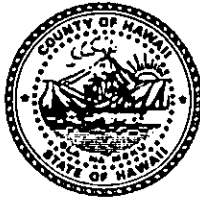


Stephen K. Yamashiro
Mayor



Donna Fay K. Kiyosaki
Chief Engineer

Riley W. Smith
Deputy Chief Engineer

RECEIVED

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County of Hawaii

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL DEPARTMENT OF PUBLIC WORKS
25 Aupuni Street, Room 202 • Hilo, Hawaii 96720-4252
(808) 961-8321 • Fax (808) 969-7138

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OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

September 10, 1993

MR. BRIAN J.J. CHOY, DIRECTOR
Office of Environmental Quality Control
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

SUBJECT: Negative Declaration for Kailua Landfill Closure
TMK: 7-4-08:16

The Department of Public Works, County of Hawaii has reviewed the comments received during the 30-day public comment period which began on July 8, 1993. This agency has determined that this project will not have a significant environmental effect and has issued a negative declaration. Please publish this notice in the September 23, 1993 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Form and four copies of the final E.A.

Please contact Fred Rodrigues, of Parametrix, Inc. at 524-0594 if you have any questions.

Donna Fay K. Kiyosaki
Donna Fay K. Kiyosaki, P.E.
Chief Engineer

LEC:naz

cc: SWD

1993-09-23-HI-FEA-Kailua Landfill - Closure Plan

SEP 23 1993

FINAL ENVIRONMENTAL ASSESSMENT
IN ANTICIPATION OF A NEGATIVE DECLARATION
CHAPTER 343, HAWAII REVISED STATUTES (HRS)

FOR

KAILUA LANDFILL CLOSURE

KAILUA-KONA, HAWAII

TMK: 7-4-08: 16

PREPARED FOR THE COUNTY OF HAWAII

DEPARTMENT OF PUBLIC WORKS
SOLID WASTE DIVISION

PREPARED BY

PARAMETRIX, INC.

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EXHIBIT

Correspondence - Agencies Consulted

I. SUMMARY

CHAPTER 343, HRS ENVIRONMENTAL ASSESSMENT (EA)

Action:	Agency
Project Name:	Kailua Landfill - Closure Plan
Project Description:	The Kailua Landfill is an operating Landfill located in the North Kona District on the island of Hawaii. The landfill footprint occupies approximately 18 acres of the 27 acre landfill facility. Solid waste has been deposited at this landfill since the mid-1970s. At the present time, the facility receives approximately 100 tons per day, and has available capacity to continue operations until September, 1993. When the subsurface fires have been extinguished, the closure plan will include perimeter fencing and gates to discourage indiscriminate dumping and also to prevent damage to implemented improvements (See page 10, Sec. E. - Ancillary Facilities).
Project Location:	It is approximately three miles north of Kailua-Kona, adjacent to the Kealakehe Homesteads and east of Highway 19, the Queen Kaahumanu Highway (See Figure 1). The Kealakehe Police Station is located immediately adjacent to the Landfill, northeast of the Site (See Figure 2).
Tax Map Key:	7-4-08: 16
Area:	Total Facility - 27 acres
State Land Use Designation:	Conservation; Urban
General Plan Land Use Pattern Allocation Map:	Industrial
County Zoning Designation:	Open

Landowner:

State of Hawaii

Contact:

**F. J. Rodriguez
c/o Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813
Phone: (808) 524-0594**

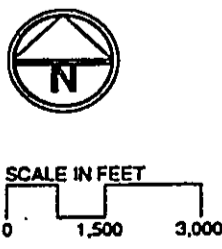
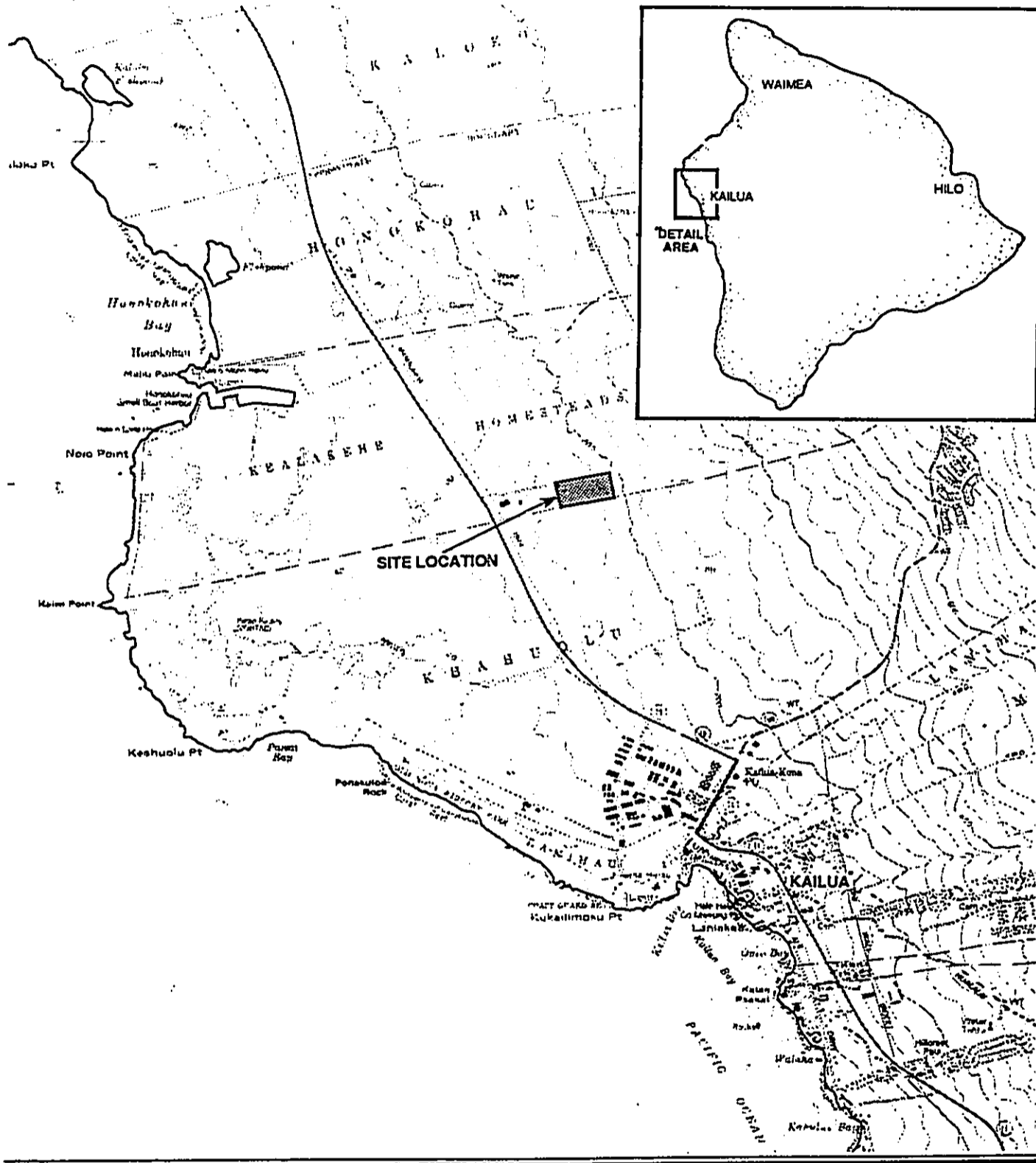
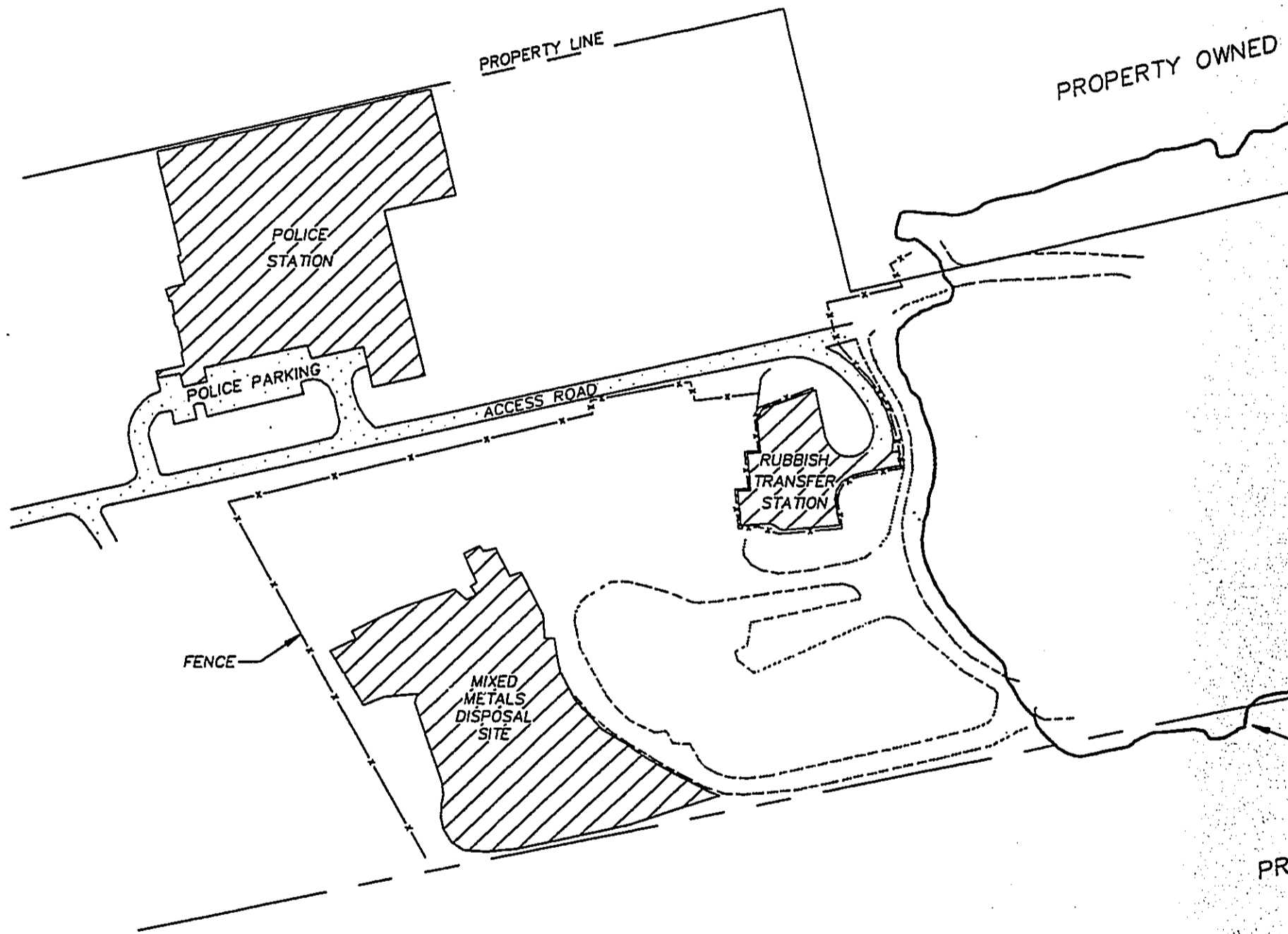


Figure 1.
Approximate Site
Location



FILE: FIG-2 JOB: 55-2126-02



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SCALE IN FEET

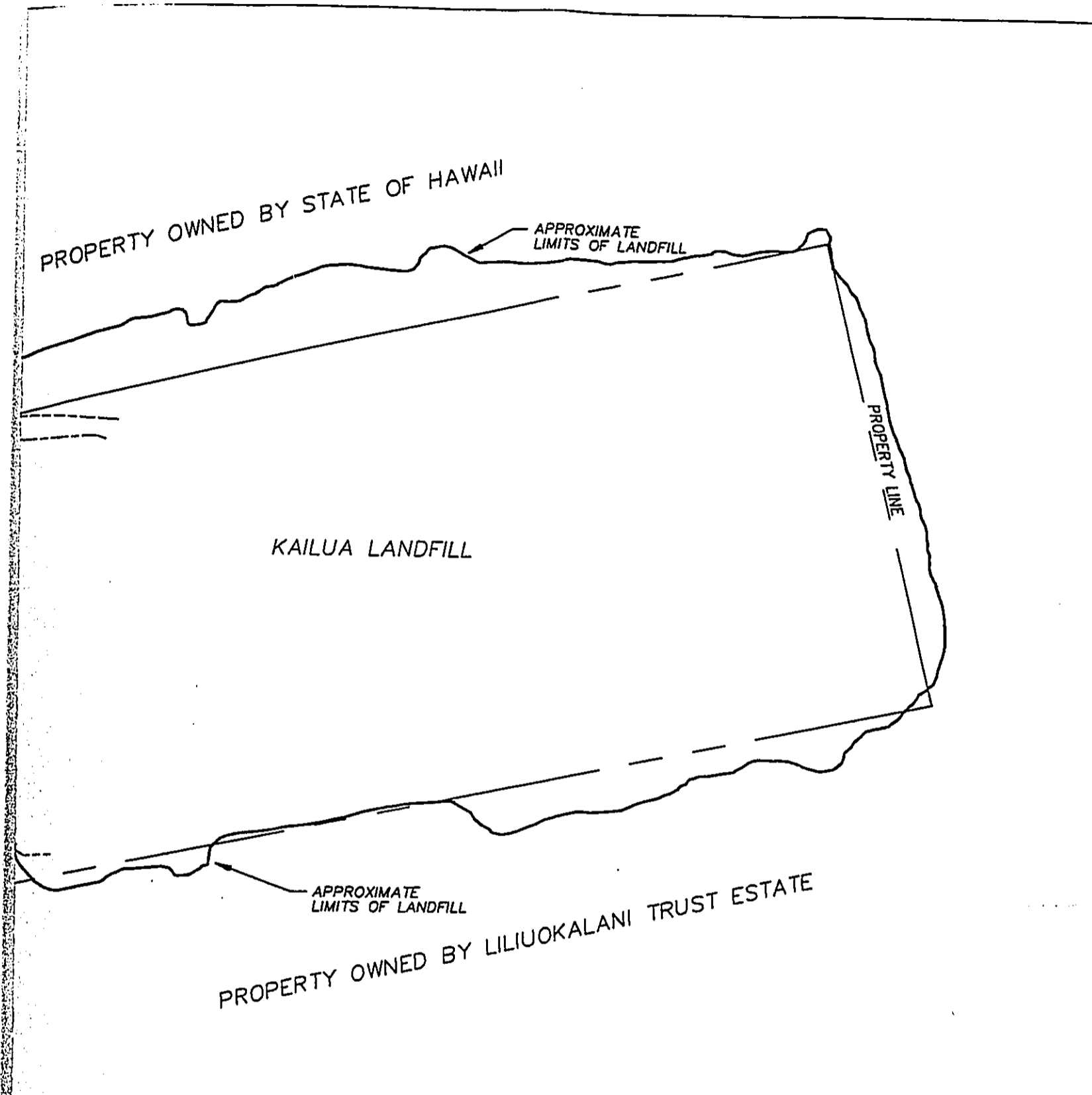


Figure 2
Site Plan

Kailua Landfill

II. PROJECT DESCRIPTION

A. Technical Characteristics

1. The Kailua Landfill has been an operating Landfill since the mid-1970s, accepting refuse and solid waste materials from the South Kohala and Kailua-Kona areas. Although the original grade at the site was generally flat with slight sloping from the east, refuse was placed over the original grade with little or no excavation of native materials.
2. Subsurface fires are known to exist within the disposal area limits and attempts to extinguish the fires by excavation and dousing have been unsuccessful in the past. At times these fires have caused small localized brush fires on the landfill. In addition, odors complaints have been received by the County on several occasions from employees of the Kealakehe Police Station. Complaints have also been received during the late 1980s from the Kealakehe School and residents to the east of the landfill.
3. Subsurface landfill fire is complex and a function of many factors, some of which include waste composition, available oxygen, and ambient pressure in the area of combustion. Wastes placed in a landfill initially undergo decomposition aerobically, producing carbon dioxide, heat, and water. Once the oxygen is consumed, if no new source of for oxygen is available, the biological decomposition becomes anaerobic with the resultant production of methane and carbon dioxide.
4. Organic waste materials whether decomposing aerobically or anaerobically, may release heat. The rate of biological decomposition is slow for most materials; the heat produced is transferred to nearby surroundings as it is formed and the landfill temperatures elevate somewhat as decomposition proceeds. The landfill's refuse material may undergo a chemical decomposition through the action known as pyrolysis. Pyrolysis converts the refuse material to a black carbonaceous char. The char material becomes red hot if air infiltrates. The heat generated is subsequently transferred to additional refuse materials, spreading the pyrolysis process. While open flames within the landfill are considered unlikely, once the subsurface fire reaches the surface, open flames could occur.
5. Spontaneous ignition of combustible material can occur if enough air infiltration occurs, and already high temperatures allow for an increase in the chemical oxidation rate. Temperatures reaching the ignition temperature for the combustible material are influenced by the rate of heat generation, available air infiltration, and the insulating properties of the surrounding materials. Heating to the point of spontaneous combustion is the result of continued chemical oxidation; for this

process to proceed to the point of ignition, a continuous source of oxygen is necessary.

6. Heat within the landfill is transferred either by convection or conduction. During conduction heat is transferred by direct contact, while in convection heat is transferred by a circulating gas medium. Conductive heating of the landfill is limited to the surface area of the refuse undergoing oxidation, whereas convective forces cause the hot gas to expand and rise through the landfill. As the hot gas comes into contact with cooler refuse material, heat is transferred by conduction.
7. Finally, consider the refuse material in the landfill as the combustible material. Depriving the subsurface fire of its air supply will terminate combustion. However, because of the insulating properties of the refuse materials, simply smothering the fire could keep subsurface temperatures high, necessitating an extended cooldown period by natural heat dissipation. The cooldown period could last for years. During this period, any reintroduction of an air supply could result in the regeneration of subsurface combustion. It is therefore recommended that the top surface of the landfill remain uncovered for a period of time (up to two years) to allow for controlled dissipation of the heat created by the subsurface fires. The influence of atmospheric oxygen can either ignite new fires or help spread existing fires. These existing fires can transfer heat by convection and create currents within the landfill. Convection currents can create a chimney effect and cause air to be drawn down into the landfill. Therefore, it is important that a well compacted and non-permeable materials be maintained along the landfill's side slopes to counter any atmospheric oxygen from infiltrating.

B. Social and Economic Characteristics

1. Historically, refuse has been placed beyond the north, east and south landfill property boundaries. The limits of refuse extend approximately 100 feet past the property line on the north side of the landfill, about 40 feet on the east side of the landfill, and about 20 feet in a limited area along the south property boundary. These limits of refuse placement are approximate and will be verified by field investigation during final closure plan design. The remaining capacity at the landfill has been estimated by determining the volume between the existing grade and the proposed final grade. The volume between the existing and proposed final grades was estimated to be approximately 90,000 cubic yards. This estimated volume represents available space for refuse as well as daily and intermediate cover material. Assuming that daily and intermediate cover material represents 10 percent of the total volume, approximately 84,000 cubic yards of volume is available for refuse placement. The estimated site life, based on the current daily waste stream of 110 tons per day (seven days per week) is approximately 381 days from October,

1992. These estimates will be verified after more current and updated site investigations are obtained. The grades can be revised at that time, if necessary to provide adequate capacity.

2. It is recommended that the County negotiate with the adjacent property owner/lessees (State of Hawaii and Liliuokalani Trust Estate) to acquire sufficient additional property for proper closure of the landfill. Based on the current limits of the refuse loading and the preliminary closure design, the existing north property line would need to be relocated approximately 110 feet to the north, 60 feet to the east, and a small section of the south property line would need to be relocated about 50 feet to the south to accommodate the wedge of refuse overfill in that area.
3. It may be feasible to remove sufficient refuse along the south perimeter to allow final cover placement within the property boundary. However, a section of the perimeter access road would extend about 20 feet over the property line. An easement may be required for this section of the perimeter access road. The perimeter road allows for maintenance and monitoring of the closure improvements during the post closure period.
4. During closure construction it is recommended that a 1000 foot buffer zone be established to limit public exposure to noise, dust, and other nuisances associated with a construction site. After construction activities are complete, it is recommended that a 250 foot buffer zone be maintained beyond the limits of the final cover.
5. The primary concern after closure is off-site gas migration. During the post closure period, monitoring for landfill gas around the perimeter will be performed to ensure that the gas collection system is operating effectively and that there is no off-site gas migration.

C. Phased Closure Plan and Schedule

1. The Kailua Landfill will be closed in three phases; the phased closure will provide control of both odors and subsurface fires as soon as possible. The existing landfill side slopes will be closed while the landfill is still operating. Phase 1 of the closure includes installation of a gas collection system and flare system. This work was completed in January, 1993. The second phase of the closure consists of placing final cover over the existing side slopes along with the installation of a permanent active gas management system. These controls will supplement the interim gas control system currently in place at the landfill. The final phase consists of closing the remaining top portion of the landfill after the landfill stops receiving solid waste. Construction of Phase 2 is planned to begin September, 1993, with completion

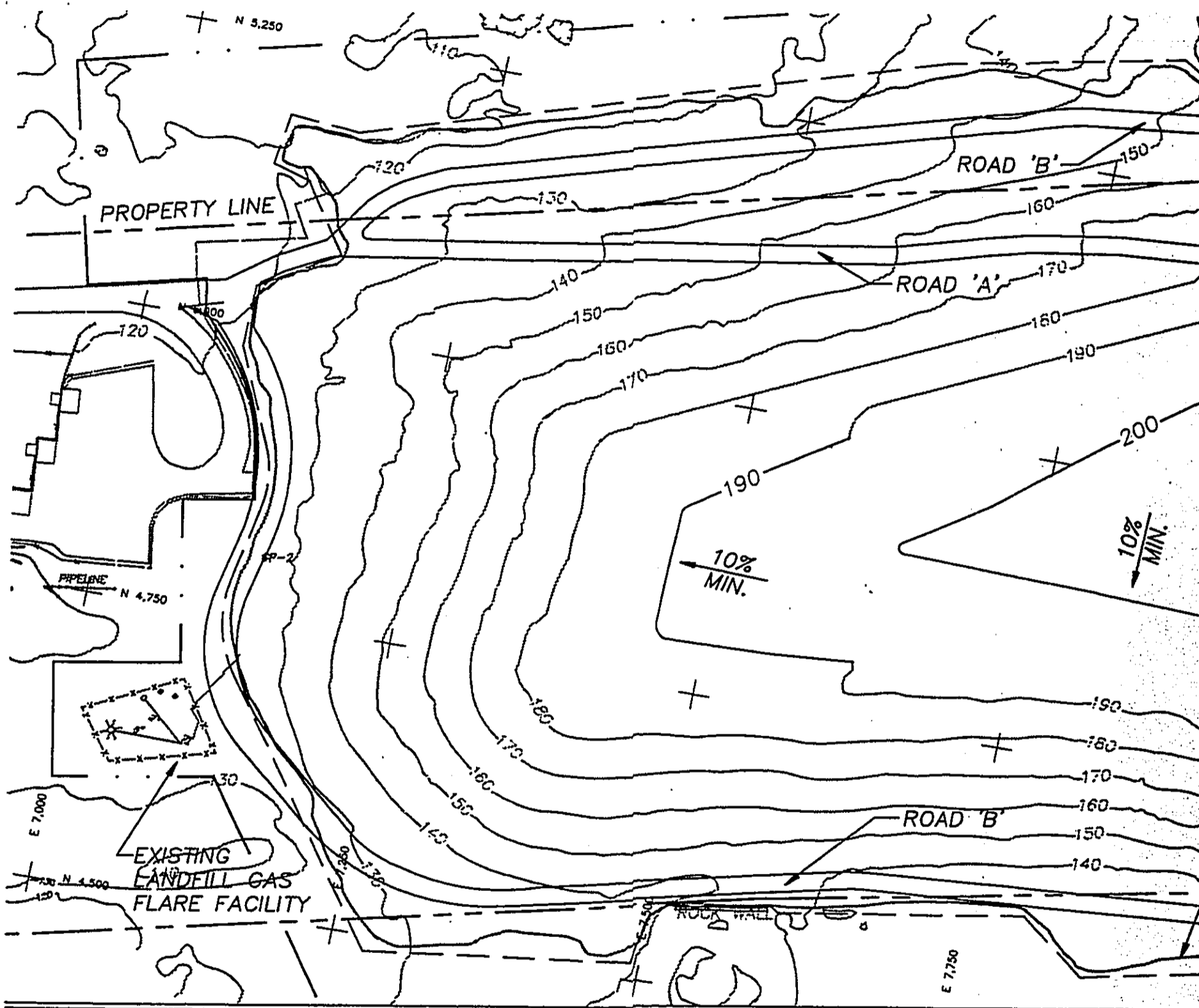
scheduled on or about December, 1993. Phase 3, which will occur after the landfill stops receiving refuse material no later than October 4, 1993, is planned to begin in January, 1994 and be completed in April, 1994.

To provide access around the perimeter of the landfill, the construction limits will be set roughly about 25 feet away from the toe of the landfill. The final phase of the project closure plan will be completed after the landfill stops receiving waste material. This phase includes completing the final landfill cover system, installation of additional gas collection trenches in the last waste lift, installing vertical gas extraction wells if necessary, and completing the permanent gas collection manifold.

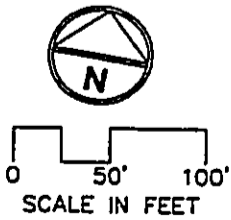
2. The Final Grading Plan (See Figure 3) discusses the construction requirements necessary to prepare the site for placement of the final cover system. The proposed grading plan shows maximum side slopes of 2.5 horizontal to 1 vertical (2.5H:1V) on the existing side slopes (Phase 2) and 3H:1V on the new side slopes (Phase 3). A 20-foot bench separates the phases. The 3H:1V slopes of Phase III provides the capacity needed to operate the landfill until September, 1993 and are desirable for slope stability. The 20-foot bench provides space to construct the cover system and space for final surface water drainage. The top of the landfill will be approximately 100 feet in width to allow room for landfill operations and slopes will be a minimum of five percent to maintain surface water drainage after settlement has occurred. Temporary erosion control measures will be required during initial site preparation and throughout construction. This control will be necessary until site conditions stabilize and permanent erosion controls and cover vegetation have been established. All construction designs will be reviewed and approved by State and County agencies.
3. After the landfill stops receiving refuse material no later than October 4, 1993, the existing waste stream will be routed to the new West Hawaii Landfill. If the new landfill is not ready to receive refuse when the Kailua Landfill closes, the waste stream will be temporarily routed to the Hilo Landfill. The public transfer station at the Kailua Landfill will remain and continue current operations. Refuse collection trucks will deliver refuse directly to the new landfill, significantly reducing the current traffic volumes at the Kailua Landfill.

D. Environmental Characteristics

1. Air quality, on and around the landfill site has been a concern for a number of years. Local residents and the adjacent police station personnel have complained about odors and particulates associated both with the landfill's operations, and the subsurface fires. Gas emissions, which originate from the uncovered and uncontrolled landfill, are transported to local residential areas and the police station

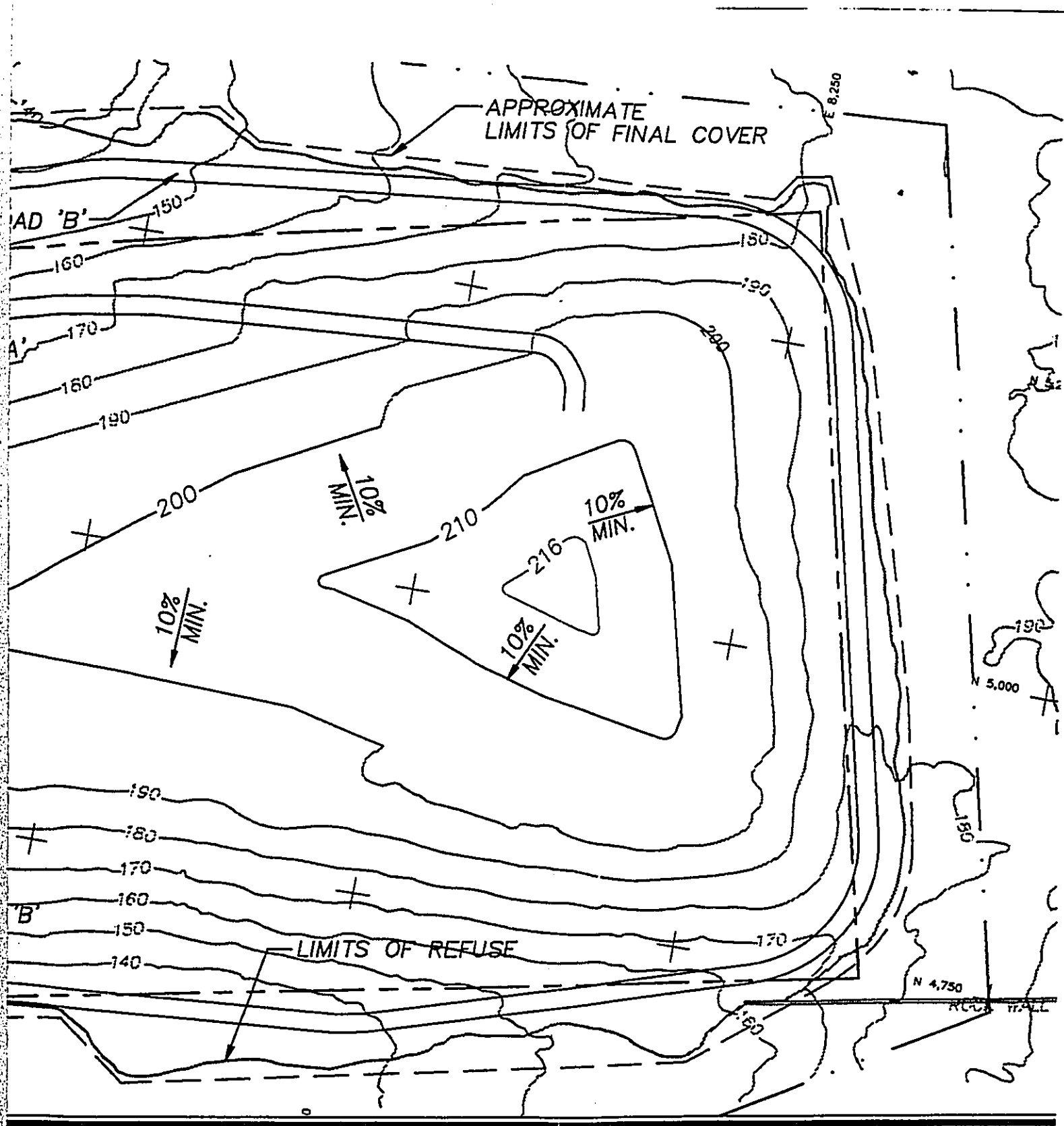


FILE: FIG-3 JOB: 55-2126-02



NOTE

1. Contours shown represent Subgrades. The Final C installed directly over resulting in the final g 4 feet above the grad



NOTE

Contours shown represent the Final Cover Subgrades. The Final Cover System will be installed directly over the grades shown, resulting in the final grade being approximately 4 feet above the grades shown.

Figure 3
Final Subgrade Plan

Kailua Landfill

by the trade winds during the day and by localized wind currents at night. The police station is particularly susceptible because the local currents direct the landfill gas emissions into the station's air conditioning system at night and the gas is circulated throughout the building. Federal and State health and occupational safety agencies conducted numerous air quality testing in response to complaints from landfill workers, local residents, and the police station personnel. Preliminary results from the investigations indicated that emissions from products associated with landfill/municipal wastes (decomposing organic matter) and particulates from subsurface fires were present at the landfill. The State Department of Health and the Federal Environmental Protection Agency both determined that concentrations of the air contaminants detected were generally low and not sufficient cause for health concern, the smoke and odors did create a nuisance situation.

2. **Proper surface water management can reduce erosion problems, and when appropriate erosion control measures are implemented, they ensure the long term stability of a site and minimize the need for site maintenance and sedimentation control.** Investigation of existing drainage patterns at the Kailua Landfill site revealed that there are no drainage patterns in the vicinity of the landfill. According to several local experts, any water from rainfall percolates into the ground extremely fast with little or no runoff. However, if there were runoff, the area to the east may affect the landfill site. Appropriate erosion and sedimentation controls are established in the County of Hawaii standards Chapter 10 of the Hawaii County Code, Erosion and Sedimentation Control. All plans discussed in this document have been developed in compliance with County of Hawaii Public Works Erosion and Sedimentation guidelines, and will be incorporated into project plans and specifications. Major components of the proposed surface water management plan for the Kailua Landfill include:

- a. *Landfill collector ditches to intercept and direct landfill runoff to the drywells;*
- b. *A perimeter ditch to collect any run-on water from the drainage basin to the east and divert it away from the landfill;*
- c. *Drywells to collect the water from the drainage ditches and allow it to percolate into the ground.*
 - aa. The landfill collector ditches are in general, located along the sides of the landfill access roads. The ditches will be triangular in shape and will follow the slope of the road with a minimum 1 percent grade. They will be grass-lined except in the case of peak velocities greater than 5 feet per second, in which case the ditch will be armored to prevent erosion.

Required depth based on design calculations will typically be two feet in depth to allow for excess deposits from erosion and for freeboard.

- bb. The perimeter ditch is located on the extreme east side of the landfill. It is positioned on the east side of the access road to prevent any run-on from the drainage basin mauka of the landfill site. The flow from the mauka lands is still unknown, but when urban related improvements are completed, the increased amount of hard surfaces will no doubt increase the potential for surface run-on to the landfill site. The perimeter ditch is designed for a depth of 2 feet, and will be made to collect any run-on that occurs and divert it to a drywell.
- cc. The landfill is located below the underground injection control line. Therefore, the runoff collected from the landfill may be disposed of into the ground through the use of drywells. Since there are no drainage patterns in the area, drywells will be used to dispose of the collected water. The drywells will be located in the existing natural rock as close to the culverts as possible. All design and construction will be in accordance with County of Hawaii standards; further, permits for building drywells will need to be obtained from the State Department of Health, Underground Injection Control Branch.

E. Ancillary Facilities - are those facilities required to protect and maintain the integrity of a landfill after closure. Security fencing and gates will provide controlled access to the site and discourage indiscriminate use. Controlling public access to the site after closure is necessary both to prevent injuries and to safeguard the implemented closure improvements.

1. **Fencing and Gates** are used to discourage indiscriminate dumping, prevent damage from unauthorized traffic, and protect implemented improvements, i.e. gas probes, final cover systems, and landfill gas control system components. A chain link fence will be installed around the facility to provide site security. Final siting of the fence will be made after site investigations and determination of final cover and perimeter road improvements are completed. Also, the adjacent lessee to the north is in the planning stage for a golf course which can influence the final siting of the perimeter fence.
2. **Access Roads** will be built around the landfill perimeter to facilitate closure and post-closure maintenance. The existing road on the north side slope will be improved to allow placement of the final cover system. All of these roads will be constructed on the final cover system. All roads will be covered with four inches of aggregate base course and sloped to drain off surface water. A surface water

collection ditch will be constructed along the roadways during placement of the final cover.

3. The existing Transfer Station will continue to operate during and after the landfill closure. Closure activities will be coordinated to minimize interference with the operation of the station and to maintain access to and from the station.

III. AFFECTED ENVIRONMENT

A. Geographical Characteristics

1. Topography

The existing site represents over two decades of refuse placement on a previously unexcavated site. It is described as a mound over 100 feet high, and slightly sloping to the north.

2. Soils

Soils on the Kailua Landfill site consist of two soil types and two rock types. A map providing the soil types is presented in Figure 4. A description of these soils identifies the soils as:

Punaluu extremely rocky peat (rPYD) is from the Punaluu Series and *consists of well drained, thin organic soils over pahoehoe lava bedrock. These soils are gently sloping to moderately steep. They are on uplands at an elevation ranging from near sea level to 1000' and receive from 60 to 90 inches of annual rainfall. Soil Survey of Island of Hawaii, U.S. Dept. of Agriculture, Soil Conservation Service, Aug., 1972*

Kaimu extremely stony peat (rKED) is from the Kaimu Series and consists *"of well drained, thin, organic soils over Aa lava. These are gently sloping to moderately steep soils on uplands at an elevation ranging from near sea level to 1000'." Ibid.*

Aa lava flows (rLV) are classified as a miscellaneous land type. *"It has practically no soil covering and is typically bare of vegetation, except for mosses, lichens, ferns, and a few small ohia trees. It is typically rough and broken, consisting of a mass of clinkery (rubbly) hard, glassy, sharp pieces piled in tumbled heaps." Ibid.*

Pahoehoe lava flows (rLW) are classified as a miscellaneous land type. *"It has practically no soil covering and is typically bare of vegetation except for mosses and lichens. Pahoehoe lava has a billowy, glassy surface that is relatively smooth. In some areas, the surface is rough and broken, and may include hummocks and pressure domes." Ibid.*

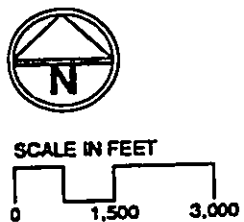
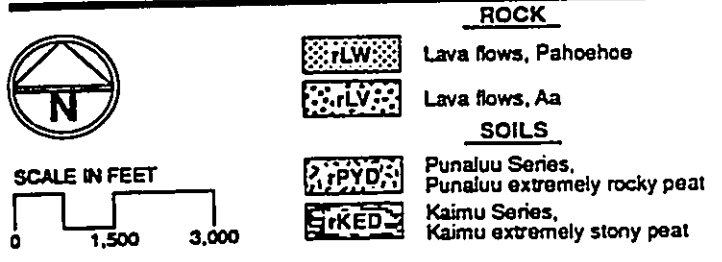
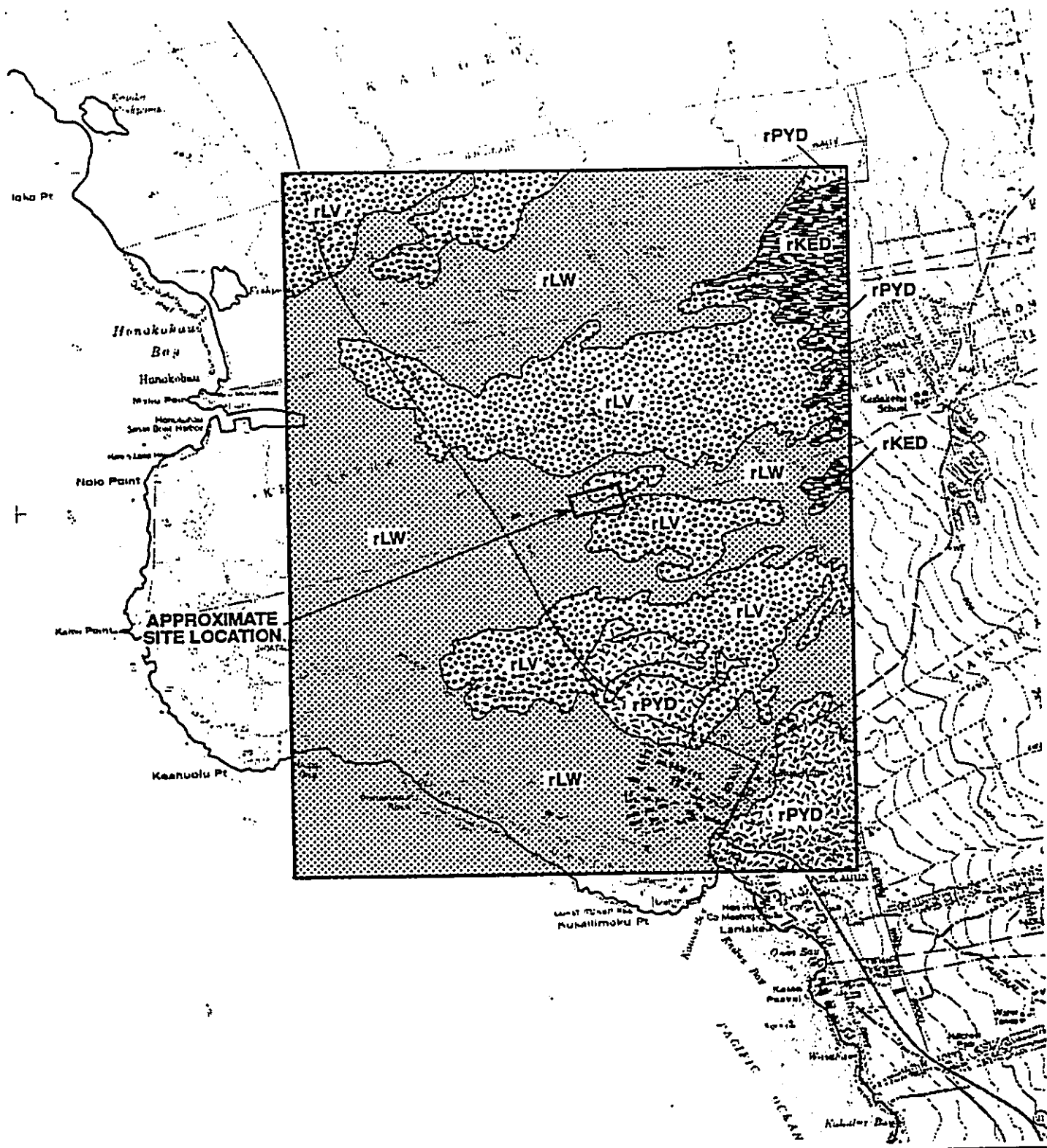


Figure 4.
Rock and Soil Map in
Vicinity of Kailua Landfill

3. Vegetation

Vegetation on the landfill site is limited to exotic or introduced species of weeds and grasses. The combination of the dry climate and land usage eliminate viable presence of vegetation. There are no endangered or protected species on the landfill parcel.

B. Hydrological Characteristics

1. Drainage

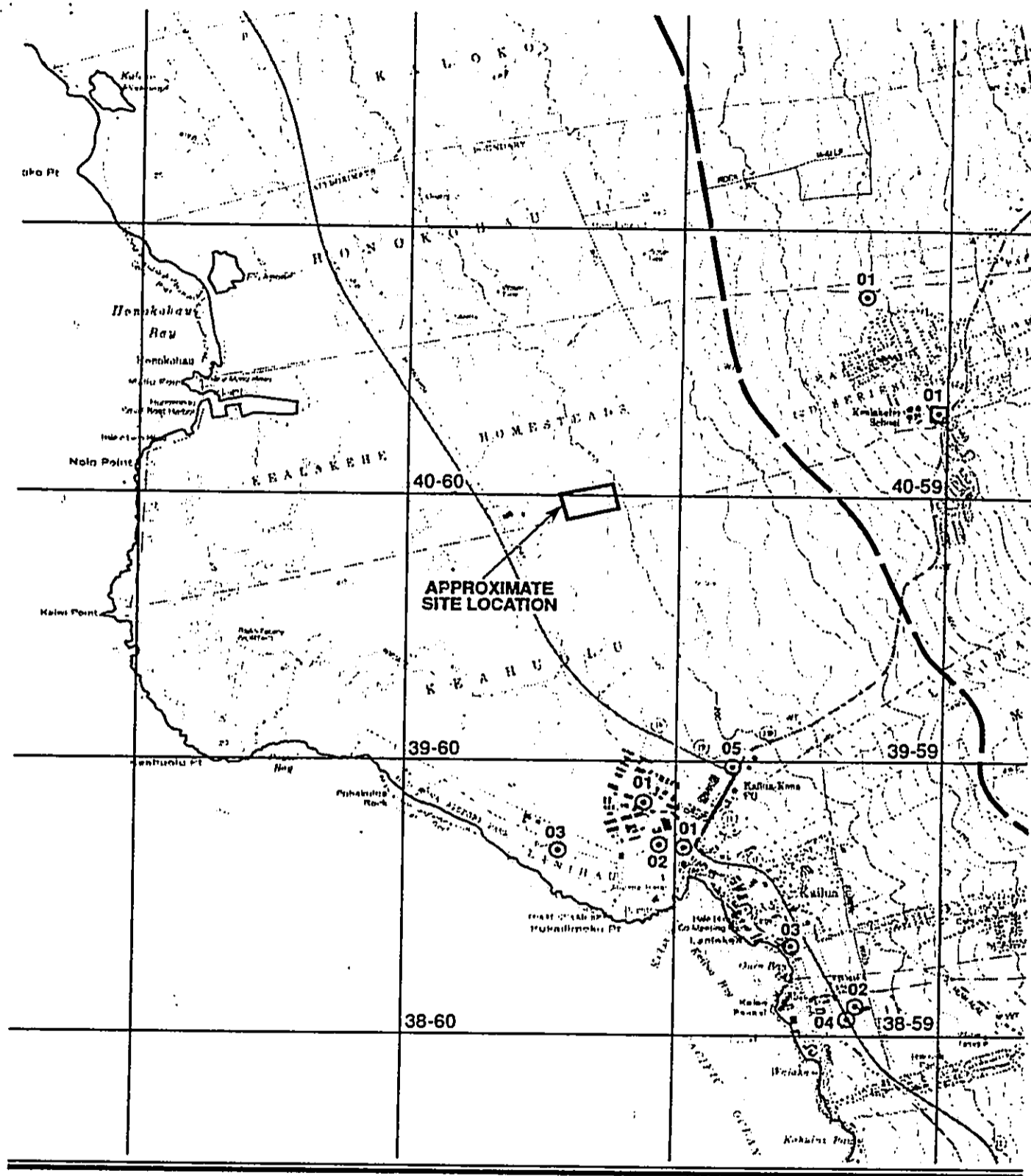
The site is located on the dry leeward side of the island, and it is subject to infrequent major storms which occur primarily in the winter months. Average annual rainfall is about 30 inches occurring primarily between the months of March and October. Because of the high permeability of the rock in the area and the relatively low rainfall, there are no surface streams. Groundwater occurrence at the Kailua Landfill site is felt to be minimal, and primarily brackish in content. It occurs as a brackish water lens about 150 to 200' below ground surface. Because of the highly permeable nature of the lava under the site and the lack of any known ash layers or other low permeability units below the site, it is not expected that any perched groundwater is present. No seeps or springs occur in the project area. Any leachate generated by the landfill is expected to flow generally vertically downward through the unsaturated zone to the brackish water table. Because of the relatively low rainfall in the landfill area, leachate generation should be relatively low. The addition of a low permeability cover to the landfill coupled with the low mean annual rainfall in the site area should sufficiently mitigate any leachate migration to basal groundwater. The landfill site is located below the designated Underground Injection Control (UIC) boundary for "Pass - No Pass" identification (See Figure 5) and does not conflict with groundwater control guidelines.

2. Coastal Zone Management Program

The site is outside the County Special Management Area boundary and will not require Coastal Zone Management certification since there is no Federal funding or permit requirements. Improvements are at County expense.

C. Biological Characteristics

The site is notable by the lack of the white cattle egret, a bird commonly associated with landfills. The egrets, as well as the Indian mynah, are usually present at landfills seeking insects and other forms of sustenance as the landfill machinery grades and compacts the



SCALE IN FEET
 0 1,500 3,000

- — — — — Underground Injection Control (UIC) Line
- ⊙ Injection Well
- Other Well

Figure 5.
Underground Injection
Control (UIC) Map for Vicinity
of Kailua Landfill

refuse surface. It is assumed that rodents and feral animals, dogs, cats, etc. would be present. No census was taken to confirm actual numbers of animals at the landfill.

IV. SUMMARY OF MAJOR IMPACTS AND MITIGATIVE MEASURES

The major impact that will result from this planned closure of the Kailua Landfill is a beneficial one. This is the quenching of the subsurface fires which have been causing increasing health related concerns to the landfill employees and adjacent residents. At the present time, the air sampling programs conducted by the County and the State indicate that there is no direct health hazard due to the landfill emissions. However, the nuisance aspects of the subsurface fires do not contribute in a positive manner to the current adjacent land uses, or the long range future land uses at Kealakehe. The balance of the impacts to be anticipated from the closure of the landfill will be in the areas of potential groundwater contamination of the brackish lens. Potential groundwater contamination of the brackish lens will be mitigated by installation of the final cover system. The final cover system consists of a non-permeable geomembrane liner covered by 2 feet of protective cover soil. The final cover system will serve as a barrier to infiltration of surface water into the refuse and resulting percolation of contaminated water down into the brackish lens. The temporary construction related impacts of noise and dust will be mitigated by the contractor in accordance with the State Department of Health and County of Hawaii ordinances and regulations.

V. ALTERNATIVES CONSIDERED

There were no viable alternatives to the closure plan since the presence of the subsurface fires coupled with the nearly completed life span of the landfill, have made this proposed closure plan mandatory.

VI. DETERMINATION, FINDINGS, AND REASONS SUPPORTING DETERMINATION

After completing an assessment of the potential environmental effects of the project's implementation, and evaluating the long term future impacts of the project, it has been determined that an Environmental Impact Statement (EIS) is not required. Reasons supporting the determination are as follows, using as the criteria, the policy, guidelines, and provisions of Chapters 343, and 344, Hawaii Revised Statutes.

1. The proposed project will not adversely affect the physical and social environment.
2. There will be no permanent degradation to the ambient air and noise quality or levels.
3. No residences or businesses will be disrupted or affected by the proposed project's implementation.
4. There are no endangered plant or animal species at the construction sites.
5. There are no known historical or archaeological sites at the project sites. If there are findings during the construction phase, the State Historic Preservation Division, Department of Land and Natural Resources will be advised and all work halted until a determination is received from the DLNR.
6. There are no significant or adverse secondary impacts on population, and future development due to the proposed project. The Kailua Landfill facility will be closed in accordance with appropriate Federal, State, and County requirements.
7. This assessment will be reviewed by government agencies, community groups and private citizens, in accordance with Act 241, HRS. Upon completion of the Preliminary Agency consultation process, the Draft Environmental Assessment will be published in the OEQC Bulletin. At the completion of the 30 day review, the County may file a Notice of Anticipated Negative Declaration with OEQC.

VII. PROJECT FUNDING AND PHASING

Capital costs presented here represent only those costs necessary for the remaining closure elements of the Kailua Landfill. Costs normally incurred as a part of normal landfill operations before landfill closure, i.e. waste placement and placement of intermediate and daily cover are not included in this cost estimate. Closure construction costs are presented in 1992 dollars and should be considered as "pre-design estimates", adequate for estimating budgets for site development and closure. These cost estimates will be refined during final design and preparation for plans and specifications. Estimated costs are approximately \$4,000,000.00 and will be done in three phases of work. Post closure maintenance will be estimated at a later date and will not be included in this document.

VIII.LIST OF PREPARERS

Parametrix, Inc.
Kirkland, Washington - Closure and Post Closure Plan

Parametrix, Inc.
Honolulu, Hawaii - Environmental Assessment

**IX. LIST OF AGENCIES TO BE CONSULTED DURING THE PREPARATION OF
THE ENVIRONMENTAL ASSESSMENT**

ORGANIZATIONS AND AGENCIES

<u>Agency</u>	<u>Date of Consultation</u>	<u>Date Comment Received</u>
<u>State of Hawaii</u>		
Office of State Planning		
Department of Land and Natural Resources		
Historic Preservation Division		
Conservation and Environmental Affairs		
Commission on Water Resource Management		
Land Management Division		
<u>State Department of Health</u>		
Environmental Management Division		
Solid/Hazardous Waste Branch		
<u>State Department of Transportation</u>		
Highways Division		
Hawaii County District Engineer		
<u>County of Hawaii</u>		
Planning Department		05-12-93
Department of Public Works		02-23-93
Jerry Rothstein		08-07-93
Daniel Hathaway		08-10-93
The Exchange Club of Waimea, Hawaii		08-10-93

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII
HILO, HAWAII

FEB 23 1993

PARAMETRIX, INC.

DATE: February 22, 1993

MEMORANDUM

TO : PLANNING DIRECTOR
FROM : GALEN KUBA, Chief Solid Waste Division
SUBJECT: ENVIRONMENTAL ASSESSMENT
KAILUA LANDFILL CLOSURE

Forwarded are 2 sets of draft assessments for your review. Your timely review will be greatly appreciated. Please provide written comments to the Solid Waste Division as soon as possible. If you have any questions please call P. J. Rodriguez of Parametrix, Inc. (our Engineers for the project) at 574-0594.

cc: Parametrix (P.J. Rodriguez)
Parametrix (William Sullivan)

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County of Hawaii
PLANNING DEPARTMENT
21 Airport Street, Room 109 - Hilo, Hawaii 96720-1171
(808) 941-2224 • Fax (808) 941-9413

Virginia Goldstein
Director
Norman Olcott
Deputy Director

May 10, 1993

MEMORANDUM

TO: Chief Engineer
ATTENTION: Larry Cepellas
FROM: Virginia Goldstein
Planning Director
SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT - KAILUA LANDFILL CLOSURE

We have reviewed the Draft Environmental Assessment (EA) for the closure of the Kailua Landfill and have the following comments:

1. The EA should include a section on the purpose of the EA.
2. a) Page 1, Project Description. This section should generally describe the action that will be taken to close the landfill which will also include proposed security chain link fencing and proposed access roads. The proposed easement or acquisition of State Lands should also be included in the discussion.
b) The overflow portion of the Landfill is situated within the State Land Use Urban district.
c) The General Plan Land Use Pattern Allocation Map designates the area as Industrial.
3. Page 2, Item 1. The Kailua Landfill has also been accepting refuse and solid waste materials from the South Kohala area as well as other areas within North Kona.



Department of Public Works

County of Hawaii - 25 Auapua Street, Room 202 - Hilo, Hawaii 96720 - (800) 961-4321 - Fax (800) 969-7138

Stephen K. Yamashiro
Mayor

Donna Fay K. Kiyosaki
City Engineer

Riley W. Smith
Deputy Chief Engineer

RECEIVED
FEB 23 1993

MR F J RODRIGUEZ
PARAMETRIX INC
1164 BISHOP STREET SUITE 1600
HONOLULU HAWAII 96813

PARAMETRIX, INC
HONOLULU, HI

February 22, 1993

SUBJECT: KAIKUA LANDFILL CLOSURE - E.A.

I have reviewed your 2/12/93 draft environmental assessment and have no comments to offer.

Sincerely yours,

GALEN M. KUBA, PE
Chief, DPN Solid Waste Division

Memo to Chief Engineer
Page 2
May 10, 1993

4. Page 4, Item 2. The EA should identify the names of the adjacent landowner/lessees.
5. Page 9, Soils. In reviewing Figure 4, the Kaimu Series (rKED) is situated further mauka of the subject property.
6. The EA should include discussions on historic sites and land use.
7. Page 11. The EA should include discussions on what kinds of mitigative measures will be taken with regard to potential groundwater contamination of the breachish lens.
8. Page 13. Items 7, 8 and 9 should not be included as criteria for an EIS determination. Item 7 could be included in the Purpose section. Items 8 and 9 would be appropriate under the Land Use section.
9. Throughout the EA, the word "Kealakehe" should be corrected to read "Kealahaha".

Thank you for the opportunity to provide comments on the Draft EA for the proposed Kaiiua Landfill closure.

AK:mjs
8974D

cc: Mr. Fred Rodriguez, Parametrix

Daniel P. W. Hathaway
P.O. Box 415, Honaunau, Hawaii, 96726 (808)-328-8043

The Draft Environmental Assessment for Kailua Landfill Closure for the Kealahou dump site prepared for County of Hawaii by Parametrix assures me there are many fires active in the dump. I also realize if that is the case, the plan is an elegant solution; providing for containment, venting, cooling and the eventual smothering.

The "alternative considered" section lacks mention of dismantling the landfill. A few years ago the County of Hawaii approved Boyd Hanson's plan to use the Lundell Materials Recovery System to handle our garbage and boasted that the dump would be hauled away the before our police department was built; so the idea is not new around here.

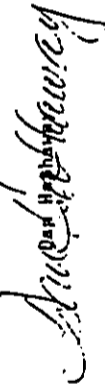
Recently C. Brewer advanced the same Lundell system to the County and presented plans to process the Hilo garbage for an end-product of fuel pellets to be burned by Hilo Coast Processing's boilers when they run out of sugar cane.

The caloric value in Kailua's Kealahou landfill must be substantial; relatively dry and no industry to pollute predominantly post-consumer household waste.. the richest industrial feedstock in the world of tomorrow. I remember that Parametrix was represented by Mr. William F. Sullivan at a recent conference on landfill mining and site reclamation in San Jose, California on 24, 25 & 26 March 1993. I am sure the company is aware of the huge caloric matrix sequestered in landfills. Why not show what you had considered and explain the reasons that covering and capping is the most viable option?

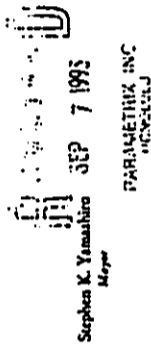
Perhaps there are so many fires that the conflagration cannot be put out. I remember the emissions from the highly controlled burning of rubbish at the H-Power plant required the installation of an exhaust gas scrubber on the smokestack... how can these random wildfires burning the same kind of garbage in the Kealahou dump be said to be safe? Covering the sides draws the smoke into your methane recovery, emissions monitoring, and flare systems. I would be interested in something as simple as a weekly printout of the emissions analysis and in the newspaper.

If the public is somehow allowed to follow the progress and containment of "The Dragons of Kealahou" they would have more patience. Harbor residents, mauka people, downtown... all Kona knows there is a fire there.. we want to know what is going on too. See the communications articles in your recent issues of Waste Age magazine and the ads for trash mining, odor control, composting, and the "its been fun" landfill closure.

Thank you,



SEP 10 1993



SEP 7 1993

Stephen K. Yamashiro
Mayor

PARAMETRIX INC
HONOLULU



County of Hawaii

DEPARTMENT OF PUBLIC WORKS

15 Arapaho Street, Room 201 • HOLA, Hawaii 96720-1111
(808) 944-3111 • Fax (808) 944-3114

Donna Fay Kiyosaki
Chief Engineer
Riley W. Smith
Deputy Chief Engineer

August 26, 1993

MR DANIEL P HATHAWAY
P O BOX 415
HONOLULU HI 96726

SUBJECT: KAILUA LANDFILL CLOSURE DRAFT ENVIRONMENTAL ASSESSMENT

We appreciate your input and expressed concerns and we have responded to your comments.

Capping the landfill is the best option available to the County. Our concept in closing the landfill focuses on eliminating air infiltration and preventing precipitation from mixing with the refuse and forming leachate.

The most effective method of extinguishing a subsurface refuse fire is to eliminate the oxygen so that combustion cannot take place. The final cover will minimize the air infiltration and is expected to extinguish the fires and prevent them from recurring in the future. The potential for future fires will always be present if there is a potential for air infiltration.

The final cover, in combination with the active landfill collection system, is the best alternative for preventing odorous emissions from the landfill. The final cover will act to smother the fire, reducing the emissions, and it will allow the active landfill gas collection system to collect all the gases generated by the landfill and combust them in the flare, thereby destroying the odorous compounds.

Mining of the landfills is not an available alternative at this site. This subject was addressed on July 23, 1993, in a letter report from William Sullivan (Parametrix, Inc.) to Donna Kiyosaki (County of Hawaii, Department of Public Works), see attachment.

The resource value of the recyclable material in the landfill is adversely affected by several factors:

1. The material must be mined, and this compounds the refuse fire issue.
2. The material must be evaluated for contamination.

Ltr. to Daniel P.M. Hathaway
Page 2
August 26, 1993

3. There is not a ready market for recycled metal on the islands, these materials are typically shipped to the mainland, thereby increasing the costs for this alternative.

Assuming (conservatively) that 20% of the refuse mass could be recycled, a rough estimate of the cost for excavating and re-depositing the remaining materials would be \$15 million dollars (see attachment).

You mentioned processing the refuse into fuel pellets. While the refuse may have a high caloric value, the logistics and costs of dismantling the landfill, compounded with opening up the refuse and allowing air infiltration, and the resulting detrimental effect on the fires, eliminates this option from practical consideration.

As indicated in the Draft Environmental Assessment, the State Department of Health and the Federal EPA both determined that concentrations of the air contaminants detected were generally low and not sufficient cause for health concern, and that the smoke and odors did create a nuisance situation. The DOH and EPA reports on the air quality testing are available to the public. Please contact Mr. Gary Siu (State of Hawaii, Department of Health, Solid and Hazardous Waste Branch).

The landfill gas flare will destroy the landfill gas and any trace contaminants. The placement of the final cover is expected to minimize or extinguish the fires. The "smoke" you refer to will be eliminated from venting through the surface by the cover placement, and destroyed by the flare.

The power plant you refer to which incinerates refuse and uses a scrubber to clean the exhaust, is a much different situation. In the case of this landfill, some of the refuse is undergoing combustion and various gasses are released, but the refuse is not being incinerated. The final cover will act to smother the fires and prevent odorous emissions. In response to your request for public availability of emissions data, we will be preparing yearly monitoring reports to the Department of Health. In these reports will be the estimated emission values, landfill temperatures, gas collection rates, changes over time, and recommendations for future alterations in Post Closure Operations and Monitoring. These reports will be available to the general public through the Department of Health.

We hope your questions have been answered.



DONNA FAY Z. KIYOSAKI, P.E.
Chief Engineer

cc: SMD - Larry Capellas
Parametrix - Fred Rodrigues

OK - JTV

THE EXCHANGE CLUB OF WAIMEA, HAWAII

August 6, 1993

Mr. Larry Capellas
Solid Waste Division
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

RE: EAST HAWAII REFUSE TO WEST HAWAII LANDFILL

Dear Mr. Capellas:

The members of the Waimea Exchange Club strongly oppose the transfer of refuse from East Hawaii to the new landfill at Puu Anahulu. This cross-island transport of over half the total refuse is an ill-conceived use of public resources.

We encourage the County to make every effort to earnestly seek a site in any one of the five East Hawaii districts for a new East Hawaii Landfill. Further, timely implementation is needed of an Integrated Solid Waste Management System for the island which includes source separation and recovery of recyclable and compostable material.


We hope that the County will take these positive and responsible actions.


Sincerely,

WAIWEA EXCHANGE CLUB


CHARLES W. PETERSEN
President


FREDERICK HOELLER
Secretary


EVAN KING
President-elect


RICHARD D. EDNIE
TREASURER

c: Mayor Stephen Yamashiro
Ms. Donna Kiyosake - Chief Engineer, Dept. of Public Works
Mr. Rob Rosehill - Chairman, Human Services & Public Works Committee

Stephen K. Tomihata
Mayor
PARAMETRIX, INC.
HONOLULU
7 1993



County of Hawaii
DEPARTMENT OF PUBLIC WORKS
33 Aupuni Street, Room 203 • Hilo, Hawaii 96720-4132
(808) 941-3111 • Fax: (808) 943-1138

August 26, 1993

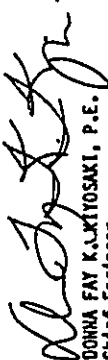
MR. CHARLES W. PETERSEN - PRESIDENT
WAIWEA EXCHANGE CLUB
PAUULUO HI 96778

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED KAILUA LANDFILL

We have received your organization's comments dated August 6, 1993 and we respond as follows:

The County Administration recognizes the Waimea Exchange Club's position on the transfer of refuse from East Hawaii to the new landfill at Puuanahulu. Please be assured that all efforts will be made to finalize the Integrated Solid Waste Management System for Hawaii County so that source separation, resource recovery of recyclable and compostable materials will become a reality.

Your continuing interest is greatly appreciated.


DONNA FAY KIYOSAKI, P.E.
Chief Engineer

cc: SMO - Larry Capellas
Parametrix - Fred Rodrigues

look
ST

Donna Fay K. Kiyosaki
Chief Engineer
Riley W. Smith
Deputy Chief Engineer

August 7, 1993

Mr. F. J. Rodriguez
c/o Parametrix, Inc
1164 Bishop St. Ste 1400
Honolulu Hawaii 96813

Donna Kivosaki
Dept. of Public Works
25 Aupuni Street
Hilo Hawaii 96720

Re: Kailua Landfill Closure draft EA

Dear Mr. Rodriguez & Ms. Kivosaki,

Please address the following concerns:

- 1. It is my understanding that the fires in the Kailua Landfill are unique in regard to the possible involvement with lava tubes that can feed the fire forever and the inability to extinguish it over a long period of time. This means that that you cannot rely on being able to extinguish the fire. This is a very serious concern.
- a. What is Parametrix's experience in putting out fires of this particular kind considering its longevity, resistance to extinguishment, and the unknown factors thereto?
- b. Is there a guarantee that the fire will be extinguished?
- c. How long will it take to determine whether or not the fire has been extinguished?
- d. Considering that the fire is odorless and non-toxic, what will you do in the event you fail to extinguish the fire?

2. Sec. 5 on page 19 regarding "Alternatives Considered" states "There were no viable alternatives to the closure plan since the presence of the subsurface fires coupled with the nearly completed life span of the landfill have made this proposed closure plan mandatory."

a. Hinting the landfill is a viable alternative and HAS NOT BEEN ADDRESSED. This is a crucial omission as numerous companies are engaged in mining landfills which is a permanent solution as opposed to carrying which may be only temporary.

Please provide a comprehensive discussion of this alternative including but not limited to its efficacy, cost, risks & benefits, and long term results in comparison to carrying as planned.

I expect to send your reply to all the companies in the country who engage in landfill mining in order that they may review and respond. Decision makers must have the very best information with which to determine the manner in which the Kailua Landfill as well as the Hilo Landfill will be closed. It is in no one's best interest to engage in a short term, temporary and costly solution if a better way exists.

b. How does "subsurface fires coupled with the nearly completed life span of the landfill" make "this proposed closure plan mandatory?" - The fire has been burning for many years and may continue to burn indefinitely under the proposed closure plan. The fire itself is no reason to limit closure options to "carrying".

- While the life span of the landfill is nearly completed, halting the dumping of trash into the landfill has nothing whatsoever to do with the method of closure. One way or the other dumping at Keelakehe Landfill will cease when the PuuAhahulu Landfill is open, no sooner or later. This is expected by October 1993.

- 3. The resource value of the material in the landfill has not been addressed.
 - a. What is the resource value of the material in the landfill if it were to be mined?
- 4. Water quality monitoring was not addressed in the EA. Only temperature and seepage are to be monitored. Considering the "highly permeable nature of the lava under the site" a well for dye testing underground leakage from the landfill to the ocean, and for base line organic content should be part of this closure plan. Otherwise the county is depriving itself of information necessary to determine the possible long term adverse consequences of the carrying option.
 - a. Will you do initial and ongoing dye testing and organic content testing in order to obtain baseline and periodic comparisons?
- 5. Regarding adjoining property owners on whose land the dump has overflowed.
 - a. What is the updated estimated tonnage of the overflow material?
 - b. What arrangements have been made to deal with this overflow?
- 6. Regarding costs:
 - a. How much will it cost to resolve the overflow problem as per #5 above?
 - b. How much did the "gas collection system and flare system" cost and how much will it cost to maintain the "permanent active gas management system"?
 - c. What is the estimated cost of the "final phase" of the closure as planned?
 - d. What is the breakdown and estimated total cost of this closure plan including costs including the Parametrix contract, various studies, and other present and future contracts involved in the closure?
 - e. What is the cost of post closure maintenance with carrying & monitoring?
- 7. What is the cover vegetation plan?

Stephen K. Yamashiro
Mayor
AUG 11 1993
7 1993



County of Hawaii
DEPARTMENT OF PUBLIC WORKS
35 Airport Blvd., Room 202 - Hahaione, HI 96720-4122
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Donna Fay K. Kiyooki
Chief Engineer
Rory W. Smith
Deputy Chief Engineer

AUG-6-93 FRI 22:52 JERRY ROTHSTEIN 8083297651 P.04

9. Please make available the DCH and EPA report determining the air contaminants from air quality testing in the area of the landfill that has been done to date.

9. Re subterranean studies
a. What engineering studies have been made of the area under and around the landfill in regard to lava tubes and other factors that may affect the outcome of the proposed closure plan?

b. What do these studies indicate?

10. Considering that the landfill was started in an existing channel, what is the water flow from the mauka lands above the landfill which may impact the closure?

11. The description of "Topography" on page 13 is unclear when it says "it is described as a mound over 100 feet high, and slightly sloping to the north." It reads as if it is the mound that is "slightly sloping to the north?" Is that what is intended?

12. Re capping:

a. What is the life of the capping material i.e. how long before it needs replacement?

b. Page 18 says that the geo membrane liner will be "covered by 2 feet of protective cover soil. Has the final choice been made and will it be the thicker liner with less covering of the thinner liner with more covering?

Yours for a better day

Jerry Rothstein, Esq.
75-123 Royal Poinciana Dr.
Kailua-Kona Hawaii Island 96740
329-1568 // 329-7651

MR JERRY ROTHSTEIN CECW
76-123 ROYAL POINCIANA DRIVE
KAILUA KONA HI 96740

SUBJECT: KAILUA LANDFILL CLOSURE DRAFT ENVIRONMENTAL ASSESSMENT

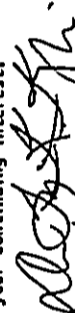
We have received your comments dated August 7, 1993, on the subject E.A. and we respond as follows:

1. a) Landfill fires are not specific to this site and are a problem at numerous sites throughout the Hawaiian Islands. The lava tubes may add to the problem at this site by supplying some additional air to the fires. Please refer to Section 3.4.5.2 (Lava Tube Cutoff) and Appendix B, of the Closure/Post Closure Plan. This section describes a geologic reconnaissance conducted by Pacific Geotechnical Engineers which concluded the lava tubes are not a prime source of air to the landfill.
- b) While there is no guarantee that the fires will be extinguished within a certain time period, this method for refuse fire control has proven successful on several similar projects in Hawaii, namely the Palaili Landfill on Oahu, and the Olowalu and Makani Landfills on Maui. Our concept of closing the landfill focuses on eliminating air infiltration. The potential for future fires will always be present if there is a potential for air infiltration. The final cover will minimize the air infiltration and is expected to extinguish the fires and prevent them from recurring in the future.
- c) We expect the fires will be extinguished within 12 to 18 months after the final cover is in place.
- d) The final cover in combination with the active landfill gas collection system, is the best alternative for preventing odorous emissions from the landfill. The final cover will act to smother the fire, reducing the emissions and it will allow the active landfill gas collection system to collect all the gases generated by the landfill and combust them in the flare thereby destroying the odorous compounds. The most effective method of extinguishing the subsurface refuse fires is to eliminate the oxygen so that combustion cannot take place.

2. a) Mining of the landfill is not a viable alternative. This subject was addressed on July 23, 1993, in a letter report from William Sullivan (Parametrix, Inc.) to Donna Kiyosaki (County of Hawaii, Department of Public Works), see attachment.
- b) Capping the landfill may not be a perfect solution, but it is the best option available to the County. The fires are not expected to burn indefinitely and we do have specific methods described in Section 3.3.2 of the Closure/Post Closure Plan to monitor the effectiveness of the landfill cap in extinguishing the fires.
3. a) The resource value of the recyclable material in the landfill is significantly reduced at this site. In order for a material to be truly recyclable or reusable, a market for the material must be present, and the material must be uncontaminated. There is not a ready market for recycled metal on the islands, these materials are typically shipped to the mainland, making the costs for reclaiming and shipping far greater than the market value of the material itself. Assuming (conservatively) that 20% of the refuse mass could be recycled, a rough estimate of the cost for excavating and re-depositing the remaining material would be \$15 million dollars (refer to the attached letter report).
4. a) One of the primary functions of the cover designed for the landfill is to prevent water from contacting refuse and potentially contaminating surface water and ground water. The alternative process of excavating the refuse over a five to six year period could allow significant amounts of water to contact the refuse. Please refer to Section 6 and Appendix A of the Closure/Post Closure Plan.
The landfill site is located below the designated Underground Injection Control boundary and does not conflict with groundwater control guidelines.
No dye or organic testing will be performed.
5. a) The quantity of the overflow material has not been estimated.
b) Arrangements are being made with the adjacent property owners to address the overflow issue. This is covered in Section 1.4 of the Closure/Post Closure Plan.
6. a) Please refer to Section 9 (Closure Costs) of the Closure/Post Closure Plan.
b) same
c) same
d) same

7. Please refer to Section 5.4.5 (Vegetative Cover) of the Closure/Post Closure Plan.
8. The DOH and EPA reports on the air quality testing are available to the public, please contact Mr. Gary Siu (State of Hawaii, Department of Health, Solid and Hazardous Waste Branch).
9. a) and b) Please refer to Section 3.4.5.2 (Lava Tube Cutoff) of the Closure/Post Closure Plan. This section describes a geological reconnaissance conducted by Pacific Geotechnical Engineers, which concluded the lava tubes are not a prime source of air to the landfill.
10. This issue was addressed in Section 6.5 (Developed Drainage Plan) of the Closure/Post Closure Plan. The runoff from the mauka lands will depend on what type of development takes place on the lands, and will depend on their surface water plans.
11. The sentence you refer to will be changed to indicate that the natural topography, and not the mound of refuse, is gently sloping to the north.
12. a) The post closure plan is based on an estimated ten year period, please refer to Section 9 (Closure Costs). It is expected that the final cover would be maintained and prepared as necessary, during this post closure period. Each year, a report will be submitted to the DOH describing monitoring activities at the site. If monitoring results indicate that the landfill has stabilized (no fires, no gas migration, no significant settlement, etc.) the County will seek the permission of the DOH to cease post-closure monitoring.
b) The geomembrane cover is expected to be 30 mil PVC. A detailed discussion of the materials considered is in Section 5.3 of the Closure/Post Closure Plan.

We trust that we have adequately responded to your concerns. Thank you for your continuing interest.


DONHA FAY K. KIYOSAKI, P.E.
Chief Engineer

cc: SMD - Larry Capellas
Parametrix - Fred Rodrigues

Vol. 35

Parametrix, Inc.

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206-422-8400 • FAX 206-469-4904



Ms. Donna Fay K. Kiyosaki, P.E.
Chief Engineer
County of Hawaii, Department of Public Works
25 Alupuni Street, Room 202
Hilo, Hawaii 96720

July 23, 1993
55-2126-03

Re: Landfill Mining, Kailua Landfill

Dear Ms. Kiyosaki:

In response to our conversations of last week, I have prepared the following description of the logistics, environmental impacts, and other issues associated with "Mining" the Kailua Landfill. The purpose of this letter is to equip the County with the information necessary to logically evaluate the issues associated with landfill mining. To aid in your review of this description, I have organized this letter into the following sections:

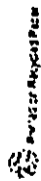
- I. Process Description
- II. Volume of Refuse to be Mined/Timing
- III. Assumptions of Refuse Composition/Potential Markets for Material
- IV. Impact on Landfill Capacity at the New West Hawaii Landfill
- V. Potential for Landfill Fires
- VI. Odor Releases/Evacuation of Nearby Residences and Businesses
- VII. Potential for Surface Water and Groundwater Contamination
- VIII. Costs

I. PROCESS DESCRIPTION

The basic premise for landfill mining or sanitary landfill reclamation is to excavate an old landfill and reclaim the available cover material, then separate and sell/reuse other materials, i.e. ferrous metal, aluminum, etc. The remaining fraction is then replaced in a landfill, or converted to energy¹ (incinerated).

Since the Kailua Landfill is not a Subtitle D compliant landfill, all excavated refuse and cover materials (whether recycled, re-used, or landfilled) would be shipped off-site. Subtitle

¹ Taken from the introduction of "Landfill Mining - The Future in Solid Waste Management", prepared by Cross/Tessitore & Associates, Orlando Florida for the Randolph, Breyer & Associates Sanitary Landfill Mining Conference, San Jose California, March 24, 1993.



Ms. Donna Fay K. Kiyosaki, P.E.
Chief Engineer
County of Hawaii, Department of Public Works
July 23, 1993
Page 2

D regulations would not permit re-depositing of refuse that could not be recycled or re-used into the Kailua Landfill. These materials would need to be replaced in another landfill, most likely the new West Hawaii Landfill currently under construction.

II. VOLUME OF REFUSE TO BE MINED/TIMING

There are approximately 1.1 million cubic yards of material (refuse and cover soils) in place at the Kailua Landfill. As described in Section I above, this entire mass of material would be removed from the Kailua site and transported to another off-site facility for sorting. The following calculations describe the impacts of this effort:

- 1. 1.1 million cubic yards of material x 18 cubic yards³ per ten-ton truck = 61,000 trucks of material to be hauled.
- 2. 4 trucks/hour x 10 hours/day x 6 days/week x 52 weeks/year x 61,000 trucks = 4.8 years.

It is important to note that calculation #2, above represents an extremely aggressive schedule. In all likelihood, this process could easily extend over five or six years. This means that for between four and six years, Highway 19 will be filled with four trucks per hour, ten hours per day. And these trucks would be filled with rotting garbage. It is critical that this impact be evaluated considering the nature of the economy on the Kona Coast of the Big Island being primarily related to the tourist trade.

¹ incorporates expansion factor of refuse as it is removed from the landfill.



Ms. Donna Fay K. Kiyosaki, P.E.
 Chief Engineer
 County of Hawaii, Department of Public Works
 July 23, 1993
 Page 3

III. ASSUMPTIONS OF REFUSE COMPOSITION/POTENTIAL MARKETS FOR MATERIAL

The following is a general break-down of refuse composition, typical for a US landfill:

ITEM	COMPOSITION (%)
Rock, inorganic material	30.8
Plastics	12.9
Paper	10.4
Organics	8.6
Iron	8.4
Aluminum	5.1
Glass	5.0
Ferrous Metals	1.6
Other (wood/green-waste)	17.2

It is important to qualify the above table with the understanding that cover soils were not placed regularly during the history of the Kailua Landfill, and rarely have been replaced with a thin plastic sheeting for daily cover. Therefore, the percentage of inorganic material at Kailua is probably considerably less than that described in the table above.

Of those elements described above, all but the Organics and Ferrous Metals are theoretically recyclable or re-usable. However, for a material to be truly recyclable or re-usable, a market for the material must be present, and the material must be uncontaminated.

As demonstrated by the "Car-Crushing" contract at both the Hilo and Kailua Landfills, there is not a ready market for recycled metal on the islands. These materials are typically shipped to the mainland, making the costs for reclaiming and shipping greater than the market value of the material itself. It is anticipated that any other metals recycling would be similarly non cost-effective.

* USA Today, Article printed 4/24/92.



Ms. Donna Fay K. Kiyosaki, P.E.
 Chief Engineer
 County of Hawaii, Department of Public Works
 July 23, 1993
 Page 4

Green-waste compost and soils can be mixed to create a top-soil, however, green-waste that has been placed in a landfill typically has a strong odor that does not dissipate over time. This makes compost from landfills undesirable for use near residences, golf courses, or other public places.

Paper, glass and plastic goods probably could be recycled, however the methods for extracting this portion of the refuse mass is quite labor intensive and expensive.

IV. IMPACT ON LANDFILL CAPACITY AT THE NEW WEST HAWAII LANDFILL

Assuming that an extremely large portion of the refuse mass at the Kailua Landfill could not be recycled or re-used, as described in Section III above, it is likely that the mass would then be deposited in the new West Hawaii Landfill. Even if we conservatively estimate that 20% of the refuse mass could be recycled/re-used, 880,000 cubic yards of additional material would then be deposited at the new landfill. This would shorten the life of the new facility by approximately 10 years*.

V. POTENTIAL FOR LANDFILL FIRES

The Kailua Landfill is currently experiencing several subsurface landfill fires. These fires are caused by un-controlled air infiltration into the refuse, causing an exothermic reaction which ignites the dry refuse. For this reason, our concept for closing the landfill focuses on eliminating air infiltration. Because the Kailua Landfill is located in a very warm and dry climate, there is very little moisture within the landfill to suppress fires. Therefore, even after the current fires are extinguished as part of the closure activities underway, the potential for future fires will always exist if there is a potential for air infiltration.

If the landfill were to be excavated, there would be no way to control the air infiltration into the refuse. Therefore, the occurrence of surface and sub-surface refuse fires would most likely be quite frequent. This would present an extreme hazard to the workers at the site, as well as nearby residences, businesses, and traffic along Highway 19.

* Assuming a current waste stream of 100 tons/day on the Kona side of the island.



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VI. ODOR RELEASES/EVACUATION OF NEARBY RESIDENCES AND BUSINESSES

As demonstrated during the installation of the horizontal gas collection trenches during the fall of 1992, excavation of rotting garbage is an extremely odorous task. There truly are no engineering controls that would adequately control the odors created during a massive excavation. Therefore, the adjacent police station would likely need to be evacuated during the four to six years excavation period. Also, the proposed housing and golf course north of the landfill would need to be delayed until this excavation process is completed.

Also, during some atmospheric conditions, it may be necessary to evacuate the existing school and housing east of the site.

VII. POTENTIAL FOR SURFACE WATER AND GROUNDWATER CONTAMINATION

One of the primary functions of the cover designed for the landfill is to eliminate water from contacting refuse and potentially contaminating surface water and ground water. The process of excavating the refuse over a four to six year period could allow significant amounts of water to contact the refuse.

VIII. COSTS

During a recent construction project on Maui, a Contractor bid \$16.00/cubic yard to excavate refuse at one location on a landfill and re-deposit it in another place on the same landfill. Since the refuse at the Kailua Landfill would need to be deposited at the new landfill, this cost would likely increase significantly. Also, a fee would likely be paid to the private landfilling firm that will operate the new landfill for placing the refuse. Based on these assumptions, it is anticipated that the cost for excavating and re-depositing the Kailua Landfill material into the new landfill would be between \$17/ and \$18/cubic yard. Assuming (conservatively) that 20% of the refuse mass at Kailua could be recycled at a break-even cost, the remaining cost to the County would be between \$14,960,000 and \$15,840,000. It is important to note that these figures are extremely rough and do not consider the cost of "air space" at the new landfill (\$15/ - \$25/cubic yard). They are provided here only to provide the County with a general understanding of the potential costs involved.



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CONCLUSIONS

Based on the information provided above, it appears that "Landfill Mining" is not an appropriate means of dealing with the Kailua Landfill given the location of the site, the uncertainty of the materials placed within the landfill, and the lack of ready markets for any material excavated from the site. In fact, the process of mining the landfill would most likely have serious detrimental effects on the environment of the Kona Coast of the Big Island, as well as the health of the residents and visitors to the area.

I hope this information is helpful to the County in future discussions on this issue. If I can be of further help, or provide additional information, please do not hesitate to call. Also, if the County feels that meetings with proponents of this technology would be helpful in resolving this matter, I would be happy to participate in those meetings.

Sincerely,

PARAMETRIX, INC.


 William F. Sullivan
 Kailua Landfill Closure Project Manager

cc: Larry Capellas (County of Hawaii, Solid Waste Division Chief)
 Fred Rodriguez (Parametrix, Inc.)
 Gene Fox (Parametrix, Inc.)

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Chief Engineer
County of Hawaii, Department of Public Works
25 Aupuni Street, Room 202
Hilo, Hawaii 96720

August 25, 1993
82-2126-02(01)

Re: Kailua Landfill Closure, Phase I and Phase II Construction

Dear Ms. Kiyosaki:

In response to your message to me on August 23, the following is a discussion regarding the performance of the odor control system installed as part of Phase I construction, and how that performance will effect Phase II construction.

The odor control system was installed in the fall of 1992 primarily to construct gas collection trenches in lower lifts of refuse than would be possible if the entire gas collection system were installed after landfill closure. Due to complaints from employees at the Police Station, we attempted to operate the gas collection system prior to capping the landfill. Because of the extremely low methane concentrations (between 5% and 19% by volume) we were not able to maintain a continuous flame for more than a few hours in the flare at any given time. Therefore, the decision was made to shut the system down and re-start it once the final cover is in-place. It is important to note at this point that a vacuum is established in the landfill when the blowers are operating. The fact that we are able to establish vacuum in the trench system indicates that the integrity of the system has been maintained. The system is not shut down because the trenching system is compromised, it is only shut down due to low methane concentrations.

To understand varying levels of methane concentrations within landfills, it is important to understand the dynamics occurring within the landfill as the refuse undergoes decomposition. Organic material (in this case, refuse) decomposes by two different means, depending on the environment surrounding the material. *Aerobic* decomposition occurs in the presence of air (Oxygen and Nitrogen). In the aerobic decomposition process, the aerobic bacteria uses organic material and oxygen to survive. The by-products of this chemical reaction are carbon dioxide and water. This is an exothermic reaction. During aerobic decomposition, temperatures within the organic material can attain levels that can cause the refuse to spontaneously combust.

Aerobic decomposition is likely the cause of the subsurface fires within the Kailua Landfill. Due to the poor compaction of the refuse over the history of the landfilling operations, combined with the extremely porous cover material used, air has been allowed to flow freely through the refuse over time. This, in combination with the extremely dry climate and warm temperatures on the Kona Coast, make the refuse highly susceptible to subsurface fires.



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Anaerobic decomposition occurs in the absence of air. Anaerobic bacteria consumes organic material and water to survive. The by-products of this chemical reaction are methane and carbon dioxide. This is also a slightly exothermic reaction, however this reaction typically does not create temperatures capable of causing spontaneous combustion of the refuse.

As you can see from the descriptions of the two types of decomposition which occur within landfills, if a landfill is experiencing significant aerobic decomposition (as is the case with the Kailua Landfill), the decomposing material may not produce enough methane to support combustion. Unfortunately, the levels of aerobic versus anaerobic decomposition occurring within the landfill were impossible to determine without actually attempting to operate the gas collection system. However, as stated above, it was still necessary to install the Phase I gas collection trenches at the elevation they were installed to be able to collect gas from the mid-levels of the landfill as part of post-closure operations.

When we ceased operation of the gas collection system in February of this year, our technicians worked with your landfill operations crews to move the gas collection headers away from future landfill operations areas. Unfortunately, since that time, some of the gas collection header piping has been damaged by on-going landfilling operations. It is important to note, however that the gas collection trenches are still functional, and will be re-connected to the gas collection system by the Phase II Contractor. The design of the gas collection trenches actually allows for portions of the trench's perforated pipe to be damaged by heat and still function. The gas collection trench consists of a three-foot square trench, filled with gravel, and surrounded by a filter fabric. Within this gravel trench is a perforated HDPE pipe. If a portion of the HDPE pipe were to become damaged by heat or mechanical damage, gas will still flow through the highly permeable gravel to the trench ends where it is collected in the gas collection manifold piping. Part of the Phase II Contractor's responsibility is to verify the integrity of the trench-ends prior to connecting them to the gas collection piping. If the trench ends have been damaged by heat or landfilling operations, they will be repaired by the Phase II Contractor.

The intent of the Phase II construction is to seal off the side slopes from air infiltration. Our geotechnical investigations at the site, during the preparation of the Closure Plan, indicated that the primary source of air infiltration to the refuse is through the unconsolidated side slopes. By sealing these side slopes off, air will be eliminated from the refuse, thereby shutting off the oxygen supply, and "smothering" the subsurface fires. Between Phase II and Phase III, the top of the landfill will remain un-capped to allow residual heat from the landfill fires to vent from the top, thereby helping to reduce the potential for future subsurface "flare-ups". Another

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benefit of sealing off the landfill side slopes will be that the dynamics within the landfill will quickly turn from primarily aerobic decomposition to a more anaerobic environment. As this phenomenon occurs, methane concentrations in the landfill gas will increase, thereby allowing us to re-ignite the flare and continuously operate the gas collection system.

Our geotechnical investigations further indicated that air infiltration from lava tubes in the area likely provide only a minimal impact to air supply to the subsurface fires. However, a contingency plan is incorporated into the closure plan for the landfill should air infiltration through lava tubes continue to provide sufficient oxygen to support combustion in certain areas of the landfill:

1. As stated in the Closure Plan, temperatures will be closely monitored after closure of the landfill side slopes to verify that temperatures are being reduced as the landfill's oxygen supply is eliminated. This will be accomplished through a series of temperature probes, installed in the final cover system, that will be monitored periodically after the Phase II construction.
2. If temperature monitoring indicates that there are areas which are not cooling off as rapidly as others, a barrier trench, filled with low-permeable grout will be installed in native soil adjacent to the elevated temperatures, to effectively block the lava tubes in the area. This will be accomplished as part of the Phase III contract.
3. During the Phase III contract, the top of the landfill will be capped, thereby eliminating any pathway for air to escape. In this way, if a "chimney effect" between the lava tubes and the top of the landfill does exist, the top of the chimney will be blocked, thereby eliminating this effect.

As you can see from the descriptions provided above, the closure of the Kailua Landfill continues to proceed essentially as originally planned. I would have preferred that there be sufficient methane in the landfill at this time to support combustion within the flare prior to closure of the landfill's side slopes. However, as described above, the fact that there is not enough methane to continuously support combustion is not surprising.

It is also important to note that, while the Kailua Landfill has received substantial press over the years, it is not unique in the Hawaiian Islands with respect to its subsurface fire problems. Subsurface refuse fires are unfortunately common in the islands due primarily to the available

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materials for daily and intermediate cover being highly permeable, and the relatively low moisture and high temperatures within the refuse.

Parametrix has been extremely successful in combating subsurface landfill fires over the years both in Hawaii and the mainland. The Palalalai Landfill on Oahu, as well as the Olowalu and Makani Landfills on Maui all presented Parametrix with very similar circumstances and problems as that presented at the Kailua Landfill. All were experiencing significant subsurface landfill fires, all were in extremely arid areas, and air was being fed to the refuse at each site through unconsolidated side slopes and near surface cracks and fissures in surrounding soils. In each instance, we have been able to engineer proper methods to smother the fires, and have been successful at each site in extinguishing the fires.

I hope the information contained herein is helpful to your understanding of the methods and systems in-place, as well as planned, for closure of the Kailua Landfill. It is important that this work begin as soon as possible to allow a proper "window" between Phase II and Phase III to allow the heat within the landfill to dissipate prior to capping the top. If I can provide additional information, or clarification of points presented in this letter, please do not hesitate to call.

Sincerely,

PARAMETRIX, INC.


William F. Sullivan
Project Manager

cc: Larry Capellas (County of Hawaii)
Gene Fox (Parametrix, Inc.)
Fred Rodriguez (Parametrix, Inc.)