VOLUME III

SUNSHINE CANYON LANDFILL EXTENTION

PROJECT NUMBER: SP 86312
CASE: CP 2556

STATE CLEARINGHOUSE NO.: 84082908

draft environmental impact report

ultrasystems

PREPARED FOR

COUNTY OF LOS ANGELES
DEPT. OF REGIONAL PLANNING

RESPONSES TO PRE-CIRCULATION COMMENTS FROM COUNTY AGENCIES

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DRAFT ENVIRONMENTAL IMPACT REPORT
SUNSHINE CANYON LANDFILL EXTENSION
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RESPONSES TO COMMENTS FROM COUNTY AGENCIES

ON DRAFT EIR PRIOR TO PUBLIC CIRCULATION

Prepared For:

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I. INTRODUCTION

This Volume (III) of the Draft Environmental Impact Report (EIR) contains the written comments received from responsible Los Angeles County agencies on the Draft EIR prior to public circulation. In most cases the comments are verbatim and taken directly from the written comment letters, in other cases the comments are paraphrased as appropriate. Copies of original comments and letters are contained as an appendix to this volume. A response to each comment follows the respective comment; however, where a response to a similar comment has been prepared, reference is made to the previous response by number.

When responses make reference to project related documentation that may be very technical and volumenous, applicable statements have been extracted. The reference documents are on file as noted below for further use if deemed necessary by the concerned agency or person. These technical reports include: the Report of Waste Discharge; Solid Waste Assessment Test for Air Quality Monitoring; and the South Coast Air Quality Management District Permit to Construct Application. They are available for review at the following locations:

Granada Hills Library
10640 Petit Avenue
Granada Hills, California

Sylmar Library
13059 Glen Oaks Boulevard
Sylmar, California

San Fernando Library
1050 Library Street
San Fernando, California

Central Library
433 South Spring Street
Los Angeles, California

II. DEPARTMENT OF PUBLIC WORKS COMMENTS

A. Comments received from Waste Management Division, letter dated May 19, 1989.

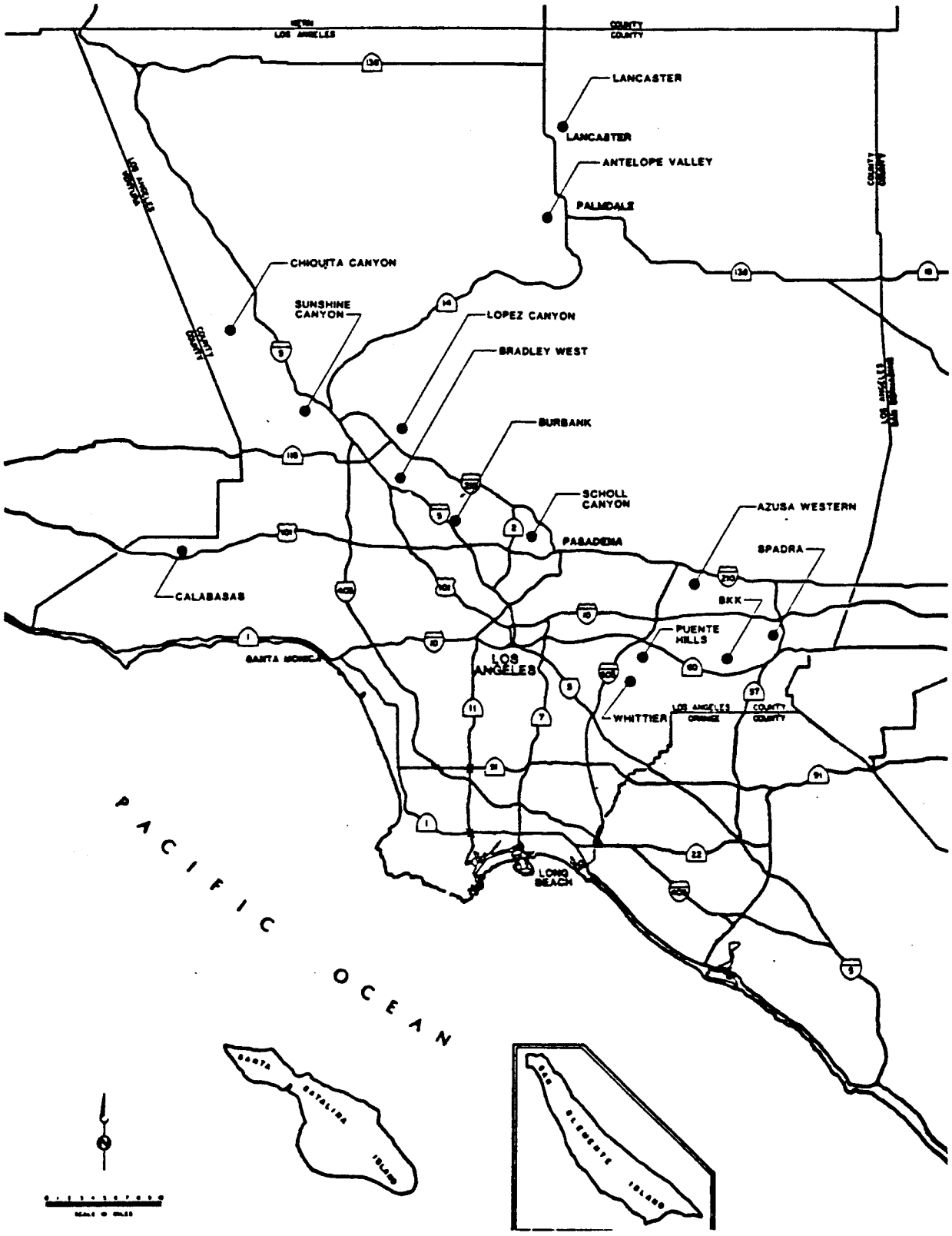
Comment 1: As one of the requirements under the Conditional Use Permit, it is recommended that the spacing of landfill gas monitoring probes not exceed 500 feet, unless otherwise approved by the Waste Management Division of this Department.

Response 1: This comment is acknowledged. Gas monitoring probes will be proposed for 500 foot spacing as recommended; however, actual spacing of installed probes will be in accordance with the most stringent requirements of the lead agency with ultimate control over that area of jurisdiction.

Comment 2: Page 32, Figure 7: The figure should be revised to exclude the closed landfills.

Response 2: Figure 7 has been revised as suggested and is provided on the following page.

Comment 3: Page 33, Table 1: This office recognizes that the capacity as shown in Table 1 is current as of February, 1988. However, due to the critical and dynamic situation regarding waste disposal in Los Angeles County at this time, the consultant should conduct a survey on current disposal quantities and remaining capacity, and revise Table 1, so that the most recent shift/trend changes can be properly evaluated.



	Source:	Title:	
ultrasystems	LACOSWMP 1984 (REVISED 1985)	LOCATION OF MAJOR CLASS III LANDFILLS IN LOS ANGELES COUNTY	**7** (REVISED)

Response 3: Landfill capacities shown in Table 1 of the Draft EIR are current as of November, 1988 based on Department of Public Works input; however, it is recognized that these values change regularly. A follow-up survey was conducted on June 1 and June 2, 1989 in response to this request and the results are shown on the revised Table 1 provided on the following page. It should be noted that most landfill operators do not desire to provide the requested information and the accuracy of the data that was provided cannot be verified. However, the values provided by facility operators through the telephone survey for current rates of disposal and remaining capacities are shown in the revised table for informational purposes.

Comment 4: Page 37, Paragraph 3: The information should be revised to include the City of Los Angeles Board of Zoning Appeals (determination) to limit the height of the landfill not to exceed 1,700 feet and to close the main canyon by the end of next year, unless a new zoning variance is approved. The information that this final decision is under appeal should also be included.

Response 4: As of June 23, 1989, the City of Los Angeles has not yet made a final decision concerning the landfill variance.

TABLE 1
(REVISED)
REMAINING CAPACITY OF CLASS III (FORMER CLASS II)
LANDFILL FACILITIES AS IDENTIFIED IN COUNTY SOLID WASTE MANAGEMENT PLAN

Landfill Site	Operator	Rate of Disposal Tons/Day		Rate of Disposal 10^6 Tons/yr	Remaining Permitted Capacity in Million Tons		Remaining Years of Operations
Antelope Valley	Private	700		0.22	0.65		3
Azusa Western*	Private	3,000		0.78			
BKK	Private	6,000		1.56	10.07		7 (1995)
Bradley West*	Private	7,000		1.82	17.39		10
Brand Park	City of Glendale	100		0.03	.07		3
Burbank	City of Burbank	240		0.06	6.39		11 (2001)
Calabasas	CSD**	2,520	(2,400)***	0.79	10.40	(15.0)***	13
Chiquita Canyon	Private	3,000		0.97	3.36		3
Lancaster	Private	500		0.16	0.11		1
Lopez Canyon	City of Los Angeles	5,700		1.48	12.04		8
Pebbley Beach	City of Avalon	4	(18)***	0.001	0.063		11 (1999)
Puente Hills	CSD**	12,000	(12,000)***	3.75	8.71	(17.0)***	2
San Clemente Island	U.S. Navy	3		0.001	0.02		20
Scholl Canyon*	CSD**	5,600	(2,200***	1.75		(15.0)***	
Spadra	CSD**	2,680	(2,200)***	0.84	3.73	(4.0)***	4
Sunshine Canyon	Private	6,362		1.98	6.00		3 (1991)
Two Harbors	Private	1		0.0003	0.001		3
Pitchess Honor Ranch	L. A. County Sheriff	65		0.02	0.12		6
Whittier/Savage	City of Whittier	350	(350)***	.11	0.84		8

* Data regarding the current rate of disposal for Bradley West and the remaining capacities for Azuza Western and Scholl Canyon are not available from the County Department of Public Works.
** County Sanitation Districts.
*** Supplemental data provided by landfill operators, June, 1989. Capacity estimates may include some expansions not yet permitted.

Source: Base data from "Los Angeles County Solid Waste Siting Project," Los Angeles County Department of Public Works, Waste Management Division, May 18, 1987. This table also contains updated data based on November, 1988 conversations with County Department of Public Works (Mike Mohajer, Solid Waste Management Division).
Note: Other landfills in the Los Angeles area are also available for disposal of inert wastes only, such as San Marino Disposal site and others listed in the above referenced study.
Note: Ascon, Operating Industries, Penrose Pit and Toyon Canyon Landfills have been closed.

Comment 5: Page 62, Table 2: The table should be updated regarding the exclusion of nonhazardous liquid waste in Class III landfills and the appropriate percentages recalculated.

Response 5: The data shown in Table 2 of the DEIR was obtained from the Los Angeles County Solid Waste Management Plan Triennial Review, Volume I (Figure 1) 1984 and Revision A, 1985, and is the most current available published data. However, it is recognized that non-hazardous liquid waste is no longer accepted and that the percentages of waste types shown in the table may have changed since the CoSWMP was prepared. Based on survey results from conversations with cooperating landfill operators, the percentages in Table 2 are revised as follows:

TABLE 2 (Revised)

COMPOSITION OF WASTE LANDFILLED IN LOS ANGELES COUNTY

Type of Waste	County Average %
Demolition and construction waste	29% (17%)
Municipal Solid Waste (MSW)	
Residential waste	39% (42%)
Commercial waste	21% (36%)
Industrial waste	5% (-)*
Miscellaneous waste	3% (5%)
Non-Hazardous Liquid Waste	3% (0%)
Sewage Sludge	Less than 1% (-)*

( ) Percentages based on information provided by Calabasas, Puente Hills, Scholl Canyon, Spadra, and Sunshine Canyon Landfills.
* Data not obtained.

Comment 6: Page 169, Paragraph 3: The section assumes a worst-case scenario for landfill gas protection of 40 million cubic feet per day (MMCFD) for evaluating flaring emissions. However, page 183 shows this is actually the lowest expected gas flow rate projection. As such, the evaluation should be revised for the worst-case and should be based on 95 MMCFD flow rate.

Response 6: The applicant intends to recover and sell as much gas as is possible given the market conditions at the time. The economic viability for commercial sale of landfill gas will occur at levels well below 40 MMCFD. The Draft EIR thus analyzes flaring of 40 MMCFD of landfill gas as a worst-case scenario. It should also be noted that the 95 MMCFD is worst-case maximum gas generation for the entire project (City/County). The permit being requested by the applicant at the time is for the County-only portion of the landfill (approximately one-third of the overall project), thus, regardless of the commercial sale of landfill gas, the 40 MMCFD is an appropriate worst-case assumption for the currently proposed extension even without commercial gas usage.

Comment 7: Page 179, Paragraph 5, Line 4: The statement that, "The County's Solid Waste Management Plan has not identified any future waste disposal sites close to the waste source that could serve the communities currently served by the Sunshine Canyon Landfill," is inaccurate. We do not agree with this statement as the development of Elsmere Canyon is specifically identified in the CoSWMP. As a matter of fact, this is one of the six (6) potential landfill sites identified in the County Solid Waste Action Plan (Action Plan) adopted by the Board of Supervisors in April, 1988.

Response 7: The statement in the Draft EIR was addressing air pollutant emissions relative to truck traffic travel distances to the landfill. In terms of travel distance, Sunshine Canyon is closer to the wastestream source than other landfills identified in Table 6-3 of the CoSWMP; therefore a reduction in total truck emissions may be realized. The DEIR statement should be as follows:

> "The County's Solid Waste Management Plan has not identified any future waste disposal sites as close to the current waste sources that could serve the communities currently served by the Sunshine Canyon Landfill without an additional increase in emissions."

Comment 8: Pages 267-281, Alternate Project Location: In regard to the discussion provided on Elsmere Canyon, this office does not concur with the statement, "..... a number of constraints that made development of this new landfill site infeasible." The section should be revised to either provide supporting information or the statement should be deleted (page 267, paragraph 2), last sentence). The site is selected for further studies in the Action Plan, and this office is not aware of any technical data which would substantiate the conclusion reached in the DEIR.

Response 8: The statement in the Draft EIR in the first paragraph of the Elsmere Canyon Alternative Site discussion was referring to the applicant's decision several years ago not to pursue the possibility for development of Elsmere Canyon as a landfill site. It was not meant to imply that development of Elsmere Canyon by another party is infeasible. It is recognized that Elsmere

Canyon is identified as a potential new landfill site in the Action Plan; however, the applicant feels that various potential development constraints existing in Elsmere Canyon made it less desirable than Sunshine Canyon as a landfill site.

Comment 9: Appendix Y, Volume IIB

The litter control program is not adequate. The vehicle tarping requirements should be enforced and applicable to all users. It is recommended that first time violators should be warned and put on record. Repeated violators should be fined or turned away at the facility. As previously stated, the litter control program is a condition for granting a Finding of Conformance of the subject facility.

Response 9: The Litter Control Program (Appendix Y, Volume IIB) has been revised to include provisions for enforcement of load covering regulations on the landfill property; however, enforcement of highway and street regulations is beyond the applicant's control. Signs will also be posted notifying all users of the landfill that loads must be covered. The revised Litter Control Program is provided on pages 10 through 12 of this document (revised or added text is underlined for clarification).

BROWNING-FERRIS INDUSTRIES
SUNSHINE CANYON LANDFILL
LITTER CONTROL PROGRAM

The Sunshine Canyon Landfill is operated in a manner which strives to minimize the possibility of stray litter either being blown out of the landfill during heavy winds or falling out of waste hauling trucks using the facility. A litter control program has been established to ensure effective preventative and response measures to effectively maintain this operation objective.

Vehicle Tarping

Vehicle tarping requirements at Sunshine Canyon Landfill are in accordance with Sections 23114 and 23115 of the Vehicle Code of the State of California.

> Section 23114:
>
> No vehicle shall be driven or moved on any highway unless the vehicle is so constructed, covered, or loaded as to prevent any of its contents or load other than clear water or feathers from live birds from dropping, shifting, leaking, blowing, spilling, or otherwise escaping therefrom.
>
> Section 23115:
>
> No vehicle loaded with garbage, swill, cans, bottles, wastepaper, ashes, refuse, trash, or rubbish, or any other noisome, nauseous, or offensive matter, or anything being transported to a dump site for disposal shall be driven or moved upon any highway unless the load is totally

> covered in a manner which will prevent the load or any part of the load from spilling or falling upon the highway. This section does not prohibit a rubbish vehicle from being without cover while in the process of acquiring its load in circumstances wherein no law, administrative regulation, or local ordinance requires such cover.

Private vehicles driven by occasional users of the landfill are considered the most likely offenders of vehicle tarping requirements and are the most difficult to control. Primary repeat users of the existing landfill are known to the operator and have not posed problems in the past. Any driver without truck tarping is informed of the requirements for covered loads and asked to have his next load covered. Regular users of the landfill who repeatedly violate this requirement are not allowed to dispose of their loads.

For the first six months of the landfill extension operation all vehicles will be given a handout explaining the current regulations regarding vehicle tarping. After the initial six month period, if the regulations are violated, drivers will be surcharged $25.00 for each occurrence. These funds will be used for cleanup programs in the local area. If vehicle tarping regulations are repeatedly violated by regular users of the landfill, the appropriate authorities will be notified for necessary enforcement action. These enforcement measures will continue to be implemented throughout the development of the landfill extension.

Landfill Litter Control

The landfill operator will designate a remote disposal area for use during strong wind conditions. Controlled placement of waste materials in a wind-shielded area will control off-site migration of stray wind-blown litter. Litter and debris is also contained within the landfill properties by litter fences located along the perimeter of the landfill, as well as portable fences placed adjacent to the daily

operating area. A major portion of the landfill is in remote and low portions of Sunshine Canyon which minimizes high wind conditions within the operating area. These remedial measures will continue to be implemented throughout the development of the landfill extension.

Litter Cleanup Program

On a once a week basis, or more frequently if needed, the landfill operator mobilizes cleanup crews to provide litter control pick-up service in O'Melveny Park, along Balboa Boulevard and San Fernando Road and in other areas in proximity to the landfill. On a daily basis, a BFI employee inspects the surrounding area to assess whether a more frequent clean-up is required. This program is provided to clean up any stray litter or debris which may have dropped in the surrounding area, whether or not its source is related to the landfill operations.

The landfill is equipped with a radio dispatch system which is utilized by the site operator to quickly engage crews to respond to litter complaints and other complaints from the surrounding neighborhoods. Stray litter or debris should be reported to the Sunshine Canyon Landfill office at (818) 362-1567 between the hours of 8:30 a.m. and 6:00 p.m.

B. Comments received from Land Development Division - Geology and Soils Section, letter dated May 10, 1989.

Note: The following comments in this section make reference to various literature sources that are listed in the original comment letter from the agency which is included in Appendix A of this document.

Comment 10: The pervasive presence of friable, non-cemented sandstone beds and the presence of fractures/joints in bedrock should be addressed with respect to potential subsurface water/leachate migration pathways at the site.

Response 10: A potential problem is not expected with respect to subsurface water/leachate migration pathways through friable, non-cemented sandstone beds or fractures/joints in bedrock because a clay liner will be installed to preclude such an event. As covered in DEIR, Volume I, page 96:

> "To supplement the natural containment features of the site, a compacted manmade liner of 1×10^{-6} cm/sec hydraulic conductivity will be placed along the base of the canyon, extending ten feet up the side slopes from the canyon floor. Field testing during excavation and subgrade preparation will determine areas requiring a liner."

The man-made liner will be installed in the areas designated in the Earth Technology, Design Report (Exhibit C of the ROWD) in accordance with the recommendations contained in the Report of Waste Discharge (ROWD) and all corrective procedures and field testing of this liner will be under the supervision of a State

licensed Engineering Geologist or Geotechnical Engineer. In addition to a man-made liner, the bedrock at this site is not highly fractured and any fractures are generally closed at depth. This is based on a series of fracture surveys performed by Purcell, Rhoades & Associates and contained in the Report of Waste Discharge, Appendix D, the Earth Technology Corporation's Hydrology Report (Exhibit B), the Field Packer Tests (Table 5 of the ROWD), and the Compilation of Previously Published Field and Laboratory Data (Exhibit A). The borings indicate friable sandstone, but the sandstone has a considerable percentage of silt sized grains and results in slow permeability for this rock type. Interbedded with low permeability siltstone and bedrock structure at this site presents overall effective containment of any potential leachate.

Comment 11: Nature and extent of groundwater occurrence and aquifer(s) description in and surrounding the proposed landfill. See also comment 8b below.

Response 11: As covered in Earth Technology Corporation's "Hydrogeologic Assessment of Proposed Sunshine Canyon Landfill Extension" (Exhibit B of the Report of Waste Discharge), Regional Hydrogeology section:

"6.1 REGIONAL HYDROGEOLOGY

Sunshine Canyon is located in the hill and mountain area of the San Fernando groundwater basin northwest of the Sylmar hydrologic sub-basin. This sub-basin is bound on the north and east by the non-water-bearing granitic basement complex of the San Gabriel Mountains and the non-water-bearing marine and non-marine sedimentary rocks of the Santa Susana Mountains (Figure 6-1). The sub-basin is

> separated from the larger San Fernando basin to the south by a naturally occurring groundwater barrier referred to as the Cascades. Northwest of the Sunshine Canyon drainage, the adjacent canyons (Gavin, East, and Rice) drain into the Santa Clarita Basin (Figure 6-1)."

A complete explanation of regional and site hydrology is included in the above-referenced report.

Surface waters within the alluvium of Sunshine Canyon discharge into the lined Los Angeles River. These waters do not come into contact with the landfill. The hydrogeology of the bedrock at Sunshine Canyon has been described in various prior submittals regarding the existing site to the governing technical review agency, the Regional Water Quality Control Board (RWQCB). The RWQCB has concurred that the technical data base for this site verified protection of the waters of the State.

The Towsley Formation which underlies the site contains a series of rocks which are considered non-water-bearing because of their low permeability and low yield (Brown, 1975). This formation is comprised of well-indurated mudstone, sandstone and conglomerate which have a very low primary permeability (flow through the interstices). Secondary permeability (flow through joints and fractures) is more developed, especially along the crests of the sharp ridges where the water table lies below the maximum 1986 exploration drilling depth of 60 feet. Downhole packer permeability tests conducted by Purcell, Rhoades & Associates in 1986 in bedrock core holes generally confirm this.

The rate of groundwater movement in bedrock is not known. Due to the pervasively folded, faulted and anisotropic nature of the bedrock (i.e., interbedded sandstone and shale), the flow rate of groundwater at the site will vary significantly over short distances. The presence of non-active faults, in addition to the low-permeability bedrock, will greatly restrict groundwater movement. An effective hydraulic buffer between groundwater beneath the landfill site and the groundwater in the San Fernando Valley is provided by the low permeability bedrock materials beneath the site, and the similar bedrock of the Pico and Saugus Formations that lie between the site and the valley alluvium. The effectiveness of this buffer is evidenced by the large differences in water quality between the poor quality groundwater of the mountain regions versus the excellent quality of valley groundwater (Bean, 1978).

Comment 12: Feasibility appears to be significantly dependent on capping (soil lining) of all permeable materials, and availability of reported low permeability bedrock for lining. Due to the interbedded nature, and therefore, variable permeability of sandstone and siltstone units, substantially more extensive lining may be required than indicated, to assure permeable sandstone and fractured siltstone are adequately "protected". Approximate field distribution and calculations of volume of each type appear warranted.

Response 12: Rock corings and test pit excavations show an interbedded nature consisting of thin layers. Laboratory testing of the different soil and bedrock types within Sunshine Canyon verify acceptable 1×10^{-6} cm/sec permeabilty values in compacted samples. Therefore, no determination of the available proportions of siltstone

and sandstone is necessary, with sufficient earth material available for liner placement even in the event of larger than expected areal limits.

Comment 13: The hydrologic and hydrogeologic conditions at the Sunshine Canyon mouth/San Fernando Pass area, in relationship to the groundwater of the San Fernando Groundwater Basin.

If the Sunshine Canyon groundwater is a "closed system" (see Volume I, page 114, 1st paragraph), how can this be verified?

Response 13: The "closed system" nature of Sunshine Canyon groundwater is documented in the regional study of hydrologic and hydrogeologic conditions, which is contained within the Earth Technology Corporation's Hydrology Assessment (Exhibit B of the Report of Waste Discharge) and is based on published information listed in the references as:

Bean, R. T., 1978; "Hydrology of Sunshine Canyon North Valley Landfill Site.

Brown, G. A., 1975, "Groundwater Geology of the San Fernando Valley," contained within California Division of Mines and Geology Bulletin 196.

See also Response to Comment #11 above.

Comment 14: [What are the] existing and proposed [methods of] groundwater monitoring downgradient of the property and peripheral to the area, relative to the extent of the proposed landfilling?

Response 14: The current groundwater monitoring program includes:

Five (5) MW-series groundwater monitoring wells

Six (6) CM-series groundwater monitoring wells

Four (4) DW-series groundwater monitoring wells

Of the 15 monitoring wells, two are considered background monitoring for the landfill extension while the remaining 13 wells can be used as downgradient wells. Additional monitoring wells (up to four) are to be installed during construction of the proposed toe berm facility at the County extension site. A discussion of existing on-site and off-site monitoring is contained within the technical document, "Hydrogeologic Assessment of Proposed Sunshine Canyon Landfill Extension, Sylmar, California," prepared by Earth Technology Corporation and contained with the ROWD as Exhibit B. This document canvassed wells within one mile of both the existing and proposed extension landfill sites.

Comment 15: Some of the above issues are covered in The Earth Technology Corporation's Report reviewed (see Reference 8), but this report is insufficient as it focuses only on the County section of the proposed landfill. Pertinent information contained in this report should be incorporated into the DEIR.

Response 15: The Draft EIR addresses Geology, Surface Water, and Groundwater issues for the ultimate landfill development (County and City extension) in sufficient detail to satisfy CEQA requirements. However, although CEQA Section 15378 requires the DEIR to address the "whole of the action" for purposes of environmental review,

additional detailed technical analyses are only necessary to support those specific facility permit applications currently under consideration. Thus, the data provided in the Report of Waste Discharge and the Earth Technology Corporation reports is primarily focused on the County portion of the landfill extension since permits are currently only being sought for operations in that portion of the canyon. When subsequent entitlements are requested for operations within the remainder (Los Angeles City portion) of the extension area, supplemental environmental analyses to meet CEQA requirements and technical analyses to support specific permit applications will be prepared.

The Report of Waste Discharge (ROWD) does contain information in support of a number of requested permits from various state and local agencies. Additional hydrogeologic data and design plans to supplement the DEIR analyses can be found in that document. However, due to the voluminous size of the ROWD, and the technical nature of its material, it is not included in whole as part of the DEIR. Rather, it has been incorporated by reference and is available for agency and public review.

Comment 16: As described in Volume I, page 96, 1st paragraph, and Reference 9, Page 27, 5th paragraph, the proposed liner will be placed along the base of the canyon and extend 10 feet up the side slopes of the proposed landfill. However, Reference 4, Page 11, 2nd paragraph says: "The bowl-shaped fill section would be extended upward from the low point center line of the canyon to a variable height on each canyon flank. The extent and height of the clay liner below the landfill will be determined by a representative of PRA during placement." Please clarify.

In addition, please clarify and explain the following comment from Reference 9, Exhibit C, Page 27, 5th paragraph: "At heights above the canyon floor greater than 10 feet the potential of leachate infiltrating and reaching groundwater is greatly decreased because of the steep canyon slope."

Response 16: The limited lateral extent of the liner is based upon the general principal that water will flow along lines of greater permeability. It is believed that the path of least resistance will be the interface between the bedrock and the refuse. This principle, coupled with the slope of the canyon sides, as detailed in the Wong Model (Earth Technology Corporation's "Hydrogeology Report," Exhibit B of the ROWD), will contain and guide any infiltrated water into the leachate collection and removal system (LCRS).

For a complete reference see Earth Technology Corporation's, "Preliminary Design Report for Sunshine Canyon Landfill Extension" (Exhibit C of the Report of Waste Discharge), dated September 30, 1988, pages 17 through 27.

The Wong model particularly addresses the steepness of liner slope versus percentage percolation. It demonstrates that a liner is only needed for up to 10 feet above the creek bottom. The Earth Technology Corporation report states, "At heights above the canyon floor greater than 10 feet, the potential of leachate infiltrating and reaching groundwater is greatly decreased because of the steep canyon slope." The technical basis of this report is currently under review by the governing agency, the RWQCB.

Comment 17: How effectively can the leachate be isolated so that it does not get in contact with water of the underdrain or subdrain from seeps or springs and does not enter ground water aquifers beyond the area of the liner? The limited lateral extent of the liner assumes that any percolation of water through the landfill will only occur where the liner exists, or will be funneled into the liner. What happens to any landfill infiltrated water in bedrock beyond the limits of the liner, particularly in the permeable sandstones and fractured siltstone?

Response 17: As stated in the Report of Waste Discharge, and the Earth Technology Corporation's "Hydrogeologic Assessment" report (Exhibit B of the Report of Waste Discharge), permeability values indicate that excellent containment characteristics of the cover materials are present at the site. The minimum required permeability of natural and manmade features is $1x10^{-6}$ cm/sec. Field and laboratory testing of natural and compacted soil samples verify permeability values of 10^{-6}, 10^{-8} and 10^{-10} cm/sec.

As explained in Response to Comment #16, the steep canyon sides preclude the requirement of a compacted soil liner beyond the recommended area by the Earth Technology Corporation. The underdrains that will be installed to collect seepage will also be overlain by a compacted soil liner to prevent infiltration by any generated leachate.

The placement of the soil liner will be done in accordance with generally accepted earthwork practices and will be carefully documented through construction and inspection procedures. Inspection and monitoring will be done by a registered geotechnical engineer.

Comment 18: Volume IIA, Appendix B, Table 1. The laboratory permeability values for sand appear to be low, as compared with published values for these grain size materials. Please comment.

Response 18: The laboratory permeability values for sand only appear to be low when compared with permeabilities of clean sand. The test results referenced in Volume IIA, Appendix B, Table 1, are for soil and bedrock samples. These samples were analyzed in the laboratory for optimum moisture and density as recompacted permeabilities. The lower permeabilities are also associated with the high percentage of fines found in the sandy material. The laboratory procedures followed were consistent with established industry standards and good engineering practice.

Comment 19: Comments on Landslide Section, Volume I, Page 84 and Figure 16.

Based on Reference 8, Figure 5.1; Reference 5, Figure 8: Reference 1, and aerial photographs, larger or additional landslides occur at the site, indicating that these deposits are more extensive than as shown in Figure 16 of the DEIR. Therefore, substantial additional removal will be required. Additional data will be required for landslides prior to approval of specific development plans subsequent to the DEIR.

Response 19: Extensive geologic mapping presented in the Report of Waste Discharge shows geologic units and landslides. The ancient landslides have densified and are very dense at depth. The estimates given were based upon geomorphic expression. The DEIR states on page 97, paragraph 3, that "it is recommended that once the toe of a

slide is encountered, all material constituting the landslide be removed and stockpiled in a stable area for use as cover material." The recommended procedure of removal of soft landslide material to firm bedrock is consistent with good engineering practice. A State licensed Engineering Geologist will be present during grading operations and will verify depth of removal; therefore, additional exploratory borings or mapping is not necessary.

Comment 20: Comments on "Fold and Faults". Volume I, Page 87, 3rd paragraph, says: "No movement was detected on the Santa Susana fault traces in the vicinity of the site during the San Fernando earthquake in 1971. Limited portions of that fault did show movement several miles east of the site ...". However, based on information contained in this report (Figure 16, and page 88), fault breaks occurred within only about 3/4 of a mile east of the site.

Please discuss the potential effects of surface fault rupture on the lining and underlying canyon subdrain at the base of the landfill, and recommended mitigation measures.

Response 20: For historical completeness, Figure 16 of the DEIR (Site Geologic Map) indicates the area east of the site reportedly showing 'ground rupture' from the 1971 earthquake. As stated in published works by representatives of the California Division of Mines and Geology and cited in the DEIR on page 87, 3rd paragraph, "... that movement is felt to be the result of wave propagation along the old zones of weakness (Saul, 1975; 1979) rather than actual thrusting."

Fault investigations contained within Appendix B of the Report of Waste Discharge verified that surface ground rupture due to tectonic activity upon an active fault was unlikely within Sunshine Canyon. The amount of displacement measured after the 1971 San Fernando earthquake east of I-5 was 2 to 3 cm. The compacted liner would be cohesive and capable of resisting the effects of this amount of movement. In addition, the integrity of containment structures (liner) and LCRS pipes is verified by the acceptable slope stability analysis under both static and dynamic conditions assuming a bedrock acceleration of 0.6g. The Slope Stability Report is included as Appendix C of the ROWD. In the unlikely event of rupture of the liner or LCRS piping, at the mouth of this canyon will be a containment toe berm, grout curtain and extraction wells for collection and removal of leachate. This provides an additional safety factor against leakage and provides extra safeguards to protect the waters of the State in accordance with Subchapter 15 requirements, even in the event of adverse conditions.

Comment 21: There is a discrepancy between Table 5 in Volume I, Page 89 (lists the magnitudes and "Maximum Probable Earthquake Magnitude"), and Table 2 in Volume IIA, Appendix B (lists them as Maximum Credible Earthquake Magnitude"). The Maximum Credible Earthquake Magnitudes as listed on Table 1 of Reference 2 should be incorporated into the DEIR.

Response 21: The maximum probable earthquake is the design seismic event required for Class III sanitary landfills. Therefore, Table 5 in Volume I of the DEIR is the appropriate data. For the slope stability analyses and for conservatism in design under a potential worst-case scenario, the maximum credible earthquake bedrock

acceleration of 0.6g was used instead of the required design maximum probable earthquake; thus, this is considered the worst-case scenario.

Comment 22: Volume I, Page 90, 1st and 4th paragraphs. The design peak acceleration (g) value for the site should be 0.5 as shown by Greensfelder, instead of 0.3 as listed on Table 5. Please review.

Response 22: The 0.5g acceleration contour indicated on Greensfelder's map is for peak bedrock accelerations for maximum credible earthquakes. The appropriate design earthquake is the maximum probable seismic event, which is 0.3g.

Comment 23: Volume I, Page 90, 1st paragraph, says: "... maximum credible earthquakes of 0.55 and 0.65 ...". Please correct.

Response 23: This typographical error should be corrected to "... maximum credible earthquake bedrock accelerations of 0.55 and 0.65 ..."

Comment 24: Volume I, Page 90, 4th paragraph: "... during the 1971 earthquake... slopes in the canyon did not fail". This is in disagreement with the landslides shown in Figure 19 and comments on "landslides" on page 84. Please review.

Response 24: The sentence referenced in this comment refers to the refuse slopes within the canyon which did not fail during the 1971 earthquake. The majority of the slides that occurred within the canyon were within the natural

soil/weathered bedrock zone overlying the dense non-weathered zone. Landfill operations will excavate this loose surface zone prior to refuse infilling.

Comment 25: Comments on "Slope Stability", Volume I, Page 94,, 2nd paragraph.

What slopes are referred to in this paragraph? Are these natural slopes or proposed landfill slopes?

Response 25: The described slope stability analysis refers to proposed refuse slopes. The cross-sections and computer-generated stability analysis is presented in the technical documentation in Appendix C of the Report of Waste Discharge.

Comment 26: The value of 0.2g is described as "peak acceleration value". According to Table 5, this value is the "repeatable high ground acceleration".

Response 26: The reference to 0.2g in the 2nd paragraph on page 94 of the DEIR is a typographical error and should be 0.6g.

Comment 27: As noted on Volume I, Page 86, 1st paragraph, dip slope conditions are pervasive at the site. Please discuss: (i) the potential impact of daylighted bedding conditions on proposal at the site, (ii) Are there daylighted slopes adjacent and offsite which may affect the landfill?, (iii) What is the effect of surcharge of the landfill materials on such slopes?, and (iv) What effect could failure or instability of these daylighted slopes have offsite, if they undermine landfill materials?

Evaluate the stability of the high, steep descending natural slopes peripheral to the landfill, particularly in the Bee Canyon area, where numerous landslides occur.

Response 27: Daylighted slopes with adverse, dipslope bedrock structure will be buttressed as recommended by an Engineering Geologist during construction excavations. There will be no effect upon off-site areas either as a result of excavation or due to the additional weight of placed refuse. A discussion of landslide deposits and slope stability is contained with the ROWD and in the Slope Stability Report (Appendix C of the ROWD).

Comment 28: Volume I, Page 113, 4th paragraph says; "Because of the topographic ..., groundwater and infiltration surface water remain within Sunshine Canyon and do not affect the roots of native vegetation in adjoining canyons." Please clarify.

Response 28: This sentence states that the Sunshine Canyon hydrologic conditions are self-contained within its own boundaries. Surface and subsurface waters do not penetrate through the mountain nor surface off-site as seepage on slopes beyond the landfill boundaries.

Comment 29: Volume I, Page 114, 1st paragraph: "The subsurface water in Sunshine Canyon is effectively hydraulically separated from the San Fernando Valley alluvium by the low-permeability rock". Please substantiate and illustrate.

Response 29: The sentence should read:

> "The subsurface water in the Sunshine Canyon bedrock material is effectively hydraulically separated from the San Fernando Valley alluvium by the low permeability of the rock unit."

Hydrogeologic investigations were performed for both the existing and proposed extension landfill sites. The acceptance of the 5-Year Engineering Review report by the Regional Water Quality Control Board (RWQCB) overseeing the technical compliance of this site verifies that the existing site has adequate natural and manmade features to minimize the potential for contamination of subsurface waters of the State. The technical data generated for this site is contained within the ROWD. (See also Response to Comment #11.)

While the surface alluvium from Sunshine Canyon is in hydraulic continuity with alluvium within San Fernando Basin, the bedrock structure and permeability would considerably reduce the possibility of hydraulic continuity. Field work including rock corings, field packer and pump tests and laboratory tests demonstrate the low permeability values of the bedrock formation. Regional data confirms the description of the bedrock formations within Sunshine Canyon as aquicludes and nonwater bearing. The bedrock structure shows plunging folds towards the mouth of Sunshine Canyon, with what little water penetrates the surface weathered fracture zone would have to cross steeply dipping bedrock strata. Water migration within the fractured bedrock is also constrained by the numerous, small, intersecting fault zones which provide barriers to fluid.

That any possible water leaving the site is not degrading the water of the San Fernando Basin is evidenced by the difference in water quality comparing the naturally occuring poor, nonpotable water quality encountered within the alluvium and bedrock of Sunshine Canyon and the good water quality within the San Fernando Basin.

In addition, the regional bedrock structure of San Fernando Pass indicates that the Susana thrust fault zone crossing the pass south of the site would also affect a bedrock barrier to fluid migration.

Comment 30: Potential Impacts, Volume 1, Page 116. The potential of leachate entering groundwater (specifically entering bedrock beyond the edge of the liner), and the impact of possible subsequent migration into the San Fernando Groundwater Basin, should be included in this section with supporting subsurface data.

Response 30: As previously stated in Response to Comment #16:

> "The limited lateral extent of the liner is based upon the general principle that water will flow along lines of greater permeability. It is believed that the path of least resistance will be the interface between the bedrock and the refuse. This theory, coupled with the slope of the canyon sides, will contain and guide any infiltrated water into the leachate collection and removal system (LCRS)."

The technical hydrogeologic report prepared by the Earth Technology Corporation (Exhibit B of the ROWD) describes the computations used in the Wong model to substantiate

the area of liner placement. A State licensed Engineering Geologist will evaluate canyon excavations to verify depth of overburden removal and to determine the need for supplemental liner areas. (See also Response to Comments #11 and #16.)

Comment 31: Mitigation Measures, Volume I, Page 118. As described in Reference 9, Page 18, 1st paragraph, groundwater elevation should be at least five feet below the solid waste bottom to "provide a definite separation between the non-hazardous solid waste and water of the state". This statement should be incorporated, with the appropriate recommendations, into the DEIR.

Response 31: As required by the State permitting agency, the Regional Water Quality Control Board (RWQCB), the regulation referenced above will be complied with.

Comment 32: Volume I, Page 120, 3rd paragraph. More detailed information on the containment structures proposed (grout curtain, slurry wall, cut-off wall and/or containment dam), should be included. These should include, but not limited to: location, depth, monitoring, etc. (see Reference 3).

Response 32: See the Earth Technology Corporation's "Preliminary Design for Sunshine Canyon Landfill Extension" (Exhibit C of the Report of Waste Discharge), page 56; Grout curtain and cut off wall descriptions.

Comment 33: Cross Section A-A'-A" shown in Volume I, Figure 22 is missing. Please provide.

Response 33: The Cross-Sections A-A'-A" indicated on Figure 22 were draft cross-sections which were based on preliminary data compiled for the Report of Waste Discharge, and were incorrectly referenced on this figure in the DEIR. The cross-sections were later superseded by cross-sections which are contained within the Report of Waste Discharge for this site (Geologic Cross-Sections, Figures 9-12 of the ROWD).

Comment 34: The following logs of borings are missing:

From Reference 7: Page 6 of 6 of MW-3, log of MW-4 and Page 1 of CM-1.

Log of MW-4 is missing from Volume IIA.

Logs of borings DW-1 to DW-4 are missing both from Volume IIA and in Reference 7.

Response 34: The above referenced boring logs are provided for review in Appendix D of this Volume III document.

Comment 35: The following comments on Earth Technology's Report (Reference 8) should be addressed and incorporated into the DEIR:

i) As described, groundwater at the site occurs primarily in the alluvial units and underlying shallow bedrock. Is this groundwater, particularly in bedrock, in hydraulic continuity with the aquifers of the Sylmar Hydrologic Subarea? Provide hydrogeologic cross section(s) and other details as already described above.

ii) The confined groundwater zone present in bedrock should be described and defined, including its relationship to the shallow unconfined zone at the site, and to the San Fernando Valley Groundwater Basin.

Response 35: Subsurface water at this site is limited to the surface alluvial covering and within the surface fractures of the highly weathered bedrock zones. Both regional and site-specific investigations demonstrate through field and laboratory testing that the bedrock consists of bedrock with a high percentage of silt and clay and inherent low permeability, and that the fractures are of limited extent and close at depth. The groundwater of the site is not potable, with high natural sulfate content, and the alluvium and bedrock are considered poor aquifers with low hydraulic conductivities. Surface drainage discharge at the mouth of Sunshine Canyon is confined to a lined channel which is the Los Angeles River. (See also Response to Comments #11 and #29.)

C. Comments received from Land Development Division - Geology and Soils Section, letter dated May 26, 1989.

Note: The following comment makes reference to literature sources that are listed in the original comment letter from the agency which is included in Appendix A of this document.

Comment 36: The consultant's recommendation to extend the liner only 10 feet up the side slopes of the proposed landfill is based on an extrapolation of Wong's model (Reference 1). Based on Earth Technology's report (Reference 2), Wong's model is for efficiency of liner slopes only. Therefore, the consultant's use of this model to eliminate the liner on natural slopes where permeabilities exceed 10^{-6}cm/sec is unsubstantiated.

No evidence has been presented that indicates that this method is applicable or has been successful in other operating landfills. It appears that this approach is inappropriate, considering the potential consequences of leachate infiltration.

Response 36: The Wong Model presents a conservative approach for evaluating potential percolation of leachate into soil liners at different slope gradients. However, this model also demonstrates that at steep slopes, the requirement of a liner is lessened, since the model assumes a constant head of leachate within a sand layer on top of the liner. Since the Wong Model is based upon a drainage layer of sand, and an assumed constant, uniform head of leachate, this model would represent a worst-case scenario that would not occur against a steep canyon slope situation. Any leachate generated would be directed downward to the base of the canyon.

This leachate would then be collected atop of the soil liner placed against the slope for direction towards the LCRS.

As stated previously, overburden removal within the canyon slopes is to be observed by a licensed Engineering Geologist, field tested to determine field permeability conditions for its consistency with design assumptions based upon prior field and laboratory testing. The technical review of the proposed LCRS and liner design is currently ongoing by the RWQCB and the proposed design may be revised or modified pending incorporation of comments by the approving agency.

D. Comments received from Land Development Division - Geology and Soils Section, letter dated July 3, 1989.

Comment 37: The responses [to date] satisfactorily provide answers to our comments. Data presented by the consultant indicates that the landfill is underlain by bedrock materials with permeabilities that exceed 10^{-6} cm/sec. These areas will be field tested to determine if a liner is required in accordance with established criteria.

Response 37: This comment is acknowledged. Field testing during excavation and subgrade preparation will determine areas requiring a liner. The Regional Water Quality Control Board has the discretionary authority for review and approval of the Report of Waste Discharge, including future liner needs, and issuance of Waste Discharge Requirements for the proposed landfill extension.

E. Comments received from Land Development Division - Drainage and Grading Section, letter dated April 24, 1989.

Comment 38: This project will not significantly affect the environment as far as the Section's interests are concerned, provided the appropriate ordinances and codes are followed.

Response 38: This comment is acknowledged.

F. Comments received from Waterworks and Sewer Maintenance Division Division, letter dated April 25, 1989.

Comment 39: As requested we have reviewed the subject Draft Environmental Impact Report (DEIR). The proposed expansion will not have any significant impact on Sewer Maintenance facilities or operations.

Response 39: This comment is acknowledged.

G. Comments received from Traffic and Lighting Division, letter dated June 1, 1989.

Comment 40: The report projected that the project would generate an additional 3,180 truck trips per day. However, it does not analyze the impact on the structural section of County roadways. We, therefore, recommend the report address the project's impact on the structural section of Sierra Highway and The Old Road in the unincorporated County area.

Response 40: The landfill trucks will not travel on Sierra Highway in the unincorporated County area.

Landfill trucks will impact approximately a 1/4 mile section of The Old Road, from the Route 14 offramp southward to the County boundary. We assume that six percent of inbound trips or 95 truck trips per day (i.e., 3,180/2 x 6% = 95) of the generated landfill traffic would travel over this section of The Old Road. Based on existing Browning-Ferris Industries (BFI) Sunshine Canyon Landfill related types of trucks, we project the percentages of trucks and ESAL (Equivalent Single Axle Loads) for a 20-year design period, as follows:

Truck Type	Trips	ESAL Constant*	ESAL
2-axle	22% x 95 = 21	1,380	28,980
3-axle	58% x 95 = 55	3,680	202,400
4-axle	20% x 95 = 19	5,880	111,720
		Total:	343,100

* Source: Caltrans, "Highway Design Manual" (page 600-6).

The foregoing calculation suggests that the 20-year load on this section of The Old Road will be 343,100 ESAL.

According to the Materials Laboratory of the Public Works Department, The Old Road has a 2-inch A.C. (Asphalt Concrete) on top of an 8-inch P.C.C. (Portland Cement Concrete), which rests on top of a 4-inch base. The rigid pavement has an equivalent 36-inch A.C. value. From the Caltrans Highway Design Manual, this 10-inch thickness can support a T.I. (Traffic Index) value greater than 12 (Ref. Table 607.2 on page 600-23).

A Traffic Index of 12 is associated with an ESAL of 13,500,000 (Ref. Table 603.4A on page 600-8).

The project would cause an increase of 0.305 in the Traffic Index (i.e., 12 x 343,100/13,500,000 = 0.305) on the impacted 1/4 mile of The Old Road. Based on Table 607.2 of the Caltrans "Highway Design Manual," a 0.75 foot (9-inch) pavement can support a T.I. of 10.5 to 12.0. Therefore, we conclude that an increase of 0.305 in Traffic Index will not be significant enough to require a thicker pavement.

H. Comments received from Traffic and Lighting Division, letter dated July 5, 1989.

Comment 40a: We have reviewed additional information concerning the increase in truck traffic on County roads as provided by the developer of the subject project. We agree that the increase in truck traffic will not have a significant impact on the structural section of Sierra Highway and The Old Road in the unincorporated County area. No additional information is required.

Response 40a: This comment is acknowledged.

III. DEPARTMENT OF HEALTH SERVICES COMMENTS

Comments received from Department of Health Services, letter dated May 11, 1989.

Comment 41: The staff of the Solid Waste Management Program (SWMP) have reviewed the most recent version of the PDEIR and have found that all the concerns of the SWMP regarding the prior version have been satisfactorily addressed.

Response 41: This comment is acknowledged.

Comment 42: Furthermore, we believe that the authors of the document have done an exceptionally good job in its content and presentation. They appear to have exceeded CEQA requirements relative to the extent of technical detail used to describe some of the proposed environmental controls, which, perhaps, would be more appropriately contained within the Report of Waste Discharge and Report of Disposal Site Information required later in the permitting process by the Regional Water Quality Control Board and the Local Enforcement Agency.

Response 42: This comment is acknowledged.

IV. COUNTY SANITATION DISTRICT COMMENTS

Comments received from County Sanitation District, letter dated May 26, 1989.

Comment 43: The subject document fails to adequately discuss the potential cumulative impacts of the proposed Sunshine Canyon project with other probable future solid waste projects, specifically the six potential landfill sites (Blind Canyon, Browns Canyon, Elsmere Canyon, Mission Canyon, Sullivan Canyon, Towsley Canyon and Toyon Canyon) identified in the Solid Waste Management Action Plan adopted by the Board of Supervisors and the Sanitation Districts' Boards of Directors last year. A Notice of Preparation for a Program EIR on the Action Plan and the six sites was circulated by the Sanitation Districts in December, 1988. Guidance on dealing with Cumulative Impacts provided by the Resources Agency (California EIR Monitor, Vol. 12, No. 1, February, 1985) indicates that "probable future projects" to be evaluated should include projects undergoing environmental review for which the lead agency possesses specific knowledge concerning the nature of the project. Clearly this is the case for the County of Los Angeles in regard to the six potential landfill sites identified in the Action Plan. It is also clear that since the PDEIR makes numerous references to the and studies upon which the Action Plan was based, that the project proponent was also aware of the status of these potential sites. The potential cumulative impacts in the areas of traffic, biology and air quality should be addressed for all probable solid waste projects.

Response 43: The Draft EIR considered the cumulative impact (traffic - pages 207 through 209, and air quality - page 176) from all known projects in the near vicinity of Sunshine Canyon that are in the development process and which could have a cumulative environmental impact. The cumulative impact of the other six (6) potential landfill sites referenced in the Solid Waste Management Action Plan for Los Angeles County (SWMAP) were not considered for the following reasons:

The environmental review being undertaken by the County Sanitation Districts is to determine the feasibility and propriety of developing any of the Action Plan sites to meet the regional need for additional landfill capacity and to avert an impending waste disposal crisis.

Because the solid waste stream amount is not directly dependent on the number of landfills available. First, the number of trucks hauling the waste will not change as a function of the number of landfills. Therefore, the traffic is not expected to be any greater on the roadways serving Sunshine Canyon. If other landfills are assumed, the cumulative impacts will not be any greater, but in fact the direct impacts will be less because of the diffusion of truck trips to other sites. The traffic impacts noted in the DEIR for Sunshine Canyon could, therefore, be considered worst-case. Furthermore, the combined existence of Sunshine Canyon and other Action Plan sites would not produce increased environmental impacts.

Second, the air quality, from both mobile and landfill disposal related sources, would not be any worse than projected in the DEIR, if more landfills were considered, because the vehicle trips would not increase

nor would the volume of waste disposed of increase. Therefore, the air quality analysis in the DEIR for the Sunshine Canyon extension could be considered to be comparable to that which would exist from a cumulative standpoint.

Third, in order to evaluate the cumulative biological impact several speculative assumptions (i.e., future development of existing regional habitat areas, regional gene flow characteristics and long term disposition of SEA designated lands) would have to be made relative to which landfill or landfills among the six suggested sites in the Action Plan would be developed. Further, the detailed biological features of each of the proposed Action Plan sites would need to be determined. A detailed comprehensive study for a regional biota analysis would need to be prepared. Without this information any cumulative impact assessment would be shallow and not meaningful.

Comment 44: The subject document fails to adequately discuss a reasonable range of alternative sites and waste management methods to the proposed use of Sunshine Canyon, which could attain the basic objectives of the project. The Resources Agency (California EIR Monitor, Vol. 14, No. 1, March, 1988) in discussing recent court decisions indicates that a comparative analysis of sufficient detail and specificity to permit a comparison of the potential impacts of the proposed project and the alternatives is an important component to the successful completion of the environmental review of a major project. A reasonable range of alternative sites and methods should include at a minimum all six potential landfill sites and a reasonable assumption regarding the implementation of waste diversion strategies identified in the Solid Waste Management Plan adopted by the Board of Supervisors in April, 1988.

Response 44: The DEIR evaluated an alternative site, i.e, Elsmere Canyon, which is one of six sites listed in the SWMAP, even though this alternative site did not "feasibly attain the basic objective of the project" which is to extend the life of the existing operations at Sunshine Canyon landfill through utilization of the established infrastructure. The Sunshine Canyon applicant's project objective differs significantly from the project objective of the SWMAP. It appears that the Action Plan's objective is to evaluate "six potential new sanitary landfills near metropolitan Los Angeles County previously identified." Further, the Action Plan has been prepared by three public agencies "in response to an impending solid waste disposal crisis which faces the metropolitan area of the County." The approach which has been taken by the County Sanitation Districts fulfills the appropriate approach to satisfying their objectives but does not include the Sunshine Canyon extension. The Action Plan sites do not present reasonable and feasible alternatives to the Sunshine Canyon landfill extension. The Action Plan is considering these sites in order to satisfy a regional demand and need for additional waste disposal facilities, whereas the project applicant's intention is to extend its business enterprise by increasing the capacity of the existing landfill operation. Further, BFI does not own, nor do they have land options for the proposed SWMAP sites, therefore, further consideration of such sites as alternative sites would be speculative.

Comment 45: The subject document does not address historical/ cultural resources for the Sunshine Canyon Project, yet raises that very issue when discussing Elsmere Canyon (see page 275). The project proponent should contact

Native American representatives about cultural resources of Sunshine Canyon in order to address this issue.

Response 45: Appendix D, Volume IIA of the Draft EIR contains an assessment of archaeological and historic resources for the landfill extension area. Section 3.2.5 of Volume I (pages 151-153) also provides a summary of the technical report. No archaeological or historical resources were found on the property during the field reconnaissance, and the one previously recorded archaeological site near the bottom of the canyon has already been naturally covered by alluvial deposits. It was concluded in the report that significant impacts to archaeological or historical resources from the project are not expected.

Comment 46: The existing Sunshine Canyon Landfill is the only major landfill in the metropolitan area which does not have weigh scales to accurately determine the quantity of refuse which it handles. It is recommended that if this proposed expansion is approved one of the conditions of the conditional use permit require that the operator construct weigh scales and maintain accurate weight measurements of all waste received at the site.

Response 46: The existing landfill has been operated effectively since its opening without the use of weigh scales. Daily waste stream tonnage can be accurately calculated using an industry accepted conversion factor of four cubic yards per ton to determine weight from volume, plus or minus ten percent. The use of weigh scales would be less efficient and create a slower, more

cumbersome movement of vehicles into the landfill site. A change to the use of weigh scales in the future would present an economic and operational burden to the applicant with little or no resulting benefits.

Comment 47: Table 1, Page 33 should be updated to 1989. Under the heading "Operator" the Sanitation Districts should be listed in place of L.A. County for the Calabasas, Puente Hills, Scholl Canyon and Spadra Landfills.

Response 47: Table 1 of the Draft EIR has been revised and is shown on page 5 of this Volume III (see Response to Comment #3).

Comment 48: On Page 43, the quantity of daily and final cover have been reversed.

Response 48: This sentence under Cover Material Excavation and Handling in the Draft EIR should state that on-site soils expected to be encountered will be adequate to provide 80 million cubic yards of material for daily cover and 5 million cubic yards for intermediate and final cover.

V. FIRE DEPARTMENT COMMENTS

Comments received from Fire Department, letter dated May 10, 1989.

Comment 49: Our evaluation of the impact on fire protection and paramedic service for the proposed development is based on the current level of service available within the general area. With this in mind, additional manpower and equipment may be required as the need arises.

Response 49: This comment is acknowledged.

Comment 50: The Sunshine Canyon Sanitary Landfill currently lies totally within the City of Los Angeles. The proposed initial extension, which is adjacent to the existing sanitary landfill, is located within the County of Los Angeles. The current area of the existing landfill covers 230 acres. The proposed extension will increase the land area by 100 percent to 460 acres.

Response 50: The approximate acreage figures for the proposed landfill extension within both County and City of Los Angeles areas of the Canyon are shown on the figure in Appendix L, Volume IIB.

A. Comments from Preparedness and Emergency Planning Division

Comment 51: The subject development will receive fire protection and paramedic service from the County of Los Angeles Fire Department. Fire Station #73, located at 24875 North San Fernando Road, Newhall, CA 91321, is the jurisdictional engine for this property.

EQUIPMENT	DISTANCE/ MILES	TIME/ MINUTES	MEN
Engine 46	3.5	6.0	3
Engine 73	6.25	10.7	4
Engine 273	6.25	10.7	4
Truck 73	6.25	10.7	3
Paramedic Squad 107	8.0	13.7	2

Response 51: This comment is acknowledged. The information provided regarding fire protection and emergency medical service availability supplements the discussion provided in the Draft EIR, page 252.

B. Comments from Engineering and Water Flow Division

Comment 52: The development of this project must comply with all applicable code and ordinance requirements for access, water mains, fire flows and fire hydrants.

Response 52: The landfill extension will comply with all applicable code and ordinance requirements for access, water mains, fire flows and fire hydrants as specifically defined by the County Fire Department.

Comment 53: A water supply shall be provided capable of flowing not less than 750 gallons per minute at 20 pounds per square inch residual pressure for a period of not less than 1-1/2 hours.

Response 53: New construction of water tanks, water mains and fire hydrants will be completed to meet the fire flow requirements of the County Fire Department.

Comment 54: Adequate on-site hydrants shall be installed every 1,000 feet.

Response 54: Fire hydrants will be installed to meet the requirements of the County Fire Department for 1,000 foot spacing.

Comment 55: In addition, a Class II standpipe system shall be provided and located within 200 feet of dumping operations and shall have sufficient 1-1/2 inch hose with a variable fog nozzle to reach all portions of such operations. The standpipe system shall be capable of delivering a fire flow of not less than 250 gallons per minute from water mains of not less than two (2) inches in diameter.

Response 55: On-site are one 7,000 gallon and three 4,000 gallon water trucks that will be used as a source of water for firefighting at the active area. A 200-foot 1-1/2 inch fire hose with fog nozzle will be available on the vehicles for firefighting at the working area. In addition, earth moving equipment will be available for controlling fires by smothering fires with dirt.

Comment 56: Approved access roads shall be provided and maintained at all times around the dumping areas to provide access for fire fighting equipment.

Response 56: Access roads will be constructed and maintained around the working area of the landfill to provide emergency access for firefighting equipment.

C. Comments from Forestry Division

Comment 57: The statutory responsibilities of the Forestry Division of the Los Angeles County Department of Forester and Fire Warden include rare and/or endangered species, potential erosion and control of same, biota, and the Oak Tree Ordinance. The Preliminary Draft Environmental Impact Report (PDEIR), Project #86-312 has been reviewed in respect to these responsibilities.

Response 57: This comment is acknowledged.

Comment 58: According to the PDEIR, the fill area will ultimately extend into the portion of the canyon located in the City, and this PDEIR addresses the impact of the entire project. The Oak Tree Summary in Appendix Z does not reflect the oak resource found within Los Angeles City nor does the PDEIR address this issue.

Response 58: The Draft EIR addresses impacts to flora and fauna from the ultimate landfill development (County and City extension) in sufficient detail to satisfy CEQA requirements. However, although CEQA Section 15378 requires the DEIR to address the "whole of the action" for purposes of environmental review, additional detailed technical analyses are only necessary to support those specific facility permits currently under consideration. Thus, the data provided in the Oak Tree Report is focused on the County portion of the landfill extension since an Oak Tree Permit and other entitlements are currently only being sought for operations in that portion of the canyon. When subsequent entitlements are requested for operations within the City portion of the extension area, a supplemental technical

oak tree resource assessment and mitigation plan will be prepared as necessary to support an oak tree permit application for that portion of the canyon.

Comment 59: The effect of expansion into both Los Angeles City and Los Angeles County should be addressed at the present time, not in the future. The magnitude of both expansions would have a compounded effect on the vegetation due to the size. The final use of the site and completed landform should be specifically determined prior to possible approval. A "private open space, landscaped, planted, and maintained in a park-like setting" does not return this area to previous conditions. "The only project related unavoidable adverse environmental impact which could remain significant after mitigation is the loss of vegetation and natural habitat."

Response 59: The DEIR does address the impacts to biotic resources within the entire landfill extension area (see also response to comment #58). The applicant is not proposing any specific future use for the completed landfill. The landfill surface will be revegetated in accordance with the Revegetation Program (Appendix H, Volume IIA) and other measures will be taken to re-establish vegetation on the project site. The filled portion of the property will be maintained as private open space until the time that it will be converted for future uses consistent with applicable regulations. Current regulations restrict the use of completed landfills as public open space or for further land development.

Comment 60: Revegetation should be an attempt to re-establish the native species removed and should not include "new species that are suitable to a sanitary landfill environment."

Response 60: It should be noted that revegetation efforts will be comprised of ground cover and vegetation planting on the landfill surface (as specified in the Revegetation Program - Appendix H, Volume IIA), and re-establishment of native oak tree resources through the proposed Oak Tree Mitigation Plan (see Appendix B of this Volume III). To the extent feasible, native plantings will be placed in the landfill extension area itself, particularly along the perimeter of the fill area, to maintain the existing biotic environment of the canyon. Plantings around the perimeter of the landfill will also protect and enhance views of Sunshine Canyon.

Comment 61: The proposed relocation of the Southern California Edison 66KV line will create an additional impact. This should be fully explained in the EIR, to include new access roads which may be required.

Response 61: As stated in the Draft EIR, page 146, the transmission line reroute will be jointly defined by the applicant and Southern California Edison. Only on-site rerouting of the line will occur; access roads may also need to be constructed. However, there are currently no specific plans for this line relocation. It should be noted that transmission line rerouting will not be necessary for the permit application currently under consideration (i.e., County extension only). When the balance of the project (i.e., City and County ultimate development, as discussed in the Draft EIR) is requested, additional environmental information will be

submitted as necessary to determine potential impacts from the line relocation activities (i.e., tower footings construction and access roads).

Comment 62: SEA 20 "was established as a representative area, within the small dry interior mountain ranges of Los Angeles County, to provide for an assortment of oaks and for gene flow and species movement between the San Gabriel and Santa Monica Mountains." This designation is designed to preserve unique biota resource values and should not be allowed to be reduced in size.

Response 62: A complete discussion of SEA 20 is provided on pages 123-124 of the DEIR, Volume I.

Comment 63: Any development should be consistent with the North Los Angeles County General Plan - Santa Clarita Valley Areawide General Plan (December 1983), or the Los Angeles City General Plan.

Response 63: As stated in the Draft EIR, page 54, a General Plan Amendment (GPA) to the Conservation Element will be required to relocate the boundary of the SEA #20 and to change various land use designations on the site in order to allow the proposed landfill extension to be consistent with the County General Plan.

Comment 64: The mitigations suggested on pages #16, #148, and #149, Volume I state that the "Operator will plant oaks off-site through County nursery programs. Measures will be taken to cooperate with the Department of Forester and Fire Warden in upgrading nursery facilities and to provide seed for plantings." This should be clarified as a proposal from BFI. There has been no

formal agreement made between BFI and the Department of Forester and Fire Warden, nor has this idea been presented as a potential mitigation measure in our responses to Regional Planning.

Response 64: The applicant will cooperate with the Department of Forester and Fire Warden and other responsible agencies to implement various mitigation measures to offset loss of oak trees. Specific measures are discussed in the proposed Oak Tree Mitigation Plan, included as Appendix B of this Volume III.

Comment 65: In order of priority we recommend the no project alternative, followed by the smaller landfill alternative, and finally the unincorporated County area-only alternative. A city-only alternative should be considered in the Final EIR.

Response 65: The applicant is currently requesting entitlements for extension of the landfill into only that portion of the canyon under the County of Los Angeles' jurisdiction. However, as required by CEQA, the Draft EIR addresses the ultimate development of the landfill within the entire canyon. In terms of alternatives to the currently proposed project, a City-only landfill extension would be outside the jurisdiction of the County of Los Angeles and would not present a viable option to the action currently under consideration by the County.

Comment 66: Any approval for expansion will result in the complete loss of vegetation cover and associated ecosystem. This loss cannot be mitigated.

Response 66: Mitigation measures presented in the Draft EIR, pages 147-150, the Revegetation Program (Appendix H, Volume IIA), and the proposed Oak Tree Mitigation Plan (Appendix B of this Volume III) will offset some biotic resource impacts. Measures will be taken to reestablish the ecosystem within the canyon as well as replace lost vegetation and habitat through off-site mitigation programs. Planting of all 17,226 replacement oaks (2:1 replacement ratio) will be initiated in the beginning stages of the landfill development, even though removal of oak trees in the extension area will only occur in a staged process as necessary to provide new cut and fill areas of the site. Thus, by the time the landfill extension is completely developed (approximately 50 years), the replacement oak trees will be mature. However, it is recognized that impacts created by the loss of vegetation and natural habitat in the landfill extension area could remain significant even after mitigation.

Comment 67: Copies of the Los Angeles County Department of Forester and Fire Warden responses to Regional Planning dated February 2, 1989 and April 7, 1989, (see enclosures) regarding this Oak Tree Permit Request #86-312 should be included in the Oak Tree Issue Section of the EIR. A copy of the Oak Tree Permit application dated May 25, 1989 should also be included. In addition, a revised application should indicate 234 acres of Southern Oak Woodland and 8,613 oak trees for removal.

Response 67: The referenced letters and Oak Tree Permit Application are included as Appendix C of this Volume III. Revisions to the Oak Tree Permit application will be submitted to the County Department of Forester and Fire Warden.

Comment 68: We are in agreement with the results of the oak survey conducted by Ralph Osterling Consultants, Inc. His report of March 26, 1989, has been used as the basis for our review.

Response 68: This comment is acknowledged. The Oak Tree Report is provided in Appendix Z, Volume IIB, of the Draft EIR.

Comment 69: Sampling is designed to provide an estimate with a given standard error. It does not give an exact number, rather it provides a range within which the exact number would fall. The upper range of this survey indicates 8,613 oak trees. This figure is accepted by the Department of Forester and Fire Warden and should be utilized on the Oak Tree Permit application. Our response of April 7, 1989, incorrectly stated 11,888 oak trees. This number was the total stem count taken from a February 23, 1989 Oak Tree Report prior to the addition of extra samples plots.

Response 69: This comment is acknowledged. The revised Oak Tree Permit application will indicate a reasonable worst-case estimate of 8,613 oak trees to be removed.

Comment 70: It is standard practice to note any inconsistencies found in the review of an Oak Tree Report. Procedural inconsistencies listed in the April 7, 1989 response are meant for matters of clarification and do not affect the validity of the survey.

Response 70: It is recognized that the noted inconsistencies are only procedural and do not affect the validity or acceptability of the March 26, 1989 Oak Tree Report.

The April 7, 1989 letter from the Department of Forester and Fire Warden is included in Appendix C of this Volume III.

Comment 71: The Oak Tree Permit as presented April 25, 1988 asks for the complete removal of the Southern Oak Woodland. The loss of an entire ecosystem cannot be adequately mitigated. This removal is also inconsistent with the intent of the Oak Tree Ordinance and should be denied.

Response 71: See Response to Comment #66.

Comment 72: If the commission decides to grant this Oak Tree Permit, partial mitigation may be rendered by means of:

1. The reduction of acreage removed.

2. The preservation of the Douglas Fir/Oak vegetation type.

3. The increased understanding of oaks through studies.

4. The study of potential land use and landform of the expansion area.

5. The inventory and planting of suitable lands to continue the oak species.

6. The development of public education displays regarding oak trees.

Response 72: While this comment is acknowledged, specific measures are set forth in the applicant's proposed Oak Tree Mitigation Plan which is provided in Appendix B of this Volume III.

Comment 73: As a condition of this permit the health and vigor of all remaining trees should be protected. Future removal of the remaining trees should not be allowed under subsequent applications.

Response 73: The applicant fully intends to protect all remaining trees and understory within the canyon, as well as protecting biotic resources within the remainder of adjacent property under ownership, namely East Canyon, by restricting future landfill operations from extending into those areas. Mitigation measures presented on pages 147-150 of the Draft EIR, Volume I outline various efforts that will be taken to protect and maintain undisturbed trees and other vegetation. Ridgetop vegetation will also be protected around the canyon, and, although not required, the Douglas-Fir (big cone spruce) habitat will be reestablished.

VI. SHERIFF'S DEPARTMENT COMMENTS

Comments received from Sheriff's Department, letter dated May 19, 1989.

Comment 74: Our primary concern is the illegal dumping that occurs in the unincorporated areas just north of the landfill. It has been our experience that the majority of these illegal dumpers arrive at the dump after hours, and on weekend days. When they find the dump closed, they drive north to our area, dumping their trash just off our rural highways.

Response 74: This comment from the County Sheriff's Department is acknowledged. However, illegal waste dumping occurs County-wide and is not just related to the Sunshine Canyon landfill. Illegal dumping typically occurs in predominantly rural or open space areas, such as those north of the landfill, regardless of the presence of a nearby landfill.

It should be noted that as part of normal daily operations Sunshine Canyon landfill employees watch carefully for any illegal dumping activities on or around the project site. The landfill has also established a Litter Cleanup Program (see page 12 of this document) to provide cleanup service in the landfill area. Additionally, the applicant has contracted with various metropolitan area cities to provide neighborhood cleanup and disposal programs.

Comment 75: Our strongest suggestion for mitigation would be to open the landfill seven (7) days a week. This would assist tremendously in our efforts to eliminate illegal dumping. It would also reduce state and county expenditures required to clean up the debris.

Response 75: It has been and will continue to be the policy of the Sunshine Canyon landfill to be closed on Sundays; very few landfills in the County are open seven days a week. It should also be noted that illegal waste dumping is not simply a result of landfills being closed on certain days and after certain operational hours; rather, it is a sympton of some people's desire for convenience and financial savings.

Comment 76: An additional possible mitigation would be to place a large trash bin at the entrance for after-hour dumping. I understand that this may not be practical from the owner's viewpoint, however, it would help to eliminate the serious problem of illegal dumping in the county and city areas north of the landfill.

Response 76: It should be noted that no other landfills in the County have such after-hours disposal receptacles. Provision of an unmanned trash bin 24 hours per day would only serve to encourage after hours disposal due to its convenient availability, which would result in the bin being regularly filled beyond its capacity. More importantly, such unregulated after-hours disposal of wastes would result in many hazardous substances being discarded in the bin, which are otherwise restricted from being deposited at the landfill, thereby creating a burden on the applicant to dispose of unacceptable materials.

VII. DEPARTMENT OF PARKS AND RECREATION COMMENTS

Comments received from Department of Parks and Recreation, letter dated April 27, 1989.

Comment 77: Screening and other mitigation measures should be used to minimize the landfill activity's harsh visual impact (see photo on page 245, Vol. I) on hikers and horseback riders using the trails immediately adjacent to the landfill.

Response 77: As stated in the Draft EIR, Volume I, page 244:

> "Upper levels of the landfill extension will be visible from some elevated portions of hiking trails in O'Melveny Park (Viewshed Area "A" of Figure 38). The project will also be visible from portions of elevated ridgeline trail routes proposed by the County and City of Los Angeles.
>
> .... It should be noted that landfill development and filling of the canyon to elevations which would be visible from O'Melveny Park or the proposed trails is a slow process. The lower reaches of the canyon are filled first and only after a period of many years will the surface of the landfill become visible to hiking trail areas outside the canyon itself."

Figure 47 in the Draft EIR, Volume I, is more representative of landfill activities that could be observed at the later stages of the landfill development as the fill height reaches higher elevations. It is recognized, however, that some portions of the landfill extension may be intermittently visible from certain

trail locations as the landfill development progresses. As part of revegetation efforts for the landfill extension the upper ridges of the canyon will be planted with native species (oaks and ground cover) to both supplement the existing vegetation on the ridges and to reestablish naturally bare areas in order to protect and enhance views of Sunshine Canyon.

Comment 78: While the document states that a revegetation program will be undertaken, it will take years to replace the mature oak and walnut woodlands destroyed by the project.

Response 78: It should be noted that oak tree mitigation measures are intended to offset impacts to oak resources, not necessarily replace them at the landfill site itself. Revegetation of the landfill face will be undertaken as the landfill extension progresses in the canyon. However, off-site oak tree planting of all 17,226 replacement oaks (2:1 replacement ratio) will be initiated in the beginning stages of the landfill development, even though removal of oak trees in the extension area will only occur in a staged process as necessary to provide new cut and fill areas of the site (see the Oak Tree Mitigation Plan, Appendix B of this document). Thus, by the time the landfill extension is completely developed (approximately 50 years), the replacement oak trees will be mature.

APPENDIX A

Comments and Letters Received from County Agencies Listed in this Document

May 19, 1989

II A

TO: Carl Blum
Planning Division

Attention Rene Villa-Agustin

FROM: Alice P. Chung
Waste Management Division

DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR)
STATE CLEARINGHOUSE NO. 84082908
SUNSHINE CANYON LANDFILL EXTENSION
PROJECT NO. 86312

Pursuant to your notice of April 19, 1989, this office has reviewed the subject document in reference to our area of responsibility. Based on our previous comments (March 10, 1989) and response from Ultrasystems, Inc. (May 9, 1989), the following is offered:

I. GENERAL COMMENT

As one of the requirements under the Conditional Use Permit, it is recommended that the spacing of landfill gas monitoring probes not to exceed 500 feet, unless otherwise approved by the Waste Management Division of this Department. 01

II. SPECIFIC COMMENTS

Volume I - Sunshine Canyon Landfill Extension

1. Page 32, Figure 7

The figure should be revised to exclude the closed landfills. 02

2. Page 33, Table 1

This office recognizes that the capacity as shown in Table 1 is current as of February, 1988. However, due to the critical and dynamic situation regarding waste disposal in Los Angeles County at this time, the consultant should conduct a survey on current disposal quantities and remaining capacity, and revise Table 1, so that the most recent shift/trend changes can be properly evaluated. 03

3. Page 37, Paragraph 3

The information should be revised to include the City of Los Angeles Board of Zoning Appeals to limit the height of the landfill not to exceed 1,700 feet and to close the main canyon by the end of next year, unless a new zoning variance is approved. The information that this final decision is under appeal should also be included. 04

4. Page 62, Table 2

The table should be updated regarding the exclusion of nonhazardous liquid waste in Class III landfills and the appropriate percentages recalculated. 05

5. Page 169, Paragraph 3

The section assumes a worst-case scenario for landfill gas protection of 40 million cubic feet per day (MMCFD) for evaluating flaring emissions. However, page 183 shows this is actually the lowest expected gas flow rate projection. As such, the evaluation should be revised for the worst-case and should be based on 95 MMCFD flow rate. 06

6. Page 179, Paragraph 5, Line 4

The statement that, "The County's Solid Waste Management Plan has not identified any future waste disposal sites close to the waste source that could serve the communities currently served by the Sunshine Canyon Landfill", is inaccurate. We do not agree with this statement as the development of Elsmere Canyon is specifically identified in the CoSWMP. As a matter of fact, this is one of the six (6) potential landfill sites identified in the County Solid Waste Action Plan (Action Plan) adopted by the Board of Supervisors in April, 1988. 07

7. Page 267-281, Alternate Project Location

In regard to the discussion provided on Elsmere Canyon, this office does not concur with the statement ".... a number of constraints that made development of this new landfill site infeasible." The section should be revised to either provide supporting information or the statement should be deleted (page 267, paragraph 2, last sentence). The site is selected for further studies in the Action Plan, and this office is not aware of any technical data which would substantiate the conclusion reached in the DEIR. 08

Volume IIB

8. Appendix Y

The litter control program is not adequate. The vehicle tarping requirements should be enforced and applicable to all users. It is recommended that first time violaters should be warned and put on record. Repeated violaters should be fined or turned away at the facility. As previously stated, the litter control program is a condition for granting a Finding of Conformance of the subject facility. 09

MA:du/SUNSHINE

May 10, 1989

II B

TO: Anna Marie Gilmore
Planning Division

FROM: Lidia Lustig
Geology and Soils Section
Land Development Division

GEOLOGIC AND HYDROGEOLOGIC REVIEW - SUNSHINE CANYON LANDFILL EXTENSION, DRAFT ENVIRONMENTAL IMPACT REPORT, DATED APRIL 1989

As per your memo dated April 19, 1989, we have reviewed the geologic and hydrogeologic sections of the Draft Environmental Impact Report (DEIR) and supplemental reports (see References) pertinent to the project. This review supersedes our March 31, 1989 review sheet. We have prepared the following comments. Response to technical questions should be provided by the project geotechnical consultants.

GENERAL COMMENTS

The hydrogeologic characteristics of the site area (onsite and offsite) are not adequately covered in the DEIR report. Additional analysis and data should be provided, including, but not limited to:

a) The pervasive presence of friable, non-cemented sandstone beds and the presence of fractures/joints in bedrock should be addressed with respect to potential subsurface water/leachate migration pathways at the site. 10

b) Nature and extent of groundwater occurrence and aquifer(s) description in and surrounding the proposed landfill. See also comment 8b below. 11

c) Feasibility appears to be significantly dependent on capping (soil lining) of all permeable materials, and availability of reported low permeability bedrock for lining. Due to the interbedded nature, and therefore, variable permeability of sandstone and siltstone units, substantially more extensive lining may be required than indicated, to assure permeable sandstone and fractured siltstone are adequately "protected". Approximate field distribution and calculations of volume of each type appear warranted. 12

d) The hydrologic and hydrogeologic conditions at the Sunshine Canyon mouth/San Fernando Pass area, in relationship to the groundwater of the San Fernando Groundwater Basin.

If the Sunshine Canyon groundwater is a "closed system" (see Volume I, page 114, 1st paragraph), how can this be verified? 13

e) Existing and proposed groundwater monitoring downgradient of the property and peripheral to the area, relative to the extent of the proposed landfilling. 14

Some of the above issues are covered in The Earth Technology Corporation's Report reviewed (see Reference 8), but this report is insufficient as it focuses only on the County section of the proposed landfill. Pertinent information contained in this report should be incorporated into the DEIR. 15

SPECIFIC COMMENTS

1. Permeability of Site Materials

   a) As described in Volume I, Page 96, 1st paragraph, and Reference 9, Page 27, 5th paragraph, the proposed liner will be placed along the base of the canyon and extend 10 feet up the side slopes of the proposed landfill. However, Reference 4, Page 11, 2nd paragraph says: "The bowl-shaped fill section would be extended upward from the low point center line of the canyon to a variable height on each canyon flank. The extent and height of the clay liner below the landfill will be determined by a representative of PRA during placement." Please clarify. 16

      In addition, please clarify and explain the following comment from Reference 9, Exhibit C, Page 27, 5th paragraph: "At heights above the canyon floor greater than 10 feet the potential of leachate infiltrating and reaching groundwater is greatly decreased because of the steep canyon slope."

   b) How effectively can the leachate be isolated so that it does not get in contact with water of the underdrain or subdrain from seeps or springs and does not enter ground water aquifers beyond the area of the liner? The limited lateral extent of the liner assumes that any percolation of water through the landfill will only occur where the liner exists, or will be funneled into the liner. What happens to any landfill infiltrated water in bedrock beyond the limits of the liner, particularly in the permeable sandstones and fractured siltstone? 17

   c) Volume IIA, Appendix B, Table 1. The laboratory permeability values for sand appear to be low, as compared with published values for these grain size materials. Please comment. 18

2. Landslides

   Comments on Landslide Section, Volume I, Page 84 and Figure 16.

   Based on Reference 8, Figure 5.1; Reference 5, Figure 8; Reference 1, and aerial photographs, larger or additional landslides occur at the site, indicating that these deposits are more extensive than as shown in Figure 16 of the DEIR. Therefore, substantial additional removal will be required. Additional data will be required for landslides prior to approval of specific development plans subsequent to the DEIR. 19

3. Geologic Structure

Comments on "Fold and Faults". Volume I, Page 87, 3rd paragraph, says: "No movement was detected on the Santa Susana fault traces in the vicinity of the site during the San Fernando earthquake in 1971. Limited portions of that fault did show movement several miles east of the site ...". However, based on information contained in this report (Figure 16, and Page 88), fault breaks occurred within only about 3/4 of a mile east of the site. 20

Please discuss the potential effects of surface fault rupture on the lining and underlying canyon subdrain at the base of the landfill, and recommended mitigation measures.

4. Seismicity

a) There is a discrepancy between Table 5 in Volume I, Page 89 (lists the magnitudes as "Maximum Probable Earthquake Magnitude"), and Table 2 in Volume IIA, Appendix B (lists them as Maximum Credible Earthquake Magnitude"). The Maximum Credible Earthquake Magnitudes as listed on Table I of Reference 2 should be incorporated into the DEIR. 21

b) Volume I, Page 90, 1st and 4th paragraphs. The design peak acceleration (g) value for the site should be 0.5 as shown by Greensfelder, instead of 0.3 as listed on Table 5. Please review. 22

c) Volume I, Page 90, 1st paragraph, says: "... maximum credible earthquakes of 0.55 and 0.65 ...". Please correct. 23

d) Volume I, Page 90, 4th paragraph: "... during the 1971 earthquake ... slopes in the canyon did not fail". This is in disagreement with the landslides shown in Figure 19 and comments on "Landslides" on page 84. Please review. 24

5. Slope Stability

Comments on "Slope Stability", Volume I, Page 94, 2nd paragraph.

a) What slopes are referred to in this paragraph? Are these natural slopes or proposed landfill slopes? 25

b) The value of 0.2g is described as "peak acceleration value". According to Table 5, this value is the "repeatable high ground acceleration". 26

Other Comments

As noted on Volume I, Page 86, 1st paragraph, dip slope conditions are pervasive at the site. Please discuss: (i) The potential impact of daylighted bedding conditions on proposals at the site, (ii) Are there daylighted slopes adjacent and offsite which may affect the landfill?, (iii) What is the effect of surcharge of the landfill materials on such slopes?, and (iv) What effect could failure or instability of these daylighted slopes 27

have offsite, if they undermine landfill materials? Evaluate the stability of the high, steep descending natural slopes peripheral to the landfill, particularly in the Bee Canyon area, where numerous landslides occur.

6. Groundwater

a) Volume I, Page 113, 4th paragraph says; "Because of the topographic ..., groundwater and infiltration surface water remain within Sunshine Canyon and do not affect the roots of native vegetation in adjoining canyons." Please clarify. 28

b) Volume I, Page 114, 1st paragraph: "The subsurface water in Sunshine Canyon is effectively hydraulically separated from the San Fernando Valley alluvium by the low-permeability rock". Please substantiate and illustrate. 29

c) Potential Impacts, Volume 1, Page 116. The potential of leachate entering groundwater (specifically entering bedrock beyond the edge of the liner), and the impact of possible subsequent migration into the San Fernando Groundwater Basin, should be included in this section with supporting subsurface data. 30

d) Mitigation Measures, Volume I, Page 118. As described in Reference 9, Page 18, 1st paragraph, groundwater elevation should be at least five feet below the solid waste bottom to "provide a definite separation between the non-hazardous solid waste and water of the state". This statement should be incorporated, with the appropriate recommendations, into the DEIR. 31

e) Volume I, Page 120, 3rd paragraph. More detailed information on the containment structures proposed (grout curtain, slurry wall, cut-off wall and/or containment dam), should be included. These should include, but not limited to: location, depth, monitoring, etc. (see Reference 3). 32

7. Cross Section A-A'-A'' shown in Volume I, Figure 22 is missing. Please provide. 33

8. Additional Comments

a) The following logs of borings are missing:

From Reference 7: Page 6 of 6 of MW-3, log of MW-4 and Page 1 of CM-1.

Log of MW-4 is missing from Volume IIA.

Logs of borings DW-1 to DW-4 are missing both from Volume IIA and in Reference 7. 34

b) The following comments on Earth Technology's Report (Reference 8) should be addressed and incorporated into the DEIR:

i) As described, groundwater at the site occurs primarily in the alluvial units and underlying shallow bedrock. Is this groundwater, particularly in bedrock, in hydraulic continuity with the aquifers of the Sylmar Hydrologic Subarea? Provide hydrogeologic cross section(s) and other details as already described above.

ii) The confined groundwater zone present in bedrock should be described and defined, including its relationship to the shallow unconfined zone at the site, and to the San Fernando Valley Groundwater Basin.

35

REFERENCES

1. California Division of Mines and Geology, 1987. Landslide Hazards in the North One-Half of the Oat Mountain Quadrangle, Los Angeles, California. Open File Report 87-8 LA.

2. Purcell, Rhoades and Associates, April 4, 1982, Revised September 30, 1982. Phase II, Fault Evaluation and Seismic Hazard Study, Proposed Expansion Site, Sunshine Canyon, Los Angeles, California. For Browning-Ferris Industries of California.

3. -----, April 22, 1988. Geotechnical Recommendations for Proposed Grout Curtain or Slurry Wall, Sunshine Canyon Extension Site, Sylmar, California. Exhibit D.

4. -----, April 22, 1988. Stability Analysis. Static and Dynamic Loading Conditions, Sunshine Canyon Extension Site, Sylmar, California. Appendix C.

5. -----, April 22, 1988. Report of Waste Discharge, Proposed Sunshine Canyon Sanitary Landfill Extension Site, Sylmar, California.

6. -----, July 13, 1988. Water Monitoring and Analysis Program, Sunshine Canyon Extension Site, Sylmar, California.

7. -----, Compilation of Previously Published Field and Laboratory Data, Sunshine Canyon, Sylmar California, Exhibit A.

8. The Earth Technology Corporation, September 20, 1988. Hydrogeologic Assessment of Proposed Sunshine Canyon Landfill Extension, Sylmar, California. Exhibit B.

9. -----, September 30, 1988. Preliminary Design Report for Sunshine Canyon Landfill Extension, Sylmar, California. Exhibit C.

May 25, 1989

II C

TO: Anna-Marie Gilmore
Planning Division

FROM: Lidia Lustig
Land Development Division

SUNSHINE CANYON LANDFILL EXTENSION - DEIR DATED APRIL 1989
RE: LANDFILL LINER

The purpose of this letter is to address Item 1a of our previous review sheet of May 10, 1989, relative to our discussions with the consultant during our meeting on May 24, 1989.

The consultant's recommendation to extend the liner only 10 feet up the side slopes of the proposed landfill is based on an extrapolation of Wong's model (Reference 1).

Based on Earth Technology's report (Reference 2), Wong's model is for efficiency of liner slopes only. Therefore, the consultant's use of this model to eliminate the liner on natural slopes where permeabilities exceed 10^{-6} cm/sec, is unsubstantiated. No evidence has been presented that indicates that this method is applicable or has been successful in other operating landfills. It appears that this approach is inappropiate, considering the potential consequences of leachate infiltration.

36

REFERENCES

1. Wong, J. 1977. The Design of a System for Collecting Leachate from a Lined Landfill Site. Water Resources Research, Vol. 13, No. 2, April.

2. The Earth Technology Corporation. 1988. Preliminary Design Report for Sunshine Canyon Landfill Extension, Sylmar, California, September 30. Exhibit C.

July 3, 1989

II D

TO: Anna-Marie Gilmore
Planning Division

FROM: V. C. Martinez
Geology and Soils Section
Land Development Division

GEOLOGIC AND HYDROLOGIC REVIEW: SUNSHINE CANYON LANDFILL EXTENSION - DRAFT ENVIRONMENTAL REPORT, APRIL 1989
RE: LANDFILL LINER

The response from Ultrasystems dated June 19, 1989 satisfactorily provides answers to our comments. Data presented by the consultant indicates that the landfill is underlain by bedrock materials with permeabilities that exceed 10^{-6} cm/sec. These areas will be field tested to determine if a liner is required in accordance with established criteria. 37

VCM:sh
cp:SUN

cc: Geology and Soils Files

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
Drainage & Grading Section

☐ FINAL MAP REPORT
☑ LAND USE REPORT

Files Nos. 2-15.311 2-15.313 1.21

Review of DRAFT EIR-PROJ 86312
Santiago Canyon Landfill Extension

Map or Transmittal Letter Date 9-19-89

Assignment No. _____

II E

38 I

TO: Planning Division
Attn Rene Villa-Agustin

_____ 1. The Drainage and Grading Section has no requirements for this subdivision/application.

_____ 2. The subdivision/site is reasonably free of flood hazard.

_____ 3. Portions of the property are subject to sheet overflow, (and) ponding, ( ) and mudflows from steep hillsides.

_____ 4. Portions of the subdivision/site lying in and adjacent to ( ) steep hillsides, ( ) natural watercourses, ( ) _____ are subject to flood hazard because of ( ) tidal/wave action, ( ) overflow, ( ) erosion, ( ) mudflow and, or deposition of debris.

X 5. This project will not significantly affect the environment as far as the Section's interests are concerned, provided the appropriate ordinances and codes are followed.

_____ 6. Place a note of flood hazard on the final map/grant of waiver and submit engineering documentation to support those limits.

_____ 7. Dedicate to the City/County the right to restrict the erection of buildings in the flood hazard areas.

_____ 8. Adequate engineering documentation must be submitted showing that building sites are available and are free of flood hazard.

_____ 9. Provide a drainage concept prior to approval of the tentative map. Sufficient information must be submitted to the Department showing the extent of the drainage problem and proposed solution.

_____ 10. Provide improvements to eliminate the flood hazard. Improvements may include: ( ) storm drains and/or channels, ( ) debris control facilities, ( ) vehicular access to structures, ( ) _____.

_____ 11. Dedicate fee title/an easement/future easement to the District/County of Los Angeles/City of _____ providing adequate right of way for _____.

_____ 12. Show on the final map the Flood Control District's right of way for _____. A permit will be required for any construction affecting the District's right of way or facilities.

_____ 13. Approval of the _____ is recommended subject to conditions noted herein or shown on the returned map.

_____ 14. The recordation of this map will not unreasonably interfere with the free and complete exercise of the easement held by the District/County.

_____ 15. The _____ is unsatisfactory. Note the reasons stated herein or shown on returned map.

_____ 16. Proposed grading must be in compliance with Chapter 70 of the County Building Code.

Comments:

Information relative to the above comments may be obtained by contacting:

Engineering Investigator _____ Telephone (818) 458-4920

Approved by J. Grandt Date of Report 9/29/89
Drainage and Grading Section

II F

April 25, 1989

TO: Carl L. Blum
Planning Division

Attention Rene Villa-Agustin

FROM: Gary Hartley Brian Scanlon
for Waterworks and Sewer Maintenance Division

DRAFT ENVIRONMENTAL IMPACT REPORT
FOR SUNSHINE CANYON LANDFILL EXPANSION

As requested we have reviewed the subject Draft Environmental Impact Report (DEIR). The proposed expansion will not have any significant impact on Sewer Maintenance facilities or operations. 39

Thank you for the opportunity to comment on this project. If you have any questions, please contact Mr. Tim Hampton at extension 7173.

TH:jl W-9 (SM 971)

bc: Hartley, Scanlon, Khojasteh, Hampton, File (EIR Review)

II G

June 1, 1989

TO: Carl Blum
Planning Division

FROM: A. H. Keim
Traffic and Lighting Division

DRAFT ENVIRONMENTAL IMPACT REPORT (APRIL 1989)
SUNSHINE CANYON LANDFILL
CITY OF LOS ANGELES

As requested, we reviewed the revised traffic study prepared for the proposed expansion of the Sunshine Canyon Landfill. The proposed project, located southwest of the Golden State and Antelope Valley Freeways interchange, consists of the expansion of the landfill from its current capacity of 6,600 tons of refuse per day to 17,500 tons per day.

The report projected that the project would generate an additional 3,180 truck trips per day. However, it does not analyze the impact on the structural section of County roadways as requested in our December 28, 1987 memo (attached). 40

We, therefore, recommend the report address the project's impact on the structural section of Sierra Highway and The Old Road in the unincorporated County area.

If you have any questions, please contact our Traffic Studies Unit at 5909.

PTC:as/L
T-2

Attach.

cc: Roger W. Burger
Land Development Division (2)

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (818) 458-5100

THOMAS A. TIDEMANSON, Director
CECIL E. BUGH, Chief Deputy Director
MAS NAGAMI, Assistant Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

July 6, 1989

IN REPLY PLEASE REFER TO FILE: T-2
850.27.14

Mr. James E. Hartl, Director
Department of Regional Planning
County of Los Angeles
320 West Temple Street

II H

Attention Mr. Frank Kuo
Impact Analysis Section

Dear Mr. Hartl:

ADDITIONAL INFORMATION
SUNSHINE CANYON LANDFILL
CITY OF LOS ANGELES

We have reviewed additional information concerning the increase in truck traffic on County roads as provided by the developer of the subject project.

We agree that the increase in truck traffic will not have a significant impact on the structural section of Sierra Highway and The Old Road in the unincorporated County area. No additional information is required.

40a

If you have any questions, please contact our Traffic Studies Unit at (818) 458-5909.

Very truly yours,

T. A. TIDEMANSON
Director of Public Works

Roger W Burger

ROGER W. BURGER
Deputy Director

PTC:sl

COUNTY OF LOS ANGELES • DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL HEALTH / HEALTH FACILITIES
SOLID WASTE MANAGEMENT PROGRAM
2615 SOUTH GRAND AVENUE ROOM 450 • LOS ANGELES, CALIFORNIA 90007 • (213) 744-3261

III

May 11, 1989

L.A. County Department of Regional Planning
Impact Analysis Section
320 West Temple Street
Los Angeles, Ca. 90012

Attention: Frank Kuo

RE: Preliminary Draft Environmental Impact Report (PDEIR) - Project 86-312 (Sub-Plan Amendment and Oak Tree Permit), Conditional Use Permit 2556-Sunshine Canyon Landfill Extension

Dear Sirs;

The staff of the Solid Waste Management Program (SWMP) have reviewed the most recent version of the PDEIR and have found that all the concerns of the SWMP regarding the prior version have been satisfactorily addressed. 41

Furthermore, we believe that the authors of the document have done an exceptionally good job in its content and presentation. They appear to have exceeded CEQA requirements relative to the extent of technical detail used to describe some of the proposed environmental controls, which, perhaps, would be more appropriately contained within the Report of Waste Discharge and Report of Disposal Site Information required later in the permitting process by the Regional Water Quality Control Board and the Local Enforcement Agency. 42

If you have any questions regarding this matter please contact myself or Richard Hanson of my staff at (213) 744-3261.

Sincerely,

Charles W. Coffee
Director, Solid Waste Management Program

CWC: dh

WASTEWATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road / Whittier, California
Mailing Address: / P. O. Box 4998, Whittier, California 90607-4998
Telephone: (213) 699-7411 / From Los Angeles (213) 685-5217

CHARLES W. CARRY
Chief Engineer and General Manager

May 26, 1989
File No. 31R-10.10

Mr. Frank Kuo, AICP
Supervising Regional Planner, Section Manager
Impact Analysis Section
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

IV

Mr. Frank Kuo:

Preliminary Draft Environmental Impact Report (PDEIR)
Sunshine Canyon Landfill Extension

The Sanitation Districts' staff has reviewed the above referenced PDEIR and offers the following comments:

1) The subject document fails to adequately discuss the potential cumulative impacts of the proposed Sunshine Canyon project with other probable future solid waste projects, specifically the six potential landfill sites (Blind Canyon, Browns Canyon, Elsmere Canyon, Mission Canyon, Sullivan Canyon, Towsley Canyon and Toyon Canyon) identified in the Solid Waste Management Action Plan adopted by the Board of Supervisors and the Sanitation Districts' Boards of Directors last year. A Notice of Preparation for a Program EIR on the Action Plan and the six sites was circulated by the Sanitation Districts in December, 1988. Guidance on dealing with Cumulative Impacts provided by the Resources Agency (California EIR Monitor, Vol. 12, No. 1, February, 1985) indicates that "probable future projects" to be evaluated should include projects undergoing environmental review for which the lead agency possesses specific knowledge concerning the nature of the project. Clearly this is the case for the County of Los Angeles in regard to the six potential landfill sites identified in the Action Plan. It is also clear that since the PDEIR makes numerous references to the and studies upon which the Action Plan was based, that the project proponent was also aware of the status of these potential sites. The potential cumulative impacts in the areas of traffic, biology and air quality should be addressed for all probable solid waste projects. **43**

2) The subject document fails to adequately discuss a reasonable range of alternative sites and waste management methods to the proposed use of Sunshine Canyon, which could attain the basic objectives of the project. The Resources Agency (California EIR Monitor, Vol. 14, No. 1, March, 1988) in discussing recent court decisions indicates that a comparative analysis of sufficient detail and specificity to permit a comparison of the potential impacts of the proposed project and the alternatives is an important component to the successful completion of the environmental review of a major project. A reasonable range of alternative sites and **44**

methods should include at a minimum all six potential landfill sites and a reasonable assumption regarding the implementation of waste diversion strategies identified in the Solid Waste Management Plan adopted by the Board of Supervisors in April, 1988.

3) The subject document does not address historical/cultural resources for the Sunshine Canyon Project, yet raises that very issue when discussing Elsmere Canyon (see page 275). The project proponent should contact Native American representatives about cultural resources of Sunshine Canyon in order to address this issue. 45

4) The existing Sunshine Canyon Landfill is the only major landfill in the metropolitan area which does not have weigh scales to accurately determine the quantity of refuse which it handles. It is recommended that if this proposed expansion is approved one of the conditions of the conditional use permit require that the operator construct weigh scales and maintain accurate weight measurements of all waste received at the site. 46

5) Table 1, Page 33 should be updated to 1989. Under the heading "Operator" the Sanitation Districts should be listed in place of L. A. County for the Calabasas, Puente Hills, Scholl Canyon and Spadra Landfills. 47

6) On Page 43, the quantity of daily and final cover have been reversed. 48

If you have any question concerning this matter, please contact the undersigned at the above listed number.

Very truly yours,

Charles W. Carry

Donald S. Nellor
Planning/Engineering Section Head
Solid Waste Management Department

DSN:rm

cc: David Yamahara, Department of Public Works

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063
(213) 267-2481

L.A. COUNTY
'89 MAY 22 AM 10:41

DEPARTMENT OF
REGIONAL PLANNING

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

May 10, 1989

V

Frank Kuo, AICP
Impact Analysis
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Dear Mr. Kuo:

SUBJECT: ENVIRONMENTAL IMPACT REPORT — SUNSHINE CANYON EXTENSION PROJECT #86-312, CUP #2556 — SUB-PLAN AMENDMENT AND OAK TREE PERMIT — (STATE CLEARING HOUSE NUMBER 84082908)

Our evaluation of the impact on fire protection and paramedic service for the proposed development is based on the current level of service available within the general area. With this in mind, additional manpower and equipment may be required as the need arises. 49

The Sunshine Canyon Sanitary Landfill currently lies totally within the City of Los Angeles. The proposed initial extension, which is adjacent to the existing sanitary landfill, is located within the County of Los Angeles. The current area of the existing landfill covers 230 acres. The proposed extension will increase the land area by 100 percent to 460 acres. 50

A FIRE PROTECTION AND EMERGENCY MEDICAL SERVICE AVAILABILITY

The subject development will receive fire protection and paramedic service from the County of Los Angeles Fire Department. Fire Station #73, located at 24875 North San Fernando Road, Newhall, CA 91321, is the jurisdictional engine company for this property.

EQUIPMENT	DISTANCE/MILES	TIME/MINUTES	MEN
Engine 46	3.5	6.0	3
Engine 73	6.25	10.7	4
Engine 273	6.25	10.7	4
Truck 73	6.25	10.7	3
Paramedic Squad 107	8.0	13.7	2

51

B DESIGN AND CONSTRUCTION

The development of this project must comply with all applicable code and ordinance requirements for access, water mains, fire flows and fire hydrants. 52

SERVING THE UNINCORPORATED AREAS OF LOS ANGELES COUNTY AND THE CITIES OF:

AGOURA HILLS
ARTESIA
AZUSA
BALDWIN PARK
BELL
BELLFLOWER
BELL GARDENS
BRADBURY
CARSON
CERRITOS
CLAREMONT
COMMERCE
CUDAHY
DUARTE
GLENDORA
HAWAIIAN GARDENS
HIDDEN HILLS
HUNTINGTON PARK
INDUSTRY
IRWINDALE
LA CANADA FLINTRIDGE
LAKEWOOD
LA MIRADA
LANCASTER
LA PUENTE
LAWNDALE
LOMITA
MAYWOOD
NORWALK
PALMDALE
PALOS VERDES ESTATES
PARAMOUNT
PICO RIVERA
RANCHO PALOS VERDES
ROLLING HILLS
ROLLING HILLS ESTATES
ROSEMEAD
SAN DIMAS
SANTA CLARITA
SIGNAL HILL
SOUTH EL MONTE
SOUTH GATE
TEMPLE CITY
WALNUT
WEST HOLLYWOOD
WESTLAKE VILLAGE
WHITTIER

DESIGN AND CONSTRUCTION - (Continued)
A water supply shall be provided capable of flowing not less than 750 gallons per minute at 20 pounds per square inch residual pressure for a period of not less than 1½ hours. 53

Adequate on-site hydrants shall be installed every 1,000 feet. 54

In addition, a Class II standpipe system shall be provided and located within 200 feet of dumping operations and shall have sufficient 1½ inch hose with a variable fog nozzle to reach all portions of such operations. The standpipe system shall be capable of delivering a fire flow of not less than 250 gallons per minute from water mains of not less than two (2) inches in diameter. 55

Approved access roads shall be provided and maintained at all times around the dumping areas to provide access for firefighting equipment. 56

C FORESTRY DIVISION - STATUTORY RESPONSIBILITIES (Response #1)
The statutory responsibilities of the Forestry Division of the Los Angeles County Department of Forester and Fire Warden include rare and/or endangered species, potential erosion and control of same, biota, and the Oak Tree Ordinance. The Preliminary Draft Environmental Impact Report (PDEIR), Project #86-312 has been reviewed in respect to these reponsibilities. The Los Angeles County Oak Tree Ordinance and Appendix Z, Oak Tree Survey were reviewed under reponse #2. 57

According to the PDEIR, the fill area will ultimately extend into the portion of the canyon located in the city, and this PDEIR addresses the impact of the entire project. The Oak Tree Summary in Appendix Z does not reflect the oak resource found within Los Angeles City nor does the PDEIR address this issue. 58

The effect of expansion into both Los Angeles City and Los Angales County should be addressed at the present time, not in the future. The magnitude of both expansions would have a compounded effect on the vegetation due to the size. The final use of the site and completed landform should be specifically determined prior to possible approval. A "private open space, landscaped, planted, and maintained in a park-like setting" does not return this area to previous conditions. "The only project related unavoidable adverse environmental impact which could remain significant after mitigation is the loss of vegetation and natural habitat". 59

Revegetation should be an attempt to re-establish the native species removed and should not include "new species that are suitable to a sanitary landfill environment". 60

The proposed relocation of the Southern California Edison 66KV line will create an additional impact. This should be fully explained in the EIR, to include new access roads which may be required. 61

SEA 20, "was established as a representative area, within the small dry interior mountain ranges of Los Angeles County, to provide for an assortment of oaks and for gene flow and species movement between the San Gabriel and Santa Monica Mountains". This designation is designed to preserve unique biota resource values and should not be allowed to be reduced in size. 62

Any development should be consistent with the North Los Angeles County General Plan - Santa Clarita Valley Areawide General Plan (December 1983), or the Los Angeles City General Plan. 63

The mitigations suggested on pages #16, #148, and #149, Volume I state that the "Operator will plant oaks off-site through County nursery programs. Measures will be taken to cooperate with the Department of Forester and Fire Warden in upgrading nursery facilities and to provide seed for plantings". This should be clarified as a proposal from BFI. There has been no formal agreement made between BFI and the Depart- ment of Forester and Fire Warden nor has this idea been presented as a potential mitigation measure in our responses to Regional Planning. 64

In order of priority we recommend the no project alternative, followed by the smaller landfill alternative, and finally the unincorporated County area - only alternative. A city - only alternative should be considered in the final EIR. 65

Any approval for expansion will result in the complete loss of vegetative cover and associated ecosystem. This loss cannot be mitigated. 66

FORESTRY DIVISION - OAK TREE SURVEY (Response #2)
We have reviewed the Preliminary Draft Environmental Impact Report (PDEIR) Project #86-312 (Sub-Plan Amendment and Oak Tree Permit), Sunshine Canyon Landfill Extension.

Copies of the Los Angeles County Department of Forester and Fire Warden responses to Regional Planning dated February 2, 1989 and April 7, 1989, (see enclosures) regarding this Oak Tree Permit Request #86-312 should be included in the Oak Tree Issue Section of the EIR. A copy of the Oak Tree Permit application dated May 25, 1989 should also be included. In addition a revised application should indicate 234 acres of Southern Oak Woodland and 8,613 oak trees for removal. 67

We are in agreement with the results of the oak survey conducted by Ralph Osterling Consultants, Inc. His report of March 26, 1989, has been used as the basis for our review. 68

Sampling is designed to provide an estimate with a given standard error. It does not give an exact number, rather it provides a range within which the exact number would fall. The upper range of this survey indicates 8,613 oak trees. This figure is accepted by the Department of Forester and Fire Warden and should be utilized on the Oak Tree Permit application. Our response of April 7, 1989, incorrectly stated 11,888 oak trees. This number was the total stem count taken from a February 23, 1989 Oak Tree Report prior to the addition of extra sample plots. 69

It is standard practice to note any inconsistencies found in the review of an Oak Tree Report. Procedural inconsistencies listed in the April 7, 1989, response are meant for matters of clarification and do not affect the validity of the survey. 70

The Oak Tree Permit as presented April 25, 1988 asks for the complete removal of the Southern Oak Woodland. The loss of an entire ecosystem cannot be adequately mitigated. This removal is also inconsistent with the intent of the Oak Tree Ordinance and should be denied. 71

If the commission decides to grant this Oak Tree Permit, partial mitigation may be rendered by means of: 72

1. The reduction of acreage removed.
2. The preservation of the Douglas Fir/Oak vegetation type.
3. The increased understanding of oaks through studies.
4. The study of potential land use and landform of the expansion area.
5. The inventory and planting of suitable lands to continue the oak species.
6. The development of public education displays regarding oak trees.

As a condition of this permit the health and vigor of all remaining trees should be protected. Future removal of the remaining trees should not be allowed under subsequent applications. 73

If you have any additional questions, please feel free to contact me at (213) 267-2481.

Very truly yours,

P. MICHAEL FREEMAN

Joseph Ferrara

BY
JOSEPH FERRARA
HEAD DEPUTY FORESTER
FORESTRY DIVISION

JF:lc

Enclosures

SHERMAN BLOCK, SHERIFF

County of Los Angeles
Office of the Sheriff
Hall of Justice
Los Angeles, California 90012
(805) 255-1121

May 19, 1989

VI

Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

Attention: Frank Kuo, AICP

Dear Mr. Kuo:

We have reviewed the documents sent to us regarding the Sunshine Landfill Extension. Our primary concern is the illegal dumping that occurs in the unincorporated areas just north of the landfill. It has been our experience that the majority of these illegal dumpers arrive at the dump after hours, and on weekend days. When they find the dump closed, they drive north to our area, dumping their trash just off our rural highways. 74

Our strongest suggestion for mitigation would be to open the landfill seven (7) days-a-week. This would assist tremendously in our efforts to eliminate illegal dumping. It would also reduce state and county expenditures required to clean up the debris. 75

An additional possible mitigation would be to place a large trash bin at the entrance for after-hour dumping. I understand that this may not be practical from the owner's viewpoint, however, it would help to eliminate the serious problem of illegal dumping in the county and city areas north of the landfill. 76

Sincerely,

SHERMAN BLOCK, SHERIFF

Tony F. Welch, Acting Captain
Santa Clarita Valley Station

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION

433 South Vermont Avenue - Los Angeles, California 90020-1975 - (213) 738-2961

Rodney E. Cooper . . . . Director

April 27, 1989

VII

Frank Kuo, Section Manager
Impact Analysis Section
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Dear Mr. Kuo:

Sunshine Canyon Landfill Extension
Preliminary Draft EIR, Project #86312

This Department has the following comments concerning the subject document's treatment of visual impacts on county hiking and riding trails, and impacts on vegetation within the Santa Susana Mountains (Significant Ecological Area 20):

1. Screening and other mitigation measures should be used to minimize the landfill activity's harsh visual impact (see photo on page 245, Vol. I) on hikers and horseback riders using the trails immediately adjacent to the landfill; and **77**
2. While the document states that a revegetation program will be undertaken, it will take years to replace the mature oak and walnut woodlands destroyed by the project. **78**

This Department appreciates the opportunity to review this project. If you have any questions about these comments, please contact me at (213) 738-2971.

Sincerely,

J. Barber

James Barber
Departmental Facilities Planner II

cc: Jim Park
Joan Rupert

APPENDIX B

Oak Tree Mitigation Plan

OAK TREE MITIGATION PLAN FOR THE SUNSHINE CANYON LANDFILL EXTENSION PROJECT

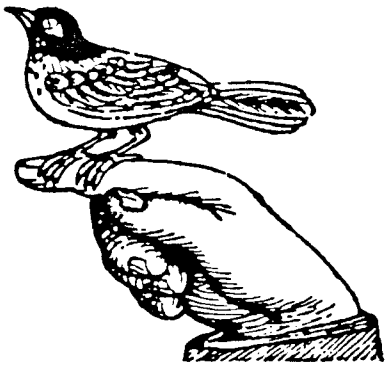
prepared for:

Browning-Ferris Industries, Inc.
Sylmar, California

prepared by:

Ralph Osterling Consultants, Inc.
San Mateo, California

June 22, 1989



RALPH OSTERLING
CONSULTANTS, INC.
PHONE (415) 573-8733
1650 BOREL PLACE SUITE 204
SAN MATEO, CA 94402

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Introduction

Browning-Ferris Industries, Inc. of California (BFI) owns and operates the Sunshine Canyon Sanitary Landfill located in Sylmar, California. The existing facility has been in operation since 1958 and has been owned and operated by BFI since 1978.

Currently, the landfill operates on approximately 230 acres within the Los Angeles city limits. The presently permitted City portion of the landfill is nearing capacity and is scheduled for closure in 1991. BFI is in the process of filing for permits to extend its current operation onto adjacent land it owns within Los Angeles County jurisdiction.

The extension area is located northwest of the existing operation and consists of a series of eastward trending canyons and intervening ridges. Vegetation within the extension area is composed of oak woodlands, chaparral, grasslands and oak/bigcone Douglas-fir woodlands.

As part of the project application process, Los Angeles County requires an Oak Tree Removal Permit before any native oak trees can be removed from the extension area. Los Angeles County's Regional Planning Department is responsible for processing all Oak Tree Removal Permits while the Los Angeles County Fire and Forester Department is responsible for implementing the ordinance and reviewing all Oak Tree Reports and requests. The County's oak tree ordinance (Ord. 88-0157) requires that all trees to be removed,trimmed or impacted be measured and identified in an oak tree report. Another requirement of the ordinance is that each oak tree removed must be replaced on a minimum 2:1 ratio with indigenous oak trees. The ordinance requires maintenance and replacement of dead plants for the first two years following planting. To meet this requirement, BFI will plant 17,226 oak trees and guarantee their survival with maintenance for a five year period.

Due to the rugged terrain, the large area, and the number of trees to be counted, a proposal to conduct a statistical sampling of the oak trees was submitted to the Los Angeles County Fire and Forester Department. The Department determined that the statistical sampling was in compliance with the Oak Tree Ordinance and accepted the proposal on October 17, 1988. The final Oak Tree Report dated March 26, 1989 was accepted on May 10, 1989.

The sampling program indicated a mean of 7,741 oak trees within the County extension area with a lower and upper range ($\pm$ 10%) of 6,870 and 8,613 oak trees, respectively. The high range (8,613 trees) was accepted by the County Fire and Forester Department as

the number to be used for mitigation purposes. This is the maximum number of oak trees to be removed over the 50 year life in the County project area.

Objectives

BFI will guarantee a 2:1 oak tree replacement and the successful establishment of 17,226 oak trees at the end of the first five year period. Table 1 illustrates the tree removal/replacement schedule. Mitigation sites will be planted and replanted, as necessary, until the minimum survival of 17,226 oak trees is attained. Planting sites will be selected to provide the greatest potential for oak tree growth and survival. In addition, drip irrigation and regular maintenance will be provided to ensure successful plant growth and establishment. All 17,226 oak trees will be planted by the end of the third year following permitting of the extension area. By the end of landfill operations, the initial mitigation planting will have developed into 50 year old, sexually mature, seed producing trees, capable of self perpetuation.

This mitigation plan provides detailed plans for on-site and off-site replacement of trees and related habitat lost due to the construction of the proposed project. This includes identifying potential mitigation sites on which to plant a total of 17,226 oak trees (2:1 guaranteed replacement) plus added bigcone Douglas-fir (Pseudotsuga macrocarpa) and grasslands, and technical specifications for the installation and maintenance of the trees. Graph 1 illustrates the removal/replacement schedule for the oak trees.

Mitigation Site Characteristics

Successful implementation of this mitigation plan requires that mitigation sites possess topographic and site characteristics conducive to the growth and establishment of coast live oak (Quercus agrifolia) and canyon live oak (Quercus chrysolepis) trees. One of the most important physical characteristics is aspect. Aspect is the direction or exposure towards which a slope faces. In most instances, natural stands of native oak trees within the Los Angeles area are found growing on north and east facing slopes. These aspects have cooler, moister environments than south and west exposures. Moisture deficiencies during establishment can be overcome on the drier aspects with drip irrigation. However, preference will be given to north and east aspects when selecting mitigation sites on moderate to steeply sloping sites.

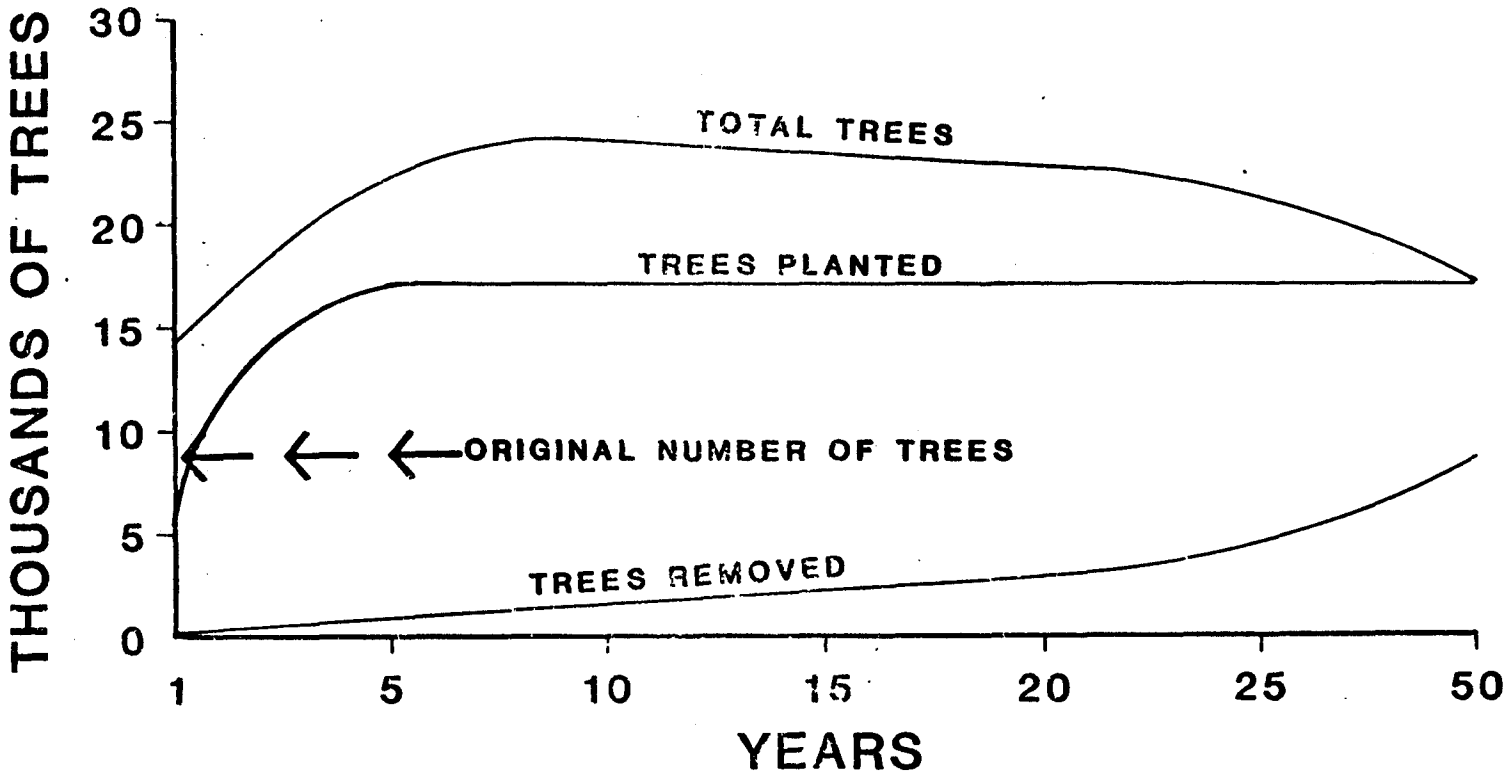
All mitigation sites will be located within ownerships that preclude land development and removal of oak tree plantings at any

TABLE 1
TREE REMOVAL/REPLACEMENT SCHEDULE

YEAR	NUMBER OF EXISTING TREES TO BE REMOVED (VARYING AGES)	TOTAL NUMBER OF NEW TREES PLANTED (YEARS 1 - 3; 17,226)	TOTAL INVENTORY OF TREES
1	176	5742	14179
5	851	17226	24988
10	1801	17226	24037
15	2354	17226	23484
20	2973	17226	22865
25	3677	17226	22162
50	8613	17226	17226

NOTE:
THE TOTAL NUMBER OF TREES TO BE REMOVED IS BASED ON THE HIGH RANGE OF A SAMPLE ESTIMATE (8,613 TREES). THE ACTUAL NUMBER OF TREES REMOVED MAY BE LESS THAN 8,613. HOWEVER, MITIGATION IS BASED ON THE ASSUMPTION THAT A TOTAL OF 8,613 TREES WILL BE REMOVED. REPLACEMENT IS BASED ON A GUARANTEED SURVIVAL REPLACEMENT OF A 2:1 RATIO (8,613 X 2 = 17,226 REPLACEMENT TREES).

SUNSHINE CANYON OAK MITIGATION
TREE REMOVAL/REPLACEMENT



GRAPH 1

RALPH OSTERLING
CONSULTANTS, INC.

future date. In most cases this includes state, federal, or municipal lands. However, private land can be considered provided deed restrictions ensure protection of the plantings in perpetuity.

Mitigation Site Locations

Offsite mitigation locations are being actively explored with suggestions and guidance from the Los Angeles County Fire and Forester Department, State of California Department of Water Resources, California State Parks and Recreation Department, U.S. Department of the Interior, National Park Service, Mountain Conservancy Foundation, and the Santa Monica Conservancy. Tentative offsite locations that are under consideration include:

1. Van Norman Reservoir
2. Rim of the Valley Trail corridor
3. Pyramid Lake
4. Placerita Canyon Visitor Center
5. Del Valle Park
6. Lake Hughes and Castaic project area
7. Interstate 5 along Five Mile Grade
8. Other County Parks

In addition to exploring publicly owned off-site locations for oak plantings, the applicant is investigating the possibility of oak planting in the dedicated open space, recreational and greenbelt areas of private large-scale residential and commercial land development projects.

Onsite planting will be done on the upper slopes between the upper limit of the proposed landfill and the ridgetops. This area presently contains a mature mixture of native oaks and big cone Douglas-fir. This ridgetop buffer will remain undisturbed by the landfill construction and operation. Mitigation planting will interplant and expand these existing woodland areas plus add a young age class of oak and Douglas-fir trees grown from local seed sources. In addition, work is currently underway to establish a native oak woodland ecosystem within the canyons located southeast of the existing landfill (buffer zone area between the existing landfill and Granada Hills). Establishment of native oak trees within these canyons will create new oak ecosystems in an area where it did not formerly exist.

Seed Source and Species

All seed used for mitigation planting will be from local, southern California seed sources. Two species of oak will be planted; coast live oak, canyon live oak and valley oak. Total tree planting will include a guaranteed 17,226 oak trees. In addition to the required oak tree planting, BFI will also plant bigcone Douglas-fir. Although this species is not protected by ordinance, BFI recognizes

its population is limited within the Los Angeles area. Low elevation variety bigcone Douglas-fir will be planted on the upper slopes of Sunshine Canyon between the upper limit of the proposed landfill and the ridgetop. The species will also be planted at offsite locations that have the appropriate site requirement or existing dwindling populations. Bigcone Douglas-fir when planted will be intermixed with oak trees. Actual numbers of trees to be planted will be determined by the availability of viable seed and the number of trees lost within the County project area.

Planting Stock Sizes

Small planting stock (2"x2"x6" containers with open bottoms) will be used for most planting. Field studies and observations have shown that smaller planting stock is more adaptable to adverse growing conditions and suffers less from transplant shock than does larger sized plant material. In most cases, the smaller sized seedlings will outgrow larger sized plants within a few years after planting. In addition, the smaller plants develop a deep, natural root system that provides better anchorage and drought tolerance. On planting sites with less harsh conditions, larger sized plants may be planted. However, plant container size shall not exceed 5-gallons.

Planting Patterns

Tree planting patterns will be natural in appearance, avoiding geometric patterns. Trees will be planted in groves or scattered clumps in such a way as to imitate the natural patterns of the Southern California oak woodlands.

Deer and Rodent Control

Predation of young seedlings by browsing deer and rodents can prevent successful plant establishment if not controlled. All seedlings will be protected with browse protection screens, animal repellents or a combination of the two.

Planting Specifications

The following specifications will be used for all tree planting projects:

1. A minimum three foot diameter area around each planting spot will be scalped to bare soil to remove all grass and competing vegetation.

2. A planting bench approximately two feet square shall be constructed. The bench will be slightly backsloped to prevent puddling of water around the seedling and to act as a catchment for rainfall.

3. The seedlings or seed spots will be planted in the center of the planting bench. The location of the plant should insure that it will not be inundated by water or buried by soil and rocks moving downslope.

4. The planting hole will be excavated to a minimum depth of 12 inches and backfilled with loose friable soil to the proper depth for the planting stock. This will provide a good medium for root growth and infiltration of rainfall/irrigation water.

5. A 10 gram Agriform fertilizer tablet or approved equal shall be placed in each planting hole. The tablet shall be placed to the side of the root wad at approximately one-half of the root depth.

6. Each plant will be provided with browse protection. Screening material shall be either Vexar tubes or aluminum mesh screen. An animal repellent such as RoPel may be substituted for browse screens.

Planting spots shall be located on 8 to 10 foot centers with random, natural appearing placement. Non-irrigated plants will be installed in the fall after sufficient precipitation has moistened the soil to a minimum depth of 12 inches. All non-irrigated plants will be installed after adequate precipitation has been received. This will allow time for suitable root development prior to the onset of summer drought conditions. The normal planting season for nonirrigated plants ranges between mid November and mid March. Irrigated plants may be planted at any time of the year. During the dry season, all planting spots will be thoroughly wetted before planting.

Maintenance and Monitoring

Continued maintenance of the oak trees will include biannual fertilization with a granular slow release fertilizer, spring and fall weed control, and replacement of dead plants. As the oak stands mature natural mortality is expected as individual trees become larger and require more space. However, the intent of the monitoring program is to assure the successful establishment of the oak trees during the difficult juvenile growth stages. A survival monitoring report, including photographs, will be prepared at the end of each of the first five growing seasons detailing the percentage survival, follow-up recommendations, and remedial actions taken. Reports will be submitted to the Los Angeles County Fire and Forestry Department for their review and recommendations.

Irrigation Specifications

Drip irrigation will be used where it is necessary for plant establishment or to improve growth. When connection to a

pressurized water supply is not available, a gravity fed tank system will be used. This system will use temporary water tanks supplied with water from an outside source. A gravity fed system requires between 46 and 92 feet of elevation difference between the tank and the planting area. This will provide the 20 to 40 psi necessary for proper operation the drip irrigation system (1 foot of head = .43 psi). For pressures above 40 psi a pressure reducing device must be used. Any permits needed for the installation of the irrigation systems will be obtained from the appropriate agencies prior to any installation.

The emitters used in drip irrigation have extremely small openings through which the water passes. These small openings may become clogged if clean water is not used. To assure proper operation a filter must be installed to prevent clogging; the filter must be between 150 and 200 mesh. If line pressures exceed 60 p.s.i., the filter must be installed down stream of the pressure reducing valve to prevent damage to the filter.

Irrigated trees will receive a deep watering with a minimum of 1 gallon of water per week. Standard one-gallon/hour Vortex emitters will be used requiring a minimum watering time of one hour per week. To provide consistent watering schedules, battery operated controllers and electric valves will be used to automate all irrigation systems.

Conventional one-half inch polyethylene tubing will be used for the drip distribution lines. Supply lines will be schedule 40 p.v.c. pipe. Pipe sizing will be dependent upon the number of plants and the amount of water required for each planting area. To reduce line pressure losses tubing lengths will not exceed 500 feet. Tubing will be installed above ground and pinned in place with heavy wire staples. Emitters are to be placed approximated 6-12 inches away from the plant on the uphill side. Wire staples are to be placed 6 inches from the emitter on both sides. Figure 1 provides a typical layout for a drip irrigation system.

Landfill Revegetation

As the new landfill is constructed, the completed slopes will be revegetated with annual and perennial grasses and legumes. Native species will be used where applicable. Providing rapid establishment of a grass cover crop will control gully formation and control wind blown dust from the landfill slopes. In addition, the grasses and legumes will provide wildlife habitat with palatable food and cover for many species of upland wildlife.

Revegetation and erosion control seeding will proceed at the same rate as new land clearing. At any point in time, only the active landfill and the construction area will be unvegetated. To insure successful plant growth and establishment, the cover soils will be sampled and monitored to determine soil nutrient and pH levels.

Laboratory soil analysis recommendations will be used to correct any imbalances. An aggressive soil analysis program is critical for a successful revegetation program. This is especially true when working with relatively unweathered soil materials such as those often used for landfill cover material.

Other Mitigation Programs

Other mitigation programs proposed in addition to the oak tree replacement program are:

1. Inventory of dedicated open space properties (public and private ownerships) to determine the need for oak tree establishment. All candidate areas will be mapped and categorized according to their suitability for oak tree establishment and potential planting expanse.

2. Conduct literature and site specific studies to determine reason(s) for the lack of oak tree regeneration in Los Angeles County. Based on the findings of the study, provide guidelines for site evaluation and techniques for increasing oak tree planting successes and seed crop evaluation.

3. Preserve and enhance the bigcone Douglas-fir/oak vegetation type within the upper canyon and ridgetop areas.

4. The grading limits of the landfill construction area will be marked on the ground including fencing prior to construction activities. These limits will serve as equipment exclusion areas to protect and preserve trees bordering the landfill construction area.

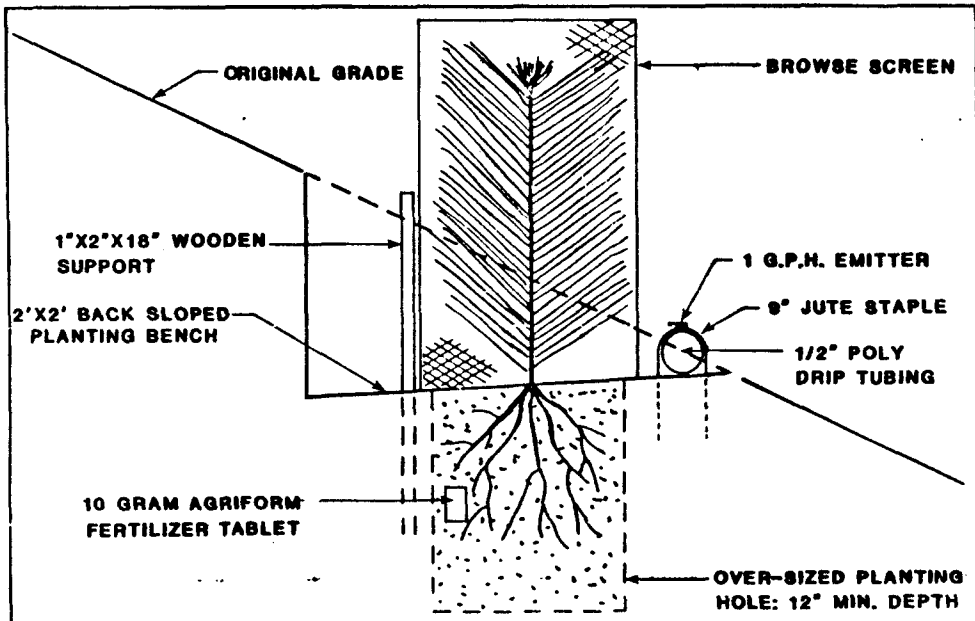
5. As part of a public education program, BFI will coordinate with the Los Angeles County Fire and Forester Department, County Parks and Recreation Department, other museums, and other appropriate agencies, to develop an oak education program. This program will include informative posters and display material that explain the ecology and benefits provided by the native oak trees.

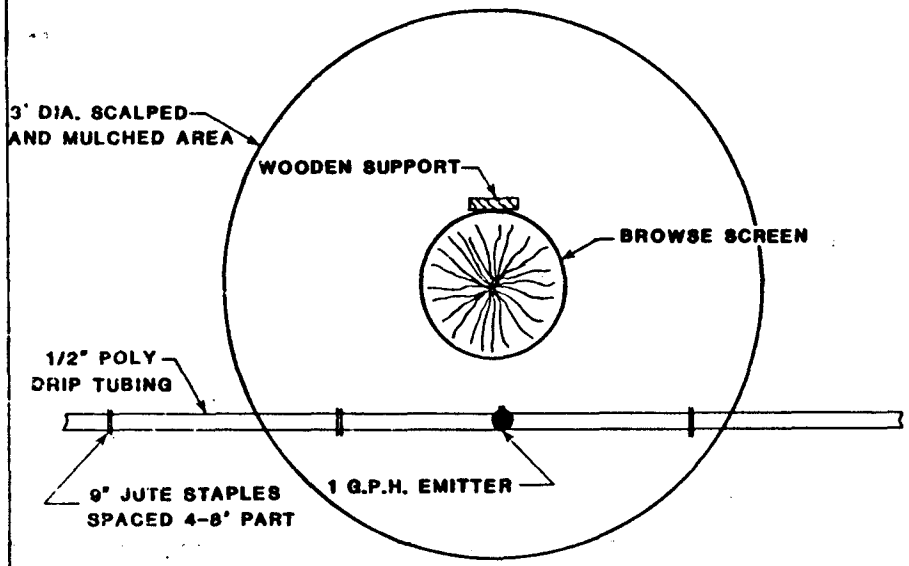
6. Implement a monitoring program to assure the successful establishment of 17,226 oak trees at the end of the first five years. The monitoring program will be carried out by a qualified Registered Professional Forester acceptable to the County Fire and Forester Department. Written reports will be prepared annually showing plant survival, follow up recommendations, and remedial actions taken. Reports will be submitted to the Department for their review and approval.

Summary

The permitted City portion of the Sunshine Canyon Sanitary Landfill is nearing capacity and is scheduled for closure in 1991. BFI is in the process of filing for permits to extend its current operation onto adjacent land it owns within the Los Angeles County jurisdiction. Construction of the landfill extension will result in the removal of a maximum of 8,612 native oak trees. Before these trees can be removed, Los Angeles County Ordinance 88-0157 requires that an Oak Tree Permit must be obtained. A prerequisite to the issuance of a permit is the preparation of an Oak Tree Report. That completed report now identifies the location, and the number of trees to be removed. Due to the rugged terrain, large area, and high number of trees, BFI submitted a proposal to the Los Angeles County Fire and Forester Department to conduct a statistical inventory of the extension area. The Department determined that the statistical sampling was in compliance with the ordinance and accepted the proposal on October 17, 1988. The final Oak Tree Report dated March 26, 1989 was accepted on May 10, 1989.

As mitigation for tree removal the ordinance requires that each tree removed be replaced 2:1 with native oak trees. These replacement trees must be maintained and their survival guaranteed for a period of two years. BFI will plant 17,226 native oak trees and guarantee their maintenance and survival for a period of five years. In addition, BFI will also plant big cone Douglas-fir and revegetation grasses. The tree planting program will plant all 17,226 oak trees during the first three years following issuance of the landfill operation permit. By planting all of the trees during the initial stages of landfill development, the mitigation planting will be sexually mature, seed producing trees by the time the landfill is completed.





Planting techniques will include the following:

1. A minimum 3 foot diameter area around each planting spot will be scalped to bare mineral soil to remove all grass and competing vegetation.

2. A planting bench approximately 2 feet square shall be constructed. The bench will be slightly backsloped to prevent puddling of water around the root collar of the seedling and to act a catchment for rainfall.

3. The seedlings will be planted toward the outer lip of the planting bench. The location of the plant should insure that it will not be inundated by water or buried by soil and rocks moving down slope.

4. The planting hole will be excavated to minimum depth of 12 inches and backfilled with loose friable soil to the proper depth for the planting stock. This will provide a good medium for root growth and infiltration of rainfall and irrigation water.

5. A 10 gram Agriform fertilizer tablet or approved equal shall be placed in each planting hole. The tablet shall be placed to the side of the root wad at approximately one-half of the root depth.

6. To reduce weed and grass competition and to conserve soil moisture, each plant will be mulched with asphalt laminated kraft paper, plastic mulch sheets, or other suitable material.

Where appropriate, the following drip irrigation specification will be used:

7. One drip irrigation emitter shall be placed 4-6 inches from the plant on the outer edge of the planting bench.

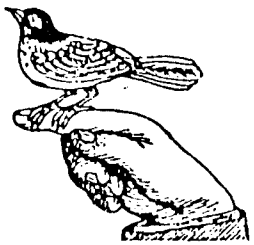
8. The 1/2 inch drip line shall be placed on the outer edge of the planting bench and staked in place with 9 inch jute staples. Staples shall be placed approximately every 4 to 8 feet apart.

9. Sufficient slack shall be left in the 1/2 inch drip line to allow for thermal expansion and contraction.

10. A "Y" type filter with a 250 mesh screen will be used to filter all irrigation water.

TREE PLANTING/IRRIGATION DETAIL

(NOT TO SCALE)



RALPH OSTERLING
CONSULTANTS, Inc.
PHONE (415) 573-8733
1650 BOREL PLACE
SAN MATEO, CA 94402

FIGURE 1

APPENDIX C

Oak Tree Permit Application
and Letters from County Department
of Forester and Fire Warden

REQUEST FOR OAK TREE PERMIT

Los Angeles County DEPARTMENT OF REGIONAL PLANNING 320 West Temple Street, Los Angeles, CA 90012

As provided by Ordinance, 82-0168 effective August 20, 1982

NOTE: It is the applicant's responsibility to notify the Planning Director of any change of the principals involved in this case prior to the completion of processing.

CONCURRENT CASES: Project #SP 86312
Case: CP2556

APPLICANT

Name DAVID H. BREIER
Address 10850 Wilshire Blvd.
Telephone (213) 474-7600

PROPERTY OWNER

Name Browning-Ferris Industries of California, Inc.
Address 215 N. Marengo Ave. Ste. 180 Pasadena, CA 91101
Telephone (818) 791-0914

OWNER'S AUTHORIZATION

I certify that I am the owner of the herein described property and permit the applicant to file this request. [signature]

Location (i.e., address or general description of location) and legal description of property in question: (use additional sheets as necessary)

14747 San Fernando Road, Los Angeles, CA 91342

How many oak trees will be cut, removed, relocated or damaged? 13 acres of riparian Woodland, 186 acres of Southern oak Woodland - see attached vegetatic map

How many oak trees will remain? None

Will trees to be removed be replace? No If yes, indicate the proposed size, type, location (indicate on site plan) and schedule for planting.

Are trees to be relocated? No If yes, identify who will move them and his qualifications for doing this.

BURDEN OF PROOF

Submit additional sheets describing how the following findings will be satisfied.

A. That the proposed construction or proposed use will be accomplished without endangering the health of the remaining trees subject to this Part 16, if any, on the subject property, and

B. That the removal or relocation of the oak tree(s) proposed will not result in soil erosion through the diversion or increased flow of surface waters which cannot be satisfactorily mitigated, and

C. That in addition to the above facts at least one of the following findings apply:

1. That the removal or relocation of the oak tree(s) proposed is necessary as continued existence at present location(s) frustrates the planned improvement or proposed use of the subject property to such an extent that:

   a. Alternative development plans cannot achieve the same permitted density or that the cost of such alternative would be prohibitive, or

   b. Placement of such tree(s) precludes the reasonable and efficient use of such property for a use otherwise authorized, or

2. That the oak tree(s) proposed for removal or relocation interfere with utility services or streets and highways either within or outside of the subject property and no reasonable alternative to such interference exists other than removal of the tree(s), or

3. That the condition of the oak tree(s) proposed for removal with reference to seriously debilitating disease or danger of falling is such that it cannot be remedied through reasonable preservation procedures and practices.

Today's Date: 4/25/88 Applicant's Signature [signature]

Burden of Proof: SP 86312

The property owner has applied for a General Plan Amendment and for a Conditional Use Permit to allow the continuation of its landfill operations onto property within the jurisdiction of the County of Los Angeles. An initial study was completed resulting in a conclusion that preparation of a major Environmental Impact Report was required. The initial study is attached, and the EIR is presently being completed by the Department Environmental Section. The removal of oak trees is comprehesively discussed in the biota section of the Report.

The project involves the filling of Sunshine Canyon with Class III material, and such an operation requires the removal/destruction of all the trees in the canyon. Since the entire canyon will be filled, alternative development plans could not achieve the saving of the trees, and the location of the trees would preclude the use of the canyon for a landfill.

The permit is necessary to allow the continuing landfill operations which in turn will help prevent the exhaustion of landfill capacity in Los Angeles County. Landfill capacity is badly needed in the County and this site is geologically sound, close to urban generators and is virtually isolated from residential uses.

The property owner requests a waiver of the Oak Tree Report since an alternative design is not possible and the filling of the canyon will by necessity require the removal/destruction of all trees.

June 28, 1989

Mr. Frank Kuo
Impact Analysis Section
REGIONAL PLANNING
COUNTY OF LOS ANGELES
320 West Temple, 13th Floor
Los Angeles, CA 90012

RE: AMENDMENT TO REQUEST FOR OAK TREE PERMIT, PROJECT SP86312, CASE CP2556, BROWNING-FERRIS INDUSTRIES OF CALIFORNIA.

Dear Mr. Kuo:

This Amendment and Burden of Proof is to be included with the above project application. This Burden of Proof and Oak Tree Report complete the Request for Oak Tree Permit.

Should you or others have questions, please feel free to call at your convenience.

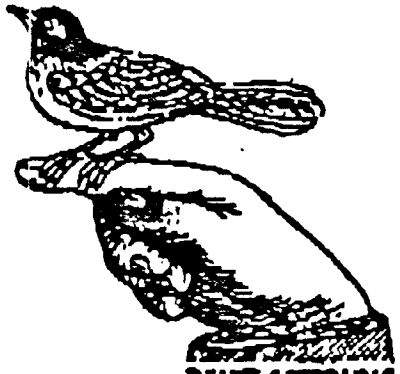
Respectfully,

Ralph B. Osterling,
President

RSO:js

Enclosures
via: Federal Express

cc: J. Aidukas, Browning-Ferris Industries
P. Cohen, Ultrasystems, Inc.



RALPH OSTERLING
CONSULTANTS, INC.
PHONE (415) 573-8738
1650 BOREL PLACE
SAN MATEO, CA 94402

June 27, 1989

RE: AMENDMENT TO REQUEST FOR OAK TREE PERMIT, PROJECT SP86312, CASE CP2556, BROWNING-FERRIS INDUSTRIES OF CALIFORNIA.

Burden of Proof:

The property owner has applied for a General Plan Amendment and for a Conditional Use permit to allow the planned extension of the Sunshine Canyon landfill operations. This extension of operation, including 234 acres of oak woodland, falls within the jurisdiction of the County of Los Angeles. The environmental impact report has been prepared regarding this project. Included as part of the EIR and this application is a detailed and comprehensive oak tree mitigation plan. This plan recognizes the value of oaks, the intent and covenants of the ordinance and when implemented will mitigate the impacts of implementation of this project. Replanting on site is not possible due to the filling operations. All fill materials will be revegetated with selected species for soil stabilization and habitat development.

Over the course of the projected fifty year life of the project, a maximum of 8,613 oaks will be removed, as inventoried and documented in the Oak Tree Report dated March 26, 1989. This inventory and report was accepted by the County of Los Angeles Department of Forester and Fire Warden on May 10, 1989. This amounts to 173 trees per year, average. The mitigation plan calls for replanting with guaranteed survival double that total number of oak trees within the first five years of project development. Oak tree plantings will be focused in areas that have had or can support ecosystems of oaks that will be biologically meaningful and accessible to the public. Planting schedules will include additional trees beyond the required 17,226 to allow for natural mortality and possible predation. Table 1 of the Oak Tree Report details the removal rate over 50 years and the replacement rate over the initial 3 year period. The criteria set forth within the plan limits the planting to suitable sites on public property or other properties suitable for perpetual oak growth. The project proponent proposes to replant the oak trees at a greater than 2:1 ratio with a guaranteed tree establishment for the total 17,226 trees. Included within this five year program is a maintenance and monitoring program to assure that all trees will be surviving and capable of producing subsequent stands of oaks. On-site plantings will be concentrated adjacent to the Granada Hills residential area and on the ridge top areas above the clearing limits within the proposed extension area. Both areas are identified as open space.

In addition, a public information program including educational material and displays depicting the value of oaks, the life cycle and oak enhancement is proposed. Albeit that many trees are being removed within the project area, at the end of the fifty year period double the number of trees will be growing on a variety of sites suitable for public appreciation.

RALPH OSTERLING CONSULTANTS, INC.

1

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063
(213) 267-2481

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

April 7, 1989

Frank Kuo, Section Head
Impact Analysis
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Attention Austin Roy Munger

Dear Mr. Kuo:

SUBJECT: OAK TREE REPORT #86-312 (BROWNING-FERRIS INDUSTRIES)

Oak Tree Permit Case #86-312 is located at 14747 San Fernando Road, Los Angeles.

Foresters of the Los Angeles County Department of Forester and Fire Warden have reviewed the Oak Tree Report and request prepared December 30, 1988, by Ralph Osterling Consultants, Inc. A field inspection of thirty 1/5-acre sample plots randomly selected by computer was conducted to verify the accuracy of the field data collected by Ralph Osterling Consultants, Inc. The Oak Tree Report field measurements and tree evaluations required by the County Oak Tree Ordinance were found to be accurate and true.

The following inconsistencies were however noted:

(1) Vegetative typing accuracy and field checks of vegetation types.

(2) Compass magnetic declinations used to determine plot boundaries and mark plot centers.

(3) Field location of plot centers in relation to the topographic map of plot centers provided.

(4) Locations of measurable plots in relation to plot centers.

These problems mixed with the highly variable makeup of the oak resource may have resulted in unrealistic oak tree estimates. At best, this provides us with an estimate of 11,888 oak trees. This figure can be used

in developing mitigation measures. However, the significant aspect of this permit is the request to remove all the oak trees in the area of the proposed landfill expansion. At a minimum, this project will permanently remove 234 acres of the oak ecosystem. This is inconsistent with the intent of the County Oak Tree Ordinance. We recommend denial of this Oak Tree Permit as presented. The nature of the expansion project precludes leaving scattered trees, however the size of the area being removed and the lack of intent to preserve the oaks support our recommendation.

If sufficient "Burden of Proof" is provided to prevent this denial, we suggest limiting the expansion to individual canyons or below a given elevation to ensure the preservation of the Douglas Fir/Oak vegetation type.

Loss of an entire ecosystem cannot be adequately mitigated. If the commission decides to grant this oak tree permit request, we would like to meet and discuss possible measures in the areas of increased understanding of the native oaks, potential land use of expansion areas, inventory and planting of suitable lands to continue the oak species, and public education displays.

The conditions placed on the remaining trees will be dependent upon the number and location.

The Oak Tree Permit Request should be amended to indicate the change from 186 to 234 acres of Southern Oak Woodland and to reflect the estimate of 11,888 oak trees for removal.

Additional questions may be directed to Deputy Forester Mike Wilkinson at (213) 267-2481.

Very truly yours,

P. MICHAEL FREEMAN

Joseph Ferrara

BY
JOSEPH FERRARA
HEAD DEPUTY FORESTER
FORESTRY DIVISION

JF:lc

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063
(23) 267-2481

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

February 2, 1989

Roy Munger
Impact Analysis Section
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Dear Mr. Munger:

SUBJECT: OAK TREE PERMIT #86-312

We have reviewed the Oak Tree Permit Case #86-312 filed by Browning-Ferris Industries.

The Oak Tree Permit as submitted fails to meet the ten percent sample required per our agreement on sampling techniques dated October 17, 1988.

Deputy Forester Mike Wilkinson has contacted Ralph Osterling and Doug Nicks of Ralph Osterling Consultants, Inc., regarding this matter. Mr. Nicks stated that they would request Hammon, Fensen, & Wallen to select additional sample plots to meet this ten percent sample. In addition, information on plots D-7 and F-2 is missing or in error.

Upon receipt of this additional information we will proceed with our review.

Questions may be directed to Deputy Forester Mike Wilkinson at (213) 267-2481.

Very truly yours,

EARL E. FORDHAM, ACTING FIRE CHIEF

BY Joseph Ferrara
JOSEPH FERRARA
HEAD DEPUTY FORESTER
FORESTRY DIVISION

JF:lc

APPENDIX D
Additional Boring Logs to Supplement Appendix B of Volume IIA

Core Barrel and Bit Design

Job Name: Geotechnical Study
Location: Sunshine Canyon
Date Started: 9/24/82
Date Completed: 9/27/82

Hole No. MW-3
Sheet: 6 of 6
Location:
Elevation:
Orientation: Vertical

Fracture Frequency	% Core Recovery	Core Box Number	Depth in feet	Symbolic Log	DESCRIPTION
~	100	9	101		Silty-Sandstone. Conglomerate, gray, pebble to cobble-sized lithic fragments, silty-sand matrix.
			102		Boring terminated at 102.0'

Dames, Moore & Associates
Soil Investigation & Geology

Logged By: J. Johnson
Scale: 1" = 2.5'

Title: FIRURE A-3 (cont'd)

DRILL RIG	BORING ELEVATION	LOGGED BY	PROJECT NO.	BORING NO.
Longyear 44	1500±	DRS	304001	CM-1
DEPTH TO GROUNDWATER 3.7 Ft.	BORING DIAMETER 3.5 In.	DATE DRILLED 08-04-86	SHEET 1 OF 2	

EXPLORATORY BORING LOG

SOIL/ROCK DESCRIPTION—CLASSIFICATION AND REMARKS	CONSISTENCY	GROUP SYMBOL (U.S.C.S.)	WATER LEVEL / GRAPHIC LOG	DEPTH IN FEET	SAMPLE	BLOW COUNTS / FOOT	% MOISTURE CONTENT	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSF)	PLASTICITY INDEX (PI)
SAND, gravelly, coarse-grained, dry, clasts up to 1/4 inch, no fines.	Loose	SP		1 2						
SAND, silty, mottled orange and gray, damp with some clay.	Very Dense	SM	▽	3 4 5		W.L. measured 08-19-86 44				
? ?		?		6		?				?
SANDSTONE, dark gray, dry, fine-grained, moderately hard, micaceous; weathered.		BEDROCK		7 8 9 10 1 2 3 4		26 6"				
CORE RUN NO. 1				15		91% REC.				
SANDSTONE, very dark gray, damp, very fine-grained, micaceous, 45° fractures with clay filling, massive				6 7 8 9 20 1		38% RQD				

PURCELL, RHOADES & ASSOCIATES
FOUNDATION ENGINEERING § SOIL ENGINEERING § GEOLOGY

TITLE
FIGURE A-4 - LOG OF BORING CM-1

SITE / LOCATION: Near site Entrance	BEGUN: 2-6-88	HOLE SIZE: 9 5/8"	ANGLE & BEARING: VERTICAL	BORING NO.: DW-1	
COORDINATES / STATION	COMPLETED: 2-7-88	SAMPLES: 0	CORE REC.-LENGTH/%: —	GROUND EL.: 1340'±	
DRILLING CONTRACTOR: THE WATER DEVELOPMENT CORP.	CORE BOXES: 0	WATER-DEPTH / EL. / DATE: 0.00' / / 6-16-88		TOP OF ROCK-DEPTH / EL.: 27' /	
DRILL MAKE AND MODEL: SPEEDSTAR, AMCA INTERNATIONAL	LOGGED BY: S. R. Clark			BOTTOM OF HOLE-DEPTH/EL.: 210.2' /	

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS/ROD ft	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
Hole advanced using an air rotary casing hammer. Hole drilled in plant area, along main haul road. 13-27' Rig vibrates, slow drilling. DRILL STRING & CASING WERE STEAM CLEANED AT HOLE PRIOR TO BEGIN DRILLING. 33-34' slow drilling, rig vibrates. 36' Encountered water, hole making 5± gpm. 40' End shift @ 1745 hrs on 2-6-88 & begin shift @ 0730 hrs on 2-7-88. 47-49' Rig vibrates. 49-69' Hole making water.	9 5/8"				2		af	0-2' ARTIFICIAL FILL (af): ASPHALT & ROADBASE
							SM	2-27' ALLUVIUM (Qal): 2-13' SILTY SAND (SM): Brown, med. dense, dry.
					10			
					13			
					15		GC	13-15' CLAYEY GRAVEL (GC): Brown, dense, wet, weathered cobbles.
					20		SM	15-27' SILTY SAND (SM): Light brown, very dense, wet, poorly graded, stratified, a few cobbles.
					27			27' Change to saturated.
					50		Tt sl	27-210.2' TOWSLEY FORMATION (Tt): 27-33' SILTSTONE (sl): Dark gray, unweathered, barely hard, wet.
					40		ss	33-69' SANDSTONE (ss): Fine- to coarse-grained, bedded, w/ scattered siltstone & conglomerate interbeds. Gray, unweathered. 33-34' Light gray, hard. Well-graded, contains quartz grains. 34-46' Dark gray, slightly hard. 40' Thin siltstone interbed. 46-47' conglomerate interbed, barely hard, barely strong, extremely friable. 47-49' Dark gray interbed of siltstone, hard. 49-69' Medium-grained, barely hard, barely strong, highly friable.
					50			
					60			
					70		sl	69-74' SANDY SILTSTONE (sl): Gray, unweathered, slightly hard.

PURCELL, RHOADES & ASSOCIATES
Foundation Engineering • Soil Engineering • Geology

BORING LOG

FIGURE: B-6

JOB NO.: 3040-01 | DATE: 7-1-88

DRAWN BY: C. I. Trantham | APPROVED BY: T. D. Affeldt CEG.

FORM 11-4/87

BORING NO. DW-1

REMARKS WATER DATA DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
							Tt / sl	27-210.2' TOWSLEY FORMATION (Tt):
74-93' slow drilling, rig vibrated; hole making water.	9 5/8"							74-93' SANDSTONE (ss): Gray, unweathered, moderately hard. Siltstone interbeds.
					80		ss	
					90			
93-94' Drill Rate 1/30' per minute (1' in 30 min). Casing very difficult to drive below 93'. 96' Bottom of casing - open hole below. 103' Hole making water.	8 1/2"				100		sl	93-140' SILTSTONE (sl): Gray, unweathered, mod. hard. 93-94' Hard, well cemented. 94-105' Thin interbeds of sandstone and conglomerate. 105-106' Hard, well cemented. 106-140' Thin sandstone interbeds, scattered hard siltstone layers less than 3".
					110			
					120			
					130			
140-148' Rig vibrates, slow drilling, unit acts as aquifer.					140		cg	140-148' CONGLOMERATE (cg): Gray, unweathered, mod. hard, mod. friable.
					150		sl	148-210.2' SILTSTONE (sl):

PURCELL, RHOADES & ASSOCIATES
Foundation Engineering • Soil Engineering • Geology

BORING LOG

JOB NO. 3040-01	DATE 7-1-88	FIGURE B-6
DRAWN BY C. I. Trantham	APPROVED BY I. D. Arfeldt, CEG.	2 of 3

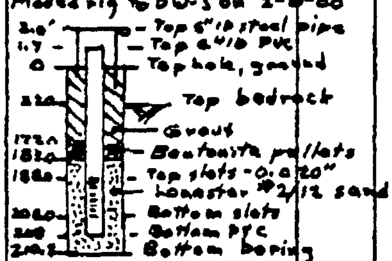
FORM 12-4/87

Recycled paper

BORING NO. DW-1

REMARKS WATER DATA DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
							Tt	27-210.2' TOWSLEY FORMATION (Tt):
	$8\frac{1}{2}$"						sl	148-210.2' SILTSTONE (sl): Gray, unweathered, slightly hard, slightly strong.
								148-154' Thin interbeds of conglomerate.
					160			
168-170' slow drilling. 170-193' Fast drilling.					170			168-170' Hard, well cemented
								176' Thin interbed of sandstone/conglomerate.
					180			
					190			
194-197 Fast drilling.								193-194' Hard, well cemented.
197-210.2' Rig vibrates, slower drilling.					200			197-210.2' Thin interbeds of hard siltstone.
					210.2			BOTTOM OF HOLE Depth – 210.2' Elev –

Groundwater monitoring well installed on 2-26-88
Moved rig to DW-3 on 2-?-88



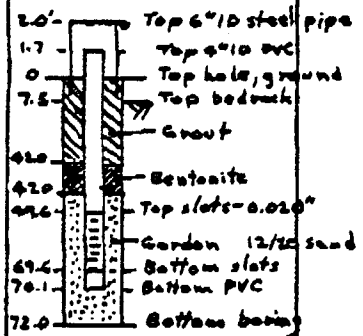
NOT TO SCALE

PURCELL, RHOADES & ASSOCIATES
Foundation Engineering • Soil Engineering • Geology

JOB NO. 3040-01	DATE 7-1-88	BORING LOG	FIGURE B-6
DRAWN BY C. I. Trantham	APPROVED BY I. D. Amelio CEG		3 of 3

SITE / LOCATION: Near methane recovery pad	BEGUN: 3-3-88	HOLE SIZE: 9 5/8"	ANGLE & BEARING: VERTICAL	BORING NO.: DW-2	
COORDINATES / STATION:	COMPLETED: 3-4-88	SAMPLES: 0	CORE REC.-LENGTH / %	GROUND EL.: 1515 ±	
DRILLING CONTRACTOR: THE WATER DEVELOPMENT CORP.	CORE BOXES: 0	WATER-DEPTH / EL. / DATE: 25.25' /	/6-16-88	TOP OF ROCK-DEPTH / EL.: 7.5' /	
DRILL MAKE AND MODEL: SPEEDSTAR, AMCA INTERNATIONAL	LOGGED BY: K. P. Johnson			BOTTOM OF HOLE-DEPTH/EL.: 72.0' /	

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
Hole advanced using an air rotary casing hammer. Material classification based on cuttings. 7.5-24' Fast drilling. 24-72 Somewhat slower drilling. 30-31' Slow drilling. 31' Drive shoe bent inward, pulled and replaced shoe. End shift on 3-3-88 & begin shift on 3-4-88 w/ 2' of water in hole. 50-72' Rock is wet to saturated.	9 5/8"				7.5		Qal ML	0-7.5' ALLUVIUM (Qal): SANDY SILT (ML): Medium brown, med. stiff, dry 5' change to damp.
					10			7.5-72.0' TOWSLEY FORMATION (Tt): Fine-grained w/ scattered medium-grained interbeds and mudstone/siltstone interbeds. 7.5-10' Medium brown, moderately weathered, barely hard, dry. 10-24' Gray & brown gray, slightly weathered, barely hard, slightly strong.
					20			
					30			24-72' Gray, unweathered, slightly hard, slightly strong. 24-34' Light gray. 30-31' Hard, well cemented. 34-72' Medium gray.
					40			
					50			50' change to wet.
					70			
					72.0			BOTTOM OF HOLE Depth - 72.0' Elev -



NOT TO SCALE

BREAK IN SCALE

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BORING LOG

FIGURE B-7

JOB NO.	DATE
3040-01	7-1-88

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C. I. Trantham	I. D. Rhoades

FORM 11-4/87

SITE / LOCATION: Near methane recovery pad	BEGUN: 2-13-88	HOLE SIZE: NX	ANGLE & BEARING: VERTICAL	BORING NO.: DW-2C
COORDINATES / STATION:	COMPLETED: 2-24-88	SAMPLES: 0	CORE REC.-LENGTH / %: 165.7' / 235.0' = 71%	GROUND EL.: 1515'±
DRILLING CONTRACTOR: WATER DEVELOPMENT CORP.	CORE BOXES: 18	WATER-DEPTH / EL. / DATE:		TOP OF ROCK-DEPTH / EL.: 2.0' /
DRILL MAKE AND MODEL: CME-750	LOGGED BY: S.R. Clann, D.W. Norman, C.I. Trantham			BOTTOM OF HOLE-DEPTH/EL.: 237.0' /

REMARKS (WATER DATA, DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
Scott Irwin – Driller Mike Lindberg – Helper	NX WIRE LINE CORING	0%	2.0' RUN 1 D-5.0', C-1.9', CL-3.1', %-38, LP-0.2' 7.0'		0		Qal MH	0-12' ALLUVIUM (Qal) CLAYEY SILT (MH): Brown, medium stiff, dry, minor sand.
		0%	RUN 2 D-5.0' C-0.0 CL-5.0' %-8 LP-0 12.0'		5 10 12	BOX 1	MH	
		84% / 5.0'	RUN 3 D-5.0' C-1.0' CL-4.0' %-20 LP-0.9 17.0'		15			12-237.0' TOWSLEY FORMATION (Tt): SANDSTONE (ss): Fine-grained w/ scattered med-grained interbeds and a few mudstone interbeds. Predominantly subangular, white quartz, black rock fragments, and a few yellow green mineral grains in a finer matrix. Typically the coarser sandstone is more friable. Bedding layers spaced 1mm to approx. 4ft, typically 1-4" (closely bedded). Bedding dips 0-65°, cross bedding locally.
		24% / 5.0'	RUN 4 D-5.0' C-1.9' CL-3.1' %-38 LP-0.7 22.0'		20			12-20' Gray brown, moderately weathered, slightly hard, slightly strong; HCl Reaction-none. Drills to average 0.1', max. 0.4' cores. 16.1' Fracture dip 30, 1mm gypsum? filling, oxidized.
		46% / 5.0'	RUN 5 D-5.0' C-4.0' CL-1.0' %-80 LP-1.1' 27.0'		25			20-237' Gray, unweathered, slightly hard, slightly strong; HCl Reaction-none to strong but typically none except local areas. Drills to average 0.5', max. 3.3' cores. Coarser sandstone is typically mod. to extremely friable. 22-25' Slight increase in grain size.
		74% / 5.0'	RUN 6 D-5.0' C-4.7' CL-0.3' %-94 LP-3.3' 32.0'		30	BOX 2		25.5-27.6' Drills to average 0.1' cores, slakes. 32-37' Slight increase in grain size, locally medium-grained; HCl Reaction-moderate; locally highly friable.
		0%	RUN 7 D-5.0' C-1.3' CL-3.7' %-26 LP-0.3'		35	46.5'		

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FIGURE B-8

JOB NO.	DATE
3040-01	7-1-88

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C.I. Trantham	T.D. Affeldt, CEG.

FORM 11-4/87

BORING NO. DW-2C

REMARKS (WATER DATA, DRILLING DATA)	TOOL SIZE / WATER TEST	$\frac{\text{B-ONE}}{\text{RQD \%}}$	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
	NX	0%	RUN 7, D-5.0', C-1.3', 37.0'		35	BOX 2	12 - 237.0' TOWSLEY FORMATION (Tt): SANDSTONE (ss): 20-237' Gray, unweathered.
37.0-52.5' WATER TEST #18 No take.		3.3'/5.0', 66%	RUN 8, D-5.0', C-4.0', CL-1.0', %-80, LP-0.7', 42.0		40	40.5'	40-59' Interbeds (1mm-1ft) of light gray, slightly larger grain sizes - locally to med.-grained; local areas highly friable.
		1.6'/5.0', 32%	RUN 9, D-5.0', C-1.8', CL-3.2', %-36, LP-1.6', 47.0'		45	BOX 3	41.5-42' Light gray, mod. hard, mod. strong, calcareous cement, HCl Reaction - very strong, mod. hard, mod. strong. 40-47' Predominantly medium-grained.
42.0-67.5' WATER TEST #17 No take.		3.1'/5.0', 62%	RUN 10, D-5.0', C-3.1', CL-1.9', %-62, LP-1.1', 52.0'		50		
		3.0'/5.0', 60%	RUN 11, D-5.0', C-4.8', CL-0.2', %-96, LP-1.9', 57.0'		55	56.0'	
		2.5'/5.0', 50%	RUN 12, D-5.0', C-3.8', CL-1.2', %-76, LP-1.1', 62.0'		60	BOX 4	58.5' HCl Reaction - strong (local?). 59.0' Fracture dip 60°, barely rough. 59.8' Fracture dip 30°, barely rough. 60.0' Fracture dip 75°, mod. rough.
		0%	RUN 13, D-5.0', C-0, CL-5.0', %-0, LP-0', 67.0'		65		62-77' Light gray, slightly larger grain sizes & locally medium-grained; HCl Reaction strong locally; core washes to slightly smaller size - sl. & mod. friable, locally highly friable.
		0.4'/5.0', 8%	RUN 14, D-5.0', C-2.3', CL-2.7', %-46, LP-0.4', 72.0'		70		
		0%	RUN 15, D-5.0', C-0, CL-5.0', %-0, LP-0'		75	75.5	

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FIGURE B-8

JOB NO. 3040-01	DATE 7-1-88
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BORING NO. DW-2C

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS / RQD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG
		0%	RUN 15 D-5.0' C-0 77.0'		75	BOX 4	
	NX	4.8'/5.0' 96%	RUN 16 D-5.0' C-5.0' CL-0 %-100 LP-2.4' 82.0'		80	78.5'	f55 f55 f30 f85 f44 f50 f70 25° f35
		2.6'/5.0' 52%	RUN 17 D-5.0' C-2.9' CL-2.1' %-58 LP-1.1' 87.0'		85	BOX 5	f65 f62 f68 f5
Run 18 Drill Rate 1 ft/min (5 ft in 5 min).		0%	RUN 18 D-5.0' C-0 CL-5.0' %-0 LP-0 92.0'		90		
Run 19 Core sticks to innertube. WATER TEST DATA #10 95.0-110.5' #11 90.0-105.5' #12 85.0-100.0' #13 72.0-87.5' #14 62.0-77.5' #15 57.0-72.5' #16 52.0-67.5 Unable to seat packer on tests #8-#16.		1.0'/5.0' 20%	RUN 19 D-5.0' C-2.8' CL-2.2' %-56 LP-0.5' 97.0'		95	97.0'	f80 f55 f70 f18 f66 f40 f45 f25 f45
		3.2'/5.0' 64%	RUN 20 D-5.0' C-3.5' CL-1.5' %-70 LP-1.6' 102.0		100	BOX 6	f60 f20 f50 f65 f54
		2.3'/5.0' 46%	RUN 21 D-5.0' C-2.9' CL-2.1' %-58 LP-0.9' 107.0'		105		f50 f40 f60
107.0-122.5' WATER TEST #8 Unable to seat packer.		3.7'/5.0' 74%	RUN 22 D-5.0' C-5.0 CL-0 %-100 LP-1.7' 112.0'		110	110.0'	f65 f48 f35 f50 f60 f40 f15 f80
107.5-117.5' WATER TEST #9 Unable to seat packer.		1.0'/5.0' 20%	RUN 23 D-5.0' C-1.0' CL-4.0' %-20 LP-1.0'		115	BOX 7	

MATERIAL CLASSIFICATION

PHYSICAL DESCRIPTION

12-237.0' TOWSLEY FORMATION (Tt):

SANDSTONE (ss):

20-237' Gray, unweathered.

77-83' HCl Reaction - none.

78.2-79.0' Fracture dip 85°, mod. rough.

80.5' Bedding dip 45 w/ slickensided(?), 1mm appkm(?) (Fe?) filling.

80.8' Fracture dip 50°, curved, smooth.

81.4' Fracture dip 70, curved, smooth.

83-88.5' Light gray, slight increase in grain size; locally medium-grained & mod. hard.

85.5' Tight bedding contact dip 65° partially opened on drilling w/ med-grained ss above & mudstone at base; contact plane mod. rough.

86.0' Bedding dip 65° w/ 1/4" seam highly organic mudstone w/ tendency to slake.

97-122' Thin interbeds of light gray, slightly larger grain sizes and locally medium-grained; locally mod. friable; HCl Reaction - none. Locally mod. hard.

102-107' Core washes to smaller diameter, mod. friable to highly friable.

108-109' Drills to average 0.1' controlled by breaks along fractures & bedding.

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JOB NO. 3040-01	DATE 7-1-88		
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BORING NO. DW-2C

REMARKS (Water Data / Drilling Data)	Tool Size / Water Test	Blows / RQD %	Advance / Recovery	Elevation	Depth	Box No. / Sample No.	Material Log	MATERIAL CLASSIFICATION (Physical Description)
		20%	D-5.0' C-1.0' 117.0'		115	BOX 7	35, 40, 40, 30, 30	12-237.0' TOWSLEY FORMATION (Tt): SANDSTONE (ss): 20-237' Gray, unweathered.
121.0-127.5' WATER TEST #7 No take. 121.5-137.0' WATER TEST #6 No take	NX	4.9'/5.0' 98%	RUN 24 D-5.0' C-5.0' CL-0 %-100 LP-2.6' 122.0'		120			122-126' Interbeds of mudstone
		5.1'/5.0' 82%	RUN 25 D-5.0' C-4.8' CL-0.2' %-96 LP-1.7' 127.0'		125	124.6 BOX 8	30, 55, 25, 55, 20, 30	124.0' Fracture dip 35°, smooth, planar.
		5.0'/5.0' 80%	RUN 26 D-5.0' C-5.0' CL-0 %-100 LP-1.3' 132.0'		130		35, 15, 20, 35	
133.0-149.0' WATER TEST #5 No take.		2.2'/5.0' 54%	RUN 27 D-5.0' C-4.0' CL-1.0' %-80 LP-1.5' 137.0'		135	133.5 BOX 9	35, 30, 50, 40	133.5-135' Light gray, slightly larger grain sizes to medium-grained locally; highly friable, HCl Reaction - None.
		3.6'/5.0' 72%	RUN 28 D-5.0' C-5.0' CL-0 %-100 LP-1.8' 142.0'		140		30, 35, 70, 35, 60, 40, 40	137-142' HCl Reaction - Very strong to moderate; locally mod. hard. 139.5-140.4' Drills to average 0.1' cores.
140.5-148' Slower drilling.		1.7'/5.0' 34%	RUN 29 D-5.0' C-1.7' CL-2.3' %-34 LP-1.3' 147.0'		145			142-156.5' HCl Reaction - none.
146.0-161.5' WATER TEST #4 Take 0 gpm @ 20, 30, 40 & 50 psi. Take 0.14 gpm @ 60 psi Average k = 3.90×10⁻⁶ cm/sec, max k - same. 149-150' Drills fast.		1.8'/5.0' 36%	RUN 30 D-5.0' C-3.6' CL-1.4' %-72 LP-1.8' 152.0		150	147.0 BOX 10	32, 35, 50, 20, 40, 20, 20, 20	
		3.6'/5.0 72%	RUN 31 D-5.0' C-4.7' CL-0.3' %-94 LP-1.7'		155		30, 60, 45, 45	

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JOB NO. 3040-01	DATE 7-1-88		B-8
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BORING NO. DW-2C

REMARKS / WATER DATA / DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION / PHYSICAL DESCRIPTION
152-188' Slow drilling, core tight in inner tube.	NX	72%	RUN 31 D-5.0' C-4.7' 157.0'		155	BOX 10		12 - 237.0' TOWSLEY FORMATION (Tt): SANDSTONE (ss):
		2.1' 5.0' 42%	RUN 32 D-5.0' C-3.5' CL-1.5' %-70 LP-0.8' 162.0'		160	BOX 11		20 - 237' Gray, unweathered. 156.5 - 174' Light gray, slight increase in grain size w/ a few med-grained interbeds; HCl Reaction - none typically but locally strong. 159.0' Fracture dip 60°, slightly rough.
		2.7' 5.0' 54%	RUN 33 D-5.0' C-5.0' CL-0 %-100 LP-1.8' 167.0'		165			
		2.5' 4.0' 63%	RUN 34 D-4.0' C-3.5' CL-0.5 %-88 LP-1.1' 171.0'		170			169' Fracture dip 85, slightly rough.
		2.2' 5.0' 44%	RUN 35 D-5.0' C-5.0' CL-0 %-100 LP-0.8' 176.0'		175	BOX 12		174 - 176' Closely fractured, drills to avg. 0.1' cores controlled by non-oxidized fractures - typically slightly rough.
		5.0' 5.0' 88%	RUN 36 D-5.0' C-4.7' CL-0.3 %-94 LP-1.4' 181.0'		180			178.8 - 181.2' Closely fractured.
		5.0' 8.0' 60%	RUN 37 D-5.0' C-5.0' CL-0' %-100 LP-2.0' 186.0'		185	BOX 13		185.3 - 186.3' Drills to avg. 0.1' cores controlled by non-oxidized fractures, HCl Reaction - locally strong. 188.5' Fracture dip 65° 1mm asphaltic. 190.6 - 191.8' Shear dip 85° filled w/ 1/2 gouge & brecciated sl. hard mudstone w/ trace organics, 1° offset visible on bedding; parallel healed fractures to 190.5'. 191.5 - 191' slight increase in grain size, HCl Reaction - none. 192 - 193' Shear? dip 70°, planar - smooth 193.2' Shear? dip 70°, 1-5 mm coal? 193.5' Shear? dip 65, 1-3 mm organic mudstone.
		2.2' 4.5' 82%	RUN 38 D-4.5' C-4.5' CL-0 %-100 LP-1.2' 191.0' 192.5		190	BOX 14		194.6 - 196.0' Shear dip 60, curves to 85° & autofaces @ TD, filled w/ 1/2 brecciated mudstone/gouge, sl. hard - opens locally on drilling.
			RUN 39 D-4.5' C-4.5' CL-0 %-100 LP-1.2' 192.5		195			

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BORING LOG

FIGURE B-8

JOB NO. 3040-01 DATE 7-1-88

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FORM 12-4/87

BORING NO. DW-2C

REMARKS WATER DATA DRILLING DATA	HOLE SIZE / WATER TEST	BLOWS/ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
Run 40, % Rec = 100% LP = 1.0'	NX	1.1' 3.6' 72%	RUN 39 195.5 Run 39 D-1.5 C-1.5		195	BOX 14		12-237.0' TOWSLEY FORMATION (Tf): SANDSTONE (Ss): 20-237' Gray, unweathered.
		2.0' 5.0' 40%	197.0' RUN 41 D-5.0' C-4.7' CL-0.3 %-94 LP-45		200			197-200.5' Drills to average 0.1', max 0.3', cores controlled mainly by non-oxidized fracture (some mechanical breaks), fracture surfaces sl-mod rough.
			202.0'					
		2.8' 5.0' 56%	RUN 42 D-5.0' C-4.7' CL-0.3' %-94 LP-40'		205	BOX 15		203.5-205.3' Drills to avg. 0.1' cores controlled by breaks along non-oxidized fractures - sl-mod. rough.
			207.0'					205-237' Slightly coarser grain size & locally medium-grained interbeds. A few light gray layers w/ very strong HCl Reaction.
		4.9' 5.0'	RUN 43 D-5.0' C-5.0' CL-0					205-218' Shear dip 85, curved - slightly rough, sporadic / parallel fractures w/ locally to 1/2" brecciated filled mudstone - sl. hard.
		98%	%-100 LP-20'		210	210.0'		
			212.0'			BOX 16		
		4.8' 5.0'	RUN 44 D-5.0' C-5.0' CL-0					
216-226' WATER TEST #1 No take		80%	%-100 LP-1.2'		215			216.5-218' Drills to avg. 0.1' cores.
			217.0					
		2.9' 5.0'	RUN 45 D-5.0' C-4.8' CL-0.2'					218.7' Fracture dip 70°, filled w/3mm black, organic rich, med. hard mudstone. Healed fracture dip 70° @ 218.8'.
		78%	%-96 LP-15'		220	220.7'		
			222.0'			BOX 17		221.0-221.3' Fractures dip 53, 60, 65 different orientations, sl. rough.
		4.5' 5.0'	RUN 46 D-5.0' C-5.0' CL-0					
226.0-236.0' WATER TEST #2 No take		90%	%-100 LP-23'		225			
			227.0'					
		4.1' 5.0'	RUN 47 D-5.0' C-4.6 CL-0.4					230.0' Shear dip 80°, filled w/5mm highly organic mudstone rubble offset by tight 55° dip shear filled w/1mm calcite @ 230.4'.
		82%	%-92 LP-16'		230	230.7'		230.9' Shear dip 50°, filled w/0.1' gypsum? & healed mudstone breccia, highly friable.
			232.0'			BOX 18		232.3' Shear ? dip 35°.
		2.6' 5.0'	RUN 48 D-5.0' C-3.7 CL-1.3 LP-1.5'					232.3-235' Light gray, med-grained, med to v. highly friable.
		52%	237.0'		235			

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FIGURE B-8

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FORM 12-4/87

REMARKS WATER DATA DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	BORING NO. DW-2C MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
					235			
	NX	52%	RUN #8 D-227.0' C-235.0' R-1.3'		237.0	BOX 1B	35 35 35	12-237.0' TOWSLEY FORMATION (Tt): SANDSTONE (ss):
Hole backfilled using neat cement grout w/ 5% bentonite tremied into place								BOTTOM OF HOLE Depth - 237.0' Elev. -

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FIGURE B-8

JOB NO. 3040-01 DATE 7-1-88

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FORM 12-4/87

SITE / LOCATION	BEGUN	HOLE SIZE	ANGLE & BEARING	BORING NO.
South of Site Entrance	2-8-88	9 7/8"	VERTICAL	DW-3
COORDINATES / STATION	COMPLETED	SAMPLES	CORE REC/LENGTH/%	GROUND EL.
	2-9-88	0	—	1680'±
DRILLING CONTRACTOR	CORE BOXES	WATER-DEPTH / EL. / DATE		TOP OF ROCK-DEPTH / EL.
THE WATER DEVELOPMENT CORP.	0	145.00' / 6-16-88		0' /
DRILL MAKE AND MODEL	LOGGED BY			BOTTOM OF HOLE-DEPTH/EL.
SPEEDSTAR, AMCA INTERNATIONAL	S. R. Clark			260.0' /

REMARKS WATER DATA DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
								0-260.0' PICO FORMATION (Tp):
Hole advanced using an air rotary casing hammer. Material classification based on cuttings. Drill string & casing steam cleaned prior to drilling.	9 5/8"						Tp SS	0-73' SANDSTONE (ss): Scattered conglomerate interbeds (thin) and areas of pebbly sandstone. Light brown, moderately weathered, slightly hard.
					10			
					20			
								25' Moist area.
					30			
					40			41' Thin conglomerate layer.
					50			
					60			60' Thin conglomerate layer.
					70			

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JOB NO. 3040-01	DATE 7-1-88	FIGURE B-9
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FORM 11-4/87

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BORING NO. DW-3

REMARKS WATER DATA DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
	9 7/8"				80		ss Tp ss	0-260.0' PICO FORMATION (Tp): 0-73' SANDSTONE (ss): 73-90' SILTY SANDSTONE (ss): Areas of pebbly sandstone; grades finer grained w/ depth. Medium gray, unweathered, slightly hard.
					90		—	90-119' CLAYEY SILTSTONE (cl): Medium gray, unweathered, slightly hard.
					100		sl	
					110			
					120		—	119-170' SILTSTONE (sl): Dark gray, unweathered, slightly hard.
125' End shift on 2-8-88 t begin shift on 2-9-88.					130		sl	
					140			
					150			

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BORING LOG

FIGURE B-9

JOB NO. 3040-01 DATE 7-1-88

DRAWN BY C. I. Trantham APPROVED BY I. D. Appleton CEG.

p 2 of 4

FORM 12-4/87

REMARKS / WATER DATA / DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	BORING NO. DW-3 — MATERIAL CLASSIFICATION / PHYSICAL DESCRIPTION
							Tp	0-260.0' PICO FORMATION (Tp):
	9 5/8"						sl	119-170' SILTSTONE (sl): Dark gray, unweathered, slightly hard.
					160			
					170		—	
170-178' Drill Rate 50% slower than unit above.							ss	170-178' SILTY SANDSTONE (ss): Gray, unweathered, mod. hard, damp.
							—	
					180			178-260' SILTSTONE (sl): Thin interbeds of harder siltstone and locally conglomerate layer.
							sl	Dark gray, unweathered, moderately hard.
					190			
								192' Hard siltstone layer.
					200			
					210			
					220			
								228' Hard siltstone layer.
					230			

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BORING LOG

FIGURE B-9

JOB NO. 3040-01 DATE 7-1-88

DRAWN BY C. I. Trentham APPROVED BY D. Affeldt CEG

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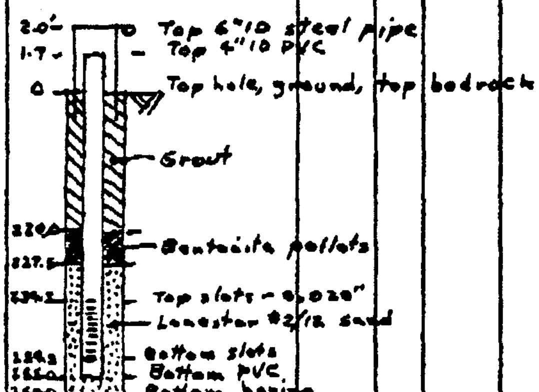
FORM 12-4/87

BORING NO. DW-3

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
	9 5/8"						Tp sl	0-260.0' PICO FORMATION (Tp): 178-260' SILTSTONE (sl):
								238-242' Conglomerate layer.
					240			
243' Cuttings recovered are moist to wet.								
					250			
					260			
Development of well on 2/9-10/88. Groundwater monitoring well installed 2/10-17/88. Moved rig to LR-2 on 2-18-88.								BOTTOM OF HOLE Depth - 260.0' Elev. -



PURCELL, RHOADES & ASSOCIATES Foundation Engineering • Soil Engineering • Geology		BORING LOG	FIGURE
JOB NO. 3040-01	DATE 7-1-88		B-91
DRAWN BY C. I. Trantham	APPROVED BY I. D. Affeldt CEG		4 of 4

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SITE / LOCATION: Approx. 200 yds. E. of scale house	BEGUN: 2-2-88	HOLE SIZE: 9 5/8"	ANGLE & BEARING: VERTICAL	BORING NO.: DW-4	
COORDINATES / STATION:	COMPLETED: 2-3-88	SAMPLES: 0	CORE REC.-LENGTH / %	GROUND EL.: 1390' ±	
DRILLING CONTRACTOR: THE WATER DEVELOPMENT CORP.	CORE BOXES: 0	WATER-DEPTH / EL. / DATE: 0.00' / 16-15-88		TOP OF ROCK-DEPTH / EL.: 18' /	
DRILL MAKE AND MODEL: SPEEDSTAR, AMCA INTERNATIONAL	LOGGED BY: S. R. Clark			BOTTOM OF HOLE-DEPTH/EL.: 118.5'	

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS/ROD ft	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
Hole advanced using an air rotary casing hammer. Hole drilled along side main site access road.	9 5/8"				10		Qal SM	0-18' ALLUVIUM (Qal): SILTY SAND (SM): Light brown, med. dense, damp, stratified, minor fine gravels. 11' change to dark gray. 14' change to moist. 17' change to light brown.
18' Minor amount of water at contact					18			
36' Minor amount of water encountered, cased off @ 39'					20		Tt ss	18-118.5' TOWSLEY FORMATION (Tt): SANDSTONE (ss): Fine-grained with scattered thin interbeds of medium-grained sandstone and siltstone. Typically the coarser sandstone is more friable; bedded w/ local cross-bedding. Gray brown, slightly weathered, slightly hard.
40' Bottom of casing, open hole below.	8 1/2"				30			
					40			
					50			
					60			
69.5' End shift on 2-2-88 & begin shift on 2-3-88.					70			

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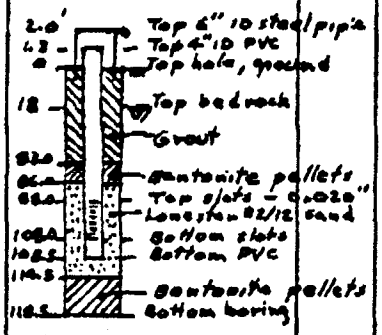
JOB NO.: 3040-01	DATE: 7-1-88		B-10
DRAWN BY: C.I. Trantham	APPROVED BY: T. D. APPLEGATE		1 of 2

FORM 11-4/87

BORING NO. DW-4

REMARKS WATER DATA DRILLING DATA	TOOL & SIZE / WATER TEST	BLOWS / ROD ⅝	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
72-83' Fast drilling. 73' Cuttings are moist	8½"				80			18-118.5' TOWSLEY FORMATION (Tt): SANDSTONE (ss): 72-83' Highly friable.
83-86' slow drilling. 87' Cuttings are wet.					90			83' Light brown layer, thin. 83-86' Hard layer. 87-118.5' Moderately hard.
Completed drilling on 2-3-88					100 110 118.5			
Groundwater monitoring well installed on 2-4-88. Moved rig to MW-2B.								BOTTOM OF HOLE Depth = 118.5' Elev. =



NOT TO SCALE

NOTE
1. Artesian water flow from top of PVC on 2-5-88.

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BORING LOG

FIGURE B-10

JOB NO. 3040-01 DATE 7-1-88

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FORM 12-4/87

Page 2 of 2

SITE / LOCATION	BEGUN	HOLE SIZE	ANGLE & BEARING	BORING NO.
Approx. 200 yds E. of scale house	2-10-88	NX	VERTICAL	DW-4C
COORDINATES / STATION	**COMPLETED**	**SAMPLES**	**CORE REC.-LENGTH / %**	**GROUND EL.**
	2-13-88	0	75.6'/155.0' = 49%	1390'±
DRILLING CONTRACTOR	**CORE BOXES**	**WATER-DEPTH / EL. / DATE**		**TOP OF ROCK-DEPTH / EL.**
WATER DEVELOPMENT CORP.	9			23.0'/
DRILL MAKE AND MODEL	**LOGGED BY**			**BOTTOM OF HOLE-DEPTH/EL.**
CME-750	D.W. Norman, C.I. Trantham			178.0'/

REMARKS (WATER DATA, DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS / ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
Scott Irwin-Driller Mike Lindberg-Helper					0.5			0-0.5' ASPHALT
Boring drilled on flat area by road-side above creek.							SM	0.5-23.0' ALLUVIUM (Qal) SILTY SAND (SM): Brown, medium dense, dry, stratified.
					5			
Unable to maintain circulation, add E-Z mud to drill fluid. Water/drill fluid loss approx. 100 gal/ft.					10			
					15			
Add sawdust to E-Z mud for better circulation - loss approx. 50 gal/ft.		0	16.8' RUN 1 D-1.2' C-0.2'		16.8	BOX 1		16.8-17.4' Sandstone boulder; light brown, medium-grained, slightly weathered, hard, strong; siliceous cement.
		0	18.0' RUN 2 D-5.0' C-0 CL-5.0' 2-0 LP-0		20			
23' End shift on 2-10-88.			23.0'		23.0			
	NX WIRE-LINE CORING	2.2'/5.0' 44%	RUN 3 D-5.0' C-2.4' CL-1.6' 2-68 LP-0.9' 28.0'		25			23.0-178.0' TOWSLEY FORMATION (Tt): 23-127' SANDSTONE (ss): Gray brown, fine-grained, argillaceous, moderately bedded with cross bedding; Reaction to HCl-none with local areas of weak. Moderately weathered, slightly hard, slightly strong.
		3.6'/5.0' 72%	RUN 4 D-5.0' C-5.0' CL-0 2-100 LP-0.9' 33.0'		30	33.0 BOX 2		Core has local irregular areas to 1" washed out - assumed friable sandstone. Scattered thin interbeds of medium-grained, friable sandstone.
		3.8'/5.0'	RUN 5 D-5.0' C-5.0		35			

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BORING LOG

JOB NO.	DATE	FIGURE
3040-01	7-1-88	B-11
DRAWN BY	**APPROVED BY**	
C.I. Trantham	[illegible], CEG.	1 of 5

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BORING NO. DW-4C

REMARKS WATER DATA DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS/ROD & ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
Drill fluid – EZ mud & bentonite, approx. 100% return.	NX	76% RUN 5 0-5.0' C-5.0' CL-0 %-100 LP-1.2' 38.0' 70% 2.5'/5.0' RUN 6 0-5.0' C-4.3' CL-0.7' %-86 LP-2.1' 43.0' 40% 2.5'/5.0' RUN 7 0-5.0' C-4.0' CL-1.0' %-80 LP-1.0' 48.0' 80% 4.0/5.0 RUN 8 0-5.0' C-4.0' CL-1.0' %-80 LP-2.0' 53.0' 80% 4.5'/5.0' RUN 9 0-5.0' C-4.5' CL-0.5' %-90 LP-2.0' 58.0' 95% 2.2/5.0 RUN 10 0-5.0' C-5.0' CL-0 %-100 LP-2.0 63.0' 92% 4.6'/5.0' RUN 11 0-5.0' C-5.0' CL-0 %-100 LP-1.5' 68.0' 68% 2.5'/5.0 RUN 12 0-5.0' C-3.4' CL-1.6 %-68 LP-1.4' 73.0' 28% 1.4'/5.0' RUN 13 0-5.0' C-1.9' CL-3.1'		35 40 45 50 55 60 65 70 75	BOX 2 43.0' BOX 3 BOX 4 63.4' BOX 5 74.2		23.0 – 178.0' TOWSLEY FORMATION (Tt): 23-127' SANDSTONE (ss): 64.3-65.0' Gray, siliceous cementation, slightly weathered, hard, strong. 72.4-73.0' Gray, calcareous cementation, Reaction to HCl-strong. slightly weathered, mod. hard, strong.

Run 13 – Lost core when it fell through core spring and went down the hole; put on new core spring.

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BORING LOG

FIGURE B-11

JOB NO. 3040-01 DATE 7-1-88

DRAWN BY C. I. Trantham APPROVED BY T. D. Affeldt CEG

FORM 12-4/87

BORING NO. DW-4C

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS / ROD M	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
					75			
	NX	28%	RUN 13 D-5.0' C-1.9' CL-3.1' %-38 LP-0.5' 78.0'			M-1 thru BOX 6		23.0 – 178.0' TOWSLEY FORMATION (Tf):
		74%	2.7' / 5.0' RUN 14 D-5.0' C-4.2' CL-0.8' %-84 LP-1.2' 83.0'		80			23 – 127' SANDSTONE (ss):
		52%	2.6' / 5.0' RUN 15 D-5.0' C-4.1' CL-0.9' %-82 LP-0.9' 88.0'		85			
Drill fluid return-gray		32%	1.6' / 5.0' RUN 16 D-5.0' C-2.2' CL-2.8' %-44 LP-0.7' 93.0'		90	BOX 7		88.7' Irregular area 2½ dia. of gray, siliceous cementation; unweathered, hard, strong.
		32%	1.6' / 5.0' RUN 17 D-5.0' C-2.8' CL-2.2' %-56 LP-1.2' 98.0'		95			
103' Rod sh.ft on 2-11-88.		88%	4.6' / 5.0' RUN 18 D-5.0' C-4.5' CL-0.5' %-90 LP-24' 103.0'		100			
Run 19 – Core lost due to core falling through core spring and down the hole after the innertube reached the surface.		38%	1.9' / 5.0' RUN 19 D-5.0' C-2.3' CL-2.7' %-46 LP-1.1' 108.0'		105	BOX 8		
		0%	RUN 20 D-5.0' C-1.7' CL-3.3' %-34 LP-0.2' 113.0'		110			112.8–112.9' Gray, siliceous cementation; unweathered, hard, strong.
		0%	RUN 21 D-2.7' C-0.5' LP-0.2' 115.7'		115			

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BORING LOG

FIGURE B-11

JOB NO. 3040-01 DATE 7-1-88

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FORM 12-4/87

BORING NO. DW-9C

REMARKS WATER DATA DRILLING DATA	TOOL & SIZE / WATER TEST	BLOWS/ROD ft	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOR NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION PHYSICAL DESCRIPTION
					115			
		0%	115.7'				115	23.0–178.0' TOWSLEY FORMATION (Tt): 23–127' SANDSTONE (ss): 115.5–115.7' Gray, calcareous cementation; Reaction to HCl - moderate. Unweathered, med. hard, mod. strong.
	NX	0%	RUN 22 D-2.3' C-0.7' CL-2.3' %-0 LP-0.7' 118.0'				118	
Run 23 Drill Rate ½'/min. (5' in 10 min.)		0%	RUN 23 D-5.0' C-0 CL-5.0' %-0 LP-0 123.0'		120			
Run 24 Drill Rate 1¼'/min. (5' in 4 min) Drill fluid – E-2 mud + bentonite		0%	RUN 24 D-5.0' C-0.9' CL-4.1' %-10 LP-0.3' 128.0'		125	B X O 8		CONTACT GRADATIONAL – ARBITRARY
							130	127–168' SANDSTONE (ss): Gray; fine-grained, argillaceous layers interbedded with medium-grained, light gray friable layers; bedding layers spaced averaging 1½' cross bedded. Sand grains are predominantly subangular quartz. Unweathered, slightly hard, slightly strong, mod. friable.
Run 25 Drill Rate 1'/min. (5' in 5 min.)		0%	RUN 25 D-5.0' C-0.4' CL-4.6' %-8 LP-0.2' 133.0'		130			
		0%	RUN 26 D-5.0' C-0.6' CL-4.4' %-12 LP-0.2' 138.0'		135		135	
Run 27 Drill Rate 2½'/min. (5' in 2 min.)		0%	RUN 27 D-5.0' C-0 CL-5.0' %-0 LP-0 143.0'		140			
		0%	RUN 28 D-5.0' C-0 CL-5.0' %-0 LP-0 148.0'		145			
153.0–168.5' WATER TEST #1 Take 0 gpm @ 20 psi Take 0.12 gpm @ 30 psi Take 0.19 gpm @ 40 psi Take 0.28 gpm @ 50 psi Take 0.12 gpm @ 40 psi Take 0 gpm @ 30 (20 psi) Avg. k = 8.20×10^{-4} cm/sec. Max k = 1.04×10^{-3} cm/sec		0.5' 5.0' 10%	RUN 29 D-5.0' C-0.6' CL-4.4' %-12 LP-0.5' 153.0'		150		150	
Run 30 Drill Rate ½'/min. (5' in 10 min.)		0%	RUN 30 D-5.0' C-0 CL-5.0'		155		158	

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BORING LOG

FIGURE B-11

JOB NO. 3040-01 DATE 7-1-88

DRAWN BY C.I. Trantham APPROVED BY I. D. Affeldt, CEG.

FORM 12-4787

BORING NO. DW-4C

REMARKS / WATER DATA / DRILLING DATA	TOOL SIZE / WATER TEST	BLOWS/ROD %	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION / PHYSICAL DESCRIPTION
					155			
	NX	0%	RUN 30 D-5.0' C-0 CL-5.0' %-0 LP-0 158.0'			B x 08		23.0-178.0' TOWSLEY FORMATION (Tt): 127-168' SANDSTONE (ss):
Run 31 Drill Rate ½'/min. (5' in 10 min).		0%	RUN 31 D-5.0' C-0.7' CL-4.3' %-14 LP-0.3 163.0'		160			130
		0%	RUN 32 D-5.0' C-0 CL-5.0' %-0 LP-0 168.0'		165			
168' End shift on 2-12-88, and begin shift 2-13-88. Put on new bit.		0%	RUN 33 D-5.0' C-3.1' CL-1.9' %-62 LP-0.3' 173.0'		170	172.1 B x 08 9		CONTACT GRADATIONAL 168-178' SANDSTONE (ss): Whitish-gray, medium-grained, with scattered coarse sand grains and a few fine gravel sizes of angular quartz; predominantly subangular quartz grains, some black rock fragments and a few yellow-green grains. Unweathered, barely hard, barely strong, extremely friable.
		2.4'/5.0' 82	RUN 34 D-5.0' C-1.2' CL-3.8' %-24 LP-0.4' 178.0'		175 178			
178.0' Finished drilling @ 11:00 am on 2-13-88. Hole backfilled using neat cement grout w/ 5% bentonite tremied into place.								BOTTOM OF HOLE Depth — 178.0' Elev. —

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BORING LOG

FIGURE B-11

JOB NO. 3040-01 DATE 7-1-88

DRAWN BY C. I. Trantham APPROVED BY I. D. Affolter, CEG.

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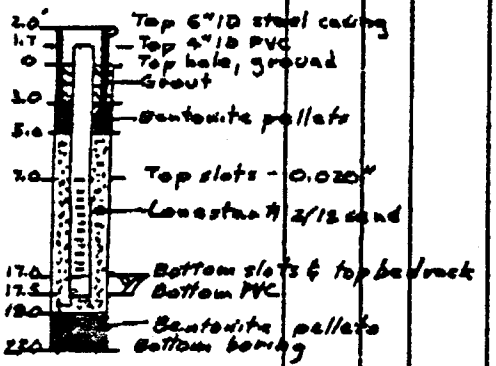
FORM 12-4/87

SITE / LOCATION: Approx. 200 yds from stable	BEGUN: 2-6-88	HOLE SIZE: 9 5/8"	ANGLE & BEARING: VERTICAL	BORING NO.: MW-4	
COORDINATES / STATION:	COMPLETED: 2-6-88	SAMPLES: 0	CORE REC.-LENGTH / %	GROUND EL.: 1450'±	
DRILLING CONTRACTOR: THE WATER DEVELOPMENT CORP.	CORE BOXES: 0	WATER-DEPTH / EL. / DATE: 16.41' / / 6-15-88		TOP OF ROCK-DEPTH / EL.: 17'/	
DRILL MAKE AND MODEL: SPEEDSTAR, AMCA INTERNATIONAL	LOGGED BY: S. R. Clark			BOTTOM OF HOLE-DEPTH/EL.: 23.0'/	

REMARKS (WATER DATA / DRILLING DATA)	TOOL SIZE / WATER TEST	BLOWS/ROD'S	ADVANCE / RECOVERY	ELEVATION	DEPTH	BOX NO. / SAMPLE NO.	MATERIAL LOG	MATERIAL CLASSIFICATION (PHYSICAL DESCRIPTION)
Hole advanced using air rotary casing hammer. Drill string (casing) steam cleaned prior to drilling.	9⅝"				10		Qal ML GP SM	0-17' ALLUVIUM (Qal): 0-7' SANDY SILT (ML): Light brown, soft, dry, minor sand and fine gravel sizes. 7-13' GRAVEL (GP): Brown, med. dense, damp. 7-10.5' conglomerate, boulder or well cemented gravels. 13-17' SILTY SAND (SM): Brown, med. dense, moist, rounded fine gravel sizes. 14.5' change to loose, less gravel.
					17			
					20		Tt ss	17-23.0' TOWSLEY FORMATION (Tt): SANDSTONE (ss): Fine-grained w/ siltstone interbeds. Brown gray, slightly weathered, slightly hard.
					23			
Upon completion of drilling, water noted running into hole — within 30 min water was 2' deep. Groundwater monitoring well installed on 2-6-88. Moved rig to DW-1								BOTTOM OF HOLE Depth = 23.0' Elev =



NOT TO SCALE

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BORING LOG

FIGURE: B-14

JOB NO.	DATE	DRAWN BY	APPROVED BY
3040-01	7-1-88	C. I. Trantham	I. D. Affeldt

FORM 11-4/87