations
- Decontamination procedures
- Name of courier and laboratory
- Condition of samples prior to transport

Documentation must provide sufficient information to reconstruct the sampling event without relying on the monitoring technician's memory.

Laboratory QA/QC Procedure

- Record the activity name, field log book number, sample I.D., sample volume, date, time, sample location, sample type, number of containers, analysis method and any remarks on the Chain of Custody record and attach to each sampling bag.

- Submit one trip blank (Nitrogen) sample with every batch of gas perimeter probe samples to be analyzed by the laboratory to ensure analytical accuracy.

- The analyses for methane and selected VOCs shall be done by an SCAQMD approved laboratory.

4.10 ANALYTICAL PROCEDURE

Bag samples collected shall be analyzed within 72 hours of collection, or sooner if notified by the Executive Officer. Bag Samples shall be analyzed for total organic compounds, chlorinated hydrocarbons, methane, vinyl chloride, and toxic air contaminants using analytical methods identified in Table 4.2, in accordance with Analytical Procedures, Guidelines for Implementation of Rule 1150.1, SCAQMD, October 1985, or by equivalent methods approved by the Executive Officer. Note that all bags samples must be kept in light-sealed containers to avoid photochemical reactions. Laboratory reports shall contain the following information:

- Laboratory name
- Sample identification

- Laboratory identification number
- Type of media analyzed (air, gas, etc.)
- Parameters analyzed
- Concentrations
- Units and limits of detection
- Analytical method used
- Sample date
- Dilution factors, if necessary
- Chain of Custody Record

The analytical laboratory shall also provide QA/QC information for results of field blanks, replicates and calibrations, as well as laboratory sample custody information.

The Bureau shall file a written request with the Executive Officer to either composite samples or test fewer samples. Such a request shall be supported with sampling results and other documentation which characterize the toxic emissions. The Executive Officer shall notify the Director of the Bureau of any related decisions in writing. Upon request, samples shall be split to allow confirmation of the analyses by the SCAQMD.

4.11 CHAIN OF CUSTODY

A Chain of Custody Record, Exhibit 4.2, shall accompany all bag samples. The Chain of Custody (COC) is employed as physical evidence of a sample custody. The COC record system provides the means to identify, track and monitor each individual sample from the point of collection through final data analysis reporting. A COC record is required for each shipment of samples. Laboratory personnel shall also record the condition of the sample. Corrections shall consist of line-out deletions that are initialed and dated. No erasures shall be permitted. The following information shall appear on the COC record:

- Name of Site
- Activity name and reference number
- Sample identification(s) and sample bag number(s)
- Sampling date(s) and times for all sample(s)
- Sample type(s)
- Number of sample(s) and number of container(s)
- Analyses requested
- Name of courier and shipping number
- Name of laboratory
- Signatures of sampler, Chief Monitoring Technician, courier and Laboratory receiver.

The sampler and Chief Monitoring Technician will complete a COC record to accompany each sample shipment from the field to the laboratory. After completion of the COC, one copy will be attached to each sample. One copy will be retained by the Chief Monitoring Technician. The courier does need to sign the COC.

The laboratory representative who accepts the incoming sample shipment will sign and date the COC to acknowledge receipt of samples. This signed copy will then be returned with the analytical reports.

4.12 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained onsite, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771 Foothill Blvd., Tujunga, CA 91042.

- Quality Control Data Sheet with probe ID, sample ID, bag number, flow rate, start time, stop time, sample volume and methane concentration for each gas perimeter probe, Exhibit 4.1.

- Gas Perimeter Probe Map showing the map of the landfill, drawn to scale, with the sampling locations clearly marked and numbered, Figure 4.1.

- Chain of Custody Record for each gas perimeter probe sample submitted to the laboratory for analysis, Exhibit 4.2.

- Analytical Data Sheet reporting volume concentration of total organic compounds (reported as methane and total non-methane hydrocarbons) for gas perimeter probes chosen for analysis, Exhibit 4.3.

4.13 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to gas perimeter probe monitoring onsite. Such records shall be retained for a minimum of two (2) years.

- Quality Control Data Sheet: Exhibit 4.1,
- Chain of Custody Record: Exhibit 4.2,
- Field Sheet: Exhibit 4.4,
- Laboratory Analyses
- Notification Sheets

- Equipment calibration, maintenance ad repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets

FIGURE 4.1

LOPEZ CANYON LANDFILL GAS PERIMETER PROBES LOCATION MAP

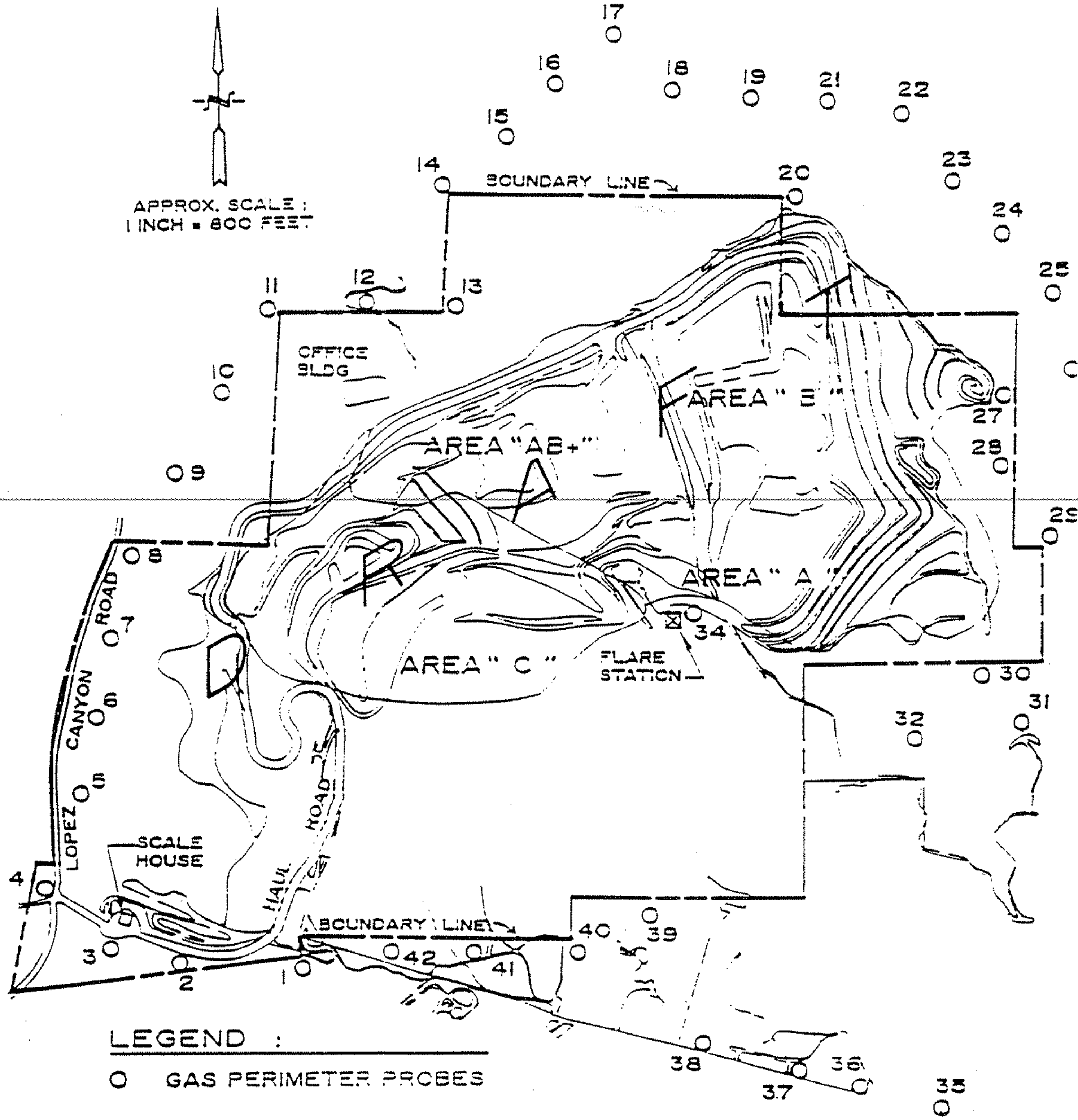


EXHIBIT 4.1
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE SAMPLING
QUALITY CONTROL DATA SHEET

Date: June 8, 1991 Inspector: IWI Instrument Serial No.:_________

Probe ID	Sample ID	Bag No.	Flow Rate (cc/min)	Start Time	Stop Time	Sample Volume (Liters)	Methane (%/ppm)

EXHIBIT 4.2
LOPEZ CANYON LANDFILL

CHAIN OF COUSTODY RECORD

Field Log Book

ACTIVITY: Gas Perimeter Probes

Reference No.______

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks

Total No. of Samples Shipped: 1	Total No. of Containers Shipped:	Special Instructions:

SAMPLED BY:
(SIGN) Chief Monitoring Technician /__________ /__________ /

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 (____/____)

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME (____/____)

Revised: August 25, 1991

Form: LC-00

Performance Analytical Inc.
Environmental Testing and Consulting

EXHIBIT 4.3

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: GM-LC-33-7 (Tedlar Bag #201)

PAI Sample ID: 9102695

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

Matrix: Tedlar Bag
Date Received: 07/30/91
Date Analyzed: 07/31/91
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	400	10	160	3.9
75-35-4	1,1-DICHLOROETHENE	39	10	10	2.5
75-09-2	METHYLENE CHLORIDE	2100	10	620	2.9
75-34-3	1,1-DICHLOROETHANE	630	10	160	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	100	10	19	1.8
71-43-2	BENZENE	280	10	88	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	600	10	110	1.9
108-88-3	TOLUENE	120	10	32	2.7
12-18-4	TETRACHLOROETHENE	790	10	120	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	190	10	44	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

22954 Osborne Street ... CA 91304 • Phone ...

Performance Analytical Inc.

PERFORMANCE ANALYTICAL INC.

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:	Joseph Cook	Date Received:	N/A
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	07/31/91
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

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: 3423

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #3
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/30/91
Date Analyzed: 08/01/91

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Total Non-Methane Organics (as Methane) Result	Detection Limit
GM-LC-33-7 (201)	9102695	130	2.0
GM-LC-33-7 (201)	LAB DUPLICATE	130	2.0
N/A (08/01/91)	METHOD BLANK	ND	2.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/30/91
Date Analyzed: 07/31/91

Client Sample ID	PAI Sample ID	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Methane (ppm)	Nitrogen (ppm)	Oxygen (ppm)
GM-LC-33-7 (201)	9102695	310000	ND < 100	420000	160000	6500
N/A (07/31/91)	METHOD BLANK	ND < 100	ND < 100	ND < 100	ND < 1000	ND < 40

ND = Not Detected - Less Than Indicated Detection Limit

22954 Osborne Street • Canoga Park, CA 91304 • Phone [illegible] • Fax [illegible]

EXHIBIT 4.4
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE MONITORING
FIELD SHEET

Date:	Inspectors:	Instrument(ppm)-S/No.: Instrument(ppm)-M/No.:	Instrument(%)-S/No.: Instrument(%)-M/No.:

Temperature @ Start: ________ Temperature @ End: ________	Weather:	Legend:	T = Trace W = Water D = Destroyed -1 = no reading taken

GPP #	Time	Barometric Pressure	Pressure (in. of H_20)	Methane (%/ppm)	Oxygen (%)	Background (PPM)	Sampled (Yes or No)	Remarks
GPP #1								
GPP #2								
GPP #3								
GPP #4								
GPP #5								
GPP #6								
GPP #7								
GPP #8								
GPP #9								
GPP #10								
GPP #11								
GPP #12								
GPP #13								
GPP #14								
GPP #15								
GPP #16								
GPP #17								
GPP #18								
GPP #19								
GPP #20								

EXHIBIT 4.4
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE MONITORING
FIELD SHEET

GPP #	Time	Barometric Pressure	Pressure (in. of H_20)	Methane (%/ppm)	Oxygen (%)	Background (PPM)	Sampled (Yes or No)	Remarks
GPP #21								
GPP #22								
GPP #23								
GPP #24								
GPP #25								
GPP #26								
GPP #27								
GPP #28								
GPP #29								
GPP #30								
GPP #31								
GPP #32								
GPP #34								
GPP #35								
GPP #36								
GPP #37								
GPP #38								
GPP #39								
GPP #40								
GPP #41								
GPP #42								

NOTE: GPP Probe #33 is designated as a Gas Indicator Probe.

TABLE 4.1
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Organic Vapor Analyzer 128		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	1/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Leak Check	Hydrogen Supply System	1/Per Day
Voltage Supply	Internal	1/Per Day
High and Low Calibration	Internal	2/Per Day
Hydrogen Fill-Up	Hydrogen Supply	2/Per Day
Gas Calibration	10 PPM Methane	2/Per Day
Gas Calibration	100 PPM Methane	2/Per Day
Gas Calibration	500 PPM Methane	2/Per Day
Gas Calibration	2% Methane in Air	2/Per Day
Electrical Calibration	Internal	1/Per Week
Flow Rate	Flow Meter	1/Per Week
Maintenance and Cleaning		1/Per Day

Magnehelic Pressure Guages		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	As needed
Pressure Calibration	Manometer	1/Per Month
Maintenance/Cleaning		1/Per Day

TABLE 4.1
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Gastech NP - 204 Explosimeter		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	3/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Voltage Adjust	Internal	As needed
Operational Zero	Ultra Pure Nitrogen	3/Per Day
LEL Zero	Internal	3/Per Day
LEL Gas Calibration	2% Methane in Air	3/Per Day
High % Scale Zero	Internal	3/Per Day
High % Scale Calibration	20% Methane in Nitrogen	3/Per Day
Maintenance/Cleaning		1/Per Week

TABLE 4.2
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE SAMPLING ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
METHANE	GC/FID (EPA METHOD 25.2) GC/TCD	0.1%v
TGNMHC	GC/FID (EPA METHOD 25.1) GC/FID (EPA METHOD 25.2)	TESTING
ACETONITRILE	GC/MS MODIFIED EPA TO-14	50 ppbv
BENZYL CHLORIDE	GC/ELCD & PID MODIFIED CARB 102 & 103	50 ppbv
CHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	40 ppbv
CHLOROETHENE (VYNIL CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	30 ppbv
DICHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	40 ppbv
1,1-DICHLOROETHANE (ETHYLIDENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
1,2-DICHLROETHANE (ETHYLENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
1,1-DICHLOROETHENE (VINYLIDENE CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
DICHLOROMETHANE	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
HYDROGEN SULFIDE	GC/FID & ELCD(S)	TESTING
TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
TETRACHLOROMETHANE (CARBON TETRACHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv

TABLE 4.2
LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE SAMPLING ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
TOLUENE	GC/PID MODIFIED CARB 102 & 103	25 ppbv
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
TRICHLOROETHYLENE	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
TRICHLOROMETHANE (CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
XYLENE	GC/PID MODIFIED CARB 102 & 103	2.5 ppbv

SECTION 5.0

MONITORING OF GAS COLLECTION INDICATOR PROBES

5.0 MONITORING OF GAS COLLECTION INDICATOR PROBES

5.1 OBJECTIVE

The objective of the installation and monitoring of Gas Collection Indicator Probes (GCIPS) is to assist in the proper adjusting and optimizing of the gas collection system. Soil gas pressures and gas concentrations are measured to evaluate the operation of the gas control system. These probes are non-compliance probes located outside of the refuse prism and inboard of the severely steep adjacent side slopes. They will act as gas migration probes for gas emissions detection on these slopes.

5.2 PROTOCOL REQUIREMENT

The Bureau shall monitor the gas collection indicator probes for static gas pressure and total organic compounds, reported as methane, and oxygen concentrations at least once each week.

5.3 LOCATION OF GAS COLLECTION INDICATOR PROBES

The locations of the gas collection indicator probes are shown on Figure 5.1. Currently, ten (10) gas collection indicator probes have been installed.

Additional gas collection indicator probes shall comply with the following guidelines unless site specific conditions dictate otherwise and then as approved by the Executive Officer:

- The probes shall be installed at the locations agreed to by the District and the Bureau.
- The spacing and location of probes shall be based on factors of drilling equipment access, distance to refuse and meeting all criteria established for the gas collection indicator probes.
- The depth of the gas collection indicator probes shall be based on the depth of the refuse adjacent to the proposed probe locations as follows:

First Depth	10 feet below surface
Second Depth	25% of refuse depth or 25 feet below surface, whichever is deeper
Third Depth	50% of refuse depth or 50 feet below surface, whichever is deeper

Fourth Depth — 75% of refuse depth or 75 feet below surface, whichever is deeper

Second, third and fourth depth probes may be deleted if the first depth is deeper than the depth of refuse. If drilling to the required depth fails, the Bureau shall document all attempts with drilling logs and submit this information to the District for approval.

5.4 DESIGN OF GAS COLLECTION INDICATOR PROBES

Design and construction details shall be submitted to the Executive Officer for approval prior to installation. Employees involved in the construction of the gas collection indicator probes shall have completed the instruction program on landfill safety procedures. If at anytime work is interrupted, the bore hole shall be immediately covered with plastic sheeting and secured by an earth berm to hold the plastic sheet firmly in place.

5.5 MONITORING FREQUENCY

The Bureau shall monitor each gas collection indicator probe at least once each week. The monitoring frequency shall be reduced to once a month after four (4) consecutive probe readings indicate a volume of less than five percent total organics and a negative static gas pressure. If positive gas pressure or five percent methane is detected in the probe, then the frequency will revert to weekly monitoring. The Director of the Bureau shall file a written request with the Executive Officer to monitor less frequently. Such a request shall be supported with previous monitoring results and any other pertinent/related data. The Executive Officer will notify the Director of the Bureau of his decision in this matter in writing. Unless District approval is granted, the Bureau shall continue the monitoring schedule described above.

5.6 MONITORING PROCEDURE

All gas collection indicator probes shall be monitored for the following parameter:

- Static gas pressure with a pressure gauge using a Dwyer Series 2000 Magnehelic. Venting of the probe, or any action which would allow a potential pressure change in the probe, shall not be permitted prior to measure in a pressure. A leak-tight connection shall be made between the differential pressure gauge and the collection indicator probe, then the labcock valve shall be opened and the pressure or vacuum measured and the value recorded.

- Total organic compounds, measured as methane, with a Gas Tech Model NP-204 explosimeter equipped with both catalytic oxidation and thermal conductivity detectors. The gas collection indicator probes shall be evacuated with a vacuum pump until the total organic compounds concentration remains constant for at least 30 seconds, then the total organic compounds shall be measured and record the value.

- If this value is less than one percent, then monitor total organic compounds with an OVA 108 and record the value.

- The barometric pressure shall be recorded with a barometer that has a range of 28.3" to 32.0" of mercury.

Instruments shall be approved in writing by the Executive Officer. If any gas collection indicator probe static pressure reading in positive, the Bureau shall implement the contingency plan is Section 5.7.

5.7 CONTINGENCY PLAN

The following procedures shall be undertaken if positive gas pressure is detected in any gas collection indicator probe:

- Review historical gas collection indicator probe monitoring data to determine if positive gas pressure has been detected previously in the probe.

- Identify all gas collection wells with a radius of influence on the probe.

- Review data from gas perimeter probes in the area to determine if landfill gas is migrating offsite.

- Increase vacuum to adjacent gas collection wells within the radius of influence of the probe, if possible.

- Compare previous gas collection indicator probe data to probe monitoring data collected within 48 hours after the contingency procedures, and submit the data to the Site Engineer for further evaluation or corrective action.

- Review barometric pressure data.

5.8 QUALITY CONTROL PROCEDURE

The following quality control procedure shall be implemented during the gas collection indicator probe monitoring operations:

Field Monitoring QA/QC Procedure

- Before sending the monitoring equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Calibrate and maintain the explosimeter and differential pressure gauges or other approved instruments as detailed in Table 5.1.

- Clearly mark and identify each probe location on a gas collection indicator probe location map of the landfill drawn to scale, Figure 5.1.

Data for each probe monitored shall be entered on a Field Sheet Form, Exhibit 5.1

5.9 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained onsite, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771 Foothill Blvd., Tujunga, CA 91042.

- Gas Collection Indicator Probe Map showing the map of the landfill, drawn to scale, with the probe locations clearly marked and numbered, Figure 5.1.

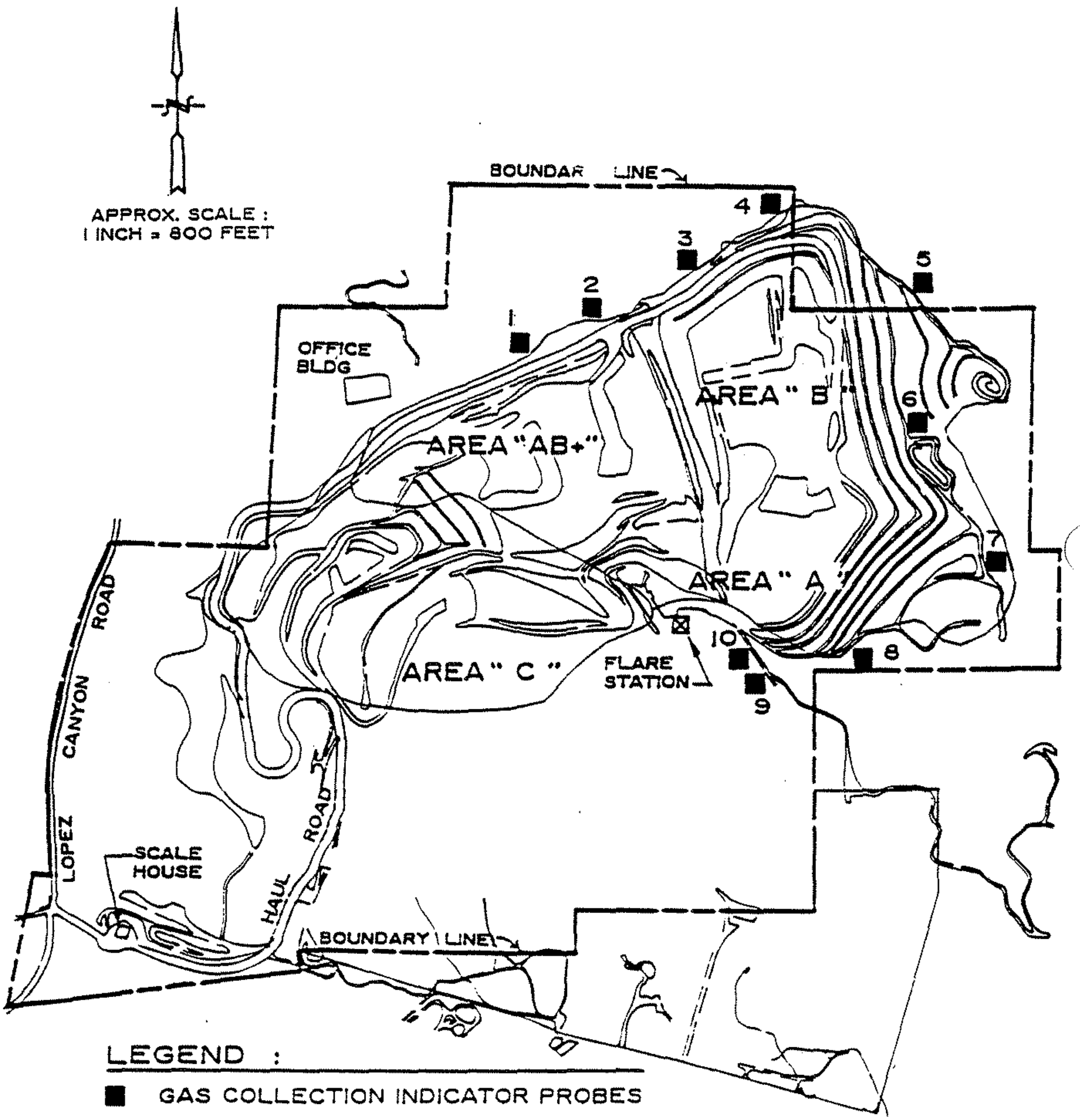
5.10 RECORD KEEPING REQUIREMENT

The Bureau shall maintain the following records of all data and results relating to Gas Collection Indicator Probe Monitoring. Such records shall be retained for a minimum of two (2) years.

- Field Sheet: Exhibit 5.1
- Notification sheets
- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets

FIGURE 5.1

LOPEZ CANYON LANDFILL GAS COLLECTION INDICATOR PROBES LOCATION MAP



LEGEND :

■ GAS COLLECTION INDICATOR PROBES

GAS COLLECTION INDICATOR PROBE MONITORING

Date:	Inspectors:	Instrument(ppm)-S/No.: Instrument(ppm)-M/No.:	Instrument(%)-S/No.: Instrument(%)-M/No.:

Temperature @ Start: ________ Temperature @ End: ________	Weather:	Legend: T = Trace, D = Destroyed, W = Water, -1 = no reading taken

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_20)	TOC (ppm)	Methane (%)	Background (PPM)	Remarks
1A	7'-11'							
1B	17'-41'							
1C	47'-61'							
1D	67'-81'							
2A	7'-11'							
2B	17'-26'							
2C	32'-51'							
2D	57'-101'							
3A	7'-11'							
3B	17'-26'							
3C	32'-51'							
3D	57'-101'							
4A	7'-11'							
4B	17'-36'							
4C	42'-71'							
4D	77'-101'							

EXHIBIT 5.1
GAS COLLECTION INDICATOR PROBE MONITORING

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_20)	Total Organics (PPM)	Methane (%)	Background (PPM)	Remarks
5A	7'-11'							
5B	17'-26'							
5C	32'-51'							
6A	7'-11'							
6B	17'-26'							
6C	32'-51'							
7A	7'-11'							
7B	17'-26'							
7C	32'-51'							
8A	7'-11'							
8B	17'-36'							
8C	42'-71'							
8D	77'-101'							
9A	3'-7'							
10A	7'-11'							
10B	17'-36'							
10C	42'-71'							
10D	77'-101'							

TABLE 5.1
LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Organic Vapor Analyzer 128		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	1/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Leak Check	Hydrogen Supply System	1/Per Day
Voltage Supply	Internal	1/Per Day
High and Low Calibration	Internal	2/Per Day
Hydrogen Fill-Up	Hydrogen Supply	2/Per Day
Gas Calibration	10 PPM Methane	2/Per Day
Gas Calibration	100 PPM Methane	2/Per Day
Gas Calibration	500 PPM Methane	2/Per Day
Gas Calibration	2% Methane in Air	2/Per Day
Electrical Calibration	Internal	1/Per Week
Flow Rate	Flow Meter	1/Per Week
Maintenance and Cleaning		1/Per Day

Magnehelic Pressure Guages		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	As needed
Pressure Calibration	Manometer	1/Per Month
Maintenance/Cleaning		1/Per Day

TABLE 5.1
LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Gastech NP - 204 Explosimeter		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	3/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Voltage Adjust	Internal	As needed
Operational Zero	Ultra Pure Nitrogen	3/Per Day
LEL Zero	Internal	3/Per Day
LEL Gas Calibration	2% Methane in Air	3/Per Day
High % Scale Zero	Internal	3/Per Day
High % Scale Calibration	20% Methane in Nitrogen	3/Per Day
Maintenance/Cleaning		1/Per Week

SECTION 6.0

AMBIENT AIR SAMPLING

6.0 AMBIENT AIR SAMPLING

6.1 OBJECTIVE

The objective of ambient air sampling is to determine the concentrations of total organic compounds and any toxic air contaminants in the air at the perimeter of the landfill, and to assess the effectiveness of the landfill gas control system.

6.2 PROTOCOL REQUIREMENT

The Bureau shall conduct ambient air sampling at least once per month. The sampling plan shall include sampler locations, sample operational procedures and plans for the continuous monitoring of wind direction and speed. Records of all data and results shall be maintained onsite.

6.3 NUMBER AND LOCATION OF SAMPLERS AND WEATHER STATIONS

Sampler and weather station locations shall be placed with respect to local meteorological conditions, topography, and population density. The number of air samples required shall depend upon the topography and the location of the sampler. Samplers shall be located to provide good meteorological exposure to the predominant offshore (drainage land breeze) and onshore (sea breeze) wind flow patterns. In those areas with significant slopes, local nightly drainage patterns shall also be sampled. The site has six samplers; one daytime drainage, two nighttime drainage and three diurnal. In addition, there are three weather stations; two perimeter and one near the Flare Station compound. The locations of the samplers and weather stations are shown on Figure 6.1. The Executive Officer will approve the sampling and weather station locations prior to sampling.

6.4 SAMPLING FREQUENCY

The Bureau shall conduct ambient air sampling at least once per month or at less frequent intervals to be determined by the Executive Officer upon a written request from the Director of the Bureau. Such a request shall be supported with previous sampling results and other related documentation. The Executive Officer will notify the Director of the Bureau of any such decision in writing. The current ambient station sampling schedule is detailed in Table 6.2.

6.5 SAMPLING PROCEDURE

All ambient air samples shall be collected in 12-hour sets: daytime drainage and diurnal samples beginning within the hours of 10 am - 11:00 am and ending within the hours of 10 pm - 11:00 pm, nighttime drainage and diurnal samples beginning within the hours of 10 pm - 11:00 pm and ending within the hours of 10 am - 11:00 am. One sample shall be collected at each sampling location to identify the mass flow parameters during both daytime onshore winds and nighttime offshore or drainage flow, using the self-contained portable sampling units. The wind monitoring stations, with continuous recorders, shall measure wind speed and direction throughout the entire sampling period.

6.6 SAMPLING CONDITIONS

Ambient air sampling shall be conducted on days when stable (offshore drainage) and unstable (onshore sea breeze) meteorological conditions are representative for the season. Preferable sampling conditions are characterized by the following meteorological conditions:

- Clear cool nights with wind speeds two (2) miles per hour or less.
- Onshore sea breezes with wind speeds 10 miles per hour or less.

No sampling shall be conducted or terminated if the following adverse meteorological conditions exist.

- ~~Within 72 hours after rainfall.~~
- Average wind speeds greater than 15 miles per hour for any 30 minute period.
- Instantaneous wind speeds greater than 25 miles per hour.

Continuously recorded on-site wind speed and direction measurements shall be used to characterize the micrometeorology of the site and to verify that the meteorological criteria have been met during sampling. Multiple wind monitoring systems shall be installed onsite and operated to characterize the air mass movement in and around the landfill. The location of the wind monitoring stations are shown on Figure 6.1.

6.7 EQUIPMENT SPECIFICATIONS

The integrated ambient air sampling units shall consist of a sampler housing containing:

- Power -- 12-volt DC deep cycle battery (lead acid).
- Pump -- Spectrex pump, Model AS 300-10, 3 to 15-volts DC, 4.5 l/min, maximum unloaded flow rate, non-lubricated Viton diaphragm.

- Clock Timer Switch -- Paragon microprocessor, Model EC-72D/12VDC.

- Bags -- 10 liter Tedlar bag with stainless steel push-pull type valve, with Viton O-ring seal.

- Enclosure -- Waterproof seams and door seal.

- Rotameter -- Porter Rotameter, Model F150-SHRO-13-125-10-13-2285, borosilicate glass, 1 to 50 cc/min flow range with 5 cc/min major graduation and 1 cc/min minor graduation direct reading scale.

- Air Flow Control Orifice -- 316 stainless steel capillary tubing, 1/16 inch O.D. x 0.016 inch wall.

- Bypass Value -- Parker needle valve, Model 4A-V4AN-SS.

- Fittings, Tubing, and Connectors -- 316 stainless steel or Teflon.

The wind monitoring stations shall consist of:

- Climatronics Recorder, P/N 101150. Six standard inputs, 0 to 1-volts DC, 100k ohm impedance. Chart recording on pressure sensitive paper at 2 sec intervals and 1 in/hr travel. Accuracy - 1%± of full scale. Response time - 1 sec max. 3 min±/mo crystal controlled chart drive. Chart life - 30 days. Power requirements - 12-volt DC at 15 MA. Recording range - 0 to 25 and 0 to 50 mph wind speed and 0 to 540° wind direction.

- Climatronics F460 Wind Speed Sensor, P/N 100075. Three cup anemometer. Accuracy - 1%± of full scale. Threshold - 0.5 mph. Operating range - 0 to 125 mph. Power requirements are 12-volt DC at 1 MA.

- Climatronics F460 Wind Direction Sensor, P/N 100076. Straight weighted vane. Accuracy - 2%± of full scale. Threshold - 0.5 mph. Operating range - 0° to 360°. Power requirements - 12-volt DC at 1 MA.

- 10 watt solar panel with 8 Amp/Hr battery.

6.8 QUALITY CONTROL PROCEDURE

The following quality control procedure shall be implemented during the ambient air sampling operation:

Field Sampling QA/QC Procedure

- Prior to use, the new and used Tedlar bags shall be evacuated and filled with purified nitrogen three times to flush out any contaminants. Twenty-four hours before each bag is to be used in the field, it shall be filled with purified nitrogen. The following morning, the bag shall be checked for leakage. Each bag shall be flushed with purified oxygen and checked with an OVA for contamination. Any bag having leakage or contamination shall be removed from service.

- Assign an identification number to each sampling bag.

- Check the pump flows manually by pressing the C1 button on the Clock-Timer switch. Cover bypass momentarily to ensure the ball is free in the rotameter. When the bypass is covered, the ball should rise above its full scale reading.

- Install sample bag (each bag should have a unique identification No.).

- Check the rotameter reading. The float (measured at the middle) should be within +3 and -3 minor graduations of the marked setting for 6.0 cubic centimeters per minute. If the rotameter setting exceeds the above limits, adjust the bypass valve to correct the flow rate. Make sure the flow has stabilized (at least three minutes at constant flow).

- Document the date and time that the bag was put into operation and check the bag valve. If the valve is in the closed position, open the valve and record the time on the Quality Control Data Sheet, Exhibit 6.1. If the valve is open, replace the bag, start the procedure over and record the time it was removed from service on the Quality Control Data Sheet.

- All samples shall be taken with an Ambient Air Sampler that is calibrated and maintained in accordance with the Instrument Calibration and Maintenance Frequency, Table 6.1.

- Check the clock timer. The clock time and the actual time should agree within $\pm$ 3 minutes.

- The wind direction transmitter shall be oriented to true north using a compass.

- Remove the bag for analyses at the end of the 24-hour or other designated period. Keep the bag in a light-sealed container at all times.

Sampling Event/Logbook Documentation

The Chief Monitoring Technician shall maintain a thorough, accurate logbook record for all samples sent to the laboratory. Entries in the logbook shall be made in waterproof ink and corrections shall consist of line-out deletions that are initialed and dated. Entries must include the following information:

- Name of personnel
- Name of actual sample collector
- Sample identification number(s)
- Physical condition during sampling
- Climate conditions
- Date and time of collection
- Sample collection procedure/equipment
- Number and volume of samples(s)
- Parameters requested for analysis
- Duplicates collected and identification number
- Field observations
- Decontamination procedures
- Name of courier and laboratory
- Condition of samples prior to transport

Documentation must provide sufficient information to reconstruct the sampling event without relying on the monitoring technician's memory.

Laboratory QA/QC Procedure

- Assign an activity name, field log book number, sample I.D., sample volume, date, time, sample location, sample type, number of containers, analysis method and any remarks to each sampling bag.

- One trip blank (Nitrogen) sample shall be submitted with every batch of ambient samples to be analyzed by the laboratory to ensure analytical accuracy.

- The analyses for methane and selected VOCs shall be done by an SCAQMD approved laboratory.

6.9 ANALYTICAL PROCEDURE

Bag samples collected shall be analyzed within 72 hours of collection, or shorter period of time if notified by the Executive Officer, for total organic compounds, chlorinated hydrocarbons, methane, vinyl chloride, and toxic air contaminants using analytical methods identified in Table 6.3 in accordance with Analytical Procedures, Guidelines for Implementation of Rule 1150.1, SCAQMD, October 1985, or equivalent methods approved by the Executive Officer. Note that all bags samples must be kept in light-sealed containers to avoid photochemical reactions. Laboratory reports shall contain the following:

- Laboratory name
- Sample identification
- Laboratory identification number
- Type of media analyzed (air, gas, etc.)
- Parameters analyzed
- Concentrations
- Units and limits of detection
- Analytical Method used
- Sample date
- Dilution factors, if necessary
- Chain of Custody Record

The analytical laboratory shall also provide QA/QC information for results of field blanks, replicates and calibrations, as well as laboratory sample custody information.

The Bureau shall file a written request with the Executive Officer, to collect either composite samples or test fewer samples. Such a request shall be supported with sampling results and other documentation which characterize the toxic emissions. The Executive Officer will notify the Director of the Bureau of any related decision in writing. Upon request, samples shall be split to allow confirmation of analyses by the SCAQMD.

6.10 CHAIN OF CUSTODY

A Chain of Custody Record, Exhibit 6.2, shall accompany all bag samples. The Chain of Custody (COC) is employed as physical evidence of sample custody. The COC record system provides the means to identify, track and monitor each individual sample from the point of collection through final data analysis reporting. A COC record is required for each shipment of samples. Laboratory personnel shall also record the condition of the sample. Corrections shall consist of line-out deletions that are initialed and dated. No erasures shall be permitted. The following information shall appear on the COC record:

- Name of Site
- Activity name and reference number
- Sampling location(s) and sample identification(s)
- Sampling date(s) and times for all sample(s)
- Sample type(s)

- Number of sample container(s)
- Analyses requested
- Name of courier and shipping number
- Name of laboratory
- Signatures of sampler, Chief Monitoring Technician, courier and Laboratory receiver.

The sampler and Chief Monitoring Technician shall complete a COC record to accompany each sample shipment from the field to the laboratory. After completion of the COC, one copy shall be attached to each sample. One copy shall be retained by the Chief Monitoring Technician and one copy shall be submitted to the LCMIS Data Entry Processor for office records. The courier will not need to sign the COC if the samples are in an enclosed container with custody seals.

The laboratory representative who accepts the incoming sample shipment shall sign and date the COC to acknowledge receipt of samples. This signed copy shall be returned with the analytical reports.

6.11 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained on-site, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771 Foothill Blvd., Tujunga, CA 91042.

- Quality Control Data Sheet, Exhibit 6.1 reporting station identification (ID) number, sample ID number, sample bag number, initial flow, final flow, sample volume, sample time and any comments.

- Wind Data Summary reporting average wind speed in miles per hour for the day and hour the ambient samples were taken, Exhibit 6.3.

- Ambient Air Sampling and Weather Station map drawn to scale, with the sampling locations clearly marked and numbered, Figure 6.1.

- Chain of Custody Record for each ambient air sample submitted to the laboratory for analysis, Exhibit 6.2.

- Analytical Data Sheet reporting volume concentration of total organic compounds (reported as methane and total non-methane hydrocarbons) and toxic air contaminants for ambient air samples chosen for analysis, Exhibit 6.4.

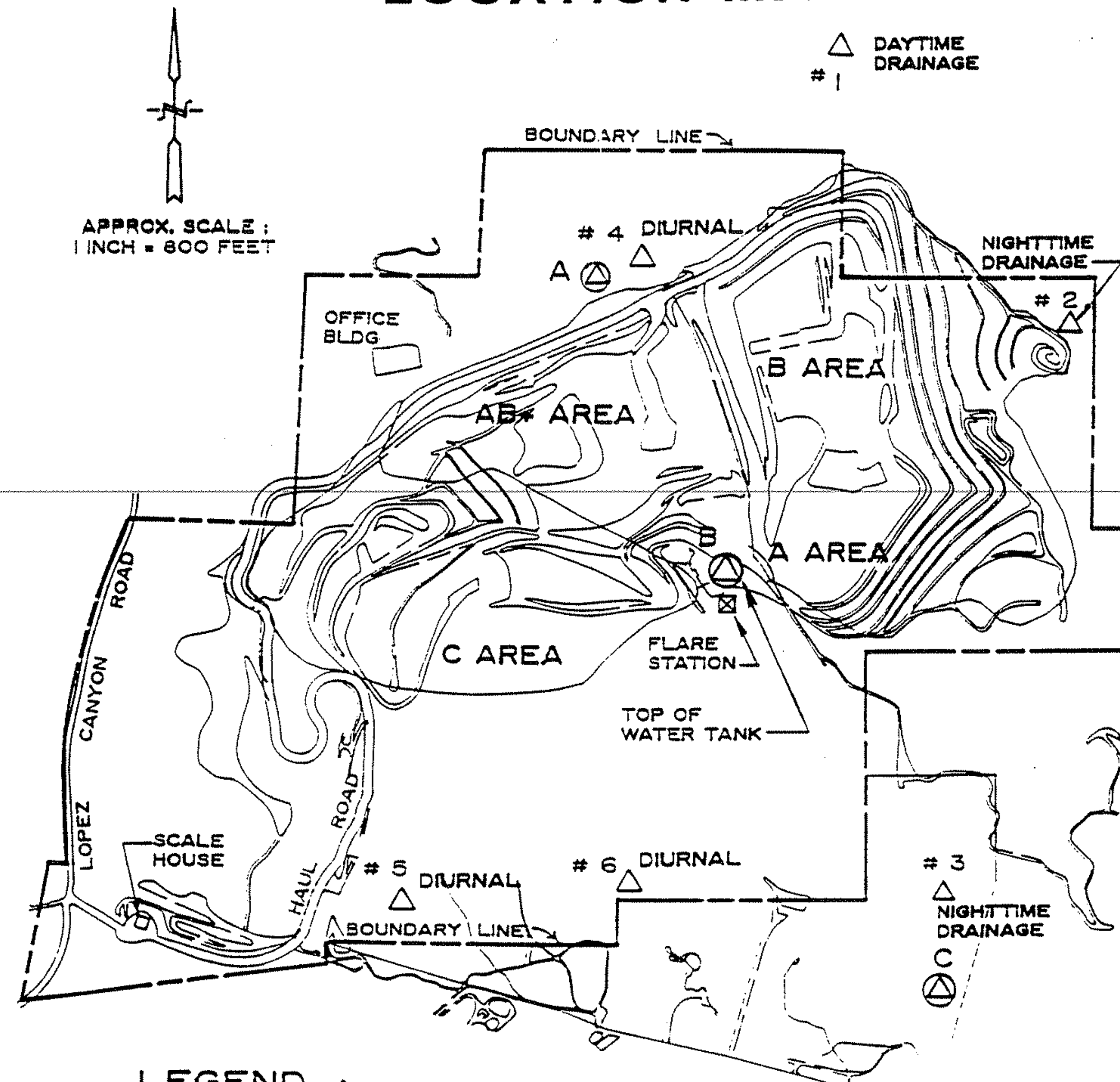
6.12 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to Ambient Air Sampling onsite. Such records shall be retained for a minimum of two (2) years.

- Quality Control Data Sheet: Exhibit 6.1
- Chain of Custody Record: Exhibit 6.2
- Wind Data Summary: Exhibit 6.3
- Laboratory Analyses
- Notification Sheets
- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets

FIGURE 6.1

LOPEZ CANYON LANDFILL AMBIENT AIR SAMPLERS & WEATHER STATIONS LOCATION MAP



LEGEND :

△ AMBIENT AIR SAMPLERS

WEATHER STATIONS

EXHIBIT 6.1
LOPEZ CANYON LANDFILL
QUALITY CONTROL DATA SHEET
AMBIENT AIR SAMPLING

Date: 6/8/91 Inspector: IWI Instrument Serial No.:__________

Day Time Drainage

12-Hour Sample

Station ID	Sample ID	Bag No.	Initial Flow (cc/min)	Final Flow (cc/min)	Volume (Liters)	Sample Time	Comments
#1							

Night Time Drainage

12-Hour Sample

Station ID	Sample ID	Bag No.	Initial Flow (cc/min)	Final Flow (cc/min)	Volume (Liters)	Sample Time	Comments
#2							
#3							

Diurnal 24-Hour

12 Hour Daytime/12 Hour Nightime Sample

Station ID	Sample ID	Bag No.	Initial Flow (cc/min)	Final Flow (cc/min)	Volume (Liters)	Sample Time	Comments
#4A							
#4B							

EXHIBIT 6.1
LOPEZ CANYON LANDFILL
QUALITY CONTROL DATA SHEET
AMBIENT AIR SAMPLING

Diurnal 24-Hour

12 Hour Daytime/12 Hour Nightime Sample

Station ID	Sample ID	Bag No.	Initial Flow (cc/min)	Final Flow (cc/min)	Volume (Liters)	Sample Time	Comments
#5A							
#5B							
#6A							
#6B							

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.

EXHIBIT 6.2
LOPEZ CANYON LANDFILL

CHAIN OF CUSTODY RECORD

Field Log Book

ACTIVITY: ________ Reference No.________

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks

Total No. of Samples Shipped: 9	Total No. of Containers Shipped:	Special Instructions:

SAMPLED BY:
(SIGN) Chief Monitoring Technician / ____________________ / ____________________ /

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
________________	________________	________________	(________/________)

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
________________	________________	(________/________)

Revised: August 25, 1991 Form: LC-00?

EXHIBIT 6.3
LOPEZ CANYON LANDFILL
WIND DATA SUMMARY
AMBIENT AIR SAMPLING

MONTH: YEAR:

STATION ID: ______

DATE: am to am

date time date time

Sampling Time	Wind Direction	Wind Speed

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 nort east, 3 is east north east, etc.

* : Rapid wind direction changes (non-directional).

NOTE: Wind Data taken from wind monitoring station located at the Flare Station.

Performance Analytical Inc.
Environmental Testing and Consulting

EXHIBIT 6.4

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-LC-1B-7 (Tedlar Bag #402)

PAI Sample ID: 9102533

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

Matrix: Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/19/91
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	7.9 TR	10	2.3 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	18	10	3.4	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	10	10	2.3	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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TABLE 6.1
LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Ambient Air Sampling Station

TEST	CALIBRATION/TYPE	FREQUENCY
Flow Rate Calibration	Flow Meter	1/Per Month
Leak Check	Flow Blockage or Restriction	1/Per Month
Clock Timer Check	Internal	1/Per Month
Voltage Supply	Internal	1/Per Month
Maintenance and Cleaning	Internal Enclosure	1/Per Month

Climatronics Weather Station

TEST	CALIBRATION/TYPE	FREQUENCY
True North Calibration	Internal	1/Per Week
Recorder Check	Internal	1/Per Month
Voltage Supply	Internal	As needed
Assembly Check	Vane, Sensor Bearings, etc.	1/Per Month
Maintenance and Cleaning	Assembly	1/Per Month

Revised: July 3, 1991

TABLE 6.2
LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING SCHEDULE

STATION NUMBER	SAMPLING SCHEDULE	SAMPLE TYPE	NUMBER OF SAMPLES
#1	START: 10:00 - 11:00 AM STOP: 10:00 - 11:00 PM	DAYTIME DRAINAGE	1
#2	START: 10:00 - 11:00 AM STOP: 10:00 - 11:00 PM	NIGHTTIME DRAINAGE	1
#3	START: 10:00 - 11:00 AM STOP: 10:00 - 11:00 PM	NIGHTTIME DRAINAGE	1
#4A	START: 10:00 - 11:00 AM STOP: 10:00 - 11:00 PM	DAYTIME DIURNAL	1
#4B	START: 10:00 - 11:00 PM STOP: 10:00 - 11:00 AM	NIGHTTIME DIURNAL	1
#5A	START: 10:00 - 11:00 AM STOP: 10:00 - 11:00 PM	DAYTIME DIURNAL	1
#5B	START: 10:00 - 11:00 PM STOP: 10:00 - 11:00 AM	NIGHTTIME DIURNAL	1
#6A	START: 10:00 - 11:00 AM STOP: 10:00 - 11:00 PM	DAYTIME DIURNAL	1
#6B	START: 10:00 - 11:00 PM STOP: 10:00 - 11:00 AM	NIGHTTIME DIURNAL	1

TABLE 6.3
LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
METHANE	GC/FID (EPA METHOD 25.2) GC/TCD	1.0 ppmv
TGNMHC	GC/FID (EPA METHOD 25.1) GC/FID (EPA METHOD 25.2)	2.0 ppmv
ACETONITRILE	GC/MS MODIFIED EPA TO-14	2.0 ppbv
BENZYL CHLORIDE	GC/ELCD & PID MODIFIED CARB 102 & 103	2.0 ppbv
CHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv
CHLOROETHENE (VYNIL CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	1.5 ppbv
DICHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	2.0 ppbv
1,1-DICHLOROETHANE (ETHYLIDENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	1.0 ppbv
1,2-DICHLROETHANE (ETHYLENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	1.0 ppbv
1,1-DICHLOROETHENE (VINYLIDENE CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv
DICHLOROMETHANE	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv
HYDROGEN SULFIDE	GC/FID & ELCD(S)	TESTING
TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	GC/ELCD & PID MODIFIED CARB 102 & 103	0.5 ppbv
TETRACHLOROMETHANE (CARBON TETRACHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	1.0 ppbv

TABLE 6.3
LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv)
TOLUENE	GC/PID MODIFIED CARB 102 & 103	1.0 ppbv
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	TESTING
TRICHLOROETHYLENE	GC/ELCD & PID MODIFIED CARB 102 & 103	0.5 ppbv
TRICHLOROMETHANE (CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	0.5 ppbv
XYLENE	GC/PID MODIFIED CARB 102 & 103	1.0 ppbv

Performance Analytical Inc.
Environmental Testing and Consulting

EXHIBIT 6.4

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill
Client Sample ID: AA-LC-1B-7 (Tedlar Bag #402)
PAI Sample ID: 9102533

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

Matrix: Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/19/91
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	7.9 TR	10	2.3 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	18	10	3.4	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	10	10	2.3	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 ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-LC-2F-7 (Tedlar Bag #403)

PAI Sample ID: 9102534

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

Matrix: Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/19/91
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	5.0 TR	10	1.5 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	17	10	3.1	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	16	10	4.3	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	8.3 TR	10	1.9 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 ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-LC-3C-7 (Tedlar Bag #400)

PAI Sample ID: 9102535

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

Matrix: Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/19/91
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	16	10	3.1	1.8
71-43-2	BENZENE	4.6 TR	10	1.5 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	20	10	5.4	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	9.7 TR	10	2.2 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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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-LC-4D-7 (Tedlar Bag #404)

PAI Sample ID: 9102536

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Joseph Cook	Date Received:	07/18/91
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	07/19/91
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	10	10	2.9	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	43	10	8.0	1.8
71-43-2	BENZENE	7.6 TR	10	2.4 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	34	10	9.1	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	3.8	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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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-LC-5A-7 (Tedlar Bag #401)

PAI Sample ID: 9102537

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

Matrix: Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/19/91
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	5.7 TR	10	1.7 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	5.0 TR	10	1.6 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	18	10	4.8	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	8.9 TR	10	2.1 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 FIXED GASES ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Job ID: 3388

Test code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix : Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/18/91

Client Sample ID	PAI Sample ID	Nitrogen (ppm)	Oxygen (ppm)
AA-LC-1B-7	9102533	750000	210000
AA-LC-2F-7	9102534	750000	210000
AA-LC-3C-7	9102535	750000	210000
AA-LC-4D-7	9102536	740000	210000
AA-LC-5A-7	9102537	750000	210000
ISLCIA[illegible]-7	9102538	760000	220000
N/A	METHOD BLANK	ND < 500	ND < 300

ND = Not Detected - Less Than 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: 3388

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #3
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/18/91
Date Analyzed: 07/19/91

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v			
		Carbon Monoxide	Methane	Carbon Dioxide	Total Non-Methane Organics (as Methane)
AA-LC-1B-7	9102533	ND < 1.0	1.3	350	ND < 1.0
AA-LC-2F-7	9102534	ND < 1.0	1.2	350	ND < 1.0
AA-LC-3C-7	9102535	ND < 1.0	1.8	350	ND < 1.0
AA-LC-4D-7	9102536	ND < 1.0	1.3	360	ND < 1.0
AA-LC-5A-7	9102537	ND < 1.0	1.4	360	ND < 1.0
ISLCIAG-7	9102538	ND < 1.0	1.9	330	ND < 1.0
N/A (07/19/91)	METHOD BLANK	ND < 1.0	ND < 1.0	ND < 1.0	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

N/A = Not Applicable

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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
Analyst: Joseph Cook
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: N/A
Date Analyzed: 07/19/91
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

SECTION 7.0

GAS COLLECTION SYSTEM SAMPLING
AT
FLARE STATION

7.0 GAS COLLECTION SYSTEM SAMPLING AT FLARE STATION

7.1 OBJECTIVE

The objective of gas collection system sampling at the Flare Station is to determine the concentrations of total organic compounds and any toxic air contaminants in the gas stream being extracted from the landfill.

7.2 PROTOCOL REQUIREMENT

The Bureau shall collect a gas sample from the header sampling port(s) on the positive pressure side of the Flare Station gas blower.

7.3 NUMBER AND LOCATION OF SAMPLES

One sample shall be taken from the sampling port on the main header located on the discharge side of the landfill Flare Station gas blower, Figure 7.1.

7.4 SAMPLING FREQUENCY

The Bureau shall collect a sample of landfill gas from the gas collection system once per month or at less frequent intervals to be determined by the Executive Officer. The Bureau shall file a written request with the Executive Officer to sample less frequently. Such a request shall be supported with previous sampling results and other related documentation. The Executive Officer will notify the Director of the Bureau of any related decision in writing.

7.5 SAMPLING PROCEDURE

The sample shall be collected directly into the Tedlar bag due to positive pressure in the header line. The sampling unit shall consist of Tygon tubing, moisture trap, filter and a Tedlar sample bag. A leak-tight connection shall be made between the Tygon tubing and the gas header sampling port, then the labcock valve shall be opened. A sample bag of approximately 10-liters shall be collected in a Tedlar bag over a continuous period.

7.6 QUALITY CONTROL PROCEDURE

The following quality control procedure shall be implemented during the gas sampling operation:

Field Sampling QA/QC Procedure

- Prior to use, the new and used Tedlar sampling bags shall be evacuated and filled with high purity nitrogen three times to flush out any contaminants. Twenty- four hours before each bag is to be used in the field, it shall be filled with high purity nitrogen. The following morning the bag shall be checked for leakage. Each bag then shall be flushed with zero hydrocarbon air and checked with an OVA for contamination. Any bag having leakage or contamination shall be removed from service.

- Assign an identification number to each sampling bag.

- Document the date and time that the bag was put into operation, check whether the bag valve is in the open position. If the valve is in the closed position, open the valve and record the time on the Quality Control Data Sheet. If the valve is open, replace the bag and start the procedure over recording the time it was removed from service on the Quality Control Data Sheet.

- Remove the bag for analyses at the end of the designated period or if the bag is near full (Never fill the bag to capacity to avoid the danger of the bag rupturing). Keep the bag in a light-sealed container at all times.

- Data for each sample collected shall be entered on a Quality Control Data Sheet, Exhibit 7.1.

Sampling Event/Logbook Documentation

The Chief Monitoring Technician shall maintain a thorough, accurate logbook record for all samples sent to the laboratory. Entries in the logbook shall be made in waterproof ink and corrections shall consist of line-out deletions that are initialed and dated. Entries must include the following information:

- Name of personnel
- Name of actual sample collector
- Sample identification number(s)
- Physical condition during sampling
- Climate conditions
- Date and time of sample collection
- Sample collection procedure and equipment
- Number and volume of sample(s)
- List of compounds requested for analysis
- Field observations

- Decontamination procedures
- Name of courier and laboratory
- Condition of samples prior to transport

Documentation must provide sufficient information to reconstruct the sampling event without relying on the monitoring technician's memory.

Laboratory QA/QC Procedure

- Assign an activity name, field log book number, sample I.D., sample volume, date, time, sample location, sample type, number of containers, analysis method and any remarks to each sampling bag.

- One trip blank (Nitrogen) sample shall be submitted with every batch of gas blower samples to be analyzed by the laboratory to ensure analytical accuracy.

- The analysis for total organic compounds (reported as methane and total gaseous non-methane hydrocarbons) and selected VOCs shall be done by an SCAQMD approved laboratory.

7.7 ANALYTICAL PROCEDURE

Bag samples collected shall be analyzed within 72 hours of collection, or shorter period of time if notified by the Executive Officer, for total organic compounds, chlorinated hydrocarbons, methane, vinyl chloride, and toxic air contaminants using analytical methods identified in Table 7.1 in accordance with Analytical Procedures, Guidelines for Implementation of Rule 1150.1, SCAQMD, October 1985, or equivalent methods approved by the Executive Officer. Note that all bags samples must be kept in light-sealed containers to avoid photochemical reactions. Laboratory reports shall contain the following:

- Laboratory name
- Sample identification
- Laboratory identification number
- Type of media analyzed (air, gas, etc.)
- Parameters analyzed
- Concentrations
- Units and limits of detection
- Analytical Method used
- Sample date
- Dilution factors, if necessary

- Chain of Custody Record

The analytical laboratory shall also provide QA/QC information for results of field blanks, replicates and calibrations, as well as laboratory sample custody information.

The Bureau shall file a written request with the Executive Officer, to collect either composite samples or test fewer samples. Such a request shall be supported with sampling results and other documentation which characterize the toxic emissions. The Executive Officer will notify the Director of the Bureau of any related decision in writing. Upon request, samples shall be split to allow confirmation of analyses by the SCAQMD.

7.8 CHAIN OF CUSTODY

A Chain of Custody Record (COC), Exhibit 7.2, shall accompany all bag samples. The COC is employed as physical evidence of sample custody. The COC record system provides the means to identify, track and monitor each individual sample from the point of collection through final data analysis reporting. A COC record is required for each shipment of samples. Laboratory personnel shall also record the condition of the sample. Corrections shall consist of line-out deletions that are initialed and dated. No erasures shall be permitted. The following information shall appear on the COC record:

- Name of Site
- Activity name and reference number
- Sample identification(s) and sample bag number(s)
- Sampling date(s) and times for all sample(s)
- Sample type(s)
- Number of sample(s) and number of container(s)
- Analyses requested
- Name of courier and shipping number
- Name of laboratory
- Signatures of sampler, Chief Monitoring Technician, courier and laboratory receiver.

The sampler and Chief Monitoring Technician shall complete a COC record to accompany each sample shipment from the field to the laboratory. After completion of the COC, one copy shall be attached to each sample. One copy shall be retained by the Chief Monitoring Technician and one copy shall be submitted to the LCMIS Data Entry Processor for office records. The courier does need to sign the COC.

The laboratory representative who accepts the incoming sample shipment will sign and date the COC to acknowledge receipt of samples. This signed copy will then be returned with the analytical reports.

7.9 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained on-site, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771 Foothill Blvd., Tujunga, CA 91042.

- Gas Collection System Sampling Location drawing, drawn to scale, with the sample port locations clearly marked and numbered, Figure 7.1.

- Quality Control Data Sheet reporting sample port identification (ID) number, sample ID number, sample bag number, methane and oxygen concentrations, sample volume, sample time, Exhibit 7.1.

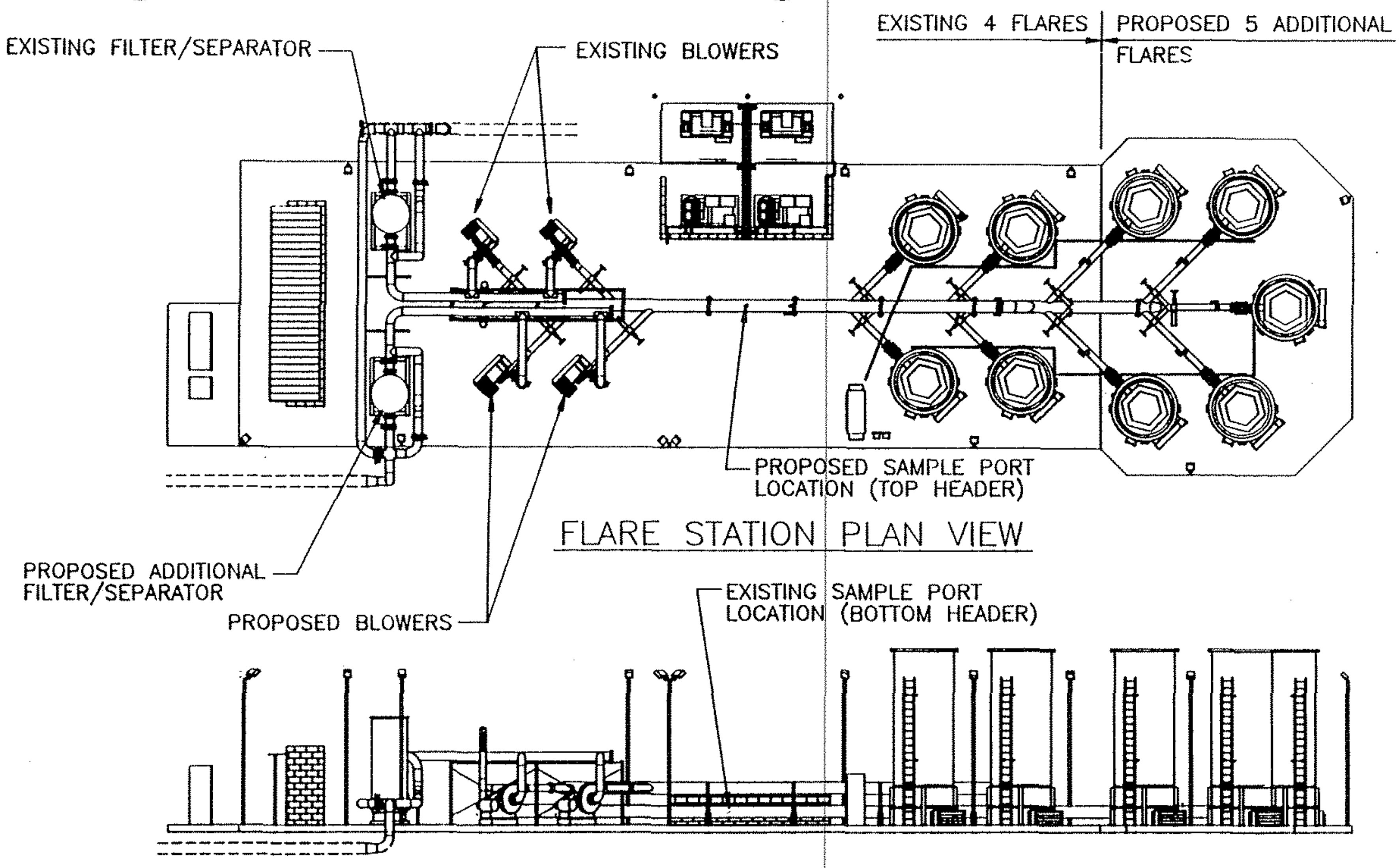
- Chain of Custody Record for each gas collection system sample submitted to the laboratory for analysis, Exhibit 7.2.

- Analytical Data Sheet reporting volume concentration of total organic compounds (reported as methane and total non-methane hydrocarbons) and selected toxic air contaminants for gas collection system samples for Exhibit 7.3.

7.10 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to Gas Collection System Sampling at the Flare Station onsite. Such records shall be retained for a minimum of two (2) years.

- Quality Control Data Sheet: Exhibit 7.1
- Chain of Custody Record: Exhibit 7.2
- Laboratory Analyses
- Notification sheets
- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets



FLARE STATION PLAN VIEW

FLARE STATION ELEVATION

FIGURE 7.1

LOPEZ CANYON LANDFILL

GAS COLLECTION SYSTEM
SAMPLING PORT LOCATION

JOB NO.	
DATE	
DRAWN BY:	
CHECKED BY:	

EXHIBIT 7.1
LOPEZ CANYON LANDFILL
GAS COLLECTION SYSTEM SAMPLING
QUALITY CONTROL DATA SHEET

Date: Inspector: Instrument Serial No.:__________

Sample Port ID	Sample ID	Bag No.	Flow Rate (cc/min)	Methane (%)	Oxygen (%)	Sample Volume (Liters)	Sample Time (min)

EXHIBIT 7.2
LOPEZ CANYON LANDFILL

CHAIN OF CUSTODY RECORD

Field Log Book

ACTIVITY:

Reference No.________

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks

Total No. of Samples Shipped: 1	Total No. of Containers Shipped:	Special Instructions:

SAMPLED BY:
(SIGN) Chief Monitoring Technician /____________________ / ____________________ /
____

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
________________	________________	________________	(________/________)

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
________________	________________	(________/________)

Revised: August 25, 1991

Form: LC-00:

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EXHIBIT 7.3

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: LGLC-B 731 (Tedlar Bag #100)

PAI Sample ID: 9102696

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

Matrix: Tedlar Bag
Date Received: 07/31/91
Date Analyzed: 07/31/91
Volume Analyzed: 0.025 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	2200	400	850	160
75-35-4	1,1-DICHLOROETHENE	ND	400	ND	100
75-09-2	METHYLENE CHLORIDE	33000	400	8800	120
75-34-3	1,1-DICHLOROETHANE	5600	400	1400	100
67-66-3	CHLOROFORM	ND	400	ND	83
107-06-2	1,2-DICHLOROETHANE	ND	400	ND	100
71-55-6	1,1,1-TRICHLOROETHANE	3500	400	650	74
71-43-2	BENZENE	4500	400	1400	130
56-23-5	CARBON TETRACHLORIDE	ND	400	ND	64
79-01-6	TRICHLOROETHENE	7800	400	1500	75
108-88-3	TOLUENE	130000	400	36000	110
12-18-4	TETRACHLOROETHENE	9000	400	1300	60
108-90-7	CHLOROBENZENE	ND	400	ND	87
1330-20-7	TOTAL XYLENES	52000	400	12000	92
541-34-5	1,3-DICHLOROBENZENE	ND	400	ND	67
106-73-1	1,4-DICHLOROBENZENE	3200	400	540	67
95-50-1	1,2-DICHLOROBENZENE	ND	400	ND	67
100-44-7	BENZYL CHLORIDE	ND	400	ND	77

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:	Joseph Cook	Date Received:	N/A
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	07/31/91
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

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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: 3424

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #3
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/31/91
Date Analyzed: 08/01/91

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Total Non-Methane Organics (as Methane) Result	Detection Limit
LGLC-B731 (100)	9102696	4000	2.0
N/A (08/01/91)	METHOD BLANK	ND	2.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Ku-Jih Chen
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 07/31/91
Date Analyzed: 07/31/91

Client Sample ID	PAI Sample ID	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Methane (ppm)	Nitrogen (ppm)	Oxygen (ppm)
LGLC-B731 (100)	9102696	400000	ND < 100	420000	160000	20000
LGLC-B731 (100)	LAB DUPLICATE	400000	ND < 100	420000	160000	20000
N/A (07/31/91)	METHOD BLANK	ND < 100	ND < 100	ND < 100	ND < 1000	ND < 40[illegible]

ND = Not Detected - Less Than Indicated Detection Limit

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TABLE 7.1
LOPEZ CANYON LANDFILL
GAS COLLECTION SYSTEM SAMPLING
ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
METHANE	GC/FID (EPA METHOD 25.2) GC/TCD	0.1%v
TGNMHC	GC/FID (EPA METHOD 25.1) GC/FID (EPA METHOD 25.2)	TESTING
ACETONITRILE	GC/MS MODIFIED EPA TO-14	50 ppbv
BENZYL CHLORIDE	GC/ELCD & PID MODIFIED CARB 102 & 103	50 ppbv
CHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	40 ppbv
CHLOROETHENE (VYNIL CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	30 ppbv
DICHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	40 ppbv
1,1-DICHLOROETHANE (ETHYLIDENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
1,2-DICHLROETHANE (ETHYLENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
1,1-DICHLOROETHENE (VINYLIDENE CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
DICHLOROMETHANE	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
HYDROGEN SULFIDE	GC/FID & ELCD(S)	TESTING
TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
TETRACHLOROMETHANE (CARBON TETRACHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv

TABLE 7.1
LOPEZ CANYON LANDFILL
GAS COLLECTION SYSTEM SAMPLING
ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
TOLUENE	GC/PID MODIFIED CARB 102 & 103	25 ppbv
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
TRICHLOROETHYLENE	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
TRICHLOROMETHANE (CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
XYLENE	GC/PID MODIFIED CARB 102 & 103	2.5 ppbv

SECTION 8.0

ANALYSIS OF ALL COLLECTED SAMPLES
OF
LANDFILL GAS

8.0 ANALYSIS OF ALL COLLECTED SAMPLES OF LANDFILL GAS

8.1 OBJECTIVE

The objective in analyzing all collected samples of landfill gas is to determine the concentrations of any toxic contaminants extracted from the landfill.

8.2 PROTOCOL REQUIREMENT

The Bureau shall conduct analysis of all samples of landfill gas as required both by this plan and by District Rule 1150.1.

8.3 ANALYTICAL PROCEDURES

Analytical methods are referenced in Sections 1.0, 4.0, 6.0, 7.0, and 9.0 of this plan. A detectable range is provided for those analytical methods which are referenced to and described in the above sections and in Section 11.0 of the Guidelines for Implementation of Rule 1150.1, SCAQMD, October 1985.

If the concentration in a sample exceeds the upper detectable limit of the required analytical method, quantitative dilution with pure nitrogen shall be used to reduce the sample concentration to within the detectable limits. Due to the complex nature of landfill gas, possible interference problems shall be evaluated during the analytical processes.

Bag samples collected shall be analyzed within 72 hours of collection or sooner if specified by the Executive Officer.

8.4 QUALITY CONTROL PROCEDURE

The quality control procedure for each analytical event is referenced in the corresponding sections of this plan.

Each sample bag must have an assigned identification number. A bag sample code must be used for each individual sampling activity, as detailed in the Laboratory Sample Codes, Table 8.1.

8.5 CHAIN OF CUSTODY

A Chain of Custody Record shall accompany all bag samples, as described in the corresponding sections of this plan.

8.6 REPORT OF RESULTS

The data related to laboratory analyses to be submitted to the Direcotrs of Enforcement and Engineering Division(s) are described in the corresponding sections of this plan.

8.7 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to the analyses of all collected samples of landfill gas onsite. Such records shall be retained for a minimum of two (2) years.

- Laboratory Analyses
- Notification Sheets
- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets

TABLE 8.1
LOPEZ CANYON LANDFILL
LABORATORY SAMPLE CODES

ACTIVITY	ACTIVITY CODE		LOCATION ID		SAMPLE NUMBER	BLANK SAMPLE LETTER
INTEGRATED SURFACE EMISSIONS SAMPLING	IS	-	GRID #	-	(1,2,etc.)	(B,C,etc.)
GAS INDICATOR PROBE SAMPLING	GI	-	PROBE #	-	(1,2,etc.)	(B,C,etc.)
GAS PERIMETER PROBE SAMPLING	GP	-	PROBE #	-	(1,2,etc.)	(B,C,etc.)
GAS COLLECTION WELL SAMPLING	GW	-	WELL #	-	(1,2,etc.)	(B,C,etc.)
AMBIENT AIR SAMPLING	AA	-	STATION #	-	1,2,etc.)	(B,C,etc.)
LANDFILL GAS SYSTEM SAMPLING	LG	-	HEADER SAMPLE PORT #	-	(1,2,etc.)	(B,C,etc.)

NOTE:

1. Additional sample codes, as necessary, will be determined by the Site Engineer or the Chief Monitoring Technician.

2. Sample bag sample code #IS-75-1-B.

SECTION 9.0

MONITORING OF GAS COLLECTION WELLS

9.0 MONITORING OF GAS COLLECTION WELLS

9.1 OBJECTIVE

The objective of monitoring and adjusting the gas collection wells is to optimize the collection of the landfill gas. The landfill gas collection system is designed to ensure that the landfill gas produced within the landfill is controlled and not allowed to migrate vertically up through the surface of the landfill cover, or laterally, below the ground surface, past the landfill boundary.

9.2 PROTOCOL REQUIREMENT

The Bureau shall monitor the gas collection wells to include the following parameters:

- Velocity of the gas in the well lateral connection in feet per minute (fpm).
- Volume percent of total organic compounds, measured as methane, in the landfill gas.
- Volume percent of oxygen in the gas.
- Landfill gas temperature.
- Static pressure in the gas well in inches of water column ("W.C.).
- Static pressure in the gas header in ("W.C.).

9.3 LOCATION OF GAS COLLECTION WELLS

The locations of the gas collection wells are shown on Figure 9.1. Currently, various types of collection wells (deep, shallow, angled, horizontal) have been installed. Additional gas collection wells shall comply with the following guidelines unless site specific conditions dictate otherwise and then as approved by the Executive Officer.

9.4 DESIGN AND INSTALLATION OF GAS COLLECTION WELLS

Design and construction details for all proposed wells shall be submitted to the Executive Officer for his approval prior to installation. All installations will follow the appropriate safety procedures and will comply with the Permit to Construct issued by the SCAQMD.

9.5 MONITORING FREQUENCY

All gas collection wells are to be monitored once every week. If the monitoring data for specific wells becomes consistent enough to justify less frequent monitoring the District will be notified of the change in frequency.

9.6 MONITORING PROCEDURE

Field Monitoring Data

All gas collection wells shall be monitored for the following and shall be recorded on the Field Data Sheet, example shown in Exhibit 9.4.

- Static pressure shall be measured with a Dwyer Series 2000 Magnehelic differential pressure gauge. Determine the Magnehelic pressure gauge that is appropriate for the well. Select the gauge with the lowest pressure scale that will yield the most precise reading. A leak-tight connection shall be made between the differential pressure gauge and the gas collection well sample port. Hold the gauge vertical and record the gauge reading. If the vacuum is pulsing, record the average between the high and low reading on the gauge.

- Gas flow rate and temperature shall be measured using a Kurz Velocity Meter. Insert the sensor probe into the well lateral monitoring port to the approximate center of the pipe. Make sure a leak-tight seal connection is made. Select the scale that gives the most sensitive velocity reading. Determine the gas velocity by rotating the probe until the maximum steady velocity value is obtained. Record the velocity on the monitoring form. Immediately following the velocity measurement, rotate the selector switch on the meter to the "Temp. °F" position and record the gas temperature.

- Methane, recorded in percent, shall be measured using a Gas Tech Model NP-204 explosimeter equipped with both catalytic oxidation and thermal conductivity detectors. Make sure a leak-tight connection is made to the well lateral monitoring port. The gas collection wells shall continue until the total organic compounds concentration, remains constant for at least 30 seconds.

- Oxygen. recorded in percent, shall be measured using a Gas Tech XP-204 electrochemical oxygen analyzer. Make sure a leak-tight connection is made to the well lateral monitoring port. The oxygen measurement shall be made immediately following the methane measurement.

- Barometric pressure shall be recorded using a Wind and Weather Model IN-303 barometer.

- Record the position of the flow control valve as a percentage of full open.

- Record any apparent leaks and any missing well parts in the remarks column on Gas Well Monitoring Form, Exhibit 9.4.

Calculated Data

Some field monitoring data can be used directly to evaluate well performance. These include static pressure,. gas concentrations, and temperature which are direct measurements. Other parameters need to have mathematical calculations performed on the field data before meaningful information can be compared to other well performance criteria. The calculated data shall be recorded on the Gas Collection Well Monitoring Summary, Exhibit 9.3. The following values are to be calculated from the field monitoring data:

- Gas Flow Rate

  Using the Kurz velocity measurement, the flow rate from each well can be calculated. The gas flow rate is needed to determine the change in gas production as a result of a well adjustment and to determine if additional adjustment is necessary. Additionally, the flow rate from a given gas well is important data to record over time so well gas production can be observed with time. Gas well laterals are not all the same size, therefore, flow rates from the Kurz velocity readings must be calculated using the specific pipe size areas of the laterals. The flow rate in cubic feet per minute is equal to the Kurz velocity multiplied by the pipe area in square feet.

- Methane Flow Rate

  Multiply the gas flow rate by the percent methane measured in the well to determine the actual flow rate of pure methane. This measurement is used to compare the actual methane production from a given well over time. For some wells, if the vacuum is increased, a certain amount of atmospheric air will be drawn into the well which will dilute the landfill gas extracted. An increase in gas extraction from a gas well does not necessarily translate directly to increased methane flow rate.

- Vacuum to Methane Flow Rate Ratio

  Divide the methane flow rate by the well head static pressure to calculate the vacuum to methane flow rate ratio. This ratio is a type of gas permeability coefficient. For a certain vacuum applied to a well, a resultant flow rate of methane will result. The flow rate ratio may not be linear over the entire flow range. It is a good indicator of methane extraction efficiency to be used during the gas well tuning process.

- Compost ratio ("R" value)

  The compost ratio uses the ratio of oxygen concentration divided by methane concentration measured at the well head to estimate the extent of undesirable oxygen being drawn through the cover material into the refuse. If excessive air is drawn into the landfill due to over extraction of a well, the normal anaerobic decomposition will diminish and aerobic decomposition (composting) will increase. Aerobic decomposition generally occurs at a higher temperature than anaerobic decomposition and is generally thought to be a precursor of elevated subsurface temperature phenomena, which often leads to underground fires. Gas wells indicating

"R" values <0.1 are considered to have an indication of composting activity and should be remonitored to confirm gas composition and temperature readings. If high readings are confirmed, the flow rate should be reduced.

9.7 GAS COLLECTION WELL ADJUSTMENT CRITERIA

Landfill gas collection wells that require periodic adjustment, in order to maintain satisfactory operation of the gas collection system are documented on Priority Adjustments, Exhibit 9.5. The gas wells shall be monitored and adjusted in order to maintain the following preferred operating conditions:

- Vacuum

  The minimum vacuum level, for normal operations, shall be maintained at a minimum of 0.1 inches of water column ("W.C.), as measured on the well side of the flow control valve. Positive pressure in a gas well shall be avoided to reduce the potential for increased surface emissions. Vacuum readings in each gas well will be tracked and a responsive field adjustment action is triggered if a positive pressure is measured in a well. The vacuum for gas wells, in native soils, at the perimeter of the landfill be maintained at a level that effectively controls the horizontal migration of gas, while at the same time minimizes the dilution of the landfill gas by air intrusion.

- Methane Content

  The methane content in landfill gas should be maximized. Methane concentrations should be kept above 35 percent for interior wells and for perimeter wells in refuse.

- Oxygen Content

  The oxygen content in landfill gas shall be minimized. Interior and perimeter gas collection wells, in refuse, shall be adjusted to maintain an oxygen concentration at less than two (2) percent by volume. Perimeter wells, in native soil, shall be allowed to contain up to twelve (12) percent oxygen to control gas migration.

- Landfill Gas Temperatures

  The normal landfill gas temperatures range from 80° to 120°F. Landfill gas temperatures higher than 125°F may indicate an elevated subsurface temperature. Gas flow shall be reduced in wells with gas temperatures exceeding 125°F.

If any of the gas collection wells do not comply with the parameters described above, the Bureau shall implement the contingency plan in Section 9.8.

9.8 CONTINGENCY PLAN

The following procedures shall be undertaken if parameters are detected in a gas collection well, in refuse, with a methane concentration equal to or less than thirty-five (35) percent, or a gas pressure greater than -0.1" of water column, or greater than 125°F, or an oxygen concentration greater than two (2) percent for wells in trash, or an oxygen concentration greater than twelve (12) percent for perimeter wells.

- Review historical gas collection well monitoring data to determine if readings outside the guidelines described above have previously been observed.

- Review related gas collection system monitoring data from the flare station, header pipes, or adjacent gas collection wells to determine if changes in these systems may have caused a change in the gas monitoring well data.

- If related gas system data are normal, the gas collection well shall be adjusted (valve position, flow adjustment, etc.) so the well will return to the established guidelines.

- Compare previous gas collection well data to well data collected within 48 hours after the contingency procedures are implemented. Submit the data to the Site Engineer for further evaluation of corrective action.

9.9 SAMPLING PROCEDURE

In the event that the Site Engineer requests a gas collection well sample, the following procedure shall be used.

- Prior to collecting a gas sample, the static pressure in gas collection well shall be measured. Following the pressure measurement, the wells shall be evacuated (the well must be sealed from the gas collection header during evacuation) until the methane concentration remains constant for at least 30 seconds. The constant methane concentration shall be measured using the Gastech NP-204. A bag sample shall then be collected in a 10-liter Tedlar bag over a continuous ten minute period utilizing a vacuum pump.

9.10 QUALITY CONTROL PROCEDURE

The following quality control procedure shall be implemented during the gas collection well monitoring and sampling operations:

Field Monitoring and Sampling QA/QC Procedures

<u>Monitoring</u>

- Before sending the monitoring equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Calibrate and maintain the velocity meter, temperature indicator, differential pressure gauge, explosimeter, and oxygen indicator, or other approved instruments as detailed in Table 9.1.

Data for each well monitored shall be entered on a Gas Collection Well Monitoring Forms, Exhibit 9.4.

Sampling

- Before sending the sampling equipment into the field, it shall be checked to make sure that there is no leakage in the system. If leakage occurs, the equipment shall be removed from service.

- Prior to use, the new and used Tedlar bags shall be evacuated and filled with high purity nitrogen three times to flush out any contaminants. Twenty-four hours before each bag is to be used in the field, it shall be filled with high purity nitrogen. The following morning the bag shall be checked for leakage. Each bag then shall be flushed with zero hydrocarbon air and checked with an OVA for contamination. Any bag having leakage or contamination shall be removed from service.

- Assign an identification number to each sampling bag.

- Document the date and time that the bag was put into operation, check whether the bag valve is in the open position. If the valve is in the closed position, open the valve and record the time on the Quality Control Data Sheet. If the valve is open, replace the bag and start the procedure over recording the time it was removed from service on the Quality Control Data Sheet.

- Calibrate and maintain the instruments or other approved instruments as detailed in the Instrument Calibration and Maintenance Frequency, Table 9.1.

Data from each sample collected shall be entered on a Quality Control Data Sheet, Exhibit 9.1.

Sampling Event/Logbook Documentation

The Chief Monitoring Technician shall maintain a thorough, accurate logbook record for all samples sent to the laboratory. Entries in the logbook shall be made in waterproof ink and corrections shall consist of line-out deletions that are initialed and dated. Entries must include the following information:

- Name of personnel
- Name of sample collector
- Sample identification number(s)
- Physical condition during sampling
- Climate conditions
- Date and time of sample collection
- Sample collection procedure and equipment
- Number and volume of sample(s)
- List of compounds requested for analysis
- Duplicates collected and identification number
- Field observations
- Decontamination procedures
- Name of courier and laboratory
- Condition of samples prior to transport

Documentation must provide sufficient information to reconstruct the sampling event without relying on the monitoring technician's memory.

Laboratory QA/QC Procedure

- Record the activity name, field logbook number, sample I.D., sample volume, date, time, sample location, sample type, number of containers, analysis method and any remarks on the Chain of Custody record and attach to each sampling bag.

- Submit one trip blank (Nitrogen) sample with every batch of gas collection well samples to be analyzed by the laboratory to ensure analytical accuracy.

- The analyses for methane and selected VOCs shall be done by an SCAQMD approved laboratory.

9.11 ANALYTICAL PROCEDURE

Bag samples collected shall be analyzed within 72 hours of collection, or sooner if notified by the Executive Officer. Bag Samples shall be analyzed for total gaseous non-methane hydrocarbon, fixed gases, methane and toxic air contaminants using analytical methods identified in Table 9.2. Analytical methods shall be in accordance with Analytical Procedures, Guidelines for the Implementation of Rule 1150.1, SCAQMD, October 1985, or by equivalent methods approved by the Executive Officer. All bag samples shall be kept in light-sealed containers to avoid photochemical reactions.

Laboratory reports shall contain the following information:

- Laboratory name
- Sample identification
- Laboratory identification number

- Type of media analyzed (air, gas, etc.)
- List of quantified compounds analyzed
- Concentrations
- Units of limits of detection
- Analytical Methods used
- Sample date
- Dilution factors, if necessary
- Chain of Custody Record

The analytical laboratory shall also provide QA/QC information for results of field blanks, replicates and calibrations, as well as laboratory sample custody information.

9.12 CHAIN OF CUSTODY

A Chain of Custody Record, Exhibit 9.2, shall accompany all bag samples. The Chain of Custody (COC) is employed as physical evidence of a sample custody. The COC record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data analysis reporting. A COC record is required for each shipment of samples. Laboratory personnel shall also record the condition of the sample. Corrections will consist of line-out deletions that are initialed and dated. No erasures will be permitted. The following information will appear on the COC record:

- Project name and identification number
- Name of site
- Identification number(s) and sample bag number(s)
- Number of samples
- Number of sample(s) and number of containers
- Field measurements, if applicable
- Analyses requested
- Name of courier and shipping number
- Name of laboratory
- Signatures of sampler, and Chief Monitoring Technician

The sampler and Chief Monitoring Technician will complete a COC record to accompany each sample shipment form the field to the laboratory. After completion of the COC, one copy will be attached to each sample. One copy will be retained by the Chief Monitoring Technician. The courier does need to sign the COC.

The laboratory representative who accepts the incoming sample shipment will sign and date the COC to acknowledge receipt of samples. This signed copy will then be returned with the analytical reports.

9.13 REPORTING OF RESULTS

The following data shall be submitted to the Directors of Enforcement and Engineering Division(s) monthly. A different submittal time may be implemented upon approval of the Executive Officer. All data shall be retained onsite, and shall be submitted to the repository located at the Sunland-Tujunga Public Library, 7771
Foothill Blvd., Tujunga, CA 91042.

- Gas Collection Well Map showing the map of the Landfill, drawn to scale, with the monitoring locations clearly marked and numbered, Figure 9.1.

- Monitoring Summary reporting well ID, gas temperature, vacuum to methane flow rate ratio, compost ratio, methane and oxygen concentration, gas flow rate and methane flow rate, Exhibit 9.3.

9.14 RECORD KEEPING REQUIREMENTS

The Bureau shall maintain the following records of all data and results relating to Gas Collection Well Monitoring onsite. Such records shall be retained for a minimum of two (2) years.

- Quality Control Data Sheet: Exhibit 9.1
- Chain of Custody Record: Exhibit 9.2
- Monitoring Summary: Exhibit 9.3
- Monitoring Forms: Exhibit 9.4
- Priority Adjustments: Exhibit 9.5
- Notification Sheets
- Equipment calibration, maintenance and repair sheets
- Equipment inventory sheets and purchasing requests
- Facility inspection sheets

EXHIBIT 9.1
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL SAMPLING
QUALITY CONTROL DATA SHEET

Date: Inspector: Instrument Serial No.:

Well ID	Sample ID	Bag No.	Flow Rate (cc/min)	Methane (%)	Oxygen (%)	Sample Volume (Liters)	Sample Time (min)

EXHIBIT 9.2
LOPEZ CANYON LANDFILL

CHAIN OF CUSTODY RECORD

Field Log Book

ACTIVITY: ____________

Reference No.________

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks

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

SAMPLED BY:
(SIGN) Chief Monitoring Technician / ____________________ / ____________________ /
____

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
____________	____________	____________	(______/______)

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
____________	____________	(______/______)

Revised: August 25, 1991

Form: LC-002

EXHIBIT 9.3
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL MONITORING
MONITORING SUMMARY

Well ID	Date	Gas Temp. (°F)	Vacuum to CH_4 Flow Rate Ratio	Compost Ratio ("R" Value)	CH_4 Flow Rate (cfm)	CH_4 (%)	O_2 (%)	Gas Flow Rate (cfm)

EXHIBIT 9.4
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL MONITORING
FIELD FORM

DATE: **TECHNICIANS:** CANYON A - ROAD

Well ID	Air Temp. (^oF)	Gas Temp. (^oF)	Gas Header Static Pressure ("W.C.)	Gas Well Static Pressure ("W.C.)	CH_4 (%)	O_2 (%)	Kurz Velocity (ft/min)	Valve Position (% Open)	Barometric Pressure (HG)	Time	Comments
ANVW00.5											
ANVW01											
ANVW02											
ANVW03											
ASVW01											
ASVW03											
ASVW03											

EXHIBIT 9.5
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL MONITORING
PRIORITY ADJUSTMENT FIELD FORM

DATE: **TECHNICIANS:**

Well ID	Air Temp. (^oF)	Gas Temp. (^oF)	Gas Header Static Pressure ("W.C.)	Gas Well Static Pressure ("W.C.)	CH_4 (%)	O_2 (%)	Kurz Velocity (ft/min)	Valve Position (% Open)	Barometric Pressure (HG)	Time	Comments

TABLE 9.1
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Gastech NP - 204 Explosimeter		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	3/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Voltage Adjust	Internal	As needed
Operational Zero	Ultra Pure Nitrogen	3/Per Day
LEL Zero	Internal	3/Per Day
LEL Gas Calibration	2% Methane in Air	3/Per Day
High % Scale Zero	Internal	3/Per Day
High % Scale Calibration	20% Methane in Nitrogen	3/Per Day
Maintenance/Cleaning		1/Per Week

TABLE 9.1
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL MONITORING
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Kurz Velocity Meter		
TEST	CALIBRATION/TYPE	FREQUENCY
Flow Rate	Internal	As needed
Voltage Supply	Volt Meter	1/Per Day
Maintenance and Cleaning		1/Per Day

Gastech XP - 204 Oxygen		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	3/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Operational Zero	Ultra Pure Nitrogen	3/Per Day
Maintenance/Cleaning		3/Per Day

Magnehelic Pressure Guages		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	As needed
Pressure Calibration	Manometer	1/Per Month
Maintenance/Cleaning		1/Per Day

TABLE 9.2
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL SAMPLING
ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
TOLUENE	GC/PID MODIFIED CARB 102 & 103	25 ppbv
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
TRICHLOROETHYLENE	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
TRICHLOROMETHANE (CHLOROFORM)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
XYLENE	GC/PID MODIFIED CARB 102 & 103	2.5 ppbv

TABLE 9.2
LOPEZ CANYON LANDFILL
GAS COLLECTION WELL SAMPLING
ANALYTICAL METHODS

CHEMICAL COMPOUNDS	ANALYTICAL METHOD	APPROXIMATE DETECTION LIMIT (ppbv/ppmv/%v)
METHANE	GC/FID (EPA METHOD 25.2) GC/TCD	0.1%v
TGNMHC	GC/FID (EPA METHOD 25.1) GC/FID (EPA METHOD 25.2)	TESTING
ACETONITRILE	GC/MS MODIFIED EPA TO-14	50 ppbv
BENZYL CHLORIDE	GC/ELCD & PID MODIFIED CARB 102 & 103	50 ppbv
CHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	40 ppbv
CHLOROETHENE (VYNIL CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	30 ppbv
DICHLOROBENZENE	GC/ELCD & PID MODIFIED CARB 102 & 103	40 ppbv
1,1-DICHLOROETHANE (ETHYLIDENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
1,2-DICHLROETHANE (ETHYLENE CHLORIDE)	GC/ELCD MODIFIED CARB 102 & 103	25 ppbv
1,1-DICHLOROETHENE (VINYLIDENE CHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
DICHLOROMETHANE	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
HYDROGEN SULFIDE	GC/FID & ELCD(S)	TESTING
TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv
TETRACHLOROMETHANE (CARBON TETRACHLORIDE)	GC/ELCD & PID MODIFIED CARB 102 & 103	25 ppbv

SECTION 10.0

EQUIPMENT STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES

10.1.0 STANDARD OPERATING MAINTENANCE AND CALIBRATION PROCEDURE FOR ORGANIC VAPOR ANALYZER MODELS 108 AND 128

10.1.1 INTRODUCTION

1. This document describes procedures that field personnel will perform when taking measurements with an Organic Vapor Analyzer (OVA) as well as during maintenance and calibration of the instrument.

2. These procedures are developed based on Foxboro's manuals and recommendations, as well as technical and field experience.

10.1.2 PURPOSES OF MEASUREMENT

1. The OVA is designed to measure trace quantities of organic materials in air. It is essentially a hydrogen flame ionization detector such as utilized in gas chromatographs (GC) and has similar analytical capabilities.

2. The instrument has broad applications, since it has a continuous air sampling system and can be readily calibrated to measure all organic vapors.

3. It has a single, logarithmically-scaled readout from 1 to 10,000 ppm (OVA-108), or 1 to 1,000 ppm (OVA-128), and is designed for use as a portable survey instrument. It can also be readily adapted to fixed, remote monitoring, or mobile installations.

10.1.3 MAJOR FEATURES

1. The basic instrument consists of two major assemblies, the Probe/Readout Assembly and the Side Pack Assembly. The recorder is optional on all models, but is normally used with all instruments which incorporate the GC Option. The major features of the unit include:

- logarithmically-scaled readout
- internal electronic calibration
- less than 2 second response time
- minimum 8-hour service life for fuel supply and battery pack
- battery test feature to allow charge condition to be read on the meter

- audible and visual alarm to signify hydrogen flameout
- frequency modulated detection alarm which can be preset to sound a desired concentration level
- earphone to assist operator in hearing the alarm in noisy areas

2. Controls and Indicators for the Sidepack Assembly include:

   - Instr/Batt Test Switch: This 3-position toggle switch turns on all instrument electrical power except the pump and alarm power and also permits display of the battery charge condition on the readout meter.

   - Pump (On/Off) Switch: This toggle switch turns on power to the internal pump and audio alarms.

   - Igniter Switch: This momentary push button switch connects power to the igniter coil in the detector chamber and simultaneously disconnects power to the pump.

   - Calibrate Switch: This 3-position toggle switch introduces the HIGH or LOW calibration signal currents.

   - Calibrate Adjust Knob: This potentiometer adjusts the instrument electronic calibration.

   - Gas Select Knob: This 10-turn dial readout potentiometer sets a pre-determined calibration reference level for electronic calibration.

   - Recorder Connector: This 126-series 5-pin Amphenol connector is used to connect the instrument to an external monitor with the following pin connections.

   - Recharger Connector: This BNC connector is used to connect the battery pack to the battery recharger assembly.

   - H2 Tank Valve: This valve is used to supply or close off the fuel supply from the hydrogen tank.

   - H2 Tank Pressure Indicator: This high pressure gauge measures the pressure in the hydrogen fuel tank which is an indication of fuel supply.

- H2 Supply Valve: This valve is used to supply or close off the hydrogen fuel to the detector chamber.

- H2 Supply Pressure Indicator: This low pressure gauge is used to monitor the hydrogen pressure at the capillary restrictor.

- Sample Flow Rate Indicator: This indicator is used to monitor the sample flow rate.

- Refill Connector: This 1/4-inch AN fitting is used to connect the hydrogen refill hose to the instrument.

- Refill Valve: This valve is used to open one end of the instrument fuel tank for refilling with hydrogen.

- Earphone Jack: This jack is used to connect the earphone and turn off the speaker.

- Volume Knob: This potentiometer adjusts the volume of the internal speaker and earphone.

- Readout and Sample Connectors: These connections are used to connect the sample hose and umbilical cord from the Probe/Readout Assembly to the side pack.

3. Controls and Indicators for the Probe/Readout Assembly include:

   - Meter: This logarithmically-scaled meter displays the output signal level in ppm or percent.

   - Alarm Level Adjust Knob: This potentiometer (located on the back of the Readout Assembly) is used to set the vapor detection level at which the audible alarm is actuated.

10.1.4 SUPPLIES AND EQUIPMENT

10.1.4.1 Standard Accessories

1. Instrument carrying and storage case
2. Fuel filling hose assembly
3. A.C. battery charger
4. Earphone
5. Various pickup fixtures

10.1.4.2 Optional Accessories

1. Gas chromatograph option
2. Portable strip chart recorder
3. Activated charcoal filter; also used with desiccant as a moisture trap
4. Dilution valve
5. Septum adapter for use with gas chromatograph

10.1.4.3 Supplies Needed

1. Size K cylinder of Hydrogen
2. Size K cylinder of 100 ppm CH_4 with air balance
3. Size K cylinder of 500 ppm CH_4 with air balance

10.1.5 SAFETY CONSIDERATIONS

10.1.5.1 General

1. All flame ionization hydrocarbon detectors are potentially hazardous since they use Hydrogen (H2) or H2 mixtures as their fuel. Mixtures of H2 and air are flammable over a wide range of concentrations whether an inert gas such as (Nitrogen N2) is present or not. Therefore, the recommended precautions and procedures should be followed for maximum safety. Safety considerations were a major consideration in the design of the OVA.

2. All connectors are of the permanent type as opposed to quick disconnect. To protect against external ignition of flammable gas mixtures, the flame detection chamber has porous metal flame arrestors on both the sample input and the exhaust ports. The standard battery pack has internal current limiting to safety level and also includes fuses for overload protection.

10.1.5.2 Fuel Supply and Tank

1. The OVA fuel tank has a volume of 75 to 85 cc which, when filled to the maximum rated pressure of 2300 PSI, holds approximately 5/8 cubic foot of gas. The fuel used in the OVA is pure hydrogen which can be readily purchased in a highly pure form at nominal cost. The H2 tanks used in the instrument are made from stainless steel, proof-tested to 6,000 PSI and 100 percent production tested to 4,000 PSI.

10.1.5.3 H2 Flow Restrictors

1. Hydrogen gas gains heat when expanding and, therefore, should not be rapidly released from a high pressure tank to a low pressure environment. A flow restrictor is incorporated in the H2 refill fitting and H2 is restricted on the output side of the tank by the low flow rate control system. In addition, a special flow restrictor is incorporated in the fill/bleed valve of the hydrogen filling hose assembly. These precautions to limit the flow rate of the H2 remove the possibility of self-ignition of the H2 due to self-heat from expansion.

10.1.5.4 Detector Chamber

1. The OVA has a small flame ionization chamber cavity with sintered metal flame arrestors on both the input and output ports. The chamber is ruggedly constructed of Teflon so that even if highly explosive mixtures of H2 and air are inadvertently created in the chamber and ignited, the chamber would not rupture.

10.1.5.5 H2 Filling and Emptying Operations

1. Precautions should be taken during H2 filling or H2 tank emptying operations to ensure that there are no sources of ignition in the immediate area. Since the instrument tank at 2,300 PSIG holds only 5/8 cubic feet of H2, the total quantity if released to the atmosphere would be quickly diluted to a non-flammable level. There is, however, the possibility of generating flammable mixtures in the immediate vicinity of the instrument during the filling or emptying operations if normal care is not exercised.

10.1.5.6 Venting

1. The OVA case is vented to eliminate the possibility of trapping an explosive mixture of H2 air inside the case.

10.1.5.7 Short Circuit Protection

1. The battery pack has two power circuits, one for the pump motor and igniter, and the other for the electronic circuits. Both circuits have resistive current limiting to restrict the short circuit current to a safe level. In addition to the current limiting, a fuse in each line protects against overload conditions.

10.1.6 STARTUP PROCEDURE

1. Certain safety precautions must be followed in using the instrument. Hydrogen gas, when mixed with air, is highly flammable. Operating and refueling instructions should be strictly followed to ensure safe, reliable operation.

2. Move the Instr switch to On and allow one to five minutes for warmup.

3. To set the audible alarm to a predetermined level, first turn the Pump switch to On, then adjust the meter pointer to the desired level, using the Calibrate knob. Turn the Alarm Level Adjust knob on the back of the Readout Assembly until the audible alarm just comes on. The instrument is then preset to activate the alarm when the level exceeds that of the setting.

4. Adjust speaker volume with Volume knob. If earphone is used, plug in and readjust volume.

5. Move the Calibrate switch to High and check that the meter reads full scale. If not, adjust meter reading to full scale with the Calibrate knob.

6. Move Calibrate switch to Low and verify that the meter reads 100-ppm for the OVA-128 and 10 ppm for the OVA-108 models. Move the Calibrate switch back to High and then to Off position.

7. Move the Pump switch to On and observe the Sample Flow Rate indicator. Indication should be approximately 2 on the scale. Note the audible flame-out alarm will now be on until the H1 flame is ignited.

8. Open H1 Tank valve one turn and observe the reading on the H2 Tank Pressure indicator. Approximately 150 psi of pressure is needed for each hour of operation.

9. Open H2 Supply valve one turn and observe the reading on the H2 Supply Pressure indicator.

10. Caution: do not leave the Supply valve open when the pump is not running, as this will allow hydrogen to accumulate in the detector chamber.

11. Press igniter button. There will be a slight "pop" as the hydrogen ignites and the meter pointer will move up scale and return to a position up scale of 1 ppm. Immediately after ignition, release the igniter button. After ignition, the audible flame-out alarm will go off. Do not depress igniter button for more than six seconds. If burner does not ignite, let instrument run for several minutes and try again. After ignition, the meter pointer will indicate the background concentration.

12. After chamber ignition, allow approximately one minute for the chamber to reach operating temperature. After warm-up, the meter will read the organic vapor level present.

13. If the alarm level is to be set just above the normal background detection level, turn the Alarm Level Adjust knob (back of Readout Assembly) until it actuates slightly above background.

10.1.7 SHUTDOWN PROCEDURE

1. Close H2 Supply valve.

2. Close H2 Tank valve.

3. Move Instr switch to Off.

4. Wait five seconds and move Pump switch to Off.

10.1.8 CALIBRATION

1. The OVA is capable of responding to nearly all organic compounds. For precise analyses, it will be necessary to calibrate the instrument with the specific compound of interest. This is especially true for materials containing elements other than carbon and hydrogen.

2. All Century logarithmic OVA instruments contain a 2-point internal electronic calibration system, wherein reference signals are generated by introducing small currents at the input to the electrometer preamplifier. These reference signals are introduced by a Calibrate Switch on the instrument panel. The reference points in the OVA-128 are at 100 and 1,000 ppm and 10 ppm and 10,000 ppm (one percent) in the Model OVA-108.

3. The Model OVA-128, intended for use primarily in the natural gas industry, are factory calibrated to a methane-in-air standard. The Model OVA-108 was designed for use in applications requiring the instrument response to be readily and rapidly calibrated to a variety of organic compounds. To accomplish this, the OVA-108 incorporates a Gas select control on the instrument panel which is used to set the internal calibration reference signals to a predetermined point corresponding to a particular organic vapor compound.

4. In addition, three electronic adjustments are provided on the electronics board to calibrate and align the electronic circuits. One adjustment potentiometer, R-38 is used to set the power supply voltage and is a one-time factory adjustment. The remaining two adjustments, R-4 and R-16, are used for: (1) setting the electronic amplifier gain and, (2) setting the amplifier bias respectively. The bias adjustment, R-16, is a one-time factory adjustment since it performs the same function as the Gas select control on the instrument on the panel. Access to these adjustments is accomplished by removing the instrument from its case.

10.1.8.1 Electronic Adjustments Gain Adjustment

1. Turn the Instr switch On. Leave all other controls and valves off or shut.

2. Place the Calibrate switch in the High position and adjust for full scale defection using the Calibrate Adjust knob on the instrument panel.

3. Place the Calibrate switch in the Low position. The meter should read 100 ppm on the OVA-128 or 10 ppm on the OVA-108.

4. If the meter reads higher than 10 ppm (or 100 ppm) in the Low position, move Calibrate switch to High. While watching the meter. adjust R-4 potentiometer clockwise to increase the meter reading above full scale. Move Calibrate Adjust knob to return the meter to full scale. Place the Calibrate switch in Low position and check to see if the meter reads 10 ppm (or 100 ppm on OVA-128). If the meter still reads too high, repeat the procedure in this paragraph.

5. If the meter reads lower than 10 ppm (100 ppm on OVA-128) with the Calibrate switch in Low, move Calibrate switch to High. While

watching the meter, adjust R-4 counterclockwise to decrease the meter reading below full scale. Move Calibrate Adjust knob to return the meter to full scale. Place the Calibrate Switch in Low position and check to see if the meter reads 10 ppm (or 100 ppm on OVA-128). If the meter still reads too low, repeat the procedure in this paragraph. After making these adjustments, the gain of the entire electronics system is calibrated.

10.1.8.2 Bias Adjustment (Methane Calibration)

1. Place the instrument in normal operation and apply a known sample of methane in air at the input. The recommended concentration is 100 ppm of methane.

2. On Model OVA-108, the Gas Select control should be set to 500 prior to this adjustment.

3. Adjust the meter reading to correspond with the level of the known methane sample using the Calibrate Adjust knob on the instrument panel. The instrument is now calibrated to read as methane. Then turn the H2 fuel system off using the H2 Supply Valve knob so that only the electronics are on.

4. Place the Calibrate switch in the low position and turn potentiometer R-16 until the meter reads 100 ppm on the OVA-128 or 10 ppm on the OVA-108.

5. After this adjustment the internal electronic calibration signals are set up to correspond to the previously established methane calibration.

10.1.8.3 Calibration to Other Organic Vapors Setting Gas Select Control

1. Primary calibration of the instrument is accomplished using a known mixture of a specific organic vapor compound. Prior to calibration, the two point electronic calibration is used to ensure the gain of the system is aligned. After the instrument is in operation, draw a sample of the known mixture into the instrument. The Calibrate knob on the panel is then used to shift the readout meter indication to correspond to the concentration of the calibration gas mixture. The instrument is now calibrated for the vapor mixture being used.

2. The flame in the instrument is then shut off by closing the H2 Supply valve to eliminate any background signal. Move the Calibrate switch to the High position. Using the Gas Select digital affects the instrument response only when the Calibrate switch is in the Low or High position. Its only purpose is to establish resettable levels of the internal calibration signals to correspond to a previous primary calibration.

3. After this adjustment, the setting on the digital is read and recorded for that particular organic vapor compound. This exercise can be performed for a large variety of compounds and when desiring to read a particular compound the Gas Select control is turned to the predetermined setting for that compound and the normal electronics internal calibration check is used to adjust the instrument response to the setting determined in previous tests.

10.1.9 HYDROGEN FUEL REFILLING

1. The instrument should be completely shut down as described in Section 10.1.9 herein during hydrogen tank refilling operations. The refilling should be done in a ventilated area. There should be no potential igniters or flame in the area being used.

2. If you are making the first filling of the instrument or if the filling hose has been allowed to fill with air, the filling hose should be purged with N2 or H2 prior to filling the instrument tank. This purging is not required for subsequent fillings.

3. The filling hose assembly should be left attached to the hydrogen supply tank. Ensure that the Fill/bleed valve on the instrument end of the hose is in the Off position. Connect the hose to the refill connection on the Side Pack Assembly.

4. Open the hydrogen supply bottle valve slightly. Open the Refill valve and the H2 Tank valve on the instrument panel and place the fill/bleed valve on the filling hose assembly in the fill position. The pressure in the instrument tank will now be indicated on the H2 Tank Pressure indicator.

5. After the instrument fuel tank is filled, shut off the Refill valve on the panel, the Fill/bleed valve on the filling hose assembly, and the hydrogen supply bottle valve.

6. The hydrogen trapped in the hose should now be bled off to atmospheric pressure. Caution should be used in this operation as described in the next step below, since the hose will contain a significant amount of hydrogen at high pressure.

7. The hose is bled by turning the Fill/bleed valve on the filling hose assembly to the Bleed position. After the hose is bled down to atmospheric pressure, the Fill/bleed valve should be turned to the Fill position to allow the hydrogen trapped in the connection fittings to go into the hose assembly. Then, again, turn the Fill/bleed valve to Bleed position and exhaust the trapped hydrogen. Then turn the Fill/bleed valve to Off to keep the hydrogen at one atmosphere in the hose so that at the time of the next filling, there will be no air trapped in the filling line.

8. Close the H2 Tank valve.

9. With the H2 Tank valve and the H2 Supply valve closed, a small amount of H2 at high pressure will be present in the regulators and plumbing. As a leak check, observe the H2 Tank pressure indicator while the remainder of the system is shut down and ensure that the pressure indication does not go down rapidly, indicating a significant leak. If it does decrease rapidly (greater than 350 PSIG/hour), there is a significant leak in the H2 supply system.

10.1.10 CALIBRATION ACCEPTANCE LIMITS

1. Equipment calibration should result in readings with 25 percent of standard value for continued use. Equipment that does not meet these limits during calibration will require corrective action.

10.1.11 FIELD MEASUREMENTS

1. For surface emission monitoring, use the shoulder carrying strap, probe assembly, and pickup funnel.

2. Place the probe/pickup funnel from one (1) inch to three (3) inches from the surface of the area being monitored and record the readings.

3. The following procedures will be utilized to monitor at gas sampling ports:

- Attach the probe using 1/4-inch Tygon tubing to the sampling port.

- Open the sampling port.

- Watch closely for water in the sampling line. If water enters, the sampling line and liquid bottle trap, record and take the reading.

- Record the OVA reading after the needle stabilizes.

- If the OVA flamed out (OVA-108) due to high percentage of CH4 (>1 percent OVA-108), shut off the discharge meter inlet and connect the NP-204 for high combustible readings.

- Depress igniter button on more than 6 seconds until burner lights and let the OVA vent with the pump running.

- Record the reading.

- Close the gas sampling port.

- Disconnect the Tygon tubing at the sampling port.

- If water entered the sampling line and the liquid bottle, remove the water and clean the bottle before going to the next probe.

10.1.12 MAINTENANCE

10.1.12.1 General

1. Caution: Maintenance personnel should be thoroughly familiar with instrument operation before performing maintenance. It is essential that all portions of this manual relating to safety of operation, servicing and maintenance, including Section 10.1.10, be thoroughly understood. There should be no potential igniters or flame in the area when filling, emptying or purging the hydrogen system and the instrument should be turned off.

2. Extreme care should be exercised to ensure that required parts replacement is accomplished with the same parts specified by Century. This is especially necessary on the Models OVA-108 and

OVA-128 in order that their certification for use in hazardous atmospheres be maintained. No modifications are permitted. Disassemble instrument only in a non-hazardous atmosphere.

10.1.12.2 Primary Filter

1. This filter is located behind the sample inlet connector (Fitting Assembly) on the Side Pack Assembly and is removed for cleaning by using a thin wall socket to unscrew the Fitting Assembly. The filter cup, O-ring and loading spring will then come out as shown in the Side Pack Assembly drawing in Appendix A. The porous stainless steel filter cup can then be cleaned by blowing out with nitrogen. Reassemble in reverse order ensuring that the O ring seal on the Fitting Assembly is intact.

10.1.12.3 Particle Filters

1. A particle filter is located in each pickup fixture. One of these filters must be in the sample line whenever the instrument is in use. The Model OVA-128 uses a disposable cellulose filter which should be changed as often as required. The Model OVA-108 and OVA-128 use a porous metal filter which can be replaced or cleaned.

10.1.12.4 Mixer/Burner Assembly Filter

1. Another porous metal particle is incorporated in the Mixer/Burner Assembly which screws into the Preamp Assembly. (See Side Pack Assembly drawing.) This filter is used as the sample mixer and inlet flame arrestor in the chamber. This filter should not become contaminated under normal conditions but can be cleaned, or the assembly replaced, if necessary.

2. Access to this filter for output surface cleaning is gained by simply unscrewing the exhaust port from the Preamp Assembly without removing the instrument from the case. The OVA-108 and OVA-128 instruments require removal of the safety cover prior to unscrewing the exhaust port. The Filter Assembly can now be seen on the side of the chamber (Preamp Assembly) and can be scraped or cleaned with a small wire brush.

3. If filter replacement is required, install a new or factory rebuilt Mixer/Burner Assembly. In several OVA models, this requires removal of the Preamp Assembly.

10.1.12.5 Exhaust Flame Arrestor

1. A porous metal flame arrestor is located in the exhaust port of the detector chamber (Preamp Assembly). It acts as a particle filter on the chamber output and restricts foreign matter from entering the chamber. This filter may be cleaned, if required, by removing the exhaust port from the Preamp Assembly. The exhaust port is removed from the bottom of the case without case removal. Note that the filter is captive to the exhaust port on the Models OVA-108 and OVA-128. Clean the filter with a solvent or detergent but ensure that it is dry and any solvent completely baked out at temperature of 120°F before reinstalling.

10.1.12.6 Pickup Fixtures

1. The pickup fixtures should be periodically cleaned with an air hose and/or detergent water to eliminate foreign particle matter. If a solvent is used, the fixture should be subsequently cleaned with detergent and baked out at a temperature of 120°F to eliminate any residual hydrocarbons from the solvent.

10.1.12.7 Seal Maintenance-Cylinder AssemblY, H2 Tank, H2 Supply and Refill Valves

1. After some time, the teflon washers under each valve packing nut can cold flow (move with pressure) and allow hydrogen to leak. Leakage can be determined by using Leak-Tec, Snoop or a soap solution around the valve stems. This leakage can usually be stopped by tightening the compression nut (adapter) as outlined below (see Side Pack Assembly and Cylinder Assembly drawings):

2. Remove the instrument from the case by unlocking the four 1/4 turn fasteners on the panel and removing the exhaust port and refill cap nut. Be sure refill valve is closed before removing refill cap nut.

3. Remove the valve knob screw and knob.

4. Loosen the panel nut with a 3/4-inch wrench.

5. The valve compression nut is located just under the panel. Tighten

the compression nut - usually not more than 1/4 turn.

6. This compression is against soft material and only a small amount of force is necessary to sufficiently compress the teflon washers. If, after tightening, leakage still occurs, it would be advisable to replace the two teflon washers, as follows:

7. Drain hydrogen system slowly and to the extent necessary to work on the leaking valve(s). Observe safety precautions. There should be no potential igniters in the area.

8. Disconnect the capillary tube from the manifold at the low pressure gauge (H2 Supply Pressure).

9. Remove all three knob screws and knobs.

10. Carefully remove the tank assembly from the panel. NOTE: If the OVA has GC Option installed, the GC valve assembly must be loosened or removed in order to remove the tank assembly from the panel.

11. Remove the compression nut on the valve that is not sealing properly. Remove the stem by unscrewing it from the valve body. Observe the sandwich of metal and teflon washers and note their order.

12. Visually check the Kel-F seat on the stem for cracks or foreign material. Wipe clean, if necessary, with a lint-free cloth (no solvents or oils) and replace if damaged.

13. Remove the washers and replace the Teflon washers (the factory procedure is a light wipe of hydrocarbon-free silicone grease).

14. Replace the stem assembly in the valve body and tighten lightly.

15. Push the washers down into the compression area in the same order as noted upon removal. Replace the compression nut and tighten snugly.

16. Close the low pressure valve and fill the tank assembly. Check valves for leaks. Tighten again, if necessary, and reassemble the unit.

10.1.12.8 Refiller Valve Packing Adjustment

1. Adjustment for the valve on the refiller can be made by loosening the screw with a 3/32-inch hex key, so that the handle turns freely on the stem. Insert two 3/32-inch hex keys through the holes provided in the handle and turn until they engage the holes in the packing adjuster. Then tighten the packaging by turning the handle.

10.1.12.9 Air Sampling System Maintenance - General

1. A potential problem associated with the OVA instrument is that leaks can develop in the air sample pumping system. These leaks can result in either dilution or loss of sample, causing low reading of vapor concentration and slow response time.

10.1.12.10 Testing for Leaks

1. The OVAs are equipped with a flow gauge, which provides a method to check for leaks. Assemble the pickup probe selected for use to the readout assembly and then position the sidepack vertically so the flow gauge may be observed. Cover the end of the pickup probe with your finger and observe that the ball in the flow gauge goes to the bottom, indicating no air flow (if ball has slight chatter while on bottom, this is acceptable). Cover the center of the chamber exhaust port with your thumb and again observe the ball going to the bottom. Another simple check is to expose the pickup probe to cigarette smoke or a light vapor(butane) and observe that the meter responds in approximately 1.5 to 2.0 seconds. It should be noted that slow meter response may also indicate a restriction in the air sampling system.

10.1.12.11 Leak Isolation

1. Failure of the ball to go to the bottom when the inlet is blocked indicates a leak in the system between the probe and the pump inlet or the inlet check valve. To isolate the problem, remove parts, one at a time, and again block off the air inlet. Remove the pickup probe(s) and cover the air inlet at the Readout Assembly. If the ball goes to the bottom, check that the "readout to probe" seal washer is in place and replace the probes, holding them back against this seal while tightening the nut. Recheck, and if leakage is still

present, it is probably in the probe (pickup fixture), which should be repaired or replaced.

2. If leakage is indicated as being past the readout handle when the connection to the sidepack is tight, disconnect the sample line at the fitting on the sidepack and cover this inlet with your finger. If the flow gauge ball goes to the bottom, the problem should be a leak in the umbilical cord/Readout Assembly, which should be investigated and repaired. There is also the possibility of a leaking check valve in the pump which would not show up on this test. If the leakage is not found in the umbilical cord, it is most likely in the pump check valve which should be repaired or replaced.

3. If the ball does not go to the bottom, the leak will be either in the flow gauge or its connecting tubing. Visually check that the tubing is connected and if so, the flow gauge should be repaired or replaced. Check the O ring installation in the sample inlet connector (Fitting Assembly).

4. As an alternate approach, leaks on the inlet side of the pump can be detected by using alcohol on a Q-Tip and lightly swabbing the connections one at a time or by directing organic vapor or smoke at the potential leakage points and observing the meter response or audible alarm.

5. Leaks (beyond the pump) are easier to locate, as any of the commercially available leak detection solutions can be used. Cover the exhaust port, which will place the exhaust system under pressure, and check each connection, one at a time. Replace the Teflon tubing or retape the threaded connections with teflon joint tape. Check the igniter and

6. Mixer/Burner Assembly where they screw into the detector, the high voltage terminal screw on the side of the Mixer/Burner and exhaust port itself. If after these checks, the flow gauge ball still will not go to the bottom with the exhaust blocked, the problem is likely a leaking exhaust check valve in the pump, which should be repaired or replaced.

10.1.13 BATTERY RECHARGING - AC BATTERY CHARGER

1. Plug charger BNC connector into mating connector on battery cover and insert AC plug into 115-volt AC wall outlet. Never charge in a hazardous area or environment.

2. Move the battery charger switch to the On position. The light above the switch button should illuminate.

3. Battery charge condition is indicated by the meter on the front panel of the charger: the meter will deflect to the right when charging. When fully charged, the pointer will be in line with the charged marker above the scale.

4. Approximately one hour of charging time is required for each hour of operation. However, an overnight charge is recommended, since the charger can be left on indefinitely without damaging the batteries. When finished, move the battery charger switch to Off and disconnect from the Side Pack Assembly.

5. The following are special instructions relative to batteries which have been allowed to completely discharge:

6. It has been established that the above battery recharging procedures may not be sufficient when the operator of the instrument has inadvertently left the Instr switch ON for a period of time without recharging and allowed the battery to completely discharge.

7. When this happens and the above procedures fail to recharge the battery, the following should be accomplished:

8. Remove the battery from the instrument case.

9. Connect to any variable DC power supply.

10. Apply 40 volts at 1/2 amp maximum.

11. Observe the meter on the power supply frequently and as soon as the battery begins to draw current, reduce the voltage on the power supply at a slow rate until the meter reads approximately 15 volt. Note: The time required to reach the 15-volt reading will depend on degree of discharge.

12. Repeat the steps above to continue charging

10.1.14 SPECIFICATIONS

1. Sensitivity: 1 ppm (methane).

2. Response time: less than two seconds.

3. Readout: logarithmic scaled meter, in the range of 1 - 10,000 ppm, or 1 - 1,000 ppm. External monitor connector.

4. Internal calibration: 2-point electronic.

5. Sample flow rate: nominally two units.

6. Fuel supply: 75 cubic centimeter tank of pure hydrogen at maximum pressure of 2300 PSIG, fillable while in case.

7. Primary electrical power: rechargeable and replaceable battery pack at 12V DC.

8. Service life: hydrogen supply and battery power - eight hours operating time minimum.

9. Size: Standard Unit: 8-5/8 X 11-5/8 X 4-1/4 inches. FM Unit: 8-5/8 X 11-5/8 X 4-1/2 inches. Probe/Readout Assembly: variable.

10. Weight: Standard Unit: Side Pack Assembly, less than 10 pounds FM Unit: Side Pack Assembly, less than 11 pounds Probe/Readout Assembly: less than two pounds.

11. Operator requirements: one man, one hand operation.

12. Detection Alarm: frequency modulated audible alarm. Can be preset to desired level. Frequency varies as a function of detection level.

13. Flameout indication: audible alarm plus visual meter indication.

14. Battery test: battery charge condition indicated on readout meter of battery recharger.

15. Pickup fixtures: variety of types, various applications.

16. Probe: telescoping adjustment over eight inches or probe can be completely removed from Readout Assembly.

17. Umbilical cord: cable between readout and sidepack with connectors for electrical cable and sample hose.

18. Filtering: in-line disposable and permanent particle filters and optional activated charcoal filter.

19. Side Pack case: molded high impact plastic case with carrying handle and shoulder strap.

20. Electrical protection: The battery pack has two power circuits, one for the pump motor and igniter, and the other for the electronic circuits. Both circuits have resistive current limiting to restrict the short circuit current to a safe level. In addition to the current limiting, a fuse in each line protects against overload conditions.

10.1.13 CONTAMINATION CONTROL AND MAINTENANCE

10.1.13.1 General

1. On occasion, the background reading of the OVA may be relatively high under normal ambient conditions. Ambient background readings will vary somewhat depending on the geographical location where the instrument is being used. However, the background reading normally should be in the range of 3 to 5 ppm as methane. The acceptable background reading consists of 1 to 1-1/2 ppm of methane which is present in the normal air environment. In addition to the measurement of a normal methane background, there will normally be 2 to 4 ppm of equivalent methane background caused by acceptable levels of contamination in the hydrogen fuel and/or hydrogen fuel handling system, resulting in a total equivalent methane reading of 3 to 5 ppm in clean air.

2. If the background reading goes above 5 ppm to 6 or 7 ppm, this is normally still acceptable since any measurement is additive to that background reading, i.e., 2 ppm on top of 5, or 2 ppm on top of 7 provides the same differential reading. However, the lower background is obviously desirable.

3. The background reading on the linear OVAs is zeroed out or nulled out - even though in reality the background still exists. The

background reading on the linear OVAs is measured by zeroing the meter with the flame out and noting the meter indication after the flame is on. However, on the logarithmic scaled OVAs the background reading is observed on the meter at all times. This is considered desirable since it assures the operator that the instrument is, in fact, operating properly. The background reading on the OVAs serves as a low level calibration point since it does represent the measurement of ambient levels of methane in the air, which are extremely stable and predictable any place in the world.

4. The cause for a high background reading is usually associated with contamination in the hydrogen fuel system. This will, of course, cause a background reading since this is the function of the basic detector (to measure contamination entering the detector chamber). In addition, contamination present in the hydrogen will many times leave a small unobservable deposit on the burner face which can continue to generate a background reading when the detector is in operation and the burner assembly is heated.

5. Another possible cause of contamination is the mixer/burner assembly when the contamination is trapped in the porous bronze sample filter. This is not a common problem and usually only happens when an unusually high level of contaminant is drawn into the assembly. Another possible cause of high background reading is contamination someplace in the air sample line to the detector. This is also uncommon but can be the source of the problem.

6. OVAs that include the Chromatograph Option installed can also have an indication of high background related to saturation or contamination of the activated charcoal filter, which is in the line during chromatograph analysis, or of the column which is in the hydrogen line at all times.

10.1.13.2 Analysis and Correction

1. Prior to analyzing the problem, the OVA should be checked for proper electronic operation. Check logarithmic instruments for proper high and low calibration points and for proper gas selector operation. On logarithmic OVAs, check Gas Selector by turning to 500 and observing the flame-out alarm comes on as the needle goes below 1 ppm. It should be ensured that the instruments calibrated to methane as referenced.

2. If, after checking that the OVA is properly calibrated, the background is still higher than normal for ambient conditions, the following procedure should be followed to isolate the cause of the problem:

- Let the OVA run for a period of time (15 to 30 minutes) and see if the background level decreases as a function of time. The background could go down and stay down as a result of clearing line contamination which is removable simply by the normal flow of air through the sample line.

- Take a reading in a known, relatively clean air environment. Normally, outside air environment is clean enough to assess by comparison whether the background reading is internal to the instrument or is present in the laboratory, office or location where the instrument is being used.

- If the OVA includes the Gas Chromatograph Option, depress the sample inject valve so that the activated charcoal is in the line and observe whether the background reading goes down and stays steady after the elusion of the air peak. The reading should always go down or stay the same but never be a higher background reading with the sample valve depressed, since the charcoal filter will take out any trace elements of organic vapors in the air heavier than a C_2. If another activated charcoal filter is available, this may be attached to the end of the probe to scrub the air so that a clean air sample would be going to the detector. The external activated charcoal can be used on any instrument, with or without chromatograph, for providing a clean air sample to assess background level.

- If background still stays up and cannot be reduced by any of the previous steps, the safety cover (if included) and the exhaust port on the detector chamber (Preamp Assembly) on the bottom of the case should be removed and the Mixer/Burner Assembly scraped or brushed with a small wire brush. This will remove any small quantities of contamination that are on the Mixer/Burner Assembly which could be the source of the background vapor. After cleaning the face of the burner and tube, replace the exhaust port and safety cover (if included) and reignite the OVA. If contamination on the burner face was the cause, the problem should be immediately resolved and the ambient background will drop to an acceptable level.

- If the background is still present, place your finger over the inlet of the probe to reduce the flow of air to the detector chamber. Reduced flow rate may be observed either on the sample flow gauge or can normally be observed by the sound of the pump motor.

- If the background drops immediately in response to the reduced flow of air to the chamber, this is an indication that the contamination is in the air sample line. Therefore, the various parts of the sample flow line such as pickup probes, umbilical cord to the instrument, etc., should be investigated by the process of elimination to see if the contamination can be isolated.

- Serious contamination in the air sample line is very uncommon. However, if very large doses of very heavy compounds are sampled, there is a possibility of a residual contamination which would eventually clear itself out but may take a considerable period of time. A typical cause for the high background from the sample line is a contaminated Mixer/Burner Assembly. If heavy contamination of the Mixer/Burner is still indicated by a high background, replace the Mixer/Burner Assembly. In several OVA models, this will require removal of the Preamp Assembly. The old Mixer/Burner Assembly should be either discarded or returned to the factory for cleaning and rebuilding.

- In the event there is contamination in the pump or other internal parts of the sample flow lines which cannot be removed, the sample flow components would have to be disassembled and cleaned. This is normally a factory type operation. However, the components such as the pump can be replaced in the field along with any contaminated tubing in the sample lines.

- High background readings on OVAs which include the Gas Chromatograph Option can be caused by other sources of contamination. If the charcoal in the charcoal filter mounted on the panel of the instrument is contaminated or saturated, contaminated air would be supplied to the detector and raise the ambient level background. To check for this, the charcoal filter cartridge can be removed from the panel and either a bypass tube put between the two connectors or the charcoal can be removed from the charcoal cartridge and the cartridge refilled with clean activated charcoal. This would determine if the charcoal was the source of the background reading. It is possible that an apparent high background reading could be due to contamination in the column that is on the instrument. This background could be caused by compounds that are slowly eluting from a column which has become contaminated. The easiest way to check for column contamination is to replace the column with a known clean column or a short empty piece of column tubing and see if the high background reading drops.

- If all the above steps do not correct the high background problem, the cause will normally be contamination in the hydrogen fuel system.

- Contamination in the hydrogen fuel system is usually the direct result of contamination in the hydrogen gas used or contamination introduced during the filling operation. Filling hose contamination can be caused by storing the hose in a contaminated area. Hydrogen fuel system contamination can be removed using the following method:

- To remove contamination from the hydrogen fuel system, it should be purged with hydrogen. Effective purging of the hydrogen system is accomplished by disconnecting the capillary tube fitting which attached on to the manifold block which has the low pressure gauge (H2 Supply Pressure Gauge and H2 Supply Valve). This disconnects the capillary tubing from the hydrogen line so that hydrogen may be purged at a reasonable rate from the tank assembly through the regulators, gauges and valves. After disconnecting the capillary, the hydrogen tank can be filled in the normal manner. The tank valve and H2 supply valve can then be opened which will bleed the hydrogen from the tank through the H2 fuel system purging out the contamination which is in vapor form. There is the possibility that contamination has been introduced into the hydrogen fuel system which is not readily purged out by the hydrogen gas but this is unlikely. After purging with clean hydrogen, approximately two or three times, the capillary tube should be reconnected and the background again checked. Five or 10 minutes should be allowed before assessing the background reading, since contaminated hydrogen may still have been trapped in the capillary tube.

- If another tank assembly in a clean instrument is available, the fuel system from the clean instrument can be connected to the contaminated instrument to absolutely verify that it is or is not in the hydrogen fuel supply system. The interconnection should be made to the capillary tube of the contaminated instrument.

10.1.13.3 Fuse Replacement

1. This paragraph applies only to the standard (non-certified) OVAs. There are two overload fuses incorporated in the Battery Pack Assembly, one is a 3AG- 1 AMP Slo-Blo in the power line to the pump and igniter and the other a 3AG-1/4 AMP in the power line to the electronics. Both fuses follow the current limiting resistors which provide primary short circuit protection. However, in the event of an excessive overload, the fuses will open and prevent overheating of the current limiting resistors. It should be pointed out that the 1 AMP Slo-Blo fuse will blow in approximately 8 to 12 seconds if the igniter switch is kept depressed. Normal ignition should take place in not more than six seconds. Therefore, do not depress igniter button for more than six seconds. If ignition does not occur, wait one to two minutes and try again. If the required 1 AMP Slo-Blo fuse cannot be readily obtained, replace temporarily with a 3 AMP-3 AG standard fuse.

10.1.14 TROUBLESHOOTING

1. Table 10.1.2 presents a summary of recommended field trouble shooting procedures. If necessary, the instrument can be easily removed from the case by unlocking the four 1/4 turn fasteners on the panel face and removing the refill cap and exhaust port. The battery pack is removed by taking out the four screws on the panel and disconnecting the power connector at the battery pack.

10.1.15 CORRECTIVE ACTION

1. If a piece of equipment does not properly calibrate, or is suspected to be malfunctioning, remove the device from operation, and tag as appropriately. Segregate the device so that it will not be unintentionally used. Notify the Chief Monitoring Technician so that a recalibration can be performed or a replacement will be obtained. Corrective action remedies for the OVA are detailed in Table 10.1.2.

10.1.16 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Industrial Waste Inspectors records room following a Technical Quality Assurance and Quality Control review.

TABLE 10.1.1
LOPEZ CANYON LANDFILL
OVA 108 AND 128
INSTRUMENT CALIBRATION AND MAINTENANCE FREQUENCY

Organic Vapor Analyzer 128 & 108		
TEST	CALIBRATION/TYPE	FREQUENCY
Mechanical Zero	Internal	1/Per Day
Leak Check	Flow Blockage or Restriction	1/Per Day
Leak Check	Hydrogen Supply System	1/Per Day
Voltage Supply	Internal	1/Per Day
High and Low Calibration	Internal	2/Per Day
Hydrogen Fill-Up	Hydrogen Supply	2/Per Day
Gas Calibration	10 PPM Methane	2/Per Day
Gas Calibration	100 PPM Methane	2/Per Day
Gas Calibration	500 PPM Methane	2/Per Day
Gas Calibration	1% Methane in Air	2/Per Day
Electrical Calibration	Internal	1/Per Week
Flow Rate	Flow Meter	1/Per Week
Maintenance and Cleaning		1/Per Day

TABLE 10.1.2
LOPEZ CANYON LANDFILL
TROUBLE SHOOTING PROCEDURES

TROUBLE	TROUBLE SHOOTING PROCEDURES	REMEDY
1. Low sample flowrate on flow indicator. Nominally two units on flow gauge. (See item 6 below).	a. Check primary filter and particle filters in the pickup assembly. b. Determine assembly containing restriction by process of elimination, i.e., remove probe, remove Readout Assembly, remove primary filter, etc. c. If the restriction is in the SidePack Assembly, further isolate by disconnecting the sample flow tubing at various points, i.e., pump output, chamber input, etc. Note: The inherent restictions due to length of sample line, flame arrestors, etc., must be taken into account when troubleshooting.	a. Replace or clean filter if clogged. b. Investigate the assembly containing this restriction to determine cause blockage. Clean or replace as required. c. If in the detector chamber, remove and clean or replace porous metal flame arrestors. If pump is found to be the problem, remove and clean or replace.
2. H2 flame will not light. (See also 6 below).	a. Check sample flow rate (See Item 1 above). b. Check ignitor by removing the chamber exhaust port and observing the glow when the button is depressed. c. Check for rated H2 Supply Pressure. (Listed on calibration plate on pump bracket). d. Check H2 flow rate by observing the PSI decrease in pressure on the H2 Tank Pressure gauge. The flow rate should be about 130 PSI decrease in pressure per hour. (Approximately 12 cc/min. at detector.) On instruments with GC option, disconnect column and measure H2 flow rate with a bubble meter. e. Check all H2 plumbing joints for leaks using soap bubble solution also, shut off all valves and note pressure decay on H2 tank gauge. It should be less than 350 PSIG per hour. f. Check to see if H2 supply system is frozen up by taking unit into warm area. g. Remove exhaust port and check for contamination. h. Check spacing between collecting electrode and burner tip. Spacing should be 0.1 to 0.15 inches.	a. If sample flow rate is low, follow procedure 1 above. b. If ignitor does not light up, repalce the plug. If ignitor does not light, check the battery and wiring. c. If low, remove battery pack and adjust to proper level by turning the allen wrench adjustment on the low pressure regulator cap. d. The normal cause for H2 flow restricti[illegible] would be a blocked or partially blocked capillary tube. If the flow rate is margially low, attempt to compensate by increasing the H2 Supply Pressure by 1/2 or 1 PSI. If flow rate cannot be compensated for, replace capillary tubing. e. Repair leaking joint. f. If their is moisture in the H2 supply system and the unit must be operated in subfreezing temperatures, purge the H2 system with dry N2 and ensure the H2 gas used is dry. g. If the chamber is dirty, clean with ethyl alcohol and dry by running pump for approx 15 minutes. If H2 fuel jet is misaligned, ensure the porous metal flame arrestor is properly seated. h. Adjust by screwing Mixer/Burner Assembly in or out. This spacing problem should only occur after reassembling a Mixer/Burner Assembly to a Preamp Assembly.
3. H2 flame lights but will not stay lighted.	a. Follow procedures 2(a),(c),(d),(e)(g) and (h) above. Also refer to Item 5 below.	

TABLE 10.1.2
LOPEZ CANYON LANDFILL
TROUBLE SHOOTING PROCEDURES

TROUBLE		TROUBLE SHOOTING PROCEDURES		REMEDY	
4.	Flameout alarm will not go on when H2 flame is out.	a.	Check instrument calibration setting and Gas Select control setting.	a.	Readjust as required to proper setting. Note that on linear OVAs the flameout alarm is actuated when the meter reading goes below zero. On logarithmic OVAs, the alarm is actuated when the signal level goes below 1 ppm methane or the equivalent.
		b.	Remove exhaust port and check for leakage current path in chamber (probably moisture or dirt in chamber).	b.	Clean contamination and/or moisture from the chamber using a swab and alcohol. dry chamber by running pump for approx. 15 minutes.
		c.	If above procedures do not reslove problem. the probable cause is a malfunction in the preamp or powerboard assemblies.	c.	Return preamp chamber or power board assembly to the factory for repair.
		d.	Check Volume Control knob is tuned up.	d.	Adjust for desired volume.
5.	False flame-out alarm. (Applies to linear OVAs).	a.	Flameout alarm is actuated on linear instruments when signal goes below electronic zero (even though flame is still on). This can be due to inaccurate initial setting, drift or a decrease in ambient concentration. Verify if this is the problem by zeroing meter with flame out and reigniting.	a.	When using the X1 range, adjust meter to 1 ppm rather than zero. Be sure instrument has been zeroed to lowest expected ambient background level.
6.	Slow response time, i.e., time to obtain response after sample in applied to input.	a.	Check to ensure that probe is firmly seated onthe rubber seal in the readout assembly.	a.	Reset by holding the probe firmly against the rubber seat and then lock in position with the knurled locking nut.
		b.	Check sample flow rate per procedure 1 above.	b.	See item 1 above.
7.	Slow recovery time, i.e., too long a time for the reading to go back to ambient after exposure to a high concentration of organic vapor.	a.	This problem is normally caused by contamination in the sample input, requiring pumping for a long period to get the system clean of vapors again. Charcoal in the lines would be the worst type of contamination. Isolate through the process of elimination. See 1b.	a.	Clean or replace contaminated sample input or assembly as required.
		b.	Check flame chamber for contamination.	b.	Clean as required.

TABLE 10.1.2
LOPEZ CANYON LANDFILL
TROUBLE SHOOTING PROCEDURES

TROUBLE		TROUBLE SHOOTING PROCEDURES		REMEDY
8. Ambient backgrund reading in clean environment is too high.	a.	An ambient background reading can be caused by hydrocarbons in the H2 fuel supply system. Place finger over sample probe tube restricitng sample flow and if meter indication does not go down significantly, the contamination is probably in the H2 fuel.	a.	Use a higher grade of hydrocarbon free hydrogen. Check for contanimated fittings on filling hose assembly.
	b.	An ambient background reading can be caused by a residue of sample building up on the face of the sample inlet filter. If the test in Item 8a above produces a large drop in reading, this is usually the cause.	b.	Remove the exhaust port (it is not necessary to remove instrument from case), use small wire brush from the tool kit or a knife blad and lightly scrub surface of sample inlet filter.
	c.	An ambient background reading can also be caused by hydrocarbon contmaination in the sample input system. The most likely cause would be a contaminat absorbed or condensed in the sample line. NOTE: It should be emphasized that running the instrument tends to keep down the buildup of backgorund vapors. Therefore, run the unit whenever possible to store it with the carrying case open in clean air.	c.	Clean and/or replace the sample input lines Normally the lines will clear up with sufficient running.
9. Pump will not run.	a.	CHeck 1 AMP Slo-Blo fuse on the battery pack cover. Note: Certified OVAs do not have fuses.	a.	Replace fuse. Important: Note that fuse is a Slo-Blo type. If fuse continues to blow when ignitor switch is closed, check for short circuit. If igniter is not the problem, there is a short in the wiring or pump motor. Return OVA to facotry or authorized repair facility.
10. No power to electronics, but pump runs.	a.	Check 1/4 AMP fuse on the batteyr pack cover. Note: Certified OVAs do not have fuses.	a.	Replace fuse. If fuse continues to blow, there is a short in the electronics assembly. Return OVA to factory or authorized repai facility.
11. No power to pump or to electronics.	a.	Place battery on charger and see if power is then available. Recharge in a non-hazardous area only.	a.	If power is available, battery pack is dead or open. Recharge battery pack. If snil defective, repaice battery pack.

SECTION 10.2

MODEL NP-204
PORTABLE NATURAL GAS INDICATOR

10.2.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR MODEL NP-204 PORTABLE NATURAL GAS INDICATOR

10.2.1 INTRODUCTION

1. The Model NP-204, Natural Gas Indicator is a compact battery-operated portable instrument that is used for taking a gas/air sample and indicating the presence and concentration of combustible gas. Samples are drawn by means of a rubber aspirator bulb and analyzed for combustible gas content on a heated platinum filament in a Wheatstone bridge measuring circuit. A built-in meter indicates gas content in units of explosibility and/or in percent by volume.

2. Power for operation of the instrument is provided by built-in dry cells or rechargeable nickel-cadmium batteries. A probe and extension hose permit withdrawl of samples.

3. These procedures were developed based on GasTech's manuals and recommendations, as well as technical and field experience.

10.2.2 PURPOSES OF MEASUREMENT

1. The Model NP-204 is essentially two instruments combined in one. It is a combustible gas indicator, using the catalytic detection principle to respond to flammable gases up to the lower explosive limit, and it is also a thermal conductivity indicator, using the cooling effect of natural gas to produce the readings up to 100% by volume. Both detection methods employ the Wheatstone bridge measurement principle, and use the same batteries, meter and sampling system. The detection methods are discussed further below.

10.2.2.1 "L" Range

1. This range uses a catalytic platinum filament, initially heated by the battery current to the point where it will cause catalytic oxidation of any combustible gases or vapors that come in contact with the active surface. This oxidation produces a definite heat of combustion, corresponding to the concentration of gas. The heat in turn produces an increase in temperature, hence in electrical resistance, of the filament. This resistance change produces a deflection on the

meter, corresponding to gas concentration.

2. The catalytic method is applicable to detection of gas in air up to the point where the heat of combustion no longer increases with increase in the gas content. Beyond this point, an increase in gas well produce a decrease in reading. As a practical matter, the catalytic method is useful only up to the lower explosive limit (around 5% by volume, for natural gas). It works only in a background of air, as oxygen is required to support catalytic oxidation.

10.2.2.2 "H" Range

1. This range uses a thermal conductivity filament, initially heated by the battery current to a point where it assumes a definite temperature and resistance, corresponding to the heat added by the current and the heat removed by conduction through the surrounding atmosphere. If the instrument is initially set up on fresh air. then when natural gas is sampled the greater cooling ability of the gas causes the filament to become cooler and assume a lower electrical resistance. The resistance change produces a meter reading which can be calibrated in units of percent gas by volume.

2. The thermal conductivity phenomenon is a continuous one from 0 to 100%, so any concentration can be read without limitation. It is a relatively insensitive method, so is used only for the higher concentrations above the LEL. It is not dependent on combustion, hence is applicable regardless of oxygen content of sample.

10.2.3 MAJOR FEATURES

10.2.3.1 "L" Range

1. The Low or "L" range is offered with two alternate sets of graduations. The standard scale reads 0-5% gas % by volume. On instruments equipped with this scale, meter readings can be read directly in percent gas.

2. The optional scale reads 0-100% LEL, where the abbreviation LEL stands for Lower Explosive Limit, and represents the lowest concentration which can be ignited by a source of ignition, hence the lowest concentration which can produce an explosion. This quantity is also spoken of as the lower Flammable Limit (LFL).

3. The Model NP-204 is calibrated before shipment to read directly in percent (0-5) of natural gas in air, based on an average for natural gas of 5% by volume. That is, a 5% by volume mixture will produce a reading of 5% and smaller concentrations will read in proportion. Actually, the instrument is calibrated to read about 10% higher than true explosibility as a safety factor.

4. Other combustible gases will read approximately correctly in terms of explosibility but for maximum accuracy a calibration curve for the specific substance should be consulted. Concentrations are interpreted of volume percent.

10.2.3.1 "H" Range

1. In the "H" range, readings are taken directly in percent by volume of gas, from 0 to 100%.

2. As wells are tested an higher readings are obtained over the "L" range, switch to the "H" range and note reading. any concentration up to 100% gas an be read in this way.

3. If a series of wells all give readings over the "L" range, it is unnecessary to go through the "L" step, and readings may be taken directly on the "H" range.

4. Other gases, including propane and other petroleum vapors, can also be read on the "H" range. The calibration generally will not be correct but comperative readings may be made to determine changes in concentration or variations from one point to another.

10.2.4 ACCESSORIES

1. PROBE

The standard probe supplied with the NP-204 is a 30" aluminum probe with holes cross-drilled 4" from the end, to prevent water from being drawn in if the end of the probe is inadvertently immersed.

2. EXTENSION HOSES

Additional lengths of hose may be used, up to approximately 50", for sampling. The polyethylene-lined hoses (80-0015 and 80-0025, see parts list) are satisfactory for most samples including methane, natural gas, hydrogen, propane, and gasoline vapors. Some of the more complex hydrocarbons such as xylene and styrene, tend to be absorbed on the walls of the polyethylene hose. For these samples, consult factory for the most appropriate hose selection.

3. MOISTURE TRAP

Where there is danger of water or dust being drawn into instrument, a moisture trap can be used. This glass-bodied trap with sintered metal filter couples to indicator inlet and will collect water that is drawn into or condensed in sample hose. Inspect trap periodically while in use, and empty or clean bowl and filter whenever visible water or dust accumulate. Regular sample hoses connect to inlet of trap when it is installed on instrument. Order Stock No. 80-0200.

4. HYDROPHOBIC FILTER

As an alternative to the moisture trap, a "hydrophobic filter" is now available, which has a porous fluorocarbon filter element that is not wetted by water and hence will not allow liquid water to pass through. It couples to instrument inlet fitting and will block any water that is drawn through the hose. Order Stock No. 80-0221.

5. CALIBRATION

Dependable results from any gas indicator are best assured by frequent tests for response. The Calibration Test Kit provides a convenient means for making suck tests. It consists of two cylinders of compressed gas-air mixture, a gas collecting bag, a control valve and a hose for coupling valve to indicator, all stored in a convenient carrying case. Gas cylinders are filled with a mixture of 2.5% natural gas in air, which should produce a reading of 3.0 on the "L" indicator scale or 60 on the % LEL scale. Natural gas (primarily methane) is used because this is the most critical material for catalytic activity on a platinum filament.

- If the instrument gives a normal response on natural gas, it will also give a normal response to all other combustible gases and vapors. To make a response test, first turn on and adjust the indicator to zero in the normal way. Couple control valve and hose to cylinder, and connect hose to indicator. Open control valve slowly and watch meter reading carefully, noting maximum reading. Normal reading should be between 2.7 and 3.5 on the "L" scale or 55 and 70 on the % LEL scale. If it is not, recalibrate indicator to a reading corresponding to that marked on cylinder. Order Stock No. 81-0202.

6. STORAGE CASE

A durable plastic storage case with carrying handle is available for the NP-204. Case is padded with foam for protection, and includes space for probe, hose, charger, moisture trap, spare filaments, spare batteries and other parts and accessories. Order Stock No. 20-0201.

10.2.5 STARTUP PROCEDURE

1. Before taking instrument on the job, check battery voltage. To check, put switch in VOLT ADJ position. Meter should rise to the "CHECK" position near top of the scale. Lift and turn VOLT ADJ clockwise to determine maximum voltage setting. If it cannot be set beyond mark, batteries need recharging or replacement for full capacity. Do not attempt to use instrument at all if reading cannot be set up to mark.

2. If voltage is satisfactory, continue with next steps of preliminary adjustment as follows:

   - Confirm operation of "L" pilot light/meter illuminating lamp.

   - With sample inlet in fresh air, squeeze bulb several times to flush out any remaining gas.

   - Check zero setting by turning switch to "L" position. Meter should read close to zero. Lift and turn "L" ZERO knob to bring reading to exactly 0.

   - Couple sampling hose to instrument inlet on left hand end, and connect probe to end of hose.

   - Admit a small amount of 2.5% methane combustible gas to end of probe, and confirm that meter rises upscale. Flush indicator with fresh air, and verify that reading returns to zero. (refer to step 2 above).

   - Turn switch to "H" position. Confirm operation of "H" light/meter illuminating lamp. Make sure that meter settles on or close to zero. (If it does not, see Maintenance section.) Meter should be adjusted to zero before Calibration is done.

- Admit a 45% methane sample of standard calibration gas to instrument inlet, and note that meter rises upscale once more. Flush indicator with fresh air and verify that meter returns to zero.

3. Instrument is now adjusted and ready to use. It may be turned off and carried to the job. To make a gas test, proceed as follows:

- Turn to VOLT ADJ position, adjust voltage if necessary, then turn to "L".

- Hold probe within space to be tested. Squeeze bulb several times while watching meter, and observe maximum reading, on "L" scale.

- If reading goes to top of scale, on "L" range, move switch to "H" position. Continue to sample, then observe meter reading on "H" scale. Take reading at point where meter comes to rest after last squeeze of bulb.

- Purge indicator with fresh air to return meter to zero, before switching back to "L" range.

NOTE: When testing locations suspected of high concentrations of combustible gas, as in landfill gas testing or leak location close to the gas leak, be sure to make first test in the "H" range. If no reading is observed, then switch to the "L" range filament from exposure to very high concentrations which could damage it. See Section 10.2.6.3, Rich Mixtures.

10.2.6 SHUTDOWN PROCEDURE

10.2.7 CALIBRATION AND ADJUSTMENT

1. In addition to the normal operating controls found on the top panel, the following auxiliary controls are available. They are single turn miniature slotted-shaft potentiometers which are mounted on the circuit board, accessible when the top panel is removed and

inverted. To remove panel, loosen the two captive retaining screws, one on each end of the panel.

- SPAN "L": used to set the meter to the correct valuer while sampling a known concentration of combustible gas in the range up to LEL or 0-5%.

- ZERO, "H" a zero adjustment potentiometer connected in the "H" Wheatstone bridge. It is used to balance that bridge while filament is surrounded by gas-free fresh air. After instrument has been set up and adjusted for voltage and zero, on the "L" range, move switch to "H" position. Meter should settle to zero after a few moments. If it does not, then remove top panel and turn "H" ZERO control to bring reading to zero.

- SPAN "H". Response should be set to give a 100% GAS reading while sampling gas of the type to be detected. Connect probe to instrument, adjust voltage, turn to "H" range, check zero, then admit straight gas to indicator, either by forcing it through under its own pressure or by drawing it in from a container filled with gas. When sample system is full of gas, shut off flow of gas and adjust SPAN until meter reads 100% of known gas.

10.2.8 MAINTENANCE

10.2.8.1 Filament Replacement

1. Two pairs of filaments are used in the Model NP-204: Catalytic filaments for the "L" range, and thermal conductivity filaments for the "H" range. Each pair consists of an active or measuring filament and a reference or compensating filament. The active and reference catalytic elements and the active thermal element are all housed within a sintered bronze porous metal cup, which acts as a flame arrestor to retain explosions when sampling explosive gas within a cavity in the instrument housing, so that a sample drawn into instrument will pass through the flame arrestor and reach the elements.

2. The reference thermal element is mounted outside the flame arrestor so that when installed in the instrument it is enclosed in an isolated cavity and does not encounter the sample. All four elements and the flame arrestor are permanently assembled onto an

anodized aluminum plate with holes in each corner, so that it can be retained within the instrument by means of four screws. Short wires with lugs are provided, to connect to terminals on the circuit board, and the wires and terminals are color-coded for proper connection.

3. The entire filament/flame arrestor assembly must be replaced as a unit, if any portion becomes defective or damaged. To replace:

- Loosen the two panel hold-down screws; remove and invert top panel.

- Loosen (do not remove) the six screws holding the terminals T1-T6 for the colored lead wires. Pull wires from terminals.

- Remove four screws, one in each corner of plate.

- Remove complete plate and filament/flame arrestor assembly. Inspect cavity and gasket, and be sure that the cavity and incoming passage is clear and dry.

- Install new filament/flame arrestor in same position, with gasket in place.

CAUTION

While handling the new assembly, be very careful not to touch or otherwise damage the exposed thermal reference filament. Line it up carefully with cavity in panel before pushing the assembly into position.

- Connect lead wires to corresponding color-coded terminals and fasten screws securely. Be sure to observe color coding. Note that there are two red wires, T2 and T6 which electrically are connected in common. Each should be connected to the red-coded terminal, T2 or T6 that is most readily accessible.

10.2.8.2 Batteries and Recharging

1. The Model NP-204 is furnished with two standard size D alkaline-type dry cells or with two rechargeable nickel-cadmium batteries. The alkaline - type cells will give 4 to 6 hours of operating life; however, ordinary carbon-zinc dry cells can also be substituted. If dry cells are used, they will be adequate for 45 minutes of continuous operation, longer on intermittent use. Nickel-cadmium

batteries will last up to 4 hours and can be recharged repeatedly. When meter cannot be set as high as the "CHECK" line with switch in VOLT ADJ position and VOLT ADJ knob all the way clockwise, batteries require replacement or recharging.

2. An extra-cost option provides for four size D cells in place of two, which doubles the operating hours. Instruments ordered with this arrangement should be used only with alkaline or carbon-zinc dry cells, and do not include a battery charger connection. Two sets of two cells in series are held between spring contacts, and an insulating tube is provided to hold the two cells in each pair in line.

3. To replace batteries, remove instrument from its case, and loosen the coin-slotted captive screw found in center of bottom plate. Remove plate, exposing batteries in their spring-contact holders. Pull old batteries out, and install new ones in the same position, observing polarity as marked on holder.

4. If instrument is furnished with nickel-cadmium batteries and a charger, batteries may be recharged in the instrument. Insert charger plug into socket on end of instrument, and plug charger cord into a standard AC outlet. Charger used is a dual voltage type, with small switch on the inner face, usable to put charger in 120 or 240 volt connection. As shipped, this switch will be taped in the anticipated voltage position, but can be shifted over in the field if necessary.

5. Overnight charge (16 hours) should restore batteries to full capacity without damaging them. An optional charger for use in recharging from a vehicle battery is also available.

WARNING

Do not attempt to charge non-rechargeable batteries as this can cause them to explode, injuring personnel or damaging the indicator.

10.2.8.3 Sample System

1. PROBE

The standard probe used with the Model NP-204 is a 30" long x 1/4 " OD aluminum tube with a dust filter in the handle. The dust filter consists of a transparent acrylic plastic body threaded to a nickelplated base. A cotton ball filter element is used, which can easily be replaced by unscrewing filter body.

The end of the probe tube is a cross-drilled, which prevents liquid from being drawn in if the tip is placed in water.

An optional fiberglass probe tube is available in place of the aluminum tube.

2. HOSE

The hose used is polyethylene-lined with a nylon braid reinforced polyethylene jacket. Keep hose clean and be sure that couplings make air-tight contact, checking occasionally by holding finger over hose inlet. Bulb should remain flattened after squeezing if there is no leak.

Extension hoses of the same material in various lengths are available. The standard polyethylene-lined hoses are suitable for natural gas and most hydrocarbon vapors. Consult factory for hose recommendation if aromatic or other solvent vapors are to be handled.

3. ASPIRATOR BULB AND OUTLET FITTING

Sample is drawn by squeezing the aspirator bulb, a rubber bulb with inlet and outlet check valves. This assembly normally requires no maintenance, but bulb should be inspected periodically for cracks, and valves should be checked for leakage. The entire assembly is readily replaced.

The bulb connects to a hose barb outlet fitting in right hand of panel. A flow-restricting orifice is screwed into end of barb, and may be unscrewed for cleaning if desired. The orifice hole can be cleaned out using a small wire.

If orifice is omitted or enlarged unduly, this will result in excessive meter fluctuation while aspirating.

10.2.8.4 Meter/Indicator Lamps

1. Either the "L" or the "H" lamp is on whenever the instrument is on. This indicates which range is in use, and provides illumination to

permit reading meter in dark places. If lamp fails, it should be replaced as follows: Remove four screws holding top plate to top panel. Take off top plate, exposing lamps. Unsolder lamp wires at terminals and solder new lamp in the same position.

10.2.9 PRECAUTIONS AND TROUBLESHOOTING TIPS

10.2.9.1 Heated Samples

1. When sampling spaces such as hot tanks that are warmer than the instrument, remember that condensation can occur as the sample passes through the cool sample line. Water as the sample passes through the cool sample line. Water vapor condensed in this way can block the flow system and vapor condensed in this way can block the flow system and corrode the flame arrestor. A water trap or filter can be used to control this, and is available as an accessory.

2. If heated hydrocarbon vapors of the heavier hydrocarbons (flash point 90°F or above) are present, they may also condense in the sample line and fail to reach the filament. Thus an erroneous low reading may be obtained. Special techniques are required to handle such samples, and consultation with engineers at GasTech is advised.

10.2.9.2 Filament Poisoning

1. Certain substances have the property of desensitizing the catalytic surface of the platinum filament used in the "L" range. These substances are termed "catalyst poisons" and can result in reduced sensitivity or in failure to give a reading on samples containing combustible gas. The most commonly encountered catalyst poisons are the silicon vapors, and samples containing suck\vapors even in small proportions should be avoided.

2. Occasional calibration checks on known gas samples are necessary, especially if the possibility exists of exposure to silicones. A calibration check on a known methane mixture is the most dependable as an indication of normal sensitivity. A convenient calibration test kit is available and described under "Accessories".

10.2.9.3 Rich Mixtures

1. In using the "L" (catalytic) range, when high concentrations of gas

are sampled, especially those above the LEL, considerable heat is liberated at the filament. This heat may cause damage to the filament or tend to shorten its life, so sustained testing of samples beyond the meter range should be avoided. Instead, make tests in the "H" range.

2. When sampling rich mixtures, using the "L" range, the following instrument action may be expected:

- Mixtures up to 100% LEL (5% natural gas) - reading on scale.

- Mixtures between :E: (0-5%) and Upper Explosive Limit (0-100%) readings at top of meter.

- Mixtures above (0-100%) UEL - as sampling continues, the meter first goes to top of scale, then may come back down on scale, depending upon concentration. Very rich mixtures may give a zero reading.

- Since the "H" range gives a means of reading gas concentrations up to 100% (undiluted) gas, there is no need to expose the catalytic filament repeatedly to concentrations beyond its useful range.

10.2.9.4 Oxygen Deficient Mixtures

1. Samples which do not have the normal proportion of oxygen may tend to read low on the "L" range, if there is not enough oxygen to react with all combustible gas present in the sample. As a general rule, samples containing 10% oxygen or more have enough oxygen to give a full reading on any combustible gas sample up to the LEL.

2. Oxygen deficiency does not affect the "H" range, since it does not depend on oxidation or combustion, but only on the cooling effect of the gas.

10.2.9.5 Oxygen-Enriched Mixtures

1. Samples having more than the normal proportion of oxygen will give a normal reading. However, they should be avoided because the flame arrestor used is not dense enough to arrest flames from

combustible gas in oxygen, which can be much more intense than those in air. DO NOT ATTEMPT TO USE THE MODEL NP-204 ON SAMPLES OF COMBUSTIBLE GAS IN OXYGEN.

10.2.10 PARTS LIST

1. The following parts are considered as normal repair or replacement items or accessories, and may be ordered separately, by description and stock number. Always specify model and serial number of instrument for which parts and accessories are required. For problems with parts not listed, write or telephone GasTech for information or request shipping instructions for return on the instrument for repair.

STOCK NUMBER	DESCRIPTION
20-0201	Storage case, Model NP-204
20-0252	Carrying case, vinyl, with strap (specify Model NP-204)
30-0410	Aspirator bulb with tube
33-1031	Filter element, cotton, pkg. of 24
49-1201	Battery, alkaline, size D
49-1501	Battery, nickel-cadmium, size D
51-0101	Lamp, meter illuminating
62-0106	Filament/flame arrestor assembly, including catalytic and thermal conductivity filaments, wired and ready for installation
71-0071	Instruction Manual, Model NP-204
80-0002	Hose. 6", Teflon-lined, complete with couplings
80-0003	Hose, 3", Polyethylene, complete with couplings
80-0015	Hose, 15", polyethylene-lined, complete with couplings
80-0025	Hose, 15', polyethylene-lined, complete with couplings
80-0150	Probe with filter, 10" plastic
80-0155	Probe with filter, 30" aluminum
80-156	Probe with filter, 30" fiberglass
80-0200	Moisture trap, attached
80-0221	Filter, hydrophobic

81-0012	Cylinder, replacement, 2.5% natural gas
81-0202	Calibration Test Kit, 2.5% natural gas

10.2.9 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Industrial Waste Inspectors records room following a technical Quality Assurance and Quality Control review.

SECTION 10.3

MODEL XP-204
PORTABLE OXYGEN INDICATOR

10.3.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURE FOR MODEL XP-204 PORTABLE OXYGEN INDICATOR

10.3.1 INTRODUCTION

1. The Model XP-204 Oxygen Indicator is a compact battery-operated portable instrument for indicating the existence of oxygen deficiency, or the concentration of oxygen in a nominally inert sample. A rubber aspirator bulb draws a sample of the air under test into contact with an electrochemical oxygen cell. The output of the oxygen cell is amplified and displayed on a built-in meter.

2. Power for operation of the instrument is provided by two batteries. A probe and extension hose permit withdrawal of samples from remote locations.

3. These procedure are developed based a GasTech's manual and recommendations, as well as technical and field experience.

10.3.4 SAMPLE SYSTEM

PROBE

1. Probe consists of a 10" long 1/4" 00 plastic tube with a dust filter chamber at the upper end, forming a handle. The filter chamber is of transparent plastic, so the filter condition can be inspected easily for the presence of dust or moisture.

2. The filter can be removed by unscrewing the plastic filter body from the probe and pulling the filter ball out with tweezers or a pick. Clean the filter ball out with tweezers or a pick. Clean the filter cavity and insert a clean filter. Replacement filters are available from Gas Tech, or regular cotton balls may be obtained at a drugstore.

3. The standard 10" probe is convenient for general-purpose use, a 30" aluminum probe is available. The probe is cross-drilled 4" from the end, so that water will not be drawn into instrument even if the tip of the probe is inadvertently immersed. Same filter arrangement is provided in handle as with 10" probe.

HOSE

1. The hose used is polyethylene-lined, synthetic rubber-jacketed with a fabric reinforcement. A threaded swivel fitting at one end fits on the instrument and a fixed threaded fitting with an O-ring, on the other end, fits into and seals the probe.

2. Keep hose clean and be sure that couplings make air-tight contact, checking occasionally by holding finger over the hose inlet and squeezing the aspirator bulb. Bulb should remain flattened after squeezing if there is no leak.

3. Extension hoses in various lengths are available as shown in the parts list. A moisture trap is also available for use in very wet environments.

10.3.3 STARTUP PROCEDURE

1. Connect the hose and probe assembly to the sample inlet, and the aspirator bulb to the sample outlet.

2. Instrument is now ready for use.

3. Verify that connections are tight by holding a finger over the probe inlet and squeezing the bulb. If there are no leaks, the bulb will remain flat.

4. Turn power on by moving "BATT" switch to "ON".

5. Clear gas chamber by squeezing aspirator bulb a couple of times while the instrument is in a normal atmosphere. Normal air contains 21% oxygen by volume and is used as a calibrating gas. Adjust "SPAN ADJ." to set meter needle on the "CALIB." line or 21%. The instrument is now ready for use.

6. Verify normal operation by testing your expired breath, which gives a convenient oxygen-deficient sample. Hold the end of the probe inside your open mouth and breathe out while squeezing the bulb a couple of times. This should give a reading of 18% or less.

7. Place the probe tip in the atmosphere to be sampled and draw in a sample by squeezing the aspirator bulb gently a few times. Read percent oxygen by volume directly from the meter.

10.3.4 SHUTDOWN PROCEDURE

1. Turn the power control knob to the OFF position.

10.3.5 CALIBRATION AND ADJUSTMENT

The instrument zero should be checked and adjusted once a month to compensate for aging of the oxygen cell. To adjust to zero:

1. Sample an oxygen-free sample such as nitrogen, argon or natural gas.

2. Turn the miniature slotted shaft "ZERO ADJ." control using a small screwdriver through the access hole in the front panel. Set meter to exact zero. (If meter cannot be set to zero, return oxygen cell to factory for reactivation).

3. Disconnect the oxygen-free sample and clear the chamber with the aspirator bulb, drawing in a sample of a normal atmosphere.

4. Lift and rotate the "SPAN ADJ." knob to place meter needle at the "CALIB." position. If unable to adjust "SPAN ADJ." to calibration setting, the oxygen cell should be returned to the factory for reactivation.

   NOTE: Check both batteries for minimum operating voltage of 5.5 volts or a voltage difference between them of less than 2 volts before concluding that oxygen cell is defective.

10.3.5.1 Pressure Effects

1. <u>Altitude Effect</u>: The oxygen cell responds to the partial pressure of oxygen in the atmosphere under test. This is affected by oxygen content, but also by sample pressure. For example, is the instrument is set to 21% on atmospheric air at sea level, then a change in altitude to 6,000 feet will cause a reduction in pressure to 80% of sea level pressure, and a corresponding reduction in reading to 16.8%. If percent oxygen readings are to be taken under altitude conditions, then readjust reading to 21% on normal air at the altitude.

   - Since this requires greater cell output than would be required at sea level, some cells, which are useable at sea level, may be marginal or insensitive at altitude.

- Conversely, use for the instrument at higher pressures, such as underwater tunnel construction, will require readjustment to reduce the reading to 21%.

2. Pressure Fluctuations: As the aspirator bulb is squeezed, slight pressure fluctuations occur within the instrument, which are reflected in movements, will be exaggerated by restrictions in the incoming sample line, or by use of extra long sample hoses.

3. Cell Deterioration: One of the most common modes of cell failure is undue response to pressure variations below atmospheric, as produced by operation of the aspirator bulb. Instead of slight downward movement of the needle as the bulb is released, drastic upscale movement occurs, caused by movement of the Teflon membrane covering the cell. This is more likely to happen under maximum vacuum conditions, caused by long sample lines or by a plugged sample inlet. This includes the flow system test which can bring on premature cell failure.

    - If operation at low or varying pressure is a normal requirement of the intended application, it is possible to minimize the adverse effects by reversing the bulb, connecting it to suck through the sample line and discharge into the instrument under slight pressure. The necessary adapter fitting for this purpose is listed in the Parts List, Section 10.3.6.

10.3.5.2 Temperature Effects

1. Temperature Limits: The oxygen cell used employs a water-based electrolyte which contains both dissolved alkaline compounds and anti-freeze, so it can be used well below 32°F (0°C) without danger of freezing. Operation below 14°F (-10°C) is not recommended.

    - High temperature conditions are unfavorable to cell life and should be avoided as much as possible. The cell is operable up to 140°F (60°C) but such operation will reduce cell life drastically.

2. Temperature Compensation: The electrochemical cell is inherently a temperature-sensitive device , whose output tends to increase with

7. Connect the socket to the plug in the upper section. Some care is normally required to be sure that pins are lined up before pushing the plug in its socket.

8. Check the zero on oxygen-free gas and adjust as in number 3 in section 10.3.3.1. Then verify that there is ample range of "SPAN ADJ." knob to set the meter to 21%.

9. Reassemble upper and lower sections being careful to avoid pinching loose wires.

10. If used oxygen sensor assembly requires repair, it should be sent to factory for reactivation. Alternatively, a complete new detector can be ordered, on an exchange basis.

    - Oxygen cell is an electrochemical device similar to a battery, which gradually depletes itself, regardless of usage of the cell. It requires periodic reactivation, consisting of replacement of the electrolyte and the membrane, plus cleaning and inspection of the electrodes. This must be done at the factory.

    - New and reactivate oxygen cells are date-coded and carry a one-year factory guarantee based on length of time from date of original shipment. Cells returned for reactivation are inspected and in-warranty cells are tested for operability. Any that fall prematurely receive a warranty allowance.

10.3.6.2 Battery Replacement

1. Two 9-volt translator radio type alkaline batteries are used in this instrument to provide + and - voltages. Batteries should be replaced if the difference between the two batteries exceeds 2 volts or when their voltage drops to less than 6 volts.

    - To replace batteries, remove the instrument from its carrying case, and loosen the coin-slotted captive screw found in the center of the bottom plate.

    - Remove the plate, exposing batteries.

    - Remove the knurled nut and retainer holding the batteries. Pull old batteries out and disconnect them from the snap connector. Connect new batteries and install them under the temperature. This is compensated for by a thermistor/resistor combination across the cell output, which will absorb the added output by reducing its resistance as the temperature increases.

- This compensation is more precise for some cells than others, and is valid only over a limited temperature range. The design temperature range is from 40° to 100°F, and this compensation is more perfect for some cells than for others. Thus when taking the instrument from one temperature environment to another, some recalibration to 21% on air should very likely be required.

- The instrument may be used beyond the limits of compensation simply be recalibrating at 21%. The reading at zero is not much affected by temperature.

10.3.6 MAINTENANCE

10.3.6.1 Oxygen Cell Replacement

1. Remove upper section of instrument by loosening the two large captive screws on top of instrument (one on each side).

2. Separate the two sections, placing the top section face down on a table for convenience in servicing.

3. The oxygen cell block contains the inlet and outlet passages that bring the sample to the cell. It also serves as a clamp and retainer for the cell. To remove the cell, take out the two slotted hex-head screws that hold the block, and swing the block up and away from the cell. Leave the flexible tubes connected to block.

4. Unplug the cell wiring at connector and remove cell completely.

5. Clean out the cavity in the cell block. Make sure O-ring gasket is clean, in good condition and properly positioned.

6. Remove the seal from the flat face of a new or reactivated cell. Shake out ant residual drops of water. Install the cell with open side toward block, and with edge sealed against the O-ring gasket. Place the block in position with the cell against the spring in the upper section an install and tighten the two hexhead screws to retain the block and cell in place.

10.3.7 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Industrial Waste Inspectors records room following a technical Quality Assurance and Quality Control review.

retainer.

- Replace bottom plate and return instrument to its carrying case.

NOTE: For longest operating time, 8.4-volt mercury cells are recommended, however, ordinary translator radio 9-volt dry cells (alkaline or carbon types) are normally used. Battery life ranges from 20 to 40 operating hours, depending on type of battery used.

10.3.6 PARTS LIST

1. The following parts are considered as normal repair or replacement items or accessories, and may be ordered separately, by description and part number. Always specify model and serial number of instrument for which parts are required. For problems with parts not listed, write or telephone GasTech Inc. for information, or request shipping instructions for return of the instrument for repair.

PART NO.	DESCRIPTION
30-0410	Aspirator bulb with tube
30-0501	Hose adapter fitting (for pressure side testing)
49-1302	Battery, alkaline, 9-volts (2 required)
65-0601	Oxygen cell, CO2 resistant
65-0601E	Oxygen Cell Exchange
71-0083	Instruction Manual, Model IP/XP-204
80-0003	Hose 3', Polyethylene lined, complete with couplings
80-0006	Hose 6', Polyethylene lined, completed with couplings
80-0015	Hose 15', polyethylene lined, complete with couplings
80-0025	Hose 25', Polyethylene-lined, complete with couplings
80-0150	Probe with filter, 10" plastic
80-0155	Probe with filter, 30" aluminum
80-0200	Moisture trap

10.4.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR CLIMATRONICS MODEL P/N 101281 WITH A 101150 WIND RECORDER, F460 WIND SENSORS AND CROSSARM.

10.4.1 INTRODUCTION

1. This document describes procedures that field personnel will perform when taking measurements with a Climatronics Model P/N 101281 which consists of a 101150 wind recorder housed in a steel NEMA enclosure, F460 Wind Sensors and a crossarm. Technicians will document field equipment operation, maintenance, and calibrations on the appropriate logbooks and forms.

2. These procedures were developed based on Climatronics' manuals and recommendations, as well as technical and field experience.

10.4.2 PURPOSE OF MEASUREMENT

1. The Climatronics 101281 wind system is a highly sensitive instrument that measures wind speed and direction. The instrument has broad applications, since it can be permanently installed or transportable and has a continuous weather monitoring and data recording system.

10.4.3 MAJOR FEATURES

1. The F460 Wind Speed Sensor P/N 1000075; monitors the wind speed with a three-cup anemometer assembly. A 30-hole chopper with an LED photo chopper device provides a frequency output directly proportional to the wind speed.

2. The F-460 Wind Direction Sensor, P/N 100076 consists of a counter-balanced, lightweight vane and a precision, low torque, potentiometer to yield a voltage output proportional to wind direction.

3. The Climatronics 101281 system can register measurements on a strip chart recorder utilizing a two-pen, pressure sensitive 12 VDC recorder or can be downloaded to a data acquisition system.

4. The crossarm mounts on any 1 1/4-inch IPS (1.67-inch OD) vertical pipe stub.

SECTION 10.4

CLIMATRONICS MODEL P/N 101281
WITH A 101150 WIND RECORDER,
F460 WIND SENSORS AND CROSSARM

10.4.6 STARTUP PROCEDURE

1. Certain safety precautions should be followed in using the instrument. Once the crossarm and wind sensor has been assembled the instrument will spin freely and could cause a possible eye or head injury. Operating and assembly instructions should be strictly followed to ensure safe, reliable operation.

The startup procedures is as follows:

- Check all system cable connections.

- Locate the power switch on the P.C. board at the rear of the recorder. To gain access to the power switch, loosen the thumbscrew located in the upper left, front corner of the recorder and allow the front panel to swing down. Pull the switch outward, then move the power switch towards the up position. This will power the recorder from the internal battery.

Note: An audible alarm has been incorporated into the 101281 environmental enclosures. This alarm will sound when the batteries are incorrectly connected.

- Locate the wind speed transmitter and rapidly spin the shaft. The wind speed recorder stylus (left side of the recorder) should slowly move upscale.

- Slowly rotate the wind direction shaft and note that the wind direction stylus (right side of the recorder) moves across the chart. Clockwise rotation of the shaft should cause the stylus to move upscale, and counterclockwise rotation of the shaft should cause the stylus to move down scale.

10.4.7 SHUTDOWN PROCEDURE

1. The following procedure should be followed for shutdown of the instrument:

- Locate the power switch on the P.C. board at the rear of the recorder. To gain access to the power switch, loosen the thumbscrew located in the upper left, front corner of the recorder and allow the front panel to swing down. Pull the switch outward, then move the power switch towards the

5. The system will operate on either AC line voltage through the use of a small power pack, external 12-volt battery, 10 watt solar panel with an internal DC batteries.

10.4.4 SUPPLIES AND EQUIPMENT

10.4.4.1 Standard Accessories

- Data output cable
- Power output cable
- Strip chart recorder
- Chart paper
- 1 1/4 inch IPS (1.67 inch OD) vertical pipe stand

10.4.4.2 Optional Accessories

- Anemometer Cup Type
  - Vinyl or Stainless Steel or Heavy Duty
- Wind Speed Range
  - 0-50 and 0-100 mph / 0-25 and 0-50 m/s
  - 0-80 KPH and 0-160 KPH
- Voltage Outputs
  - 0-5VDC or 0-1VDC
- Power Sources
  - AC line voltage (Direct current or power pack)
  - External 12-volt battery
  - Internal Batteries (6 and 12-volt)
  - 10-watt solar panel with 8 amp/hr battery

10.4.5 SAFETY CONSIDERATIONS

10.4.5.1 General

1. Certain safety precautions should be followed in using the instrument. Once the crossarm and wind sensor has been assembled the instrument will spin freely and could cause a possible eye or head injury. Operating and assembly instructions should be strictly followed to ensure safe, reliable operation.

5. System SPAN Adjustments: Place S1 in SPAN (DOWN); leave S4 in ZERO. S2 and S# remain in the same position.

- Monitor TP5 and adjust R18 (WS SPAN ADJ) for the voltage specified on Figure 4.2 for WS SPAN.

- Monitor TP3 and adjust R26 (POT +/- V ADJ) for 3.080 VDC, +/- 0.001 VDC for the 1 VDC system, or +/- 0.005 V for a 5 VDC system.

- Monitor TP6 and adjust R53 (WD SPAN ADJ) for the voltage specified in Figure 10.4.2 for W.D SPAN. The voltage is equivalent to 360 degrees.

- Adjust R59 for an indication of 360 degrees on the wind direction recorder.

- Adjust R23 for the appropriate indication on the wind speed recorder, see Figure 10.4.2.

6. System SPAN 540 degrees Adjustments: Place S1 in ZERO (CENTER) and S4 in SPAN (DOWN). S2 and S3 remain in the same position.

- Monitor TP6 and adjust R42 (SPAN 540 degrees ADJ) for the voltage specified in Figure 10.4.2 for 540 degrees SPAN. The voltage is equivalent to 360 degrees.

7. Place both S1 and S4 in OPERATE and place S2 and S3 in the desired position. The calibration procedure is now complete and the unit is ready for use.

NOTE: To access the mechanical ZERO adjustment, remove Climatronics' nameplate on the front face of the recorder.

10.4.8.2.1 Test Equipment

1. A voltmeter is the only equipment needed to accurately calibrate the unit. System output accuracy will be dependent upon the accuracy of the voltmeter.

2. Wind Speed: The wind speed output voltage is measured between TP1 (GND) and TP5.

down position. This will disconnect power to the recorder from the internal battery. Close the front panel and tighten the thumbscrew located in the upper left, front corner of the recorder.

10.4.8 CALIBRATION

10.4.8.1 General

1. The recorder comes fully calibrated from the factory. The 101281 wind recording system requires semi-annual calibration of the translator and monthly inspection of the system cabling for damage.

10.4.8.2 101281 F460 Calibration

1. Make and Check all system connections.

2. Apply Power to the system. Refer to Figure 10.4.1 for monitoring and adjustment locations.

3. Connect the negative lead of the voltameter to TP1 (GND). Monitor TP2 for system +V. Voltage should be 6.40 VDC +/- 0.01 VDC. Adjust R63 to correct any +V error. Note: All calibration voltages for ZERO, SPAN and 540 adjustments should be within +/-0.1 percent of the full scale voltage (i.e., 0.001 for a 1 VDC system and 0.005 for a 5 VDC system).

4. <u>System Zero Adjustments</u>: Place S1 and S4 in the ZERO (CENTER) position, S2 (wind speed range) in the HIGH position (UP) and S3 (time constant) in the STD position (CENTER).

   - Monitor TP6 and adjust R56 (WD ZERO ADJ) for 0.000 VDC (0 degrees).

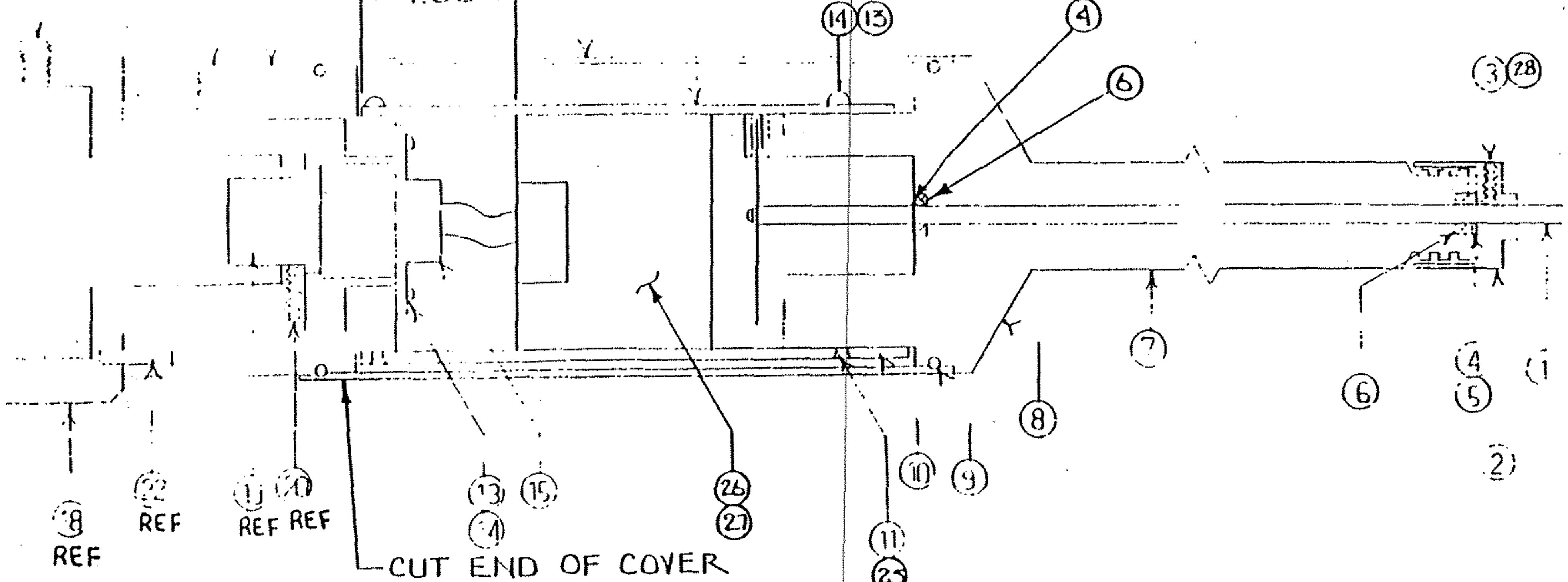
   - Monitor TP5 and Adjust R14 (WS ZERO ADJ) for the voltage specified on Figure 10.4.2 for W.S. ZERO.

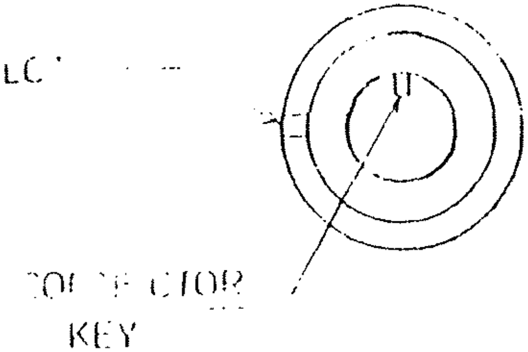
   - With the recorder running, adjust the mechanical zero of the recorder to agree with the voltages set in the second bullet item. Set the wind direction chart reading for zero degrees and the wind speed chart for 0.5 mph or 0.225 meters/second.

J	2221 BJ	12-5-??
K	2523 JS	2-11-85

REVISIONS

LTR	DESCRIPTION	DATE	APPROVED
B	ADD (18-21) REF	3/19/76	
C	ECN 1151 NEW 'G' LIST	9/22/80 KC	
D	ECN 1317 ADD NOTE	1/29/81 KC	
E	ECN 1747 KC	5/4/82	





CONNECTOR ORIENTATION
BOTTOM VIEW

F	ECN 1828 KC	8/3/82	
G	ECN 2032 BJ	3/23/83	
H	ECN 2045 BJ	3·31·83	

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ± DEC ± ANGLES ±	**CLIMATRONICS CORP.**
APPROVALS / DATE DRAWN 2D2. 5-14-74 CHECKED	F460 WIND SPEED TRANSMITTER ASS'Y. DRW.
SCALE	SIZE / DRAWING NO. A100075 - K
DO NOT SCALE DRAWING	SHEET 1 OF 4

WIND SPEED TRANSMITTER
P/N 100075 K
PARTS LIST

ITEM	QTY	P/N	DESCRIPTION
1	1	100082	Shaft Assembly
2	1	101441	Cap, W.S.
3	2	SC8-5	No-mar Set Screw
4	2	Q2-I2	Retainer Ring
5	A/R	SS1-	Spacers
6	2	A500096	Bearing
7	1	A500107	Column
8	1	A500108	Top
9	2	2-031	"O" Ring
10	1	A500109	Support TX
11	4	MS51959-13	4/40 x 1/4 Phillips Flat Head Screws
12	1	101080	W.S. Amp. Assembly
13	6	MS51957-14	4/40 x 5/16 S.S. Screw
14	6	MS35338-135	#4 Split Lockwasher
15	1	MS3102R-14S-6P	Connector
16	1	A500110	Base
17	2	SC10-4	Brass Tip Set Screw
18*	1	A500112	Adapter
19*	1	MS3106A-14S-6S	Plug (less shell)
20*	2	MS51021-21	6/32 x 3/16 Set Screw
21*	2	MS51023-60	1/4-28 x 3/16 Set Screw
22*	1	CP5-14	Roll Pin
23	1	A500111	Cover
24	1	See G List	Cup Assy. (Not Shown)
25	A/R		Locktite
26	1	See H List	
27	A/R	See H List	
28	A/R	Molykote	

* Items 18 - 22 for reference only.

necessary. Drawing 100075 Section 10.4.10 will help in locating the parts described below. Read the whole procedure through before starting.

- Remove the cups and vane by loosening the two set screws that hold them to the shaft and lifting them off the shaft.

- Unscrew th two screws holding the printed board, and move it away from the shutter.

- Remove the two flat head screws holding the column assembly to the support and remove the column assembly.

- Loosen the two set screws that hold the cap in place and remove the cap.

- Remove the retaining ring from the shaft with retainer ring pliers or a small pen knife. If the retaining ring is bent, it must be replaced.

- Allow the shaft to slide out through the open end of the column, being careful not to damage the shutter.

- Remove and discard the old bearings. It may be necessary to push the bearings out from the bottom of the seats with a long thin rod or the shaft assembly. Pushing lightly all around the bearing is better than too much pressure on one side of the bearing.

- Replace the spacer that was closest to the shutter on the shaft.

- Place a new bearing on the shaft and guide the shaft back into its hole from the bottom, until the bearing is seated. When the bearing is seated, the retainer ring groove will be visible at the top of the transmitter.

- Hold the shaft in place from the bottom, being careful not to damage the shutter, and place the new bearing over the top of the shaft and press it down into its seat.

- Replace the spacers on top of the bearing and then replace the retainer ring. If retainer ring pliers are not available, the retainer ring may be replaced by placing it over the hole in

The cap should now be rotated so that the flat section on the cap is perpendicular to a line drawn through the center of the transmitter and the alignment mark on the adapter.

3. The set screws should now be tightened to look the cap in place.

10.4.9 MAINTENANCE

10.4.9.1 General

1. Caution: Maintenance personnel should be thoroughly familiar with instrument operation before performing maintenance. It is essential that all portions of this manual relating to safety of operation, servicing and maintenance, including Section 10.4, be thoroughly understood.

2. Extreme care should be exercised to ensure that required parts replacement is accomplished with the same parts specified by Climatronics. No modifications are permitted. Disassemble instrument only in a non-hazardous atmosphere.

3. Check the set screws at the base of each sensor, mounting cross (3/16" key) and at the vane and cross (0.050 key). Tighten if necessary the with the above mentioned Allen (Hex) keys.

10.4.9.2 101281 Wind System

1. The 101281 Wind Recording System requires no maintenance other than periodic calibration of the translator and inspection of the system cabling for damage. Damaged cables should be replaced.

10.4.9.3 100075 Wind Speed Sensor

1. The Wind Speed Sensor is a low maintenance wind sensor that only requires periodic inspection of the cup set and periodic replacement of the sensor bearings. Damaged cup sets should be replaced.

2. Should it become necessary to replace the bearings, proceed as follows. Both bearings should be replaced if replacement is

removed in this case. Refer to the NOTE below before continuing. Pushing lightly all around the bearing is better than too mush pressure on one side of the bearing.

NOTE: To remove the potentiometer, follow this procedure:

- Using a Phillips head screwdriver, remove the two top screws from the transmitter support. This frees the upper portion of the transmitter.

- Using a flat tip screwdriver, loosen the three retaining clamps to slide out the potentiometer.

After completing the bearing change, reinstall the potentiometer by reversing the above steps.

6. Place a new bearing on the shaft and guide the shaft back into its hole from the top until the bearing is seated.

7. Tighten the set screw in the coupling.

8. Adjust the cap described in the calibration section.

10.4.9.5 Chart Paper Reloading Instructions / Take Up Mode

1. A drawing for the chart recorded is shown in Section 10.4.9.

2. Turn off the power to the instrument, making sure that both recorder pens are away from the clapper bar and free to move.

3. Loosen the thumbscrew on th upper, left hand side of the recorder and pivot the recorder downward.

4. Release the retaining brackets on each side of the supply roller. Release the white plastic latch on the right side of the recorder.

5. Remove the take up roller and the supply roller. Slide a cardboard sleeve on the take up roller and a full roll of chart paper on the supply roller.

6. Unroll about a foot of paper and slide it between the side plate and latch with a printed side facing down. Match the paper perforations

the cap and pushing the shaft through the retainer and the cap until it is seated.

- Replace the cap and screw the column back onto the transmitter.

NOTE: If the shaft assembly is to be replaced, the procedure is the same as outlined above, except that the spacers cannot necessarily be replaced as above. The lower spacer (one next to the shutter) is always a 0.010 inch thick spacer (P/N SS1-7). The upper spacers are selected to give between 0.005 and 0.010 inches of end play.

If no way to measure this is available, then it can be assumed to be correct if the shaft has some end play, and if the shutter is free to rotate. In all cases, a minimum spacer of 0.010 inches is required at the top of the shaft.

10.4.9.4 100076 Wind Direction Sensor

1. The wind direction sensor is a low maintenance wind sensor that only requires periodic inspection of the vane and periodic replacement of the sensor bearing. Damaged vanes should be replaced.

2. Should it become necessary to replace the bearing, proceed as follows. Drawing 100076 (Section 10.4.10) will help in locating the parts described below. Read through the whole procedure before starting.

   - Remove the vane by loosening the two set screws that hold it to the shaft and lifting the vane off the shaft.

   - Remove the transmitter cover by pulling it toward the base with a slight twisting motion.

   - Loosen the upper set screw in the coupling with a 1/16 Allen key.

   - Allow the shaft to slide to through the top end if the column.

   - Remove and discard the old bearing. It may be necessary to push the bearing out from the bottom of the seats with a long thin rod or the shaft assembly. The potentiometer must be

10.4.12 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Industrial Waste Inspectors records room following a technical Quality Assurance and Quality Control review.

with the drum sprockets. Set the supply roller into its holding notch.

7. Tape the end of the chart paper to the take up roller's cardboard sleeve and roll on the extra paper. Set this roller into the deep notch so the gears on the left hand side mesh.

8. Close the retaining clips, snap up the plastic latch, raise up the recorder front and tighten the thumbscrew. Advance the chart to the proper time with the front panel advance thumbwheel.

NOTE: To remove the chart paper, gain access to the paper as listed and slide it out. Roll the excess paper onto the take up roller. Slide the whole roll and cardboard sleeve off the take up roller.

10.4.10 SPECIFICATIONS

1. Recorder, P/N 101150. Six standard inputs, 0-1VDC, 100k ohm impedance. Chart recording, pressure sensitive paper, each 2 sec, 1 in/hr. Accuracy +/- 1% of full scale. Response time 1 second maximum. Chart drive is crystal controlled to +/- 3 min/month. Chart life in 30 days. Power requirements 12 VDC at 15 MA. Operating range 0-25, 0-50 mph and 0-540 degrees.

2. F460 Wind Speed Sensor P/N 100075 three cup anemometer. Accuracy +/- .15 mph, +/- 1%. Threshold 0.5 mph. Operating range is 0-125 mph. Power requirements are 12 VDC at 1 MA.

3. F460 Wind Direction Sensor, P/N 100076. Straight weighted vane. Accuracy +/- 2 of full scale. Threshold 0.5 mph. Operating range 0-360 degrees. Power requirements 12 VDC and 1 MA.

4. 10 watt solar panel with 8 Amp/hr battery.

10.4.11 ASSEMBLY DRAWINGS, PARTS LIST, and SCHEMATICS

Part No.	Description
100075	F460 Wind Speed Sensor
100076	F460 Wind Direction Sensor
	Chart Paper Recorder Drawing

FIGURE 10.4.1
LOPEZ CANYON LANDFILL

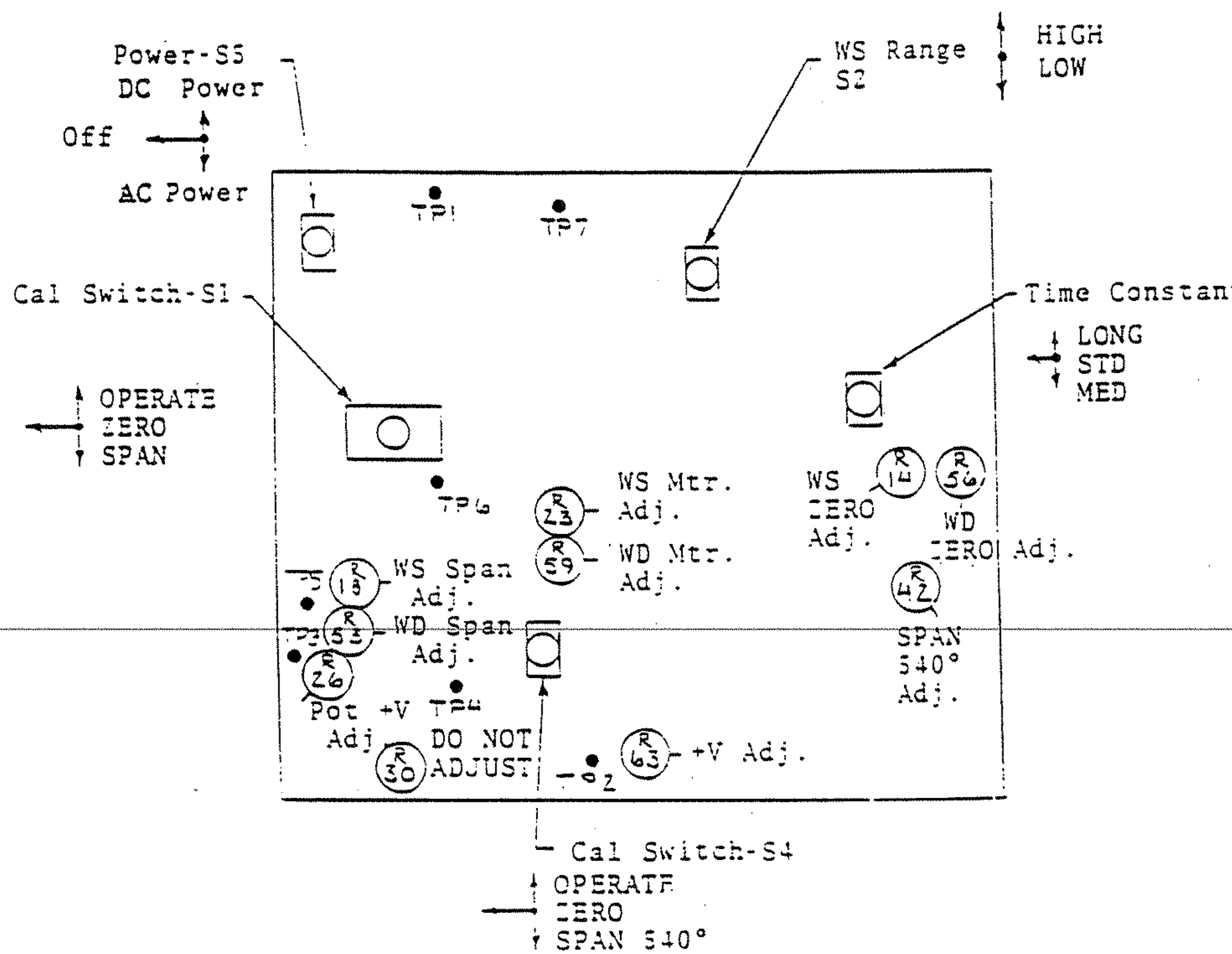
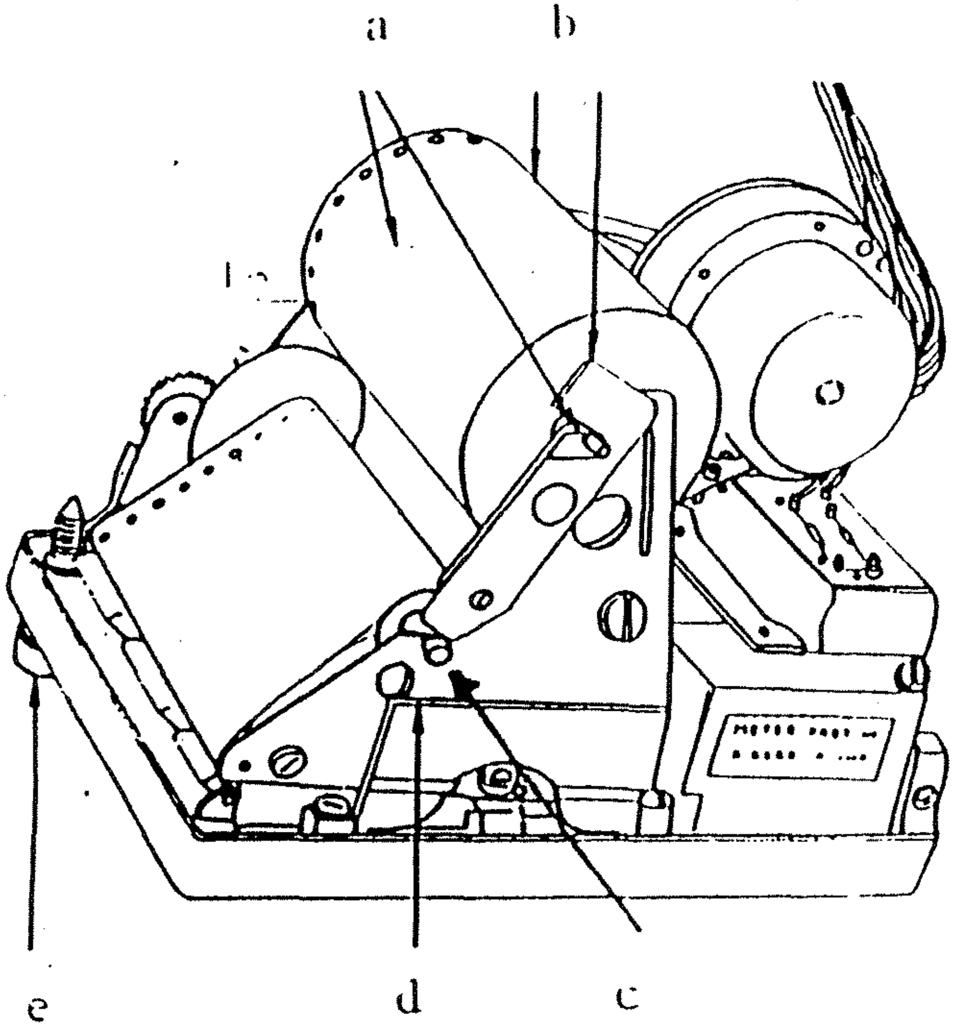


CHART PAPER RELOADING INSTRUCTIONS

TAKE UP MODE



a - Supply Roller and Roll

b - Retaining Clips

c - Take Up Roller

d - Latch

e - Thumbscrew

FIGURE 10.4.2
LOPEZ CANYON LANDFILL
VOLTAGE CALIBRATION OPTIONS

101279-80081 F460

Cup Set: Stainless Steel (W1,4,6,15,16,19,20,21,23,25)

W.S. Range	0-50 mph (0-80 kph) 0-100 mph (0-160 kph)		0-25 m/sec 0-50 m/sec (W9)	
Output Voltage	0-1V (W7,13)	0-5V (W8,10,12,14)	0-1V (W7,13)	0-5V (W8,10,12,14)
W.S. Zero (R14)	.005V .5mph (0.8kph)	.025V .5mph (0.8kph)	.0045V .225m/sec	.0224V .225m/sec
W.D. Zero (R56)	OV "0" Deg	OV "0" Deg	OV "0" Deg	OV "0" Deg
W.S. Span (R18)	.235V 23.5mph (0.236V) (37.8kph)	1.175V 23.5mph (1.180V) (37.8kph)	.210V 10.5m/sec	1.051V 10.5m/sec
W.D. Span (R53)	.667V 360°	3.33V 360°	.667V 360°	3.33V 360°
540° Span (R42)	.667V 360°	3.33V 360°	.667V 360°	3.33V 360°

SECTION 10.5

PRESSURE GAUGES

- Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore the gauge will leak if not properly tightened.

- Zero the gauge and compare to the test instrument. Make further adjustments as necessary.

10.5.7.1 Calibration Acceptance Limits

1. Equipment calibration should result in readings with 25 percent of standard value for continued use. Equipment that does not meet these limits during calibration will require corrective action.

10.5.8 MAINTENANCE

1. No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressurized lines to vent both sides of the gauge to the atmosphere, and re-zero. Optional vent valves should be used in permanent installations.

10.5.9 TROUBLESHOOTING TIPS

1. ~~Gage will not indicate or is sluggish:~~

- Duplicate pressure port not plugged
- Diaphragm ruptured due to overpressure
- Fittings or sensing lines blocked, pinched, or leaking
- Cover loose or O ring damaged or missing.
- Pressure sensors (static tips, Pitot tub, etc.) improperly located
- Ambient temperature too low. For operation below 20°F, order a gauge with low temperature (LT) option.

2. Pointer stuck gauge cannot be zeroed:

- Scale touching pointer
- Spring/magnet assembly shifted and touching helix
- Metallic particles clinging to magnet and interfering with helix movement
- Cover zero engaged in P/N 230-b adjusting screw

3. It is generally recommended that gauges needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gauge to another, and use of incorrect components may cause improper operation or failure. Gauges repaired at the factory

3. For surface mounting, locate the mounting holes, 120 degrees apart on a 4 1/8-inch diameter circle. Use No. 6-32 machine screws of appropriate length.

4. For flush mounting, provide a 4 1/2-inch diameter opening in panel. Insert gauge and secure in place with No. 6-32 machine screws of approximate length, with adaptors, Part No. 360c, firmly secured in place. To mount the gauge on 1 1/4-inch to 2-inch pipe, order the optional A-610 pipe mounting kit.

10.5.6 SHUTDOWN PROCEDURE

1. Disengage the hose from the port.

10.5.7 CALIBRATION

1. Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the magnehelic gauge and the test gauge to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid, to drain and compare readings. If accuracy is unacceptable, the gauge may be returned to the factory for recalibration. To calibrate in the field, use the following procedure:

   - With gauge case, P/N 1, held firmly, loosen bezel, P/N 4 by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.

   - Lift out plastic cover and O ring.

   - Remove scale screws and scale assembly. Be careful not to damage pointer.

   - The calibration is changed by moving the clamp, P/N 70-b. Loosen the clamp screw(s) and move slightly toward the helix if the gauge is reading high, and away if reading low. Tighten the clamp screw and install scale assembly when calibration is satisfactorily completed.

   - Place cover and O ring in position. Make sure the hex shaft inside the cover is properly engaged in zero adjust screw, P/N 230-b.

10.5.4.2 Negative Pressure

1. Connect tubing from the source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

10.5.4.3 Differential Pressure

1. Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

2. When one side of the gauge is vented in a dirty, dusty atmosphere, an A-331 Filter Vent Plug should be installed in the open port to keep the inside the of gauge clean.

   - For portable use or temporary installation, use 1/8-inch pipe thread to the rubber tubing adapter and connect to the source of pressure with rubber or Tygon tubing.

   - For permanent installation, 1/4-inch O.D., or larger, copper or aluminum tubing is recommended.

10.5.5 STARTUP PROCEDURE

1. Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F. Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines may be run to any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping methods.

2. All standard Magnehelic gauges are calibrated with the diaphragm vertical, and should be used in that position for maximum accuracy. If gauges are to be used in a position other than vertical, this should be specified on the order. Many higher range gauges will perform within tolerance in other positions, with only re-zeroing required. Low range Model 2,000-00 and metric equivalents must be used in the vertical position.

10.5.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR PRESSURE GAUGES

10.5.1 INTRODUCTION

1. This document describes procedures that field personnel will perform when taking measurements with a magnehelic. Technicians will document field equipment operation, maintenance, and calibrations on the appropriate logbooks and forms.

2. These procedures were developed based on Dwyer's manuals and recommendations, as well as technical and field experience.

10.5.2 PURPOSE OF MEASUREMENTS

1. The magnehelic measures inches of water in low range and high range scales. The magnehelic is used for probe, well and flare station measurements.

10.5.3 SUPPLIES AND EQUIPMENT

1. 1/4-, 1/8-, 1/16-inch Tygon tubing

2. Magnehelics scale range 0 to 2.0, 0 to 5.0, 0 to 10.0, 0 to 50.0, 0 to 80.0, 0 to 150.0 inches of water column

10.5.4 FIELD MEASUREMENTS

1. Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

10.5.4.1 Positive Pressure

1. Connect tubing from the source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

are carefully calibrated and tested to assure like-new operation.

4. Consult the factory for assistance on unusual applications or conditions.

10.5.10 CORRECTIVE ACTION

1. If a piece of equipment does not properly calibrate, or is suspected to be malfunctioning, remove the device from operation and tag appropriately. Segregate the device so that it will not be unintentionally used. Notify the Chief Monitoring Technician so that a recalibration can be performed or a replacement obtained.

10.5.11 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Industrial Waste Inspectors records room following a technical Quality Assurance and Quality Control review.

SECTION 10.6

KURZ SERIES 1146-5
DIGITAL PORTABLE AIR VELOCITY METER
WITH "METALCLAD" SENSOR

10.6.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR THE KURZ SERIES 1446-5 DIGITAL PORTABLE AIR VELOCITY METER WITH "METALCLAD" SENSOR

10.6.1 INTRODUCTION

1. This document describes procedures that field personnel will perform when taking measurements with a KURZ 1446-5 Digital Portable Air Velocity Meter, as well as during maintenance and calibration of the instrument. Technicians will document field equipment operation, maintenance, and calibrations on the appropriate logbooks and forms.

2. The KURZ 1446-5 Meter is used for measuring gas velocity, temperature and static pressure.

3. These procedures were developed based on KURZ Instrument's manual and recommendations, as well as technical and field experience.

10.6.2 PURPOSE OF MEASUREMENT

1. The basic sensing element of the meter is the "MetalClad" probe. The "MetalClad" probe consists of two integral sensors: a velocity sensor and a temperature sensor:

   - The velocity sensor is a constant-temperature thermal anemometer which measures "standard" velocity (referenced to 25°C and 760 mm Hg), or mass flow, by sensing the cooling effect of the moving flowstream as it passes over the control circuitry in the electrons package.

   - The temperature sensor compensates for a wide range of temperature variations. The maximum temperature of the velocity sensor is 75°F above ambient temperature.

2. The probe is used directly to measure air velocity in open spaces, and supply and return openings. The gas flow generated by the static pressure to be measured is proportional to the static pressure. Either negative or positive static pressures can be measured.

3. Normally, this correction is small and may be neglected for most work. In many applications, however, it is the mass velocity which is needed and no density calculation is required.

10.6.3 MAJOR FEATURES

1. The KURZ 1446-5 instrument provides measurements of extremely low velocities, with sensitivity and readability (down to +/- fpm). The large size of "MetalClad" velocity-sensing elements renders them immune from particulate contamination.

2. A linear, analog output voltage permits time history recording with linear amplitude calibrations. The analog output is in engineering units, with a maximum of 0 to 2 VDC full scale.

3. The "MetalClad" velocity probe shield can be reversed and slid down the probe cable to make a total probe length up to 48 inches.

10.6.4 SUPPLIES AND EQUIPMENT

10.6.4.1 Standard Accessories

1. A 13-inch long by 3/8-inch diameter "MetalClad" velocity probe marked every inch.

2. Retractable, removable shield.

3. 8-foot probe cable.

4. 115/230 VAC battery charger.

5. Foam padded carrying case.

10.6.4.2 Optional Accessories

1. High-temperature probes to 250°C and 500°C.

2. Probe extenders up to 48 inches.

3. External data recorder.

10.6.5 STARTUP PROCEDURE

1. The KURZ 1446-5 Meter is shipped with the battery in a low-charge condition. With the range switch in the "OFF" position, charge the batteries before use. Plug the charger into the front panel receptacle labeled "CHARGER". Plug the other end of the charger into a 110VAC wall socket. Charge the unit for a period of

at least one hour before operating. A charge of 12-16 hours is recommended to achieve a full charge. The charger is intended for charging purposes only. Its use is not recommended during operation.

2. To check the battery voltage, turn the control knob to the "BATT OK" position. For proper operation, the indicator should read in excess of 9 volts. A fully-charged condition is approximately 10.7 volts. At full charge, the instrument can be operated for about 8 hours of typical use. For maximum operating time between charges, turn the system off between measurements.

3. To operate, plug the probe connector into the "PROBE" receptacle, preferably when the control switch is in the "OFF" position. Allow about 30 seconds for warmup.

4. The instrument is now ready for use.

10.6.6 SHUTDOWN PROCEDURE

1. Turn the control knob to "OFF".

2. Slide the probeshield over the sensor and unplug the probe when putting the system back into the carrying case.

NOTE: ALWAYS SLIDE THE RETRACTABLE PROBESHIELD OVER THE SENSOR WHEN THE SYSTEM IS NOT IN USE TO AVOID POSSIBLE BREAKAGE.

10.6.7 CALIBRATION

1. The KURZ Air Velocity Meter shall be calibrated quarterly by the manufacturer or authorized dealer. Be sure to include the battery charger and the probe.

10.6.7.1 Calibration Acceptance Limits

1. Equipment calibration should result in readings with 25 percent of standard value for continued use. Equipment that does not meet these limits during calibration will require corrective action.

2. When the KURZ Meter is used in a gas other than air, due to the difference in the cooling effect of the gas composition, there will be an error factor in the calibration of approximately 25 percent higher

than the actual reading (-\+ 5 percent), but the reading will be repeatable. Multiply the reading times by 0.75 in order to find the actual velocity (-\+5 percent).

10.6.8 FIELD MEASUREMENTS

1. If the instrument has two velocity range positions, select the higher range. Loosen the knurled nut on the probe shield and slide the shield toward the cable, exposing the sensor. Tighten the knurled nut to secure the probe shield. The air velocity meter is now operating and will respond to the slightest movement. Set the control knob to the "FAST" position. If the digital indication is not stable, switch to the "SLOW" position. The "FAST" and "SLOW" positions have time constants corresponding to 1 second and 2 seconds.

2. You have a choice of continuous measurement in the "DISPLAY" mode, or you can stop the display from updating and hold a reading in the "HOLD" mode. Switch to the lower range, if provided, to obtain increased resolution at low velocities.

3. To measure temperature, set the control switch to the "TEMP" position.

4. To measure static pressure measurements, set the control knob to the "inches of water" position.

5. If a longer probe is needed for your measurement, remove the probe shield, put in on the probe in the reversed position, an slide it down the cable. Lock the shield in position to make effective probe lengths of up to 20 inches.

10.6.8.1 Applications

10.6.8.1.1 <u>Air Velocities in Open Spaces or Single-point Measurements</u>

1. To measure local gas velocities simply retract the probe shield and place the probe perpendicular to the expected gas flow. Rotate the window in the probe tip such that the flow passes directly through it. You will notice that the output is not greatly affected by angular orientation of the probe, until a change of about +/- 40° to the direction of flow.

2. For extremely low velocities, it is recommended that the probe be firmly attached to a tripod, wall, beam or other structure, in order to

eliminate movement of the probe.

3. In situations where gas temperature is changing, allow the probe to come to temperature equilibrium before taking readings, thus allowing time for the temperature compensation features of the instrument to respond.

10.6.8.1.2 Velocities and Flow Rates Inside Gas Well Connections and Gas Headers

1. The procedure is to divide the flow area into several equal areas and to take a velocity reading at the center of each area. The number of equal areas will increase as the velocity profile becomes more non-uniform. These readings are then averaged arithmetically to obtain the average velocity. The total flow rate is then:

   $Q = V \times A$

   Where Q = flow rate, in standard cubic feet/min.

   V = average velocity, in standard feet/min.

   A = area of conduit, in square feet

2. A common procedure is to traverse the probe once in order to obtain the proper velocity readings. Figure 4-1 shows non-dimensional probe traverse locations for equal-area readings. To obtain faster results, less points can be used with a corresponding sacrifice in accuracy.

10.6.8.1.3 Static Pressure Measurements

1. The static pressure (either positive or negative) within a gas well connection gas header, filter or other pressurized or evacuated body can be easily measured.

2. Slip the pressure attachment into the probe as far as it will go, and rotate it until the scribe line on the pressure attachment lines up with the axial scribe lines on the probe. Lock the pressure attachment in position with the locking screw. You will note that a "+" mark is stamped into the barrel of the pressure attachment directly above the scribe line, and a corresponding "-" mark is on the opposite of the barrel.

3. The pressure attachment has identical flow nozzles opposite each other. Each nozzle is fitted with a soft sponge gasket to enable

sealing the pressure attachment against the conduit probe connector in which the static pressure measurement is to be made.

4. To take the measurement, turn the range selector knob to the "INCHES OF WATER" position. Firmly place the pressure attachment nozzle in the probe connection. If the static pressure in the conduit is positive, place the pressure attachment against the probe such than the "+" mark is facing the operator. If the static pressure is negative, place the pressure attachment against the probe such that the "-" mark is facing the operator.

10.6.8.1.4 Temperature Measurement

1. The temperature of the air within a gas well connection and a gas header can be measured with the KURZ Meter by setting the control knob to the "TEMP" position.

2. In this mode of operation, the velocity sensor is not heated and is switched out of the circuit. The temperature sensor output which is used to temperature compensate the velocity sensor output in the velocity mode of operation is now used to drive the digital indicator to give the temperature reading.

10.6.8.1.5 Use With Optional Recorders

1. The KURZ 1446-5 Meter has an analog output signal available via jacks on the front panel. The voltage is proportional to velocity or temperature, depending upon the variable being read on the digital display.

2. The output signal level is directly related to engineering units of measured variable with a maximum of 2 VDC full scale. For example, a range of 0 to 200 fpm has an output of 0 to 2 V; a range of 0 to 100 fps has 0 to 1 V; 0 to 30 mps has 0 to 0.3 V; and 0 to 125°C has 0 to 1.25 V. If the instrument has two velocity ranges, the output voltage always corresponds to the higher range.

10.6.9 MAINTENANCE

10.6.9.1 Probe

1. Although the relatively large diameter of the velocity sensor renders it immune to particulate contamination in most environments, continuous use in dirty environments may necessitate periodic cleaning. Clean the sensor with a camel hair brush and clean water,

followed by an alcohol rinse. The sensor should be dry before resuming operation.

2. Always cover the probe with the probe shield when not using the system, to protect the sensor from contract with foreign objects or contaminants. Store or transport the meter and probe in the convenient foam-padded carrying case to prevent shock damage.

3. USERS SHOULD NOTE THAT PROBES ARE NOT INTERCHANGEABLE. Each probe is matched, for temperature compensation and calibration, by circuit components in the instrument with which it was delivered. Accurate measurements can be made only when an instrument is used with the probe with which it was delivered.

10.6.10 Battery Recharging - AC Battery Charger

1. As with all rechargeable nickel-cadmium battery systems, the batteries will have longer life if they are not allowed to become overly discharged. It is recommended that the batteries be kept fully charged whenever possible and that the battery voltage be checked from time to time while using the instrument. Simply set the control knob to the "BATT OK" position and read the voltage on the display. At full charge, the reading will be about 10.7 volts. Minimum voltage for instrument operation is about 9 volts. When the batteries are fully charged, the instrument can be typically used for about eight hours unless high flow rates are measured for extended periods of time. It is recommended that the instrument be turned off between measurements.

2. Temporary degradation, peculiar to nickel-cadmium batteries, may cause a decrease in operating period between recharges. If this occurs, let the batteries discharge to below 9-volts and then fully recharge them. This should correct the temporary degradation.

10.6.11 SPECIFICATIONS

1. Repeatability: +/-2 percent accuracy for each full-scale range, and +/- .25 percent of full scale reproducibility over the wide temperature range of -20°C to 55°C.

2. Standard probe: -55°C to +125°C operating range.

3. "MetalClad" velocity probe: 13-inch long by 3/8-inch diameter, marked every inch, powered by two internal 1.2 Ni-Cad batteries.

4. Analog front panel outputs: 0-2 VDC

10.6.12 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Monitoring Technicians records room following a technical Quality Assurance and Quality Control revision.

WIND DIRECTION TRANSMITTER
P/N 100076 K
PARTS LIST

ITEM	QTY	P/N	DESCRIPTION
1	1	101357	Cap W.D.
2	1	A500022	Shaft
3	2	SC8-5	No-mar Set Screw
4	1	Q2-I2	Retainer Ring
5	A/R	SS1-	Spacer
6	1	A500096	Bearing
7	1	A500107	Column
8	1	A500108	Top
9	1	500187	Coupling
10	2	2-031	"O" Ring
11	1	See J List	
12	3	SQ-8 (L3-3)	Clamp
13	1	A500109	Support TX
14	4	MS51959-13	4/40 x 1/4 Phillips Flat Head Screw
15	1	GFA-1/32	1/32 amp, GFA Fuse, 125V
16	1	MS3102R-14S-6P	Connector
17	4	MS51957-14	4/40 x 5/16 SS Screw
18	4	MS35338-135	#4 Split Lockwasher
19	1	A500111	Cover
20	1	A500110	Base
21*	1	A500112	Adapter
22*	1	MS3106A-14S-6S	Roll Pin
23*	2	MS51021-21	6/32 x 1/8 Set Screw
24*	2	MS51023-60	1/4 -28 x 3/16 Set Screw
25*	1	CP5-14	Roll Pin
26	2	SC10-4	Brass Tip Set Screw
27	2	SC6-3	6/32 x 1/8 Set Screw, Berg
28	1	See G List	Wind Vane Assy. (Not Shown)
29	1	RN55C2431F	Resistor, 2.43K 1% 1/8W
30	A/R	G623	Silicone Compound, GE
31	2	PBC 105-I2	Sleeving, Clear 1/2" Long
32	A/R		22 GA Teflon
33	1	See H List	
34	A/R	See H List	
		A400097	Schematic

* Items 21 - 25 for reference only.

WIND DIRECTION TRANSMITTER
P/N 100076 0
PARTS LIST

G LIST

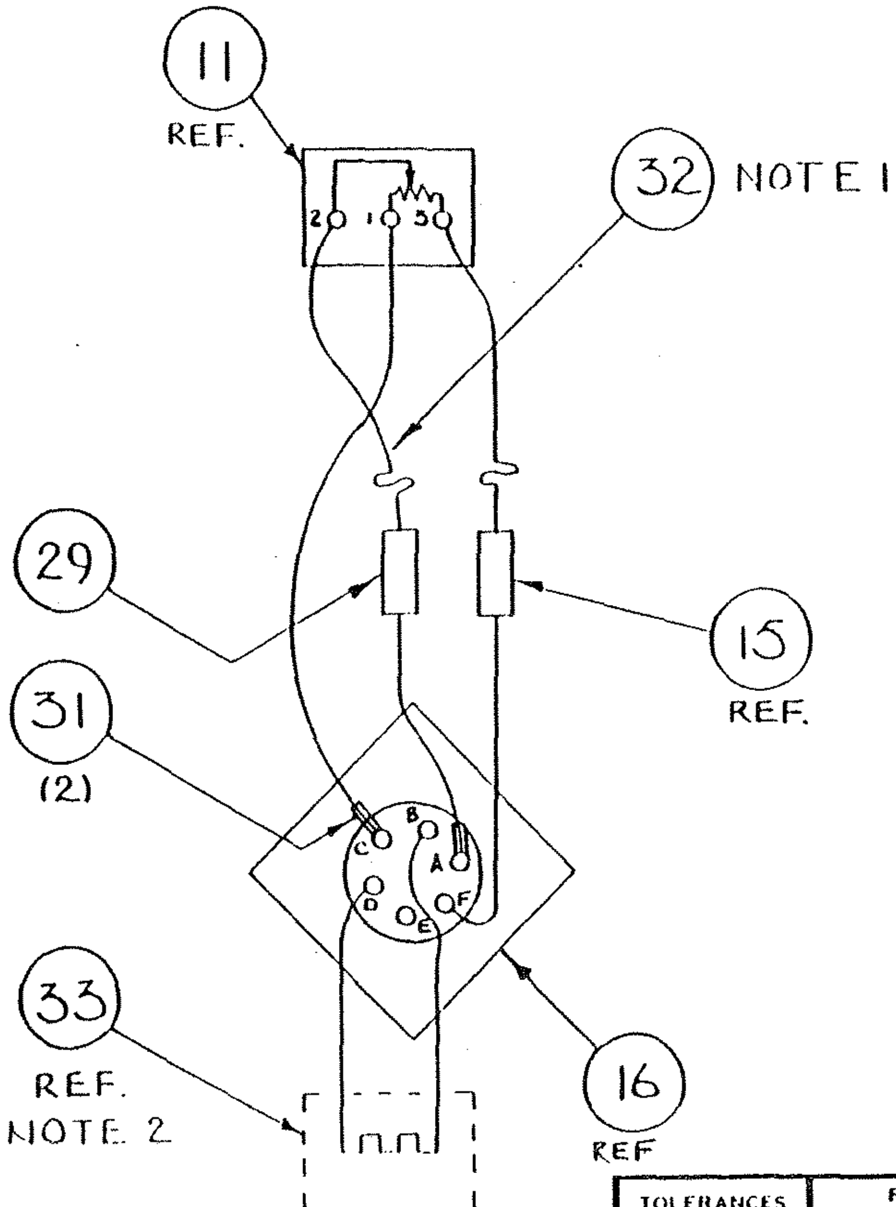
PRE	P/N	DESCRIPTION
G0	100084	Vinyl Vane Assembly
G1	101288	F460 Magnesium Vane Assembly (Heavy Duty)

H LIST

PRE	ITEM	P/N	DESCRIPTION
H0	33	None	----
	34	None	----
H1	33	101263	F460 Internal Heater
	34	999	RTV, Dow Corning

J LIST

PRE	ITEM	P/N	DESCRIPTION
J0	11	702-288-10K	Potentiometer 10K Bridging
J1	11	PM05133A	Potentiometer 10k Non-Bridging Spectrol 158-156-00

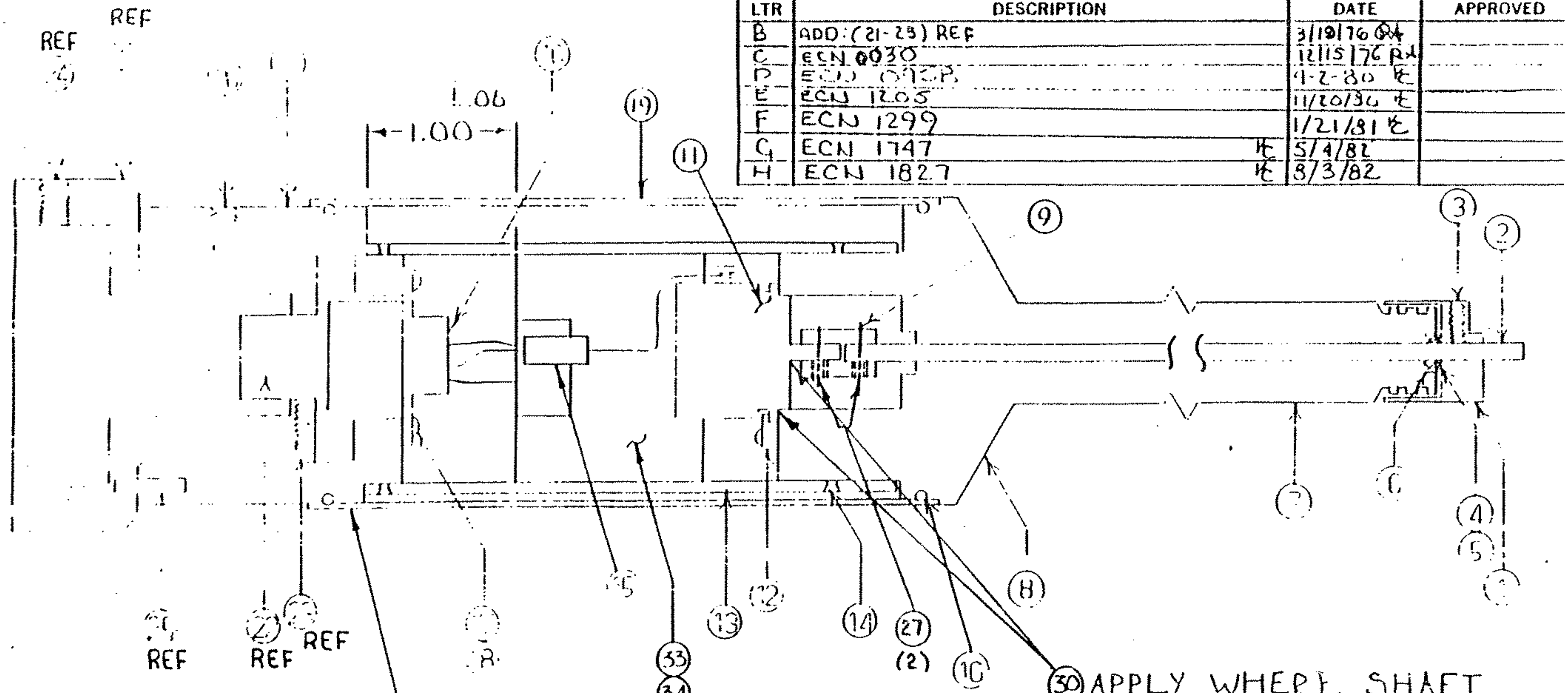


NOTE:

1. WIRE USED ON THIS ASSEMBLY IS 22 GA, WHITE/BLACK. 3." LG.
2. HEATER OPTION
3. ITEM 29 & 15 TO HAVE SMALL SERVICE LOOP.

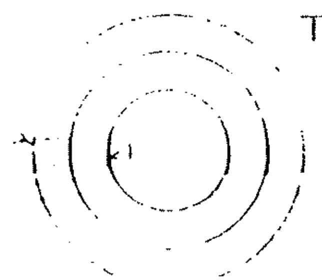
TOLERANCES (EXCEPT AS NOTED)	REVISIONS			CLIMATRONICS CORP.		
	NO.	DESCRIPT	BY	F460 WIND DIRECTION TRANSMITTER		
DECIMAL	A					
±	B					
FRACTIONAL	C			DRAWN BY KC	SCALE FULL	MATERIAL SEE P/L
±	D			CHK'D	DATE 11/20/80	DRAWING NO. [illegible]

LTR	DESCRIPTION	DATE	APPROVED
B	ADD: (21-25) REF	3/19/76	
C	ECN 0030	12/15/76	
D	ECN 0938	4-2-80	
E	ECN 1205	11/20/80	
F	ECN 1299	1/21/81	
G	ECN 1747	5/4/82	
H	ECN 1827	8/3/82	



CUT END OF COVER INSTALLED THIS END

(30) APPLY WHERE SHAFT EMERGES FROM HOUSING, & ON MOUNTING FLANGE.



CONNECTOR KEY

CONNECTOR ORIENTATION BOTTOM VIEW

REV	ECN	DATE
J	2016	3-1-83
K	2045	3-30-83
L	2222	7/27/83
M	2273	11/4/83
N	2289	2/1/84
O	2397	9/8/8[illegible]

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS ± DEC ± ANGLES ±

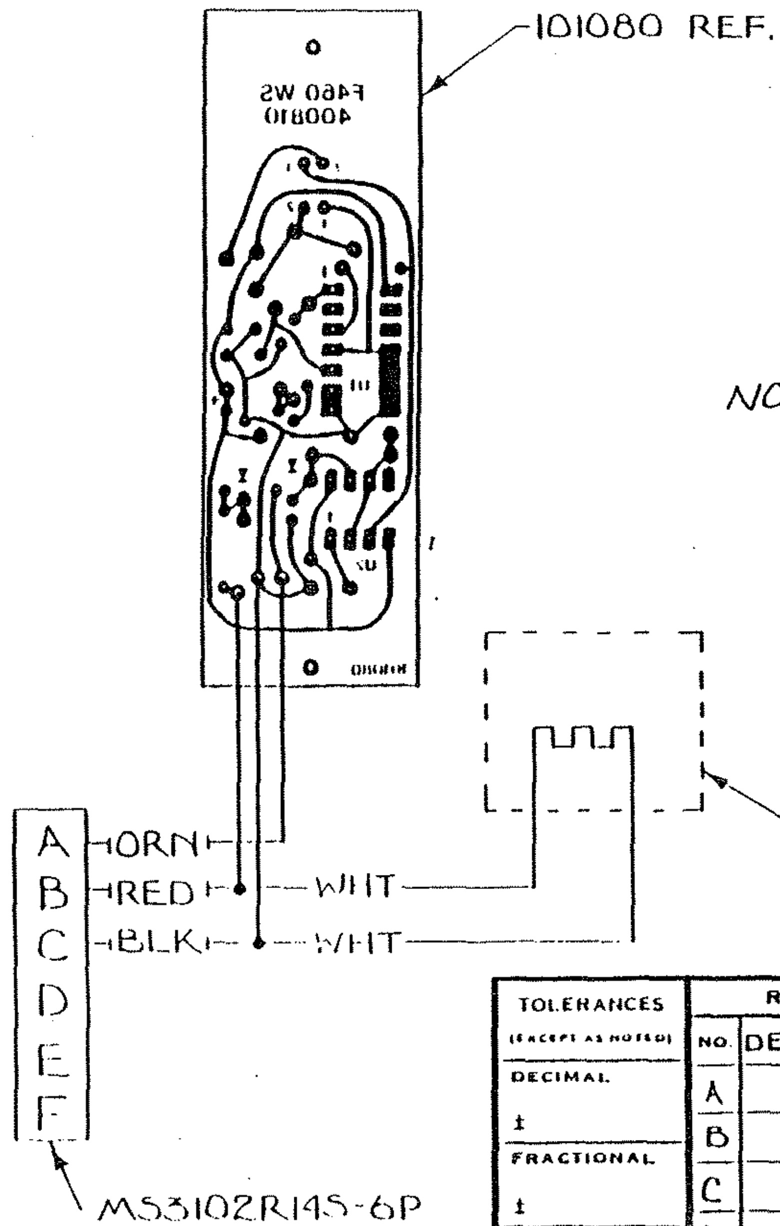
APPROVALS	DATE
DRAWN	5-14-74
CHECKED	

CLIMATRONICS CORP.

F460 WIND DIRECTION TRANSMITTER ASS'Y. DRW.

SCALE | SIZE | DRAWING NO. A1000[illegible] C

DO NOT SCALE DRAWING | SHEET 1 OF 5



NOTES:

1. ALL WIRES 22 GA, 2 IN. LONG
2. INSTALL #10 PVC TUBING 1/2 LONG ON CONNECTOR PINS A, B, & C AFTER SOLDERING WIRES
3. HEATER OPTION

TOLERANCES (EXCEPT AS NOTED)	REVISIONS			CLIMATRONICS CORP.		
DECIMAL	NO.	DESCRIPT	BY	F460 W.S. TRANSMITTER		
±	A					
FRACTIONAL	B			DRAWN BY KC	SCALE FULL	MATERIAL
±	C			CHK'D	DATE 1/29/81	DRAWING NO
	D					

WIND SPEED TRANSMITTER
P/N 100075 K
PARTS LIST

G LIST

PRE	P/N	DESCRIPTION	CONSTANT
G0	100083	Vinyl Cup Set	9.511
G1	100057	Stainless Steel Cup Set	10.425
G2	101287	Heavy Duty Cup Set	9.511

H LIST

PRE	ITEM	P/N	DESCRIPTION
H0	26	None	----
	27	None	----
H1	26	101263	F460 Internal Heater
	27	999	RTV, Dow Corning

SECTION 10.7

AMBIENT AIR SAMPLING UNIT

10.7.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR AMBIENT AIR SAMPLING UNIT

10.7.1 INTRODUCTION

1. This document describes the procedures that field personnel will perform when collecting samples with an Ambient Air Sampler as well as during maintenance and calibration of the instrument. Technicians will document field equipment operation, maintenance, and calibrations on the appropriate logbooks and forms.

2. These procedures were developed based on Paragon Electric Company's and Spectrex's manuals and recommendations, as well as technical and field experience.

10.7.1.1 Description

1. The sampling unit consists of a bag sampler, Spectrex AS-300 precision gas pump, Porter rotameter and 316 stainless steel and Teflon tubing and fittings, bypass valve and a Paragon Clock/Controller enclosed in a NEMA Type 12 enclosure. These components allow a controlled gas sample to be collected in specified periods of time such as a 24-hour or 8-hour representative sample.

2. All samples are collected using a gas pump having a total unloaded flow capacity of 4.5 l/min, stainless steel capillary tubing to control the sample rate to the bag, a bypass valve to control the sample flow rate (and minimize back pressure on the pump), a rotameter for flow indication to aid in setting the flow, and a 10-liter Tedlar bag. In addition, the use of a bypass valve ensures that the pump is operating at near maximum flow, both minimizing residence time in the pump and flushing it with fresh sample continuously. Only stainless steel, glass, Teflon, and Tedlar come in contact with the collected sample. The aforementioned connections and tubing and a Viton diaphragm in the pump were specified to minimize sample contamination.

10.7.2 PURPOSE OF SAMPLING

1. The Ambient Air Sampler is an instrument designed to collect time interval gas samples for analysis. It can also be readily adapted to fixed, remote monitoring, or mobile installations.

10.7.3 MAJOR FEATURES

1. The Paragon Clock/Controller controls will automatically turn loads ON and OFF according to your schedule, compensating for changes in Daylight Savings Time and altering ON/OFF events on designated holidays. The following programming options can be selected:

   - Seven Day Programming: each day of the week can be uniquely programmed.

   - 16 Events Per Channel: up to 16 ON/OFF events can be programmed for each channel.

   - Repeat Programming: increases the total number of events through the daily repetition of certain ON's and OFF's; creates a maximum of 112 events per week per channel.

   - Holiday Programming: twelve single-day holidays and two holiday durations are programmable by date.

   - Daylight Savings Time: can be programmed for automatic changeover in the spring and fall.

   - Manual Override Option

2. The Spectrex AS-300 gas pump uses a high quality "tape deck" type 3-15 VDC motor, with a maximum flow rate of 4.5 liters. It can be mounted in any orientation. The unit provides a variable stroke mechanism which can be adjusted. The diaphragm is made of a non-lubricated Viton material that is relatively inert.

10.7.4 SUPPLIES AND EQUIPMENT

10.7.4.1 Standard Accessories

1. 316 Stainless Steel Tubing
2. Teflon Tubing
3. Viton Pump Diaphagm
4. 12 VDC Marine-Type Battery
5. Light-tight Boxes

10.7.4.2 Optional Accessories

1. Sample Line Water Trap

10.7.5 STARTUP PROCEDURE

1. Check the battery voltage using the voltmeter. There must be a minimum of 12 VDC. If it does not, remove from service.

2. Install and connect the 12 VDC battery.

3. Check the pump flows manually by pressing the C1 button. Cover the bypass momentarily with your finger to ensure the ball is free in the rotameter. When the bypass is covered, the ball should rise above its full scale reading.

4. Inspect the system for leaks. **If any leaks are detected, the instrument must be removed from service.**

5. Allow the sampler to sample zero grade air (less than 0.1 ppm total hydrocarbons as methane) as it normally would in the field, and then analyze the sample for contaminants using an Organic Vapor Analyzer (OVA). If no significant contaminants are present, then the sampling unit will be used in the sampling program. If contaminants are detected, remove the sampler from service.

6. Program the Clock/Timer as detailed below in Section 10.7.5.1.

7. Attach the Tedlar bag to the filler tube. Ensure the sampling valve is open.

8. Activate the Clock/Controller to initiate sampling.

9. Close and secure the sampling enclosure.

   NOTE: If water enters the sampling line, remove the water and clean the line before going to the next sample. Inspect the sample bag for water drops, if any drops are found in the bag the entire sampling event must be repeated.

10.7.5.1 PROGRAMMING THE CLOCK/TIMER

1. To program Time, Day and Date

STEP	KEY	DESCRIPTION
1.		Install battery power. 0:00 1 displayed; colon and 1 flashing.
2.	CLK	Flashing stops.
3.	#### #	Enter current time, then day of week. Enter four digits for time (e.g., 0900 = 9:00am). Use 24-hour clock format, Figure 10.7.1. For days of the week: 1 = Sunday, 2 = Monday, 3 = Tuesday, 4 = Wednesday, 5 = Thursday, 6 = Friday, 7 = Saturday.
4.	E	Enters time. 101 displayed indicating January 1.
5.	####	Enters current month, then date. Press two keys for month and two for date, (e.g. 0101 = January 1).
6.	E	Enters month and date. 84 is displayed indicating 1984.
7.	##	Enter current year. Two keys must be pressed (e.g. 88).
8.	E	Enters year. Control switches automatically to run mode. Time and day-of-week displayed. Colon flashing.

2. To Review Date

STEP	KEY	DESCRIPTION
1.	CLK	Current time displayed. Flashing stops.
2.	E	Current month and date displayed.
3.	E	Current year displayed.

4.	RUN	Restores normal operation. Time and day displayed. Colon flashing.
5.	C1/C2	Switching of loads occurs only in the RUN mode. If an event was scheduled to occur while you were reviewing information, the event will not have taken place if you were reviewing during the entire minute that the event was scheduled to occur. Press C1 or C2 to initiate override if the status of either circuit is incorrect. (This applies to programming as well as reviewing).

3. To Change Time, Day or Date

STEP	KEY	DESCRIPTION
1.	CLK	Currently programmed time displayed. Flashing stops.
2.	#### #	Enter correct time, then day of the week.
3.	E	Enters new time. Currently programmed date displayed.
4.	####	Enter new month, then date if either is incorrect.
5.	RUN	Time and day displayed. Colon flashing.
6.	C1/C2	Press C1 or C2 to initiate override if the status of either circuit is incorrect. See above, Step 2. To Review Date.

4. To Program ON/OFF Events

STEP	KEY	DESCRIPTION
1.	PRG	Display goes blank except for the Channel Indicator bars, which flash alternately to indicate that a channel number key must be pressed.

2.	C1/C2	Selects channel to be programmed. C1 or C2 Indicator bar energizes and E 01 (first event) is displayed.
3.	#### #	Enter time then the day of the week for the first event. Enter four digits for time (e.g. 0900 = 9:00am). For day of the week: 1 = Sunday, 2 = Monday, 3 = Tuesday, 4 = Wednesday, 5 = Thursday, 6 = Friday, 7 = Saturday, 8 = Holiday, 0 = Daily. If no events are disred on a particular day, for instance on day 8 (the Holiday Program), key in 0000 for the time, and in step 4 below, select ON or OFF for the entire day.
4.	ON/OFF	Selects an ON or OFF event. Colon signifies an ON, no colon signifies an OFF. This step is unnecessary if you have used the Momentary Option, since all events become ON events.
5.	E	Enters programmed event into memory. Next event slot (E:02-E-16) displayed.
6.		Repeat steps 3-5 for all events on one channel. The control will automatically switch to E:01 on the other channel.
7.	RUN	Restores normal operation. Time and day displayed. Colon flashing.

5. To Review of Change Events

STEP	KEY	DESCRIPTION
1.	PRG	Display goes blank except for Channel Indicator bars, which flash alternately to indicate that a channel number key must be pressed.
2.	C1/C2	Select channel to be reviewed. Selected Channel Indicator bar will energize. The first programmed event will be displayed. If the first event has not programmed, E:01 will be displayed.

3. E — Press repeatedly to review all-16 events for one channel, followed by all 16 events for the other channel.

4. CLR — Press if any displayed time and/or day must be changed.

5. #### # — Enter correct time and day.

6. RUN — Restores normal operation. Time and day displayed. Colon flashing.

7. C1/C2 — Switching of loads occurs only in the RUN mode. If an event was scheduled to occur while you were reviewing or programming information, the event will not have taken place if you were reviewing or programming during the entire minute that the event was scheduled to occur. Press C1 or C2 to initiate override if the status of either circuit is incorrect.

8. Notes on Events

   1. The weekday keys 1-7 and the holiday key 8 have priority over the daily key 0. If an ON/OFF event is programmed for an individual weekday, then all programmed daily events are canceled for that day on that channel. For example, if you program a daily ON at 8:00am and a daily OFF at 5:00pm, and then program an ON to occur only on Wednesday at 10:00am, the ON at 8:00am and OFF at 5:00pm will be canceled out. You will need to program a separate OFF for Wednesday.

   2. You can program daily events and still skip a day by programming an event with 0000 for the time on that day. For instance, say you want an 8:00am ON and 5:00pm OFF for each weekday, but you wish to skip both Saturday and Sunday. Program the ON and OFF as daily events and then program a 0000 event for each Saturday and Sunday. See Step 3 on page 26. This process, however, cannot be used if the control has been converted to momentary output. If you selected the Momentary Option, there is no way to use the daily function and also skip any day(s) - all daily events will

occur everyday. In some applications, this can be overcome by external wiring.

9. Override

1. To initiate override, the control must be in the RUN mode. Press C1 and/or C2 to override desired channel from ON to OFF, or OFF to ON. Channel remains in the state until overridden again or until the next opposite programmed event. If control has been converted to the momentary output, initiating override will energize the relay(s) for two seconds.

10. Holidays and Daylight Savings Time

1. Twelve single holidays (H:01-H:12) and two holiday durations (H:13-H:16) are provided. Fill in the chart at night before you begin.

STEP	KEY	DESCRIPTION
1.	HOL	H:01 displayed indicating Holiday.
2.	####	Enter month, then date of holiday. Press two keys for month and two for date.
3.	E	Enters holiday into memory and advances to next holiday. Repeat Steps 2 and 3 until all single holidays through H:12 are programmed.
4.	E	H:13 displayed indicating begin date for first holiday duration.
5.	####	Enter month, then date that the holiday duration will begin.
6.	E	H:14 displayed indicating end date for first holiday duration.
7.	####	Enter month, then date that holiday duration will end.
8.		Repeat Steps 4-7 for second holiday duration.

		H:15 denotes begin date:H:16 denotes end date.
9.	E	Displays SPR indicating start date for Spring Daylight Savings Time changeover.
10.	####	Enter month then date of spring changeover.
11.		Repeat Steps 9 and 10 to program Fall Daylight Savings Time changeover. Control displays Fall.
12.	RUN	Restores normal operation. Time and day displayed. Colon flashing.

11. To Review or Change Holidays

STEP	KEY	DESCRIPTION
1.	HOL	Date of first holiday (H:01) displayed.
2.	E	Press repeatedly to review single day holidays, H:01-H:12. Press again to review H:13-H:16. A colon will appear between month and date for H:13 and H:15, indicating the begin dates for both holiday durations. No colon will appear for H:14 and H:16, the duration end dates. Press again to review Daylight Savings Time dates.
3.	CLR	Press key if you discover that any date is incorrect. The title of the cleared holiday (H:01-H:16) or Daylight Savings Time date (SPR or Fall) will be displayed.
4.	####	Enter correct month and date.
5.	E	Enters new date into memory and advances to next holiday.
6.	RUN	Time and day of week displayed. Colon flashing.

10.7.6 SHUTDOWN PROCEDURE

1. Deactivate the Clock/Controller to terminate sampling.

2. Remove the 12 VDC battery and place on AC recharger.

3. Close and secure the sampling enclosure.

10.7.7 CALIBRATION

1. The Rotameter shall be calibrated by a bubble meter instrument and stopwatch. As long as the flow can be set, such that the total sample will not exceed the volume of the bag, yet be sufficient for analysis, the calibration is adequate. The factor of primary importance is maintaining reasonably constant flow throughout the sampling to ensure an unbiased sample.

2. Connect the bubble meter to the outlet of the sampling unit where the Tedlar bag would normally be attached.

3. Manually set the timer to turn on the sampling unit undergoing calibration.

4. Using the bypass valve, set the rotameter to the 2 cc/min mark. Allow the flow to stabilize for a minute or two. Measure the flow rate, allowing at least 20 seconds for a measurement. When 3 consecutive measurements agree to within +/- 5 percent, the calibration is complete. Record the position of the middle of the ball and the actual flow rate. Repeat this procedure for every 2 cc/min up to 10 cc/min and every 5 cc/min up to 45 cc/min. Prepare a calibration curve for the rotameter.

5. From the above calibration, estimate the position of the rotameter ball that would give a flow of 6.0 cc/min (24-hour sample), and adjust the bypass valve to position the float at the position nearest cc/min mark. Calibrate the flow rate as in item 5 above. If the flow rate is 6.0 + or 0.25 cc/min, then mark this float position. If not, adjust the float position again and recalibrated until this condition is met. A 12-hour sample would require 12 cc/min while an 8-hour sample would need 18 cc/min calibration.

6. Repeat items 1 through 6 for each sample unit.

10.7.7.1 Test Equipment

1. The following equipment will be needed:

   - Bubble meter calibrated for flow rates from 1-100 cc/min.
   - Stopwatch with 0.1 second resolution.

10.7.7.2 Calibration Acceptance Limits

1. Rotameter calibration should result in readings with a + or - 5 percent of standard value for continued use. If it does not meet these limits during calibration it will require corrective action.

10.7.8 MAINTENANCE

10.7.8.1 General

1. CAUTION: Maintenance personnel should be thoroughly familiar with instrument operation before performing maintenance. It is essential that all portions of this manual relating to safety of operation, servicing and maintenance be thoroughly understood.

2. Extreme care should be exercised to ensure that required parts replacement is accomplished with the same parts specified by the manufacturers and the assembly drawing. No modifications are permitted. Disassemble instrument only in a non-hazardous atmosphere.

10.7.8.2 Air Sampling System Maintenance

1. A potential problem associated with the Ambient Air Sampler is that leaks can develop in the air sample pumping system. These leaks can result in either dilution or loss of sample, causing vapor concentration and slow response time.

10.7.8.3 Testing for Leaks

1. The Ambient Air Sampler is equipped with a rotameter, which provides a method to check for leaks. Cover the bypass valve with your finger and observe that the ball in the rotameter goes to the bottom, indicating no air flow (if ball has slight chatter while on bottom, this is acceptable). It should be noted that slow rotameter response may also indicate a restriction in the air sampling system.

10.7.8.4 Leak Isolation

1. Failure of the ball to go to the bottom when the inlet is blocked indicates a leak in the system between the Spectrex pump and the rotameter. To isolate the problem, remove parts, one at a time, and again block off the air inlet until the leak is detected. There is also the possibility of a leakage in the pump diaphragm which would not show up on this test. If the leakage is not found in the sample line system, it is most likely in the pump diaphragm which should be replaced.

2. If the ball does not go to the bottom, the leak will be either in the flow gauge or its connecting tubing. Visually check that the tubing is connected and if so, the flow gauge should be repaired or replaced. Check the O ring installation in the sample inlet connector (Fitting Assembly).

3. Leaks (beyond the pump) are easier to locate. Cover the exhaust port, which will place the exhaust system under pressure, and check each connection, one at a time. Replace the tubing or retape the threaded connections with teflon joint tape.

10.7.8.5 Inspection of Rotameter, Tubing, Connections and Fittings

1. Visually inspect the rotameter, tubing, connections and fittings for dirt or foreign matter buildup at each sampling event. Clean or replace as necessary.

10.7.8.6 Spectrex Pump

1. Remove pump and inspect diaphragm and valves for cracking, deformation or dirt buildup at each sampling event. Clean or replace as necessary.

10.7.9 BATTERY RECHARGING - AC BATTERY CHARGER

1. Test the battery with a volt meter at each event. There must be a minimum of 12 VDC to complete the sampling event. If it does not meet these limits it will require corrective action.

2. Remove the battery cell covers and connect the charging terminals to the battery posts. Insert AC plug into 115 VAC wall outlet. Never charge in a hazardous area or environment.

10.7.10 SPECIFICATIONS

1. Paragon Clock/Controller/Model EC72D

   Clock Timer Switch - Microprocessor based timer capable of performing seven day, two channel time controls that will switch two different electrical circuits according to preset, time of day program; Power: voltage 12 VDC.

2. Spectrex AS-330 Gas Pump

   Flow range 0-4.5 LPM; vacuum to 20-inch mercury; variable stroke mechanism, mounts in any orientation, non-lubricated Viton diaphragm, Power: 3-15 VDC and "tape deck" type DC motor.

3. Porter Rotameter/Model F150-SHRO-13-125-10-13-2285

   The rotameter is made of borosilicate glass and has a flow range of 1 to 50 cc/min. The scale is direct reading with major graduations every 5 and minor graduations every 1.

4. Parker Bypass Valve/Model 4A-V4AN-SS

5. Air Flow Control Orifice

   3/16-inch stainless steel capillary tubing

6. Fittings, Tubing, and Connectors

   316 stainless steel and Teflon tubing and connections.

   NOTE: Sizes for the various fittings, tubing and connections are specified in the Ambient Air Sampler assembly drawing.

7. Tedlar Bag

   10 Liter Tedlar bag with push-pull type valve constructed of stainless steel with a viton "O" ring valve.

10.7.11 CONTAMINATION CONTROL AND MAINTENANCE

10.7.11.1 General

1. A possible cause of contamination is contamination trapped in the sample line system. This is not a common problem and usually only happens when an unusually high level of contaminant is drawn into the assembly.

10.7.11.2 Analysis and Correction

1. Prior to analyzing the problem, the Ambient Air sampler should be checked for proper electronic operation and flow rate as referenced.

2. If, after checking that the sampler is properly calibrated, the following procedure should be followed to isolate the cause of the problem:

3. Let the sampler run for a period of time (15 to 30 minutes) and see if the flow rate increases as a function of time. The flow could increase as a result of clearing line contamination which is removable simply by the normal flow of air through the sample line.

4. Serious contamination in the air sample line is very uncommon. However, if very large doses of very heavy compounds are sampled, there is a possibility of a residual contamination which would eventually clear itself out. In the event there is contamination in the pump or other internal parts of the sample flow lines which cannot be removed, the sample flow components would have to be disassembled and cleaned. The components such as the pump can be replaced in the field along with any contaminated tubing in the sample lines.

5. If the flow or leak problem cannot be resolved remove the instrument from service.

10.7.12 CORRECTIVE ACTION

1. If a piece of equipment does not properly calibrate, or is suspected to be malfunctioning, remove the device from operation, and tag appropriately. Segregate the device so that it will not be

unintentionally used. Notify the Chief Monitoring Technician so that a recalibration can be performed or a replacement can be obtained.

10.7.13 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Monitoring Technicians records room following a technical Quality Assurance and Quality Control review.

FIGURE 10.7.1
LOPEZ CANYON LANDFILL
24-HOUR CLOCK FORMAT

24-HOUR CLOCK TIME 0:00	12-HOUR CLOCK TIME 12:00AM MIDNIGHT	24-HOUR CLOCK TIME 12:00	12-HOUR CLOCK TIME 12:00PM NOON
1:00	1:00am	13:00	1:00pm
2:00	2:00am	14:00	2:00pm
3:00	3:00am	15:00	3:00pm
4:00	4:00am	16:00	4:00pm
5:00	5:00am	17:00	5:00pm
6:00	6:00am	18:00	6:00pm
7:00	7:00am	19:00	7:00pm
8:00	8:00am	20:00	8:00pm
9:00	9:00am	21:00	9:00pm
10:00	10:00am	22:00	10:00pm
11:00	11:00am	23:00	11:00pm

LOPEZ CANYON LANDFILL
RECORD OF DAILY EVENTS

EVENTS																			
C1	TYPE	TIME	DAY OF THE WEEK							C2	TYPE	TIME	DAY OF THE WEEK						
1	ON/OFF		S	M	T	W	T	F	S	1	ON/OFF		S	M	T	W	T	F	S
2	ON/OFF		S	M	T	W	T	F	S	2	ON/OFF		S	M	T	W	T	F	S
3	ON/OFF		S	M	T	W	T	F	S	3	ON/OFF		S	M	T	W	T	F	S
4	ON/OFF		S	M	T	W	T	F	S	4	ON/OFF		S	M	T	W	T	F	S
5	ON/OFF		S	M	T	W	T	F	S	5	ON/OFF		S	M	T	W	T	F	S
6	ON/OFF		S	M	T	W	T	F	S	6	ON/OFF		S	M	T	W	T	F	S
7	ON/OFF		S	M	T	W	T	F	S	7	ON/OFF		S	M	T	W	T	F	S
8	ON/OFF		S	M	T	W	T	F	S	8	ON/OFF		S	M	T	W	T	F	S
9	ON/OFF		S	M	T	W	T	F	S	9	ON/OFF		S	M	T	W	T	F	S
10	ON/OFF		S	M	T	W	T	F	S	10	ON/OFF		S	M	T	W	T	F	S
11	ON/OFF		S	M	T	W	T	F	S	11	ON/OFF		S	M	T	W	T	F	S
12	ON/OFF		S	M	T	W	T	F	S	12	ON/OFF		S	M	T	W	T	F	S
13	ON/OFF		S	M	T	W	T	F	S	13	ON/OFF		S	M	T	W	T	F	S
14	ON/OFF		S	M	T	W	T	F	S	14	ON/OFF		S	M	T	W	T	F	S
15	ON/OFF		S	M	T	W	T	F	S	15	ON/OFF		S	M	T	W	T	F	S
16	ON/OFF		S	M	T	W	T	F	S	16	ON/OFF		S	M	T	W	T	F	S

SECTION 10.8

PAS-3000 PERSONAL AIR SAMPLER

10.8.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR THE PAS-3000 PERSONAL AIR SAMPLER

10.8.1 INTRODUCTION

1. This document describes procedures that field personnel will perform when collecting samples with a PAS-3000 Personal Air Sampler as well as during maintenance and calibration of the instrument. Technicians will document field equipment operation, maintenance, and calibrations on the appropriate logbooks and forms.

2. These procedures were developed based on Spectrex's manuals adn recommendations, as well as technical and field experience.

10.8.1.2 Description

1. The PAS-3000 is a personal air sampler for moving air through a device, such as a charcoal tube or a gravimetric filter, or for filling sample bags. It automatically provides constant flow to +/- 5 percent in spite of changes of up to 10 inches of water.

10.8.2 MAJOR FEATURES

1. Flow rates from 0 to 3 LPM set by combination of mechanically adjustable pump stroke and electronic, potentiometer control.

2. Servo flow control to provide constant flow for changing input vacuum load up to 10 inches of water.

3. Pulsation dampener.

4. 2 LPM flow for 10 hours across a 0.8 pm filter.

5. Dependable 10,000 hour operating life.

6. Audible battery charge indicator; automatic pump turn-off when batteries are discharged.

7. Visible indicator (LED) to record low flow "event".

8. Audible low flow indicator and automatic pump turn-off when load is above user preset level for excessive length of time.

9. On/Off key to permit turning pump on and off without the need of external switch or removal of cover. If fits into the "recharge receptacle" when in use. Key also resets visible low flow indicator and resets timer read-out. The key may be kept separate from the pump when the sampler is in use or it can be fitted in tapered receptacle on rear of sample case.

NOTE: Do not use battery charger as on/off key. The batteries will discharge.

10. All controls are internal and are protected from tampering during sampling period.

11. An optional timer can be added to basic unit without the need to return it to the factory.

10.8.3 SUPPLIES AND EQUIPMENT

10.8.3.1 Standard Accessories

1. Constant flow sampler, with built-in rechargeable battery pack
2. 110VAC, 60 Hz battery charger
3. Delrin orifice (for adding 10 inches of water pressure at 2 LPM for flow calibration)
4. Carrying case
5. On/Off key
6. Fusible resistor
7. Screwdriver

10.8.3.2 Optional Accessories

1. Exit port, for bag sampling
2. Visible flow meter (rotameter) plus exit port
3. Optional Timer which provides:

a. LED readout, visible through cover window, displaying in hours and minutes

b. Display turn-on by laying pump flat on its back.

c. Total elapsed time, since pump was turned on.

d. Programmable "turn-off" permitting automatic pump turn-off at a pre-selected time.

e. Time recorded turn-off caused by either obstructed flow or low battery status.

10.8.4 STARTUP PROCEDURE

1. Check the battery charge by removing the On/Off key at the recharge receptacle and a short beep will indicate that the batteries are fully charged.

2. A brief alternating tone indicates that the batteries are not fully charged.

3. If the alternating tone persists, and the pump automatically turns off, then the batteries are fully discharged and will have to be recharged. The instrument must be removed from service.

4. The sampler must be calibrated for every sampling event as detailed in Section 10.8.6.

10.8.5 SHUTDOWN PROCEDURE

1. To preserve battery life, let the pump continue to run after sampling is over. The ensures that the batteries are fully discharged (avoiding typical "memory" problem of Ni-Cad batteries) and, because of automatic turn-off, avoids danger of deep reversal of the battery cells.

2. Plug battery charger cord into receptacle on left side of the pump and plug the three-pronged adaptor into any standard 100VAC outlet. A full charge is obtained after 16 hours. The batteries cannot be overcharged.

10.8.6 CALIBRATION

1. Figure 10.8.1 shall be used for all calibration procedures in this section.

2. Open pump by unscrewing 4 corner screws on the back case of the pump, using the screwdriver provided. The screws are retained and cannot fall out of the rear case.

3. Remove the pump cover by pulling it upwards, away from the rear case. Lay the pump cover so that the inside surface, with control diagram, is visible.

4. Locate the switch module on the control board. (Control diagram is displayed on the inside of the pump cover). Right hand switch #2 is the main On/Off switch. Make sure it is in the off position. Left and switch #1 is a manual override to enable the display when the timer is incorporated.

10.8.6.1 Set Flow Rate

1. Set "stroke" of pump

a. With pump off, firmly grasp knurled disc A with scale. Loosen clamping screws B with screwdriver provided.

b. While still grasping disc, with screwdriver in slot C rotate inner disc until mark D is pointing to correct position of circular scale A.

NOTE: The scale is symmetrical around the max/min axis, and can be set on either side. The following settings are suggested:

REQ'D FLOW	SCALE SETTING
5 cc/min	Min.
20 "	.1
50 "	.2
100 "	.3
500 "	1.0
1000 "	2.5
1500 "	Max.
2000 "	Max.

c. If settings do not give the required flow, find the correct settings and enter onto silver chart on inside of pump cover.

2. Set potentiometer for fine flow adjust.

a. Connect flow meter (bubble tube meter) and sample collector to the inlet port.

b. Set trip point potentiometer fully clockwise.

c. Set Stage 1 potentiometer so the flow passes through the flowmeter as required.

NOTE: Avoid setting the potentiometer to maximum flow position as voltage regulation to pump is decreased. Mid to low position provides maximum regulation.

10.8.6.2 Flow Calibration Using A Bubble Meter

1. Place the unit on a horizontal surface and press the ON/RESET button momentarily. A "0" display indicated the instrument is ready for use. If any fault message ("F") appears remove the instrument from service.

2. Fill the liquid chamber through the lower gas inlet tube to a level just below the inner glass tubing. Use the lower inlet to measure pressure flows and the upper inlet to measure vacuum flows. Make this connection with the shortest tubing length possible and avoid kinks and bends for the most accurate measurements.

3. Connect the bubble meter to the outlet of the sampling unit where the Tedlar bag would normally be attached.

4. For flow rates below 500 ml/min slide the bubble meter to its highest position on the stand.

Note: At low flow rates, while the bubbles are being timed through the sensor block, the latex bulb SHOULD NOT BE TOUCHED or erroneous flow rates may result.

5. For flow rates above 21 cc/min., place the rubber bulb clamp on the rubber bulb with the "U" open end parallel with the rubber bulb. With the air flowing, lightly tighten the clamp until the bubbles

begin to form. Adjust the clamp so the bubbles are going through the glass tube one at a time.

6. When the bubble passes the lower sensor in the sensor block, the "Timing In Progress" symbol (The "+" sign) should go on. It should remain on as long as there are bubbles between the lower and upper sensors. If it remains on after all the bubbles have left the sensor block area, or if a bubble pops while between the sensors, press the RESET button momentarily. After the bubble passes the upper sensor the display will read out the gas flow rate. This reading will be held until the next bubble comes along or the unit is turned off.

7. Manually set the timer to turn on the sampling unit.

8. Allow the flow to stabilize for a minute or two. Measure the flowrate, allowing at least 20 seconds for a measurement. When 3 consecutive measurements agree to within + or - 5 percent, the calibration is complete. Record the actual flowrate for each event. Repeat this procedure for every 2 cc/min up to 10 cc/min and every 5 cc/min up to 45 cc/min. Prepare a calibration curve for the sampler.

9. From the above calibration, estimate the position of the inner disk until the mark "D" is pointing to the correct position of the circular scale. Find the correct settings and enter them onto the silver chart on the required calibration forms.

10.8.6.3 Set "Low Flow" Beeper Level

1. With delrin orifice position, adjust "Beeper adjust potentiometer so that the beeper just goes on at this back pressure.

   NOTE: The low flow light will go on at the same time.

2. Then slightly back off potentiometer clockwise from this position so that it would take a little more pressure to operate the beeper.

3. Check this out by slowly obstructing flow into the flowmeter with finger and noting when beeper goes on and then goes off when obstruction is removed.

4. Remove delrin orifice and recheck Stage 1 operation with only original sample collector in position.

   NOTE: Inserting on/off key for five seconds will reset the low flow LED.

10.8.6.4 Test Equipment

1. Bubble meter calibrated for flow rates from 5-500 cc/min.

2. Stopwatch with 0.1 second resolution.

10.8.7 CALIBRATION ACCEPTANCE LIMITS

1. Equipment calibration should result in readings with 25 percent of standard value for continued use. Equipment that does not meet these limits during calibration will require corrective action.

10.8.8 BATTERY RECHARGING - AC BATTERY CHARGER

1. The battery charger supplied with the pump will supply about 140 mA of current when it is being used. The charger limits the current to a safe value so the batteries can never be overcharged.

2. Under normal operation, the batteries will last 9-11 hours on a full charge, Charge the batteries from 14 to 16 hours to obtain a full charge.

10.8.9 FIELD SAMPLING PROCEDURES

1. Leave switch #2 on and turn pump off by using on/off key in recharge receptacle.

2. Refit front cover to pump by aligning the edge of the control board with central groove on the inside of the cover and secure by tightening the four corner screws from the rear.

3. With the sample collector attached, commence sampling.

4. Record starting time and remove on/off key, starting pump.

   NOTE: If pump has timer, it will automatically start when key is removed. There will be a delay of about 1 second however.

5. At the end of the sampling period record the time.

   NOTE: Timer will automatically record total elapsed ne. If timer is fitted and pump "timed out" to preset time, the preset time will be on the display. If the pump has turned off due to low battery, the time it turned off will be held in the display. If it has turned off due to low flow condition, the low flow LED indicator will be glowing and the display will hold the time.

10.8.9.1 Check for Low Flow During Sample

1. If red light lows in the center of the front cover and the pump is still running, then there has been a temporary flow obstruction causing low flow. The low flow light can be turned off by inserting the on/off key for 4 to 5 seconds and then removing it. The pump is now primed for the next period of sampling.

2. If the light glows, and the pump has stopped, then the obstruction was of long enough duration to effect the sample.

   NOTE: If pump has timer, the time of turn-off will be indicated when the pump is titled.

10.8.9.2 Check for Low Battery State

1. If pump has turned itself off during the sampling period and the low flow light is off, then the batteries have run down.

   NOTE: Timer will indicate the exact time of turn-off, thus preserving the sample collected before turn-off.

10.8.9.3 Timer

1. The timer control board fits over the battery pack. (see layout on page 1). The on/off switch for the timer display is Switch #1 on switch module. (this switch is a manual override for the tilt switch on the timer board).

2. To check the running time since turn-on, simply tilt pump and timer on its back. Display will show the hours and minutes. IMPORTANT: ALWAYS READ TIME BEFORE TURNING PUMP OFF, AS DATA IS DUMPED ON TURN-OFF.

10.8.9.4 To Set Automatic Pump Turn-off

1. The row of three time-set switches can be set with the screwdriver provided. They are set to the number of hours and minutes (to the nearest ten minutes) the pump is required to run before it is automatically turned off.

2. If automatic turn-ff is not required, switch A of C should be set to 6, 7, 8, of 9.

NOTE: This is because the timer counts in a 50:59 sequence. Therefore, if the 10's digit for either minutes or hours is set to a value greater than 5, the clock will never equal the value set on the switches and never time out.

10.8.10 INSTALLATION OF OPTIONAL TIMER

1. The timer control board can be installed in the field.

   NOTE: Make sure switch #2 is in "open" position.

2. Remove the four outer screws on the battery cover.

3. Carefully slide timer board into position, aligning connector clips opposite recessed sections of board and engaging them. Place spacers provided between timer battery cover. Replace screws, through holes in timer board with new screws provided. Make sure the screws pass through the new spacers.

10.8.10.1 Operation of Timer

1. To preserve battery life, leave switch #1 (display enable) off as much as possible. While pump is running, timer display can be activated by tilting the pump on its back. It will stay on for 6-10 seconds.

10.8.11 MAINTENANCE

10.8.11.1 Pump and Motor

1. The pump can be removed from the case by loosening two screws accessible on clip side of case. It is easily disassembled and reassembled. All the standard controls are on one printed circuit board. (The control board). This can easily be replaced by making appropriate connections from wires to (A) Pump Motor (2 wires); (B) Peizo disc (2 fine black wires); (C) Battery Pack (2 wires); to a new circuit board and sliding it into position.

   NOTE: Battery Recharge Receptacle remains connected to the board. this is removed from case by loosening the locking nut and pushing inward.

10.8.11.2 Battery Pack

1. The battery pack can be replaced by removing the battery cover beneath timer board and sliding the old pack out.

10.8.11.3 Fusible Resistor

1. There is a fusible resistor in the center of the pack which will open if the batteries are shorted or overloaded. This is easily replaced with a soldering iron. A spare fusible resistor is included in the PAS-3000 kit.

10.8.12 BATTERY RECHARGING - AC BATTERY CHARGER

1. The battery cells in your pump are rated at 1.2 Ah. This means that if the eight-cell pack is drained at 1.2 Amps for one hour, the voltage would still beat or above 8-volts. Eight volts (or one volt per cell) is considered the end point and marks the point at which the internal impedance" of the battery begins to increase greatly. Below eight volts, the servo cannot be trusted to operate normally.

Therefore, there is a "watchdog" circuit on the servo board to turn-off the pump when the battery pack reaches this point.

2. Ni-Cad (nickel cadmium) batteries are NOT immortal. However, with reasonable care, they should provide a good service life for your pump. Any of the following three conditions may reduce the life of a Ni-Cad battery:

   - Sustained overcharging heat
   - Cell reversal
   - Memory

3. Sustained overcharging heat is eliminated a long as you use one of the two battery charges available for this pump. These charges have been designed to prevent overcharging of the battery cells.

4. Cell reversal takes place when one of the cells in the battery is completely discharged (zero volts). The remaining cells then force a current through the discharged cell; this causes the voltage across the cell to reverse and begins to destroy the cell chemistry. To avoid this condition the "watchdog" circuit was incorporated into the electronics in the pump (to keep the battery voltage from dropping below 8 volts). If you feel that a battery has gone bad, simply voltmeter test, measuring the voltage across each cell, will usually turn up the defective cell. It is usually best to run the pump for half an hour after the defective ones. Typical voltages with pump running are:

   - 1.38 volts maximum at full charge
   - 1.25 volts typical during discharge
   - 1.0 volt end point

5. "Memory" is an apparent reduction of the battery capacity. If the battery pack is not fully discharged before recharging on a repeated basis, then the apparent capacity of the peak will decrease. This doesn't necessarily cause a problem if the pack is used for the same length of time on each cycle. However, if the user tries to extend his normal running time with a pack in this condition, the pack will not then have the necessary capacity and the pump will stop before it is expected.

6. You can reverse memory with a series of full, charge/discharge cycles, the battery pack will normally improve after each cycle. It may not be a bad idea, after you complete your sampling, to run the

battery pack down and then recharge fully each time before use.

7. Since the charging efficiency for a Ni-Cad cell is approximately 66% and your charger will typically provide 140 mA of current, it will take about 14-16 hours to totally recharge a completely discharged battery pack.

8. While a Ni-Cad battery system is not ideal, it is the best system currently available for battery-lowered equipment like your sampling pump. These battery cells can and will take a lot of abuse and if you avoid over discharging and overcharging, they will give you many dependable recycles.

NOTE: When not in use, the battery pack will lose approximately 1% of its charger per day. Also, when not charged for 90 days, it will charge only to 80% of capacity on the first charge. It will, however, return to 100% after several charges and uses. Thus, the best way to ensure top battery performance is frequent use.

10.8.13 TROUBLESHOOTING

1. If the pump has turned itself off by the end of the sampling period, one of three things has happened:

- When the "low flow" LED glows in the center of the front cover, there has been excessive obstructed flow. Check time of turn-off by tilting the pump.

- When the "low flow" LED does not glow, check time turn-off by tilting pump. If the time recorded in the display coincides with time-set switches, then the pump has timed out normally, with automatic turn-off.

- When the time on the display is less than the setting on the time-set switches, then the batteries have discharged prematurely.

10.8.14 CORRECTIVE ACTION

1. If a piece of equipment does not properly calibrate, or is suspected to be malfunctioning, remove the device from operation, and tag as appropriately. Segregate the device so that it will not be unintentionally used. Notify the Chief Monitoring Technician so

that a recalibration can be performed or a replacement will be obtained.

10.8.15 SAFETY CONSIDERATIONS

1. The pump is intrinsically safe and has been tested in methane-air mixtures only. It is approved by the United States Department of Labor Mine Safety and Health administration.

10.8.16 CALIBRATION AND MAINTENANCE RECORDS

1. The Calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Monitoring Technicians records room following a technical Quality Assurance and Quality Control review.

10.8.17 PARTS AND ACCESSORIES

10.8.17.1 Part Number and Description

4047100	Belt Clip
4101000	Rear Cover
4101100	Front Cover
4101710	Inlet port (stainless steel)
4101800	Crankpin (variable stroke)
4101900	Crankpin hub (variable stroke)
4102300	Connecting rod, with bearings and con. rod cap
4102700	Motor (Philips) 12V
4102800	Motor (Maxon) 12V
4106000	Pulsation dampener
4106300	Finger cot (pulsation dampener)
4107100	Upper valve plate
4107200	Lower valve plate
4107300	Flapper valve
4107600	Diaphragm (pump)
4107700	Crankpin (fixed stroke)
6004000	Fusible resistor
6470000	Control board (Model II)
6470100	Timer board
6500000	Battery pack (including fusible resistor)

10.8.17.2 Accessories

1. The following parts are included with the standard PAS-3000 or PAS 3005 multi-pump kits.

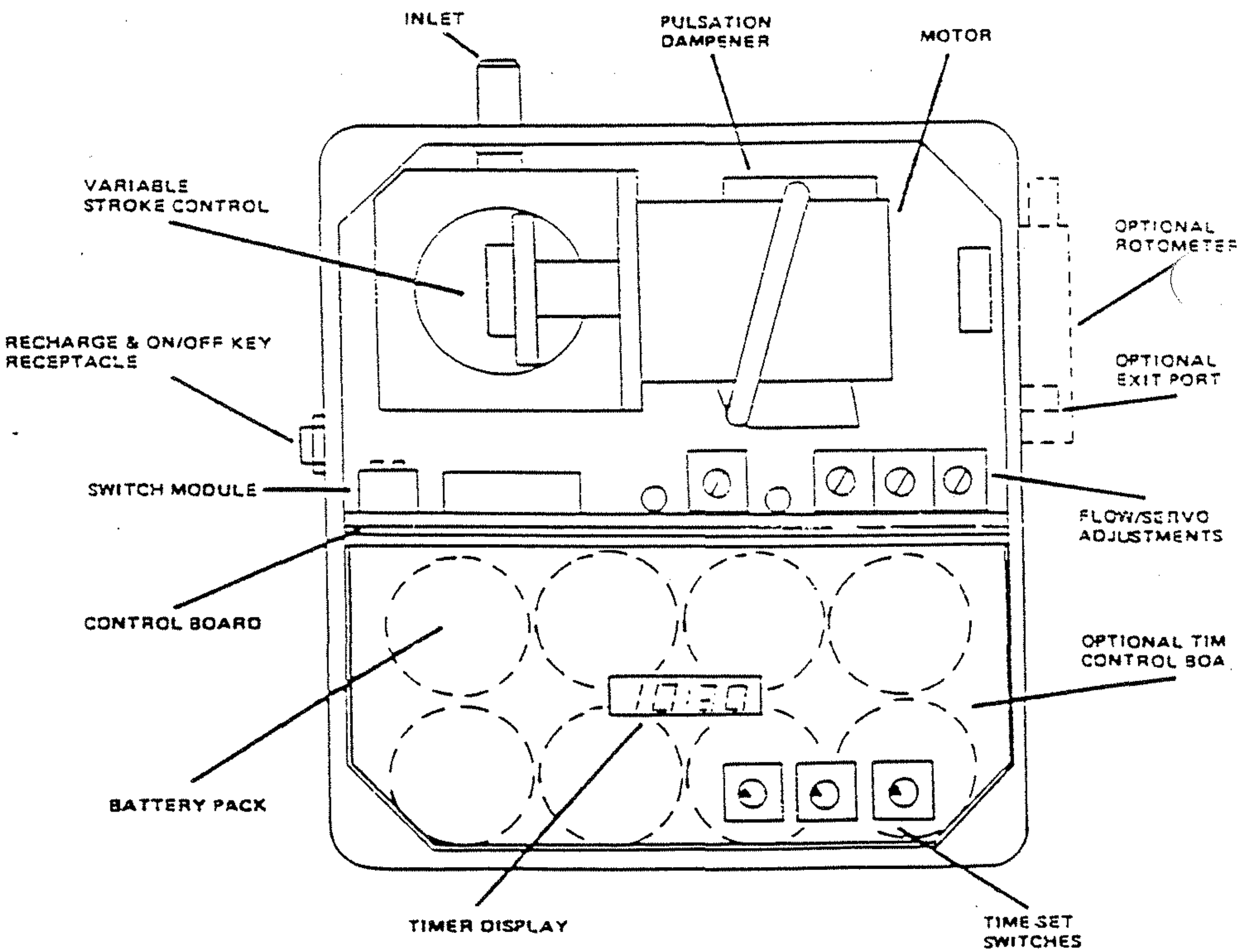
4082800	Screwdriver
4082900	Orifice, flow restrictor
4090400	Carrying case (multi-pump)
4100000	Carrying case
4108100	On/off key
6204300	Battery charger (110VAC)
6204400	Battery charger (220VAC)
6468400	Multi-pump battery charger (110VAC)
6468500	Manual

2. Optional Modifications

4082100	Rotameter & Exit Port
6470000	Model II Control Board (for pre 4/81 users)
6470100	Timer (total elapsed time & Programmable turn-off)

FIGURE 10.8.1

SAMPLER LAYOUT



SECTION 10.9

SPECTREX DIGITAL FLOW METER
MODEL BFM 2500

10.9.0 STANDARD OPERATING, MAINTENANCE AND CALIBRATION PROCEDURES FOR THE SPECTREX DIGITAL FLOWMETER/MODEL BFM 2500

10.9.1 INTRODUCTION

1. This document describes procedures that field personnel will perform when calibrating with a Spectrex Digital Flowmeter as well as during maintenance of the instrument. Technicians will document field equipment operation, maintenance, and calibrations on the appropriate logbooks and forms.

2. These procedures were developed based on Spectrex's manuals and recommendations, as well as technical and field experience.

10.9.1.1 Description

1. The flow meter is a bubble meter used for measuring flow rates on vacuum and pressure gas sources.

10.9.2 PURPOSE OF MEASUREMENT

1. The bubble flow meter shall be used for verification and calibration of vacuum and pressure gas flow rates on gas sampling instruments and field monitoring tasks.

10.9.3 MAJOR FEATURES

Microprocessor Autoranging and Averaging

1. The microprocessor automatically adjusts the resolution of the display to the gas flow rate. The three ranges are:

		FLOW (ml/min)	RESOLUTION (ml/min)
RANGE	1	5.0-99.9 ml/min	0.1 ml/min
	2	.100-.999 l/min	0.001 l/min
	3	1.00-5.00 l/min	0.01 l/min

Accuracy is maintained to +/-2% of the reading.

2. Averaging is used at higher flow rates for increased accuracy and to make the display easier to read. For flows under 2.00 l/min, flows are

displayed for each individual bubble. Between 2.00 and 3.00 l/min, the unit displays the flow average of two bubbles. In other words, every other bubble will update the display. Above 3.00 l/min, the flow average of four bubbles is displayed or every fourth bubble will update the display.

Auto Power Off

1. When the unit is activated by pressing the ON/RESET button momentarily, a new "INSTRUMENT TIME ON" cycle begins. This cycle lasts three (3) minutes. Any bubble traveling past either sensor will automatically make the instrument begin a new "INSTRUMENT TIME ON" cycle. The display will hold the last flow result for the entire "INSTRUMENT TIME ON" cycle. If a fault message is displayed, the instrument automatically turns off after about 10 seconds unless the ON/RESET button is momentarily pressed. If pressing the ON/RESET button clears the fault, the display will indicate 0. As an added feature to help conserve battery life even more, you can turn off the instrument manually by pressing the ON/RESET button until the word "OFF" appears on the display, then release the button.

10.9.4 SUPPLIES AND EQUIPMENT

10.9.4.1 Standard Accessories

1. Glass Bubble Meter
2. Flow Trap
3. 8 oz. Bottle of Bubble Solution
4. Auto-Bubble Clamp
5. Carrying Case

10.9.4.2 Optional Accessories

1. Printer Kit, 110 volt

10.9.5 STARTUP PROCEDURE

1. Place the unit on a horizontal surface and press the ON/RESET button momentarily. A "0" display indicated the instrument is ready for use. If any fault message ("F") appears on the display after the instrument check proceed to the Troubleshooting procedures, Section 10.9.12 for corrective action.

10.9.5.1 Optional Printer With Battery Pack

1. To use the printer, plug the DIN cable with 5 pins into the flowmeter's jack on the back of the unit. Visually line up the plug and socket before insertion. Connect the charged battery pack and the printer together with the 2-pronged plug and socket. It does not matter which way this connection is made. Turn on both printer and battery pack switches in any order. You may operate the printer and flowmeter with the AC charge unit plugged in or not. In any case the RED indicator on the battery pack must be OFF, indicating there is enough power in the battery pack for proper operation. When this indicator comes on, the battery pack must be charged. A full charge takes approximately 14 hours, and the pack may be left on charge for extended periods of time without damage. When a printout is not required, turn off the battery pack switch to conserve battery life.

10.9.6 SHUTDOWN PROCEDURE

1. Press the ON/RESET button momentarily, the pump will stop and the display will clear.

2. Remove the liquid chamber and clean with distilled water and allow to dry thoroughly.

3. Clean the sensors in the liquid chamber brackets with a mild soap solution (Windex, etc.) and a Q-tip swab prior to reinstalling the liquid chamber.

10.9.7 SAFETY CONSIDERATIONS

1. Keep the unit away from open flames when measuring flammable gas. Do not expose the rubber tubing to high temperatures.

10.9.8 CALIBRATION

10.9.8.1 Flow Calibration Using a Bubble Meter

1. Fill the liquid chamber through the lower gas inlet tube to a level just below the inner glass tubing. Use the lower inlet to measure pressure flows and the upper inlet to measure vacuum flows.

   Note: The instrument is calibrated to and should be operated with a completely wet bubble meter. Erroneous results and faults are more likely if the tube is not completely wet. Also be careful not to allow solution to enter the rubber hose and contaminate or damage the instrument whose flow you are measuring.

2. Make this connection with the shortest tubing length possible and avoid kinks and bends for the most accurate measurements. Connect the tubing to the gas source and start the air flow you wish to measure.

3. For flow rates below 500 cc/min slide the bubble meter to its lowest position on the stand. For low flow rates, slide the glass bubble meter to its highest position on the stand. Based on the measured flow capacity utilize the Low or High flow calibration procedures detailed below.

4. Manually set the timer to turn on the sampling unit.

5. Allow the flow to stabilize for a minute or two. Measure the flow rate, allowing at least 20 seconds for a measurement. When 3 consecutive measurements agree to within + or - 5 percent, the calibration is complete. Record the actual flow rate for each event. Repeat this procedure for every 2 cc/min up to 10 cc/min and every 5 cc/min up to 45 cc/min. Prepare a calibration curve for the instrument.

Note: Several other messages may appear on the display. If you try to measure a flow below the range of the instrument you may see "-L-" for Low flow. An "-H-" indicates a High flow. If the instrument rejects a measurement it has made you will see "-b-" for Bad reading.

10.9.8.2 Low Flow Calibration

1. At low flow rates (less than 10 cc/min.), the instrument may turn itself off before the bubble has a chance to reach the lower sensor unless the ON/RESET button is momentarily pressed after the bubble is formed to establish a new "INSTRUMENT TIME ON" cycle.

2. Press the ON/RESET button momentarily to turn on the instrument. When an "O" is displayed, the instrument will be ready to measure a volumetric flow (cc/min.).

3. At low flow rates, while the bubbles are being timed through the sensor block, the latex bulb SHOULD NOT BE TOUCHED or erroneous flow rates may result.

10.9.8.3 High Flow Calibration

1. For flow rates above 21 cc/min., place the rubber bulb clamp on the rubber bulb with the "U" open end parallel with the rubber bulb. With the gas flowing, lightly tighten the clamp until the bubbles begin to form. Adjust the clamp so the bubbles are going through the glass tube one at a time.

2. When the bubble passes the lower sensor in the sensor block, the "Timing In Progress" symbol (The "+" sign) should go on. It should remain on as long as there are bubbles between the lower and upper sensors. If it remains on after all the bubbles have left the sensor block area, or if a bubble pops while between the sensors, press the RESET button momentarily. After the bubble passes the upper sensor the display will read out the gas flow rate. This reading will be held until the next bubble comes along or the unit is turned off.

10.9.9 CALIBRATION ACCEPTANCE LIMITS

1. Equipment calibration should result in readings with +/- ** percent of standard value for continued use. Equipment that does not meet these limits during calibration will require corrective action.

10.9.10 MAINTENANCE

10.9.10.1 Bubble Meter

1. Clean the glass bubble meter periodically on both the inside and outside. To remove the glass bubble meter, gently spread the sensor clamp assembly apart and slip[the tube out. Be careful not to damage the gas inlet tube. Care is required to prevent injury from broken glass. Ensure that no liquids get inside of the unit or into the sensor assembly. They are NOT submersible. Reverse the above process to re-install the glass bubble meter. If it is loose, remove the tube again and gently squeeze the sensor clamp assembly together slightly to give it a greater holding pressure.

established. Follow the recommendations listed under F1.

F6 This fault is equivalent to F5 but it applies to the upper sensor. Follow the recommendations listed under F5.

F7 Internal fault 7. Contact manufacturer.

F8 Internal fault 8. Contact manufacturer.

F9 This fault indicates that you are trying to track too many bubbles within the sensor block at a time. It can also be caused by imperfectly formed bubbles passing through the sensor block. In any case, just press the ON/RESET button momentarily to reset the unit and begin your flow measurements again. Allow more space between the bubbles and make sure they are properly formed.

10.9.13 CORRECTIVE ACTION

1. If a piece of equipment does not properly calibrate, or is suspected to be malfunctioning, remove the device from operation, and tag as appropriately. Segregate the device so that it will not be unintentionally used. Notify the Chief Monitoring Technician so that a recalibration can be performed or a replacement will be obtained.

10.9.14 CALIBRATION AND MAINTENANCE RECORDS

1. The calibration and Maintenance forms and logbooks shall be submitted to the Chief Monitoring Technician for review. All data shall be retained onsite in the Monitoring Technicians records room following a technical Quality Assurance and Quality Control review.

10.9.11 BATTERY REPLACEMENT

1. When you see the "LO BAT" symbol on the display, a new battery should be installed in the unit. Use a standard 9-volt carbon battery or if greater battery life is desired, install a standard 9-volt alkaline battery. Remove the four screws on the back of the unit and lift off the back cover. Remove the old battery from its holder and replace with a new one. Replace the back cover, insert and lightly tighten the four screws.

10.9.12 TROUBLESHOOTING

10.9.12.1 Fault Conditions

1. Internal malfunctions will result in the display of a FAULT NUMBER. These numbers with their possible remedies and recommendations appear in the following table. After following the recommendations, the ON/RESET button should be pressed momentarily to see if the fault has been cleared.

F1 This fault can be caused if the instrument is turned on when a bubble is in front of the lower sensor. If this was not the case, it is most probably caused by some sort of obstruction blocking the lower sensor and may be remedied by cleaning the bubble flow meter and making sure there are no obstructions in the lower sensor path within the sensor block. If this does not remedy the situation, a more severe failure is indicated, notify the Chief Monitoring Technician (CMT).

F2 This fault can be caused byu using the instrument in an environment which has a very high ambient light level and applies to the lower sensor. This can be corrected by reducing the ambient light level at the instrument location. If this does not remedy the situation, call the CMT.

F3 This fault is equivalent to F1 but applies to the upper sensor. Follow the recommendations listed under F1.

F4 This fault is equivalent to F2 but applies to the upper sensor. Follow the recommendations listed under F2.

F5 This fault can occur if a bubble or other obstruction blocks the lower sensor path for too much time after normal operation was

SECTION 11.0

TRAINING PROGRAM FOR RESPONSIBLE LANDFILL PERSONNEL

11.0 TRAINING PROGRAM FOR RESPONSIBLE LANDFILL PERSONNEL

11.1 PROTOCOL REQUIREMENT

The Bureau shall conduct training for all aspects of this plan for all responsible landfill personnel. The landfill manager shall maintain on-site a record of all individuals trained. Records will include the names of trainees, ID numbers of trainees, names of trainers, course/lesson taught, and dates of training.

11.2 DEVELOPMENT AND IMPLEMENTATION OF TRAINING FOR KEY LANDFILL PERSONNEL

The City's comprehensive training program will provide the City of Los Angeles Lopez Canyon Landfill (LCL) personnei with the skills and knowledge necessary to safely and efficiently operate the Lopez Canyon Sanitary Landfill. The training program is being developed by the City's training consultant, MCS Group, Inc., hereinafter referred to as MCS, using standard instructional technology criteria and methodologies.

As an overview of the systems approach being used in the preparation of this training for specific performance on the job, the following Task Descriptions from the MCS SCOPE OF SERVICES are submitted. See Table 11.1.

11.2.1 See Figure 11-1: **Lopez Canyon Tactical Project Plan.** Tasks above the dashed line are performed concurrently with Tasks below the line. Tasks below the line are to be repeated 22 times for 22 position descriptions.

11.3 QUALIFICATION OF TRAINING PRINCIPALS

Technical competencies of MCS training principals working at the Lopez Canyon Landfill are exhibited by their resumes in Appendix 11.3: **Qualifications of Training Principals at the Lopez Canyon Landfill - MCS GROUP, Inc.**

11.4 PERSONNEL TO BE TRAINED

The Bureau shall train all responsible landfill personnel for their respective job positions. Job incumbents whose work pertains to the operation of the Lopez Canyon Sanitary Landfill will be trained in conformance with the State of California Health and Safety Code, SCAQMD Rule 1150.1, all SCAQMD orders pertaining to this landfill, this plan, and other generally accepted industry standards for the operation and maintenance of sanitary landfills. Temporary and exempt employees assigned to the landfill for more than three weeks shall receive training commensurate with their responsibilities or Civil Service Classifications.

All Bureau Civil Service Classifications assigned to, or with major responsibilities for the Lopez Canyon Sanitary Landfill shall have Job and Task Analyses (JTAs) performed on their positions. Training needs will be determined based on these analyses and skills audits. Appropriate training shall be developed.

A tabulation of the personnel currently [FY91] assigned to LCL is presented below. Truck Operators have different areas of responsibility, therefore, for training purposes, their jobs are considered two different positions. There are two levels of Sanitary Engineering Associate, also considered two different positions for training purposes.

CITY CIVIL SERVICE CLASSIFICATIONS	NO.
Refuse Collection and Disposal Manager I	1
Refuse Collection Superintendent II	1
Refuse Collection Superintendent I	2
Truck Operator (2 Levels)	3
Refuse Collection Truck Operator II	2
Equipment Operator Supervisor	6
~~Management Analyst II~~	~~2~~
Equipment Operator	38
Senior Gardener	1
Gardener Caretaker	5
Maintenance and Construction Helper	5
Maintenance Laborer	20
Senior Clerk Typist	1
Clerk Typist	4
Instrument Mechanic	1
Industrial Waste Inspector	5
Sanitary Engineer	1
Sanitary Engineering Associate (2 Levels)	2
Sanitary Engineering Assistant	1
Student Engineer, Part-time	1

Total Number of Personnel 102

New personnel to be assigned to the landfill during [FY91] are one Accounting Clerk, two Heavy Duty Truck Operators, and one Park Maintenance Supervisor.

11.5 TRAINING ADMINISTRATIVE MANUAL (TAM)

The Training Administrative Manual (TAM) provides an organizational and administrative overview of the training system in place in the Bureau of Sanitation.

The TAM is a single-source document which explains **what** is being done, and **how** it is being managed by a Total Training Management System (TTMS). See the Training Documents System Flowchart, in the TAM, page II-1, for the relationship of the TAM to other documentation.

Applicable Federal, State, County, City, Department documents which define and/or regulate the policies, goals, criteria, standards, and program content of Bureau of Sanitation training are superior to the Training Administrative Manual (TAM) and are listed under **Document References** in the TAM. See Appendix 11.5: **Training Administrative Manual.**

11.6 TRAINING PROCEDURES MANUAL

The Training Procedures Manual, subordinate to the Training Administrative Manual, explains **how** training responsibilities are to be carried out, **who** has the responsibility, and within **what timeframe.** Abstracts of the Procedures are in the TAM. See Appendix 11.6: **Training Procedures Manual** for full Procedures.

11.7 INSTRUCTIONAL SYSTEMS DESIGN GUIDE (ISD Guide)

This guidebook provides both MCS and City personnel with a practical guide to the Instructional Systems Design (ISD) process being used throughout the Bureau. The process focuses on designing training that maximizes worker performance on the job. The ISD Guide refers to the Training Procedures for quality control checks. This ISD Guide provides a consistent, logical, systematic path for designing quality training. See Appendix 11.7: **Instructional Systems Design Guide.**

11.8 TRAINING PROGRAM DESCRIPTION AND DESIGN DOCUMENTATION

The Training Program Description is a training blueprint which includes specifications for the Lesson Plan/Instructor Guide to be developed, and outlines a big picture overview for the program.

TABLE 11.1
LOPEZ CANYON LANDFILL
TASK DESCRIPTIONS

Task No.	Task Description
14.0	COLLECTING DATA
14.1	Analyze Agreement between SCAQMD and City. Prepare and hold orientations for MCS and City staffs.
14.2	Review position descriptions/class code information for Lopez Canyon Landfill (LCL) personnel, including Department of General Service and Refuse Disposal and Solid Waste Management.
14.3	Perform needs analysis interviews, and on-site comprehensive Job Analyses and Task Analyses for each of the 22 identified positions assigned to inspection, operation, and maintenance functions. (See Section 11.4 for positions to be analyzed.)
14.4	Review documentation that relates to jobs: SOPs, SMPs, O&M Manuals, management manuals, equipment vendor videos, equipment suppliers manuals, orientation procedures, and other appropriate documents.
14.5	With City personnel, project future impacts of economic, personnel changes; labor conditions; equipment and process changes; training mandates; site expansion; and review City-union contracts.
14.6	Prepare Master Report identifying qualitative training requirements.
15.0	DETERMINING TRAINING REQUIREMENTS
15.1	Review City-sponsored training, and equipment vendor/supplier-sponsored training currently available for City personnel assigned to LCL. Also review training materials currently in use.
15.2	Perform skills audit/evaluations (based on Sub-Task 14.3 information above) of LCL personnel to determine their current levels of knowledge and skills.
15.3	Identify training needs by taking the results of Sub-Task 14.3 [Minimum required levels of knowledge and skills] MINUS results of Sub-Task 15.2 [Current levels of knowledge and skills] EQUALS training needed.
15.4	Construct a Position/Training Matrix for 22 positions assigned to LCL.

Backup design documentation includes the City Position Description, Job Posting, Job Analysis Chart also called a "DACUM Chart" for Developing A CurriculUM, deselection criteria to explain why some tasks will not be trained, Task Analyses for major tasks, a contents outline for the program, and a generic LCL orientation course. See Appendix 11.8: **Examples of a Training Program Description, Design Documentation, Instructional Material, Industrial Waste Inspector/4292, Lopez Canyon Landfill.**

11.9 RECORD OF TRAINING

Records of all employee training shall be maintained at the site, on the forms provided. These records shall include the names of the trainees, ID numbers of trainees, names of trainers, course/lessons taught, and dates of training.

TABLE 11.1
LOPEZ CANYON LANDFILL
TASK DESCRIPTIONS

Task No.	Task Description
15.5	Prepare written report recommending equipment or modifications of facilities needed; number and types of courses/lessons; approximate number of City instructors needed; other pertinent information.
16.0	BUILDING THE FOUNDATION
16.1	With City personnel, formulate carefully written mission and philosophy statements, and develop goals and objectives.
16.2	With City personnel, establish Total Training Management System (TTMS) to include: • Training Administrative Manual (TAM) with Document References, Policies, other; • Training Procedures Manual; • Training Program Descriptions; • Instructional Systems Design Guide with QC; • Instructor Training Process.
16.3	Assist in identifying and taking responsibility for training Subject Matter Experts (SMEs) from the field to become trainers.
16.4	Construct a Training Project Plan (TPP) with timelines, milestones, and responsibilities.
17.0	DESIGNING/DEVELOPING THE TRAINING
17.1	Design/develop Lesson Plan/Instructor Guides/Student Guides for Industrial Waste Inspector program which will include: Purpose/overview for each lesson, terminal/enabling objectives based on Job and Task Analyses, optimum instructional location, documentation of references used, content outline, training aids and qualification guides, test/examinations with answer keys, other.
17.2	Oversee and evaluate program.
17.3	Above tasks are to be repeated for each of the 22 identified positions.

SECTION 12.0

RECORDS

12.0 RECORDS

12.1 MAINTENANCE OF RECORDS

The Bureau shall maintain at the Lopez Canyon Sanitary Landfill site all field data, summary data, analyses, maintenance and calibration records and related records generated pursuant to this Plan.

12.2 RECORD KEEPING REQUIREMENT

The Bureau shall prepare a monthly report, in a format approved in writing by the Directors of the Enforcement and Engineering Division(s). Said report shall include copies of all data, analyses, and related records required to be kept pursuant to this plan. The report shall specifically include, but is not limited to, a current color-coded map identifying all areas exceeding 500 ppm/v found during instantaneous monitoring and subsequent repair work, and all completed and proposed well locations and well depths. The corresponding sections of this Plan describe in detail the records which shall be maintained onsite and those which shall be submitted to the District Office of the SCAQMD. All data and analyses shall be reported and submitted in legible text. All such data, analyses, and related reports/documents shall be retained for a period of at least two (2) years.

12.3 CUSTODIAN OF RECORDS

The City's Refuse Disposal Manager I in charge of the landfill, or his formally designated representative, shall be the custodian of all required records. The custodian of records and reports, maintained at the Sunland-Tujunga Public Library, is the Chief Librarian at said facility.

12.4 LOCATION OF RECORDS

The documentation of all data, analyses, and related records generated pursuant to this plan shall be maintained at one filing location at the landfill. Furthermore, all data, analyses, and related records, which are required to be submitted to the District Office of the SCAQMD, will be maintained at one alternate filing location located Sunland-Tunjunga Public Library, 7771 Foothill Blvd., Tunjunga, CA 91042.

SECTION B.3

FLARE EMISSIONS SAMPLING

B.3 FLARE EMISSIONS SAMPLING

B.3.1 INTRODUCTION

The flare emissions testing program described in this section gives the methods and procedures required to monitor the combustion efficiency of the landfill gas flare in accordance with SCAQMD Rule 1150.1.

The landfill gas flare system consists of five flares fed by two gas blowers (one is on standby). Additional SCAQMD permits have been obtained to allow for the gas flare station to be expanded in order to facilitate the increased landfill gas production resulting from Disposal Area C development. The proposed landfill gas flare system modifications will consist primarily of four additional flares fed by two gas blowers. One blower will be primary and one will be on standby. Additionally, two oxygen monitors will be installed on the discharge side of the two operational blowers. The primary operating blowers for the entire flare station (9 flares) will be fed by one main header line for each blower.

The Bureau of Sanitation has the responsibility of performing the flare emission testing and reporting data to SCAQMD.

The SCAQMD Rule 1150.1 requires evaluation of the efficiency of combustion equipment used to dispose of landfill gas on an annual basis. Evaluation must be made in a manner approved by the SCAQMD. Such evaluation of the combustion disposal system used at the Lopez Canyon Landfill will be based on source tests.

B.3.2 FLARE TESTING PROTOCOL

The source testing procedures and analytical methods will conform with those set forth in the most recent South Coast Air Quality Management District Source Test Manual (March, 1989).

Where the SCAQMD has established a different test method, the SCAQMD test method will be used. The tests will provide data on gas flow rates, inlet and outlet concentrations, and mass loading for the following compounds:

- o Methane and non-methane hydrocarbons
- o Oxides of Nitrogen (outlet only)
- o Carbon monoxide
- o Particulates (outlet only)
- o Carbon dioxide
- o Moisture content
- o Oxygen

The destruction efficiency of the flare, based on mass inlet and outlet loadings, will be quantified for the following compounds and additional compounds as required by SCAQMD:

- o Vinyl Chloride
- o Trichloroethylene
- o Benzene
- o Perchloroethylene
- o Chloroform
- o 1,1-Dichloroethene
- o 1,1,1-Trichloroethane
- o Carbon Tetrachloride
- o 1,2-Dichloroethane
- o 1,1-Dichloroethane
- o Dichloroethane

All detectable organic compounds will be identified by Gas Chromatography/Mass Spectrometry (GC/MS) and reported with their respective concentrations. The organic compound removal efficiency will be reported on a mass basis. Refer to Appendix B.2.2 for sampling procedures.

B.3.3 FLARE TEST SAMPLING PLATFORMS

A sampling platform constructed from scaffolding will be provided for source testing personnel. Sample ports are located three feet below the top of the flare exhaust stack. The sampling platform will be adjustable to any required distance below the top of the flare. Heat protective gear will be used, if needed.

SECTION C

POST-CLOSURE EMERGENCY RESPONSE PLAN

C POSTCLOSURE EMERGENCY RESPONSE PLAN

C.1 PURPOSE AND SCOPE

This Emergency Response Plan (Plan) was prepared in accordance with Title 14, California Code of Regulations, Chapter 3, Article 7.8, Section 17766, for the City of Los Angeles Bureau of Sanitation as part of the Lopez Canyon Landfill Postclosure Maintenance Plan. The Plan identifies occurrences that may exceed the design of the site and endanger public health or the environment. The Plan also sets forth actions which will minimize the effects of these catastrophic events. The provisions of this Plan will be carried out immediately whenever an event occurs such as a fire, explosion, flood, earthquake, vandalism, surface drainage problem or release of any waste product which may threaten public health and/or the environment. Additional information regarding site safety activities and procedures are included in the Lopez Canyon Landfill Site Safety Plan included herein as Appendix C.1.

C.2 DECLARATION OF EMERGENCY AND COMMAND CENTER

o Declaration of Emergency

A catastrophic emergency can be declared by (in order of Preference)

- Site Safety Officer
- Site Manager
- Site Safety Officer Alternate

A catastrophic emergency is defined as any occurrence that may exceed the design of the site and may endanger public health or the environment. Such emergencies may include any of the following:

- fire
- explosion
- flood
- earthquake

- vandalism
- surface drainage problem
- release of any waste product

o Command Center

The command center shall be located in the scale house at the entrance to the landfill.

C.3 EMERGENCY RESPONSE COMMANDER

The Site Safety Officer (SSO; Appendix C.1, Sec. 2.4) or alternate will serve as the Emergency Response Commander (ERC). The ERC and alternate will be trained in on-site management of emergency and catastrophic events.

As ERC, the SSO will be thoroughly familiar with all aspects of emergency response plan as well as all postclosure maintenance activities, the location and characteristics of buried refuse, the location of facility records, and the overall site layout. In addition, the ERC has the authority to commit any of the available resources necessary to carry out the emergency response plan.

C.4 EMERGENCY RESPONSE TEAM

In the event of a major emergency or catastrophic event, an Emergency Response Team will be activated. Activation will be automatic upon declaration of the emergency. Team members will report to the command center for assignment and deployment. They shall not return to their normal duties unless relieved of emergency response duties by the ERC. Team members will include:

o Rescue Team Site Employees (2)

When an emergency event is declared, they will dress in Level B personal protective equipment (PPE) and report to the command center for assignment. They must be ready to immediately rescue any endangered worker. They will be capable of administering cardiopulmonary resuscitation (CPR) and emergency first aid. One rescue team member shall be designated by the ERC as team leader.

o	Emergency Response	Site Safety Officer/ Emergency Response Commander

The SSO is the Emergency Response Commander ERC and directs all emergency response operations. The ERC will be familiar with emergency procedures, evacuation routes, and have readily available all appropriate telephone numbers, including ambulance, medical facility, fire department, and police department. The ERC is the Chief Operating Officer at the scene and directs all operations in response to onsite emergencies.

o	Decontamination Station Officers	Site Employees (2)

Decontamination Station Officers shall be designated by the ERC. They shall report to the command center for assignment. They shall operate any designated decontamination stations and perform emergency decontamination of personnel and equipment needed in accordance with procedures outlined in Section 8.0 of the Site Safety Plan (Appendix C.1).

o	Communication Leader	Site Manager or equivalent

The Communication Leader notifies emergency support personnel, and appropriate LAC and other personnel by telephone or radio, and assists the ERC and rescue team as necessary to mitigate the emergency.

o	Emergency Medical Support	Los Angeles City Fire Department - Paramedics

Los Angeles City Fire Department paramedic support is available within 3-5 minutes of notification. Paramedics stabilize potential victims and transport to local emergency rooms as designated by their base commander.

Team members assignments shall be made by the SSO/ERC in consultation with the Site Manager prior to the beginning of post closure activities

C.5 EMERGENCY RESPONSE NOTIFICATION PROCEDURE

When any landfill personnel discover or witness an event which constitutes an emergency situation they shall determine the nature, source, and location of the emergency situation and immediately report the occurrence to the Site Manager or to an employee with a two-way radio capable of reporting the incident to the SSO/ERC. If an emergency event occurs when field personnel are not on-site, the general public may use the telephone number posted at the site entrance to notify the SSO/ERC.

C.6 EMERGENCY RESPONSE PROCEDURES

Lopez Canyon Sanitary Landfill will maintain a small stockpile of final cover material for those catastrophic events which may require immediate cover placement to curb waste releases, to repair severe cracks, or to fill in large erosion gullies.

Procedure	Responsibility
o Remove all non-essential employees from the vicinity of the incident.	Site Manager
o Remove non-essential equipment, if it can be done safely, from the vicinity of the incident.	Site Manager
o Determine and identify the nearest source of available equipment and supplies for responding to the incident.	Site Manager
o Assign additional on-site personnel to control the incident, as appropriate.	ERC/SSO

- o Assign on-site personnel to inspect the landfill as appropriate. All crew members will be supplied with full face respirators when conducting any inspections of the site for possible design failure. All findings will be reported to the SSO for action. — ERC/SSO

- o Assign on-site personnel to conduct environmental monitoring — ERC/SSO

- o Shut down any control system, such as a gas migration control system, that has been damaged during an incident. — Site Manager

C.6.1 FIRE AND/OR EXPLOSIONS

Services available to extinguish fires or explosions include water supply to the site provided by the City of Los Angeles Department of Water and Power. On-site water supply facilities include a one-million gallon water tank with a pumping station on the main haul road past the scalehouse. A single-stage close coupled centrifugal pump is used to provide water for fire fighting purposes. The pump is rated for 150 gallons per minute at 85 psig. In addition, four water tankers with a 7,000 gallon capacity, and three water trucks with a 3,500 gallon capacity are available at the landfill as well as portable fire extinguishers.

The flare station is equipped with a fire pump rated for 150 gallons per minute at 85 psig. This will be used to contain or extinguish fires that may occur at or near the vicinity of the flare station.

The nearest fire fighting facility is a Task Force Station consisting of two fire engines and a paramedic ambulance on Van Nuys Boulevard between San Fernando Road and Glenoaks Boulevard. Other fire stations in the vicinity of the site are located near Dexter Park in Kagel Canyon, at Penrose Street and at Glenoaks Boulevard in Sun Valley. A City Fire Department heliport facility is located at the Van Nuys Airport which could respond to the need for air-borne fire fighting services, transfer of personnel, and/or air ambulance services.

The following procedures will be followed if there is fire and/or explosion:

Procedure	Responsibility
o Contact the City of Los Angeles Fire Department even if on-site capabilities are deemed adequate to extinguish fires or control future explosions. Instruct Landfill personnel will follow the Fire Department's directions and give their full cooperation. The Fire Department's telephone numbers are: Emergency: 911 Non Emergency: (213) 485-6185	Site Manager
o In the event of an off-site fire near the landfill, such as a brush fire, assign personnel and equipment to the City Fire Department and /or the Forestry Department to fight the fire.	Site Manager
o Vent gas control system to avoid further chance of explosion.	Site Manager

C.6.2 FLOOD

The following procedures will be followed during incidents of flood:

Procedure	Responsibility
o Cut a diversion channel to avoid innundation of the refuse cell, as appropriate.	Site Manager
o Use sand bags in coordination with diversion channels as appropriate. A supply of soil will be kept on-site for filling sand bags.	Site Manager

C.6.3 EARTHQUAKE

The following procedures will be followed during an Earthquake incident. The ERC/SSO will designate responsibilities for these procedures, as described in Section 3.4 of Appendix C.1.

- o Inspect cracks observed in the final cover after an earthquake with a combustible gas analyzer. The location of venting and the gas concentrations will be determined and reported to the ERC/SSO. Excavate and refill the smaller surface cracks immediately. More extensive corrective actions will be determined by the Bureau of Sanitation engineering staff in accordance with the QA/QC Plan.

- o If driving in the field during an earthquake, stop vehicles and get out, if this can be done in a safe manner. Move to an open area.

- o After the earthquake has subsided, report to the Command Center (scalehouse) or elsewhere if expressly directed to do so by the ERC.designated area as chosen by the SSO near the site entrance.

C.7 EMERGENCY RESPONSE PLAN DISTRIBUTION

The Emergency Response Plan will be distributed to the following agencies:

City of Los Angeles
- Fire Department
- Planning Department
- Department of Public Works

County of Los Angeles
- Sheriffs Department
- Planning Department
- Hazardous Materials Control Program

State of California

California Regional Water Quality Control Board, Los Angeles Region
California Integrated Waste Management Board
South Coast Air Quality Management District
State Department of Health Services

Hospital

Holy Cross Hospital

C.8 EMERGENCY RESPONSE PLAN ORIENTATION

The ERC/SSO or representative designated by the Supervision Sanitary Engineer will meet with the agencies listed in Section C.8 to:

- Familiarize them with the layout of the facility, the properties of the waste materials handled, and the evacuation routes.

- Establish understandings between the responding Sheriff and Fire Departments and designate which agency has primary emergency authority during an incident.

- Establish understandings between emergency response teams, emergency response contractors, and equipment suppliers for smooth coordination of emergency response actions.

- Make arrangements to familiarize medical staff from the local hospitals with the types of injuries or illness which may occur as a result of an emergency situation.

C.9 EVACUATION PROCEDURES

During and/or after an incident the ERC/SSO in consultation with the Site Manager or other emergency personnel, such as the Fire Department, will assess the potential for injury to the local residents located on adjacent properties. If the assessment concludes that an imminent threat to public health is possible, an evacuation of the nearby area will be initiated. Situations which warrant partial or complete evacuation of site personnel and/or local residents are as follows:

- o Explosions resulting in airborne debris including particles and large fragments.
- o Spills or chemical reactions resulting in highly toxic fumes or vapors.
- o Fires that can not be readily contained or are spreading to other parts of the facility; or when fire could generate highly toxic fumes, or create a danger of igniting potentially explosive substances which may be stored on-site.

The Site Manager will then immediately notify the City of Los Angeles (213: 893-8208), the Los Angeles Police Department (911) and all other emergency response agencies.

C.10 MEDICAL CARE PROCEDURE

Should an emergency situation result in personal injury, immediate steps will be taken to determine the cause and extent of the injury and to render first aid. Los Angeles City Fire Department paramedics will be called when required (911). If further medical attention is necessary the injured person will be transported to the designated medical facility. The designated facility for this site is the Holy Cross Hospital located at 15031 Rinaldi Street, Mission Hills, California. An evacuation map showing routes to the hospital is located in Appendix C.1, Section 10.

C.11 AMENDMENTS TO THE EMERGENCY RESPONSE PLAN

The Emergency Response Plan will be reviewed and immediately amended, in accordance with the criteria listed in Title 14, California Code of Regulation, Chapter 3, Article 7.8, Section 17766. The amendment criteria are as follows:

- o A failure or release occurs for which the plan did not provide an appropriate response.
- o The post-closure use and/or structures on the site change and these changes are not addressed in the existing plan.

- The local enforcement agency or the California Integrated Waste Management Board (Board) notifies the Los Angeles City Bureau of Sanitation in writing that the current emergency response plan is inadequate under the provisions of this section. The notifying agency shall include within the written notice those items that must be considered for the plan to be in compliance with this section. The LACBS shall submit an amended emergency response plan to both the local enforcement agency and the Board within 30 days of receipt of notification that the plan is inadequate.

C.12 EMERGENCY CONTACT LIST

The following list presents the emergency contacts for the Lopez Canyon Sanitary Landfill:

City of Los Angeles, Bureau of Sanitation
Assistant Director . . . . (213) 485-5112

City of Los Angeles, Bureau of Sanitation
Environmental Monitoring Division - City Chemist
Lucy Jao . . . . (213) 648-5262
Farhana Mohammed . . . . (213) 648-5921

City of Los Angeles, Bureau of Sanitation
Refuse Disposal Division - Lopez Canyon Landfill

<u>Primary Emergency Coordinator</u>
Fred Young . . . . wk (818) 834-5133
hm (818) 353 5695

<u>Secondary Emergency Coordinator</u>
Gregorio de la Rosa . . . . wk (818) 834-5134
hm (818) 893-4766

Ernie McCoy . . . . wk (818) 376-6956
hm (714) 242-3584

<u>Landfill Engineering Group</u>
Ken Redd . . . . wk (818) 834-5111
hm (805) 297-8408

City of Los Angeles, Fire Department
Fire Station No. 98 . . . . (818) 989-8698

City of Los Angeles, Police Department
Foothill Police Station . . . . (818) 989-8861

City of Los Angeles, Department of Health Services
Radiation Management . . . . (213) 744-3244

Hazardous Waste Disposal Contractors

<u>City Hazardous Waste Contractor</u>
Containerized Chemical . . . . (800)233-3748
24 hours (714) 625-6645

<u>City's HHW Contractor</u>
Greenfield Environmental Services . . . . (619) 431-5500

APPENDIX C.1

SITE SAFETY PLAN

LOPEZ CANYON SANITARY LANDFILL
SITE SAFETY PLAN

CITY OF LOS ANGELES
Department of Public Works
Bureau of Sanitation
Solid Waste Management Division

August 1994

LOPEZ CANYON LANDFILL
SITE SAFETY PLAN

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this Site Safety Plan is to document some of the hazards to which workers at the landfill may be exposed. In addition, this document lists some of the methods and procedures to be used by personnel of the Lopez Canyon Sanitary Landfill (the landfill) and other workers/visitors at the landfill, to mitigate the risk to the health and safety of landfill personnel and the general public due to the listed hazards which may be present at the landfill.

Applicability of this document extends to all personnel at the landfill including:

- Bureau of Sanitation (BOS) personnel;
- employees of BOS subcontractors;
- refuse haulers; and
- landfill visitors.

II. BACKGROUND

The Lopez Canyon Sanitary Landfill is located at 11950 Lopez Canyon Road, Los Angeles, California, 91342. It is situated in the foothills of the western San Gabriel Mountains with elevations between 1,200 and 1,810 feet above mean sea level (msl). The site is the topographic high point in the Bartholomaus Canyon watershed.

The Lopez Canyon Sanitary Landfill is owned by the City of Los Angeles, with the exception of a 7-acre portion in the northeastern area of the site, which is leased from the U.S. Forest Service.

Landfill disposal operations commenced on October 1975 and have been continuous to the present time. The Lopez Canyon Sanitary Landfill is a "cut and cover" facility for the disposal of municipal solid waste, inert waste, and street sweepings. Borrow material is excavated from adjacent ridges and is used for daily cover, as fill for construction projects, and to provide additional refuse disposal capacity. The total landfill site covers 399 acres, approximately seven (7) acres of which is the leased U.S. Forest Service land. Active waste disposal is currently limited to Disposal Area C, which covers approximately 53 acres.

Access to the landfill is by way of four major routes: 1. The Simi Valley-San Fernando Valley Freeway (SR 118); 2. The Foothill Freeway (I-210); 3. Foothill Boulevard; and 4. Glenoaks Boulevard. All routes utilize Paxton Street for access into the landfill at the intersection of Lopez Canyon Road. The on-site main access roads are paved 2-way, single and double land roads that are used for all landfill traffic except that of earth moving equipment.

Landfill operations are conducted in accordance with the requirements established in the Waste Discharge Requirements established by the California Regional Water Quality Control Board - Los Angeles Region, Order No. 90-122, File No. 69-68 and Order No. 93-062, File No. 93-43.

Fueling facilities are located on the north side of the landfill. On-site water facilities include a one million gallon water tank with a pumping station.

Lopez Canyon utilizes a system of horizontal and vertical gas collection wells, collection header lines and a flaring system to collect and eliminate landfill gas generated at the landfill.

The deck of areas A and B are utilized for the stockpiling of dirt.

No medical, hazardous, liquid or other wastes, as defined by the California State Department of Health Services, requiring special treatment or handling are permitted at this landfill. Lopez Canyon Landfill does not receive sludge from the City's sewage treatment process, large dead animals, septic tank pumping, or asbestos. There is a waste load checking program to counteract the accidental or illicit disposal of hazardous and other unacceptable materials at the landfill.

The maximum daily load capacity the landfill can handle on a continuous basis with the existing staff and equipment is 6,000 tons per day (TPD), though this limit is only reached during emergencies. Pursuant to the landfill's Conditional Use Permit (CUP), granted February 4, 1991 and revised October 24, 1991, the maximum daily inflow of refuse is limited to 4,000 tons and the number of refuse disposal vehicular trips to the landfill is limited to 400 vehicles per operating day.. The current daily average waste disposal at the landfill is 3,600 TPD, which is derived from the November 1991 modified Report of Disposal Site Information (RDSI).

Design and operation of this facility are described by the November 1991 modified "Report of Disposal Site Information and Engineering Report."

Refuse is unloaded at the toe of the daily working face (or daily cell) and spread in layers of no more than two feet thick which are then compacted by crawler tractors which make three to five passes over the refuse up the shallow incline of the cell. This process is continued throughout the day until a section of the compacted waste reaches a specified lift height. The lifts may range from 5 to 20 vertical feet, depending on elevations needed to establish the design grading. The length along the toe of the working face varies from 50 to 250 feet, with an approximate 3:1 horizontal to vertical slope at the end of the day.

The site normally operates a second smaller working face that accommodates only transfer trailers and 18-wheel end dump trucks. The transfer trucks take much longer to unload than the smaller collection vehicles. This can cause delays at the relatively confined main dumping area. An additional safety reason to separate these vehicles is that end dump trucks tilt up on their rear wheels to unload and their higher center of gravity make them more prone to tipping over while unloading on the uneven surface of the landfill. This smaller working face is operated in the same manner as the main working face.

In wet weather, the fill height may reach 25 feet due to the need to dispose of refuse in confined winter disposal areas. These wet weather areas are prepared before the beginning of the rainy season, which usually begins by mid-November. Wet weather access for the refuse collection vehicles is provided by roads and ramps constructed of either new asphalt or recycled inert materials. During the rainy season, cover materials is stockpiled near the working faces so that daily covering of the refuse can be carried out.

A 6 to 12 inch thick layer of cover is placed over the cell at the end of each day's operation. If disposal is not anticipated in this area within the following week, the refuse is covered with an intermediate cover of 12 to 18 inches deep. Clean earth for daily cover is excavated or taken from stockpiled cover material areas and transferred to the working face by earth moving equipment.

In the future, the Bureau of Sanitation may request the use of alternative types of daily cover. These may include shredded tree trimmings and yard wastes, foam type synthetic covers or inert materials such as broken asphalt and concrete. These materials would not be used without approval from all regulatory agencies.

The maximum refuse disposal elevation is 1,770 feet (including final cover and surcharge) above mean sea level.

III. HEALTH AND SAFETY MEETINGS

The landfill manager, or his/her designee, will hold bi-weekly health and safety meetings at which landfill personnel will be briefed on health and safety issues. Additional meetings may be held as necessary.

New employees at the landfill will be briefed on health and safety issues and procedures by the landfill manager, or his/her designee, as is warranted by the new employee's responsibilities. Additional information regarding employee health and safety training is given in Section IX of this Site Safety Plan.

The BOS will maintain a log of special/unusual occurrences. This log will contain information pertaining to the following events:

- surface fires;
- underground fires;
- explosions;
- discharge of hazardous liquids or gases to the ground or the atmosphere;
- significant injuries;
- earthquakes;
- accidents; and
- property damage.

Each log entry is accompanied by a summary of any actions taken by the operator to mitigate risks associated with the occurrence. The landfill manager, or his/her designee, will review the special/unusual occurrences log on a regular basis. The landfill manager, or his/her designee, will brief landfill personnel on those occurrences which are relevant to site health and safety, e.g. accidents which have occurred at the site which have occurred at the site since the last health and safety briefing.

IV. HAZARD ANALYSIS

Hazards to which landfill personnel may be exposed include:

- traffic accidents (including vehicle/pedestrian accidents);
- explosions;
- oxygen deficient atmospheres;
- rotating equipment;
- unloading waste hauling vehicles;
- construction vehicles
- electric shock;
- underground utilities;
- heat stress;
- slips, trips, and falls;
- steep hillsides;
- hazardous chemicals;
- windblown dust;
- noise;
- heavy lifting; and
- poisonous snakes.

Waste hauling trucks, construction vehicles, and general traffic are all present at the landfill. These vehicles pose an extreme hazard to landfill personnel, especially those vehicles (e.g. scrapers) whose drivers may have limited visibility.

The most serious threat of explosion is attributable to methane gas generated by decomposing waste. Methane is an odorless, colorless gas which burns with a faintly luminous flame. Methane is explosive when mixed with air and an ignition source at concentrations of between 5.5 and 15 percent.

While generally lighter than air, there are circumstances in which landfill gas (which is a complex mixture of methane, carbon dioxide, and trace gases) will accumulate in low-lying areas. As a result, it is possible for landfill gas to displace the air from enclosed or low-lying areas (such as trenches) creating an atmosphere without enough oxygen to support life. Enclosed vessels (e.g. tanks, water trucks, pipes, culverts) and trenches at the landfill can potentially contain oxygen deficient atmospheres.

Rotating equipment (e.g. drill rigs, winches) pose a danger of dismemberment.

Waste hauling vehicles, besides posing a traffic risk, can potentially roll-over during the unloading process. There is also the potential for being buried by waste.

Workers are at risk of pinching, crushing, impact and other injuries from the heavy construction equipment in use at the site. Backhoes can tip over into trenches being excavated.

Overhead power lines are a potential danger to equipment (e.g. cranes or drill rigs) operators.

Underground utilities pose a risk to landfill personnel engaged in subsurface operations (e.g. drilling and trenching).

Landfill personnel engaged in manual labor are at risk due to heat stress and/or heat stroke.

Slips, trips, and falls are the largest cause of accidents on construction sites. Landfill personnel wearing protective equipment (e.g. respirators) are at a greater risk of slips, trips, and falls because the protective equipment obscures vision and reduces worker agility and reaction time.

There are a number of steep (1H:1V horizontal to vertical), high (greater than 100 ft high) slopes at the landfill. A fall from one of these slopes could be fatal.

Workers are at risk of potential exposure to the chemical compounds normally found in landfill gas. The potential pathways along which these compounds could enter workers bodies include: inhalation, ingestion, and dermal contact. Some workers may come into contact with landfill gas condensate and landfill leachate, which possibly contain chemicals at hazardous concentrations.

Windblown dust is a respiratory hazard and may also cause eye injuries.

Excessive noise can permanently impair the hearing of landfill personnel. Noise can also increase the level of hazards posed by other threats to worker safety as it can mask warning noises (approaching vehicles) and verbal warnings from other workers.

Lifting of heavy objects can injure landfill personnel.

Rattlesnakes have been observed at the landfill. Rattlesnake bites can cause severe injuries and death.

V. PROTECTIVE MEASURES

Landfill personnel are responsible for conducting work activities at the landfill in a safe manner. While observing the general safety rules outlined in this Site Safety Plan can mitigate against accidents, the final responsibility for preventing accidents and injuries resides with individual workers.

The Site Superintendent is the emergency response commander and directs all emergency response operations. He/she is familiar with emergency procedures, evacuation routes and have readily available all appropriate telephone numbers, including ambulance, medical facility, fire department and police department. He/she is the Chief Operation Officer at the scene and directs all operations in response to onsite emergencies.

Los Angeles City Fire Department paramedic support is available within 15 minutes of notification. Paramedics stabilize potential victims and transport to local emergency rooms as designated by their base commander.

Motor Vehicles

Motor vehicles are an extreme hazard. Landfill personnel will conduct all work activities at the landfill as far from vehicular traffic pathways as feasible. Work areas will be coned off with international orange traffic pylons or cones. When appropriate, flag persons will be stationed at work areas. Backup warning alarms shall be required by all onsite heavy equipment. All traffic is subject to the 15 mph speed limit posted at the site.

Explosions

In areas where there is the potential for an explosion (e.g. enclosed areas) continuous monitoring for explosive conditions will be performed using a combustible gas indicator (CGI) calibrated with methane. If the reading on the CGI exceeds 20% of the Lower Explosive Limit (LEL), the work area will be evacuated immediately. Monitoring of trenches and borings will be performed at the ground surface, personnel will not enter trenches or borings (bucket auger borings can be as wide as six feet in diameter or larger) to conduct air monitoring unless they have specialized training in monitoring enclosed areas and are wearing the proper protective equipment (i.e. self-contained breathing apparatus (SCBA)). Landfill personnel will employee the buddy system in all cases where SCBA is to be employed. In any case where a landfill worker must wear SCBA into an area, that worker will wear a safety harness which is to be properly belayed (tied off to a object capable of withstanding the full weight of the worker and his/her equipment with an adequate safety margin) by backup personnel. Rescue personnel, also wearing SCBA, will stand-by in case of an emergency. Personnel not wearing SCBA will not under any circumstance attempt to come to the aid of a worker who is wearing SCBA.

Oxygen Deficient Atmospheres

In areas where there is the potential for an oxygen deficient atmosphere (i.e. enclosed areas) continuous monitoring for explosive conditions will be performed using an oxygen meter. If the reading on the oxygen meter is less than 19.5% oxygen, the work area will be evacuated immediately. Monitoring of trenches and borings will be performed at the ground surface, personnel will not enter trenches or borings (bucket auger borings can be as wide as six feet in diameter or larger) to conduct air monitoring unless they have specialized training in monitoring enclosed areas and are wearing the proper protective equipment (i.e. self-contained breathing apparatus (SCBA)). Landfill personnel will employee the buddy system in all cases where SCBA is to be employed. In any case where a landfill worker must wear SCBA into an area, that worker will wear a safety harness which is to be properly belayed (tied off to a object capable of withstanding the full weight of the worker and his/her equipment with an adequate safety margin) by backup personnel. Rescue personnel, also wearing SCBA, will standby in case of an emergency. Personnel not wearing SCBA will not under any circumstance attempt to come to the aid of a worker who is wearing SCBA.

Trenches

Excavations which are deeper than 5 feet are required by Title 29 of the Code of Federal Regulations (CFR) §1926 Subpart P to be shored, sloped, sheet-piled, braced or otherwise supported if BOS personnel are to work within the trench. If no one is permitted to enter the trench, then the trench does not require these measures. If it becomes necessary for anyone to enter the trench, then all work ceases and a shoring design system shall be approved by a registered professional engineer and installed as necessary.

Rotating Equipment

Landfill personnel not actively engaged in the work activity requiring the use of rotating equipment (e.g. drill rigs) will maintain a safe distance from the heavy equipment. Landfill personnel will use the proper protective equipment including eye and ear protection, when in the presence of rotating equipment. Loose clothing will not be worn in the presence of rotating equipment. Unauthorized personnel will not attempt to repair non-working rotating equipment. Authorized repair personnel will deactivate rotating equipment prior to beginning the repair.

Unloading Waste Hauling Vehicles

Landfill personnel who must work in the vicinity of unloading waste hauling vehicles will take appropriate steps to avoid being injured by the vehicles. Landfill personnel will wear international orange colored clothing. Landfill personnel will attempt to make eye contact with waste hauling vehicle drivers. Landfill personnel will not stand within the zone into which a vertically discharging waste hauling vehicle could overturn.

Construction Vehicles

Landfill personnel who must work in the vicinity of construction vehicles will take appropriate steps to avoid being injured by the vehicles. Landfill personnel will wear international orange colored clothing. Landfill personnel will attempt to make eye contact with the construction vehicle drivers. Construction vehicles always have the right of way. When two construction vehicles approach each other, the construction vehicle traveling down hill has the right-of-way.

Electric Shock

Personnel engaged in work on electrical components will use proper lock-out/tag-out procedures at the junction box supplying electrical current to the equipment. Personnel will not rely on locks for which they do not have the sole key on their person.

Drill rig and crane operators will take care that their equipment does not come into contact with overhead power lines.

Underground Utilities

Subsurface activities (e.g. drilling and trenching) pose a threat to landfill personnel as they may come into contact with:

- landfill gas pipelines;
- water pipelines; and
- sewer lines.

Striking a landfill gas pipeline could be fatal or lead to serious injuries of site personnel or other people in the vicinity of the subsurface activities. Striking a buried sewer or water line could lead to substantial property damage and delays in the project schedule.

Heat Stress

Weather conditions may expose personnel to extreme heat, especially when personal protective clothing is being worn, increasing the risk of heat stress. Heat stress may occur any time that ambient air temperature is above 70°F and may cause rashes, cramps, discomfort, dehydration, and heat stroke. Heat stroke is often fatal. BOS personnel must observe for conditions which promote heat stress. Heat stress will be controlled through monitoring air temperatures, modification of work schedules such as frequent breaks, and use of preventative techniques such as eliminating caffeine beverages and encouraging extra consumption of water and electrolyte replacement drinks. BOS personnel will be alert for symptoms of heat stress and stroke. These symptoms include:

- pale, clammy skin;
- rapid, shallow breathing;
- profuse sweating;
- reduced coordination, dizziness, weakness;
- headache;
- muscle cramps;
- lack of perspiration; and
- flushed skin.

Slips, Trips, and Falls

Slips, trips, and falls are the most common accidents that cause injuries on construction sites. BOS personnel can reduce the frequency of slips, trips, and falls by exercising care in the performance of all work activities. Work areas must be kept as neat as possible. Objects likely to promote slips, trips, and falls (e.g. holes, low-lying objects) must be marked with cones and/or taped-off from passageways.

Steep Hillsides

BOS personnel will not approach within six feet of the crests of steep slopes unless absolutely necessary. If an approach to the crest of a steep slope is necessary, extreme care must be exercised. If BOS personnel must perform activities below the edge of the top of a steep slope, they must be properly belayed (tied off to a object capable of withstanding the full weight of the worker and his/her equipment with an adequate safety margin) with a safety harness which is properly anchored. Landfill workers engaged in activities on steep slopes at the landfill will use the buddy system.

Hazardous Chemicals

Reduction of risk to BOS personnel due to hazardous chemicals is discussed in Section VI of this Site Safety Plan.

Noise

Hearing protection such as ear plugs or ear muffs are available at the site for use by personnel who must work in high noise areas. This protection is mandatory for all personnel who are exposed to noise levels in excess of 85 decibels (dBA) during site activities. Signs will be posted at those areas which are identified as requiring the use of hearing protection. Normally, hearing protection should be worn whenever a normal conversational voice cannot be discerned from a distance of three feet.

Heavy Lifting

Proper lifting procedures will be used. In general, if an object appears to be heavy, it should not be lifted manually.

Poisonous Snakes

BOS personnel will exercise caution entering enclosed areas and areas overgrown with weeds. Snakes are best avoided. Victims of snake bite should receive the same first aid as victims of shock and should be rushed to the nearest hospital. The route to the nearest hospital is given in Section IX of this Site Safety Plan.

Dust

Inhalation of airborne dust is controlled for those workers at highest risk because they are required to wear masks or respirators. Water trucks will further aid in dust control. Threat of eye injuries due to dust particles may be reduced through the use of safety goggles or safety glasses with side shields.

Installation and Maintenance of Landfill Gas Wells

Procedures for the installation and maintenance of landfill gas wells is attached to this Site Safety Plan in Appendix A.

VI. EXPOSURE MONITORING

Direct reading monitoring instruments shall be used to conduct the work area monitoring program. These instruments may include:

- Organic Vapor Analyzer (OVA);
- Organic Vapor Monitor (OVM);
- Combustible Gas Indictor (CGI);
- Colorimetric Tubes;
- Monitor Meter for Hydrogen Sulfide;
- MINIRAM Dust Monitor; and
- Sound Level Meter.

The specific application of the environmental monitoring instruments and the monitoring schedule are summarized in Table 5-1.

Benzene, hydrogen sulfide, methane, methylene chloride, vinyl chloride, total dust and respirable dust are identified as the primary indicator hazards for chemical exposure.

Stop work and action levels for the primary indicator hazards are given in Table 5-2. The standard stop-work and action levels include: 1.0% methane by volume for combustible gases (equivalent to 20% of the Lower Explosive Limit), 19.5% oxygen by volume for oxygen deficiency hazard, the Federal Permissible Exposure Levels and Ceiling Levels (29 CFR 1910.1000, 1910.1017 and 1910.1028) for benzene, hydrogen sulfide, methylene chloride, vinyl chloride, respirable dust and total dust, and 85 dBA for noise.

Baseline chemical monitoring shall be used to characterize potential exposures to personnel. Data will be obtained from air monitoring utilizing organic vapor monitors, combustible gas indicators, and laboratory analysis for quantifying levels of benzene, hydrogen sulfide, methylene chloride, and vinyl chloride. Samples will be taken at a background location in the general work zone and within worker breathing zones.

Baseline monitoring may also be conducted for total and respirable dusts and for noise when required.

TABLE 5-1

ENVIRONMENTAL MONITORING SUMMARY

HAZARD	MONITORING INSTRUMENTS	MONITORING SCHEDULE
Fire/Explosion	• Combustible Gas Indicator • Organic Vapor Monitor	Baseline/Continuous
Chemical Gas/Vapor • Organic Vapors • Hydrogen Sulfide • Other specific chemicals	 • Organic Vapor Analyzer • Organic Vapor Monitor • Monitox Meter (H2S) • Colorimetric Tubes (benzene, chloride, hydrogen sulfide, methylene, and vinyl chloride)	 Baseline/Continuous Baseline/Continuous Baseline/Continuous As necessary
Oxygen Deficiency	• Oxygen Meter or Combustible Gas Indicator equipped with an oxygen meter	Continuous
Noise	• Sound Level Meter	Baseline (preliminary phase) Additional as appropriate
Heat Stress	• LACSB Weather Monitoring Station	
Trench/Site Safety	N/A	Continuous
Dust	• Miniram dust monitor	Baseline (preliminary phase) Additional as appropriate
High Winds	• LACSB Weather Monitoring Station	Continuous

TABLE 5-2

STOP-WORK AND ACTION LEVELS FOR PRIMARY INDICATOR CHEMICALS AND OTHER HAZARDS

POTENTIAL HAZARD	ACTION LEVELS[a]		STOP-WORK
	TWA[b]	CEILING[c]	
CHEMICAL COMPOUNDS:			
• Benzene	1 ppm	1 ppm	1 ppm
• Hydrogen Sulfide	10 ppm	10 ppm	10 ppm
• Methylene Chloride	250 ppm	500 ppm	500 ppm
• Vinyl Chloride	1 ppm	5 ppm	1 ppm
• Methane	Methane is an explosive hazard		
DUST:			
• Dust	50 $\mu g/m^3$	-	N/A
Explosion	-	-	1 % methane by volume
Heat Stress	-	-	N/A
High Wind (d)	-	-	15 mph average (over 15 min.) 25 mph instantaneous
Oxygen deficiency (e)	-	-	19.5% oxygen by volume
Noise	85 dBA	-	N/A

(a) Initial chemical action levels are set at the Permissible Exposure Level (time weighted average and/or ceiling), 29 CFR 1910.1000. Tables 22 and 23.29 CFR 1910.10 24 (benzene), 29 CFR 1910.1017 (vinyl chloride). Dust levels are set at the South Coast Air Quality Monitoring District Rule 403 limit for particulate matter with an aerodynamic diameter smaller than or equal to 10 microns.

(b) TWA - Time Weighted Average.

(c) Ceiling - employee exposure that shall not be exceeded during any part of the work day.

(d) Levels set by SCAQMD permit to construct A/N R-237767.

(e) 29 CFR 1910.94(d)(9)(iv).

SAMPLE TASK/WORK SAFETY PROCEDURE SAFETY PLAN/PROCEDURES

CONSTRUCTION OF HORIZONTAL GAS EXTRACTION WELLS
(Excavations Less Than Five Feet In Depth)

GENERAL

The Construction of horizontal gas extraction wells may expose certain landfill employees to harmful objects, dusts, fumes, mists, vapors or gases. To mitigate the adverse impacts associated with such exposure, employees shall be trained and provided with both specified personal protective equipment and work site surveillance.

TRAINING

All key project personnel who may be exposed to harmful objects, dusts, fumes, mists, vapors or gases shall receive the 40-hour general training required by OSHA in 29 CFR 1910.120.

The Site Safety Technician (Industrial Waste Inspector) shall also be qualified per the Industrial Waste Inspector Pilot Program.

PERSONAL PROTECTIVE EQUIPMENT

All key project personnel who may be exposed to harmful objects, dusts, fumes, mists, vapors and gases shall possess and utilize the following protective items:

- Hard Hat
- Steel Toed Boots/shoes
- Safety Glasses
- Overalls
- Gloves
- Full-face/Half-face Respirator

KEY PROJECT PERSONNEL

- Pipe Layers
- Backhoe Operator
- Loader Operator
- Site Safety Technician (Industrial Waste Inspector)
- Others as designated by project supervisor

SITE SURVEILLANCE AND EVALUATION

A Site Safety Technician shall provide work site surveillance and evaluation. He/She has the authority to stop the construction work and clear employees from the work area when environmental conditions are immediately hazardous to life or health.

Monitoring instruments shall consist of, but are not limited to:

- Organic Vapor Analyzer (OVA)
- Combustible Gas Indicator (CGI)
- Dust Monitor (MINIRAM) and/or Wind Speed Sensor

VIII. GENERAL SAFE WORK PRACTICES/RULES

POLICY AND DISCIPLINARY PROCEDURES

All landfill personnel (including consultants, contractors and subcontractors) are expected to conduct themselves in a professional, safety-conscious manner at all times. Such conduct is expected to include compliance with all work rules established for the safety of the employee and others. Violation of the established safety work rules may result in the following progressive disciplinary actions:

- FIRST OFFENSE

  A verbal warning will be issued to the individual. The offense will be noted in the individual's file and the supervisor's file, and the individual and his supervisor will discuss the infraction.

- SECOND OFFENSE

  A written warning will be issued to the individual. A copy of this written reprimand will be placed in both the individual's and the supervisor's files. Serious violations may result in a two-day temporary suspension without pay.

- THIRD OFFENSE

  A third offense will be considered to be an indication of continue disregard for health and safety concerns, and may result in a recommendation for discharge of the individual.

Any individual's action which, in the opinion of the Supervisor-in-Charge, causes immediate threat of serious harm or death to site personnel, may result in immediate dismissal from the project area instead of a verbal warning.

- Employees must abide by the provisions of the BOS's safety program, and all safety rules and procedures as described in these work rules or as developed throughout the life of the landfill.

Employees will be provided with a copy of the work rules set forth below assuring them adequate notice of the standards to which they are being held. Each employee is encouraged to discuss these rules with his/her immediate supervisor if there is any questions as to the applicability of a particular rule. Changes in work practices and/or these safety work rules will be implemented only after approval by the Landfill Manager.

GENERAL SITE HEALTH AND SAFETY WORK RULES

- Drinking of alcoholic beverages, gambling, use of illegal drugs, or possession of firearms are not allowed onsite. Anyone reporting to work under the influence of alcohol and/or illegal drugs will be subject to immediate disciplinary action. Any person bringing alcoholic beverages, illegal drugs, or firearms onsite may be subject to immediate termination. Any employee under a physician's care, and/or taking prescribed narcotics or other medications (e.g., antihistamines) which may impair work ability, must notify his/her supervisor.

- Horseplay will not be tolerated. "Horseplay" encompasses any frivolous behavior that increases the probability of an accident.

- Personal protective equipment (PPE) is required to be worn in certain designated areas or for certain duties. Such equipment may include, but is not limited to: respiratory protection, earplugs, hard hats, safety vest, coveralls, sturdy boots, gloves, and safety glasses.

- Employees are responsible for cleaning and maintaining the protective equipment issued to them. Any noted defects in the equipment must be immediately reported to his/her supervisor.

- Construction equipment always has the right-of-way over passenger vehicles and pedestrians.

- All workers must listen for warning signals on construction equipment and must yield to construction equipment.

- Equipment operators must pay deliberate attention to watching for workers who may be in their path and provide warning to these people before moving.

- Passengers are not allowed to ride on or in heavy equipment. This includes any portion of a backhoe, bulldozer, or forklift.

- All personnel will keep a safe distance (a minimum of 50 feet) away from any earth moving equipment operating on the landfill, unless specifically needed for inspections and/or work assignments.

- Vehicles/equipment used to carry out everyday work assignments must be maintained in a manner that will ensure proper and safe operation.

- Employees will not handle, tamper with, or attempt to operate any power equipment or vehicles outside the scope of their work and/or training prior to receiving instructions from their supervisor.

- Available vehicle/equipment safeguards will be utilized consistently to minimize hazards. Mechanical safeguards, removed for any purpose, shall be replaced prior to operating the equipment.

- When securing heavy equipment, the driver will lower all implements, i.e., buckets, slope boards, bowls, and blades.

- Materials, tools, or other objects will not be thrown, tossed, or dropped from a vehicle. Always hand lower items or use appropriate equipment.

- Apparatus, tools, equipment, and machinery shall not be repaired while in operation.

- The driver of a vehicle shall be held responsible for the condition of the vehicle. Before driving the vehicle, a routine check must be conducted to ensure that it is in proper operating condition, with special attention to the condition of the brakes, lights (including brake lights and turn signals), steering, windshield wipers, tires, and lugnuts (loose or missing)

- Report immediately any deficiencies observed or suspected in the vehicle to your supervisor or personnel in charge of vehicle maintenance. Deficiencies shall be corrected prior to the vehicle being operated.

- Extra caution must be exercised when backing-up. If rear vision is obstructed, take time to walk around the vehicle or have someone guide you back.

- No one shall be allowed to jump off or onto the back of any moving pickup or truck.

- Tailgates will be locked on trucks when carrying personnel in the bed of the truck. Personnel shall be seated on the bed of the truck and not on the sides of the bed.

- Unattended vehicles shall be parked with handbrake secured.

- Heavy equipment shall not be driven/pulled into the shop work area until instructed to do so by a shop employee.

- Vehicles/equipment shall not be moved after any breakdown occurs. Employees will leave the vehicle/equipment at the location of breakdown and report to the nearest supervisor or mechanic.

- Driving regulations, traffic controls and rules of the road will be observed within the site. These regulations include maintaining speeds within posted limits and wearing seat belts while vehicle is in motion.

- Speed limit on the access road adjacent to the shop work area is 5 miles per hour.

- Employees shall observe speed limits on public streets/highways/freeways when operating City owned vehicles.

- Employees must report all injuries and/or illnesses to their supervisor. This includes minor or slight injuries.

- Prospective employees must pass a pre-employment physical. Failure to submit to any additional medical surveillance requirements will constitute grounds for dismissal.

- New employees must complete a required training program prior to starting work.

- Employees must participate in the air quality exposure monitoring program by wearing the personal monitors or sampling devices, when required and specified in future such programs. Any employee refusing to participate in the program, or who tampers with a sample, will be subject to disciplinary action, up to and including dismissal.

- Sideburns, beards and mustaches are acceptable. Employees, however, must report to work clean-shaven when there is a scheduled need for the use of respiratory protection.

- There will be no excavation or pipe laying activities conducted on-site without sufficient safety control measures in place.

- Forty-eight hours prior to the performance of any subsurface activities at the landfill (e.g. trenching, drilling), the Landfill Manager will be notified so that underground utilities, landfill gas conduits, and buried cables can be located and flagged prior to the performance of the subsurface activities

- All employees will perform their job assignments according to the "buddy" system with line of sight contact with co-workers being maintained at all times. The only allowable exceptions are individuals driving a vehicle to join other employees already using the buddy system and individuals who are touring the site in their vehicles, without getting out of them.

- Safety guards, chains, and other safety added apparatus must be in place prior to commencing operation of equipment.

- All contractor or subcontractor personnel shall bring to the attention of the BOS Management any unsafe condition or practice associated with site activities that they are unable to correct themselves.

- Landfill personnel actually handling hazardous waste material shall have received specialized training in the handling of hazardous waste and shall wear the proper personal protective equipment.

- Hands shall be thoroughly cleaned prior to smoking, eating, or other activities following the handling of any waste material.

- Respiratory devices (e.g. respirators or SCBA) will not be worn with contact lenses unless clearance is given by a medical doctor.

- Hard hats are required at all times when working in the trash dumping area and when required by the supervisor for a particular task assignment.

- Salvaging and/or scavenging from refuse is not permitted.

- Unauthorized vehicles shall not be parked in designated handicapped parking spaces.

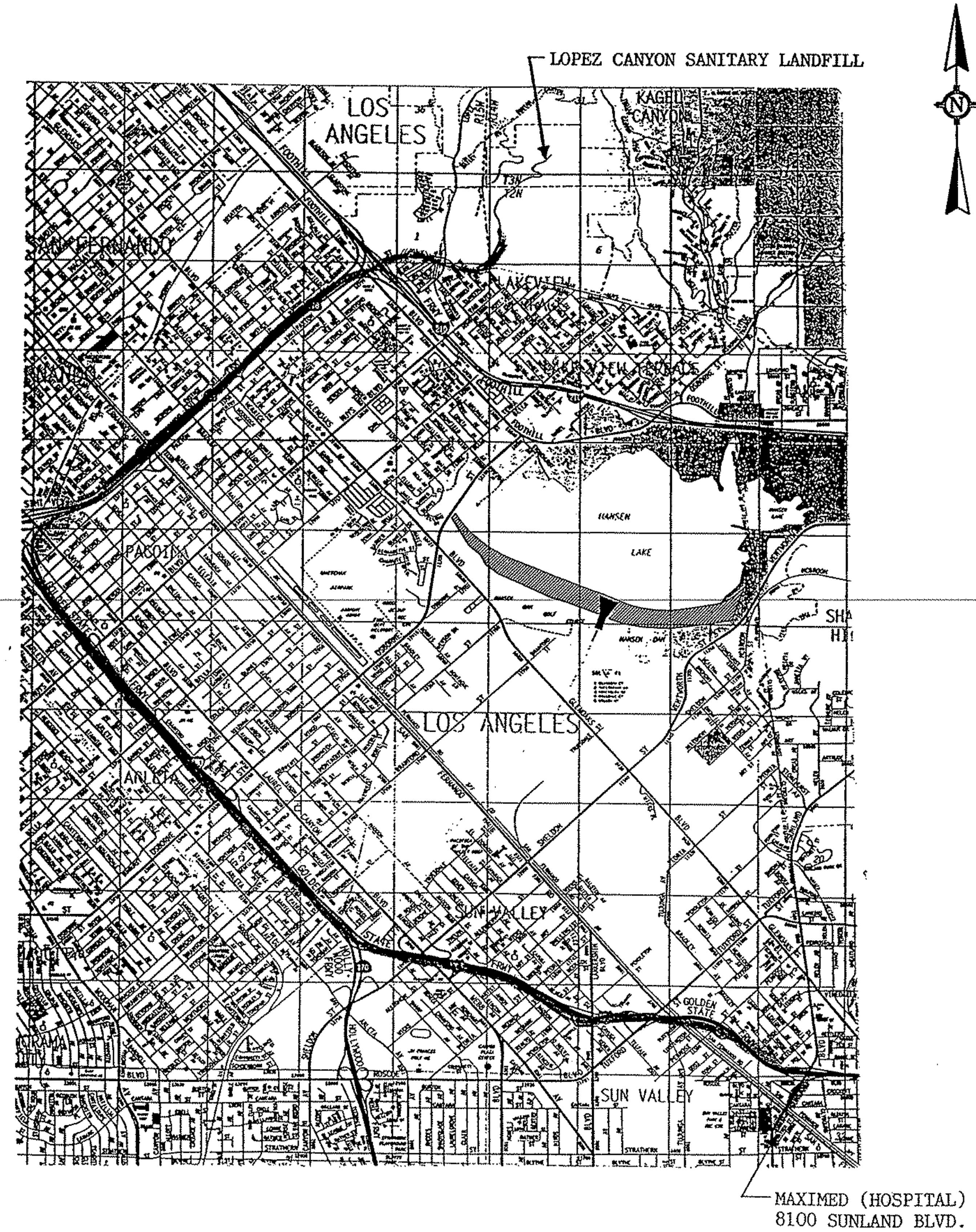
- Abbreviated clothing (e.g. shorts, sleeveless shirts) shall not be worn on the landfill.

IX. EMERGENCY RESPONSE/TRAINING (EXTRACTS FROM BUSINESS PLAN)

The nearest hospital to the site is the Maximed facility at 8100 Sunland Boulevard in Sun Valley. The route to get from the landfill to the Maximed facility is:

- from the site, drive southwest on Paxton Street to Glenoaks Blvd;
- turn right on Glenoaks Blvd.;
- take the westbound entrance to the San Fernando Valley Freeway (118);
- exit the San Fernando Freeway (118) to the southbound Golden State freeway (5);
- exit on Sunland Boulevard;
- right on Sunland Boulevard to Ratner Street; and
- left on Ratner Street to the Maximed entrance.

A map showing the location of the Maximed facility is included in this Site Safety Plan on the following page.



Hospital Evacuation Route
Lopez Canyon Sanitary Landfill
Los Angeles, California

NOTIFICATION PROCEDURES - In the event of a reportable hazardous materials or waste release or threatened release, your business is required by State Law to provide an immediate verbal report to:

1. The Los Angeles City Fire Department: 9-1-1

2. The State Office of Emergency Services: (OES) 1-800-852-7550 or 1-916-262-1621

   Notifications will normally be made by on-site superintendent, Turner Johnson. If your business has an additional emergency response notification system, explain here:

   Notify Director, Bureau of Sanitation: (213) 485-5112
   Notify the Hazardous Materials Control Program Office: (213) 744-3223
   Notify the City Occupational Safety Office: (213) 485-4691/5500 after hours
   See the attached Special Notification List for additional notification requirements.

3. How will the employees who are responsible for responding to a release or spill be notified of the emergency:

   The on-site superintendent/supervisor will notify employees either verbal or by the on-site radio communication system. At the Equipment Maintenance Facility, the intercom system will also be utilized.

4. In the event of a spill or release, how will immediate notification and evacuation of the business be done. Include a description of the steps needed to evacuate employees from your facility.

The on-site superintendent/supervisor will notify affected employees to evacuate the area of the spill/release and to assemble in the office parking lot for instructions. Evacuation will utilize on-site vehicles/equipment, when required.

MEDICAL ASSISTANCE

5. List two local emergency medical facilities that will be used. EXCLUDING PARAMEDICS AND 911.

Name of emergency medical facility: Maximed Airport Urgent Care Burbank
Industrial Medical Services

Address: 8100 Sunland Blvd., Sun Valley, CA 91352

Phone: (818) 768-8882

Name of emergency medical facility:

Medical Referral, East Valley Industrial Medical Group,
Lake View Professional Center

Address: 10875 San Fernando Road
Pacoima, California 91331

Phone: (818) 896-4199

PREVENTION - Actions your business will take to prevent a hazard from occurring. Conduct ongoing and provide additional employee training in the management of hazardous material.

6. Describe the kinds of hazards associated with a the hazardous materials present at your facility. What actions would your business take to prevent these hazards from occurring? You may include a discussion of safety and storage procedures.

Hazards from petroleum products stored and dispensed on-site consist of skin irritation, eye contact hazards, and inhalation dangers. Petroleum products are stored within diked areas to contain contents of the tanks. Employees are trained to properly handle, store, and dispense of those hazardous waste/materials found on-site. Eye wash facilities are provided and hazardous waste/materials are stored in permitted trucks in a restricted area.

MITIGATION (REDUCE THE HAZARD) - What is done to lessen the harm or the damage to persons, property, or environment, and prevent what has occurred from getting worse or spreading.

Hazardous materials are stored in diked areas. Existing equipment is available to contain any spills with soil and/or absorbed material.

7. What is the immediate response to a leak, spill, fire, explosion or airborne release at your business?

- *Call the Fire Department: 9-1-1 Give location and describe situation.*
- *Alert employees, when necessary*
- *Evacuate area, as required*
- *Give/get first aid as needed*

- *Mitigate hazard with resources available on-site - follow Material Safety Data Sheet (MSDS) directions, applicable and if safe to do so*

ABATEMENT - What you do to stop the hazard.

Train employees in good housekeeping procedures and MSDS instructions.

8. At your facility, how do you handle the complete process of stopping a release, cleaning up, and disposing of the released materials?

- *Employees will be evacuated from the release area; and others will:*

- *Cap/seal container/tank to stop release if safe to do so - follow safety procedures.*

- ~~*Contain spill with soil and/or absorbent per instructions from MSDS.*~~

- *Follow MSDS clean up procedural steps.*

- *Contaminated waste will be containerized and disposed of in accordance with hazardous waste regulations.*

EMPLOYEE TRAINING - Employee training is designed to teach employees about the following four categories:

1. Handling hazardous materials safely.
2. Which emergency agencies to contact.
3. Use of emergency clean-up equipment and supplies.
4. Evacuation procedures.

Employee Training, Part 1 - Safety

9a. Describe the training NEW employees receive in handling and using the hazardous materials and waste that are part of your operation. How is this documented and where is the documentation kept?

New employees will receive 24 hours of initial training from experienced instructors to enable them to perform their assigned duties in a safe manner, per General Industry Safety Orders (GISO) Section 5192, Subsection(p). Documentation is maintained by superintendent/supervisor in landfill office files. Those employees who will be exposed to occupational health hazards involving hazardous waste/materials receive 40-hours of training, per GISO, Section 5192, Subsection(e).

9b. How often does REFRESHER training occur, how is it conducted, and what subjects are covered? How is this documented and where is the documentation kept?

Current employees receive 8 hours of refresher training annually, per GISO, Section 5192, Subsections (e) & (p). Refresher training is also conducted at tailgate meetings by the on-site supervisor. MSDS and the landfill's Injury and Illness Prevention Program, including the Emergency Action and Fire Prevention Plans, are used to prepare instruction/lesson plans for said meetings. Attendance rosters are prepared and documentation is maintained by superintendent/supervisor in landfill office files.

Employee Training, Part 2 - Emergency Contact

10a. Are NEW employees trained to know which emergency response agencies to contact if an emergency occurs? Are specific individuals or teams designated to perform this function? Briefly describe.

During the new employee's orientation, the landfill superintendent/supervisor explains emergency notification procedures. Included in this orientation are Fire Department (9-911) and supervisor notification requirements. Superintendent/supervisor has access to all emergency notification numbers/requirements, see Item No. 2. The Solid Waste Management Division is also participating in the LACFD Emergency Response Team training program.

10b. How often does REFRESHER training occur, how is it conducted, and what information is covered?

Supervisors of landfill work units conduct tailgate safety meetings with their crew members at least once every ten working days. Various safety topics are discussed, i.e., emergency contacts, injury reports, safe work procedures, hazardous waste management, safe equipment operation, accident review, and Cal/OSHA requirements. Also, employees assigned to the load checking program receive refresher training annually.

Employee Training, Part 3 - Emergency Equipment and Supplies

11a. How are NEW employees trained in the use of emergency equipment and supplies needed to stop spills, leaks, or fires? What kind of equipment and supplies are they taught to use to stop the release?

Following the new employee's orientation, the employee receives on-the-job training on the use of an emergency equipment and supplies needed to stop spills, leaks, and fires. Earth moving equipment and fire extinguishers are covered in such training.

11b. How often is REFRESHER training conducted in this subject area? Are drills ever conducted?

Refresher training is conducted during the bi-weekly tailgate meetings on an as-needed basis. On-the-job training on equipment is ongoing inasmuch as earth moving is a daily operation. Drills have not been conducted, however, the need for such drills is under study.

Employee Training, Part 4 - Evacuation

12. Are ALL employees given initial and refresher training on evacuation procedure?

__X__ Yes ______ No

Note: Your business is required by State Law to keep a copy of this Business Plan, including the inventory. Describe where this copy is located at your business.

A copy of this Business Plan is kept in a file cabinet in the landfill office trailer.

Signature of Business Owner or Authorized Representative:

____ Date:____________________

SPECIAL OCCURRENCE NOTIFICATION LIST

NO.	NAME	ORGANIZATION	PHONE NO.	TIME
1	Drew Sones	Asst. Director	(213) 485-5112	
2	William Thompson Ask for Mr. Tombara	SCAQMD	(714) 396-2319	
3	Joe Maticrino	Environmental Affairs Department	(213) 847-3294	
4	Chris Westhoff	City Attorney	(213) 485-6262	
5	Marco Torres	Councilman Alarĉon office	(213) 847-7777 or (818) 756-9115	
6	Robert Rogers Ask for Eric Ritter	Planning Department	(213) 485-4241	
7	Laura Reynolds	R. Katz Office Assemblyman	(818) 894-3671	
8	Don Peterson	Regional Water Quality Control Board	(213) 266-7578	
9	Dave Smith	County of L.A./Dept. of Public Works/Waste Mgmt Division	(818) 458-3561	
10	Christine Harris*	Public Relations	(818) 899-4153 (310) 670-8083	
*Christine Harris will contact numbers 11 through 28.				
11	Lewis Snow	Community Organization	(818) 897-9276	
12	Lisa Betts	Community Organization	(818) 896-5210	
13	Rob Zapple	Community Organization	(818) 896-8917	
14	Phyllis Hines	Community Organization	(818) 896-5741 Alt: 818-897-7644	

NO.	NAME	ORGANIZATION	PHONE NO.	TIME
15	Irene Allert	Kagel Canyon Resident	(818) 896-7016 (818) 896-4144	
16	Eileen Barry	Lake View Terrace Resident	(818) 896-3145	
17	Melanie Bernard	LVT Improv. Assoc.	(818) 896-6137	
18	Ruth Bostwick	Kagel Canyon Resident	(818) 890-5942	
19	Anne Coleman	Sky Terrace Mobile/Manager	(818) 896-2766	
20	Marge Miller		(818) 896-6286	
21	Mrs. Saheen		(818) 896-8917 (818) 568-6000 (wk)	
22	Arnease Finley	LVT Improv. Assoc.	(818) 896-6137	
23	James Radcliffe	Lake View Terrace Resident	(818) 899-4606	
24	Jim Kelly	Blue Star Mobile/Manager	(818) 364-0957	
25	Chris & Ellen Reed	Sky Terrace Residents	(818) 896-1769	
26	Roger Klemm/ Laura Newlin	Lake View Terrace Residents	(818) 354-9379 (R.wk) (818) 354-0130 (L.wk) (818) 899-9365 (home)	
27	Nancy Snyder		(818) 890-1238	
28	Michael Wilson	Kagel Canyon President	(818) 890-4810	

Turner L. Johnson, Superintendent II

EMERGENCY CONTACT LIST

City of Los Angeles, Bureau of Sanitation
Assistant Director . . . . (213) 485-5112

City of Los Angeles, Bureau of Sanitation
Environmental Monitoring Division - City Chemist
Lucy Jao . . . . (213) 648-5262
Farhana Mohammed . . . . (213) 648-5921

City of Los Angeles, Bureau of Sanitation
Refuse Disposal Division - Lopez Canyon Landfill

Primary Emergency Coordinator
Turner Johnson . . . . wk (818) 834-5128
hm (213) 684 6787
beeper (818) 604-3312

Secondary Emergency Coordinator
Gregorio de la Rosa . . . . wk (818) 834-5134
hm (818) 893-4766

Ernie McCoy . . . . wk (818) 834-5136
hm (909) 242-3584

Landfill Engineering Group
Ken Redd . . . . wk (818) 834-5111
hm (805) 297-8408

City of Los Angeles, Fire Department
Fire Station No. 98 . . . . (818) 989-8698

City of Los Angeles, Police Department
Foothill Police Station . . . . (818) 989-8861

County of Los Angeles, Department of Health Services
Radiation Management . . . . (213) 738-4059

Hazardous Waste Disposal Contractors

City's Hazardous Waste Contractor
Containerized Chemical . . . . 1-(800) 233-3748
24 Hours 1-(909) 625-6645

City's HHW Contractor
Greenfield Environmental Services . . . . 1-(619) 431-5500

APPENDIX A

SAFETY RULES FOR THE INSTALLATION AND MAINTENANCE OF LANDFILL GAS WELLS

SAFETY RULES FOR THE INSTALLATION AND MAINTENANCE OF LANDFILL GAS WELLS

(1) All employees designated to work on gas well construction or related tasks shall receive a minimum of four (4) hours of task specific safety training and must have completed the respirator fit testing. Site specific safety training will consist of the following items:

- These procedures;
- Description of landfill gas, how it is created, it's general properties, and contaminant types and quantities;
- Description of the general procedures for horizontal well construction;
- Review of safety concerns including but not limited to working with landfill gas, trash, and heavy equipment; and
- Viewing of actual horizontal well construction on video tape.

Employees who have previously worked on well construction or gas related tasks will be exempt from this requirement. However, they will be required to periodically watch the video tape. Copies of training records will be kept at the landfill and will be available for the LEA's review upon request.

(2) Daily information meetings will be held prior to proceeding to the work site and starting any gas well related tasks. The meeting will be attended by all involved parties including but not limited to: operators, laborers, industrial

waste inspectors, and engineers. The daily information meetings will be held by the Equipment Supervisor and/or the Engineer. Job responsibilities will be assigned at the daily meetings. Meeting minutes along with attendance records will be prepared and filed for future reference.

(3) To eliminate the possibility of exposure to positive pressure, the horizontal wells will be installed per the attached procedure.

(4) All gas well lines shall be checked to determine whether positive or negative pressure is present prior to beginning work on the line. This will be accomplished by installing a sample port on all gas well ends where future connections are to be made. If positive pressure exists, the Bureau will either make the connection or abandon the well and cover it. If the Bureau decides to make the connection, both the Bureau's safety division (HRDD) and the LEA will be notified. Following the notification, the Bureau will assign an employee equipped and trained with self contained breathing apparatus (SCBA) to either eliminate the positive pressure and/or complete the connection. The SCBA will be periodically inspected and maintained in accordance with the Bureau's safety division's recommendations.

(5) There will be two (2) self contained breathing apparatus (SCBA) at the project site within easy reach of the assigned and trained employees whenever any work planned requires the use of SCBA. One (1) SCBA will be for primary use and the other will be for stand-by use. The responsible employee(s) for SCBA use will be assigned during the daily meetings. All SCBA equipped personnel shall be attached to safety lines.

(6) Any employee working on the gas wells or around the gas well trench shall wear the required personal protective equipment. Personal Protective

Equipment (PPE) will consist of a half mask North dual cartridge Air Purifying Respirator. The respirator face-piece shall be equipped with North TC-23C-210 organic vapor, acid gases, and highly toxic particulates filter/cartridges (HEPA). Safety vests, steel-toed work boots, and eye protection shall be worn at all times. Gloves, hard hat, and disposal coveralls will also be available to the employees.

All half mask filters shall be changed daily and verified by the Supervisor in charge.

(7) A Gas Tech GX-82 air monitor shall be located near the trenching operation at all times construction is in progress. A second GX-82 shall be left in the cab of the backhoe or excavator and monitored by the Operator, and a third GX-82 shall be carried by the Technician. The GX-82 limits are 10 ppm for H_2S, 20% of the Lower Explosive Limit (LEL) for CH_4, and 19.5% limit for O_2. When any of the above limits are detected by the GX-82 an audible alarm is sounded, and the work area must be cleared immediately.

A Foxboro Organic Vapor Analyzer (OVA) model 108 or 128 shall be used in conjunction with the Gastech GX-82 air monitor described above. The environmental monitoring shall be conducted by the Technician assigned to the project and recorded on the attached form.

All instruments shall be calibrated regularly in accordance with the manufacturer's instructions. Calibration logs shall be kept at the landfill.

(8) Any personnel coming within ten (10) feet of the open trench or blowers shall wear the designated PPE.

(9) The technician shall be at the work site and shall monitor during all trenching operations in trash fill areas to assure that the work area breathing zone is safe. The breathing zone is defined as three feet (3') above the top of the trench and the action level is 500 ppm on the OVA. A reading at the three feet (3') breathing level and ten feet (10') from the well construction site will be taken and documented by the technician whenever possible. During normal operations no employee will be allowed in the trench. If it is absolutely necessary to place a person into the trench, the breathing zone will be lowered directly above the open trench flush with the ground surface. The action level will remain at 500 ppm and the monitoring will be continuous until the employee(s) exit the trench.

If the 500 ppm action level is reached at the breathing zone, the technician shall immediately direct the employees to clear the area. The technician is given authority to stop the construction work and clear employees from the work area when the action level is reached. Blowers will be redirected to reduce the concentration level. Operation shall not resume until the level is below 500 ppm.

Following an area clearing, the technician will first re-monitor the breathing zone starting from the clear zone and working at a slow pace toward the open trench. At any time the technician reads exceedance levels on either the OVA or GX-82 he/she will immediately return to the clear zone and continue to prohibit work. Operation must not resume until the levels are back to within acceptable ranges.

(10) A sampler shall be available at the work site at all times and shall be utilized following unusual occurrences. Samples will be collected with a 6 liter Suma canister or a 10 liter tedlar bag. Samples will be collected by the landfill technician when requested by the project site Supervisor. The Bureau however, **will not** jeopardize an employee's safety to obtain an air sample.

Unusual occurrences are defined as non-typical odors, employee's experiencing unusual symptoms or any occurrence identified by the Supervisor in charge as unusual.

(11) Communication on job site to the landfill office and other personnel shall be conducted via two-way, hand-held Motorola Saber radios on a channel designated solely for the use of the landfill. There shall be at least two radios at the project site.

(12) In case of emergency, the site injury and illness prevention program "Reporting Injuries" shall be followed. Any of the following medical facilities may be used in case of an injury that requires medical attention:

(a) The Workplace (Occupational Medicine)
14500 Sherman Circle
Van Nuys, CA 91405
(818) 908-8733

(b) Maxi-Med Urgent Care
8100 Sunland Blvd.
Sun Valley, CA 91342
(818) 768-8882

(c) East Valley Medical
10875 San Fernando Road
Pacoima, California 91331
(818) 896-4199

(d) COMPSELECT
15333 Sherman Way
Van Nuys, CA 91405
(818) 909-0630

LOPEZ CANYON LANDFILL
WELL DRILLING & TRENCH MONITORING LOG

INSPECTOR________________ TIME:________ BEGIN_______ END_______ DATE________
WELL NO./LOCATION______________________________ WELL PRESSURE__________
RESPIRATORS USED:______________________________ SCBA AVAILABLE:__________
BLOWERS IN USE:____________ BLOWER CONNECTED TO "A.D.S." FLEX LINE:________
PERSONNEL ROSTER OF TRENCH CREW____
____
____
EXCEEDANCE/WORK STOPPAGE INFO:____
____
AUTHORITY REQUESTING SAMPLE:________________________ TIME______________
SAMPLE BAG NO./OR CANISTER NO.______________ LENGTH OF TIME____ VOLUME______
INSTRUMENTATION: OVA___________ GX82__________ PUMP_________

TIME	WIND SPEED**	OVA#	GX82			COMMENTS
		ACTION LEVEL*	COMB % LEL	OXY %	H_2S PPM	

Notes:
* OVA reading 3 feet above ground level within 2 feet of trench. OVA readings taken after 5 seconds stabilization period. Bag or canister samples are to be taken within 2 feet of well or trench and 3 feet above the ground level. Use sampling stand.
** Excavation shall not be conducted when the wind speed is greater than 15 mph. Average (over 15 minutes) or the wind speed instantaneously exceeds 25 mph.

SECTION D

COST ESTIMATE

SECTION D1

POST-CLOSURE EQUIPMENT, LABOR, AND MATERIAL REQUIREMENTS AND COST ESTIMATE

D.1 POST-CLOSURE EQUIPMENT, LABOR AND MATERIAL REQUIREMENTS AND COST ESTIMATE

D.1.1 EQUIPMENT, LABOR AND MATERIAL REQUIREMENTS

D.1.1.1 INTRODUCTION

The work force necessary to monitor and maintain the Lopez Canyon Landfill during Post-Closure will be assembled from Bureau of Sanitation crews. These crews will be directed and coordinated by an on-site field engineer-manager. Any required equipment, not kept on the landfill or available from other city facilities will be rented on an "as needed" basis.

D.1.1.2 EQUIPMENT

The attached equipment schedule, Exhibit D.1.1 delineates the specific type of machinery, instruments and tools expected to be used. Most of the heavy equipment listed in Exhibit D.1.1 can be used for multiple purposes, therefore reducing the total amount of equipment required.

D.1.1.3 LABOR

It is expected that there will be a dedicated staff for each of the following activities:

- Final Cover Maintenance
- Liquid Management Operation and Maintenance
- Landfill Gas Management Systems Operation and Maintenance
- Landscape and Irrigation Operation and Maintenance
- Environmental Monitoring and Reporting

EXHIBIT D.1.1. POST-CLOSURE EQUIPMENT SCHEDULE

EQUIPMENT REQUIREMENTS	Small Dozer	Dump Truck	Motor Grader	Backhoe w/ Bucket Loader	Com-pactor	Sheeps-foot Comp.	Tampers	Water Truck	Vacuum Truck	Pickup Truck	Flatbed Truck	Boom Truck	Port. Gen.	Air Comp.	Concrete Mixer	Sand Blasting Unit	Hydro-mulching Machine	Grout. Equip.	Transfer Pumps	Sump Pumps	Hand Tools
Final Cover Maintenance																					
Inspection										■											
Repair	■	■	■	■	■	■	■	■		■								■			■
Drainage Facilities Maintenance																					
Bench Drains and Inlet Structures		■	■	■			■	■	■	■	■	■	■	■	■						■
Down Drain Systems				■			■	■		■	■	■	■	■							■
Deck Drainage System								■		■		■	■	■	■						■
Concrete Drainage Channels, Pipes and Ditches								■		■		■	■	■	■	■		■			■
Liquids Management System Maintenance																					
Pumps										■		■	■	■					■		■
Liquid Sumps and Storage Tanks									■	■			■							■	■
Leachate Collection and Removal System				■			■			■			■	■							■
Condensate Drain Line				■			■			■			■								■
Subdrain Collection system				■			■			■			■	■							■
Liquids Disposal Maintenance																					
Transfer Pump and Pipeline									■	■		■	■						■		■
Drain Line				■						■											■
Landfill Gas Recovery System Maintenance																					
Gas Extraction Well Maintenance										■	■	■	■	■							■
Gas Extraction Well Replacement										■	■		■								■
Piping System										■	■	■	■								■
Gas Flares																					■
Blowers				■			■		■	■	■	■	■								■
Gas Migration Control System Maintenance																					
Perimeter Probes										■	■		■								■
Perimeter Wells										■	■		■	■							■
Piping System										■	■		■	■							■
Landscape and Irrigation Maintenance																					
Weed Control								■		■	■			■							■
Fertilization								■		■	■			■			■				■
Rodent Control										■											■
Reseeding and Mulching								■		■	■			■			■				■
Irrigation System										■	■		■						■		■
Survey Monumentation Maintenance																					
Disposed Area Monuments										■											■
Perimeter Fence Maintenance																					
Fence Maintenance and Repair										■	■	■	■								■
Groundwater Monitoring Well and Lysimeter Maintenance																					
Well Maintenance										■	■	■	■	■							■
Well Replacement										■	■		■	■	■						■
Groundwater and Vadose Zone Monitoring										■											
Gas Recovery System Monitoring										■											
Gas Migration Control System Monitoring										■											
Surface Emissions Monitoring										■											
Storm Water Monitoring										■											

EXHIBIT D.1.1 POST-CLOSURE EQUIPMENT SCHEDULE (Continued)

EQUIPMENT REQUIREMENTS	W Pu	OVA Meters	Gas Chroma-tography	Blowers for Vent-ilation	Safety Equip.	Resp. Equip.
Final Cover Maintenance						
Inspection						
Repair					X	
Drainage Facilities Maintenance						
Bench Drains and Inlet Structures				X	X	X
Down Drain Systems				X	X	X
Deck Drainage System				X	X	X
Concrete Drainage Channels, Pipes and Ditches					X	
Liquids Management System Maintenance						
Pumps					X	
Liquid Sumps and Storage Tanks				X	X	X
Leachate Collection and Removal System					X	
Condensate Drain Line				X	X	X
Subdrain Collection System					X	
Liquids Disposal Maintenance						
Transfer Pump and Pipeline					X	X
Drain Line					X	X
Landfill Gas Recovery System Maintenance						
Gas Extraction Well Maintenance					X	X
Gas Extraction Well Replacement				X	X	X
Piping System				X	X	X
Gas Flares		X		X	X	X
Blowers		X			X	
Gas Migration Control System Maintenance						
Perimeter Probes					X	
Perimeter Wells					X	
Piping System					X	
Landscape and Irrigation Maintenance						
Weed Control					X	
Fertilization					X	
Rodent Control					X	
Reseeding and Mulching					X	
Irrigation System					X	
Survey Monumentation Maintenance						
Disposed Area Monuments					X	
Perimeter Fence Maintenance						
Fence Maintenance and Repair					X	
Groundwater Monitoring Well and Lysimeter Maintenance						
Well Maintenance					X	
Well Replacement					X	
Groundwater and Vadose Zone Monitoring					X	
Gas Recovery System Monitoring		X	X		X	
Gas Migration Control System Monitoring		X	X		X	
Surface Emissions Monitoring	X				X	
Storm Water Monitoring					X	

(Lopez Partial Post-Closure:EQUIPSCH:12-7-92)

A general maintenance crew will conduct the remaining Post-Closure activities and will be available to each of the above dedicated teams as needed. Each team consisting of six individuals will be supervised by, and report to the on-site field engineer-manager.

The maintenance schedule for each of the Post-Closure activities is shown on Exhibit D.1.2. The primary purpose of this schedule is to identify the frequency of mandatory inspections for the various systems. The frequency for the sampling and analyzing of the groundwater, landfill gas, surface emissions, flare emissions, perimeter gas probes and storm water, will be in accordance with the Monitoring Schedule attached as Exhibit D.1.3. Any additional personnel needed for surveying or drilling will be obtained from outside contractors.

D.1.1.4 MATERIALS

Listed below are estimates of material to be kept onsite for maintenance of the Post-Closure plan facilities.

- o Final Cover
    - 5,000 cubic yards of cover material
    - Bentonite clay, as required
- o Drainage Facilities
    - Sections of 18", 24" and 36" CSP
    - Assorted fittings
    - Asphalt mastic filler compound
    - Pipe anchors
    - Corrosion resistant paint
- o Liquid Management System
    - Pipe, valves, fittings, and couplings
    - Spare parts for extraction and sump pumps

EXHIBIT D.1.2
POST-CLOSURE
MAINTENANCE SCHEDULE

MAINTENANCE REQUIREMENTS	FREQUENCY
FINAL COVER MAINTENANCE	
A. Inspection	5
B. Repair	9
DRAINAGE FACILITIES MAINTENANCE	
A. Bench Drains & Inlet Structures	7
B. Down Drain Systems	6
C. Deck Drainage System	7
D. Concrete Drainage Channels, Pipes and Ditches	6
LIQUIDS MANAGEMENT SYSTEM MAINTENANCE	
A. Pumps	1/9
B. Liquid Sumps and Storage Tanks	9
C. Condensate Drain Line	9
D. Leachate Collection and Removal System	9
LIQUIDS DISPOSAL MAINTENANCE	
A. Transfer Pump and Pipeline	1/9
B. Drain Line	1
LANDFILL GAS RECOVERY SYSTEM MAINTENANCE	
A. Gas Extraction Well Maintenance	4
B. Gas Extraction Well Replacement	9
C. Piping System	4
D. Gas Flare	2/9
E. Blowers	2/9
GAS MIGRATION CONTROL SYSTEM MAINTENANCE	
A. Perimeter Probes	9
B. Perimeter Wells	4
C. Piping System	4
LANDSCAPE AND IRRIGATION MAINTENANCE	
A. Weed Control	2/8
B. Fertilization	1
C. Rodent Control	9
D. Reseeding and Mulching	1
E. Irrigation System	5
SURVEY MONUMENTATION MAINTENANCE	
A. Disposal Area Monuments	1
PERIMETER FENCE MAINTENANCE	
B. Fence Maintenance and Repair	1
GROUNDWATER MONITORING WELL & LYSIMETER MAINTENANCE	
A. Well and Lysimeter Maintenance	1
B. Well and Lysimeter Replacement	9

LEGEND

1 = Annually	4 = Weekly	7 = After Each Heavy Rainfall
2 = Biannually	5 = Daily	8 = Every Other Month
3 = Monthly	6 = Annually During Summer Months	9 = As Required

(Lopez Canyon Landfill Partial Post-Closure:MAINTSCH:12-7-92)

EXHIBIT D.1.3
POST-CLOSURE
MONITORING SCHEDULE

MONITORING REQUIREMENTS	FREQUENCY
GROUNDWATER MONITORING	
A. Regular Well Sampling	1
B. Vadose Zone	1
C. Leachate Collection and Removal System	11
GAS RECOVERY SYSTEM MONITORING	
A. Collection Headers	3
B. Wells & Horizontal Collectors	3
C. Sumps and Condensate Drain Lines	7
D. Flare Station Sampling	3
GAS MIGRATION CONTROL SYSTEMS MONITORING	
A. Perimeter Probes	3
B. Gas Collection Indiactor Probe (GCIP)	3
SURFACE EMISSIONS MONITORING	
A. Integrated Surface Emissions (50 PPM Rule)	3
B. Instantaneous Surface Emissions (500 PPM Rule)	3
C. Visual Inspection of Landfill Surfaces	7
D. Sampling Gas in Collection Headers & Wells	1
E. Ambient Air Samples at Perimeter of the Site	3
FLARE EMISSIONS TESTING	
A. Source Testing	1
STORMWATER MONITORING	
A. During Discharges	11
WEATHER STATION MANAGEMENT	6

LEGEND

1 = Annually
2 = Biannually
3 = Quarterly
4 = Monthly
5 = Every Two Weeks
6 = Weekly
7 = Daily
8 = After Each Heavy Rainfall
9 = As Required
10 = Seasonally
11 = 3 times annually

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- o Gas Recovery/Migration Control
  - PVC and HDPE piping and fittings
  - Corrugated HDPE pipe and fittings
  - Silicone sealant
  - Valves
  - Flexible couplings

- o Landscaping/Irrigation
  - Fertilizer
  - Hydromulch seed mixture
  - Rodent toxic bait
  - Spare parts for irrigation systems
  - Herbicide for undesirable weeds

- o Environmental Monitoring
  - Sampling supplies
  - Spare parts for testing equipment

Refer to each of the Post-Closure sections for a specific listing of the required maintenance repairs and replacement materials.

D.1.2 COST ESTIMATE

D.1.2.1 INTRODUCTION

The Post-Closure cost estimate has been prepared utilizing the schedule of manpower and equipment necessary to perform maintenance and monitoring at the Lopez Canyon Landfill in compliance with current applicable regulations. The backup for the cost estimates are presented in Appendix I of the Partial Closure Plan utilizing cost estimate worksheets provided by the CIWMB.

D.1.2.2 EQUIPMENT AND LABOR

As outlined in Section D.1.1, the Lopez Canyon Landfill will generate a level of maintenance and monitoring staff, equipment, and materials required to perform the Post-Closure tasks. It is expected that the work force will consist of those positions as outlined in Section D.1.1.3.

Some of the equipment used at other city facilities may be available after closure to perform Post-Closure maintenance. Any required equipment not kept on site will be rented on an "as needed" basis.

D.1.2.3 SUMMARY

The total annual post-closure cost estimate (Maintenance and Monitoring combined) is $1,101,573. A vegetation maintenance cost of $1,531,495 has been estimated for an establishment period during the first six years of the post-closure maintenance activities. The cost is projected in 1992 dollars, assuming no change in the regulatory environment with respect to the Lopez Canyon Landfill

It should be noted that the Maintenance and Monitoring costs presented have been projected utilizing existing, current regulations and applicable requirements. In the event that changes occur in the regulatory conditions pertaining to the Lopez Canyon Landfill facility, these estimates should be adjusted accordingly.