(2)

ELDERBERRY MITIGATION AREA INVESTIGATION FINAL REPORT

A Report to the City of Sacramento

by the

Elderberry Mitigation Area Investigation Task Force

AUGUST, 1988

INVESTIGATION TASK FORCE MEMBERS

David A. Pelser - Solid Waste Division Manager, City of Sacramento
Gail Kobetich - Field Supervisor, U. S. Fish & Wildlife Service
Steve Rosembaum - Water Resources Control Engineer, CVRWQCB
Robert Berger - Senior Sanitarian, County of Sacramento Enviromnmental Health

AUXILIARY MEMBERS

(Other interested people to get reports)

Melvin H. Johnson - Director of Public Works, City of Sacramento
Reginald Young - Deputy Director of Public Works, City of Sacramento
Ronald W. Smith - Engineer, American River Flood Control District
Mary Coyle - Waste Management Specialist, California Waste Management Board
Eric Skelton - Air Toxics Manager, Sacramento Air Pollution Control District

PROJECT STAFF

Keith A. Johnson - Associate Engineer, City of Sacramento Solid Waste Division
Lynette Gardner - Division Secretary/Typist Clerk III, City of Sacramento Solid Waste Division

ELDERBERRY MITIGATION AREA INVESTIGATION
FINAL REPORT
August, 1988

EXECUTIVE SUMMARY

During the Fall of 1987, staff of the American River Flood Control District noticed that young Elderberry bushes, planted along the American river adjacent to the City of Sacramento Landfill, were dying. These bushes provided a habitat for the Valley Elderberry Longhorn Beetle (Desmocerus Californicus Dimorphus), a species listed as threatened by the U. S. Department of the Interior. The cause of death of the Elderberry bushes was unknown, but contamination from the City Landfill was suspected. A task force of several agencies was formed to investigate the distressed vegetation. The presence of landfill gas (methane) was confirmed in the area and other plants besides the young Elderberries were also impacted. The Task Force concluded that landfill gas is the cause of the plant distress and certain mitigating actions are recommended.

INTRODUCTION

During the February 1986 Flood, record quantities of water were released into the American River. The high flow rates associated with the flood caused some damage to the American River Levee System. One portion of the levee requiring repair (under Public Law 99) was southeast of the freeway Business 80 overcrossing. The flood repair consisted of filling and rebuilding the eroded levee bank with crushed rock (6 inches to 1 foot in diameter) which was not capable of supporting vegetation. The flood repair activities destroyed some Elderberry bushes, which are a habitat for the Valley Elderberry Longhorn Beetle. As part of an interagency agreement between The California Department of Water Resources, The U. S. Army Corps of Engineers, and The U.S. Fish and Wildlife Service, a mitigation project was planned which would replace the lost bushes at a ratio of two (2) bushes for every bush lost. The area chosen to plant the bushes for the mitigation project was directly north of the City Landfill and approximately 1/4 mile downstream from

the levee repair (See Figure 1). In mid-November 1986 the Department of Water Resources planted 100 Blue Elderberry Bushes.

In late August 1987, Gail Kobetich with the U.S. Department of the Interior Fish and Wildlife Service sent a letter to the City of Sacramento Public Works Department regarding the death of some of the recently planted young Elderberry bushes. A copy of this letter is contained in Appendix A.

In addition to the distressed or dead Elderberry bushes it appeared that a long section of established riparian vegetation near the landfill was also distressed or dead. The City Department of Public Works staff inspected the area of concern and formed a task force with various regulatory agencies to investigate the possible connection between the distressed vegetation and the landfill.

INVESTIGATION

On September 4, 1987 the first task force meeting was held. Agencies involved included the U. S. Fish and Wildlife Service, State Department of Water Resources, California Waste Management Board, Central Valley Regional Water Quality Control Board, American River Flood Control District, Sacramento Air Pollution Control District, Sacramento County Health Department, City Department of Parks and Community Services, and the City Department of Public Works. Tim Crandall with the Central Valley Regional Water Quality Control Board (CVRWQCB) presented to the Task Force the results of his August 13, 1987 inspection of the area (See Appendix B). He stated in his inspection summary that "evidence was found that implicates the 28th Street Landfill as the cause of the plant death." At this first task force meeting a proposed plan of action was developed (See Appendix C). This plan of action included ground environmental surveys, landfill

gas (LFG) testing, aerial photo review, and literature review. The Public Works Department immediately began to implement the plan.

On September 10, 1987 a soil cross section (See Figure 2) was prepared of the 6' deep trench excavated by Southern Pacific Pipelines. This log would be compared with future LFG data. On October 13, 1987 black and white and color infra-red (CIR) photographs were taken of the landfill. These photos could be compared with historical photos to give an indication of the relative health of the riparian vegetation. Color infrared photos have been typically used to aid in the detection of certain kinds of diseased vegetation.

On October 20, 1987 the second meeting of the task force was held for the purpose of comparing the vegetation on the south bank of the American River downstream from the City Landfill with the vegetation adjacent to the landfill. At the conclusion of this meeting it was generally agreed that further study was warranted and that there may be a correlation between the presence of the landfill and the distressed vegetation. The distress was not apparent in plants located in other areas along the lower American River. Two recommendations which stemmed from the meeting were to continue with the City's proposed LFG monitoring program and reinspect the mitigation area in the Spring when the vegetation would be growing vigorously.

In late October, 1987, sixty-five (65) shallow LFG monitoring probes were installed at the toe of the American River Levee, north of the City Landfill (See Figure 3-9). These probes were designed to detect the presence of landfill gas (LFG) in the top 2'-6" of soil. The probes were first monitored in early December and have subsequently been monitored on a monthly basis. Methane in concentrations ranging from 0 to 62 percent by volume has been detected in the area of the distressed vegetation. Methane concentrations along the American River have been decreasing since January. However, because the production rate of LFG within

a landfill increases as the landfill ages, this trend should not be expected to continue. Table 1 shows the test results for the dedicated LFG probes installed south and east of the landfill.

On November 9, 1987 the CVRWQCB collected soil samples along the American River Levee, north of the landfill. The CVRWQCB staff also monitored methane gas levels at various areas around the landfill. This investigation (See Appendix D) identified two contaminates in the soil in addition to methane: vinyl chloride and ammonia. These contaminates are considered to be indicative of landfills with a gas migration problem. The samples also exhibited high electrical conductivity readings. High levels of methane gas were detected by the CVRWQCB in some of the City's newly installed 2'-6" monitoring probes.

Solid Waste Division staff presented the first landfill migration report to the City Council's Transportation and Community Development Committee (T&CD) on February 9, 1988. The tentative conclusion of this report was that landfill gas was at least a contributing factor and may be the primary factor in the observed plant distress.

On February 16, 1988 the CVRWQCB staff returned to the city landfill to install three lysimeters. Lysimeters, or porous cup samplers, are devices which collect pore water from the unsaturated (vadose) soil zone (See Figure 10). These instruments were installed along the northern toe of the American River Levee to determine if leachate was traveling through the vadose zone, and what the characteristic contaminates were. Two lysimeters were installed at Stations 7 and 8 and the third (background) was installed approximately 1000' to the west. The lysimeter samples were analyzed for COD (Chemical Oxygen Demand), nitrate, ammonia, EC (Electrical Conductivity) and pH. Only ammonia was found in levels above the background readings. The results of the other four parameters were inconclusive. A copy of the CVRWQCB's report, which includes the lysimeter results, is contained in Appendix E. On the basis of the

elevated ammonia readings the CVRWQCB concluded that leachate had contaminated the vadose zone in the areas tested.

On March 2, 1988 the CVRWQCB, and Patrick Porgans with Red Tape Abatement arrived at the Landfill to take soil and water samples. The purpose of this investigation was to determine if the City landfill was having a detrimental effect on the water quality of the American River. Three identical sets of water samples were taken with one set going to the City of Sacramento, one set to Red Tape Abatement and one set retained by the CVRWQCB. EPA method 601 and 602 analyses were performed on each set of samples. The analytical results of the water and soil samples do not indicate the presence of quantifiable concentrations of hazardous or designated contaminates. It was concluded that the landfill was not impacting the water quality of the American River. These results are consistent with the City's ongoing quarterly sampling of the River which has never indicated any river water quality degradation due to the landfill.

The Solid Waste Division staff presented a second landfill gas migration report to the T&CD Committee on March 22, 1988. This was an extensive report covering all aspects of the LFG migration and environmental issue. Contained in this report was a discussion of various LFG control strategies which might be employed to mitigate the LFG migration to the north. The T&CD Committee has received two verbal updates since the March 22 report was presented.

On May 5, 1988 a third meeting of the Task Force was held to reinspect the riparian vegetation in the mitigation area. The Task Force chose to only inspect the riparian vegetation north of the landfill. The entire northern boundary was walked. It was the general opinion of the Task Force that the vegetation appeared healthier than during the Fall 1987 field inspection. It did not appear that any additional young Elderberry

bushes had died and several bushes had new growth. However, in the area of Station 17+00 there was a significant amount of dead vegetation. This station's northern methane probe has had much higher readings than the surrounding probes. Elderberry bushes that appeared dead during the Fall 1987 field inspection show no signs of recovering.

TASK FORCE WORKPLAN

The Solid Waste Division staff has followed the plan of action formulated at the September 4, 1987 Task Force meeting. Each item is listed below:

1. Aerial Photo Review. On October 13, 1987 black and white and color infrared photos were taken of the landfill and the American River. Historic black and white photos were obtained from CH2M Hill and compared with the most recent photos. These black and white photos were also used by the Fish and Wildlife Service to locate and quantify Elderberry bushes north of the landfill. These bushes were then rated as to their relative health. The State Water Resources Control Board supplied the City with CIR photos of the American River and the riparian vegetation. The City had hoped to compare the old CIR photos with the most recent photos to determine approximately when the distress in the riparian vegetation became apparent. However, the riparian vegetation adjacent to the City landfill wasn't covered in any of the photos.

2. Ground Environmental Survey. This was conducted in October 1987 and in May 1988 as previously discussed.

3. Climatological Data Review. After the first ground environmental survey it was concluded that there was a definite difference in the riparian vegetation adjacent to the landfill when compared with the vegetation upstream and downstream. Since both environments were subjected to the same climatology it seemed likely that climatology was not involved. After the first set of LFG readings were gathered from the sixty-five (65) LFG probes it became apparent that LFG was the problem. Therefore, no staff time was devoted to the climatological review.

4. Recent Literature Review. The City's Water Quality and Air Quality Solid Waste Assessment Test Reports were reviewed for any information which would relate to the distressed vegetation. In addition, other technical reports were reviewed, some of which directly related to vegetation above and adjacent to landfills. A complete list of literature reviewed is contained in the Bibliography.

5. LFG Testing. Currently six sets of data have been collected for the 65 2' deep probes installed north of the American River Levee. All six sets of data indicate high concentrations of LFG are present in the area of the distressed riparian vegetation. Generally, the area monitored by the probes can be separated at Station 18+00 into two distinct zones. The western zone doesn't seem to be affected by the 6' deep S. P. Pipeline trench. However the eastern zone's northern wells have low or zero readings while the wells to the south of the pipeline trench have moderate readings. Therefore it appears that the S. P. Pipeline trench is acting as an obstruction to LFG flow in this zone. The LFG readings have been compared to the S. P. Pipeline trench log and there seems to be a general correlation between thick lenses of sand and high LFG readings.

6. Problem Definition. After review of all the information obtained in 1 through 5 above the problem was defined. This definition appears at the beginning of this report in the Introduction.

CONCLUSIONS

There is a definite difference in the riparian vegetation north of the City of Sacramento Landfill when compared with the vegetation upstream and downstream of the landfill. The plant distress is not limited to the young Elderberry bushes. All types of riparian vegetation have been affected, including Oak, Black Walnut, Cottonwood, Boxwood and Willow trees, and Bamboo.

Results obtained from the sixty-five (65) shallow LFG probes installed along the toe of the American River Levee indicate that landfill gas is present in the soil. The LFG readings range from 0 to 62 percent by volume and have been decreasing since monitoring began in early December. The average LFG reading for the first set of data was 39%. The average LFG reading for the most recent set of data is 25% by volume. This decreasing trend in the concentration of LFG in the soil surrounding the landfill is not expected to continue. The City of Sacramento landfill is in the early stages of waste decomposition. As internal temperatures increase within the landfill, due to the heat generated by anaerobic decomposition of the wastes, the process will accelerate and the LFG production rate will increase. Graphs of the typical LFG production rates verses refuse age are shown in Figure 11.

The general driving forces responsible for the migration of landfill gas are total pressure and partial pressure gradients. Total pressure gradients occur if the gas pressure within the landfill is greater than atmospheric pressure. Partial pressure gradients occur when the landfill gas concentrations are higher near the landfill than away from it. Specific contributing factors affecting the degree of LFG migration include:

1. Depth of refuse. When the City of Sacramento Landfill is closed the waste will be approximately 60 feet deep. (See Figures 12 and 13). Deeper sections of waste will produce LFG under higher pressures. Landfill gas produced by refuse at the base of the 60' section will be under the highest pressure and have the greatest likelihood of migrating horizontally.

2. Existence of a final cap section over the landfill. The one foot thick section of clay that is part of the four foot thick final cap section is not gas permeable. Areas of the landfill that have been capped will build up higher internal gas pressures and the gas will tend to migrate horizontally.

3. Degree of moisture in the cover soil. When the cover soil pores are filled with water the soil becomes less gas permeable. During the winter months, areas of the landfill that have a 12" intermediate cover layer will build up higher internal gas pressures similar to those areas that have received a final cap section. The decreasing trend in the concentration of LFG in the soil since January 1988 could be caused by the decreasing moisture content of the cover soil. LFG gas may be more likely to vent vertically rather than migrate horizontally in the spring and summer months.

4. Barometric pressure. Literature published on the subject of landfill gas migration suggests a correlation between landfill gas migration and barometric pressure. Low barometric pressure would allow more gas to escape the landfill and therefore yield higher LFG readings. Figure 14 shows average barometric readings for 12 months. The City's data doesn't confirm the theoretical correlation. In fact, the City's data seems to indicate the antithesis of the stated theory.

5. Methane production rate due to waste characteristics and the stage of decomposition. The City of Sacramento Landfill has a higher percentage of organic waste than most other landfills, and will have higher production capacity. This waste is in various stages of decomposition. Waste was first deposited at the active site in 1973 and will continue until late 1990. As stated previously in this section, the production rate of LFG is expected to increase over time. Referring to Figure 11, the City Landfill's present condition would be plotted on the uphill side of either curve.

It has been documented in the literature that poor growth and death of vegetation is associated with the concentrations of landfill gas which are present along the American River Levee. It is reasonable to assume that the distress evident in the vegetation is due to the presence of LFG in the soil. It appears that the vegetation dies as a result of the physical displacement of oxygen in the soil by LFG, causing the soil environment to become anaerobic. In Franklin B. Flower's paper titled "Vegetation kills in Landfill Environs" he reported that an anaerobic soil environment is directly toxic to vegetation. Further, the CVRWQCB staff has found elevated levels of ammonia in the soil, which is indicative of landfills with a gas migration problem. Refer to Tim Crandall's letter to David Pelser for the results of the soil sampling, Appendix D. On the basis of the studies conducted by the CVRWQCB, the City of Sacramento Solid Waste Division, and the Fish and

Wildlife Service, the Task Force has concluded that the City of Sacramento Landfill has caused the death or distress of the riparian vegetation located between the landfill and the American River.

The CVRWQCB staff had suspected that leachate, generated by the landfill, has migrated north through the vadose zone and contaminated the American River. There is no evidence to confirm this suspicion. Water samples collected from the American River adjacent to the landfill by the CVRWQCB on March 2, 1988 did not detect any hazardous or designated contaminates. The movement of shallow groundwater under the site is generally in a southwest direction away from the American River. Lysimeter test results of the vadose zone show no indicators that are not explained by the presence of LFG.

In addition to the gas migration problem north of the landfill, which has caused the plant death, gas migration south and southeast of the landfill has caused the landfill to be in violation of it's solid waste facilities Permit No. 35-AF-004. The landfill has technically been in violation of Title 14, section 17705 of the California Administrative Code and explosive gases Section 257.3-8 of the Federal Register Vol, 44, No. 179 since October of 1987. (See Appendix F).

RECOMMENDATIONS

The City of Sacramento Solid Waste Division is committed to controlling migration of landfill gas. Of primary concern to the Solid Waste Division has been LFG migration to the south and southeast because 1) public safety is involved and 2) off-site migration is a violation of the landfill's operating permit. Several measures have been taken or will be taken in the near future to control the LFG migration in those areas. The Solid Waste Division is also aggressively pursuing a long term solution to the migration problem which consists of a landfill gas extraction system. Installation of an extraction system at the landfill is expected to take

place during the 1989 construction season. In addition to extraction wells along the landfill's southern boundary, several extraction wells will be located near the landfill's northern boundary just south of the American River levee. These northern extraction wells would be located in an area of the landfill which has received final cover. Associated with the installation of the extraction system would be an anticipated reduction or elimination of methane concentrations north of the American River levee.

The Solid Waste Division is also concerned with the continued health of the riparian vegetation to the north of the landfill. The riparian vegetation serves many purposes, one of which is a habitat for the Valley Elderberry Longhorn Beetle. The Fish and Wildlife service is particularly concerned with loss of habitat for the Valley Elderberry Beetle because it is a federally listed threatened species.

The Elderberry Task Force's recommended mitigation plan for restoring the Valley Elderberry Beetle's habitat north of the City of Sacramento landfill is contingent upon the control of migrating landfill gas in the mitigation area. After installation of the landfill gas (LFG) extraction system, LFG concentrations will be monitored to ensure that a healthy environment exists for plant growth. If a healthy environment does not exist, an alternative mitigation area will be chosen.

The task force's mitigation plan consists of planting 1000 young Blue Elderberry bushes between the City of Sacramento Landfill and the American River. One hundred (100) of these plants will replace the 100 plants which were part of a previous mitigation effort. The remaining 900 plants will replace an estimated 450 naturally occurring bushes which have or will perish as a result of the LFG migration. The ultimate goal of this plan would be to have 550 viable, actively growing Elderberry bushes at the end of a five year period. Enactment of the mitigation plan would entail contracting with a local nursery, specializing in native plants,

to gather seeds from Elderberry bushes growing along the American River and grow seedlings for planting. Seedlings which are 12" tall, grown in 3" diameter by 10" deep containers have shown the best chance of surviving. Because Elderberry bushes grow very quickly, growing and planting of the Elderberries must be coordinated so the plants don't become root-bound in their containers.

The 1000 young Elderberries would be planted in September 1989. The Elderberries would be planted in groups of five (5) spaced 30 feet apart, and watered in the summer and fall of 1990 to ensure that the plants are well established. It is anticipated that some of the naturally occurring Elderberry bushes, which are presently in poor health, would respond to the improved growing environment as a result of the LFG extraction system and begin to flourish again. A combination of the 1000 young Elderberry bushes and healthy naturally occurring Elderberry bushes would provide the uneven age stands of bushes requested by the U.S. Fish and Wildlife Service, (See Appendix G).

The City of Sacramento Solid Waste Division would report to the U. S. Fish and Wildlife service each September 30th for three (3) years after the first planting. These reports would include an inventory of the surviving Elderberry plants included under the mitigation plan. Should the inventory fall below the 550 plant goal, additional Elderberries would be planted. Submittal of the third annual report would complete the mitigation project.

BIBLIOGRAPHY

DATE	TITLE	AUTHOR, PUBLICATION
Sept., 1977	Management of Gas and Leachate in Landfills/ Vegetation Kills In Landfill Environs	Franklin Flower etal, Cook College-Rutgers University Prepared for U.S. Environmental Protection Agency
Jan., 1978	Preventing the Underground Movement of Methane From Sanitary Landfills	Ralph Stone, Civil Engineering - ASCE
Feb., 1979	Methane Migration Around Sanitary Landfills	Charles Moore etal., Journal of The Goetechnical Engineering Division
Oct., 1979	Landfill Gas Collected by Negative Pressure Systems	R. Patrick Caffrey, LaCrosse,WI & James Retzlaff, Donohue & Associates Public Works
July, 1980	Probabilistic Model for Sanitary Landfill Gas Production	Dallan Clancy etal. Systems Engineering Group, User's Guide To The Fillgas Program

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

DATE	TITLE	AUTHOR, PUBLICATION
March, 1981	Mountain View Landfill Gas Recovery Project	Peter Bray, PG & E Company & City of Mountain View, CA under EPA Grant No. S-803390
Aug., 1983	Landfill Methanogenesis: Literature Review and Critique	C. P. Haalvadakis etal. Environmental Engineering & Science Department of Civil Engineering Stanford University
Nov., 1983	Recovering Methane At A Small Landfill	Waste Age
Jan., 1987	Study of Vinyl Chloride Formation at Landfill Sites in California	Battelle Laboratories, Prepared for California Air Resources Board
June, 1987	Solid Waste Assessment Test Report City of Sacramento 28th & A Street Sanitary Landfill	City of Sacramento Department of Public Works Solid Waste Division
Nov., 1987	Air Quality Solid Waste Assessment Test Report	City of Sacramento Department of Public Works Solid Waste Division

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

DATE	TITLE	AUTHOR, PUBLICATION
Nov., 1987	Trace Organic Constituents In Landfill Gas	Robert Lang etal, Department of Civil Engineering U.C.,Davis & Robert Spicher Dept. of Civil Egineering, San Jose Univ. Prepared for CA Waste Management Board
Jan., 1988	Aerial Detection Techniques For Landfill Pollutants	Warren Philipson & Dwight Sangrey, Cornell University
Jan., 1988	NOAA Technical Memorandum Climate of Sacramento, CA	Toni Martini, National Weather Service
Feb. 22 &23, 1988	The Vadose Zone: Physical Properties, Theoretical Considerations and Monitoring Approaches	Robert Morrison, Seminar on Vadose and Groundwater Monitoring
March, 1988	Easy Landfill Gas Profits	Robert Schleifer, Waste Age
	The Fundamentals of Landfill Gas Control	Robert Sterns, SCS Engineers

Y OF SACRAMENTO 28TH ST LANDFILL, GAS REPORTED AS % METHANE (VOL)

	1987				1988									
WELL #	9-23	10-9	12-7	12-29	1-13	1-19	1-29	2-26	3-17	3-29	4-15	5-02	5-12	5-26
1A	0	0	0	0	0	-	0	0	0	0	-	0	-	0
1B	0	0	0	0	0	-	0	0	0	0	-	0	-	0
2	0	0	0	0	0	-	0	0	0	0	-	0	-	0
3A	0	0	0	0	0	-	0	0	0	0	-	0	-	0
3B	0	0	0	0	0	-	0	0	0	0	-	0	-	0
4A	0	0	0	0	0	-	0	0	0	0	-	0	-	0
4B	0	0	0	0	0	-	0	0	0	0	-	0	-	0
5	0	0	0	0	0	-	0	0	0	0	-	0	-	0
6A	0	0	0	0	0	-	0	0	0	0	-	0	-	0
6B	0	0	0	0	0	-	0	0	0	0	-	0	-	0
7	0	0	0	0	0	-	0	0	0	0	-	0	-	0
8	0	0	0	0	0	-	0	0	0	0	-	0	-	0
9	0	0	0	0	0	-	0	0	0	0	-	0	-	0
10	0	0	0	0	0	-	0	0	0	0	-	0	-	0
10.2	-	-	-	-	-	-	-	0	0	0	0	0	0	0
10.4	-	-	-	-	-	-	-	60	57	58	56	50	57	55
10.6	-	-	-	-	-	-	-	60	58	58	58	52	58	58
10.8	-	-	-	-	-	-	-	55	0	50	50	38	48	36
10.9	-	-	-	-	-	-	-	65	58	60	60	55	60	57
11	5+	30	56	0	58	-	60	56	55	53	54	50	55	54
12	5+	15	0	0	0	-	56	55	53	51	52	50	55	54
13	5+	10	52	55	56	-	56	52	44	52	50	47	50	50
14	0	0	55	55	56	-	56	54	34	54	51	48	51	53
	0	0	50	56	59	-	57	55	39	53	51	47	51	52
	0	0	53	57	59	-	58	55	30	53	50	48	52	52
	0	0	50	55	58	-	57	54	28	53	51	47	52	52
18	0	0	4	55	58	-	57	54	28	54	51	46	52	52
19	0	0	4	55	57	-	57	54	18	54	51	47	52	52
20	0	0	0	0	0	-	45	45	19	45	28	33	0	0
21	0	0	0	0	0	-	0	0	0	0	0	0	0	0
22	0	0	0	0	0	-	0	0	0	0	0	0	0	0
23	0	0	0	0	0	-	0	0	0	0	0	0	0	0
24	0	0	0	18	28	-	28	0	0	9	0	2.5%	0	0
25	0	0	0	18	22	-	24	26	0	26	32	22	5	0
26	0	0	41	48	49	-	42	46	5	44	26	35	42	31
27	0	0	0	3	17	-	.5	8	0	0	0	0	0	0
Lennane 1	-	-	-	0	0	Trace	0	0	0	0	0	0	0	0
Lennane 2	-	-	-	12	24	38	2.5	2	0	7	0	0	0	0
Lennane 3	-	-	-	-	25	13	2.5	10	0	14	1	3	0	0
Lennane 4	-	-	-	-	55	58	50	28	0	1	3	18	3.5	1%
Lennane 5	-	-	-	-	-	55	4.5	8	0	0	3.5	10	2.0	.5%
Lennane 6	-	-	-	-	-	0.5	0	0	0	0	0	0	0	0
Lennane 7	-	-	-	-	-	-	-	-	-	0	0	0	0	0
Lennane 8	-	-	-	-	-	-	-	-	-	0	0	0	0	0
28	-	-	-	-	-	-	-	0	0	0	0	0	0	0
28.5(T)	-	-	-	-	-	-	-	0	0	0	0	0	0	0
29	-	-	-	-	-	-	-	0	0	0	0	0	0	0
29.5(T)	-	-	-	-	-	-	-	-	-	-	-	-	0	0
LFG Control Trench					-	-	0	0	0	0	0	0	0	0

Y OF SACRAMENTO 28TH ST LANDFILL, GAS REPORTED AS % METHANE (VOL)

WELL #	1988 6-20	7-06	7-25	00-0	00-0	00-0	00-0	00-0	00-0	00-0	00-0	00-0	00-0	00-0
1A	0	0	0											
1B	0	0	0											
2	0	0	0											
3A	0	0	0											
3B	0	0	0											
4A	0	0	0											
4B	0	0	0											
5	0	0	0											
6A	0	0	0											
6B	0	0	0											
7	0	0	0											
8	0	0	0											
10	0	0	0											
10.2	0	0	0											
10.3	-	-	40											
10.4	54	53	55											
10.6	55	53	56											
10.8	7	0	0											
10.9	55	54	56											
11	50	50	53											
12	50	49	51											
13	53	25	36											
14	51	50	51											
15	51	49	50											
	50	49	51											
	50	49	52											
	49	49	50											
19	50	49	50											
20	0	0	16											
21	0	0	0											
22	0	0	0											
23	0	0	0											
24	5	0	0%											
25	28	0	18%											
26	44	37	38%											
27	7	1.5	2%											
Lennane 1	0	-	.5%											
Lennane 2	-	-	2.5											
Lennane 3	-	1	0											
Lennane 4	3	18	11											
Lennane 5	3	6	3.5											
Lennane 6	0	0	0											
Lennane 7	0	0	0											
Lennane 8	0	0	0											
28	0	0	-											
28.5(T)	0	0	0											
29	0	0	0											
29.5(T)	0	0	0											

TY OF SACRAMENTO 28TH ST LANDFILL, GAS REPORTED AS % METHANE (VOL)

1988

WELL #	6-20	7-06	7-25	00-0	00-0	00-0	00-0	00-0	00-0	00-0	00-0
10.975A			55								
10.975B			55								
10.975S			8%								
25.75A			40%								
25.75B			35%								
25.75S			.5%								
30A			0								
30B			0								
30S			0								
31A			0								
31B			0								
31S			0								
LFG Control Trench		0	0								
Station #2	12%	18%	8%								
Station #3	.5%	.5%	.5%								
Barometric Pressure			29.88								

LFGTB

LFGTBL

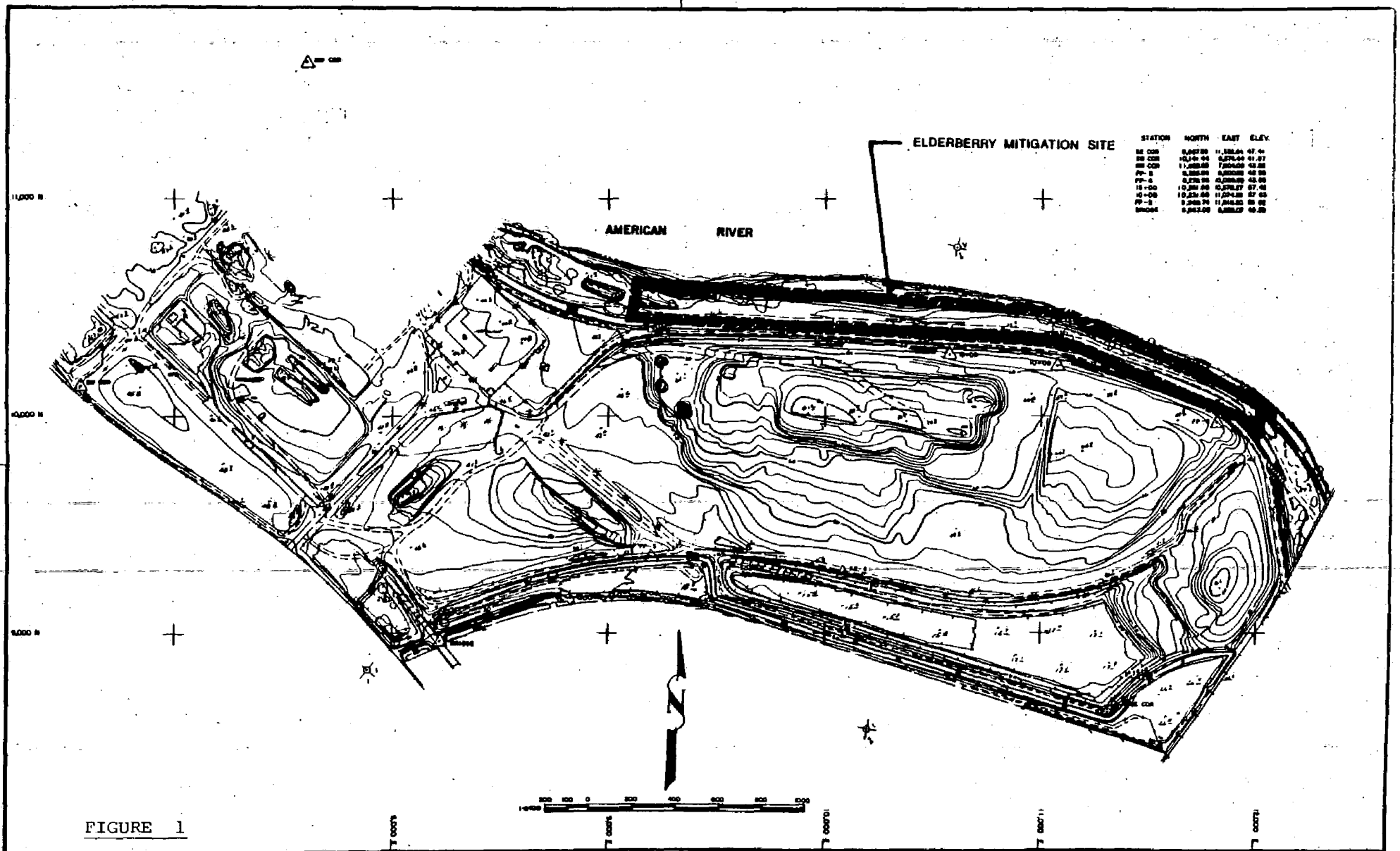


FIGURE 1

REVISIONS				BENCH MARK	FIELD BOOK	CITY OF SACRAMENTO	ELDERBERRY MITIGATION SITE	SHEET
NO.	DESCRIPTION	DATE	BY	DESCRIPTION	SCALE	DEPARTMENT OF PUBLIC WORKS		
						DRAWN BY: KAJ DATE 8-9-88	DESIGNED BY: R.C.E. DATE	CHECKED BY: R.C.E. DATE

FIGURE #
LANDFILL SITE MAP SHOWING TRENCH LOCATION

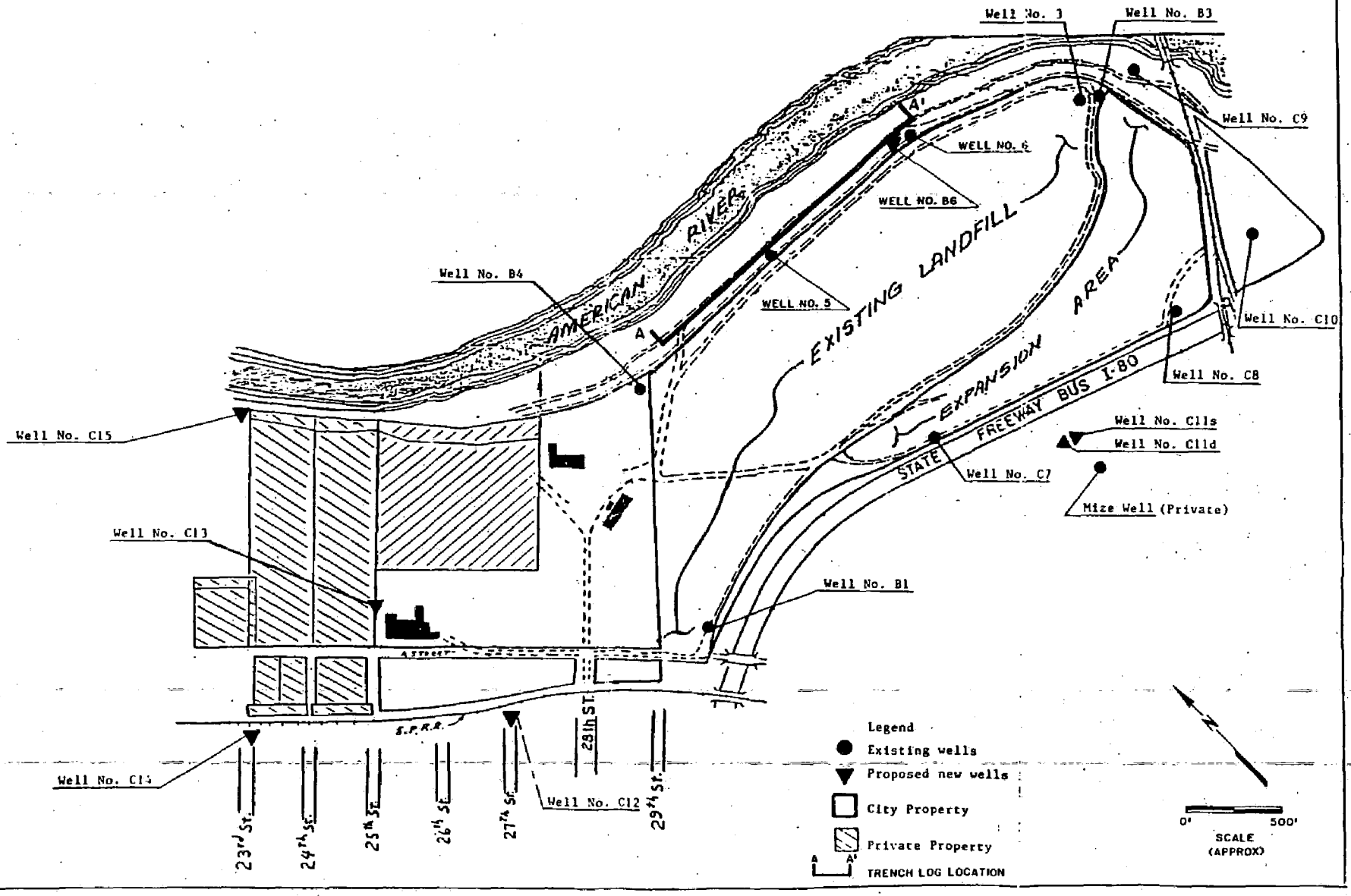
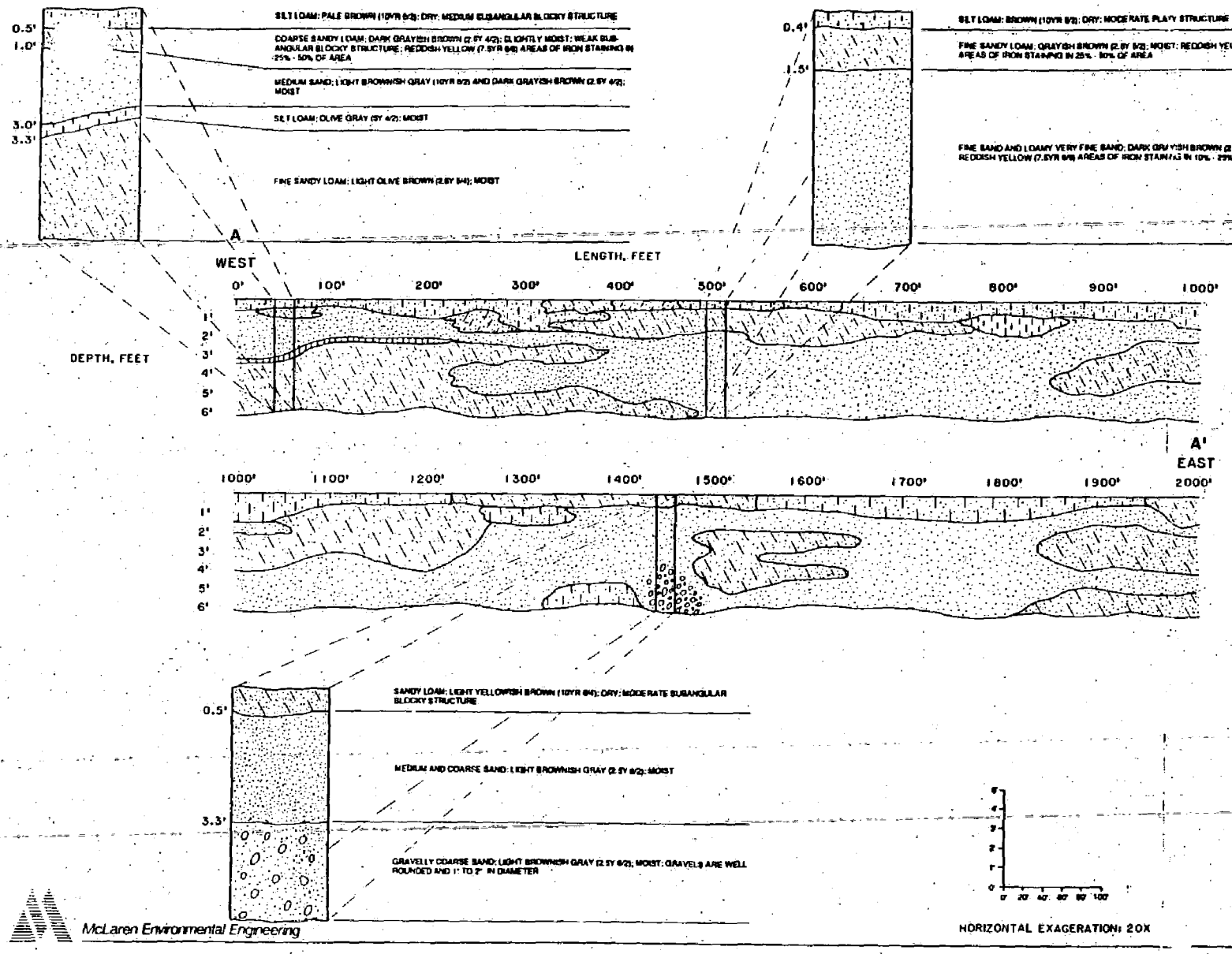


FIGURE 2

GENERALIZED TRENCH WALL



McLaren Environmental Engineering

FIGURE 2

McLaren Environmental Engineering

September 17, 1987

Mr. David A. Pelser
Department of Public Works
City of Sacramento
1231 I Street
Sacramento, CA 95814-2933

Dear Mr. Pelser:

SOUTHERN PACIFIC PIPELINE TRENCH LOG

BACKGROUND

At your request, on September 10, 1987, McLaren Environmental Engineering logged a trench near the north boundary of the City of Sacramento Landfill Site at 28th and C Streets, Sacramento. The trench was excavated September 8th and 9th by Southern Pacific Pipeline Company to install a pipeline. Backfilling of the trench began September 10, 1987. The trench was logged to obtain a general lithologic description of the soil along the north boundary of the landfill, and to record any unusual features which could be indicative of leachate or gas migration from the landfill. We understand that information from the trench log may be used by the City of Sacramento as background data for an upcoming study to assess the cause of mortality among recently planted Elderberry plants located in the area.

The Southern Pacific Pipeline Trench was located approximately 50 feet north of the landfill site, and approximately 20 to 30 feet south of the Elderberry planting area. The trench was about 6 feet deep and 3 to 5 feet wide. Approximately 2,900 feet of trench was exposed. The western 2,000 feet of the trench was logged (See Figure 1 and enclosed topographic map with sketched traverse location). Pipelaying activities in the eastern 900 feet of trench did not allow access to that area.

LOGGING PROCEDURES

The trench was logged from the surface by walking along the side of the trench and creating fresh wall exposures with a shovel. Wall smear created by excavation equipment made it necessary to cut back into the trench wall to accurately reveal the soil horizons. The original trench exposure was helpful to locate and follow coarse sand lenses because the lenses were drier than the surrounding material. In accordance with McLaren Environmental Engineering health and safety

☑ Sacramento — 11101 White Rock Road, Rancho Cordova, CA 95670 (916) 638-3696
☐ Los Angeles — 12555 West Jefferson Boulevard, Suite 216, Los Angeles, CA 90066 (213) 823-2313

policies and federal regulations, the logging was not performed within the trench because the trench was deeper than five feet and was not shored.

A tape measure was used to locate 100-foot intervals along the trench. The location of features between the 100-foot reference points was estimated by pacing. The beginning and ending locations of the trench log were identified using a topographic map of the landfill, which is included with this report. Soil descriptions were recorded at 25 locations along the trench. Soil grab samples were collected with a shovel at these locations for use in the field in describing the soil. Texture, structure, moisture content, color, iron staining, and other distinguishing characteristics were noted. The U.S.D.A. soil classification system was used to describe the soil. Soil textures were estimated in the field. Soil horizon depths were measured using a tape measure. Soil color was recorded using a Munsell color chart. Definitions of soil description terms used in the U.S.D.A. soil classification system can be found in the Soil Survey Manual (U.S.D.A. Agriculture Handbook No. 18, 1951).

Soil samples were collected in plastic bags at three locations along the trench and were retained to confirm field estimates of soil color and texture. The samples will be stored for two weeks and then will be disposed of. The samples can be submitted to the Sacramento City Department of Public Works, if requested.

Soil atmosphere readings were collected using an HNu photo ionization field instrument at various locations along the trench to verify the presence or absence of methane and other volatile gasses possibly originating from the landfill site. The readings were taken in two ways. First, the ambient air within the trench was sampled by inserting the probe tip of the HNu meter about three feet into the trench. Secondly, the probe tip was placed within one inch of the upper three feet of the trench wall immediately after scraping the wall back approximately two to four inches with a shovel.

A generalized log of the south wall of the trench is presented in Figure 2. Distances are recorded in feet from west to east.

DISCUSSION

Soil along the entire length of the trench consists of interbedded fluvial deposits of coarse sand, fine sand, and silt from the American River. Sandy deposits which contain sufficient amounts of silt and/or clay sized particles were classified as sandy loam.

A typical profile is shown in Figure 2 at 500 feet along the trench wall. At this location, the silt loam surface horizon exhibits platy structure, and soil structure is absent in underlying horizons which is typical of recent river bank soils. From a depth of 0.4 to 1.5 feet there is a fine sandy loam horizon which contains areas of iron staining indicating periods of saturation. Underlying fine sand and loamy fine sand deposits also show iron staining, which was found to occur in horizontal bands.

In general, subangular blocky structure and/or platy structure was found in the surface horizons along the trench wall. Areas of platy structure were commonly found to be associated with iron staining and occasionally with weak iron cementation. In such areas fine roots of grasses were observed to be growing horizontally between or above the iron stained platy areas and generally not below them. Weak iron cementation was noted at a depth of approximately 10 inches in a few isolated areas. Iron cementation is not expected to be prevalent within such a young soil. In areas with brush and trees near the trench, large roots were commonly observed within the lower portions of the profile.

Artifacts of trash were noted within the upper six inches of the trench wall in two locations, indicating local areas of soil surface disturbance.

Soil atmosphere readings were collected between the 0 to 300 feet and 1000 to 1400 feet intervals along the trench wall. No vapors were detected by the instrument. Slight methane odors were evident in the 1000 to 1400 feet interval when portions of the wall were scraped back with a shovel, but the presence of vapors was not confirmed by the HNu instrument. The lack of detectable vapors using the HNu instrument is not surprising because the trench had been excavated for 1 or 2 days, and gasses would likely dispurse quickly through the sandy material. Soil atmosphere readings were not taken continuously along the trench

wall because initial readings showed an absence of volatile gasses. However, pipeline installation personnel indicated that the area between approximately the 1000 and 1700 feet designations exhibited odors during excavation activities.

No evidence of leachates originating from the landfill was observed within the trench.

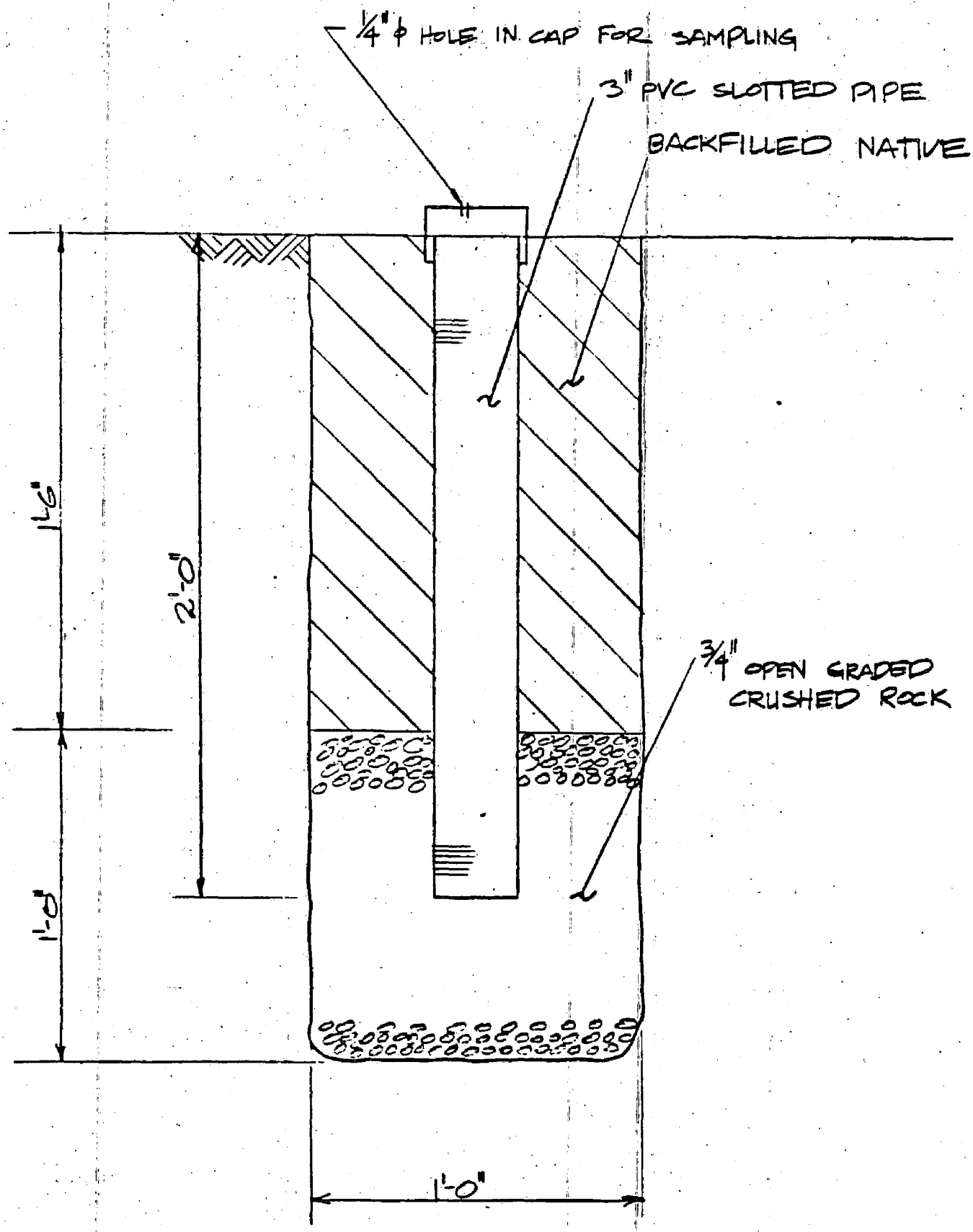
Please call Tim Costello or me if you have any questions about this report or the generalized trench log. In addition, do not hesitate to call in regard to any facet of the upcoming site investigation to identify the cause of mortality among the Elderberry plants. McLaren Environmental Engineering has extensive experience in vadose zone sampling and monitoring including the design, installation and sampling of vapor extraction wells in accordance with California Health and Safety Code Section 41805.5.

Very truly yours,

Gary Taggart
Principal Hydrogeologist

GT:rdt

Enclosures



TYPICAL METHANE MONITORING WELLS ALONG THE TOE OF THE AMERICAN RIVER LEVEE

INSTALLED 10-30-87
12-11-87 KAJ

FIGURE 4

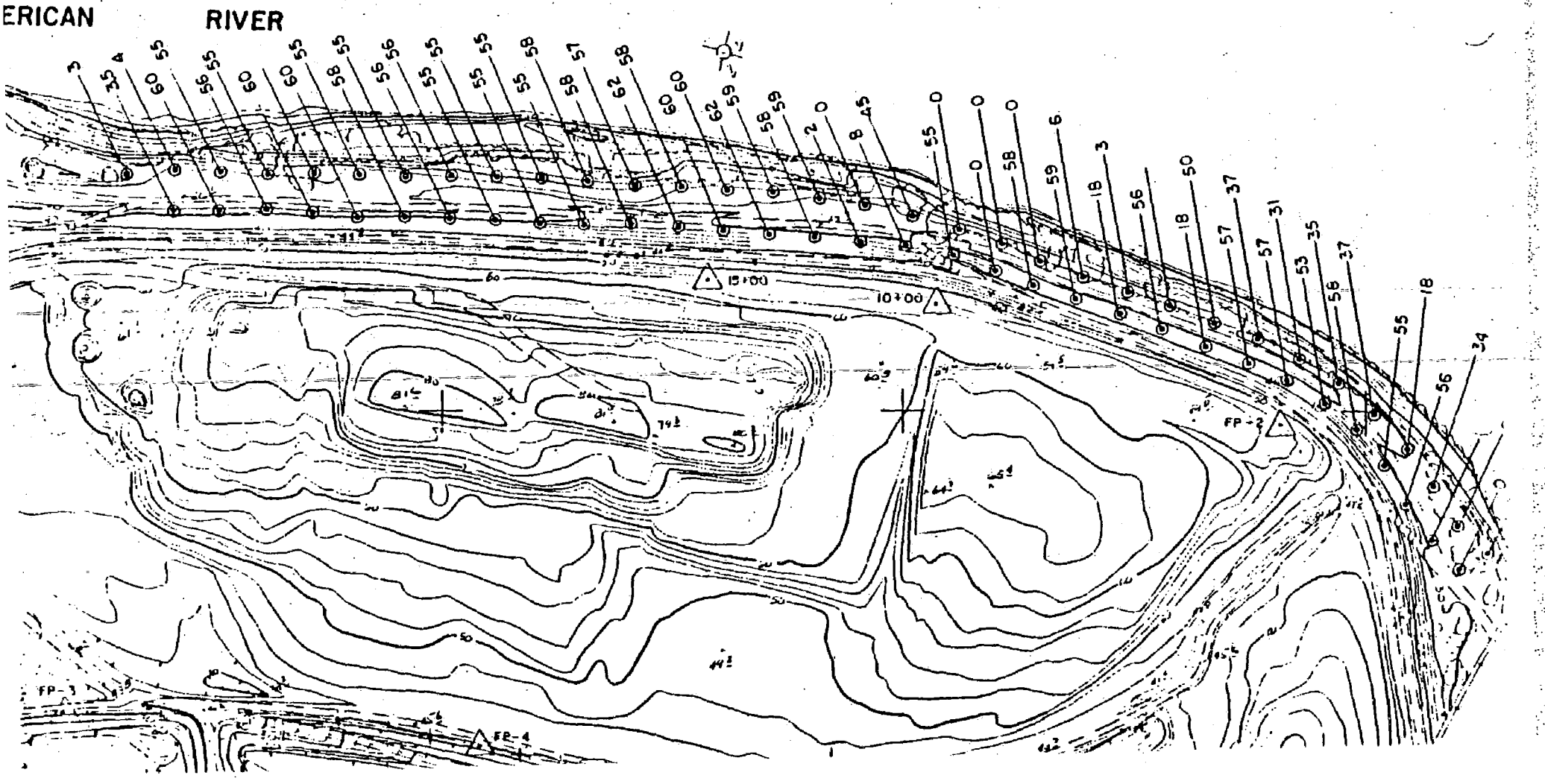
CITY LANDFILL SITE

METHANE MONITORING WELLS

SAMPLED 12-7-87/ 12-9-87

⊙- 2' DEEP WELL

STATION	NORTH	EAST	ELEV
SE COR	8,667.36	11,332.64	47.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

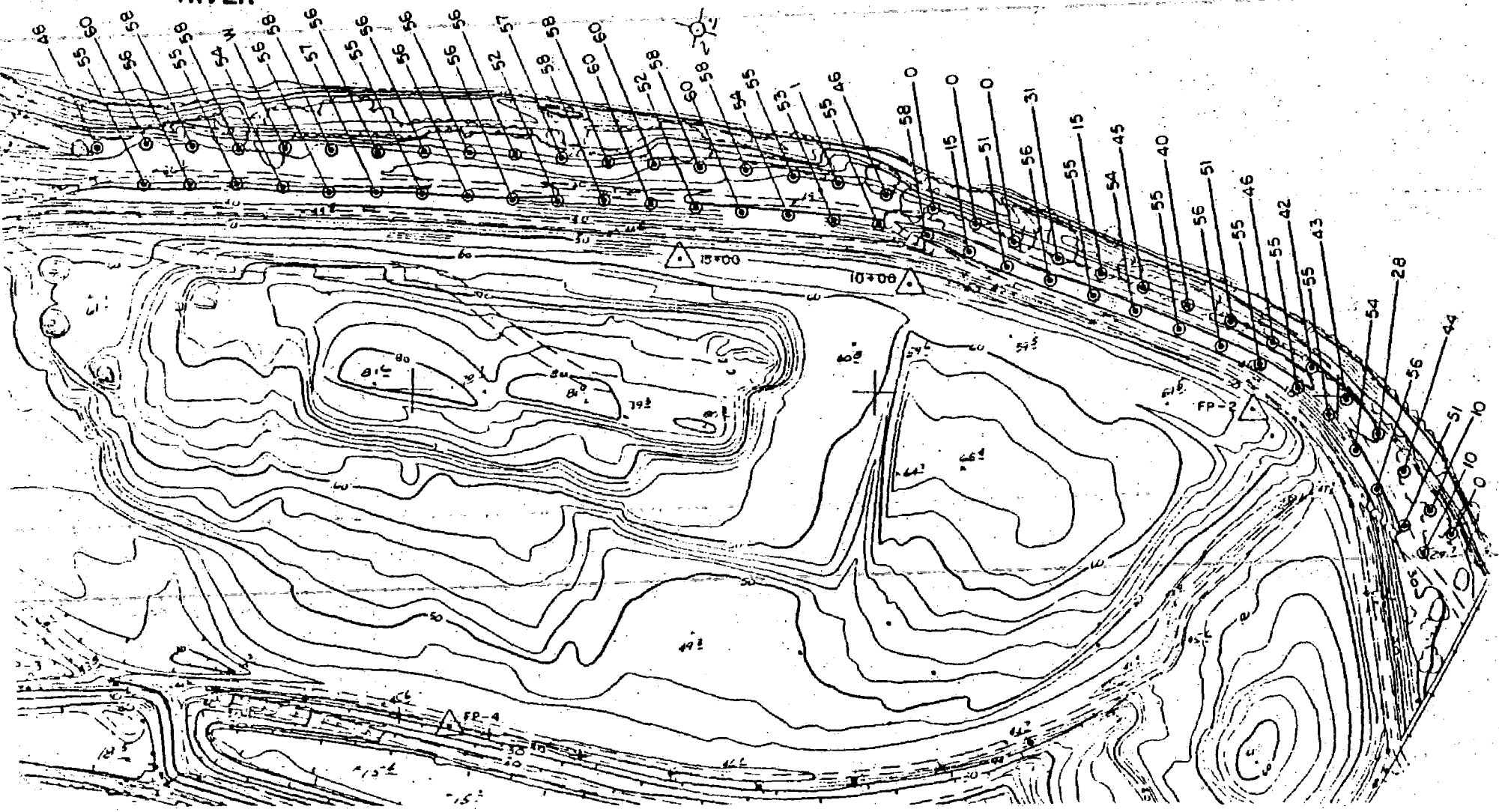


STATION	NORTH	EAST	
SE COR	8,667.36	11,332.64	41.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

SAMPLED 1-12-88

FIGURE 5

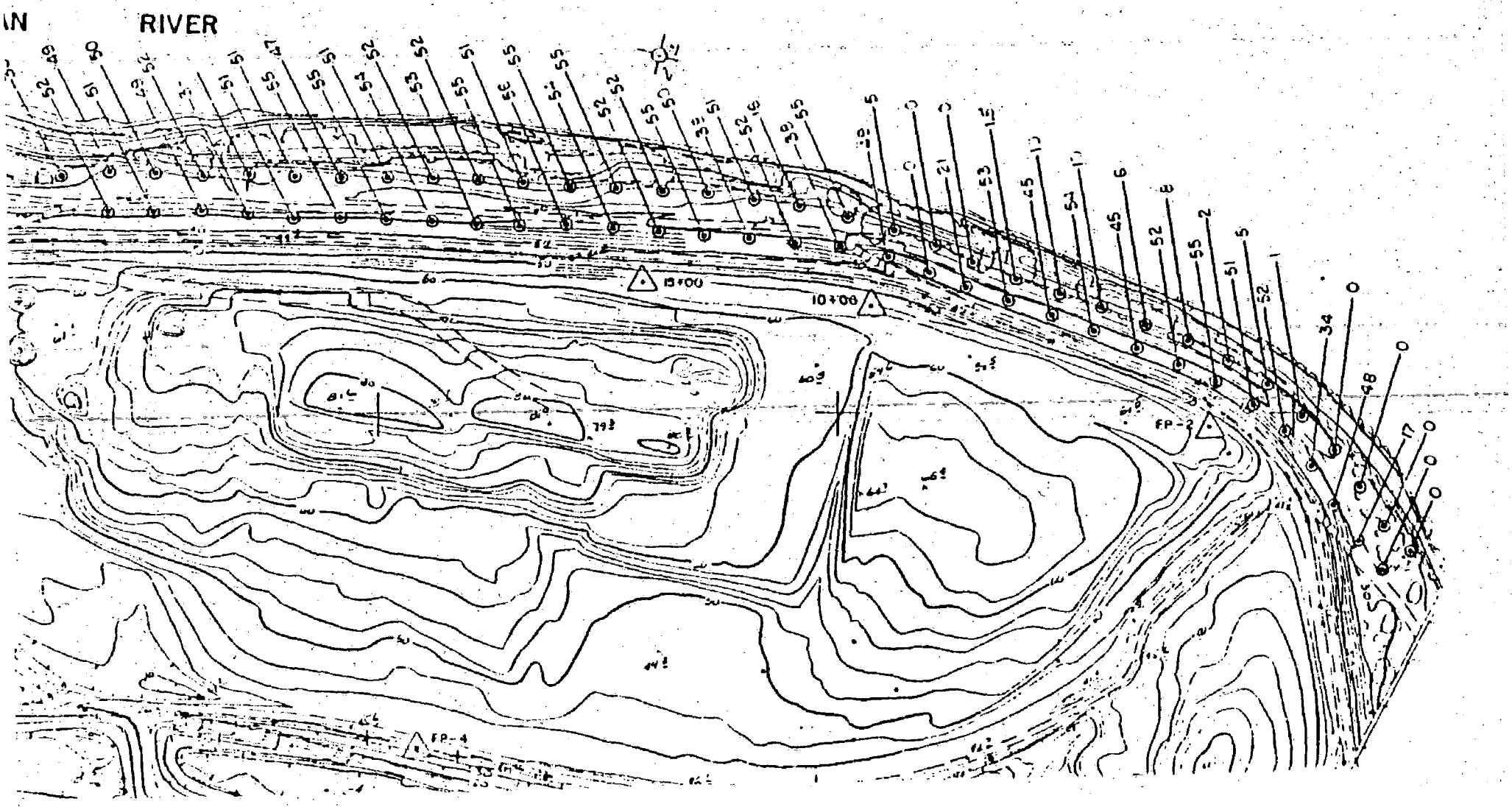
ICAN RIVER



STATION	NORTH	EAST	ELEV
SE COR	8,667.36	11,332.64	47.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

SAMPLED 2-25-88

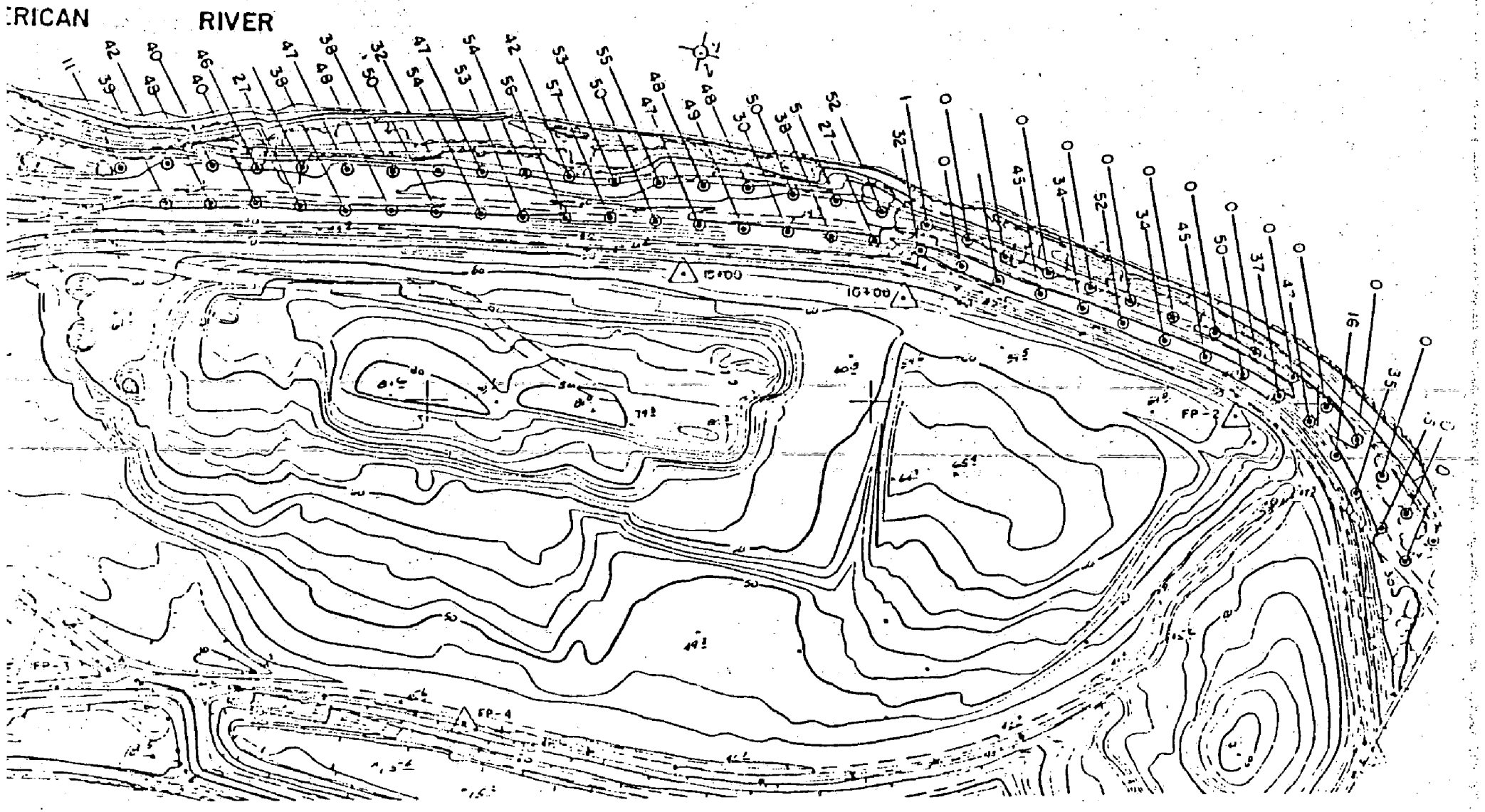
FIGURE 6



STATION	NORTH	EAST	ELEV
SE COR	8,667.36	11,332.64	47.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

SAMPLED 3-29-88

FIGURE 7



CITY LANDFILL

METHANE MONITORING WELLS

SAMPLED 4-13-88

STATION	NORTH	EAST	V
SE COR	8,667.36	11,332.64	1
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

FIGURE 8

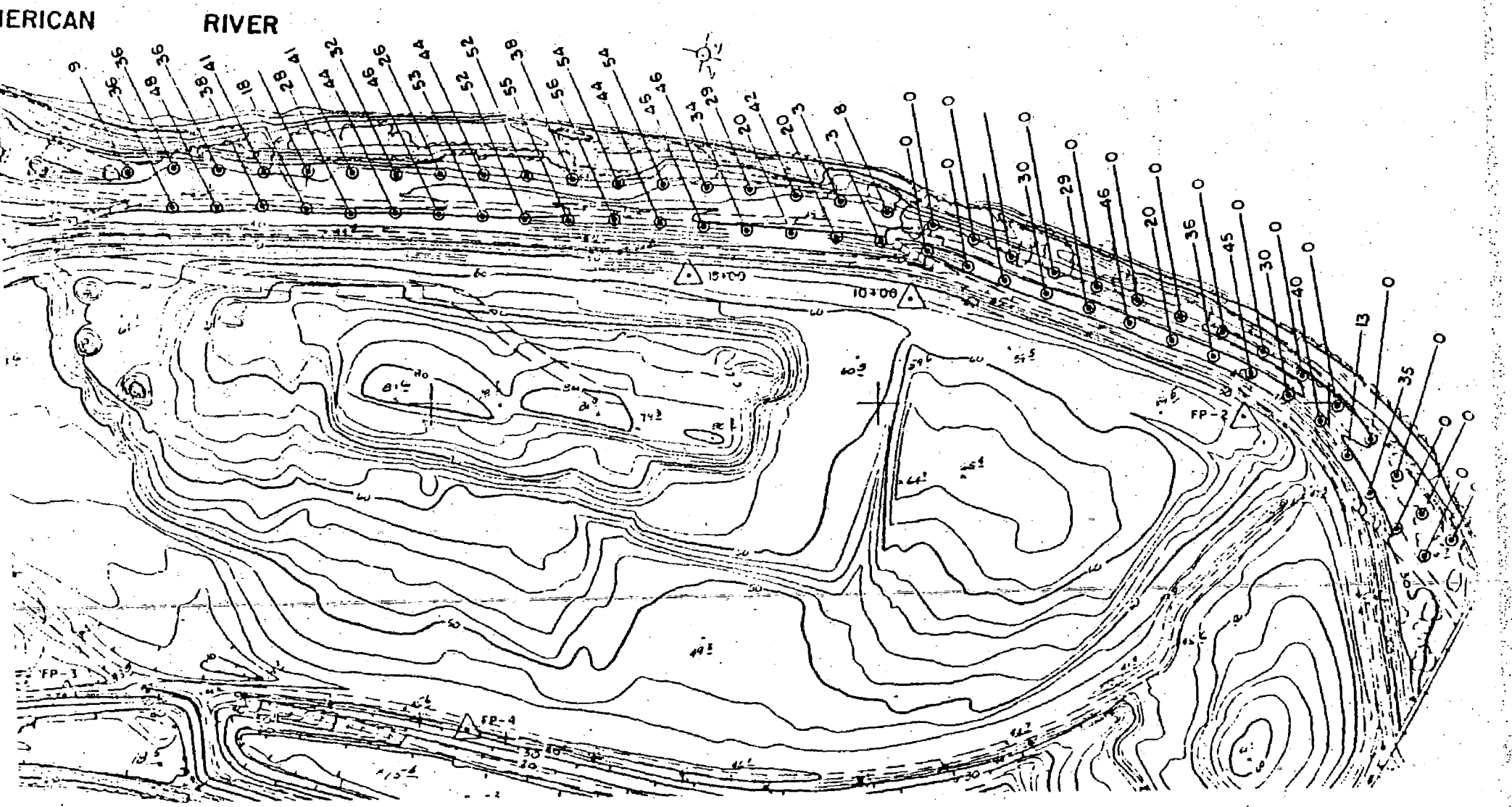


FIGURE 9

CITY LANDFILL SITE

METHANE MONITORING WELLS

SAMPLED 5-26-88

STATION	NORTH	EAST	ELEV
SE COR	8,667.36	11,332.64	47.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

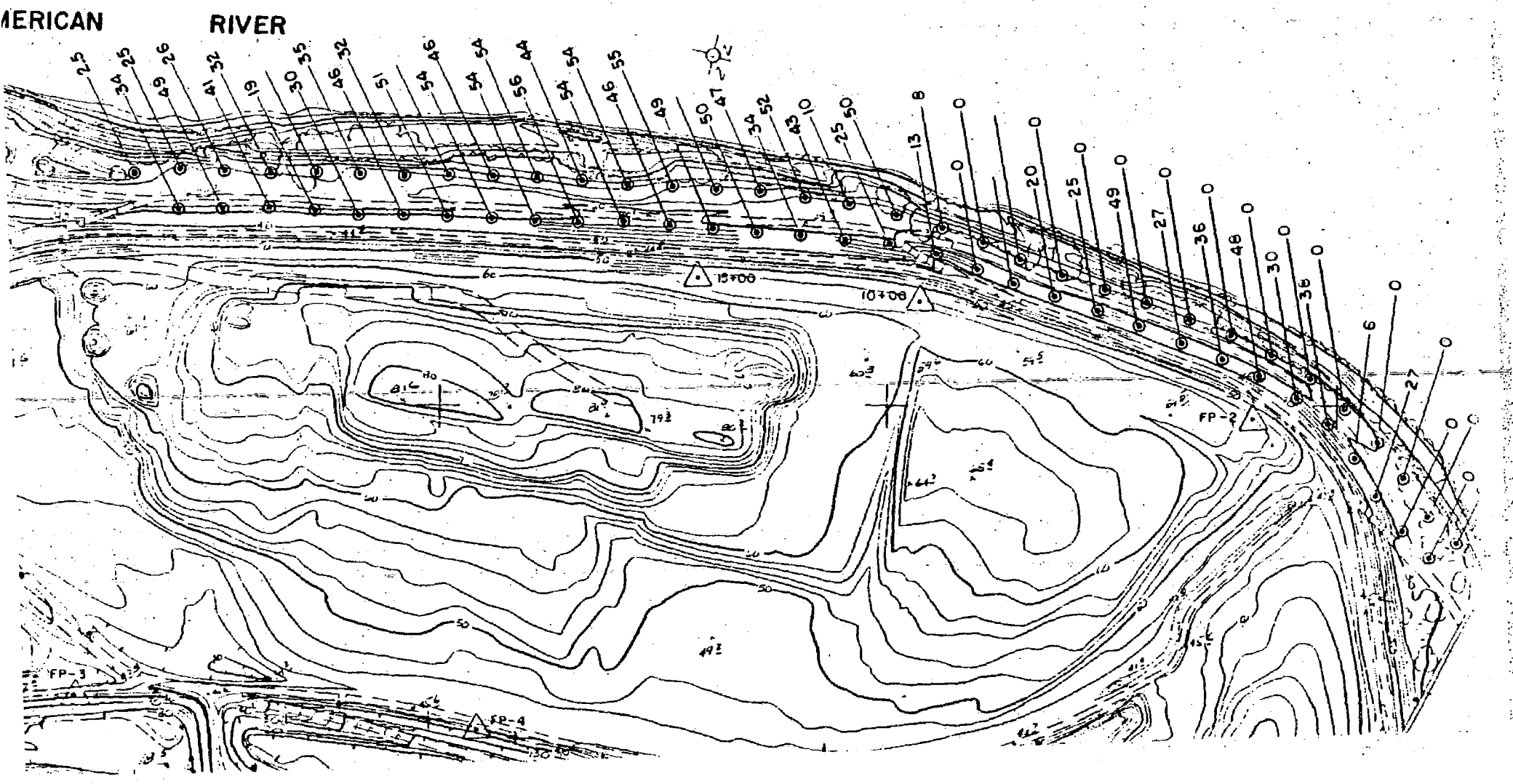


FIGURE 9-a

CITY LANDFILL SITE

METHANE MONITORING WELLS

SAMPLED 6-20-88 KAJ

STATION	NORTH	EAST	ELEV.
SE COR	8,667.36	11,332.64	47.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59

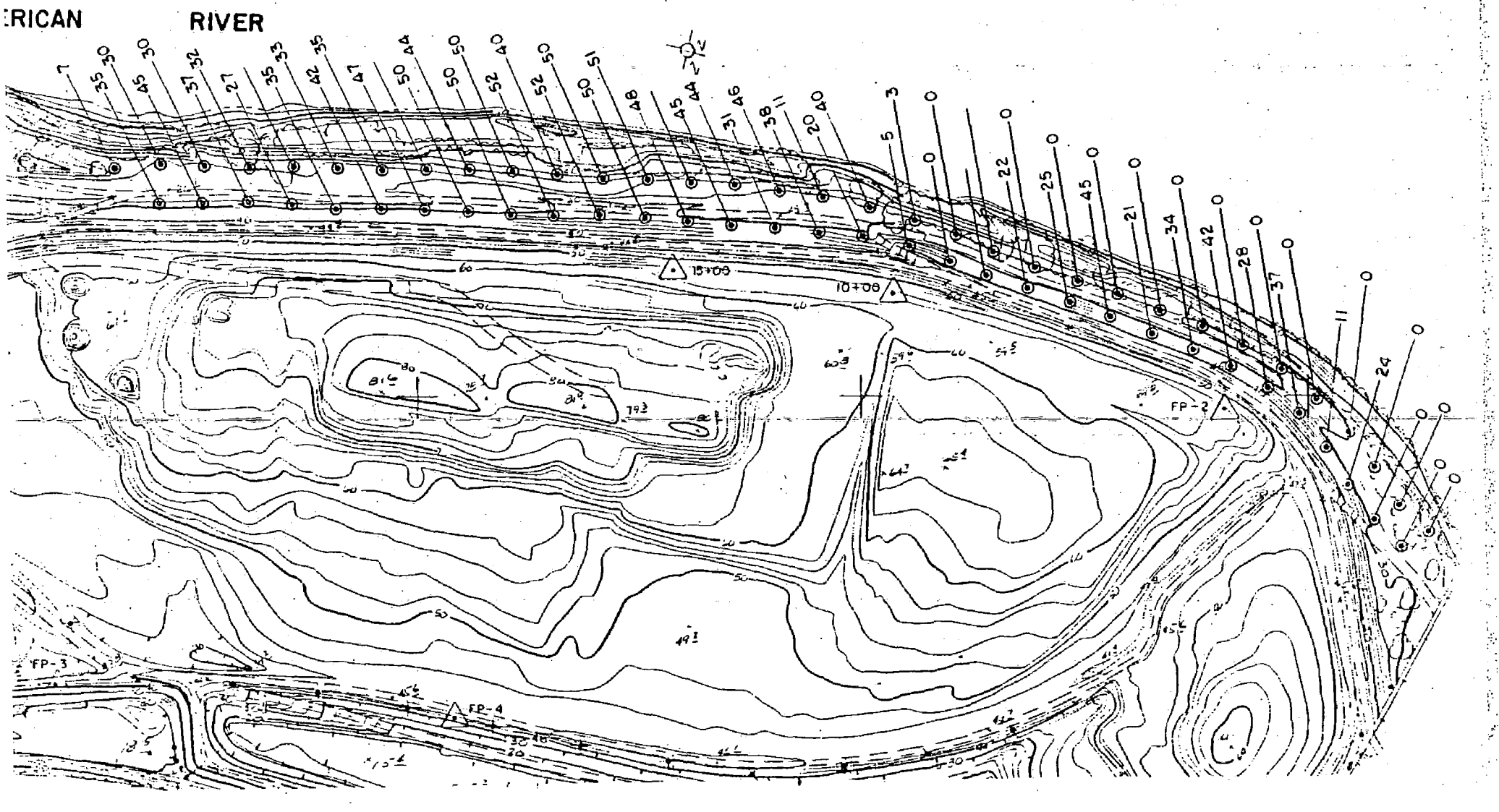


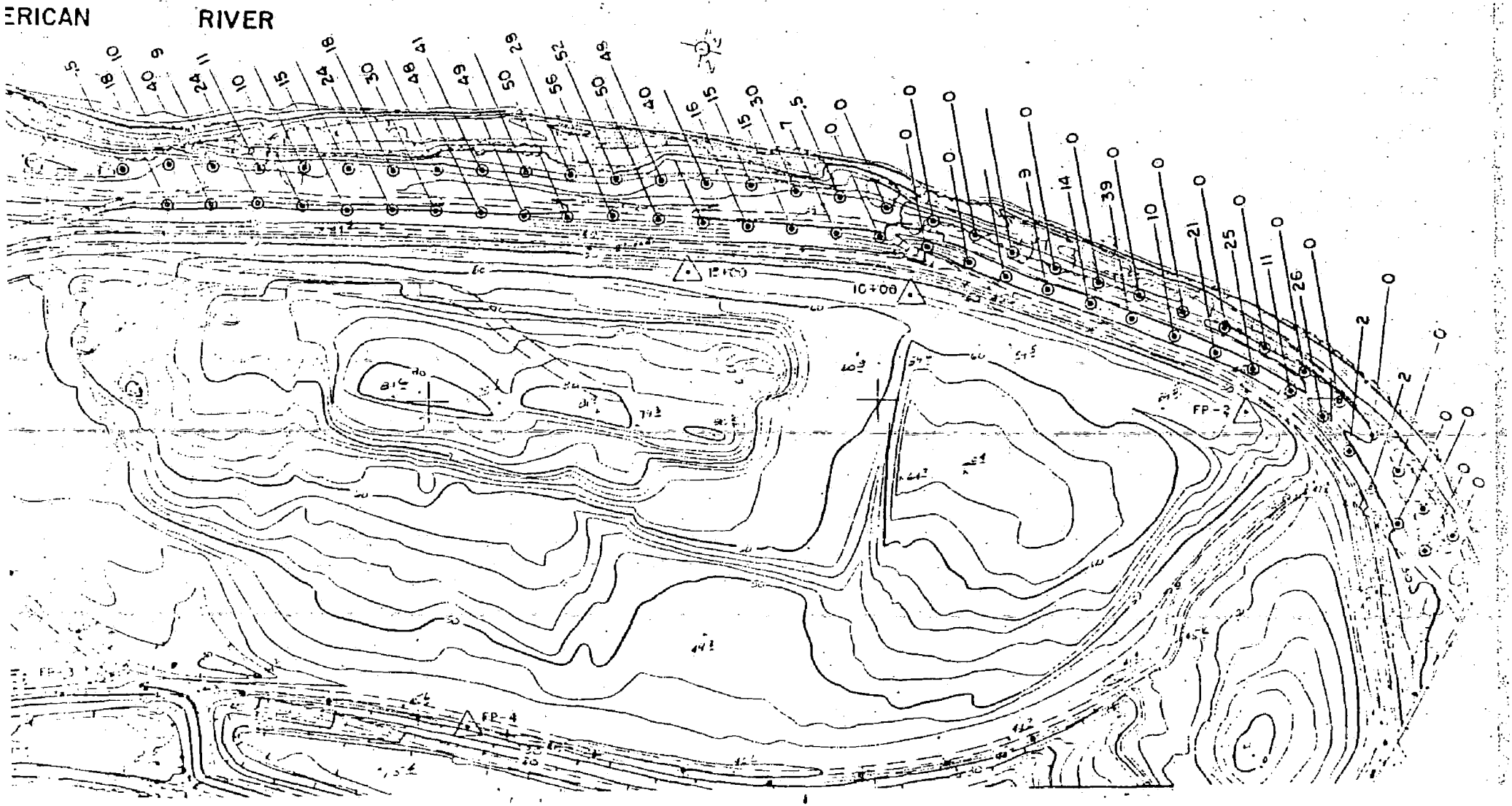
FIGURE 9-b

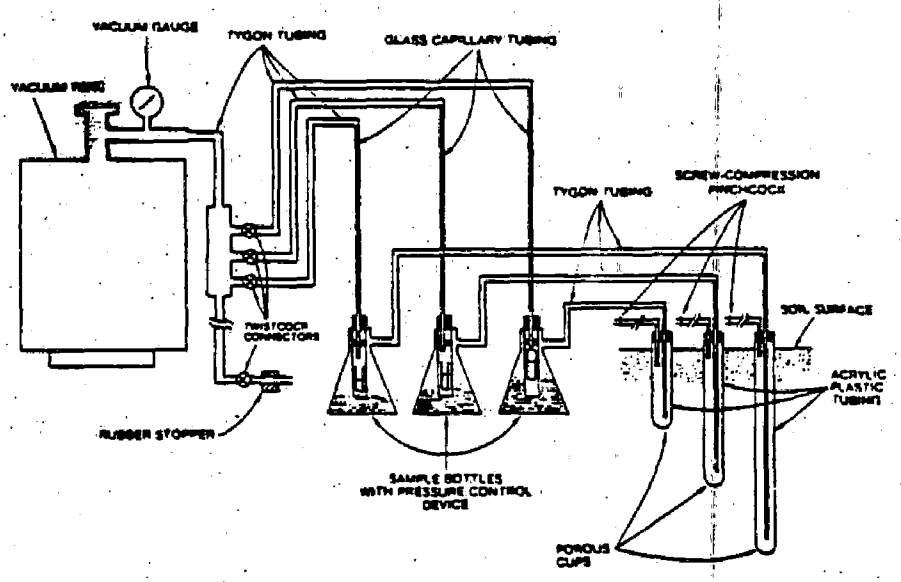
CITY LANDFILL SITE

METHANE MONITORING WELLS

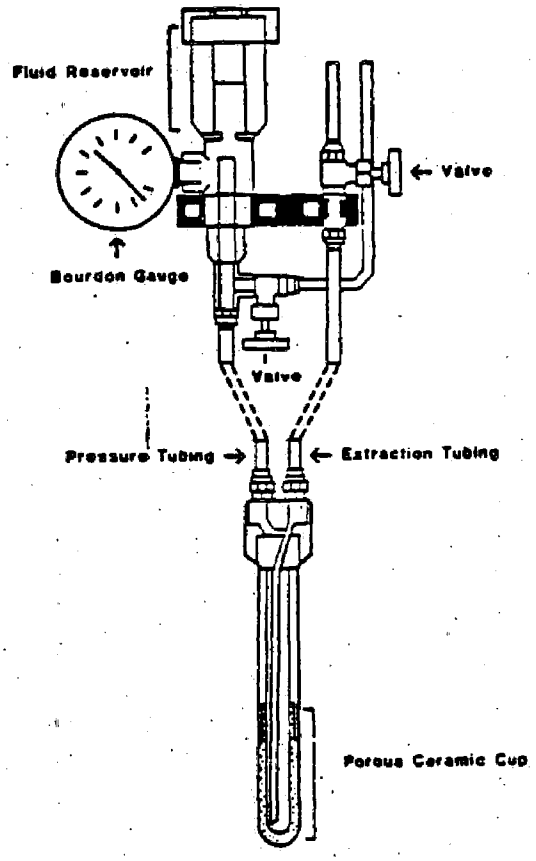
SAMPLED 8-5-88 KAJ

STATION	NORTH	EAST	ELEV
SE COR	8,667.36	11,332.64	47.41
SW COR	10,141.44	6,574.44	41.87
NW COR	11,628.65	7,604.09	42.62
FP-3	9,355.94	9,200.85	42.98
FP-4	9,278.96	10,086.60	43.68
15+00	10,281.98	10,578.27	57.42
10+00	10,231.68	11,074.85	57.63
FP-2	9,968.74	11,818.20	55.62
BRIDGE	8,963.08	8,228.07	45.59





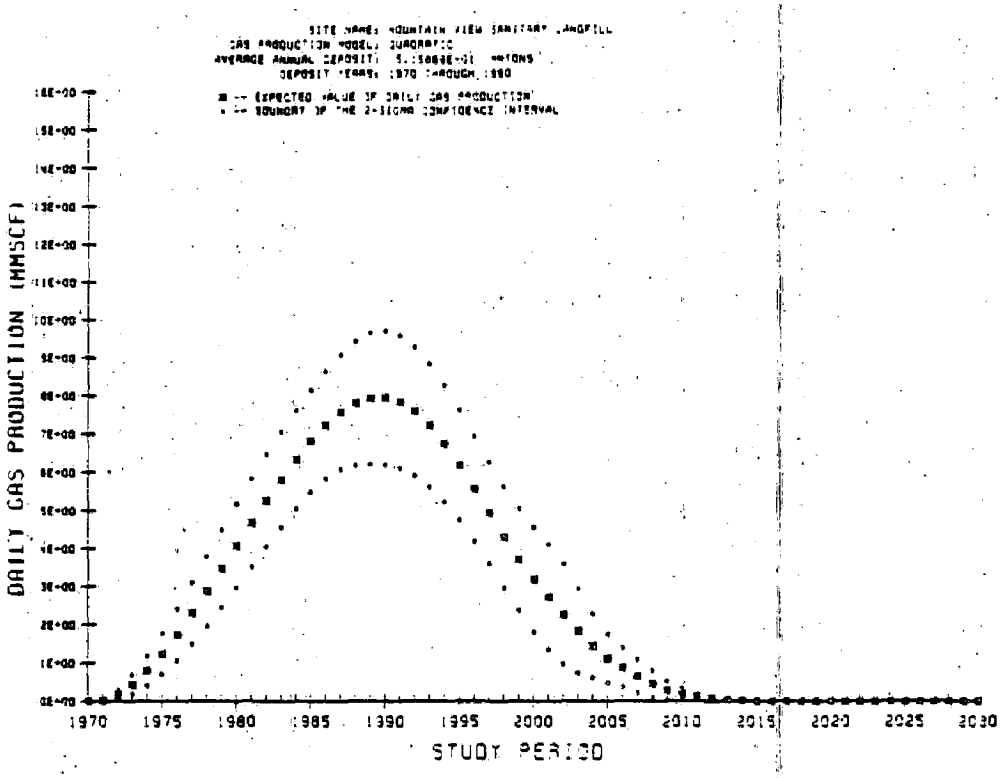
THREE LYSIMETER SET-UP



LYSIMETER/TENSIOMETER

FIGURE 10

QUADRATIC MODEL ESTIMATE OF GAS PRODUCTION IN THE MOUNTAIN VIEW SANITARY LANDFILL



EXPONENTIAL MODEL ESTIMATE OF GAS PRODUCTION IN THE MOUNTAIN VIEW SANITARY LANDFILL

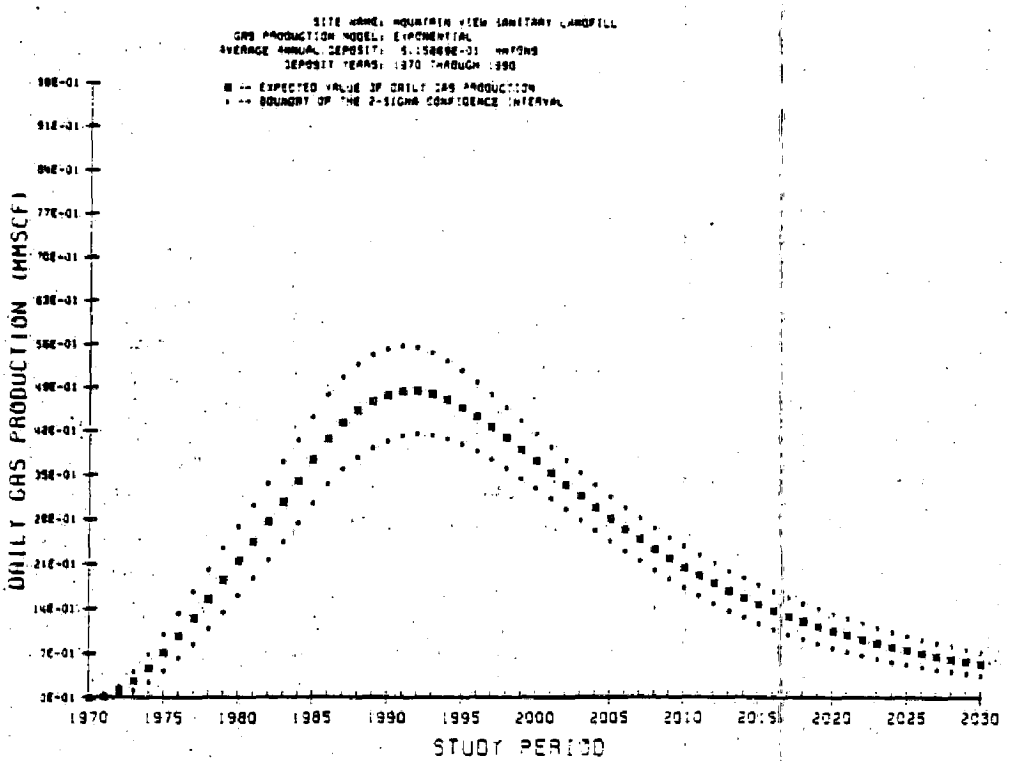
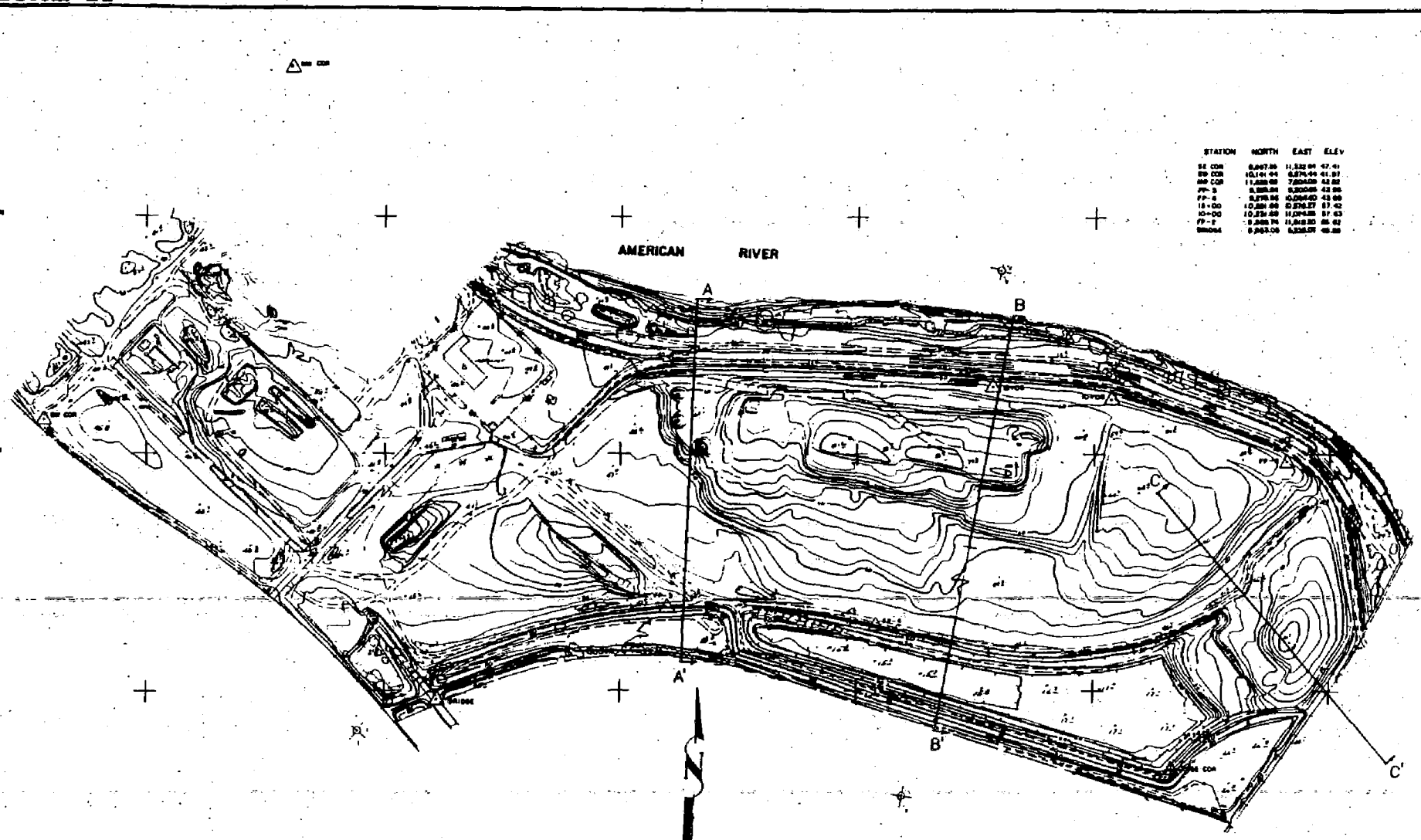


FIGURE 11

FIGURE 12



BASE MAP Prepared By
Topographical Surveys, Inc.
Date of Photography 10-13-87

REVISIONS

BENCH MARK

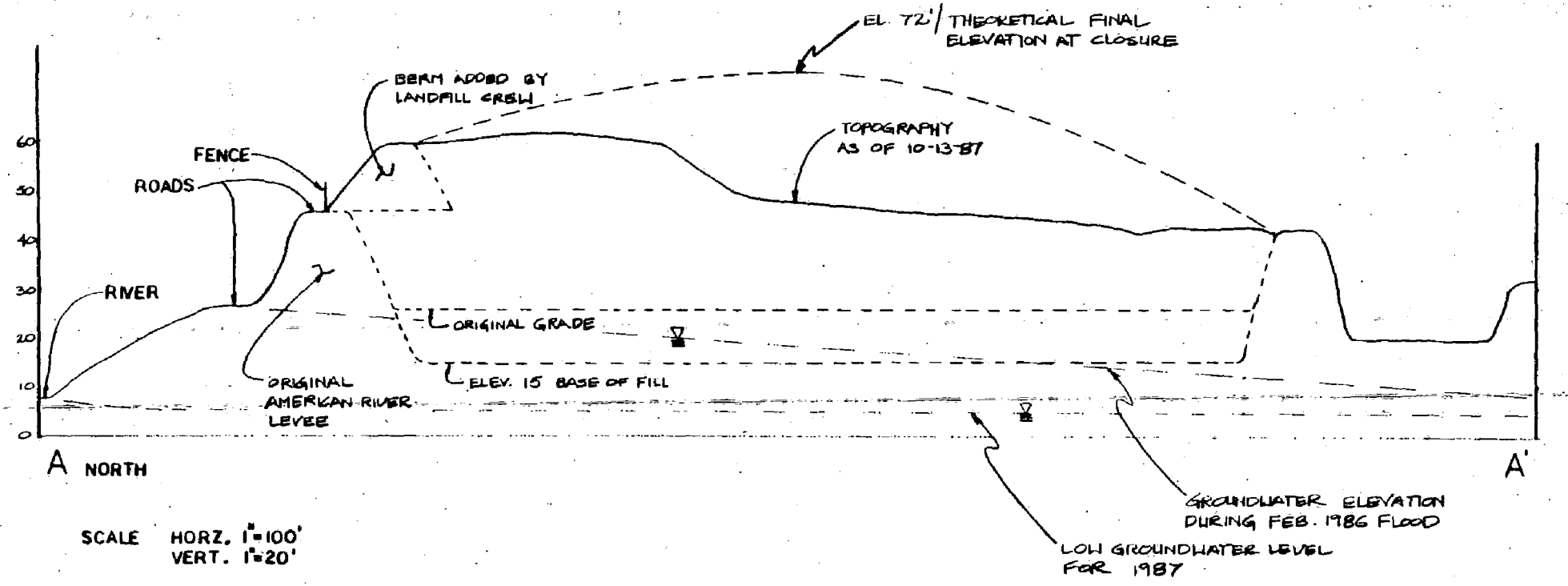
CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

KAT
5-16-88

LANDFILL CROSS SECTIONS

SHEET 1

FIGURE 13



SCALE HORZ. 1"=100'
VERT. 1"=20'

FIGURE 2 OF 4

KAJ 5-11-88

AVERAGE SEA-LEVEL PRESSURE WITH THE HIGHEST AND LOWEST BY MONTH WITH DATE AND YEAR OF OCCURRENCE
(July 1877-December 1987)

Month	Average	Highest	Date	Year	Lowest	Date	Year
Jan	30.07	30.64	24	1938	28.95	27	1916
Feb	30.02	30.74	17	1883	29.15	22	1891
Mar	29.98	30.56	2	1971	29.22	12	1906
Apr	29.94	30.45	4	1945	29.37	22	1931
May	29.87	30.34	12	1890	29.50	17	1949
Jun	29.82	30.22	25	1975*	29.54	29	1901
Jul	29.81	30.21	12	1888	29.55	8	1926
Aug	29.81	30.19	4	1976	29.49	26	1932
Sep	29.82	30.19	19	1950*	29.44	12	1927
Oct	29.92	30.42	28	1921	29.42	24	1951
Nov	30.03	30.53	18	1969*	29.20	30	1982
Dec	30.07	30.67	25	1879	29.23	22	1982
Annual	29.93	30.74	17 Feb	1883	28.95	27 Jan	1916

City Data used until July 1, 1939. Executive Airport thereafter.
* Occurred on earlier dates and years.

FIGURE 14

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

APPENDIX A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
SACRAMENTO ENDANGERED SPECIES OFFICE
2800 Cottage Way, Room E-1823
Sacramento, California 95825-1846

AUG 25 1987

PUBLIC WORKS
OFFICE OF THE DIRECTOR

AUG 26 1987

In Reply Refer To:
JW/1-1-87-TA-577

area. Perhaps an informal meeting is appropriate at this point to assess the problem. Please contact Dr. Jack Williams of my staff at the letterhead address or at 978-4866 for further discussion.

Sincerely,

Gail C. Kobetich

Gail C. Kobetich
Field Supervisor

cc: Chief, Endangered Species, Portland, Oregon (FWE-SE)
Field Supervisor, Ecological Services, Sacramento, California (ES-S; Attn: Don Palawski)
Mr. David Shore, City Councilman, City Hall, Room 205, 915 I Street, Sacramento, California 95814
Mr. Phil Mahr, American River Flood Control District, 720 F Street, Sacramento, California 95814
Mr. Jim King, Department of Water Resources, P.O. Box 942836, Sacramento, California 94236-0001
Mr. Walter Yep, Chief, Planning Division, U.S. Army Corps of Engineers, 650 Capitol Mall, Sacramento, California 95814
Mr. Jeff Groska, U.S. Army Corps of Engineers, 650 Capitol Mall, Sacramento, California 95814
Mr. Tim Crandall, California Regional Water Quality Control Board, 3443 Routier Road, Sacramento, California 95827

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

23 September 1987

DISCHARGER: City of Sacramento, 28th Street Landfill (Case# 2891)

LOCATION & COUNTY: 28th Street, Sacramento County

CONTACT(S): Dave Pelser, City of Sacramento Solid Waste

INSPECTION DATE: 13 August 1987

INSPECTED BY: Timothy Crandall

ACCOMPANIED BY: Jack Williams, U.S. Fish and Wildlife Service

OBSERVATIONS AND COMMENTS:
I received a call from Jack Williams of the U.S. Fish and Wildlife Service. He explained that his organization had established a mitigation area for the benefit of the threatened valley elderberry longhorn beetle. Part of this area borders the northern side of the 28th Street Landfill next to the American River. In November of 1986, a number of elderberry bushes were planted in the mitigation area to augment the established elderberries. Starting in April, the American River Flood Control District watered the plantings on a regular basis. Approximately a month ago, Jack and a botanist from the Department of Water Resources (Jim King) noticed that the plantings were dying. In addition, much of the established riparian vegetation was also stressed or dead. This includes large cottonwood trees that are estimated to be over 80 years old.

Jack and I traveled to the site on 13 September 1987. On our way there we noticed approximately four dead eucalyptus trees on the south side of the landfill near Business 80 and the expansion area. At the mitigation area, I found a stretch of dead vegetation at least one quarter mile long. This stretch is north of the lower service road (see Figure 1). After examining the vegetation, it was obvious that a plant death gradient existed. Vegetation closest to the landfill was dead. Plants further away were stressed or in the process of dying. Those plants furthest away from the landfill and closest to the river looked healthy.

Using a soil auger, I drilled down into the soil at the northern side of the lower access road. At approximately eight inches in depth I encountered a zone of sandy silt that was grey, moist, putrid smelling, and very warm. I estimated the temperature to be between 90 and 100 degrees F. I took a sample and ran an analysis for volatile and semivolatile organics. The results were negative. The lab informed me that because the sample jars were not completely packed with soil, volatiles could have

migrated to the headspace and been lost. From the spot where I took the first sample, I made additional borings at ten foot intervals heading in a northerly direction towards the American River. I continued to find the grey, moist, putrid layer but at progressively deeper points. At about 40 feet north of the lower service road, I could not find the layer. Either the contaminated zone thinned out, or its location was deeper than the four foot length of my auger. I moved to an area west of the first boring where the vegetation was not dead. There I found dry silty or sandy soil to a depth of four feet. All of this soil was cool to the touch. I did not encounter the grey, moist, putrid zone.

Bill Mahr of the American River Flood Control District arrived at the scene. He said that the plantings had been watered properly. Bill revealed that about seven years ago the city was given permission to extend the landfill to what was then a free standing levee (See Figure 1). Ever since the city started placing refuse up against the levee, grass would not grow on the opposite side. Bill said that of all the miles of levees in the district, this stretch was the only one that did not require an annual mowing. I asked Bill about the death of the established plants in the mitigation area. He recalled that the bamboo started to die off about 2 years ago, but that was all. Jack said that when this site was being considered as a mitigation area, approximately one year ago, there were no obvious signs of distressed vegetation.

Groundwater beneath the landfill is contaminated with low levels of volatile organics and metals such as iron and manganese. It is possible that these contaminants could be affecting the established vegetation, but not the new elderberry plantings. These plantings have not had time to establish root systems that reach the groundwater table which is probably twenty feet below the ground surface. Instead, I suspect that either leachate and/or gas is traveling laterally from the landfill, through the vadose zone, to the mitigation area. I found either sand, sandy silt or silt in all of the soil borings I took. These are all permeable enough to act as conduits for contaminants.

INSPECTION SUMMARY:
Vegetation in a mitigation area for the threatened valley elderberry longhorn beetle is dying off. Evidence was found that implicates the 28th Street Landfill as a cause of the plant death. Further studies should be done to define this problem.

Timothy Crandall

Timothy Crandall
Project Engineer

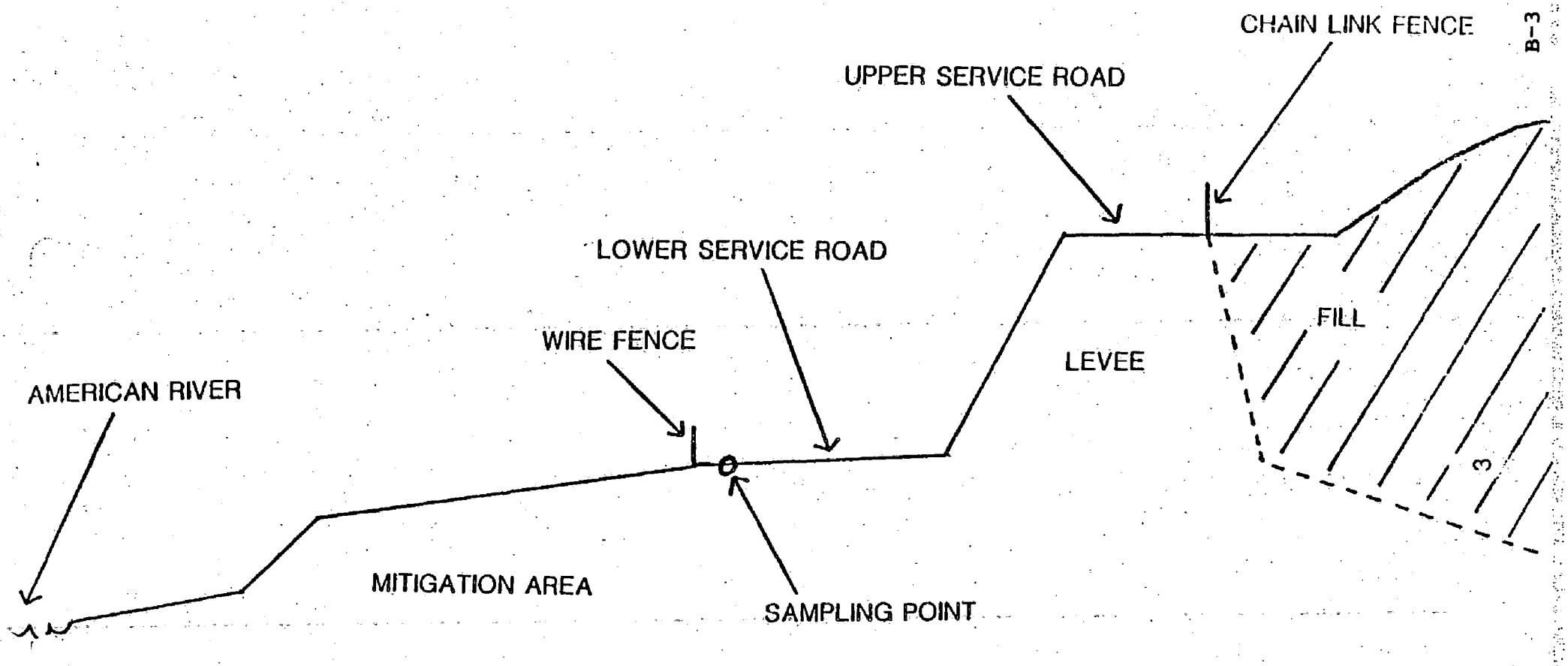


FIGURE 1

NOT TO SCALE

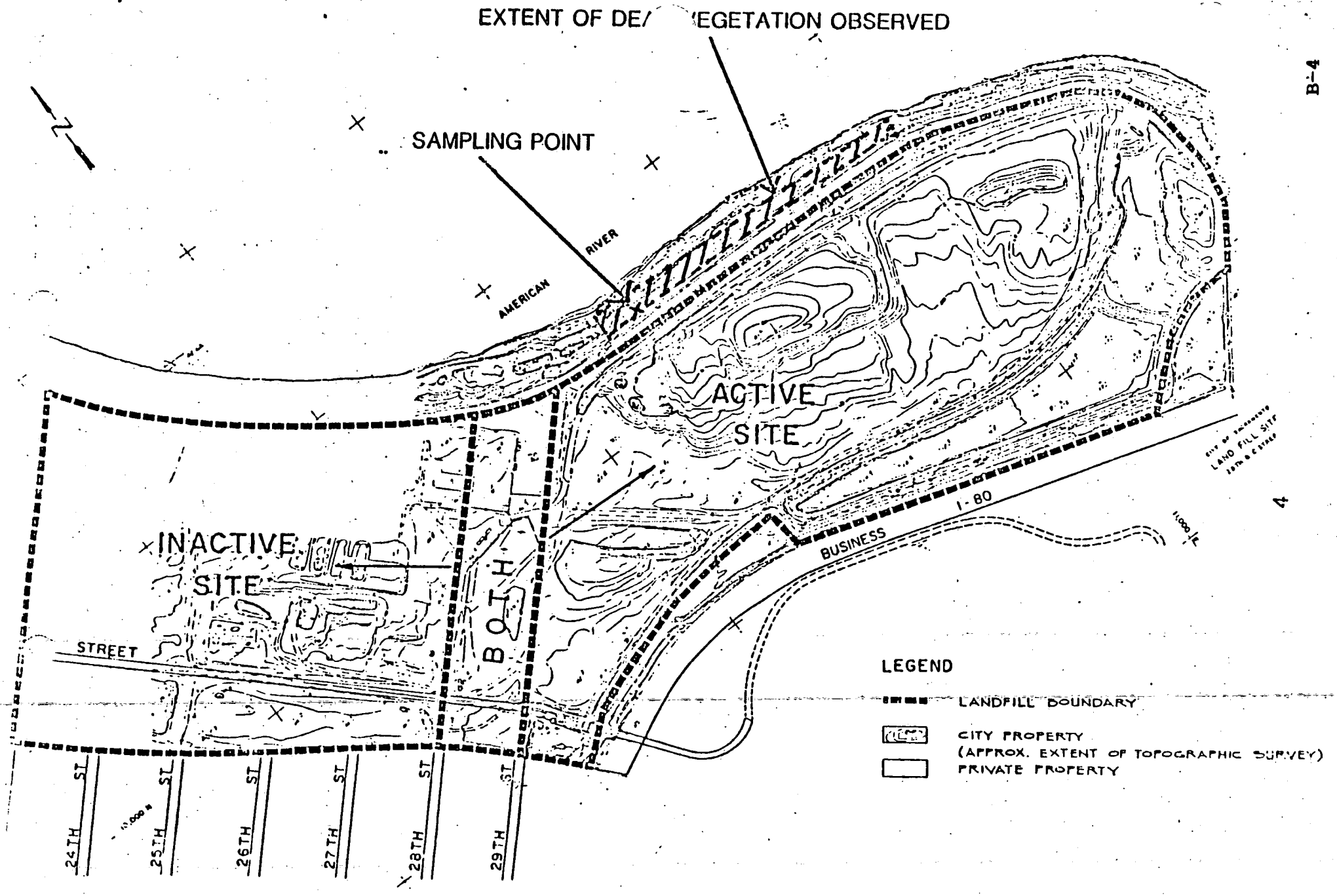

EXTENT OF DE/ EGETATION OBSERVED
SAMPLING POINT
AMERICAN RIVER
ACTIVE SITE
INACTIVE SITE
BOTH
STREET
I-80
BUSINESS
24TH ST
25TH ST
26TH ST
27TH ST
28TH ST
29TH ST
LEGEND
LANDFILL BOUNDARY
CITY PROPERTY
(APPROX. EXTENT OF TOPOGRAPHIC SURVEY)
PRIVATE PROPERTY

FIGURE 2

Memorandum

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD • CENTRAL VALLEY REGION

3443 Routier Road
Sacramento, CA 95827-3098

Phone: (916) 361-5600
ATSS: 8-495-5600

TO: Tim Crandall
Project Engineer

FROM: Phil Guadagnino
Area Engineer

DATE: 28 September 1987

SIGNATURE: Philip G. Guadagnino

SUBJECT: 28TH STREET LANDFILL, METHANE SURVEY

Attached for your review is the completed methane survey for the above facility. This information includes the sampling plan, sampling summary, site map, detailed photos, and a copy of the Hazard Evaluation Plan.

This survey found the presence of methane in soils outside of the landfill at levels up to 200% of the lower explosive limit (approximately 100,000 ppm). The attached data indicates that methane has migrated approximately 75 feet north of the landfill towards the river. Readings collected from the HNu photoionizer and the oxygen meter indicate the presence of other unknown gases. Methane gas alone may be responsible for the dead and dying vegetation in this area. The presence of these gases may indicate that other landfill pollutants may be flowing towards the American River.

The attached graph of methane levels at 40 feet and 75 feet from the landfill fence indicate that the gas is following a plume pattern which coincides with a continuous layer of moist, coarse, gray sand.

Additional soil gas and priority pollutant sampling should be done both at deeper levels and along the river edge of the landfill wherever vegetation appears stressed.

We recommend advising the City and anyone else who may have easement rights in the affected areas so that they may take appropriate precautions against explosion or asphixiation.

PGG:jj:sg

Attachment

cc

SAMPLING SUMMARY

Field Notes

28th Street Landfill

The 28th Street Landfill is a Class II facility bounded by the American River on its north side.

Prior to sampling a sketch of the survey area was made (copy attached). Proposed sampling points were selected at points forming an approximate 20-30' grid across the 200' x 250' survey area. Sampling points were relocated as necessary to conform to site conditions and instrument readings.

Air Monitoring

Both Combustible Gas Indicator (CGI) and HNu photoionizer (PID) readings were taken in the area to be sampled. Samples were drawn at heights from 18" to 72" off the ground surface in several locations to get a good representative sample in the breathing zone. No indication of combustible gases or volatizing material was found. O_2 levels were at 20.3%, 20-21% is normal. Based on these readings, Level D protection with disposal gloves was selected.

Methane Mapping

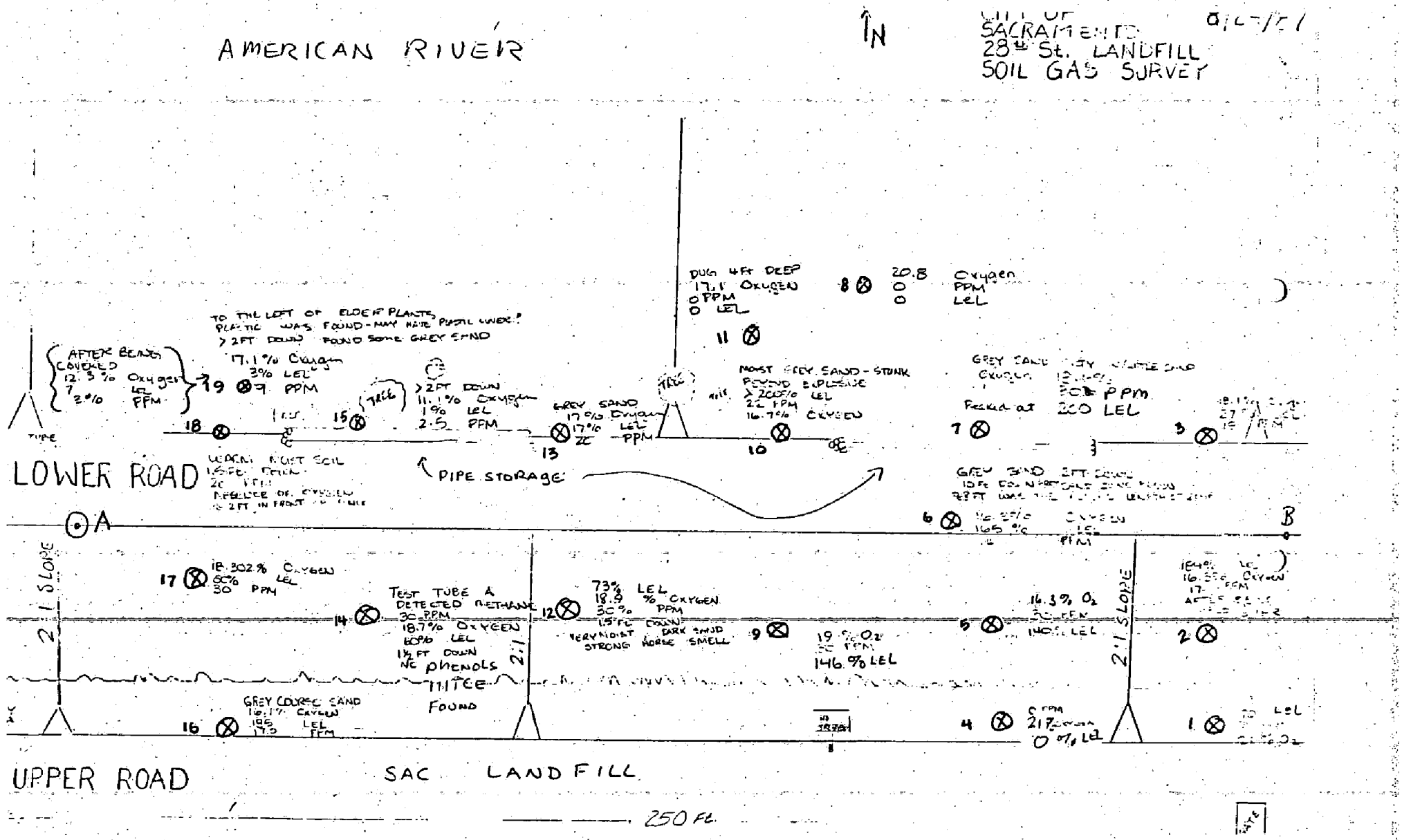
To our knowledge no previous methane study has been conducted at this portion of the landfill. A recent letter (25 August 1987) from USDI (attached) expressed concern over dead or dying vegetation in this study area.

Using our sketch grid system we began sampling at the southeast corner and worked west and north. Typical sampling procedure consisted of hand auguring a 4" hole drawn to approximately 18", covering the hole with plastic and inserting the CGI and HNu probes under the plastic as close to the bottom of the hole as possible without clogging.

Both handwritten notes and a tape recorder were used to record results. Most readings were collected at 10-15 seconds after insertion or when reading peaked. Draeger tube samples for methane, phenol and TCE were taken at Sample Point 14. Only methane was confirmed at this time. Unusual patterns such as low O_2 levels combined with fluctuating HNu readings may indicate the presence of other unknown gases.

PGG:jj

	CGI		HNu PID	
Sample Site #	% Lower Explosive Limit	% O_2	PPM Volatiles	Notes
1	70	21	3	
2	184	16.3	17	
3	27	18.1	19	
4	0	21.0	0	
5	140	16.3	30	
6	165	16.3	14	
7	200	18.6	30	
8	0	20.8	0	
9	146	19.0	30	
10	>200	16.7	22	
11	0	17.1	0	
12	73	18.9	30	
13	17	17	20	
14	60	18.7	30	
15	1	11.1	2.5	>2 feet
16	185	16.1	17.0	
17	80	18.3	30	
18	--	--	20	
19	3	17.1	9	
19A	7	12.3	3	After being covered


AMERICAN RIVER
N
CITY OF SACRAMENTO
28th St. LANDFILL
SOIL GAS SURVEY
8/6-7/81
LOWER ROAD
UPPER ROAD
SAC LANDFILL
PIPE STORAGE
A
B
2:1 SLOPE
2:1 SLOPE
2:1
250 FT.
DUG 4Ft DEEP
17.1 OXYGEN
0 PPM
0 LEL
8
20.8 Oxygen
0 PPM
0 LEL
11
AFTER BEING COVERED
12.3 % Oxygen
7 LEL
2.0% PPM
19
17.1% Oxygen
3% LEL
9 PPM
TO THE LEFT OF ELDER PLANTS PLASTIC WAS FOUND - MAY HAVE PUSTL LINER
> 2FT DOWN FOUND SOME GREY SAND
18
15
>2FT DOWN
11.1% Oxygen
1% LEL
2.5 PPM
GREY SAND
17% Oxygen
LEL
PPM
13
MOIST GREY SAND - STINK
FOUND EXPLOSIVE
> 200% LEL
22 PPM
16.7% OXYGEN
10
GREY SAND
Oxygen
PPM
LEL
7
5
17
18.302% Oxygen
60% LEL
30 PPM
14
TEST TUBE A
DETECTED METHANE
30 PPM
18.7% OXYGEN
60% LEL
1½ FT DOWN
NO PHENOLS
TITEE
FOUND
12
73% LEL
18.9 % Oxygen
30 % PPM
1.5 FT DOWN
VERY MOIST DARK SMUD
STRONG HORSE SMELL
9
19 % O2
146 % LEL
6
16.3% Oxygen
16.5 %
LEL
PPM
5
16.3% O2
30 PPM
INCR LEL
2
16
GREY COURSE SAND
16.1% Oxygen
195 LEL
17.5 PPM
4
217 PPM
0 % LEL
1
LEL

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

23 September 1987

DISCHARGER: 28th Street Landfill, City of Sacramento
(Case# 2891)

INSPECTION SUMMARY:
Soil showing the characteristic signs of contamination was found outside of the areas involved in past inspections (13 August 1987, 24 August 1987) of the mitigation area. In addition, the characteristic contamination was found on the south side of the landfill, approximately 1000 feet away from the mitigation area. The City of Sacramento is in violation of their WDRs for the 28th Street Landfill.

Timothy Crandall

Timothy Crandall
Project Engineer

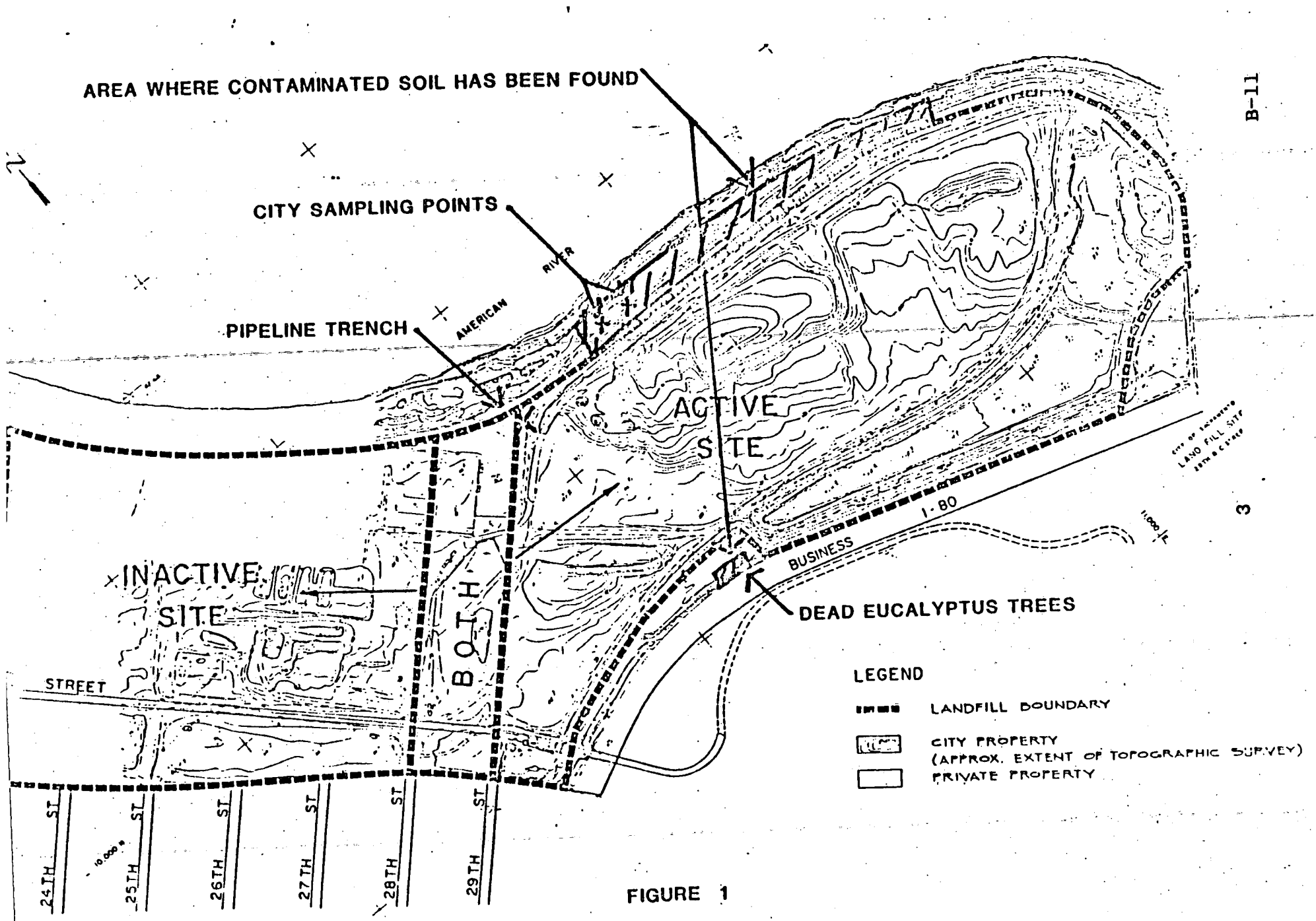

AREA WHERE CONTAMINATED SOIL HAS BEEN FOUND
CITY SAMPLING POINTS
PIPELINE TRENCH
AMERICAN RIVER
ACTIVE SITE
INACTIVE SITE
BOTH
I-80
BUSINESS
DEAD EUCALYPTUS TREES
STREET
24TH ST
25TH ST
26TH ST
27TH ST
28TH ST
29TH ST
LEGEND
LANDFILL BOUNDARY
CITY PROPERTY
(APPROX. EXTENT OF TOPOGRAPHIC SURVEY)
PRIVATE PROPERTY

FIGURE 1

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

MEMORANDUM

TO: Files FROM: Timothy Crandall

DATE: 23 September 1987 SIGNATURE: Timothy Crandall

SUBJECT: Meeting on 28th Street Landfill, Sacramento County (Case# 2891),

Reginald Young, Deputy Director of Public Works for the City of Sacramento, called a meeting on 4 September 1987. The purpose of the meeting was to discuss the problem with the valley elderberry longhorn beetle mitigation area north of the 28th street landfill. We met in the offices of the city Solid Waste Division. People in attendance are listed on the attached sign-in sheet.

Jack Williams, U.S. Department of Fish and Wildlife, gave an overview of what his department is trying to do and why the mitigation area is important. He said the beetle does not move around much and if the habitat north of the landfill were allowed to die off, the beetle population would be split into two subpopulations. This would have a negative effect on the viability of the population as a whole. David Spease, landscape architect with the city, explained what initial observations the city had made when informed of the problem about two months ago. He felt that the elderberry plantings had been improperly watered. Bill Mahr, American River Flood Control District, said the district was responsible for watering the new elderberry plantings and that they had been watered properly. I gave a brief presentation of my investigation into the problem, handing out copies of Figures 1 through 6. I said that I found contaminated soil on both the north and south sides of the landfill, that wherever there was dead vegetation I found the characteristic contaminated soil, and that I had found high levels of methane and some other yet unknown gases in the soil. I speculated that these unknown gases (detected with a photoionization detector) may contain vinyl chloride since this gas has been found in the landfill.

After some additional discussion, Reginald asked that further studies be carried out to define the problem. John Doss said he would form a task force that will consist of interested parties from the municipal, state, and federal levels. This task force will formulate a plan of action and then work on implementing that plan.

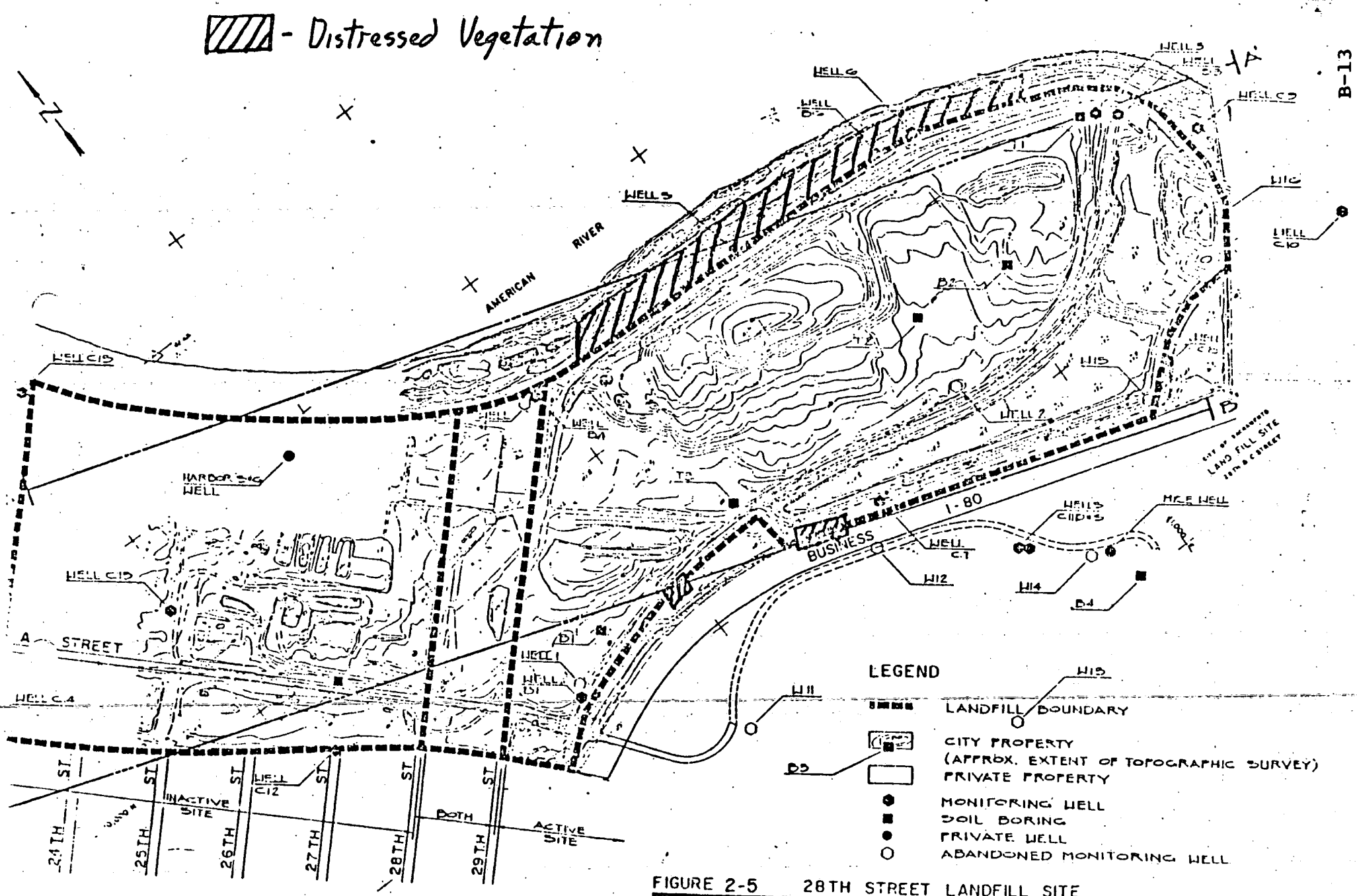


FIGURE 2-5 28TH STREET LANDFILL SITE

LOCATIONS OF WELLS, BORINGS & GEOLOGIC CROSS SECTIONS
SCALE: 1"=400'

FIGURE 1

VLLA- Approximate location of areas where soil borings revealed characteristic contamination*

*characteristics
a. grey staining
b. foul smell
c. warmth

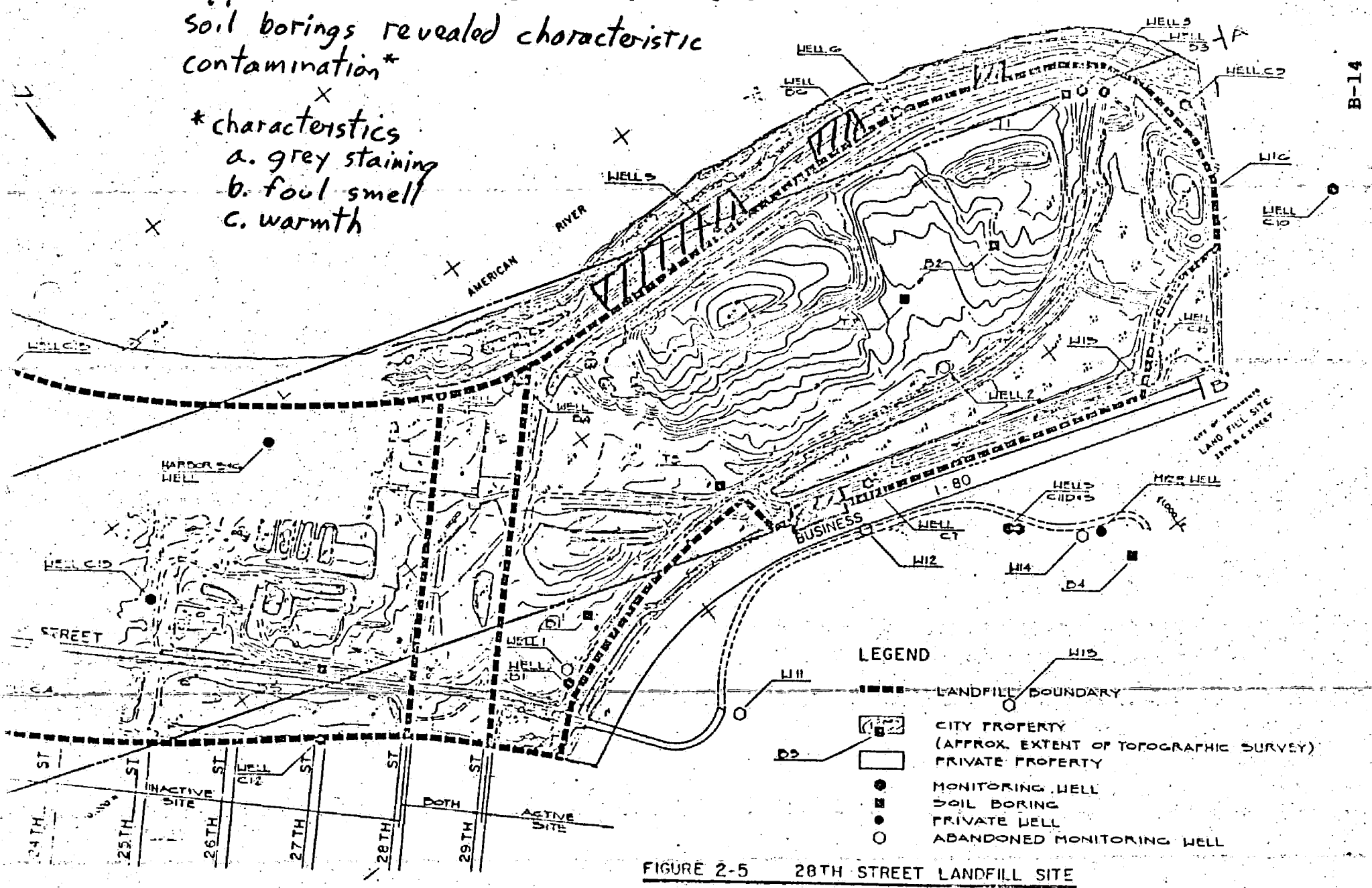


FIGURE 2-5 28TH STREET LANDFILL SITE

LOCATIONS OF WELLS, BORINGS, & GEOLOGIC CROSS SECTIONS
SCALE: 1"=400'

FIGURE 2

Ground Water Flow Vectors
For 10/81 through 9/96

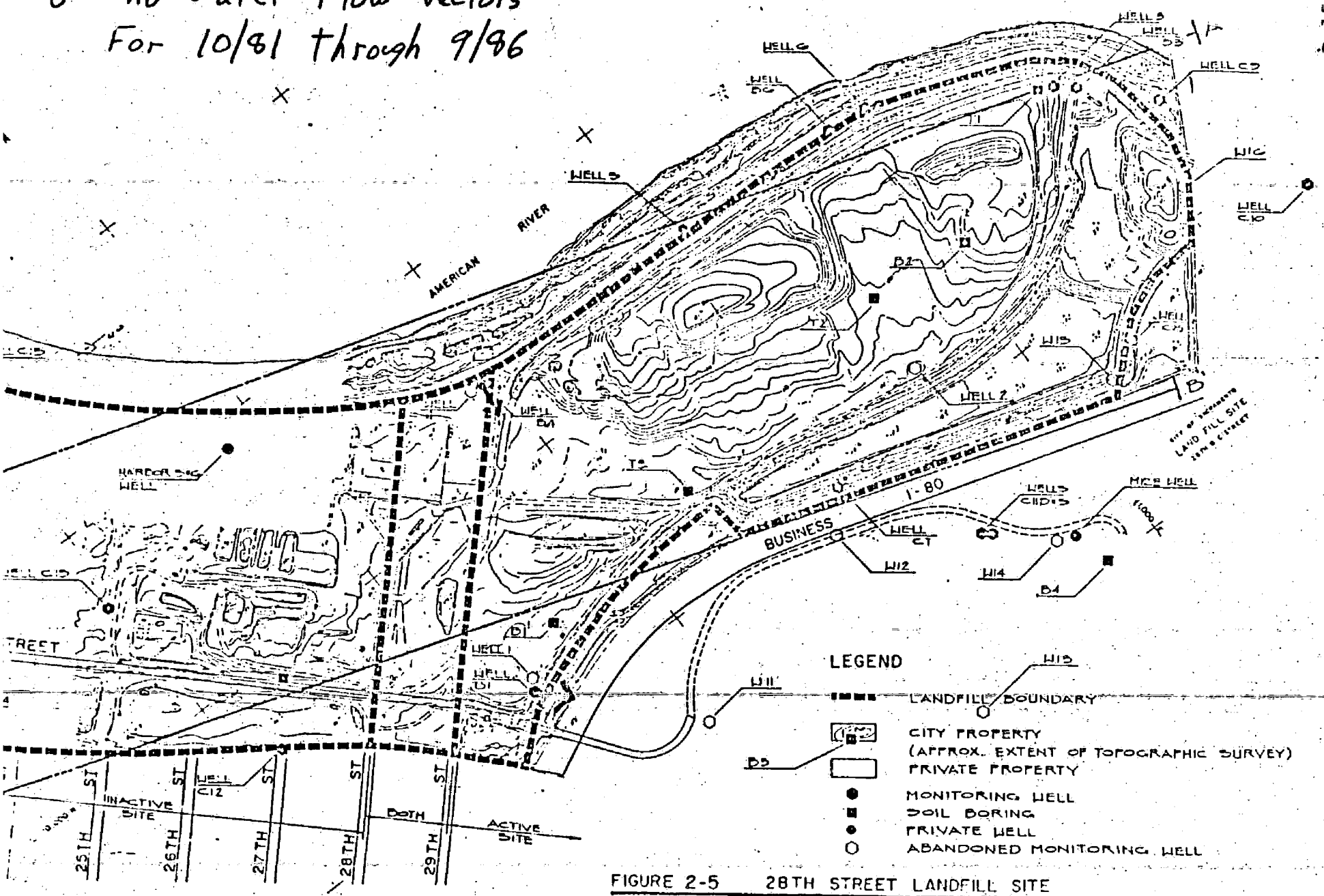


FIGURE 2-5 28TH STREET LANDFILL SITE

LOCATIONS OF WELLS, BORINGS, & GEOLOGIC CROSS SECTIONS
SCALE: 1"=400'

FIGURE 3

FIGURE 4

TABLE 5-1
28TH. ST. LANDFILL
GAS CHARACTERIZATION PRELIMINARY DATA
CONCENTRATIONS IN PPB

PARAMETER	GAS SAMPLING WELLS				
	K	L	M	N	O
VINYL CHLORIDE	1700\ND	310\340	3100\4800	1700\1800	4500\230
METHYLENE CHLORIDE	-\23	-\-	-\86	-\-	-\-
CHLOROFORM	<1\<1	<1\<1	<1\<1	<10\<10	<5\<2
METHYL CHLOROFORM	<1\2.6	2.5\2.2	1.4\7.3	<10\42	5.9\8.6
CARBON TET	<1\<1	<1\<1	<1\<1	<5\<5	<2.5\<1
TCE	13\12	38\37	35\32	2680\2500	205\95
EDB	<1\<1	<1\<1	<1\<1	<12\<6	<6\<6
PERC	1.8\1.2	10\10	14\9.2	362\454	137\93
BENZENE	165\103	202\226	374\365	818\818	114\116

NOTE: DATA OBTAINED FROM ARB ON MARCH 25,1987 AS PRELIMINARY DATA

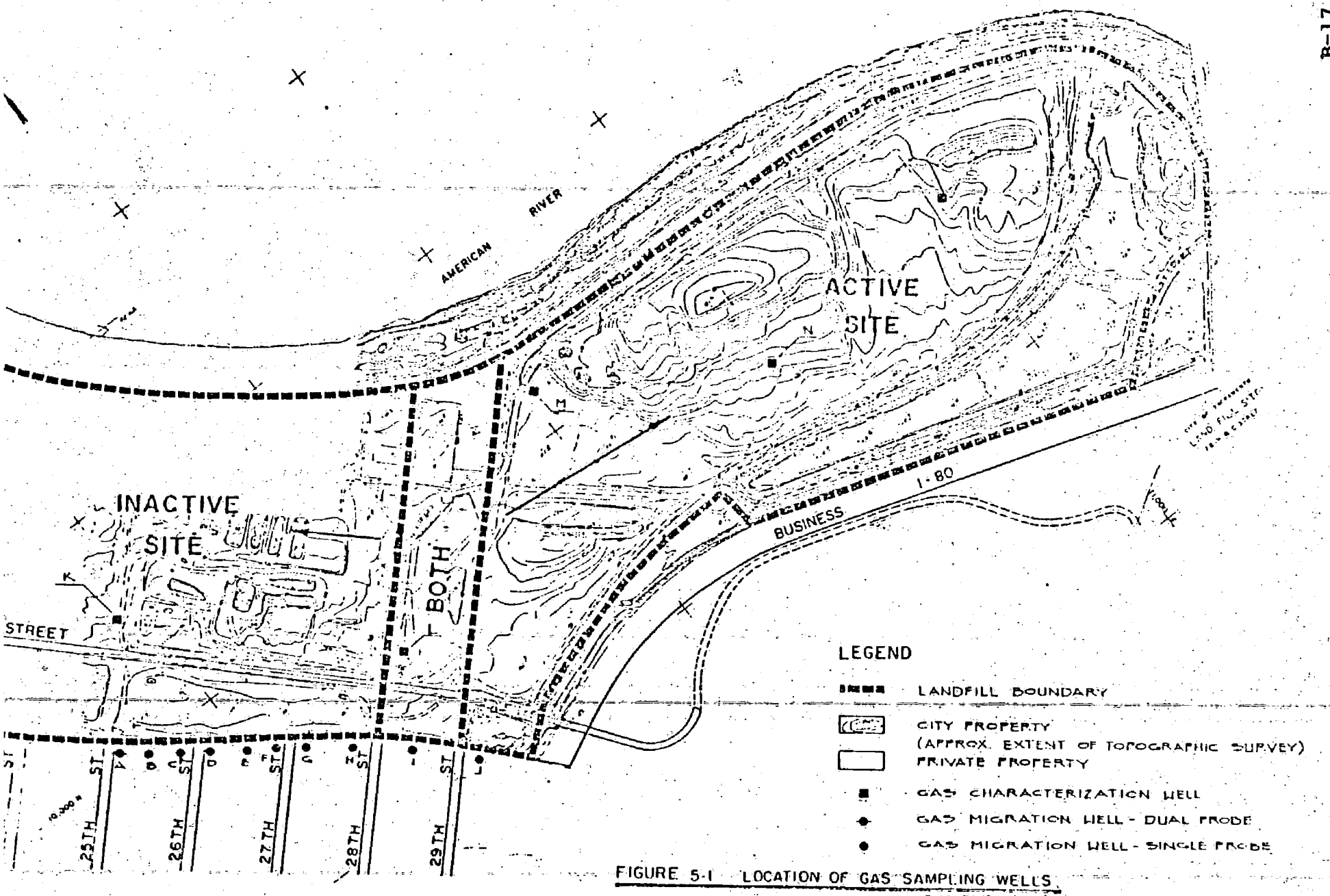
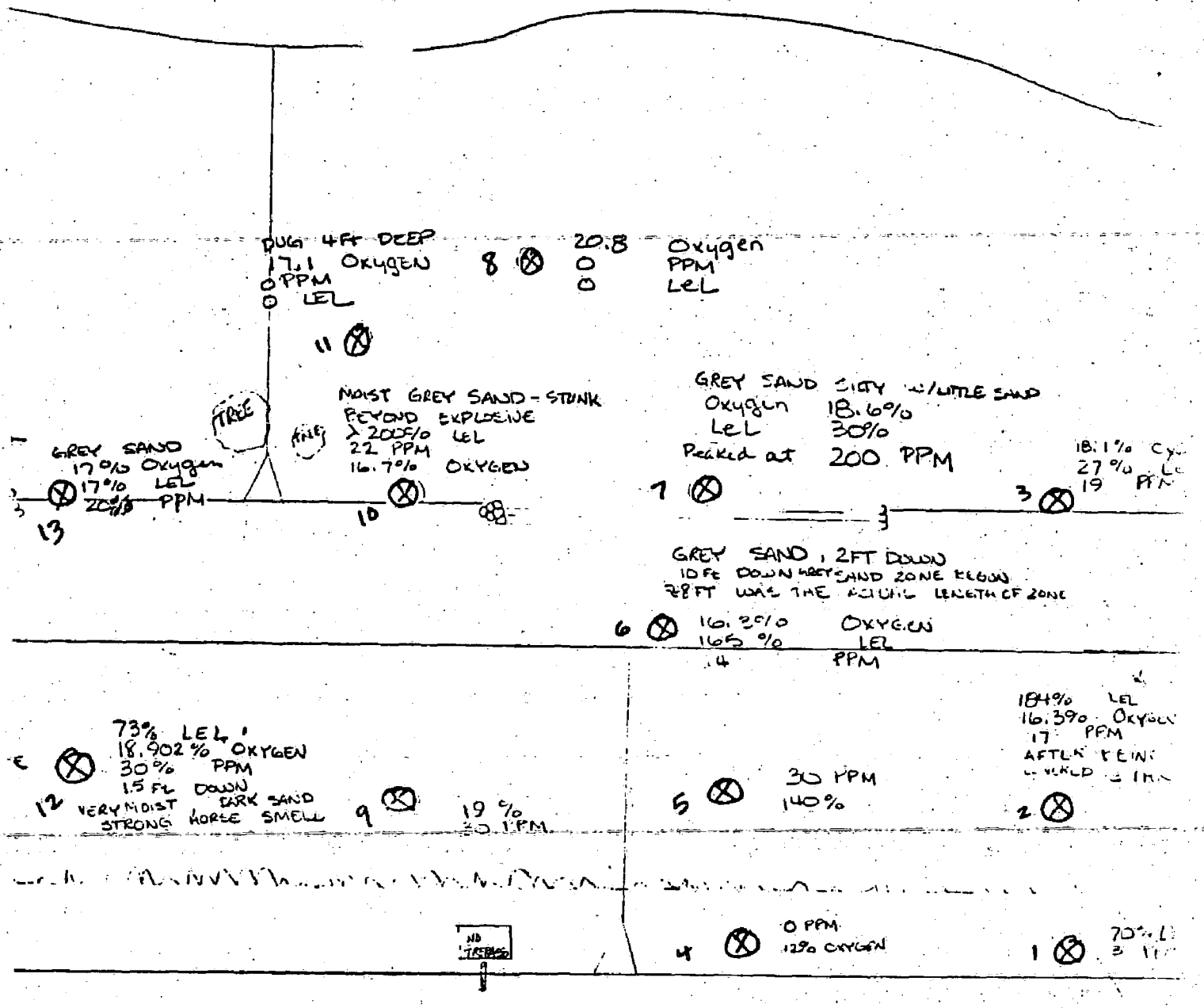


FIGURE 5-1 LOCATION OF GAS SAMPLING WELLS

SCALE: 1" = 400'

FIGURE 5


DUG 4Ft DEEP
17.1 OXYGEN
0 PPM
0 LEL
11
8
20.8 Oxygen
0 PPM
0 LeL
TREE
TREE
MOIST GREY SAND - STUNK
BEYOND EXPLOSIVE
> 200% LEL
22 PPM
16.7% OXYGEN
GREY SAND
17% Oxygen
17% LEL
PPM
13
10
GREY SAND SILTY w/LITTLE SAND
Oxygen 18.6%
LeL 30%
Peaked at 200 PPM
7
3
18.1% Oxy
27% LE
19 PPM
GREY SAND, 2FT DOWN
10 Ft DOWN GREY SAND ZONE BEGIN
28FT WAS THE ACTUAL LENGTH OF ZONE
6
16.2% Oxygen
16.5% LEL
4
PPM
18.4% LEL
16.3% Oxygen
17 PPM
AFTER BEING
73% LEL
18.902% OXYGEN
30% PPM
1.5 Ft DOWN
12
VERY MOIST DARK SAND
STRONG HORSE SMELL
9
19 %
20 PPM
30 PPM
140%
5
2
NO TRESPASS
4
0 PPM
12% OXYGEN
1
70% L
250 Ft.

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

23 September 1987

DISCHARGER: 28th Street Landfill, City of Sacramento (Case# 2891)

LOCATION & COUNTY: 28th Street, Sacramento County

CONTACT(S): Dave Pelser, City of Sacramento Solid Waste

INSPECTION DATE: 22 September 1987

INSPECTED BY: Timothy Crandall

ACCOMPANIED BY: Phil Guadagnino, CVRWQCB Toxics Unit

OBSERVATIONS AND COMMENTS:
I drove with Phil Guadagnino to the 28th Street Landfill to gather more information on soil contamination at the valley elderberry longhorn beetle mitigation area. We drilled five holes using a soil auger and monitored gases in the holes using a combustible gas meter and Drager tubes. The results of these measurements are shown in Table 1.

TABLE 1

Boring #	Depth of Boring	Soil Type at Bottom of Hole	%LEL	%Oxygen	Vinyl Chloride Gas (ppm)
B1a	1.5'	Silt	60	17.2	NM
B1b	3'	Medium Sand	84	16.9	NM
B2	4'	Silty Sand	112	12.9	NM
B3	2'	Medium Sand	185	15.5	0.1
B4	4'	Silt	180	8.6	NM
B5	3'	Coarse Sand	180	NM	0.1

1. LEL= Lower Explosive Limit
2. NM= Not Measured
3. %LEL and %Oxygen were measured with a combustible gas meter containing an oxygen sensor
4. Vinyl chloride gas was measured using Drager tubes

As we were augering the last hole (B5), Dave Pelser and the new City Solid Waste Engineer drove up. I showed them the contaminated soil that we were bringing up with the auger and

Phil proceeded to test for vinyl chloride gas using the Drager tubes. This test was positive. The tubes were shown to Dave.

INSPECTION SUMMARY:
This inspection extended the area of known contamination further east, as indicated by Figure 1. Vinyl chloride gas was also detected in the soil at 0.1 ppm using Drager tubes.

Timothy Crandall

Timothy Crandall
Project Engineer

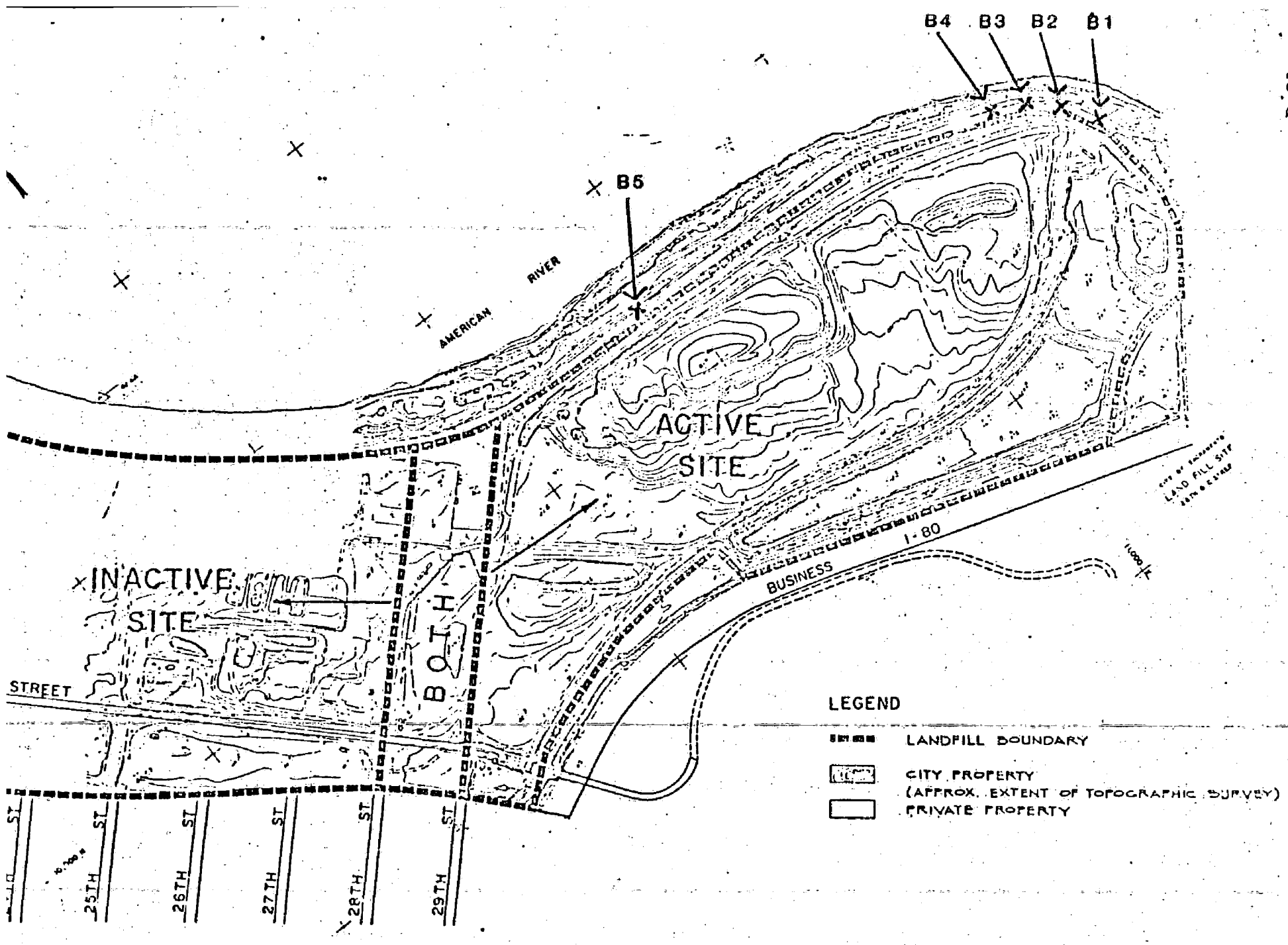

B4
B3
B2
B1
B5
AMERICAN RIVER
ACTIVE SITE
INACTIVE SITE
BOTH
I-80
BUSINESS
STREET
25TH ST
26TH ST
27TH ST
28TH ST
29TH ST
LEGEND
LANDFILL BOUNDARY
CITY PROPERTY
(APPROX. EXTENT OF TOPOGRAPHIC SURVEY)
PRIVATE PROPERTY

FIGURE 1

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

APPENDIX C

October 8, 1987
SW:87285:DAP:LG

CITY OF SACRAMENTO 28TH STREET LANDFILL PROPOSED ACTION PLAN FOR INVESTIGATION OF ELDERBERRY MITIGATION AREA
(Revised 10/12/87)

Proposed Schedule
Accomplish during
Week of:

A. FORM TASK FORCE

Suggested Task Force — 10/5/87

Gail Kobetich, Field Supervisor — 978-4866
Sacramento Endangered Species Office
U.S. Fish and Wildlife Service
2800 Cottage Way, Rm E-1823
Sacramento, CA 95825

Don Polawski — 978-4613
Contaminant Assessment Specialist
U. S. Fish and Wildlife Service

Timothy Crandall — 361-5737
Water Resources Control Engineer
Central Valley Regional Water Control Board
3443 Routier Road
Sacramento, CA 95827-3098

Robert Berger, Senior Sanitarian — 366-4284
Environmental Health Branch
Sacramento County Department of Health
3701 Branch Center Road
Sacramento, CA 95827

~~John F. Boss, Solid Waste Division Manager~~ — 449-2043
Solid Waste Division
City of Sacramento Public Works Department
1231 "I" Street, Suite 103
Sacramento, CA 95814

B. PROBLEM DEFINITION

1. Aerial Photo Review. Obtain and review aerial photos of the American River area in the vicinity of the City Landfill. Obtain infrared photos of same area. — 10/12/8 / 11/16/8

2. Ground Environmental Survey. Conduct a visual survey of the study area on both sides of the river, upstream and downstream of the landfill. Note condition of vegetation, natural and man-made features. Document with photographs. Survey team to include appropriate experts from U.S. Fish and Wildlife Service, American River Flood Control District, Regional Water Quality Control Board, City Parks Department, others. The ground survey will be coordinated by City Solid Waste Division Personnel. Conduct survey in Fall, 1987 and repeat in Spring 1988. — 10/19/87 / Spring '

3. Climatological Data Review. Assemble and review climatological data for the last several years including high water of February, 1986. — 10/12/87

4. Recent Literature Review. Review Landfill Water Quality SWAT Report and Air Quality SWAT Report (in preparation), and SP Pipeline trench log for relevant information. — 10/12/87

5. LFG Testing. Establish a base line for control. Test for landfill gas concentrations on a grid along the lower north slope of the landfill and into the Elderberry mitigation area. Use a meter that will read total percentage of natural gas and determine the concentration gradient. Plot the gradient on a map which also shows areas of distressed or dead vegetation. — 10/12/87

6. Problem Definition. Review all the information obtained in 1 through 5 above with the task force and develop a statement of the problem, likely causes, need for further study (soil testing, LFG monitoring wells, seasonal inspections, plant tissue samples, etc.) — 11/30/87

C. RISK ASSESSMENT

Assess the risks, if any associated with the problem defined in Task B.

D. MITIGATION

Propose and implement appropriate mitigation measures if necessary based o outcome of Tasks A and B.

DP-35

David A. Pelser, Senior Engineer — 449-8281
Solid Waste Division
City of Sacramento Public Works Department
1231 "I" Street, Suite 103
Sacramento, CA 95814

David Spease, Landscape Architect — 449-5725
City of Sacramento Parks & Community Services
1231 "I" Street, Suite 400
Sacramento, CA 95814

Other Interested Persons to Receive Copies of Reports

Reginald Young, Deputy Director of Public Works — 449-5283
City of Sacramento
915 "I" Street, Suite 207
Sacramento, CA 95814

American River Flood Control District — 925-5550
c/o Ronald W. Smith
The Spink Corporation
2590 Venture Oaks Way

Mary Coyle — 322-2662
Waste Management Specialist
California Waste Management Board
Office of Enforcement
1020 9th Street, Suite 300
Sacramento, CA 95814

Eric Skelton, Air Toxics Manager
County of Sacramento
Air Pollution COntrol District
9323 Tech Center Drive
Sacramento, CA 95826

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

APPENDIX D

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

28 December 1987

Mr. David Pelser
City of Sacramento Dept. of Public Works
Solid Waste Division
1231 I Street, Suite 103
Sacramento, CA 95814

SOIL SAMPLE COLLECTION AT 28TH STREET LANDFILL, CITY OF SACRAMENTO, SACRAMENTO COUNTY (CASE #2891)

Enclosed with this letter is an inspection report prepared by Phil Guadagnino, who accompanied me when we collected soil samples at 28th Street Landfill on 9 November 1987. This inspection was conducted to gather soil samples for chemical analysis and to measure soil/gas concentrations on the southern boundary of the site. The results of the sampling show elevated levels of ammonia in the soil, which is indicative of landfills with gas migration problems. The overburden sample taken near Station 7+00 has an elevated COD, probably due to chemicals from the hydroseeding operation. We also detected explosive levels of methane gas (140% LEL) in the soil near the dead eucalyptus trees between the eastern edge of the landfill and Business 80.

According to the "Action Plan for Investigation of the Elderberry Mitigation Area" submitted by the City on 8 October 1987, the problem definition phase of the plan should be starting now. In this phase, along with other concerns, the need for further study will be defined. Since we have identified three contaminants in the soil in addition to methane (vinyl chloride, EC, and ammonia), I request that the City institute a soil contaminant monitoring program that includes: along with methane; vinyl chloride, EC, ammonia, and the constituents mentioned in Table 6 of the paper "Vegetation Kills in Landfill Environs" by Franklin B. Flower, et al. I gave you a copy of this paper at our last meeting. We can discuss soil contaminant monitoring at the next task force meeting.

As explained in our letter dated 1 October 1987, the City is in violation of their waste discharge requirements and the Board expects that the City will take prompt and effective action to alleviate the problem. Any such action should include all site boundaries, not just the Elderberry Mitigation area.

If you have any questions, please contact me at (916) 361-5737.

Timothy A. Crandall

TIMOTHY A. CRANDALL
Project Engineer

RECEIVED
DEC 29 1987
CITY OF SACRAMENTO

TAC:jj

Enclosure

cc: Ms. Gail Kobetich, U.S. Fish and Wildlife Service, Sacramento
Ms. Patty Zwarts, Office of Legislative and Public Affairs, State Water Resources Control Board, Sacramento
Ms. Mary Coyle, California Waste Management Board, Sacramento
Mr. Robert Berger, Sacramento County Health Department, Sacramento

Memorandum

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD • CENTRAL VALLEY REGION

3443 Routier Road
Sacramento, CA 95827-3098

Phone: (916) 361-5600
ATSS: 8-495-5600

TO: Tim Crandall
Project Engineer

FROM: Phil Guadagnino
Area Engineer

DATE: 4 December 1987

SIGNATURE:

SUBJECT: CITY OF SACRAMENTO, 28TH STREET LANDFILL, METHANE SURVEY

Attached for your review is the completed methane survey for the above facility. This information includes the sampling plan, sampling summary, site map, and a copy of the Hazard Evaluation Plan.

This survey confirmed our 16 September 1987 discovery of methane gas in soils outside the northern edge of the landfill along the American River. In addition, methane was found in soils outside the eastern edge of the landfill along Interstate 80.

Analytical results of soils from areas where methane was detected show significant levels of NH_3 and COD. I recommend that the background sample 18805-5 be disregarded as it was taken too close to the affected areas to be considered reliable.

Additional soil gas and priority pollutant sampling is recommended to determine the extent of migration and impacts on water quality.

Again, we recommend advising the City and anyone else who may have easement rights in the affected areas so that they may take appropriate precautions against explosion or asphyxiation.

If you have any questions concerning either sampling methods or laboratory analysis, please contact me at 361-5633.

PGG:sg

cc

RECE
DEC 2 0
CITY OF
SC

SAMPLING SUMMARY

City of Sacramento
28th Street Landfill

9 November 1987

The purpose of this investigation was to collect soil samples and monitor methane gas levels at various areas around the landfill.

Air Monitoring

Both Combustible Gas Indicator (CGI) and Oxygen level readings were taken before sampling. These readings indicated no airborne threat in the breathing zone. Therefore, level D protection was selected (see HEP plan).

Shallow gas monitoring wells, approximately 2' deep, have been installed along the face of the landfill embankment. The wells consist of 4" PVC, 2' long, set into a cavity which is partially backfilled with 1" to 2" aggregate. The wells are set on 100' stations with two wells (one uphill on the embankment and the other on the outside edge of road at the toe of the embankment) at each station. Each well is tightly capped.

Soil Sampling

Sampling began on the northern edge of the site which borders the American River. Initial CGI readings at monitoring well Station No. 7+00 (uphill) found 180% LEL at 6.3% Oxygen. Soil samples were collected at point 2' west of Station 7+00 (uphill). 4" of loose overburden was augered out and our 1" drive sampler was used. (A jar sample of the overburden was taken.) Twenty-three (23) blows with the drive hammer were necessary to obtain a full samoler sleeve. CGI readings from either end of the packed sampling sleeve showed no LEL readings.

Sampling point #2 was located about 6" west of point #1. Prior to drive sampling 18" of overburden was removed by hand auger. CGI readings at the 18" depth were 41% LEL and 17.6% O_2. Twelve (12) blows were necessary to pack the drive sampler at this depth. A jar sample was also collected at this point. Boreholes 1 and 2 were backfilled with rock and soils prior to leaving.

An attempt was made to determine the extent of methane migration. It was hoped that if no methane was found in the most westerly gas monitoring well that a representative background soil sample could be obtained. Monitoring well #1 (station 00+00, downhill) however, showed an LEL of 60% and O_2 level of less than 4.6%. Station 01+00 which is east of station 00+00 and is nearer to the landfill showed readings of 0% LEL and 4% O_2. This suggests that something other than methane gas is displacing the oxygen. A second check ruled out the possibility of a pure methane atmosphere which can blind a sensor. Background samples were obtained from an area between station #1 and the river. CGI readings at this point were 0.0% LEL and 20.9% O_2. These readings did not change as we augered down about 18".

Sampling point 4 is located in an area on the eastern side of the landfill which lies along Interstate 80. There is a row of trees along the median strip between the freeway and the landfill. The first four trees near the northern end of the landfill show signs of distress such as discolored foliage or early leaf loss. Sampling point #4 is located between the first two trees on the north end of the median. Ambient background air measures 0.0% LEL and 20.6% Oxygen. At the 3-4 foot level we encountered gray silty sand which exhibited 25% LEL and 14.4% Oxygen. The soil at this depth is extremely warm and moist. Water vapor could be seen rising from the hole. Ambient air temperature was 60°F. No samples were taken at this point because of the low methane concentration.

Sample point #5, located between the third and fourth trees, was excavated down to 4 feet. Again, a warm, grey, moist sand was found with a LEL of 140% and 16.9% Oxygen. A sample at this depth was collected and labeled sample point 5 between trees 3 and 4.

Quality Assurance and Quality Control (QA/QC)

The stainless steel sampling sleeves were decontaminated by washing with alcohol and deionized (DI) water at our office; cleaned again with DI water, acetone, and hexane; and air dried prior to use. The HNu - PID was used to check for residual volatiles. None were found. The sleeved samples were wrapped in clean aluminum foil and placed in a plastic zip-lock bag for transport to the lab. Soil samples were placed in clean, previously unused 8 oz. jars from boxes with unbroken Chain-of-Custody seals. Jars were sealed with clean aluminum foil and packed for shipment. Stainless steel scoops used for sampling were decontaminated via the acetone/hexane rinse process (used for the sleeves) between each sample.

Decontamination

All scoops, boots, gloves, or other soiled equipment was returned to the office for decontamination or disposal.

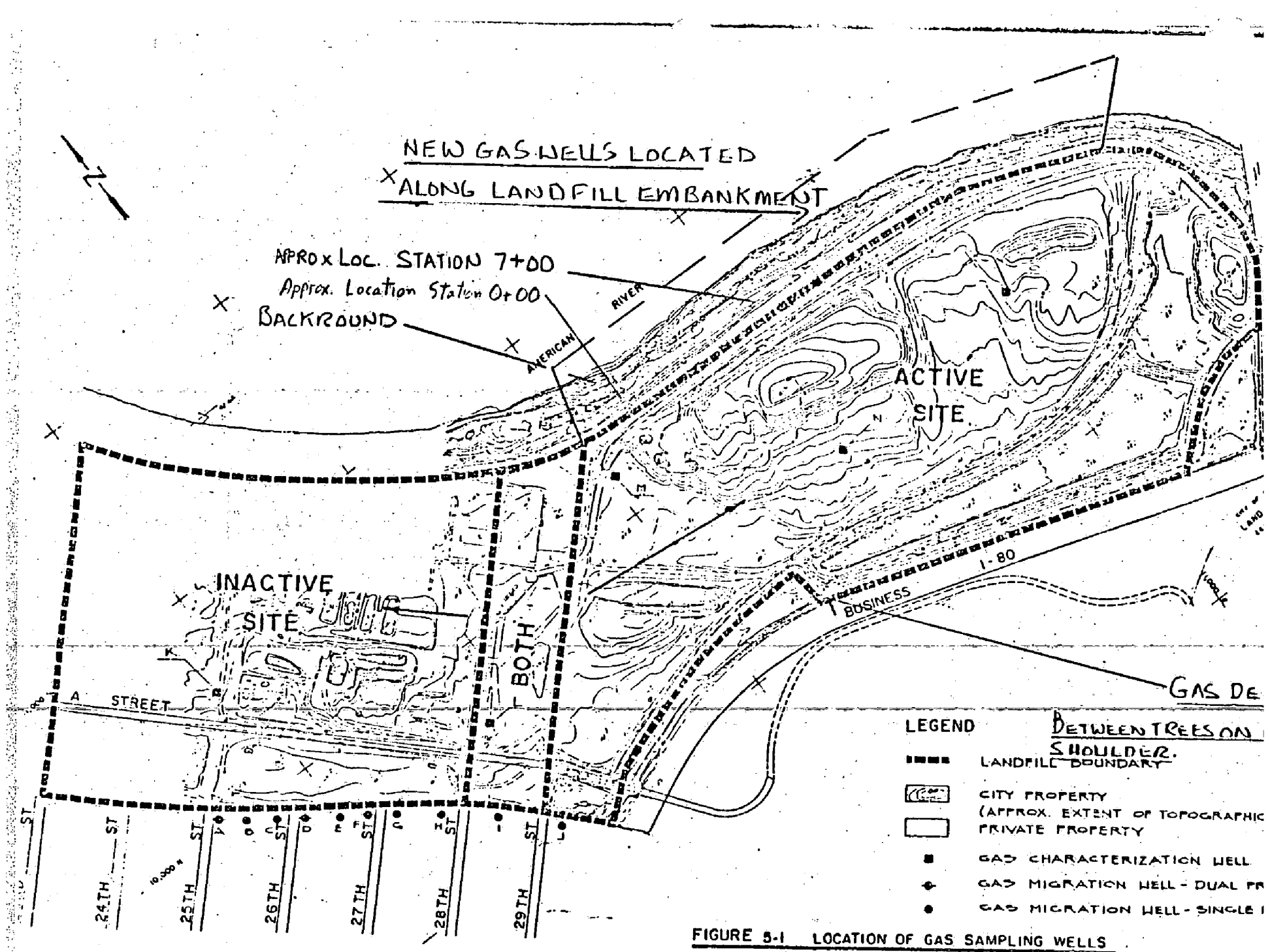


FIGURE 5-1 LOCATION OF GAS SAMPLING WELLS

SCALE: 1" = 400'

SIERRA FOOTHILL LABORATORY

823 S. HWY. 49
P.O. BOX 1268 • JACKSON, CA 95642
(209) 223-2800

REPORT

Report Date 11/24/87
Laboratory # 18805
Date Received 11/9/87
Date Completed 11/23/87
SAMPLE TYPE ☐ Water ☐ Wastewater ☒ Soil ☐ Wine
RESULTS ON SAMPLE ☒ as received ☐ as collected

TO: STATE OF CALIFORNIA
CRWQCB-CVR
ATTN: PHIL GUADAGNINO
3443 ROUTIER RD
SACRAMENTO CA 95827-3098

ANALYSIS	RESULTS				
	COD mg/kg	NH_3-N mg/kg	NO_3-N mg/kg	pH	EC umhos/cm
SAMPLE POINT #1					
18805-1 SAC LANDFILL	28600				
18805-2 SAC LANDFILL, OVERBURDEN	47800				
SAMPLE POINT #3					
18805-3 SAC LANDFILL, SLEEVE 2	20100	148	52	5.7	172
18805-4 SAC LANDFILL, STN 7	19800	177	52	6.0	225
2 18805-5 SAC LANDFILL, BKGRND	22300	<10	48	4.8	225
SAMPLE POINT #4					
4 18805-6 SAC LANDFILL, BETWNTREES	17200	85	40	6.2	364

pH and EC measured using 1:1 Soil: Distilled water extract

RECEIVED
NOV 25 1987
CENTRAL VALLEY REGION

TONY NURSE, OWNER/ANALYST

SIERRA FOOTHILL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPT. HEALTH SERVICES FOR COMPLETE BACTERIOLOGICAL AND CHEMICAL ANALYSES

APPENDIX E

LF-6.5

STATE OF CALIFORNIA — GEORGE DEUKMEJIAN, Gover

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

2 May 1988

MAY 0 3 1988

Mr. David Pelser
City of Sacramento
Solid Waste Division
1231 I Street, Suite 103
Sacramento, CA 95814

REQUEST FOR CONTAMINATION CLEANUP SCHEDULE FOR THE CITY OF SACRAMENTO 28TH STREET LANDFILL, SACRAMENTO COUNTY (CASE #2891)

Regional Board staff recently collected soil moisture (vadose zone) samples at the 28th Street Landfill. A description of sampling methods and laboratory results are provided in the enclosed memorandum. Analytical results for the samples indicate that leachate from the landfill has contaminated the vadose zone in those areas tested. These results support findings presented in the Solid Waste Assessment Test (SWAT) report for the landfill, which found that leachate had migrated outside of the waste management unit and impacted ground water.

We request that the City of Sacramento submit a time schedule for cleanup of contaminated ground water and vadose zone areas at the landfill. The time schedule shall include a starting date and estimated duration for each phase of the cleanup project, such as additional site investigation, initial design plans, equipment installation, and start of treatment operations. Please submit the time schedule to us by 1 July 1988. At this time, we concur with your request that the time schedule be incorporated in the revised waste discharge requirements (WDRs), rather than a formal enforcement order.

If you have any questions, please contact Steve Rosenbaum at (916) 361-5732.

William J. Marshall

WILLIAM J. MARSHALL
Chief, Waste Discharge to Land Unit

SER:gs

Enclosure

cc+encl: Mr. Allen Freihofer, California Waste Management Board, Sacramento

E-1

Memorandum

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD • CENTRAL VALLEY REGION
3443 Routier Road
Sacramento, CA 95827-3098
Phone: (916) 361-5600
ATSS: 8-495-5600

TO: 28th Street Landfill File
City of Sacramento
(Case #2891)

FROM: Timothy Crandall

DATE: 18 April 1988

SIGNATURE: Tim Crandall/TAC

SUBJECT: SAMPLING WITH LYSIMETERS AT 28TH STREET LANDFILL

On 16 February 1988, Phil Guadagnino, Peter Haase, Gerald Djuth, Mike Negreti, and I installed three vacuum lysimeters at the 28th Street Landfill. This vadose zone sampling equipment is owned by the Regional Board. Each lysimeter was located as follows:

Lysimeter 1 (L1) - at Station 8, three feet north of the southern landfill gas well

Lysimeter 2 (L2) - at Station 7, three feet south of the southern landfill gas well

Lysimeter 3 (L3) - approximately 250 feet west of Station 0 (this will be the background)

All lysimeters were installed the same way. A hole was made with a hand auger that was approximately 20 to 25 inches deep. Soil excavated from the bottom of the hole was mixed with distilled water to form a thick slurry. The lysimeter was placed into the hole and the soil slurry was poured to surround the ceramic cup. The remaining annular space was filled with the soil and tamped with a wooden rod. During the excavations for Lysimeters 1 and 2, we encountered soil conditions that are characteristic of what has been observed during previous soil sampling, a grey, moist, warm, putrid smelling zone. The putrid smell was less pronounced and the grey soil was not as warm as previously observed. Excavation for Lysimeter 3 revealed no sign of soil contamination. Once installed, each lysimeter was evacuated to 70 centibars and covered with camouflage to protect them from vandalism.

I returned to the landfill on 17 February 1988 to check the lysimeters. I planned to remove any liquid collected and discard it, since it would consist of mostly distilled water, and then reevacuate. L3 still had a vacuum and yielded 600 ml of clear liquid. L2 still had a vacuum and yielded 200 ml of liquid with a slight yellow tint. L1 still had a vacuum and yielded 500 ml of turbid liquid with a yellow tint. All three lysimeters were reevacutated to 70 centibars.

On 22 February 1988, I returned to collect samples. L3 had a small amount of vacuum left and yielded 600 ml of clear liquid. L2 had a small amount of vacuum left and yielded 50 ml of a transparent liquid that had a dark orange/yellow color. L1 had a small amount of vacuum left and yielded 600 ml of a turbid liquid that had a light orange/yellow color. All three lysimeters were removed one week later.

I transported the samples back to the office and, since there was a limited amount of sample (especially for L2), measured EC and pH in the laboratory. The samples were then sent to California Water Labs for COD, Nitrate, and Ammonia determinations. Wesco Laboratories ran a 601/602 analysis. The results are attached.

Results from the 601 analysis revealed a low level of methylene chloride in L1 and L2, but not in the background L3. This is a common lab contaminant and more samples should be taken to confirm this result. 602s were only run on L1 and L3, since L2 yielded only enough sample for a 601. L1 had low levels of benzene, toluene, ethylbenzene, and xylene. L3 had a little toluene and amuch higher level of xylene (29 ppb). It appears that we will have to evaluate our background location, L3.

Results from the inorganic analys are summarized as follows:

Sample	COD mg/l	Nitrate mg/l	Ammonia mg/l	EC umhos/cm	pH
L1	237	<1	11.6	1,150	6.6
L2	*	*	*	1,150	7.6
L3 (background)	<10	8.3	<0.1	360	7.1

* not enough sample collected for this analysis

These results are more definitive. There is evidence of leachate traveling through the vadose zone, as shown by the elevated COD and EC. The grey, putrid zone where the sample L1 was obtained, is probably anaerobic (putrid smell, warmth, grey coloration). This is confirmed by the nitrate and ammonia measurements. In an anaerobic, reducing environment, one would expect to see the reduced form of nitrogen (ammonia) in predominance over the oxidized form (nitrate). This is what has happened here. At L3 (oxidizing environment), nitrate is in predominance. At L1 (reducing environment), ammonia is in predominance. The orange/yellow color is probably due to dissolved iron which is commony found in landfill leachate.

In November 1987, soil cores were taken from the same areas as L1 and L3. The results are as follows:

Sample	COD mg/kg	Nitrate mg/kg	Ammonia mg/kg	EC umhos/cm	pH
L1 equivalent	19,800	52	177	225	6.0
L3 equivalent	22,300	48	<10	225	4.8

Using the soil core method, it is only clear that ammonia is elevated above background. Results of the other four parameters are inconclusive. At 28th Street Landfill, the use of vacuum lysimeters has been of great value in determining if leachate is traveling through the vadose zone and what the characteristic contaminants are. Analysis of soil cores was of little help. For shallow applications where the lysimeters can be placed using a hand auger, Board staff can easily install the lysimeters on their own and retrieve the equipment for reuse after samples are collected.

TAC:gs

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

APPENDIX F

17692. Non-Salvageable Items. (H) Drugs, cosmetics, foods, beverages, hazardous chemicals, poisons, medical wastes, syringes, needles, pesticides and other similar materials capable of impairing public health shall not be salvaged unless approved by the Enforcement Agency and the local health entity.

DISPOSAL SITE CONTROLS

17701. Nuisance Control. Each site shall be operated and maintained so as not to create a public nuisance.

17702. Animal Feeding. (H) Feeding of refuse to animals which will be used for human consumption is expressly prohibited on disposal sites. Grazing of livestock away from operating areas is permitted.

17703. Fire Control. The operator shall take adequate measures for prompt fire control as required by local fire authorities.

17704. Leachate Control. The operator shall take adequate steps to monitor, collect, treat, and effectively dispose of leachates.

History: 1. Amendment filed 7-25-78; effective thirtieth day thereafter (Register 78, No. 30).

17705. Gas Control. Where the Enforcement Agency, the local fire control authority, or the Board has cause to believe a hazard or nuisance may be created by landfill decomposition gases, they shall so notify the owner. Thereafter, the site owner shall cause the site to be monitored for presence and movement of gases, and shall take necessary action to control such gases. The site owner shall inform the operator of any actions ordered by the Enforcement Agency, the local fire control authority or the Board concerning gas control methods. The monitoring program shall be developed pursuant to the specifications of the above agencies. The site owner shall provide for continuation of the program after the completion of the landfill. The monitoring program shall not be discontinued until authorized to do so in writing by the requiring agency. Results of the monitoring shall be submitted to the appropriate agencies. If monitoring indicates methane gas movement away from the site, the owner shall, within a period of time specified by the requiring agency, construct a gas control system approved by that agency. The agency may waive this requirement if satisfactory evidence is presented indicating that adjacent properties are safe from hazard or nuisance caused by methane gas movement. The operator shall duly inform the disposal site owner of possible landfill gas problems.

17706. Dust Control. The operator shall take adequate measures to minimize the creation of dust.

17707. Vector and Bird Control. (H) The operator shall take adequate steps to control or prevent the propagation, harborage or attraction of flies, rodents or other vectors and to minimize bird problems.

federal register

Thursday
September 13, 1979

Part IX

Environmental Protection Agency

Criteria for Classification of Solid Waste Disposal Facilities and Practices; Final, Interim Final, and Proposed Regulations (as corrected in the Federal Register of September 21, 1979)

from emergency clean-up operations and ordnance.) Second, air emissions caused by solid waste disposal activities shall not violate applicable requirements developed for State implementation plans (SIP's) under Section 110 of the Clean Air Act.

While several commenters suggested that a ban on open burning is unnecessary, EPA has decided to retain that provision for residential, commercial, institutional or industrial waste. The ongoing open burning of these wastes presents significant hazards to human health, and no health or environmental benefit is derived from the practice. Several commenters suggested allowing open burning with a variance. There is no environmental rationale for such a variance because open burning does not lessen the need for disease vector control or leachate control for maintaining surface and ground-water quality. Moreover, variance procedures for this situation would be particularly difficult to administer because of the dynamic nature of the many variables involved (existing air quality, wind speed, humidity, mixing and vertical dispersion, efficiency of the burn, amount and type of waste, etc.).

EPA decided to exempt from the open burning prohibition those wastes which are typically burned infrequently. The burning of agricultural wastes in the field, land-clearing debris, standing trees in a forest, diseased trees, debris from emergency clean-up operations and ordnance is not typically an ongoing practice and, thus, does not present a significant environmental risk. In addition some of these practices, particularly the destruction of disease-carrying trees or debris from emergency clean-up operations, provides an added environmental benefit in preventing chances of disease or accident. It should be noted, however, that the criteria assure that the conduct of these infrequent acts of burning must be in compliance with applicable requirements developed under the State SIP.

In requiring compliance with the SIP, EPA is seeking to coordinate the criteria with the Clean Air Act, as mandated in Section 1006 of the Act. The regional health concerns addressed through the SIP's are clearly of concern under the Act as well. The prohibition of open burning should prevent most air quality problems. Where such concerns are not covered by the open burning ban, EPA believes that it is unacceptable for solid waste disposal activities to cause violations of SIP requirements.

EPA has eliminated that part of the proposed regulation that required compliance with "all applicable Federal, State and local air regulations" and the reference to protection of public health and welfare. Some commenters said that the proposed criteria "federalized" State and local air regulations. EPA is not federalizing any such regulations in the final criteria. In tying the criteria to the SIP's, EPA is assuring that, at a minimum, solid waste activities that undermine Congressionally-established Federal environmental air quality objectives will not be considered adequate under the Act.

Several commenters requested clarification regarding the impact of the criteria on the use of pit or trench incinerators. Emission factors (i.e., particulates) for such incinerators equal or exceed those for open burning dumps. Since such devices do not control emissions, they fit the definition of open burning. Thus, for purposes of the criteria, combustion in a trench incinerator constitutes "open dumping."

Comments were requested in the Preamble of the proposed regulation on the advisability of including in the final promulgation specific air quality limits which would be based on Occupational Safety and Health Administration (OSHA) air quality standards. Several commenters noted that since OSHA air quality standards are based on workplace exposure and not ambient air quality, the inclusion of these standards would be inappropriate and possibly confusing. Air quality standards based on OSHA regulations have not been included in the final promulgation.

Commenters also suggested that the content of the air criteria be moved to the safety criteria (§ 257.3–8) since many of the dangers of open burning relate directly to public safety. The Agency considers the problems of open burning to be broader than just public safety; thus, this change was not made. However, the safety criteria have been revised to reference the air criteria.

K. Safety (Section 257.3–8)

This portion of the criteria addresses a set of adverse effects involving potential accidents which could be caused by solid waste disposal activities. The legislative history of the Act indicates that in passing the provisions authorizing these criteria the Congress was concerned about all of the effects addressed in this section. The safety hazards addressed in the final regulation include explosive gases, fires, bird hazards to aircraft and public exposure to wastes due to uncontrolled access to disposal sites.

The proposed regulation also contained a provision for toxic and asphyxiating gases. While EPA is quite concerned about the emission of suc gases from solid waste, EPA was un to identify sufficient information on nature of this problem to support the setting of particular standards. The existing data on the generation of to and asphyxiating gases in solid was quite limited. In particular, it is diffic to define a set of gases generated in solid waste disposal that present a public health hazard. Even if such a of gases could be identified it is diffi to determine, on the basis of data currently available to EPA, what lev of such gases may be tolerated witho a substantial risk to public health or environment. EPA will continue to explore this problem. However, at present there is insufficient informati to support particular limits on toxic a asphyxiating gases.

[1] *Explosive gases.* Solid waste disposal activities may produce explosive gases. In particular, metha gas is a product of solid waste decomposition. The accumulation of sufficient concentration of methane g in disposal facility structures or near off-site structures may pose a serious threat to the health and welfare of facility employees, users of the dispo site, and occupants of nearby structu Explosions resulting in injury and dea have been caused by gases from solic waste disposal.

The proposed criteria required that the concentration of explosive gases i facility structures and in soil at the facility property boundary not reach t lower explosive limits (LEL) for the gases. The final regulation is essentia the same except that concentrations i facility structures will not be allowed exceed 25 percent of the lower explos limit for the gas. In addition the final standard, which could potentially be applicable to several explosive gases, will only be concerned with methane this time.

Commenters suggested that the gas criteria be deleted and that control be left to the Occupational Safety and Health Administration (OSHA). Following consultation with OSHA, th Agency rejected this suggestion becau the jurisdiction of OSHA does not include all solid waste disposal facilit and practices of concern to the Act, no does it include off-site residences to which gases can migrate.

The Agency has decided to adjust th standard for facility structures to provide a margin of safety. Several commenters suggested such a change, since allowing explosive gas to accumulate in concentrations just unde the lower explosive limit would be extremely dangerous and would not provide for a reasonable probability of

avoiding adverse effects. In selecting the 25% figure EPA is using a safety factor recognized by other Federal agencies as being appropriate for similar situations.

EPA also concluded that such a safety factor was unnecessary at the property boundary. Gases at or below the LEL at the property boundary will necessarily become somewhat diffused before passing into a structure beyond the property boundary. Thus, in assuring that the LEL is not exceeded at the boundary EPA has provided a margin of safety against an off-site explosion.

EPA has selected methane as the single gas of concern. The information available to EPA indicates that build up of methane gas has been the principal source of explosions associated with solid waste disposal. Other gases may be added to the list as new information develops.

Commenters recommended that disposal facilities not in close proximity to off-site structures be exempted from the gas criteria. Considering that gas production in disposal facilities is a long-term process continuing for decades, the Agency rejected this recommendation. Facilities which are remote today may be surrounded by extensive development in the future, especially after completion of disposal operations.

(2) *Fires.* Fires at solid waste disposal facilities pose the threat of property damage and injury or death to facility employees, users, and nearby residents. Examples of circumstances which can lead to fires associated with disposal facilities or practices are: Vandalism, carelessness, spontaneous combustion, open burning of wastes, and disposal of hot ashes.

The proposed criteria required that all fires be extinguished expeditiously and that fire hazards be minimized through proper site construction and design and periodic application of cover material where appropriate.

According to the final regulation, the facility or practice shall not pose a hazard to the safety of persons or property from fires. This objective can be served by compliance with the air criterion (§ 257.3–7), particularly the open burning ban, and through periodic application of cover material.

Commenters objected to the vague nature of this provision as originally proposed. While some level of flexibility is necessary, EPA has tried to make this standard as specific as possible. The reference to "expeditious" extinguishing of fires was eliminated. EPA also specified types of operational practices to accomplish the goals of this section.

Commenters suggested that, due to the relationship between open burning and potential fire hazards, the prohibition on open burning be incorporated into this section. As explained previously the safety criteria now reference the air criterion (which contains the prohibition of open burning.)

(3) *Bird Hazards.* Many reports and investigations show that disposal facilities and practices involving putrescible wastes often attract birds, in spite of vector control efforts (compaction and cover of wastes, etc.). When solid wastes are disposed in the vicinity of airports, the birds attracted to the area can present a significant risk of accidents due to collisions between birds and planes. The Federal Aviation Administration (FAA) has issued FAA Order 5200.5, "FAA Guidance Concerning Sanitary Landfills on or Near Airports" (October 16, 1974). The order states that solid waste disposal facilities have been found by study and observation to be artificial attractants of birds and, therefore, "may be incompatible with safe flight operations" when located in the vicinity of an airport.

The proposed criteria required that disposal facilities not be located within the two distance limits (10,000 feet for turbojets and 5,000 feet for piston-type aircraft) specified in FAA Order 5200.5 unless the facility was found to not pose a bird hazard to aircraft. For facilities beyond the specified distances, but within the conical surface described by FAA Regulations (FAR), Part 77, facilities were to be reviewed on a case-by-case basis for a potential bird hazard.

The final regulation retains the basic approach but clarifies several terms, including "airport" and "bird hazard." The provision for case-by-case analysis of facilities within the conical surface has been dropped.

Some commenters questioned whether the Act provides authority to control solid waste disposal on the basis of bird hazards to aircraft. They claimed that the FAA has adequate authority to prevent bird hazards to aircraft, concluding that this section of the criteria is not necessary.

The criteria are required to address the prevention of adverse effects on health and the environment from solid waste disposal facilities. The legislative history (H.R. Rep. No. 94–1491) cites an aircraft crash resulting from birds attracted to a disposal facility as one example of adverse effects of open dumps. There are also many other examples of such hazards from disposal facilities. Therefore, the Agency has concluded that this issue is clearly within the scope of this regulation.

Although the FAA is authorized to control airport operations to reduce bird hazards to aircraft, its authority does not extend to disposal facilities outside airport boundaries which may pose such hazards. It should be noted, however, that EPA is not "enforcing" the FAA order. The selection of the distances specified in that order is merely a recognition that they represent a reasonable determination of the danger zone around an airport. Likewise, it should be made clear that neither this regulation nor the proposed standard prohibited the disposal of solid waste within the specified distances. Instead, the distances define a "danger zone" within which particular care must be taken to assure that no bird hazard arises.

Some commenters challenged the relevancy of the 10,000 foot (for turbojets) and 5,000 foot (for piston-type aircraft) distances for defining the danger zone for bird/aircraft collisions. The distances cited were derived from FAA Order 5200.5. The distances are based on the consideration that over 82 percent of all bird strikes occur below altitudes of 500 feet (150 meters), and that aircraft are generally below this altitude within the distances specified.

Some commenters emphasized that bird strikes do occur outside the distances established in the regulation. Consultation with FAA personnel and other experts in the field of bird/aircraft hazards has revealed that, even when disposal facilities are located beyond the distances specified, hazards can exist where an airport is situated between a disposal facility and bird feeding, roosting, or watering sites. The hazard arises as birds traverse the airport in flying between the disposal facility and watering, feeding or roosting areas. However, EPA does not have sufficient information to indicate how serious this problem is. Moreover, the available data is insufficient to support the setting of national regulations to cover such contingencies. At some point it becomes difficult to isolate the independent effect of solid waste disposal activities on the bird hazard problem.

EPA has also decided to give a clearer definition of some key terms. The definition of "Airport" includes those airfields currently defined by the FAA as public-use airports. The regulation applies to that set of airports because existing data indicates that the preponderance of bird strikes occur at public-use airports. For example, 120 of the 121 airports reporting strikes in 1977 were public-use airports, and 220 of the 223 airports reporting strikes in 1978

consumption, and animal feed for animals whose products are consumed by humans.

(5) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(6) "Pasture crops" means crops such as legumes, grasses, grain stubble and stover which are consumed by animals while grazing.

(7) "pH" means the logarithm of the reciprocal of hydrogen ion concentration.

(8) "Root crops" means plants whose edible parts are grown below the surface of the soil.

(9) "Soil pH" is the value obtained by sampling the soil to the depth of cultivation or solid waste placement, whichever is greater, and analyzing by the electrometric method. ("Methods of Soil Analysis, Agronomy Monograph No. 9," C.A. Black, ed., American Society of Agronomy, Madison, Wisconsin, pp. 914–926, 1965.)

§ 257.3–6 Disease.

(a) *Disease Vectors.* The facility or practice shall not exist or occur unless the on-site population of disease vectors is minimized through the periodic application of cover material or other techniques as appropriate so as to protect public health.

(b) *Sewage sludge and septic tank pumpings (Interim Final).* A facility or practice involving disposal of sewage sludge or septic tank pumpings shall not exist or occur unless in compliance with paragraphs (b) (1), (2) or (3) of this section.

(1) Sewage sludge that is applied to the land surface or is incorporated into the soil is treated by a Process to Significantly Reduce Pathogens prior to application or incorporation. Public access to the facility is controlled for at least 12 months, and grazing by animals whose products are consumed by humans is prevented for at least one month. Processes to Significantly Reduce Pathogens are listed in Appendix II, Section A. (These provisions do not apply to sewage sludge disposed of by a trenching or burial operation.)

(2) Septic tank pumpings that are applied to the land surface or incorporated into the soil are treated by a Process to Significantly Reduce Pathogens (as listed in Appendix II, Section A), prior to application or incorporation, unless public access to the facility is controlled for at least 12 months and unless grazing by animals whose products are consumed by humans is prevented for at least one month. (These provisions do not apply to septic tank pumpings disposed of by a trenching or burial operation.)

(3) Sewage sludge or septic tank pumpings that are applied to the land surface or are incorporated into the soil are treated by a Process to Further Reduce Pathogens, prior to application or incorporation, if crops for direct human consumption are grown within 18 months subsequent to application or incorporation. Such treatment is not required if there is no contact between the solid waste and the edible portion of the crop; however, in this case the solid waste is treated by a Process to Significantly Reduce Pathogens, prior to application; public access to the facility is controlled for at least 12 months; and grazing by animals whose products are consumed by humans is prevented for at least one month. If crops for direct human consumption are not grown within 18 months of application or incorporation, the requirements of paragraphs (b) (1) and (2) of this section apply. Processes to Further Reduce Pathogens are listed in Appendix II, Section B.

(c) As used in this section:

(1) "Crops for direct human consumption" means crops that are consumed by humans without processing to minimize pathogens prior to distribution to the consumer.

(2) "Disease vector" means rodents, flies, and mosquitoes capable of transmitting disease to humans.

(3) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(4) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede vectors' access to the waste.

(5) "Trenching or burial operation" means the placement of sewage sludge or septic tank pumpings in a trench or other natural or man-made depression and the covering with soil or other suitable material at the end of each operating day such that the wastes do not migrate to the surface.

§ 257.3–7 Air.

(a) The facility or practice shall not engage in open burning of residential, commercial, institutional or industrial solid waste. This requirement does not apply to infrequent burning of agricultural wastes in the field, silvicultural wastes for forest management purposes, land-clearing debris, diseased trees, debris from emergency clean-up operations, and ordnance.

(b) The facility or practice shall not violate applicable requirements developed under a State implementation plan approved or promulgated by the Administrator pursuant to Section 110 of the Clean Air Act.

(c) As used in this section "open burning" means the combustion of solid waste without (1) control of combustion air to maintain adequate temperature for efficient combustion, (2) containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and (3) control of the emission of the combustion products.

§ 257.3–8 Safety.

(a) *Explosive gases.* The concentration of explosive gases generated by the facility or practice shall not exceed:

(1) Twenty-five percent (25%) of the lower explosive limit for the gases in facility structures (excluding gas control or recovery system components); and

(2) The lower explosive limit for the gases at the property boundary.

(b) *Fires.* A facility or practice shall not pose a hazard to the safety of persons or property from fires. This may be accomplished through compliance with § 257.3–7 and through the periodic application of cover material or other techniques as appropriate.

(c) *Bird hazards to aircraft.* A facility or practice disposing of putrescible wastes that may attract birds and which occurs within 10,000 feet (3,048 meters) of any airport runway used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway used by only piston-type aircraft shall not pose a bird hazard to aircraft.

(d) *Access.* A facility or practice shall not allow uncontrolled public access so as to expose the public to potential health and safety hazards at the disposal site.

(e) As used in this section:

(1) "Airport" means public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities.

(2) "Bird hazard" means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants.

(3) "Explosive gas" means methane (CH_4).

(4) "Facility structures" means any buildings and sheds or utility or drainage lines on the facility.

(5) "Lower explosive limit" means the lowest percent by volume of a mixture of explosive gases which will propagate

flame in air at 25°C and atmospheric pressure.

(j) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede disease vectors' access to the waste.

(7) "Putrescible wastes" means solid waste which contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for birds.

§ 257.4 Effective date.

These criteria become effective October 15, 1979.

Appendix I

The maximum contaminant levels promulgated herein are for use in determining whether solid waste disposal activities comply with the ground-water criteria (§ 257.3–4). Analytical methods for these contaminants may be found in 40 CFR Part 141 which should be consulted in its entirety.

1. *Maximum contaminant levels for inorganic chemicals.* The following are the maximum levels of inorganic chemicals other than fluoride:

Contaminant	Level (milligrams per liter)
.....	0.05
.....	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

The maximum contaminant levels for fluoride are:

Temperature[1] degrees Fahrenheit	Degrees Celsius	Level (milligrams per liter)
53.7 and below	12 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

[1] Annual average of the maximum daily air temperature.

2. *Maximum contaminant levels for organic chemicals.* The following are the maximum contaminant levels for organic chemicals:

	Level (milligrams per liter)
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-Hexachlorocyclohexane, gamma isomer	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl) ethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67 to 69 percent chlorine)	0.005
(b) Chlorophenoxys:	
2,4-Dichlorophenoxy-acetic acid	0.1
2,4,5-P Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01

3. *Maximum microbiological contaminant levels.* The maximum contaminant level for coliform bacteria from any one well is as follows:

(a) using the membrane filter technique:

(1) Four coliform bacteria per 100 milliliters if one sample is taken, or

(2) Four coliform bacteria per 100 milliliters in more than one sample of all the samples analyzed in one month.

(b) Using the five tube most probable number procedure, (the fermentation tube method) in accordance with the analytical recommendations set forth in "Standard Methods for Examination of Water and Waste Water", American Public Health Association, 13th Ed. pp. 662–668, and using a Standard sample, each portion being one fifth of the sample:

(1) If the standard portion is 10 milliliters, coliform in any five consecutive samples from a well shall not be present in three or more of the 25 portions, or

(2) If the standard portion is 100 milliliters, coliform in any five consecutive samples from a well shall not be present in five portions in any of five samples or in more than fifteen of the 25 portions.

4. *Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity.* The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

(a) Combined radium-226 and radium-228—5 pCi/l;

(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)—15 pCi/l.

Appendix II

A. Processes to Significantly Reduce Pathogens

Aerobic digestion: The process is conducted by agitating sludge with air or oxygen to maintain aerobic conditions at residence times ranging from 60 days at 15° C to 40 days at 20° C, with a volatile solids reduction of at least 38 percent.

Air Drying: Liquid sludge is allowed to drain and/or dry on under-drained sand beds, or paved or unpaved basins in which the sludge is at a depth of nine inches. A minimum of three months is needed, two months of which temperatures average on a daily basis above 0° C.

Anaerobic digestion: The process is conducted in the absence of air at residence times ranging from 60 days at 20° C to 15 days at 35° to 55° C, with a volatile solids reduction of at least 38 percent.

Composting: Using the within-vessel, static aerated pile or windrow composting methods, the solid waste is maintained at minimum operating conditions of 40° C for 5 days. For four hours during this period the temperature exceeds 55° C.

Lime Stabilization: Sufficient lime is added to produce a pH of 12 after 2 hours of contact.

Other methods: Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

B. Processes to Further Reduce Pathogens

Composting: Using the within-vessel composting method, the solid waste is maintained at operating conditions of 55° C or greater for three days. Using the static aerated pile composting method, the solid waste is maintained at operating conditions of 55° C or greater for three days. Using the windrow composting method, the solid waste attains a temperature of 55° C or greater for at least 15 days during the composting period. Also, during the high temperature period, there will be a minimum of five turnings of the windrow.

Heat dryng: Dewatered sludge cake is dried by direct or indirect contact with hot gases, and moisture content is reduced to 10 percent or lower. Sludge particles reach temperatures well in excess of 80° C, or the wet bulb temperature of the gas stream in contact with the sludge at the point where it leaves the dryer is in excess of 80° C.

Heat treatment: Liquid sludge is heated to temperatures of 180° C for 30 minutes.

Thermophilic Aerobic Digestion: Liquid sludge is agitated with air or oxygen to maintain aerobic conditions at residence times of 10 days at 55–60° C, with a volatile solids reduction of at least 38 percent.

Other methods: Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

Any of the processes listed below, if added to the processes described in Section A above, further reduce pathogens. Because the processes listed below, on their own, do not reduce the attraction of disease vectors, they are only add-on in nature.

Beta ray irradiation: Sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

Gamma ray irradiation: Sludge is irradiated with gamma rays from certain isotopes, such as ^{60}Cobalt and ^{137}Cesium, at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

Pasteurization: Sludge is maintained for at least 30 minutes at a minimum temperature of 70° C.

Other methods: Other methods or operating conditions may be acceptable if pathogens are reduced to an extent equivalent to the reduction achieved by any of the above add-on methods.

FR Doc. 79-28532 Filed 9-12-79; 8:45 am]
BILLING CODE 6560-01-M

CITY OF SACRAMENTO
ELDERBERRY MITIGATION AREA
INVESTIGATION TASK FORCE
FINAL REPORT - August, 1988

APPENDIX G

United States Department of the Interior

FISH AND WILDLIFE SERVICE

SACRAMENTO ENDANGERED SPECIES OFFICE
2800 Cottage Way, Room E-1823
Sacramento, California 95825-1846

JUN 07 1988

Mr. David A. Pelser, Senior Engineer
Solid Waste Division
Department of Public Works
City of Sacramento
1231 I Street, Suite 103
Sacramento, California 95814-2933

Dear Mr. Pelser:

As a result of our May 5, 1988, meeting and field trip, I have prepared comments from my observations during the field trip. These comments are Attachment A. In addition, I have prepared a draft of the Fish and Wildlife Service's position on the mitigation plan for the dead elderberry bushes (Attachment B).

If you have questions regarding these comments and the mitigation plan, please call me at 978-4866.

Sincerely,

Kathleen E. Tangren

for Gail C. Kobetich
Field Supervisor

Attachments

Attachment A

(Draft)

OBSERVATIONS FROM MAY 5, 1988, FIELD TRIP

On May 5, 1988, I accompanied representatives from Sacramento City Public Works Department and the Central Valley Region of the California Regional Water Quality Control Board for an inspection of the site along the north edge of the City's 28th Street landfill between the landfill and the American River. This area has been impacted by materials from the landfill, probably methane, that has caused vegetation in this narrow strip to die.

Of particular concern to the Fish and Wildlife Service (Service) is the death of elderberry bushes because they are host plants to the valley elderberry longhorn beetle (beetle), a federally listed threatened species. The Service is concerned about 100 elderberry bushes that were planted at the site as compensation for a project at another site along the American River. In addition, the Service is concerned about approximately 450 naturally growing elderberry bushes in the area. Both the majority of the planted elderberries and the naturally occurring ones have succumbed. The condition of the elderberry bushes did not appear much different than when viewed last fall. Of the 100 elderberries planted for mitigational purposes, 17 appeared in

good health. The majority of the rest had succumbed or were in obvious ill health. The same can be said for the naturally occurring bushes as most are dead. The living bushes occur on the upstream end of the site. In fact, some of the bushes toward the eastern end of the site that had not entirely perished appear to be recovering as exhibited by dark green vigorous growth of leaves and shoots. The bushes nearest the landfill, however, even in this vicinity, had died. Other vegetation such as cottonwood, boxelder, willow and black locust trees, and bamboo and other grasses had died in a strip closest to the landfill. It was difficult to tell if vegetation along this strip was continuing to succumb as one moved toward the River. The zone with dead vegetation did not appear to be any greater than last fall when the area was last visited.

In summary many trees and bushes and other vegetation have died in the affected area. Most of the planted elderberry bushes and about 450 stems of naturally growing elderberries have succumbed. The zone where vegetation has died or is definitely unhealthy does not appear to be getting larger.

Attachment B

(Draft)

MITIGATION PLAN

For purposes of this document it is assumed that the death of the elderberry bushes and any resident valley elderberry longhorn beetle larvae in the area between the 28th Street landfill and the American River have succumbed as a result of toxic material, probably methane, that has migrated from the landfill. Approximately 83 planted and 450 naturally occurring elderberry plants have succumbed. This amounts to a combination of 533 elderberry plants that will have to be replaced. Replacement or mitigation for this loss will have to consider numbers of plants and location for the planting.

For the elderberries that had been planted for mitigation as the result of work elsewhere on the American River, there will have to be a one to one replacement for the 100 plants. The Service is recommending that the entire 100 plants be compensated for even though only 83 have succumbed, so that the City does not have to maintain the 17 remaining elderberries. In addition, it would be unwise not to compensate for the entire 100 elderberry bushes at this time because some of the 17 remaining bushes

are in poor health and neither the Service nor the City can foretell if there will be further threats to the plants.

For the approximately 450 elderberry plants that have succumbed, the Service recommends a two to one replacement. The Service usually recommends a five to one replacement, but because the 450 plants in question were young and of approximately the same age class, the Service, in this case, will recommend a two to one replacement. A greater than one to one replacement is required because the art of growing and transplanting elderberry bushes is yet inexact and the mortality rate cannot be determined. This then would require a total of 1,000 elderberry bushes to be compensated for and planted at some specified location approved by the Service.

The elderberries would be grown from cuttings, root shoots, or seeds taken from bushes along the American River and would be raised to 6 feet in height in 5-gallon containers before being out planted. There should be 333 plants out planted each year for three years. This will allow for an uneven age stand of bushes to develop which provides better beetle habitat than single age groupings. The elderberries will have to be planted in groups of three to five plants with each group being planted about 30 feet apart. The plants will have to be watered

regularly during the dry season until they are well established, most likely by the end of the second year after out planting. The plants must be monitored regularly for condition and mortality. At the end of five years there will have to be 550 viable, actively growing elderberry bushes. An annual report will be submitted to the Service each September 30 detailing the activities that have taken place during the year.