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Environmental Impact Statement

HPOWER

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 ● (808) 523-4411

FRANK F. FASI
MAYOR

TYRONE T. KUSAO
DIRECTOR

79/EC-9(SM)

December 4, 1980

Mr. Donald Bremner, Chairman
Environmental Quality Commission
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Bremner:

Revised Environmental Impact Statement
Honolulu Program of Waste Energy Recovery (HPOWER)
City and County of Honolulu - Department of Public Works

In accordance with Section 1:72 of the EIS Regulations implementing Chapter 343, HRS, we are notifying you of our acceptance of the above as an adequate fulfillment of the provisions of the Chapter. The two main unresolved issues are (1) the ultimate location of the HPOWER facility and (2) its final design. We are transmitting a copy of this letter to the applicant.

Should you have any questions regarding this matter, please contact Mr. Sampson Mar of our staff at 523-4077.

Very truly yours,

Donald A. Clegg
for TYRONE T. KUSAO
Director of Land Utilization

TTK:sl

12/8/80

DEPARTMENT OF LAND UTILIZATION
79/EC-9(SM)

December 4, 1980

ACCEPTANCE REPORT: ENVIRONMENTAL IMPACT STATEMENT (EIS)
HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)
CITY & COUNTY OF HONOLULU - DEPARTMENT OF PUBLIC WORKS (DPW)

A. Background

The EIS was prepared for the City and County of Honolulu Department of Public Works by Belt, Collins and Associates, Inc. This document describes the anticipated environmental effects of the development of the HPOWER project, including the construction, operation, and maintenance of a resource recovery facility that would accept solid waste generated by residents, commerce, and industry on the Island of Oahu, and recover energy and other marketable products from it, thereby reducing landfill requirements and reusing materials currently being wasted.

The proposed project would entail the commitment of City and County, private, or a combination of such funds for its design, construction, shakedown, and operation. Additionally, this project is considered to be a major public works project, therefore the City and County DPW determined that an EIS was required, under the provisions of Chapter 343, HRS. The accepting authority for this document is the City and County Department of Land Utilization.

B. Procedures

1. An EIS Preparation Notice for this project appeared in the "EQC (Environmental Quality Commission) Bulletin" of May 8, 1979. This was distributed to all interested Federal, State, and City and County agencies, as well as public officials, community organizations, and private citizens.

2. Comments from consulted parties were received until July 24, 1979, allowing all parties more than the 30-day minimum consultation required by Section 1:41(b) of the EIS Regulations. Forty-six (46) parties submitted written comments during this period, which were responded to in writing.

3. The draft EIS was received by the EQC on May 5, 1980. Notice of its availability appeared in the "EQC Bulletin" of May 8, 1980. The deadline for the public review period was then set for October 16, 1980. A list of reviewers is attached.

4. The DPW made a point-by-point response to all comments received, within the 14-day response period.

C. Content

The revised EIS meets all of the basic content and style requirements specified in Sections 1:42 and 1:43 of the EIS Regulations.

D. Response

The DPW made adequate point-by-point responses to all comments, and included them in the Revised EIS.

E. Determination

The Revised EIS is determined to be acceptable under the criteria for acceptance established in Section 1:71 of the EIS Regulations. However, there are two major unresolved issues, i.e., (1) the ultimate location of the HPOWER facility and (2) its final design. The environmental impacts of the various alternatives have been adequately addressed in this document.

This determination in no way implies a favorable recommendation on the DPW's request for any subsequent permits required by this department for this project, where applicable.

for APPROVED Donald A. Clegg
TYRONE T. KUSAO
Director of Land Utilization

TTK:sl

Letters commenting on the environmental impact statement were received from the agencies, organizations, and individuals listed below. (Page numbers referenced to Revised EIS)

Continued

Representatives

Public Utilities

Public Interest Groups

ENVIRONMENTAL IMPACT STATEMENT
for the proposed

HONOLULU PROGRAM OF WASTE ENERGY RECOVERY

submitted by: City and County of Honolulu
Department of Public Works

prepared by: Belt, Collins & Associates
Honolulu, Hawaii

accepting authority: Mayor, City & County of Honolulu

responsible official: Wallace Miyahira
Wallace Miyahira
Director and Chief Engineer

date: Oct. 16, 1980

This environmental document is submitted
pursuant to Chapter 343, HRS.
Its preparation was financed, in part,
by the U.S. Department of Energy and
the State of Hawaii Office of Environmental Quality Control.

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TABLE OF CONTENTS

Chapter		Page

Chapter		Page

LIST OF FIGURES

Figure		Page
IV-9	Relationship of the Proposed Waipio Peninsula HPOWER Site to Surrounding Uses	IV-107
IV-10	Artist's Rendering of the Proposed UOP HPOWER Facility in Campbell Industrial Park	IV-110
IV-11	Cultural Resources Located within the Proposed Malakole Road HPOWER Site	IV-112
VI-1	Possible Resource Recovery Facility Locations Examined in the MITRE Corporation Study	VI-14

LIST OF TABLES

CHAPTER I.
SUMMARY

The Department of Public Works, City and County of Honolulu, is proposing the development of a resource recovery facility as a part of its overall solid waste disposal program. The HPOWER (Honolulu Program Of Waste Energy Recovery) project, as it has been named, involves the construction, operation, and maintenance of a facility that would accept solid waste generated by residents, commerce, and industry on the island of Oahu and recover energy and other marketable products from it. Residue and ash from the HPOWER facility, together with other materials not suitable for processing, would continue to be landfilled, but total landfill requirements would be drastically cut. Revenues from sale of the recovered products, especially energy (in the form of steam or electricity) and metals (ferrous, aluminum, etc.) would be used to lower overall solid waste disposal costs. HPOWER is believed to be the lowest-cost solid waste disposal alternative available to the City over the long term. It also provides a desirable re-use of materials now being wasted.

It is the City's intent to procure HPOWER via a full-service contract that entrusts a single contractor with full responsibility for the design, construction, shakedown, operation, and maintenance of the facility for a period of 20 years. Because of the complex issues that must be dealt with in the contract, a multiple-step, competitive bid procurement procedure is being used. The steps in the procurement are:

- A Request for Proposals (RFP) is issued by the City soliciting submittals from private industry.
- Step IA - evaluation of the qualifications and capabilities of interested contractors and selection of offerors qualified to submit technical proposals.
- Step IB - technical proposals are submitted by prospective bidders and reviewed by the City to insure compliance with established criteria concerning technical system design, system management, and environmental impacts. Offerors whose technical proposals are found acceptable are invited to submit price bids.
- Step II - Qualified offerors prepare and submit detailed price bids and City selects a contractor.

The winning contractor will be the one whose price bid represents the lowest net present value cost to the City for the 20-year contract period.

In the procurement process that is being used, the City establishes (in the RFP) the basic performance criteria that must be met by the facility. This includes such things as the volume of refuse that must be handled, the minimum energy-recovery efficiency that must be achieved, and the environmental standards that must be achieved. The individual bidders are responsible for developing proposals that are responsive to these requirements and have the lowest possible cost consistent with them. This procurement approach allowed the different design teams considerable latitude in developing their proposals, including the selection of a site for the facility.

As this report is written two bidders are still competing for the project. They are UOP, Inc. and a consortium made up of Amfac and Combustion Engineering, Inc. Four possible sites are under consideration; two of them are situated within the Campbell Industrial Park, one is adjacent to the Oahu Sugar Company's Waipahu Sugar Mill, and one is adjacent to the City's Waipahu Incinerator.

Both of the proposals still being considered would burn refuse in a waterwall boiler to generate steam. The steam would then be sold to an industrial user or used to generate electricity which would be sold to the Hawaiian Electric Company. There are differences in the methods of waterwall incineration among the proposals. The UOP system involves burning the municipal refuse as received, i.e., without pre-treatment, while Amfac/C-E would convert the refuse into a "refuse derived fuel" (RDF) before burning it. The two approaches are referred to as "mass-burning" and "RDF" systems, respectively.

In UOP's mass-burning method, raw municipal refuse is dumped into a large concrete receiving pit where it is stored until fed into the boiler. The boiler itself is of waterwall design and employs a patented reciprocating stoker grate. The refuse burns slowly on the grate, and spent material is dropped into a water-filled quench pit. Following quenching, the ash is passed through a series of processes that extract ferrous metal, aluminum, heavy non-ferrous metal, and other reusable components of the waste stream. The remainder is landfilled. Heat from combustion is used to generate steam which can be sold or used to generate electricity for sale to the Hawaiian Electric Company.

Amfac/C-E's RDF system differs from the mass-burning approach only in that the raw refuse is first passed through a series of shredders, classifiers, magnets, and other sorting devices that remove non-combustibles and marketable materials before it is fed to the boilers. The combustible product of this process is referred to as refuse derived fuel. It tends to burn more evenly than raw municipal refuse and requires a somewhat different configuration for the boiler and stoker. Otherwise, the energy recovery portion of the system is the same as that already described.

Two different sizes for the HPOWER facility have been proposed by each bidder, 1,200 tons per day (TPD) and 1,800 tons per day (six days per week, 50 weeks per year). This is equivalent to 360,000 and 540,000 tons per year, respectively. An 1,800-TPD facility could handle all of the combustible refuse now generated on Oahu. The 1,200-TPD alternative would be selected if HPOWER is to be used in conjunction with the existing Waipahu Incinerator, which the City is considering retrofitting with a waste heat recovery system.

Implementation of the HPOWER project would be consistent with State and County policy plans, especially those relating to energy self-sufficiency. (An 1,800-TPD facility could produce about five percent of Oahu's electricity.) Generally, the project would be consistent with specific land use controls, although a special permit would be required if the facility were to be built on the Waipio Peninsula or Malakole Road sites.

Analyses conducted for this study indicate that implementation of any of the proposals would not result in major adverse impacts so long as the mitigation measures that bidders have committed themselves to are actually used. Minor adverse effects, such as moderate increases in vehicular traffic, noise levels, air pollutant concentrations, and surface runoff are expected; they are already summarized in Chapter V of this report and will not be repeated here.

A comparison of the technologies incorporated in the two HPOWER proposals with other feasible alternative solid waste disposal methods is presented in Chapter VI of this report. These alternatives include sanitary landfilling and landfilling combined with baling, shredding, incineration, composting, or pyrolysis. Only composting offered any benefits not available from HPOWER, i.e., increased recycling of organic material, but it does not provide an energy product. Overall, none of the alternatives had fewer adverse impacts than HPOWER, and all promised to be significantly more costly.

CHAPTER II
DESCRIPTION OF THE PROPOSED PROJECT

BACKGROUND

The problem of disposing of the continually increasing volume of solid waste being generated by Oahu's residents and industries, and the need for comprehensive, long-range solid waste management planning have long been recognized by government officials. Over the past ten years, numerous studies and actions aimed at developing adequate means of handling the island's projected solid waste load have been undertaken. The most important of these are summarized in Table II-1.

The key document in this series was the 1977 study prepared by the MITRE Corporation for the City and County of Honolulu (under a consultant contract funded by the State Office of Environmental Quality Control) entitled Analysis of the Feasibility of Resource Recovery for Honolulu. The purpose of the MITRE study was two-fold. First, it examined the general applicability of alternative resource recovery technologies to the various energy markets which could be identified on Oahu. Second, it analyzed the revenues that might be obtained from the sale of recovered energy and materials, and the effect that this would have on the net cost of disposing of solid waste through a resource recovery facility. Based on their analysis, the consultants concluded that:

> . . . the recovered energy and materials market situation and other important conditions on Oahu indicate that the cost of resource recovery for Honolulu can be [emphasis added] reasonable in comparison with other disposal alternatives . . . [MITRE Corporation, 1977: iii.]

At the same time, it observed that the final economic result for Honolulu would depend upon many factors, including the technology that is selected, the design volume and throughput that are chosen, the value of the energy product (which, in turn, is determined by the cost of alternative energy sources), system availability requirements, and costs or operational constraints imposed by the need to maintain environmental quality. The study also noted that the only means of validating this economic conclusion would be to obtain technical and cost proposals from potential contractors for the proposed system. The MITRE report therefore recommended that the City solicit proposals from private industry for the construction and operation of a resource recovery facility.

Based on the above and on a review of the solid waste disposal options that were available, the City decided to pursue the resource recovery concept outlined in the MITRE report. Consequently, in July 1978 a Request for Proposals (RFP) was published for what is referred to as HPOWER -- the Honolulu Program Of Waste Energy Recovery. The purpose of the RFP is to procure a 20-year full-service contract for a resource recovery facility. A "full-service" contract differs from more traditional approaches in that the responsibility for development and operation of a facility is not divided. In the conventional approach to procuring public works, the City hires a professional engineering consultant to prepare plans for the facility, contracts

Table II-1. Chronology of Events in Solid Waste Management Planning on Oahu Leading to the Present Stage of the HPOWER Proposal

Date	Event
July 1971	Solid Waste Management Plan for City and County of Honolulu - Supplement to Hawaii State Solid Waste Management Plan, Metcalf and Eddy, Inc.
December 1972	Publication of the Hawaii State Plan for Solid Waste Recycling by the State Office of Environmental Quality Control.
February 1975	Feasibility of Power Generation from Solid Wastes on Oahu, a joint study for the City and County of Honolulu, Amfac, Inc., and the Hawaiian Electric Company, is completed by Sunn, Low, Tom and Hara, Inc., and Metcalf and Eddy, Inc.
February 1976	Report of the Solid Waste Energy and Resource Task Force, prepared in response to the Eighth State Legislature's House Concurrent Resolution 49 is submitted to the Legislature of the State of Hawaii by the Hawaii Office of Environmental Quality Control.
August 1976	The City and County of Honolulu Department of Public Works, with financial assistance from the State Office of Environmental Quality Control, retains the MITRE Corporation to determine the technical feasibility and economic viability of implementing resource recovery on Oahu. White, Weld and Co., Inc. is retained as financial consultant.
April 1977	Analysis of the Feasibility of Resource Recovery for Honolulu recommending that the City and County issue a request for proposals for a resource recovery facility is completed by the MITRE Corporation.
July 1978	City and County of Honolulu issues Request for Proposals for the Engineering, Design, Construction, Shakedown, and Operation of a Solid Waste Processing and Resource Recovery Facility soliciting contractors' proposals for the HPOWER project.
September 1978	Interested contractors submit proposals demonstrating adequacy of the organization and the proposed technological process (Step IA).
April 1979	EIS Preparation Notice for the HPOWER project published in the State Environmental Quality Commission EIS Bulletin.
August 1979	Five qualified offerors submit technical proposals and City begins review for compliance with the RFP's requirements concerning technical system design, system management, and environmental impacts (Step IB).
January 1980	City qualifies three offerors for submission of price bids (Step II).

with a private firm for its construction, employs another consultant to oversee the construction and shakedown of the facility, and, finally, awards a separate contract for its operation and maintenance or operates and maintains the facility with City forces. In the "full-service" approach, a single systems contractor has full responsibility for design, construction, shakedown, and operation. In short, a full-service contract for HPOWER provides the City with a solid waste disposal service rather than just a plant.

A multiple-step procurement procedure is being used rather than the more conventional "formal advertising" approach because of the complexity of developing a full-service contract for a resource recovery facility. The multiple-step method is frequently used by the Federal Government in "high-technology" areas. The steps in the procurement process are:

- Step 1A - The overall qualifications of the interested contractors and their technological, financial, and environmental capabilities are evaluated.

- Step 1B - Technical proposals submitted by interested contractors who have passed the Step 1A screening are reviewed for compliance with the City's requirements concerning technical system design, system management, and environmental impacts.

- Step II - Offerors whose technical proposals are found acceptable as a result of the Step IB review prepare detailed price proposals and submit formal price bids.

The basis for selection of a contractor from among those submitting price bids is to be the lowest net present value cost of solid waste disposal to the City and County for the contract period of 20 years. [Note: in this report we will refer to the organizations seeking the HPOWER contract as "bidders" or "offerors" as a means of emphasizing the fact that a contractor has not yet been selected.] At present, Steps IA and IB have been completed. The submission of price bids is scheduled for mid-summer, with the official selection of a contractor to follow shortly thereafter. The City and County is reserving the right to reject all proposals if none meets the requirements of the HPOWER Request for Proposals. One of the most important requirements expressed in the Request for Proposals concerns the "tipping fee" that users of the facility would be charged. This tipping fee represents the cost of solid waste disposal via resource recovery. The requirement is that HPOWER be economically superior to other available solid waste disposal alternatives. Should price bids submitted by the firms competing for the HPOWER contract appear to be excessive, the City has the right to reject all proposals and to pursue other courses of action.

In the multiple-step procurement procedure, the City specifies only the performance parameters that must be met by the facility. With minor exceptions, the City has not limited the methods that could be used to meet the performance standards. Hence, individual bidders have been encouraged to design operating systems that they believe are optimal. This design freedom extends to the selection of sites for the facility, to the choice of different scales of operation (600, 1,200, and 1,800 TPD), and to the choice of markets for HPOWER's products. It is believed that this flexible approach will allow the City to best utilize the technical expertise and entrepreneurial skill that is available from private industry. Moreover, the fact that the designers of the system are responsible for its long-term operation insures that they are concerned with the life-cycle costs of the project, not simply with achieving the lowest construction bid.

As indicated in Table II-1, five organizations submitted Step IB technical proposals for the HPOWER project. One of these withdrew from the competition shortly thereafter. Of the four who remained, only three were able to qualify their technical proposals. One of these informed the City that it would not continue to participate in the project if the City insisted on procurement of HPOWER via a full-service contract. It also asked that its proposal not be discussed in this EIS if the company's decision on this matter would make it ineligible for the HPOWER contract. Since the City's decision to proceed with full-service procurement remains unchanged, information about that offeror's facility is not included in this document.

In order to insure that all significant environmental concerns be addressed before the City and County commits itself to a particular HPOWER proposal, this EIS assesses the environmental impact of both of the technical proposals that are still under consideration. In so doing, the EIS deals with alternatives of scale and location that are relevant to discussions of certain environmental impacts. Both of the remaining bidders have submitted proposals for two different scales -- 1,200 tons of refuse per day and 1,800 tons of refuse per day. [Note: the 1,800-ton scale can process almost all the solid waste generated on Oahu. The City and County Department of Public Works is currently examining the feasibility of retrofitting the existing Waipahu Incinerator for energy recovery, hence, the 1,200-ton scale represents the amount of refuse that would be available for the HPOWER facility if the 600-TPD capacity Waipahu incinerator were to continue to be utilized.] The locational factor is complicated in that four sites are under consideration. This situation is discussed in more detail in the section of this chapter entitled "Location of the Proposed Project."

PROJECT DESCRIPTION

The basic HPOWER concept involves the construction, operation, and maintenance of a facility that would accept solid waste generated by residents, commerce, and industry on the island of Oahu and recover marketable energy and other products from it. While residue and ash from HPOWER, together with demolition wastes and other material not accepted for processing at it, would still need to be landfilled, the total volume requiring landfill would be greatly reduced. Revenues from the recovered energy and materials could be used to lower overall solid waste disposal costs, especially over the long term. The system would also provide for a desirable re-use of metals and other materials in the waste stream that would otherwise be lost.

General Requirements

The specific details of the proposals that are still under consideration are discussed in the sub-sections that follow. However, before addressing these it is helpful to review the major requirements stated in the Request For

Proposals (RFP). These requirements were applicable to all proposals and are designed to insure that the facility that is procured is able to meet the City's needs. As such, they provide valuable insights into the design objectives within which the bidders' technical proposals evolved. The most important items stipulated are summarized below:

- The system must have the ability to handle one or more of three volumes of waste -- 600 tons per day, 1,200 tons per day, and 1,800 tons per day. To place this in perspective, it may help to note that the largest would handle essentially all of the waste now generated on Oahu. The purpose of requesting proposals for three sizes was to explore potential economies of scale in light of the possible continued use of the existing 600-TPD capacity Waipahu Incinerator with and without retrofitting the incinerator for energy recovery.

- The facility is to be constructed at a site in Campbell Industrial Park or on the Waipio Peninsula that is identified and acquired by the City, or at some alternative site identified by the bidder. If a site identified by the City is selected, the City will be responsible for acquisition. If any other site is chosen by the bidder, the City will acquire it at fair market value.

- The bidder must employ a proven resource recovery process which does one of the following: utilizes solid waste as fuel to raise steam for use as-is or to generate electric power; converts solid waste to fuel gas suitable for firing as-is or which can be co-fired with oil in existing power plant boilers; or uses some other process to convert solid waste to energy and can be as reasonably expected to perform satisfactorily as the first two alternatives.

- Cost proposals for the system should be responsive to the following goals for the project:

  - have a realizable first year (1983) net tipping fee of not more than $12 per ton;

  - achieve a net tipping fee equal to or less than the projected cost of landfill before the facility's fifth year of operation; and

  - achieve a disposal cost which will be less than the projected cost of landfill over a 20-year period.

- The bidder must provide full disposal service for all municipal, commercial, and industrial solid waste delivered to the resource recovery facility exclusive of demolition debris, pathogenic or hazardous wastes, or agricultural solid waste.

- Construction and operation of the system must entail a minimum of adverse environmental impacts.

- The use of landfill space for both emergency back-up in the case of breakdown and for disposal of residue must be minimized, and certain quantitative performance criteria must be met.

- Individual contractors are responsible for negotiating and executing sales contracts for the purchase of energy and material products from the facility. The HPOWER contract provides for sharing of revenues derived from the sale of energy and recovered materials. The City is guaranteed 85 percent of all energy revenues. The HPOWER contractor would receive 15 percent of the revenues derived from energy sales and half of the revenues from materials sales.

- The City will consider the use of Reimbursable General Obligation Bonds (R.G.O.) or Pollution Control Revenue Bonds (P.C.R.B.). However, contractors have been encouraged to secure private or other innovative means of financing the project.

- The contractor will be required to provide monetary or other guarantees of system performance over the 20-year life of the project.

The two offerors that are still competing for the HPOWER contract are UOP, Inc. and a joint venture composed of Combustion Engineering, Inc. and Amfac. Inc. Each of these organizations has proposed a unique site/process system for the HPOWER facility. These are described below immediately following a discussion of possible locations for the HPOWER facility.

Location of the Proposed Project

As previously noted, the HPOWER RFP left the choice of sites for the proposed facility in the hands of individual bidders. As a result, the four different locations listed below are under consideration for HPOWER (see Figure II-1):

Location	Bidder Considering Site
Campbell Industrial Park/Malakole Road	UOP
Campbell Industrial Park/Hanua Street	UOP
Oahu Sugar Company Waipahu Housing Area	Amfac/C-E
Waipio Peninsula	UOP

At the time the project was initiated, it was believed that a final decision regarding the site used by each bidder would have been reached by this time. However, as this is written, only the Amfac/C-E proposal has been tied to a single location. This is due to two events. First, the owners of Campbell Industrial Park have asked the City to also consider use of a parcel adjacent to Hanua Street in lieu of the Malakole Road location stipulated in earlier discussions and in the RFP for HPOWER. Second, whereas it had been thought that economic advantages might be realized if energy produced by the project could be sold to a nearby industrial customer in the form of steam rather than to a utility as electricity, this may not prove to be the case. As it now stands, the Hawaiian Electric Company may offer to purchase HPOWER's energy product at more attractive terms than the Standard Oil Company's Chevron Refinery. Because electricity, unlike steam, does not need to be produced close to its eventual user, and because there are transportation cost disadvantages associated with a Campbell Industrial Park location, UOP may select a site on the Waipio Peninsula that has been made available by the City.

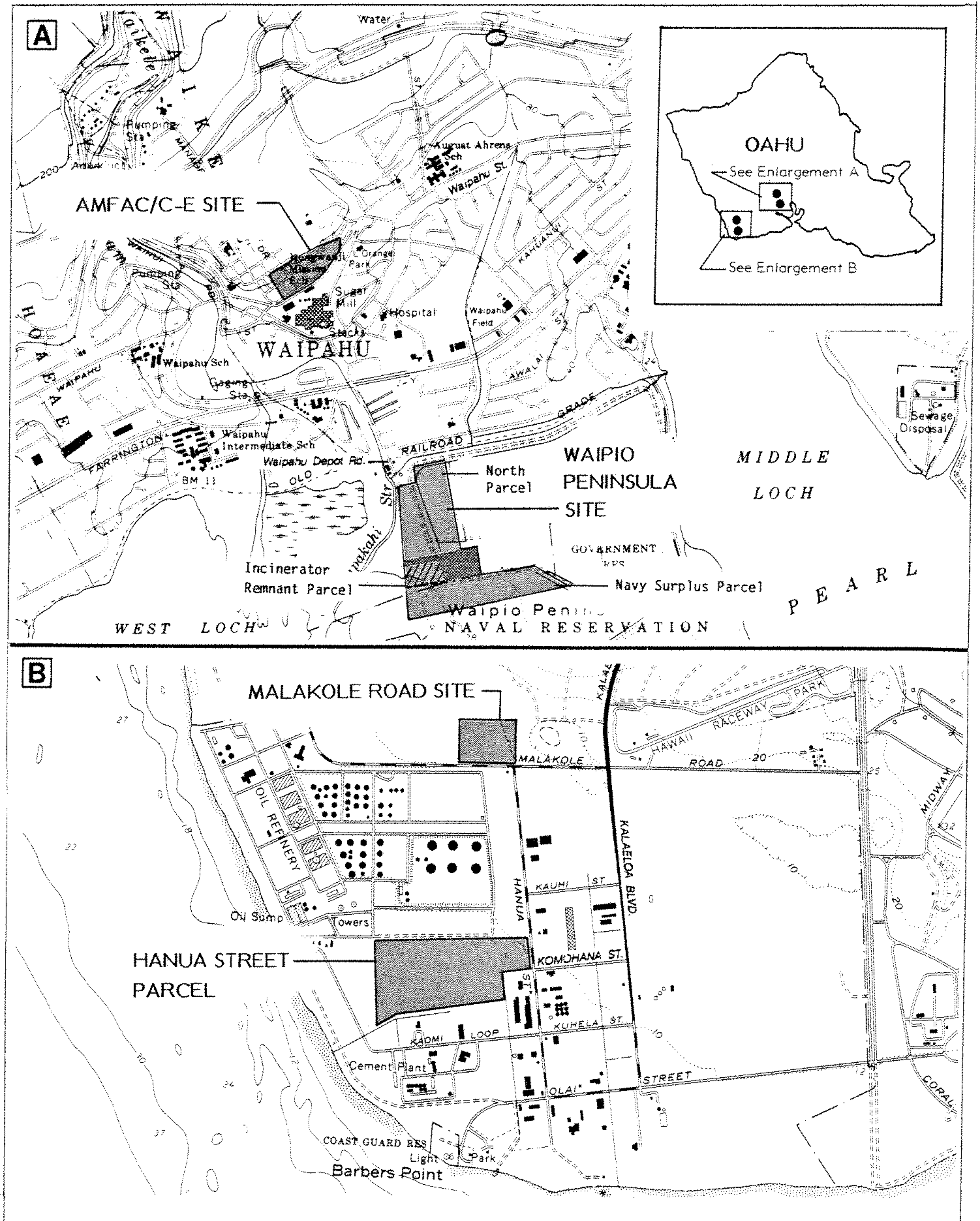


Figure II-1. Sites Under Consideration for the Proposed HPOWER Facility.

Malakole Road Site. The HPOWER Request for Proposals noted that a site adjacent to Malakole Road in the Campbell Industrial Park was available for use by HPOWER and that its acquisition would be guaranteed by the City. While this guarantee has since been extended to other sites, the Malakole Road location shown in Figure II-1 was the only one that enjoyed this status when technical proposals were submitted in August 1979. This, and other factors, led UOP to develop its site plans for the Malakole Road parcel. At the same time, they indicated their willingness to utilize an alternative site if that should prove beneficial to the project. While slight changes in the site layout would be required to adapt the UOP plans to the other two locations that it is considering, these changes would not substantially alter the character of the facility. Hence, we were able to use the plans and supporting documents suppled by UOP in assessing the impacts of their proposal at all of the possible sites identified by the City.

The City's choice of the Malakole Road site was based on discussions held with Campbell Estate several years ago. Since that time, planning for the proposed Barbers Point Deep-Draft Harbor has reached an advanced stage, and the Malakole Road site now forms a small part of the total area that has been designated for temporary storage of materials excavated during construction. However, the City and County Department of Public Works has met with representatives of Campbell Estate, the State Department of Transportation and the U.S. Army Corps of Engineers to discuss the matter. Results of these meetings suggest that both projects can be accommodated without disrupting existing plans for the harbor.

Hanua Street Site. Before these meetings were held, Campbell Estate, because of the potential conflict over the site, asked the City to consider an alternate location within the industrial park (Yoshimitsu, 1979). The Estate suggested a large parcel situated adjacent to the Standard Oil Company's Chevron refinery, west of Hanua Street. The parcel is currently leased to Conoco-Dillingham and was proposed in the early 1970s as the site of an oil refinery. The Campbell Estate is amenable to the use of any portion of the approximately 100-acre property, but has made no commitment to construct the access roads, utility lines, or other site improvements that would be necessary to serve an HPOWER facility. HPOWER bidders have been informed of the availability of this site and assured that, for the purpose of the price bid, it would be treated in the same way as the Malakole Road site.

The Hanua Street parcel is only about a half-mile south of the Malakole Road site. Moreover, from an environmental aspect it is quite similar. Because of this, our discussion of impacts that would occur if an HPOWER facility were constructed on the Hanua Street parcel focuses on those impacts that would be substantially different from the impacts reported for Malakole Road. The analytical studies on which the discussion is based were carried to the same level of detail for both locations, however.

Amfac/C-E Waipahu Site. Only the Amfac/C-E consortium stipulated another location in their proposal, and their decision was possible largely because Amfac already owns the land to the north of the existing Oahu Sugar Company mill on which the facility would be built. The Amfac/ C-E design is so closely integrated with the sugar mill operations that they have not considered another site.

Waipio Peninsula Site. The Waipio Peninsula location that is under consideration consists of about 65 acres around the existing Waipahu Incinerator (see Figure II-1). The site consists of several different parcels:

- o North parcel - 27 acres of City-owned land immediately north of the incinerator. A portion of this parcel is currently designated for the City and County's proposed Police Training Facility (Honolulu, City and County of, Building Department: January 1975, and personal communication from the Building Department to the Refuse Division). Approximately 15 acres is available for HPOWER.

- o Incinerator parcel - approximately five acres of City-owned land on which the existing incinerator is located.

- o Incinerator-remnant parcel - about five acres of land owned by the City and lying between Waipahu Depot Road, the incinerator, and the incinerator access ramp. This parcel is currently unused.

- o Navy surplus parcel - about 30 acres of land currently owned in fee by the Federal government and under the control of the Navy that has been designated as a "releasable area" by the Department of Defense as a result of the recent MILPRO-HI study (U.S. Department of the Navy, April 1979).

The City has informed the prospective bidders that they may propose use of any of these parcels (except for the incinerator parcel, which is already occupied) for their facility with the following stipulations:

- o the total area used should, if possible, be less than 15 acres;

- o their proposal must be consonant with the requirements of the proposed police training facility;

- o use of the strip of land south of the incinerator that has been designated as releasable by the Navy is predicated on its actually being made available to the City.

The same guarantees stipulated in the RFP for the Malakole Road site are applicable to the Waipio Peninsula location. The City will not know for certain whether any of the bidders will avail themselves of the Waipio Peninsula site until price bids have been submitted.

In evaluating the impacts associated with this location for HPOWER, we confronted a problem similar to that faced at the Campbell Industrial Park location off of Hanua Street -- the lack of a definitive site layout. The Hanua Street parcel and the north parcel of the Waipio Peninsula site are configured such that one could reasonably assume essentially the same site layout as specified for the Malakole Road location. Only on the Navy surplus parcel of the Waipio Peninsula site, might use of an identical site layout be infeasible. However, in view of its relatively isolated location, changes in the site layout would not substantially affect the impacts that would be created. Hence, it was possible to adequately assess all of the Waipio Peninsula alternatives using information provided in UOP's proposal.

Finally, it should be noted that the decision to include the Navy surplus parcel and incinerator-remnant parcel as a site alternative was made just as this report was being finalized. As a result, time constraints have limited detailed site investigations there. However, our preliminary review suggests that the adverse impacts associated with use of these parcels would be equivalent to or less than those resulting from use of the parcel north of the incinerator.

Transportation Costs

With respect to solid waste management, the City's primary concern is to collect and dispose of the solid waste generated by the island's residents at the lowest possible cost while maintaining environmental quality. HPOWER is designed to handle the disposal portion of the solid waste problem in an efficient way, but the waste must first be collected and transported to the facility. These collection and transportation expenses must also be taken into account in order to calculate the total cost to the City of a solid waste management system using HPOWER.

Costs associated with transporting solid waste from its point of origin to each of the HPOWER sites under consideration were calculated by GMP Associates, Inc. (August 1979). The model used by GMP takes into consideration direct haul costs for private refuse collectors and the Refuse Division, and transfer costs for the Refuse Division. These are used to calculate overall costs for a given system. Average system unit costs for the collection/transfer systems were estimated as follows:

HPOWER Location	Est. Ave. Cost Per Ton in 1979 Dollars	
	1,200 TPD	1,800 TPD
Campbell Industrial Park	7.38	7.79
Waipahu/Waipio Peninsula	6.05	6.47
Cost Advantage of a site in Waipahu Over One in Campbell Industrial Park	1.33	1.32

Based on this study, it appears that the collection and transfer costs associated with the operation of an HPOWER facility would be more than one dollar per ton lower if the plant were located in Waipahu than if it were located at Campbell Industrial Park. In determining the net cost per ton to the City (the number on which the selection of a low bidder will be based), the City will add the transportation cost per ton to the "proposed net disposal charge per ton" (i.e., to the proposed tipping fee). Hence, a proposal using a site in Waipahu may have a tipping fee up to $1.32 above an otherwise identical proposal at a Campbell site and still win the contract. This is about eleven percent of the $12.00 per ton tipping fee established as a goal in the HPOWER Request for Proposals (Honolulu, C&C of, Department of Public Works, May 18, 1979: Summary 3).

Alternative Transportation Modes. The study by GMP Associates, Inc. (August 1979) of transportation costs associated with the different locations under consideration for the HPOWER facility assumed that land transportation would be used exclusively for the project. However, during the preparation of the EIS a comment was received from the University of Hawaii Environmental Center regarding the fuel and other cost savings that might be achieved if barges were used instead of trucks to transport refuse to the HPOWER facility. This led us to undertake a brief examination of the use of ocean transport as part of this study. The results of that analysis are summarized below.

Some slight transportation fuel savings could be realized if refuse collected in the Central Honolulu area were trucked to a transfer facility situated on the water in Honolulu Harbor, and then barged to Barbers Point (Campbell Industrial Park) for disposal at an HPOWER facility situated there. The exact savings are impossible to calculate without first defining the collection system that would be used. However, an order of magnitude estimate may be made using a few coarse assumptions.

First, because of the location of solid waste generators in the City, it would be impractical to route more than 800 tons per day (and probably even less) through a barge system. The remainder of the garbage is generated in areas where it would make no sense to backtrack to Honolulu Harbor or from which the refuse would normally already have been shifted from a low-capacity packer truck to a high-capacity transfer trailer.

The barges that have been suggested for use have a rated capacity of 2,000 tons, or about 3,000 cubic yards. Refuse deposited in the barges would have a relatively low density, hence the volume would be controlling. Based on a density of about 400 pounds per cubic yard of partially-compacted refuse, 800 tons of refuse would occupy about 4,000 cubic yards, or two barges. These could be pulled by a single tug making one round-trip per day.

The barges would replace transfer trailers with a capacity of 20 tons, so that one barge trip would save about 40 truck trips. At about 50 road miles per round trip between the Keehi transfer station and Barbers Point, and with an average of three miles per gallon, each round trip would require 17 gallons of fuel. At these rates, transfering 800 tons of refuse by land would consume almost 700 gallons of diesel fuel. According to a representative of the Dillingham Tug and Barge Company, a tug pulling these barges would consume at least 70 gallons per hour and would require about six hours for the same trip. Hence, total fuel use by a barge operation would be over 400 gallons for the round trip. This amounts to about 95,000 gallons of diesel oil per year that could be saved by barging _if_ the HPOWER facility were situated on the waterfront at Barbers Point. This amounts to less than one-half percent of the energy that would be recovered by HPOWER. More importantly, there are a number of operational and cost factors that make barging impractical.

Barging refuse from Honolulu Harbor to Barbers Point would require the construction of appropriate transfer facilities at both ends of the route. The Harbors Division of the State Department of Transportation has indicated that there is a great deal of competition for pier space at Honolulu Harbor and that it would be unlikely that room could be found for a transfer station dedicated to use by HPOWER (Hawaii, State of, Department of Transportation, April 1980).

Even if space could be acquired at Honolulu Harbor for a truck-to-barge transfer station, it appears extremely unlikely that a suitable unloading/ transfer facility could be developed at the HPOWER end of the route. The existing barge harbor at Barbers Point is subject to storm surges which sometimes force the closing of the harbor for several days at a time. Delays of this duration would necessitate excessive storage capacity for raw refuse at a Honolulu Harbor transfer facility and tend to create unsanitary conditions there. They would also make it difficult for an HPOWER facility to achieve the reliability required by its energy market(s).

The surge problem would be eliminated if the proposed Barbers Point Deep-Draft Harbor is ever constructed. At present, however, legal battles cloud the fate of that proposal. Even if it does receive final approval, it would be at least 1985 before the harbor would be completed to the point where construction of HPOWER could begin. Moreover, because the present plan for the harbor does not provide space for HPOWER, considerable doubt remains as to whether or not the necessary 15-acre site could be obtained. In this regard, it should be noted that the entire HPOWER facility would have to be constructed very close to the water if barging were to be at all cost effective. If the HPOWER facility were to be sited so far from the unloading dock as to require a separate transfer operation, the total cost of transportation via barge would be prohibitively high. This means that all of the sites presently under consideration must be ruled out if barging is to be used.

UOP Proposal

UOP, Inc., the prime contractor for the UOP proposal, is a very large, U.S.-based company that would be responsible for overall project management. Engineering and construction expertise would be supplied by Procon, a wholly-owned subsidiary of UOP with over 3,000 projects costing in excess of one million dollars to its credit. The solid waste disposal and resource recovery technology is to be supplied largely by the Josef Martin Company, a German firm that is a world-recognized leader in solid waste systems. Today, there are more than 160 Martin combustion units in operation or under construction. The total daily capacity of these units exceeds 45,000 tons. E.E. Black, Ltd. (doing business as American Piping and Boiler Co.) is the proposed local construction firm for the project.

The principal components of the resource recovery facility proposed by UOP are:

- a completely enclosed tipping area and refuse storage pit;
- two independent combustion trains, each incorporating a proprietary Martin reverse-reciprocating stoker, a multi-pass waterwall boiler, and a multi-field electrostatic precipitator for control of particulate emissions;
- a 135- to 150-foot high steel stack;
- a turbine-generator and electrical switchyard;

- o a materials recovery system that would extract ferrous metals, aluminum, mixed non-ferrous metals, and aggregate from the waste stream;
- o an air-cooled steam condenser; and
- o an administration building, drivers' rest station, and weigh scales.

Figure II-2 shows the site plan proposed by UOP for the Malakole Road site. A cross-section of a typical UOP energy recovery system is presented in Figure II-3, and a simplified process flow diagram may be found in Figure II-4. Table II-2 outlines the basic design and operating parameters of the facilities proposed by UOP. Additional details regarding the UOP system are presented below.

Energy Recovery. Municipal solid waste would be delivered to the facility by truck and dumped from the tipping floor into a large concrete receiving pit as shown in Figure II-3. The pit would be large enough to hold three days worth of refuse. This storage capacity allows the boilers to continue in operation when refuse is not being delivered (e.g., at night and on Sundays). An overhead crane with a clamshell bucket loads the refuse as needed into a feed hopper which supplies fuel to the two boilers. From there, the refuse is pushed by a feeder ram onto the patented Martin reverse-reciprocating stoker grate.

The boilers themselves are of proven waterwall design. They are designed to burn up to 120 percent of the average daily refuse input. Each stoker is equipped with two water-filled quench pits into which the burned-out material that is discharged from the grate is dropped. The cooled residue is pushed out of the quench pit by a discharge ram into the draining and drying chamber. From there, the still-moist residue is transferred by conveyor to the materials recovery section of the facility.

In the boilers themselves, combustion gases are raised to about 1,600°F. This is sufficient to eliminate vaporous odors. Since the combustion air for the boilers is drawn from the tipping floor and receiving pit, the areas containing raw waste are kept under negative pressure. This results in a flow of air into (rather than out of) these areas. Hence, odors and airborne bacteria are drawn into the boiler where they are destroyed by the heat of combustion. Combustion gases pass through three-field electrostatic precipitators (one for each boiler) which remove nearly all of the particulates entrained in them. The filtered air from both boilers is exhausted through a single stack.

Steam generated in the boilers is piped to a single 39-megawatt turbine-generator. If a suitable customer (such as Chevron) is found for the moderate-pressure steam that is produced in the boilers, an automatic extraction, condensing turbine-generator would be used, and only a portion of the available steam would be used to produce electricity. If satisfactory marketing arrangements for the steam cannot be concluded, the turbo-generator would be of the straight-condensing variety. If steam is sold, the facility would be linked to the Chevron refinery by a large-diameter insulated steam line. Except where it crosses Malakole Road, the line would be above ground to facilitate maintenance and troubleshooting. As a means

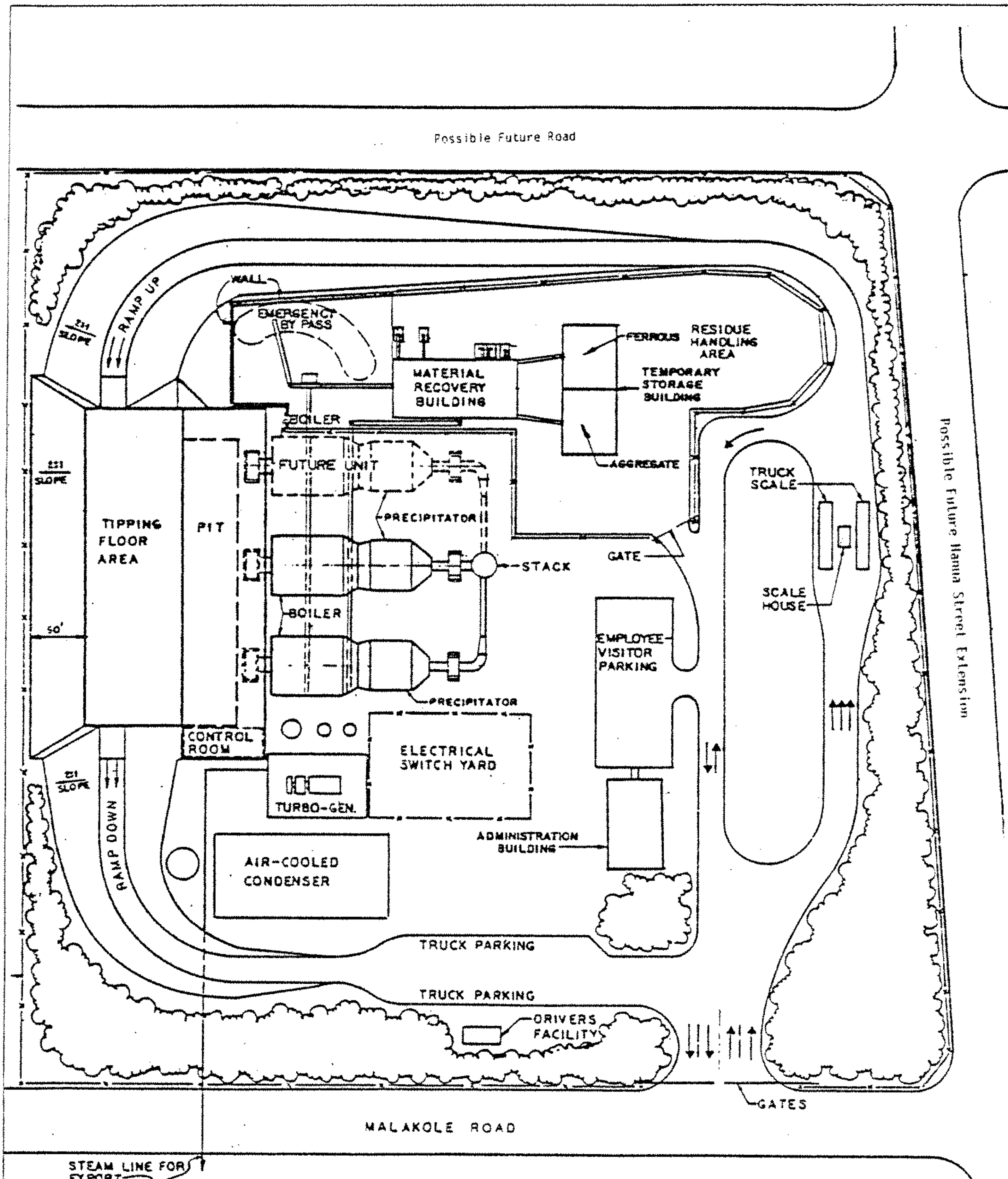


Figure II-2. Site Layout of the Resource Recovery Facility Proposed by UOP.

Source: UOP, Inc. (November 1979).

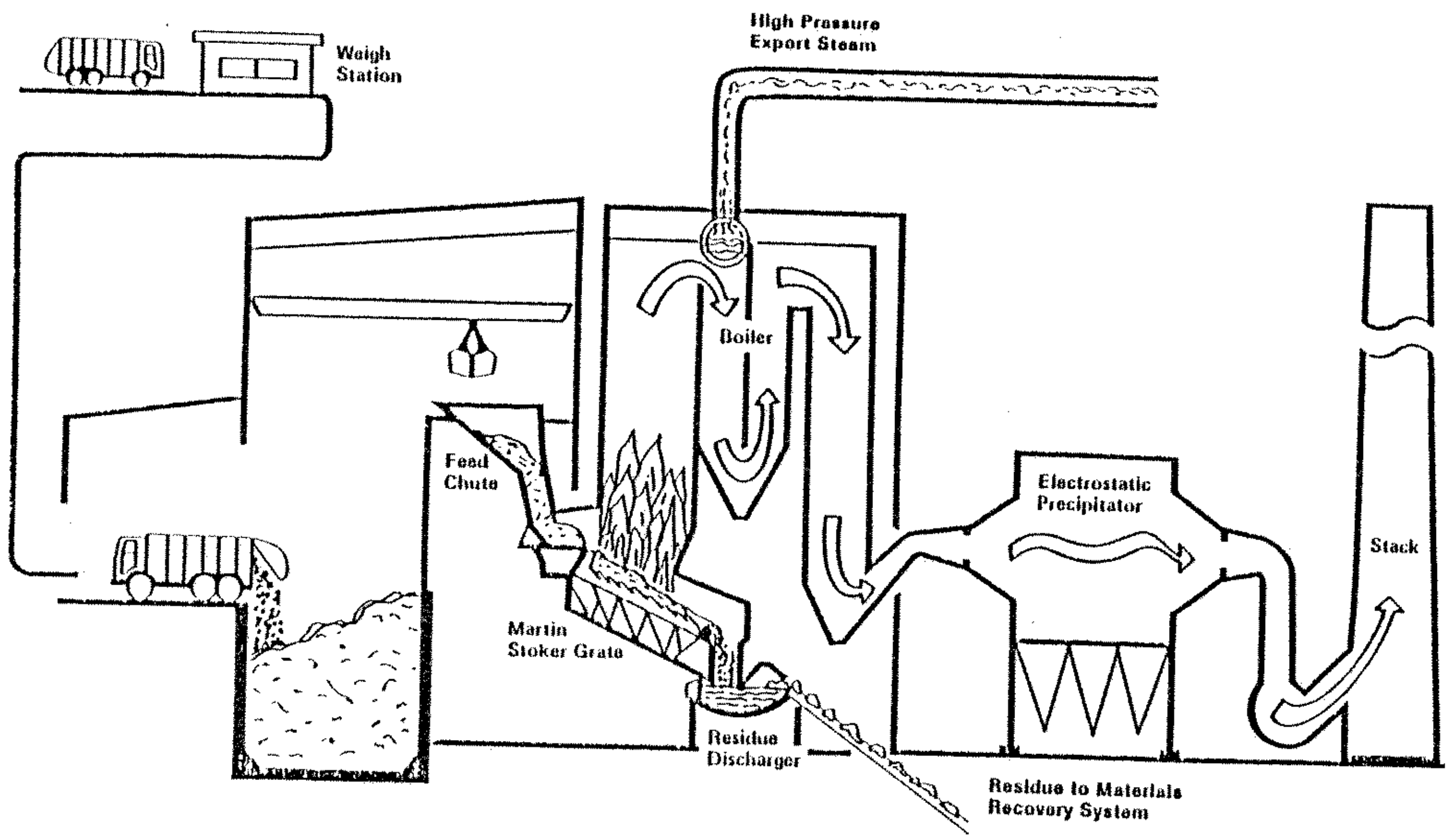


Figure II-3. Schematic Cross-Section of the Resource Recovery System Proposed by UOP.

Source: UOP, Inc. (August 1979).

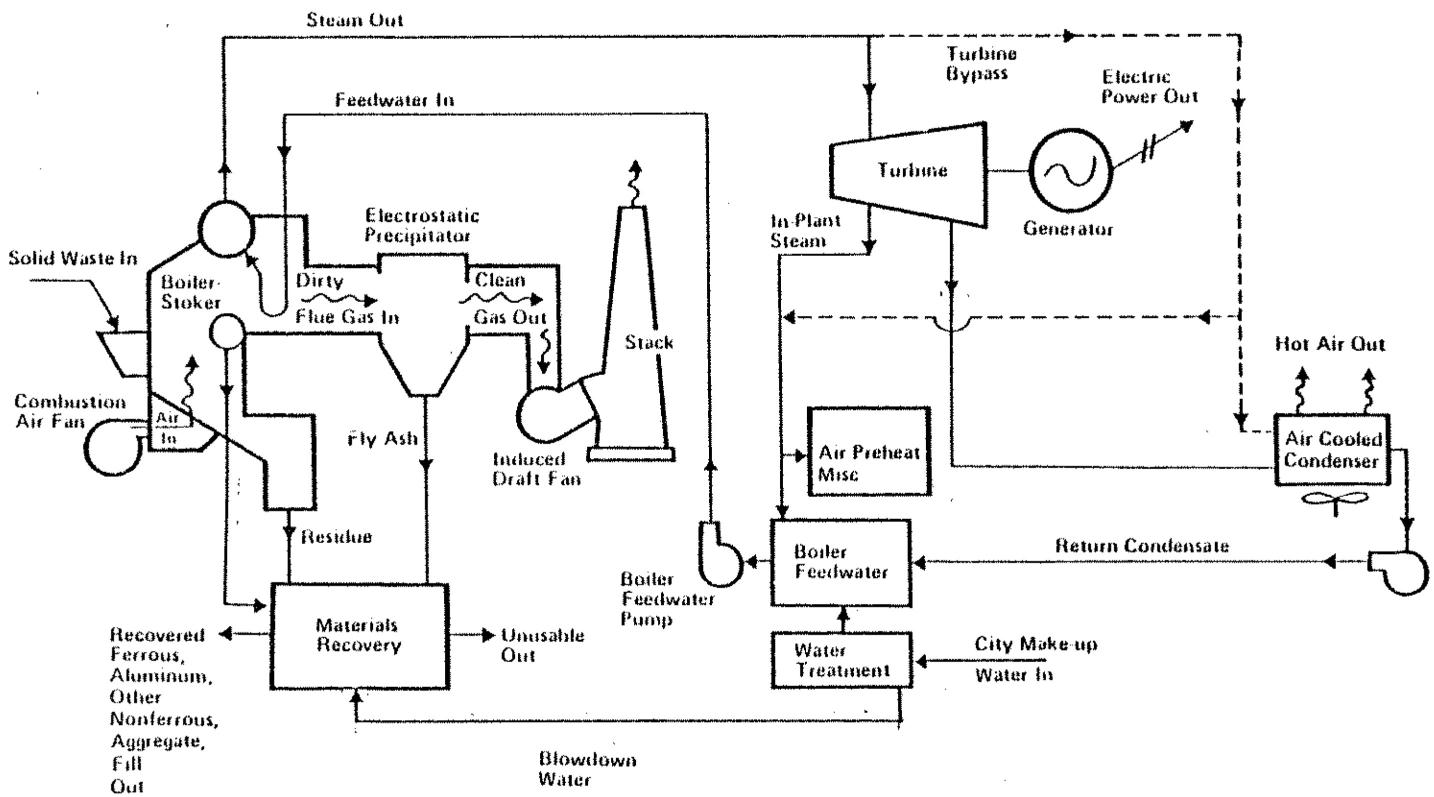


Figure II-4. Generalized Process Flow Diagram of the Resource Recovery Facility Proposed by UOP.

Source: UOP, Inc. (August 1979).

Table II-2. Values of Key System Parameters for Offerors' HPOWER Proposals.[1]

Parameter	UOP, Inc. 1,200 TPD	UOP, Inc. 1,800 TPD	Amfac/C-E 1,200 TPD	Amfac/C-E 1,800 TPD
Type of System	------Mass Burning-----		----------RDF-----------	
System Throughput (in tons per year)	374,400	561,500	360,000	561,600
Number of Tipping Positions	14	18	n.g.	19
Capacity of Receiving Pit (in tons)	3,600	5,400	3,600[3]	5,400[3]
Number of Boilers	---------- 2 -----------		---------- 2 ------------	
Capacity of Each Boiler (in Million Btu's/Hour)	226	339.5	235.8	343.5
Type of Boilers	--------Waterwall-------		-------Waterwall---------	
Type of Stoker	Martin Reverse-Reciprocating		Spreader-Stoker with Conveyor Grate	
Type of Pollution Control Device	----------E.S.P.-------		---------E.S.P.---------	
Type of Secondary Air Pollution Control Devices	-----------None--------		-------Baghouses--------	
Provision for Auxilliary Fuel	--------#2 fuel oil------		-------#6 fuel oil--------	
Turbine Generator Capacity (in Megawatts)	25	39	32	48
Steam Characteristics (°F/psig/inches Hg.)	--------750/600/5-------		-------750/865/2.5-------	
Type of Turbine	Straight Condensing, Non-Reheat		Uncontrolled Extracting and Condensing	
Turbine Bypass Condensing Capacity	----------100%----------		----------n.g.-----------	
Steam Condenser Cooling	-----------Air----------		---Evaporative Cooling---	
Number of Turbo-Generator Sets	----------- 1 ----------		----------- 1 -----------	
Capacity of RDF Storage Area (in tons)	-----------n.a.---------		1,650	2,500[3]
Amount of Potable Water Consumed (in MGD)	0.074	0.101	n.g.	1.673[4]
Source of Potable Water Consumed	------Honolulu BWS-----		Oahu Sugar, Pump No. 7	
Materials Recovered	Ferrous, Non-Ferrous, Aluminum, Aggregate		--------Ferrous----------	
Quantity of Ash (in tons per day)	171/205[2]	257/308[2]	135	302
Quantity of Residue (in tons per day)	n.a.[2]	n.a.[2]	125	188

[1] Data is based on preliminary designs. These are subject to change.

[2] Because it is a mass-burning system, there is no distinction between ash and residue. The lower figure assumes ferrous metal recovery; the higher figure assumes no recovery.

[3] Amfac/C-E, March 7, 1980: II-1.

[4] Based on 1,127 GPM from Pump No. 7 and 35 GPM from Waiahole Ditch. Of the 1.673 MGD taken from these sources, 0.540 is available for agricultural reuse. Hence, consumptive use is about 1.133 MGD.

Note: n.a. - not applicable n.g. - not given

Source: Compiled by Belt, Collins & Associates.

of minimizing water use, the facility would be equipped with air-cooled condensers. Power generated at the facility would be handled through 46-KV outdoor switch yard equipment.

Materials Recovery System. According to the UOP proposal:

> Conceptually, the UOP materials recovery system begins on the Martin stoker grate. The reverse reciprocating action of the grate agitates the refuse to assure complete burnout of combustible materials that would otherwise hamper materials recovery efforts. Further, the precise distribution of underfire combustion air assures uniform combustion at temperatures that will not destroy recoverable materials, particularly aluminum. Uniform combustion temperatures regulated by the sophisticated Martin stoker control system yields metals in an unclinkered, readily-recoverable form, virtually free of organic contamination. [UOP, August 15, 1979, p. 2-15.]

The combustion residue leaving the drying chamber consists of metals, glass, other inert materials, ash, grate siftings, and fly ash. It is approximately 10 to 15 percent (by weight) water, and contains less than five percent combustible matter and 0.2 percent putrescible (organic) matter. Approximately one-third of the residue is metallic. These materials would be recovered by a resource recovery system housed in a building adjacent to the main processing facility. The system would use a series of sizing and separation processes to segregate the metallic from the non-metallic residue and to further separate the ferrous from the non-ferrous metals. Equipment used in this sorting process includes magnets, an impact mill, screens, and a heavy media separator. Because the material recovery is undertaken after combustion, rather than before as is the case with the refuse derived fuel system utilized by Amfac/C-E, a much smaller volume needs to be processed.

If a market can be found for the aggregate that would be a by-product of the metals recovery process, only 1.5 percent of the incoming solid waste (primarily larger stones, bricks, and similar non-combustible and non-metallic objects) would have to be landfilled. If no such market is found, the facility would still exceed the minimum volume and weight reduction requirements of 90 percent and 75 percent, respectively, that are given in the RFP.

Residue Disposal. The weight of the incoming refuse is reduced by about 78 percent during the energy recovery phase of the operation. Of the remaining 22 percent, about 5.5 percent consists of recovered material, 15 percent could be used as aggregate, and 1.5 percent would have to be landfilled. As a minimum, then, the UOP facility would reduce the landfill requirement to about 255 tons per day. If a market for the aggregate can be found, the amount requiring landfill would be an almost negligible 25 tons per day.

Amfac/C-E Proposal

The other offeror that has qualified its technical proposal and is expected to submit a price bid is a consortium made up of Amfac, Inc. and Combustion

Engineering, Inc. We will refer to them as Amfac/C-E. Amfac is a diversified, Hawaii-based company with 1978 sales in excess of $1.4 billion. It is heavily involved in agricultural operations, and is the parent company of the Oahu Sugar Company (OSCO) on whose land the proposed HPOWER facility would be constructed if the consortium is awarded the contract. Cane sugar processing, including the conversion of bagasse (the pulp remaining after the juice has been extracted from sugar cane) into energy, has given Amfac experience with technology similar to that involved in HPOWER.

Combustion Engineering, Inc. (C-E), the other member of the consortium, is internationally known as a supplier of energy systems and for the design and construction of major energy projects. Experience includes fossil and nuclear steam generating systems, oil refineries, mining and petrochemical processing equipment, and related systems. Construction and construction management would be handled by the Hawaiian Dredging and Construction Company, the largest contracting firm based in Hawaii.

The Amfac/C-E proposal utilizes a waterwall boiler burning a refuse derived fuel (RDF). Unlike the "mass-burning" method proposed by UOP, this approach involves processing municipal solid waste before it is burned to produce a fuel which has a higher heat value per pound and more consistent properties than the untreated refuse delivered to the facility (hence the name "refuse derived fuel"). Conceptually, the system consists of the following elements:

- a receiving building containing the tipping floor and a raw refuse storage pit;
- two separate processing lines that extract ferrous metals for re-sale, remove other non-combustible material from the waste stream for disposal in a landfill, and convert the remaining refuse into a refuse derived fuel for use in the facility's boilers;
- an RDF storage building;
- two combustion trains, each consisting of a waterwall boiler, an electrostatic precipitator for particulate removal, and a stack;
- a single turbogenerator and an electrical switchyard; and
- an evaporative cooling tower.

The site plan for the proposed facility is shown in Figure II-5. Important design and operating characteristics of the facility are summarized in Table II-2. The process flow is diagrammed in Figure II-6.

<u>Fuel Preparation/Materials Recovery System</u>. As with all of the HPOWER proposals, municipal solid waste is delivered to the facility by truck. In this case, access is via Waipahu Street and a privately owned cane haul road that parallels Paiwa Street and the H-1 Freeway. The trucks drive up a large ramp on the southern side of the receiving building and tip their loads into a storage pit capable of holding three days average input of waste. The waste in the pit is managed by a trackdozer that distributes waste evenly within the storage area and feeds the two conveyors leading to the

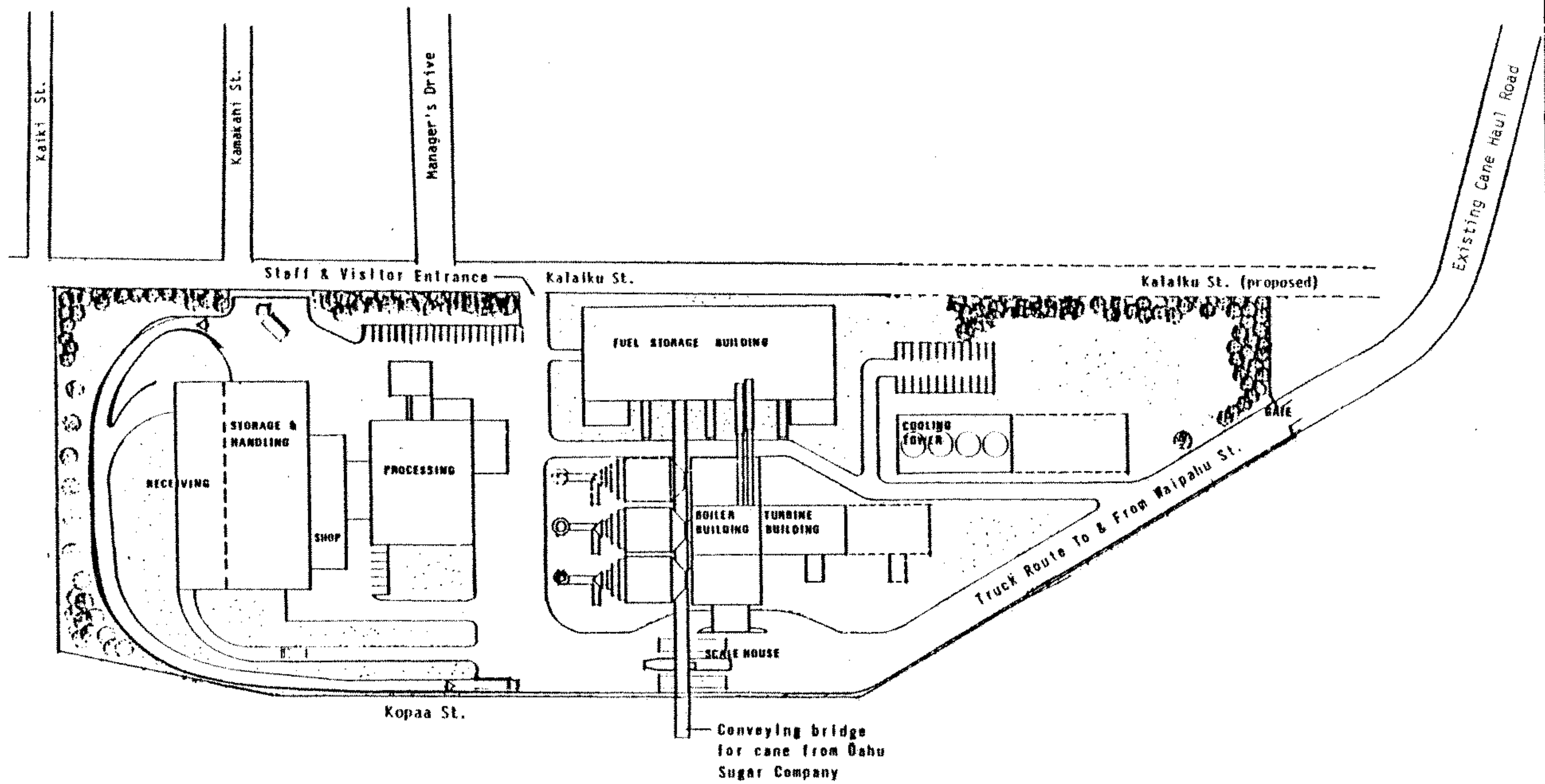


Figure II-5. Site Layout of the Resource Recovery Facility Proposed by Amfac/C-E.

Source: Amfac/C-E (January 1980).

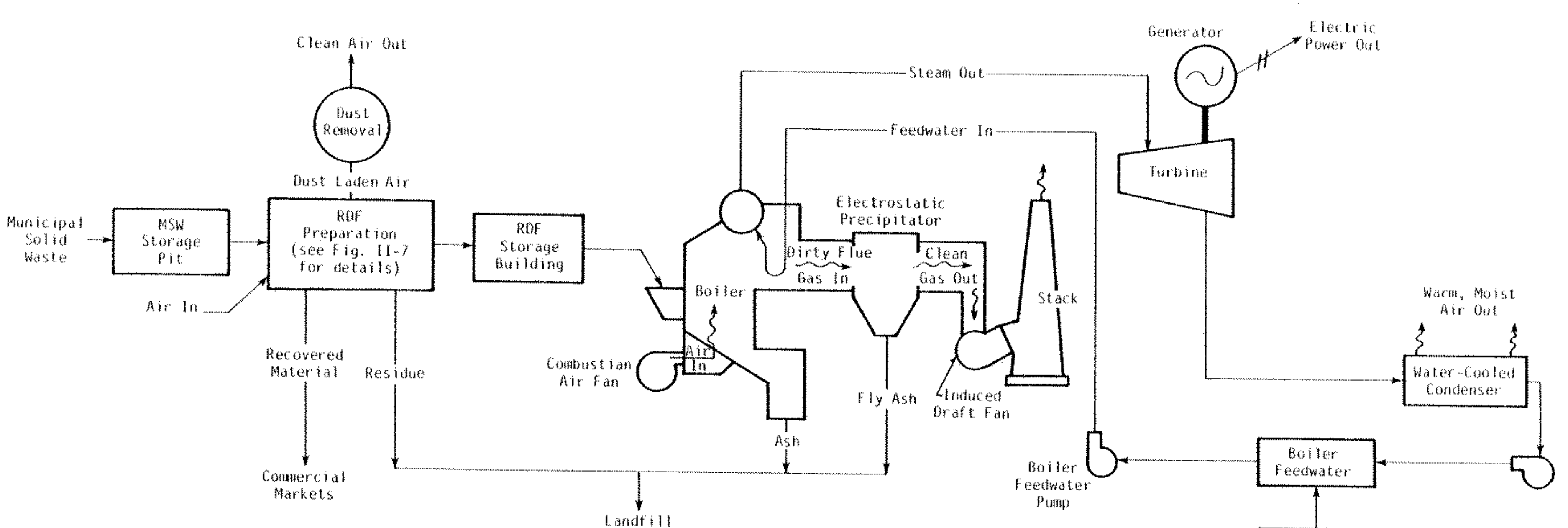


Figure II-6. Generalized Process Flow Diagram of the Resource Recovery Facility Proposed by Amfac/C-E.

Source: Compiled by Belt, Collins & Associates based on Amfac/C-E's technical proposal (November 1979).

processing area. Each conveyor can feed either of the two identical processing lines.

Raw solid waste from the refuse storage pit is conveyed to the process building where it is transformed into refuse derived fuel (see Figure II-7). Primary shredders break apart large pieces and prepare the material for ferrous metal removal by magnetic separators. Screens, trommels, air classifiers, secondary shredders, and other equipment are used to remove non-combustibles and otherwise enhance the usefulness of the refuse as a fuel. About 80 percent (by weight) of the incoming refuse emerges as refuse derived fuel; about 5.5 percent is recovered as ferrous scrap, 11 percent is non-combustible residue that is transported to landfill, and about 3.5 percent is lost as moisture to the atmosphere.

<u>RDF Storage Building</u>. Refuse derived fuel would be conveyed pneumatically from the process area to a 31,000-square-foot RDF storage building. There, the refuse may be fed directly to the boiler or stored. Large rubber-tired loaders would be used for stockpiling the fuel, with crawler tractors from the receiving area available for use during the second shift to provide additional compaction if necessary to increase the storage capacity of the building.

<u>Steam Generation Unit</u>. RDF from the fuel storage building is fed to the boilers by dual out-feed conveyors. The boilers themselves are manufactured by C-E and are of standard waterwall design with spreader-stokers. They are designed to burn the equivalent of 120 percent of the average daily refuse input plus five tons per hour of cane trash supplied from the existing Oahu Sugar Company sugar mill. The boilers can burn RDF, bagasse, or oil, making them adaptable to unexpected changes in fuel availability. The two boilers would produce a maximum of 468,400 pounds per hour of 750°F/850 psig steam. They are semi-suspension firing and have conveyor-type grates. Combustion gases are passed through electrostatic precipitators for particulate removal before being exhausted to the atmosphere through the main stack.

<u>Electrical Power Generation</u>. Steam generated in the boilers is piped to a turbine-generator set located adjacent to them. The generator would produce 48 megawatts for the 1,800-TPD alternative at a 0.85 power factor. A water-cooled steam condenser would be provided. Cooling water for the condenser would be provided by a four-cell, mechanical draft, cross-flow cooling tower. The predicted water delivery for the 1,800-TPD system is 44,000 gallons per minute (GPM). Total consumptive use of cooling water is about 730 GPM, almost all of which is evaporative loss.

The generation system would consist of the generator, a set of iso-phase bus connections, and a 13.8 to 46 KV transformer connecting the generator to HPOWER's 46 KV switchyard. The system would interconnect the generator, the Hawaiian Electric Company, and the remainder of the HPOWER facility while maintaining existing service to the Oahu Sugar Company mill.

<u>Other Equipment and Buildings</u>. In addition to the items noted above, the Amfac/C-E proposal also provides:

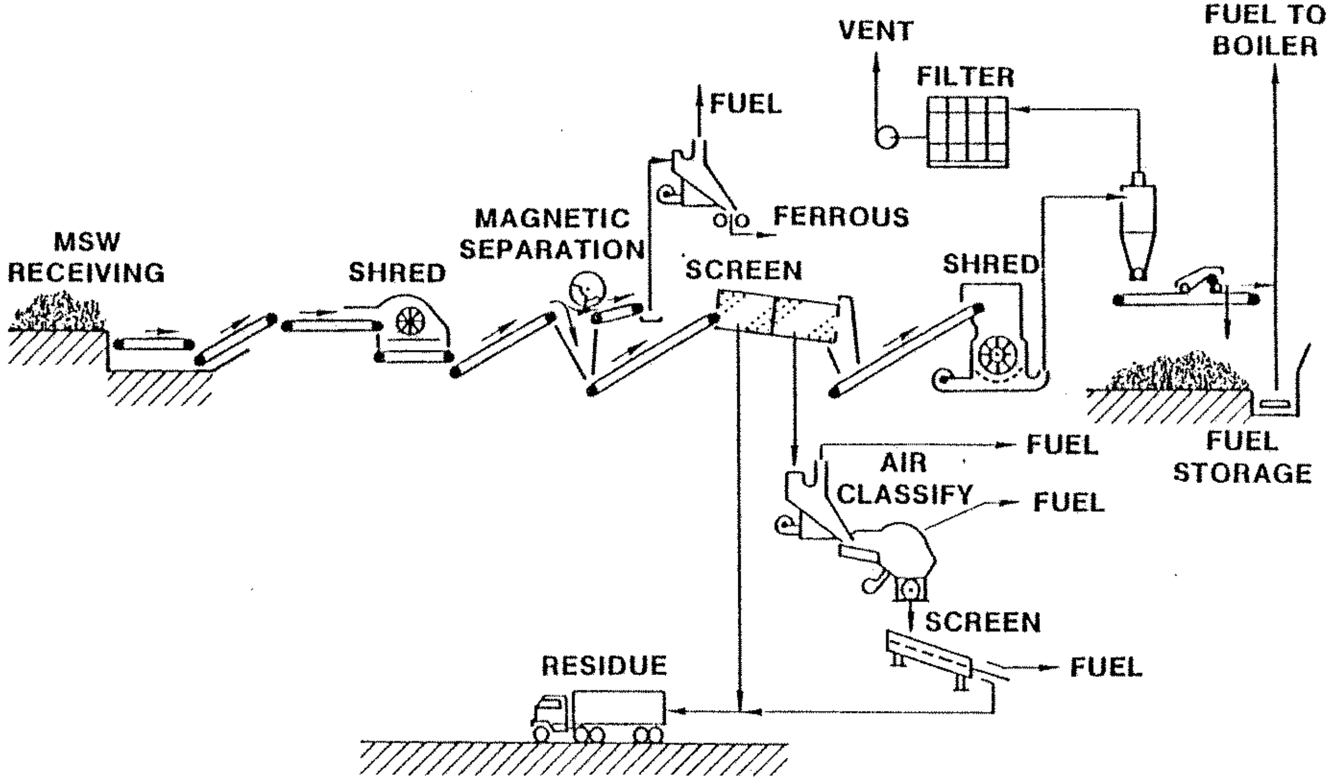


Figure II-7. Basic Steps in the Preparation of RDF in the Resource Recovery Facility Proposed by Amfac/C-E.

Source: Amfac/C-E (August 1979).

- a scale for weighing incoming and outgoing trucks;
- a conveyor linking the HPOWER fuel storage building with the cane trash processing and bagasse storage facilities on the Oahu Sugar Company site;
- oil storage tanks; and
- an existing cane haul road plus the small addition necessary to connect it to Waipahu Street near Kamehameha Highway.

Timing of the HPOWER Project

Events leading up to the acceptance of bidders' technical proposals have been identified in Table II-1. As previously stated, it is the City's desire to move with all due speed in selecting a contractor for the project and, once that has been accomplished, in completing the facility. As of March 1980, the following target dates had been established:

Milestone	Date
Notice to Offerors to Proceed with Preparation of Price Bids (Step II)	April 1980
Due Date for Bids and Bid Opening	October 1980
City Council Contract Authorization and Sale of Bonds	By January 31, 1981
Contract Awarded	February 1981
Construction Started	Winter 1982
Site Preparation Completed	Summer 1982
Completion of Mechanical Portions of Facility	Fall 1983
Start-Up and Commissioning Completed	Winter 1984
Testing Completed and Commercial Operation Begun	March 1984

The projected construction time from contract approval to acceptance by the City and the beginning of full-scale operations is three years.

BENEFITS OF THE PROPOSED PROJECT

The HPOWER project is the result of many years of study and planning aimed at developing the solid waste disposal system best able to meet Oahu's needs. The resource recovery concept on which it is based is being pursued because it will:

- result in the lowest solid waste disposal costs utilizing proven technology;

- conserve Oahu's scarce landfill resources by minimizing the amount that is needed for sanitary landfill operations;

- recover at least 250 million kilowatt hours of electricity per year, thereby reducing annual petroleum imports by 560,000 barrels; and

- have fewer adverse environmental impacts than other feasible solid waste disposal alternatives.

Minimizing Solid Waste Disposal Costs

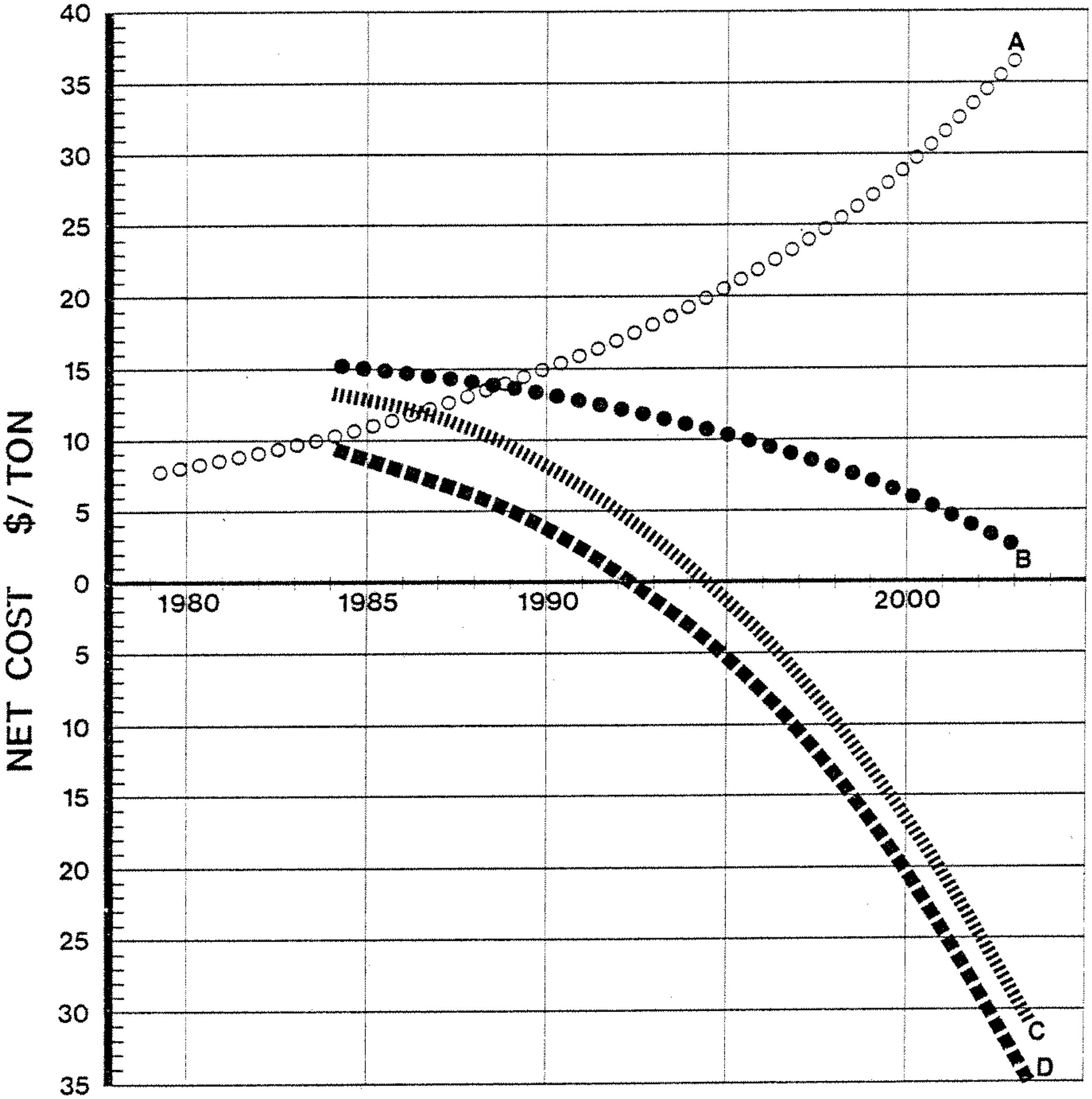
At present, nearly all of the municipal solid waste generated on Oahu is disposed of in sanitary landfills. In 1979, landfill disposal costs were estimated at about $7.00 per ton and are expected to rise. At an annual rate of about seven percent per year (as shown in Figure II-8), this would result in a disposal cost of nearly $40 per ton by the year 2004.

The exact cost of disposing of solid waste at an HPOWER facility will not be known until price bids have been opened this summer. However, using rough estimates of the probable initial construction costs and operating expenses, calculated revenues from the sale of energy and recovered materials, and assumptions regarding the rate at which operating and maintenance costs and revenues will increase over the 20-year life of the project, it is possible to gain a reasonably accurate understanding of the economic benefits likely to accrue from HPOWER.

Figure II-8 charts the projected net disposal costs for landfill and three alternative HPOWER scenarios. As shown in that figure, landfill costs (line "A") are expected to increase sharply as a result of rising wages and other operating and maintenance (O&M) expenses. Line "B" shows the net disposal cost based on the assumption that the capital cost of the facility would be $100 million and that both O&M costs and revenues would increase at nine percent per year. This amounts to a "worst-case" assumption since trends over the past ten years and recent analyses of international energy costs suggest that energy revenues are likely to increase more rapidly than O&M costs. Capital costs per unit output will, of course, remain fixed over the life of the facility. Even under these very conservative assumptions, it appears that HPOWER would offer tremendous cost savings over landfill. If revenue from energy sales should increase more rapidly than O&M costs, the comparison with landfill is even more beneficial to HPOWER as shown by line "C" in Figure II-8. Line "D" shows the net per-ton disposal cost if the capital cost of the facility is $80 million.

Several important conclusions can be drawn from the information presented in Figure II-8. First, because their O&M costs are so high in comparison with their capital costs, and because they do not produce an income stream that would help offset expenditures, landfills are destined to become a much more expensive means of disposing of solid waste than they are today.

Second, HPOWER is almost certain to result in a much lower net disposal cost to the City than would landfill, the method currently being used. As



ASSUMPTIONS	Capital Cost	O&M Cost Escalation Rate	Energy Revenue Escalation Rate
LINE "A" PROJECTED LANDFILL COST	n.a.	7 %/yr.	n. a.
LINE "B" HPOWER	$100 Million	9 %/yr.	9 %/yr.
LINE "C" HPOWER	$100 Million	7 %/yr.	9 %/yr.
LINE "D" HPOWER	$ 80 Million	7 %/yr	9 %/yr.

Figure II-8. Projected Net Disposal Costs for Selected Revenue-Cost Scenarios.

Source: MITRE Corporation (1980).

indicated in the discussion of alternatives found in Chapter VI, it is almost certain to be less expensive than other disposal methods as well. While the extent of HPOWER's advantage will depend upon such things as the facility's actual construction cost, the interest rate prevailing at the time the bonds are sold, the rate of increase in O&M costs that is experienced, and the revenues that can be obtained from the sale of energy and recovered materials, at this time it is difficult to imagine a plausible scenario that would cause the net disposal costs of HPOWER to exceed those that would result from continuing use of landfill.

As can be seen from a comparison of Lines "C" and "D" in Figure II-8, an increase in the capital cost of the facility has the effect of shifting the net disposal cost curve upward by about $4.00 to $5.00 per ton. (An increase in the cost of financing such has recently occurred on the municipal bond market would have the same effect.) Given this relationship, the estimate of capital and finance costs would have to be at least 50 percent too low to alter the conclusion that HPOWER is economically viable if O&M costs rise at seven percent per year while energy revenues rise at nine percent per year.

The net disposal cost is more sensitive to a reduction in the difference between the rates at which O&M costs and revenues from energy & materials rise than it is to differences in the original capital and finance costs. This can be seen by comparing lines "C" and "B" in Figure II-8. However, even if costs and revenues were to rise at the same annual percentage rate and the capital cost of the facility is $100 million, the project would still result in lower average net disposal costs than landfill.

<u>Minimizing Land Required for Solid Waste Disposal</u>

Ash and residue from the HPOWER facility, as well as demolition, construction, and other solid waste not accepted at the resource recovery facility, would have to be landfilled even if HPOWER is implemented. However, waste processed by HPOWER would have its volume reduced by at least 90 percent. All things considered, an 1,800-TPD resource recovery facility would cut the City's landfill requirements by 65 to 75 percent. With the exception of composting, a method whose economic viability depends upon markets which do not currently exist on Oahu, no disposal alternative reduces landfill requirements more than HPOWER.

<u>Energy and Materials Recovery</u>

Information supplied by bidders indicates that an 1,800-TPD HPOWER facility that converts all of the energy it extracts from refuse into electricity would be able to export the electrical equivalent of about 750 Btu's for each pound of refuse received at the facility. If UOP can conclude a satisfactory marketing agreement for a percentage of the steam produced by its facility, some of the energy losses that inevitably occur when heat energy (in the form of steam) is converted into electrical energy could be avoided. In this case, the energy value of the mixture of steam and electricity exported would be about 1,500 Btu's per pound of refuse received. However, the market for the steam is much less certain. On an annual basis, the 250,000,000 kilowatt hours that can be expected from an all-electric facility would constitute about five percent of the electricity now consumed on Oahu.

The materials that would be recovered vary somewhat between the two proposals. However, both bidders have indicated that they would begin with ferrous metals and aluminum, the metals which can be most easily marketed. Additional materials recovery capabilities would be added as soon as they are economically viable. Ultimately, the following yield could be expected from an 1,800-TPD facility:

Material	Tons per Year
Light ferrous	19,000
Heavy ferrous	8,000
Aluminum	1,600
Heavy non-ferrous	450
Aggregate	80,000

CHAPTER III.
THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

There are a number of different State and County plans, policies, and controls that bear some relationship to the proposed HPOWER project. These fall into three categories: (1) policy plans, (2) land use plans, and (3) other programs and controls. HPOWER's consistency with them is discussed below.

POLICY PLANS

Both the State of Hawaii and the City and County of Honolulu have adopted policy plans to guide the physical, social, and economic development of the islands and Oahu. These plans contain general objectives and policies which establish a framework for more detailed land use planning of regions and communities. They are also intended as the basis for functional plans covering such topics as transportation, housing, and economic development. Policy plans do not contain land use maps and, therefore, rarely become specific in their recommendations regarding a particular site. Hence, our discussion of them is necessarily general.

THE OAHU GENERAL PLAN

In 1977, the City and County of Honolulu adopted a new Oahu General Plan containing 180 policies designed to guide physical development, government operations, and social and economic programs for the island of Oahu through the year 2000. The General Plan has since been amended to include 18 additional policies concerning energy use and conservation. Many of the policies in the General Plan have little or no relationship to the proposed HPOWER project. Listed below are those policies most relevant to HPOWER. Each is followed by a discussion of HPOWER's conformance or non-conformance with it.

Policy: Encourage the recycling of solid-waste materials . . . (Transportation and Utilities, Objective B, Policy 6).

Policy: Encourage the development of new technology which will reduce . . . the cost of waste disposal (Transportation and Utilities, Objective B, Policy 3).

Policy: Provide safe and efficient . . . waste-disposal services (Transportation and Utilities, Objective B, Policy 5).

> Discussion: Clearly, HPOWER's intent is to apply new technology to the efficient conversion of "waste" into both energy and recoverable resources. Economically, the intent of HPOWER is to dispose of waste for a 20-year period at a cost far below that of landfill, the next most economical method available. One of the goals stipulated in the Request

for Proposals for HPOWER is that within five years of its opening it can be operating at an annual cost less than or equal to that projected for landfill and that the total cost over the 20-year life of the project will be less than or equal to that of landfill. The City reserves the right to reject any proposal whose cost would exceed that projected for operation of a sanitary landfill.

In terms of resource recovery, HPOWER would retrieve ferrous metals and provide the potential (largely dependent upon market conditions) for the future recovery of glass, aggregates, and non-ferrous metals such as copper and aluminum. It would not recycle paper but would burn it as a fuel, instead.

Policy: Require the safe disposal of hazardous waste (Transportation and Utilities, Objective B, Policy 7).

Discussion: HPOWER would not solve the problems of hazardous waste disposal and is not intended to do so. Hazardous waste would not be accepted at the HPOWER facility. Hence, other provisions would still have to be made for the disposal of such material.

Policy: Plan for the timely and orderly expansion of utility systems (Transportation and Utilities, Objective B, Policy 3).

Discussion: HPOWER's sale of electricity to the Hawaiian Electric Company would result in a reduced demand on HECO's power generation facilities. This, in turn, would postpone the time when additions to the facilities would be required and would lessen some of the burden of providing power for a rapidly growing population.

Policy: Evaluate the social, economic, and environmental impact of additions to the . . . utility systems before they are constructed (Transportation and Utilities, Objective D, Policy 4).

Discussion: Evaluation of the social, economic, and environmental impact of HPOWER is the purpose of this statement, but it should also be pointed out that all of these factors played a major role in screening the five technical proposals originally submitted, as well as in implementing changes in those proposals now under consideration (see Chapter II for a discussion of the procurement process being used). The social, economic, and environmental impacts have been considered not as an afterthought in the design of HPOWER, but rather as an integral part of the design process.

Policy: Establish economic incentives and regulatory measures which will reduce Oahu's dependence on petroleum as its primary source of energy (Energy, Objective A, Policy 2).

Policy: Support programs and projects which contribute to the attainment of energy self-sufficiency on Oahu (Energy Objective A, Policy 3).

Policy: Give adequate consideration to environmental, public health and safety concerns, to resource limitations, and to relative costs when making decisions concerning alternatives for conserving energy and developing natural energy resources (Energy, Objective A, Policy 5).

Policy: Work closely with the State and Federal governments in the formulation and implementation of all City and County energy-related programs (Energy, Objective A, Policy 6).

Discussion: Because of the many uncertainties that would face an entrepreneur attempting to construct and operate a private resource recovery facility, there is little likelihood that large-scale resource recovery would become a reality on Oahu in the near future without direct City involvement. In reality, the Honolulu Program of Waste Energy Recovery is a program which provides the economic incentives and guarantees necesary to induce private industry to construct such a facility. As indicated in Chapter II, HPOWER is the culmination of years of cooperative efforts between the State and County governments; and the Federal government has provided financial support for preliminary design work. The two bidders still competing for the HPOWER contract are the survivors of a rigorous screening process that has assured that all environmental, public health, and safety concerns have been met. Detailed investigations by the organizations that are at the forefront of resource recovery efforts in the United States and abroad have convinced them that the basic approach being proposed is the most economical and environmentally sound solid waste disposal method available. At the same time, it would generate about five percent of the electrical energy consumed on Oahu. The implications of this are discussed in the "Energy" and "Economic" sections of Chapter IV.

Policy: Support the increased use of operational solid waste energy recovery and other biomass energy conversion systems (Energy, Objective C, Policy 2).

Discussion: The proposed HPOWER project is clearly what the City Council had in mind when this policy was formulated, and it is entirely consistent with it.

Policy: Allocate efficiently the money and resources of the City and County in order to meet the needs of Oahu's anticipated future population (Population, Objective B, Policy 1).

Discussion: As mentioned previously, HPOWER is designed to lower the cost of solid waste disposal over a 20-year period, with visible economic benefits beginning to accrue to the City and County within five years. It should also be noted that, depending upon the financing method that is used, a portion of HPOWER capital costs could be funded privately. Hence, under some circumstances, capital risks could be partly assumed by private industry.

In terms of providing for population growth, HPOWER is designed to meet an existing solid waste disposal need rather than one that would be generated only by further population growth. However, the City and County has required a future expansion capability of 50 percent in all designs. This insures that HPOWER will be able to respond to increased solid waste disposal needs brought about by further population growth.

Furthermore, if "the development of Ewa as a major residential, retail, and office center" is to be encouraged (as called for in the General Plan, Physical Development and Urban Design Objective C, Policy 2), it can further be argued that HPOWER will have close proximity to future population growth.

Policy: Encourage the growth and diversification of Oahu's economic base (Economic Activity, Objective A, Policy 1).

Policy: Encourage the development of industries which will contribute to the economic and social well-being of Oahu residents (Economic Activity, Objective A, Policy 2).

Discussion: While not an industry as such, HPOWER is more labor-intensive than landfill, the only available alternative. It is expected to employ 50 to 75 people on the site, as well as to contribute indirectly to the employment of others in the recovered materials industry. Though the size of the future market for recovered materials is unpredictable at present, recycling does keep jobs in the local economy to the extent that it is a form of import substitution. The energy produced by HPOWER can also be viewed as an import substitution -- in this case for oil. One might also justifiably anticipate future development of ancillary industries devoted to the recycling of metals (e.g., aluminum or tin), glass, or aggregates.

Policy: Maintain an adequate supply of water for both future residents and future visitors (Transportation and Utilities, Objective B, Policy 1).

Policy: Maintain an adequate supply of water for future agricultural and industrial needs (Transportation and Utilities, Objective B, Policy 2).

Discussion: Unlike landfill, the proposed HPOWER systems require water. Since all of the possible HPOWER sites are situated within the Pearl Harbor Basin Groundwater Control Area established by the State Department of Land and Natural Resources, minimizing consumptive use of water is of considerable concern. The UOP system would utilize air-cooling and, by industrial standards, would consume a limited amount of water (about 100,000 gallons per day). The Amfac/C-E system would employ an evaporative cooling system consuming about one million gallons per day. Amfac/C-E proposes to divert this water from its present consumer, the Waipahu Sugar Mill (owned and operated by the Oahu Sugar Company, an Amfac subsidiary). The Amfac/C-E system, therefore, would not result in an increase in withdrawals from the aquifer. The benefit derived from use of an evaporative cooling system is that, in terms of power generation, plants employing this system are somewhat more efficient at extracting energy from the refuse than are those employing an air-cooled system.

Policy: Encourage the continuing development of Barbers Point as a major industrial center (Physical Development and Urban Design, Objective C, Policy 2).

Discussion: Clearly the establishment of an HPOWER plant in Campbell Industrial Park would be consistent with this policy of the City and County.

Policy: Preserve older communities through self-help, housing-rehabilitation, and other governmental programs (Housing, Objective C, Policy 6).

Policy: Encourage, wherever desirable, the rehabilitation of existing substandard structures (Physical Development and Urban Design, Objective E, Policy 2).

Policy: Preserve and restore, to the extent possible, buildings and sites of historic or cultural significance, including those on the State and National registers (Culture and Recreation, Objective A, Policy 3).

Policy: Encourage the restoration and preservation of early Hawaiian artifacts and landmarks (Culture and Recreation, Objective A, Policy 4).

Discussion: (1) Proposed sites at Campbell Industrial Park present no conflicts with the above policies. The sites contain no structures. Both sites do, however, contain numerous limestone sinkholes. The sinkholes which are present at the Malakole Road site that is under consideration are known to contain highly significant fossils. Based on recent studies for the U.S. Army Corps of Engineers, these remains have been found eligible for nomination to the National Register of Historic Places. However, the value of the site derives from the artifactual and paleontological remains found on it, and this value is recoverable by archaeological salvage. The necessary salvage work for the Malakole Road site has already been commissioned. It is our understanding that the eligibility of the area for the National Register will be withdrawn once excavations have been completed. Similar remains may be present on the Hanua Street site, but this has not been confirmed at the present time. If there are remains, the statements made above regarding the Malakole Road site may be extended to the Hanua Street site as well, and archaeological salvage would be necessary before construction of the proposed facility. There appears to be nothing on either Campbell site worthy of preservation in situ.

(2) The Waipio Peninsula site, which is predominantly fill area, presents no conflicts with the above policies. It contains no structures, nor is it known to have any historic or cultural significance.

(3) Use of the Amfac/C-E site would require the relocation of approximately 55 households now living in plantation housing. Such relocation is consistent with City and County plans calling for industrial use of the area. (The site is designated "Industrial" on City and County Detailed Land Use Maps.) Clearly Amfac, which has an ongoing commitment to the employees, would have a managerial interest in developing a plan acceptable to its workers.

The plantation housing is not up to modern standards, but rehabilitation is probably inappropriate as the site is destined for future industrial use. Though the houses date from the early 1900s and might, therefore, be eligible for the Hawaii Register of Historic Places, they are in other respects undistinguished, and modern construction has already destroyed the integrity of the structural groupings. If a structure were found to be significant, relocation of the building would be a viable mitigation option.

Policy: Preserve agricultural land in Ewa, in Central Oahu, and along the North Shore to ensure the continuation of sugar and pineapple as viable industries (Economic Activity, Objective C, Policy 3).

Discussion: With one exception, none of the sites under consideration contains fertile agricultural land. The Amfac/C-E site and the Hanua Street site are located in the State's Urban land use district. Though presently placed in the Agricultural district by the State Land Use Commission, the Malakole Road site has never been used for that purpose. Moreover, the low fertility of the soil there makes it unsuitable for agricultural use, and the site is designated on City and County Detailed Land Use Maps as industrial. The vast majority of the Waipio Peninsula site also appears unsuitable for agriculture, though it is so zoned. A portion of the land south of the existing Waipahu incinerator that has been designated as a "releasable area" by the Department of Defense contains reasonably good agricultural soils and is currently being used for sugar cane cultivation. The site configuration most likely to be used here would require the withdrawal of about five acres of this land from sugar cultivation. This is well under one percent of the acreage on the Waipio Peninsula that is being used by the Oahu Sugar Company, and its loss would not significantly affect the company's agricultural operations there. In addition to the fact that the HPOWER site itself would utilize little (if any) fertile agricultural land, it should also be noted that, by reducing landfill, HPOWER would greatly lessen the need to utilize arable land for that purpose.

Policy: Protect Oahu's scenic views, especially those seen from highly developed and heavily travelled areas (Natural Environment, Objective B, Policy 2).

Policy: Locate roads, highways, and other public facilities and utilities in areas where they will least obstruct important views of the mountains and the sea (Natural Environment, Objective B, Policy 2).

Discussion: All proposed sites are in areas already industrialized and none is close to a major road. The Amfac/C-E site is adjacent to a sugar mill, the Waipio Peninsula site is adjacent to an incinerator, and the two remaining sites are in an industrial park.

Policy: Protect Oahu's natural environment, especially the shoreline, valleys, and ridges, from incompatible development (Natural Environment, Objective A, Policy 1).

Policy: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, and water-recharge areas (Natural Environment, Objective A, Policy 2).

Policy: Protect the natural environment from damaging levels of air, water, and noise pollution (Natural Environment, Objective A, Policy 6).

Policy: Protect plants, birds, and other animals that are unique to the State of Hawaii and the Island of Oahu (Natural Environment, Objective A, Policy 7).

Policy: Prohibit major sources of noise and air pollution from residential areas (Physical Development and Urban Design, Objective A, Policy 7).

Discussion: Many environmental factors were considered by the City during its review and evaluation of the bidders' initial technical proposals. As a result, numerous modifications have been made in order to eliminate or reduce adverse effects. All of the HPOWER proposals must meet all City and County, State, and Federal environmental standards.

Policy: Design public structures to meet high aesthetic and functional standards and to complement the physical character of the communities they serve (Physical Development and Urban Design, Objective D, Policy 6).

Discussion: Though any HPOWER plant would look like the industrial facility it is, visual aesthetics have been a major design consideration. In addition to undergoing design review by the City, a plant constructed at Campbell Industrial Park would have to comply with design standards set by the park. Because of its location adjacent to residential units, the Amfac/C-E proposal is the most critical with respect to its visual appearance. All of the proposed plant designs call for an attractive vegetation screen to partially shield the facility from public view. Refer to the visual impacts section of Chapter IV for further discussion.

Policy: Design safe and secure public buildings (Public Safety, Objective B, Policy 3).

Discussion: Methods used to insure adequate safety would include:

- Fenced perimeter and controlled access.

- o Detection of explosive material prior to refuse processing.
- o Compliance with the Federal Occupational Safety and Health Act and all State Health Department standards.

THE HAWAII STATE PLAN

The Hawaii State Plan, adopted in 1978, consists of a series of broad goals, objectives, and policies which are to act as guidelines for future programs that will determine the growth and development of the State. Because the goals, objectives, and policies are broadly stated, it is difficult to say conclusively that HPOWER is or is not in conformance with any given policy, but three policies with which HPOWER seems clearly consonant stand out:

- o Accelerate research and development of new energy-related industries based on wind, solar, ocean, and underground resources and solid waste (Section 10, Objective B, Policy 4).
- o Promote the use of new energy sources (Section 18, Objective B, Policy 6).
- o Encourage re-use and recycling to reduce solid and liquid wastes and develop a conservation ethic (Section 15, Objective B, Policy 2).

STATE FUNCTIONAL PLANS

State Functional Plans are intended to provide more detail to the State Plan by addressing specific topics such as energy, water resources, conservation, and housing on a statewide basis. As defined in the 1978 Hawaii State Planning Act, a functional plan is to set forth "the policies, programs and projects designed to implement the objectives of a specific field of activity when such activity or program is proposed, administered, or funded by any agency of the State." Adoption of most of the State Functional Plans has been delayed until the 1981 Legislature. However, the 1980 State Legislature did adopt a State Energy Plan that calls for increased utilization and commercialization of alternate energy sources (Objective II.A) and for greater energy recovery from commercial and industrial processes (Objective III.A.(2). The proposed HPOWER project is consistent with both of these objectives.

LAND USE PLANS

Land use plans are much more specific than policy plans, primarily because they contain maps relating to the particular area of concern. For HPOWER, three relatively specific land use plans and controls affect the development of the project. These are: the State Land Use District Maps, the County Detailed Land Use Maps, and the County Zoning Maps.

STATE LAND USE

The State Land Use Regulations establish four different districts into which all lands in the State fall. Two districts, Urban and Agricultural, are relevant here.

The Hanua Street site (Campbell Industrial Park) and the Amfac/C-E site are within the Urban district. All types of urban activities are allowed within this district, and specific land use controls for the area are relegated to the County.

The Malakole Road site (Campbell Industrial Park) and the Waipio Peninsula site are within the Agricultural district. By law, this land must be utilized for agricultural purposes or left in open space unless a Special Use Permit is obtained for a reasonable use "other than those for which the district is classified" (Act 221, State Legislature, 1979). This permit is available from the County Planning Commission. If for an area greater than 15 acres, it is subject to further approval by the State Land Use Commission.

UOP, the only bidder that is considering use of the Malakole Road or Waipio Peninsula sites, has indicated that its facilities would fit on a 14- to 15-acre parcel. Hence, it appears that it will not be necessary to seek approval from the State Land Use Commission, a procedure which would consume six months. A special permit from the County Planning Commission will have to be applied for if either of these sites are chosen.

COUNTY DETAILED LAND USE MAPS

Prior to the adoption of the new Oahu General Plan in 1977, a series of land use maps covering most of the island of Oahu had been adopted as implementation tools for the old General Plan. Since the new General Plan contains no maps, the old maps were to be retained as guidelines for land use development until the Development Plans for each region of the island were adopted. These old maps, called Detailed Land Use Maps (DLUMs), represented a formal commitment by the City and County to allow the future development of the areas designated on the maps for the uses noted. DLUMs were adopted for essentially all urban areas, but large tracts of land in the State Conservation and Agricultural Districts were not always included in the mapping.

The DLUMs for both Campbell Industrial Park and the Amfac/C-E site call for industrial development and are therefore consonant with HPOWER proposals. There is no DLUM for the Waipio Peninsula site. The City's Waipahu incinerator already exists adjacent to this site.

COUNTY ZONING

The Hanua Street site (Campbell Industrial Park) is zoned I-2 (Heavy Industrial District) and therefore qualifies as a suitable location for an industrial project such as HPOWER.

Both the Malakole Road (Campbell Industrial Park) and the Waipio Peninsula sites are presently zoned AG-1 (Restricted Agricultural District). AG-1 zoning permits the construction of "public buildings" [Comprehensive Zoning Code, 1969, Article 4, Sec. 21-401 (a)(8)]. HPOWER is a public project; moreover, its construction on land acquired by the City and County will qualify its facilities as public buildings regardless of the exact contractual arrangement that is negotiated.

The Amfac/C-E site is zoned R-6 (Residential). R-6 zoning also permits the construction of "public buildings" [Comprehensive Zoning Code, 1969, Article 5, Sec. 21-501 (a)(5)]. Hence, an HPOWER facility there would be a permitted use.

OTHER PROGRAMS AND CONTROLS

FEDERAL FLOOD INSURANCE PROGRAM

Several years ago, the Federal Government established a flood insurance program intended to make insurance available to homes and establishments in flood-prone areas and to reduce the need for the Federal Government to provide massive disaster relief funds following major riverine and coastal floods. Although originally a voluntary program, Congress recently made it mandatory for any public jurisdiction or private entities that seek the use of federal funds for any purpose.

Flood Insurance Rate Maps for the island of Oahu prepared by the U.S. Department of Housing and Urban Development designate the Amfac/C-E and Campbell Industrial Park sites as areas of "undetermined, but possible, flood hazards." A portion of the Waipio Peninsula site is designated as an area of "minimal flooding."

AGRICULTURAL LANDS OF IMPORTANCE TO THE STATE OF HAWAII

In 1977, the State Board of Agriculture, concerned with the seemingly inexorable shift of land use from agricultural to other uses, adopted a system for identifying and classifying the state's best agricultural lands. It then mapped those lands for the entire state, classifying them as either: (1) Prime Agricultural Land, (2) Unique Agricultural Land, or (3) Other Important Agricultural Land. Land considered for classification was not necessarily in agricultural land use at the time, nor does the classification of land as agriculturally important necessarily consign that land to agricultural use. Rather, the classification system serves the purpose of guiding state decision makers in long-range planning. Only one of the sites under consideration contains any land that has been designated as being of agricultural importance; and that designation is limited to about five acres of the Navy surplus parcel on the Waipio Peninsula site.

SPECIAL MANAGEMENT AREA

Pursuant to the provisions of Chapter 205-A, Hawaii Revised Statutes, as amended by Act 176/1975, in November 1975, the Honolulu City Council adopted Ordinance No. 4529 establishing a Special Management Area (SMA). This ordinance contains maps which clearly define the geographic boundaries of the SMA, outlines procedures to be followed in granting permits for development within the management area, and establishes guidelines to be used in deciding upon the acceptability of a proposed action.

Of the areas that are under consideration for HPOWER, only the Waipio Peninsula site falls within the SMA. If it is selected, it will be necessary to obtain an SMA permit from the City Council. This, in turn, will require the Council to determine that the ". . . development will not have any substantial, adverse environmental or ecological effect except as such adverse effect is clearly outweighed by public health and safety." Chapter IV demonstrates that an HPOWER facility built on the Waipio Peninsula site would not have substantial adverse environmental effects. Chapter VI shows that HPOWER is superior to the alternative means of solid waste disposal that are available to the City and County of Honolulu.

CHAPTER IV.
PROBABLE IMPACTS OF THE PROPOSED PROJECT AND MITIGATION MEASURES

INTRODUCTION

Considering the tremendous number of interrelationships that exist between different physical, biological, and cultural units that make up the total environment, any subdivision of the ecosystem for the purpose of analysis and discussion is, to a certain degree, arbitrary. Nevertheless, some partitioning is essential if the task is to be kept within manageable proportions and to have a useful focus. For the purpose of this report, our discussion of the impacts of the proposed project has been divided into 12 sections, one for each of the following environmental subsystems.

- Geology, Soils, and Physiography
- Air Quality
- Noise
- Hydrology
- Biology
- Traffic
- Energy
- Aesthetics
- Historical, Archaeological, and Paleontological Resources
- Economics
- Sociology
- Communication

In general, each of these sections contains a brief description of project-related actions that would affect the particular subsystem, describes the changes that these actions would cause, and assesses the significance of the impacts as judged against accepted standards and criteria. Where appropriate, unusual measures which have been incorporated into the design to mitigate potential adverse effects are noted. When substantial adverse impacts remain despite the mitigative measures that are now proposed, additional means of reducing or eliminating them are given.

IMPACTS ON SOILS, GEOLOGY, AND PHYSIOGRAPHY

INTRODUCTION

In considering the effects that HPOWER might have on the physiography, soils, and geological resources of the different sites under consideration, our analysis focused on six broad topics or questions:

- o Are the soils and underlying geology of the sites suitable for a large industrial facility such as HPOWER? If they impose constraints on the design of the project, what are they?
- o Would industrial development of the sites prevent agricultural use of fertile soils?
- o Would implementation of the project lead to significant physiographic changes of the sites themselves or of areas from which borrow material would be obtained?
- o To what extent would construction of the project result in erosion/ sedimentation?
- o What effects, if any, would the HPOWER project have on valuable mineral resources?
- o Do any of the sites entail significant hazards from earthquakes or other geologic phenomena?

The remainder of this section discusses the results of our analysis.

OVERVIEW OF EXISTING PHYSIOGRAPHIC, SOIL, AND GEOLOGIC CONDITIONS

Campbell Industrial Park Sites

Campbell Industrial Park is situated on the elevated coral reef that makes up Oahu's Ewa plain. The makai side of this plain is quite flat with the ten-foot contour being a mile or more inland of Barbers Point. Sinkholes are numerous throughout the park and, except where they have been filled by human activities, are readily apparent at the surface due to the absence of a well-developed soil mantle (the area is designated "Coral Outcrop" by the U.S. Soil Conservation Service).

At the coastline the coral is up to 500 feet thick. Beneath and partially interleaved with it are relatively impermeable confining sediments of terrestrial origin. Underlying the sediment are the volcanic basalts that make up the core of the island. Because of the confining sediments, fresh water present in the basalt is partially buffered from the brackish water found in the overlying coral.

Waipio Peninsula Site

The north parcel of the Waipio Peninsula site is divided into two distinct physiographic areas. The first is a low-lying area (about three feet above mean sea level) of approximately five acres adjacent to Waipahu Depot Road. The second is a plateau composed primarily of incinerator residue and other fill material that stands an average of 12 feet above mean sea level. The sides of the plateau have a fairly steep slope. The underlying material consists of alluvium from the Waianae Mountains and Oahu's Central Valley.

The U.S. Soil Conservation Service designates the area as "fill land," a classification consistent with its use as a landfill. Judging from the soils present at the surface in surrounding areas, the soil underlying the fill material is probably a tropaquept (i.e., a poorly drained soil that had been subject to periodic flooding for irrigation), or a member of the Hanalei clay soil series.

The original soils on the southern portion of the Waipio Peninsula site (i.e., the Navy surplus area) are clays in the Honouluili and Keaau series. They have developed over underlying coral formations and are well suited for sugar cane cultivation. However, about two-thirds of this parcel have been used by the Oahu Sugar Company as a disposal area for effluent from the mud line originating at the Waipahu Sugar Mill. As a result, it has been covered to a depth of 20 to 25 feet with soil from the sugar mill's cane washing operation. No physical analysis of these deposits has been conducted, but cracks in the soil surface observed on our visits to the area indicate that some expansion and contraction does occur.

Amfac/C-E Site

The Amfac/C-E site lies 60 to 80 feet above sea level on moderately sloping land (about five percent) immediately above the coastal plain surrounding Pearl Harbor. It is underlain by the relatively permeable lavas of the Ko'olau series. The U.S. Soil Conservation Service has designated the soil as Waipahu silty clay.

IMPACTS AND CONSTRAINTS

Constraints Imposed by Soils or Geology

All Sites. A seismic risk map for the Hawaiian Islands was compiled by the U.S. Coast and Geodetic Survey (USC&GS) in 1949 as part of its work throughout the United States. It placed all of Oahu in zone 1, the next-to-lowest risk category. The USC&GS maps were later withdrawn because of objections to the way in which some of the zone boundaries were drawn. However, the map for the Hawaiian Islands has continued to be a part of the Uniform Building Code and is, therefore, the legal basis for establishing earthquake design criteria on Oahu. Furumoto *et al*. (June 1972:43) note that the seismic zoning established by the USC&GS and later incorporated in the Building Code is probably based on the April 2, 1868 earthquake centered in Ka'u on the Big Island. Had earthquakes centered in the "East Molokai Fracture Zone" been considered as well, the results may have been different.

As of this date, the Honolulu Building Code structural design standards are based on seismic zone 1 forces. At present, it appears that these will be followed by both the HPOWER bidders.

Campbell Industrial Park. Engineers familiar with soil and geologic conditions at Campbell Industrial Park report that, in general, the coral there has a bearing capacity of about seven tons per square foot (see for example, Raytheon Service Company, August 1979:5-11). This is sufficient for all of the facility designs under consideration. Because of the numerous sinkholes and solution channels that are present in the limestone at Campbell Industrial Park, it is normal practice to investigate the proposed location of each column footing by boring. Where voids in the coral are found, they are filled with concrete grout. The relatively large size of the proposed HPOWER facility has led all bidders to utilize slab-on-grade foundations with spread footings used where necessary for major pieces of equipment, especially those imposing large dynamic loads. This approach appears completely adequate.

Waipio Peninsula Site: Overview. Detailed information on the structural capabilities of the soils and geological strata at the Waipio Peninsula is available for the area now occupied by the Waipahu Incinerator (see Harding-Lawson Associates, January 1974) and the southern portion of the north parcel (Dames & Moore, June 1977). More generalized information regarding the geology of the remaining portions of the area within which the HPOWER facility could be located (i.e., the Navy surplus parcel, the incinerator-remnant parcel, and the remainder of the north parcel) is presented in Stearns and Vaksvik (1935: Plate 2). These studies indicate that the area is split into at least two distinct geologic zones. These are discussed below.

Waipio Peninsula Site: North Parcel. In 1977, the consulting engineering firm of Dames & Moore conducted a study of the soils and geology of the southern half of the Waipio Peninsula site's north parcel. While the northern half of that parcel undoubtedly has somewhat different geology than does the portion that was explored, most of the major conclusions reached in the aforementioned report probably apply to it as well. In view of this, it appears that proper foundation design for an HPOWER facility at this site will be critical and that the special provisions that would be required could add significantly to the construction and maintenance cost of a facility built there.

According to the Dames & Moore study (June 1977:6-7), the area lies in the course of one of the ancient streams that drained the Ko'olau Mountains and Schofield Plateau. About 120,000 years ago the ocean stood as much as 300 feet below its present level, and streams carved deep channels in the bedrock. As the sea level rose, sands and silts were deposited in the channels, and they sometimes became filled with silt and other swampy material. Next, the sea level rose more rapidly than sedimentation could occur and the area became flooded, resulting in marine and estuarine deposits. Finally, as the sea level stabilized, the area became swampy once again. In recent years the site was filled, first with silts and coral debris and then with thick layers of incompletely combusted trash.

The marine and estuarine deposits observed in the boring samples obtained by Dames & Moore extend from sea level to a depth of 75 to 130 feet. Their soft consistency is typical of material that has never been exposed above the water table. Beneath these deposits are alluvial materials. For the most part these extend to at least 200 feet below sea level, the maximum boring depth, but bedrock was encountered at -175 feet in the central part of the possible HPOWER site. The incinerator waste located close to the southern edge of the parcel was judged the most questionable material in terms of compaction because of the possible presence of voids which could lead to differential settlement. Artesian water with a head several feet above the ground surface was encountered at a number of points, and could also complicate construction.

The Dames & Moore report (June 1977:10-11) concluded that: "The proposed site is a very difficult one [for the Police and Fire Joint Training Facility] . . . Though these problems can be solved . . ., development and maintenance will be relatively expensive as it must be recognized that site conditions are not good."

The primary problem appears to be the great compressibility of the marine deposits and the potential this creates for differential settlement under the weight of the HPOWER structure and equipment. The differential settlement could overstress structural members, and is expected to be so substantial that it would extend beyond the property lines of the site.

Waipio Peninsula Site: Other Parcels. Boring data from the soil investigation conducted for the Waipahu Incinerator (Harding-Lawson Associates, January 1974) and data presented by Stearns and Vaksvik (1935:49) suggest that the remaining portions of the Waipio Peninsula site are geologically distinct from the portion described above. Instead of thick marine sediments, it is believed to be underlain by alluvium and coralline reef; the latter having much the same character as that found at Campbell Industrial Park. The types of foundations for an HPOWER facility on either these parcels or the Campbell Industrial Park sites would probably be similar. A detailed investigation of the soil characteristics in the area built up by effluent from the Oahu Sugar Company mud line will have to be undertaken before a specific approach to foundation design at this site can be determined. However, the information that is available suggests that the difficulties expected on the north parcel would not be encountered here.

Amfac/C-E Site. There are no unusual soils or geologic constraints at this site. Reinforced concrete spread footings would be used for the processing building, boiler building, stack, cooling towers, and turbine building. All other foundations would be slab-on-grade. All would meet applicable Building Code standards. Soils in the Waipahu series have a relatively high shrink-swell potential; hence, care will have to be taken in the design of the foundations to insure that an adequate thickness of non-expansive material is laid down beneath the slabs and footings.

Suitability of Soils Present for Agricultural Use

The coral outcrop at Campbell Industrial Park is not suitable for agricultural use (U.S. Department of Agriculture, Soil Conservation Service, August 1972:29, 31; Hawaii, State of, Department of Agriculture, January 1977).

The Waipahu silty clay that is present on the proposed Amfac/C-E site has inherently good agricultural potential. However, the site is zoned for urban use by both the State and County and contains existing development. This, together with the high land values and property taxes that go with it, effectively precludes any chance that the soils would be put to agricultural use. Almost all of the Waipio Peninsula site is fill land, unsuitable for agriculture. The only exception to this is a portion of the Navy surplus parcel south of the Waipahu Incinerator that is currently being used for sugar cane cultivation. The site configuration most likely to be used here would only require the withdrawal of about five acres from agricultural use. This is well under one percent of the acreage on the Waipio Peninsula that is being used by the Oahu Sugar Company. In light of this, it appears that the proposed HPOWER project would not significantly reduce the amount of good soil that is available for agricultural purposes.

In addition to the above, it should also be noted that the availability of HPOWER would reduce landfill requirements to a level far below what they would be if the City relied on an all-landfill disposal system. To the extent that this lessened the amount of prime agricultural land converted to landfill use, it would constitute a beneficial impact on the availability of land for agriculture.

Physiographic Changes

In general, none of the proposals would entail significant physiographic modifications to the sites. The Campbell Industrial Park sites might involve the importation of between 25,000 and 35,000 cubic yards of fill, but the source of this material, and, therefore, the borrow area that would be affected, is not known at this time. The relatively small volume of material that is involved suggests that this is of little concern.

Neither the Amfac/C-E site nor the north parcel of the Waipio Peninsula site would require the import of significant amounts of fill material. Hence, physiographic changes would be limited to grading necessary to insure adequate site drainage and provide suitable building pads and access roads. Much of the Navy surplus parcel is currently pocked with large, deep pits that have been used in the disposal of surplus effluent from the Oahu Sugar Company's mud line. Leveling of this area will be necessary. Depending upon the structural characteristics of the soils that are encountered there, some stripping of the existing cover may be desirable as well.

Erosion/Sedimentation

Because the HPOWER facility would have few slopes, a high percentage of impervious cover, and heavy landscaping on the remaining area, it would not result in any increase in erosion except, perhaps, for a very short period of time during the construction stage. Because of the flat terrain, erosion from the Campbell and Waipio Peninsula sites is probably quite low already. Hence, HPOWER would probably not reduce long-term erosion from those sites appreciably. Because of the dirt roadways now present on the site proposed by Amfac/C-E, present erosion levels from that area are almost certainly higher than would be the case if HPOWER occupied the area.

All applicable grading ordinances and erosion-control standards would be followed during construction. As a result, no significant increase in erosion is expected during that period.

Mineral Resources

Neither the Amfac/C-E nor the Waipio Peninsula sites contain any recoverable mineral resources. The limestone present at Campbell Industrial Park has been used as a construction material over the years. However, the two sites at Campbell that are under consideration are unlikely candidates for quarrying operations because of their location adjacent to dense urban development and their relatively low elevation. At any rate, the extensive excavations associated with development of the proposed Barbers Point Deep-Draft Harbor could make large amounts of the mineral available. Because of this, none of the proposals now under consideration would have a significant adverse effect on the availability of mineral resources.

On the positive side, the proposed HPOWER project would result in the recovery of significant quantities of metals and other materials from the refuse. The types of minerals that would be extracted from the solid waste stream by one or both of the HPOWER facilities under consideration include:

- o Light ferrous metals -- magnetic iron and steel, principally beverage and food cans, but also including small pieces such as nails, screws, and wire;
- o Heavy ferrous metals -- magnetic iron and steel in large pieces such as castings, tubings, and machine parts;
- o Aluminum -- primarily from beverage cans and containers, castings, utensils, etc.;
- o Mixed heavy non-ferrous metals -- including zinc, copper, brass, bronze, and other copper-based alloys from appliances, machine parts, and equipment;
- o Aggregate material -- inorganic materials such as glass, crushed stone, dirt, sand, and ceramic.

Based on data presented in the technical proposals submitted by bidders, the following amounts of material could be recovered by an 1,800-TPD HPOWER facility processing 540,000 tons per year:

Light ferrous	-- 19,000 tons per year
Heavy ferrous	-- 8,000 tons per year
Aluminum	-- 1,600 tons per year
Heavy non-ferrous	-- 450 tons per year
Aggregate	-- 80,000 tons per year

AIR QUALITY IMPACTS

INTRODUCTION

The HPOWER project involves the combustion of over a half-million tons of refuse per year. This fact alone made it clear from the outset that control of air pollutant emissions would be a major environmental concern. Because of this, an in-depth analysis was conducted of the impacts that each of the HPOWER alternatives under consideration would have on air quality. The studies focused on emissions and ambient air quality impacts of the major regulated pollutants emitted by the 1,800-TPD proposals. The initial concern was to determine whether or not Federal and State emission limitations and air quality standards would be exceeded as a result of the proposed action. This was accompanied by an assessment of the potential impacts of other, unregulated, pollutants likely to be emitted by an HPOWER facility.

Our discussion is divided into five major parts. The first describes relevant ground and atmospheric conditions in the vicinity of the potential HPOWER sites. The second discusses Federal and State regulations with which the proposed facility must comply. Next, emissions from the project are identified and their relationship to emission standards indicated. Sub-section four covers the impact that HPOWER would have on ambient air quality and focuses on areas where the various alternatives encounter problems meeting existing standards. The section concludes with a summary of the major impacts and a brief discussion of the kinds of measures that could be taken to lessen or avoid the problems that have been identified.

RELEVANT SITE CONDITIONS

Climate and Meteorology

All of the HPOWER sites under consideration are located on the leeward side of the Island of Oahu and experience similar weather conditions. Table IV-1 provides a brief summary of annual average data for the nearest recording stations. The only noteworthy differences between Campbell Industrial Park and the Waipahu area are that the latter appears to receive somewhat more rainfall and to experience winds of slightly lower velocity and with a more northerly component. Annual rainfall is of interest because of its role in particulate matter removal from the atmosphere, while wind speed and direction are determinants of pollutant concentration and potential receptors, respectively.

In order to perform the air quality modeling studies, stability wind roses were obtained for Barbers Point (1960-64) and the Honolulu International Airport (1960-64), the two nearest stations for which such data were available (National Climatic Center, 1960-64). Since stability data were not available for Waipahu, data on wind speed and direction collected on the Oahu Sugar Company Waipahu Sugar Mill site (Hawaiian Sugar Planters' Association, August 1979) were combined with stability data from Honolulu International Airport to produce a composite stability wind rose. For comparative purposes and in order to obtain more representative results, both the Honolulu International Airport and composite Waipahu wind roses were used in long-term modeling of the potential HPOWER sites in Waipahu.

Table IV-1. Summary of Long-Term Climatic Averages: Barbers Point and Waipahu.

		Barbers Point	Waipahu
Temperature (°F):	Mean Daily Maximum	81.0	83.5
	Mean Daily Minimum	69.0	66.2
Precipitation:	Annual Mean (inches)	20.3	27.5
Wind:	Prevailing Direction	NE	NNE
	Mean Speed (kts)	9.0	7.5

Sources: U.S. Air Force Technical Applications Center, "AWS Climatic Brief: Barbers Point, Oahu, Hawaii," undated.

Hawaiian Sugar Planters' Association. Weather Data Summary for Waipahu - Final Report, HSPA Experiment Station Project No. 5110, August, 1979.

For the modeling of short-term concentrations it was also necessary to synthesize 3-hour and 24-hour meteorological data sets representing "worst-case" conditions for both high and flat terrain in the vicinity of each site. The 24-hour flat-terrain data for Campbell Industrial Park were extracted from a previous Prevention of Significant Deterioration (PSD) Permit application (U.S. Environmental Protection Agency, Region IX, 1979) and were based on 1967 Barbers Point data processed through the CRSTER program (U.S. Environmental Protection Agency, July 1977). The 3-hour flat-terrain data were based on a PTMAX (U.S. Environmental Protection Agency, June 1973) analysis of each HPOWER technical proposal and a review of historical meteorological records. For the sites in Waipahu, the 24-hour flat-terrain data were based on Oahu Sugar Company wind speed and direction data combined with the Barbers Point CRSTER analysis for stability, mixing height, and temperature. Application of these latter data to the sites in Waipahu seems reasonable due to the relative proximity of Barbers Point and Waipahu. The 3-hour and 24-hour data for both areas that were used in the flat-terrain analysis are presented in Appendix A. With a few exceptions noted later in the text, the assumed conditions for the high-terrain analysis were stability class F and a wind speed of 2.5 meters per second.

Terrain

Campbell Industrial Park. The terrain in the Campbell Industrial Park area is generally flat and at an elevation of ten feet above mean sea level. Vegetation in the area is generally limited to grasses and some trees within the industrial park itself and sugar cane outside it. Going north, the elevation gradually increases to about 80 feet over a distance of some four kilometers, and then rises more sharply to over 1,000 feet about seven kilometers away. Immediately south of the park is the ocean; thus, the area is subjected to a land/sea-breeze regime during periods when regional winds are weakened or absent.

Waipahu. The Amfac/C-E site is in the middle of Waipahu town at an elevation of 60 to 80 feet above sea level. Hills to the north and west rise to over 500 feet within six kilometers. South and east of the site the land drops off to sea level at the shores of the West and Middle Lochs of Pearl Harbor. The other site under consideration in Waipahu, the Waipio Peninsula site adjacent to the existing City and County of Honolulu incinerator, is located about one kilometer south-southeast of the Amfac/C-E site. For air quality modeling purposes, the terrain surrounding it is essentially the same as that around the Amfac/C-E site.

Existing Air Quality

Campbell Industrial Park. The State Department of Health (DOH) maintains two monitoring stations at Campbell Industrial Park. One is located on the northeast side of the Standard Oil (Chevron) refinery; the other is at the Barbers Point Lighthouse situated in the southernmost part of the industrial park. (See Figure IV-1.) The DOH data indicate that all the National Ambient Air Quality Standards (NAAQS) are being met and that only the stringent Hawaii State 24-hour standard for particulate matter is being exceeded (see Table IV-10 and discussion of standards which follows). Recent 24-hour monitoring data from those stations are summarized in Table IV-2. Note that nitrogen dioxide has not been monitored since 1976.

Table IV-2. Summary of Department of Health Aerometric Data At Barbers Point, Oahu (1978-1979).

Pollutant	24-Hour Concentrations (ug/m³) Barbers Point Lighthouse 1978	1979[1]	Chevron Refinery 1978	1979[1]
Particulate Matter				
Range of Values	n/a	n/a	22-127	25-223
Mean Concentration	n/a	n/a	48	76
Sulfur Dioxide				
Range of Values	<5-7	<5	<5-40	<5-27
Mean Concentration	<5	<5	<5	<5
Nitrogen Dioxide[2]				
Range of Values	8-20		<5-29	
Mean Concentration	14		14	

1 January-September 1979.

2 January-March 1976 after which nitrogen dioxide monitoring ceased.

Source: Compiled by Morrow, February 1980: Table 8.

Because the two monitoring stations are situated relatively close to the elevated sources (i.e., the stacks) located at Campbell Industrial Park, it was our belief that the data which they provide might not be entirely representative of the actual ambient pollutant concentrations in the area resulting from the various industrial sources at the park. In view of this, pollutant concentrations resulting from existing sources were estimated using current emission data from the U.S. Environmental Protection Agency's (Region IX, April 1979) National Emissions Data System (NEDS), the meteorological data previously described, and the VALLEY dispersion model (U.S. Environmental Protection Agency, September 1977). Because of the limited and identifiable number of sulfur dioxide (SO^2) and nitrogen dioxide (NO^2) sources in the area, it was felt that these gases had the greatest likelihood of being successfully modeled. It was also felt that due to the "average" nature of the NEDS data and the probability distributions inherent in annual models, the use of a long-term model such as VALLEY would give the most reliable and meaningful results. VALLEY was therefore employed to estimate annual average concentrations of sulfur dioxide and nitrogen dioxide in the Campbell Industrial Park/Barbers Point area.

Figure IV-1 displays the receptor array covering the area and indicates the approximate locations of the DOH monitoring sites and proposed HPOWER sites. Table IV-3 compares the modeling results with the measured data for the area. It is evident that the modeling results in the vicinity of the DOH stations are of the same order-of-magnitude as the measured data. The modeling also indicates that the highest sulfur dioxide concentrations occur

Table IV-3. Comparison of Measured Versus Modeled Annual SO_2 and NO_2 Concentrations in the Vicinity of Campbell Industrial Park.

	Concentrations (ug/m^3)		
Pollutant	Annual Mean Measured at DOH Monitoring Stations	Modeled Range of Annual Means at DOH Monitoring Station[1]	Modeled Maximum Annual Mean
SO_2	<5[2]	2.9 - 18.1	78.0[4]
NO_2	14[3]	2.1 - 16.3	16.3[5]

[1] Monitoring station near Chevron refinery.

[2] Annual average for 1978.

[3] Annual average for 1976.

[4] At receptor #74 shown in Figure IV-1.

[5] At receptor #59 shown in Figure IV-1.

Source: Measured data from State of Hawaii Department of Health. Modeling by Morrow, February 1980: Table 9.

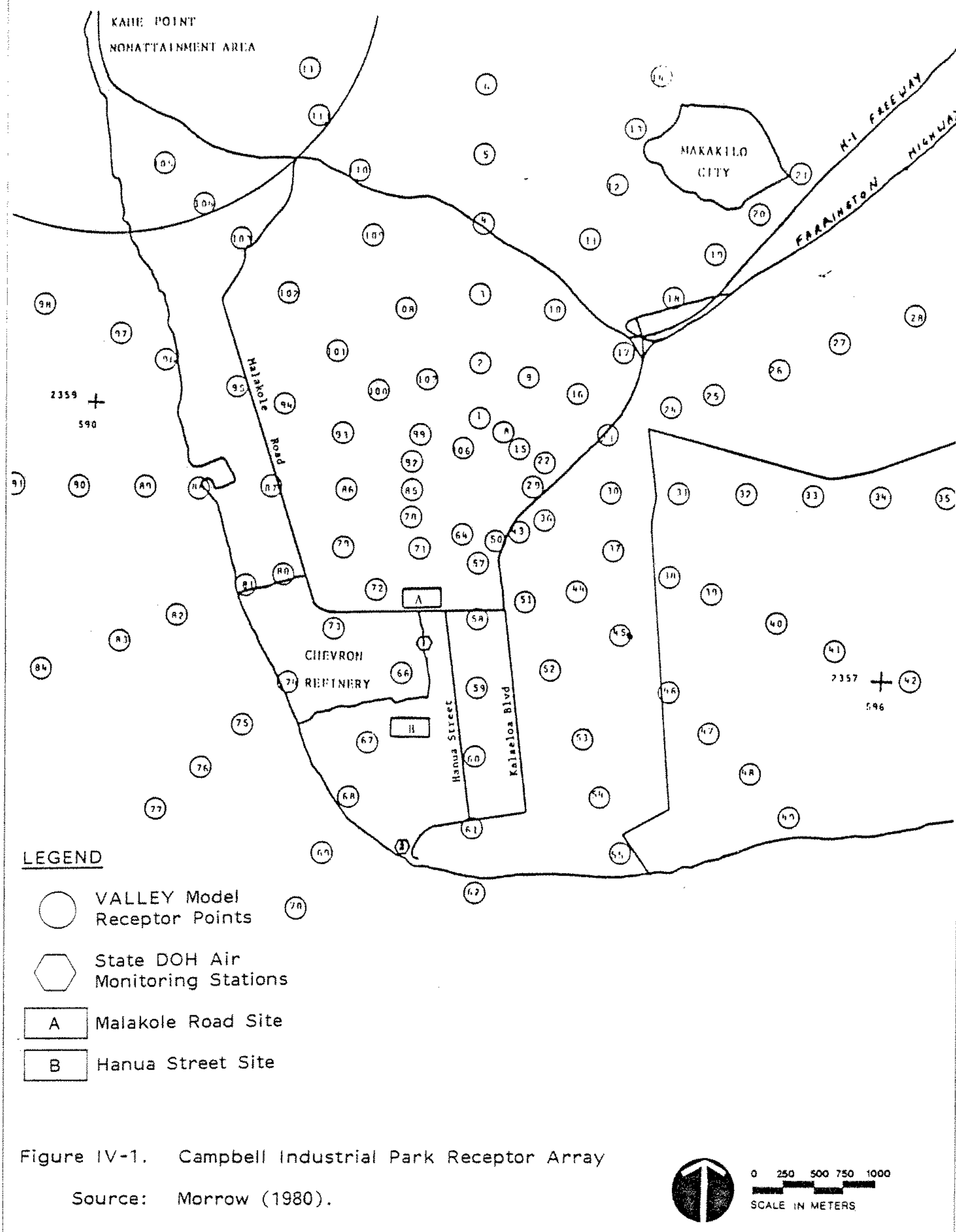


Figure IV-1. Campbell Industrial Park Receptor Array

Source: Morrow (1980).

right on the shoreline and about one kilometer offshore of the Standard Oil refinery (Points 74 and 75 in Figure IV-1). This is not surprising considering the prevailing northeast trade winds. The highest sulfur dioxide estimates appear to be just under the annual National Ambient Air Quality Standard of 80 micrograms per cubic meter (ug/m³).

Due to the shortage of historical data and the need to evaluate the short-term cumulative impact of HPOWER, the Campbell Industrial Park sources were modeled under "worst-case" meteorological conditions. The computer program PTMTP (U.S. Environmental Protection Agency, June 1973) was employed for this analysis. An array of potential receptor locations ranging from 0.5 to 10 kilometers downwind from the major sulfur dioxide and nitrogen dioxide sources in Campbell Industrial Park were input to PTMTP. The short-term version of VALLEY was also used to assess the impact of existing pollution sources in Campbell Industrial Park on the high terrain north of there. The results of these analyses are summarized in Table IV-4; they suggest that nitrogen dioxide standards are being met but that sulfur dioxide standards may already be subject to violation. For the 24-hour "worst-case," i.e., in flat terrain with tradewinds from the east-northeast, the high values appear to occur out over the ocean about 1.5 kilometers west-southwest of the industrial park; this explains why existing monitoring stations have recorded lower values. For the 3-hour "worst-case" situation, light sea breezes would be responsible for the highest concentration.

Table IV-4. Results of Short-Term Modeling of Existing Campbell Industrial Park SO_2 and NO_2 Sources.

Pollutant	Averaging Period (hour)	Maximum Concentration (ug/m³)	Downwind Distance (km)	Downwind Direction
SO_2	24[1]	141	4.5	NNE
	24	510	1.5	WSW
	3[1]	564	4.5	NNE
	3	1,055	0.5	NE
NO_2	24[1]	20	4.5	NNE
	24	64	1.5	WSW

[1] VALLEY Model - high terrain north of sites.

Source: Morrow, February 1980: Table 10 (revised 9 September 1980).

In the high terrain analysis the VALLEY model assumes six continuous hours of "F" stability and a 2.5 meter per second wind during the 24-hour period. However, a computer analysis of 23 years (1949-1971) of hourly meteorological data from the nearby Barbers Point Naval Air Station indicates that there were no instances (i.e., zero frequency) in which this occurred.

Therefore, in this analysis a south-southwest wind at 3.5 meters per second and "E" stability were used to model the "worst-case" condition.

Waipahu. There is no DOH monitoring station in Waipahu. The nearest station is at the Pearl City sewage treatment plant about three kilometers east of the Amfac/C-E and Waipio Peninsula HPOWER sites. Recent data from that station are presented in Table IV-5 and suggest that Federal and State air quality standards are presently being met. The VALLEY program was again used to model existing sources for comparison with the DOH data. Figure IV-2 depicts the receptor array for the Waipahu area and shows the approximate locations of the Pearl City monitoring sites, i.e., the sewage treatment plant (1976-present) and the pumping station (1974-1975). A comparison of the modeling and measured data is presented in Table IV-6. The modeling appears to underestimate both the sulfur dioxide and nitrogen dioxide concentrations; however, it should be kept in mind that "average" emission rates and a five-year "average" set of meteorological statistics have been applied to the sources. There could easily be significant deviations from year to year. Particularly in the case of sulfur dioxide, the estimates may be quite close to reality since the annual means for four out of the last five years of record were less than or equal to five ug/m^3. The order-of-magnitude difference between nitrogen dioxide concentrations predicted by the model and those measured at the Department of Health monitoring sites is less easily explained, but it may be due to an incomplete accounting by the model of nitrogen dioxide sources, especially of motor vehicles on Kamehameha Highway and the H-1 Freeway. Also note that the maximum sulfur dioxide and nitrogen dioxide concentrations predicted by the VALLEY model are located on the Waipio Peninsula, almost directly south of the Pearl City monitoring station. This is due to the prevailing northeast trade winds and the presence of HECO's Waiau power plant northeast of the peninsula.

Table IV-5. Summary of Department of Health Aerometric Data at Pearl City, Oahu (1978-1979).

	24-Hour Concentrations (ug/m^3)		
Pollutant	1976	1978	1979[1]
Particulate Matter			
Range of Values		20 - 81	20 - 48
Mean Concentration		37	33
Sulfur Dioxide			
Range of Values		<5 - 74	<5 - 63
Mean Concentration		15	10
Nitrogen Dioxide[2]			
Range of Values	11 - 44		
Mean Concentration	27		

[1] January-September, 1979.

[2] January-March, 1976 after which NO_2 monitoring ceased.

Source: Compiled from State of Hawaii Department of Health data (Morrow, February 1980: Table 11).

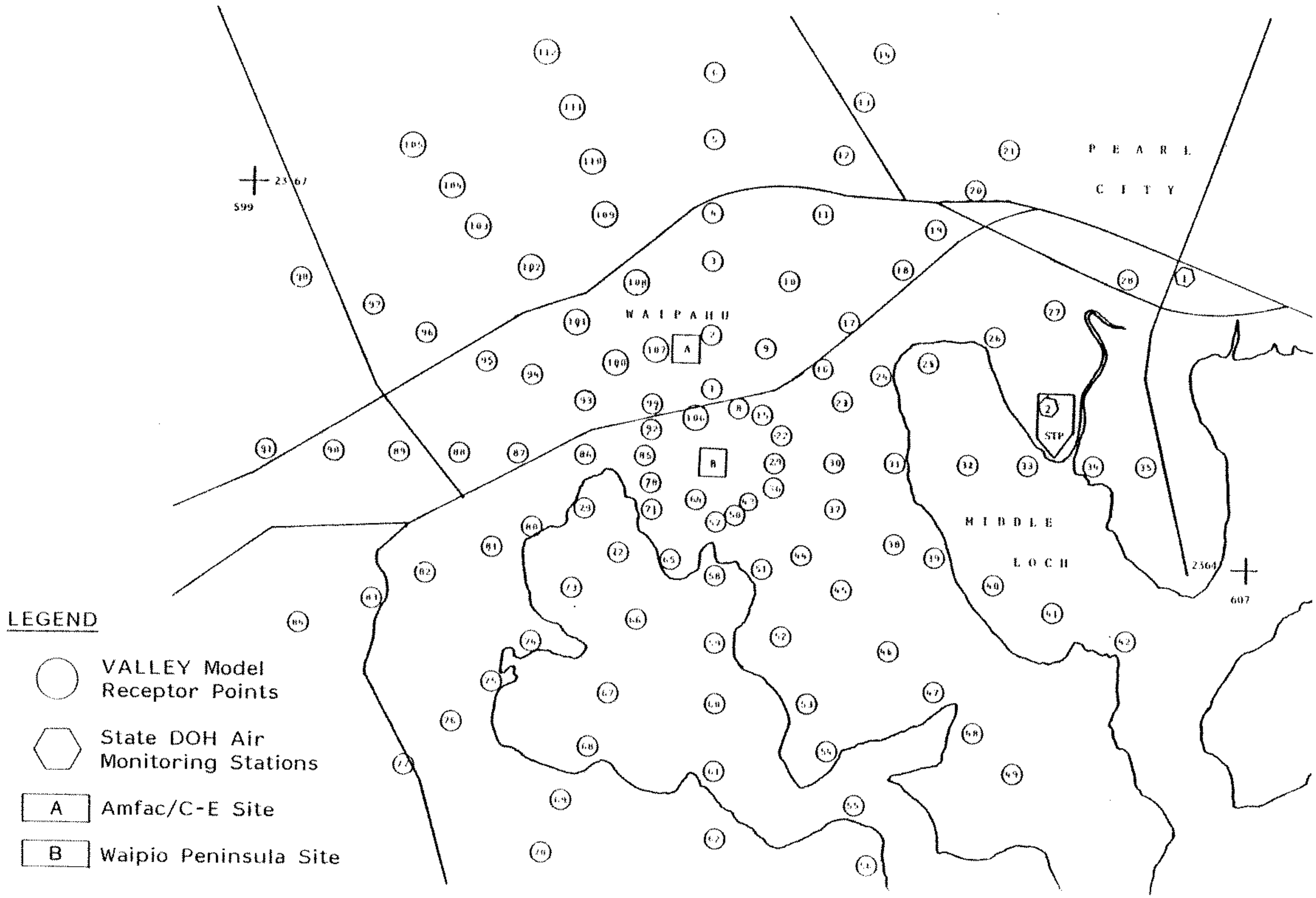


Figure IV-2. Waipahu Area Receptor Array.
Source: Morrow (1980).

Table IV-6. Comparison of Measured Versus Modeled Annual SO_2 and NO_2 Concentrations in the Pearl City and Waipahu areas.

	Concentrations (ug/m3)			
	Pearl City Monitoring Sites		Waipahu Area	
	Measured	Modeled	Measured	Modeled
Pollutant	Range of Annual Means	Range of Annual Means	Maximum Annual Mean	Maximum Annual Mean[3]
SO_2	<5-15[1]	0.5-1.7	n.a.	22 (5)
NO_2	22-27[2]	0.3-1.1	n.a.	14.8 (3.3)

[1] Data from 1974-1978.

[2] Data from 1973-1976.

[3] Values based on Honolulu International Airport (HIA) stability wind rose. Values in parentheses based on composite Waipahu wind rose described earlier. The maximums obtained using HIA data occurred at receptor 48 on Figure IV-2, using the Waipahu data they were at receptor 49.

Source: Measured concentrations compiled from State of Hawaii Department of Health data (Morrow, February 1980: Table 12).

Again, in order to assess the cumulative impact of HPOWER, it was necessary to perform short-term modeling of existing sulfur dioxide and nitrogen dioxide sources in the Waipahu area. The meteorological data presented previously and in Appendix A, together with an array of receptor locations 0.5 to 10 kilometers downwind of the Amfac/C-E and Waipio Peninsula sites, were input to the PAL program (U.S. Environmental Protection Agency, February 1978) to accomplish this analysis. The short-term mode of the VALLEY model was used to assess impact on the high terrain west and north of the sites. The results of this analysis are presented in Table IV-7; they suggest that all ambient air quality standards are being met except possibly for the State's 24-hour and 3-hour sulfur dioxide standards in high terrain. The annual frequency of wind speed and direction, and atmospheric stability necessary to generate maximum concentrations, based on the composite stability wind rose for Waipahu, is 0.0125. Since these atmospheric conditions rarely occur in increments that are at least six hours long (an assumption of the model), the actual probability of their occurrence is much less than this.

Table IV-7. Results of Short-Term Modeling of Existing Waipahu Area SO_2 and NO_2 Sources.

Pollutant	Averaging Period (hour)	Maximum Concentration (ug/m³)	Downwind Distance (km)	Downwind Direction
SO_2	24[1]	114	3.5	NW
	24	6	8.0	SSW
	3[1]	456	3.5	NW
	3	7	1.0	SSW
NO_2	24[1]	88	3.5	NW
	24	5	8.0	SSW

[1] VALLEY Model - high terrain northwest of sites.

Source: Morrow, February 1980: Table 13.

APPLICABLE REGULATIONS AND STANDARDS

Federal Regulations

New Stationary Source Performance Standards. The U.S. Environmental Protection Agency has promulgated standards of performance for new stationary sources which include maximum allowable emission rates for specific pollutants. These are found in 40 CFR (Code of Federal Regulations) Part 60, and are established for specific types of facilities. The HPOWER proposals are only subject to Subpart E which establishes a particulate matter (PM) emission rate and applies to incinerators capable of firing more than 50 tons per day of municipal refuse. The allowable emission rate for PM is set at 0.08 grains per dry standard cubic foot corrected to 12 percent carbon dioxide.

Prevention of Significant Deterioration (PSD). The U.S. Environmental Protection Agency has also promulgated regulations intended to prevent significant deterioration in the quality of air in areas where the National Ambient Air Quality Standards (NAAQS) are presently being met. With the exception of two discrete and quite limited areas, the State of Hawaii falls in this category. Under these regulations (40 CFR Part 52.21), increments of maximum allowable air quality degradation have been specified for Class I, II, and III areas. Class I areas have the most stringent increments and are intended to remain most pristine. Class II areas are permitted significantly more degradation, and the island of Oahu has been placed in Class II. Class III areas are allowed even greater air quality deterioration and would be appropriate for heavily industrialized regions. The Class II increments applicable to the HPOWER project are presented in Table IV-8. It is important to note that portions of the sulfur dioxide increments in the Campbell Industrial Park area have already been "consumed" in the sense that two PSD Permits involving oil refineries there are currently being processed by the U.S. Environmental Protection Agency; thus, the full increments as shown in Table IV-8 are not available to the HPOWER project.

Table IV-8. Prevention of Significant Deterioration Increments: Class II Areas.

Pollutant	Averaging Period	Maximum Allowable Increase (ug/m^3)
Particulate Matter	Annual Geometric Mean	19
	24-Hour Maximum	37
Sulfur Dioxide	Annual Arithmetic Mean	20
	24-Hour Maximum	91
	3-Hour Maximum	512

Source: 40 CFR 52.21.

Whether or not a particular air pollution source is subject to PSD review is currently determined by (1) the nature of the source and, (2) its "potential," i.e., uncontrolled, emissions. In the case of HPOWER, the facility is subject to review because it falls into the category of "municipal incinerators capable of charging more than 250 tons of refuse per day," and has the potential to emit more than 100 tons per year of pollutants regulated under the Clean Air Act. Pursuant to these regulations the U.S. Environmental Protection Agency must insure that the Best Available Control Technology (BACT) has been employed on the HPOWER facility, and in doing so it may impose emission limitations more stringent than those specified in the New Stationary Source Performance Standards.

Nonattainment Areas. The U.S. Environmental Protection Agency (EPA) has designated a two-kilometer-radius circle around the Hawaiian Electric Company power plant at Kahe Point as a nonattainment area for sulfur dioxide (44 Federal Register 53084, September 12, 1979). Before the U.S. Environmental Protection Agency will approve any proposed new source of air pollution outside the nonattainment area, the applicant must demonstrate that its emissions would not have a "significant" impact on that nonattainment area. In order to define "significant" impact, EPA has established significance levels which, if not exceeded, may exempt the proposed new source from emission offset rules (44 Federal Register 3283, January 16, 1979). In the case of HPOWER, it must be shown that the increment of degradation in the nonattainment area attributable to HPOWER is less than or equal to the specified significance levels. The significance levels are shown in Table IV-9.

Table IV-9. Nonattainment Areas' Significance Levels: Sulfur Dioxide.

Averaging Period	Concentration (ug/m³)
Annual	1.0
24-Hour	5.0
3-Hour	25.0

Source: 44 Federal Register 3283, January 16, 1979.

National Ambient Air Quality Standards. Pursuant to the Clean Air Act, the U.S. Environmental Protection Agency has promulgated ambient air quality standards (40 CFR Part 50). They are summarized in Table IV-10. These standards essentially address cumulative impact; thus, HPOWER's emissions in combination with emissions from existing and approved sources and natural background must not result in violations of NAAQS.

State of Hawaii Regulations

Incinerator Emission Standard. The State of Hawaii Department of Health (DOH) has promulgated a particulate emission standard of 0.20 pound per 100 pounds of refuse charged (Chapter 43, Public Health Regulations). This standard applies to the stack emissions of the HPOWER facility.

Process Industries Standard. The DOH has also promulgated an emission standard for process industries which is graduated according to the weight of material that is processed per hour. For an HPOWER proposal which includes RDF processing, a maximum allowable particulate emission rate of 40 pounds per hour is applicable (Chapter 43, Public Health Regulations).

Hawaii Ambient Air Quality Standards. The DOH-promulgated ambient air quality standards are contained in Chapter 42 of the Public Health Regulations; they are summarized in Table IV-10. The Hawaii Standards are substantially more stringent than the National Ambient Air Quality Standards and were intended to prevent air quality deterioration by being set at levels at or only slightly above the pollutant levels existing in 1971.

EMISSIONS

Qualitative Analysis

Because of the heterogeneous nature of municipal refuse, there is a large variety of toxic and nontoxic substances emitted from refuse-handling facilities and the rates of emission display significant day-to-day variability. Table IV-11 presents in a very general fashion the types of emissions resulting from such facilities. Sanitary landfills have been included for comparison. Table IV-12 lists trace elements commonly found in municipal refuse

Table IV-10. Summary of State of Hawaii and Federal Ambient Air Quality Standards.

Pollutant	Sampling Period	Federal Standards Primary[1]	Federal Standards Secondary[2]	State Standards
Suspended Particulate Matter (Micrograms per Cubic Meter)	Annual Geometric Mean	75	60	--
	Annual Arithmetic Mean	--	--	55
	Maximum Average in Any 24 Hours	260	150	100
Sulfur Dioxide (SO_2) (Micrograms per Cubic Meter)	Annual Arithmetic Mean	80	--	20
	Maximum Average in Any 24 Hours	365	--	80
	Maximum Average in Any 3 Hours	--	1,300	400
Carbon Monoxide (CO) (Milligrams per Cubic Meter)	Maximum Average in Any 8 Hours	10	10	5
	Maximum Average in Any 1 Hour	40	40	10
Hydrocarbons (HC) Non-Methane (Micrograms per Cubic Meter)	Maximum Average in Any 3 Hours	160	160	100
Photochemical Oxidants (Micrograms per Cubic Meter)	Maximum Average in Any 1 Hour	240	240	100
Nitrogen Dioxide (NO_2) (Micrograms per Cubic Meter	Annual Arithmetic Mean	100	100	70
	Maximum Average in Any 24 Hours	--	--	150
Lead (Micrograms per Cubic Meter)	Calendar Quarter	1.5	1.5	N/A

[1] Intended to prevent adverse effects on public health.

[2] Intended to prevent adverse effects on public welfare including effects on comfort; visibility, vegetation, animals, aesthetic values, and soiling and deterioration of material.

Source: Compiled by Morrow, February 1980: Table 3.

Table IV-11. Major Pollutants Associated With Disposal of Municipal Solid Waste.

PROCEDURE	POLLUTANTS
Mass Burning With Resource Recovery	
Incineration with energy recovery	Particulates Sulfur oxides Nitrogen oxides Hydrocarbons Viruses and bacteria Volatile metals Volatile organic compounds
Materials recovery	Dust
Resource Recovery	
Front-end processing	Volatile organic compounds Viruses and bacteria Dust
Energy recovery from refuse derived fuel (RDF)	Particulates Sulfur oxides Nitrogen oxides Hydrocarbons Viruses and bacteria Volatile metals Volatile organic compounds
Landfill	
	Carbon dioxide Methane Hydrogen sulfide Dust Viruses and bacteria

Source: After U.S. Environmental Protection Agency, August 1979a.

and which can be expected to become part of incinerator emissions. It also indicates which trace elements have been reported to occur at higher concentrations in refuse derived fuel (RDF) than in coal. Municipal incinerators have also been implicated as possible sources of dioxins, a group of chlorinated hydrocarbons, but the significance of the very low level of emissions has yet to be determined.

Table IV-12. Trace Elements in Urban Refuse.

Major Elements Average Content (1,000 - 100,000 ppm)	Minor Elements Average Content (1 - 999 ppm)	
Aluminum	Antimony*	Manganese
Calcium	Arsenic	Mercury*
Chlorine	Barium*	Molybdenum
Iron	Beryllium	Nickel*
Magnesium	Bismuth*	Niobium
Phosphorous*	Boron	Platinum
Potassium	Cadmium*	Ribidium
Silicon	Cesium	Selenium
Sodium*	Chromium*	Silver*
Sulfur	Cobalt	Strontium
Titanium*	Copper*	Tantalum
Zinc*	Germanium	Tin*
	Gold	Tungsten*
	Lead*	Vanadium
	Lithium*	Zirconium

* Pollutants found to have higher concentrations in refuse derived fuel (RDF) than in coal.

Source: U.S. Environmental Protection Agency, August 1977; Freeman, H.M., November 1978.

Quantitative Analysis

Criteria Pollutants. Projected emission rates for all pollutants covered by Federal or State emission and/or ambient air quality standards (i.e., criteria pollutants) were provided in bidders' technical proposals. With respect to emissions by HPOWER, only particulates are covered by existing emission standards, and both HPOWER proposals show particulate emission rates only one-half those allowable under Federal and State regulations.

Average annual emissions based on the emission rates provided were calculated for this study and are summarized in Table IV-13. Some comment is in order regarding these estimates. First, as indicated by the range of CO and HC values, emissions of these pollutants are highly variable and dependent on combustion conditions. In a properly maintained and operated furnace, CO and HC emissions are expected to be negligible (Freeman, November 1978). In fact, the HC emission rates used by both of the bidders were as much as one to two orders of magnitude greater than the range of values found in a recent EPA-funded literature search (Rinaldi, May 1979); thus, the bidders may have been overly conservative in their estimation of HC emissions. Table IV-13 also indicates the percentage contribution

Table IV-13. Estimated Annual Emissions of Regulated Pollutants from the Proposed HPOWER Facilities.

Pollutant	Emissions (Tons Per Year) Amfac/C-E	UOP
Particulate Matter[1]	640	330
Sulfur Oxides	800[2]	840
Nitrogen Oxides	1,400	940
Carbon Monoxide	840	150
Hydrocarbons	200	110

[1] The approximate contribution (in percent) of the major sources of particulate emissions for each of the proposed facilities is as follows:

Source	Amfac/C-E	UOP
Boilers	90.2	>99.0
RDF Processing	7.3	0.0
Fugitive dust from MSW receiving and RDF Handling	2.5	<1.0

[2] Based on estimated emission rate of 2.5 pounds per ton of raw refuse given in AP-42 (U.S. Environmental Protection Agency: August 1977a).

Source: Morrow, February 1980: Table 17 (revised July 1980).

of each of the three major sources of particulates associated with the HPOWER facility. For comparison purposes and to provide some standard against which the significance of the impact can be judged, the latest DOH summary of emissions in the City and County of Honolulu is presented in Table IV-14.

Trace Elements. While earlier investigations of municipal incinerator stack emissions have been conducted (Carrotti, 1974; 1969), the world-wide depletion of fossil fuels and the anticipated increase in the number of refuse-fired power plants have sparked increased interest in characterizing these emissions. Much of the work has focused on the particulates and their toxic components, both viable and nonviable (see, for example, Jackbo, October 1977; Greenberg, May 1978; Gelembiewski, June 1979).

The previously cited literature survey by Rinaldi (May 1979) provides a good summary of the possible trace element composition of particulate emissions

Table IV-14. Summary of Estimated Air Pollutant Emissions in the City and County of Honolulu as of May 1978.

Source Category	Sulfur Oxides	Particu-lates	Carbon Monoxide	Hydro-carbons	Nitrogen Oxides
	Type of Emissions (Tons Per Year)				
Transportation					
Motor Vehicles	823	2,136	235,696	31,252	18,141
Aircraft	472	2,021	8,702	5,933	1,939
Vessels	1,323	180	328	254	1,096
Gasoline Handling & Evaporation	0	0	0	2,464	0
TOTAL:	2,618	4,337	244,726	39,903	21,176
Fuel Combustion in Stationary Sources					
Residential, Commercial, Institutional	572	163	53	40	559
Industrial	79,421	7,866	1,877	3,372	19,391
Steam-Electric Utilities	37,976	2,109	59	272	19,523
TOTAL:	117,969	10,138	1,989	3,684	39,473
Solid Waste Disposal					
Open Burning	30	1,578	4,054	1,256	230
Incineration	76	43	900	554	62
TOTAL:	106	1,621	4,954	1,810	292
Industrial Process Losses	5,211	14,956	659	21,830	1,406
Agricultural Field Burning	0	4,383	15,471	5,157	516
GRAND TOTAL	125,908	35,435	267,799	72,384	62,863

Source: State of Hawaii, Department of Health.

from facilities of the type under consideration for HPOWER. This summary is presented in Table IV-15. Several important points must be made about the data that are given.

- They represent the concentrations of elements in controlled emissions, i.e., those particulates that have passed through electrostatic precipitators. Thus, the total mass of particulates produced by combustion has been reduced by 97 to 99 percent.

- The one to three percent of the particulates that does escape into the atmosphere has the elemental composition shown in Table IV-15.

- Because of differences in particle size, shape, mass, and resistivity, the ESPs do not remove all elements with the same efficiency. Hence, the relative amounts of different elements present are different in controlled emissions than in uncontrolled emissions.

- In compiling the data, Rinaldi, et al. combined data from facilities firing only RDF and those firing a combination of RDF and coal into one category. Thus, the data summarized in Table IV-15 under the heading of "RDF/Coal Co-Fired" are representative of a situation in which fossil fuels are fired with the refuse. This probably explains the unexpectedly high iron and arsenic concentrations that were reported since particulates generated from the combustion of a coal/refuse combination are significantly richer in those elements than are particulates resulting from the combustion of refuse alone. In reality, iron and arsenic emissions from an RDF-fired facility are not expected to differ significantly from those released by a mass-burning facility. Most of the other trace element concentrations in particulates from coal firing are of the same order of magnitude or somewhat lower than those typical of particulate emissions from refuse-fired systems.

Because of the foregoing, readers should exercise caution when attempting to draw conclusions from the trace element data.

Applying the concentrations from Table IV-15 to the projected boiler emissions from the facilities that have been proposed by Amfac/C-E and UOP yields the estimated annual emissions displayed in Table IV-16. Note that, with the exception of lead, zinc, and possibly iron and tin, potential emissions of each of the trace elements is less than one ton per year.

Rinaldi (May 1979) did not provide emission rates for mercury, but work by the U.S. Environmental Protection Agency (August 1977), Ball (June 1979), and Gelembiewski (June 1979) indicates that mercury in both elemental and combined form has been found in incinerator emissions. One recent study of a small (two 120-TPD units) waterwall boiler- and ESP-equipped resource recovery facility located in Braintree, Massachusetts found mercury emissions to be 20 times the 1.4 pounds of mercury per 1,000 tons of refuse rate suggested by the Environmental Protection Agency as being typical of municipal waste incineration systems (Freeman, November 1979). Over 99 percent of that mercury was in vapor form which historically has not been addressed in most environmental assessments of waste incineration. The mercury emissions that actually occur from the proposed HPOWER facility would depend largely on the mercury content of Honolulu refuse, and there is no evidence that its mercury content is unusually high.

Table IV-15. Concentrations of Trace Elements in Particulate Emissions from Solid Waste Resource Recovery Systems.

Element	Concentration (ug/g) Mass Burning	RDF/Coal Co-Fired
Antimony	460 - 1,000	2 - 180
Arsenic	50 - 100	See note 1
Barium	270 - 540	no data
Bromine	350 - 1,200	no data
Cadmium	670 - 1,150	0.2 - 10
Chlorine	>10,000	no data
Chromium	130 - 260	60 - 100
Cobalt	5 - 50	4 - 40
Copper	620 - 800	50 - 280
Iron	2,000 - 2,130	See note 1
Lead	18,100 - 34,200	4,470 - 18,400
Manganese	140 - 490	110 - 140
Nickel	no data	20 - 190
Selenium	<30	20 - 430
Silver	50 - 110	no data
Tin	1,400 - 5,000	260 - 870
Zinc	>10,000	4,360 - 17,200

[1] As indicated in the text, some of the RDF-fired facilities on which this summary is based co-fire coal with refuse. The coal can contribute high levels of iron and arsenic to the particulate emissions. Hence, the emission levels given in the Rinaldi report for these two pollutants are significantly higher than those that would result from a facility fired only by RDF. In fact, iron and arsenic emissions from an RDF-fired facility are not expected to differ significantly from those released by a mass-fired facility.

Source: Rinaldi, May 1979.

Finally, it should be noted that existing emissions data indicate that maximum trace element concentrations from energy recovery systems such as HPOWER are lower than those from municipal incinerators (Rinaldi, May 1979). This is possibly due to cooling of the exhaust gases during the energy recovery phase which in turn may promote condensation of volatile elements which can then be captured by the electrostatic precipitators. Consequently, to the extent that HPOWER is substituted for the existing Waipahu Incinerator, it could actually bring about a decrease in trace element concentrations resulting from the refuse that is already being burned at that location.

Table IV-16. Estimated Range of Trace Element Emissions from the Proposed HPOWER Facilities.

	Annual Emission (Tons per Year)[1]	
Element	Amfac/C-E	UOP
Antimony	<0.01 - 0.10	0.15 - 0.33
Arsenic	See Note 2	0.02 - 0.04
Barium	No Data	0.08 - 0.18
Bromine	No Data	0.12 - 0.40
Cadmium	<0.01	0.22 - 0.38
Chlorine	No Data	>3.30
Chromium	0.04 - 0.05	0.05 - 0.09
Cobalt	<0.01 - 0.03	0.01 - 0.02
Copper	0.03 - 0.16	0.21 - 0.27
Iron	See Note 2	0.65 - 0.70
Lead	2.60 - 10.50	6.00 - 11.50
Manganese	0.07 - 0.14	0.05 - 0.16
Nickel	0.01 - 0.11	No Data
Selenium	0.01 - 0.25	<0.01
Silver	No Data	0.02 - 0.04
Tin	0.15 - 0.50	0.46 - 1.65
Zinc	2.50 - 10.00	>3.30

[1] Based on estimated throughput of refuse provided in bidders' technical proposals and trace element concentrations given in Table IV-15.

[2] As indicated in the text, the study on which the emission rates used in calculating these figures were based included both RDF only and RDF plus coal-fired facilities, and emission rates were not provided separately for the two types of fuel. As indicated in footnote 1, Table IV-15, the emission estimates for iron and arsenic that are given in Rinaldi's report are probably significantly higher than would actually be produced by HPOWER. It is our belief that actual emissions of these trace elements by an RDF system would be less than or equal to those reported for mass-burning systems.

Source: Morrow, February 1980: Table 20; based on concentrations reported in Rinaldi, May 1979, and summarized in Table IV-15.

Other Organic and Inorganic Compounds. Incinerators have been suspected as possible sources of some polynuclear aromatic hydrocarbons (PAH) that have been of concern because of their potential carcinogenicity. Data on emissions of PAH is extremely limited, but what is available indicates that concentrations are very low, in fact at the limit or below the range of reliable quantitative analysis. It should be noted that wet scrubbing for particulate control has also been found to be very effective in reducing PAH levels (Rinaldi, May 1979). However, the relative inefficiency of wet scrubbing for particulate removal has led to the increasing use of ESPs which, while they are very efficient at particulate removal, do not have any appreciable effect on water-soluble gases and vapors.

Hydrogen chloride (HCl) is another chemical species of possible concern since its principal source is plastics, especially polyvinyl chloride (PVC), and plastics were reported to comprise some 2.8 percent of municipal refuse in 1975 (Vaughan, June 1975). One recently-reported study of two ESP-equipped, steam-generating, refuse-fired plants found that HCl emissions averaged about four pounds per ton of refuse fired, and that the chloride content of the refuse was about 0.2 percent (Rollins, November 1979). This was consistent with other studies in which chloride content ranged from 0.13 to 0.32 percent by weight (Jackson, 1974).

Based on an average emission rate of four pounds per ton, the 1,800-TPD HPOWER alternative would generate about 1,100 tons per year (TPY) of HCl. There are presently no U.S. emission standards for HCl, but West Germany, with its much greater concentration of industry, population density, and air pollution problems, has established a standard of six kilograms per hour (13 pounds per hour) (Federal Republic of Germany, August 1974). For comparison, the 1,800-TPD HPOWER alternative would emit approximately 256 pounds per hour based on the aforementioned average emission rate. As noted earlier, while emissions and emission rates are informative, the real significance of impacts can only be determined by estimating downwind concentrations and duration of exposure of susceptible animals, plants, and materials. This will be discussed in the following section.

Asbestos fibers have also been found in the emissions from a refuse processing plant, specifically from the air classifier at an RDF plant (U.S. Environmental Protection Agency, August 1979b). The average emission rate was 0.10 fiber per cubic centimeter of air. While there is no ambient standard for asbestos, the industrial standard is five fibers per cm^3, which applies only to fibers larger than five micrograms; so comparison of the above emission rate with the industrial standard is not entirely valid. However, the results of the EPA study do provide an order-of-magnitude indication of the emission rates that might be expected.

Bacterial Emissions. The Midwest Research Institute has conducted a series of investigations into the bacterial emissions from different types of waste treatment facilities (U.S. Environmental Protection Agency, August 1979b). High-volume and Andersen samplers were set up on the upwind and downwind sides, as well as inside municipal refuse incinerators, refuse processing plants, and other waste treatment facilities. Relevant conclusions reached in the study were that:

- o Airborne bacterial levels, both in-plant and at the property line, were generally higher for the RDF plant than for the other types of waste facilities that were tested.

- o A fabric filter system (baghouse) applied to the primary source of dust emissions (air classifier) at the RDF plant can significantly reduce particulate and bacterial concentrations.

- o There is insufficient information, data, or relevant standards to determine the levels of microbiological contaminants that might be considered "hazardous."

AMBIENT AIR QUALITY IMPACTS

Criteria Pollutants

As noted earlier in this section, Hawaii's Ambient Air Quality Standards are substantially more stringent than the Federal standards; thus, in the following analysis and discussion any reference to violations of the Federal standards will automatically mean that the State's standards would also be exceeded.

The very restrictive Hawaii Ambient Air Quality Standards were adopted in 1971 with the idea that they would prevent significant deterioration in the quality of the air as it was believed to exist in 1970. In short, they perform functions that are split at the Federal level between the National Ambient Air Quality Standards and the PSD regulations. Unfortunately, the data on which the 1970 estimates of "existing" air quality were based were rather limited. As a result, over the succeeding years unanticipated problems have arisen because of the stringent standards. Areas believed to be meeting the standards when they were first promulgated were later found to be in violation even though no new sources had been constructed in the interim. Of even greater concern was the fact that in some cases large sources employing the best available control technology (BACT) for air pollution control would still be unable to meet some of the State standards. As a result, the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some modification must be made if the State is to avoid the untenable position of trying to enforce standards which cannot be met with current control technology. Hence, it now seems likely that the State standards will be loosened and that the HPOWER project would comply with the amended standards.

Annual Averages. Using the previously mentioned stability wind roses and the VALLEY model, annual total suspended particulate, sulfur dioxide, and nitrogen dioxide concentrations were estimated for each of the sites under consideration. The results are displayed in Tables IV-17 and IV-18. Concentrations were estimated on both an individual and cumulative basis for comparison with PSD increments and ambient air quality standards, respectively. Locations are indicated because differences in stack heights and operating parameters result in maximum concentrations occurring at different locations; thus, the area of maximum concentration resulting from HPOWER might be quite distant from the area of maximum concentration attributable to existing sources. Modeling of the sites in Campbell Industrial Park indicated that the proposed UOP facility would not cause the allowable annual PSD increments to be exceeded. UOP would also not contribute to violations of annual Federal air quality standards. However, the State's annual standard for sulfur dioxide (20 ug/m^3) is far exceeded, and the UOP facility would contribute to this. The contribution is so slight, 0.1 ug/m^3 out of a total of 78.3 ug/m^3, that HPOWER's effects do not appear to be significant. Note

Table IV-17. Estimates of Highest Annual Concentrations of Criteria Pollutants in the Vicinity of Campbell Industrial Park.

Pollutant	Groundlevel Concentration (ug/m^3)[1] UOP (1,800 TPD) Individual	Cumulative
Particulate Matter	0.3 (7)	48.3[2] (7)
Sulfur Dioxide	0.8 (7)	78.3 (75)
Nitrogen Dioxide	0.8 (7)	16.6 (59)

[1] Numbers in parentheses indicate locations in the VALLEY receptor array where the highest concentrations would occur. See Figure IV-1.

[2] Modeled individual maximum was simply added to the measured 1978 annual average at the DOH monitoring site near the Chevron refinery.

Source: Morrow, February 1980: Table 21.

Table IV-18. Estimates of Highest Annual Concentrations of Criteria Pollutants in the Vicinity of Waipahu.

Bidder		Groundlevel Concentration (ug/m^3)[1,2] Particulate Matter	Sulfur Dioxide	Nitrogen Dioxide
UOP	- Individual	0.3 (84)	0.8 (84)	0.9 (84)
		0.1 (70)	0.3 (70)	0.3 (70)
	Cumulative	37.3[3] (84)	22.3 (48)	14.7 (48)
		37.1[3] (70)	5.1 (49)	3.3 (49)
Amfac/C-E	- Individual	9.2 (72)	0.6 (84)	1.1 (84)
		16.4 (65)	0.3 (70)	0.5 (70)
	Cumulative	46.2[3] (72)	22.3 (48)	14.7 (48)
		53.4[3] (65)	5.1 (49)	3.3 (49)

[1] Two sets of meteorological data were applied for comparison. The upper values are based on Honolulu International Airport (HIA) data and the lower values are based on the composite wind rose for Waipahu and HIA data.

[2] Numbers in parentheses indicate locations in the VALLEY receptor array where the highest concentrations would occur. See Figure IV-2.

[3] Modeled individual maximum was simply added to the measured 1978 annual average at the DOH monitoring site.

Source: Morrow, February 1980: Table 22 (revised July 1980).

that the "Individual" value for sulfur dioxide in Table IV-17 is 0.8 ug/m^3 at receptor point 7 on Figure IV-1. This location is where modeling shows HPOWER would produce the greatest increase in average annual sulfur dioxide concentrations. However, the highest "Cumulative" concentration (i.e., the sum of contributions from HPOWER and other sources) occurs at a different receptor point (75 on Figure IV-1). Similar situations are seen in many of the tables in this section. In other words, at the point of highest cumulative concentration of a given pollutant, HPOWER may add nothing or much less than the "Individual" values in the tables.

In the Waipahu area, modeling suggested that the State's annual sulfur dioxide standard may already be exceeded, although the location of the maximum concentration is about three kilometers southeast of the two sites in Waipahu. The range of increments of further degradation in that vicinity due to the HPOWER proposals appears to be 0.3 to 0.8 ug/m^3. Other annual standards and the annual PSD increments do not appear to be jeopardized in the Waipahu area by HPOWER.

24-Hour Averages. The meteorological data discussed previously were input to the PTMTP and PAL programs to generate estimates of 24-hour particulate matter, sulfur dioxide, and nitrogen dioxide concentrations. Two arrays of 0.5- to 10-kilometer-downwind receptor locations were used in each siting area, i.e., one based on the HPOWER facility itself and another based on the major sulfur dioxide and nitrogen dioxide emitters in the respective areas. The short-term mode of the VALLEY model was employed to assess the impact on high terrain near the sites and particularly the impact of the Campbell Industrial Park sites on the Kahe nonattainment area. Again, the individual and cumulative estimates at the points of maximum 24-hour concentration are reported for comparison with pertinent standards. The results may be found in Tables IV-19 and IV-20.

In the Campbell Industrial Park area, it appears that UOP would cause no violations of particulate standards, although it may contribute in a small way to the existing violations in flat terrain of the State's 24-hour PM standard. In the flat-terrain analysis, UOP appears to be an "insignificant" contributor to the apparent 24-hour sulfur dioxide violations suggested by modeling. This significance determination is based on the criteria for nonattainment areas shown in Table IV-9. UOP's contribution to the 511 microgram per cubic meter sulfur dioxide concentration, for example, is less than 0.1 microgram per cubic meter; this is only one-fiftieth of the amount that would be considered "significant." Based on these same EPA criteria, UOP's facility also would not have a "significant" effect on the Kahe Nonattainment area (U.S. Environmental Protection Agency, October 1974). Finally, in the high terrain (VALLEY model) the proposed UOP facility appears to contribute to possible existing violations of the State 24-hour sulfur dioxide standard, but the comparable Federal standard would be met.

In the Waipahu area, modeling indicates that the proposed HPOWER facilities would not cause violations of any 24-hour standards or cause PSD increments to be exceeded. Due to existing sources, there are modeled violations of the State's 24-hour sulfur dioxide standard in high terrain, but HPOWER would not contribute to this.

Table IV-19. Estimates of Highest 24-Hour Concentrations in the Vicinity of Campbell Industrial Park.

Bidder	24-Hour Concentration (ug/m^3)[1]		
	Particulate Matter	Sulfur Dioxide[2] (Refuse/Oil[3])	Nitrogen Dioxide
UOP			
Individual:			
High Terrain	5.7 (4.4 NE)	15/24 (3.5 NE)	16.0 (3.5 NE)
Flat Terrain	1.2 (10 WSW)	3.1/5.0 (10 WSW)	3.4 (10 WSW)
Cumulative:			
High Terrain	19 (3.5 NE)	156/165 (3.5 NE)	43 (3.5 NE)
Flat Terrain	100[4] (10 WSW)	511/511 (2.0 WSW)	64 (2.0 WSW)

1 Figures in parentheses indicate approximate distance (km) and direction to area of maximum concentration.

2 UOP's increment of impact on the nonattainment area is only 0.1 ug/m^3 of SO_2 (0.2 ug/m^3 if burning 0.5-percent sulfur oil).

3 Based on use of 0.5-percent sulfur oil.

4 Modeled individual concentration simply added to 1978 second-highest measured concentration at DOH monitoring site near Chevron refinery.

Source: Morrow, February 1980: Table 23 (revised 9 Sepember 1980).

Table IV-20. Estimates of Highest 24-Hour Concentrations in the Vicinity of Waipahu.

Bidder	24-Hour Concentration (ug/m^3)[1,2] Particulate Matter	Sulfur Dioxide (Refuse/Oil)[3]	Nitrogen Dioxide
UOP			
Individual:			
High Terrain	4.5 (3.5 WNW)	11.7/17.9 (3.5 WNW)	12.8 (3.5 WNW)
Flat Terrain	0.7 (10 SSW)	1.8/2.8 (10 SSW)	2.0 (10 SSW)
Cumulative:			
High Terrain	70.5[4] (3.5 WNW)	114/114 (3.5 NW)	88 (3.5 NW)
Flat Terrain	66.7[4] (10 SSW)	7.3/8.0 (10 SSW)	6.9 (10 SSW)
Amfac/C-E			
Individual:			
High Terrain	6.3 (3.5 WNW)	21.0/112 (3.5 WNW)	36.8 (3.5 WNW)
Flat Terrain	27.5 (0.5 SSW)	2.3/12.3 (10 SSW)	4.1 (10 SSW)
Cumulative:			
High Terrain	72.3[4] (3.5 WNW)	114/114 (3.5 NW)	88 (3.5 NW)
Flat Terrain	94[4] (0.5 SSW)	7.9/18.0 (10 SSW)	9.8 (10 SSW)

1 Figures in parentheses indicate approximate distance (km) and direction to area of maximum concentration.

2 Two sets of meteorological data were applied for comparison. The upper values are based on Honolulu International Airport (HIA) data and the lower values are based on the composite wind rose for Waipahu and HIA data.

3 Based on UOP firing 0.5-percent sulfur oil and Amfac/C-E firing 2.0-percent sulfur oil.

4 The modeled individual concentrations were simply added to the second-highest measured concentration at the DOH station (Pearl City, 1978).

Source: Morrow, February 1980: Table 24 (revised 9 September 1980).

3-Hour Sulfur Dioxide Averages. PTMAX, PAL, and VALLEY were used to generate estimates of 3-hour sulfur dioxide concentrations in the Campbell Industrial Park (CIP) and Waipahu areas. Meteorological data for the flat-terrain analysis were as presented in Appendix A, and receptors were located 0.5 to 2.5 kilometers downwind of the HPOWER facility and major existing sources.

For the CIP sites a computer analysis of 23 years (1949-1971) of hourly me teorological data from the nearby Barbers Point Naval Air Station was run which indicated that 3-hour periods of "F" stability and light (less than three meters per second) southerly winds occurred on only six occasions, or an average of once every four years. This is much less than the twice per year frequency necessary to produce a violation of National Ambient Air Quality Standards. Thus, the high-terrain results presented in Table IV-21 are based on more realistic "worst-case" conditions of 3.5 meters per second wind speed and "E" stability. Comparison of these results with Table IV-4 shows that the proposed UOP facility would significantly contribute to existing modeled violations of the State's 3-hour sulfur dioxide standard in high terrain. The UOP proposal does not seem to significantly affect the maximum 3-hour sulfur dioxide concentration resulting from existing sources in flat terrain (see Table IV-4), but the modeled maximum of 1,055 ug/m^3 is much higher than the State standard. There are no problems with the 3-hour SO_2 Federal standard, PSD increment, or the nonattainment area significance level.

In the Waipahu area, the high-terrain problem predominates, with both the UOP and Amfac/C-E facilities showing possible violations of the State's 3-hour sulfur dioxide standard. This is most severe in the case of the Amfac/C-E facility, which, by itself, appears capable of causing a violation of this standard when firing two-percent sulfur oil.

Table IV-21. Estimates of Highest 3-Hour SO_2 Concentrations in the Vicinity of Campbell Industrial Park.

Bidder	3-Hour SO_2 Concentration[1] (ug/m^3) Refuse	Oil[2]	Downwind Distance (km)	Downwind Direction
UOP				
Individual:				
High Terrain	59	95	3.5	NE
Flat Terrain	22	36	0.8	NE
Cumulative:				
High Terrain	622	658	3.5	NE
Flat Terrain	1055	1055	0.2	S

[1] UOP's increment of impact on the nonattainment area is only 0.4 ug/m^3 when burning refuse and 0.8 ug/m^3 when burning 0.5-percent sulfur oil. This is far below EPA's significance level of 25 ug/m^3.

[2] Assumes UOP uses 0.5-percent sulfur oil.

Source: Morrow, February 1980: Table 25 (revised 9 September 1980).

Table IV-22. Estimates of Highest 3-Hour SO_2 Concentrations in the Vicinity of Waipahu.

Bidder	3-Hour SO_2 Concentration (ug/m^3) Refuse	/ Oil[1]	Downwind Distance (km)	Downwind Direction
UOP				
Individual:				
High Terrain	47	72	3.5	WNW
Flat Terrain	22	36	0.8	SSW
Cumulative:				
High Terrain	456	456	3.5	NW
Flat Terrain	28	42	1.5	SSW
Amfac/C-E				
Individual:				
High Terrain	84	448	3.5	WNW
Flat Terrain	22	118	0.8	SSW
Cumulative:				
High Terrain	456	748	3.5	WNW
Flat Terrain	29	125	1.0	SSW

[1] Assumes UOP uses 0.5-percent sulfur oil and Amfac/C-E uses 2.0-percent sulfur oil.

Source: Morrow, February 1980: Table 26 (revised July 1980).

Trace Elements

In order to get some idea of the order-of-magnitude of trace element concentrations that might be expected, the two most concentrated metals, lead and zinc, were selected from Table IV-15 and applied to the "Individual" 24-hour particulate concentrations in Tables IV-19 and IV-20. The results are displayed in Table IV-23. The ambient standard for lead is 1.5 ug/m^3 as a calendar quarter average. None of the estimates in Table IV-23 exceed that value, and since they were based on "worst-case" conditions of meteorology and the maximum firing rate for a 24-hour period, it appears even less likely that the HPOWER facility alone would cause violations of the Federal standard for lead. The facility would, of course, contribute to airborne lead concentrations, but the cumulative impact cannot be determined at this time since existing lead levels have not been monitored by any agency. Zinc is substantially less toxic than lead; thus, it also appears to represent an insignificant hazard. All the other trace elements in Table IV-15 are several orders of magnitude lower in concentration than lead or zinc; thus, while they contribute to the overall burden of airborne trace elements, they do not seem to present a significant hazard.

Table IV-23. Estimates of Highest 24-Hour Trace Element and Hydrogen Chloride (HCl) Concentrations.

Bidder	24-Hour Concentration (ug/m^3) Campbell Industrial Park Lead	Zinc	HCl	Waipahu Lead	Zinc	HCl
UOP						
High Terrain	0.4	<0.1	52	0.2	<0.1	18
Flat Terrain	0.1	<0.1	5	<0.1	<0.1	3
Amfac/C-E						
High Terrain	n/a	n/a	n/a	0.1	0.1	35
Flat Terrain	n/a	n/a	n/a	1.1	1.1	4

Source: Morrow, February 1980: Table 27.

Based on an average emission rate of four pounds per ton of refuse fired, estimates of the highest 24-hour HCl concentrations were made. These are presented in Table IV-23. There are no ambient standards for HCl; hence, the estimates cannot be directly compared with the occupational standard of 7,000 ug/m^3 because of the different averaging times (8-hour versus 24-hour) (Hawaii, State of, Department of Labor and Industrial Relations, 1975). Nevertheless, some inferences can be drawn. As a rule-of-thumb, it is generally agreed that the safe level for long-term exposure of the general public is about one one-hundredth of the level that is acceptable as an 8-hour standard for the working environment. The highest ambient 24-hour concentration of HCl projected to result from HPOWER (i.e., 52 ug/m^3) is less than 0.01 of the occupational standard of 7,000 ug/m^3. Hence, it appears that expected maximum HCl levels would not constitute a significant hazard.

While many types of vegetation have not been tested for sensitivity to HCl, at least one study has found a threshold for visible injury of about 12,000 ug/m^3 (Massachusetts, Commonwealth of, June 1979). The HCl levels from HPOWER are at least two orders of magnitude below this level; hence, they do not seem to pose much of a threat to vegetation.

Estimates of atmospheric mercury concentrations under probable 24-hour "worst-case" conditions, as well as with the unusually high emission rate reported from the Braintree, Massachusetts resource recovery facility that were mentioned earlier (Freeman, November 1979), indicate that mercury levels produced by the HPOWER facility alone would not exceed 0.2 ug/m^3. If the U.S. Environmental Protection Agency's standard mercury emission rates are used rather than the anomalous data from Braintree, then the projected peak 24-hour mercury concentrations under "worst-case" meterological conditions would be increased by only 0.01 ug/m^3 by the HPOWER project. Based on Freeman and Olexsey's findings (November 1979) that 99 percent of the mercury is in vapor form, it is estimated that 0.0001 ug/m^3 would occur in particulate form.

Until quite recently, there was no legal requirement for the monitoring of ambient concentrations of mercury. As a result, there is little data available concerning its background level in the atmosphere. In Hawaii, the best source of information is Professor S. M. Siegel's decade-long study of atmospheric mercury concentrations. His estimates for Oahu, which are based on from three to ten samples from each of 19 sampling stations collected over a ten-year period, range from 0.04 ug/m^3 for a station situated in central Honolulu to 1.36 ug/m^3 at a station close to the Kahe power plant. An environmental impact statement for the CONOCO oil refinery proposed for Campbell Industrial Park in the early 1970s reported ambient particulate mercury concentrations of 0.0001 to 0.0030 ug/m^3. Based on the previously cited estimate that about 99 percent of all mercury emissions occur as vapor rather than particulates, this is equivalent to total atmospheric mercury concentrations of 0.01 to 0.3 ug/m^3. This is toward the lower end of range reported by Siegel.

Combining the estimated existing ambient levels of 0.04 to 1.36 ug/m^3 with the possible range of HPOWER impacts of 0.01 to 0.20 ug/m^3 gives a total of from 0.05 to 1.56 ug/m^3 following implementation of the proposed project. The broad range of these estimates is indicative of the degree of uncertainty which exists as to what would actually occur, and it would take a comprehensive, long-term monitoring program of Honolulu's ambient atmospheric mercury levels, as well as several controlled studies of existing refuse-to-energy systems, to resolve the questions that remain with any degree of scientific accuracy. Whether or not such studies are justified depends upon whether or not the potential for significant harm exists if the highest possible levels were actually to occur. For the reasons discussed below, we do not believe they would.

There are no Federal or State ambient air quality standards for mercury. The U.S. Environmental Protection Agency has no guidelines against which the maximum 24-hour concentrations discussed above can be compared. However, the EPA has suggested a threshold level of 1.0 ug/m^3 as a 30-day average. Reviewing the available meteorological data, it is apparent that the "worst-case" 30-day average concentrations produced by HPOWER would be much lower than the "worst-case" 24-hour concentrations, i.e., much lower than 0.01 to 0.2 micrograms of mercury per cubic meter cited above. The higher average wind speeds, the variations in wind direction, and the changes in atmospheric stability over a 30-day period would result in concentrations at least 50 percent lower than the "worst-case" 24-hour concentrations. Thus, it is clear that the proposed project's impact on total atmospheric mercury content would be minor.

Pollutants from Vehicular Traffic and Construction

Exhaust Emissions. Exhaust emissions from vehicles moving to and from the HPOWER facility would have an extremely minor impact on air quality. For example, a brief analysis of the effects of peak-hour traffic under "worst-case" meteorological conditions indicates that the increase in ambient carbon monoxide levels adjacent to roadways would be less than one microgram per cubic meter. When added to the existing level, this would still leave the concentrations well below the State standard. The effects on levels of other pollutants would be even smaller. Persons residing close to the access roads, particularly those serving the Waipio Peninsula and Amfac/C-E sites, could notice an increase in odors characteristic of diesel exhausts.

Fugitive Dust. In general, the proposed HPOWER project would not generate significant amounts of fugitive dust. The vast majority of each site would be covered with buildings, roadways, and other impermeable surfaces. The remainder would contain irrigated landscaping. Trucks carrying material to and from the site would be covered. Only during the site preparation phase of the construction period would one expect sufficient earth to be exposed for there to be an increased potential for entrainment of particulates. This period would be of short duration. Moreover, with the possible exception of the north parcel on the Waipio Peninsula and the Amfac/C-E site, the areas under consideration for HPOWER are well-removed from sensitive adjoining uses. Since the Amfac/C-E site currently contains dirt roads and considerable other bare soil areas, it is possible that the erosion measures that will be applied during construction will cause fugitive dust emissions from the site to remain at or below their current levels. However, a more likely scenario is that they would increase somewhat during the early phases of construction.

The one aspect of the project that does cause some concern is the potential that truck traffic associated with HPOWER has for increasing fugitive dust emissions from the cane haul road that would be used for access to the Amfac/C-E site. While the road is paved, loose dirt from adjacent fields and from the tires and contents of the cane haul trucks themselves does collect on it. Refuse trucks moving to and from the HPOWER site would not contribute significantly to the amount of dust present, but they would tend to lift more of it into the air, thereby increasing atmospheric dust concentrations.

In order to avoid this problem, it is essential that the cane haul road be kept as clean as possible and/or constantly wetted. Of these two approaches, cleaning appears by far the better. In dry, sunny weather, water would evaporate rapidly from the impermeable road surface. Use of a sweeper such as is employed on public roads and at airports probably provides the best means of preventing the creation of a dust problem, but other techniques might be employed as well. The cost of these dust mitigation measures would be absorbed by the HPOWER contractor.

DISCUSSION AND CONCLUSIONS

Based on the foregoing analyses, the following conclusions may be drawn:

1) The proposed HPOWER facility is primarily a particulate emitter with projected annual controlled emissions ranging from 330 to 640 tons per year depending on which proposal is selected. This represents 0.9 to 1.8 percent of the latest emissions inventory for the City and County of Honolulu. Based on rates supplied by the bidders, annual nitrogen dioxide emissions would range from 1.5 to 2.2 percent of the present Oahu total, while sulfur dioxide emissions would be about 0.6 to 0.7 percent of the total.

2) With the exception of lead, zinc, iron, and tin, each of the other trace element components of the particulate matter amount to less than one ton per year. HCl emissions were estimated at about 1,100 tons per year, and fabric filters (baghouses) were found to be more than 99 percent effective in removing bacterial emissions from process air streams. While they will be contributing to the overall pollutant burden, ambient concentrations of trace elements and HCl all appear to be well below standards and levels at which they are known to have adverse effects on animals or plants.

3) National Ambient Air Quality Standards appear to be met by the proposals as they existed on September 1, 1980. However, it does appear that the proposed HPOWER project would contribute to violations of the more stringent State of Hawaii standards that air quality modeling indicates may already exist. (See Table IV-24.) It must be emphasized that these apparent existing violations are indicated by "worst-case" modeling rather than by actual measurements. Moreover, the modeling itself does not define the frequency with which violations would occur. Finally, it is also worth noting that four of the five possible violations involve sulfur dioxide, a pollutant which HPOWER would emit at a lower rate per unit output than all oil-fired power plants except those burning 0.5-percent sulfur oil.

   Both of the proposed facilities appear to have some difficulty meeting the State's short-term sulfur dioxide standards under "worst-case" meteorology. This is due primarily to the presence of existing sources which by themselves seem capable of causing such violations. However, Amfac/C-E's facility alone (i.e., without considering existing sources) could produce a violation of the State's 3-hour sulfur dioxide standard because of its use of two-percent sulfur oil as a backup fuel. This could easily be solved by switching from two-percent to 0.5-percent sulfur fuel. UOP proposes use of 0.5-percent sulfur oil as backup; hence it does not have the same problem when burning oil as does Amfac/C-E.

The Request for Proposals for the HPOWER project stipulates that the facility must be designed and constructed in such a way that it can be operated in compliance with the requirements of all applicable Federal, State, and County laws, ordinances, codes, regulations, and court orders. With respect to air quality, this means that the winning HPOWER bidder is obligated to meet Federal and State emission and ambient air quality standards, to comply with Federal PSD regulations, and to demonstrate to the U.S. Environmental Protection Agency that it has employed the Best Available Control Technology (BACT).

As indicated in the preceding discussion, all of the HPOWER proposals under consideration conform to applicable emission standards, i.e., to limitations on the rate at which pollutants are discharged to the atmosphere, and to National Ambient Air Quality Standards. Violation of State standards appears possible, but, as indicated previously in this section, the State of Hawaii Department of Health has formally stated its intent to seek to revise the State standards to make them identical to the Federal National Ambient Air Quality Standards. Assuming some changes are made, the proposed HPOWER facility may well comply with the revised State standards also. If changes are not made, it will be necessary for the operator of the HPOWER facility to obtain a variance from the State Department of Health as provided for in Chapter 43, Section 20 of the State of Hawaii Public Health Regulations.

Table IV-24. Summary of Air Quality Problems of HPOWER Facilities as Indicated by Modeling Based on Preliminary Designs.[1]

Problem	UOP: Sites in Campbell Industrial Park	UOP: Waipio Peninsula Site	Amfac/C-E
Might contribute to existing violations of State's 24-hour PM Standard in flat terrain.	X[2]		
Would contribute to existing modeled violation of State's Annual SO_2 Standard.		X	X
Would contribute to existing modeled violation of State's 24-hour SO_2 Standard (significantly in high terrain; not significantly in flat terrain).	X		
Would contribute to existing modeled violation of State's 3-hour SO_2 Standard:			
- in high terrain (significantly)	X	X	X
- in flat terrain (not significantly)	X		
Would violate State's 3-hour SO_2 Standard by itself when firing two-percent sulfur oil.			X

[1] Assessment based on technical proposals as they stood at the beginning of September 1980.

[2] Only slightly.

Source: Compiled by Belt, Collins & Associates based on study by Morrow (February 1980; revised July through September, 1980).

SONIC IMPACTS

INTRODUCTION

The proposed HPOWER plant is a major industrial facility. Many of the operations involved in the resource recovery process have the potential to create high noise levels. Similarly, the truck traffic to and from the facility is a significant noise source. To determine the effects that each of the site/process combinations would have, Darby-Ebisu & Associates, an Oahu-based acoustical engineering firm, undertook an intensive study of major noise-producing elements of the HPOWER facilities proposed by each bidder. The results of its analysis form the basis of most of the discussion which follows.

The study of potential noise impacts of an HPOWER facility involved a number of different components. The most important of these were:

- a review of the information contained in the technical proposals submitted by the organizations competing for the HPOWER project and, where necessary, the solicitation from them of additional information;
- calculations of property-line noise levels from HPOWER plant equipment;
- calculations of traffic noise resulting from existing traffic and HPOWER-related traffic;
- noise measurements of non-project-related vehicles and refuse vehicles;
- measurements of existing background noise levels;
- noise measurements at the tipping area of the Keehi Refuse Transfer Station; and
- noise measurements of the electrostatic precipitators at the existing Waipahu Incinerator.

During the evaluation of bidders' technical proposals, it became apparent that the detailed information concerning expected equipment noise-source levels and likely construction materials necessary to conduct a definitive analysis of the various proposals could not be supplied by prospective bidders at this time. Despite this, both of them have expressed confidence in their ability to meet existing State and County noise standards with respect to facility noise (see, for example, Hawaii, State of, Department of Health, April 26, 1976 and Honolulu, City and County of, August 8, 1968). In line with this, each of the bidders still seeking the HPOWER contract has guaranteed that their facility would meet all applicable noise standards. This analysis was based on the assumption that this guarantee would be met.

The remainder of our discussion of sonic impacts is divided into four sub-sections. The first explains the noise descriptors that are used and indicates land uses that are compatible with different noise levels. The second characterizes the existing noise environment at each of the sites under consideration. The noise impacts sub-section discusses expected impacts from fixed plant equipment, on-site HPOWER vehicles, and off-site HPOWER vehicles. The final part of the discussion reviews the noise mitigation measures that may be required to insure compliance with State and County noise standards.

NOISE DESCRIPTORS AND THE RELATIONSHIP OF NOISE LEVELS TO LAND USE COMPATIBILITY

Increasingly, the "day-night sound level," or L sub dn* is being used to describe general environmental noise. [Note: a brief description of the acoustic terminology and symbols used is provided in Appendix B of this report.] The day-night sound level is a 24-hour average sound level in which nighttime noise levels occurring between 10:00 p.m. and 7:00 a.m. are increased (or penalized) by 10 dB before calculation of the 24-hour average. The Air Force, Army and Navy adopted the L sub dn metric in June 1978 (U.S. Departments of the Air Force, the Army, and the Navy). The current "HUD Environmental Criteria and Standards," adopted as a replacement of HUD Circular 1390.2 (a pioneer document), also utilizes the L sub dn metric. The U.S. Environmental Protection Agency (EPA) is working toward the development of a "uniform federal statement and guidance package on the noise element of land use control" (Bureau of National Affairs, May 8, 1978). Because of EPA's prior support of the L sub dn metric (National Research Council, 1977), it is likely that the L sub dn metric will be included in this future uniform guidance. Following the introduction of the L sub dn metric, a consensus among Federal agencies has developed that L sub dn 65 is the upper limit of acceptable exterior noise for residential housing areas. EPA's prior recommendation of L sub dn 55 or less for residential housing has not been adopted by other Federal agencies, but is recognized as a desirable long-term goal.

Table IV-25 describes the typical variation of L sub dn for various kinds of neighborhoods. Levels of L sub dn 60 or greater are typical along city streets with daily traffic volumes exceeding 2,500 vehicles. L sub dn 65 to 70 are typical values for city business districts where traffic is a dominant noise source.

State Department of Health (DOH) and City and County of Honolulu Comprehensive Zoning Code (CZC) noise regulations are expressed in maximum allowable noise limits rather than L sub dn. They are summarized in Table IV-26 for the cases of interest. Values shown in Table IV-26 represent short-term noise levels rather than 24-hour averages. Although they are not directly comparable to noise criteria expressed in L sub dn, the following general statements can be made:

- State DOH noise limits for residential districts are approximately equal to 55 L sub dn or 10 L sub dn units below existing Federal standards (65 L sub dn), and equal to EPA's long-term goal for residences.

- State DOH noise limits for apartment districts are approximately equal to 60 L sub dn or 5 L sub dn units below existing Federal standards.

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*Word processor limitations require that the term "L_{dn}" be typed "L sub dn" when it appears in the text.

Table IV-25. Typical Values of Yearly Day-Night Average Sound Level for Various Residential Neighborhoods Where There Are No Well-Defined Sources of Noise Other Than Usual Transportation Noise.

Description	L_{dn}
Rural (undeveloped)	35
Rural (partially developed)	40
Quiet Suburban	45
Normal Suburban	50
Urban	55
Noisy Urban	60
Very Noisy Urban	65

Source: National Research Council, National Academy of Sciences (1977).

- o CZC noise limits for residential/apartment uses are approximately equal to 59 L sub dn or 6 L sub dn units below existing Federal standards.

- o For industrial or non-dwelling areas, DOH noise limits equate to 76 L sub dn and CZC limits equate to 69 L sub dn. No explicit Federal standards exist for these land uses; however, there are Federal criteria established for land use planning purposes, which the State and County regulations here are generally consistent with. Compliance with CZC noise regulations (expressed as octave band noise limits) will insure that objectionable pure tones or concentrated bands of noise are not generated by the facility. Compliance with DOH noise regulations, if met by the proposed facility, will insure that Federal noise criteria are also met.

State and local noise regulations have been enforced, and have been used to effect court injunctions and remedial measures. However, legal clarification of DOH and CZC noise regulations may be necessary if the Amfac/C-E site is selected. Specifically, the City will need to determine whether DOH noise regulations will be applied to HPOWER traffic using the existing cane haul roads. If they do, noise standards must be met at the property line of residences bordering the haul roads. Designation of private cane haul roads or on-site circulation driveways used by refuse vehicles as Truck Routes may be possible as provided for in Chapter 44A of the State Public Health Regulations. If it is, less stringent noise regulations would apply along the cane haul roads and to on-site vehicles. In the case of Campbell Industrial Park, it will be necessary to determine whether an HPOWER facility situated on Malakole Road will have to comply with noise standards applicable to activities adjacent to an Agriculture zone (which it now is) or would be held only to the less stringent standards applicable within an Industrial district (which it will soon be).

Table IV-26. Noise Standards Applicable to the Proposed HPOWER Project.

Noise Regulation	Zoning District Adjoining HPOWER Site	Daytime/Nighttime Allowable Noise Level	Measured Location
State Dept. of Health	Residential	55/45 dB (A-weighted)[1]	HPOWER site property line
State Dept. of Health	Apartment	60/50 dB (A-weighted)[1]	HPOWER site property line
State Dept. of Health	Industrial/ Agricultural	70/70 dB (A-weighted)[1]	HPOWER site property line
Honolulu CZC	Apartment or Residential	See line (a) below for octave band limits[2]	At or beyond HPOWER boundary line
Honolulu CZC	Any district other than apartment or residential	See line (b) below for octave band limits[2]	At or beyond district boundary line for I-2 and I-3 HPOWER site zoning or at or beyond lot boundary line for I-1 HPOWER site zoning.

[1] Levels not to be exceeded for more than 10 percent of the time within any 20-minute period.

[2] Octave Band Noise Limits:

OCTAVE BAND CENTER FREQUENCY (HZ)

	63 or Below	125	250	500	1,000	2,000	4,000	≥8,000
a)	72/69dB	67/64dB	59/56dB	52/49dB	46/43dB	40/37dB	34/31dB	32/29dB
b)	79/79dB	74/74dB	66/66dB	59/59dB	53/53dB	47/47dB	41/41dB	39/39dB

Source: Compiled by Darby-Ebisu & Associates.

Rather than attempt to clarify these legal issues, the noise analyses have been performed on the basis of assuming compliance with the most stringent State and County noise regulations. Obvious areas of difficulties in compliance are noted, and the degree of impact as judged by other Federal criteria are examined. Possible mitigation measures using noise control technology are also discussed.

EXISTING NOISE ENVIRONMENT

Existing background noise measurements were made at the following locations:

- Campbell Industrial Park, 50 feet from the center of the street on the proposed Malakole Road site.
- Along the east and west cane haul roads which serve as primary entrance/departure routes for the Oahu Sugar Mill in Waipahu.
- The north boundary of the Oahu Sugar Mill along Kopaa Street.
- Along the cane haul road which intersects Waipahu Street south of the H-1 Freeway.

Additionally, prior measurements of Oahu Sugar Mill and cane haul traffic noise were also utilized to describe background ambient noise in areas surrounding the proposed Amfac/C-E HPOWER site.

The existing noise environment at locations along the lot boundary lines of the proposed Amfac/C-E facility is currently controlled by sugar mill and cane haul vehicle noise. Mill noise along the north and west property boundary of the site ranges from approximately 50 to 57 dB(A), which is higher than the existing standard for residential zones. Because the DOH property line noise limits for residential zones are already exceeded, they could not be used to evaluate the significance of HPOWER-related noise increases. Instead, the slightly higher DOH property line limits for apartment districts were used to evaluate potential HPOWER noise impacts on surrounding residential areas. Mill noise along the south boundary ranges from 57 to 63 dB(A). Noise along the east boundary of the proposed site is controlled by cane haul truck and mill vehicle noise which ranges from 64 to 71 L sub dn. Between passes of trucks, noise levels along the east boundary range from 50 to 55 dB(A).

The existing noise environment at the Malakole Road site in Campbell Industrial Park is controlled by heavy truck traffic on Malakole Road and aircraft noise. The site is relatively quiet between passes of vehicles or aircraft, with background noise levels of approximately 50 dB(A). L sub dn levels at the site probably range from 55 to 60 L sub dn. These levels are relatively low for heavy industrial areas, primarily due to the undeveloped nature of the lands surrounding the site. Because the existing noise levels are fairly low, and because we did not wish to underestimate the potential impact, the more stringent CZC noise regulations and the HPOWER site boundaries were utilized in evaluating potential noise impacts.

No noise measurements were taken at the Hanua Street or Waipio Peninsula sites. However, an examination of the noise sources that are present suggests that noise levels at the Hanua Street location are slightly higher than those recorded on Malakole Road. Noise levels near the incinerator and along the western side of the Waipio Peninsula site are probably about the same as those recorded at Campbell Industrial Park; those along the northern, eastern and southern boundaries are probably lower.

PROBABLE NOISE IMPACTS

Noise Impacts Resulting From Fixed Plant Equipment

Fixed plant equipment at the HPOWER facility has the potential to generate adverse noise impacts if noise control measures are not incorporated into the plant design. A study of power plant noise sources which generated community complaints (Hoover, 1976) indicated that induced and forced draft fans, transformers, steam release valves, circulating pump motors, and loudspeaker paging systems caused noise complaints at sound levels of 36 to 77 dB(A). At least 50 percent of the complaints involved prominent pure tone sources as would be generated by rotating equipment (fans, motors, pumps, etc.) or transformers. Approximately 80 percent of the complaints involved sound levels of 45 dB(A) or greater.

In evaluating the potential noise impacts which could result from each HPOWER facility, calculations of noise levels of the larger fixed plant equipment at the property lines were made. These included noise from the waste and residue processing buildings, tipping area building, cooling tower, boiler plant, turbine generator, transformers, induced draft fans and stack, and electrostatic precipitator. Generic source noise level data from the Edison Electric Institute (1978) and noise measurement data supplied by the prospective bidders were used to estimate these property line noise levels. It was concluded that each of the proposed HPOWER facilities would require sound attenuation measures to meet State and County noise regulations. The Amfac/C-E facility would require the most extensive noise control efforts due to its location adjacent to residential units. The UOP facility located in Campbell Industrial Park would require less extensive noise attenuation measures due to its location in agricultural- or industrial-zoned districts. However, compliance with CZC noise limits at the HPOWER lot boundaries would increase noise levels at the Malakole Road and Hanua Street sites by approximately nine to 14 dB above the existing levels. If the Waipio Peninsula site were used, potential noise impacts would vary significantly depending upon the specific location that is chosen. If the area north of the existing incinerator is used, the noise control measures needed to meet applicable standards would fall somewhere between those needed at Campbell Industrial Park and those required of the Amfac/C-E site. (The farther south one moves on this parcel the less stringent the noise control measures that would be needed.) If the Navy surplus land south of the incinerator can be used, the necessary noise control measures, as well as the potential noise impacts, would be essentially the same as those at Campbell Industrial Park.

Amfac C-E Facility. The proposed Amfac/C-E facility is sited on lands zoned as R-6 Residential District. It is adjoined to the north by air-conditioned apartments (Jack Hall Housing), the Hongwanji Mission complex, and residential units. To the east of the site and across a cane haul road are apartments, a park, and residential units. An operating sugar mill is to the south of the Amfac/C-E site, and a few plantation houses in an area zoned as R-6 Residential are to the west of the site. The Amfac/C-E facility would generate minimal noise impacts to residential and noise-sensitive communities surrounding the facility if the following noise regulations are met:

1) State Department of Health (DOH) allowable noise limits for apartment districts are not exceeded along the north, east, and west lot boundaries of the HPOWER facility, and

2) CZC allowable noise limits for industrial districts which adjoin apartment or residential properties are not exceeded along the north, east, and west facility boundaries.

Sufficient industrial buffer areas to the south exist such that noise impact from the HPOWER facility in the south sector should be minimal. Although DOH and CZC noise regulations would probably be exceeded along the south boundary, risks of noise impact south of the facility are considered minimal. Sound attenuation measures applied at the noise sources as indicated below will be required to quiet plant equipment so that DOH and CZC regulations can be met at the western, northern, and eastern boundaries. Assuming these noise attenuation measures are implemented, residential units to the south, which are at greater distances from the noise sources, would also be protected from noise impacts.

Extensive noise attenuation measures would be required to insure compliance with DOH and CZC noise regulations. Every equipment item or process which generates 71 dB(A) or higher noise level at 50 feet distance from the noise source would probably require noise control treatment. Although detailed evaluation of all possible noise sources could not be performed due to the schematic nature of the facility plans, it is likely that the following minimum noise control measures would be required to insure compliance with noise regulations at the western, northern, and eastern HPOWER lot boundaries:

1) The receiving, processing, fuel storage, boiler, and turbine buildings must be designed to contain noise. Walls must have adequate sound transmission loss; sound absorption materials should be used on interior surfaces; windows, doors, access openings, and passageways for air or material flow should be acoustically treated; and sound leakage through cracks and imperfect seals should be controlled.

2) The cooling tower's and transformers' sound power levels (re 10^{-12} watts) should not exceed the following octave band values:

Octave Band Center Freq. (Hz)	63	125	250	500	1000	2000	4000	8000
Maximum Allowable Sound Power Level (dB)	116	111	104	97	91	86	81	81

3) Draft fans would require silencers and acoustic treatment of the fan casings and ductwork. The stack and ductwork should be designed to preclude reinforcement of pure tones from the induced draft fan. Sound power levels (re 10^{-12} watts) for the acoustically-treated draft fan system should not exceed the following octave band values:

Octave Band Center Freq. (Hz)	63	125	250	500	1000	2000	4000	8000
Maximum Allowable Sound Power Level (dB)	116	111	104	97	91	86	81	81

4) Other potential noise sources such as the conveyor system, material transfer towers, electrostatic precipitators, steam valves and vents, ventilating fans, pumps, and motors should also be evaluated during the design phase and treated for noise reduction as necessary.

UOP Facility: Malakole Road Site. As indicated in Chapter II of this report (see under "Location of the Proposed Project"), the site that would be used for HPOWER will not be known until a contractor has been selected. Because of this, noise impacts must be considered separately for the Malakole Road, Hanua Street, and Waipio Peninsula sites. However, all of these potential sites are in areas less sensitive to noise than the Amfac/C-E proposal discussed above.

The possible Malakole Road site in Campbell Industrial Park is located on lands that are currently zoned for agriculture but it is anticipated that they will be rezoned for heavy industrial use. Because of this site's location in an industrial area and its distance from residences (one mile from the proposed West Beach development), noise impacts from plant equipment on dwelling units are anticipated to be minimal so long as the following noise regulations are met:

1) State DOH allowable noise limits for industrial districts are not exceeded along the facility's lot boundaries, and

2) CZC allowable noise limits for industrial districts which do not adjoin residences or apartments are not exceeded along the facility's lot boundaries.

At this site, specific sound attenuation measures will probably be required to quiet the air-cooled condenser, turbine generator, tipping area openings, and transformers. If reasonable care is used in locating and/or treating other potential noise sources during the facility design stage, minimal risks of noise impact on lands surrounding this site can be anticipated.

UOP Facility: Hanua Street Site. The Hanua Street site is also located in Campbell Industrial Park. Noise impacts from fixed plant equipment in an HPOWER facility situated at this site would be generally similar to those already identified for the Malakole Road location. Technically, this site has an advantage over a Malakole Road location in that it is located near the center of a large industrially zoned (I-2) district rather than on its periphery. As a result, it is the DOH noise regulations, rather than the generally more stringent CZC criteria, that would be controlling. Because of this, some of the noise control equipment that would be required could be designed to meet less exacting standards [70 dB(A) at the property line]. All of the land surrounding the Malakole Road site now stands unused and will almost certainly be zoned for industrial use in the not-too-distant future (it is already planned for industrial use on the Detailed Land Use Maps, see Chapter III). Hence, we believe that the distinction which now exists between the Malakole Road and Hanua Street sites on the basis of the former's location on the edge, rather than the center, of an Industrial district has little real significance.

UOP Facility: Waipio Peninsula Site. As previously noted (see, for example, "Location of the Proposed Project" in Chapter II of this report), the exact location of an HPOWER facility within the 60-some acres that are available on the Waipio Peninsula is not known at this time. If the 27-acre north parcel is used, it will probably be shared with the proposed Police Training Facility. Unfortunately, the exact location of the two facilities with respect to one another and to the parcel boundaries has not been determined. Nevertheless, a general assessment of probable noise impacts is possible with the information now available.

If UOP's HPOWER facility were sited on the north parcel adjacent to the existing Waipahu incinerator, the resultant noise impact on residential areas would be less than the Amfac/C-E facility's community noise impact due to the greater setback of the facility from dwelling units. Noise control measures required for plant equipment would lie midway between those required for the Malakole Road site and those required for the Amfac/C-E site. If the HPOWER facility were sited on the northern end of the north parcel adjacent to the residential areas along the railroad right-of-way, the noise control measures required would be nearly the same as those required of the Amfac/C-E facility. If the incinerator-remnant parcel and/or Navy surplus parcel south of the existing incinerator is used, then the noise impacts and necessary noise control measures required will be the same as those necessary at the Malakole Road site in Campbell Industrial Park.

Noise Impacts Resulting From On-Site HPOWER Vehicles

For industrial districts, State DOH regulations require that 70 dB(A) not be exceeded more than ten percent of the time in any 20-minute period on the property line. This requirement can be met if refuse vehicle circulation driveways on the HPOWER site are set back at least 50 feet from the property line. Noise measurements made during this study at the City and County's Keehi Refuse Transfer Station indicated that 70 dB(A) can be exceeded for three to nine seconds per refuse vehicle passby at 50 feet distance. Assuming a worst-case condition of 50 vehicle passes per hour (see Table IV-33) and seven seconds of noise above 70 dB(A) per pass, the State DOH requirement can be met at a 50-foot setback distance. The UOP facility's driveways have adequate setback to comply with State DOH requirements.

More stringent noise regulations apply to the Amfac/C-E facility because of adjacent apartment and residential districts. If noise barriers are not constructed between existing residential/apartment-zoned districts and the vehicle circulation driveways, DOH noise limits would be exceeded as shown in Table IV-27. This table used the nighttime and daytime hours with the highest projected heavy truck traffic to calculate the percentage of time the 50 dB and 60 dB levels (nighttime/daytime standard for apartment districts) would be exceeded. Since the standards actually allow these levels to be exceeded ten percent of the time, the standards would not be violated for the worst-case nighttime situation and would be violated from seven percent to 45 percent of the time during the hour of heaviest truck traffic, if no noise barriers were to be constructed. If residential use were discontinued

Table IV-27. Summary of Total Time that DOH Noise Limits Would be Exceeded by On-Site Vehicles at Amfac/C-E Facility.

Site Boundary Locations	Anticipated No. of Heavy Truck Passes between 6:00-7:00 am	Estimated Noise Duration Above 50 dB per Pass	Total Time 50 dB Exceeded Assuminging No Overlap in In-bound/Outbound Vehicle Passes)	% of Time 50 dB Exceeded
North (Near Tipping Area Exit, West Section)	3	27 sec. @ 10 MPH	3x27= 81 sec.	2
West (Near Tipping Area Exit, North Section)	3	32 sec. @ 10 MPH	3x32= 96 sec.	3
West (Near Tipping Area Entrance, South Section)	5	45 sec. @ 10 MPH	5x45= 225 sec.	6
North (Near Jack Hall Housing Project)	5	68 sec. @ 10 MPH	5x68= 340 sec.	9

Site Boundary Locations	Anticipated No. of Heavy Truck Passes between 8:00-9:00 am	Estimated Noise Duration Above 60 dB per Pass	Total Time 60 dB Exceeded Assuminging No Overlap in In-bound/Outbound Vehicle Passes)	% of Time 60 dB Exceeded
North (Near Tipping Area Exit, West Section)	45	14 sec. @ 10 MPH	45x14= 630 sec.	17
West (Near Tipping Area Exit, North Section)	45	20 sec. @ 10 MPH	45x20= 900 sec.	25
West (Near Tipping Area Entrance, South Section)	90	22 sec. @ 10 MPH	90x22=1980 sec.	55
North (Near Jack Hall Housing Project)	90	22 sec. @ 10 MPH	90x22=1980 sec.	55

Assumptions:

1. L_{MAX} at 50 feet = 78 dB (A) for on-site refuse vehicle.
2. Attenuation vs. distance law = 24.73 Log $\left(\frac{\text{Distance (ft.)}}{50}\right)$
3. Source level of refuse vehicle remains constant along circulation driveway at 10 MPH speed.

Source: Darby-Ebisu & Associates, Inc.

along the west anh (to the west of the Jack Hall Housing Project) boundaries of the'ollowing construction of the HPOWER facility, the more lenient DOH ty line limits of 70 dB(A) for industrial lots would apply, and DOH rens could be met along these property lines (with 50 feet minimum setbahe driveways), without constructing noise barriers.

However, the exisick Hall Housing project will require that the more stringent DOH proine noise limits be met on the eastern two-thirds of the HPOWER site, oise barrier construction will be required to shield the housing projen on-site refuse vehicle noise if these DOH noise regulations are enf Because the housing project is of two-story construction, noise bheight requirements will be substantial (15 feet or more above grade) summary, on-site refuse vehicle noise will probably exceed DOH noise br residential/apartment districts along lot boundary lines which adjoin districts. Both daytime and nighttime limits would be exceeded, and ility may be vulnerable to legal restrictions if noise barriers are not cted to shield existing dwelling units from vehicular noise.

It should be notedilthough on-site refuse vehicle traffic at the Amfac/C-E facility as nowed would probably exceed DOH noise limits, federal HUD noise criteria sub dn would not be exceeded by on-site vehicles at speeds of ten Mt 50 feet from the center of a circulation driveway, on-site refuse vehill generate 56 to 59 L sub dn. Moreover, by the L sub dn descripts level of on-site vehicular noise is slightly less than the DOH nois for apartment districts (60 L sub dn) when expressed by the L metric. Therefore, noise impacts may not be as severe as implied besults of Table IV-27.

Noise Impacts Resuom Off-Site HPOWER Vehicles

For the HPOWER siCampbell Industrial Park, noise impacts from refuse vehicle traffic alonloa Boulevard and Malakole Road are anticipated to be minimal due to ricultural and industrial uses of the area between the H-1 Freeway a possible HPOWER sites. For a total daily traffic volume shown in IV-33, project-related noise levels of 64 L sub dn along Malakole Roa0 feet from the centerline) and 63 L sub dn along Kalaeloa Boulevard)0 feet from the centerline) are anticipated. Although total noise along the two routes are anticipated to raise ambient noise levels bto five L sub dn units, these levels of project-related traffic noisot incompatible with the industrial and agricultural uses of the area.

Of greater concernise impacts resulting from off-site HPOWER-related vehicles traveling from the Amfac/C-E site in Waipahu. HPOWER traffic to this site be routed along existing cane haul roads from Waipahu Street (stion on traffic impacts in this chapter) to the HPOWER facility er/exit adjacent to the Jack Hall Housing Project. Along the cane hau project-related traffic would generate noise levels of 62 L sub dn (at from the centerline) and 59 L sub dn (at 100 feet from the centerlineminal vehicle speeds of 25 MPH are maintained. At the entrance to theER facility and at the Waipahu Street intersection, L sub dn levels aripated to be lower by four to five L sub dn units than the above valu to vehicle speed reduction.

Along the cane haul road which runs parallel to Paiwa Street, dwelling units are set back approximately 100 feet from the centerline of the cane haul road, and HUD criteria for residential areas of 65 L sub dn would not be exceeded by project-related vehicles. Along the cane haul road which is south of the freeway (see Route A on Figure IV-5), residential lot setback distances are approximately 30 feet from the centerline of the cane haul road. Project-related-traffic noise levels are anticipated to be 64 L sub dn at these lot boundaries.

Noise levels from existing cane haul operations along the roads of interest vary with field harvesting cycles. During harvesting operations (March through November, five days per week, 24 hours per day) noise levels along cane haul roads from mill vehicles range from 64 to 71 L sub dn at 50 feet from the centerline and 61 to 68 L sub dn at 100 feet from the centerline. During periods when harvesting operations are not conducted, noise levels along the cane haul roads fronting residential areas decrease to 60 L sub dn or less. Because of the non-continuous nature of the vehicular noise from cane harvesting operations, the addition of refuse vehicle traffic onto the cane haul roads would be sensed by residents as:

- o An increase in the days of high volume truck traffic from 183 days to 313 days per year.
- o An increase in the number of truck passes from approximately ten per hour (on a harvesting day) to 100 per hour during the peak refuse delivery hour (8:00 to 9:00 a.m.) during harvesting season.
- o An increase in the number of non-cane haul trucks on the road, with maximum noise levels during a refuse-truck passby sounding similar to a mill-waste haul vehicle.
- o A decrease in the number of trucks carrying cane trash to the Waipio Peninsula.

Because the cane haul road is privately owned, and because a new use is intended for the road, it is possible that DOH community noise limits for residential and apartment districts may be enforced at lot boundaries which front the cane haul road. It is very unlikely that DOH noise limits could be met along the cane haul route at the expected maximum volume of 100 heavy diesel trucks per hour in the daytime or for five per hour at night. DOH noise limits for residential lots would be exceeded in excess of 75 percent of the time during these peak hours. Designation of the cane haul road as a Truck Route by the State Department of Health may eliminate potential legal problems due to HPOWER vehicle noise.

DOH noise limits for residential lots along the cane haul road are approximately equivalent to producing no greater than 55 L sub dn noise exposure from refuse vehicles. 55 L sub dn is the limit of noise exposure that EPA considers adequate to minimize risks of adverse health and economic effects. Therefore, if a compromise on strict compliance with DOH noise limits must be made to utilize the cane haul road, a goal of attenuating refuse vehicle noise to 55 L sub dn or less at residential lot boundaries appears to be reasonable. Approximately four to ten dB additional attenuation of refuse vehicle noise is required to achieve this 55 L sub dn level along the cane haul road where it passes very close to residential units (see Route A on Figure IV-5). Construction of noise barriers and a realignment of the cane haul road at the Waipahu Street intersection are possible means of achieving this goal. Additionally, enforcement of the Oahu Vehicular Noise Control regulations should be continued to prevent the use of non-conforming refuse vehicles along the cane haul road. Alternately, Route B could be used; this would avoid significant adverse impacts on residential areas in the vicinity of Waipahu Street.

Noise impacts from refuse vehicle traffic along Farrington Highway and Waipahu Depot Road, that would result if UOP used the Waipio Peninsula site, would be similar to those associated with the Amfac/C-E site. The proximity of thin-walled residential units to Waipahu Depot Road near its intersection with Farrington Highway suggests that the heavy truck traffic associated with an HPOWER facility could result in complaints by owners of these homes. However, DOH community noise limits would not apply along public roadways; as a result there may be less risks of legal problems.

RECOMMENDED NOISE MITIGATION MEASURES

Each proposed facility would probably require noise attenuation measures to comply with State and County noise regulations. Various methods of achieving these goals are available; and ultimately, the choice of which methods to use would depend upon their impact on equipment performance, maintenance, and costs, and on overall plant efficiency. General methods of implementing noise control include:

- Procurement of lowest noise emission equipment.
- Arrangement and orientation of plant equipment and structures to take advantage of shielding effects or of distance to the property lines.
- Minimization of water, steam, and air velocities and pressures at critical noise emission or generation locations.
- Utilization of high-density material and/or composite wall and roof systems in the construction of enclosures.
- Utilization of sound-absorbing materials within the interior of high noise areas to minimize noise build-up and reduce the level of noise propagating outdoors.
- Utilization of sound-rated construction systems, silencers, enclosures, and barriers.

To insure that State and County noise regulations are met and subsequent noise impacts from the HPOWER facility and vehicular movement are minimized, the City and County of Honolulu Department of Public Works should monitor the design and construction of the HPOWER facility, and insure that noise measurements are made as necessary following construction. Source noise level data from equipment manufacturers should be obtained for plant equipment which, singly or in combination with other noise sources, is anticipated to exceed permitted noise levels. If this information is not readily available in usable form, and is deemed critical for the facility selected, field measurements should be obtained prior to final design. Because the Amfac/C-E facility would require a greater degree of precision in estimating and controlling noise levels, it is suggested that an acoustical engineer review the final plans for the facility if this proposal is selected.

During the facility construction phase, which is anticipated to extend over two years, noise impacts resulting from construction activities can be minimized by adherence to State DOH conditional use permit procedures for construction activities. Construction at the Campbell Park sites is not anticipated to generate adverse noise impacts on surrounding activities. Construction at the Amfac/C-E or Waipio Peninsula sites will require greater precautionary measures to minimize noise impacts on nearby residences. The use of quiet or properly-muffled equipment, location of stationary reciprocating engine-powered equipment away from existing dwelling units, and scheduling of noisy construction and blow-down operations during late morning or early afternoon hours are means of minimizing noise impacts. If the Amfac/C-E site is selected off-site earth- or material-moving vehicles should utilize the cane haul roads intended for refuse vehicle routing. During the two-year construction phase, noise mitigation measures required along the cane haul road could be evaluated and refined as necessary to accommodate the heavier flow of refuse vehicles that would be experienced when the plant becomes operational.

HYDROLOGIC IMPACTS

This section discusses the water-related impacts that would result from each of the HPOWER alternatives now under consideration by the City. Because of differences between the proposals, the coverage given each of them varies -- as does the organization of the discussion. In general, however, our review of each bidder's system covers the following topics:

- o the amount of freshwater that would be needed and the source or sources from which it would be obtained;
- o the adequacy of the source, storage, and transmission facilities that would be employed;
- o the effect that any projected increase in water withdrawals would have on the source and, in the case of water that would be diverted from its present use to HPOWER, on existing uses;
- o the ability of bidders to obtain water as proposed in view of the existing regulations governing water use in the Pearl Harbor basin;
- o the quality of any effluents expected to leave the sites, and the effect those effluents would have on receiving waters; and
- o the extent to which changes in surface runoff caused by the construction of the proposed facility might cause downstream flooding.

Although each bidder is offering two scales for the HPOWER facility, 1,200 TPD and 1,800 TPD, our discussion refers primarily to the 1,800-TPD alternative. This is because there is little difference between the two scales in terms of impacts; even water use would be nearly the same for both sizes. Also, where differences do exist, impacts from the 1,800-TPD facility would almost always be greater; thus, by concentrating on the 1,800-TPD proposal, we have insured that the worst-case impacts are addressed. The few instances where the impacts from the 1,200-TPD alternative would be greater are noted. For reasons of clarity, the two proposals are discussed separately beginning with UOP's.

PROPOSED UOP FACILITY

Water Use

Regardless of which of the sites under consideration is used, the HPOWER facility proposed by UOP would consume approximately 100,000 gallons of water per day (GPD) from the Honolulu Board of Water Supply system. All of the sites under consideration are served by 12-inch diameter lines having sufficient capacity to meet normal demand and applicable fire flow standards. No detailed hydraulic analysis of the Campbell Industrial Park or Waipio systems was conducted for this EIS, but the Honolulu Board of Water Supply has assured the Department of Public Works that it would make up to 200,000 GPD available to an HPOWER facility situated in Campbell Industrial Park or on the Waipio Peninsula. In view of this, it appears that the water needs of the proposed facility can be met.

Because of the limited amount of water that is available from the Board of Water Supply for this project, UOP's design employs an air-cooled steam condenser rather than the water-cooled condensers that are more commonly used. As a result a water-balance for the facility shows consumptive use of only 102,000 GPD when the plant is operating at capacity (see Figure IV-3). About 70 percent of this would be used for boiler water makeup, and the extremely high quality required of water employed for this purpose effectively precludes use of recycled water. The remaining 30,000 GPD would be used for potable supply, landscape irrigation, and equipment washdown. Non-potable water could be used for all but the first of these uses, but the necessary recycling system is not incorporated in the UOP design, and the water savings would be slight.

At present, the water used in the Campbell Industrial Park comes from wells operated by the Honolulu Board of Water Supply that tap the Pearl Harbor basal lens. The wells serving the Waipio Peninsula area depend upon the same groundwater source. Since the Board of Land and Natural Resources recently designated the Pearl Harbor basin as a "Groundwater Control Area," changes in withdrawals from these wells are subject to approval by them except that:

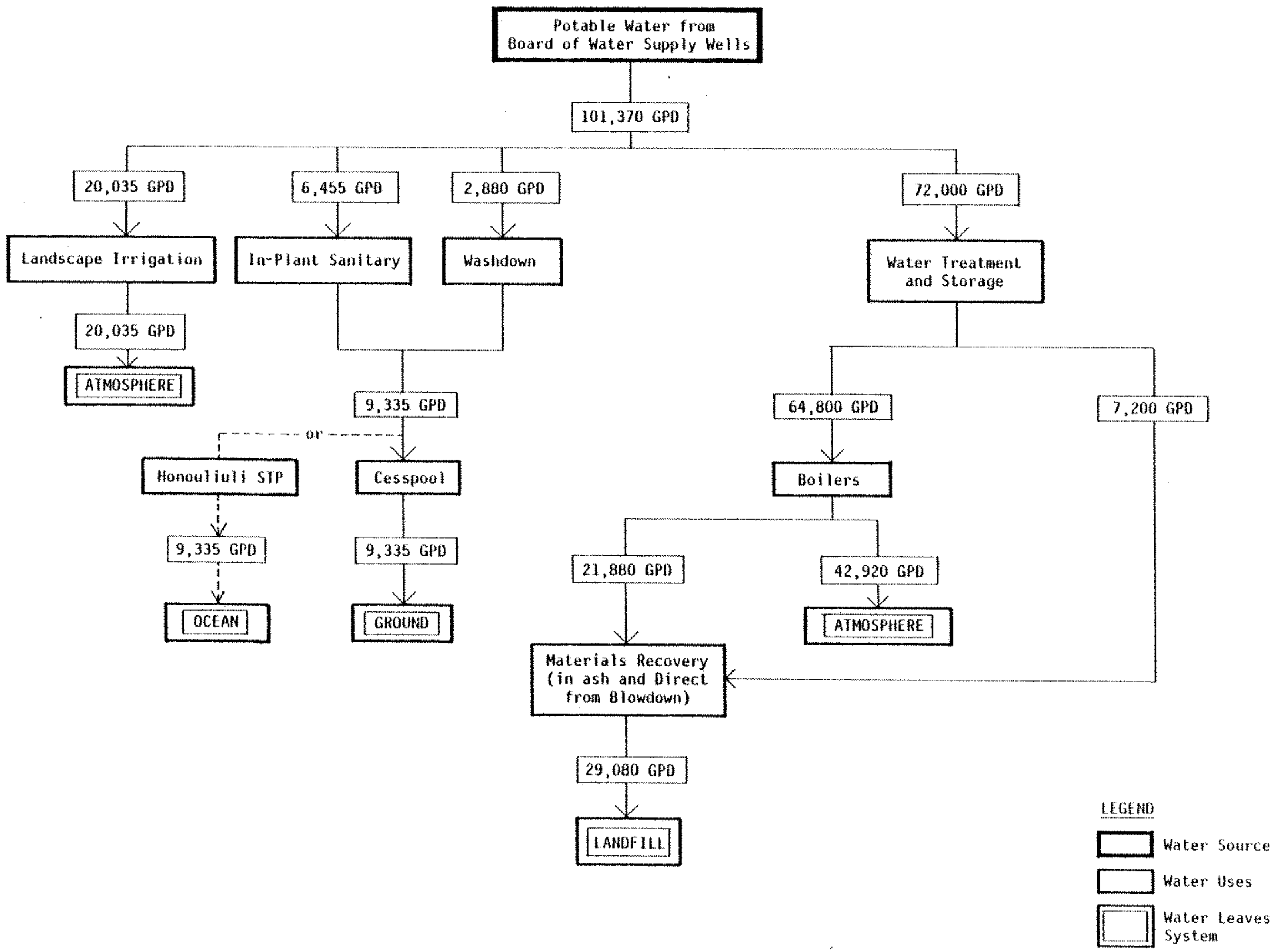
> . . . any municipal corporation . . . may increase its water use from a designated ground water control area by 100,000 gallons per day or 5 percent of the average per-day use during the period immediately prior to the designation of such ground water control area, whichever amount is greater. [Hawaii, State of, Department of Land and Natural Resources, June 1979:4.]

According to the Honolulu Board of Water Supply (August 1979:2), in 1978, the Board withdrew an average of 71 MGD from the Pearl Harbor basin. Five percent of that amounts to approximately 3.5 MGD. Comparing this with the amount of water that would be needed for the HPOWER proposal, it is apparent that UOP's proposed HPOWER facility would require about three percent of the amount of additional water that the Honolulu Board of Water Supply is empowered to take without obtaining a special permit from the Board of Land and Natural Resources.

Having concluded that there are no legal constraints that would prevent the Board of Water Supply from meeting its commitments to HPOWER, we may now turn to the question of whether or not there are any physical constraints in the system's hardware that would prevent them from doing so. With respect to the possible Waipio Peninsula site, the answer is a very clear no: the wells, storage facilities, and transmission facilities are in place and have sufficient excess capacity to accommodate UOP's needs at that location. However, the increased pumpage (about 0.04 percent of the present total withdrawals) would tend to lower groundwater levels in the Pearl Harbor basin <u>very</u> slightly.

The situation at Campbell Industrial Park is somewhat different. New wells have been proposed that would tap groundwater from the Waianae range. Alternately, additional water might be made available from wells proposed for Waianae and Makaha (Honolulu, City and County of, Board of Water Supply, July 1979 and August 1979) or from existing wells in the Ewa-Waianae District. Regardless of the exact source, the amount of water needed is so

Figure IV-3. Projected Water Balance for the 1,800-TPD HPOWER Facility Proposed By UOP.



Source: Belt, Collins & Associates based on information supplied by UOP, Inc. (November 1979).

small compared to the volume available from the regional system that it appears certain that the Board of Water Supply could meet its commitment. All but the Ewa wells lie outside of the Pearl Harbor Ground Water Control Area.

The preceding discussion has assumed that water for HPOWER would have to come from new sources. This is a "worst-case" assumption predicated on the possibility that a 1,200-TPD HPOWER facility could be selected, thereby necessitating continued operation of the existing Waipahu Incinerator. There is a good chance that a 1,800-TPD HPOWER facility will prove to be the most economical. In this case, the Waipahu Incinerator could be closed and the 135,000 gallons per day that it consumes diverted for use elsewhere in the Board of Water Supply system (Honolulu, City and County of, Department of Public Works, March 1980). This is about one-third more water than would be consumed by UOP's facility. Hence, operation of the 1,800-TPD resource recovery plant proposed by UOP would actually result in a reduction in the amount of water used for solid waste disposal.

Treatment and Disposal

As indicated in the water balance diagram for the UOP facility (Figure IV-3), water leaves the system at only a few points. First, sanitary wastes would be collected and, in the case of the Hanua Street and Malakole Road sites, disposed of in an on-site cesspool. If the Waipio Peninsula site is used, the existing municipal sewer line along Waipahu Depot Road would be used instead. This feeds directly into the existing sewage pump station at the northwest corner of the potential HPOWER site. From there, a large diameter line would carry it to the Honouliuli Sewage Treatment Plant. Water would be lost to the atmosphere from leaks, from the ash quench pit, and as evapotranspiration from the irrigated landscaping. Finally, the remaining water would leave the site in the residue that is trucked to landfill. The use of air-cooled condensers eliminates the cooling function as a consumer of water.

Periodic cleaning of the boiler tubes will be required. The frequency of such cleaning is dependent upon the quality of the feedwater that is used, and this cannot be predicted with great accuracy at this time. In general, however, it is expected that this maintenance task would be undertaken only once every two to three years. Consequently, neutralization of the resulting wastewater is normally done in a batch process involving the addition of a base (lime or sodium hydroxide). The neutralized wastewater might contain a relatively high concentration of heavy metals, and these would be removed by raising the pH of the solution to the point where the metals are precipitated as solids and then disposed of in an approved landfill.

Storm water runoff from the Campbell Industrial Park HPOWER sites is expected to be two to three times higher following construction of the project than it is at present. In percentage terms, the increase at the Waipio Peninsula site would probably be somewhat less, but in absolute terms, an HPOWER facility at either site would probably result in peak runoff from a 100-year storm event of about 50 cubic feet a second (cfs). On-site drainage problems at the Malakole Road site would be avoided by using fill to raise the site an average of two feet above the existing elevation and grading it so that runoff drains to the north. Preliminary plans call for a regional drainage channel to be constructed there, but detailed plans are not available. Until the proposed Campbell Industrial Park Drainage Master Plan has been implemented, the runoff would be allowed to spread across the neighboring undeveloped parcels. When the drainage system for surrounding parcels is constructed, the HPOWER site drainage system would be connected to it. Drainage from the Hanua Street site would be carried to an existing storm sewer along Hanua Street.

Most of the north parcel on the Waipio Peninsula site is 10 to 12 feet above the surrounding terrain. If the HPOWER facility is developed at this location, the site would probably be graded so that runoff would flow toward Waipahu Depot Road, be collected in a stormwater drainage system, and be conveyed by pipe under the roadway to an outlet at Kapakahi Stream. The outlet would be only a short distance above the point where the stream enters Pearl Harbor. The low-lying area between Waipahu Depot Road and the elevated fill area that occupies the remainder of the site is identified as Zone C (area of minimal flooding) on the "Flood Boundary and Floodway Map" prepared as part of the National Flood Insurance Program. Grading for the HPOWER project might alter the floodway boundary very slightly, but would not significantly change its capacity. No structural components of the HPOWER project would be built in a hazard area. No significant change in downstream flooding would occur as a result of an HPOWER facility at this site.

The Navy surplus parcel south of the incinerator has less even topography than the north parcel, and no detailed drainage plans have been developed at this time. However, it appears certain that the site would also drain into Kapakahi Stream and, thence, into West Loch. The Navy surplus parcel lies outside flood hazard areas, and the slight increase in surface runoff that would result would not significantly increase the potential for downstream flooding.

PROPOSED AMFAC/C-E FACILITY

Water Use

Water for the Amfac/C-E HPOWER facility would be drawn from two sources, both of them owned by Amfac's Oahu Sugar Company subsidiary. Approximately 50,000 GPD would be obtained for use as boiler-makeup water from the 500,000 GPD delivered by the Waiahole Ditch. The Waiahole Ditch would also serve as a source of water for the fire protection system; it is hoped that actual withdrawals would never be necessary.

The vast majority of the water used by the proposed Amfac/C-E facility would come from the Oahu Sugar Company's "Pump No. 7" complex. This complex consists of three deep wells (U.S.G.S Nos. 2300-21, 22, and 23) that are located at an elevation of 63.6 feet above mean sea level just east of the sugar mill powerhouse. They range in depth from 256 feet to 314 feet and draw from the Pearl Harbor aquifer. Tests of water quality conducted by the U.S. Geological Survey in 1978 (Soroos, 1979: Figure 3) indicated that the chloride content of basal lens water in the vicinity of the sugar mill is currently about 110 milligrams per liter (mg/l), and showed no evidence of a long-term increase in chloride concentrations at this location. More recent samples taken from the three wells tend to confirm the USGS measurement of chloride content (see Well 7A in Table IV-28). The data summarized in Table IV-28 also suggest that the deepest of the three wells in the Pump No. 7 complex extends nearly to the bottom of the freshwater lens. Actual pumping rates from the Pump No. 7 well complex vary substantially over the course of the year, but data furnished by the Oahu Sugar Company (Farr, March 5, 1979) indicate that it averages about 15 million gallons per day (MGD) during the 10 to 11 months each year that the mill is in operation.

Table IV-28. Concentrations of Selected Constituents in Water Drawn by Wells in the Pump No. 7 Complex: March 18, 1980.

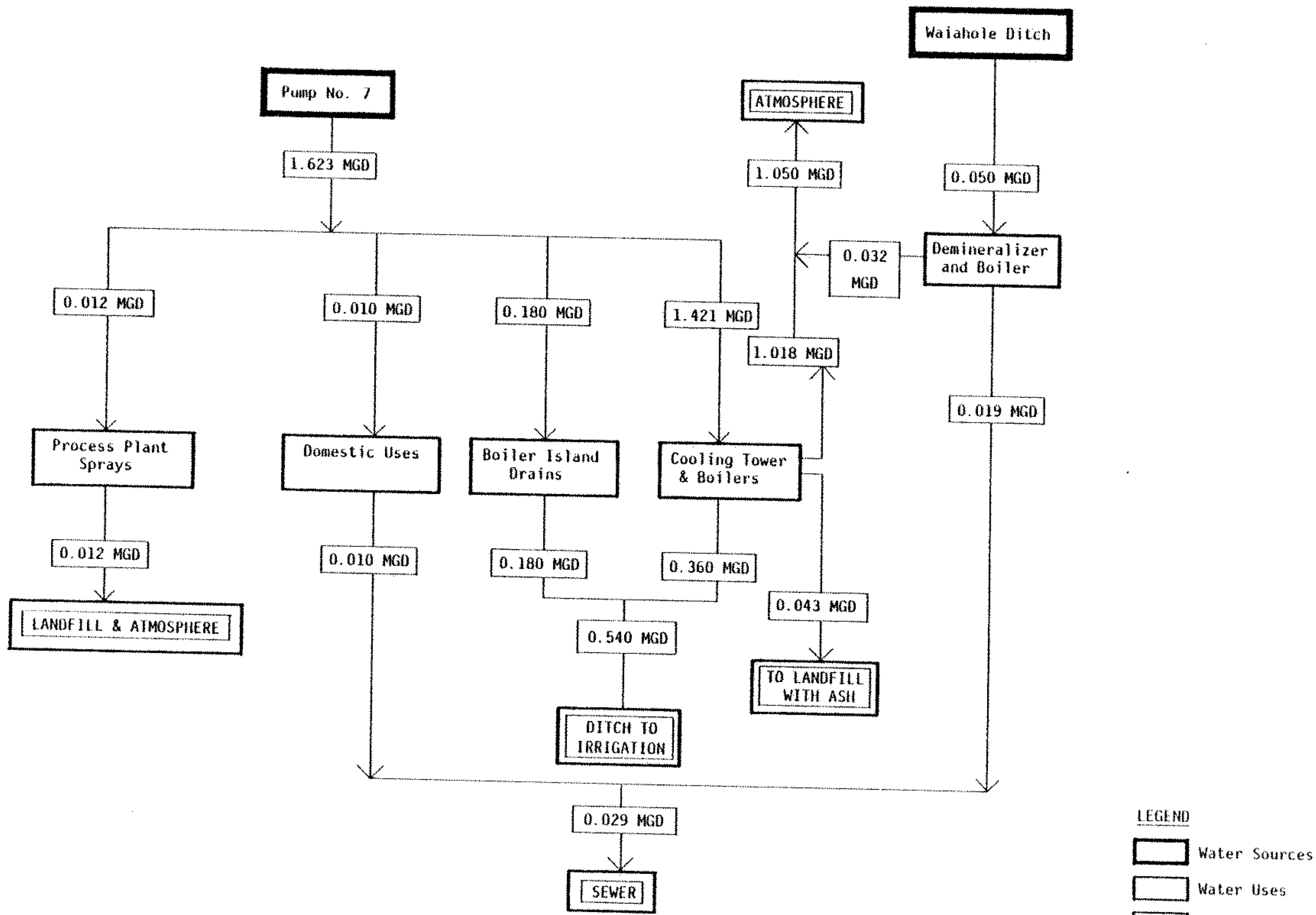
Constituent	Concentration (in mg/l) Well 7A (256' deep)	Well 7B (306' deep)	Well 7C (314' deep)
Alkalinity (bicarbonate)	5.26	5.30	4.02
Total Solids	327	438	763
Silica	40	38	38
Chlorides	105	151	264
Sulfates	29.2	35.6	54.3

Source: Brewer Analytical Laboratories, Job No. 1384, March 26, 1980.

A water balance for the proposed Amfac/C-E system is shown in Figure IV-4. It indicates that the average water requirement of the system is 1.673 MGD. Of this, 0.540 MGD would be returned to the Oahu Sugar Company irrigation system for use on their sugarcane fields on the Waipio Peninsula. The remaining 1.133 MGD would be consumptive use, mostly (1.018 MGD) as evaporative and drift losses from the condenser-water cooling tower. Relatively small amounts would be discharged to City and County sewers or sent to landfill in the form of moisture trapped in the ash and residue.

Amfac/C-E has committed itself to making up this 1.133 MGD of consumptive water use from Amfac's own sources and without increasing withdrawals from the Pump No. 7 well complex, the Waiahole Ditch, or any of the other sources available to it. According to its technical proposal, this would be accomplished by diverting a portion of the 17 MGD of water that is now being used by the Oahu Sugar Company for its mill operations to the HPOWER facility and increasing the extent to which the remaining water is recirculated within the Waipahu Sugar Mill's cane-cleaning plant. Since the diversion would only amount to about 6.5 percent of the 17 MGD that is now used by the sugar mill, the Oahu Sugar Company believes that the decreased use of fresh water and consequent increase in cane-wash water recirculation would not significantly affect their mill operations (Amfac/C-E, November 1979:173).

Figure IV-4. Projected Water Balance for the 1,800-TPD HPOWER Facility Proposed by Amfac/C-E.



Source: Amfac/C-E (March 5, 1980)

Impact of the Proposed Amfac/C-E Facility

Adequacy of Supply. At present, an average of 10 MGD of wastewater from the Oahu Sugar Company's cane washing operation is used to irrigate 800 acres of sugarcane on the Waipio Peninsula. This amounts to an average irrigation rate of 12,500 gallons/acre/day. According to the Oahu Sugar Company, this is significantly more than the 10,000 gallons/acre/day (including rainfall) that is considered desirable for optimum growth of the cane. Company sources have indicated that the high irrigation rate is maintained only because of the need to dispose of mill wastewater. (Oahu Sugar is prohibited from discharging wastewater in any way that would allow it to enter Pearl Harbor.) Based on the above, it is estimated that implementation of Amfac/C-E's HPOWER proposal would decrease the amount of irrigation water flowing to the Waipio Peninsula by 1.133 MGD to about 8.867 MGD. This amounts to over 11,000 gallons/acre/day, still well above the amount that is considered ideal for sugar cane cultivation.

As an adjunct to its proposal, Amfac/C-E has noted (November 1979:173) that the ability to dispose of cane trash at an HPOWER facility (as Amfac/C-E is proposing to do) would release for sugarcane cultivation about 100 acres of Waipio Peninsula land that is now used for cane trash storage. Assuming that this is actually done, the cane acreage there in need of irrigation would rise from 800 acres to 900 acres. At 10,000 gallons/acre/day, the amount of water discharged from the mill following construction of HPOWER (i.e., about 8.9 MGD) would almost exactly equal the amount needed for irrigation. Hence, no adverse effects on sugarcane yields are expected as a result of HPOWER. In view of the fact that the irrigated fields overlie relatively impermeable caprock (MacDonald, 1970:354), no decrease in recharge to the Pearl Harbor aquifer is expected as a result of the change in irrigation practices.

As indicated above, the Amfac/C-E HPOWER facility would meet its projected water needs without increasing water use above the level presently maintained by the Oahu Sugar Company. Hence, it would not alter withdrawals from the Pearl Harbor aquifer which is the source of water for the Pump No. 7 complex. Nevertheless, the supply wells identified in the proposal fall within the "Pearl Harbor Ground Water Control Area" recently established by the Board of Land and Natural Resource's Regulation 9. Because the Amfac/C-E proposal involves shifting some of the water withdrawn by the Pump No. 7 complex from one use to another, i.e., from the sugar mill to HPOWER, a permit had to be obtained from the Board as specified in Section 4 of Regulation 9:

> Within a designated ground water control area, no preserved existing use of water may be modified by increasing the quantity of water used <u>or by substantially changing the purpose or manner of the beneficial use</u> . . . unless authorized by the Board. [Hawaii, State of, Department of Land and Natural Resources, June 1979:4.]

In order to issue such a permit, the Board of Land and Natural Resources must find:

(1) that there is water available for use, (2) that the proposed use of water will be for a beneficial purpose, (3) that the water use proposed in the application will not impair the most beneficial use and development of the water resources of the State, and (4) that issuance of the permit will not substantially and materially interfere with any existing individual household uses, preserved uses, or permitted uses. [Hawaii, State of, Department of Land and Natural Resources, June 1979:5.]

The Board recently approved Amfac/C-E's application for this permit.

Quality Considerations. Reducing the amount of water used for cane washing would result in an increase in the concentration of settleable solids carried by the wastewater. Since the current concentration of settleable solids in the 10 MGD of water used for cane washing is approximately 100 mg/liter (Amfac/C-E, November 1979:173), the reduction in water used for dilution would increase the concentration to about 110 mg/liter. An increase of this magnitude would have no discernible effect on the usefulness of this water for irrigation. The other constituents present in cane wash water would be increased by a similar ratio. The increase in concentration (mg/liter) would not result in an increase in the total amount entering the fields since it would be accompanied by a corresponding decrease in the volume of water applied. In fact, if the additional 100 acres of land now used for cane trash storage is brought into production as previously mentioned, the per-acre volume of the constituents would actually decrease.

The water balance shown in Figure IV-4 indicates that an average of 20 gallons per minute (GPM) would enter the City and County sanitary sewer line that runs beneath Paiwa Street (just east of the HPOWER site). Of that, boiler blowdown and demineralizer blowdown is estimated to total 13 GPM. Quality estimates provided by Amfac/C-E for this effluent stream (November 1979:181) are as follows:

	Chemical Constituent	Concentration (in ppm)
Boiler Blowdown (5 GPM):	Sodium Phosphate	50
	Sodium Hydroxide	50
	Total Dissolved Solids	550
	pH	10.5 (no units)
Demineralizer Blowdown (8 GPM)	Calcium Sulfate	10,000
	Magnesium Sulfate	20,000
	Sodium Chloride	10,000
	Sodium Sulfate	8,000
	Sodium Silicate	15,000
	Sodium Bicarbonate	5,000

The estimated seven gallons per minute of domestic wastewater would have the makeup of normal municipal sewage. In the quantities that are expected, none of constituents identified above would have an adverse effect on either the collection system or the Honouliuli Sewage Treatment Plant.

With respect to the capacity of the sanitary sewer system, an analysis by Community Planning, Inc. (November 1979) concluded that:

> The recently installed sewer line in Paiwa Street has adequate capacity for H-Power as well as other mauka areas.
>
> The existing sewers through the lower portion of Waipahu to the pump station on Depot Road has (sic) additional capacity for H-Power at this time. However, . . . a relief sewer will eventually be required if Amfac lands above the H-1 Freeway are developed in the future.
>
> Sewage from H-Power can be serviced by the Honouliuli [sewage treatment] facility after that date [August 1981].

Storm Drainage. The storm drainage system for the proposed Amfac/C-E HPOWER facility would collect surface runoff and channel it to Kapakahi Stream. Estimates made using the rational method indicate that runoff would amount to about 37 cfs, 45 cfs, and 49 cfs for the ten-, fifty-, and hundred-year rainfall events, respectively (Amfac/C-E November 1979:182). This is probably about double the current amount. Given the small size of the site relative to the entire tributary area, this is not expected to lead to flooding along the lower reaches of Kapakahi Stream. Similarly, it would not overload the 36-inch diameter storm sewer that would carry runoff from the southern corner of the site to the Kapakahi Stream channel. Because all of the refuse handling areas are covered, storm water runoff quality would not be affected by the presence of the refuse. Hence, the primary effects would be those typically related to an increase in impermeable surfaces and increased vehicular traffic. Because of the limited area of the site relative to the entire watershed and the heavy urbanization that already exists there, no significant adverse impacts are expected. If anything, the replacement of the existing dirt roads with impermeable surfaces and landscaped areas could actually decrease sediment yields.

BIOLOGICAL IMPACTS

Three different types of biological impacts of the HPOWER project are examined in this report -- vegetation, wildlife, and vectors. Field surveys were conducted to determine the existing vegetation and wildlife, and their results are described below. The probable effects of the construction and operation of each of the alternatives under consideration are discussed, and measures necessary to mitigate significant adverse impacts are noted. In addition to any disruption which the project might cause to existing vegetation and wildlife, it would also create a potential habitat for insects, rodents, and other pests, including birds. Disease and nuisance problems that can arise from solid waste handling operations have been identified and are discussed in this subsection. Control measures which could be used to minimize or mitigate such problems are summarized.

VEGETATION

One can conceive of three different types of impacts on vegetation that could occur as a result of the HPOWER project. First, vegetation on the site would be removed during site preparation; second, construction and operational activities could damage vegetation in the immediate vicinity of the site; and, finally, air pollutants from the facility site could affect the vegetation of a larger area around the site. Other topics involving vegetation, such as the effect of vegetation loss on soil erosion, or the effect that the addition or loss of vegetative screens could have on views, noise levels, air quality, or other aspects of the environment are covered elsewhere in this chapter.

Methodology

In order to identify the existing vegetative cover and evaluate probable impacts of the HPOWER development, three phases of survey and analysis of the four potential HPOWER sites were conducted by two botanists, Margaret E. Elliot and Erin Marie Hall.

Reconnaissance. During the reconnaissance phase, existing maps and aerial photographs were examined for familiarization with geographic boundaries, assessment of general cover types, and location of potential survey routes and problem areas. Background research (literature review and personal interviews with botanists) was undertaken to determine whether any rare or endangered native flora could be expected in the study area. Then, a reconnaissance-level field survey of each site was conducted; information gained from this survey was used to make decisions regarding the methods and level of detail required for the intensive field survey phase.

Field Survey. Based on observations made during the reconnaissance phase, intensive field surveys were planned for each site. All sites were surveyed by walk-through survey techniques during which floristic composition, vegetative structure and complexity, patterns of distribution, and relationship to terrain were observed and recorded. Special attention was given to native flora and to determining the presence or absence of rare, unique, or endangered flora.

The Campbell Industrial Park sites were surveyed in greater detail than the Amfac/C-E site and the Waipio Peninsula site due to their large area, high proportion of natural vegetative cover, and geographic location on the Ewa plain, which is known habitat for two species of rare and proposed endangered native flora: Achyranthes splendens var. rotundata and Euphorbia skottsbergii var. kalaeloana (U.S. Army Corps of Engineers, May 1979). Both of these species are included in the U.S. Department of the Interior, Fish and Wildlife Service list of proposed endangered and threatened species, in the June 16, 1976 Federal Register. As the survey proceeded, investigations were intensified for the Hanua Street site since one of the proposed endangered species and another rare, although not endangered, species were observed. During the survey, endangered flora were generally located on maps and aerial photographs using field-mapping and aerial photo interpretation techniques.

The Amfac/C-E site was surveyed less intensively than the Campbell Industrial Park sites. Most of the site is occupied by houses, gardens, roads, and roadside vegetation. To avoid disturbance to local residents, observations were made only from existing roads and walkways and from vacant lots. Exhaustive species lists of garden ornamentals were not considered necessary in this man-modified environment, and rare or endangered species were neither expected nor observed. Vegetation observed from the roads was recorded, with special attention given to exceptional plants such as very large and attractive trees.

For the north parcel of the Waipio Peninsula site, only a reconnaissance-level survey of vegetation was completed because it was identified late in the selection process. While observations were made for each major cover type encountered, no single cover type was surveyed in detail. Hence, the checklist of plant species for the Waipio Peninsula site in Appendix C should not be considered exhaustive.

A decision to include the Navy surplus and incinerator-remnant parcels south of the Waipahu Incinerator among the areas under consideration occurred too late for detailed field work on them to be conducted prior to the submission of this document. Hence, only a cursory examination of the existing vegetation has been conducted as of this time, and the species list for the Waipio Peninsula site presented in Appendix C does not include these parcels.

Analysis. The significance of existing vegetation was evaluated and weighed against actions which would accompany HPOWER development and operation. From this, an assessment was made of vegetation impacts which might occur. Then, recommendations for mitigation of adverse impacts were developed.

Description of Vegetation on Each Site

Findings of the survey of existing vegetation and land cover are presented in this section and are summarized in Table IV-29. Lists of vegetation observed for each site are given in Appendix C. It should be noted that the study utilized a sampling technique and was conducted during only the dry season. Minor differences in species composition might be revealed by additional observation after heavy rainfall since plants in arid regions often pass through the dry season in the form of seed.

Table IV-29. Summary of Existing Vegetation/Land Cover for Potential HPOWER Sites.

Site Location	Cover Type/Description	Common Species
Malakole Road Site	Open kiawe woodland with trees and shrubs up to 35 feet high; understory shaded, supporting dryland grasses and shrubs which extend into open clearings.	Herb layer: feathery pennisetum (Pennisetum setosum), Chinese violet (Asystasia gangetica), nettle-leaved goosefoot (Chenopodium murale). Shrub layer: golden crown-beard (Verbesina enceli-oides), koa haole (Leucaena leucocephala), kiawe (Prosopis pallida). Tree layer: kiawe.
Hanua Street Site	Open kiawe woodland with scattered grassy clearings grading into open scrub grassland toward the coastal (western) side. Coralline substrate provides habitat for the proposed endangered Achyranthes splendens var. rotundata and the rare naio variety Myoporum sandwicense var. stellatum.	Herb layer: feathery pennisetum, Chinese violet, ilima (Ilima spp.), Australian salt bush (Atriplex semi-baccata), sea purslane (Sesuvium portulacastrum), seaside heliotrope (Heliotropium currassavicum). Shrub layer: naio (Myoporum sandwicense var. stel-latum), Achyranthes splendens var. rotundata, pluchea (Pluchea spp.), koa haole, kiawe. Tree layer: kiawe.
Amfac/C-E Site	Residential homes with associated ornamentals, garden crops, and streetside vegetation.	Herb layer: orchids, gingers, ilima, Bermuda grass (Cynodon dactylon), sweet potato (Ipomoea batatas), etc. Shrub layer: gardenia (Gardenia spp.), hibiscus (Hibiscus spp.), ti (Cordyline terminalis). Tree layer: plumeria (Plumeria spp.) African tulip (Spathodea campanulata), coconut (Cocos nucifera), mahogany (Swietenia mahogoni).
Waipio Peninsula Site	Landfill area, largely short grasses and forbs, with scattered low shrubs and occasional patches of taller California grass. Kiawe trees and scrub zone border drainage channel.	Herb layer: California grass (Brachiaria mutica), pickleweed (Batus maritima), spiny amaranth (Amaranthus spinosus), Bermuda grass, false mallow (Malvastrum coromandelium). Shrub layer: koa haole, castor bean (Ricinus communis), pluchea, kiawe. Tree layer: kiawe.

Source: Elliott, Margaret E. and Erin Marie Hall (January 1980).

Malakole Road Site. The Campbell Industrial Park sites fall within the potential vegetation zone of kiawe and lowland shrub (Ripperton and Hosaka, 1942). This is characteristic of Hawaiian land areas below 1,000 feet which receive less than 20 inches of rainfall per year. Field survey confirms that most of this parcel is kiawe woodland with very few patches of open ground cover. The largest open clearings are due to human modification -- two industrial dump sites located on the eastern side of the parcel. The easternmost dump site is covered by soil and rubble and is essentially void of vegetation. The other dump site supports an extensive cover of weedy grasses and shrubs over and among the existing rubble.

The kiawe woodland which occupies most of this parcel is dominated by dense growths of kiawe (Prosopis pallida) trees and shrubs up to 35 feet in height. This species forms highly-shaded, nearly impenetrable thickets. The understory includes scattered koa haole (Leucaena leucocephala), Chinese violet (Asystasia gangetica), nettle-leaved goosefoot (Chenopodium murale) and other exotic weeds adapted to arid climatic conditions. In deeper sinkholes, where moisture is available, mesic species such as ti (Cordyline terminalis) are present as well. Vegetation in the clearings includes golden crown-beard (Verbesina encelioides), feathery pennisetum (Pennisetum setosum), and pluchea (Pluchea odorata).

Two species found in this site are closely related to proposed endangered Hawaiian plant species but are not themselves endangered. These are the native Capparis sandwichiana var. zoharyi, related to the native caper C. sandwichiana var. sandwichiana, and the exotic Achyranthes indica which is related to the endemic A. splendens var. rotundata. The proposed endangered Euphorbia skottsbergii known to exist elsewhere on the Ewa plain was not observed in this site. Only common Euphorbia species (E. glomifera and E. hirta) were observed.

Hanua Street Site. This parcel, which contains about four times the amount of land that would be needed for HPOWER, is characterized by open kiawe woodland, similar in structure and composition to the Malakole Road site but with more open grassy clearings which grade into a scrub grassland cover toward the coast. Kiawe (Prosopis pallida) trees and shrubs predominate, with feathery pennisetum (Pennisetum setosum), swollen fingergrass (Chloris inflata), golden crown-beard (Verbesina encelioides), and Chinese violet (Asystasia gangetica) common in the understory and in grassy clearings. Scrub grassland areas are characterized by koa haole (Leucaena leucocephala), pluchea (Pluchea spp.), false sandalwood (Myoporum sandwicense var. stellatum), golden crown-beard and feathery pennisetum. More coastal species are found in this site, particularly towards the western edge. These include the native seaside heliotrope (Heliotropium curassavicum) and sea purslane (Sesuvium portulacastrum) as well as exotic coastal species such as pickleweed (Batis maritima) and Australian salt bush (Atriplex semibaccata).

The most significant characteristic of this site relative to vegetation is that it provides habitat for two very rare and important native Hawaiian species. Naio (Myoporum sandwicense var. stellatum) is a rare native false sandalwood whose habitat is restricted to the coralline substrate of the Ewa plain. It is currently being considered for inclusion in the Federal list of endangered and threatened species (Char, 1979). Many individuals of the species were found in this parcel, most of these shrubs or saplings averaging six feet in height. These are scattered mainly in the western half of the study area.

The most significant native Hawaiian plant species observed on this site is Achyranthes splendens var. rotundata, a species endemic to Oahu. Included in the Federal Register (U.S. Department of the Interior, 1976) proposed list of endangered species, it is highly sensitive to human disturbance and has disappeared in other known habitats -- even within Campbell Industrial Park -- when the soil nearby has been disturbed. There are at present only three or four known colonies of this achyranthes on Oahu. More than 300 healthy individuals of this species are located on the western edge of this parcel near Kaomi Loop, about 500 feet from the Brewer Chemical Company entrance. This colony represents the largest single colony of Achyranthes splendens var. rotundata remaining in the United States (Char, 1979).

Amfac/C-E Site. Most of this parcel is covered by houses, gardens, dirt roads, and associated vegetation. Vegetation may be divided into three groups: garden ornamentals, weeds and escapes, and food crops. Many of the garden ornamentals and food crops are native to Hawaii and the Pacific and are expressive of the residential atmosphere of this area. Ornamentals include plumeria (Plumeria spp.), octopus tree (Brassaia actinophylla), mahogany (Swietenia mahogoni), African tulip tree (Spathodea campanulata), and coconut (Cocos nucifera) in the tree layer, with gardenia (Gardenia spp.), hibiscus (Hibiscus spp.), ti (Cordyline terminalis), anthurium (Anthurium spp.), gingers, and orchids in the shrub and herb layer. Garden food crops include banana, sweet potato, pumpkin, onions, peppers, citrus, and avocado.

Weeds and escapes are dominated by koa haole (Leucaena leucocephala), ilima (Ilima spp.), waltheria (Waltheria americana), beggars' tick (Bidens pilosa), and Bermuda grass (Cynodon dactylon). No rare or endangered species were observed on this site, but there are several impressive and large trees which merit attention. Mango, avocado, coconut, and African tulip trees up to 35 feet in height are the more common large trees in this area. These are scattered in gardens and along roads. The most exceptional trees, however, are situated along Manager's Drive. Here, large mahogany trees, more than three feet in diameter and over 30 feet in height, form a nearly continuous canopy cover over four blocks of the road. Fourteen individual trees actually fall within the study area, but others are situated along the drive outside the site boundaries. These trees are of sufficient size and stature to be eligible for the County arborist's list of exceptional trees, but they were not on the list at the time of the survey.

Waipio Peninsula Site. The surface of this site is largely man-modified. It includes bulldozed fill and rubble, spoil from the Oahu Sugar mud line, and sugar cane. The existing vegetation on the north parcel is characterized by five zones; the first four are narrow strips parallelling Waipahu Depot Road, while the fifth consists of the plateau making up the eastern portion of the site.

- A virtually barren zone approximately 200 feet wide (narrower at the northern end) extends along Waipahu Depot Road. Piles of gravel and rubble are dominant and obscure the inner patches of wetland from the road.

- Immediately east of the zone of unvegetated rubble is an area characterized by dense weedy growths of California grass (Brachiaria mutica), three to six feet in height, and scattered pluchea shrubs (Pluchea spp.) along the western edge of a poorly-defined channel. Small salt flats and patches of brackish standing water or mud are surrounded by pickleweed (Batis maritima), a halophyte commonly found in coastal marshes and swamps in Hawaii. Other plants include mostly weedy shrubs such as castor bean (Ricinus communis), koa haole (Leucaena leucocephala), and tree tobacco (Nicotiana glauca). Forbs and grasses include the weedy spiny amaranth (Amaranthus spinosus), feathery pennisetum, and swollen fingergrass (Chloris inflata).

- At the time of the survey of the Waipio Peninsula site, the drainage channel had scattered clumps of dried, matted vegetation. California grass is the most abundant species of this zone, occurring in and along both sides of the channel. Other species include pickleweed and seashore paspalum (Paspalum vaginatum) in the herb layer and pluchea, kiawe, and koa haole in the shrub layer. No characteristic wetland species (obligate hydrophytes), besides the paspalum, were observed in this zone. This may reflect the particularly aggressive nature of California grass and/or the intermittent nature of the wetland itself.

- Kiawe and pluchea scrub border the eastern side of the channel. This narrow zone hosts the tallest layer of vegetation on the site. Kiawe (Prosopis pallida) trees and shrubs occur mixed with shrubs of Pluchea indica and P. odorata. The trees average 20 to 25 feet in height and the shrubs approximately six to eight feet.

- To the east of this zone is a broad, level "plateau" of landfill. This is the most extensive vegetation zone of this site, and is characterized by short (less than a foot high) grasses and forbs, with scattered low shrubs and occasional patches of taller California grass. The primary cover is Bermuda grass (Cynodon dactylon), dried or dead in some places. Other weedy grasses and forbs characteristic of this zone are false mallow (Malvastrum coromandelium), nut grass (Cyperus rotundus), red pua-lele (Emilia javanica) and spiny amaranth (Amaranthus spinosis). Shrubs include hairy abutilon (Abutilon grandifolium), koa haole, and tree tobacco.

In summary the vegetation of the north parcel of the Waipio Peninsula site may be described as common, weedy, and exotic. No rare or endangered native species are known to exist, and, overall, this parcel appears highly disturbed and unaesthetic. Of the three native plant species observed, Waltheria americana is a weed, common to disturbed lowland environments of Hawaii. The indigenous Heliotropium currasavicum and endemic Jacquemontia sandwicensis, are non-endangered, desirable coastal species. Representation of these species on this parcel is very poor, less than one percent of the overall cover.

A cursory examination of the incinerator-remnant parcel indicated that the vegetation there is similar to that found in the lowland zone of the north parcel. A similar check of the Navy surplus parcel indicates that the sparse vegetation found on portions of the spoil from the Oahu Sugar Company mud line consists of common weedy growth. Sugar cane is being cultivated on the eastern third of the parcel, and the mud line disposal pits are barren.

Impacts on Vegetation

Malakole Road Site. The greatest changes to vegetation in this undeveloped, semi-natural area would occur during site preparation. All vegetation in the path of clearing activities would be destroyed unless transplanted. However, most of the species concerned are common, and native representation is fairly low. Site clearance would not seriously reduce the total island population of any of the species listed for this site in Appendix C.

Since both Campbell Industrial Park sites are located in an arid region, dead or dried plant material from site-clearing should be removed immediately, to avoid undue fire hazard. Care should also be taken when using flammables or heat-producing machinery. The concern is to prevent the spread of fire, both because of valuable and rare species of plants in the area and because of the sites' proximity to the Standard Oil Company (Chevron) refinery.

Although advanced pollution control systems would be built into the proposed facility, some slight degradation of the ambient air quality appears unavoidable. However, this decline is so slight that vegetation is not expected to suffer toxic effects from stack gases or particulate emissions. Ongoing monitoring is recommended, however, since pollution injury to vegetation is difficult to predict (Hindawe, 1970).

Hanua Street Site. This site is environmentally more sensitive than the Malakole Road site due to the presence of rare and proposed endangered plant species. Clearing and site preparation of the entire parcel would be undesirable since this would result in a very significant reduction in total population of the proposed endangered *Achyranthes splendens* var. *rotundata*. Destruction of the rare native naio *Myoporum sandwicense* var. *stellatum* would also be objectionable since this species is found only on the Ewa plain. Fortunately, clearing of the entire parcel is unnecessary since only a portion of the area would be needed for the HPOWER facility. Since the vegetation survey has indicated that the coastal side of the parcel is environmentally sensitive, current plans are to avoid that portion of the property if the Hanua Street site is selected. This would also be consistent with the City's desire to minimize infrastructure costs, because the eastern side of the parcel is closer to existing utility lines and Hanua Street.

Development of any portion of this site represents a reduction in potential or actual habitat of valued native plant species. User access or traffic in this area would increase during construction and operation stages. This may result in inadvertent trampling or destruction of important plant species. Such destruction is of considerable significance because the chance of successfully transplanting *Achyranthes splendens* is believed to be low.

Many researchers have studied effects that elevated pollutant concentrations can have on vegetation (see, for example, Hindawe, 1970 and Robinette, 1972). However, none of these studies have focused on the specific species found in the vicinity of the sites that are under consideration for HPOWER. Nevertheless, the fact that none of the studies conducted have identified adverse effects as a result of even the peak pollutant levels projected as an aftermath of HPOWER suggests that emissions from the proposed facility are unlikely to have an adverse effect on vegetation.

Amfac/C-E Site. Unlike the Campbell Industrial Park sites, this site is now occupied by homes, unpaved roads, and gardens. With respect to vegetation, clearing of existing trees, shrubs, and garden crops may be expected. Destruction of larger trees would be an adverse impact of development. Loss of the 14 mahogany trees that border the portion of Manager's Drive that would be used for HPOWER would be significant since the fine large trees along these two blocks of the four-block stand form the thickest canopy cover.

Waipio Peninsula Site. Because the vegetation of the site is common and weedy, with only a few specimens of non-endangered native plants, the proposed development is not expected to cause significant adverse environmental impacts with respect to vegetation. With sufficient landscaping, development may in fact improve the vegetative environment by elimination of weedy species and introduction of desirable elements such as ornamentals and attractive native species. The portions of this site described as wetlands appear to have limited ecological significance.

Mitigation Measures

Since the proposed project would have little impact on vegetation, only a few mitigation measures would be necessary. The major one would be the avoidance of the makai portion of the Hanua Street site and the rare and endangered species there. Further protection could be provided by a 200-foot buffer zone and protective fencing. Incorporating large valuable trees or native plants into the facility's landscape design would be a positive mitigation measure. With some effort, it may be possible to incorporate one or more of the rare or proposed endangered species -- *Euphorbia skottsbergia* var. *kalaeona*, *Achyranthes splendens* var. *rotundata*, and *Myoporum sandwicense* var. *stellatum* -- into the landscape plan if the facility is to be located on a Campbell Industrial Park site. Consultation with qualified botanists is recommended, however, since these species are highly sensitive to human disturbance and extremely difficult to transplant successfully. Propagation material should be obtained only from approved sources. Successful establishment of any rare or endangered species would be a highly positive impact of HPOWER facility development. If the facility is to be built on the Amfac/C-E site, a possible, although expensive, mitigation measure would be to transplant some or all of the mahogany trees along Manager's Drive within the HPOWER site to the northern end of Manager's Drive. Costs for moving one tree of that size that distance range from $3,500 to $4,500.

WILDLIFE

A wildlife survey of the Campbell Industrial Park sites and the Amfac/ C-E site was conducted in November 1979 by Honolulu Community College zoologist, Dr. C. Robert Eddinger. A search for previous wildlife studies for these sites proved fruitless. The Amfac/C-E site has been used as a housing area for years; native forest growth and corresponding native forest birds have long been absent. The Campbell Industrial Park area has not received much attention in wildlife studies. No native forest birds have been seen at this low elevation since around the turn of the century. Waterbirds would not be expected on any of these parcels, as there are no fresh or salt water ponds within the proposed HPOWER sites. No reports could be found of native birds having been observed in any of these three sites.

A wildlife survey was conducted for the Waipio Peninsula site in June 1980, by Phil Bruner of the Brigham Young University Biology Department, since it was identified as a possible site after the eariler surveys had already been conducted.

Wildlife Present

Two days of field work were spent at the Campbell Industrial Park sites (November 10 and 17, 1979), two days at the Amfac/C-E site (November 11 and 18, 1979) and one day at the Waipio Peninsula site (June 21, 1980). The boundaries of the study sites and numerous transects through them were walked. Species lists were compiled, based on both auditory and visual identification.

The only mammals encountered were mongeese (Herpestes Auropunctatus) -- on both Campbell sites, house mice (Mus musculus) -- only on the Hanua Street site, and rats -- on the Waipio Peninsula site. The wild bird species identified for each of the sites are listed in Table IV-30. In addition, chickens were found at the Amfac/C-E site. Almost all of the observed species are introduced.

Bruner reported that the mud ponds on the Navy surplus parcel of the Waipio Peninsula site probably serve as a minor feeding ground for migratory shorebirds during the winter months, as a few stragglers were seen during the survey. However, he felt the wetland Ewa of the incinerator was by far the most valuable resource in the area for these birds. Only one native waterbird, a Black-crowned Night Heron was observed foraging along the banks of the mud ponds. He concluded that the site is used mostly by the typical array of exotic (introduced) species one would expect to find in similar habitats elsewhere on Oahu.

Impacts on Wildlife

All of the proposed sites have already been so altered by man that only those species which do well in urban settings have survived. Only one native bird was sighted within these areas. Most of the animals would vacate the site during the construction phase of the project. Few animals would be destroyed, due to their high mobility, especially the bird species.

There would be some habitat reduction as a result of clearing the existing vegetation. Some species of birds have been known to adapt very well to man-dominated ecosystems, and common mynah have been reported to nest in buildings, water drain pipes, and other engineering structures (Eddinger 1967), but the HPOWER facility would be designed to minimize such undesirable nesting sites.

Table IV-30. Checklist of Birds Observed at Potential HPOWER Sites.

Name	Scientific Name	Malakole Road Site	Hanua Street Site	Amfac/ C-E Site	Waipio Penin. Site
Barred Dove	*Geopelia striata striata*	A	A	A	A
House Finch	*Carpodacus mexicanus frontalis*	C	C	C	
Japanese White-eye	*Zosterops japonica japonica*	A	A	A	C
Lace-Necked Dove	*Streptopelia chinensis chinensis*	C	C	C	U
Red-Crested Cardinal	*Paroaria coronata*	C	C		
Barn Owl	*Tyto alba pratincola*		C		
Common Mynah	*Acridotheres tristis tristis*		A	A	C
House Sparrow	*Passer domesticus*		A	A	U
Ricebird	*Lonchura punctulata*		C	C	C
Kentucky Cardinal	*Richmondena cardinalis*		C		
Red-vested Bulbul	*Pycnonotus cafer*			C	
Common Pigeon	*Columba livia*			A	
Cattle Egret	*Bubulcus ibis*				C
Black-headed Munia	*Lonchura malacca*				C
Northern Cardinal	*Cardinalis cardinalis*				U
Golden Plover	*Pluvialis dominica*				R
Ruddy Turnstone	*Arenaria interpres*				R
Black-crowned Night Heron	*Nycticorax nycticorax*				R

Note: Letters "A," "C," "U," and "R" indicate the relative abundance of that species at that site. No letter indicates that no specimen of that species was observed at that site.

A = Abundant
C = Common
U = Uncommon
R = Rare

All species are introduced except the Black-crowned Night Heron is native, and the Golden Plover and Ruddy Turnstone are migratory.

Source: Eddinger (November 1979) and Bruner (June 1980).

Mitigation Measures

There would be some landscaping around the HPOWER facility, but the total vegetation cover on the site would be far less than is presently the case, with a consequent reduction in the available natural habitat. However, almost all of the observed wildlife species are common or very common, and the proposed project would have no measurable effect on the species' population in the region. Little can be done to mitigate this impact while still maintaining adequate control of potential vectors (see following section).

VECTORS

Introduction

One of the most significant public concerns with respect to the biologic impacts of the project is that it might result in an increase in the number of rodents, insects, and birds in the vicinity. The presence of these organisms is viewed both as a potential threat to public health and a general nuisance. Because of this and the fact that problems can arise wherever solid waste is improperly handled, Lawrence H. Pierce, a registered sanitarian who is intimately familiar with vector control problems in Hawaii, was commissioned to determine whether or not the various HPOWER alternatives would present significant public health hazards. The discussion contained in the remainder of this subsection is based on his research and observations. It begins with a brief review of the reasons why the potential exists for adverse impacts and the governmental regulations that would control them. Subsequent sections describe the vectors and associated pathogens that are of greatest concern, the impact that HPOWER would have on them, and the measures that would be taken to insure that implementation of HPOWER would not create a significant health problem or nuisance. Before beginning, however, we will pause for a moment to define two terms which are used repeatedly in our discussion.

A "vector" is any living organism that directly or indirectly transmits pathogens. The majority of the higher animals are potential vectors for pathogens that affect humans, including three types that can be associated with solid waste disposal facilities such as HPOWER: rodents, insects, and birds. In addition to being potential disease carriers, some of these animals can create public nuisances as well. Rodents are probably the most significant of these nuisance-causing animals because of the damage they do to buildings and electrical wiring, but large numbers of birds or insects would also be undesirable even if they did not carry pathogens. Because the public health and nuisance problems are caused by the same organisms, they are covered together here.

The "carrying capacity" of an environment is the number of organisms of a particular kind that it can support over an indefinite period of time. In general, it is determined by the amount of food and living space available to that population.

The hundreds of tons of solid waste that would arrive at the HPOWER facility would be a potentially rich source of food for many types of animals that can carry diseases harmful to humans. Improperly designed, the facility could provide a suitable physical habitat (or access to a suitable habitat) as well. If this were to occur, the carrying capacity of the HPOWER site could be elevated significantly above its present level. At the very least, the resulting growth in the vector population could create a public nuisance; at its worst, it could result in a significant threat to public health. The purpose of this analysis was to determine to what extent the design of the proposed HPOWER facilities would prevent this potential from being realized. As explained below, all the technical proposals now under consideration by the City appear to incorporate sufficient vector control elements to prevent serious problems.

Applicable Regulations

Both Chapter 46 of the Hawaii State Public Health Regulations and recently promulgated standards of the U.S. Environmental Protection Agency have sections related to the control of vectors at solid waste disposal facilities. Major points contained in each of these are summarized below.

State Public Health Regulations. These regulations were adopted with the intent of establishing minimum standards governing the design, construction, installation, operation and maintenance of solid waste disposal systems and, more specifically, to "prevent the spread of disease and the creation of nuisances and; [to] protect the public health and safety."

In section 3 of Chapter 46, the following "General Operating Standards" address the vector control issue:

A 1. (b) Provide effective methods to control insects, birds, rodents, other disease vectors and nuisance conditions at the facility.

(e) Provide for the adequate storage of all solid waste so as to prevent the attraction, harborage or breeding of insects or rodents and to eliminate conditions harmful to the public health or which create safety hazards, odors, unsightliness and other public nuisances.

Additional controls can be found under "Standards for Reclamation Facilities":

C 1. By-products removed during processing shall be handled in a sanitary and nuisance-free manner and shall be recycled or disposed of in a manner approved by the Department.

and under "Standards for Incineration":

D 1. Incinerator fly ash and residue generated from incineration of solid waste shall be treated and disposed of in a manner to prevent odor and dust nuisance and to control insects, birds, rodents and other disease vectors.

Although the intent of the above standards is clear, they stop short of developing a numerical performance objective such as number of flies per cubic foot or number of rats per square meter.

U.S. Environmental Protection Agency Guidelines. The qualitative nature of present standard regarding vectors is also reflected in the recently published EPA guidelines; these do not specify exactly how many vectors per unit area would be considered acceptable under the guidelines. The discussion contained in the issue of the Federal Register in which the standards were promulgated indicated that the U.S. Environmental Protection Agency felt that specific numerical standards "could not be measured with any accuracy." It went on to state, that, "EPA made the standard more specific by requiring minimization of on-site population of disease vectors." (Disease vectors were defined as rodents, flies, and mosquitos.) In section 257.3-6 (a) the following standard is given for 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.

To summarize, the primary objectives of the existing standards are:

a) to protect the public from vector-associated nuisances and diseases;

b) to insure that the processing and storage of solid waste is done in such a way as not to attract or harbor vectors;

c) to see that effective methods are employed to control/minimize vector populations associated with solid waste facilities.

The acceptability of the HPOWER proposals with respect to potential vector impacts was judged on the basis of their compliance with the aforementioned standards.

Potential HPOWER-Related Vectors and the Diseases and Nuisances Associated With Them

Initial population levels of vectors on the potential HPOWER sites have not been estimated since most of the indigenous vector species (especially insects) have such a great reproductive capacity that their eventual population level with HPOWER is almost independent of the present population. Instead, it is determined almost solely by HPOWER's effect on the carrying capacity of the environment. The diseases that can be associated with the various vectors are also discussed generally under this heading. Appendix D contains more complete lists of diseases which have reportedly been associated with vectors, and indicates the extent to which each is considered a public health concern in Hawaii.

Rodents. The rodent species most likely to be found in the area of the HPOWER site (either because they are already present or would be brought there in refuse trucks) are listed in Table IV-31. The species' high average reproductive rate for breeding females means a potential for a fast increase in the rodent population -- if suitable food and habitat is available, i.e., if the presence of the facility resulted in a greater carrying capacity of the environment.

Table IV-31. Checklist of Potential Mammalian Vectors.

Scientific Name	Common Name
Rattus rattus	Roof rat
Rattus norvegicus	Norway rat
Rattus exulans hawaiiensis	Hawaiian rat
Mus musculus domesticus	House mouse
Herpestes auropunctatus	Mongoose

Source: Lawrence H. Pierce.

Rats have been connected with about 20 diseases that can be transmitted to man. The majority of these are actually transmitted by ectoparasites (fleas, mites, lice) which live on the rats. Rats and mongooses have been shown to be carriers of both plague and leptospirosis in Hawaii (Higa, 1972).

Rats are not tolerated by the average citizen, not only because of the diseases they carry, but also because of the property damage they can cause and the fact they are considered frightening and/or physically abhorent. The types of property damage associated with rodent pests range from the consumption and contamination of food and feed to the actual destruction of buildings as the result of gnawing. The murine rodents' need to gnaw has also resulted in fires caused by insulation being stripped from electrical wiring in infested structures. One author has estimated that five to 20 percent of fires of unknown origin are started by rodents (Bjornson, 1968).

Insects. The arthropod (insect) vector species which have the greatest potential for increase in the vicinity of an HPOWER site are listed in Table IV-32. The cockroaches, fruit flies, and midges are not likely to be true vectors in the sense of disease carriers, but they are definite nuisances. Most insect populations have a phenomenal potential growth rate, a potential many local residents became fully aware of when the recent public workers' strike interrupted normal refuse collection. As an example, up to 20,000 fly larvae per week have been observed to develop (under experimental conditions) from a single garbage can (James, 1969).

There has been relatively little research into fly/solid waste/disease relationships. The public health hazard presented by flies is primarily a function of their affinity for human and animal fecal material and their ability to transfer pathogens present in this material to humans, either directly or by contaminating food and water supplies. Diseases that can be spread by flies are listed in Appendix D. Flies are a nuisance both because they can contaminate food and feed, and because they are among the most numerous, mobile, and visible of the insect vectors.

Table IV-32. Potential Insect Vectors.

Scientific Name	Common Name
Musca domestica	House Fly
Chrysomia megacephala	Oriental Blow Fly
Chrysomia rufifacics	Hairy Maggot Blow Fly
Culex quinquefasciatus	Southern House Mosquito
Diploptera dysticoides	Pacific Beetle Roach
Blatella germanica	German Cockroach
Periplaneta americana	American Cockroach
Periplaneta australasiae	Australian Cockroach
Supella longipalpis	Brown-Banded Cockroach
Chironomus sp.	Midges
Drosophilia sp.	Fruit Flies

Source: Mr. James Ikeda, Staff Entomologist for the Vector Control Branch, State of Hawaii Department of Health. Personal communication to Lawrence Pierce (October 1979).

While mosquitos are vectors of many diseases, only encephalitis and malaria have been significant health concerns in the continental United States (Hunter, 1960). In Hawaii the last significant mosquito-borne disease outbreak was a few dengue fever cases in 1943-44 (Ikeda, 1979). Mosquito bites are a source of irritation and possible secondary infection. They can make both recreation and cattle-grazing areas uninhabitable.

Cockroaches are not generally associated with human disease outbreaks, although they have the ability to act as mechanical vectors of pathogenic organisms. They are a nuisance and possible health hazard primarily because of their contamination of food. They can do some damage to property by feeding on such things as stamps, book covers, wall paper, and draperies. There is generally just a strong aversion to the sight of them.

Fruit flies may develop in any fermenting material including the organic components of MSW. With each female being capable of laying up to 500 eggs, they rank among the most prolific of the nuisance vectors. They are obviously a nuisance in large numbers and they can contaminate food. Midges also have a very high reproductive capacity and are a nuisance when present in large numbers.

Birds. The bird species observed in the areas of the proposed HPOWER sites are listed in Table IV-30 in the previous subsection. Although all birds are potential vectors, it is doubtful that more than a few of the species present in the area would be associated with the facility.

Birds are associated with several diseases which affect humans. Birds also harbor numerous ectoparasites, including: lice, mites, fleas, bed bugs, louse flies, and ticks. These may invade structures where birds nest and roost and, if in close proximity, can attack humans.

Birds in small numbers are relatively inocuous. They tend to be a nuisance or cause property damage only when they nest or roost in large numbers in or around a facility. Damages or nuisances associated with birds include droppings causing premature corrosion on metal surfaces, nests clogging drain spouts, or excessive noise and excrement.

Probable Impacts and Mitigation Measures

The preceding section notes the animals known to be vectors that could be found on or around an HPOWER facility. No distinction has been made between the various sites under consideration because it is likely that all have (or would have shortly after a resource recovery facility becomes operational) essentially the same species present. The fact that there exist in Hawaii a number of vectors that associate themselves with solid waste shows only that an improperly designed or operated resource recovery facility is capable of causing a significant increase in the density of those vectors. The more important point to be made here is that potential vector problems will be minimized so long as suitable care is taken in the design, maintenance, and operation of the HPOWER facility. [It should also be noted that an incineration method of solid waste disposal (like HPOWER) is a better option in terms of vector control than alternatives such as landfill or composting.] The evidence now available indicates that all of the bidders have included adequate provisions for the control of vectors within their proposals. The remainder of this subsection outlines the design considerations and control measures that would be used to insure that waste-related vectors do not become a problem within or outside of the HPOWER facility.

Readers will note that we do not distinguish between the different processes or sites that are under consideration. There are two reasons for this. First, while the RDF system involves more extensive handling of refuse prior to its incineration than does the mass-burning proposal (and, therefore, greater exposure area and more opportunities for spillage and equipment failure that could be conducive to vector growth), the magnitude of the difference is small. Both proposed processes would burn, move, or shred the refuse before it could be utilized as a habitat by vectors, i.e. before a breeding cycle could be completed. Second, the degree to which either process would attract or breed vectors is largely dependent upon the quality of the maintenance, sanitation, and other mitigation measures that are implemented. The control methods employed for each process might be different, but the impacts could be equivalent; the design objective of all processes is to minimize problem-creating situations.

The other difference between the proposals that has a bearing on their vector-related impacts is their location. Here, the major distinction is between the Amfac/C-E site and the others. Since the Amfac/C-E site is the closest to housing, the potential nuisance and health impacts are greater for this site. This means that more extensive mitigation measures must be implemented at this site to control vectors. There is every reason to believe that a control program would be effective, however. Hence, the actual impact of an HPOWER facility at this site is likely to be the same as for locations farther from population centers.

All of the bidders for the HPOWER project are committed to implementing whatever control or mitigation measures are necessary to assure that rodent, insect, or bird vectors are not a nuisance or a public health hazard, on or around the site. All of the facilities would be designed to minimize problem-creating situations, such as nesting and roosting areas. Other design elements which could be incorporated to control vectors include sealing around pipes coming out of the walls, installing metal rat guards on wires and pipes running up walls, and installing metal mesh on windows and other openings. Doors could be self-closing and with less than a half-inch clearance at the bottom.

In addition to design and operation controls, mechanical and chemical measures would be instituted as necessary to control pests as problems arise. The types of control methods that could be utilized for specific vectors are discussed below.

Rodents. Besides a good sanitation and housekeeping program, and design and maintenance of the structures and grounds to eliminate potential harborages, traps and poisons would probably be used to keep rodent populations as low as possible. Permanent bait stations and repeating mouse traps set at intervals around the borders of the site and at strategic locations such as entrances to the facility would serve to intercept rodents which might be attracted to the facility. The choice of attractants and poisons should be determined by the area of placement (very toxic agents should not be in areas accessible to birds or domestic animals), and the extent of rodent activity in the area. Water baits might be used at Campbell Industrial Park because these are effective against rats in areas where water is scarce and food is not. Baits incorporated into paraffin are resistant to mold, insects, and spillage, and have the additional advantage of showing gnaw marks as an indicator of activity in the area. Break-back type rat traps could be used as a further step in situations where rats cannot be eliminated by baiting.

Insects. Elimination of moisture is critical for control of many insect vectors, especially mosquitos. In addition to good drainage, openings to potential breeding areas should be screened wherever possible with a 12- to 18-mesh barrier. An air stream at large openings would minimize the ingress and egress of insects. Insect electrocutors could also be installed. These devices generally rely on the phototactic response of most flying insects to draw them into an electrically-charged grid. Chemical control can be through surface or space sprays. Since the use of chlorinated hydrocarbons has been limited by legal restrictions and insects' increasing resistance to them, organo-phosphates and carbamates are effective for surfaces, and pyrethrins for contact or space sprays. Light hydrocarbons, such as kerosene and #2 fuel oil, have been used on standing water to kill mosquito larvae. Thermal fog generators and Ultra-Low-Dosage (ULD) equipment (a highly-concentrated insecticide which is sprayed as a micron size mist) are effective against adult mosquitos. For cockroach control, contact and residual sprays, baits, dusts, and fogging materials can be used. Residual control is desirable in cracks, crevices, baseboard edges, and wall-floor intersections. Dusts (toxicants, dessicants, or abrasives) can be used in dry areas such as wall voids and under equipment.

Birds. Site noise and activity is a reasonably effective deterrent to excessive bird populations near industrial facilities. Design and operation procedures should be effective enough to limit or eliminate the need for further control measures such as repellents, toxicants, shooting, or trapping.

TRAFFIC IMPACTS

The proposed HPOWER facility would be the origin and/or destination of trips made by public and private refuse collection vehicles, transfer trailers bringing refuse from the City's transfer stations, commercial vehicles, HPOWER employees, visitors, and trucks carrying ash, process residue, and recovered materials away from the facility for disposal or reuse. While the total number of vehicle trips per day is expected to be modest, the fact that most of them would involve medium and heavy trucks makes the situation of some concern. Because of this, a detailed traffic impact analysis was undertaken as part of this EIS. The analysis attempted to answer the following questions for each of the alternatives under consideration:

- o How much traffic would be generated by the proposed facility?
- o What types of vehicles would the traffic be composed of, and what routes would it follow?
- o What are the existing traffic volumes on the roads that would be impacted?
- o What would be the total traffic on the affected roads?
- o Would the increased traffic cause the capacity of the roadway to be exceeded?
- o What actions have been or could be incorporated into the project to mitigate undesirable impacts on traffic flow?

The results of this analysis are presented below. In reviewing them, two limitations should be kept in mind. First, the analysis deals only with the roadways and intersections linking the possible HPOWER sites with the nearest public highway. These are typically the most critical areas because they experience the heaviest project-related traffic. However, it is conceivable that an already-congested road segment beyond that point, which experiences a lesser increase, could also be adversely impacted. Second, except at the Kamehameha Highway-Waipahu Street intersection, no attempt was made to account for future changes in non-project-related traffic volumes that might either lessen or aggravate the impacts reported here.

TRAFFIC GENERATED BY HPOWER

Because HPOWER is a new type of facility, it was not possible to base traffic estimates for it on actual data from a comparable project. Instead, the total traffic expected was broken down into five different constituents -- employee vehicles, collection vehicles, visitor vehicles, residue/ash disposal vehicles, and miscellaneous vehicles. Then, the best information available was used to quantify each component. For all but the employee component, traffic is expected to be the same for all of the proposals. There are significant differences in the number of employees contractors indicate they would use, however. Because of this, one would expect the employee component of traffic for the UOP proposal to be different from that for the Amfac/C-E proposal. The differences would have little effect on total traffic generation; moreover, there is some question as to whether or not the actual differences in employment will be as great as those estimated in the bidders' technical proposals. Because of this, we chose to use one generalized number for all of the proposals.

Employee Trips

The UOP proposal indicates that it would employ 45 to 50 employees. Amfac/C-E's estimate of employment is 70. Two offerors whose proposals employed RDF systems but who have now withdrawn from the competition indicated employment of 116 and 75 employees, respectively. Based on this, employment at the proposed HPOWER facility was estimated at 70 to 75 full-time workers.

Several of the technical proposals provided information about operating hours and the breakdown of staff by type of job (e.g., steam plant worker, clerical worker, process equipment operator, etc.). Combining the two types of information with the data on total employment, it was possible to arrive at a rough estimate of employee arrival/departure trips by hour of the day. In doing this, we did not attempt to correct for the number of employees who are not working on any given day because of vacation, sickness, or regular time-off. In addition, we assumed all employee trips would be by private auto and that nobody would double-up, i.e., that one employee would generate 2.0 vehicle trips per day. All of these assumptions tend to overestimate the number of trips, so that the actual employee traffic would almost certainly be 20 to 25 percent lower than that shown. This cannot be substantiated with the available data, however. Hence, we used the high figures in arriving at the estimates given in Table IV-33. The table includes hourly counts for the period from 4:00 a.m. to 6:59 p.m., the period during which all but the late-shift-employee traffic and a few ash/residue disposal trips would occur.

Collection Vehicles

Much of the refuse handled by the facility would arrive in public and private collection trucks. The City's trucks are mostly 20-cubic-yard capacity packer trucks that serve residences and small businesses. Private refuse haulers also use these, as well as assorted front-end loaders and roll-on/roll-off vehicles. Data collected by the Refuse Division from its existing disposal operations was used to estimate the number of collection vehicle trips by type of vehicle and time of day for the 1,800-TPD HPOWER alternative. These are given in Table IV-33.

Transfer Trailers

A substantial portion of the solid waste processed by the proposed HPOWER facility would arrive in transfer trailers from the City's network of transfer stations. These high-capacity vehicles would operate only during daytime hours. The estimate of daily trips by these vehicles given in Table IV-33 is based on the City's experience with its existing collection system and changes expected once HPOWER is implemented.

Table IV-33. Traffic Generation for the Proposed HPOWER Facility.

Source	One-Way Vehicle-Trips per Hour at Entrance to Facility																
	A.M.								P.M.								
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7-4	Total
Packer Trucks[1,6]	-	-	-	20	40	20	40	-	-	-	-	-	-	-	-	-	120
Transfer Trailers[2,6]	-	-	1	5	10	6	8	14	16	10	10	10	-	-	-	-	90
Private Refuse Trucks[3,6]	-	-	4	6	40	20	30	20	30	18	18	14	-	-	-	-	200
Misc. Vehicles[4,6]	-	-	2	4	10	6	8	16	14	10	10	10	-	-	-	-	90
Employee Vehicles[5,7]	-	4	13	2	1	-	-	1	1	-	7	22	1	1	-	17	70
Visitors[6]	-	-	-	-	-	4	9	2	1	5	5	2	-	-	-	-	28
Residue/ Ash Disposal Vehicles[6]	1	1	1	3	3	3	3	3	3	3	3	3	3	3	1	9	46
Total	1	5	21	40	104	59	98	56	65	46	53	61	4	4	1	26	644

1 20-cubic-yard capacity packer trucks.

2 65-cubic-yard/16-ton capacity transfer trailers.

3 Includes assorted front-end loaders and roll-on/roll-off vehicles.

4 Includes dump trucks, stake trucks, automobiles, and pick-up trucks.

5 Private automobiles.

6 Estimate supplied by the Refuse Division, Department of Public Works, City and County of Honolulu in Appendix "C" of HPOWER RFP Addendum No. 8 dated May 18, 1979.

7 Estimate by Belt, Collins & Associates on basis of contractors' technical proposals. Assumes 70 full-time employees on site.

Source: Compiled by Belt, Collins & Associates.

Visitor Vehicles

The City intends to open the HPOWER facility to the public on a limited basis. No precise estimate of the number of persons who would take advantage of this opportunity is possible. However, experience elsewhere suggests that the number of visitors would be fairly limited. The visitor vehicle-trip figures shown in Table IV-33 are based on discussions with Refuse Division staff and a conversation with the operator of the resource recovery facility located in Hempsted, Long Island, New York. It takes into account the fact that some of the visitors would arrive by bus and that visitor parking would be limited to ten stalls.

Residue/Ash Disposal Vehicles

Estimates provided in the two bidders' technical proposals indicate that an 1,800-TPD facility using an RDF process would produce about 400 TPD of ash and residue. The mass-burning system proposed by UOP produces only a single output stream consisting of 260 to 310 TPD of ash. For the purposes of our traffic-generation model, we assumed that both bidders would have to dispose of approximately the same amount of residue and ash. It was also assumed that:

- Residue would be carried in 20-ton capacity transfer trailers operating between the hours of 7:00 a.m. and 6:00 p.m. Residue disposal would require 22 one-way truck trips, or approximately two per hour.

- Ash disposal would also be via 20-ton capacity vehicles, and would produce 24 one-way truck trips per day.

Based on these assumptions, this component of traffic would amount to 46 one-way trips per day (see Table IV-33).

Miscellaneous Vehicle Trips

Miscellaneous trips include all of the trips not covered above including those by outside maintenance contractors, administrative personnel, and the like. This component of traffic was estimated by the Refuse Division based on its operating experience at other facilities. It amounts to about 90 trips per day (see Table IV-33).

Total Trips

Combining all of the above gives a total of about 645 vehicle trips per day for a 1,800-TPD facility. Traffic would peak between 8:00 a.m. and 9:00 a.m. and again between 10:00 a.m. and 11:00 a.m. The volume during each of these two hours would amount to about 15 percent of the daily total.

ROUTES FOLLOWED

Campbell Industrial Park

All traffic travelling to and from an HPOWER facility situated on the Malakole Road or Hanua Street sites in Campbell Industrial Park would arrive via the

H-1 Freeway and Kalaeloa Boulevard (see Figure IV-5). If the Malakole Road site were chosen, they would turn at the Malakole Road-Kalaeloa Boulevard intersection. If the Hanua Street site is selected, they could either use Malakole Road to reach Hanua Street or continue on Kalaeloa Bouelvard to Kauhi or Komohana Streets before cutting over to Hanua Street. Whichever site is used, the potentially critical points are the H-1 Freeway/ Farrington Highway-Kalaeloa Boulevard interchange and the Kalaeloa Boulevard intersection with Malakole Road.

Amfac/C-E Site

Because of their choice of a site within an existing town, Amfac/C-E's plan calls for segregating trucks from other traffic. Trucks would utilize an existing cane haul road running north from the Oahu Sugar Company mill alongside Paiwa Street, under the H-1 Freeway, and east to an intersection with Waipahu Street. Two possible intersection points are under consideration (see Figure IV-5). The first would require turning back under the H-1 Freeway on another cane haul road and joining Waipahu Street about 500 feet west of the point where it crosses the H-1 Freeway. This route (designated Route A on Figure IV-5) has already received the tentative approval of the State Department of Transportation (Harano, October 19, 1979), but it would bring the trucks close to the back side of some residences on Hiapo Street, Hiahia Loop, Henokea Place, Kuiki Place, Hiali Place, and Hepia Place. The alternative (designated Route B on Figure IV-5) is to continue on the original cane haul road, staying north of the H-1 Freeway to a point on Waipahu Street 500 feet before its intersection with Kamehameha Highway. At present, the cane haul road does not cross Waipahu Street at this point, but the two are separated by less than 100 feet of level ground, and it would be simple to connect them. Trucks carrying residue from the RDF processing operation and ash from the boilers would use the same route as the refuse trucks.

Visitors, employees, and at least some of the miscellaneous traffic would enter the site from Kalaiku Street to the north. It, in turn, is connected to Waipahu Street northwest of Waipahu Depot Road.

Waipio Peninsula Site

Access to the Waipio Peninsula site situated adjacent to the existing City and County incinerator would be via Farrington Highway and the southern extension of Waipahu Depot Road (see Figure IV-5).

EXISTING TRAFFIC VOLUMES

Once the roadways most likely to be affected by development of an HPOWER facility at each of the possible sites had been identified, data on existing traffic volumes were collected. Sources included State Department of Transportation records and special counts conducted especially for this study.

Campbell Industrial Park

The most recent traffic counts taken by the State Department of Transportation at the entrance to Campbell Industrial Park are from January 1 through 6, 1978. Unfortunately, they do not provide a complete record of

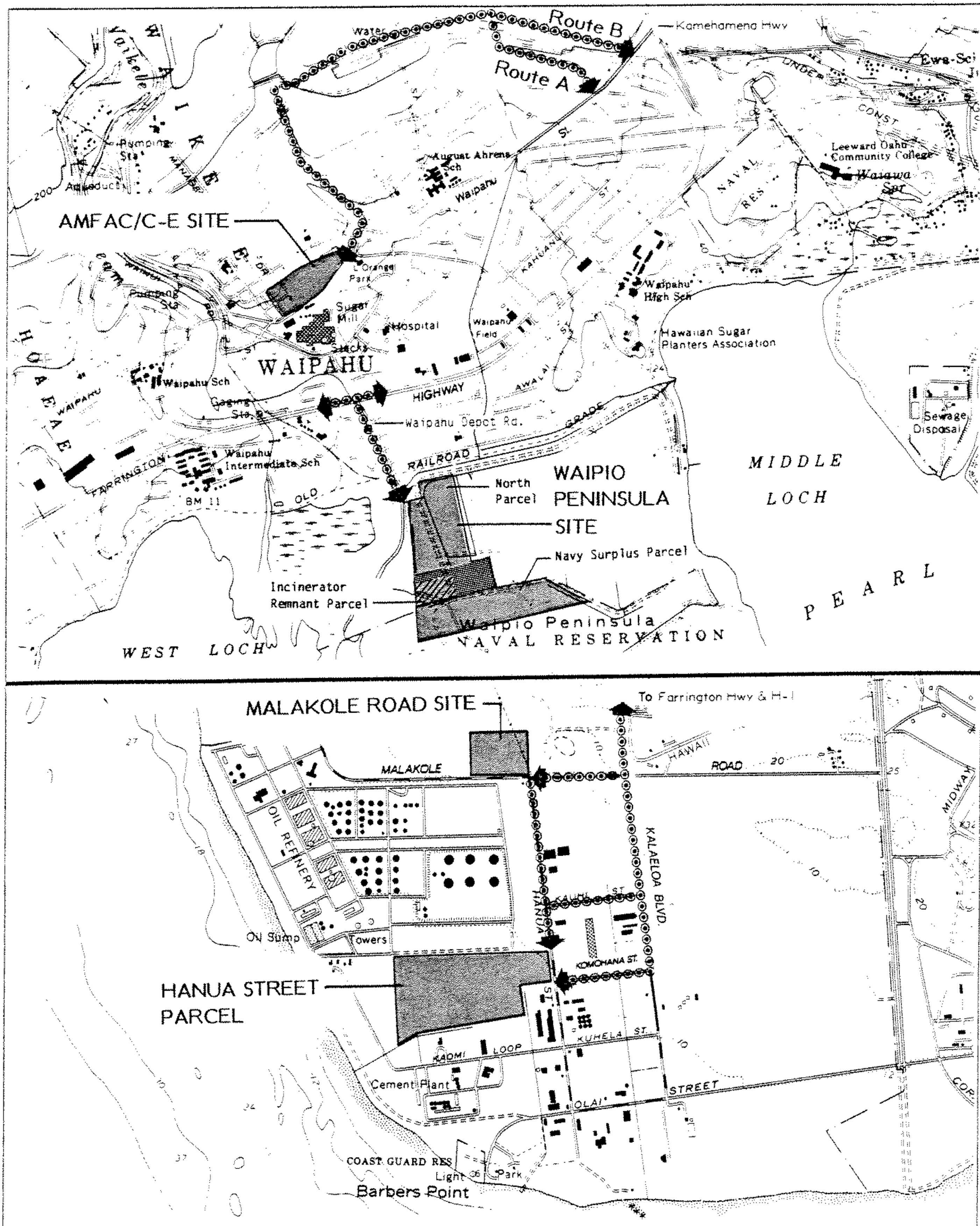


Figure IV-5. Routes Followed by Refuse Vehicles Travelling to and from Possible HPOWER Sites.

vehicles entering and leaving the park. Because of this, a special count was taken November 5 through 8, 1979 by Belt, Collins & Associates. The results of those two counts are summarized in Table IV-34.

Table IV-34. Summary of Traffic Counts at the Entrance to Campbell Industrial Park (CIP).

	24-Hour		AM Peak-Hour	
	DOT[1]	BCA[2]	DOT[1]	BCA[2]
Entering CIP from H-1 or Farrington Hwy:				
From Honolulu-Bound Lanes	535	717	160	125
From Waianae-Bound Lanes	2,190	3,344	225	642
Total Inbound on Kalaeloa Blvd.	2,725	4,061	385	767
Leaving CIP for H-1 or Farrington Hwy:				
To Honolulu-Bound Lanes	n.a.	3,386	n.a.	196
To Waianae-Bound Lanes	n.a.	659	n.a.	35
Total Outbound on Kalaeloa Blvd.	n.a.	4,045	n.a.	231
Total Traffic on Kalaeloa Blvd.	n.a.	8,106	n.a.	998

[1] Traffic count conducted by State Department of Transportation, January 1 through 6, 1978.

[2] Count conducted by Belt, Collins & Associates, November 5 through 8, 1979.

Source: Compiled by Belt, Collins & Associates.

Average daily traffic over the two complete days of the BCA study was 8,106. The peak-hour volume on those days averaged 1,116 and occurred between 3:30 and 4:30 in the afternoon. This amounted to 13.8 percent of the daily total. The directional split during this peak hour was very uneven, as one would expect at a major employment center: 82.8 percent (more than four out of five) of the vehicle trips were outbound from the Park. Despite the reasonably high volume of outbound traffic, the smoothness with which traffic moved during peak periods indicates that Kalaeloa Boulevard is currently operating far below capacity even during the morning and afternoon rush hours. Significantly, peak traffic generation by HPOWER (see Table IV-33) occurs <u>between</u> the current morning and afternoon peaks on Kalaeloa Boulevard.

Amfac/C-E: Waipahu Street

Most of the vehicles travelling to and from the Amfac/C-E site would pass through the Waipahu Street-Kamehameha Highway intersection. This intersection is controlled by a three-phase, traffic-actuated signal. Its approaches on Kamehameha Highway are channelized, but the Waipahu Street approach is not. In the vicinity of the intersection, Kamehameha Highway has four through-lanes, but it narrows to three lanes a short distance north of the intersection.

Traffic volumes at the Waipahu Street-Kamehameha Highway intersection were last recorded by the State Department of Transportation in 1978. The results of that count are summarized in Table IV-35 and indicate a relatively high volume/capacity ratio at the intersection during both the morning and afternoon commuting periods. The constancy of the volumes recorded between 6:00 and 7:00 a.m. suggest that the intersection was operating at, or very nearly at, capacity during that period with respect to vehicles southbound on Kamehameha Highway. An attempt was made to confirm this interpretation with a manual count conducted on the morning of February 20, 1980, but the significantly lower southbound-traffic volume that was observed (only 82 percent of the 1978 figures) made it impossible to do so.

When the intersection was observed in February 1980, traffic flowed smoothly through it. The green time per cycle available for southbound traffic ranged from about 40 seconds to just over 100 seconds. The green time available to all legs of the intersection was sufficient to prevent permanent queues from forming. On two occasions, cars waiting to turn north from Waipahu Street onto Kamehameha Highway prevented vehicles on Waipahu Street wishing to turn south onto the highway from doing so on the red portion of the cycle (right turns are permitted on red). The resulting queue extended back onto the off-ramp from H-2 southbound, but the vehicles involved cleared the intersection within the next complete cycle of the signal lights. Minor improvements to the shoulder in this area would probably prevent even this type of temporary backup. Virtually all of the vehicles coming to Waipahu Street from the H-2 off-ramp turn right toward Kamehameha Highway, and no conflict between vehicles from the off-ramp and through-traffic were observed.

Referring to Table IV-33 which shows traffic generation by the proposed HPOWER facility, it can be seen that the HPOWER project would contribute very little to traffic during the existing 6:00 a.m. to 7:00 a.m. peak period and only slightly more during the 7:00 a.m. to 8:00 a.m. period. Only after 8:00 a.m. does traffic from HPOWER become substantial, and by that time the other traffic has fallen to only half that recorded during the peak.

Finally, it should be noted that traffic volumes on Kamehameha Highway are expected to increase very substantially as a result of already-approved residential and industrial development in the Gentry-Waipio and Mililani Town projects north of the intersection. This projected increase is likely to cause severe congestion for southbound traffic on Kamehameha Highway during the morning peak. However, vehicles moving in other directions would be affected only to the extent that green time available for cars turning left into and out of Waipahu Street is reduced below its present level or that the flow of southbound vehicles becomes so heavy as to entirely prevent right turns from Waipahu Street onto Kamehameha Highway on the red cycle. Only the latter appears at all likely. Even then, it would occur only during the peak period; after 8:00 a.m., when HPOWER traffic would be significant, traffic volumes would (assuming any reasonable time distribution for the trips that

Table IV-35. Summary of Traffic Volumes Recorded at the Waipahu Street-Kamehameha Highway Intersection: January 9-11, 1978.

Period	Kam. Hwy. S.E. of Intersection			Kam. Hwy. N.W. of Intersection			Waipahu Street		
	Southbound	Northbound	Total	Northbound	Southbound	Total	Eastbound	Westbound	Total
12:00-1:00 AM	86	242	328	169	52	221	82	39	121
1:00-2:00	40	118	158	73	24	97	41	21	62
2:00-3:00	23	76	99	58	23	81	30	16	46
3:00-4:00	35	41	76	27	29	56	8	16	24
4:00-5:00	116	86	202	18	87	105	8	38	46
5:00-6:00	802	99	901	103	573	676	24	258	282
Subtotal: Midnight - 6:00 AM	1,102	662	1,764	448	788	1,236	193	388	581
6:00-6:15	459	53	512	49	347	396	24	132	156
6:15-6:30	466	75	541	70	335	405	37	146	183
6:30-6:45	448	114	562	114	342	456	40	140	180
6:45-7:00	449	110	559	83	357	450	65	145	210
7:00-7:15	400	98	498	74	327	401	73	99	172
7:15-7:30	347	157	504	107	322	429	87	101	188
7:30-7:45	408	128	536	86	339	425	97	116	213
7:45-8:00	337	161	498	124	256	380	95	118	213
8:00-8:15	237	100	337	77	188	265	50	82	132
8:15-8:30	202	93	295	76	159	235	28	76	104
8:30-8:45	224	89	313	64	175	239	49	71	120
8:45-9:00	189	78	267	62	136	198	37	71	108
Subtotal: 6:00 - 9:00 AM	4,166	1,256	5,422	986	3,283	4,269	682	1,297	1,979
9:00-10:00	658	353	1,011	341	629	970	70	300	470
10:00-11:00	884	422	1,306	357	582	939	207	286	493
11:00-12:00 Noon	733	486	1,219	402	464	866	89	260	449
12:00-1:00 PM	703	553	1,256	450	452	902	210	293	503
1:00-2:00	641	501	1,142	386	447	833	222	308	530
2:00-3:00	790	615	1,405	524	511	1,035	269	440	709
Subtotal: 9:00 AM - 3:00 PM	4,409	2,930	7,339	2,460	3,085	5,545	1,267	1,887	3,145
3:00-3:15	204	198	402	159	156	315	78	93	171
3:15-3:30	168	259	427	216	127	343	99	107	206
3:30-3:45	277	282	559	209	246	455	133	137	270
3:45-4:00	189	354	543	287	132	419	146	130	276
4:00-4:15	156	376	532	282	101	383	136	110	246
4:15-4:30	168	400	568	337	128	465	135	123	258
4:30-4:45	183	350	533	280	112	392	116	147	263
4:45-5:00	167	431	598	373	101	474	109	108	217
5:00-5:15	159	327	486	272	116	388	108	110	218
5:15-5:30	164	325	489	272	117	389	130	90	220
5:30-5:45	190	333	523	275	127	402	90	120	210
5:45-6:00	174	262	436	245	137	382	97	107	204
Subtotal: 3:00 - 6:00 PM	2,199	3,897	6,096	3,207	1,600	4,807	1,377	1,382	2,759
6:00-7:00	686	915	1,601	764	521	1,285	375	431	806
7:00-8:00	519	577	1,096	458	374	832	243	301	544
8:00-9:00	311	471	782	387	206	593	171	226	397
9:00-10:00	273	476	749	403	181	584	187	226	413
10:00-11:00	237	315	552	259	132	391	142	158	300
11:00-12:00	157	272	429	198	113	311	100	76	176
Subtotal: 6:00 PM - Midnight	2,183	3,026	5,209	2,469	1,527	3,996	1,218	1,418	2,636
24-Hour Total	14,059	11,771	25,830	9,570	10,283	19,853	4,737	6,372	11,109

Source: State of Hawaii Department of Transportation. Traffic count made at Station C-13-K, January 9-11, 1978.

would be generated by the expected new development) still be well under their current 6:00 a.m. to 7:00 a.m. level.

Waipio Peninsula Site

Vehicles moving to and from the possible Waipio Peninsula site would use Farrington Highway and Waipahu Depot Road. Currently, Waipahu Depot Road south of Farrington Highway serves only a very limited number of commercial/industrial establishments and a few residents, all of them situated on the east side of the road. Traffic at Waikele Bridge on Farrington Highway (about 2,000 feet east of Waipahu Depot Road) was measured by the State Department of Transportation in March 1978. Data from that count is shown in Table IV-36. It should be noted that traffic in 1968 at the Waipahu Depot Road-Farrington Highway intersection (the year before the H-1 Freeway was extended to Barbers Point) was significantly higher than that recorded during the 1978 count (Hawaii, State of, Department of Transportation, June 1970:B-9):

1968 Traffic at Station 8C:	Roadway	Segment	Average Daily Traffic
	Farrington Highway	East leg	32,771
	Farrington Highway	West leg	36,553
	Waipahu Depot Road	North leg	8,968
	Waipahu Depot Road	South leg	2,449

Comparing the 1978 count shown in Table IV-36 with the figures for 1968, it is apparent that the intersection is currently operating far below its capacity. This was confirmed by visual observations of peak-hour traffic flow at the location during the morning of February 20, 1980. At that time, the intersection was completely free of traffic about ten percent of the time.

Table IV-36. Traffic Volumes on Farrington Highway at Waikele Bridge in Waipahu: March 1978.

	Traffic Volume		
Direction	24-Hour	AM Peak-Hour[1]	7-8 AM
Eastbound	15,991	1,106	769
Westbound	18,181	1,243	833

[1] The AM peak occurs between 10:30 and 11:30.

Source: State Department of Transportation.

IMPACT OF THE PROPOSED HPOWER PROJECT ON TRAFFIC FLOW

The impact that the proposed HPOWER project would have on traffic flow at each of the sites under consideration was estimated by adding the project-related traffic estimates from Table IV-33 to the existing traffic volumes and comparing this total with the estimated capacity of the affected roadways. The results of this comparison are summarized below.

Traffic Impact of an HPOWER Facility Situated at Campbell Industrial Park

Presently, traffic on Kalaeloa Boulevard, the main entrance to Campbell Industrial Park, amounts to about 8,100 vehicle-trips per day. This would rise to about 8,750 trips per day if HPOWER were constructed there, an increase of roughly eight percent. The existing a.m. peak is about 1,000 vehicle-trips between 7:00 a.m. and 8:00 a.m., or 12.3 percent of the daily total. HPOWER would increase this by only 40 vehicle-trips, or four percent. Since the capacity of the entrance road is at least 2,000 vehicles per hour, the change would not significantly affect the level of service that would be provided.

No traffic counts were taken on Malakole Road or Hanua Street. However, they carry only a small portion of the traffic that would impact Kalaeloa Boulevard, and observations of traffic flow through the Kalaeloa Boulevard-Malakole Road intersection indicated that there are no apparent traffic problems there. In view of this, the impact that HPOWER-related traffic would have there, at the Kalaeloa Boulevard-Kauhi Street or at the Kalaeloa Boulevard-Komohana Street intersections (where traffic volumes would be even smaller) must be considered minor.

Traffic Impacts of the Amfac/C-E Proposal

The employee, visitor, and miscellaneous traffic that would be generated by an HPOWER facility situated on the Amfac/C-E property would use the Kalaiku Street entrance. The expected volume is less than 200 vehicle-trips per day, and the peak hour would have only about ten percent of that. The existing roadways can easily accommodate this increase.

The existing cane haul roads linking the site with Waipahu Street have more than enough capacity to handle the projected HPOWER truck traffic while still accommodating the cane trucks that presently use them. Either of the two intersection points with Waipahu Street that were mentioned earlier appear feasible. The one closest to the sugar mill (i.e., Route A on Figure IV-5) is probably the more desirable from a traffic standpoint because it is farther from the Waipahu Street-Kamehameha Highway intersection. However, use of that route would entail significantly greater noise exposure for those residents of Hiapo Street, Hiahia Loop, Henokea Place, Kuiki Place, Hiali Place, and Hepia Place whose yards abut the cane haul road than would construction of a new link between the cane road system and Waipahu Street situated just east of the Waipahu Street/H-1 Freeway overpass (see Route B on Figure IV-5). Because of that, and the fact that interference between the possible new intersection and the existing Waipahu Street intersections appears to be minimal, the latter route seems preferable.

Present forecasts indicate that the additional residential development that has already been approved at Gentry-Waipio and Mililani Town north of the Waipahu Street-Kamehameha Highway intersection will generate more traffic than Kamehameha Highway can handle. As a result, fairly severe congestion along that route may occur. The main problems will be experienced during the early-morning-commuting hours, however. By 8:00 a.m., when HPOWER traffic becomes significant, other traffic will have dropped to half its peak rate. Hence, the proposed project is unlikely to have a significant adverse effect on the level of service provided by Kamehameha Highway.

Traffic Impact of An HPOWER Facility At the Waipio Peninsula Site

As previously indicated, existing traffic volumes at the Farrington Highway-Waipahu Depot Road intersection are well below capacity. Even during the 8:00-9:00 a.m. and 10:00-11:00 a.m. periods when project-related traffic would be greatest, the intersection would be operating significantly below its demonstrated capacity. Because of this, it appears that there are no serious adverse traffic impacts associated with development of an HPOWER facility on this site.

MITIGATION MEASURES

Since the increase in traffic due the HPOWER project would not cause the capacity of roadways or intersections in the immediate vicinity of the sites under consideration to be exceeded, there are no significant adverse traffic impacts to be mitigated. For the Amfac/C-E proposal there are two possible truck traffic routings; neither of these would cause a traffic problem. The only reason Route B (see Figure IV-5) was considered was to avoid the residences that are situated close to Route A, thereby avoiding adverse noise impacts on homes located along these streets. In terms of traffic impacts, Route A has already received the tentative approval of the State Department of Transportation (Harano, October 19, 1979).

ENERGY IMPACTS

HPOWER's impacts on energy use are beneficial in the sense that it is a net producer of recovered energy. In this regard, the U.S. Department of Energy has stated that the proposed HPOWER project ". . . would offer some degree of energy self-sufficiency and would be supportive of the National Energy Plan" (Crawford, May 1979). As indicated in Chapter III, it would also be consistent with the Oahu General Plan's objectives regarding energy. However, because of differences in the proposals, as well as locational differences that affect energy use by collection vehicles serving the system, the benefits of the different alternatives vary. This section discusses the major effects that the project would have on Oahu's energy use.

Energy Balance

An 1,800-TPD facility operating for 50 weeks each year (it is expected that HPOWER would experience an average of two weeks of scheduled and unscheduled downtime per year) would have a throughput of about 540,000 tons of refuse per year. With an estimated heat value of 4,400 British thermal units (Btu's) per pound (Honolulu, City and County of, Department of Public Works, May 1979:Specifications p. 7), this amounts to 4.75×10^{12} Btu's per year.

Table IV-37 summarizes the estimated energy recovery efficiency (in terms of Btu's recovered per pound of refuse) of the two HPOWER proposals still under consideration. As can be seen from the bottom line of the table, they have approximately the same efficiencies. Applying the Btu's per pound figures from Table IV-37 to the 540,000 tons per year that an HPOWER facility is expected to handle results in an estimated 8.1×10^{11} Btu's per year net energy output from an all-electricity product facility. Converting this to kilowatt hours (2.4×10^{8}) and comparing it with the 4.9×10^{9} kilowatt hours that were sold on Oahu by the Hawaiian Electric Company in 1977 (Hawaii, State of, Department of Planning and Economic Development, 1978:250), it appears that HPOWER could produce about five percent of the electricity consumed on this island. Since nearly all of HECO's electricity is currently produced by petroleum-burning power plants, petroleum imports for that purpose might be expected to decrease by a similar amount.

Transportation Fuel Use

As indicated elsewhere in this report, the two sites under consideration that are located in Waipahu have significant land transportation cost advantages over the two Campbell Industrial Park sites. A portion of that advantage stems from the fuel savings resulting from Waipahu's closer proximity to the centroid of waste generation for Oahu. Based on information developed by GMP Associates, Inc. (August 1979) and summarized in Table IV-38, it appears that use of a site in Waipahu would result in a net savings of approximately 745 gallons of diesel fuel per day over a site located in Campbell Industrial Park. (Note: this is a rough estimate that does not account for differences in the fuel needed to transport ash, residue, and recovered materials to their ultimate destinations. Use of fuel for these purposes is small relative to waste delivery costs and cannot be calculated with accuracy until specific landfill and recovered materials processing sites have been selected.)

Table IV-37. Estimated Net Energy Recovery of Proposed HPOWER Facilities.

	Btu's/Pound of Refuse[1]		
	UOP		Amfac/C-E[2]
	All-Electric	W/Steam	
Refuse	4,400	4,400	4,400
Refuse Derived Fuel (RDF)	n.a.	n.a.	4,180
Steam from Boiler	2,938	2,938	3,051
Electricity from Turbogenerator	865	584	1,070[3]
Gross Energy Product	865	1,514	1,070
Less Energy Used to Operate System:			
Electricity	120	109	335
Petroleum	0	0	30
Total	120	109	365
Net Energy Export:			
Electricity	745	475	705
Steam	0	930	0
Total	745	1,405	705

n.a. - Not applicable to this type of system.

[1] Figures shown do not account for an energy credit for materials recovery. The Amfac/C-E proposal indicates that the energy credit for ferrous recovery would be 656 Btu's per pound.

[2] Note that the Amfac/C-E system would also burn an average of 890 tons per week of bagasse. The heat value of bagasse is slightly lower than that of refuse; however, since the bagasse arrives at the HPOWER plant in a usable form, there would be very little energy used in burning it. Hence, the "Net Energy Export" figure for bagasse is about the same as for refuse.

[3] Estimate based on a conversion factor of one Btu of steam = 0.35 Btu of electricity (Ellis, April 1980).

Source: Compiled by Belt, Collins & Associates from data provided by bidders.

Table IV-38. Estimated Additional Transportation Fuel Use Associated With a Campbell Industrial Park Site as Compared to a Site in Waipahu.

Increased Use:	Trips/Day[1]	Miles/Trip[2]	Miles/Day	Miles/Gal.[3]	Gal./Day
Transfer Trailer	150	9	1,350	3.0	450
Private Collection	32	9	288	4.0	72
C&C Collection	108	9	972	3.5	278
				Subtotal =	800
Decreased Use:[4]					
Private Collection	14	7	98	4.0	(24)
C&C Collection	16	8	112	3.5	(32)
				Subtotal =	(56)
				Net Difference =	744

[1] Based on GMP Associates, Inc. (August 1979:Cases 1 and 2). Note that this assumes a somewhat different collection network than was assumed in Table IV-33.

[2] Estimated by Belt, Collins & Associates.

[3] Refuse Division estimate.

[4] The decrease in fuel use noted here is a result of the Campbell Industrial Park sites' greater proximity to waste-generation sources in the Waianae area.

Source: Compiled by Belt, Collins & Associates.

Converting the daily transportation fuel use estimates shown in Table IV-38 into annual figures, results in approximately 225,000 gallons per year. At an average heat value of 139,400 Btu's per gallon, this is equivalent to 3.1 x 10^{10} Btu's per year, or 3.9 percent of the net energy contained in the electricity that would be produced by an HPOWER facility. Hence, from the standpoint of energy conservation, there is only a slight advantage to a site in Waipahu. If UOP chooses a Campbell Industrial Park site and is able to negotiate a steam sales contract with Chevron (Standard Oil) or some other industrial user, a possibility which does not exist for the sites in Waipahu, this minor disadvantage would be more than offset by the fact that direct sale of 110,000 pounds per hour of steam (750°F/600 psig) in lieu of some electricity would put about 90 percent more energy into users' hands than would be the case if only electricity can be sold. It should be noted that this would result in fuel use savings to the steam user, not to the Hawaiian Electric Company.

VISUAL IMPACTS

Any HPOWER facility would consist of large concrete and steel structures whose form is dictated more by function than aesthetics. Such a facility will naturally have the potential of creating a significant visual impact, the strength of which will be largely determined by two major factors: (1) its location, and (2) its design (external form, color, and landscaping). In the case of HPOWER, we believe the former is more important because the choice of site determines whether the viewer will be an industrial or residential neighbor. (Presumably a residential neighbor would be more concerned with visual impact than an industrial one.) This is not to say design considerations are not important, but no design would be capable of disguising the industrial nature of the facility. Design considerations affect the impact on the viewer, but site considerations determine who the viewer will be -- in what numbers and with what expectations. This section, therefore, discusses specific sites and the facilities designed for them.

AMFAC/C-E SITE

Given its proximity to a residential neighborhood, the Amfac/C-E site (see Figure IV-6) is the location which is most sensitive to visual impacts. Concerned with the psychological impact of what the public may perceive as a "garbage" plant, the designers of the proposed Amfac/C-E facility have paid particular attention to features that would minimize its visual impact. These include:

- o the visually balanced massing of forms that honestly express the industrial nature of the facility;
- o the placement of tall imposing structures away from the anticipated viewers;
- o the partial enclosure of the boilerhouse and other equipment;
- o the full enclosure of the tipping and processing area;
- o the use of electrostatic precipitators to virtually eliminate visible emissions;
- o the installation of colorful metal siding on all exterior northwest walls (i.e., the side facing existing residential development); and
- o the landscaping of the site.

Before examining the extent to which these features would minimize the visual impact of the facility on its residential neighbors, we must define who these neighbors are and what their visual relationship to the facility would be.

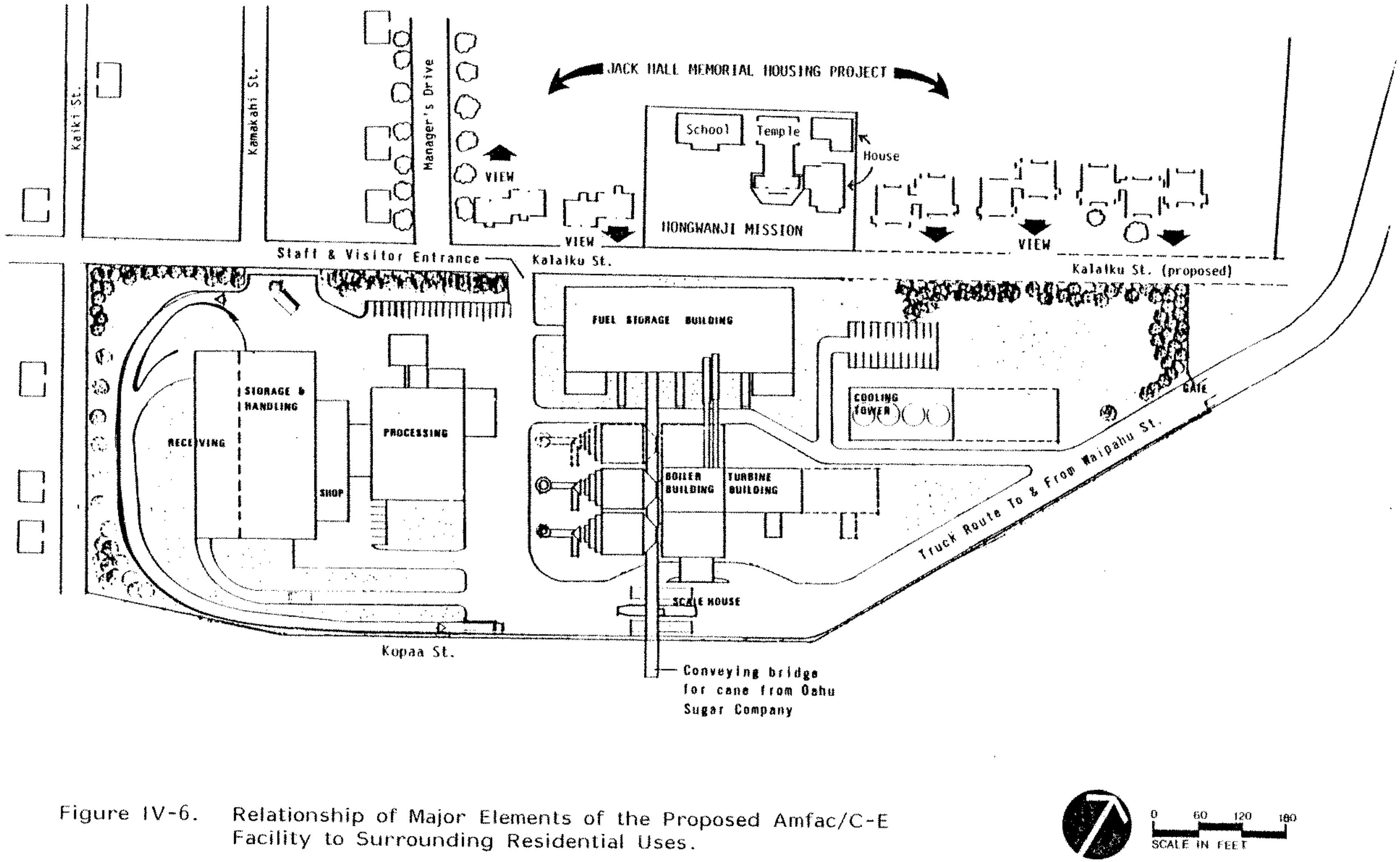


Figure IV-6. Relationship of Major Elements of the Proposed Amfac/C-E Facility to Surrounding Residential Uses.

The proposed facility's residential neighbors are found on the north side of Kalaiku Street, which defines the northwest boundary of the HPOWER site, and on the west side of Kaiki Street, which defines the southwest boundary of the site (see Figure IV-6). On Kalaiku Street, one finds the Hongwanji Mission complex and, on each side of it, residential units of the Jack Hall Memorial Housing Project. Southwest of the project, on the mauka-Ewa corner of Kalaiku Street and Manager's Drive, is a single residential dwelling. Three residential dwellings are found on the west side of Kaiki Street.

The Hongwanji Mission temple is oriented toward Kalaiku Street, its entrance steps set back approximately 70 feet from the street. The street itself is presently 20- to 25-feet wide, the exact distance being difficult to determine because of the absence of curbs, gutters, and sidewalks. Kalaiku Street is owned by Amfac, and the Amfac/C-E site plan indicates that, with construction of HPOWER, the street would be widened (on the southern side) to approximately 35 feet. The area in front of the temple is being used as a parking lot. Adjoining the temple on the west side is a Japanese language school, which also faces the street across approximately 140 feet of lawn. Adjoining the temple on the northeast side and oriented toward the temple is a house belonging to the mission complex. The house is set back approximately 50 feet from the northern edge of Kalaiku Street.

Of the Jack Hall apartments that are oriented toward the site, those closest to Kalaiku Street are set back only about 25 feet. These are found southwest of the mission complex. The closest units northeast of the mission would have a setback of about 30 feet from the proposed new boundary of Kalaiku Street (which now veers to the east at the northeast boundary of the mission complex).

All 28 units adjoining Kalaiku Street northeast of the mission are one-bedroom units whose visual orientation is toward the site; by this we mean that the primary (and in most cases the only) window exposure is on the street side. In all cases this exposure consists of two, four-foot-wide sliding glass doors adjoined by a single row of two-foot-wide glass louvers. In downstairs units the doors open onto a small lawn; in upstairs units they open onto a small lanai. These units symmetrically adjoin identical units in back, and therefore have no northern window exposure. Neither do they have east or west window exposure unless the units are located on the outer side of a residential block. Thus, 12 of the 28 units have one additional small, louvered window.

The units northeast of the mission complex also have a moderate site elevation relative to the Amfac/C-E site, which slopes down to the east-southeast at this point. The units are terraced, the first residential block being at the same elevation as the adjacent mission complex, the second floor of the second block being at approximately the same elevation as the first floor of the first block, and the second floor of the third block being at approximately the same elevation as the first floor of the second block.

All units on Kalaiku Street southwest of the mission are two-bedroom units arranged in two residential blocks, each housing eight units. The block closest to Manager's Drive is visually oriented toward the northwest, while the block closest to the mission complex is visually oriented toward the proposed HPOWER site. Units in the latter block have the same primary window exposure as the one-bedroom units, but they have the added advantage of having some louvered windows on their entrance side. However, by their very nature louvered windows offer only limited views.

The Jack Hall Memorial Housing Project does not have access drives or parking stalls on Kalaiku Street. Therefore, the majority of the residents of the 144-unit project would not have significant visual exposure to the proposed HPOWER facility. However, for virtually all residential units in the Jack Hall project fronting on Kalaiku Street, the industrial site would be the primary view afforded them. The only exception would be the residential block of eight units on the corner of Kalaiku and Manager's Drive. At present, the mission and residential units look upon a rural scene of old plantation houses surrounded by banana plants and many large mango and mahogany trees. With construction of the proposed Amfac/C-E resource recovery facility on the site, a person standing on the steps of the Hongwanji Temple would find himself or herself looking directly at a 30-foot high fuel storage building; this building would be set back only 20 feet from the street and would be more than 300 feet in length. Beyond this would rise the 80-foot high turbine building, the slightly higher electrostatic precipitators, the 107-foot high boiler building, and two 150-foot high stacks. The 60-foot high cooling towers would also be visible to the east. Elevation and perspective drawings of the Amfac/C-E facility as currently proposed are not available at this time; however, the north elevation of an earlier, and very similar, site plan is shown in Figure IV-7. Though this elevation does not portray actual design relationships, perspective, or proposed landscaping, it does provide the reader with a sense of relative masses.

Occupants of residential units immediately northeast of the mission complex would have a view to the southeast of a parking lot and the 60-foot high cooling towers, as well as an oblique view to the south of the facility's tallest structures. These views would be ameliorated by a landscape buffer on the southern side of Kalaiku Street.

Occupants of the first block of residential units southwest of the Hongwanji Mission would have an immediate view of the fuel storage building. The 150-foot boilerstacks and the boiler building and electrostatic precipitators should also be visible to most residents. Perhaps the greatest visual impact of HPOWER on these particular units, however, would be the loss of a shady arcade of immense mahogany trees lining Manager's Drive in the two blocks now running from Kalaiku to Kopaa Street (the depth of the proposed HPOWER site). Though City and County Detailed Land Use Maps call for future industrialization of the site, alternative, less intensive, industrial use could allow for the retention of these trees, perhaps incorporating Manager's Drive as it stands.

In considering the contrast between the present view afforded the citizens of Kalaiku Street and the proposed industrial one, one should bear in mind that the adjacency of a residential area and an industrial one would not be a newly-created situation. At present, residences on Kopaa Street (which defines the southeast boundary of the proposed site) are neighbored by the highly-industrialized Oahu Sugar Mill. Industrialization of the Amfac/C-E

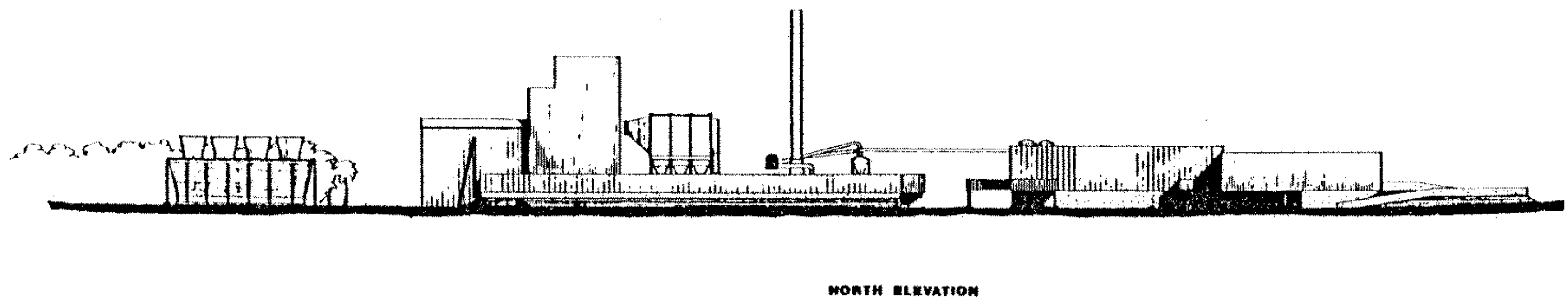
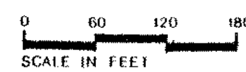


Figure IV-7. North Elevation of the Proposed Amfac/C-E HPOWER Facility.

Source: Amfac/C-E (August 1979).



parcel would merely substitute one viewing audience for another, and a new industrial facility, whose design has attempted to mitigate visual impacts, for an older industrial facility that was not designed with aesthetics in mind.

Before considering the visual impact of the proposed HPOWER facility on residents of Kaiki Street (which defines the southwest boundary of the site), one should be aware that in all likelihood the land on which these residents now dwell will soon be converted to industrial use by its owner, the Oahu Sugar Company, a subsidiary of Amfac. If the land is not converted, however, the following must be considered:

- o All three residential dwellings on the west side of Kaiki Street are visually oriented toward the site (i.e., toward the proposed HPOWER site).

- o All three dwellings have only modest setbacks.

- o All three dwellings are presently afforded a view of similar plantation houses on the opposite side of the street.

- o Should the proposed HPOWER facility be constructed, residents of the three dwellings would be afforded a potential view of the approximately 40-foot high receiving building set back 150 feet from the street, and more significantly, a potential view of refuse trucks exiting the receiving building on an elevated ramp only 45 feet from the street. Amfac/C-E site plans do indicate, however, that a landscape buffer would screen these potential views from residents of Kaiki Street.

Mitigation

Amfac/C-E has mitigated the visual impact of an HPOWER facility by such design decisions as the placement of tall imposing structures away from the anticipated viewers. The fact remains, however, that the visual impact of an industrial facility such as HPOWER would be considerable. Therefore, further mitigation measures should be considered.

The strongest visual impact of the Amfac/C-E proposal stems from the placement of the 30-foot high RDF storage building directly opposite and very close to the Hongwanji Mission and the residential units of the Jack Hall Housing project. The height of the boiler building (107 feet), turbine building (85 feet), and stacks (150 feet), means that they will have a strong visual impact as well.

Obviously a greater setback for the fuel storage building would be desirable, but the space limitations of the site suggest that this may be unfeasible. A realistic mitigation measure which could be enacted, however, would be the planting of a suitable landscape buffer along the north side of the fuel storage building. Care should be exercised in selecting the appropriate plantings for this and all other landscape buffers. The height, density, and composition of the buffer should be such that it serves as an effective visual screen.

Additional and perhaps more effective landscape buffers could also be planted on the residential side of Kalaiku Street. The Japanese Language

School would be particularly suitable for such mitigation. Its large, unlandscaped yard could easily accommodate landscaping that would convert it to a sheltered, private place shielded from the visual impact of the Amfac/C-E facility.

Retention of major existing tree masses on the Amfac/C-E site should also be encouraged. The proposed landscape buffer northwest of the processing plant, for example, could perhaps incorporate one of the mahogany trees now growing on Manager's Drive. The northern end of the site near the cooling towers could perhaps accommodate some of the extant mango trees. This may also be true of the southwestern end of the site, where the landscape buffer between Kaiki Street and the elevated truck ramp should be substantial.

Finally, particular attention should be paid to the design of the fuel storage building. Figure IV-8, an artist's rendering of an earlier, but very similar, facility design, indicates that such attention would be accorded to the building's design.

THE WAIPIO PENINSULA SITE

North Parcel

The north parcel of the Waipio Peninsula site consists of approximately 27 acres bounded on the north by a railroad right-of-way (now a dirt road), on the east by the Ted Makalena Public Golf Course, on the south by the Waipahu incinerator, and on the west by Waipahu Depot Road (see Figure IV-9). A small sewage pumping station is located in a niche carved in the northwest corner of the site. West of Waipahu Depot Road are Kapakahi Stream, and a dumping and landfill area. Immediately north of the railroad right-of-way, and running parallel to it, is a drainage ditch. The area north of this ditch is divided into a western industrial zone and an eastern residential zone. Scattered throughout the industrial zone are several residential units: mostly two-story apartment buildings and private houses. One such apartment building and one such house adjoin the ditch north of the site. The house faces north and the apartment building faces east, toward the house. West of the apartment building is an auto repair shop and truck parking lot. East of the house is an outdoor electrical warehouse. The residential zone begins east of this warehouse; it consists of single-family homes. The backyards of several of these homes on Awanei Street adjoin the ditch north of the site.

Whether an HPOWER facility constructed on this parcel would utilize its northern or southern half would most likely be determined by the disposition of a City and County proposal to build a Police Training Facility on the southern half. Clearly the construction of a large industrial facility on the northern half of the parcel would have more visual impact on Awanei Street residents than construction on the southern half. Impact may not be significant, however, for the following reasons:

1) Many existing trees in the backyards of Awanei Street residences already serve as visual buffers to the south.

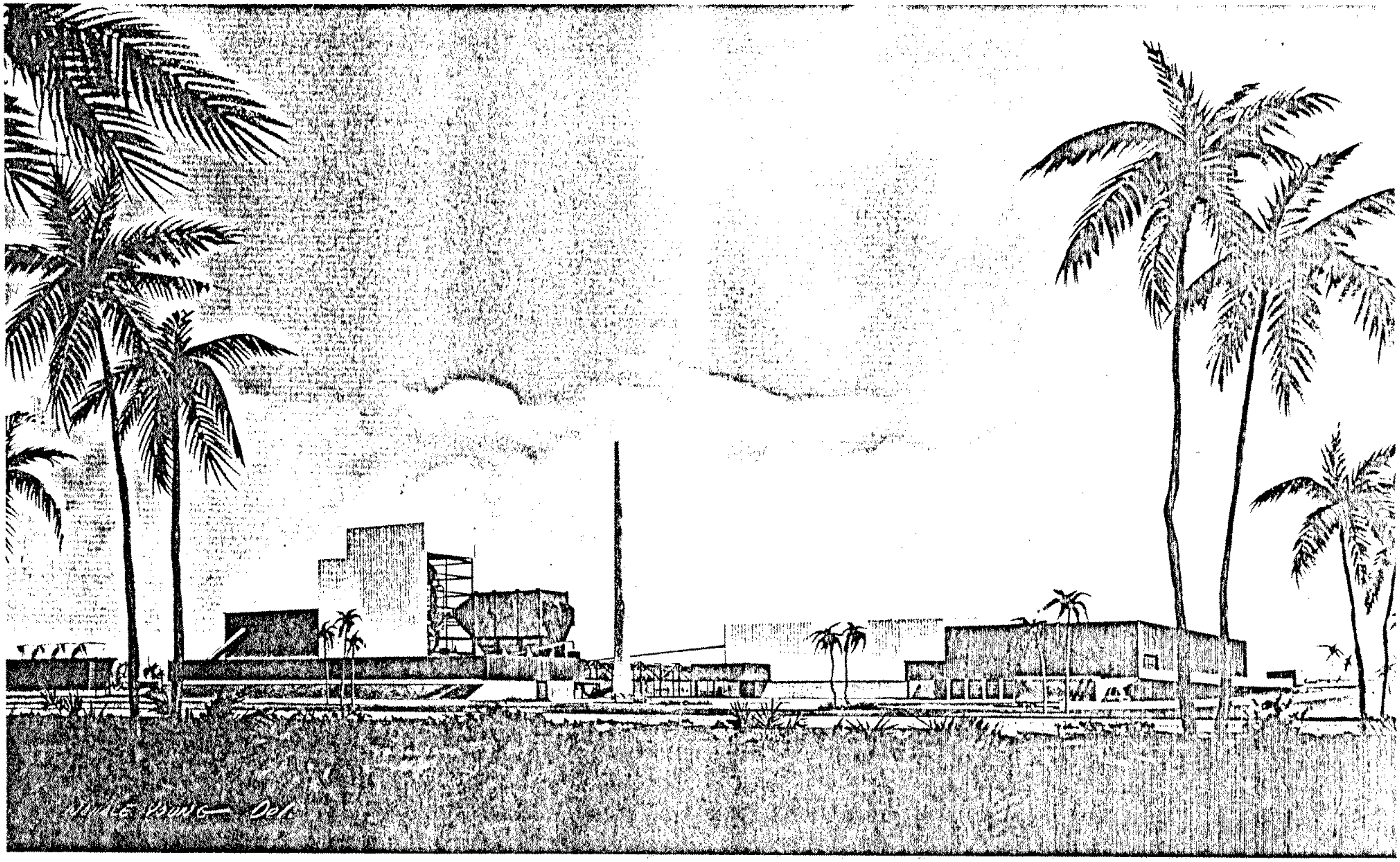


Figure IV-8. Artist's Rendering of the Proposed Amfac/C-E HPOWER Facility.

Source: Amfac/C-E (August 1979).

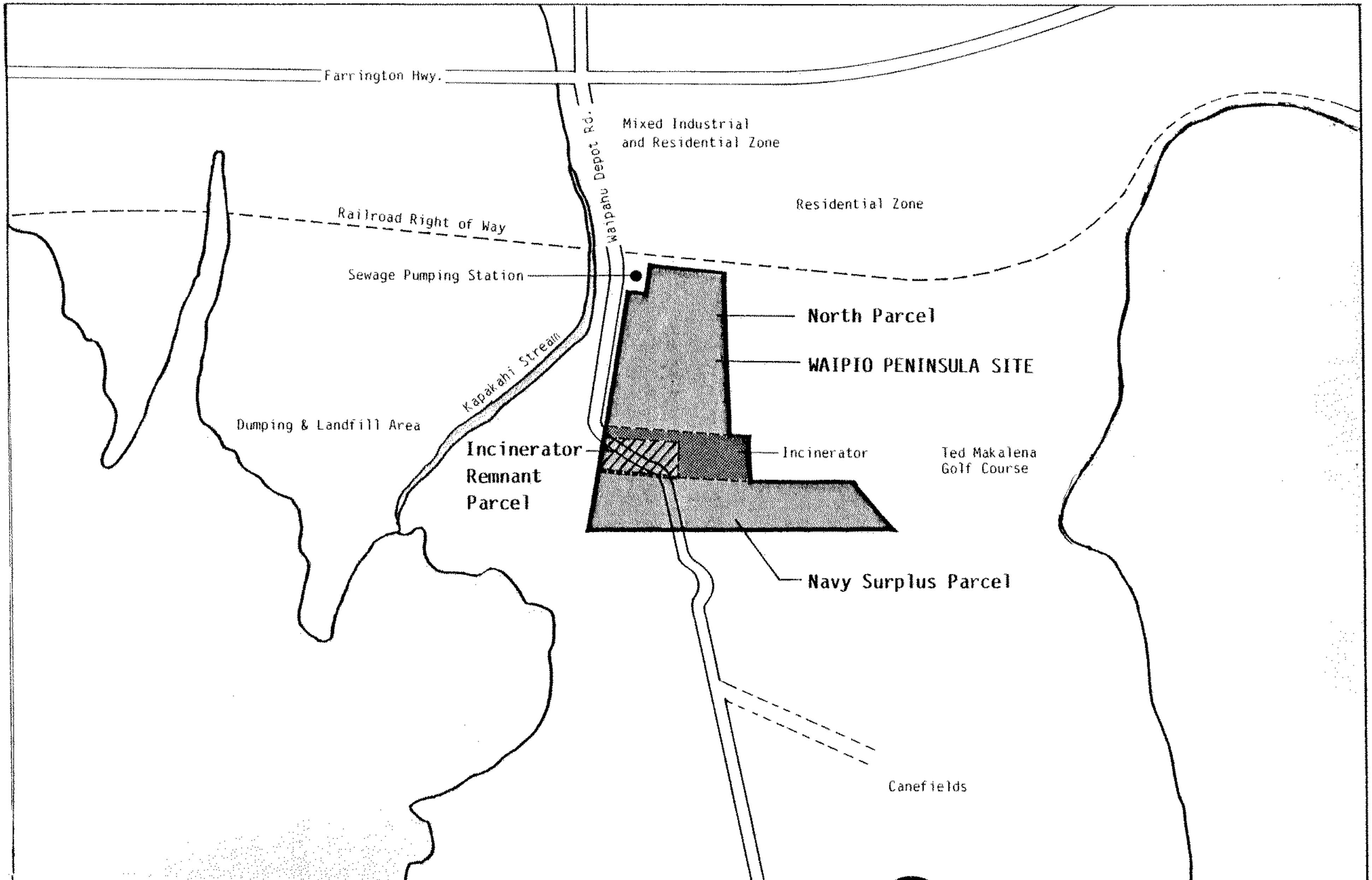


Figure IV-9. Relationship of the Proposed Waipio Peninsula HPOWER Site to Surrounding Uses.

2) The houses are separated from the site by the ditch and the dirt road (railroad right-of-way).

3) The parcel has a slightly higher elevation than the house lots. At present, this feature accounts for the fact that only the uppermost portion of the Waipahu incinerator is visible to the residents. An HPOWER facility which placed its tallest structures farthest from Awanei Street would also be partially shielded by this feature of the terrain, especially if a suitable landscape buffer were planted on the northern perimeter of the site.

4) The present view is one of a lot overgrown with kiawe and littered with industrial garbage: large pipes, machinery, tires, etc. Construction of a landscaped HPOWER facility might actually improve this view.

Reasons 2, 3, and 4 would also apply to the few potential viewers in the industrial zone located north of the sewage pumping station.

Construction on the southern half of the north parcel would restrict the primary viewing audience to users of the golf course, workers at the Waipahu Incinerator, and, possibly, students at the proposed Police Training Facility. There would be little visual impact on residents north of the drainage ditch as the facility would be placed at a considerable distance from the residential zone. There would also be virtually no impact on passing motorists as Waipahu Depot Road dead-ends at the incinerator and as construction of HPOWER could only result in a beneficial clean-up of the rubble now littering the east side of the road. The impact on the primary audience should also be minimal, mainly because there would be no unfortunate contrast between the present view and that resulting from construction of an HPOWER facility. At present the site is an eyesore: an old landfill occasionally used as an unofficial dumping ground, largely overgrown with kiawe and weeds. Although the resultant view for golfers would not be a pastoral one, neither is the present view. The Waipahu incinerator has already placed an industrial stamp on the land; while it sets a precedent for good architectural design, it lacks sufficient landscaping. The City is committed to making improvements to the landscaping of the entire area if an HPOWER facility is constructed on this site.

The exact layout for this alternative site has not been determined at this time. Presumably, however, the facility would be designed to present its best sides to its residential and recreational neighbors. Assuming this is done, the relative isolation of the site from sensitive viewers leads us to believe that adverse visual impacts would be minimal.

Navy Surplus and Incinerator-Remnant Parcels

These parcels are far removed from sensitive viewing audiences. HPOWER structures on them would be shielded from the north by the existing incinerator. Users of the Ted Makalena Golf Course would, however, be aware of an expansion of the industrial facilities on the peninsula. In general, then, visual impacts associated with development of an HPOWER plant on this site would be even more limited than those resulting from use of the north parcel.

Mitigation

Providing a suitable landscape buffer on the perimeter of the site, and avoiding the placement of massive structures close to the northern and eastern edges of the property, should prove satisfactory mitigation.

CAMPBELL INDUSTRIAL PARK

An artist's rendering of the proposed UOP HPOWER facility is shown in Figure IV-10. Our evaluation of the visual impact of this facility applies to both the Malakole Road site and the Hanua Street site as both are in Campbell Industrial Park and both would have industrial neighbors. As explained in Chapter II, a site plan has not been submitted for the Hanua Street site. For purposes of this section of the report, however, it is assumed that an HPOWER facility there would have essentially the same layout and architecture as has been proposed for the Malakole Road site.

In terms of the first of the two criteria established earlier -- location and design -- the Campbell Industrial Park sites are well situated in that they are largely removed from public view. The primary viewing audience for an HPOWER facility in Campbell Industrial Park would be other industrial neighbors. This is not to say, however, that HPOWER's industrial neighbors would have low visual expectations. All structures built in Campbell Industrial Park must conform to stringent design criteria, including:

- reduction of overbearing masses;
- minimization of "flat expanses of uninterrupted surfaces;"
- architectural harmony between principal and subsidiary buildings;
- imaginative use of color and texture; and
- abundant, well-maintained landscaping (for which there are very specific requirements).

Furthermore, all towers, conveyors, stacks, and all equipment not contained within buildings are subject to design review by Campbell Estate. In short, the Estate believes that "excellence in site planning, building design, landscaping and the design of other site improvements are of paramount concern" in "providing an attractive and pleasant working environment for industry and employees" (Campbell Estate:1). To this end, the Estate exerts considerable aesthetic control.

Mitigation

Any HPOWER facility conforming to the design criteria of Campbell Industrial Park should not require additional mitigation of visual impacts.

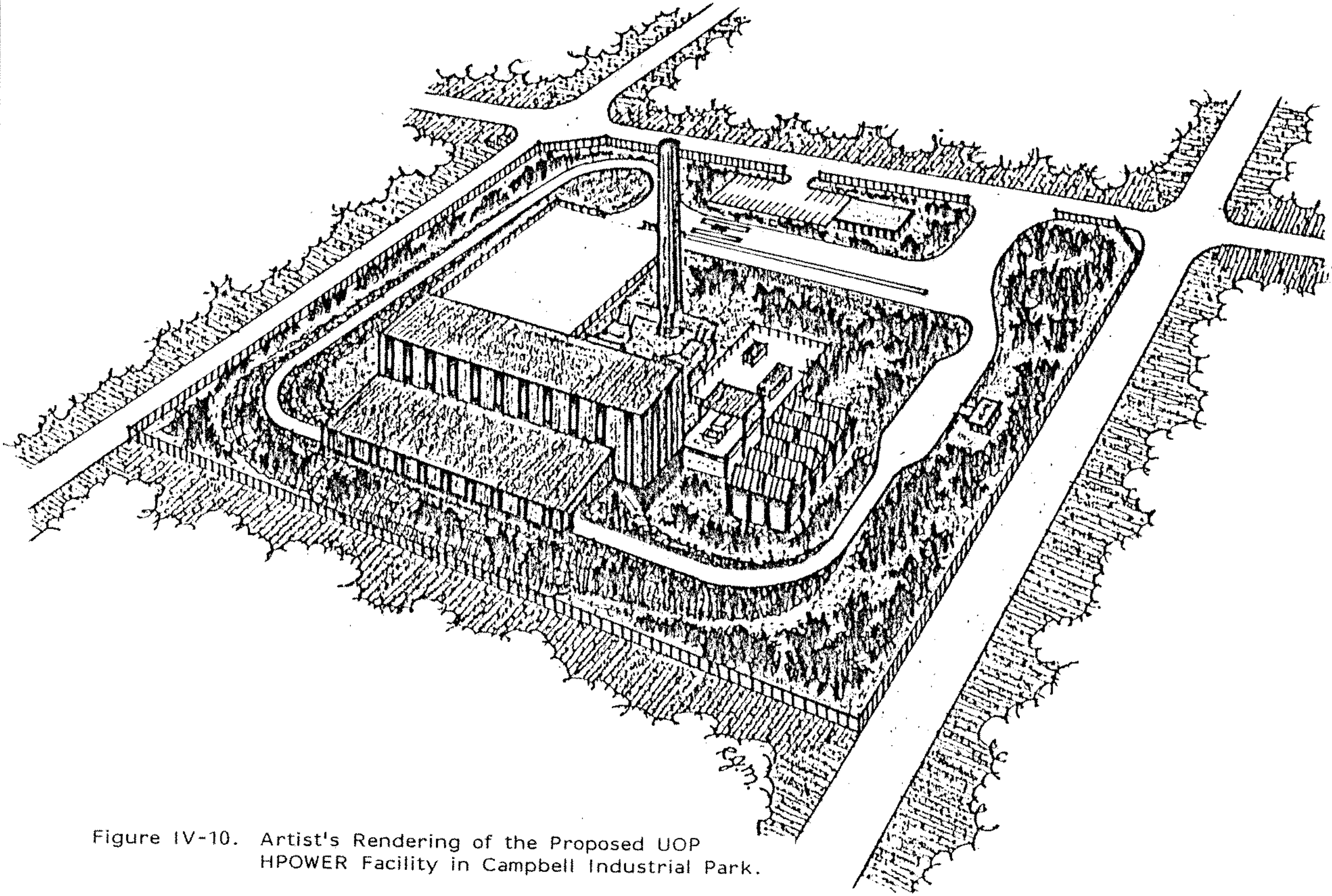


Figure IV-10. Artist's Rendering of the Proposed UOP HPOWER Facility in Campbell Industrial Park.

Source: UOP, Inc. (August 1979).

IMPACTS ON HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES

INTRODUCTION

Construction of an HPOWER facility would require the destruction, or at least the semi-permanent burial, of any immobile historic, archaeologic, or paleontologic remains on the chosen site. In addition, it has the potential to affect the interpretive value of certain types of nearby sites. On the other hand, remains that are valued largely because of the scientific information which study of them can provide would not be adversely affected so long as the appropriate investigations and salvage excavations were conducted prior to the construction of the facility.

The remainder of this section does three things: (1) it presents the information regarding these scientific and cultural resources that has already been obtained through field surveys of the sites under consideration for HPOWER; (2) it summarizes the effects that the HPOWER project would have on these resources; and (3) it indicates the steps that could be taken to mitigate the potential impacts. For reasons of clarity, each of the possible locations is discussed separately. Because of the significant finds that have been made there and the fact that a detailed survey of the site (as contrasted to a reconnaissance-level survey) has already been conducted, the greatest attention is given to the Malakole Road site. The Hanua Street, Waipio Peninsula, and Amfac/C-E sites are covered in less detail.

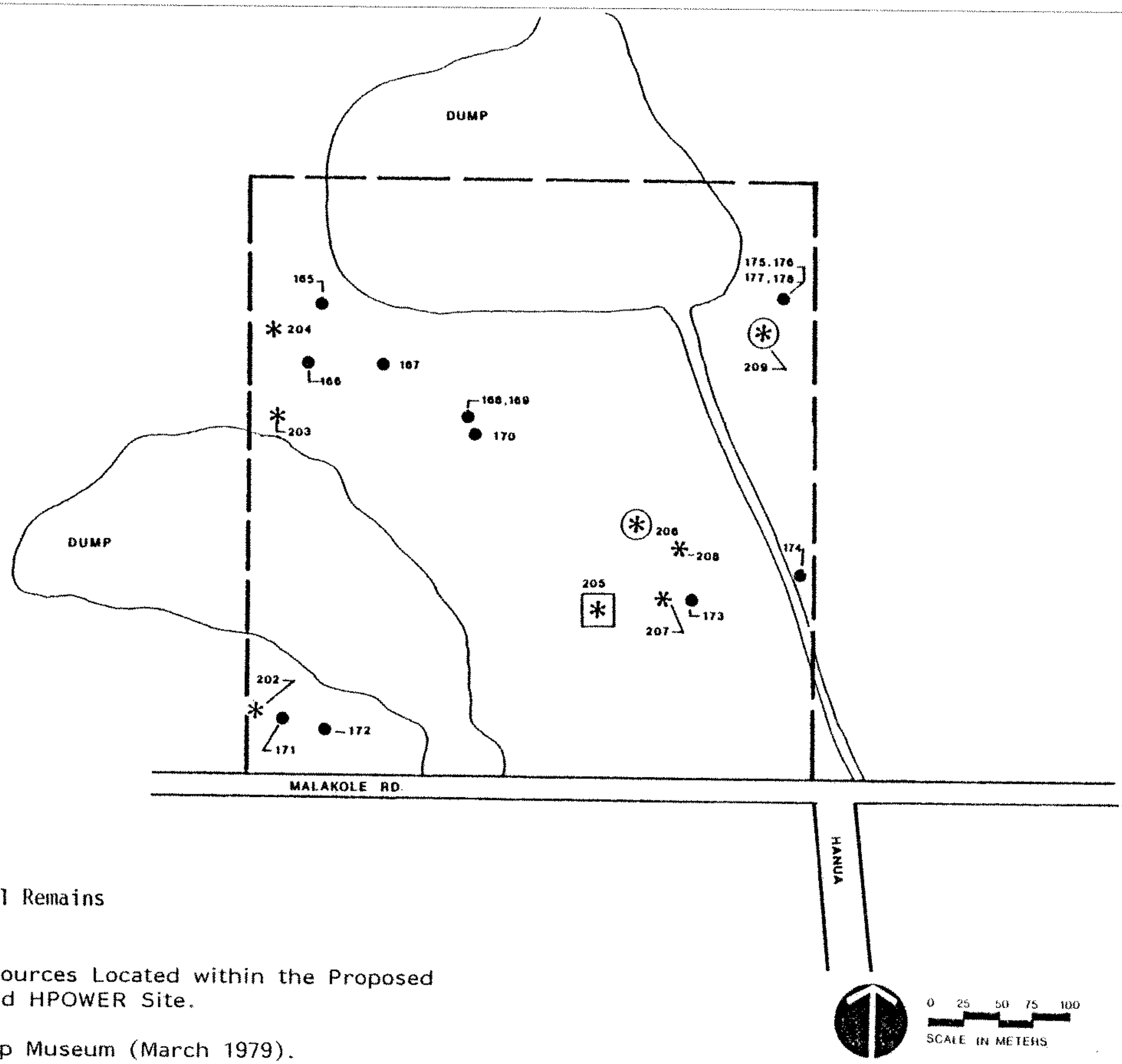
MALAKOLE ROAD SITE

An extensive cultural resources survey of an area including all of the Malakole Road site was conducted in February and March, 1979, by the Anthropology Department of the Bernice P. Bishop Museum (Sinoto, 1979). This survey, commissioned by the U.S. Army Corps of Engineers, Pacific Ocean Division, was of a proposed dredged-material disposal site to be used during construction of the proposed Barbers Point Deep-Draft Harbor.

The survey area encompassed approximately 80 acres of land within the Campbell Industrial Park, including all of the possible HPOWER site. Only the cultural resources located within the site boundaries are shown in Figure IV-11, which is adapted from Figure 2 of the survey report (Sinoto, 1979). The scope of the survey included:

1) On-the-ground locational survey and identification of all cultural features: (a) to permit the formulation of accurate assessments for further work that may be required to mitigate possible adverse effects of the planned development activities; and (b) to permit significance determinations for National Register eligibility.

2) Location, identification, and limited testing of paleontological sites: (a) to determine presence or absence of fossil birdbone in sinkhole deposits and (b) to determine the necessity and extent of future testing and more intensive recovery (salvage) of paleontological deposits (Sinoto, 1979:3).



LEGEND

- Archaeological Site

Tested Paleontological Sites

- * Avifaunal Remains Present
- ⊛ Avifaunal Remains Absent
- ⊠ Possible Extinct Avifaunal Remains

Figure IV-11. Cultural Resources Located within the Proposed Malakole Road HPOWER Site.

Source: Sinoto-Bishop Museum (March 1979).

Findings

The survey area was found to contain numerous limestone sinkholes formed by the subterranean leaching of carbonates and the subsequent collapse of the resulting cavities. Many of the sinkholes appear to have been used for the disposal of refuse in prehistoric times. Included in the refuse are highly significant avifaunal remains.

Though only a little over 500 sinkholes within the 80-acre survey area were mapped, Sinoto estimated that as many as 2,000 might ultimately prove testable. Preliminary analysis based on extrapolation from a small sample of 24 sinkholes suggests that avifaunal remains may be found in approximately 80 percent of the sinkholes present. Though the sinkholes also yielded non-avifaunal remains -- e.g., bones of rodents, reptiles, mammals and fish, as well as shells of terrestrial snails -- the avifaunal remains were the focus of the paleontological aspect of the survey because other surveys in the Barbers Point area have recently unearthed highly significant avifaunal finds, including the remains of extinct native birds never encountered before. Preliminary analysis also shows the distribution of remains to be fairly even throughout those portions of the area containing sinkholes.

Few sinkholes were found in the northern sector of the survey area, which had been extensively cleared at one time. The greatest density of sinkholes was found in the western sector. The Malakole Road HPOWER site has a medium sinkhole density. Taking Sinoto's prediction of 2,000 testable sites, 80 percent of which may contain avifaunal remains -- and assuming the proposed HPOWER site to contain an average number of sinkholes -- we can derive a rough estimate of 300 sinkholes with avifaunal remains. Though similar sinkholes have been discovered throughout the Barbers Point area, it is their high frequency in this survey area that makes it significant, for such high frequency statistically increases the possibility of finding evidence linking the avifaunal remains culturally to the inhabitants of ancient Hawaii.

Archaeological (as distinct from paleontological) remains are less common in the area surveyed by Sinoto (March 1979) than in previously surveyed areas. A total of 40 archaeological sites were found, eight of these being modified sinkholes. Of the total, only 14 were in the area designated for possible use by HPOWER.

Archaeological Findings. Archaeological features identified on the site under consideration for HPOWER include six ahu (a rectangular stacking of coralline rocks and slabs), remnants of two stone walls, three modified sinkholes (one of which may have been used as a habitat), a small stone platform, a paved area which may be a filled sinkhole, and a large complex of associated "walls, alignments, terrace areas, sinkholes, ahu, modified depressions, and enclosed soil-filled areas" (Sinoto, 1979:18). The complex is considered a possible past agricultural site. All except two walls and one modified sinkhole were judged to be in fair to good condition. Five of the ahu, two of the modified sinkholes, the paved area, and the possible agricultural complex have been given high priority for testing and/or salvage. Archaeological findings and recommendations for further investigation are summarized in Table IV-39.

Table IV-39. Summary of Archaeological Features on Proposed Malakole Road Site.

Bishop Museum No. 50-Oa-B6-[1]	Resource	Evaluation	Recommendation[2]	
165	Wall remnant	Poor condition	No further work	(0)
166	*Ahu* with sink	Good condition, associated sink	Salvage	(1)
167	Large complex	Fair condition	Test/Salvage	(1)
168	Platform	Fair condition	Test/Salvage	(2)
169	*Ahu*	Fair condition	Test/Salvage	(2)
170	Filled, paved area	Fair condition, possible filled sink	Salvage	(1)
171	Remnant wall	Poor condition	Test/Salvage	(3)
172	Possible habitation sink	Fair condition	Test/Salvage	(1)
173	Modified sink	Fair condition	Test/Salvage	(1)
174	*Ahu*	Fair condition	Test/Salvage	(1)
175	*Ahu*	Fair condition	Test/Salvage	(1)
176	*Ahu*	Fair condition	Test/Salvage	(1)
177	*Ahu*	Fair condition	Test/Salvage	(1)
178	Modified sink	Poor condition	Test/Salvage	(2)

[1] The code numbers in the lefthand column are the last three digits of the Bishop Museum number used to inventory the sites (all share the prefix 50-0a-B6-). For a more detailed description of the findings, see Sinoto, 1979:17-22 and 62-72.

[2] 0 = no further work; 1 = high priority; 2 = medium priority; 3 = low priority.

Source: Table 4, Summary of Archaeological Sites, New Dredged Material Disposal Site, Barbers Point, Oahu, Hawaii (Sinoto, 1979:40-41).

Paleontological Findings. The most significant paleontological find may well be that of a sinkhole (site 205) containing fossilized bones believed to represent an extinct species of bird. As only three such sinkholes were discovered among the 24 sampled in the entire study area, further examination of those in this general vicinity would be of particular interest to paleontologists.

Avifaunal remains were also found in five of the other seven sinkholes within the HPOWER site which were sampled. The remains from three sinkholes have been tentatively catalogued by the Bishop Museum's Department of Vertebrate Zoology and forwarded to the National Museum of Natural History for further study. Two other sinkholes (Nos. 203 and 204) yielded avifaunal remains whose significance has not yet been determined.

It should be noted that none of the sinkholes sampled have been completely salvaged; rather, the remains discussed here were unearthed as a result of the excavation of only the northwest quadrant of each sinkhole tested.

Significance

Archaeological Significance. None of the archaeological features recorded in this survey are considered unique or significantly different from other features previously recorded in the Barbers Point area. Furthermore, it is felt that the relatively small number of large, structurally-complex forms indicates that the area was "a relatively marginal portion" of a larger archaeological complex (Sinoto, 1979:32).

Site 167, the possible agricultural site, is considered to be of specific interest, however, because excavation of the few similar sites discovered elsewhere in the area has yielded "cultural material as well as skeletal avifaunal remains." Though the artifacts found in one similar site have indicated prehistoric occupation, no site has yet yielded dateable materials. Site 167 includes a rare modified sinkhole large enough for human habitation. The potential for the recovery of significant data from the sinkhole accords the site "much archaeological importance" according to Sinoto (1979:33).

Paleontological Significance. Paleontological specimens recovered from Barbers Point in the past four years have provided what Sinoto calls "the best record of prehistoric avifauna yet found in the Hawaiian Islands" (1979:34). In analyzing avian remains gathered in the Barbers Point area, paleontologists have found four major categories of significance:

1) avian species extinct in the Hawaiian Islands today with no historical record of extinction;

2) avian species extinct in the Hawaiian Islands today with a historical record of extinction;

3) avian species extinct on Oahu but not in the Hawaiian Islands; and

4) avian species extant today but occupying a habitat quite unlike that of Barbers Point.

The paleontological significance of Barbers Point is perhaps best expressed by Dr. Storrs Olson of the National Museum of Natural History, Washington, D.C.

> The various limestone sinks . . . at Barbers Point, Oahu, contain probably the most extensive fossil avifauna in Hawaii with many new species endemic to the island. Such fossils have not and probably cannot be found anywhere else on the island. Furthermore, the nature of the preservation is such as to insure that virtually complete skeletons can probably be assembled for most species. Thus, there is much highly significant and totally new biological and paleontological information that can be obtained only at the Barbers Point site.
>
> Destruction of any of the potential fossil sinks would result in the loss of many specimens, some possibly unique, since one sinkhole might contain species absent in another. Also, the fauna of one sinkhole might not be coetaneous with that of another, the age of a deposit being determined by when a sinkhole first formed. Therefore, an investigation of the fauna of different sinks might show changes in species composition and changes in morphology within a species through time. Finally, it would also be desirable to retain some sinks intact as fossil "banks" should some new technique or different information be desired in the future. The fossil deposits at Barbers Point are a unique and irreplaceable resource. [Olson in Sinoto, 1976:74.]

What further adds to the significance of this particular survey area is the "extremely high" number of sinkholes with possible paleontological significance, the greatest number of all areas investigated to date (Sinoto, 1979:26).

The particular significance of this survey area is not simply the likelihood that it will yield more skeletons of extinct birds, but rather the likelihood that it will afford the best possible opportunity to address the question of cultural/paleontological associations, of the relationship between prehistoric man and the avifauna of his day. The Malakole Road site, as part of what is termed the Barbers Point Archaeological Complex, has been determined eligible for entry in the National Register of Historic Places by the Keeper of the National Register largely because of its potential for yielding such significant information about Hawaiian prehistory.

Probable Impacts and Mitigation Measures

Construction of an HPOWER facility on the Malakole Road site would unavoidably destroy a number of potential archaeological and paleontological resources within the survey area. However, since the true value of these resources is their ability to yield scientific data on prehistoric life in the Barbers Point region, and since that data can be extracted either on-site or through off-site analysis of salvaged material, there is no resource in the area which must be preserved in situ (though some such preservation might be desirable to provide for future research).

In view of the above, certain mitigation measures suggested by Sinoto (1979:37-45) are desirable. Essentially, they involve a program of testing and, where warranted, salvage. Based on the recommendation of the Bishop Museum, the U.S. Army Corps of Engineers has already commissioned such a program of testing and salvage. Once the resources at the Malakole Road site have been salvaged or otherwise recovered, it is expected that the site's nomination to the National Register of Historic Places would be withdrawn. Should the Malakole Road site be chosen for the construction of an HPOWER facility, the testing and salvage commissioned by the Corps of Engineers would be completed before the earliest anticipated construction date, thereby preventing any delay to the HPOWER project.

The only further mitigation measure we suggest would be the preservation of selected sinkholes either on the site or in the adjoining survey area. This would lessen the dangers of overlooking significant data or destroying material that might later be evaluated either: (1) in the light of a new hypothesis, or (2) with presently unavailable technology.

OTHER SITES

Hanua Street Site

A preliminary archaeological and historical reconnaissance of the Hanua Street site was conducted by Chiniago, Inc. in December 1979. It failed to identify any archaeological sites, but did reveal the presence of numerous limestone sinkholes similar to those discussed in the preceding section. These sinkholes were found only on the western edge of the area, since the remainder of the site has recently been subjected to intensive clearing that would have filled and covered any sinkholes present. None of these sinkholes has been tested, but their potential significance is the same as that of the sinkholes on the Malakole Road site that were discussed in the preceding subsection.

Mitigation Measures. Should the Hanua Street site be chosen for construction of an HPOWER facility, a more intensive paleontological survey, such as that conducted at the Malakole Road site by the Bishop Museum Department of Anthropology, would be undertaken to determine if the site is eligible for nomination to the National Register of Historic Places. The results of such a survey would determine the type and extent of any additional work that might be required, but it seems likely that testing and salvaging of selected sites would be in order should avifaunal remains be found. Barring the unforeseen, the HPOWER facility could be constructed on the site once the scientific information the facility's parcel contains has been extracted. The establishment of a fossil bank on the site is a likely recommendation, but given the large size of the site, the preservation of representative sinkholes should not be difficult.

Waipio Peninsula Site

No archaeological, historical, or paleontological survey of the Waipio Peninsula site was conducted specially for this study as the site has been extensively disturbed by landfilling, sugar cane cultivation, and use as a disposal area for soil-laden water from the Oahu Sugar Company mud line. There are no indications, as there are for the Campbell Industrial Park sites, that this site would be valuable for paleontological research. The site contains no structures, nor is it listed in the Hawaii or National Register of Historic Places. No archaeological, historical, or paleontological impact is foreseen.

Amfac/C-E Site

No archaeological or paleontological survey of the proposed Amfac/C-E site has been conducted as the site has been occupied by plantation housing since early in this century. A historical survey of the site, conducted by Spencer Ltd., concerned itself with the possible historical significance of several groupings of these old plantation houses. It concluded that:

> In terms of age criteria, the Waipahu buildings could qualify for National Register designation, even though on the basis of our preliminary inspection it appears that the structural groupings have lost their integrity as a grouping due to the infringement of modern construction.
>
> Even in the event that any of the individual buildings are found to be a unique example of a particular building type or architect, it would be possible to mitigate the effect of clearing the site by documenting the existing relationships and consequently relocating any significant buildings. There is a recent precedent for relocation of National Register buildings, as both the Inari Shrine and the Dole House have been moved to the Waipahu Cultural Garden Park, and have retained their National Register status. [Chiniago, Inc., December 1979:4,5.]

ECONOMIC IMPACTS

INTRODUCTION

As indicated in Chapter II, the desirability of developing an alternative to landfill for the disposal of Oahu's solid waste has been recognized by public officials for over a decade. The growing difficulty that the City has encountered in its efforts to obtain suitable landfill sites has made the development of an alternative disposal method imperative. The search for an alternative has culminated in the proposed HPOWER project, a plan to create an industry which would profitably use refuse which is now being buried.

The 1977 MITRE Corporation study of the feasibility of resource recovery from solid waste concluded that the prospects for a viable energy and materials recovery operation were quite good. This expectation was based on an analysis of the estimated capital costs and the likely revenues. Using what they considered to be conservative estimates (i.e., assumptions which would tend to overestimate its net costs and underestimate the net benefits), the study team found that "resource recovery can cost the same as landfill . . . three years after startup." (MITRE Corporation, 1977:281).

The revenue projections used in the MITRE Corporation's 1977 analysis were based on a 1975 forecast that had oil prices increasing from the then-current level of $10 per barrel to $16 per barrel in 1980 and $25 per barrel in 1985, an increase of ten percent per year. This expected rate of increase, which seemed so plausible in 1977, can no longer be considered realistic. As of January 1980, petroleum prices had already reached $27 per barrel, and there was no indication that the rapid rate of increase in prices would slow within the near future (Federal Reserve Bank of San Francisco Weekly Letter, January 11, 1980).

Petroleum prices are not the only things that have skyrocketed, however. Between January 1978 and January 1980, the Honolulu Construction Cost Index rose by 20 percent (First Hawaiian Bank, 1978-80) and the effective rate on tax-exempt municipal bonds increased from six percent to eight percent. The combined effect of these two factors would add 40 percent to the monthly payments on the borrowed capital. Current inflationary trends and continuing increases in the yield of municipal bonds make it appear likely that the upward trend in costs will continue. Moreover, these same inflationary trends probably make the landfill cost increases used in MITRE's economic evaluation unrealistically low. On balance, when the increased revenue potential and increased costs are considered together, it appears that the changes noted above have probably made HPOWER even more economically attractive relative to landfill than was true at the time of the MITRE Corporation study. These same economic trends also highlight the value in proceeding with construction of the project now rather than at some later, and potentially more expensive, date.

For this report, Dr. John A. Mapes, a University of Hawaii economist, conducted a study, including computer modeling for an input-output analysis, to determine the economic impacts of the proposed HPOWER project. Our discussion of the potential economic impacts of the HPOWER project is based on his work and is divided into two general areas of interest: (1) impacts on the City and County of Honolulu finances and (2) impacts on the island economy as a whole. The results of the analysis are presented below.

IMPACT ON CITY AND COUNTY FINANCES AND EMPLOYMENT

The implementation of a City and County-sponsored resource recovery operation for Oahu is contingent on several criteria outlined in the HPOWER Request for Proposals (Honolulu, City and County of, Department of Public Works, 1979:Special Provisions 6) being met. As stated in that document, the bid procedure will entail the submission by each qualified company (i.e., each bidder that has an acceptable technical proposal) of a guaranteed tipping fee (a per-ton disposal charge) to the City and County. Three goals are set for the tipping fee:

- o it is to be $12 per ton or less for the first year of operation (1983);
- o its "incremental value" (i.e., its value after allowing for inflation) by the fifth year of operation is to be less than the Public Works Department's best estimate of the cost of landfilling; and
- o the projected long-run savings resulting from utilization of a resource recovery system are to more than offset its higher initial costs.

If bids responsive to these objectives are received, then the City and County will guarantee to supply adequate input to the proposed facility and will aid in its financing. This means that if the City and County accepts this alternative waste-disposal scheme, it will only be because it has long-term financial advantages in comparison with landfilling, the only practical alternative. As indicated in the last section of Chapter II (and especially in Figure II-8, there seems to be little doubt that the bids will be financially attractive to the City over the long term. The questions left for consideration are, (1) what is the potential for any short-term increase in the Refuse Division's operating expenses as a result of a decision to pursue HPOWER and (2) what burden might be imposed by the increased bonded indebtedness that would result?

Operating Expenses

The City and County of Honolulu, Department of Public Works (August 1979:Attachment C) has estimated that landfill costs would be about $9 per ton in the first year of HPOWER's operation. Hence, a $12 tipping fee (the City's target) in the initial stages of the new system would constitute a 30 percent increase in net disposal costs for the approximately 1,540 tons per day of refuse that would otherwise have gone to landfills. However, if the HPOWER facility also replaced the Waipahu Incinerator, which has a much higher per-ton cost than landfill, the initial increase in total disposal costs to the City and County would be considerably less than that. Disposal costs make up about one-third of the Refuse Division's expenses, which, in turn, have consistently been about eight percent of the total City and County budget. The magnitude of the disposal expense is presented in order to suggest that the temporary increase in costs that might occur during the first few years of operation of HPOWER is quite small relative to total expenditures. Moreover, as has already been mentioned, the higher initial costs would have to be more than made up during the later years of operation for a bidder to be awarded the contract.

If the 1,800-TPD option is selected, the City would probably close the existing Waipahu Incinerator. It would also greatly curtail its sanitary landfill operations. However, at least one landfill would remain open to accept rock, soil, construction material, demolition wastes, and other material not suitable for disposal at the HPOWER facility, as well as the residue and/or ash from HPOWER itself. This would release about 60 workers from their current jobs. Every effort will be made to find suitable positions for these workers within the Department of Public Works or elsewhere in the City and County government.

If a decision is made to retrofit the Waipahu Incinerator for energy recovery and limit HPOWER to 1,200 TPD, City and County employment at the incinerator would increase somewhat as boilermen, electricians, and others needed for the power generation component of the facility are added to the staff. This increase would partially offset decreased employment at City and County landfills.

Bonded Indebtedness

The City and County has as its primary goal for this project the minimization of the tipping fee. To this end it has offered an issue of Reimbursable General Obligation bonds that would effectively reduce the capital costs of the project. Comparing the current interest rate in the private commercial market (prime rate, 15.5 percent) with tax exempt municipal bonds (Hula Mae, 8.4 percent), it is reasonable to expect that the government bond option will be taken. A brief consideration of the implications of such a choice is warranted.

At the end of fiscal 1979, the County's "net funded debt for computing debt margin . . . totaled $163,163,745, or 1.9 percent of assessed valuation of real property for tax rate purposes" (Honolulu, City and County of, Finance Department, 1979:viii-ix). The statutory limit on the debt margin set by the State Constitution is 15 percent of real property valuation. Comparing the two, it can be seen that the City and County of Honolulu's current debt margin is only one-eighth of that allowed by the State Constitution. The bond issue required for the project would probably be on the order of $80 to $120 million. This would increase the City's indebtedness to about three percent of assessed valuation, or to approximately one-fifth of the amount allowed by law. It appears, then, that a commitment to HPOWER would not place an undue strain on the City's borrowing power or preclude capital investments in other important public projects.

The contract with the successful bidder will include monetary or other guarantees from them which will minimize any risk to the City resulting from the failure of the system to meet contractual requirements.

IMPACT ON THE OAHU ECONOMY

Impact of Project Construction

The method chosen as a framework for considering the impact of the construction phase was input-output analysis. This technique, also called inter-industry analysis, uses a table of transactions among the industries in the economy, and sales and purchases outside the economy, as a base for projecting the secondary effects that would result from a direct change in the output of a particular industry. The 1979 updated State Department of Planning and Economic Development figures were used. This matrix reflects the Oahu economy of 1977. Good explanations of this technique and its use are available in other documents (see for example, Hawaii, State of, Department of Planning and Economic Development, 1970; and Hawaii, State of, Department of Budget and Finance, January 1979).

The input-output table is an estimate of the structure of the economy for a specific year in the recent past (1977 in this case). The accuracy of projections made using the model depends upon the degree to which the estimates approximated conditions during the base year and how closely the current economy is recreated by the model. The proportional transactions between sectors are fixed, which leaves no allowance for the effects of external economies or unused capacity when a change in final demand is made. Differences in the production of the heterogeneous outputs of an industry also cannot be accounted for. These and other limitations notwithstanding, applying input-output analysis to a proposed change in output (i.e. the construction of the HPOWER project) provides a useful starting point from which to consider likely impacts.

A new construction project can be treated as an increase in the demand for, and output of, the construction industry. When the direct annual construction costs of a project are known, the results of increased purchases by the construction industry from other sectors (indirect effects) and the results of increased spending produced by the added income generated by the project (induced effects) can be estimated. The exact construction cost of the project will not be available until bidders' price proposals are submitted, so previous estimates from the MITRE report were used in the analysis.

The MITRE Corporation (April 1977:184) estimated that the capital cost of an 1,800-TPD HPOWER facility generating electricity as an energy product would be about $80 million (in 1976 dollars). A rough estimate provided by one of the firms competing for the project suggests that plant and equipment would account for approximately 80 percent of capital costs. Of this amount, it appears that as much as two-thirds may be prefabricated heavy-machinery imports such as turbine generators, furnaces, pollution control devices, and front-end processing equipment (MITRE Corporation, 1977:239); in comparison, the typical construction job on Oahu (and, therefore, the type of job on which the construction industry input-output multipliers are based) has only about one-eighth of its costs in imported capital equipment. Correcting for this factor, it appears that HPOWER would have a direct impact on income to the local construction industry in the neighborhood of $30 million. A three-year construction period would make this $10 million per year. As a rough approximation of the indirect and induced effects which would accompany such a construction investment, the impacts of a $10-million increase in the final demand for construction were estimated. The results are presented in Tables IV-40 and IV-41.

Table IV-40. Annual Economic Impact on Total Output During Construction Phase of HPOWER.

Industry	Direct Plus Indirect ($1,000)	Induced ($1,000)	New Total ($1,000)	Percent Change
Sugar	0.81	1.00	23,501.80	0.01
Pineapple	0.26	16.52	31,816.78	0.05
Other Agriculture	2.34	67.64	57,599.98	0.12
Pineapple Processing	0.00	5.35	116,075.31	0.00
Sugar Processing	0.02	0.75	36,100.77	0.00
Other Food Processing	2.04	362.67	292,364.69	0.12
Manufacturing	561.59	424.80	953,686.37	0.10
Petroleum Refining	4.28	132.08	400,136.31	0.03
Construction	10,029.16	42.55	679,371.69	1.50
Transportation and Warehousing	103.82	191.48	659,095.25	0.04
Communication	27.01	152.33	204,179.31	0.09
Electricity	7.66	217.23	206,024.87	0.11
Gas	6.96	20.58	24,627.64	0.11
Sanitary Services	3.82	21.89	23,125.70	0.11
Wholesale Trade	327.71	221.15	341,828.81	0.16
Retail Trade	263.72	86.76	737,250.44	0.05
Eating and Drinking Places	2.23	200.45	427,902.62	0.05
Banking and Real Estate	59.80	756.51	701,316.31	0.12
Hotels	2.05	45.33	305,647.31	0.02
Health and Professional Services	253.89	560.89	513,814.75	0.16
Other Services	90.05	400.80	536,190.81	0.09
Government Enterprises	12.44	53.27	147,365.69	0.04
Dummy Industries	60.50	64.68	120,125.12	0.10
Households	0.00	5,618.06	3,715,618.00	0.15
Totals	11,822.14	9,664.75	11,254,757.00	

Source: Mapes (February 1980).

The direct expenditure of $10 million shows up in the construction sector plus a small amount of extra construction generated by the project. The needs of the construction industry would mostly be met by manufacturers, suppliers (wholesale and retail), and professional services (architects, engineers, lawyers, etc.). Direct labor payments of $3.7 million would be made by the project with another half-million dollars coming from the affected industries. This new income would then induce more business through household expenditure. Saving and investment would take a large share, and this would show up in the banking and real estate sector. Wholesale

Table IV-41. Annual Economic Impact on Personal Income During Construction Phase of HPOWER.

Industry	Direct Plus Indirect ($1,000)	Induced ($1,000)	New Total ($1,000)	Percent Change
Sugar	0.24	0.30	7,015.64	0.01
Pineapple	0.09	5.41	10,427.73	0.05
Other Agriculture	0.25	7.20	6,129.57	0.12
Pineapple Processing	0.00	1.05	22,866.29	0.00
Sugar Processing	0.00	0.06	2,897.92	0.00
Other Food Processing	0.35	63.03	50,808.17	0.12
Manufacturing	164.88	124.72	280,004.25	0.10
Petroleum Refining	1.05	32.39	98,132.12	0.03
Construction	3,658.72	15.52	247,840.00	1.50
Transportation and Warehousing	33.94	62.59	215,448.69	0.04
Communication	10.58	59.65	79,954.87	0.09
Electricity	1.95	55.43	52,571.17	0.11
Gas	2.13	6.30	5,029.46	0.17
Sanitary Services	0.53	3.06	3,231.40	0.11
Wholesale Trade	143.24	96.66	149,409.75	0.16
Retail Trade	104.97	34.53	293,461.19	0.05
Eating and Drinking Places	0.60	53.50	114,210.87	0.05
Banking and Real Estate	25.12	317.73	294,546.81	0.12
Hotels	0.55	12.24	82,565.75	0.02
Health and Professional Services	97.31	214.97	196,930.62	0.16
Other Services	30.18	134.33	179,707.06	0.09
Government Enterprises	4.06	17.36	48,029.68	0.04
Dummy Industries	0.00	0.00	0.00	0.00
Households	0.00	19.28	12,751.19	0.15
Totals	4,280.73	1,337.32	2,453,964.00	

Source: Mapes (February 1980).

and retail trade are computed as margins earned, so that their absolute values (as seen in the tables) reflect a small portion of the value of the inventory they handle. Food, durables, and services round out the major recipients of increased household incomes.

The totals from Table IV-40 suggest that for every dollar spent in construction, $0.18 worth of extra output is produced in other Oahu industries. When the effect of increased household spending is added, another $0.97 of extra sales are induced. Altogether, the output of the economy is increased by $2.15 for every added dollar spent on construction, or it could be said that the construction multiplier is 2.15.

It should be mentioned at this point that an input-output system is linear; this means that if the assumed construction increase were $20 million instead of $10 million, then the indirect and induced responses would be twice as large. Therefore, any alteration in the proposed $10 million figure can be proportionally transferred to the impacts on other industries. Along with the warnings about the artificial nature of the input-output model, it must be kept in mind that these projected annual impacts can only be considered increases to the Oahu economy if it is believed that no alternative investment of this magnitude would have been made. Given the nature of the project, including the fact that there are no similar alternatives competing with it and the importance that low-cost public financing plays in determining the project's feasibility, it is reasonable to believe that this is the case, and that HPOWER represents an added local investment which would not occur if the project were abandoned.

The figures presented must be further qualified for two reasons. An extraordinary building project of this type is likely to require the employment of some specialized labor from elsewhere. To the degree that this occurs and these peoples' incomes are not wholly spent in Hawaii, the induced effects would be lower. On the other hand, the absolute values reported are in 1976 dollars; they would be about 25 percent higher if stated in terms of today's prices. The relative impact should be about the same, however.

A $21.5-million addition to the 1977 economy would have increased the Gross Island Product by about 0.3 percent. This is a noticeable amount for a single venture, but certainly not of a size to cause economic dislocations.

Impact of Project Operation

The Request for Proposals for HPOWER establishes 450 net kilowatt hours of electricity per ton of refuse as the minimum acceptable efficiency of energy conversion for a water-cooled facility; the comparable figure for air-cooled facilities is 430. All of the proposals still under consideration would meet these standards. At this rate, a 1,800-TPD facility could produce about five percent of the Hawaiian Electric Company's calendar year 1978 output of 5.0 billion kilowatt hours (Hawaii, State of, Public Utilities Commission, October 1979). In 1977, oil made up 18.5 percent of the total imports to the state (Bank of Hawaii, August 1979:35), and electrical utilities used about 30 percent of the imported oil (Hawaii, State of, Department of Planning and Economic Development, November 1977:16). If HPOWER could replace five percent of that, we are considering a potential reduction of 0.2 percent of the state's annual imports. In other words, while we are considering the impact of a new, progressive, multi-million dollar industry, its size relative to the entire economy is still small. Communication with The Recycling Group (Wheeler, February 11, 1980) has confirmed that although the current West Coast price for salvaged metals (aluminum and ferrous) is sufficient to provide a 10 to 20 percent margin above transportation cost, the major revenues should be expected from energy recovery.

The energy output from the new plant will be assumed to be used in place of energy which would otherwise have been produced by burning oil. Whether the power is used in sugar refining, petroleum refining, or general transmission through Hawaiian Electric Company lines, it can be viewed as an oil replacement; hence, no significant increase in total power output or usage would be expected. What, then, would be the effect of the project?

Two characteristics of the new industry would probably play the primary role in determining its effects: (1) its size and (2) its dependence on local purchases. HPOWER's size is the most important determinant of its impact on the electrical power industry. HPOWER, the new industry, would replace some of the existing output of the electrical power industry. Does that mean that the original producer would decline by a like amount with employment and incomes in the electrical-power sector dropping as HPOWER comes on line? The answer is that it would probably not.

In this regard it must be remembered that Hawaiian Electric Company (HECO) will still have the primary responsibility for providing adequate power to meet demands 24 hours a day, and it is quite likely that such a small reduction in the power that they must produce may not allow for any layoffs. At that level of output, staffing is as much a matter of time in operation as a question of actual output. Another important factor is that electricity consumption on Oahu is still increasing; HPOWER could accommodate the growth in demand for power rather than actually reducing HECO's output. Viewed in this way, it is possible to hypothesize a new industry employing, by preliminary estimates, about 70 workers and providing around one million dollars in income to the community with a negligible reduction in the original industry. The potential for reduced output to increase the per-unit cost of production to HECO should be offset to some degree by (1) their tendency to cut back first at their older, less-efficient generating facilities, (2) reduced oil purchases, and (3) the potential profit on purchased energy from HPOWER.

We might, then, anticipate a net increase in employment and income to the island while maintaining the same output, accompanied by reduced import expenditures. HECO spent more than half its 1978 revenues on oil (Hawaii, State of, Public Utilities Commission, October 1979:T-6/2-3), but the proposed industry would make most of its purchases locally. If we assume that the resource recovery plant would have the same inter-industry connections as Hawaiian Electric Company but without purchasing any imported fuel, only ten percent of its expenditures would leave the Oahu economy. This means that locally-supplied labor and previously-unused resources would be substituted for an increasingly expensive import.

SOCIAL IMPACTS

INTRODUCTION

While the proposed HPOWER project would lead to limited expansion in the materials recovery industry in Hawaii, it would not spark any sizeable secondary growth that might entail adverse social impacts. Neither are the jobs that would be created the type that might cause undue physical or psychological stress to employees. Unlike resource recovery programs that require households to separate their refuse into two or more piles (e.g., newspapers and other pure paper products in one place, food wastes in another, and glass in a third), HPOWER would not require households or refuse workers to change their behavior. Solid waste would be collected in the same fashion as it is currently; separation would take place at the resource recovery facility. Finally, three of the four sites that are under consideration are currently vacant, meaning that only one proposal -- that submitted by Amfac/C-E -- entails the dislocation of existing uses. Because that dislocation is expected to be the only significant source of social impacts that could result from the proposed HPOWER project, the remainder of this section reviews it in some detail.

EXISTING USE OF THE AMFAC/C-E SITE

Amfac/C-E has proposed use of a site immediately mauka of the Oahu Sugar Company's (OSCO) Waipahu Sugar Mill (see Figure II-1). The site is designated for industrial use on the City's Detailed Land Use Maps, but the zoning is residential (R-6). It currently contains old plantation houses that are occupied by active and retired OSCO employees. Information regarding the houses and their occupants was supplied by the Oahu Sugar Company (April 2, 1980; March 5, 1980), and forms the basis of the discussion which follows.

Existing Housing

The 53 homes present on the site are old wooden frame structures typical of those found on plantations throughout the State. Of these, 31 (58.5 percent) are of "Type 3" construction, the best of the three grades into which plantation housing is divided (see Table IV-42 and definition of "Types" in footnote 1). Only four (7.5 percent) are "Type 1," the lowest grade. If one looks at the number of persons occupying each type, the preponderance of "Type 3" houses is even more evident; 66 percent of the individuals living in the OSCO housing area that would be affected by the proposed project are in "Type 3" units. [From the perspective of most people, the greatest distinction between "Type 3" and "Type 2" units is probably the fact that the latter have detached toilet and bath facilities and drop-cord electrical outlets whereas the "Type 3" units have toilet and bath facilities inside the main house and have floor plugs and outlets for electrical equipment.] Rents on the units are stipulated in the Union contract between the ILWU and the Oahu Sugar Company. They range from $12.50 per month for a 700 square foot "Type 1" unit to $39.50 per month for an 1,100 square foot "Type C" unit.

Table IV-42. Present and Projected Housing Occupied by Residents of the Plantation Housing Area Affected by the Amfac/C-E Proposal.

Residents' Present Housing			Approximate Number of Persons Expected to Move to Each Category of Relocation Housing					
Type[1]	No. Units	No. Persons	Type 1	Type 2	Type 3	Jack Hall	Own Home	Relative's Home
1	4	15	12	3	--	--	--	--
2	18	41	--	14	8	7	8	4
3	31	109	--	6	89	7	1	6
Totals	53	165	12	23	97	14	9	10

[1] Housing types are as follows:

Type 1 - A dwelling constructed of rough merchantable lumber stud framing, single wall, floor 1"x12" or 1"x6"; stock-sized or T&G doors; sliding windows; drop-cord electrical outlets; toilet, bathing, and laundry facilities detached; kitchen with sink and tap may be attached or detached.

Type 2 - A dwelling constructed of surfaced lumber; ceiling of canec, surfaced lumber, or other material; single wall, stock doors; sliding or hung windows; stain or paint outside and inside; drop-cord electrical outlets; kitchen with sink and tap, attached; toilet, bathing facilities and laundry, with laundry trays, detached; sewer or cesspool connections.

Type 3 - A dwelling constructed of surfaced lumber; canec or surfaced lumber ceiling, T&G floors, stock doors; sliding, double-hung, or casement windows; stain or paint outside and inside; clothes closets; some kitchen cabinet work; floor plugs and outlets for electrical equipment; shower or bathtub, standard flush toilet, lavatory, and kitchen sink in the dwelling; individual laundry and laundry trays; sewer or cesspool connections.

Source: Data supplied by Oahu Sugar Company, April 2, 1980; compiled by Belt, Collins & Associates.

Description of Residents

Slightly over half of the affected households include an active OSCO employee (see Table IV-43). Nineteen other households (35 percent) contain a retired employee, and eight have a spouse of a deceased OSCO employee. The age distribution shown in Table IV-43 makes it evident that the residents as a group are somewhat older than the general population: 43 percent of those for whom age data are available are 50 years of age or older, and 27 percent are over 60. A related (and rather significant) piece of information that can be gleaned from the data is that about 70 percent of the active OSCO employees who are living in the houses will be retiring within the next few years. If they continued to live in their present houses after retirement, there will be only a few new openings for younger OSCO employees, and we may expect to see the number of persons less than 22 years old drop rather drastically during the next few years.

Because of its confidential nature, data on income was not solicited. However, the high proportion of elderly retirees and older workers who are expected to retire soon suggests that incomes may be relatively low.

Table IV-43. Age of Residents Who Would Be Displaced by the Amfac/C-E Facility, by Relationship.

Type of Resident	Less than 18	18-22	23-50	51-60	Over 60	Not Given	Total
Active OSCO employee			8	15	5	1	29
Retired OSCO employee					19		19
Spouse of active or retired employee			16	9	10	2	37
Son or daughter of OSCO employee	33	17	11	1		1	63
Other dependent	4				1		5
Spouse of deceased employee				1	7		8
Son or daughter of deceased employee			1			2	3
Other	—	—	—	—	1	—	1
All	37	17	36	26	43	6	165

Source: Oahu Sugar Company (April 2, 1980).

<u>Current Plans for the Employee Housing Area without HPOWER</u>

As indicated in Chapter III of this report, the site that Amfac/C-E has proposed for the HPOWER facility is designated for industrial use on the 1964 Oahu General Plan Map and on the City's Detailed Land Use Map for Waipahu. Because of its prime location and the premium price that could be obtained for it if it were developed for industrial use, it is OSCO's intent to phase out residential use of the property regardless of whether or not the Amfac/C-E consortium wins the HPOWER contract. In line with this, the site has been declared a "development area," and relocation of tenants has already begun.

This conversion is only the latest step taken to implement an Oahu Sugar Company policy established in 1948 calling for its gradual withdrawal from the housing rental market. The company is actively pursuing the policy, but progress has been slow, largely because the merging of OSCO's operations with those of the Ewa Plantation added over 1,000 units to its housing inventory. Nevertheless, as the following figures show, during the past decade there has been a significant decline in the number of units maintained by the company:

Location	1970	1980
Waipahu	367	157
Ewa	1,048	665
Total	1,415	822

Section 14 of the contract between the ILWU and the Oahu Sugar Company makes it clear that the Union has an interest in housing policy but that the ultimate authority over company housing rests with OSCO:

> The Company will maintain procedures whereby a committee designated by the Union will be recognized by management for the purpose of jointly discussing housing matters, including repairs and allocation of houses for members of the bargaining unit. Final decision on any recommendations made by such committee will rest with management or such agency as is or may be set up by management to take care of housing. [Oahu Sugar Company, Ltd., February 1979:33.]

While this seems to be clear-cut, a memorandum of agreement between the ILWU and the Oahu Sugar Company dated April 7, 1972 provides guarantees to residents that limit OSCO's right to exercise this authority if it would work an undue hardship on workers:

> While the Companies will not guarantee housing, they will not evict pensioners and surviving widows of pensioners and employees from Company housing when suitable alternative accommodations are not available. The Union recognizes that employees have priority to Company housing and when housing for employees is required the Union shall cooperate with the Company in seeking suitable alternative accommodations for pensioners and surviving widows living in Company housing and to get them to move to such alternative accommodations. [Oahu Sugar Company, Ltd., and ILWU Local 142, February 1979:81.]

PROBABLE IMPACTS AND MITIGATION MEASURES

Representatives of the Oahu Sugar Company have stated that the Waipahu housing area that would be affected by Amfac/C-E's HPOWER proposal will be redeveloped within the near future regardless of whether or not Amfac/C-E is awarded the HPOWER contract. The fact that relocation of residents has been initiated well before Amfac, OSCO's parent company, has any guarantee that it will win the HPOWER contract lends some credence to OSCO's stated position. When viewed in this light, it might be argued that implementation of HPOWER on the Amfac/C-E site would not affect the present residents of the area. However, there exists the possibility that the announced company policy might be changed in the absence of HPOWER, whereas the relocation becomes essential if HPOWER is to be developed there. Because of this, the more significant social changes that can be expected as a result of the move are discussed below.

Information supplied by the Oahu Sugar Company indicates that 132 (80 percent) of the 165 persons who would be displaced by an HPOWER facility on the Amfac/C-E site would probably move to other company housing. Of these, about 85 percent would be in Ewa and 15 percent would occupy other existing units in Waipahu. About 85 percent of the people remaining in company housing could be provided with the same house "Type" as they now have, while about ten percent could move to a better "Type," and about five percent might have to settle for a less desirable "Type." OSCO has estimated that about 20 percent of all residents would prefer to move to non-company housing (either in the Jack Hall project, their own home, or a relative's home). All things considered, following relocation, from 90 to 95 percent of the residents would occupy housing whose physical character is equal to or better than the units in which they now reside.

Because plantation housing rents are tied very closely and very specifically to the size and condition of the structures, a comparison of the rent paid by occupants before and after relocation provides another good measure of the extent to which the proposed replacement housing is a reasonable substitute.

Projected changes in rental costs are tabulated in Table IV-44. The data indicate that:

- average rent following relocation of the households remaining within the plantation system would be virtually unchanged;
- 40 percent of the households staying within the system would have lower rents while 60 percent would have higher rents; and
- the median increase for those whose rents would rise is about $3.00 per month, while the median decrease for those whose rents would fall is $7.00 per month.

While this suggests that the housing being offered residents who move to other plantation housing may be slightly inferior to what they now have, the difference is extremely slight. For all practical purposes then, the quality of the replacement housing is equivalent to that which the residents now occupy. If judged by housing costs on the open market, it must also be considered extremely inexpensive.

Table IV-44. Projected Changes in Rent for Households Relocating to Other Plantation Housing.

Change in Rent (in $/month)	Number of Units
-16.00 to -17.99	1
-14.00 to -15.99	-
-12.00 to -13.99	1
-10.00 to -11.99	1
-8.00 to -9.99	2
-6.00 to -7.99	4
-4.00 to -5.99	1
-2.00 to -3.99	2
-0.01 to -1.99	2
-no change-	-
+0.01 to +1.99	7
+2.00 to +3.99	4
+4.00 to +5.99	1
+6.00 to +7.99	2
+8.00 to +9.99	1
+10.00 to +11.99	2
+12.00 to +13.99	-
+14.00 to +15.99	-
+16.00 to +17.99	-
+18.00 to +19.99	1
+10.00 to +21.99	1

Source: Oahu Sugar Company, Ltd., April 1980.

Most of the replacement housing that would be used for households remaining within the plantation housing system is in Ewa, about five miles from Waipahu. The setting is similar to that at the proposed HPOWER site, but the relocation would effectively separate residents from friends and relatives in the Waipahu community. On the other hand, they would be moving into a large plantation community composed of persons with backgrounds and values similar to their own. Because of this, it is expected that the adverse social impacts that would result from the move would be limited. The Oahu Sugar Company has stated that it will pay for costs associated with the movement of household goods (Oahu Sugar Company, Ltd., April 1980:1). Hence, the only financial burden that would fall on the residents would be the cost of personalizing their new homes.

The Jack Hall Housing Project is immediately mauka of the Amfac/C-E HPOWER site and contains 144 one- and two-bedroom rental units. It was developed by the ILWU and is aimed at families with incomes below the following limits:

	Number in Household			
	1	2	3	4
Qualifying Income Limit (per year)	$10,700	$12,200	$13,750	$15,300

Those who qualify would pay only 25 percent of their monthly income as rent (as low as 15 percent for those with very low incomes). The proximity of this project to the existing housing area means that persons moving there would not have to adjust to a new neighborhood. However, the approximately 14 persons who will probably chose this alternative will have to accommodate themselves to a new (and very much more urban) housing style. They will also have to assume the burden of rents very much higher than they now pay for company housing.

We assume there are special circumstances for the nine or so persons who would move into homes which they already own, and for the ten or so who would move in with relatives, which make these options more attractive than the alternative company housing that is available. From the data that is available, it is impossible to determine whether their withdrawal from plantation housing would have occurred if the site were not slated for redevelopment.

The information available at this time suggests that the Oahu Sugar Company will be handling the relocation of present residents in a timely and humane way. Because of the uncertainty over whether or not the Amfac/C-E consortium will be awarded the HPOWER contract and the fact that relocation to make way for a large project (especially one funded by public money) is always a potentially sensitive issue, OSCO has not undertaken a large-scale publicity effort regarding the proposed project. Instead, it has proceeded slowly and on a more personal level. Members of OSCO's employee relations department have talked individually with residents in developing the relocation program discussed previously. In addition, OSCO reports that:

> The proposed HPOWER project has been the subject of Union/Management discussion on numerous occasions, the most recent of which was held on March 13, 1980 to brief the new unit officers. At this meeting, the 1980 plans, goals, and objectives of Oahu Sugar Co., Ltd. were discussed. Teruo Tabata, Factory Superintendent, updated and elaborated on Oahu Sugar Company's role in a joint venture with Combustion Engineering in the tentative HPOWER project. It was stated at this time that a contract has not been consummated, however, we are in the final stages of bidding for the project . . . Comments from the Union Officers were in summary supportive and they would compliment the efforts of Oahu Sugar Company in seeking alternative housing for their members. [Oahu Sugar Company, Ltd., April 1980:1.]

Sitework on an HPOWER facility would not begin for about 18 months. This is sufficient time for OSCO to implement its relocation plans in an orderly fashion and without creating the impression that residents are being summarily evicted. Hence, while most of those affected would probably prefer to remain where they are, present plans would lead to the effective mitigation of the potentially major adverse impacts.

COMMUNICATION IMPACTS

In general, the proposed HPOWER project is not expected to have a significant effect on radio, television, or other electronic communication devices. However, the proximity of the Waipio Peninsula site to the Federal Communications Commission's (FCC) Waipahu Radio Monitoring Station means that possible interference with the operation of that facility must be taken into consideration in designing a facility for that location.

Areas of Concern

The FCC identified two aspects of the proposed HPOWER project as being of particular concern. First, they noted that structures proposed as part of the project (particularly the 150-foot high stack) had the potential of intruding into the field of view of the monitoring station's radio direction finder, thereby contributing to bearing error that would compromise its effectiveness. Second, they expressed a fear that broad-band radio noise generated by switch contacts, commutators, electrostatic precipitators, and high-voltage transmission lines would interfere with the ability of the station to monitor weak signals. Subsequent to the City's receipt of the FCC's comment letter, further research was conducted by UOP concerning the potential impacts of the proposed HPOWER project on the operation of the Waipahu monitoring station.

Height of Stack. With regard to the FCC's first concern, i.e., that the facility's stack would project above a conical surface originating at the monitoring antenna and extending in all directions at an angle three degrees above the horizon, the FCC suggested that the HPOWER facility's proposed 150-foot high stack should be at least 2,863 feet from their direction finder. Because of space limitations on the Waipio Peninsula, this is not feasible. However, another, and possibly simpler, solution is to place the stack and other high structures on the far side of the available parcel relative to the monitoring station while decreasing the stack height sufficiently to prevent it from subtending the field of view of the direction finder. Preliminary dispersion modeling by the City's air quality consultant has indicated that the stack could be lowered by ten to fifteen feet while still maintaining pollutant concentrations below existing standards. As a result, UOP has agreed to lower their stack height to conform to the three-degree limitation.

Radio Noise. In order to thoroughly understand and address the second concern expressed by the FCC and to address it in a meaningful manner, a rigorous investigation of the proposed HPOWER project's potential effects on the radio spectrum and radio communications was undertaken by UOP, the only bidder proposing a Waipio Peninsula site. During the course of this investigation, contacts were made with the following: manufacturers of power-generating and ancillary equipment, including General Electric and Westinghouse; manufacturers of electrostatic precipitators, manufacturers of communications equipment; the Illinois Institute of Technology; the Electromagnetic Compatibility Analysis Center of the Department of Defense; the Federal Communications Commission in Washington, D.C.; and the Hawaiian Electric Company. The remainder of this discussion is based on the results of that investigation.

Radio noise exists everywhere, some due to natural phenomena and some due to man-made devices. The man-made devices can be anything from an automobile ignition system to a kitchen blender to a high-voltage power transmission line. The FCC monitoring station on the Waipio peninsula is now operating in the presence of radio noise with some level of radio frequency interference. This existing background noise represents an ambient condition against which the potential impact of the HPOWER facility should be considered, and it was our hope that data from the FCC's monitoring station would be available to characterize this background noise level, thereby providing a quantitative baseline against which HPOWER-related radio noise might be judged. However, when queried on the matter, the FCC explained that such information had never been developed. They further indicated that it would be extremely difficult to do so in any meaningful way.

In the absence of actual measurements of the background noise, an effort was made to examine the environment around the monitoring station to identify current sources of radio noise in the presence of which the station is assumed to be successfully fulfilling its mission. These sources include the City's Waipahu incinerator equipped with electrostatic precipitators; overhead transmission lines of the Hawaiian Electric Company along the old railroad right-of-way on the Waipio Peninsula; trucks using the incinerator; a 394-MW power plant less than three miles from the station; the power-generating equipment at Oahu Sugar Company's mill less than a mile and a half from the station; Hickam Air Force Base and the Honolulu International Airport with their attendant power, radar, and communications equipment as well as the aircraft using these facilities; and ships passing in and out of Pearl Harbor emitting radio noise in several bands including the HF, VHF, and UHF communications bands and radar frequencies. This is the background against which the proposed HPOWER facility and the equipment of concern to the FCC should be considered.

Switch contacts within the proposed facility include switches in the motor control centers, and the circuit breakers and line disconnect switch in the facility substation. In all instances, these are sources of intermittent rather than continuous noise, the noise being produced when the switches are opened and closed. Because the facility is designed to operate on a continuous basis such switch-contact derived noise is expected to be infrequent. The motor control centers, where one might anticipate switch contacts to be made far more often than in the substation, are themselves housed in grounded metal cabinets which act as a partial shield against the emission of noise when contact does occur. Further, the HPOWER facility substation should not be confused with the sophisticated switching substations having numerous arrays of circuit breakers and/or switches typically associated with utility power stations. The HPOWER substation will have two circuit breakers and one line disconnect switch. Frequent opening and closing of these contacts is simply inconsistent with normal facility operations. We must therefore conclude that noise from switch contacts in the proposed HPOWER facility would be infrequent, shielded, and not likely to even be detectable against existing background noise sources.

Regarding commutators as a potential noise source, the proposed HPOWER turbine-generator contains no commutators. All motors in the facility are squirrel-cage induction type within which there are no contacts or commutators. Noise emissions from these motors are considered non-existent.

The electrostatic precipitation process necessarily employs high levels of power, high voltage, and corona that could be suspected of generating radio frequency interference. The construction of modern precipitators, however, is such that these potential noise sources are enclosed and contained by heavy metal grounded surfaces which form the gas-tight structure of the precipitator. In the opinion of the manufacturer and supplier of this equipment, the precipitator will not be a significant source of radio frequency interference noise. It should also be noted that electrostatic precipitators were recently installed at the City's Waipahu incinerator. This equipment is in closer proximity to the FCC station than the proposed HPOWER facility would be and presumably contributes marginally to existing background noise. Assuming that the proposed facility precipitators and the existing incinerator precipitators have similar radio noise emission levels and considering that radio noise diminishes rapidly over distance, we do not believe that the proposed facility would have even the impact of the existing incinerator, in the presence of which the FCC station is currently accomplishing its mission. In the event the City selects the larger HPOWER facility size option and elects to phase out the existing incinerator operation, background noise due to precipitation equipment would potentially be reduced from present levels due to the increased distance between the equipment and the monitoring station.

High-voltage transmission lines are a source of radio frequency interference. According to the Electromagnetic Compatibility Analysis Center of the Department of Defense, a rule of thumb is that transmission lines having voltages below 70 KV produce discharge noise, and lines having voltages above about 110 KV produce corona noise. The proposed HPOWER facility transmission lines will be connected to existing Hawaiian Electric Company lines at the site boundary and will be 46-KV lines. As this is well below the 70-KV level, radio frequency interference from the lines would appear to derive from discharge noises. Discharge noise is a phenomenon of an intermittent nature. It results from currents created by electrical discharges where there are faulty system components or where the system has been subjected to an overvoltage, as from a lightning strike. It follows that discharges should not be of concern to the FCC since a transmission system characterized by frequent discharges would prove to be totally unreliable to the HPOWER facility and to Hawaiian Electric Company long before the resulting noise would become objectionable. Disregarding lightning strikes, discharge noise can be eliminated simply through proper maintenance of the transmission lines.

Based upon the data supplied by UOP, there is nothing that demonstrates the likelihood that radio noise from an HPOWER facility would have a significant adverse impact on the monitoring station. The City intends to continue its discussions regarding these matters with the FCC. If the Waipio Peninsula site is selected for HPOWER, efforts will be made to minimize its effects on the electromagnetic environment through careful selection of equipment, proper shielding, and/or other mitigation measures to be decided on during the detailed design phase of the project.

CHAPTER V.
SUMMARY OF ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

Soils, Geology, and Physiography

If one of the Campbell Industrial Park sites is chosen, 25,000 to 35,000 cubic yards of fill material might have to be imported. The impact on the borrow area is not possible to determine at this time. Use of the Campbell Industrial Park sites would preclude use of the limestone underlying the area as a construction material. However, economic factors and the availability of superior sources of this material make it extremely unlikely that this potential resource would be exploited even if HPOWER is not built there.

If the HPOWER facility is to be built on the Waipio Peninsula site, detailed soils investigations will be needed to determine the best location for the facility within the large site. Soils investigations have been conducted on the north parcel by Dames & Moore (June 1977), and indicate that conditions are not good. If this portion of the site is used, foundation and structural design may be more expensive as a result of special provisions for the soil conditions.

Air Quality

Computer modeling of the 1,800-TPD proposals was conducted to assess ambient air quality impacts. It indicated that an HPOWER facility constructed at any of the sites would result in a slight degradation of air quality. Preliminary modeling of the air quality impacts of the bidders' proposals indicates that the HPOWER project would lead to or aggravate violations of State ambient air quality standards. However, in most instances of violation, the proposed facility's contribution of pollutants would be moderate compared to that from other sources. It should also be noted that the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. Modeling shows all Federal air quality standards are met by the proposed facilities.

Sonic

Because final specifications for equipment and building materials were not available from the bidders, precise calculation of the noise levels that would be produced by each of the site/process combinations was not possible. However, all of the bidders have guaranteed that their facility would meet all Federal, State, and County noise standards. Despite their compliance with existing standards, the facilities would still result in a rise in noise levels. The increase could be as great as 20 dB(A) for the Campbell Industrial Park sites since the existing background noise level is only 50 dB(A), while the State DOH standard for industrial districts is 70 dB(A). For the Amfac/C-E site the noise standards are much stricter, due to the residential and apartment districts bordering the site. Since the existing noise levels are already higher than the DOH standards for residential areas (due to the sugar mill and cane haul vehicles), the DOH noise standard for apartment districts was considered the one which HPOWER could reasonably meet. Attainment of this standard, as well as the CZC standard for residential and apartment districts, would result in an increase in average noise levels of only two to ten dB(A).

The increase in noise levels resulting from an HPOWER facility situated on the Waipio Peninsula site would fall between those expected at Campbell Industrial Park and at the Amfac/C-E site in Waipahu. The exact values would depend upon the placement of the HPOWER facility on the site.

In addition to the impacts on the lots immediately adjoining the HPOWER facility, there would also be a rise in noise levels along the routes used by vehicles (especially refuse trucks) associated with the project. For the Campbell Industrial Park sites, this increase would only be two to five L sub dn units along Malakole Road and Kalaeloa Boulevard. The impact could be greater if the Amfac/C-E or Waipio Peninsula site were chosen because the truck routes that would be used are adjacent to residential areas. Depending on which truck route to the Amfac/C-E site is chosen (see alternative Routes A and B on Figure IV-5), construction of noise barriers may be required to mitigate high noise levels. Residential units adjacent to the Waipahu Depot Road access route to the Waipio Peninsula site would probably be among those most affected because there are no noise standards that must be met along a public roadway such as this.

Hydrologic

Impacts on water use would be greater with the 1,200-TPD alternative, because the Waipahu Incinerator, which consumes 135,000 gallons per day (GPD), would continue to operate. If the 1,800-TPD alternative is chosen, the Waipahu Incinerator would probably be closed, and the water it consumes diverted for use elsewhere in the Board of Water Supply (BWS) system. The UOP proposal involves drawing about 100,000 GPD of water from the BWS system. This would have to be obtained by increasing well pumpage. No increase in water withdrawals would be needed for the Amfac/C-E facility. Instead water would be diverted from the Waipahu sugar mill operation to HPOWER.

Storm water runoff from an HPOWER site would just about double as a result of the increase in impermeable surfaces. However the area of any site relative to its entire watersheds is limited, so the impact on the receiving waters would be minimal. For the Amfac/C-E site especially, the sediment loads of the runoff would be decreased since the existing dirt roads would be replaced by impermeable surfaces or landscaping.

Biological

Construction of the HPOWER project would involve almost total clearing of vegetation on the selected site. This removal of vegetation would not be a significant adverse impact, except for the loss of the 14 mahogany trees along the portion of Manager's Drive within the Amfac/C-E site. Most of the species on the proposed sites are quite common and site clearance would not seriously reduce the total island population of any of the species listed in Appendix C. Although rare and proposed endangered plant species exist in Campbell Industrial Park, the HPOWER project is not expected to have any adverse effect on them. However, construction on either Campbell Industrial Park site would reduce the potential habitat of some native plant species which are found only on the Ewa plain.

Despite landscaping of the site, there would be a reduction in the available natural habitat for wildlife on the proposed site. However, the species of wildlife observed are all common, and this impact does not appear to be serious.

Traffic

The total increase in traffic due to the HPOWER project would be about 645 one-way vehicle trips per day for a 1,800-TPD facility. The peak periods for these trips would be from 8:00 to 9:00 a.m. and from 10:00 to 11:00 a.m., when the facility would generate traffic volumes of about 100 vehicles per hour. Peak traffic generation by the project would not coincide with the existing traffic's peak volumes at any of the primary intersections or routes used by HPOWER-related vehicles. The increase in traffic volumes would not significantly affect the level of service on any of these roadways, either.

Visual

By virtue of its size, any HPOWER facility would have a strong visual image. The extent and nature of its impact is determined largely by the site that is chosen. The Amfac/C-E site plan shows the 30-foot high fuel storage building 70 feet from the nearest block of units of the ILWU's Jack Hall Housing Project. The most adverse impact would be on the eight units of this block. The one-bedroom units along Kalaiku Street on the northeast of the mission complex have only one primary view - toward Amfac/C-E's proposed HPOWER site. However, the project's potential visual impact would be mitigated by the fact that these housing units are somewhat elevated, the 60-foot high cooling towers are set back about 140 feet, and a partial landscape buffer is planned. There are also houses Ewa of the Jack Hall apartments, along Kalaiku and Kaiki Streets, which would be visually impacted by the HPOWER project. The houses on Kaiki Street are on land which will also probably be converted to industrial use, so these houses may be cleared before the HPOWER facility is built. Another visual impact of the HPOWER project would be the loss of two blocks of the shady arcade of mahogany trees along Manager's Drive.

The visual impacts which would result from the construction of the HPOWER facility on the Waipio Peninsula site depend upon the placement of the facility on the site. Since the exact layout and placement have not yet been determined at this time, it is difficult to assess the visual impacts exactly. If the HPOWER facility is constructed on the northern half of the north parcel, it would impact residents on Awanei Street. This impact, however, may not be significant if the facility boundaries are landscaped and the tall structures are placed away from the northern boundary. There might actually be an improvement over the present view of a rubble-strewn landfill. The impact on the view for those using Waipahu Depot Road or the golf course would not be great as the area already has an industrial impression from the Waipahu Incinerator.

Historic, Archaeological, and Paleontological

If the HPOWER facility were built on the Malakole Road site, the destruction, or at least the semi-permanent burial, of some archaeological and paleontological remains would result. Since these remains are valued for their ability to yield significant information about Hawaiian prehistory, preservation _in situ_ is not necessary (except to provide for future research). A program of archaeological and paleontological research and salvage could extract the data from the site before construction of the HPOWER facility. Such a program has already been commissioned for the Malakole Road site by the U.S. Army Corps of Engineers. Some archaeological and paleontological resources either on the site or in the adjoining surveyed area should be preserved for future study.

The Hanua Street site has been subjected to extensive clearing, so that only on the western edge have any sinkholes, similar to the ones on the Malakole Road site which yielded paleontological resources, been found. If this site is chosen, more intensive survey work would be undertaken to determine if a research and salvage program would be necessary.

Economic

If the 1,800-TPD alternative is built, the Waipahu Incinerator would probably be closed. This would have the adverse economic effect of releasing about 50 workers from their jobs. However, this impact would be mitigated, because jobs would be found for them within the Department of Public Works or elsewhere in the City and County government.

If the public bond issue option for financing the project is used, the City's bonded indebtedness would increase. However, the contract with the successful bidder will include monetary or other guarantees from them which will minimize any risk to the City resulting from the failure of the system to meet contractual requirements.

Social

Construction of the HPOWER facility on the Amfac/C-E site would result in the dislocation of 165 residents in 53 plantation houses. Since the Oahu Sugar Company's (OSCO) long-range plan has been to relocate these residents, even if Amfac/C-E is not awarded the HPOWER contract, the major adverse impact of the project would be the acceleration of the relocation. The site would have to be cleared within 18 months, so that Amfac/OSCO could not proceed at as leisurely a pace as they otherwise might. OSCO will assure that alternative housing is available for these residents (either other company housing, apartments in the Jack Hall Housing Project, their own home, or relatives' homes) and will pay for moving costs.

CHAPTER VI.
ALTERNATIVES

INTRODUCTION

As discussed in Chapter II of this report, the two HPOWER proposals that are still under consideration by the City are the result of planning efforts spanning a number of years. When combined with sanitary landfills for residue and ash and for materials not suitable for processing through a resource recovery facility, HPOWER is believed to be the most economical method of disposing of Oahu's solid waste in an environmentally sound manner.

This chapter reviews the alternative types of disposal methods that are available. A brief narrative description of the most important aspects of each alternative method is provided, together with a summary of its cost and environmental characteristics. The discussion covers the following solid waste disposal technologies:

- Sanitary landfilling
- Baling/Landfilling
- Shredding/Landfilling
- Incineration/Landfilling
- Composting/Landfilling
- Pyrolysis/Landfilling

In addition to alternative disposal technologies, the implications of "no action" or "delayed action" are also discussed, although they are found to be generally inappropriate. Finally, the chapter concludes with a discussion of the sites that are under consideration or that have been examined during the various planning stages of the proposed project.

CONTINUED LANDFILLING

The bulk of Oahu's solid waste is currently disposed of in sanitary landfills. As of March 1980, there were four civilian sanitary landfills in operation on the island (see Table VI-1). Average daily volume at the four sanitary landfills totals about 1,540 tons and includes about 285 tons per day of demolition wastes. The Waipahu Incinerator currently receives about 335 tons of waste per day (based on a seven-day week) and landfills about 100 tons per day of ash on land immediately adjacent to it. Assuming a continuation of these refuse volumes, it is estimated that there is sufficient space available in existing landfills for about the next five years, or about one year more than the time it would take HPOWER to become operational.

The selection, acquisition, and development of new landfill sites takes considerable time. Because of this, and because the only sanitary landfill currently in operation in Leeward Oahu with substantial remaining capacity is the privately owned Palailai Sanitary Landfill, the City is currently planning for a new Leeward Sanitary Landfill. A large number of potential sites have been identified, the important characteristics of which are presented in Table VI-2. That table also notes the most important impacts associated with

Table VI-1. Present Solid Waste Volumes at Oahu's Civilian Disposal Facilities.

Facility Name	Ownership	Existing Volume (Tons/Day)[1]	Approximate Remaining Life (Years)
Kapa'a Sanitary Landfill	C&C	950	6
Kawailoa Sanitary Landfill	C&C	55	2
Waianae Sanitary Landfill	C&C	35	2
Palailai Sanitary Landfill	Private	500	5
Subtotal		1,540	
Waipahu Incinerator Landfill	C&C	100[2]	1
Total Amount Now Landfilled		1,640	
Waipahu Incinerator	C&C	335	N.A.

[1] GMP Associates, Inc. (1980) adjusted from the six-day-per-week averages used in that report to the seven-day-per-week average used in this EIS.

[2] Consists of ash from the incinerator.

Source: Refuse Division, Department of Public Works, City and County of Honolulu; GMP Associates, Inc.

landfill use of each of the sites. A much more complete discussion of potential impacts can be found in the EIS Preparation Notice prepared for the Leeward Sanitary Landfill (Environment Impact Study Corp., July 1979:2-1 through 2-136).

Using a standard conversion factor of two cubic yards per ton of refuse landfilled and an estimated 0.6 cubic yard per ton of incinerator ash landfilled, the 1,640 tons per day existing landfill volume translates into approximately 3,100 cubic yards per day. At this rate, the landfill requirement over a 20-year period amounts to about 23 million cubic yards. Comparing this with the capacity figures reported in Table VI-2, it is clear that the only single site capable of handling the expected waste volume is at Kaloi Gulch north of Pu'u Makakilo. And it is expected that there could be reasonably strong public opposition to landfill use of that site. If it is not the site selected, at least two and possibly as many as nine other sites would need to be developed as landfills over the next 20 years.

To the extent that some of the refuse generated on Oahu would be disposed of at sites outside of the Leeward District, the life of whatever landfills are

Table VI-2. Potential Landfill Sites Presently Under Study by the City and County.

Location	TMK No.	Total Area (Acres)	Capacity (Cu. Yds.)	Present Use	Estimated[1] Life (Years)	Comments
1. Barbers Point	9-1-16:18 + por. 1	±15	740,000	Open space, cane junk yard	0.7	No cover material available on site
2. Diamond Head Crater	3-1-42: por. 6	115	8,300,000	Open space	7.5	Strong opposition by State DLNR & DOD
3. Ewa No. 1	9-1-17: por. 4	210	12,000,000	Sugar cane and open	11.0	Opposed by Oahu Sugar Co.
4. Ewa No. 2	9-1-10: por. 2	200	6,900,000	Sugar cane	6.3	Poss. opposition from Oahu Sugar
5. Honouliuli	9-1-17	22	1,650,000	Agriculture and open	1.5	Poss. community opposition
6. Kaena	6-9-01: por. 3,33,34	40	1,500,000	Abandoned quarry	1.4	Cover material is scarce, high transportation costs
7. Kahe	9-2-03: por. 27	200	7,400,000	Open space	6.7	Highly visible, moderate transportation costs
8. Kaloi Gulch	9-2-02: por. 1 9-2-03: por. 2 9-2-04: por. 5	400	24,300,000	Sugar cane, ranching, open space	22.1	May require leachate control; substantial site preparation costs
9. Keekee	6-9-01: por. 3, 4 6-9-03: por. 2	40	1,200,000	Open space	1.1	Highly visible; possible community opposition
10. Koko Crater	3-9-12: por. 1	140	5,500,000	Open space, bot. garden	5.0	High transportation costs
11. Maili	8-7-10:3	200	9,200,000	Quarry and open space	8.4	Would displace limestone quarry; mod. costs & high trans. costs
12. Ohikilolo	8-3-01:13	706	15,600,000	Agriculture, open space	14.2	Would displace rec. center; high visibility
13. Sand Island	1-5-41: por. 6	150	2,600,000	Park, recreation and junk yard	2.4	Displacement of recreation; strong public opposition
14. Waianae	8-5-03:1,29-32 8-5-06:10	140	6,800,000	Open	6.2	Strong public opposition, high transportation costs
15. Waimanalo Gulch	9-2-03:13,14	260	3,700,000	Agriculture and open	3.4	High land and capital costs, and moderate transportation costs
16. Waipio	9-3-02: por. 1	75	2,600,000	Sugar cane and cane wash water and bagasse disposal	2.4	Problems and costs associated with relocating existing use

[1] Based on an estimated landfill use rate of 1.1 million cubic yards per year for the entire island.

Source: Compiled by Belt, Collins & Associates from Environment Impact Study Corp. (June 1979).

developed in Leeward Oahu would be extended. However, the fact remains that, without HPOWER, from 400 to 1,000 acres of land would have to be withdrawn from other uses over the next 20 years in order to meet the expected landfill requirements.

There are, of course, no saleable products resulting from a landfill operation and, therefore, no income stream is generated. Costs of landfill operations are normally quite site-specific. They are much higher where utility and roadway improvements or relocations are needed or where environmental considerations require extensive landscaping, leachate control, or other pollution control measures. Currently, landfill costs are running about $7 per ton. As indicated in Figure II-8, they are expected to rise at a rate of seven percent per year. Hence, by the year 2004 (i.e., by the time an HPOWER contract would expire), the cost would have risen to over $35 per ton. Based on the expectation that operation and maintenance costs for HPOWER will rise more slowly than revenues from materials and energy sales, net disposal costs with HPOWER are expected to decrease over the long-term (see Figure II-8).

As we have noted previously, <u>all</u> disposal methods involve landfilling to a greater or lesser extent because the earth is the only suitable resting place for many of the constituents of the municipal solid waste stream. However, the amount of landfilling that will be required can be reduced very substantially by combining it with the resource-recovery/volume-reduction technologies discussed in the following pages.

OTHER DISPOSAL TECHNOLOGIES

<u>Baling/Landfilling</u>

Baling involves forming raw solid waste into dense blocks of material. At present, three basic types of balers are in use. One of these, a derivative of scrap metal balers, achieves densities which are high enough to eliminate the need for baling wire; the other two utilize tie wires. By itself, baling is not a disposal method and is not, therefore, an alternative to HPOWER. However, by increasing the density of solid waste from the 600 pounds per cubic yard typical of refuse received from a collection or transfer vehicle to the 1,200 to 1,700 pounds per cubic yard reported for baling operations (U.S. Environmental Protection Agency, 1976:76), baling can provide transportation cost savings that are significant <u>if</u> transfer is already necessary <u>and</u> the disposal sites are a long distance from the point of waste generation. Since baled waste has a density somewhat higher than the 1,000 pounds per cubic yard that is typical of refuse in place in landfills, baling can extend the life of a landfill by 20 to 70 percent.

Baling is a fairly recent development resorted to by communities unable to find adequate disposal sites within a reasonable distance. The operations undertaken thus far have relatively high processing costs, and those studied by the U.S. Environmental Protection Agency (1976:76,77) had costs (in 1975 dollars) ranging from $5.90 per ton to $9.20 per ton. Since these costs are in addition to transfer and disposal costs and do not reflect the very substantial inflationary price increases that have occurred since 1975, baling does not appear to be a reasonable alternative from an economic standpoint.

With respect to environmental effects, baling does not appear to differ significantly from landfilling without baling, except insofar as it reduces the area that is required. It is possible that baling would allow more immediate re-use of disposal sites following the termination of landfill operations.

Shredding/Landfilling

Shredding raw solid waste prior to disposal is, like baling, a means of reducing its volume and therefore the amount of landfill space that is required. By itself, it is not a disposal method and must be used in conjunction with landfilling or resource recovery/incineration. According to the U.S. Environmental Protection Agency (1976:79), experience with shredding has shown that it can improve landfill operations by preventing problems from vectors, odors, and littering. Equally important, by reducing the volume of voids in the refuse, shredding allows higher average densities to be achieved in the landfill. The increase in density that is possible depends upon the extent to which shredding eliminates the need for daily earth cover, but reportedly ranges from 25 to 60 percent. This is about the same as that achievable from baling.

Costs of shredding are highly variable depending upon the type and volume of refuse being processed and the relationship of the shredding operation to other elements composing the overall solid waste collection and disposal system. A 1976 study published by the U.S. Environmental Protection Agency (1976:79-80) reported the costs of shredding ranged from a high of $10.60 per ton in New York to a low of $4.10 per ton in Charleston. These costs are in 1974 dollars and include landfill operations. The possibility of including a shredding operation at the City's Keehi Transfer Station was considered during the design phase of that project (1975). However, a feasibility analysis indicated that shredding would add substantially to the capital and operating costs of the transfer station and that this would be only partially offset by the lower transportation costs and extended landfill life made possible by the higher density of shredded (as compared to raw) solid waste. Moreover, since a resource recovery facility (which later emerged as the HPOWER project) was under discussion even at that time, it appeared inappropriate to install shredding equipment at a separate location.

If HPOWER is not implemented, the possibility of establishing one or more shredding operations, most likely in conjunction with one or more additional transfer stations or at a landfill site, would be re-evaluated. If the overall economics of such an operation prove reasonable, it would probably be pursued as a means of extending landfill life on Oahu. However, it should be noted that shredding would add no more than 25 to 60 percent to landfill life, whereas HPOWER would increase it by more than 400 percent.

In terms of its environmental effects, a shredding/landfill operation is much the same as landfill alone. A few special hazards are added by the fact that fires and explosions do occasionally occur when flammable or explosive material is inadvertently fed into the shredder, but these can be contained by proper design and constitute more of an operational problem than a threat to the environment. Shredders are potential sources of dust and noise, but these, too, can be held to reasonable levels by appropriate design and emission control measures.

Incineration/Landfilling

Incineration is the controlled burning of solid, liquid, or gaseous wastes. For many years, essentially all incinerators constructed in the United States were conventional refractory-lined units. The City's existing Waipahu Incinerator is of this type and has a capacity of about 600 tons per day (assuming fuller utilization than is presently the case). Incineration reduces the volume of municipal solid waste by about 80 to 85 percent. The percentage of volume reduction is increased even further when the ash from the incinerator is compacted in a landfill. However, bulky burnable wastes such as logs, tree stumps, mattresses, etc., and large non-flammable materials such as refrigerators, vehicle parts, stoves, etc., cannot be incinerated and must, therefore, be disposed of at a landfill. Altogether, the Environmental Protection Agency estimates that incineration can extend the life of a landfill by at least 200 percent.

To insure complete combustion and to help cool the incinerator, the amount of air fed to the firebox of a conventional refractory incinerator greatly exceeds the amount theoretically required for combustion. The turbulence created by the high volumes of air that are used entrains large amounts of particulate matter in the exhaust gas stream. With increasingly stringent air quality and emission standards being adopted by the State and Federal governments, the air pollution control devices necessary to handle the high volumes of gas that are involved have become prohibitively expensive.

At present, the only municipal incinerator still in operation on Oahu is at Waipahu. That facility was built in 1968 and underwent extensive renovations in 1978; these allowed it to meet the air pollutant emission standards now in effect. The most recent information available indicates that disposal of refuse at the Waipahu Incinerator costs about $13 per ton exclusive of costs associated with landfilling the ash. When these are included, the total comes to about $17 per ton. The City's two other incinerators, Kapalama and Kewalo, were closed in 1977 because of their inability to comply with air quality standards. Renovation of these facilities was considered, but the large capital costs that were involved and the relative inefficiencies associated with their basic design and small scale made the estimated per-ton disposal costs following renovation prohibitive.

The direct environmental impacts associated with conventional incineration are similar to those reported in previous chapters for HPOWER. Some, such as particulate emissions to the atmosphere, are normally slightly higher. But others, such as noise, may be less severe because of the absence of fuel preparation and resource recovery operations. Conventional incinerators, of course, do not recover materials or energy from the waste stream. This means that conventional power sources must consume more fuel, and that the iron, steel, and aluminum industries must utilize more raw materials if conventional incineration is used in lieu of resource recovery. The increased industrial activity which this would generate would produce a wide variety of indirect impacts.

Composting/Landfilling

Composting is a process in which organic solid wastes are biochemically decomposed in open windrows or within confined tanks. The process results in a humus-like substance that is used to condition the soil (Institute for Solid Wastes, 1970:293). Before municipal solid waste can be composted, the non-organic component (about 15 percent of the total) must be removed and disposed of at a landfill. The end product is "disposed of" in agricultural fields and nurseries where it can greatly improve the ability of the soil to support plant growth.

Composting has attracted a great deal of attention from environmental groups because it involves large-scale recycling of solid waste back into the soil. Because it reduces the volume and weight of the refuse that must be disposed of in landfill, it can greatly extend landfill life. Unfortunately, efforts in the United States aimed at utilizing composting on a large scale for the disposal of municipal refuse have not proven economically viable (Pavoni, et al., 1975).

The failure of composting to establish itself in the United States in the same way that it has in Western Europe is traceable to a number of factors, two of which appear to be critical. First, the initial investment and operating costs are higher than those for most other disposal methods. Second, no steady, income-producing market has been found for the compost that has been produced. With high expenses and limited income, composting has proven to be an extremely high-cost method of solid waste disposal. Given Hawaii's relatively high construction costs and the extremely limited local market for compost (the large sugar and pineapple plantations that make up the bulk of agricultural operations in Hawaii have shown no interest in its utilization), there is virtually no chance that composting offers an economically viable solution to Oahu's solid waste disposal needs.

Pyrolysis/Landfilling

In its analysis of resource-recovery technologies feasible for Honolulu, the MITRE Corportion identified pyrolysis as being one which deserved consideration. Pyrolysis is:

> The physical and chemical decomposition of organic matter at high temperatures in the absence of oxygen. Unlike combustion in an excess of air which produces heat and carbon dioxide, the pyrolysis reaction absorbs heat and results in the production of synthetic oil-like liquids and a solid carbon char [oil pyrolysis], or, at higher temperatures, a low Btu gas and a slag material [gas pyrolysis]. [MITRE Corporation, April 1977:160.]

Medium- and Low-Btu Gas Pyrolysis. There are several different types of gas pyrolysis processes under development, but their basic concept is the same. As described by the MITRE Corporation:

> Waste materials in the pyrolysis reactor are heated by hot gases; as refuse moves through the reactor it is exposed to successively higher temperatures and is destructively distilled. In some processes the recovered fuels are of sufficient quality to permit their use as auxiliary fuels in fossil fuel boilers (medium Btu gas systems). In other systems, the low Btu value of the gas will not justify its transport to off-site facilities and thus must be used as a fuel in a waste heat boiler to produce steam or electric power. [April 1977:187.]

As part of its study, the MITRE Corporation prepared estimates of capital and operating costs for one of the medium Btu (300 Btu per cubic foot) gas pyrolysis systems under development; revenue estimates assuming different selling prices for the gas were also prepared (see Table VI-3). The cost estimates indicate that capital and operating expenses for a 1,200- and 1,800-TPD gas pyrolysis facility would be about $32 per ton and $27 per ton, respectively. At the estimated present worth of $1.00 per million Btu (MBtu) for the gas fuel that would be produced, net disposal costs for such a system would be about $25 per ton and $20 per ton for 1,200- and 1,800-TPD facilities, respectively. In view of present prices of substitute fuels; even $1.00 per million Btu may be optimistic.

Table VI-3. Cost and and Revenue Estimates for 1,200- and 1,800-TPD Gas Pyrolysis Facility (in mid-1976 dollars).

Nominal Capacity (TPD)	Throughput (Tons/Year)	Capital[1] Cost ($/Ton)	O&M[1] Cost ($/Ton)	Total[1] Cost ($/Ton)	Net Cost of Disposal[2] ($/Ton)	
					@ $1/MBtu	@ $2/MBtu
1,200	360,000	14.35	17.52	31.87	25	18
1,800	540,000	12.38	14.66	27.04	20	13

[1] Interpolation from Table 4-XI, MITRE Corporation, April 1977:196.

[2] Based on Figure 4-11, MITRE Corporation 1977:198. Cost of gas as of March 21, 1980 was reported as from $0.67 to $1.04 per million Btu (MBtu) for synthetic natural gas and $0.924 to $1.00 per million Btu for propane/LPG (Ed Inouye, 1980, personal communication). Hence, $1.00 represents the high end of existing prices.

Source: Compiled by Belt, Collins & Associates from sources noted above.

The MITRE Corporation study also identified the potential environmental impacts of a gas pyrolysis process that would have to be dealt with. These are reproduced in Table VI-4.

Oil Pyrolysis. The basic difference between oil pyrolysis and gas pyrolysis is that the former subjects solid waste to much lower temperatures. Like gas pyrolysis, oil pyrolysis works only on organic matter; hence, incoming raw municipal solid waste must be processed before it enters the pyrolysis process. The only pyrolysis technology that is close to commercial availability at the present time is the "flash pyrolysis" process developed by the Occidental Petroleum Research Company. As described by the U.S. Environmental Protection Agency (1976:52):

Table VI-4. Potential Environmental Impacts Associated with a Gas Pyrolysis Resource Recovery Facility.

	Analysis	Control Measures
Air		
• Pyrolysis Plant	No serious problem. Only gas outlet is emergency vent which flares CO_2 and H_2O if excess pressure. Nitrogen, NO_x, given off from oxygen plant.	Scrubber and electrostatic precipitator clean gas to be sold. NO_x not generally sufficient to require controls, but possible in non-attainment areas (with very stringent limits).
• Gas User	1750 TPD refuse plant yields pyrolytic gas emissions at energy market of: 1.8 TPD SO_x as SO_2 (per 0.1% S refuse), 2.8 TPD Cl as HCl (based on 0.3% Cl in refuse, of which 0.16% is organic), and a negligible amount of particulates. Equivalently, this is 0.31 lb (SO_2)/million Btu and 0.50 lb(HCl)/million Btu, assuming 72% efficiency from refuse Btu to gas Btu and 4420 Btu/lb refuse.	Controls not normally required; gas cleaning at refuse plant would be upgraded if necessary.
Noise		
• Community	Data not available for pyrolysis and oxygen plant. Refuse processing enclosed, but total plant spread out in several buildings or units; layout and component noise distributions will determine community noise projections -- 55 dBA property bound level probably attainable. Intermittent peaks to 70-80 dBA due to on-site traffic.	Site layout -- buffer area around site, earth as natural barrier, accoustic treatment on components, muffling.
• In-Plant	Major sources are air compressor in oxygen plant; in PUROX system gasifier, I.D. and F. D. fans, fixed heaters; front-end shredders, air classifiers, and conveyors; additional sources including fans and turbine if generating power directly.	Design and operation to meet OSHA limitations.
Water (1750 TPD)		
• Use	250 gpm for PUROX plant, additional 20-30 gpm for front-end processing and sanitary, plus 130 gpm oxygen plant cooling water make-up (Quantities not clear from literature, but total ~400 gpm)	Water uses integral part of system.
• Effluents	Cooling water blowdown from oxygen plant 105 gpm, not a serious problem. Cooling water blowdown from PUROX system 20 gpm, low in pollutants -- includes 1000 ppm solids, negligible BOD may be discharged to sewer. PUROX combined condensates from wet precipitator and knockout drum 210 gpm, heavily polluted with soluble organics, BOD 20-30,000. Additional effluents from front-end washdown, storm drains. Salts and metals content of slag produce a leachate when applied to land.	Treatment system using oxidation may be required for PUROX effluents prior to discharge.
Land (1750 TPD)		
• Pyrolysis plant	20-25 acres; also:	25 + 2.8 x 30 = 110 acres for pyrolysis is to be compared with 990 acres for landfill over a 30 year period.
• Residue Disposal	Slag fraction: 80 acre-ft/yr, or 2.7 acres/yr, based on 30 feet depth of fill, 25% cover factor, 80 lb./cu. ft. bulk density of slag, slag 22% by weight of raw refuse. Slag fraction is 97% of total residue, the remainder being largely nonferrous metals. Total residue therefore approximately 2.8 acres/yr.	Productive uses of the slag or char may be developed.
Aesthetics	General character of a chemical plant or small refinery, with multiple buildings, gas storage and oxygen tanks, piping, and gas cleaning equipment dispersed over the site area rather than enclosed in a large building complex (as is the case with other resource recovery systems). Profile depends on design choice of number vs. capacity of tanks.	Approoriate choice of site, to shield plant from view; location in industrial or remote area. Landscaping of surrounding buffer area and immediate access route.

Source: MITRE Corporation (April 1977:193 and 194).

The Occidental Process utilizes two stages of shredding, air classification, magnetic separation, drying, and screening to produce fluff RDF for the pyrolyser feedstock. Representing about 60 percent of the input solid waste, the fluff RDF is fed along with hot char into a vertical, stainless steel reactor. The hot char, which is actually the solid residue remaining after the pyrolysis reaction, provides the energy needed to pyrolyze the organic material. The material exiting the reactor consists of a mixture of char and ash and the pyrolysis gases. By rapidly cooling the gases before they can completely react, a portion of the gas is condensed into an oil-like liquid fuel. Both the remaining gas and the char are reused within the system.

The fuel product will be an oil-like, chemically complex organic fluid. The sulfur content will be a good deal lower than even the best residual oils. The average heating value of the pyrolytic "oil" . . . contains about 76 percent of the heat value available from No. 6 oil.

In their 1977 study, the MITRE Corporation analysts prepared cost estimates for oil pyrolysis similar to those made for gas pyrolysis. These are presented in Table VI-5 for 1,200-TPD and 1,800-TPD facilities. No revenue estimates were given, and this makes it impossible to derive a dollar value for the net disposal cost per ton. However, the estimated total disposal costs for oil pyrolysis shown in the table are only slightly below those for gas pyrolysis while the overall energy recovery efficiency of gas pyrolysis is more than twice that of oil pyrolysis. In view of the fact that energy revenues are expected to escalate very much more rapidly than costs, it appears that the net disposal costs of an oil pyrolysis system are likely to be very much higher than those for a gas pyrolysis system.

Table VI-5. Cost Estimates for 1,200- and 1,800-TPD Oil Pyrolysis Facilities (in mid-1976 dollars).

Nominal Capacity (TPD)	Throughput (Tons/Year)	Capital Cost[1] ($/Ton)	O&M Cost[1] ($/Ton)	Total Cost[1,2] ($/Ton)
1,200	360,000	8.90	16.90	25.80
1,800	540,000	8.16	15.53	23.69

[1] Interpolation from Table 4-XIII, MITRE Corporation April 1977:203.

[2] No revenue estimates were given for oil pyrolysis in the MITRE Report; hence, no net disposal cost estimates are possible.

Source: Compiled by Belt, Collins & Associates based on data provided by MITRE Corporation, April 1977.

Table VI-6. Potential Environmental Impacts Associated with an Oil Pyrolysis Resource Recovery Facility.

	Analysis	Control Measures
Air (1750 TPD)		
• Pyrolysis Plant	Emissions from afterburner baghouse include 45 lb./hr (0.54 TPD) SO_2, up to 64 lb/hr (0.77 TPD) NO_x, and 0.05 gr/SCF particulates, based on scale-up from pilot operation; volume (c.f.) not certain. NO_x value is a theoretical maximum, and may be lower in actual operations.	Plant air drawn into baghouse for dust control. Exhaust gases from rotary kiln drier and char burner pass through after-burner followed by another baghouse. Afterburner at 1200°F expected to eliminate odors (may need to be somewhat higher T).
• Oil User	Limited experience with pyrolytic oil combustion makes impact projections difficult. Typical compositions, by weight 57% C, 7.7% H, 0.2% S, 0.3% Cl, 0.5% ash, 1.1% N, 33.2% O at 10,600 Btu/lb, 14% water, and spec. grav. 1.30; on an equivalent Btu basis, No. 6 oil is higher in sulfur but lower in ash and chlorine.	Additional controls beyond those needed for fossil fuel firing not anticipated. Pyrolytic oil expected to be cofired or blended with No. 6 fuel oil.
Noise	Major sources are shredders, air classifiers, conveyors, fans, loaders, and trucks. Noise data and projections not available for commercial scale plant.	Separate housing of primary shredder with accoustic treatment anticipated. Additional measures will depend on optimum design resulting from current demonstration projects.
Water		
• Use	Data on water use from process not available, but expected to be order of magnitude comparable to that for gas pyrolysis, discussed earlier.	
• Effluents	Effluents arise from: cooling water, chemical reactions in pyrolysis, sanitary facilities, washdown, and surface run-off (normally uncontaminated). A glass recovery component would also have an effluent, but no ready market for glass exists on Oahu. The major water pollution problem involves the pyrolysis effluent, which is 25 TPD @ 1750 TPD, and contains up to 100,000 ppm COD of organics. Also, leachates arise from landfill of the residue.	Pyrolysis reaction effluent may require either pretreatment prior to discharge to sewer, or incineration in afterburner.
Land (1750 TPD)		
• Pyrolysis plant	20-25 acres -- may change following demonstration plant experience; also:	
• Residue disposal	Minimum of 22-23% by weight to be landfilled implies 2.8 acres/year required (see gas pyrolysis analysis).	110 acres for pyrolysis vs. 990 acres for landfill over a 30 year period. Productive uses of slag or other residue possible, but premature to assume will be developed.
Aesthetics	General character of a chemical plant or small refinery, with buildings, oil storage tanks, and piping spread over site area. Profile depends heavily on design decisions following demonstration plant experience.	Appropriate choice of site, to shield plant from view; location in industrial or remote area. Landscaping of surrounding buffer area and immediate access route.

Source: MITRE Corporation (April 1977:201).

Table VI-6 reproduces the MITRE study's assessment of the impacts associated with an oil pyrolysis facility. Comparing this table with Table VI-4, it is apparent that the impacts of the two types of systems are comparable.

Eligibility of Pyrolysis Systems for HPOWER. In 1977/78 when the Request for Proposals for HPOWER was being written, it was expected that bidders utilizing pyrolytic systems would be strong competitors for the project. However, no bidder proposing a pyrolytic system was able to demonstrate a minimum of one-year of trouble-free, full-scale commercial operation as required by the RFP. Hence, no Step IIB technical proposal was accepted for a pyrolytic system.

NO ACTION/DELAYED ACTION

At present, the overwhelming majority of the refuse that is generated each day on Oahu finds its final resting place in one of the island's sanitary landfills. Only the small amount that is actually consumed in the Waipahu Incinerator (i.e., total input minus the amount of ash that is taken to landfill), about 250 tons per day, is actually eliminated from the island. The remainder is simply buried at the landfill sites.

Landfill sites do not last indefinitely; the amount of space available at a particular location is limited, and it is consumed as solid waste is disposed of there. Hence, so long as solid waste continues to be generated, new landfill sites will have to be found and put into operation. Because of this land-consuming aspect of present disposal methods and the near-certainty that island residents and industries will continue to produce solid waste, "no action" is not a practical alternative. Some action simply must be taken before existing landfill space is exhausted. Given the long lead time needed for the planning and development of either this project, additional landfill(s), or other disposal alternatives, "delayed action" is not a feasible alternative, either.

ALTERNATIVE SITES

As noted in Chapter II of this report, the City's Request for Proposals (RFP) for the HPOWER project guaranteed that the City would make a site at the intersection of Malakole Road and Hanua Street in Campbell Industrial Park available to any bidder wanting to use it. However, firms seeking the project were permitted to select whatever location they believed to be most advantageous to their proposal. Partly because the short time period involved made it difficult for contractors to secure the necessary guarantees on alternative sites, and partly because certain bidders valued the Malakole Road site's proximity to the potential energy market at the Chevron refinery, only Amfac/C-E specified a location other than the Malakole Road parcel guaranteed by the City. Amfac/C-E's selection of a Waipahu site was predicated on the fact that the necessary land was already under Amfac's control and that benefits resulting from the integration of the resource recovery facility with the existing sugar mill were believed by Amfac/C-E to offset the limited energy market (only electrical power sales to HECO are possible) at that site. Subsequent to the issuance of the RFP, the City has extended its guarantee of site availability to a site off Hanua Street in Campbell Industrial

Park and to a site adajcent to the existing Waipahu Incinerator on the Waipio Peninsula. The possibility exists that any one of these sites could be selected; hence, impacts associated with use of each of these locations have been discussed in Chapter IV of this report.

By leaving the choice of sites up to the individual bidders (subject only to a determination by the City that environmental impacts would be minimal and to a transportation charge designed to account for differences in the cost to the City of delivering waste to the various sites), the City believes it is most likely to achieve the lowest possible disposal costs. However, as an alternative to this, it would have been possible to specify a particular location in the RFP, thereby taking the decision out of the hands of individual bidders.

The MITRE Corporation's 1977 study, Analysis of the Feasibility of Resource Recovery for Honolulu, included an investigation of a number of alternative sites for HPOWER. It examined ten different possible locations for a resource recovery facility; these potential sites were suggested by public agencies, by proximity to potential markets for recovered energy, and by previous reports. The approximate location of the sites considered most feasible by the MITRE study team are shown in Figure VI-1. According to their report:

> The sites were surveyed by MITRE in December 1976, and the visits supplemented by examination of soils, flood prone areas, and other maps and engineering plans. Assistance was also provided by the Refuse Division and Sewers Division of the Board of Water Supply the Department of Land Utilization and Management, the State Department of Transportation (Airports Division), the FCC, the FAA, and owners of private sites in obtaining data on the sites. For each site area (in some cases, two or more specific sites are in the same general area) excluding those covered in the SLTH [Sunn, Low, Tom and Hara, 1975] Study, a Site Fact Sheet was prepared . . . .
>
> The Fact Sheets contain locational, descriptive, environmental, and other pertinent data on the sites, according to the following basic outline:
>
> 1. Location (reference to a map);
>
> 2. Tax Map Key Number;
>
> 3. Owner;
>
> 4. Description - size, topography, City and County Zoning, General Plan Land Use Designation, Soil Classification; Presence of Wetlands, and abutters;
>
> 5. Accessibility - Type/Condition of Access Road, Proximity to Major Highways, and Area Traffic;
>
> 6. Environmental Considerations - Air Emissions, Biological, and Noise;

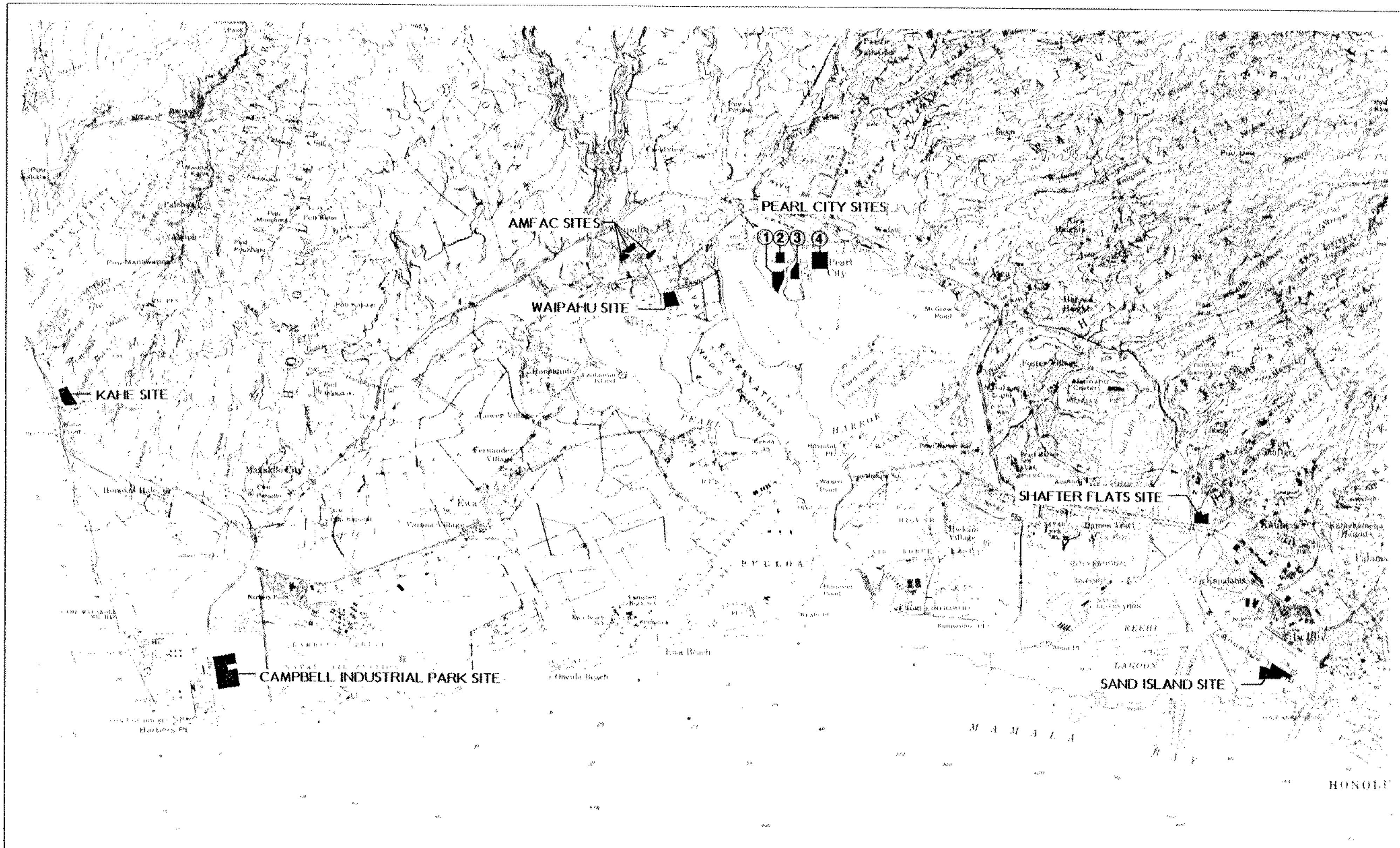


Figure VI-1. Possible Resource Recovery Facility Locations Examined in the MITRE Corporation Study.

7. Utilities - Power, Water, and Sewer;

8. Applicability to Markets - Products, User(s), Distance to User(s) Facility; and

9. General Comments - Willingness of Owner to Sell/Lease Site; Extent of Site Development Required, Necessary Highway Changes, and Other (e.g., local opposition). [MITRE Corporation, April 1977:206, 207.]

In evaluating the suitability of each site for an HPOWER facility, the study used the following criteria:

1. Useable area refers to the amount of land on the site suitable for construction. For example, flood prone areas, wetlands or wildlife habitat considered valuable would be excluded. In general, a plant processing 1000 tons per day would require at least 10 acres.

2. Access covers the ease of getting to the site from a major highway, along an access road, and directly onto the site proper. Proximity to the nearest major highway, possible congestion problems, highway improvements required, and the nature of the area (e.g., residential vs. open or industrial) along the likely access road(s) are taken into consideration.

3. Transportation cost reflects, approximately, the distance from the island's centroid of refuse generation, which is in Kalihi near the Shafter Flats area. It should be noted, however, that with the efficient use of transfer stations and major highway routes, distances of 20 to 30 miles from the centroid may still be economically acceptable if the siting and market conditions suggest this type of solution.

4. Air impacts from stack emission apply to steam and power generation from waterwall incineration facilities, which burn refuse onsite. (The type of gas pyrolysis system considered for this project would not have a stack.) Examined are the residential areas and sensitive receptors such as hospitals and schools, in the vicinity of the site and particularly within about 2 miles in the prevailing downwind direction. Locations where existing particulate concentrations, as monitored by the State Department of Health, are near or exceeding ambient air quality standards are also considered possible problem areas.

5. Land use compatibility, aesthetics, and conservation impacts are evaluated to determine to what extent a refuse plant would fit in or "make sense" within the current and planned environment, both natural and man-made, in the vicinity of the site. Zoning and future land use designations of the specific site are taken into account, as well as the general character of the surrounding area.

6. Energy product saleability deals with the suitability of the site for marketing either power, gas, or steam. Important considerations include proximity to the potential market and associated product transport or transmission costs, the need for the product by that market, and the technical feasibility of utilizing the product at the market.

7. Ease of acquisition considers the potential difficulty in purchase or lease of the site by the City and County, or the State, for the construction and operation of a resource recovery facility. This criterion refers to the willingness of the present owner to sell or lease, or to use the site for resource recovery in the case of City and County or State-owned lands; it does not directly include potential implementation problems due to local opposition. [MITRE Corporation, April 1977:215, 216.]

The MITRE report noted that the list of criteria was not exhaustive, but that it was adequate for the purpose of narrowing the choice of potential sites and as a general guide in selecting the best available sites.

The MITRE Corporation study team (1977:221) evaluated all of the sites using the criteria that had been developed. The results of their analysis are summarized in Table VI-7. That table uses a scale of 1 (worst) to 10 (best) to show the relative merits of the different sites for a given criteria. The report emphasized the fact that the rating scheme ". . . is simply a communications device; no formal weighting of criteria has been done, nor is this recommended." All of the criteria were taken into account using qualitative judgments as to their relative importance in order to arrive at the "overall assessment" of each site presented in the last row of the matrix. It should be noted that the "AMFAC" site that was evaluated by MITRE is not the location specified in the Amfac/C-E technical proposal; the new location would rank considerably higher.

Four sites were categorized by the MITRE Corporation as being "good" for the energy markets that are available, i.e., for sale of electricity to the Hawaiian Electric Company and/or sale of steam to the Chevron refinery. These are the Campbell Industrial Park site and Pearl City sites 1, 3, and 4. Campbell Industrial Park is still under consideration by UOP. The Pearl City sites have been determined to be unavailable from the Navy, precluding their use for HPOWER. The AMFAC site (not the Amfac/C-E site now proposed) and the Waipio Peninsula site ranked fourth on MITRE's list (MITRE Corporation, April 1977:221).

By its own admission, the MITRE Corporation's site evaluation study was not meant to be definitive. In fact, given that it has been four years since the analysis was conducted, it is remarkable that all of the sites still under consideration were, in fact, identified in the MITRE report. (The exact boundary of the Amfac/C-E site has changed somewhat, partially as a result of the bidder's response to limitations noted in the MITRE study.) However, several of the "problems" which prevented the Waipio Peninsula and AMFAC sites from being highly rated have been resolved. Hence, at this time there does not appear to be any compelling reasons to force bidders to utilize a site other than the ones that have been proposed. Because all of the sites

Table VI-7. Results of Preliminary Evaluation of Potential Resource Recovery Facility Sites.

SITES / CRITERIA	AMFAC[2]	Campbell Park	Kahe Point	Sand Island	Shafter Flats	Waipahu	Pearl City 1	Pearl City 2	Pearl City 3	Pearl City 4
Useable Area	Limited 3	8	9	9	Need to add military areas 4	7	9	Landfill settling 4	Portion flood-prone 7	9
Access	Fair, through town 5	Very good 9	Needs some highway modification 8	Bridge weight limit, poor roads 3	Very good, designed for transf. sta. 9	Congestion at highway intersection; travel through restricted area. 5	Bridge upgrading required 6	6	7	7
Transportation Cost	6	5	Approx. 25 miles from Shafter Flats 4	9	Near island centroid of waste generation 10	6	7	7	7	7
Air Impacts from Stack Emissions[1]	Residential abutters, other sensitive receptors in area 5	Good location, but max. stack height 170 ft. 8	Good location, but some topographic effects 8	Downwind impact area largely over water 8	Severe airport zoning (state) height restriction 1	Residential areas generally upwind but nearby 6	Downwind impact areas largely over water; some over planned park 8	8	8	Naval housing downwind 6
Land use compatibility/ Aesthetics/ Conservation	Near center of town 4	Industrial area 10	Beaches and open, hilly area in vicinity of Kahe Power plant. 5	Park planned for areas near site 4	Transf. Sta. under construction on site; military plans for rest of site 8	Near residential areas, golf course, Waipahu Incinerator, Stream 5	Current use designation must be changed 7	On U.S. Navy property, with planned alternate uses. Abuts bird sanctuary 6	Abuts bird sanctuary 6	7
Energy Product Salability										
• Power	Limited scale of operation; integration with AMFAC operations a plus. As limited market - 9 Otherwise - much lower	Would displace part of HECO's most efficient generation, at Kahe power plant. Stack height limit; substation at Campbell 7	Adjacent to Kahe plant. 8	Distance to nearest substation a problem. 3	Height Restriction 1	Radio interference with FCC Station > potential problem. 3	Would displace part of HECO's less efficient generation, at Waiau power plant; different ratings reflect anticipated transmission costs. 7-8	7-8	8-9	9
• Gas	-	In absence of technical problems with gas use at GASCO - 10 Gas transport to Kahe too costly - 2	At Kahe power plant 9	-	-	-	Comment above applies, with "transmission" replaced by "gas transport." 3	3	6	8
• Steam	-	-	Kahe steam temp., pressure too high for refuse plant 1	-	-	-	Same as for power above, with "transmission" replaced by "steam line." 3	3	6	8
Ease of Acquisition	10	10	3	7	6	10	9	5	3	3
Overall Assessment	Fair for power, limited scale only	Good - very good for power, poor for gas to HECO, very good if can sell gas to GASCO	Fair-good for power, good-very good for gas, poor for steam	Fair-poor for power.	Poor, but could be good for power if height limit were relaxed.	Fair-poor for power, may be eliminated by FCC ruling.	Good for power, poor for gas or steam.	Fair for power, poor for gas or steam.	Good for power, good for gas or steam.	Good for power, very good for gas or steam.

[1] Steam or power generation only; air cooling can be utilized, with some loss of energy efficiency.

[2] The AMFAC site evaluated by MITRE is <u>not</u> the one that is now being proposed by them. The new location would rank much higher.

Note: Numerical ratings (1 = worst, 10 = best) are used to communicate the relative merits of different sites on a given criterion; no formal weighting of criteria has been done, nor is this recommended.

Source: MITRE Corporation (April 1977:219).

still under consideration are good alternatives and all of the other reasonable alternatives had been identified and ranked by the MITRE study, it was not deemed necessary for this EIS to examine additional alternative sites.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES AND THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

A decision to proceed with the proposed HPOWER project would involve the commitment of approximately 15 acres of land for a period of from 25 to 50 years. Three of the four sites under consideration are already planned for industrial use; hence, their use by HPOWER would simply preclude usage for other industrial activities. Given the amount of other land planned for industrial use that is available at Campbell Industrial Park, this does not appear likely to foreclose significant development options there or to narrow the range of beneficial uses that are possible. The Waipio Peninsula site is zoned for agricultural use, but the vast majority of it (over 90 percent) is not suitable for that purpose. Hence, its use for an HPOWER facility appears consistent with the goal of preserving long-term productivity.

The HPOWER proposals under consideration provide for recovery of economically valuable minerals, the specific items varying somewhat between the bidders. However, in recovering heat from the refuse, the organic matter which it contains is destroyed. Two of the alternatives discussed in Chapter VI, composting and landfilling, preserve the organic matter, but only the former allows it to be put to a beneficial use. In practice, however, the economics of composting in Hawaii (at least on the scale required of a substitute for HPOWER) appear to make it prohibitively expensive.

Unlike some alternative disposal methods, HPOWER involves few, if any, long-term risks. All air, noise, water quality, and other standards would be met. If serious problems should arise, the facility could be closed immediately, thereby eliminating the source of the problem. In return for the relatively limited commitments that are being made, Oahu would have a solid waste disposal system that recycles many elements and effects a significant reduction in the use of fossil fuel.

CHAPTER VIII.
INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES BELIEVED TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

As indicated in Chapter III of this report, the proposed HPOWER project is consistent with Federal, State, and County policies calling for a reduction in the consumption of fossil fuel and increased dependence on renewable forms of energy. Similarly, policies also exist with respect to the preservation of other mineral resources through increased recycling such as is provided for by HPOWER. HPOWER is the most significant single step that could be taken toward implementing those policies on Oahu.

As we have noted repeatedly throughout this report, the City and County must find a means of handling the solid waste that will continue to be generated on this island. "No action" is not a viable course to follow; hence, the only realistic means of judging HPOWER's impacts is by comparing them with the impacts that would result from the other alternatives that are available. Based on the analysis presented in Chapter VI, it appears that none of the alternatives that are available would have fewer adverse impacts than HPOWER (most have more) and that there are no proven alternatives that offer equivalent benefits in terms of energy savings or that can provide superior materials recovery possibilities. [Note: in some respects, composting is an exception to this last conclusion regarding materials recovery. It would recycle organic matter which is consumed in HPOWER. At this time, however, there is no evidence that suggests that the local market for compost is such that a composting operation could be competitive with HPOWER in terms of cost and reliability.]

CHAPTER IX.
LIST OF NECESSARY APPROVALS

The winning bidder and/or the City will need to obtain the following approvals before the HPOWER project can be fully implemented:

	Permit Requirement by Site Used for Facility			
	Malakole Road	Hanua Street	Waipio Peninsula	Amfac/ C-E
Federal				
1. Prevention of Significant Deterioration (PSD) Permit, U.S. Environmental Protection Agency	X	X	X	X
2. FAA Clearance	X	X	X	X
State				
1. Conditional Use Permit for construction activities, Chapter 44B (Noise Control) of Department of Health Public Health Regulations	X	X	X	X
2. Approval of proposed access road connection to Waipahu Street				X
3. Approval from Department of Land and Natural Resources for change in groundwater withdrawals from the Pearl Harbor Basin as required by Regulation 9				X
4. Certificate of Compliance and Solid Waste Management Permit from the Department of Health	X	X	X	X
5. Authority to Construct and Permit to Operate as required by Chapter 43 of the Public Health Regulations	X	X	X	X
6. Permit to Operate a Sewage Treatment Facility as required by Chapter 38 of the State Public Health Regulations	X	X		
City and County of Honolulu				
1. Agricultural District Special Use Permit, County Planning Commission	X		X	
2. Subdivision Approval, Department of Land Utilization	X	X		X

	Permit Requirement by Site Used for Facility			
	Malakole Road	Hanua Street	Waipio Peninsula	Amfac/ C-E
<u>City and County of Honolulu (cont.)</u>				
3. Water Connection Permit, Board of Water Supply	X	X	X	
4. Grading Permit, Department of Public Works	X	X	X	X
5. Sewer Connection Permit, Department of Public Works			X	X
6. Drainage Plan Approval , Department of Public Works	X	X	X	X
7. Demolition Permit, Building Department				X
8. Special Management Area Permit, Department of Land Utilization/City Council			X	

CHAPTER X.
ORGANIZATIONS AND PERSONS CONSULTED AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THIS EIS

CONSULTED PARTIES

An EIS Preparation Notice for the proposed HPOWER project was published in the Environmental Quality Commission's EIS Bulletin on April 8, 1979. The agencies, organizations, and individuals listed below were sent copies of the Notice and asked to comment on the proposal. Everyone who we believed might have an interest in the project or who requested consulted-party status is included. Letters from those who chose to submit comments based on information contained in the EIS Preparation Notice, our responses to them, and a copy of the EISPN itself are contained in Chapter XI.

Federal Agencies

U.S. Army Corps of Engineers, Pacific Ocean Division
U.S. Department of Agriculture, Soil Conservation Service
U.S. Air Force
U.S. Department of Commerce, National Marine Fisheries Service - Honolulu
U.S. Department of Health, Education, and Welfare
U.S. Department of Housing and Urban Development
U.S. Department of the Interior
    Fish and Wildlife Service
    Geological Survey, Water Resources Division
U.S. Department of Labor, Occupational Safety & Health Administration
U.S. Navy, Fourteenth Naval District
U.S. Department of Transportation
    Federal Highway Administration
    Federal Aviation Administration
U.S. Environmental Protection Agency, Region IX - San Francisco
U.S. Department of Energy

State Agencies

Office of the Governor, Office of Environmental Quality Control
Department of Agriculture
Department of Accounting and General Services
Department of Budget and Finance
Department of Defense
Department of Education
Department of Health
Department of Labor and Industrial Relations
Department of Land and Natural Resources
Department of Planning and Economic Development
Department of Social Services and Housing
Department of Transportation
Department of Taxation

University of Hawaii

Environmental Center
Water Resources Research Center
Hawaii Natural Energy Institute
Leeward Community College

City and County of Honolulu

Honolulu Board of Water Supply
Department of Budget
Department of Building
Honolulu City Council
Oahu Civil Defense Agency
Fire Department
Department of General Planning
Department of Health
Department of Housing and Community Development
Department of Land Utilization
Department of Parks and Recreation
Police Department
Department of Transportation Services

Congressional Representatives

The Honorable Daniel K. Inouye
The Honorable Spark M. Matsunaga
The Honorable Daniel K. Akaka
The Honorable Cecil Heftel

State Legislators

Senator Richard S. H. Wong - 5th Sen. District
Senator Stanley Hara - 1st Sen. District
Senator Duke T. Kawasaki - 5th Sen. District
Senator Charles M. Campbell - 5th Sen. District
Senator Benjamin J. Cayetano - 4th Sen. District
Senator Joseph T. Kuroda - 4th Sen. District
Senator Norman Mizuguchi - 4th Sen. District
Senator T. C. Yim - 5th Sen. District
Senator Patsy K. Young - 4th Sen. District
Representative Richard Garcia - 17th Rep. District
Representative Kenneth Lee - 17th Rep. District
Representative Mitsuo Uechi - 18th Rep. District
Representative James Wakatsuki - 18th Rep. District
Representative Clarice Hashimoto - 19th Rep. District
Representative Donald Masutani, Jr. - 19th Rep. District
Representative Daniel Kihano - 20th Rep. District
Representative Mitsuo Shito - 20th Rep. District
Representative James Aki - 21st Rep. District
Representative Henry Peters - 21st Rep. District

City Council Members

Rudolph Pacarro
George Akahane

Community Associations

Neighborhood Boards Nos. 20, 21, and 23
Waipahu Community Association

Public Interest Groups

League of Women Voters
American Lung Association
Oahu Development Conference
Oahu Metropolitan Planning Organization
Life of the Land
Outdoor Circle
Common Cause Hawaii
Sierra Club

Public Utilities

Hawaiian Electric Company
Hawaiian Telephone Company
Honolulu Gas Company

Other

Campbell Estate
United Refuse Collectors of Hawaii
Standard Oil Company, Chevron Refinery
General Contractors Association of Hawaii
Hawaii Employers Council
Consulting Engineers Council of Hawaii
A.F.L.-C.I.O.
Hawaii Chamber of Commerce
Environment Impact Study Corporation
Ms. Dana Peterson
Brock & Associates
Environmental Communications, Inc.

ORGANIZATIONS AND INDIVIDUALS WHO
ASSISTED IN THE PREPARATION OF THE EIS

This environmental impact statement was prepared for the Refuse Division, Department of Public Works, City and County of Honolulu by Belt Collins & Associates. The following individuals were involved:

Belt, Collins & Associates

Paul M. Hirota - Chief Engineer
Perry J. White - Project Manager and Principal Author
Ann K. Yoklavich - Contributor, Senior Editor, and Production Coordination
Thomas F. Nance - Contributor (Hydrology)
Gary Kissick - Contributor (Land Use Plans, Policies, and Controls/Visual/ Historic, Archaeological, and Paleontological Resources)
Violet Porras, Gladys Kaneshiro, Addie Lunson, Colleen Vaught, Linda Tajiri - Typing
Cary Shiramizu, Jan Olin, Owen Nishijima, Margaret Ness - Graphics
Cal Machida - Editing and Production Assistance
Ken Watanabe, Dennis Takushi - Reproduction

Sub-Consultants/Sub-Contractors

Lawrence H. Pierce - Vector Control
Dr. Robert Eddinger - Wildlife Biology
Phillip Bruner - Ornithology
Erin Hall and Margaret Elliott (Earthwatch) - Vegetation
Darby-Ebisu & Associates, Inc. - Sonic
James W. Morrow - Air Quality
Chiniago, Inc. - Archaeology and History
Dr. John Mapes - Economics
The Copy Center - Printing (text)
Standard Printers - Printing (covers and dividers)
Studio Graphics - Cover Graphics
The Out Basket - Word Processing

CHAPTER XI.
COMMENTS AND RESPONSES DURING THE CONSULTING PROCESS

COMMENT AND RESPONSE LETTERS

Chapter 343, Hawaii Revised Statutes
Environmental Assessment/Preparation Notice for the

HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

Proposing Agency	:	Department of Public Works, City and County of Honolulu
Accepting Agency	:	Department of Land Utilization, City and County of Honolulu
Project Location	:	Various possible sites in Campbell Industrial Park, Waipahu, Pearl City Penninsula, and Shafter Flats (Keehi)
Proposed Action	:	Commitment of City, Private, or Combination of Such Funds For the Design, Construction, Shakedown, and Operation of a Resource Recovery Facility
Determination	:	EIS Required

DESCRIPTION OF THE PROPOSED PROJECT

Background

The problem of disposing of the continually increasing volume of solid waste being generated by Oahu's residents and industry and the need for comprehensive, long-range solid waste management planning have long been recognized by government officials. In recent years, a number of studies and actions aimed at developing adequate means of handling the island's projected solid waste load have been conducted. The most recent of these to be completed was a report prepared by the MITRE Corporation for the City and County of Honolulu (under a consultant contract funded by the State Office of Environmental Quality Control) entitled "Analysis of the Feasibility of Resource Recovery for Oahu."

The purpose of the MITRE study was two-fold. First, it examined the general applicability of alternative resource recovery technologies to the various energy markets which could be identified on Oahu. Second, it analyzed the revenues that might be obtained from recovered energy and materials sales and the effect that this would have on the net cost of disposing of solid waste through a resource recovery facility. Based on their analysis, the consultants concluded that:

> "...the recovered energy and materials market situation and other important conditions on Oahu indicate that the cost of resource recovery for Honolulu can be (emphasis added) reasonable in comparison with other disposal alternatives..."

At the same time, it observed that the final economic result for Honolulu would depend upon many factors, including the technology that is selected, the design volume and throughput that are chosen, the value of the energy product (which, in turn, is determined by the cost of alternative energy sources), system availability requirements, and costs or operational constraints imposed by the need to maintain environmental quality. The study also noted that the only means of validating this economic conclusion would be to obtain technical and cost proposals from potential contractors for the proposed system. Towards this end, the MITRE report recommended that the City solicit proposals from private industry for the construction and operation of a resource recovery facility.

Based on the above and on an in-house review of the solid waste disposal options that are available, a decision was made to pursue the resource recovery concept outlined in the MITRE report. Consequently, in July 1978 a "Request for Proposals" (RFP) was published for what is referred to as HPOWER -- the Honolulu Program Of Waste Energy Recovery. The purpose of the RFP is to procure a full-service contract for the engineering, design, construction, shakedown and operation of a solid waste processing/resource recovery facility for a period of twenty years.

A multiple-step bidding procedure is being used rather than the more conventional "formal advertising" approach because of the complexity of resource recovery procurement. The multiple-step method is frequently used by the Federal Government in "high-technology" areas such as this. The first two steps in the process are:

- Step IA - The general suitability of the interested contractors organization and their proposed technology are evaluated.

- Step IB - Technical proposals submitted by interested contractors who have passed the Step 1A screening are reviewed for compliance with the City's requirements concerning technical system design, system management, and environmental impacts.

Only contractors whose proposals have been found acceptable in Steps IA and IB are asked to participate in Step II, the submission of formal price bids. The basis for selection of a contractor from among those submitting price bids is to be the lowest net present value cost of solid waste disposal to the City and County for the contract period of 20 years. At present, Step IA has been completed. As shown in Table 1, Step IB proposals are due June 1, 1979, and selection of a contractor is to be made on December 27, 1979. The City and County is reserving the right to reject all proposals if none meets the requirements stated in the RFP.

Table 1. Timetable For HPOWER Contract Development and Award As of April 2, 1979.

Milestone	Date
Due Date for Technical Proposals	June 1, 1979
Invitation to Bid	October 25, 1979
Due Date for Bids & Bid Opening	November 27, 1979
Notification of Selection	December 27, 1979
Start-Up of Facility	Spring, 1983

Project Description

As this assessment is being prepared, the due date for contractors' technical proposals is approximately two months away. Preliminary letters of intent to submit proposals have been received from a number of different firms or consortiums. Detailed descriptions of the systems that will be proposed are now being finalized. The following discussion must therefore remain at a fairly general level, but it also insures that information relative to the potential environmental impacts of HPOWER can be brought to light sufficiently early in the decision-making process to influence the outcome.

The basic HPOWER concept involves the construction and operation of a facility that would accept solid waste generated by residents and industry on the island of Oahu and convert it into saleable energy and other products. The system would provide an alternative to landfill disposal. Revenues from the recovered energy and materials could be used to partially offset overall solid waste disposal costs. The system would also provide for a desirable re-use of materials that would otherwise be lost.

The specific details of the Step 1B technical proposals will not be known until after the technical proposals have been submitted by Contractors on June 1, 1979. However, to insure that the procurement of the HPOWER project is tailored to the City's needs, the RFP establishes a number of requirements that must be met by all proposals. These provide some insights into the probable content of the proposals, and the most important items stipulated are summarized below:

- The system must have the ability to handle any or all of three volumes of waste - 600 tons per day, 1,200 tons per day, and 1,800 tons per day. To place this in perspective, it may help to note that the largest would handle essentially all of the waste now generated on Oahu. The purpose of requesting proposals at three scales is to explore potential economies of scale in light of the possible continued use of the Waipahu Incinerator with and without retrofitting the incinerator for energy recovery.

- o The facility is to be constructed at a site in Campbell Industrial Park that is chosen and acquired by the City <u>or</u> at some alternative site selected and acquired by the contractor.

- o The contractor must employ a proven resource recovery process which utilizes solid waste as fuel to raise steam for use as-is or to generate electric power; converts solid waste to fuel gas suitable for firing as-is or which can be co-fired with oil in existing power plant boilers; or uses some other process to convert solid waste to energy and can be as reasonably expected to perform satisfactorily as the first two alternatives.

- o Cost proposals for the system must meet the following three criteria:

  - have a realizable first year (1983) net tipping fee of not more than $12 per ton;

  - achieve a net tipping fee equal to or less than the projected cost of landfill before the facility's fifth year of operation; and

  - achieve a disposal cost which will be less than the projected cost of landfill over a 20 year period.

- o The contractor must provide full disposal service for all municipal, commercial, and industrial solid waste delivered to the resource recovery facility exclusive of demolition debris, pathogenic or hazardous wastes, or agricultural solid waste.

- o Construction and operation of the system must entail a minimum of adverse environmental impacts.

- o The use of landfill space for both emergency back-up in the case of breakdown and for disposal of residue must be minimized, and certain quantitative performance criteria must be met.

- o The system must maximize the amount of resources that can be economically recovered from solid waste.

So far, six qualified contractors have indicated that they will submit technical proposals. Further, it is expected that these proposals will involve the following site/scale combinations:

Site	Scale(s) (in tons per day)
Campbell Industrial Park (see Figure A)	600; 1,200; 1,800
Waipahu (see Figure B)	600; 1,200; 1,800
Pearl City Penninsula (see Figure C)	1,200; 1,800
Keehi (Shafter Flats) (see Figure D)	600; 1,200; 1,800

All site/scale/process combinations proposed in contractors' Step IB submittals will be considered as alternatives and will be evaluated in detail in the impact statement. The approximate location of each of the four sites listed above is shown in Figures A through D.

IMPACTS GENERALLY ASSOCIATED WITH DISPOSAL TECHNOLOGIES UNDER CONSIDERATION

As indicated above, the details of the HPOWER proposal will not be available until potential contractors submit their Step IB technical proposals. Nevertheless, it is clear that a facility which might accept and dispose of up to 1,800 tons per day of waste, be the destination of many truck trips per day, and extract energy from waste using a mass-burning or semi-suspension combustion process could have a significant effect on the environment. A detailed assessment of the magnitude and significance of the impacts associated with each of the HPOWER alternatives under consideration must await the availability of the contractors Step IB submittals. However, even at this stage most of the major areas of concern have been fairly well identified and provisions made for their further study. These are discussed in more detail below.

The MITRE feasibility report analyzed the various waste disposal technologies considered applicable to Honolulu's situation to determine the types of impacts that might be expected in the areas of air quality, noise, water quality, land, and aesthetics. Initial impact summaries for mass-burning and semi-suspension firing, the two technologies which it is believed will be proposed by contractors for the HPOWER project, are shown in Tables 2 and 3. The report's preliminary analysis concluded that "Overall, there do not appear to be any serious environmental problems with the waterwall incineration technology which cannot be satisfactorily overcome with careful attention in plant design, siting, and regulatory enforcement."

Atmospheric Impacts

A fairly extensive analysis of possible air quality impacts will be undertaken for each of the alternatives. Meteorological data for the air quality modeling effort will be obtained from historical records maintained by the National Weather Service, Barbers Point Naval Air Station, Hickam Air Force Base, and other sources. Where necessary, on-site data might be used to correlate on-site climatological conditions with those occurring simultaneously at long-term recording stations.

Using the emission and climatological data referenced above, one or more dispersion models will be used to estimate pollutant concentrations that can be expected at sensitive receptor sites in proximity to each of the plant configuration/location combinations under consideration. Once the expected pollutant concentrations have been estimated, they will be compared with Federal and State Air Quality Standards, where these exist (e.g, CO, SO_2, particulates, NO_x, etc.). The RFP for the project requires that all systems proposed by contractors must meet all Federal and State emissions standards and air quality requirements, and any initial proposals deemed unacceptable in this respect will be returned for modification by the contractors.

Table 2. Mass Burning Environmental Impact Summary

	Analysis	Control Measures
Air		
• Stack Emissions	Typical flue gas constituent concentrations and emissions are: 200-400 ppm (3-6 TPD) HCl, 60 ppm (1.5 TPD) SO_2 assuming 0.1% S refuse, 50-150 ppm (1-3 TPD) NO_x, 50-150 ppm (.6-1.8 TPD) CO, and 1.5 TPD particulates @ 0.08 gr/SCF corrected to 12% CO_2; based on average gas volume of 380,000 acfm for 1750 TPD plant operated at annual average 1500 TPD; scale up to get maximum daily emission rates. Particulates require controls; impact on ambient can be <0.5 $\mu g/m^3$ addition to annual average, and <4$\mu g/m^3$ increment to max. 24-hour average, with moderate stack height (~200 ft.).	Electrostatic precipitators can remove 99+% of particulates; scrubbing systems can be used if control of gaseous emissions is desired as well. Fairly complete combustion can be achieved in modern furnace/grate/control systems.
• Dust & Odor	In-plant dust and odor result from refuse handling, especially in receiving and storage areas.	Plant air is drawn into the combustion units under negative pressure; this minimizes fugitive dust and T>1400°F in the furnaces eliminates odor. Baghouses are also used for dust control.
Noise		
• Community	Noise from plant alone can normally be controlled to 50dBA at plant boundary with a modest buffer area. Trucking raises this to 70dBA or more for short periods during receiving hours. Typical commercial area is 50dBA with higher levels intermittent from traffic; quiet residential areas typically 40dBA - requires greater buffer from refuse plant site and access route.	Accoustic treatment, walls and earth barriers, muffling equipment, site layout and access design; for electric power generation, evaporative cooling is less noisy than air cooling.
• In-plant	Sources are shredder (intermittent); I.D. and F.D. fans; conveyors; steam pressure release station; cooling tower, transformers, and turbo-generator (power only); stack; on-site mobile equipment and trucks. High noise levels typical of power plant operations.	Occupational exposure designed to meet OSHA limits, e.g., 90dBA max. 8-hour exposure, 105dBA max. 1-hour, 115dBA max. 15 min. or less.

Table 2. (Continued)

	Analysis	Control Measures
Water (1750 TPD)		
• Use	50-60 gpm for process and sanitary. 1200-1400 gpm for cooling water make-up (power only).	Cooling water use assumes closed loop (zero discharge) systems; some discharge or "once through" system reduces net use but is environmentally less desirable, and generally illegal for new sources, with some exceptions for power plants. Air-cooled condensers are an alternative.
• Effluents	From boiler and cooling tower blowdowns, washdown, periodic boiler tube cleaning, wet scrubber if employed, residue quench tank, surface runoff (generally uncontaminated), and leachates from residue disposal (particularly heavy metals). 95% of water used leaves as evaporation and windage from cooling towers, 3.5% as vaporized water out the stack, just over 1% as moisture on the residue, and <1% to the sewer (5-6 gpm).	Demineralization and solids reduction normal part of plant treatment for boiler feedwater. Pretreatment of effluent may be required prior to discharge to sewer, but no serious control problem for closed loop cooling design. Residue leachate impacts heavily site-dependent.
Land (1750 TPD)		
• Plant	Requires 15-20 acres, although smaller areas can be accommodated through vertical consolidation, as is often done in Europe. To this must be added:	By comparison, raw refuse landfill would require about 1000 acre-ft/yr, or 33 acres/year assuming 30 feet/lift, 800/lb/cu. yd. in place density, and 25% cover factor. Compare 20 + 3.7 x 30 = 130 acres for resource recovery with 33 x 30 = 990 acres for landfill over a 30-year period.
• Residue Disposal	110 acre-ft/yr, or 3.7 acres/yr assuming 30 feet/lift, 1300 lb./cu. yd. residue, 25% cover factor, and residue disposed is 18% by weight of raw refuse.	Residues can be used as portion of aggregate in highway construction, and for other productive uses. Residue storage is still necessary, but land requirement is reduced.
Aesthetics	General appearance of a heavy industrial or power plant, with stack(s) typically 150-300 feet and main building 90-120 feet above ground level. Designs vary on number of truck receiving doors.	Landscaping, site layout to conceal trucking, maximum enclosure of refuse tipping area and metals/residue storage and loading areas.

Source: MITRE Corporation (April 1977). Analysis of the Feasibility of Resource Recovery for Honolulu, pp. 175 & 176.

Table 3. Semi-Suspension Firing Environmental Impact Summary

	Analysis	Control Measures
Air		
• Stack emissions	Impact on ambient comparable to mass burning, with particulates requiring controls. Gas volume 30% less, so easier to control than mass burning, but limited experience with this technology introduces uncertainty in control effectiveness as well. Roughly 1/3 of the refuse is not burned, including metals separated in front-end system, so e.g., lower metals emissions. Emission rates of SO_2, NO_x, CO, HCl, etc. expected to be somewhat lower, but same order of magnitude, as for mass burning, assuming both achieve fairly complete combustion.	Same as for mass burning.
• Dust & Odor	Potential for dust and odor greater than for mass burning, because of the shredding, air classification, conveying and other front-end materials handling.	Same as for mass burning, but more of a control problem in front-end separation part of plant.
Noise		
• Community	Essentially the same as for mass burning.	Same as for mass burning.
• In-plant	Sources are shredders, air classifiers, conveyors, front-end loaders; other the same as for mass burning.	Same, but more of a control problem in front-end separation part of plant. Shredders may require separate housing and accoustic treatment.
Water		
• Use	120-140 gpm for process and sanitary 1250-1500 gpm cooling water make-up (power only)	Same as for mass burning; somewhat higher make-up water reflects greater steam generation possible.
• Effluents	Essentially same as for mass burning, except somewhat greater flow to sewer (~ 10-15 gpm) (rough estimate, but depends largely on design). Drying step in fuel preparation may involve a wet scrubber. Washdown and dust control in front-end increase effluent quantity. Residue includes organics remaining after fuel preparation, as well as fly and bottom ash.	Same as for mass burning, plus controls at fuel drying step and additional residue leachate control (maybe).
Land		
• Plant	15-20 acres, plus:	Compare 20 + 4.7 x 30 = 160 acres, with 33 x 30 = 990 acres for raw refuse landfill for a 30 year period.
• Residue Disposal	140 acre-ft/yr, or 4.7 acres/yr, assuming 30 feet/lift, 1300 lb./cu.yd. residue, 25% cover factor, and residue 23% by weight of raw refuse.	Fly and bottom ash residue, similar to mass burning unless glass from front-end separation is sold.
Aesthetics	Essentially same as for mass burning.	Same.

Source: MITRE Corp. (April 1977). Analysis of the Feasibility of Resource Recovery for Honolulu, pp. 177.

The RFP calls for contractors to supply information regarding measures that would be incorporated into their proposals as a means of mitigating potentially adverse effects. These measures will be described. In addition, in consultation with the State Department of Health, the Public Health Department, and other concerned organizations, additional measures will be identified which could reduce or eliminate potentially adverse impacts.

Geological and Soils Impacts

Due to the nature of the HPOWER operation and the sites that are under consideration, impacts related to geology and soils do not appear to be a major concern. With the possible exception of one site (Pearl City), soils appear unlikely to constitute a significant construction constraint, and a detailed analysis of this factor will be limited to that location. Geohydrologic considerations will be covered as will the potential for soil erosion/sedimentation. Any implications that commitment of the sites to the HPOWER project might have on agricultural productivity will be evaluated.

Noise Impacts

The evaluation of the HPOWER plant's potential noise impacts will be based on the noise emission characteristics for each alternative provided in the contractors' proposals. Once the source noise characteristics have been established, 360-degree, free-field noise contours will be drawn for each facility type which is unique in its noise emission characteristics. These contours will then be adjusted to account for site-specific terrain and development features in the vicinity of the potential HPOWER sites. Information on HPOWER vehicle-trip counts, access routes, and vehicle mix will be used to generate time-specific noise contours along the access roads that would service each of the possible sites.

The noise contours developed above will be overlaid on land use maps of the area in the vicinity of the potential HPOWER sites. For the noise sensitive land uses identified above, measurements of existing ambient noise levels will be obtained. Site visits will be conducted to evaluate the potential noise impacts of the proposed facilities and the possibilities of employing mitigation measures. Price bids for the HPOWER system will ony be accepted from contractors whose proposals comply with all applicable Federal, State, and Local statues and regulations on noise emissions and ambient noise levels.

Visual Impacts

An evaluation of the aesthetic quality of the various architectural schemes that may be proposed is an extremely subjective undertaking, but it is a necessary part of the assessment process. The effect that each alternative would have on the visual character of the area in which it would be located and on public views of or across the various sites will be evaluated.

Public Utilities/Energy Impacts

The demands that each of the alternatives would place on the existing public utility services in the vicinity of the sites will be estimated, and the ability of those utility systems to accommodate the additional loads will be assessed. Where improvements to the existing system would be required, these will be identified and the order-of-magnitude cost of making them estimated.

The amount and form (electricity, steam, or gas) of power that would be generated by each of the alternatives will be described, including its temporal variability, using information provided in the contractors' proposals. Income derived from the sale of this energy will be determined, and the effect that its availability would have on the need for fuel imports to the state will be evaluated. Mitigation measures that could be used to lessen impacts on public utilities will be investigated as well.

Traffic Impacts

The HPOWER project, particularly the 1,200 and 1,800 tpd alternatives, is a potentially significant generator of heavy truck traffic. Aside from the obvious effects that this traffic would have on noise levels and air quality adjacent to the streets which are impacted, it could also effect the level of service provided by existing streets and highways, create safety problems, or cause premature deterioration of light-duty roadways. To determine whether or not any of these problems would actually arise as a result of the HPOWER project, data from past traffic counts on affected roadways will be assembled and projections of refuse truck trips made. All of this information will be used to develop a profile of the traffic that would be generated by each of the different scale projects being considered.

Routes that would be taken by vehicles traveling to and from each HPOWER site under consideration will be identified, and an analysis will be conducted to determine what problems, if any, might be caused by the additional traffic. As with the other impacts, possible mitigation measures will be explored.

Archaeological/Historical Impacts

A reconnaissance - level survey of each site under consideration will be performed that will include:

- o A visual inspection of each site to determine the presence or absence of archaeological or historic architectural values;
- o An assessment of the significance of any sites located with regard to their potential eligibility for inclusion in the National Register of Historic Places;

- An assessment of the probable impact of the project on any sites located within the project areas; and

- A discussion of measures that might be taken to mitigate adverse effects associated with the project.

Should the reconnaissance survey reveal information about a site that suggests the need for more detailed study, additional work will be undertaken as necessary. Based on information now available, none of the sites being considered for the HPOWER facility are believed to contain significant historical or archaeological remains.

Biological Impacts

Information presently available suggests that the direct biological impacts of the HPOWER project would not be great. Because of this, the proposed work program in this area is fairly limited. Three different topics--vegetation, wildlife, and vector control (rodents, insects, etc.) will be treated.

Reconnaissance level field surveys will be conducted of each of the possible HPOWER sites, and the general floristic pattern and most significant elements of species composition will be noted. This field data, descriptions of the proposed facilities, and information contained in the scientific literature will be used to estimate the probable effects on vegetation of construction and operation of each alternative.

The study of potential wildlife effects will be similar to and integrated with the vegetative analysis described above.

In addition to any disruption which the project might cause to existing wildlife and vegetation, it will also create a potential habitat for insects, rodents, and other pests. Major pest problems that can arise from solid waste handling operations will be identified. Then, control measures proposed by contractors to prevent such problems will be summarized. Based on the preceding, the probably severity of the problems that would remain after the planned control measures have been applied will be assessed. Where the designs proposed by contractors appear to be important contributors to potential problems, additional measures that would significantly improve the situation will be explored.

Economic Impacts

Data supplied by the contractors will be used to estimate employment that would be generated by construction and operation of the proposed facility. This, together with construction and maintenance cost estimates will be used as inputs for an interindustry analysis that will trace the income, employment, and sales effects of HPOWER. Included in this work will be an analysis of the effects that the project would have on employees of the Waipahu Incinerator and an examination of ways in which undesired displacement of these workers might be avoided.

Consistency With Existing Land Use Plans, Policies, and Controls

Because of its relationship to energy supply, solid waste disposal, and health and sanitation, as well as the fact that it would be a major industrial land use, the HPOWER project has significant public policy implications. Site/process/scale combinations proposed by contractors will be evaluated with respect to their consistency with existing zoning, DLUM's, and State Land Use District Regulations. Brief discussions will be provided regarding the alternatives' consistency with relevant policies in the Hawaii State Plan, the Hawaii CZM Plan, and, if they are available in time, with drafts of the Development Plans for the areas which the alternative sites are located.

MITIGATION MEASURES

As indicated above, detailed assessments of means of mitigating potential adverse impacts of each of the alternatives will be undertaken as soon as the necessary technical information is submitted by the contractors. Some of the specific types of mitigation measures that would probably be employed are identified in Tables 2 and 3. The resource recovery facility will be designed to meet all applicable Federal, State, and County environmental regulatory requirements and standards, and proof of such conformance will be made available before a specific proposal is selected.

ALTERNATIVES TO THE PROPOSED ACTION

All of the sites, scales, and processes in which potential contractors are interested and which meet the requirements stated in the Request for Proposals for HPOWER are still under consideration. These are outlined in the "Description of the Project" portion of this assessment. Given the limited remaining capacity of existing landfills and the projected solid waste generation rate for Oahu, "no project" is not a viable alternative. Some means of disposing of the waste must be found. However, the establishment of a new landfill or further expansion of existing landfills is a possibility, and a comparison of this and the HPOWER proposals and other waste disposal alternatives will be undertaken.

AREAS REQUIRING FURTHER STUDY

Because contractors have not submitted their Step IB technical proposals as yet, no detailed analysis of specific project-related impacts has been conducted as yet. However, as indicated above, provisions have been made for the intensive study of all potentially significant effects.

ASSESSMENT PROCESS

As indicated elsewhere in this assessment, the proposed project is the outgrowth of a series of previous studies. The most recent of these was prepared by the MITRE Corporation in consultation with numerous public agencies and was published in April, 1977. It contains an asessment of the types of impacts that may be expected to accompany the construction and operation of a waste recovery facility such as is now under consideration for HPOWER. Based on this information and in conformance with criteria established by the State of Hawaii Environmental Quality Commission, the

City and County of Honolulu has determined that an environmental impact statement should be prepared prior to the selection of a specific contractor and design.

REASONS SUPPORTING DETERMINATION

Considering the nature of the proposed action as previously described and the "significance criteria" contained in Section 1:31 of the Environmental Quality Commission's Environmental Impact Statement Regulations," it is judged that the proposed action could have a potentially significant impact on the environment.

PARTIES TO BE CONSULTED FOR THE PREPARATION OF THE EIS

A great deal of agency consultation at the Federal, State, and local levels of government has taken place since the MITRE Corporation study team first began its analysis of the feasibility of establishing a major resource recovery facility on Oahu. During the preparation of an EIS for the proposed HPOWER facility, comments will be solicited from the following agencies, organizations, and individuals, as well as all other groups and individuals formally requesting consulted-party status.

Federal Agencies

U.S. Army Corps of Engineers, Pacific Ocean Division
U.S. Department of Agriculture, Soil Conservation Service
U.S. Air Force
U.S. Department of Commerce, National Marine Fisheries Service - Honolulu
U.S. Department of Health, Education, and Welfare
U.S. Department of Housing and Urban Development
U.S. Department of the Interior
    Fish and Wildlife Service
    Geological Survey, Water Resources Division
U.S. Department of Labor, Occupational Safety & Health Administration
U.S. Navy, Fourteenth Naval District U.S. Department of Transportation,
Federal Highway Administration
U.S. Environmental Protection Agency, Region IX - San Francisco
Federal Aviation Administration
U.S. Department of Energy

State Agencies

Office of the Governor, Office of Environmental Quality Control
Department of Agriculture
Department of Accounting and General Services
Department of Budget and Finance
Department of Defense
Department of Education
Department of Health
Department of Labor and Industrial Relations
Department of Land and Natural Resources
Department of Planning and Economic Development
Department of Social Services and Housing
Department of Transportation
Department of Taxation

University of Hawaii

Environmental Center
Water Resources Research Center
Hawaii Natural Energy Institute

City and County of Honolulu

Honolulu Board of Water Supply
Department of Budget
Department of Building
Honolulu City Council
Oahu Civil Defense Agency
Fire Department
Department of General Planning
Department of Health
Department of Housing and Community Development
Department of Land Utilization
Department of Parks and Recreation
Police Department
Department of Transportation Services

Congressional Representatives

The Honorable Daniel K. Inouye
The Honorable Spark M. Matsunaga
The Honorable Daniel K. Akaka
The Honorable Cecil Heftel

State Legislators

Senator Richard S. H. Wong - 5th Sen. District
Senator Stanley Hara - 1st Sen. District
Senator Duke T. Kawasaki - 5th Sen. District
Senator Charles M. Campbell - 5th Sen. District
Senator Benjamin J. Cayetano - 4th Sen. District
Senator Joseph T. Kuroda - 4th Sen. District
Senator Norman Mizuguchi - 4th Sen. District
Senator T. C. Yim - 5th Sen. District
Senator Patsy K. Young - 4th Sen. District
Representative Richard Garcia - 17th Rep. District
Representative Kenneth Lee - 17th Rep. District
Representative Mitsuo Uechi - 18th Rep. District
Representative James Wakatsuke - 18th Rep. District
Representative Clarice Hashimoto - 19th Rep. District
Representative Donald Masutani, Jr. - 19th Rep. District
Representative Daniel Kihano - 20th Rep. District
Representative Mitsuo Shito - 20th Rep. District
Representative James Aki - 21st Rep. District
Representative Henry Peters - 21st Rep. District

City Council Members

Rudolph Pacarro
George Akahane

Community Associations

Neighborhood Boards Nos. 17, 18, 19, 20, 21, 22, and 23

Public Interest Groups

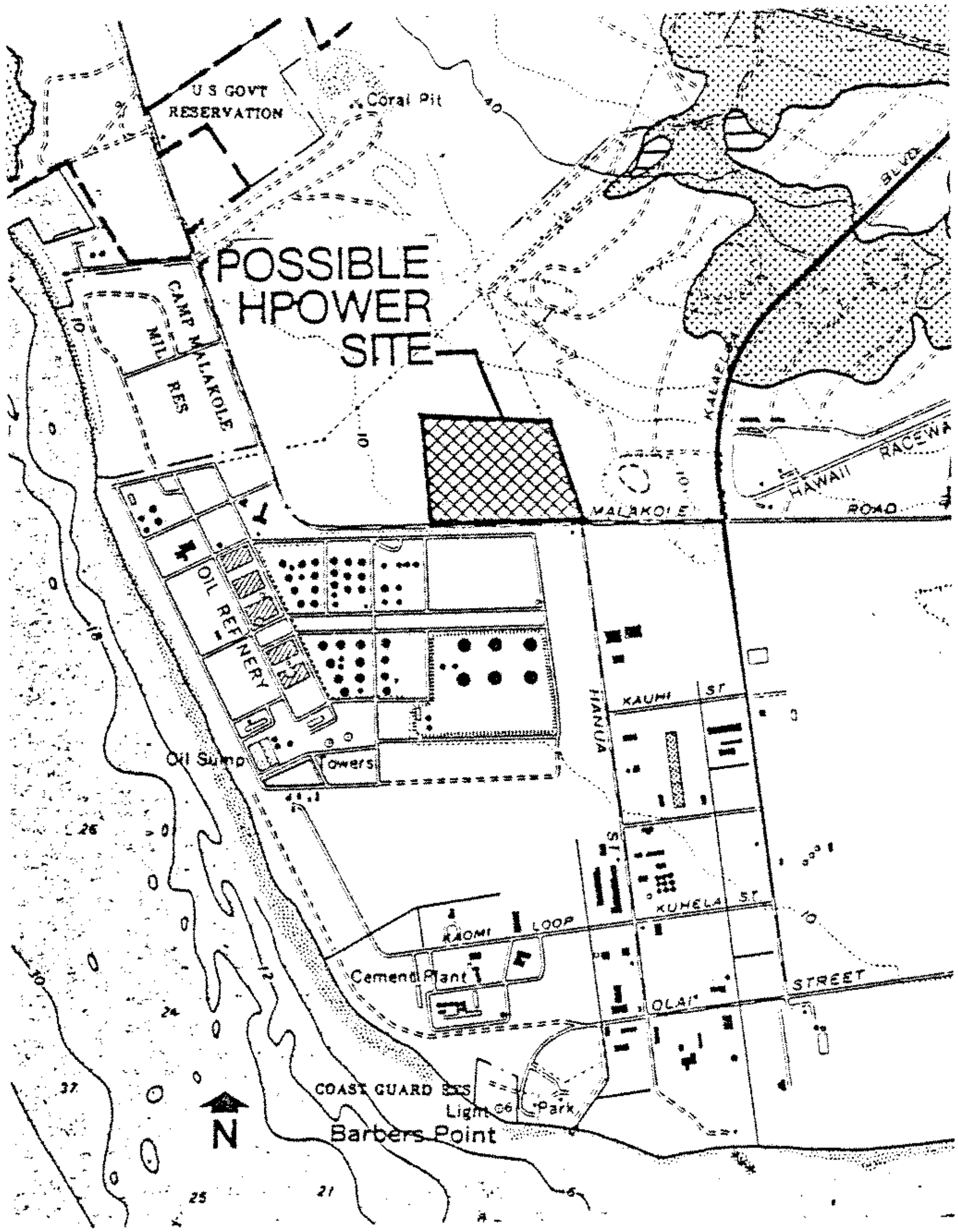
League of Women Voters
American Lung Association
Oahu Development Conference
Oahu Metropolitan Planning Organization
Life of the Land
Outdoor Circle

Public Utilities

Hawaiian Electric Company
Hawaiian Telephone Company
Honolulu Gas Company

Other

Campbell Estate
United Refuse Collectors of Hawaii



Note: One other site within Campbell Industrial may be specified, but the exact location is not known at this time.

Figure A. Campbell Industrial Park Site

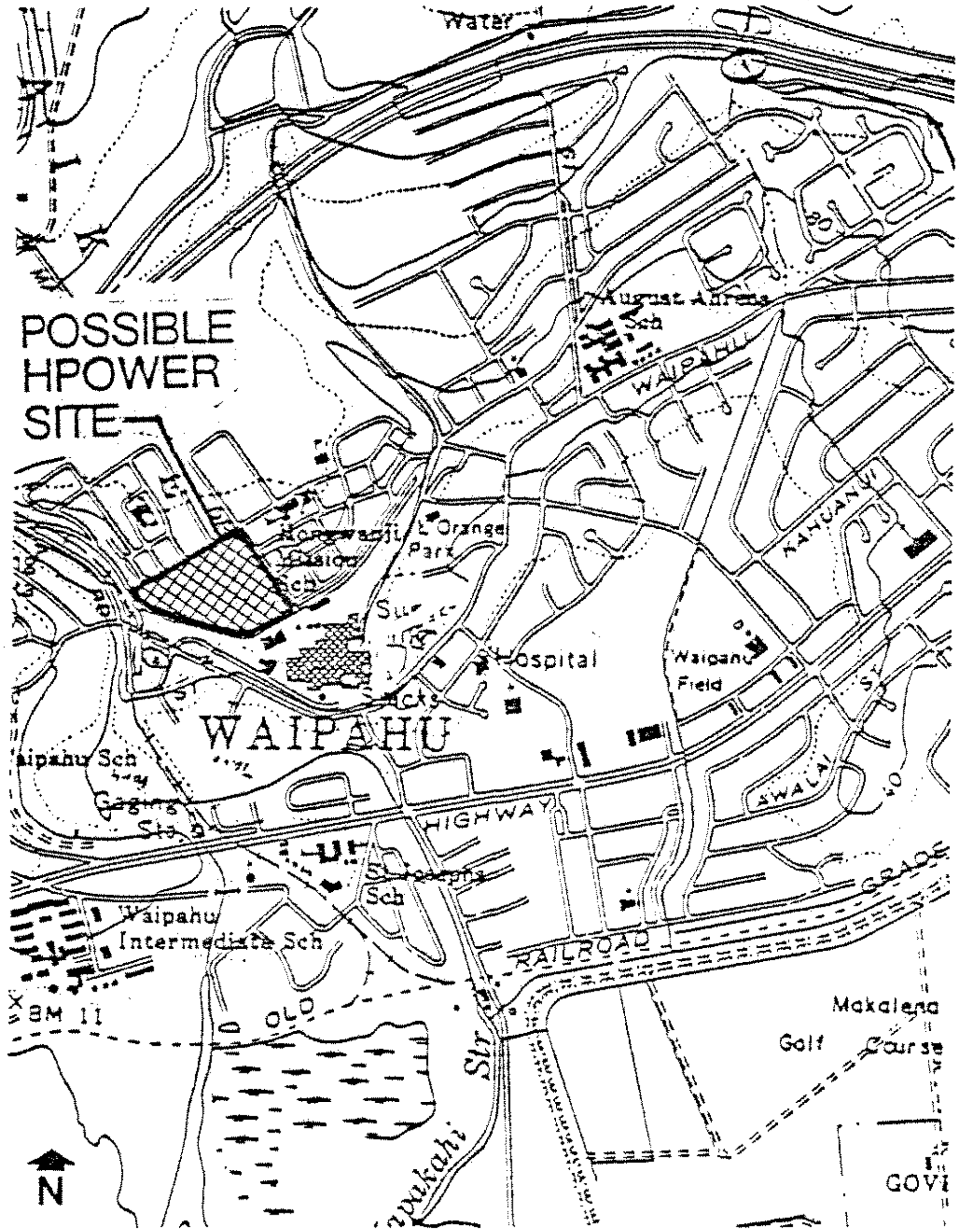


Figure B. Waipahu Site

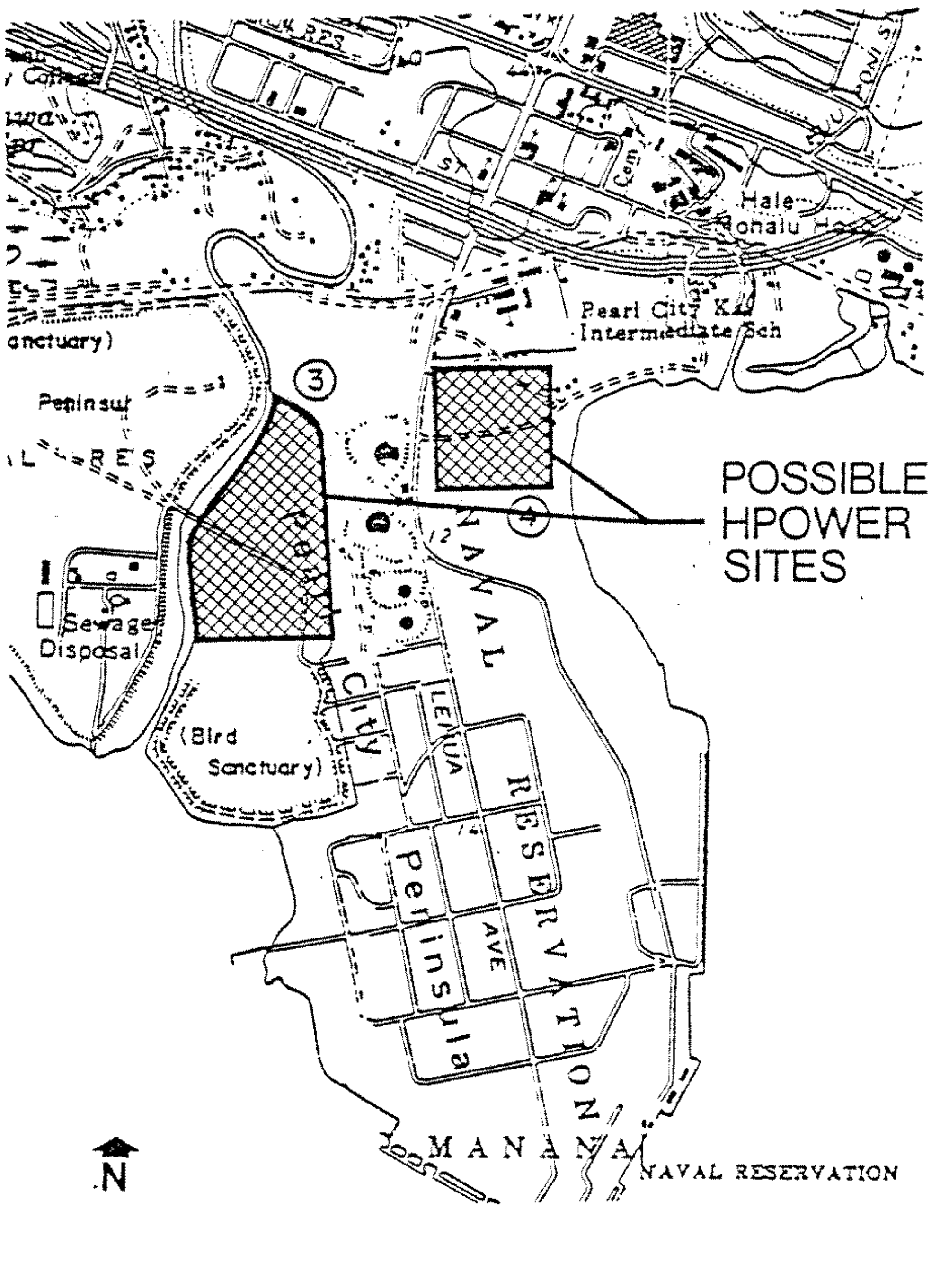


Figure C. Pearl City Peninsula Site

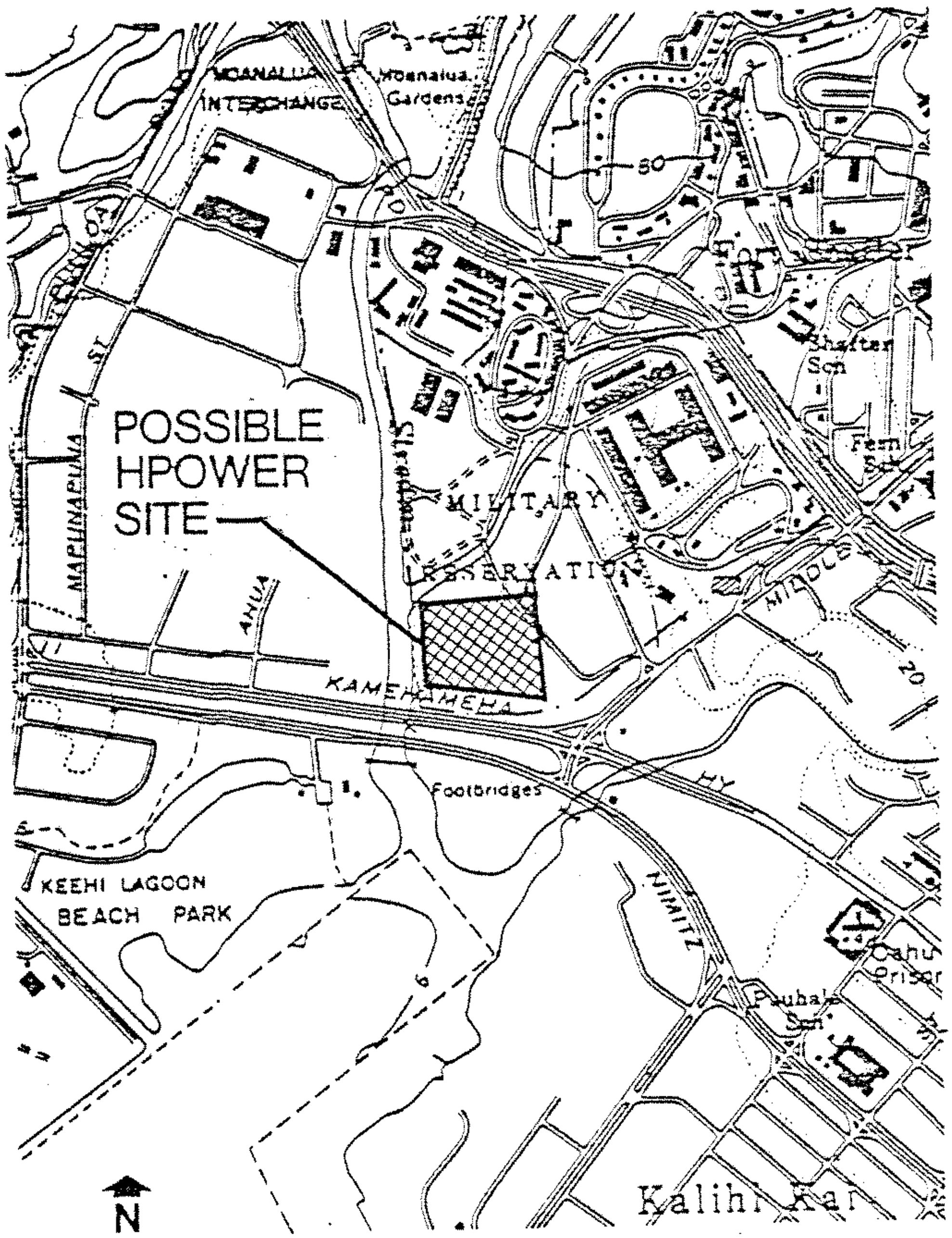


Figure D.. Keehi (Shafter Flats) Site

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-179

April 10, 1979

See attached distribution list

Environmental Impact Statement Preparation Notice for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

We are in the consultation phase of preparing an EIS for the subject project. We request your assistance in the preparation of the EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special expertise, knowledge, or special interest with respect to any environmental impact, study or survey involved with the subject project.

The enclosed EIS Preparation Notice will provide information on the general description of the project's technical, economic, social and environmental characteristics as well as a summary of the major impacts, and alternatives considered. As provided in Section 1:41b of the Environmental Quality Commission's EIS Regulation, consulted agencies, groups or individuals shall have a period of thirty (30) days in which to make written comments on the environmental effects of the proposed project. The period may be extended upon good cause for a period not to exceed thirty (30) days by written request to the Department of Land Utilization, City and County of Honolulu, the accepting authority authorized by the Mayor.

Written comments received shall be responded to in writing prior to the filing of the EIS. If further information is required, you may call Mr. Tom Vendetta of the Division of Refuse Collection and Disposal at 523-4774.

Very truly yours,

Wallace Miyahira

WALLACE MIYAHIRA
Director and Chief Engineer

Attach.
cc: Chew Lun Lau & Belt Collins

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

P.O. Box 50006 Honolulu, Hawaii 96850

April 23, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

We have no comment but appreciate the opportunity to review this EIS Preparation Notice and would like to review the EIS when it is prepared.

Sincerely,

Otis M. Gryde

Otis M. Gryde
District Conservationist

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-393

June 14, 1979

Mr. Otis M. Gryde
District Conservationist
Soil Conservation Service
United States Department of Agriculture
P. O. Box 50006
Honolulu, Hawaii 96850

Dear Mr. Gryde:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 23, 1979, regarding the Environmental Impact Statement Preparation Notice for the Honolulu Program of Waste Energy Recovery. We appreciate the time spent by you and your staff reviewing the document. You will be sent a copy of the EIS for review and comment as soon as it has been completed. In the meantime, if you should have any questions regarding HPOWER, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

W Miyahira Jr

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Department of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

UNITED STATES
DEPARTMENT OF ENERGY

P.O. BOX 50168
HONOLULU, HAWAII 96850

April 19, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

I am in receipt of your Environmental Impact Statement notice for the Waste Energy Program. I am forwarding your request to our Technical Assistance Branch of the Energy Programs Division in San Francisco for their comments.

Sincerely,

Thomas E. Brennan

Thomas E. Brennan
External Affairs Officer

UNITED STATES
DEPARTMENT OF ENERGY

SAN FRANCISCO OFFICE
111 PINE STREET
SAN FRANCISCO, CA 94111

MAY 17 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Hawaii
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

This is in response to your letter of April 10 and enclosed Preparation Notice of EIS for the proposed Honolulu waste energy recovery plant. The following comments may be of some assistance to you in your EIS process:

1) the notice provides no indication of the heat energy (BTU's) or electrical energy (MW's ranges which might be expected from the facility.

2) in the final review and evaluation process the impacts and mitigation measures for this proposed facility might be considered in light of the amount of energy it is providing versus the impacts and mitigation measures necessary to produce an equal amount of energy from a new conventional steam-powered generator facility, including importation of crude oil, refining and transportation of the fuel oil to the power plants, etc.

3) in making such trade-offs, it should be noted that the proposed facility would offer some degree of energy self-sufficiency and would be supportive of the National Energy Plan.

4) when investigating mitigation measures to lessen impact upon public utilities, consideration should be given to the sale of the energy to the local utility and at what price, as opposed to the County and City acting in a utility capacity, or such other procedures for sale and distribution of the energy which may be technically and economically attractive.

5) the potential locations appear to be within the Coastal Zone, and while Hawaii's Coastal Zone Management Program provides for the siting of energy facilities in the National Interest, it would seem prudent to thoroughly evaluate the possible CZM conflicts with the Department of Planning and Economic Development.

We would be glad to review the draft EIS for the proposed facility, and provide whatever other assistance we can. Please feel free to call on our Honolulu representative, Mr. Tom Brennan, at the Honolulu Federal Building.

Sincerely,

John E Crawford

John E. Crawford

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

June 29, 1979

Mr. John E. Crawford
San Francisco Office
United Stats Department of Energy
111 Pine Street
San Francisco, California 94111

Dear Mr. Crawford:

Subject: Environmental Impact Statement for the Honolulu <u>Program of Waste Energy Recovery (HPOWER) Project</u>

Thank you for your letter of May 17, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. Brief responses to each item contained in your letter are listed below.

1. The exact heat energy or electrical energy that may be expected from the project will depend upon the technical characteristics of the plant designs that are proposed, and these are not yet available. However, the specifications provided contractors in the "Request for Proposals" (RFP) for the project state that:

   "The average higher heating value [of the refuse] shall be taken to be 4,400 BTU per pound of refuse" (p.7).

   Using this figure, the BTU output of the 600-, 1,200- and 1,800-ton per day alternatives would be 5.3×10^9 BTU/day, 10.6×10^9 BTU/day and 15.8×10^9 BTU/day, respectively. The proportion of this that could be converted to electricity would depend upon the efficiency of the system used.

2. We expect that the questions you raise regarding the impacts of obtaining energy from alternative sources will be discussed in the "Alternatives" section of the EIS.

3. These facts will be noted.

4. The City and County of Honolulu has no intention of acting in a utility capacity. The marketing of all products of the HPOWER facility will be the responsibility of the successful contractor.

5. Once contractors have submitted their technical proposals for the HPOWER facility, we will work with the State of Hawaii Department of Planning and Economic Development in evaluating its consistency with the State's Coastal Zone Management Plan.

Thank you for your offer to review the draft EIS for the proposed facility. We expect that there will be opportunities to avail ourselves of your expertise as the study progresses.

Very truly yours,

Wallace Miyahira
Director and Chief Engineer

U. S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
HONOLULU AREA OFFICE
300 Ala Moana Boulevard, Suite
P. O. Box 50072
Honolulu, Hawaii 96850

Telephone. ~~546-3157~~

April 18, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Your request for comment on (HPOWER) is referred to the Regional Administrator, OSHA, Region 9.

Sincerely,

PAUL F. HAYGOOD
Area Director

cc:
Gabriel J. Gillotti, Regional Administrator, OSHA, Region IX

PFH:mi

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-391

June 15, 1979

Mr. Paul F. Haygood
Director, Honolulu Area Office
Occupational Safety and Health Administration
U.S. Department of Labor
P. O. Box 50072
Honolulu, Hawaii 96850

Dear Mr. Haygood:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 18, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). We understand that any comments from your department will come from the Regional Administrator of OSHA. As of this date, no comments have been received from that office.

If you should need any additional information regarding the HPOWER Project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002A:JWC:amn
Ser 724

18 APR 1979

Mr. Thomas Vendetta
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Vendetta:

EIS Preparation Notice
Honolulu Power of Waste Energy Recovery (HPOWER)
Various Sites on Oahu

In accordance with the EQC Bulletin of 8 April 1979, it is requested that Commander, Naval Base, Pearl Harbor (COMNAVBASE PEARL) be consulted in the preparation of the subject EIS. Of particular interest to the Navy are the Waipahu and Pearl City Penninsula sites of the proposed project.

The Navy contact for this project is LT J. Carl at telephone: 471-8471.

Sincerely,

J. W. CARL
Lieutenant, CEC, USN
Deputy Staff Civil Engineer
By direction of the Commander

Copy to:
Dept of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-413

June 15, 1979

Commander, Naval Base Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96860

Reference: COMNAVBASE PEARL 002A:JWC:amn/Ser 724/4-18-79

Dear Commander:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 18, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

As indicated in the EISPN, the assessment was based on preliminary information regarding the various sites which contractors are expected to propose. More definite information will not be available until contractors' technical proposals are submitted. At present, this is scheduled for early in August. As soon as the proposals are submitted, we will begin a detailed evaluation of the environmental consequences of the alternatives, and our consultants for the EIS, Belt, Collins and Associates, will contact Lieutenant Carl. In the meantime, if you have any questions, please call Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins & Associates
Environmental Quality Commission

HEADQUARTERS
FOURTEENTH NAVAL DISTRICT
BOX 110
PEARL HARBOR, HAWAII 96860

RECEIVED

IN REPLY REFER TO:
002 09F SH:joh
Ser 914

10 MAY 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Environmental Impact Statement (EIS)
Preparation Notice for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)
(April 4, 1979)

The subject EIS Preparation Notice, which was forwarded by your letter of April 10, 1979, has been reviewed, and the following comments are submitted:

a. The U. S. Navy supports the proposed HPOWER project and intends to participate as a customer, subject to economic feasibility analysis.

b. Sites Nos. 3 and 4 on the Pearl City Peninsula are unacceptable. Two sites located west of Site 3 but not shown on the proposal are less objectionable.

Substantiating material, including a copy of prior review of these sites by the U. S. Navy, is enclosed for your reference.

Thank you for the opportunity to register these objections to the Pearl City Peninsula sites. Please forward the completed EIS for further review by the U. S. Navy.

Sincerely,

L. H. TUFF
CAPTAIN, CEC, USN
DISTRICT CIVIL ENGINEER
BY DIRECTION OF THE COMMANDANT

Encl:
(1) Cy, COMFOURTEEN ltr
48:09PA:ci ser 492 of
16 Mar 1977 w/encl to QEQC

Copy to: (see page 2)

Copy to: (w/o encl)
Dept of Land Utilization, City
& County of Honolulu
Office of Environmental Quality
Control, State of Hawaii

48:09PA:cl
Ser 492

16 MAR 1977

Dr. Richard E. Marland, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

This correspondence is in response to your 7 March 1977 letter advising of plans to pursue the construction of a resource recovery plant on Oahu.

Please be assured that the Navy in Hawaii is vitally interested in on-going studies which have the purpose of finding ways to economically dispose of solid wastes while minimizing adverse effects on the environment.

My representative on such matters is Captain R. P. Hystedt, District Civil Engineer, who can be reached at telephone number 474-9101 to arrange a meeting to discuss possible sites for a resource recovery plant.

Navy representatives were given an opportunity to review a portion of the preliminary report prepared by the MITRE Corporation and White Weld and Co., Inc. A copy of the informal comments which were made is enclosed for review prior to the proposed meeting.

Since the Commander, Marine Corps Bases, Pacific; the Commander, Pacific Division, Naval Facilities Engineering Command; the Commanding Officers of the Naval Supply Center, Pearl Harbor and the Navy Public Works Center, Pearl Harbor are all affected to varying degrees by the proposed Pearl City sites, they will be invited to participate in the proposed meeting.

Sincerely,

R. S. WENTWORTH, JR.
Rear Admiral, U. S. Navy

Enclosure

BCC:
COMMARCORBASESPAC
COMPACNAVFACENGCOM
CO NSC PEARL
CO PWC PEARL

48A/48:09PA/48:114

Enclosure (1)

24 January 1977

REVIEW MEMORANDUM

Subj: Unofficial Review Comments on Report on Resource Recovery Processing Site Survey (pages 3 through 34)

Encl: (1) Marked Map of Pearl City Peninsula Area

1. The draft report has been reviewed and the comments listed below are submitted for consideration and assistance. The comments have been limited to the Pearl City sites, three of which are on Navy property and one of which is on former Navy land.

a. Pearl City Peninsula Site No. 1 is located on property transferred from the Navy to the City and County through the Department of Health, Education, and Welfare. There is a reverter clause in the transfer documents which requires that the property be returned to the Navy to preclude use of the land for purposes other than a sewage treatment plant, unless there is prior approval of the change by the Navy. Of the four Pearl City Peninsula sites, No. 1 appears to be the least objectionable to the Navy.

b. Pearl City Peninsula Site No. 2 is located partly on a wildlife sanctuary and partly on the site of a former sanitary landfill. The long-range Master Plan for the Pearl Harbor Complex shows this area reserved for expansion of the waterfront oriented light industrial complex now occupying part of the Pearl City Peninsula. In the interim, the site is considered to be adaptable as a park for joint civilian/military usage. Shifting of the site to the east or extending the site in the north and south directions outside of the wildlife sanctuary would make this site more acceptable. A new configuration would make this site the second choice of the four sites on the Peninsula.

c. Pearl City Peninsula Site No. 3 is an area reserved for future expansion of the Petroleum, Oil and Lubricants (POL) Storage Facility. Location of the resource recovery facility in the immediate vicinity of the Tank Farm, in which volatile fuels are stored, could create an undesirable hazard to the Tank Farm and to the resource recovery facility in case of a fire in one or more of the tanks. This site is also objectionable because of its proximity to Navy family housing units. This site is considered to be unacceptable to the Navy.

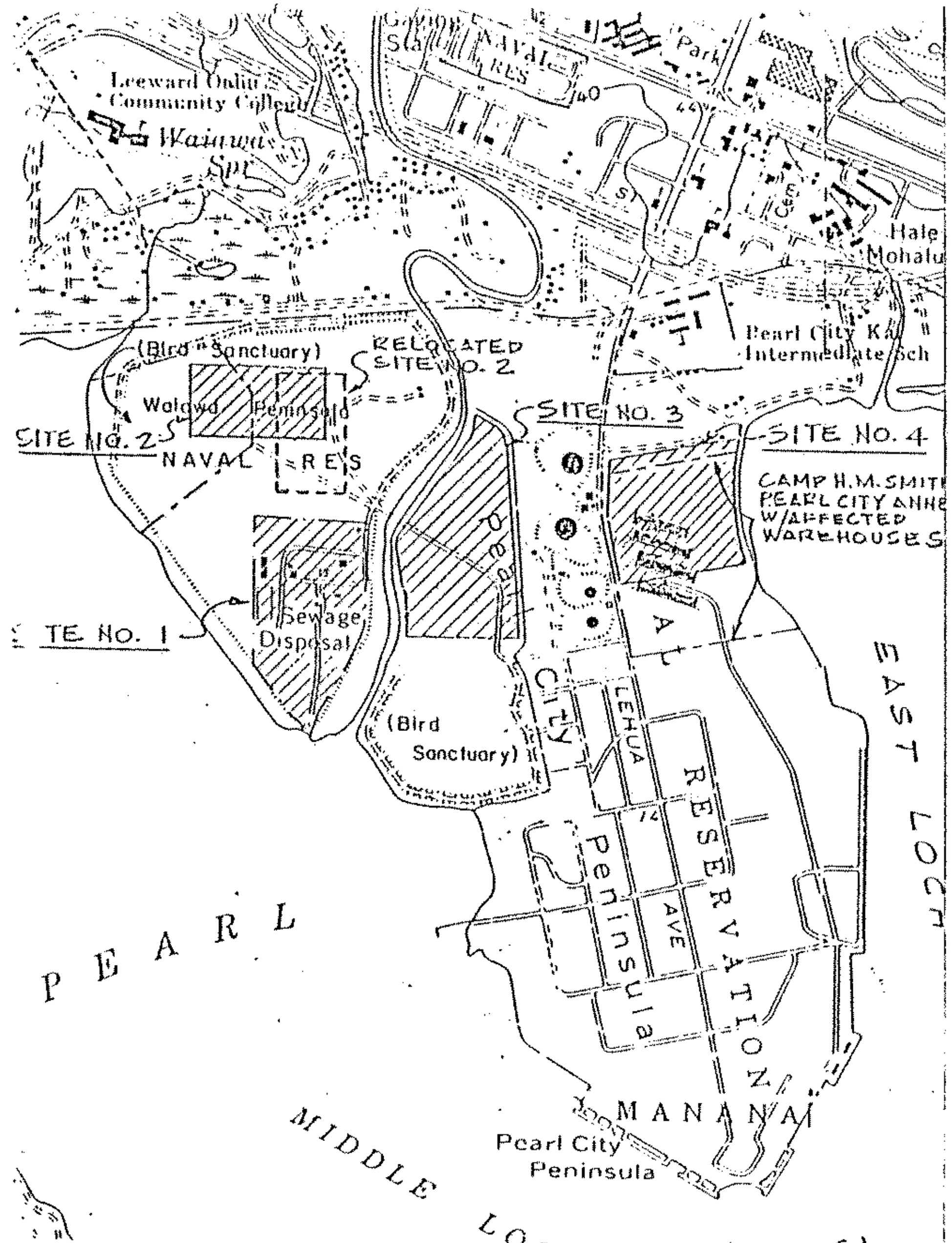
d. Pearl City Peninsula Site No. 4 as shown would require the relocation of over 281,000 square feet of Marine Corps warehousing. It is assumed that the actual site surveyed lies north of the warehouses and encompasses an area now outleased for farming. The long-range Master Plan for the Pearl Harbor Complex shows this area reserved for expansion of the waterfront oriented light industrial complex now occupying part of the Pearl City Peninsula. This site is objectionable for use as a resource recovery facility site because of its proximity to the POL Tank Farm and because it is close to and upwind of the Navy family housing area. It is also considered that this site would be objectionable to the Pearl City Kai School authorities because of the noise it would generate. The cost to attenuate the noise would be rather high.

e. The draft report does not appear to give proper recognition to the traffic hazards and congestion problems that would be experienced in getting into and out of the Pearl City Peninsula area. The congestion would be very heavy anywhere south of the old railroad right-of-way. The roads on the Pearl City Peninsula are considered to be very marginal as far as safety and load carrying capability are concerned and would not support the added heavy loads adequately.

f. The air pollution and noise impacts, under certain meterological conditions, on the Pearl City Peninsula facilities, the Inactive Ship Maintenance Detachment, and the Ford Island facilities have not been given adequate recognition in the analysis.

g. Enclosure (1) has been marked to highlight some of the above comments with regard to certain of the sites studied.

2



DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-421

June 25, 1979

Captain L. H. Ruff
District Civil Engineer
Headquarters, Fourteenth Naval District
P. O. Box 110
Pearl Harbor, Hawaii 96860

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of 10 May 1979 (your reference 002:09F: SH: joh) regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Because of the method being used for the procurement of construction and operation contracts for the proposed HPOWER facility, it is the potential contractors for the project who will specify the sites under consideration. The possible Pearl City Penninsula sites shown in the EISPN were those that had been tentatively identified by contractors as potential sites. We share many of your concerns with respect to the area and have made them known to contractors. However, until official technical proposals are received in mid-August, we will not know whether or not any of the Pearl City Penninsula sites are still under consideration. If they are, we will immediately make arrangments to discuss the issue with you.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002:09P:joh
Ser 1373

6 JUL 1979

Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Attention Mr. Tom Vendetta

Gentlemen:

Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Receipt of your letter R79-421 of 25 June 1979 is acknowledged. Your methods being used for procurement of construction and operational contracts for the proposed HPOWER facility are understood and it is realized that the contractors will specify the sites under consideration. However, it hardly seems fair to prospective bidders to list areas of Navy land on Pearl City Peninsula as potential sites when the design consultant, the MITRE Corporation, and the State Office of Environmental Quality Control were advised by letter more than two years ago that the areas listed were not acceptable to the Navy and should not be considered as possible sites (see attached letter).

It is requested that all prospective bidders be advised of the nonavailability of the sites identified on Pearl City Peninsula to preclude difficulties and misunderstandings after official technical proposals are received.

Sincerely,

L. H. RUFF
CAPTAIN, CEC, USN
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Encl:
(1) Cy, COMFOURTEEN ltr 48:09PA:ci ser 492 of 16 Mar 1977 to Office of Environmental Quality Control, State of Hawaii

48:09PA:ci
Ser 492

16 MAR 1977

Dr. Richard E. Marland, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

This correspondence is in response to your 7 March 1977 letter advising of plans to pursue the construction of a resource recovery plant on Oahu.

Please be assured that the Navy in Hawaii is vitally interested in on-going studies which have the purpose of finding ways to economically dispose of solid wastes while minimizing adverse effects on the environment.

My representative on such matters is Captain R. P. Nystedt, District Civil Engineer, who can be reached at telephone number 474-9101 to arrange a meeting to discuss possible sites for a resource recovery plant.

Navy representatives were given an opportunity to review a portion of the preliminary report prepared by the MITRE Corporation and White Weld and Co., Inc. A copy of the informal comments which were made is enclosed for review prior to the proposed meeting.

Since the Commander, Marine Corps Bases, Pacific; the Commander, Pacific Division, Naval Facilities Engineering Command; the Commanding Officers of the Naval Supply Center, Pearl Harbor and the Navy Public Works Center, Pearl Harbor are all affected to varying degrees by the proposed Pearl City sites, they will be invited to participate in the proposed meeting.

Sincerely,

R. S. WENTWORTH, JR.
Rear Admiral, U. S. Navy

Enclosure

BCC:
COMMARCORBASESPAC
COMPACNAVFACENGCOM
CO NSC PEARL
CO PWC PEARL

48A/48:09PA/48:114

24 January 1977

REVIEW MEMORANDUM

Subj: Unofficial Review Comments on Report on Resource Recovery Processing Site Survey (pages 3 through 34)

Encl: (1) Marked Map of Pearl City Peninsula Area

1. The draft report has been reviewed and the comments listed below are submitted for consideration and assistance. The comments have been limited to the Pearl City sites, three of which are on Navy property and one of which is on former Navy land.

a. Pearl City Peninsula Site No. 1 is located on property transferred from the Navy to the City and County through the Department of Health, Education, and Welfare. There is a reverter clause in the transfer documents which requires that the property be returned to the Navy to preclude use of the land for purposes other than a sewage treatment plant, unless there is prior approval of the change by the Navy. Of the four Pearl City Peninsula sites, No. 1 appears to be the least objectionable to the Navy.

b. Pearl City Peninsula Site No. 2 is located partly on a wildlife sanctuary and partly on the site of a former sanitary landfill. The long-range Master Plan for the Pearl Harbor Complex shows this area reserved for expansion of the waterfront oriented light industrial complex now occupying part of the Pearl City Peninsula. In the interim, the site is considered to be adaptable as a park for joint civilian/military usage. Shifting of the site to the east or extending the site in the north and south directions outside of the wildlife sanctuary would make this site more acceptable. A new configuration would make this site the second choice of the four sites on the Peninsula.

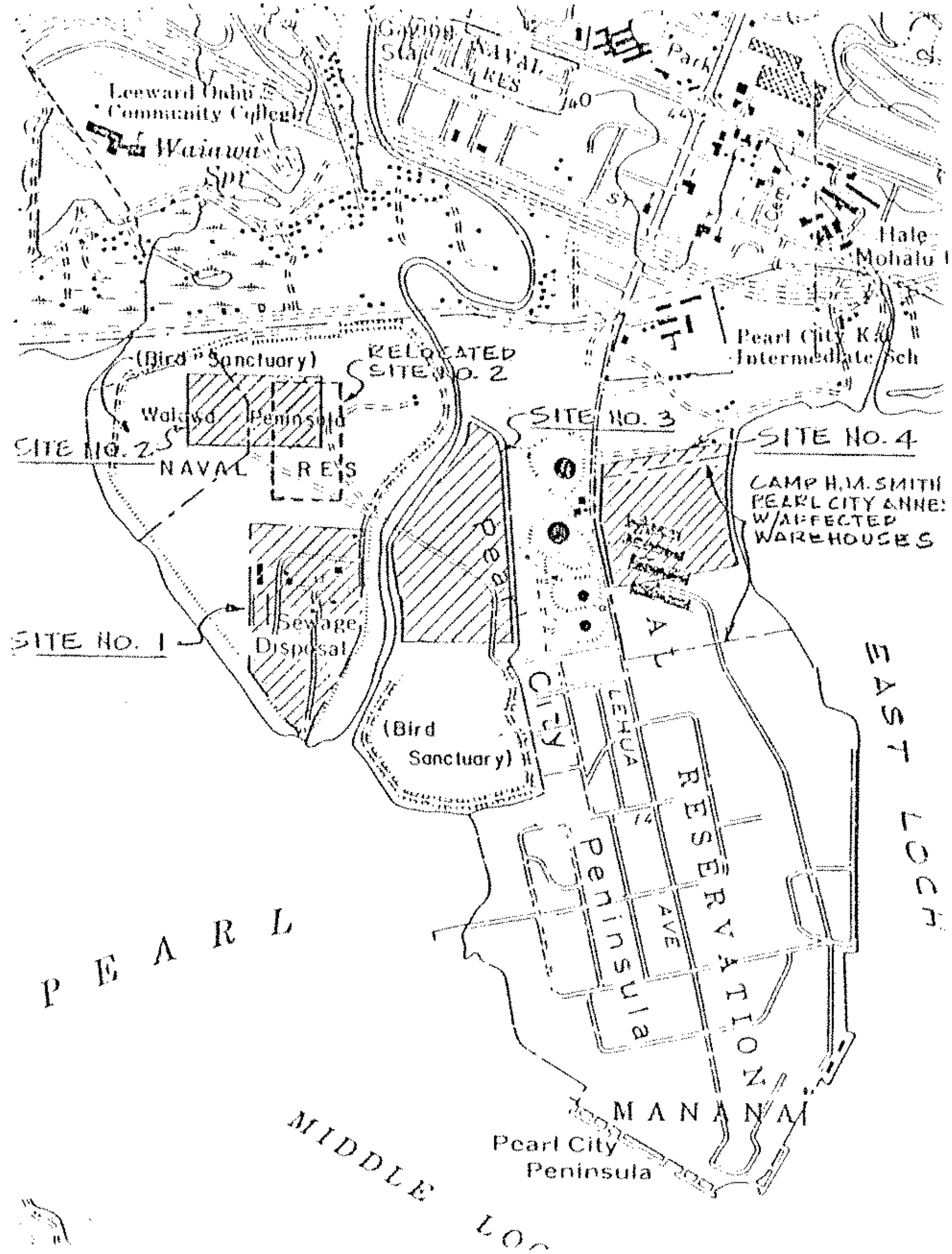
c. Pearl City Peninsula Site No. 3 is an area reserved for future expansion of the Petroleum, Oil and Lubricants (POL) Storage Facility. Location of the resource recovery facility in the immediate vicinity of the Tank Farm, in which volatile fuels are stored, could create an undesirable hazard to the Tank Farm and to the resource recovery facility in case of a fire in one or more of the tanks. This site is also objectionable because of its proximity to Navy family housing units. This site is considered to be unacceptable to the Navy.

d. Pearl City Peninsula Site No. 4 as shown would require the relocation of over 281,000 square feet of Marine Corps warehousing. It is assumed that the actual site surveyed lies north of the warehouses and encompasses an area now outleased for farming. The long-range Master Plan for the Pearl Harbor Complex shows this area reserved for expansion of the waterfront oriented light industrial complex now occupying part of the Pearl City Peninsula. This site is objectionable for use as a resource recovery facility site because of its proximity to the POL tank farm and because it is close to and upwind of the Navy family housing area. It is also considered that this site would be objectionable to the Pearl City Kai School authorities because of the noise it would generate. The cost to attenuate the noise would be rather high.

e. The draft report does not appear to give proper recognition to the traffic hazards and congestion problems that would be experienced in getting into and out of the Pearl City Peninsula area. The congestion would be very heavy anywhere south of the old railroad right-of-way. The roads on the Pearl City Peninsula are considered to be very marginal as far as safety and load carrying capability are concerned and would not support the added heavy loads adequately.

f. The air pollution and noise impacts, under certain meteorological conditions, on the Pearl City Peninsula facilities, the Inactive Ship Maintenance Detachment, and the Ford Island facilities have not been given adequate recognition in the analysis.

g. Enclosure (1) has been marked to highlight some of the above comments with regard to certain of the sites studied.



R 79-49J

July 13, 1979

Captain L. H. Ruff
District Civil Engineer
Headquarters, Fourteenth Naval District
P. O. Box 110
Pearl Harbor, HI 96860

Dear Captain Ruff:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

This is in response to your letter, 002:09P:joh Ser 1373, dated July 6, 1979. In our next addenda, we will inform HPOWER bidders that the Navy considers the identified Pearl City sites to be unavailable.

If you have any additional questions, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Environmental Quality Commission
Belt, Collins & Associates

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
AREA OFFICE
300 ALA MOANA BLVD., RM. 3318, P.O. BOX 50007
HONOLULU, HAWAII 96850

REGION IX
450 Golden Gate Avenue
P.O. Box 36003
San Francisco, California 94102

May 4, 1979

IN REPLY REFER TO:
9.1SS (Johnson/
546-5554)

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

The Honolulu Area Office concurs with the concept of HPOWER and finds that the issues to be addressed in the Draft EIS appropriate.

Should the Waipahu site be selected, we would be concerned over the possible impacts that noise and odor would have on the HUD-assisted Jack Hall Housing Project located northeast and adjacent to the site. The 144-unit housing project is approximately 25% complete and oriented for plantation workers.

We look forward to receiving the Draft EIS.

Sincerely,

Alvin K. H. Pang
Area Manager

Attachment

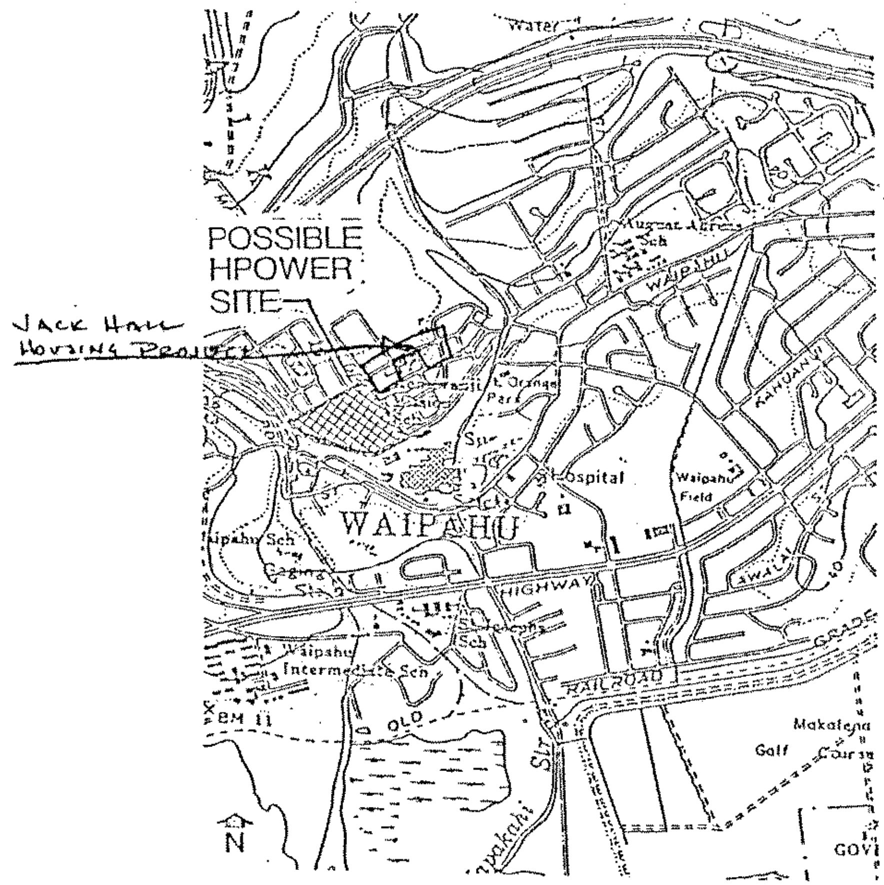


Figure B. Waipahu Site

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-429

June 25, 1979

Mr. Alvin K.H. Pang
Area Manager
U.S. Department of Housing and Urban Development
P.O. Box 50007
Honolulu, Hawaii 96850

Dear Mr. Pang:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 4, 1979 [your reference number 9.1SS (Johnson/546-554)] regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document and are pleased you agree with our assessment of the issues that need to be covered in the EIS.

The effect that operation of an HPOWER facility situated on the Waipahu site would have on nearby residential areas, including the Jack Hall housing project, is of major concern. Because of its location in a built-up area, we will be examing this proposed site with particular care.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

2 May 1979

Mr. Wallace Miyahara
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahara:

In response to your letter of 10 April 1979 regarding the Environmental Impact Statement (EIS) Preparation Notice for the "Proposed Honolulu Program of Waste Energy Recovery (HPOWER)," the US Army Corps of Engineers has the following concerns:

a. Three of the proposed sites are located in the vicinity of streams. Any discharges of dredged or fill material in these waters will require Department of the Army permits.

b. The proposed Campbell Industrial Park site is located in the vicinity of known habitats of the proposed federal endangered species of Euphorbia skottsbergii var. kalaeloana Sherf and Achyranthes splendens var. rotundata Hbd. The US Fish and Wildlife Service (USFWS) has let a contract to the University of Hawaii to survey the entire Ewa Plain for these species. The City and County should coordinate planning with USFWS so that the waste recovery program does not jeopardize the continued existence of the endangered species.

c. Based on studies conducted by the Bishop Museum, mainly for the Corps, it is known that most unimproved areas of Campbell Industrial Park have remnants of a prehistoric Hawaiian settlement. The area shown in figure A is located within an area currently being surveyed by the museum for eventual use by the Corps and the State for disposal of dredged material from the planned Barbers Point deep-draft harbor. Preliminary indications from the museum are that this area has sites which appear eligible for possible inclusion on the National Register of Historic Places.

d. The proposed Pearl City sites are located near the Waiawa Unit of the Pearl Harbor National Wildlife Refuge and another sanctuary north of the Pearl City sewage disposal plant. Noise, emissions, and truck activities generated by the plant near these sanctuaries may have an adverse effect on the refuges and sanctuaries. We suggest that coordination with the USFWS be initiated.

e. The proposed Keehi (Shafter Flats) site is located near the Keehi Lagoon Beach Park. Plant operations may generate possible excessive air pollution that could jeopardize the aesthetics and peacefulness of the park and your planning efforts should consider methods or designs to avoid or minimize such problems.

The Corps currently has projects in the planning stage near the following two sites - the Barbers Point deep-draft harbor and Moanalua Stream flood control. Corps reports on both of these projects may be useful in the preparation of your EIS and are available upon request. The proposed Campbell Industrial site area has been tentatively set aside by the estate of James Campbell for deposition of dredged coral material from the planned Barbers Point Harbor. The estate estimates that the area will be used for this purpose for up to a 17-year period. It appears prudent that you coordinate any plans for use of privately-owned lands with respective landowners.

Thank you for the opportunity of commenting on the subject project.

Sincerely yours,

KISUK CHEUNG
Chief, Engineering Division

1 Incl
Figure A

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-431

June 25, 1979

Mr. Kisuk Cheung, Chief
Engineering Division
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

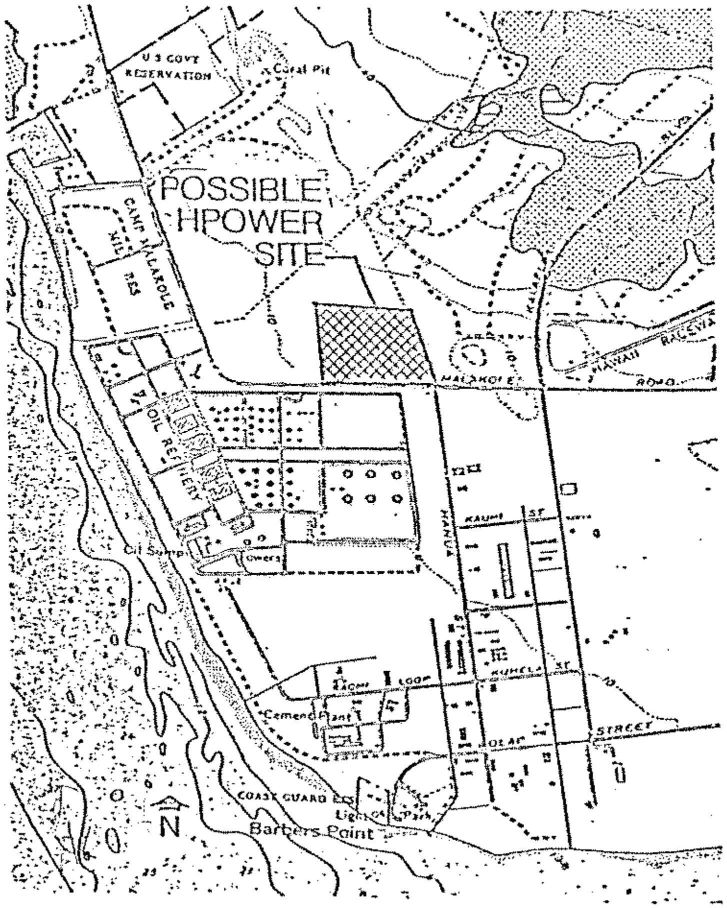
Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 2, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. Listed below are item-by-item responses to the comments contained in your letter.

a. The permit requirements for each of the sites will be identified in the EIS.

b. We are aware that the Campbell Industrial Park site is located in the vicinity of known habitats of the two proposed endangered species listed in your letter. Botanical surveys of all sites proposed by prospective contractors will be conducted during the preparation of the EIS. The survey of the Ewa site will be coordinated with the work that has been commissioned by the U.S. Fish and Wildlife Service (USFWS). All necessary steps will be taken to insure that the waste recovery program does not pose a threat to the continued existence of the endangered species.

c. Our work program for the HPOWER EIS calls for reconnaissance-level archaeological surveys of all prospective sites. The availability of information from the Bishop Museum on the Campbell Industrial Park site will facilitate our evaluation of that possible HPOWER location. Effects that HPOWER would have on sites which appear eligible for inclusion on the National Register of Historic Places will be identified, and possible mitigation measures will be indicated.



Note: One other site within Campbell Industrial may be specified, but the exact location is not known at this time.

Figure A. Campbell Industrial Park Site

d. As indicated in your letter, the Pearl City sites are in close proximity to the Wahiawa Unit of the Pearl Harbor National Wildlife Refuge and another sanctuary north of the Pearl City sewage disposal plant. If these sites are named in any of the contractors' final technical proposals, an eventuality which we consider to be unlikely, we will contact the USFWS immediately for their suggestions and guidance.

e. The potential adverse impacts that would result from construction and operation of an HPOWER plant on the Shafter Flats site will be thoroughly studied at such time as technical proposals are received from contractors.

We are appreciative of the information you supplied regarding plans to use the proposed Campbell Industrial Park HPOWER site for dredged spoil disposal in conjunction with the planned Barbers Point Harbor. Subsequent to receipt of your letter, we have met once again with representatives of the Campbell Estate to reconfirm the availability of the site to HPOWER. They have assured us that it would be possible to accommodate the facility while still maintaining sufficient space for the disposal of dredged materials. The specific details of such an arrangement are being worked out now.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P.O. BOX 50167
HONOLULU, HAWAII 96850

REPLY REFER TO:
Room 6307

May 1, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Re: EIS Preparation
Notice for Proposed
HPOWER, Oahu

Dear Sir:

We have reviewed the EIS preparation notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER). We are pleased that the city has taken the lead in developing what could become a major conservation effort here in Hawaii. This program could serve as a model for similar programs throughout the nation.

Our only concern, however, is the location of Site 3, Pearl City Peninsula Site (Figure C). This location is directly adjacent to the Waiawa Unit of the Pearl Harbor National Wildlife Refuge, which provides resting and feeding habitat for all four species of endangered Hawaiian waterbirds. Furthermore, it provides nesting habitat for the endangered Hawaiian stilt. Our refuge obtains water from the small stream that adjoins the proposed site, for use in the refuge ponds. We are concern that leachites from your operation will degrade water quality and consequently adversely impact the endangered waterbird habitat in the refuge. Therefore, we do not believe this site would be an appropriate location for the proposed activity.

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

We appreciate the opportunity to provide early input and will be pleased to provide further assistance if necessary.

Sincerely yours,

Maurice H. Taylor

Maurice H. Taylor
Field Supervisor
Division of Ecological
Services

cc: HA
HDF&G
RF, Honolulu

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-436

June 29, 1979

Mr. Maurice Taylor
Field Supervisor
Division of Ecological Services
Fish and Wildlife Service
United States Department of the Interior
P. O. Box 50167
Honolulu, HI 96850

Dear Mr. Taylor:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 1, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

As indicated in the EISPN, the "request for proposals" for the HPOWER project leaves the designation of a site for the facility in the hands of the individual contractors. Because of this, it is impossible to know exactly which sites will be specified until the official technical proposals are submitted. This is now scheduled for August, 1979. If any of the contractors continue to specify one of the Pearl City sites as their choice, they must address the potential adverse impacts on the Waiawa Unit of the Pearl Harbor National Wildlife Refuge that you identified. The environmental impact statement will provide a discussion of such potential impacts and abatement measures, as necessary.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

W. E. [signature]
WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING
DEPT OF PUBLIC WORKS
HICKAM AIR FORCE BASE, HAWAII 96853

11 MAY 1979

REPLY TO ATTN OF: DEEV (Mr Shiroma, 449-1831)

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

TO: Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

1. This office has reviewed the subject EIS and has no comment to render relative to the proposed project.

2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document.

Shuzo Kimura
SHUZO KIMURA
Acting Chief, Engrg & Envmtl Plng Div
Directorate of Civil Engineering

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-427

June 25, 1979

Mr. Shuzo Kimura, Acting Chief
Engineering and Environmental Planning Division
Headquarters, 15th Air Base Wing (PACAF)
Department of the Air Force
Hickam Air Force Base, Hawaii 96853

Dear Mr. Kimura:

Subject: Environmental Impact Statement for the Honolulu <u>Program of Waste Energy Recovery (HPOWER) Project</u>

Thank you for your letter of May 11, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. We understand that you have no comments to make on the project at this time.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

PACIFIC-ASIA
P. O. BOX
HONOLULU HAWAII 96850

May 7, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Thank you for your letter of April 10 in which you request comment on preparation of an EIS for solid waste energy recovery.

Although we have no substantive comment or suggestion on preparation of the EIS, we applaud the proposed effort toward waste disposal and energy recovery. Also, we note that one of the proposed sites is Keehi (Shafter Flats). This location is about one mile northeast of the approach to Runway 22 at Honolulu International Airport. If the selected energy recovery system would require a tall structure, it could be an obstruction to air navigation. Such a potential should be investigated if the Keehi area is selected.

Please let us know if we can be of further assistance in this matter.

Sincerely,

H. O. Adams

H. O. ADAMS
International Aviation Affairs Officer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-422

June 25, 1979

Mr. H. O. Adams
International Aviation Affairs Officer
Federal Aviation Administration
United States Department of Transportation
P. O. Box 50109
Honolulu, Hawaii 96850

Dear Mr. Adams:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 7, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by the FAA staff reviewing the document.

Your observations regarding the possibility of an HPOWER facility situated on the Keehi site interfering with approaches to Honolulu International Airport were most helpful. The same concerns have been expressed by others with respect to the Campbell Industrial Park site shown in the EIS Preparation Notice.

At present, contractors are not scheduled to submit their technical proposals for the project until mid-August, 1979. Because of this, it is not yet certain exactly which sites will be proposed or what the maximum height of HPOWER-related structures would be. When this information is available, the proposals' consistency with FAA height restrictions will be evaluated.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh
cc: Dept. of Land Utilization
Belt, Collins and Associates

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO. KING STREET
HONOLULU, HAWAII 96814

April 18, 1979

MEMORANDUM

To: Mr. Wallace Miyahira, Director and Chief Engineer
Department of Public Works, C&C of Honolulu

Subject: EIS Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

The Department of Agriculture has reviewed the subject preparation notice and has no comments to offer.

We appreciate the opportunity to comment.

John Farias, Jr.

JOHN FARIAS, JR.
Chairman, Board of Agriculture

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-390

June 15, 1979

Mr. John Farias, Jr., Chairman
Hawaii State Board of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Dear Mr. Farias:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 18, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. If, in the future, you need additional information concerning the project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Department of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2360
HONOLULU, HAWAII 96804

CHARLES G. CLARK
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

April 30, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Sir:

SUBJECT: Environmental Impact Statement Preparation Notice Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

We have reviewed the Preparation Notice for the subject project and offer the following comments for your consideration.

Two sites proposed as possible HPOWER sites are located near elementary schools. These sites are identified as the Waipahu site, near August Ahrens and Waipahu Elementary schools and the Pearl City Peninsula Site, near Lehua Elementary School.

We are concerned about the increase in truck traffic on the existing streets servicing our schools as a result of the HPOWER projects. The expected noise levels may exceed the Department of Health standard and we are also concerned about the associated vehicular safety problems.

In addition, the Pearl City Peninsula Site would be objectionable from an esthetic point of view since it is located adjacent to Lehua Elementary School.

Thank you for the opportunity to review and comment on the subject project.

Sincerely,

Charles G. Clark

CHARLES G. CLARK
Superintendent

CGC:HL:jl

cc: Mr. James E. Edington
Leeward Oahu District

AN EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-416

June 21, 1979

Mr. Charles G. Clark
Superintendent
Hawaii State Department of Education
P. O. Box 2360
Honolulu, HI 96804

Dear Mr. Clark:

Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 30, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Your concern for potential traffic and noise effects on the two elementary schools located near possible HPOWER sites is understandable. Both of these topics are being addressed in the EIS, and contractors are expected to consider mitigation measures in their technical proposals for the HPOWER facility.

The aesthetic quality of the facility is of major concern to us. The Consultants who are preparing the EIS will evaluate the visual impact of all proposals and suggest means by which undesirable effects may be mitigated by design changes.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

May 3, 1979

GEORGE A. L. YUEN
DIRECTOR OF HEALTH

VERNE C. WAITE, M.D.
DEPUTY DIRECTOR OF HEALTH

HENRY N. THOMPSON, M.A.
DEPUTY DIRECTOR OF HEALTH

JAMES S. KUMAGAI, PH.D., P.E.
DEPUTY DIRECTOR OF HEALTH

TADAO BEPPU
DEPUTY DIRECTOR OF HEALTH

In reply, please refer to:
File: EPHS-SS

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 S. King St.
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Request for Comments on Proposed Environmental Impact Statement (EIS) for the Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for allowing us to review and comment on the subject proposed EIS.

We submit the following comments for your consideration:

1. Sewage and Wastewater Disposal: The subject project description assumes sewers are available. Sewers are not available in the Campbell Industrial Park area. More details on wastewater treatment and disposal are needed.

2. General: A discussion of other resource recovery facilities in the country and anticipated wasteloads and characteristics are needed regardless of the disposal alternative.

   Leachate treatment, effluent characteristics and disposal need to be thoroughly discussed; especially the disposal of toxic chemicals and heavy metals.

3. Biological Impacts: The effects of wastewater disposal and leachates on groundwater and coastal waters should be discussed in the context of anticipated nearshore biological impacts.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Sincerely,

Brian J. Choy
for JAMES S. KUMAGAI, Ph.D.
Deputy Director for
Environmental Health

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-423

June 25, 1979

Dr. James S. Kumagai
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Kumagai:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 3, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

The environmental impact summaries shown in Tables 2 and 3 of the EISPN are from a report prepared by the MITRE Corporation entitled Analysis of the Feasibility of Resource Recovery for Honolulu. They do, in fact, assume the availability of a public sanitary sewer treatment system. Hence, as you have indicated, they are not applicable to the existing situation at Campbell Industrial Park. The discussion of possible impacts on public utilities at the top of page 10 of the EISPN notes that the EIS will identify any utility system improvements that would be needed as a result of the proposed project. Where it is impractical to link the facility to an existing system, the facility will incorporate its own on-site system that will be designed to meet all State and Federal standards.,

Under point "2" of your letter you state that, "A discussion of other resource recovery facilities in the country and anticipated wasteloads and characteristics are needed regardless of the disposal alternative." The EIS will summarize projections of the volume and makeup of Oahu's future solid waste load that have been developed in previous studies. It will also briefly review the disposal techniques and options that are available. However, at present we do not intend to conduct a comprehensive review of the other resource recovery facilities in this country. Methods proposed for the containment and disposal of leachate from the waste stored prior to combustion and from the residue will be discussed.

Our intent to cover potential geohydrologic effects of the HPOWER project was noted on page 9 of the EISPN. More detailed discussion of the topic, including possible impacts on aquatic biota, was omitted because of the absence of sufficient information regarding contractors' proposals. Contractors are now expected to submit their technical proposals in mid-August. As soon as they are available, a detailed program for evaluating the impacts, if any, on nearshore biota will be established.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU, HAWAII 96813

RICHARD L. O'CONNELL
DIRECTOR

TELEPHONE NO.
548-6915

April 27, 1979

Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu

Dear Mr. Miyahira:

SUBJECT: EIS Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

We have reviewed the subject EIS Preparation Notice and offer the following comments for your consideration:

1) The EIS should discuss the potential for hazardous airborne bacteria and virus levels in and around the facility.

2) The characteristics of the incinerator ash, its classification with respect to proposed EPA hazardous waste criteria and plans for ash disposal should be discussed.

3) The proposed heights of the stacks may require FAA clearance depending on the proposed site.

4) There should be some discussion on the economic impacts upon the private haulers and how these would be mitigated. The varibility of economic impact upon waste generators according to their location with respect to the project site should be discussed.

5) Rare plants are known to exist in the Barber's Point area and any survey should assure that such plants as well as endangered fauna would be identified.

6) The beneficial as well as adverse environmental impacts should be discussed in the EIS; for example, reduction of the need for landfills on Oahu.

Thank you for providing us the opportunity to comment on this EIS Preparation Notice.

Sincerely,

R L O'Connell

Richard L. O'Connell
Director

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-435

June 29, 1979

Mr. Richard L. O'Connell, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. O'Connell:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 27, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. Point-by-point responses to the six comments you provided are given below.

1. The potential for the release of hazardous bacteria and viruses into the atmosphere will be discussed in the EIS. We will also evaluate the probable significance of such releases on public health.

2. Information regarding the characteristics of the incinerator ash, its classification with respect to proposed EPA hazardous waste criteria, and the plans that have been made for ash disposal will be presented in the EIS.

3. Contractors' technical proposals for the HPOWER facility will be carefully reviewed to insure that they comply with any FAA height restrictions that may apply.

4. The subject of the project's economic impact upon private haulers and waste generators will be discussed in the EIS.

Moreover, comments are being solicited directly from the commercial waste haulers regarding the compatibility of HPOWER with their operations.

At present, it does not appear that any of the potential HPOWER sites would be substantially farther from the centroid of waste generation than the Palailai landfill site. However, the economic implications of the various potential HPOWER and landfill sites will be discussed in the EIS.

5. Surveys will be conducted of the flora and fauna on the various possible sites. If any endangered species are encountered that would be affected by the project, appropriate mitigation measures will be taken.

6. The EIS will discuss beneficial, as well as adverse, effects of the proposed project.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WE Spencer Jr
WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR

RYOKICHI HIGASHIONNA, PH.D.
DIRECTOR

DEPUTY DIRECTORS
WALLACE AOKI
DOUGLAS S. SAKAMOTO
CHARLES O. SWANSON
James R. Carras

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

May 15, 1979

IN REPLY REFER TO:
STP 8.5436

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: EIS Preparation Notice
Honolulu Program of Waste
Energy Recovery (HPOWER)

Thank you very much for giving us the opportunity to review and comment on the above-captioned notice. We support your efforts to analyze Hawaii's ever-growing solid waste problem.

We would especially be interested in reviewing the traffic study that will be conducted. Since our Department will be among the consulted agencies during the preparation of the EIS, we are reserving our further comments until more detail studies have been conducted and the EIS circulated for review.

Very truly yours,
Ryokichi Higashionna
Ryokichi Higashionna

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-420

June 25, 1979

Dr. Ryokichi Higashionna, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

Subject: Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 15, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

As indicated in the EISPN for the project, our analysis of potential traffic impacts will focus primarily on the streets linking each of the potential HPOWER sites with the closest major highway. Our consultants for the EIS, Belt, Collins and Associates, will be contacting your Department for historical traffic counts and other information after the various contractors competing for the contract have submitted their technical proposals. At present, the submittals are scheduled for August, 1979.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR

George Freitas
DIRECTOR OF TAXATION

DEPARTMENT OF TAXATION
STATE OF HAWAII

Honolulu, Hawaii
May 16, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

RE: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

The Department of Taxation has no comment on the subject

project and proposal.

Very truly yours,

George Freitas

GEORGE FREITAS
Director of Taxation

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-419

June 25, 1979

Mr. George Freitas, Director
Department of Taxation
State of Hawaii
425 Queen Street
Honolulu, Hawaii 96813

Dear Mr. Freitas:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 16, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

If you have any additional questions concerning the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

May 10, 1979

REF. NO.: APO-427
YOUR REF. NO.: R79-179

Honorable Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Sir:

Thank you for sending us a copy of the EIS preparation notice for the HPOWER project.

We would like to see the EIS cover:

1) Indirect as well as direct impacts on wildlife. Both the Pearl City and Keehi sites are close to sensitive waterbird habitat.

2) Potential impacts on aquatic environments. The Keehi site is near Moanalua Stream and the Pearl City site is near Waiawa Stream.

Very truly yours,

Susumu Ono

SUSUMU ONO, Chairman
Board of Land and Natural Resources

TO CLEAN OUR LAND · STATE OF HAWAII

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-426

June 25, 1979

Mr. Susumu Ono, Chairman
Board of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 10, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

The EIS will discuss both direct and indirect impacts on wildlife and the aquatic environment. But, the exact scope of the investigations that will be conducted of these topics will not be known until after potential contractors for the project submit their technical proposals for the facility. This is currently scheduled for mid-August, 1979.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR

ANDREW I. T. CHANG
DIRECTOR OF SOCIAL SERVICES & HOUSING

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING

May 8, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

The Hawaii Housing Authority in coordination with the Department of Social Services has reviewed the subject Environmental Impact Statement Preparation Notice and has no comments to offer.

Thank you for allowing us the opportunity to review this EIS Preparation Notice.

Sincerely,

ANDREW I. T. CHANG
Director

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-417

June 25, 1979

Mr. Andrew I.T. Chang, Director
Department of Social Services and Housing
State of Hawaii
1390 Miller Street
Honolulu, Hawaii 96813

Dear Mr. Chang:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 8, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

If you have any additional questions concerning the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh
cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

~~LETTER~~ NO. (P)1453.9

MAY 7 1979

Mr. Wallace Miyahira
Director & Chief Engineer
Department of Public Works
City & County of Honolulu
Honolulu, Hawaii

Dear Mr. Miyahira:

Subject: EIS Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

This is in response to your Letter No. R 79-179 dated April 10, 1979.

DAGS feels that is a worthwhile project to pursue and hope that the City receives an acceptable Technical Proposal. Although the project is needed we would like to express our concerns regarding the Keehi (Shafter Flats) site. DAGS has several operating agencies at 729 Kakoi Street in Shafter Flats. The EIS preparation notice does discuss ways of controlling stack emissions, dust and odor and noise pollutions. We would like to emphasize that besides DAGS there are many other businesses in the area that will be affected if the stated adverse affects are not controlled properly.

Very truly yours,

T. Tominaga

TEUANE TOMINAGA
Acting State Public Works Engineer

R 79-525

July 31, 1979

Mr. Teuane Tominaga
Acting State Public Works Engineer
Dept. of Accounting and General Services
State of Hawaii
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Tominaga:

Environmental Impact Statement for the Honolulu
<u>Program of Waste Energy Recovery (HPOWER) Project</u>

Thank you for your letter of May 7, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

We understand your concern that the proposed HPOWER project might adversely affect DAGS facilities in Shafter Flats. As indicated in the EISPN, the contractors competing for the project have not yet submitted their technical proposals. Should any of the proposals identify the Shafter Flats area as an HPOWER site, the EIS will assess the magnitude of potential adverse effects, and appropriate mitigating measures as necessary.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Belt, Collins & Associates
Environmental Quality Commission

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

April 25, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

EIS Preparation Notice
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Your letter of 10 April 1979 (R-79-179), requesting our assistance in the preparation of the EIS for the HPOWER system was received a few days ago. We do not usually participate in the preparation stage of the EIS so as not to be in conflict with our later review responsibilities. However, a couple of points have come to our attention which we hereby convey for your information and consideration in the preparation of the EIS.

The Pearl City and Waipahu sites are either adjacent to a bird sanctuary or schools. The impacts on these facilities would seem to be potentially great particularly with regard to traffic and processing noise, air pollutants, and traffic safety.

We note that plans call for processing between 600 and 1800 tons of refuse per day. The magnitude of this quantity is substantial particularly when one considers the transportation costs of trucking it to Campbell Industrial Park (CIP). Has any consideration been given to the economics of barge transportation of the refuse from a selected pick up point at Honolulu Harbor to CIP?

Yours truly,

Doak C. Cox
Director

DCC/ck

cc: Jacquelin Miller
Barbara Vogt

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-430

June 25, 1979

Dr. Doak C. Cox, Director
Environmental Center
Crawford Hall, Room 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Dr. Cox:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 25, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and others at the University who reviewed the document.

As indicated in the EISPN, the contracting method being used for this project allows contractors to specify the site they would use. Because of this, the exact locations under consideration will not be known until the official technical proposals are submitted to the City. This is now scheduled for mid-August 1979. The list of possible HPOWER sites contained in the EISPN was based on preliminary information supplied by potential contractors. More recent discussions with them suggest that the Pearl City Penninsula site will not be among those included in the contractors' official proposals. If this proves to be the case, and we believe it will, there will be no threat to the bird sanctuaries. At least one contractor is expected to propose utilization of the Waipahu site identified in the assessment, however, and we will be examining potential effects that this would have on the nearby residential, commercial, and educational facilities in considerable detail.

Transportation costs, as well as the environmental effects resulting from the long distance transportation of solid waste are major concerns of the City, and they are being taken into consideration in the selection of a contractor for the proposed project. At this time, however, it is not expected that barge transportation will be utilized.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh
cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

May 15, 1979

MEMORANDUM

TO: Richard O'Connell, Director
Office of Environmental Quality Control

FROM: Jacquelin Miller *Jacki Miller*

SUBJECT: HPOWER Project

The attached memo contains some preliminary ideas on the HPOWER projects. I thought you might be interested. Any comments or suggestions you care to offer would be appreciated.

JM/ck

from the desk of
RICHARD L. O'CONNELL
Office of Environmental Quality Control
Office of the Governor

- [x] *Thought you'd be interested in subject matter.*
- [ ] *As requested.*
- [ ] *For your comments by* ____________

Frank Doyle
DPW
C&C Honolulu

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

May 10, 1979

MEMORANDUM

TO: John Craven, Dean
Marine Programs

FROM: Jacquelin Miller *Jacki*

SUBJECT: Additional Thoughts on Barged Transport of Solid Wastes with Regard to the Proposed Honolulu Program of Waste Energy Recovery (HPOWER) Project

After our telephone conversation of a few days ago, I dug up some ball park figures on barge transport which makes the idea of barging wastes to Campbell Industrial Park (CIP) look like it would be worth a more careful analysis. I thought you would be interested in looking over the proposed HPOWER program (see attachment) and the figures I've compiled.

Typical local barge capacity (like those used on the recent Ala Wai Dredging Project)	1000 tons
Round trip (Honolulu to CIP)	≈ 4 hrs.
Tug costs:	
Young Brothers	≈ \$150/hr. @ 4 hrs. minimum = \$600
Dillingham	≈ \$210/hr. @ 4 hrs. minimum = \$840
Barge costs	≈ \$300/day

It would appear that for something like \$1500/day, one could transport 2000 tons of refuse/day from Honolulu Harbor to Campbell Industrial Park. If we assume only one trip per day (1000 tons) the cost is essentially half or \$750/day. These figures include wages for marine transport personnel.

In contrast, if we compare costs of operating a large truck the following costs can be assumed:

*Standard refuse truck (6 ton capacity)	= $.20/mile
Round trip (Campbell Industrial Park = 40 miles)	= $8/round trip
Cost per 1000 tons (166 trucks @ $8/round trip)	= $1300/day
Cost per 2000 tons (333 trucks @ $8/round trip)	= $2600/day (exclusive of salaries)

*My guess—info not available from Refuse Department. UH trucks are figured at 17¢/mile.)

Costs in loading and unloading operations immediately come to mind, however, there are a number of possible alternatives that might prove economically feasible such as loading at the existing Sand Island facility into roll-on roll-off trailers; use of specially designed loading nets for the barges somewhat similar to cane nets or dumping into a dredged channel onto a conveyor belt.

The figures presented were compiled from information provided by various people in the tug and barge business and the City & County Refuse Department. They are only "ball park figures" and should not of course be considered as precise economic analyses. They do, however, appear to support the opinion that marine transport of refuse for resource recovery operations should be carefully analysed prior to decisionmaking as to the site selection and plant operation determinations.

I would appreciate your thoughts and suggestions on this idea as soon as possible. If it seems reasonable we should request that barging be considered in the EIS which is currently in the preparation stage.

Thank you for your help once again.

Jackie

JNM/ck

R 79-367

June 8, 1979

Mr. Richard L. O'Connell, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. O'Connell:

Subject: Barge Transport Of Solid Waste For HPOWER

We have completed our review of Jacquelin Miller's letter including cost projections for the barging of refuse between Sand Island (SI) and Campbell Industrial Park (CIP). We believe that further studies are unnecessary and should be discouraged.

The cost comparisons of barging versus trucking which Jackie has presented are unrealistic. Our experience shows that the handling of refuse after collection, and not the actual transport, is the single most expensive cost item associated with disposal operations. Each time refuse is handled, an approximate cost of $6.00/ton is incurred. A barging operation requires refuse to be handled twice (loading at SI, unloading at CIP) which would result in a cost exceeding $12.00/ton. The City's handling and transporting cost for HPOWER will be less than $7.00/ton.

Here are some other factors that need to be considered:

1) Barging requires some means of transporting the refuse from the dock to the resource recovery facility.

2) Barge size may be inadequate since the physical characteristics of refuse dictate sizing by volume rather than weight.

3) Rental and travel time estimates should include the time necessary to load and unload (4 hours round trip too optimistic, realistically 8-12 hours).

4) Surge conditions may restrict the barge delivery of refuse to the facility. HPOWER requires daily delivery of refuse.

We appreciate Jackie's interest in our project and would encourage further participation in HPOWER.

Very truly yours,

Frank J. Doyle

FRANK J. DOYLE
Chief
Refuse Division

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

June 25, 1979

PN:0001

Mr. Wallace Miyahira
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Proposed Honolulu Program of
Waste Energy Recovery (HPOWER)

In our review of the brief outline of the HPOWER project submitted to the University of Hawaii Environmental Center with the EIS preparation notice, some thoughts on the transport of the waste to the resource recovery plant have come to mind.

Preliminary ball-park figures, indicate that barge transport of the solid waste to Campbell Industrial Park could be significantly less costly than the truck transport currently proposed. In discussing the barge mode of transportation with John Craven, Dean of Marine Programs at the University; and Kyran O'Dwyer, Dillingham Tug and Barge Corporation, it appears that the difference in costs could generate a savings of 8-9 fold in salaries, 2000+ gallons per day in fuel, and $8,000,000+ in capital expenses.

These are just rough estimates of course, but the preliminary figures demonstrate the need to examine in detail the feasibility and economics of barging wastes to the resource recovery plant. The positive environmental consequences of such barging could be tremendous: Traffic congestion reduced, air pollutant emmissions minimized, significant fuel energy savings, lower maintenance costs on highways and trucks due to reduced travel, and savings of as much as 900 man hours per day in travel time.

An analysis and evaluation of the barging of wastes to the resource recovery site should be included in the Environmental Impact Statement. For specific information on barge transport, you may wish to contact Mr. O'Dwyer of the Dillingham Corporation. He has indicated that Dillingham Corporation would be most interested in examining the feasibility of such an operation given the necessary information as to the expected tonnage, density, compaction, special handling needs if any, etc.

We appreciate your consideration of this recommendation and look forward to reviewing the EIS. Please keep us apprised of the status of this project.

Yours truly,

Jacquelin N. Miller

Jacquelin Miller
Acting Director

JM/dh

cc: Richard O'Connell
John Craven
Kyran O'Dwyer
Jack Davidson

R 79-538

August 3, 1979

Ms. Jacquelin Miller, Acting Director
Environmental Center
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Ms. Miller:

Subject: Environmental Impact Statement For The
Honolulu Program of Waste Energy Recovery (HPOWER)

This is in response to your letter, PN:0001, dated June 25, 1979 regarding the transport of solid waste by barge for HPOWER. This matter will be addressed in the EIS.

We appreciate the time you have taken to make your concerns known. If you have any additional questions, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: DLU
EQC
Belt, Collins

UNIVERSITY OF HAWAII

LEEWARD COMMUNITY COLLEGE

Office of Special Programs and Community Services

April 30, 1979

Mr. Thomas Vendetta
Department of Public Works
City and County of Honolulu
650 S. King St.
Honolulu, HI 96813

Dear Mr. Vendetta,

Certain instructors at Leeward Community College are interested in being consulted in the preparation of: Honolulu Program of Waste Energy Recovery (H Power), Various Sites on Oahu. Please send us two copies of this preparation notice. Thank you.

Sincerely yours,

Marva Garrett

Marva Garrett, Director
Office of Special Programs and Community Service

cc Department of Land Utilization

96-045 Ala Ike · Pearl City, Hawaii 96782 / Cable Address: UNIHAW
An Equal Opportunity Employer

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-428

June 25, 1979

Ms. Marva Garrett, Director
Office of Special Programs and Community Service
Leeward Community College
96-045 Ala Ike
Pearl City, Hawaii 96782

Dear Ms. Garrett:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Your letter of April 30, 1979, regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project indicated that some instructors at Leeward Community College were interested in being consulted parties in the EIS process. Two additional copies of the Environmental Impact Statement Preparation Notice (EISPN) were forwarded to you for distribution to them. Thus far, we have not received specific comments from any of the L.C.C. staff; I assume, therefore, that the EISPN answered any questions they may have had.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

UNIVERSITY OF HAWAII

Water Resources Research Center

May 14, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Review of EIS Preparation Notice: Honolulu Program of Waste Energy Recovery

Thank you for sending the subject notice for our review and comment.

The following points are suggested for your consideration:

1. For a better presentation, three maps with the same scale may be organized:

   a. One map showing all proposed sites.

   b. One map showing the estimated solid waste from various areas, e.g., Waikiki, Honolulu downtown, Makiki, and etc.

   c. One map showing the optimal routes for collecting and transporting the wastes to proposed site.

2. Location is important with respect to every requirement for handling the waste to the plant, therefore, an optimization of all possible contamination of sites and routes is needed as stated in item 1.

Sincerely,

Yu-Si Fok

Yu-Si Fok, Ph.D.
WRRC EIS Review Coordinator

YSF:jmn

cc: Dr. Mike Chun
Dr. James Moncur
Mr. Ed Murabayashi
Dr. N. Saxena

AN EQUAL OPPORTUNITY EMPLOYER

2540 Dole Street · Honolulu, Hawaii 96822

R 79-522

July 30, 1979

Dr. Yu-Si Fok
EIS Review Coordinator
Water Resources Research Center
University of Hawaii
2540 Dole Street
Honolulu, HI 96822

Dear Dr. Fok:

Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 14, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. Responses to the two specific requests in your letter are as follows:

1. The EIS will contain islandwide and regional maps showing the relative location of the various sites being proposed by potential contractors for the project. It will also show major flow patterns followed by the refuse on its way from the point of generation to the alternative sites, but it is not our intent to portray this in as much detail as you suggested.

2. Transportation costs, as well as the environmental effects resulting from long distance transportation of solid waste, are major concerns of the City, and they are being taken into consideration in the selection of a contractor for the project. Linear programming models have been developed to study costs associated with the transport of refuse to the sites identified in the preparation notice.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Belt, Collins & Associates
Environmental Quality Commission

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII

FRANK F. FASI
MAYOR

GEORGE S. MORIGUCHI
CHIEF PLANNING OFFICER

DGP4/79-1126(CT)

April 25, 1979

MEMORANDUM

TO : MR. WALLACE MIYAHIRA, DIRECTOR & CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : GEORGE S. MORIGUCHI, CHIEF PLANNING OFFICER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)
COMMENTS REQUESTED 4/10/79--DPW REF. NO. R 79-179

We have nothing to add to the proposed outline of topics to be discussed in the proposed impact statement.

Thank you for affording us the opportunity of reviewing your preparation notice.

George Moriguchi
GEORGE S. MORIGUCHI
Chief Planning Officer

GSM:fmt

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-397

June 15, 1979

TO : MR. GEORGE S. MORIGUCHI, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of April 25, 1979 [(Reference number DGP4/79-1126(CT)] regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We are pleased that all of your concerns are being addressed.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Department of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 S. BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

B. K. AIU
CHIEF

April 25, 1979

TO : MR. WALLACE MIYAHIRA, DIRECTOR & CHIEF ENGINEER

FROM : BONIFACE K. AIU, FIRE CHIEF

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) (R 79-179)

We have no comments to offer at this time on the proposed project. However, proposed sites as shown on pages 16 through 19, would have adequate fire protection.

Boniface K. Aiu
BONIFACE K. AIU
Fire Chief

BKA:JF:lhc

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-394

June 19, 1979

TO : MR. BONIFACE AIU, FIRE CHIEF
HONOLULU FIRE DEPARTMENT

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the design, construction and operation of the proposed HPOWER facility. We appreciate the information that you provided regarding the adequacy of fire protection at the alternative sites under consideration. Our consultants, Belt, Collins and Associates, will be contacting you for additional information as the study progresses.

In the meantime, if you have any questions regarding HPOWER, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

BUILDING DEPARTMENT

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

HOWARD M. SHIMA
DIRECTOR AND BUILDING SUPERINTENDENT

B79-330

April 24, 1979

Mr. Wallace Miyahira, Director and Chief Engineer
Department of Public Works
City and County of Honolulu
Honolulu, Hawaii 96813

Attention: Mr. Thomas Vendetta
Division of Refuse Collection and Disposal

Dear Mr. Miyahira:

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPower) Various Possible Sites in Campbell Industrial Park, Waipahu, Pearl City Peninsula, and Shafter Flats

This is in answer to your letter dated April 10, 1979 requesting our assistance in the preparation of an EIS by providing comments on the subject project as it relates to our jurisdiction and responsibility, special expertise, knowledge, or special interest with respect to any environmental impact, study or survey involved with the subject project.

Since our permit approval process is strictly ministerial, this department does not have any comments or recommendations concerning environmental impact of the project.

Very truly yours,

HOWARD M. SHIMA
Director and Building Superintendent

HH/ak

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-406

June 15, 1979

TO : MR. HOWARD SHIMA, DIRECTOR AND BUILDING SUPERINTENDENT BUILDING DEPARTMENT

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT COMMENTS OF APRIL 24, 1979-BLDG. DEPT. REF. NO. B79-330

Thank you for reviewing the environmental impact statement preparation notice for the proposed HPOWER project. We understand that the Building Department's responsibilities are primarily ministerial, and our letter was intended primarily as a means of keeping you informed of a major impending project.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GEORGE AKAHANE, FLOOR LEADER
CHAIRMAN PLANNING & ZONING COMMITTEE

CITY COUNCIL

CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813 / TELEPHONE 523-4000

RECEIVED

April 23, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

With reference to your letter of April 10, 1979 concerning the preparation of an environmental impact statement for the proposed HPOWER project, I have reviewed your EIS Preparation Notice and wish to offer the following comments at this time.

1. On page 12 of the Notice, the section entitled "Consistency With Existing Land Use Plans, Policies, and Controls" should include the General Plan of the City and County of Honolulu. The General Plan was amended by City Council in February, 1979, to include a new section on energy and a policy specific to solid waste energy recovery.

2. The close proximity of especially the Waipahu and Pearl City Peninsula site alternatives to residential communities warrants special attention in your EIS in relation to (1) social compatibility of the sites in terms of effects on the surrounding land use, and (2) acceptability by the communities affected.

Thank you for the opportunity to review and comment on this EIS Preparation Notice.

Sincerely,

George Akahane

GEORGE AKAHANE
Councilman

jt

R 79-405

June 25, 1979

Honorable Rudy Pacarro, Chairman
City Council
City and County of Honolulu
Honolulu, Hawaii 96813

Dear Councilman Pacarro:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 23, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the Honolulu Program of Waste Energy Recovery. We appreciate the time spent by you and your staff reviewing the document.

When it was typed, reference to the Oahu General Plan was inadvertently omitted from the section of the EISPN covering the proposed project's consistency with existing land use plans, policies, and controls. The General Plan is a key policy document, and the proposed HPOWER project's relationship to it will be discussed in the EIS.

Because of the selection process being used in obtaining a contractor for the project, the exact location of potential HPOWER sites given final consideration will not be known until after the contractors' technical proposals are submitted to the Department. As soon as they are, work will be initiated to determine the compatibility of HPOWER facilities on each prospective site with surrounding uses and the proposed facilities' acceptability to nearby communities.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendotta, our project manager for the EIS, at 523-4774.

Very truly yours,

For WALLACE MIYAHIRA
Director and Chief Engineer

cc: Councilman George Akahane

APPROVED:

EDWARD Y. HIRATA
Managing Director

cc: Dept of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4181

FRANK F. FASI, MAYOR
EDWARD Y. HIRATA, MANAGING DIRECTOR

BARRY CHUNG, DIRECTOR
MYRA M. TAKASAKI, DEPUTY DIRECTOR

April 20, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
Honolulu, Hawaii

Dear Mr. Miyahira:

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

We have reviewed the Environmental Impact Statement Preparation Notice for HPOWER and note that the proposed site at Waipahu is directly across Manager's Drive from our Jack Hall Memorial Housing Project, which is presently under construction.

Thank you for forwarding the Preparation Notice.

Very truly yours,

Barry Chung

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI, MAYOR

WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

R 79-396

June 20, 1979

TO : MR. BARRY CHUNG, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of April 20, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). We appreciate the time spent by you and your staff reviewing the document.

The Waipahu site's proximity to existing and proposed residential areas, including the Jack Hall Memorial Housing Project now under construction, makes it of particular concern. As soon as the details of the contractor's proposal for that location are known, we will initiate discussions with residents of the affected area. Possible adverse impacts resulting from construction and operation of an HPOWER facility in Waipahu will be discussed in the EIS.

In the meantime, if you have any questions regarding HPOWER, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF LAND UTILIZATION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU HAWAII 96813

FRANK F. FASI
MAYOR

TYRONE T. KUSAO
DIRECTOR

79/EC-9(JW)
LU4/79-1299

April 18, 1979

MEMORANDUM

TO : MR. WALLACE MIYAHIRA, DIRECTOR & CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : TYRONE T. KUSAO, DIRECTOR

SUBJECT : EIS PREPARATION NOTICE, HPOWER

Your EIS Preparation Notice on the proposed solid waste resource recovery system is well organized and thorough.

The Pearl City Peninsula and Shafter Flats sites are located within the Special Management Area, so projects at these locations would require a Shoreline Management Permit. However, permit procedures and the SMA boundary itself are likely to change as the result of legislative amendments. We will let you know through EIS process of any changes relating to the alternative HPOWER sites.

Other land use controls for the possible project sites are as follows:

LOCATION	ZONING	STATE LAND USE
Campbell Industrial Park	AG-1	AGRICULTURE
Pearl City Peninsula (both)	R-6	URBAN
Waipahu	R-6	URBAN
Shafter Flats	R-6	URBAN

Since the HPOWER facility would be considered a public use, it would be allowable in any zoning district. Building heights, setbacks and other such requirements of the district could be waived upon justification to the Director of Land Utilization.

The Campbell Industrial Park site is located in the State Agricultural District and would probably require a Special Permit. Procedures for this permit may also change as the result of legislative amendments being considered at this time. We will keep you apprised of this.

On behalf of the Mayor's Environmental Committee, which is placed under our Department, we request three additional copies of the Preparation Notice for their review. Please consider this as their "request to be consulted" under the EIS Regulations.

Should you have any questions on this matter, please call Mr. John Whalen of our staff at 523-4077.

TYRONE T. KUSAO
Director of Land Utilization

TTK:sl

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-445

June 29, 1979

TO : MR. TYRONE T. KUSAO, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of April 18, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). We appreciate the time spent by you and your staff reviewing the project.

Your comments regarding land use controls in effect at the various sites are helpful. We would appreciate any additional information available at this time with respect to the legislative amendments referred to in your letter. It is essential that we keep abreast of any changes which may affect the processing of plans for the project, and your offer to keep us apprised of new legislation is extremely helpful in this regard.

If you have any questions or any additional information of which you believe we should be aware, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

OAHU CIVIL DEFENSE AGENCY
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII

FRANK F. FASI
MAYOR

JOHN BOHN
ADMINISTRATOR

April 18, 1979

TO : Mr. Wallace Miyahira, Director and Chief Engineer

FROM : John Bohn, Administrator, OCDA

SUBJECT : Comments On Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

In reference to your letter of April 10, 1979 asking for comments on the Proposed Honolulu Program of Waste Energy Recovery, the following is submitted:

- There are no apparent adverse effects from the standpoint of Civil Defense planning caused by the construction and operation of the proposed HPOWER facility.

- The proposed HPOWER facility site on the Ewa side of Lehua Ave., Pearl City Peninsula, is within the 100-year flood plain shown on the preliminary copy of National Flood Insurance Program Map Panel No. 150001 0110 A. It is recommended that the Department of Land Utilization, as lead agency of the Flood Insurance Program, be asked for comments in this respect.

JOHN BOHN
Administrator

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-407

June 15, 1979

TO : MR. JOHN BOHN, ADMINISTRATOR
OAHU CIVIL DEFENSE AGENCY

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of April 13, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

The possible HPOWER sites shown in the EISPN were based on preliminary information supplied by potential contractors. The analysis and discussion of probable effects that will be incorporated in the EIS will be based on the contractors' final technical proposals. If the Pearl City Penninsula sites depicted in the EISPN are still under consideration at that time, a thorough investigation of potential flood hazards will be conducted.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

FRANCIS KEALA
CHIEF

April 27, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Your letter of April 10, 1979 relating to Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program Of Waste Energy Recovery (HPOWER)

Our department has reviewed the abovementioned subject. At this time we have no specific comments except for the anticipated generation of heavy truck traffic; i.e., 1,200 and 1,800 tpd alternatives. With this information, it is safe to assume that the additional traffic flow anticipated for each different scale project will be a traffic control concern.

Our department will be more adapt to provide specific impacts that may affect our police operations and services, once we receive the selection of a final site, expected generation of refuse truck trips and traffic counts on surrounding affected roadways.

We hope this information will be of assistance to you.

Sincerely,

FRANCIS KEALA
Chief of Police

WC:es

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-395

June 20, 1979

TO : CHIEF FRANCIS KEALA
HONOLULU POLICE DEPARTMENT

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of April 27, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

A detailed analysis of truck traffic generation at each of the possible HPOWER sites will be conducted by our consultants, Belt, Collins and Associates, during the preparation of the EIS. Once the traffic estimates have been made, we will arrange a meeting with your department to discuss the effects of that traffic on your operations.

In the meantime, if you have any questions or desire additional information, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

ROBERT R. WAY
DIRECTOR

TE4/79-1130

May 2, 1979

MEMORANDUM

TO : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : ROBERT R. WAY, DIRECTOR

SUBJECT: YOUR LETTER OF APRIL 10, 1979 REGARDING ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) (REF: R 79-179)

We are satisfied with your proposed procedures to evaluate and mitigate the traffic impact that will be connected with the project.

Robert R. Way

ROBERT R. WAY
Director

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-408

June 21, 1979

TO : MR. ROBERT R. WAY, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of May 2, 1979 (your reference TE4/79-1130) regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document, and are pleased that you are satisfied with the procedures proposed for the evaluation and mitigation of traffic impacts.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

RAMON DURAN
DIRECTOR

May 15, 1979

MEMORANDUM

TO : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : RAMON DURAN, DIRECTOR

SUBJECT: COMMENTS ON ENVIRONMENTAL IMPACT STATEMENT, PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

Figure C shows two possible HPOWER sites on Pearl City Peninsula which may conflict with potential or existing City and County park sites.

Site 3 occupies a portion of an area which is in the early planning stages for a future golf course.

Site 4 appears to be partially superimposed on Pearl City Kai Neighborhood Park.

If further information is required, will you please call Donald Griffin at extension 4521.

Warm regards.

Ron

RAMON DURAN, Director

RD:ls

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-432

June 25, 1979

TO : MR. RAMON DURAN, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of May 15, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

The maps showing possible HPOWER sites that were contained in the EISPN were based on very preliminary information from potential contractors for the HPOWER facility. Final identification of sites under consideration by the bidders will not be made until they submit official technical proposals. If either of the two Pearl City sites which conflict with existing and potential City and County park lands are named in any of the contractors' official technical proposals for the HPOWER facility, we will contact Mr. Donald Griffin of your office immediately.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA
HONOLULU, HAWAII 96843

May 9, 1979

TO : MR. WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF APRIL 10, 1979, ON EIS PREPARATION NOTICE FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

We have no objections to your project. However, because of the large water demand of the project, we recommend that alternative water sources be considered for the non-potable water requirements of the project. We would be glad to assist you on this matter.

The water requirements for the Campbell Industrial Park site should be coordinated with Campbell Estate. We are requiring the Estate to install a new transmission main, a new reservoir, and a new source to accommodate their new tenants. The expansion of their water system should include your proposed project's water requirement.

Our system will be able to handle the 50-60 gpm of water required for process and sanitary purposes on the other sites. However, for the large demand of cooling water needed, there may be problems in providing water. We recommend that you work closely with us so that we can advise you on the course of action to take. We will assist you in evaluating the availability of water in the area and advise you on the improvements that you may need to make water available to your facility.

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

R 79-424

June 25, 1979

TO: MR. KAZU HAYASHIDA
MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER) PROJECT

Thank you for your letter of May 9, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

As indicated in the EISPN, contractors competing for the project are developing their own technical proposals for the facility, and our request for proposals allows them to specify the site and technology which they will use. Hence, the details of the project, including the amount and source of water that would be required, will not be known until the official technical proposals have been submitted to us. This has now been rescheduled for August, 1979.

Contractors' technical proposals will contain provisions for water supplies. As soon as they are available, we will call on you for assistance in evaluating the adequacy of their proposals. In cases where contractors' initial proposals do not offer satisfactory solutions to the water supply problem, they will be returned to them for revision.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

W. Miyahira Jr.
WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

DANIEL K. INOUYE
HAWAII

DAVID M. PETERS
EXECUTIVE ASSISTANT
HAWAII

United States Senate

April 19, 1979

Honorable Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Thank you for your letter of 10 April regarding the preparation of an environmental impact statement for the Proposed Honolulu Program of Wasted Energy Recovery.

Your thoughtfulness in keeping Senator Inouye informed is appreciated.

Aloha,

DAVID M. PETERS
Executive Assistant
Honolulu Office

DMP:jmo

PLEASE REPLY: PRINCE KUHIO FEDERAL BUILDING, ROOM 6104, 300 ALA MOANA BOULEVARD, HONOLULU, HAWAII 96850

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-392

June 14, 1979

Mr. David M. Peters
Executive Assistant, Hawaii
Senator Daniel K. Inouye
Prince Kuhio Office Building, Rm. 6104
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

Dear Mr. Peters:

Environmental Impact Statement for the Honolulu
<u>Program of Waste Energy Recovery (HPOWER) Project</u>

Thank you for your letter of April 19, 1979, regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). The proposed waste energy recovery facility is an important element in the City's plans for meeting Oahu's solid waste disposal needs. We will continue to keep you informed of the project's status.

If you should need any additional information regarding HPOWER, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Yours very truly,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

SPARK M. MATSUNAGA
HAWAII

United States Senate
WASHINGTON, D.C.

CHIEF DEPUTY MAJORITY WHIP

April 23, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Wallace:

Re: Environmental Impact Statement

Receipt of your recent communication addressed to Senator Spark Matsunaga is hereby acknowledged.

Please be assured that it will be brought to the Senator's attention at the earliest possible moment.

Yours truly,

Cherry

C. Matano
Administrative Assistant
to Senator Matsunaga

SPARK M. MATSUNAGA
HAWAII

WASHINGTON OFFICE:
362 RUSSELL BUILDING
WASHINGTON, D.C. 20510

HONOLULU OFFICE:
3104 PRINCE KUHIO BUILDING
HONOLULU, HAWAII 96850

United States Senate
WASHINGTON, D.C. 20510

CHIEF DEPUTY MAJORITY WHIP

CHAIRMAN, SUBCOMMITTEE ON TOURISM AND SUGAR
COMMITTEE ON FINANCE

MEMBER:
COMMITTEE ON ENERGY AND NATURAL RESOURCES
COMMITTEE ON VETERANS' AFFAIRS

May 17, 1979

Mr. Wallace Miyahara
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Wallace:

Thank you for your letter which informed me of the preparation of an Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER).

As you may know, the concept of urban waste recovery is one which I strongly support, especially for Hawaii. The potential benefits to Hawaii of this project are enormous, not only with respect to energy savings, but also with respect to savings of land otherwise required for disposal of the waste materials. I am confident that an economically attractive and environmentally acceptable system can be designed to serve Hawaii.

I appreciate this opportunity to express my support of your efforts in this matter.

Aloha and best wishes.

Sincerely,

Sparky

Spark Matsunaga
U.S. Senator

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-418

June 25, 1979

Senator Spark M. Matsunaga
362 Russell Building
Washington, D. C. 20510

Dear Senator Matsunaga:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 17, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We share your confidence that it will be possible to design an economically attractive waste energy recovery facility which is environmentally acceptable to the people of this island.

We will continue to keep you informed as the project progresses. In the meantime, if you should have any questions regarding HPOWER, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

LIFE OF THE LAND
A GROUP FOR ENVIRONMENTAL RESEARCH AND ACTION

April 17, 1979

Thomas Vendetta
Department of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Vendetta:

Life of the Land would like to be a consulted party on the EIS being prepared for the Honolulu Program of Waste Energy Recovery.

Sincerely,

Dee Dee Letts

Dee Dee Letts
Administrator

DDL:cc
cc: Department of Land Utilization

404 PIIKOI STREET HONOLULU HAWAII 96814 TELEPHONE 521-1300

LIFE OF THE LAND A GROUP FOR ENVIRONMENTAL RESEARCH AND ACTION

Wallace Miyahira
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Re: EIS preparation notice
Honolulu Program of
Waste Energy Recovery

Dear Mr. Miyahira:

Life of the Land would like to remain a consulted party as the HPOWER project develops. We have reviewed the preliminary document sent to us and have the following comments.

1. We support the use of a closed loop cooling system for any plant developed.

2. In subsequent documents we would hope to see more in-depth discussion of heavy metals contained in residue and leachate problems.

3. We would like to see a comparative analysis of existing prototypes and whether or not fossil fuels are also required in the burning process for maximum efficiency.

4. A further discussion of what is meant by "Mitigation measures that could be used to lessen impacts on public utilities will be investigated as well." In our opinion a little competition for the Public Utilities would not be a bad thing.

5. Due to the size and industrial look of a recovery plant we at this time feel it should be located at Campbell Industrial Park.

We look forward to reviewing future documents and feel HPOWER is the right direction for the City to pursue in handling its municipal waste problem.

Sincerely,

Dee Dee Letts

Dee Dee Letts
Administrator

404 PIIKOI STREET HONOLULU HAWAII 96814 TELEPHONE 521-1300

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-414

June 28, 1979

Ms. Dee Dee Letts
Administrator
Life of the Land
404 Piikoi Street
Honolulu, HI 96814

Dear Ms. Letts:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 17, 1979 and subsequent letter (undated) regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by Life of the Land reviewing the document. Item-by-item responses to your comments are listed below.

1. The Contractors' technical proposals will include the details of the cooling system for the proposed facility. These will be evaluated in the EIS.

2. These potential problems and proposed solutions will be discussed in more detail in the EIS.

3. Two processes, mass burning and Refuse Derived Fuel (RDF), are being proposed by the Contractors. A comparative analysis of these prototypes will be included in the EIS.

In general, we do not expect that any of the proposals will require fossil fuels to be burned simultaneously with refuse in order to maintain efficient operation of the facility. However, it is likely that the Contractors will provide for the occasional combustion of fossil fuels in order to meet the reliability requirements of the potential markets for the energy.

4. The reference to lessening impacts on public utilities was not meant to imply that the City and County would attempt to lessen competition. Instead, it refers to the efforts that would be made to insure that the public utility needs of the facility could be met without placing undue stress on the various utility systems.

5. We recognize your concern that the HPOWER facility be located in a suitable area. Possible land use conflicts will be examined for each of the proposals submitted by Contractors.

We are pleased that you share our faith in the value of the HPOWER concept. If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

W E Spencer Jr

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

OMPO

Oahu Metropolitan Planning Organization

Suite 603
Bishop Trust Building
1000 Bishop Street
Honolulu, Hawaii 96813
(808) 523-4178
(808) 548-2638

April 26, 1979

Mr. Wallace Miyahira
Director of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, HI 96813

Dear Mr. Miyahara:

We have received your EIS Preparation Notice concerning the proposed Honolulu Program of Waste Energy Recovery. We congratulate you on the comprehensiveness of your approach.

Your analysis of routes and traffic projections should take time of day for trip into account, since as you are aware, peak hours are the chief congestion problem in Honolulu. This analysis may suggest possible mitigation measures.

OMPO has nothing further to add at this time to the proposed approach to traffic impacts as described on page 10.

We thank you for the opportunity to comment.

Sincerely,

Roy Parker

Roy A. Parker
Executive Director

CDS:ac

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-409

June 15, 1979

Mr. Roy M. Parker
Executive Director
Oahu Metropolitan Planning Organization
1000 Bishop Street, Suite 603
Honolulu, Hawaii 96813

Dear Mr. Parker:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of April 26, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

As you suggested, our analysis will take the temporal distribution of vehicle trips generated by the HPOWER project into consideration. Moreover, we intend to devote considerable attention in the EIS to the topic of mitigation measures.

If you have any further comments or desire additional information concerning the project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

THE OUTDOOR CIRCLE 200 No. Vineyard Honolulu Hawaii 96817

April 30, 1979

Wallace Miyahira
Director & Chief Engineer
Dept. of Public Works
City & County of HOnolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira,

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery

I was most fortunate as a member of the Governor's Environmental Council to review a presentation of this proposed program at our last meeting.

I was favorably impressed with the details that were presented; it is for the "layman" - clear and concise.

The project's whole impact was very clearly stated and The Outdoor Circle would be very interested in its progress.

Our only comments would include the favoring of a site in Campbell Park , in the leeward area where traffic would not present a problem, and landscaping the finished project.

Thank you for this opportuinity to present The Outdoor Circle's views.

Sincerley,

Susan Fristoe

Mrs. Ashby J. Fristoe
President

SF/mw

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-410

June 21, 1979

Mrs. Ashby J. Fristoe, President
The Outdoor Circle
200 North Vineyard Boulevard
Honolulu, Hawaii 96817

Dear Mrs. Fristoe:

Environmental Impact Statement for the Honolulu <u>Program of Waste Energy Recovery (HPOWER) Project</u>

Thank you for your letter of April 30, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time you spent reviewing the document, and are pleased that you found our presentation of the proposed program to the Governor's Environmental Council clear and concise. You will be kept informed of our progress.

Potential traffic impacts of an HPOWER facility will be assessed during the preparation of the EIS. The EIS will contain mitigation measures for sites which would cause traffic problems.

If you have any additional questions regarding the proposed project, please contact our project manager for the EIS, Mr. Tom Vendetta, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

"REPRESENTING ALL THE PEOPLE OF WAIPAHU"

Waipahu Community Association

HONOLULU SAVINGS AND LOAN BUILDING
94-229 WAIPAHU DEPOT STREET
WAIPAHU, HAWAII 96797

TELEPHONE 677-4950

May 7, 1979

Mr. Thomas Vendetta
Department of Public Works
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Vendetta:

SUBJECT: HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER), VARIOUS SITES ON OAHU

The Waipahu Community Association requests being consulted in the preparation of the EIS of the above subject.

Thank you.

Yours truly,

C. O. Anderson
President

lfo

cc: Department of Land Utilization, City & County of Honolulu

"REPRESENTING ALL THE PEOPLE OF WAIPAHU"

Waipahu Community Association

HONOLULU SAVINGS AND LOAN BUILDING
94-229 WAIPAHU DEPOT STREET
WAIPAHU, HAWAII 96797

TELEPHONE 677-4950

July 20, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

This letter is submitted in response to your letter R79-179 dated April 10, 1979, a copy of which was obtained on June 25, 1979 after telephone request. Subsequently, I have spoken with Mr. Tom Vendetta whom I found to be informative and resourceful. Upon his suggestion I disclose having discussed the H-POWER project with Oahu Sugar Company representatives and recognize the need for additional employment opportunities for Waipahu citizens, as well as the probable increased economic benefits to our community. My site selection choice is that of Waipahu.

I have reviewed the tables of technical data presented with your EIS preparation notice and firmly believe the conditions described therein already prevail in the vicinity of the Waipahu sugar mill. I am, of course, addressing noise levels from heavy trucks, industrial noise and odors, pest control, refuse disposal, and management and community relations.

I strongly believe Waipahu would be an excellent location choice because of near-central location proximity to maximum refuse collection areas at present and upon finalization of the proposed Horita development at West Beach in 10 or 12 years.

Please place Waipahu Community Association (or LNO #22) on your distribution list for review of future proposals on H-POWER.

Sincerely,

C. O. "Andy" Anderson
President

COA:lfo

cc: Oahu Sugar Company

COMPRISING OF:
Crestview/Seaview Association, D. O. E. - Leeward District, Friends of Waipahu Cultural Garden Park, Harbor View Neighborhood Association, Leeward Community College, Oahu Sugar Company, Robinson Heights Association, Waikele Neighborhood Association, Waikele Rise Association Waipahu Advocates for the Elderly, Waipahu Businessmen's Association, Waipahu Highlands Association, Waipahu Jackrabbits, Waipahu Recreation Advisory Council, Waipahu Recreation Center.

R 79-545

August 8, 1979

Mr. C. O. Anderson, President
Waipahu Community Association
Honolulu Savings and Loan Building
94-229 Waipahu Depot Street
Waipahu, HI 96797

Dear Mr. Anderson:

Environmental Impact Statement for the Honolulu
<u>Program of Waste Energy Recovery (HPOWER) Project</u>

Thank you for your letter of July 20, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed HPOWER project. We appreciate the time spent by you and others in the community reviewing the document.

We are pleased to know that the Waipahu Community Association is receptive to an HPOWER site in Waipahu. As indicated in the EISPN, contractors competing for the project are now developing technical proposals for the facility which will specify the site and technology they will use. However, the selection will not be known until after price bids are submitted. The price bid is now scheduled for April, 1980.

We will send you a copy of the EIS to review after it has been prepared. If you have any additional questions regarding the project, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Environmental Quality Commission
Belt, Collins and Associates

HAWAIIAN ELECTRIC COMPANY, INC.

Box 2750 / Honolulu, Hawaii / 96840

April 17, 1979

JOHN C. McCAIN, Ph.D
MANAGER ENVIRONMENTAL DEPARTMENT

ENV 2-1
NV/G/NV

Mr. Thomas Vendetta
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Vendetta:

Subject: EIS Preparation Notice - Honolulu Program of Waste Energy Recovery

I am writing in response to the Environmental Impact Statement (EIS) preparation notice to the Honolulu Program of Waste Energy Recovery as published in the April 8, 1979 EQC Bulletin. I would appreciate it greatly if you would include Hawaiian Electric Co. as a party to be consulted during the preparation of this EIS.

If you have any questions, please contact me at 548-6880.

Yours truly,

John C. McCain

JCMc:cm

cc: Department of Land Utilization
City and County of Honolulu

ENV 2-1
YY/R/NV

HAWAIIAN ELECTRIC COMPANY, INC.
Box 2750 / Honolulu Hawaii 96840

May 1, 1979

City and County of Honolulu
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Wallace Miyahira
Director and Chief Engineer

Subject: Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Gentlemen:

Reference is made to your letter of April 10, 1979, subject as above, file R-79-179. Therein you requested comments from the Hawaiian Electric Company (HECO) concerning preparation of an environmental impact statement (EIS) on the Honolulu Program of Waste Energy Recovery (HPOWER). HECO's comments follow:

a. It would appear from the second paragraph on page 4 and the order of the several alternative sites listed at the bottom of the page that the Campbell Estate Industrial Park (CEIP) site has preference. For your information, the SO_2 concentrations in the Barbers Point area are in excess of National Ambient Air Quality Standards. Please refer to figure 5 on page 25 of the attached Proceedings of the Symposium on Air Pollution dated December 1971. The ambient concentrations at the other listed sites are of course unknown at this time but study prior to preparation of the EIS will establish similar comparisons.

b. From prior experience on other projects, HECO believes that the required tall stacks at the CEIP and Shafter Flats sites will pose an unacceptable aeronautical problem to the Federal Aviation Agency (FAA), and to the Air Force and Navy. It is doubtful if a FAA permit for the stacks would be granted at either site.

c. Although the preparation notice does not specifically state the source of power plant cooling water for initial charging and make-up, it is assumed the water will be either fresh or marginally brackish and come from City and County Board of Water Supply sources. The impact of this requirement on the subterranean water lens at each site will need to be evaluated vis a vis other known area requirements.

d. Tables 2 and 3 of the preparation notice on pages 6, 7 and 8 do not discuss the impact on the surrounding environs of drift from the evaporative cooling towers. Under either trade or Kona wind conditions, this could pose a considerable environmental problem over a lengthy period of time to inhabitated areas downwind of the proposed Keehi, Waipahu and Pearl City power plant sites. The problem would not be as severe at the CEIP site, but would still warrant attention.

e. Reference is made to the paragraph on page 10 titled Public Utilities/Energy Impacts. Therein no mention is made of the utility systems that would be required to accept energy from the HPOWER generating plant. These systems may exceed the systems required from the existing public utility services in the vicinity of each site to deliver energy to the processing plant for solid waste. In the case of HECO, the availability of feasible routes for electric transmission lines into and out of each site to accept and deliver energy at 46kv and 138kv respectively must be fully evaluated. Problems in this area can be foreseen for the sites located Waipahu, Pearl City and Keahi since they are located adjacent or in the middle of developed urban areas. The CEIP site would not pose such a problem.

f. Again with reference to page 10, the paragraph on Traffic Impacts, the following point should be fully addressed by the EIS. The effect of the plant and its site location on the increased fuel consumption by trucks hauling solid waste may cause an overall net increase in oil importation to Oahu. If so, the purpose of HPOWER could be self defeating.

We trust the foregoing comments adequately respond to the request of your letter. Should you or your staff have any questions, please do not hesitate to contact me.

Very truly yours,

V. E. Cronkhite
V. E. Cronkhite
Manager
Engineering Design Department

MDW:jst
Attach.
cc: J. F. Richardson
J. McCain
F. Karimoto
W. Johnston

PROCEEDINGS OF THE SYMPOSIUM ON AIR POLLUTION, TURBULENCE AND DIFFUSION

December 7-10, 1971

Edited by H. W. Church and R. E. Luna
Atmospheric Fluid Dynamics Division 5644
Sandia Laboratories
Albuquerque, New Mexico 87115

March 1972

ABSTRACT

The manuscripts reproduced in this collection of proceedings are unrefereed papers presented at the Symposium on Air Pollution, Turbulence and Diffusion at New Mexico State University; their appearance in this collection does not constitute formal publication.

Key words: Meteorology, environment, atmosphere

SYMPOSIUM COMMITTEE

Frank V. Hansen, ASL	Chairman
Henry Rachele, ASL	Treasurer
Hugh W. Church, Sandia	Pgm & Pub
Robert E. Luna, Sandia	Pgm & Pub
Keith Hennigh, PSL	Publicity
Kent Roberts, PSL	Publicity

ACKNOWLEDGMENTS

The Symposium organizing committee wishes to extend special thanks to Hal Lawrence, Director of the Physical Sciences Laboratory, and to the PSL staff for the excellent facilities and support provided. Thanks are also due to Donna Jacobs, Juanita Quesenberry, and Ralph Reynolds of White Sands Missile Range, and to Eva Marie Franks of Sandia Laboratories for their efforts in keeping track of the details necessary for efficient operation of the Symposium.

THE USE OF CLIMATOLOGICAL PREDICTION MODELS FOR INDUSTRIAL AIR RESOURCES MANAGEMENT

Wilfrid Bach,* Barry Root* and Anders Daniels**
University of Hawaii, Honolulu, Hawaii

INTRODUCTION

Air resource management in the U.S. has now reached the point where each of the states is attempting to complete implementation plans which should state in rather specific terms how they plan to meet the ambient air quality standards that have been set for their areas. One tool that could be used to good advantage by both the agencies writing these plans and the industries that will be legally required to comply with the regulations they set forth is the climatological prediction model. In this paper ground level isopleths of sulfur dioxide concentration in the vicinity of an oil refinery in Hawaii have been calculated and compared using both the standard 22.5° sector model and a 1° sector model for both arithmetic and harmonic mean wind values.

THE 22.5° SECTOR MODEL

The basic form of this diffusion model for a continuously emitting point source has been set forth by Martin:(1)

(1) $$\chi = \frac{360\ F\ Q}{\theta\ 100\ 2^{1/2}\ \pi^{1/2}\ \sigma_z\ \bar{u}\ x} \exp[-1/2(\frac{H}{\sigma_z})^2]$$

where χ is the ground level pollutant concentration at a given downwind distance, x.
Q and H are source parameters representing the source strength and effective stack height, respectively.
σ_z is the standard deviation in the vertical direction (a function of atmospheric stability and downwind distance).
F and $\bar{u}$ are the frequency and arithmetic mean wind speed values for each sector of width, θ.

To this should be added a term, $\exp[-\frac{(\ln 2)x}{T_{1/2}\bar{u}}]$ which accounts for the decay of sulfur dioxide with downwind distance where $T_{1/2}$ represents the 'half life' of 4 hours. This form of the equation assumes perfect reflection of the pollutants at the ground. To allow for less than perfect reflection another term $(1 + a)/2$, should be included where a (θ) is the reflection coefficient (a = 1 for $\bar{u}$ (θ) > 7 m/sec, $a = \bar{u}$ $(\theta)/7$ for $\bar{u}$ (θ) < 7 m/sec).(2)

Thus the equation for the model as used in this paper becomes:

(2) $$\chi = \frac{360\ F\ Q}{\theta\ 100\ (2\pi)^{1/2}\ \sigma_z\ \bar{u} x} (1+a) \exp[-1/2(\frac{H}{\sigma_z})^2] \exp[-\frac{(\ln 2)x}{T_{1/2}\bar{u}}]$$

Since climatological wind data is most often available in a format consisting of just the 16 cardinal compass directions the sector width, θ, becomes 22.5°. By computing pollution concentrations at various distances from the source within each of these 16 wind sectors a predicted pollution pattern such as the one shown in Figure 1A might result. The discontinuity at the boundaries between sectors results from the assumption inherent in the use of this model that whenever the wind blows into a specific angular sector each of the wind directions within the sector occur with equal frequency and that a single arithmetic mean wind speed, $\bar{u}$, can be used to describe the magnitude of the wind throughout the sector.

It is relatively simple to eliminate this discontinuity merely by interpolation linearly from the middle of one sector to the middle of the next, etc., until a somewhat smoother set of isolines is produced (Figure 1B). But this is a rather crude way to smooth out the errors in the assumption. A better way to eliminate these errors would be to eliminate the assumption.

*Department of Geography
**Department of Meteorology

THE 1° SECTOR MODEL

Since winds blow with different frequencies and wind speeds within any given sector it would be a much better approach to perform diffusion calculations for each individual 1° sector.

In this case it would be possible to use the Gaussian Diffusion Equation for one wind direction:

(3) $$\chi = \frac{f\ Q}{100\ 2\pi\ \bar{u}\sigma_y\sigma_z} \exp[-\frac{1}{2}(\frac{y}{\sigma_y})^2] (1+a) \exp[-1/2(\frac{H}{\sigma_z})^2] \exp -[\frac{(\ln 2)x}{T_{1/2}\bar{u}}]$$

where f and $\bar{u}$ are the frequency and mean wind speed (arithmetic or harmonic) for each 1° sector. In this case a Gaussian distribution with standard deviation σ_y can be included in the climatological calculations.

The geometry for this model is shown in Figure 2. A receptor at R^0 and a given downwind distance, x_0, will receive pollutants from the source when the wind blows into any of the $R^0 \pm 3^0$ sectors from R^0-11^0 to R^0+11^0. For winds outside this sector we neglect the very minute pollution contribution. The total pollutant concentration at the receptor will thus be the sum of 22 separate contributions.

This model obviously depends upon our being able to define mean wind speed and frequencies for each 1° sector. One of the best ways to interpolate wind data that has been given only for the 16 cardinal directions to data for every one degree is to apply harmonic analysis to the data.

HARMONIC ANALYSIS OF STANDARD WIND DATA

The harmonic analysis used in this paper was carried out as follows:(3)

1. A set of degrees was assigned to each of the 16 cardinal wind directions. Since 360° cannot be evenly divided into 16 sectors the major wind sectors were assigned 23 degrees and the minor ones 22 degrees. Thus the frequency of occurrence of the wind becomes:

(4) $$F_M(J) = \sum_{\theta=\theta L}^{\theta L+22} f(\theta)$$

(5) $$F_N(J) = \sum_{\theta=\theta L}^{\theta L+21} f(\theta)$$

where θL is the leftmost degree in the J-th sector, $F_M(J)$ is the total frequency of occurrence of winds from a major compass point direction (e.g. NE) and $F_N(J)$ that for a minor compass point direction (e.g. NNE) and $f(\theta)$ is the occurrence for wind from θ degrees.

2. It was assumed that the actual wind statistics (speed or occurrence) can be written as a sum of harmonics with some amplitudes, a:

(6) $$f(\theta) = a_1 + \sum_{i=1}^{8} a_{(i+1)} \cos(i\theta) + \sum_{i=1}^{7} a_{(i+7)} \sin(i\theta)$$

3. Summing all the $f(\theta)$ for the 8 major and the 8 minor compass sectors yields a set of 16 equations with 16 unknowns $(a_1 \ldots a_{16})$.

4. A computer program solving this system of equations has been developed. The machine time required for the complete operation is about 8 seconds.

THE WIND DATA

The industrial operation used as the source for these computations is located at Barber's Point, Oahu, Hawaii, immediately adjacent to a naval air station where hourly wind data has been recorded continuously since 1950. A magnetic computer tape of this data was obtained from the National Weather Records Center at Asheville, N.C. Data for the month of January was extracted from this tape and fed into the program for harmonic analysis. January data was selected because onshore winds are most frequent during that month and the location of the refinery is such that only onshore winds will create any significant pollution concentrations over the inland area. Barber's Point itself is a relatively level coastal plain and effects of topography on the diffusion calculations are negligible.

The wind data from the tape was subdivided into 3-hourly periods and sorted for 20 speed classes (1, 2, 3, ... ≥ 20 knots) and for 16 compass points. Harmonic analysis was employed to obtain the frequency for each wind speed class and each degree of wind direction.

For this the following parameters were calculated:

For the 22.5° sector model:

(7) $$F(j) = \sum_{i=1}^{20} FJ(i,j)$$

where i is the number of wind speed classes, and j is the number of wind direction sectors (j = 1 to 16), and FJ(i,j) is the frequency of winds from the j-th direction at speed i.

Similarly,

(8) $$\bar{u}(j) = \sum_{i=1}^{20} FJ(i,j) \cdot u(j)/F(j)$$

and the reflection coefficient α is also expressed as a function of this arithmetic mean wind speed (α ($\bar{u}(j)$)). The stability class for each sector was determined using sector arithmetic mean wind.

For the 1° sector model $\bar{u}$ has, for comparative purposes, been defined in two ways:

In the first instance the arithmetic mean wind data has been used:

(9) $$\bar{u}A(\theta) = \sum_{i=1}^{20} f(i,\theta)u(i,\theta) \Big/ \sum_{i=1}^{20} f(i,\theta)$$

and

(10) $$fA(\theta) = \sum_{i=1}^{20} f(i,\theta) \Big/ \sum_{\theta=1}^{360} fA(\theta)$$

where $\bar{u}A(\theta)$ is the arithmetic mean wind speed for the θ-th degree. fA(θ) is the fraction of the time the wind blows from the θ-th degree and the reflection coefficient α uses $\bar{u}A(\theta)$. The stability class for each degree was here based on the arithmetic mean wind for the degree.

In the second instance the harmonic mean wind data has been used:

(11) $$\bar{u}H(\theta) = \sum_{i=1}^{20} f(i,\theta) \Big/ \sum_{i=1}^{20} [f(i,\theta)/u(i,\theta)]$$

and

(12) $$fH(\theta) = \sum_{i=1}^{20} \{f(i,\theta)[1+\alpha(u(i,\theta))]/u(i,\theta)\}\,\bar{u}H(\theta) \Big/ \sum_{\theta=1}^{360} fH(\theta)$$

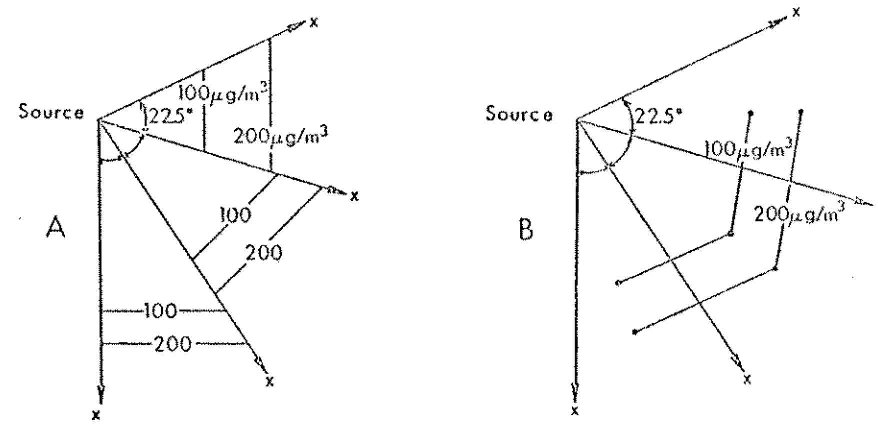


Fig. 1A and B: 22.5 Sector Model with Linear Interpolation

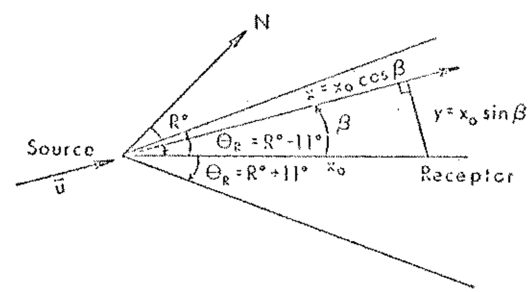


Fig. 2: Geometry of a 1° Sector Model

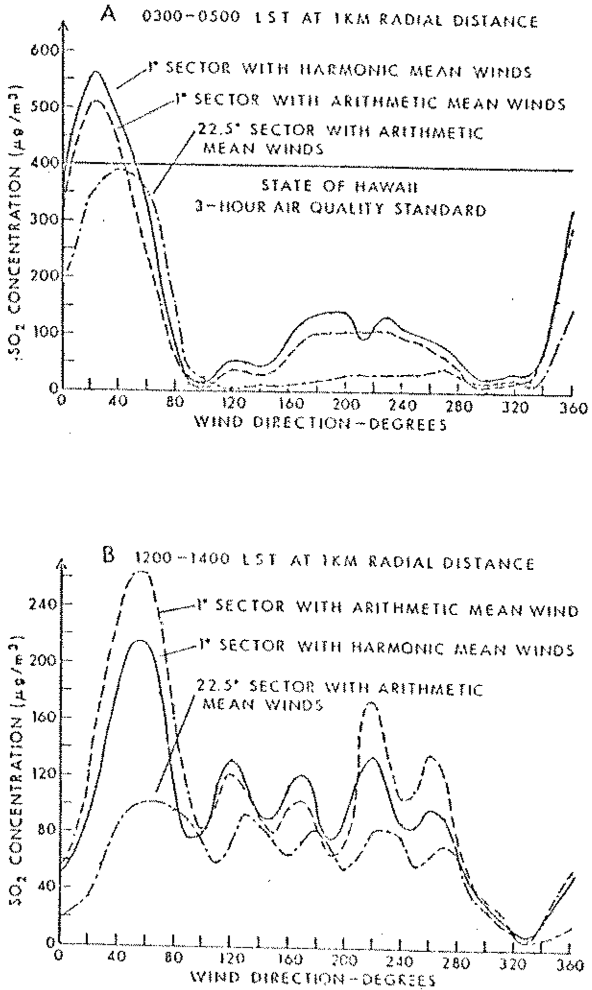


Fig.3A&B SO_2 CONCENTRATIONS AS CALCULATED USING DIFFERENT METHODS

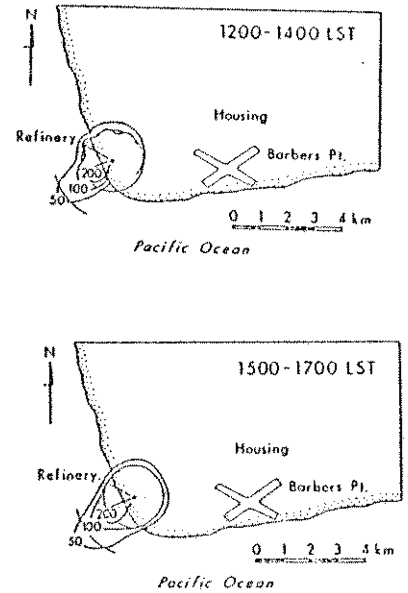


Fig.4 PREDICTED SO_2 - CONCENTRATION ($\mu g/m^3$) AROUND AN OIL REFINERY

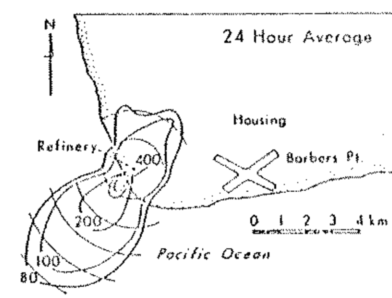


Fig.5 PREDICTED SO_2 - CONCENTRATION ($\mu g/m^3$) AROUND AN OIL REFINERY

where $\bar{u}_H(\theta)$ is the harmonic mean wind speed and $f_H(\theta)$ is the frequency of winds from θ-th degree multiplied by the reflection coefficient α. In this case the stability class for each degree was based on the harmonic mean wind.

The harmonic mean wind has been used here because the diffusion equations clearly show that the concentration, χ, is a function of the harmonic rather than the arithmetic wind speed (see also Hilst).[4]

CONCENTRATION COMPARISONS

Using the University of Hawaii's IBM 360 computer 3-hour climatological pollution concentrations for radial distances of 1 to 10 km were calculated for both of the models using only arithmetic mean winds for the 22.5° sector model and both arithmetic and harmonic mean winds for the 1° sector model. Comparisons of results are shown for the 1 km radial distance for the 3-hourly time periods from 0300 to 0500 LST and time 1200 to 1400 LST in Figures 3A and B.

Using the 1° sector model values of SO_2 concentration exceeding the set 3-hour air quality standard of 400 µg/m³ were found (see Figure 3A). Values of this magnitude would not have been revealed using only the 22.5° sector model.

DAILY PATTERNS OF SULFUR DIOXIDE POLLUTANTS AROUND AN OIL REFINERY

Using the 1° sector model with harmonic mean winds and source parameters of Q_{AVG} = 194 g/sec and H=43m[5] isolines of ground level sulfur dioxide concentrations are shown for the area in the vicinity of the Barber's Point oil refinery for each of the three-hourly time periods on an average January day (Figure 4). The three-hourly allowable standard for SO_2 set by the Hawaii State Department of Health is 400 µg/m³. It can be seen that during the two 3-hour periods, namely between 3 to 5 and 6 to 8 a.m., the air quality standard for SO_2 is exceeded in a small downwind area of approximately 1-2 km away from the source. The average daily pattern is shown in Figure 5. The 24-hourly air quality standard of 80 µg/m³ is exceeded up to 5 km away from the source over the shoreline, and about 2 km inland close to some settlements.

USEFULNESS OF THE MODEL AS A MANAGEMENT TOOL

It is sometimes necessary in refinery operations to 'flare' excess sulfur and if such activities must be conducted it is vital that they be done at a time when diffusion of pollutants is likely to be the greatest. From the maps presented here it can be seen that climatic factors combine to make the hours from 1200 - 1700 the best time of the day to conduct such operations.

Other managerial uses for the model should be obvious. Any time physical parameters such as stack heights or control devices are altered or production is increased or decreased a climatological model can, indeed should, be used to predict what the consequences in terms of ground level pollutant concentrations will be.[6]

ACKNOWLEDGEMENT

This work was supported by the Atmospheric Sciences Section, National Science Foundation, NSF Grant GA-23660.

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DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-433

June 25, 1979

Mr. V. E. Cronkhite, Manager
Engineering Design Department
Hawaiian Electric Co., Inc.
Box 2750
Honolulu, HI 96840

Dear Mr. Cronkhite:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 1, 1979 (your reference ENV 2-1; YY/R/NV) regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. Responses to the specific comments contained in your letter are given below.

a. While the second paragraph on page four of the EISPN mentions only the Campbell Industrial Park site by name, this is not meant to imply that it has preference. Similarly, the order in which the sites are listed at the bottom of page four is not in any way a reflection of their relative desirability. The choice of a site for an HPOWER facility has been left in the hands of the organizations that are competing for the project, and the selection of a contractor will be based on criteria established in the contract documents.

We are aware that the existing concentration of major air pollution sources in the Barbers Point/Kahe area makes the potential air quality impact of an HPOWER facility situated at Campbell Industrial Park of particular interest. We also understand your concern that the construction and operation of a new source within a few miles of your Kahe Point power plant could have implications with respect to possible future expansion of that facility. Because of this, we will devote a very significant proportion of our total work effort to the analysis of air quality impacts. The symposium proceedings attached to your letter are helpful in this respect, and we thank you for including them with your comments.

b. Your comments regarding limitations on stack heights at the Barbers Point and Shafter Flats sites are well taken. Because contractors' technical proposals have not yet been submitted, we do not know what approach they will take with respect to this constraint. It is a problem that must be adequately dealt with, however, and proposed solutions will be discussed with the Federal Aviation Administration to insure their adequacy.

c. The source of power plant cooling water that would be used by contractors will not be known until after their technical proposals are submitted. (Submittals are now scheduled for August 1979). Once the volume requirements and sources are known, it will be possible to analyze and discuss these needs with respect to the sustainable yield of the aquifers being tapped and other water requirements of the region.

d. Your point is well taken. Tables 2 and 3 of the EISPN are from the feasibility study conducted by the MITRE Corporation for the HPOWER project and were intended solely to provide a generalized indication of the types of impacts that could be expected from a facility of this sort. Once contractors have submitted their technical proposals, a much more detailed investigation will be initiated. It will include the evaluation of potential drift effects that you suggested.

e. No utility system "...would be required to accept energy from the HPOWER generating plant." Rather, each prospective contractor is required to demonstrate in its technical proposal that it has made satisfactory marketing arrangements for the products (including electrical power) of the facility.

> "Concrete (written) evidence of successful marketing for the products described in this proposal [should be provided]. (This type of evidence will weigh heavily in the contract award deliberations. The level of commitment will be evaluated on the basis of whether signed contracts or letters of intent for products exist.)" - from p. 51 of "Special Provisions" of the "Request for "Proposals" for HPOWER.

It is expected, therefore, that any proposals which envision HECO as a potential purchaser of electrical energy from the plant will contain provisions for the necessary transmission facilities. Any contractors whose proposal fails to meet this technical requirement will not be allowed to submit a price bid for the project.

f. The EIS will discuss the effect that plant location and other factors have on overall fuel consumption. However, in deciding whether or not the proposed project would have a beneficial or deleterious effect on energy use, fuel use by alternative disposal methods, principally landfill, will be used as the basis of comparison. Since available landfill sites would involve transportation fuel similar to HPOWER, there seems little likelihood that HPOWER would be self-defeating with respect to its effects on fuel consumption.

Assuming that the power product of HPOWER takes the form of electricity--and, in all probability, it will--it will be necessary to insure that contractors' proposals are compatible with your needs. Because of this we expect that we and our consultants on the EIS, Belt, Collins and Associates, will contact you again for comments once the contractors have submitted their technical proposals. In the meantime, if you have any questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WE Spencer Jr

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

GASCO, INC.
A PACIFIC RESOURCES, INC. COMPANY
P.O. BOX 3379 / HONOLULU, HAWAII 96842

HOWARD J. T. LEE
Senior Vice President

May 4, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Following are comments on the Environmental Impact Statement (EIS) for the proposed Honolulu Program of Waste Energy Recovery (HPOWER).

Gasco supports this urgently needed project; and Pacific Resources, Inc. (PRI), Gasco's parent company, is actively assisting one of the qualified bidders in developing a viable bid proposal. However, we would appreciate your consideration of our concerns which deals primarily with only one of the four proposed plant sites; that being the Campbell Industrial Park at Barber's Point.

1. Traffic Hazards and Congestion: Gasco transports liquefied petroleum gas (LPG) from the Chevron refinery to Honolulu in 10,000 gallon tank trucks on Malakole Road, Kalaeloa Boulevard, and H-1. The proposed site abuts Malakole Road and presumably this two-lane road will be used for ingress and egress to the plant by the garbage trucks. The heavy truck traffic will cause congestion not only for our LPG trucks but also for our employees who work at our gas manufacturing plant on Kauhi Street, and to the other tenants and employees of the Park.

2. Air Pollution: Will the plant overload the air basin with pollution so that it will preclude the establishment of any other industrial plant in the area?

3. Water Availability: There is a shortage of potable water in the area; and the advent of this new facility may consume all available water, or the new facility may not be able to get all the water required for the proposed recovery process.

4. Health Hazards: The storage of large quantities of garbage will attract rodents and could be a breeding ground for flies and insects.

Thank you for this opportunity to express our concerns and comments on the proposed project.

Very truly yours,

Howard J. T. Lee

HJTL:RKF:jn

(808) 548-4211 / CABLE GASCO / TELEX 7430292

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-415

June 21, 1979

Mr. Howard J. T. Lee
Senior Vice President
GASCO, Inc.
P.O. Box 3379
Honolulu, HI 96842

Dear Mr. Lee:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 4, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document. The comments contained in your response are addressed on a point-by-point basis below.

1. Traffic Hazards and Congestion. Our analysis of the traffic impacts that would result from establishment of the HPOWER facility in Campbell Industrial Park will take into account the other vehicular traffic using the roadways in that area. Projected traffic volumes will be compared to estimates of roadway capacity to determine whether or not congestion is likely to occur as a result of the HPOWER project.

2. Air Pollution. An extremely detailed air quality impact analysis will be conducted for the EIS and for Federal and State permits that must be obtained before the facility can be constructed or put into operation. One of the topics that must be addressed in the applications for these permits which will be touched on in the EIS is the extent to which HPOWER emissions might limit other industrial development in the air basin.

3. Water Availability. As you have indicated, potable water is currently in short supply in Leeward Oahu. The EIS will discuss the amount of water that would be consumed by each of the HPOWER alternatives and indicate the means that would be used to insure an adequate supply of water for them. It will

also evaluate the extent to which use of water for HPOWER would preclude other proposed activities or uses.

4. Health Hazards. Each of the HPOWER alternatives will be evaluated for its potential effects on rodent and insect populations. Means of preventing or reducing possible adverse effects will be discussed.

Additional information regarding the project will be available following the receipt of technical proposals from prospective contractors. This is currently scheduled for August. In the meantime, if you have any additional comments or questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:civ

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

HAWAIIAN TELEPHONE COMPANY

P. O. BOX 2200 · HONOLULU, HAWAII 96805 · TELEPHONE (808) 537-7111 · CABLE: TELHAWAII

May 10, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Environmental Impact Statement Preparation Notice for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

We have reviewed the subject EIS Preparation Notice and find that the proposed alternative sites for the HPOWER plant and will have no significant effect upon our existing facilities or our ability to provide the necessary communication services to the site chosen.

At present, with the exception of the Keehi (Shafter Flats) site, existing overhead telephone lines either fronts the project sites or are located a short distance from them. It would be just a simple task to extend our service lines overhead to the HPOWER plant installation. However, additional poles will need to be installed to service the Waipahu site and the Pearl City site which is located at the end of Waipahu Avenue. If for some reason overhead services are undesirable, then costs should be included in your project budget for undergrounding of our lines. These costs will be determined after the site selection and notification of your plans.

Existing underground telephone facilities now exist on the Kamehameha Highway side of the proposed Keehi site. It is our intention to serve this site from these underground facilities. Hawaiian Telephone Company will extend a conduit at its cost to the property line of the project only. The conduit required within the project site must be installed as part of the expense of your project.

Whatever construction is to be performed by the Hawaiian Telephone Company at any of the alternative sites will have no significant adverse impact upon the environment as like construction presently exists within the immediate surrounding area and the scope of work is considered as routine or insignificant.

We appreciate the opportunity to comment on your proposed HPOWER project. If there are any further questions, please do not hesitate to call me at 546-3650.

Sincerely,

R. Mau
Richard Mau
E&C Staff Manager

yrk

cc: H. Hu
G. Kaneko

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-425

June 25, 1979

Mr. Richard Mau
E & C Staff Manager
Hawaiian Telephone Company
P. O. Box 2200
Honolulu, Hawaii 96805

Dear Mr. Mau:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 10, 1979 regarding the Environmental Impact Statement Preparation Notice for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document and are pleased to know that the Hawaiian Telephone Company would be able to provide the necessary telephone services to any of the sites indicated in the EISPN.

As soon as the contractors competing for the project have submitted their technical proposals, we will contact you to confirm the availability of adequate telephone service on the sites they have specified.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept. of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

Dana Peterson
2641 Lāmau'u Drive
Honolulu HI 96817

Mr. Thomas Vendetta
Dept. of Public Works
City and County of Honolulu
650 S. King Street
Honolulu HI 96813

28 April 1979

Dear Mr. Vendetta :

I would like to request that you add my name to your list of "consulted parties" for the EIS process on the "HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (H-POWER), VARIOUS SITES ON OAHU".

This opportunity for participation in review of the project plans is very much appreciated!

Sincerely,

Dana Peterson

Ms. Dana Peterson

cc: Dept. of Land Utilization
City and County of Honolulu

BROCK AND ASSOCIATES
SURVEYORS · ENGINEERS

48 MARKET STREET
WAILUKU, MAUI, HAWAII 96793
TELEPHONE (808) 244-7464

FILE: 7000
1st May 1979

Mr. Thomas Vendetta
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Oahu, Hawaii
96813

Dear Mr. Vendetta:

Our firm would like to be consulted in the preparation of the following EIS:

Honolulu Program of Waste Energy Recovery (HPOWER), Various Sites on Oahu, Department of Public Works, City and County of Honolulu.

Thank you.

Very truly yours,
BROCK AND ASSOCIATES

Stephen C. Hynson
Stephen C. Hynson
Planner

:dsk
cc: Department of Land Utilization

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-437

June 29, 1979

Mr. Stephen C. Hynson
Brock and Associates
48 Market Street
Wailuku, Maui 96793

Dear Mr. Hynson:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

A copy of the Environmental Impact Statement Preparation Notice (EISPN) was mailed to you shortly after our receipt of your letter of May 1, 1979. At the same time, we requested any comments you might have regarding the proposed project. As of this date, we have received no further communication from you. Unless we hear otherwise, we will assume that you have no specific comments to make at this time.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:al

cc: Department of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

BROCK AND ASSOCIATES
SURVEYORS - ENGINEERS

48 MARKET STREET
WAILUKU, MAUI, HAWAII 96793
TELEPHONE (808) 244-7464

FILE: 7000
2nd July 1979

Wallace Miyahara
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii
96813

Re: Program of Waste Energy Recovery (HPOWER) Project

Dear Mr. Miyahara:

Thank you for your letter. Our office never received a copy of the EIS preparation notice. Consequently, no comments will be immediately forthcoming.

We would like to obtain a copy of the draft EIS when its preparation is completed, in order to be able to comment on it.

Thank you.

Very truly yours,
BROCK AND ASSOCIATES

Stephen Hynson
Planner

:nkm

R 79-493

July 16, 1979

Mr. Stephen C. Hynson
Brock and Associates
48 Market Street
Wailuku, Maui, HI 96793

Dear Mr. Hynson:

Environmental Impact Statement for the Honolulu
<u>Program of Waste Energy Recovery (HPOWER) Project</u>

This is in response to your letter of July 2, 1979 regarding your request to review a copy of the EIS.

The enclosed EIS Preparation Notice (EISPN) provides information on the general description of the project's technical, economic, social and environmental characteristics as well as a summary of the major impacts and alternatives considered.

Written comments received on the EISPN will be responded to in writing prior to the filing of the EIS.

We appreciate your interest in our project and regret that you were unable to review the EISPN sooner. We will also send you a copy of the EIS to review after it has been prepared.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

Enc.

cc: Dept. of Land Utilization
Belt, Collins & Associates
Environmental Quality Commission

BROCK AND ASSOCIATES
SURVEYORS - ENGINEERS

48 MARKET STREET
WAILUKU, MAUI, HAWAII 96793
TELEPHONE (808) 244-7464

FILE: 7000
July 24, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Oahu, Hawaii 96813

Re: HPOWER EIS

Dear Mr. Miyahira,

Thank you for your letter and the EIS preparation notice. While it appears that impacts and the economics of the project have been or will be considered in detail, I think an equally, if not more important aspect of the project to consider is a net energy analysis, i.e., how many BTU's are going into the construction, maintenance, and waste supply of the plant vs. how many BTU's are recovered. Such an analysis would provide a means for evaluating the energy feasibility of the project. For example, if it takes more BTU's to produce the energy than are recovered, is the plant really worthwhile?

Perhaps such an analysis has already been carried out. If so, I would be interested in obtaining this material.

Also, our firm would like to obtain a list of the qualified contractors for the project.

Sincerely,
BROCK AND ASSOCIATES

Stephen C. Hynson

Stephen Hynson
Associate, Planning

lk

R 79-537

August 3, 1979

Mr. Stephen C. Hynson
Brock and Associates
48 Market Street
Wailuku, Maui, HI 96793

Dear Mr. Hynson:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of July 24, 1979 regarding the EIS preparation notice for the proposed HPOWER project. We appreciate the time spent by you reviewing the document.

The exact heat energy or electrical energy that may be expected from the project will depend on the technical characteristics of the plant designs that are proposed. In general, it is expected that an 1800 ton per day facility will net approximately 35 megawatts of electricity. The attached excerpts on energy balance for energy systems from EPA's Resource Recovery Plant Implementation: Guides for Municipal Officials, TECHNOLOGIES, 1976 are provided for your information. A discussion of net energy will be provided in the EIS.

The following contractors are expected to submit technical proposals for HPOWER on August 15, 1979:

1. Amfac Inc./Combustion Engineering, Inc.
2. Occidental Research Corp.
3. Raytheon Service Company
4. Teledyne National
5. UOP Inc.

If you have any additional questions regarding the project, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

Attach.

cc: Dept. of Land Utilization
Environmental Quality Commission
Belt, Collins and Associates

experienced severe design and operating problems. Failure to employ design features already proven in other plants, largely due to an attempt to cut costs, is the primary reason for the problems experienced.

Another new steam generating incinerator, which is located in Saugus, Massachusetts, sells superheated steam to an adjacent industrial user. The market was obtained before the plant was built. This plant, which began operating in 1976, was privately constructed as a profit-making venture. It is owned jointly by a combustion systems manufacturer and a waste disposal contractor.

The overall operating experience of waterwall combustion systems in the U.S. and Europe varies. There are examples of both good and bad operations. That is, some units have performed reliably, been economically acceptable, and sold steam or electricity to a user on a regular basis. This is particularly true of units in Europe installed within the past 5 to 8 years by reliable, experienced companies. Other facilities which have been either designed or operated poorly or which have not developed markets for their steam output have exhibited technical or economic problems.

Waterwall combustion systems or components are available from a variety of manufacturers. Wheelabrator-Frye (representing the Von Roll Company of Zurich) and Universal Oil Products (representing the Josef Martin Company of Munich) are marketing complete systems. Components (boilers and stokers) are available from Babcox and Wilcox, Combustion Engineering, Foster-Wheeler, Riley Stoker and Detroit Stoker.

Energy Balance. Figure 2 shows an energy balance for a waterwall furnace burning mixed municipal solid waste. In a well designed and operated unit, more than 97 percent of the combustible matter is consumed to liberate heat for steam generation. European design and operating practices indicate that approximately 62 percent of the energy in the refuse can be converted into steam. After accounting for the energy used to operate the waterwall furnace, 59 percent of the input energy is available for sale to a customer. This is among the highest energy efficiencies of any of the systems discussed in this report.

Recent design changes have been made by Wheelabrator-Frye in the plant they have installed in Saugus, Massachusetts, which may enable the waterwall furnace to operate at 70 percent excess air. If these changes resolve the severe corrosion problems encountered in previous attempts to operate at low excess air, then up to 67 percent energy recovery could be realized.

Residues produced from the combustion of refuse in waterwall incinerators represent approximately 10 percent by volume of the input waste and 25 to 35 percent of their original weight. Residues consist of ash, glass, ferrous and nonferrous metals, and unburned organic materials. Recovery techniques use the unit operations described in Section IV. Unrecovered residue must be buried in sanitary landfills to minimize leaching problems.

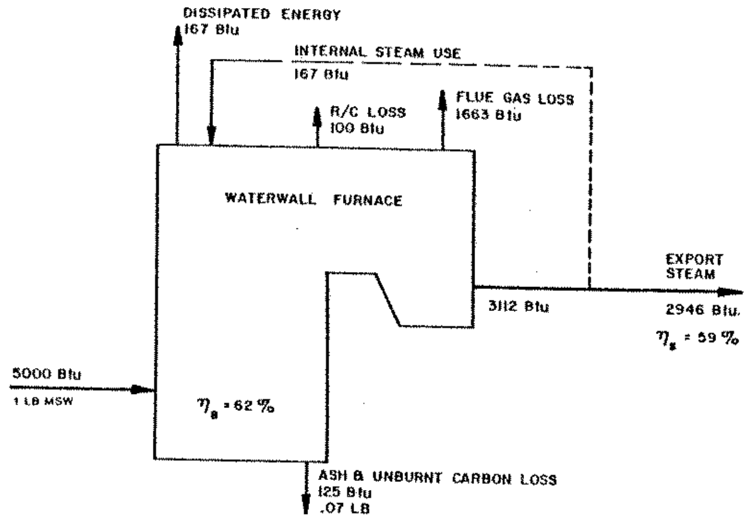

Figure 2. Waterwall Furnance Energy Balance*

*This balance was based upon data obtained from:

Stabenow, G., Performance of the New Chicago Northwest Incinerator, In Proceedings; 1972 National Incinerator Conference, New York, June 4-7, 1972. New York, American Society of Mechanical Engineers, p. 178-194.

Barniske, L., and W. Schenkel, Entwicklungsstand der Muellverbrennungsanlagen mit Waermeverwertung in der Bundesrepublik Deutschland, In Proceedings; Conversion of Refuse to Energy, Montreux, Switzerland, November 3-5, 1975. New York, Institute of Electrical and Electronics Engineers, p. 91-96.

Stephens, W. C., and R. I. Simon, An Economic and Financing Model for Implementing Solid Waste Management/Resource Recovery Projects, In Proceedings; Conversion of Refuse to Energy, Montreux, Switzerland, November 3-5, 1975. New York, Institute of Electrical and Electronics Engineers, p. 422-427.

Energy Balance. An energy balance has been developed for a typical fluff RDF system (See Figure 4). It is based on a system having two stage shredding; a trommel screen; air classification; and truck transport to a user 15 miles away. Sixty-two percent of the raw waste is assumed recovered as RDF.

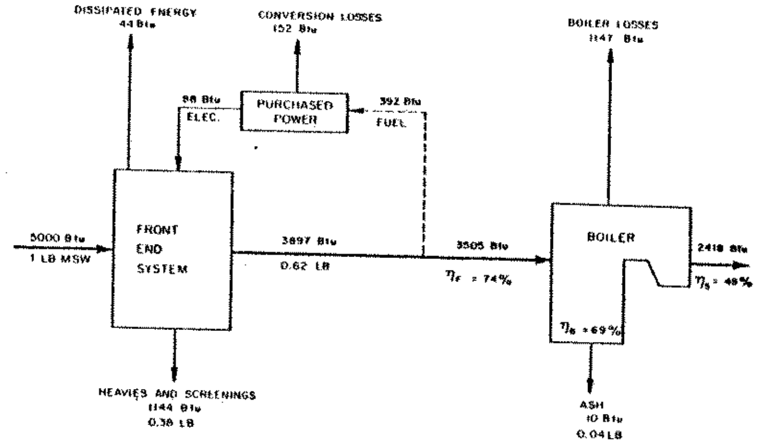

Figure 4. Fluff RDF Energy Balance*

*This balance was based upon data obtained from:

Shannon, L. J., M. P. Schrag, F. I. Honea, and D. Bendersky, St. Louis/Union Electric Refuse Firing Demonstration Air Pollution Test Report, August 1974. Washington, Office of Research and Development, U. S. Environmental Protection Agency. 108 p.

Proceedings; National Center for Resource Recovery, Inc., Seminar, U. S. Environmental Protection Agency, Municipal Environmental Research Laboratory, Cincinnati, Ohio, December 3-4, 1975. Session V, "Unit Processes for Materials Recovery."

Rigo, H. G., Technical Evaluation of the Feasibility of Burning Eco-Fuel at Philadelphia Naval Shipyard, January 1974. Construction Engineering Research Laboratory, Letter Report E-25. 54 p.

Product Characteristics. RDF is clearly an inferior fuel to coal in practically every parameter except sulfur content (Table 5). However, when fired at low rates--10 to 20 percent of power output--boiler operation and maintenance problems are not expected to increase measurably. However, there is only very limited experience to verify this.

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

ENV 79-143

May 22, 1979

Mr. Fred J. Rodriguez
Environmental Communications Inc.
P. O. Box 536
Honolulu, Hawaii 96809

Dear Mr. Rodriguez:

Subject: Additional Comments on the EIS Preparation Notice for the West Beach Project

In addition to the comments we made in our letter ENV 79-127, dated May 4, 1979, we wish to add the following:

1. A potential HPOWER site is being considered within the Campbell Industrial Park north of Malakole Road which might impact on the proposed West Beach development. Additional information is contained in the attached EIS Preparation Notice for HPOWER, including a location map (page 16, Figure A) of the industrial park site.

2. Item 9 of our May 4, 1979 comments should be amended to read - "The cost of refuse collection and disposal, whether private, municipal, or both, should be identified. The total cost of municipal collection and incineration for the 1978-79 fiscal year is expected to be $48.48 per ton."

Very truly yours,

for WALLACE MIYAHIRA
Director and Chief Engineer

Attach.
cc: Dept. of Land Utilization
Div. of Refuse Collection & Disposal

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

May 30, 1979

Mr. Wallace Miyahara, Director & Chief Engineer
Department of Public Works,
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahara,

Subject: West Beach Resort Project
EIS Preparation Notice

We have received your additional comments on the above-mentioned EIS Preparation Notice. With regard to your first item on the HPOWER site, we have noted that the HPOWER site (identified on page 16, Figure A, of the EIS Preparation Notice for HPOWER) is below the planned Barbers Point Deep Draft Harbor. This location in the Campbell Industrial Park area, as well as the condition that the HPOWER facility conform with the applicable environmental considerations (as stated in your EIS Preparation Notice), is unlikely to present any conflicts with the West Beach Resort Project. Your concern on this matter is appreciated. We will, of course, be available to meet with you and your staff on the future planning anticipated, and any subsequent impacts.

Item 2 of your letter requests that an updated figure on municipal collection and incineration ($48.48 per ton in 1978-1979 fiscal year) replace that which was provided in your earlier letter of 4 May. We will comply with this request.

Yours very truly,

F. J. Rodriguez

FJR/dhk

cc: West Beach Resorts
Department of Land Utilization
Environmental Quality Commission
Corps of Engineers
John Chapman

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 79-444

June 29, 1979

Mr. F. J. Rodriguez
Environmental Communications, Inc.
P. O. Box 536
Honolulu, Hawaii 96809

Dear Mr. Rodriguez:

Subject: Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER) Project

We are pleased to know that you have reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the proposed HPOWER project and have found that it is unlikely to present any conflict with the West Beach Resort Project.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

PJW:lh

cc: Dept of Land Utilization
Belt, Collins and Associates
Environmental Quality Commission

UNITED REFUSE COLLECTORS ASSOCIATION OF HAWAII
P.O. BOX 6140
HONOLULU, HAWAII 96818

July 12, 1979

City & County of Honolulu
Department of Public Works
Division of Refuse
Honolulu, Hawaii

Attention: Mr. Wallace Miyahira

Dear Mr. Miyahira:

SUBJECT: Comments Submitted for Consideration in the Preparation of an EIS for HPOWER

The United Refuse Collectors Association of Hawaii (URCAN) wishes to express their appreciation for being offered this opportunity to comment on the environmental effects of the "Proposed Honolulu Program of Waste Energy Recovery (HPOWER)". Since at least half of all solid wastes are collected by URCAN and other private haulers, we do feel that we have a vital concern that this project will be beneficial to the people of Oahu. We feel that our involvement should be not only that of a contributor of raw refuse to this facility but also in its development and eventual successful and acceptable operation. In this effort, we realize environmental impacts will be created by the plant and must be covered by the EIS. Our comments will generally cover the following points:

1. Site and architecture of the building, including landscaping;
2. Construction procedures;
3. Water and waste water;
4. Noise;
5. Odors;
6. Air quality;
7. Traffic;
8. Social and economic impacts;
9. Energy.

1. SITE DEVELOPMENT, ARCHITECTURE AND LANDSCAPING

Guidelines established by the management of Campbell Industrial Park (CIP) must be followed at all possible sites with CIP standards applied with the same level of effort. A tour of existing plants indicates clearly that these standards have indeed produced attractive and aesthetically acceptable surroundings. Also, the standards requirement for the inclusion of abundant, well maintained landscaping, well designed buildings, and site improvements have made the Park into a very pleasant area. We recommend CIP standards be carefully studied and adhered to wherever possible.

The plant location will determine the type of landscaping that will be most attractive and blend in with surrounding buildings, trees and shrubbery in the area. The buildings should be set back from main streets so that a wide grassed area may be provided. Trees, shrubs and other plantings may be easily adapted to screen areas, fences and some industrial activities. Provision for irrigation is required for continued growth and maintenance of planted areas.

The Park has an existing Master Plan for landscape work which covers types and numbers of trees for the frontage set-back area. For maximum screening effect, use of high and dense foliage would successfully meet CIP guidelines.

2. CONSTRUCTION PROCEDURES

There is no doubt that there will be some deleterious impact during construction. Although this cannot be avoided, it is possible to mitigate the effects. Primary impacts during construction are dust, erosion, noise, more and heavier traffic. Some impacts are beneficial: more employment, expenditures for materials, supplies, fuel, and food --- thus creating more income for the area. Effective measures should be undertaken for dust control---mainly sprinkling on a continuing basis. Existing City & County regulations for erosion control should also be followed to the letter.

Construction safety requirements (both State and Federal) will assure minimum noise production as well as provide for maximum safety for the construction crew. Although it is evident that there will be some increase in traffic, the fact is that the Park already experiences considerable heavy traffic now (concrete trucks, lumber trucks, etc.), and the increase due to this construction effort is not expected to produce any serious effect.

The completed plant, when in operation, should be expected to produce minimum deleterious environmental effects.

3. WATER AND WASTE WATER

It is imperative that all possible sites have provision for an adequate supply of process water. The volume of water which may be used by HPOWER is dependent upon the successful proposer's scheme of mode of operation. The quantity of water needed will therefore be determined when the final choice of a process system has been approved by the City. Potable water will be needed for human use (drinking, showers) as well as for other purposes. The great bulk will be the volume required for process use. Brackish water (and even sea water) is readily available at the site and may be utilized for cooling and other uses where potable water is not necessary. A large amount will be required if the plant is to produce steam as an energy form.

Waste water may be:

A. Warm water which has been used for cooling and may be acceptably discharged through existing drainage structures to the ocean;

B. Sewage which must be treated before discharge. Acceptable techniques could be septic tanks or package plants with discharge of effluent into suitable disposal wells. This is the method now in use throughout the Park.

4. NOISE

When the plant is in operation, noise sources may be divided into two classes: 1) Noise generated outside the building, and 2) Noise generated inside the building.

Outside generated noises will be mainly from truck traffic and will be negligible since, as mentioned above, heavy trucks are already moving through the Park. The refuse vehicles arriving to discharge their loads will be contributing very little to the existing decibel (dB) level.

Inside the building, noise will be generated by the equipment and machines, but all this equipment should be provided with noise suppression devices to the best degree possible. The

highest noise producer will be the shredding machines. The building housing this equipment should be insulated for noise suppression and the machine itself should also be provided with integral noise control means. Noise will also be produced by moving conveyor belts, rotary screens, feeding devices to the boilers, ash removal equipment and pusher tractors on the tipping floor. Refuse trucks entering the buildings (which should be kept under negative pressure) should be unloaded only after entry doors are closed---thus containing most noise within the building. Entry doors should be automatically opened and closed to reduce the possibility of inside noise being heard outside the building. The previously mentioned landscape program will also provide noise suppression.

5. ODORS

Although some odors will certainly be present within the building, the creation of negative pressure will keep all odors inside. Mechanical ventilation should be used to move inside air to the furnaces for fuel combustion and concurrently consume odors. The tipping floor should be free of all refuse at the day's end. This will also effectively eliminate insect and rodents.

6. AIR QUALITY

It is certain that some air pollutants will be generated by this facility. This will include sulfur oxide (SO_x), nitrogen oxide (NO_x), carbon monoxide (CO), and some particulates.

Because solid wastes are very low in sulfur content, burning of a refuse derived fuel (RDF) will result in only insignificant quantities of SO_x.

The generation of NO_x can be controlled to a high degree by boiler design. Relatively low combustion temperature tends to reduce NO_x discharges. Also, free carbon, always present when RDF is burned, further reduces NO_x production.

Release of CO is an indication of poor combustion which will certainly be avoided by controlled techniques in the furnaces. A well operated boiler should not release any CO.

Particulates should be retained by properly designed three stage electro static precipitators.

Except for escaping dust, air quality should not be measurably deteriorated by this facility.

7. ENERGY

Perhaps the most important beneficial environmental impact which this project will have is the utilization of the energy inherent in solid waste. The BTU value of RDF is at least one-half that of coal. We have not only been wasting this energy source but have used additional energy to bury or burn it with no significant energy return. The project will, in addition to reducing landfill requirements and reusing recoverable materials (steel and aluminum and even the ash), provide an economical energy potential for Oahu---possibly as much as five percent of our total requirement; and this could be the equivalent of reducing oil importation by one million barrels per year.

The selection of a final site location should also take into consideration the amount of energy required to move solid wastes to the site. For example, we are certain that a requirement for all usable solid waste generated on Oahu to be transported to CIP rather than existing disposal areas will cause a significant increase in the amount of energy and time expended. These factors will cause an increase in both the City and private sector ton mile hauling costs. One method to alleviate these costs would be provision by the City of suitably located transfer stations and it is urged that such transfer stations be included as part of HPOWER rather than has a separate project.

Again, on behalf of our Association and the private sector, thank you for the opportunity to submit our comments.

Very truly yours,

UNITED REFUSE COLLECTORS
ASSOCIATION OF HAWAII

F. T. McGuire

Frederick T. McGuire
President

FTM:MB:amk

R 79-546

August 8, 1979

Mr. Frederick T. McGuire, President
United Refuse Collectors Association
of Hawaii
P. O. Box 6140
Honolulu, HI 96818

Dear Mr. McGuire:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your very comprehensive letter of July 12, 1979 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We greatly appreciate the time spent by you and others in the Association reviewing the document and preparing your thoughtful comments.

We are fully aware of HPOWER's possible impact on Oahu's private refuse collectors. It has therefore been the policy of the Refuse Division to see that the members of your organization are able to provide input at various stages of our planning. The Refuse Division has met with representatives of the United Refuse Collectors Association on a number of occasions regarding HPOWER procurement and the preparation of the Oahu's Solid Waste Management Plan.

On resource recovery matters, the HPOWER Overview Committee is charged with maintaining close communication and cooperation between the private sector and our Department. Mr. Bill Peterson of your organization sits on that Committee and has done an excellent job of representing the interests of the private haulers. The transportation cost analysis that is being conducted as part of our study of the HPOWER project has been designed specifically to answer questions raised by members of your organization. Results of that analysis will be part of the process to select a contractor for HPOWER.

Mr. Frederick T. McGuire
Page 2
August 8, 1979

The points made in your letter relative to the location of transfer stations are well taken. The need for transfer stations is currently being examined by consultants. Should the need for new transfer stations be established, the construction of these stations will not be included in the current HPOWER procurement because of scheduling problems and because transfer station procurement can best be accomplished using standard procurement procedures.

Your remarks concerning particular types of impacts are helpful. As indicated in the EIS Preparation Notice, they will be addressed in the EIS. The mitigation measures you suggested will be discussed as appropriate.

Thank you again for the considerable amount of work you performed in reviewing the Preparation Notice. We will continue to keep you informed as the project evolves. If you have any additional questions regarding the project, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

FOR WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Environmental Quality Commission
Belt, Collins and Associates

GENERAL CONTRACTORS ASSOCIATION OF HAWAII

1065 AHUA STREET • HONOLULU, HAWAII 96819 TELEPHONE 833-1681

May 17, 1979

Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

RE: Proposed Honolulu Program Of Waste Energy Recovery (HPOWER)

The General Contractors Association of Hawaii welcomes this opportunity to comment on the above referenced project.

We wish to congratulate the City on their innovative contracting approach. Your plan of calling on private enterprise for financing, design, construction and operation of the facility and thereby assigning the responsibility to produce a working plant to the best qualified bidder is to be commended. It will allow private enterprise to most efficiently integrate the various disciplines necessary in a technologically advanced project.

We believe this to be a more efficient approach than having several layers of consultants, designers, construction manager, general contractors, subcontractors, inspectors, government agencies and operators integrated into a working project.

The General Contractors Association of Hawaii stands ready to support the private enterprise approach and to participate fully. However, we would like to have your assurances that positive directions will be included in your specifications which mandate the maximum utilization of Hawaii based contractors, subcontractors and suppliers. One such direction could be the inclusion of a credit percentage, similar to the one provided by the Hawaii Product Preference Law, for work that is performed by local contractors.

The package for design, build and operation is certainly going to allow the rate payers of this City to enjoy the most efficient methods available and we congratulate you on your farsightedness.

Very truly yours,

Robert Sheer

Robert Sheer
President

A Full-Service Chapter of the
Associated General Contractors of America, Inc.

R 79-544

August 8, 1979

Mr. Robert Sheer, President
General Contractors Association of Hawaii
1065 Ahua Street
Honolulu, HI 96819

Dear Mr. Sheer:

Environmental Impact Statement for the Honolulu
Program of Waste Energy Recovery (HPOWER) Project

Thank you for your letter of May 17, 1979 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed HPOWER project. We appreciate the time spent by you and others in the Association reviewing the document and are pleased that you found our approach to procurement innovative and efficient.

We fully understand the position of the General Contractors Association of Hawaii with regards to the maximum utilization of Hawaii based contractors, subcontractors and suppliers. HPOWER contract documents already specify that bidders must meet the requirements of law regarding preferences for Hawaii products. However, the law does not provide for the mandatory use of local contractors and subcontractors. We do expect that a job of this magnitude would require major support services from local contractors and subcontractors.

If you have any additional questions regarding the project, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

W E Miyahira Jr.
WALLACE MIYAHIRA
Director and Chief Engineer

cc: Dept. of Land Utilization
Environmental Quality Commission
Belt, Collins and Associates

CHAPTER XII.
SUMMARY OF UNRESOLVED ISSUES

At present, two different bidders are under consideration for HPOWER. As indicated previously, it is expected that one of these will be awarded a contract for the project. However, the City has retained the right to halt the procurement procedure if satisfactory contractual terms cannot be agreed upon or if the price bids received are not responsive to the economic and other objectives that have been established for the project. Hence, until a final contract has been awarded and the City has found that reasonable financing can be obtained, the question as to whether or not the proposed project will be implemented remains an "unresolved issue."

There are also a number of detailed design issues regarding such things as final grading and drainage plans, water system approvals, relocation provisions, and air quality control devices that have been dealt with on a conceptual level, but which have not been given final approval by the necessary agencies. These details must, therefore, be considered "unresolved." However, based on the careful review and analysis of bidders' proposals that has been conducted by the City and a team of technical, environmental, and financial consultants, it appears that both of the proposals still under consideration would be able to comply with applicable standards and to obtain the approvals listed in Chapter IX. Because of this, it is our belief that none of the specific design issues which remain unresolved are likely to become significant obstacles to the successful implementation of the project.

One major question that remains unresolved at the present time is the site that would be used for the facility. If the Amfac/C-E consortium submits the low bid, it is certain that HPOWER would be built on the site specified by them mauka of the existing Waipahu Sugar Mill. The UOP facility could be constructed at any one of three sites that are available. A final choice must await the outcome of negotiations between UOP and the Standard Oil Company regarding the terms under which steam might be sold to the Chevron Refinery. If a satisfactory agreement is reached, the facility would be built on either the Malakole Road or Hanua Street sites, the choice between the two depending upon the outcome of negotiations between the City and the Campbell Estate. If no steam sales agreement is reached, it is likely that the UOP facility would be constructed on the Waipio Peninsula site in order to take advantage of the transportation cost advantage which that location has over the Campbell Industrial Park sites.

Finally, it should be noted that the exact cost of the project, the tipping fee that would be charged the City, the specific financing arrangements and cost (i.e., the interest rate on the bonds that would be issued), and the net disposal cost (i.e., the difference between expenditures and revenues from the sale of energy and materials products) are not known at this time. Some of these questions will be resolved when a contractor is selected, but others will remain unsettled until financing has been concluded.

CHAPTER XIII
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CHAPTER XIV.
COMMENTS AND RESPONSES

The environmental impact statement for the Honolulu Program of Waste Energy Recovery was submitted to the Office of Environmental Quality Control on May 5, 1980. Notice of its availability was published in the EQC Bulletin on May 8, 1980. Letters commenting on the environmental impact statement were received from the agencies, organizations, and individuals listed below. Their comment letters and the responses to them are reproduced on the following pages.

INDEX TO SUPPLEMENTAL INFORMATION IN RESPONSE LETTERS

Where comments indicated significant omissions or errors, the text of the EIS was changed. The text has also been updated to reflect more recent information received from the bidders, especially the Air Quality Impacts section of Chapter IV. The Communication Impacts Section has also been expanded, based on further investigations. Most of the text has not been changed since the May edition as the information in these sections is still current. Many of the comment letters requested supplemental information that was considered of limited interest to general readers. This information was provided in the response letters, but was not incorporated into the EIS, as it did not alter the conclusions reached in the document. However, the following index is provided to help readers locate subjects of major interest.

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED PV

2 June 1980

Honorable Frank F. Fasi
Mayor of Honolulu
530 South King Street
Honolulu, Hawaii 96813

Dear Mayor Fasi:

We have reviewed your Environmental Impact Statement (EIS) for the "Honolulu Program of Waste Energy Recovery (HPOWER)" forwarded to us on 6 May 1980 by your office. We have prepared the following comments for your consideration.

Two of the proposed sites are located in the vicinity of streams. Any discharge of dredged or fill material in these waters will require Department of the Army permits. The four proposed alternative project sites do not lie in any known floodplain and, therefore, are not situated in any designated special flood hazard areas according to the flood insurance study for the island of Oahu prepared by the Federal Insurance Administration, Federal Emergency Management Agency (see attached Flood Insurance Rate Maps) (Incl 1). The subject of flood hazards has been adequately addressed in the EIS. Thank you for the opportunity to comment on your EIS.

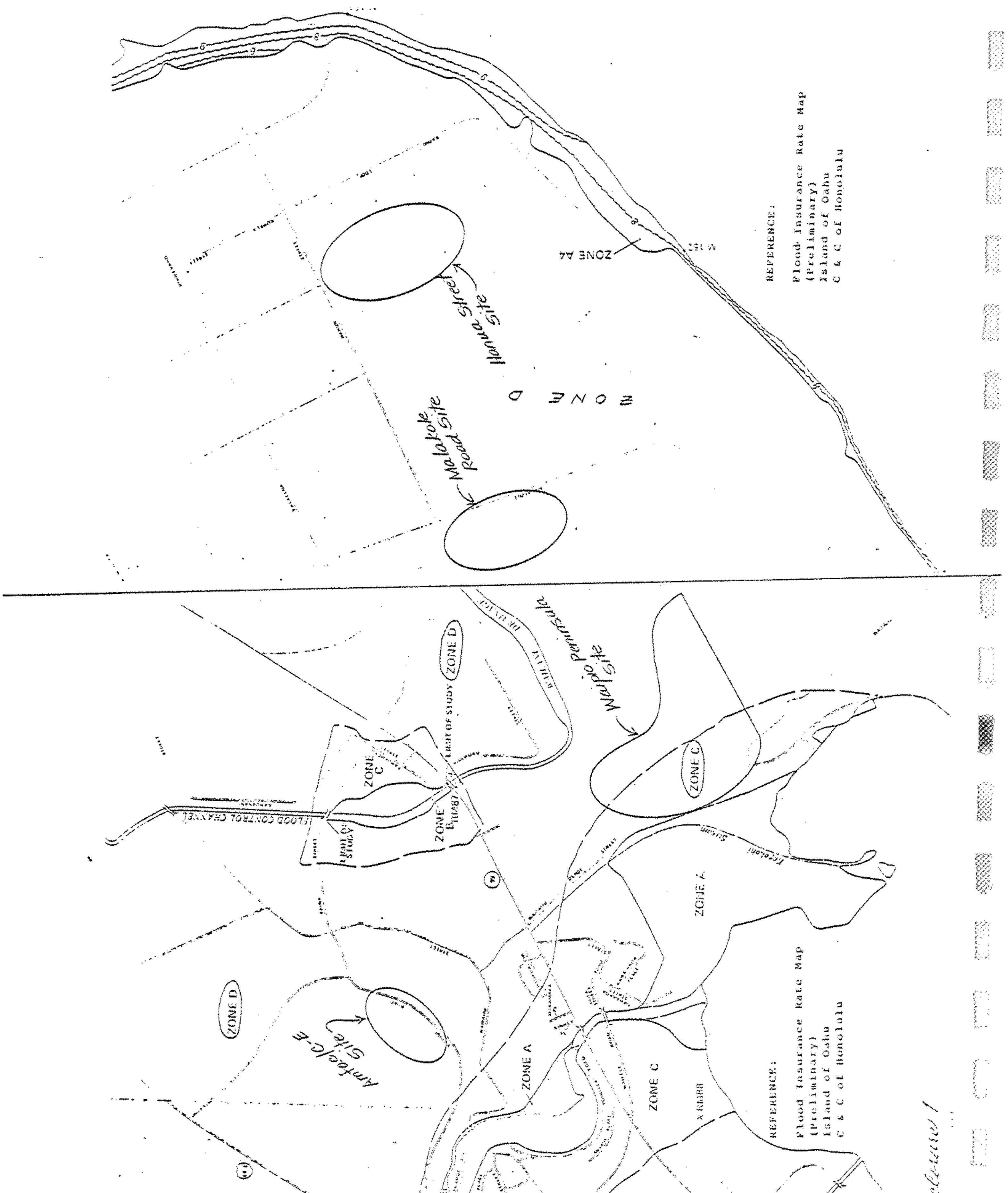
Sincerely,

KISUK CHEUNG
Chief, Engineering Division

1 Incl
As stated

CF: w/incl
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30*	Areas of 100-year flood, base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30*	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.
*	The numerals indicate the magnitude of difference between the 100-year and 10-year flood elevations. For numerals between 1-20, the difference is one half of the value; for values greater than 20, the difference is 10 less than the numerals shown. This information is used in establishing insurance rates.
~~18~~	100-year tsunami or riverine elevation line, with elevation in feet above mean sea level.
	Zone boundary line


ZONE D
Amfac/C-E Site
ZONE A
ZONE C
X 8888
REFERENCE:
Flood Insurance Rate Map
(Preliminary)
Island of Oahu
C & C of Honolulu
ZONE A
ZONE C
Waipio Peninsula Site
ZONE D
LIMIT OF STUDY
ZONE C
ZONE B
LIMIT OF STUDY
FLOOD CONTROL CHANNEL
Enclosure 1
Malakole Road Site
Hanua Street Site
ZONE D
ZONE A4
REFERENCE:
Flood Insurance Rate Map
(Preliminary)
Island of Oahu
C & C of Honolulu

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Kisuk Cheung
Chief, Engineering Division
Department of the Army
U. S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 2, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document, and are pleased that you found the subject of flood hazards was adequately addressed. At this time, it is not expected that the project would involve discharge of dredged or fill material into streams or other waters under your jurisdiction. If this is found necessary, permit applications will be submitted to the Department of the Army.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII
FORT SHAFTER, HAWAII 96858

REPLY TO ATTENTION OF:
APZV-EHE-E

2 8 MAY 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, HI 96813

Gentlemen:

The Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER) has been reviewed and we have no comments to offer regarding the construction, operation, and maintenance of the facility by full-service contract.

Sincerely,

Original signed by

PETER D. STEARNS
COL, EN
Director of Engineering and Housing

Copy Furnished:
Dept of Public Works
City and County of Honolulu
650 South King St., 11th Flr
Honolulu, HI 96813

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Colonel Peter D. Stearns
Director of Engineering and Housing
United States Army Support Command,
Hawaii
Department of the Army
Fort Shafter, Hawaii 96858

Dear Colonel Stearns:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 28, 1980 (your reference APZV-EHE-E) regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

WALLACE MIYAHIRA
Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
Belt, Collins & Associates

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

June 6, 1980

IN REPLY REFER TO:
File 1220-A

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Sirs:

This letter constitutes the official comment of the Federal Communications Commission on the Environmental Impact Statement prepared by Belt, Collins, and Associates for the Honolulu Program of Waste Energy Recovery (HPOWER). The chief of your Refuse Division, Mr. Frank Doyle, also requested our comments on the proposed facility in a letter dated April 25, 1980, and this letter will also serve as a reply to his query. A copy has been mailed to him.

In December, 1976, representatives of the Mitre Corporation conducting a feasibility study for the proposed plant visited our Waipahu Monitoring Station to determine the effect that construction of the facility at the Waipio Peninsula site would have on the operations of the monitoring station. The Engineer in Charge of the monitoring station expressed our serious concerns and was told that the Commission would be contacted if further information was required. Unfortunately, the Commission was not consulted again until April of this year. Mr. Perry White of Belt, Collins, and Associates contacted our Engineering Division informally by telephone after the bulk of the manuscript for the Environmental Impact Statement had already been prepared. We did not receive a copy of the Environmental Impact Statement Preparation Notice.

As a result, the EIS contains no less than eight pages of discussion on the project's impact on bird fossils, but brushes aside the plant's deleterious effect on the electromagnetic environment in three short paragraphs.

The radio spectrum is one of our most valuable natural resources and its preservation should be given commensurate consideration. The Federal Communications Commission has a multi-million-dollar investment in the Waipahu Monitoring Station which must be protected if it is to carry out its public interest mandated missions of radio spectrum management and protection of safety of life and property through its long range direction finder.

The monitoring station is one of thirteen such facilities in the United States and its participation in the network of long range direction finders is vital to location of signal sources in the Pacific region. The Commission's direction finding network is utilized by the U.S. Coast Guard as their only long-range signal location capability for search and rescue.

The presence of objects in the field of view of the direction finder which subtend a vertical angle of more than 3^{o} from the horizon contributes substantially to bearing error. A bearing error of only a few degrees could misplace the location of a downed aircraft or sinking ship in the vast Pacific by hundreds of miles. To avoid the potential for such error, the 150-foot stack of the UOP-proposed plant would have to be at least 2863 feet removed from the direction finder. This eliminates all of the Waipio Peninsula site except the extreme northwest corner as potential locations for the stack.

Similarly, we must point out that the broad-band radio noise generated by switch contacts, commutators, electrostatic precipitators, and high voltage transmission lines--even if minimized through careful selection and design of components--may seriously jeopardize the mission of the monitoring station. In a large portion of the radio spectrum, the sensitivity of our receivers is limited by the level of background radio noise. When the signal being monitored is marginal in strength, even slight differences in background noise can make the differences between hearing the signal or not hearing it.

The Environmental Impact Statement indicates that location of an HPOWER facility at the Waipio Peninsula site would not cause any insurmountable problems with respect to the monitoring station. We are not so certain this is true. The Commission, while recognizing the benefits of the facility to the residents of Honolulu, must go on record as strongly opposing the use of the Waipio Peninsula site and supporting construction on any of the alternative sites, none of which appear to have any greater adverse environmental or economic impact.

We would be happy to provide any further amplification of our concerns you may desire. The contact point in this agency is Mr. David Means of our Engineering Division who may be reached at (202) 632-7593.

Sincerely,

Richard D. Lichtwardt
Executive Director

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-551

October 16, 1980

Mr. Richard D. Lichtwardt
Executive Director
Federal Communications Commission
Washington, D.C. 20554

Dear Mr. Lichtwardt:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 6, 1980 (your file No. 1220-A) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time that you and your staff spent reviewing the document, as well as the additional information that has been provided to one of the bidders (UOP, Inc.) by Mr. Luther and Mr. Means. Your concern for possible adverse effects on the Federal Communications Commission's Waipahu Monitoring Station is understandable, and the remainder of this letter expands on the treatment given the topic in the EIS. The EIS itself has been revised to reflect the more detailed information that is now available.

Early Notification of the Proposed Project

An EIS Preparation Notice announcing the City's intent to prepare an environmental impact statement for the proposed HPOWER project was published in the April 8, 1979 edition of the State of Hawaii, Environmental Quality Commission's EIS Bulletin, and comments were received from many governmental agencies. When a Waipahu Peninsula location emerged as a strong possibility for HPOWER, our EIS consultants, Belt, Collins and Associates, followed up by meeting in person on at least two occassions with Mr. Jack Shedletsky, Engineer-in-Charge of the FCC's Honolulu office. Comments were also solicited by telephone from Mr. David Means of your Washington office. Taken together, these comments highlighted some potential problem areas, but failed to demonstrate in any concrete fashion that an actual problem existed. The FCC's concerns were noted in the EIS, as was the City's commitment to continue efforts to resolve the questions that had been raised. Subsequent to our receipt of your letter, additional research was conducted by UOP that further examined the potential impacts of the proposed HPOWER facility on the Waipahu Monitoring Station.

Areas of Concern

As we understand, there are two aspects of the proposed HPOWER project that are of particular concern to the FCC. First, the structures proposed as part of the project (particularly the 150-foot high stack) have the potential of intruding into the field of view of the monitoring station's radio direction finder, thereby contributing to bearing error that would compromise its effectiveness. Second, there is concern that broad-band radio noise generated by switch contacts, commutators, electrostatic precipitators, and high-voltage transmission lines would interfere with the ability of the station to monitor weak signals.

Height of Stack. With regard to your first concern, i.e., that the facility's stack would project above a conical surface originating at the monitoring antenna and extending in all directions at an angle three degrees above the horizon, you suggested that the HPOWER facility's proposed 150-foot high stack should be at least 2,863 feet from the direction finder. Because of space limitations on the Waipio Peninsula, this is not feasible. However, another, and possibly simpler, solution is to place the stack and other high structures on the far side of the available site relative to your monitoring station while lowering the height of the stack sufficiently to prevent it from subtending the field of view of the direction finder. Preliminary dispersion modeling by the City's air quality consultant has indicated that the stack could be lowered by ten to fifteen feet while still maintaining pollutant concentrations below existing standards. As a result, UOP has agreed to lower their stack height to conform to the three-degree limitation.

Radio Noise. In order to thoroughly understand and address your second concern and to address it in a meaningful manner, a rigorous investigation of the proposed HPOWER project's potential effects on the radio spectrum and radio communications was undertaken by UOP, the only bidder proposing a Waipio Peninsula site. During the course of this investigation, contacts were made with the following: manufacturers of power-generating and ancillary equipment, including General Electric and Westinghouse; manufacturers of electrostatic precipitators; manufacturers of communications equipment; the Illinois Institute of Technology; the Electromagnetic Compatibility Analysis Center of the Department of Defense; the Federal Communications Commission in Washington, D.C.; and the Hawaiian Electric Company. The remainder of this discussion is based on the results of that investigation.

Radio noise exists everywhere, some due to natural phenomena and some due to man-made devices. The man-made devices can be anything from an automobile ignition system to a kitchen blender to a high-voltage power transmission line. The FCC monitoring station on the Waipio Peninsula is now operating in the presence of radio noise with some level of radio frequency interference. This existing background noise represents an ambient condition against which the potential impact of the HPOWER facility should be considered; and it was our hope that data from the FCC's monitoring station would be available to characterize this background noise level, thereby providing a quantitative baseline against which HPOWER-related radio noise might be judged. However, you have explained that such information has never been developed, and, furthermore, that it would be extremely difficult to do so in any meaningful way.

In the absence of actual measurements of the background noise, an effort was made to examine the environment around the monitoring station to identify current sources of radio noise in the presence of which the station is assumed to be successfully fulfilling its mission. These sources include the City's Waipahu incinerator equipped with electrostatic precipitators; overhead transmission lines of the Hawaiian Electric Company along the old railroad right-of-way on the Waipio Peninsula; trucks using the incinerator; a 394-MW power plant less than three miles from the station; the power-generating equipment at Oahu Sugar Company's mill less than a mile and a half from the station; Hickam Air Force Base and the Honolulu International Airport with their attendant power, radar, and communications equipment, as well as the aircraft using these facilities; and ships passing in and out of Pearl Harbor emitting radio noise in several bands including the HF, VHF, and UHF communications bands and radar frequencies. This is the background against which we now consider the proposed HPOWER facility and the equipment of concern to the FCC.

Switch contacts within the proposed facility include switches in the motor control centers, and the circuit breakers and line disconnect switch in the facility substation. In all instances, these are sources of intermittent rather than continuous noise, the noise being produced when the switches are opened and closed. Because the facility is designed to operate on a continuous basis, such switch-contact derived noise is expected to be infrequent. The motor control centers, where one might anticipate switch contacts to be made far more often than in the substation, are themselves housed in grounded metal cabinets which act as a partial shield against the emission of noise when contact does occur. Further, the HPOWER facility substations should not be confused with the sophisticated switching substations having numerous arrays of circuit breakers and/or switches typically associated with utility power stations. The HPOWER substation will have two circuit breakers and one line disconnect switch. Frequent opening and closing of these contacts is simply inconsistent with normal facility operations. We must therefore conclude that noise from switch contacts in the proposed HPOWER facility would be infrequent, shielded, and not likely to even be detectable against existing background noise sources.

Regarding commutators as a potential noise source, the proposed HPOWER turbine-generator contains no commutators. All motors proposed for the facility are squirrel-cage induction type which have no contacts or commutators. Noise emissions from these motors are considered non-existent.

The electrostatic precipitation process necessarily employs high levels of power, high voltage, and corona that could be suspected of generating radio frequency interference. The construction of modern precipitators, however, is such that these potential noise sources are enclosed and contained by heavy metal grounded surfaces which form the gas-tight structure of the precipitator. In the opinion of the manufacturer and supplier of this equipment, the precipitator will not be a significant source of radio frequency interference noise. It should also be noted that electrostatic precipitators were recently installed at the City's Waipahu Incinerator. This equipment is in closer proximity to the FCC monitoring station than the proposed HPOWER facility would be and presumably contributes marginally to existing background noise. Assuming that the precipitators proposed for HPOWER and the existing

incinerator precipitators have similar radio noise emission levels, and considering that radio noise diminishes rapidly over distance, we believe that the proposed HPOWER facility would have even less impact than the existing incinerator, in the presence of which the FCC station is currently accomplishing its mission. In the event the City selects the larger HPOWER facility size option and elects to phase out the existing incinerator operation, background noise due to precipitation equipment would potentially be reduced from present levels due to the increased distance between the equipment and the monitoring station.

High-voltage transmission lines are a source of radio frequency interference. According to the Electromagnetic Compatibility Analysis Center of the Department of Defense, a rule of thumb is that transmission lines having voltages below 70 KV produce discharge noise, and lines having voltages above about 110 KV produce corona noise. The proposed HPOWER facility transmission lines will be connected to existing Hawaiian Electric company lines at the site boundary and will be 46-KV lines. As this is well below the 70-KV level, radio frequency interference from the lines would appear to derive from discharge noises. Discharge noise is a phenomenon of an intermittent nature. It results from currents created by electrical discharges where there are faulty system components or where the system has been subjected to an overvoltage, as from a lightning strike. It follows that discharge noise should not be of concern to the FCC since a transmission system characterized by frequent discharges would prove to be totally unreliable to the HPOWER facility and to the Hawaiian Electric Company long before the resulting noise would become objectionable. Disregarding lightning strikes, discharge noise can be eliminated through proper maintenance of the transmission lines.

Based upon the data supplied by UOP, we can see nothing that demonstrates the likelihood that radio frequency interference from an HPOWER facility would have a significant adverse impact on the monitoring station.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

Mr. Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs

cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

United States Department of Agriculture | Soil Conservation Service | P. O. Box 50006 Honolulu, Hawaii 96850

June 5, 1980

Office of the Mayor
City and County of Honolulu
530 South King St., 3rd Floor
Honolulu, Hawaii 96813

Dear Sir:

Subject: EIS for Honolulu Program of Waste Energy Recovery (HPOWER), Oahu

We have no comment on subject EIS.

Thank you for the opportunity to review the document; the EIS is returned as requested.

Very truly yours,

Otis M. Gryde
OTIS M. GRYDE
District Conservationist

Enclosure

cc:
Dept. of Public Works
City and County of Honolulu
650 South King St., 11th Floor
Honolulu, HI 96813

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Otis M. Gryde
District Conservationist
United States Department
of Agriculture
Soil Conservation Service
P. O. Box 50006
Honolulu, Hawaii 96850

Dear Mr. Gryde:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 5, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:
ES
Room 6307

May 20, 1980

Office of the Mayor
City and County of Honolulu
520 South King St., 3rd Floor
Honolulu, Hawaii 96813

Re: EIS
Honolulu Program of
Waste Energy Recovery
(HPOWER)

Dear Sir:

We have reviewed the HPOWER Environmental Impact Statement (EIS) and offer the following comments. The U.S. Fish and Wildlife Service is pleased that your office is taking the initiative in exploring methods of electrical generation through the burning of refuse.

Of the four possible project locations shown on page II-7, we believe that development of the AMFAC/C-E or Malakole Road sites would have the least impact on fish, wildlife, and their habitat. We recommend avoidance of the Waipio Peninsula Site due to its proximity to West Loch and the endangered and migratory bird habitat therein. We recommend avoidance of the Hanua Street Parcel due to its proximity to plants which are candidates for Federal listing as endangered species.

In this latter regard, the discussions in paragraph 3, page IV-66 and paragraph 2, page IV-67, should be modified as follows:

> The plants noted as being classified as endangered are in fact candidates for this status (Capparis sandwichiana var. sandwichiana, Achyranthes splendens var. rotundata, Euphorbia skottsbergii). Also, Achyranthes indica is introduced, not native.

We appreciate this opportunity to comment and hope our comments are helpful.

Sincerely yours,

Maurice H. Taylor

Maurice H. Taylor
Field Supervisor
Division of Ecological Services

cc: Dept. of Public Works
Hawaii Division of Fish and Game
Endangered Species, FWS, HI

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-479

August 26, 1980

Mr. Maurice H. Taylor
Field Supervisor
Division of Ecological Services
Fish and Wildlife Service
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Taylor:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 20, 1980 regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the project and note your recommendation to avoid the use of the Hanua Street and Waipio Peninsula sites.

Thank you for the information you provided regarding the status of the plants found on the Malakole Road and Hanua Street sites. The third paragraph on page IV-66 has been changed to read:

"Two native species found in this parcel are closely related to proposed endangered Hawaiian plant species but are not themselves endangered. These are the native Capparis sandwichiana var. zoharyi, related to the native caper C. sandwichiana var. sandwichiana, and the exotic Achyranthes indica, which is related to the A. splendens var. rotundata ..."

The second paragraph on page IV-67 has also been modified to reflect the fact that final designation of the plants as endangered species has not yet occurred.

We understand your concern for the plants on the Hanua Street site that are candidates for designation as endangered species. However, the botanical survey conducted for the EIS indicates that such plants are present only on the makai portions of the large parcel that was identified. Should the Hanua Street site be selected, the HPOWER facility would be constructed on a portion of the parcel well away from the endangered species, thereby avoiding damage to the existing colony.

The Waipio Peninsula site discussed in the EIS does not appear to be important to endangered birds found in West Loch. To our knowledge, the City and County's existing Waipahu Incinerator (which is adjacent to the possible HPOWER site and which involves operations very similar to those associated with the proposed resource recovery facility) has not had any significant adverse effect on West Loch fauna.

Based on the facts presented above, the City feels that the use of the Waipio Peninsula site or the Hanua Street site for HPOWER is warranted. If you have any further questions regarding the proposed project, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

Wallace Miyahira
Director and Chief Engineer

WM:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:
ES
Room 6307

September 16, 1980

Mr. Wallace Miyahara
Director and Chief Engineer
City Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Re: EIS for Honolulu
Program of Waste
Energy Recovery

Dear Mr. Miyahara:

Thank you for your letter of August 26, 1980, in reply to our comments on the proposed Honolulu Program of Waste Energy Recovery (HPOWER).

Although the U.S. Fish and Wildlife Service prefers the AMFAC/C-E and Malakole Road sites, the Hanua Street and Waipio Peninsula sites would be acceptable to the Service provided that certain precautions are taken to avoid adverse impacts on endangered and proposed endangered fauna and flora.

At the Hanua Street site, lands on which Achyranthes splendens var. rotundata is found should be excluded from development and protected by means of a buffer zone, 200-feet or greater in width, and protective fencing to prevent entry during and after construction, as suggested in Paragraph 4 on Page IV-70 of the EIS.

The wetland area immediately southwest of the proposed Waipio Peninsula site provides only marginal habitat for endangered waterbirds. Both the State of Hawaii and City and County of Honolulu are evaluating its potential for development as a wildlife sanctuary.

Settling ponds southeast of the proposed HPOWER site do provide significant feeding habitat for waterbirds. These ponds probably would not be directly affected by project construction and operation, and airborne pollutants probably would not adversely impact this area during prevailing NNE tradewind conditions. However, the Service recommends that a survey of wildlife resources in the vicinity of the Waipio site be made to assess any unforeseen impacts which may result from project construction and operation.

We appreciate this opportunity to comment.

Sincerely yours,

Nevin D. Holmberg
Deputy Project Leader for
Ecological Services

cc: ARD-E, Portland
EQC
HDF&G
NMFS
EPA, San Francisco

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-528

October 9, 1980

Mr. Nevin D. Holmberg
Deputy Project Leader
Division of Ecological Services
Fish and Wildlife Service
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Holmberg:

Subject: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of September 16, 1980, which contained additional comments on the Hanua Street and Waipio Peninsula sites for the proposed HPOWER project. We are happy to note your acceptance of the use of these sites provided precautions are taken to avoid adverse impacts on endangered fauna and flora.

Concerning your request for a survey of wildlife resources, one has already been done. As we indicated in the EIS, the Waipio Peninsula site was identified as a possible HPOWER location very late in the selection process. A vegetation survey of the site was conducted and indicated that the area was almost certainly not a significant wildlife habitat. Subsequent to the publication of the EIS, Mr. Phil Bruner, a wildlife biologist at the Hawaii Campus of Brigham Young University, was commissioned to undertake an avifaunal survey of the Waipio Peninsula sites as a means of confirming this tentative appraisal.

Mr. Bruner studied the Waipio Peninsula site during June, 1980. He concluded that the site is used by the typical array of exotic species one would expect to find in similar habitat elsewhere on Oahu (see Table 1, attached). The only representative of a native species that was recorded was one Black-crowned Night Heron observed foraging along the banks of the mud settling ponds makai of the Waipahu Incinerator. Based on this work, it does not appear that use of any of the Waipio sites would have a significant adverse effect on the availability of habitat.

With respect to possible effects on off-site areas from noise and stack emissions, nothing substantial is expected. The existing Waipahu Incinerator is a relatively significant noise source, yet no correlation between bird sighting frequency and proximity to the incinerator was noted. In fact, most birds are remarkably insensitive to moderate noise, as numerous studies of bird populations in the vicinity of airports has shown. Air pollutants emitted from an HPOWER facility would affect birds only if they resulted in greatly elevated ambient concentrations of those pollutants. As indicated in the EIS's discussions of air quality impacts, HPOWER-related emissions would have only a slight effect on pollutant levels. Moreover, the highest concentrations that would occur would not be in areas immediately adjacent to the facility but at some distance.

Thank you again for your comments. If you have any further questions regarding the proposed HPOWER project, please call Mr. Tom Vendetta at 523-4774.

Very truly yours,

Wallace Miyahira

WALLACE MIYAHIRA
Director and Chief Engineer

Attach.

cc: Belt, Collins & Assoc.
EQC
DLU

TABLE 1

Distribution and relative abundance of birds observed at the Incinerator site, Waipio Peninsula (21 June 1980).

Species	Distribution*	Relative Abundance*
Black-crowned Night Heron (Nycticorax nycticorax)	M	R
Cattle Egret (Bubulcus ibis)	G,M,B	C
Golden Plover (Pluvialis dominica)	G,M	R
Ruddy Turnstone (Arenaria interpres)	G,M	R
Spotted Dove (Streptopelia chinensis)	G,B	U
Barred Dove (Geopelia striata)	G,B	A
Myna(Acridotheres tristis)	G,B,M,O	C
Norbhern Cardinal (Cardinalis cardinalis)	B	U
White-eye (Zosterops japonica)	B,G	C
House Sparrow (Passer domesticus)	B,O	U
Spotted Munia (Lonchura punctulata)	G,B	C
Black-headed Munia (Lonchura malacca)	G,B	C

Key * Distribution:
G= Grassland
M= Mud flats
B= Brush
O= Open ground

Abundance:
A= Abundant (50+ recorded)
C= Common (25-50 recorded)
U= Uncommon (5-25 recorded)
R= Rare (1-5 recorded)

U. S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
HONOLULU AREA OFFICE
300 Ala Moana Boulevard, Suite 5122
P. O. Box 50072
Honolulu, Hawaii 96850

Telephone: 54603157

May 9, 1980

State of Hawaii
Environmental Quality Commission
Office of the Governor
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Subject: HPOWER EIS - Return Without Comment

We return, herewith, the above project without comment, our expertise being bounded by the professional area of Occupational Safety and Health.

Paul F. Haygood
PAUL F. HAYGOOD
Area Director

cc: Office of the Mayor, City and County of Honolulu
Dept. of Public Works, City and County of Honolulu

PFH:ls

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Paul F. Haygood
Honolulu Area Director
Occupational Safety and
Health Administration
U.S. Department of Labor
P. O. Box 50072
Honolulu, Hawaii 96850

Dear Mr. Haygood:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 9, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. The document was sent to you for review because the facilities under consideration involve industrial processes subject to OSHA regulations. If you have any further questions, please call Mr. Tom Vendetta at 523-4774.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
✓ Belt, Collins & Associates

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

PACIFIC-ASIA REGION
P. O. BOX 50109
HONOLULU, HAWAII 96850

MAY 23 1980

Office of the Mayor
City and County of Honolulu
530 S. King Street, 3rd Floor
Honolulu, Hawaii 96813

Gentlemen:

The following is in response to a request for the FAA to review the Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER).

We note that the HPOWER project has progressed to the point where technical proposals have been submitted by prospective contractors. The system descriptions include provisions for exhaust stacks 150 to 180 feet high. Two of the alternative sites for the HPOWER facility are on Waipio Peninsula. In this regard, it will be of interest to you that the Hawaii Department of Transportation has included Waipio Peninsula as an alternative site for a general aviation reliever airport on Oahu. The high stacks involved with the HPOWER facility could affect the viability of Waipio as an airport site, particularly if the Navy surplus and incinerator remnant parcels were selected. The actual impact of the HPOWER facility would, of course, depend on future action which the State may or may not take for airport development on Waipio.

Please let us know if we can be of further assistance in this matter.

Sincerely,

Original signed by

R. O. ZIEGLER
Director

cc:
Dept of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 28, 1980

R 80-490

Mr. R. O. Ziegler, Director
Pacific Asia Region
Federal Aviation Administration
U.S. Department of Transportation
P. O. Box 50109
Honolulu, Hawaii 96850

Dear Mr. Ziegler:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 28, 1980 regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time you and your staff spent reviewing the document.

We are aware that the Waipio Peninsula has been considered at various times in the past as a possible site for a general aviation airport. However, it is our understanding that it is only one of many alternatives that have been suggested. Moreover, based on testimony presented to the 1980 State Legislature, there is considerable doubt that a Waipio Peninsula site would ever be selected.

The most recent general aviation airport study of which we are aware is the Interim Report: Poamoho General Aviation Airfield Study dated March 18, 1980. It contains an airport layout for a Waipio Peninsula site (see attached figure). Based on the scheme shown in that document, it appears that it would be possible to situate an HPOWER facility with a 150- to 180-foot high stack on the parcel north of the existing City and County Waipahu Incinerator without interfering with the airport. However, use of the "navy surplus" parcel south of the incinerator for HPOWER would preclude use of the Waipio Peninsula for a general aviation airport. It should be noted that the airport layout shown for this site would place the runway considerably closer to the existing Waipahu Incinerator than is desirable. As a result, the 75-foot high stacks on that facility would protrude almost 40 feet into the FAA specified clearance area. Moreover, exhaust gases from them would be blown across the approach pattern by the prevailing winds.

Mr. R. O. Ziegler
August 28, 1980
Page two

If you have any questions, or would like to discuss the potential HPOWER/Airport conflict further, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Sincerely,

Wallace Miyahira
Director and Chief Engineer

Attachment: Waipio Airport Layout

WM:PJW:ghs

cc: Environmental Quality Commission
Belt, Collins & Associates

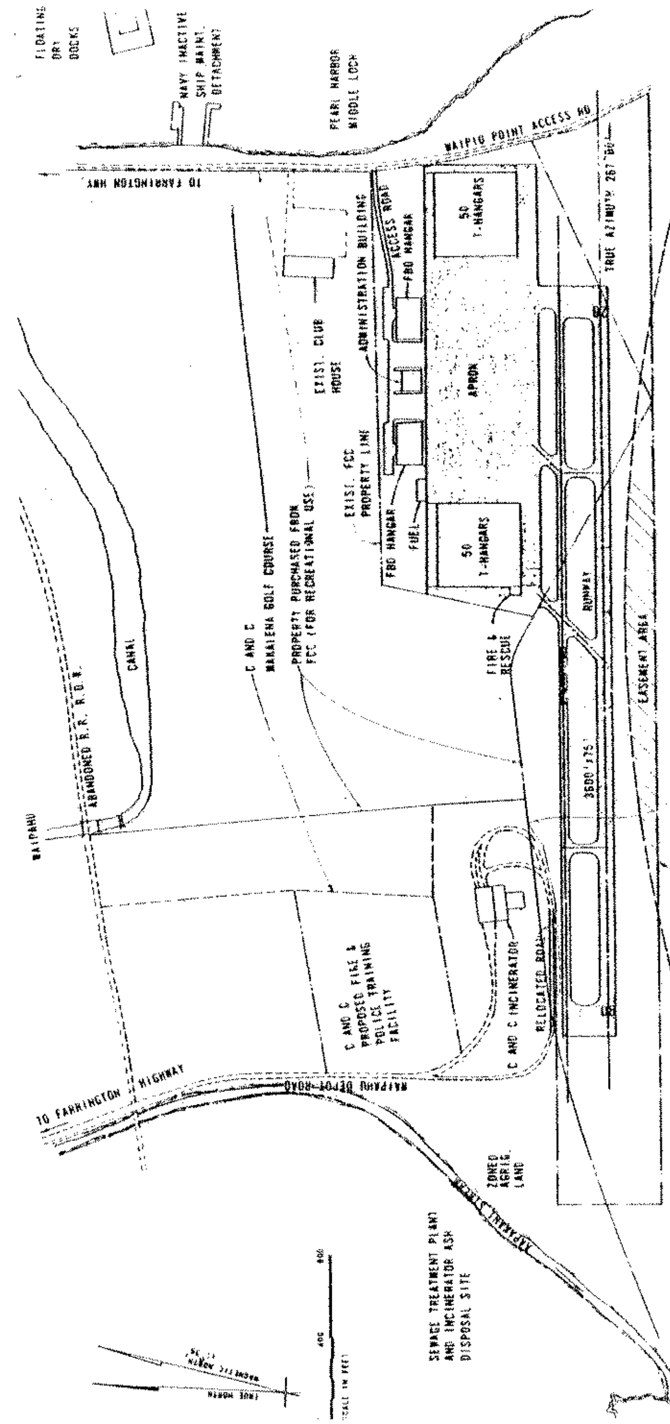


FIGURE 6-2
GENERAL AVIATION AIRFIELD LAYOUT
WAIPIO PENINSULA SITE

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

COMMANDER (dpl)
Fourteenth Coast Guard District
Prince Kalanianaole Federal Bldg.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

16450
13 May 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Gentlemen:

The Coast Guard has reviewed the Environmental Impact Statement on the Honolulu Program of Waste Energy Recovery (HPOWER) and has no objection to the plan or constructive comments to offer at the present time.

Sincerely,

J. F. OTRANTO
Commander, U. S. Coast Guard
District Planning Officer
Fourteenth Coast Guard District
By Direction of the District Commander

Copy to: City and County of Honolulu, Dept. of Public Works
COMDT (G-WEP/7)

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Commander J. F. Otranto
District Planning Officer
Fourteenth Coast Guard District
Prince Kalanianaole Federal Building
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

Dear Commander Otranto:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 13, 1980 (your reference No. 16450) regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
✓ Belt, Collins & Associates

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

Project #A-DOE-K09004-HI

The Honorable Frank Fasi
Office of the Mayor
City and County of Honolulu
530 South King St., 3rd Floor
Honolulu HI 96813

5 JUN 1980

Dear Mr. Fasi:

The Environmental Protection Agency (EPA) has reviewed the Environmental Assessment titled HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER).

The EPA has no comments to offer at this time. We appreciate the opportunity to comment on this EA and request three copies of the subsequent documents describing any National Environmental Policy Act (NEPA) actions.

If you have any questions regarding this project, please contact Susan Sakaki, EIS Coordinator, at (415)556-7858.

Sincerely yours,

Jake Mackenzie, Director
Surveillance and Analysis Division

cc: Mr. Wallace Miyahira
Department of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-480

August 26, 1980

Mr. Jake MacKenzie, Director
Surveillance and Analysis Division
United States Environmental
Protection Agency, Region IX
215 Fremont Street
San Francisco, California 94105

Dear Mr. MacKenzie:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 5, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). We appreciate the time spent by you and your staff reviewing the document.

We do not anticipate at this time that any project action will fall under the provisions of the National Environmental Policy Act.

Very truly yours,

Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002:09P2:joh
Ser 1210

13 JUN 1980

Office of the Mayor
City and County of Honolulu
530 South King Street
Honolulu, Hawaii 96813

Gentlemen:

Environmental Impact Statement (EIS)
for the proposed Honolulu Program of Waste Energy
Recovery (HPOWER), May 1980

The subject EIS, provided by the State Environmental Quality Commission in its transmittal of 6 May 1980, has been reviewed and the following comments are provided:

a. Sites. The Navy is pleased that you have dropped from consideration Pearl City Peninsula Sites 1 through 4. The Navy had previously indicated objections to these sites in letters dated 16 March, 18 April, 10 May and 6 July 1979.

b. Navy Surplus Parcel. On page 11-9, paragraph 6, regarding the Waipio Peninsula site, interest is shown in approximately 50 acres of Waipio Peninsula land which was identified as releasable in the MILPRO-HI study conducted by the Navy in April 1979 for the Department of Defense. The status of this parcel is as follows:

(1) This area has been identified as releasable by the Defense Department, and for planning purposes, the property is considered to be excess. The Navy does not have authority to lease excess property.

(2) The report of excess for the property is now in the process of preparation. Once complete legal descriptions and a title opinion are completed, and the disposal has been reported to the Congressional Armed Services Committees, it will be reported as excess to the General Services Administration (GSA). This may require six months.

(3) The GSA will thereupon screen the property with all federal agencies. If there are no federal agencies which need the property, then the City and State governments will have an opportunity to obtain the property before the GSA takes the next step which is advertising it for sale to the public.

Thank you for the opportunity to review this EIS and to submit the above comments.

Sincerely,

R. D. EBER
CDR, CEC, USN
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Copy to:
DEPT of PUBWKS, C&C HONO
State Environmental Quality Commission

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Commander R. D. Eber
Headquarters, Naval Base Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96860

Dear Commander Eber:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of 13 June, 1980 (Reference No. 002:09P2:joh/Ser 1210) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and your staff spent reviewing the document.

The information you provided regarding the status of the area referred to in the EIS as the "Navy surplus parcel" appears to be consistent with the statements made on Page II-9 of the EIS. Should the City decide to use the parcel, we would expect to submit an application pursuant to the procedures described in your letter. In any case, we will continue to keep you informed of any HPOWER-related plans that could affect Navy property or operations.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 119, HONOLULU, HAWAII 96810

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

LETTER NO. (P)1621.0

JUN 09 19[illegible]

Honorable Frank F. Fasi
Mayor
City and County of Honolulu
530 South King Street
Honolulu, Hawaii 96813

Dear Mayor Fasi:

Subject: Environmental Impact Statement
Honolulu Program of Waste
Energy Recovery (HPOWER)

We have reviewed the subject report and are supportive in the development of the proposed resource recovery facility. We do, however, have reservations about the location of such a facility.

DAGS is primarily concerned about the proposed Amfac/C-E facility located next to the Oahu Sugar Mill. The proposed location places the facility in close proximity to three of the proposed sites of the Waipahu Civic Center. As potential neighbors, we are concerned about the high content of particulate matter and sulfur dioxide that will be emitted by the Amfac/C-E resource recovery facility. The summary shown on Table IV-24 of the report indicates that this facility will emit sulfur dioxide in amounts that will exceed the 3-hour and 24-hour standards. The combination of the proposed resource recovery facility and the Oahu Sugar Mill at one location might result in a high level of air pollutant emission in the vicinity.

We are also concerned about the additional traffic that will be generated along the cane haul road and short section of Waipahu Street. Table IV-33 indicates that the peak volume of vehicles to the recovery facility would occur between the hours of 7:00 A.M. to 9:00 A.M. This high volume of traffic will cause noise problems and will present an additional hazard to the youngsters who may be crossing Waipahu Street on their way to school.

We have no reservations concerning the remaining three sites. These sites seem to conform more favorably to the air pollution standards. The access routes to these sites are also better adapted to handle the additional truck traffic without any problems.

Thank you for allowing us to comment on the subject report. We are very much concerned about the development of the resource recovery facility and would like to remain an interested party in this program.

If you have any questions on our comments, please have your staff contact Mr. Merton Ishida of the Public Works Division at 548-5460.

Respectfully,

HIDEO MURAKAMI
State Comptroller

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-549

October 15, 1980

Mr. Hideo Murakami, Comptroller
Department of Accounting and General Services
State of Hawaii
Honolulu, Hawaii 96813

Dear Mr. Murakami:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 9, 1980 (Reference "P" 1621.0) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and your staff spent reviewing the document, and understand your concern regarding the potential impact of the proposed Amfac/C-E facility. However, for reasons outlined in the remainder of this letter, we believe that the proposed resource recovery facility would not have significant adverse effects on its neighbors.

Air Quality Impacts

The results of the analysis described in the EIS were based on preliminary design information available in January of this year. Subsequently, Amfac/C-E has submitted revised emission rates and operating procedures which significantly lessen the effect that their facility can be expected to have on ambient air quality. With these changes, the facility would be able to comply with existing Federal air quality standards. This fact will be reflected in the revised EIS for the project.

Violations of the State of Hawaii standards now in effect could still occur. The very restrictive Hawaii Ambient Air Quality Standards were adopted in 1971 with the idea that they would prevent significant deterioration in the quality of the air as it was believed to exist in 1970. In short, they perform functions that at the Federal level are split between the National Ambient Air Quality Standards and the U.S. Environmental Protection Agency's "Prevention of Significant Deterioration" (PSD) regulations. Unfortunately, the data on which the 1970 estimates of "existing" air quality were based were rather limited. As a result, over the succeeding years, unanticipated problems have arisen. Areas believed to be meeting the standards when they were first promulgated were shown by subsequent monitoring data to be in violation even

though no new sources had been constructed in the interim. Of even greater concern was the fact that in some cases large sources employing the best available control technology (BACT) for air pollution control would still be unable to meet some of the State standards. As a result, the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some modification must be made if the State is to avoid the untenable position of trying to enforce standards which cannot be met with current control technology.

With respect to the fact that the Amfac/C-E facility would be close to the existing Oahu Sugar Company mill, it should be noted that the model already takes into account emissions from that source. Hence, no further adjustments need be made.

Finally, we would also like to call your attention to the fact that the highest concentrations of pollutants would not occur immediately adjacent to the facility as you might first expect. Largely because emissions from the main stack take considerable time to reach the ground, modeling indicates that HPOWER's greatest effects on sulfur dioxide levels would be felt most heavily at downwind distance of 3.5 to 10 kilometers for a 24-hour averaging period and from 1.0 to 3.5 kilometers for a 3-hour averaging period. This means that, for the most part, the highest concentrations would occur well outside populated areas.

Traffic and Noise Impacts

With respect to traffic and noise impacts, we would first like to note that the peak HPOWER traffic hour is between 8:00 a.m. and 9:00 a.m. During the 7:00 a.m. to 8:00 a.m. period when children are on their way to school, only about 35 one-way trips would be made on the cane haul road. Moreover, assuming that Route B (as shown on Figure IV-5, page IV-85) is used, there would be no increase in the volume of traffic on Waipahu Street except for the last 500 feet before it intersects with Kamehameha Highway. In view of these facts, we believe that it would not increase the hazards faced by school children.

Noise problems associated with HPOWER-related traffic are thoroughly discussed on pages IV-49 through IV-52 of the EIS. This discussion makes it clear that mitigation measures, probably in the form of noise barriers adjacent to critical road segments, will be necessary to avoid excessive noise impacts to residential areas. So far as we are aware, no public properties that are the responsibility of your department would be adversely affected by noise generated by the Amfac/C-E proposal.

There is no doubt that the location of the Amfac/C-E facility makes it the most critical of those under consideration with respect to impacts on the surrounding community. However, it is our belief that the various mitigation measures incorporated into the design will limit adverse effects of the facility to an acceptable level.

Thank you again for your comments. If you have any further questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira
Director and Chief Engineer

WM:PJM:gns
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO. KING STREET
HONOLULU, HAWAII 96814

C
o
p
y

June 3, 1980

MEMORANDUM

To: Office of the Mayor
City and County of Honolulu

Subject: EIS for Honolulu Program of Waste Energy Recovery (HPOWER)
Oahu, Hawaii

The Department of Agriculture has reviewed the subject EIS and finds that the following potential impacts to agriculture were identified.

1. State and County land use controls - The Malakole Road and the Waipio Peninsula sites are within the State's Agricultural District and currently zoned for agricultural use. Only one of the sites under consideration on the Waipio Peninsula consists of lands classified as "Other Important Lands" according to the Agricultural Lands of Importance to the State of Hawaii classification system (about 5 acres).

2. Water supply - Our major concern is the shifting of water use away from existing agricultural operations for HPOWER use, specifically for the proposed Amfac/C-E facility which would reduce the amount of water used for cane washing and irrigation or as an alternative, require an increase in the demand for water being delivered by the Waiahole Ditch. This same proposal, however, involves the possible disposal of cane trash which would release about 100 acres for sugar cane cultivation on the Waipio Pensinsula.

3. Housing for agricultural workers - Construction of the HPOWER facility at the proposed Amfac/C-E site would result in the dislocation of some plantation workers. The long range plan has been to relocate these residents regardless of the project. The project would cause an acceleration of the relocation activities.

4. The alternative of composting was investigated and found to be unfeasible at the present time as a viable solution to Oahu's solid waste disposal problems.

In view of the above comments, it appears that the potential impacts of the proposed project have been adequately addressed. Thank you for the opportunity to comment.

John Farias, Jr.
Chairman, Board of Agriculture

cc: Department of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. John Farias, Jr.
Chairman, Board of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814

Dear Mr. Farias:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 3, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document, and are pleased that you found the potential impacts on agriculture have been adequately addressed.

Very truly yours,

Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

GEORGE R. ARIYOSHI
GOVERNOR

CHARLES G. CLARK
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

May 13, 1980

Office of the Mayor
City and County of Honolulu
530 S. King Street, 3rd Floor
Honolulu, HI 96813

Dear Sir:

SUBJECT: Environmental Impact Statement
Honolulu Program of Waste Energy Recovery (HPOWER)

The subject EIS has been reviewed and we would like to offer the following comments for your consideration:

1. We have no objection to the Campbell Industrial Park/Malakole Road and Hanua Street sites and the Waipio Peninsula site as shown on Figure 11-1 of the report. We do have reservations about the Amfac/C-E site.

2. We are concerned that the high concentrations of sulfur dioxide and particulate matter emitted by a facility at the Amfac/C-E site would have a deleterious impact on three schools in the area. August Ahrens Elementary, Waipahu Elementary and Waipahu Intermediate schools are all located within 1/3 to 1/2 mile from the proposed facility. Our concern involves not only the violation of the 3-hour and 24-hour standards but the long-term effect of these emissions.

3. We are gratified that the Amfac/C-E proposal to route the trucks through Route A or B and utilizing the cane haul road will keep Waipahu Street from becoming a problem for August Ahrens and Waipahu Elementary schools. This is based on the assumption that trucks servicing the Waianae and adjoining areas will be required to use the cane haul road route.

Should there be any questions, please contact Mr. Howard Lau at 548-5704.

Sincerely,

Charles G. Clark
CHARLES G. CLARK
Superintendent

CGC:HL:jl
cc: Leeward District
Dept. of Public Works, C&C of Honolulu
DAGS
Mr. James E. Edington

AN EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-540

October 10, 1980

Dr. Charles G. Clark
Superintendent
Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Dr. Clark:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 13, 1980 regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document.

We share your concern over the possibility of adverse air quality impacts from the Amfac/C-E facility as originally proposed but wish to make the following clarifications:

1. The City is requiring that the HPOWER facility be designed and constructed in such a way that it can be operated in compliance with all applicable Federal, State, and County laws, ordinances, codes, regulations, and court orders. With respect to air quality, this means that the winning HPOWER bidder is obligated to meet Federal and State emission and ambient air quality standards, to comply with Federal PSD regulations, and to demonstrate to the U.S. Environmental Protection Agency that it has employed the best available control technology (BACT).

2. The discussion presented in the EIS was based on the results of preliminary modeling. It indicated that, with the emission controls then proposed, the Amfac/C-E proposal could result in the violation of certain ambient air quality standards under assumed "worst-case" operating and meteorological conditions. All emission limitations on the facility itself would be met.

Following publication of the EIS, a number of changes have occurred that affect the situation. First, the Amfac/C-E consortium has altered its design so as to reduce its particulate emissions. In addition, a more realistic sulfur dioxide emission rate has been submitted that is consistent with that suggested by the U.S. Environmental Protection Agency. Finally, additional analyses of the available meteorological data have been conducted which more accurately define the atmospheric conditions that would be most likely to produce the highest ambient pollutant concentrations. As a result of these changes, it now appears that all applicable National Ambient Air Quality Standards would be met.

Violations of the State of Hawaii standards now in effect could still occur. The very restrictive Hawaii ambient air quality standards were adopted in 1971 with the idea that they would prevent significant deterioration in the quality of the air as it was believed to exist in 1970. In short, they perform functions that at the Federal level are split between the National Ambient Air Quality Standards and the U.S. Environmental Protection Agency's "Prevention of Significant Deterioration" (PSD) regulations. Unfortunately, the data on which the 1970 estimates of "existing" air quality were based were rather limited. As a result, over the succeeding years, unanticipated problems have arisen. Areas believed to be meeting the standards when they were first promulgated were shown by subsequent monitoring data to be in violation even though no new sources had been constructed in the interim. Of even greater concern was the fact that in some cases large sources employing the best available control technology (BACT) for air pollution control would still be unable to meet some of the State standards. As a result, the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some modification must be made if the State is to avoid the untenable position of trying to enforce standards which cannot be met with current control technology. In view of all this, it appears that the proposed project would have no deleterious effect on schools in the area.

3. Use of the cane haul road for access to the proposed Amfac/C-E HPOWER facility is designed to minimize the adverse effect of refuse trucks on the Waipahu community. Trucks hauling waste to and from their HPOWER plant, including those servicing Waianae and other adjoining areas, will be required to use the cane haul road access route.

If you have any additional comments or questions, please direct them to Mr. Tom Vendetta of the Refuse Division staff. He may be reached at 523-4774.

Sincerely,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Department of Land Utilization
Belt, Collins & Associates

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

GEORGE A. L. YUEN
DIRECTOR OF HEALTH

~~VERNE G. WAITE, M.D.~~
DEPUTY DIRECTOR OF HEALTH

HENRY N. THOMPSON, M.A.
DEPUTY DIRECTOR OF HEALTH

~~JAMES S. KUMAGAI, Ph.D., P.E.~~
DEPUTY DIRECTOR OF HEALTH

~~TADAO BEPPU~~
DEPUTY DIRECTOR OF HEALTH

May 27, 1980

In reply, please refer to:
File: EPHS-SS

MEMORANDUM

To: Mr. Wallace Miyahira, Director and Chief Engineer
Department of Public Works, City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Honolulu Program of Waste Energy Recovery (HPOWER), Oahu

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we do not have any objections to this project.

We submit the following comments for your information and consideration:

Air Pollution

The projected increase in the number of truck passes will be very significant in the project area (reference: page IV-50, projections of the increase in truck passes).

While the vehicular noise impact of the increase in truck passes is adequately addressed, an analysis of the vehicular air pollution resulting from the increase in truck passes was not done and should be addressed.

Wastewater Treatment and Disposal UOP Proposal

1. A cesspool would not be acceptable for 9,335 gpd of washdown plus sanitary wastes, unless the flow can meet the requirements of Section 3.4.B of Public Health Regulations, Chapter 38, Private Wastewater Treatment Works & Individual Wastewater Systems.

2. Industrial wastes must be treated to meet the requirements of Section 3.2.C of Chapter 38.

3. Stormwater shall not be allowed to contact solids or ash unless UOP plans to treat the contaminated water.

AMFAC/C-E Proposal

1. Additional 0.540 mgd of irrigation water will contribute to the flooding of canefields in Waipio and only accentuate the existing problem of mosquito breeding in the area.

2. Any project which will have an impact in the Waipio area such that the mosquito problem will be accentuated shall be submitted to our Vector Control Branch for review and approval. If you should have any questions, please contact Mr. Patrick Nakagawa, Chief of our Vector Control Branch at 548-8484.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the pboject at the time final plans are submitted to this office for review.

for Brian J. Choy
MELVIN K. KOIZUMI

cc: OEQC
Office of the Mayor

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-534

October 10, 1980

Mr. Melvin K. Koizumi
Deputy Director for Environmental
Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Koizumi:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 27, 1980 (reference file: EPHS-SS) regarding the Environmental Impact Statement (EIS) for the proposed Honolulu Program of Waste Energy Recovery. We appreciate the time spent by you and your staff reviewing the document, and are pleased that you do not have any objections to the proposed project. Item-by-item responses to your comments are presented below.

Air Pollution

The Amfac/C-E proposal would very definitely produce a large increase in the number of truck passes along the cane haul road serving the site. This, in turn, would have a very substantial effect on noise levels in the vicinity; hence, that topic was discussed in some detail in the EIS. This same increase in truck traffic would also affect air quality, but the effects would be so minor that we did not believe it necessary to discuss them in the EIS. However, in response to your comment, the following paragraphs have been added to the report:

> Exhaust Emissions. Exhaust emissions from vehicles moving to and from the HPOWER facility would have an extremely minor impact on air quality. For example, a brief analysis of the effects of peak-hour traffic under "worst-case" meteorological conditions indicates that the increase in ambient carbon monoxide levels adjacent to roadways would be less than one microgram per cubic meter. When added to the existing level, this would still leave the concentrations well below the State standard. The effects on levels

> of other pollutants would be even smaller. Persons residing close to the access roads, particularly those serving the Waipio Peninsula and Amfac/C-E sites, could notice an increase in odors characteristic of diesel exhausts.
>
> Fugitive Dust. In general, the proposed HPOWER project would not generate significant amounts of fugitive dust. The vast majority of each site would be covered with buildings, roadways, and other impermeable surfaces. The remainder would contain irrigated landscaping. Trucks carrying material to and from the site would be covered. Only during the site preparation phase of the construction period would one expect sufficient earth to be exposed for there to be an increased potential for entrainment of particulates. This period would be of short duration. Moreover, with the possible exception of the north parcel on the Waipio Peninsula and the Amfac/C-E site, the areas under consideration for HPOWER are well-removed from sensitive adjoining uses. Since the Amfac/C-E site currently contains dirt roads and considerable other bare soil areas, it is possible that the erosion measures that will be applied during construction will cause fugitive dust emissions from the site to remain at or below their current levels. However, a more likely scenario is that they would increase somewhat during the early phases of construction.
>
> The one aspect of the project that does cause some concern is the potential that truck traffic associated with HPOWER has for increasing fugitive dust emissions from the cane haul road that would be used for access to the Amfac/C-E site. While the road is paved, loose dirt from adjacent fields and from the tires and contents of the cane haul trucks themselves does collect on it. Refuse trucks moving to and from the HPOWER site would not contribute significantly to the amount of dust present, but they would tend to lift more of it into the air, thereby increasing atmospheric dust concentrations.
>
> In order to avoid this problem, it is essential that the cane haul road be kept as clean as possible and/or constantly wetted. Of these two approaches, cleaning appears by far the better. In dry, sunny weather, water would evaporate rapidly from the impermeable road surface. Use of a sweeper such as is employed on public roads and at airports probably provides the best means of preventing the

creation of a dust problem, but other techniques might be employed as well. The cost of these dust mitigation measures would be absorbed by the HPOWER contractor.

Wastewater Treatment and Disposal: UOP Proposal

1. Section 3.4.B of Chapter 38 of the Public Health Regulations stipulates that individual wastewater treatment systems (including cesspools) may be utilized in lieu of treatment works for developments that generate wastewater at a rate of less than 400 gallons per day (GPD) per 5,000 square feet of ultimate development. The UOP facility requires about 15 acres of land (approximately 650,000 square feet), and our calculations indicate that the 9,335 GPD of sanitary waste and washdown water that would be generated (see Figure IV-3 on page IV-55 of the EIS) is less than one-fifth of the 52,000 GPD that the regulation would allow to be disposed of via a cesspool. In view of this, we believe that UOP's proposed cesspool system is in compliance with Section 3.4.B.

2. The UOP facility is designed to recycle and reuse water in order to reduce make-up requirements and discharges to the greatest extent practical. Wastewater streams (other than the domestic wastewater handled by the cesspool and discussed above) are not discharged directly from the facility. Instead, they are used for residue quenching and as make-up water for the materials recovery system; both these operations are net water consumers. All wastewaters will be appropriately treated before their reuse in the facility.

   Section 3.2.C of Chapter 38 of the Public Health Regulations concerns effluent standards for buildings generating non-domestic wastewater. It gives the Director of the Health Department the power to establish effluent requirements as necessary to serve the interest and purpose of Chapter 38. Hence, it will not be possible to make a final determination that the proposed treatment system would, in fact, comply with the requirements of this section until such time as your Department has completed a detailed review of the construction plans. However, UOP has certified that it has contacted members of your staff and been informed that the basic disposal concept that is being proposed is a sound one.

3. Under normal conditions, the residue and ash would not be allowed to come in contact with stormwater. However, as depicted in Figure II-2 (page II-14 of the EIS) an emergency by-pass storage area exists immediately west of the material recovery building. Residue and ash would be conveyed to this area only during periods when the material recovery system is temporarily inoperative, a small fraction of the total operating time. As soon as repairs have been made, it would be retrieved and moved to the materials recovery building for processing. The emergency storage area is not roofed and would, therefore, be subject to wetting by rainfall.

Runoff water from the emergency bypass storage area may contain trace amounts of combustible and putrescible material. Because of this, the area would be curbed and sloped so that all runoff would be collected in a sump and, if necessary, pumped into the refuse storage pit. The 24-hour rainfall for a storm with a recurrence interval of 50 years is approximately 10.5 inches at both Campbell Industrial Park and the Waipio Peninsula, or about 15,250 cubic feet over the 0.4-acre emergency bypass storage area. The floor area of the refuse storage pit is approximately 14,500 square feet. Taking into account the density of refuse in the storage pit, the 15,250 cubic feet of water resulting from a 50-year storm would saturate the bottom two to three feet of the pit.

Amfac/C-E Proposal

1. The proposed Amfac/C-E facility would not increase the amount of irrigation water flowing to the Waipio Peninsula by 0.540 MGD. On the contrary, as indicated on page IV-60 of the EIS, it would actually decrease it by 1.133 MGD. The 0.540 MGD figure shown in the water balance diagram on page IV-59 represents only the amount of water that would be discharged from the Amfac/C-E HPOWER facility; it would be more than offset by a reduction of 1.623 MGD in the amount of water discharged to the Waipio Peninsula by the Oahu Sugar Company's Waipahu Mill.

2. Because implementation of the Amfac/C-E HPOWER proposal would significantly decrease the amount of wastewater discharged on the Waipio Peninsula, we believe it would actually reduce the existing mosquito problem noted in your letter.

Thank you again for your comments. If you have any questions, please call Mr. Tom Vendetta at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS
825 MILILANI STREET
HONOLULU, HAWAII 96813

JOSHUA C. AGSALUD
DIRECTOR

ROBERT C. GILKEY
DEPUTY DIRECTOR

Office of the Mayor
City and County of Honolulu
3rd Floor
530 South King Street
Honolulu, Hawaii 96813

Gentlemen:

This is to acknowledge receipt of your Environmental Impact Statement regarding the Honolulu Program of Waste Energy Recovery (HPOWER).

At this time, I have no comments.

Sincerely,

Joshua C. Agsalud

Joshua C. Agsalud
Director of Labor and
Industrial Relations

cc: Department of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Joshua C. Agsalud, Director
Department of Labor and
Industrial Relations
State of Hawaii
825 Mililani Street
Honolulu, Hawaii 96813

Dear Mr. Agsalud:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 21, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
Belt, Collins & Associates

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

June 3, 1980

REF. NO.: APO-1689

Honorable Frank Fasi
Mayor of Honolulu
Honolulu Hale
Honolulu, Hawaii 96813

Dear Mayor Fasi:

We have reviewed the EIS for the HPOWER project.

We note that both the UOP and AMFAC-CE proposals provide for particulate emission control but that neither provides for control of soluble gas emissions (SO_2, NO_2 and HCl). It also appears that the modelling and monitoring of emissions does not include long term concentration of pollutants in downwind soils, water and properties.

The project description also does not include disposal of ash and slag waste nor are the impacts of this activity described -- except the impact on traffic. Similarly, the discharge of treated boiler cleaning water ought to be described as well as the impacts of the discharge.

The project description also does not contain operational routines for vector monitoring and control. Maintenance levels appear to be indefinite.

Each site, excepting the Waipahu location, is near the sea. During construction: 1) lumber and other materials treated with creosote or other preservative substances should not be permitted to contact the water without one week of drying; and 2) construction materials, petroleum products, human wastes, debris and landscaping substances (herbicides, fertilizers, pesticides) should not be permitted to fall, flow, or leach into the ocean.

To prevent contamination of nearby water courses, special precautions will be required with respect to use of harmful substances for vector control. This would be especially critical at the Waipio site, which is virtually surrounded by Middle and West Lochs of Pearl Harbor, and by Kapakahi Stream to the west.

The Malakole Road site (page II-6) lies within the Barbers Point Archaeological District which has been determined to be eligible for the National Register. At the moment, archaeological research is being conducted in the vicinity of the HPOWER Malakole site. The EIS addresses this site on page IV 108-114 and possible mitigation. If the Malakole site is chosen, the mitigative actions should be completed prior to disturbance of the area.

Regarding the Hanua Street site, mitigative measures should be taken prior to any destruction of the paleontological resources.

As noted in the EIS, the Hanua site contains the largest living colony of the endangered plant, Achyranthes solendens var. rotundata, in the U. S. (or world since it is endemic to Oahu). No mention is made of the recently completed Ewa Plains Botanical Survey by the University of Hawaii for the U. S. Fish and Wildlife Service which includes portions of this proposed site as a recommended natural area. The EIS does not adequately discuss the impact of this project on these plants and their habitat.

The vulnerability of Achyranthes solendens is evident in its pattern of demise in the Leeward Islands where its relative, A. splendens var. reflexa, may recently have become extinct. Causes of the decline of this close relative are postulated to be: 1) rats; 2) competition of introduced exotics, and 3) indirect causes associated with man's activities. There have been no scientific studies which would support these theories and this is part of the problem which makes knowledgable discussion of the impacts of a project so difficult.

We recommend the EIS be expanded to include a discussion of the effect of rats, site disturbance and the introduction of exotics and the peripheral impacts of construction and operation on such things as contamination of groundwater which the plants depend on and the effect of possible chemical contamination from either spills or leachates.

We believe a careful survey is needed to determine if any plants will be directly affected, but we are much more concerned over the "peripheral" impacts associated with the project. It is possible that through careful planning these plants can be protected from fire and other current threats and adverse impacts can be mitigated. However, at this point, the EIS must be strengthened in this area if the Hanua site is under serious consideration.

Thank you for allowing us the opportunity to review this EIS.

Very truly yours,

Susumu Ono

SUSUMU ONO, Chairman
Board of Land and Natural Resources

cc: C&C/Dept. of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-537

October 10, 1980

Mr. Susumo Ono
Chairman of the Board
Dept. of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Ono:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter dated June 3, 1980 (your reference number APO-1689) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document. Your comments have been transmitted to the HPOWER bidders, and item-by-item responses are presented below.

Soluble Gas Emissions

Your observation that neither of the HPOWER proposals under consideration contains provisions for the removal of soluble gases is correct. Indications are that none are necessary in order to meet existing regulations.

Nitrogen oxides (NO_x) are created: (i) when fuel-bound nitrogen is oxidized, and (ii) by thermal fixation of the elemental nitrogen that is present in the combustion air. The latter process is affected primarily by the amount of excess air that is present and by the combustion temperature, the same factors that influence emissions of hydrocarbons and carbon monoxide. In settling on an optimal operating regime, a balance is struck between emissions of nitrogen oxides (which tend to increase as the amount of excess air and/or combustion temperature rises) and carbon monoxide/hydrocarbon emissions (which tend to decrease with a rise in excess air and/or combustion temperature). The boilers that would be used for HPOWER have lower operating temperatures than fossil-fuel-fired boilers and, therefore, produce lower nitrogen oxide emissions per kilowatt-hour of power generated. As a result, nitrogen oxides are not a problem with HPOWER, and no special controls are warranted.

As indicated on page IV-35 of the EIS, there are no emission limits or ambient air quality standards for hydrogen chloride. However, a comparison of projected "worst-case" 24-hour concentrations with values one one-hundreth of the OSHA standards for the working environment suggests that they are safe (see page IV-35 of the EIS). Therefore, special controls for hydrogen chloride appear to be inappropriate.

Resource recovery facilities such as HPOWER are not normally considered major sources of sulfur dioxide. Hence, the possible violations of air quality standards for sulfur dioxide that were noted in the EIS came as something of a surprise. A review of the data that were used has shown that the modeled violations stemmed largely from the use of the unrealistically high emission rate supplied in the Amfac/C-E technical proposal and from the fact that modeled existing sulfur dioxide levels in the Campbell Industrial Park area are already high. Moreover, the conclusions reached were based on an assumed "worst-case" analysis. Subsequently, a more detailed analysis of the meteorological data that are available has shown that the "worst-case" conditions assumed for our analysis do not occur at all. Under actual "worst-case" conditions, existing Federal standards would not be violated.

Violations of the State of Hawaii standards now in effect could still occur. The very restrictive Hawaii Ambient Air Quality Standards were adopted in 1971 with the idea that they would prevent significant deterioration in the quality of the air as it was believed to exist in 1970. In short, they perform functions that at the Federal level are split between the National Ambient Air Quality Standards and the U.S. Environmental Protection Agency "Prevention of Significant Deterioration" (PSD) regulations. Unfortunately, the data on which the 1970 estimates of "existing" air quality were based were rather limited. As a result, over the succeeding years, unanticipated problems have arisen. Areas believed to be meeting the standards when they were first promulgated were shown by subsequent monitoring data to be in violation even though no new sources had been constructed in the interim. Of even greater concern was the fact that in some cases large sources employing the best available control technology (BACT) for air pollution control would still be unable to meet some of the State standards. As a result, the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some modification must be made if the State is to avoid the untenable position of trying to enforce standards which cannot be met with current control technology.

When considering potential sulfur dioxide impacts of an HPOWER facility in the Campbell Industrial Park area, it is also important to remember that energy produced by it would be a substitute for power from fossil-fuel-fired generating facilities. Based on: (i) an average sulfur content for Honolulu refuse of 0.19 percent, (ii) an estimated 40 percent of the incoming sulfur leaving in the bottom ash rather than as stack emissions, and (iii) an average heat content of refuse that is only 23.6 percent that of the fuel oil burned by Hawaiian Electric (4,400 Btu's per pound of refuse versus 18,620 Btu's per pound of fuel oil), burning refuse is equivalent to burning oil with a sulfur content of 0.48 percent. This is slightly better than the best available alternative (0.5-percent sulfur fuel oil), and is much better than the 1.5- to 2.0-percent sulfur content oil that is in more abundant supply. The advantage that HPOWER has as a result of the relatively low sulfur content of the refuse, is partially offset by the fact that a conventional fossil-fuel power plant has lower internal energy requirements and is, therefore, able to export a higher proportion of its gross energy production. Nevertheless, it is evident that, as a sulfur dioxide source, the proposed resource recovery facility would be no worse than, and probably an improvement over, the fossil-fuel-fired generating facilities which would otherwise be called upon to produce the power.

As stated repeatedly in the EIS, the City intends to comply with all applicable air quality regulations. Towards that end, stack testing for sulfur dioxide will be conducted as part of the monitoring program required by the U.S. Environmental Protection Agency. The City is aware of the possibility that regulations may change during the life of the project and is prepared to modify the facility as necessary to insure continued compliance with them.

Pollution of Downwind Soils, Waters, and Properties

For at least two reasons, the accumulation of pollutants in soils, waters, and properties downwind of an HPOWER facility is not expected to be significant. First, such contamination has historically been associated with industrial facilities, such as metal smelters, that are large and employed few, if any, controls. The proposed HPOWER facility, besides being relatively small in comparison with such plants, would be equipped with very efficient electrostatic precipitators that reduce particulate emissions by 97 to 99 percent. Second, essentially all the particles that do pass through the electrostatic precipitators would be only a few microns in diameter and have no appreciable settling rate. Because of this, they would remain airborne for extended periods of time and be carried far out over the ocean by regional winds. This is not to say that HPOWER would not contribute to the overall air pollutant levels in Honolulu, but significant local concentration is not likely.

Waste Disposal Impacts

As indicated in the EIS, residue and ash from the proposed HPOWER facility would be disposed of at an existing or newly approved landfill facility. Landfill operations are not a part of the HPOWER project; hence, potential impacts from them were not discussed in the HPOWER Environmental Impact Statement. A discussion of impacts that are typical of landfills in general may be found in the EIS prepared for the City's Kapa'a Landfill Expansion Project. A copy of this document is available for loan at the City and County of Honolulu Municipal Reference Library or at the Department of Public Works, Division of Refuse Collection and Disposal.

In this respect, it should be noted that solid waste processing by HPOWER would generally reduce or leave unchanged the amount of potentially objectionable material being landfilled. The mass-burning system proposed by UOP would, for example, remove essentially all of the organic material, as well as any heavy metals associated with the ferrous metal and other materials recovered from the waste stream. At this time we are unaware of any new landfill pollutants that would be created by the resource recovery process. Leachate collection and treatment provisions have been implemented at our Kapa'a Landfill Expansion sites and will be incorporated in new sanitary landfills where necessary.

The discharge of treated boiler cleaning water referred to in your letter would occur very infrequently. As indicated in the EIS (see, for example, the third full paragraph on page IV-56), it would be done in a batch process, the chemicals neutralized, and the effluent disposed of in a hazardous waste disposal facility approved by the U.S. Environmental Protection Agency. This approach has been used successfully by the operators of many other industrial boilers throughout the State.

Vector Control

Bidders for the HPOWER contract have been required by the City to design the facility so as to avoid or minimize conditions conducive to the growth of vector populations. All spaces would be accessible for cleaning, the bidders are allocating considerable resources to daily cleanup operations, and they have acknowledged the need to take corrective action whenever a problem arises. The City has informed the bidders that the use of chemicals for vector control should be minimized. Some use of poisons may be expected, however. In such instances it will be applied in accordance with regulations established by the U.S. Environmental Protection Agency and other regulatory agencies.

Construction Wastes

Your comments regarding the proper handling of construction wastes are well taken, and a copy of them has been sent to each of the HPOWER bidders. During construction, debris such as used lumber, packaging and crating materials, scrap metals, used oils and hydraulic fluids, and general rubbish will be collected and taken to an existing approved landfill for proper disposal. Recyclable materials, such as metals and oils, will be recovered whenever feasible. Such handling of construction debris will eliminate the possibility of significant contamination of Pearl Harbor or the ocean from this source.

Archaeological and Paleontological Resources

If the Malakole Road site is selected for the proposed HPOWER project, the mitigative measures described in the EIS will be completed prior to disturbance of the area. should the Hanua Street site be selected, a program similar to that undertaken by the Corps of Engineers on Malakole Road will be followed for the portion of the Hanua Street parcel that is used.

Endangered Plant Species

We share your concern for the survival of the colony of Achyranthes splendens var. rotundata that is present on the makai portion of the Hanua Street parcel. The presence of this proposed endangered species is carefully documented on pages IV-64 through IV-67 of the EIS, and potential impacts and proposed mitigative measures are discussed on pages IV-69 and IV-70.

Achyranthes splendens var. rotundata is presently found only towards the seaward end of the Hanua Street parcel; it would not be directly affected by an HPOWER facility situated on the eastern portion of that parcel. At the time the botanical work for the EIS was conducted, the University of Hawaii's

Ewa Plains Botanical Survey had not been published. However, Winona Char, co-author of that report, was contacted and supplied data used in assessing HPOWER's potential impact at that site. It was this information that led us to conclude that an HPOWER facility could be developed there without major threat to the Achyranthes that was present.

Your letter recommends that the EIS:

> "...be expanded to include a discussion of the effects of rats, site disturbance and the introduction of exotics, and the peripheral impacts of construction and operation on such things as contamination of groundwater which the plants depend on and the effects of possible chemical contamination from either spills or leachates."

Following receipt of this comment we reviewed the technical characteristics of the proposed HPOWER facility and met with Dr. Darryl Herpst of the U.S. Fish and Wildlife Service's endangered species section. Conclusions reached as a result of this review include the following:

o Vector control programs that would be implemented by the HPOWER operator would prevent it from becoming a significant habitat for rats. Even if the control problem should be poorly managed, (an extremely unlikely event considering the extensive experience of UOP, Inc., the only bidder considering the Hanua Street site), rats would tend to feed on refuse at the facility rather than on surrounding plants. It was Dr. Herpst's informal opinion that the rats simply would not constitute a significant threat to nearby Achyranthes splendens var. rotundata.

o The construction work associated with development of an HPOWER facility on the inland third of the Hanua Street site would not adversely affect the endangered plants present at its makai end because of the buffer zone that would be maintained between them and the HPOWER facility. This is evidenced by the continued existence of these same plants immediately adjacent to developed parcels at Campbell.

o The HPOWER facility would not have a significant effect on groundwater quality and, therefore, would not threaten the water supply on which the plants depend. The only effluent disposal would consist of domestic wastewater discharged from the cesspool. It would have the same composition as all of the other cesspool effluent streams at Campbell, and would not measurably alter water quality. There is no source of leachate from the facility since both the raw refuse and the recovered materials are kept in covered areas. Even the outdoor emergency bypass storage area, where ash and residue can be stored during temporary stoppages in the materials recovery component of the facility, is on a concrete pad and drains back into the refuse storage pit. Hence, there is no opportunity for leachate to enter the ground from that source.

o The only waste which could spill is raw refuse, and the likelihood of that occurring in anything but small quantities is very small. Refuse which does spill would generally fall on paved areas and would be picked up immediately.

o Oil storage tanks containing standby fuel for the facility would be bermed and/or provided with other anti-spill protection as required.

In view of the facts outlined above, it is our belief that the EIS has adequately addressed both the direct and "peripheral" effect of the proposed HPOWER project. If you have any additional questions, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

Kamamalu Building 250 South King St. Honolulu Hawaii • Mailing Address P.O. Box 2359 Honolulu Hawaii 96804

June 6, 1980

C O P Y

Ref. No. 1451

The Honorable Frank F. Fasi
Mayor
City and County of Honolulu
Honolulu, Hawaii 96813

Dear Mayor Fasi:

Subject: Honolulu Program of Waste Energy Recovery (HPOWER) -- Draft EIS, Oahu

This Department's staff offices concerned with energy conservation (the State Energy Office) and the development of Hawaii's alternate energy resources (the Center for Science Policy and Technology Assessment) have followed and assisted the HPOWER project from its inception, and have strongly supported its goal of recovering energy from Oahu's solid waste.

The Hawaii Energy Conservation Council and its technical committees, particularly the Energy Recovery Committee which is concerned with industrial energy conservation, have also enthusiastically promoted HPOWER.

In the interest of implementing the HPOWER concept in a manner which adequately addresses all pertinent concerns, we have reviewed the subject Draft Environmental Impact Statement and offer the following comments for your consideration:

Procurement Process. The basis for the selection of a contractor utilizing the lowest net present value cost criterion does not ensure that the environmental and social costs resulting from HPOWER will be internalized. Although the EIS discusses the anticipated impacts in detail for the various proposed sites, the selection process itself does not specifically account for these concerns by requiring estimated costs for avoiding or mitigating impacts; thus, a desirable balance between the economic and the environmental and social implications of HPOWER may be precluded.

Waipahu Incinerator Retrofit. The economics of retrofitting the Waipahu Incinerator for energy recovery in conjunction with a new HPOWER facility is not adequately discussed. This alternative should be given similar consideration in analysis in order that it be seriously treated as a viable option.

Additional MSW Handling Alternatives. Every effort should be made to design flexibility and dependability into any proposed system to handle Oahu's municipal solid waste (MSW). The possibility of constructing several smaller scale HPOWER facilities at various sites on the Island may minimize traffic congestion and transportation costs, while providing for alternative MSW processing opportunities that would alleviate the adverse effects of downtime at a single facility. A trade-off between system costs and flexibility may be involved. An investigation into the performance of similar systems in other municipalities would provide useful input for the consideration of several facilities.

Traffic Analysis. The EIS discusses the probable impacts of additional traffic from refuse vehicles on roadways in the vicinity of the proposed sites; however, implementation of a single HPOWER facility sized to process all of Oahu's daily MSW load will affect the transporting of refuse on an islandwide basis. An assessment of refuse vehicles traveling major routes to the proposed HPOWER sites is needed to identify any significant impacts that may result from the proposed alteration in the flow of refuse from the various sectors of Oahu.

Thank you for the opportunity to review and comment on this document.

Sincerely,

Frank Skrivanek
for Hideto Kono

cc: Mr. Wallace Miyahira, Department of Public Works, City and County of Honolulu
Mr. Richard O'Connell, Office of Environmental Quality Control

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R80-543

October 15, 1980

Mr. Hideto Kono, Director
Department of Planning and Economic Development
Kamamalu Building
250 South King Street
Honolulu, Hawaii 96813

Dear Mr. Kono:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 6, 1980 (Reference No. 1451) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and your staff spent reviewing the document as well as the past assistance that we have received from your department. Responses to the specific points raised in your letter are presented below.

Procurement Process

As indicated in the EIS, the award of the HPOWER contract to the bidder offering the lowest net present value cost to the City (Step II) is only the last step in a multi-step procurement process. Previous steps, particularly the review of bidders' technical proposals (Step IB), allowed for the incorporation of environmental and social concerns early in the procurement process. Specifically, both the Department's staff and its environmental consultants analyzed contractors' technical proposals to determine whether or not they were in conformance with existing regulations and standards. Effects not covered by specific regulations, e.g., visual and traffic impacts, were also assessed and a qualitative decision regarding their significance made by the City. Where the analysis indicated that a proposal would result in significant adverse impacts, bidders were given the choice of modifying their proposals so as to eliminate violations or problems or being dropped from further consideration. Hence, all the bidders' price proposals will reflect the costs that they will incur avoiding or mitigating adverse impacts.

No special bonus is offered to bidders whose facilities perform substantially better than required by the City's Request for Proposals. This would require an ability to establish relative values for very dissimilar effects that is well beyond the current state-of-the-art of environmental impact assessment

techniques. Hence, in terms of a practical decision-making process, we believe that it is better to determine in advance what levels of impacts the tolerable and to insist that these not be exceeded. This is what has been done with HPOWER, and if one assumes that maintenance of standards assures negligible adverse impacts to the environment, is a tact that cannot be faulted.

Since they were first submitted, both of the HPOWER proposals still under consideration have undergone substantial modifications designed to minimize their adverse environmental impacts. As a result, all measures needed to prevent potentially damaging effects have been incorporated into the contract documents, and we are confident that the proposed project is now capable of being implemented without causing substantial degradation of the environment.

Waipahu Incinerator Retrofit

Both UOP and Amfac/C-E have indicated their intention of submitting proposals for both a 1,200-ton per day (TPD) and an 1,800-TPD facility. The smaller of these is compatible for use with the City's existing 600-TPD-capacity Waipahu Incinerator. The City is giving both scales serious consideration. A study of the feasibility of retrofitting the Incinerator for energy recovery has recently been finalized and will be used to help determine if continued use of the existing Waipahu Incinerator is desirable.

Since the Waipahu Incinerator retrofit study was being undertaken simultaneously with the writing of the HPOWER EIS, the economic conclusions which it reached were unavailable for inclusion in the impact statement. However, as indicated above, the report has now been finalized. Attached to this letter is a copy of the computer analysis that will be used by the City in decision making. If the City decides that retrofitting the incinerator would be economically advantageous and proceeds with such a project, an environmental assessment will be prepared covering its impact.

Additional MSW Handling Alternatives

The Department of Public Works recognizes the need for flexibility and reliability in a system designed to serve as long as HPOWER. The Request for Proposals for the project contains many provisions that are aimed at insuring that bidders' proposals provide both of these attributes. Among the more important provisions are:

- A requirement that the facility be able to process 20 percent more refuse than its average daily load and be expandable by 50 percent;
- A stipulation that each major piece of equipment incorporated in the design have at least one year of commercial operation under similar conditions;

- o A provision requiring equipment redundancy--enabling bidders to operate at a minimum of 60 percent of capacity with one processing/energy conversion line inoperative;
- o A method for crediting bidders with any transportation cost savings that accrue to the City and private haulers as a result of the use of multiple facilities that are geographically dispersed;
- o A nearly free hand in designing and operating a materials recovery system that is responsive to the rapid market changes that occur; and
- o Freedom to propose any combination of 600-, 1,200-, and 1,800-TPD facility sizes that would meet the City's need to dispose of from 1,200 to 1,800 tons of refuse per day.

None of the bidders who qualified for submission of technical proposals elected to disperse its operations. It should be noted that a multiple-site approach would probably result in greater impacts than the present proposals. Hence, for example, while utilization of three separate HPOWER sites would reduce the project's air quality impact on any one area by about two-thirds, each of the smaller facilities would have nearly the same impact on noise levels, water usage and quality, and vegetation and wildlife. The City would also face the very considerable problem of trying to obtain three sites in three different neighborhoods willing to accept refuse-based industry and power plants.

Traffic Analysis

The EIS focuses on HPOWER's effects on traffic volumes between the sites under consideration and the nearest major highway because that is where the potential for adverse effects is by far the greatest. As indicated in the report, the results of our analysis indicate that even there, HPOWER-related traffic would not overload the roadways. As one proceeds farther from an HPOWER site the traffic disperses and, other things being equal, the impact decreases. To quantify the traffic impact at points distant from the facility would require extremely detailed information regarding the existing and projected timing and routing of collection and transfer vehicle trips. The projections would necessarily be highly speculative and, given the significant variability inherent in the timing of trips, would need to deal with the phenomenon in a probablistic way. In short, the analysis would be costly, would depend upon numerous indeterminate factors, and would produce results of questionable accuracy. In the absence of any evidence of a potential problem (remember that HPOWER's peak traffic generation occurs after the normal morning peak), we believe that further study of the traffic impacts is not warranted at this time.

Thank you for your comments. Please call Mr. Tom Vendetta at 523-4774 if you have additional questions.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM/PJW:ghs
attachment
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

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FOLLOWING ARE THE INPUT DATA.
REV. WAIPAHU INCIN. RUN 2  7/14/80 (JAN. 1980 DOLLARS)
TIMING INFORMATION  *****

        COST ESTIMATE DATE =    JANUARY  1, 1980
        BOND ISSUE DATE     =       JUNE  1, 1981
        START CONST.    =       JULY  1, 1981
        BEGIN OPER.         = SEPTEMBER  1, 1982
TIME PERIOD BETWEEN BOND ISSUE DATE AND BEGINNING
          OF OPERATION IS ASSUMED TO BE   1.25 YEARS
     CONSTRUCTION PERIOD IS ASSUMED TO BE  1.17 YEARS
     PROJECT LIFE IS ASSUMED TO BE        20 YEARS
INFLATION RATES  *****
     CAPITAL  =       0.0 %
     O. & M.  =       7.0 %
     ALT. FUEL=       0.0 %
     ELECTRIC =       9.0 %
     STEAM    =       0.0 %
     FUEL     =       0.0 %
     MATERIAL =       0.0 %
     V. TRNSP.=       0.0 %
     F. TRNSP.=       0.0%
     DISCOUNT RATE = 10.0 %
CAPITAL COST INFORMATION  *****
     PROJECT COST (EQUIP.,CONST., SITE, ETC.)   = $ 10,120,000
     ANNUAL COST ASSOCIATED WITH EQUITY CAPITAL = $          0
     CAPITAL STRUCTURE
          EQUITY CAPITAL =   0.00 %
          DEBT  CAPITAL  = 100.00 %
     BOND ISSUE EXPENSES      =   2.50 % OF THE BOND ISSUE
     INTEREST ON BONDS        =   8.50 %
     INTEREST PAID ON REINVESTMENT =   7.00 %
     ADD. CAPITAL RESERVE       =  0.00 % OF BOND ISSUE
     NO. OF EXPENSE PAYMENTS DURING CONSTRUCTION  =  3
     BOND RESERVE FUND =  0.00 YEARS OF DEBT SERVICE CCVERAGE
REFUSE PROCESSING INFORMATION ****
     BASE YEAR PROCESSING     =   131,700 TONS PER YEAR
     SYSTEM CAPACITY          =   131,700 TONS PER YEAR
     REFUSE GENERATION GROWTH =    0.00 %  PER YEAR

COSTS AND REVENUES CALCULATION INFORMATION ****
COST INFORMATION  *****
     FIXED O. & M. = $ 3,298,897 PER YEAR
     FIXED TRANSP. = $         0 PER YEAR
     VARIABLE O. & M.    = $  0.00 PER TON OF REFUSE
     VARIABLE TRANSP.    = $  0.00 PER TON OF REFUSE
     GENERATION AND RECOVERY INFORMATION
          ELECTRICITY    = 321.00 KWH PER TON OF REFUSE
          STEAM          =   0.00 LB PER LB OF REFUSE
          FUEL           =   0.00 TONS OF FUEL PER TON OF REFUSE
          FERROUS METAL  =   0.00 TONS PER TON OF REFUSE
          ALUMINUM       =   0.00 TONS PER TON OF REFUSE
          HEAVY NON-FE   =   0.00 TONS PER TON OF REFUSE
          GLASS          =   0.00 TONS PER TON OF REFUSE
          AGGREGATE      =   0.00 TONS PER TON OF REFUSE
     REVENUE PRICE INFORMATION
          ELECTRIC       = $0.0500 PER KWH
          STEAM          = $  0.00 PER 1000 LB OF STEAM
          FUEL           = $  0.00 PER TON OF FUEL
          FERROUS METAL  = $  0.00 PER TON OF METAL
          ALUMINUM       = $  0.00 PER TON OF ALUMINUM
          HEAVY NON-FE   = $  0.00 PER TON OF METAL
          GLASS          = $  0.00 PER TON OF GLASS
          AGGREGATE      = $  0.00 PER TON OF AGGREGATE
     CITY SHARE OF THE REVENUE IS *******
          ELECTRIC      = 100 %
          STEAM         =   0 %
          FUEL          =   0 %
          FERROUS       =   0 %
          ALUMINUM      =   0 %
          HEAVY NON-FE  =   0 %
          GLASS         =   0 %
          AGGREGATE     =   0 %
PRINT OPTIONS SELECTED  ****
     PRINT PROPOSAL YEAR COSTS AND REVENUES
     PRINT  7 COLUMNS PER PAGE
     PRINT RESULTS FOR EVERY  1 YEARS

     ESCALATED CAPITAL COST   = $ 10,120,000
     TOTAL BOND ISSUE         = $ 11,039,427
     ANNUAL DEBT SERVICE      = $  1,166,553
     UNDERWRITER'S FEE        = $    275,985
     MISC. FINANCE COST       = $          0
     CAPITAL RECOVERY FACTOR = 0.10567
```

REV. WAIPAHU INCIN. RUN 2 7/14/80 (JAN. 1980 DOLLARS)
TOTAL COSTS AND REVENUES -- ALL DOLLARS IN THOUSANDS (JAN 1980 DOLLARS)

INFLATION RATES
CAPITAL 0.00 % — DATE OF COST ISSUE = JANUARY 1, 1980
O. & M. 7.00 % — BOND ISSUE DATE = JUNE 1, 1981
ELECTRIC 9.00 % — START CONSTRUCTION = JULY 1, 1981
STEAM 0.00 % — BEGIN OPERATION = SEPTEMBER 1,1982
FUEL 0.00 % — BASE YEAR DISPOSAL = 131,700 TPY
MATERIAL 0.0 % — SYSTEM CAPACITY = 131,700 TPY
DISCOUNT RATE 10.00 %

YEAR	1980	1982	1983	1984	1985	1986	1987
REFUSE 1000 TPY	131	131	131	131	131	131	131
PROC. EXPENSES							
CAPITAL	1,166	1,166	1,166	1,166	1,166	1,166	1,166
O. & M. FIXED	3,298	4,087	4,373	4,679	5,007	5,357	5,732
O. & M. VAR.	0	0	0	0	0	0	0
TOTAL EXPENSE	4,465	5,253	5,539	5,845	6,173	6,524	6,899
REVENUES							
ELECTRICAL	2,113	2,777	3,027	3,299	3,596	3,920	4,272
STEAM	0	0	0	0	0	0	0
INT. ON DSRF	0	0	0	0	0	0	0
TOTAL REVENUE	2,113	2,777	3,027	3,299	3,596	3,920	4,272
CITY SHARE	2,113	2,777	3,027	3,299	3,596	3,920	4,272
NET DISP. COST	2,351	2,476	2,512	2,546	2,577	2,603	2,626
PRES. VAL.	2,351	1,831	1,689	1,556	1,431	1,315	1,205

REV. WAIPAHU INCIN. RUN 2 7/14/80 (JAN. 1980 DOLLARS)
TOTAL COSTS AND REVENUES -- ALL DOLLARS IN THOUSANDS (JAN 1980 DOLLARS)

INFLATION RATES
CAPITAL 0.00 % — DATE OF COST ISSUE = JANUARY 1, 1980
O. & M. 7.00 % — BOND ISSUE DATE = JUNE 1, 1981
ELECTRIC 9.00 % — START CONSTRUCTION = JULY 1, 1981
STEAM 0.00 % — BEGIN OPERATION = SEPTEMBER 1,1982
FUEL 0.00 % — BASE YEAR DISPOSAL = 131,700 TPY
MATERIAL 0.0 % — SYSTEM CAPACITY = 131,700 TPY
DISCOUNT RATE 10.00 %

YEAR	1988	1989	1990	1991	1992	1993	1994
REFUSE 1000 TPY	131	131	131	131	131	131	131
PROC. EXPENSES							
CAPITAL	1,166	1,166	1,166	1,166	1,166	1,166	1,166
O. & M. FIXED	6,133	6,563	7,022	7,514	8,040	8,602	9,205
O. & M. VAR.	0	0	0	0	0	0	0
TOTAL EXPENSE	7,300	7,729	8,189	8,680	9,206	9,769	10,371
REVENUES							
ELECTRICAL	4,657	5,076	5,533	6,031	6,574	7,166	7,810
STEAM	0	0	0	0	0	0	0
INT. ON DSRF	0	0	0	0	0	0	0
TOTAL REVENUE	4,657	5,076	5,533	6,031	6,574	7,166	7,810
CITY SHARE	4,657	5,076	5,533	6,031	6,574	7,166	7,810
NET DISP. COST	2,642	2,653	2,655	2,649	2,632	2,603	2,560
PRES. VAL.	1,103	1,006	916	830	750	674	603

REV. WAIPAHU INCIN. RUN 2 7/14/80 (JAN. 1980 DOLLARS)
TOTAL COSTS AND REVENUES -- ALL DOLLARS IN THOUSANDS(JAN 1980 DOLLARS)

INFLATION RATES

CAPITAL	0.00 %	DATE OF COST ISSUE =	JANUARY 1, 1980
O. & M.	7.00 %	BOND ISSUE DATE =	JUNE 1, 1981
ELECTRIC	9.00 %	START CONSTRUCTION =	JULY 1, 1981
STEAM	0.00 %	BEGIN OPERATION =	SEPTEMBER 1,1982
FUEL	0.00 %	BASE YEAR DISPOSAL =	131,700 TPY
MATERIAL	0.0 %	SYSTEM CAPACITY =	131,700 TPY
DISCOUNT RATE	10.00 %		

YEAR	1995	1996	1997	1998	1999	2000	2001
REFUSE 1000 TPY	131	131	131	131	131	131	131
PROC. EXPENSES							
CAPITAL	1,166	1,166	1,166	1,166	1,166	1,166	1,166
O. & M. FIXED	9,849	10,538	11,276	12,066	12,910	13,814	14,781
O. & M. VAR.	0	0	0	0	0	0	0
TOTAL EXPENSE	11,016	11,705	12,443	13,232	14,077	14,980	15,947
REVENUES							
ELECTRICAL	8,513	9,280	10,115	11,025	12,018	13,099	14,278
STEAM	0	0	0	0	0	0	0
INT. ON DSRF	0	0	0	0	0	0	0
TOTAL REVENUE	8,513	9,280	10,115	11,025	12,018	13,099	14,278
CITY SHARE	8,513	9,280	10,115	11,025	12,018	13,099	14,278
NET DISP. COST	2,502	2,425	2,327	2,206	2,059	1,881	1,669
PRES. VAL.	535	472	412	355	301	250	201

AVERAGE ANNUAL DISCOUNTED NET DISPOSAL COST IS $ 872
TOTAL DISCOUNTED NET DISPOSAL COST IS$ 17,443
TOTAL DISCOUNTED NET DISP. + TRNSP. COST IS$ 17,443

REV. WAIPAHU INCIN. RUN 2 7/14/80 (JAN. 1980 DOLLARS)
COSTS AND REVENUES PER TON OF REFUSE(JAN 1980 DOLLARS)

INFLATION RATES

CAPITAL	0.00 %	DATE OF COST ISSUE =	JANUARY 1, 1980
O. & M.	7.00 %	BOND ISSUE DATE =	JUNE 1, 1981
ELECTRIC	9.00 %	START CONSTRUCTION =	JULY 1, 1981
STEAM	0.00 %	BEGIN OPERATION =	SEPTEMBER 1,1982
FUEL	0.00 %	BASE YEAR DISPOSAL =	131,700 TPY
MATERIAL	0.0 %	SYSTEM CAPACITY =	131,700 TPY
DISCOUNT RATE	10.00 %		

YEAR	1980	1982	1983	1984	1985	1986	1987
REFUSE 1000 TPY	131	131	131	131	131	131	131
PROC. EXPENSES							
CAPITAL	8.86	8.86	8.86	8.86	8.86	8.86	8.86
O. & M. FIXED	25.05	31.03	33.21	35.53	38.02	40.68	43.53
O. & M. VAR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL EXPENSE	33.91	39.89	42.06	44.39	46.88	49.54	52.38
REVENUES							
ELECTRICAL	16.05	21.09	22.98	25.05	27.31	29.77	32.44
STEAM	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INT. ON DSRF	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL REVENUE	16.05	21.09	22.98	25.05	27.31	29.77	32.44
CITY SHARE	16.05	21.09	22.98	25.05	27.31	29.77	32.44
NET DISP. COST	17.86	18.81	19.08	19.34	19.57	19.77	19.94
PRES. VAL.	17.86	13.91	12.83	11.82	10.87	9.99	9.16

REV. WAIPAHU INCIN. RUN 2 7/14/80 (JAN. 1980 DOLLARS)
COSTS AND REVENUES PER TON OF REFUSE(JAN 1980 DOLLARS)

INFLATION RATES

CAPITAL	0.00 %	DATE OF COST ISSUE =	JANUARY 1, 1980
O. & M.	7.00 %	BOND ISSUE DATE =	JUNE 1, 1981
ELECTRIC	9.00 %	START CONSTRUCTION =	JULY 1, 1981
STEAM	0.00 %	BEGIN OPERATION =	SEPTEMBER 1,1982
FUEL	0.00 %	BASE YEAR DISPOSAL =	131,700 TPY
MATERIAL	0.0 %	SYSTEM CAPACITY =	131,700 TPY

DISCOUNT RATE 10.00 %

YEAR	1988	1989	1990	1991	1992	1993	1994
REFUSE 1000 TPY	131	131	131	131	131	131	131
PROC. EXPENSES							
CAPITAL	8.86	8.86	8.86	8.86	8.86	8.86	8.86
O. & M. FIXED	46.57	49.83	53.32	57.06	61.05	65.32	69.89
O. & M. VAR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL EXPENSE	55.43	58.69	62.18	65.91	69.91	74.18	78.75
REVENUES							
ELECTRICAL	35.36	38.55	42.02	45.80	49.92	54.41	59.31
STEAM	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INT. ON DSRF	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL REVENUE	35.36	38.55	42.02	45.80	49.92	54.41	59.31
CITY SHARE	35.36	38.55	42.02	45.80	49.92	54.41	59.31
NET DISP. COST	20.07	20.15	20.16	20.12	19.99	19.77	19.44
PRES. VAL.	8.38	7.64	6.96	6.31	5.70	5.12	4.58

REV. WAIPAHU INCIN. RUN 2 7/14/80 (JAN. 1980 DOLLARS)
COSTS AND REVENUES PER TON OF REFUSE(JAN 1980 DOLLARS)

INFLATION RATES

CAPITAL	0.00 %	DATE OF COST ISSUE =	JANUARY 1, 1980
O. & M.	7.00 %	BOND ISSUE DATE =	JUNE 1, 1981
ELECTRIC	9.00 %	START CONSTRUCTION =	JULY 1, 1981
STEAM	0.00 %	BEGIN OPERATION =	SEPTEMBER 1,1982
FUEL	0.00 %	BASE YEAR DISPOSAL =	131,700 TPY
MATERIAL	0.0 %	SYSTEM CAPACITY =	131,700 TPY

DISCOUNT RATE 10.00 %

YEAR	1995	1996	1997	1998	1999	2000	2001
REFUSE 1000 TPY	131	131	131	131	131	131	131
PROC. EXPENSES							
CAPITAL	8.86	8.86	8.86	8.86	8.86	8.86	8.86
O. & M. FIXED	74.79	80.02	85.62	91.62	98.03	104.89	112.24
O. & M. VAR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL EXPENSE	83.64	88.88	94.48	100.48	106.89	113.75	121.09
REVENUES							
ELECTRICAL	64.65	70.46	76.81	83.72	91.25	99.47	108.42
STEAM	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INT. ON DSRF	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL REVENUE	64.65	70.46	76.81	83.72	91.25	99.47	108.42
CITY SHARE	64.65	70.46	76.81	83.72	91.25	99.47	108.42
NET DISP. COST	19.00	18.42	17.68	16.76	15.64	14.28	12.68
PRES. VAL.	4.07	3.59	3.13	2.70	2.29	1.90	1.53

AVERAGE ANNUAL DISCOUNTED NET DISPOSAL COST IS 6.62

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION

JONATHAN K. SHIMADA, PH.D.
IN REPLY REFER TO

June 4, 1980

STP 8.6296

The Honorable Frank F. Fasi
Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Mayor Fasi:

Environmental Impact Statement
Honolulu Program of Waste Energy
Recovery (HPOWER)

Thank you for the opportunity to review the subject Environmental Impact Statement.

The Waipio Peninsula site should be assessed for its impact on the alignment of the possible general aviation airfield at Waipio Peninsula.

Very truly yours,

Jonathan K. Shimada
for Ryokichi Higashionna
Director of Transportation

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-493

September 5, 1980

Dr. Ryokichi Higashionna, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 4, 1980 (STP 8-6296) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and your staff spent reviewing the document.

Based on a review of the Interim Report of the Poamoho General Aviation Airfield Study, it appears that development of an HPOWER facility on what the EIS refers to as the "Navy surplus" parcel would preclude use of the Waipio Peninsula for a general aviation airfield. The area north of the existing Waipahu Incinerator could be utilized for HPOWER without physically precluding development of a reliever airport on the Waipio Peninsula.

In order to utilize the Waipio Peninsula for a general aviation airport, it would be necessary for the State to obtain a variance from FAA clearance requirements (the only possible runway locations are very close to the existing Waipahu Incinerator), to resign itself to a one-runway configuration and the cessation of civilian general aviation operations from Ford Island, and to face strong opposition from the Waipahu community. Moreover, based on testimony presented to the 1980 State Legislature, there is considerable doubt that the Waipio Peninsula would ever be selected as the site of a new general aviation airport. Hence, we believe that the City should not be precluded from considering the area for HPOWER.

If you have any additional questions regarding the proposed project, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira
Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates

HIENG

2 JUN 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Gentlemen:

Honolulu Program of Waste Energy Recovery

We have received the Environmental Impact Statement on the above subject and have no comments to offer at this time. The document is being returned to the Environmental Quality Commission.

Yours truly,

JERRY M. MATSUDA
Captain, HANG
Contr & Engr Officer

cc: Dept of Public Works
City and County of Honolulu

R 80-495

September 5, 1980

TAG HAWAII/HIENG
3949 Diamond Head Road
Honolulu, Hawaii 96816

Attention: Captain Jerry M. Matsuda

Gentlemen:

Environmental Impact Statement for the
<u>Proposed Honolulu Program of Waste Energy Recovery (HPOWER)</u>

Thank you for your letter of June 2, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU, HAWAII 96813

RICHARD O'CONNELL
DIRECTOR

TELEPHONE NO.
548-6915

June 9, 1980

Mr. Tyrone Kusao, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Kusao,

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program for Waste Energy Recovery

We have reviewed the subject EIS and offer the following comments for your consideration:

General

The EIS should acknowledge that financial support for its preparation was provided by the U.S. Department of Energy and the State Office of Environmental Quality Control.

At a number of places in the EIS statements are made that the City and County "should" or "could" take certain actions (eg. to mitigate noise, to minimize vector populations, etc.). Such statements are inappropriate in a City and County EIS. These statements should be modified to state what will be done by the City and County in the case of each such eventuality.

No discussion is given on the probable impact of odors associated with the HPOWER project.

Page II-13

Energy Recovery. The location and impact of overhead

power lines serving HPOWER should be discussed.

Page III-7

Policy No. 7 Discussion. The statement that "HPOWER proposals now meet all City and County, State and Federal environmental standards" is not consistent with statements elsewhere regarding air quality impact.

Page IV-6

Physiographic Changes. If the Navy surplus land parcel is used, where would surplus effluent from the Oahu Sugar Co. mud line be discharged?

Page IV-8

Air Quality Impacts. This section should discuss the impact of fugitive dust emissions from the passage of refuse trucks over cane haul roads.

Page IV-11

Table IV-3. How can the maximum Annual Mean (78.0) lie outside the Range of Annual Means (2.9-18.1)? Is this a misprint?

Page IV-17

Table IV-7. Do these ambient concentrations reflect emissions from naval ships in Pearl Harbor?

Page IV-23

Table IV-13. Either the Amfac/CE or the UOP sulfur dioxide emissions should be selected as the most probable level and the rationale given for the selection. What are the SO_2 emissions when burning 0.5% sulfur oil; 2.0% sulfur oil?

Page IV-26

How does the estimate of mercury emissions compare to the EPA standard for sewage sludge incinerators (40CFR61.52)?

Page IV-26

Table IV-15. The column heading RDF-Fired should be changed to read RDF/Coal-Fired.

Page IV-29

Annual Averages. The statement "UOP would also not contribute to violations of annual Federal or State air quality standards" appears to be in error since the cumulative SO_2 concentration in Table IV-17 (78.3) exceeds the state standard of 20.

Page IV-31,32,34

Tables IV-19, 20, 21, and 22 should note that "oil" refers to 0.5% sulfur content oil.

Page IV-35

It should be noted that the highest ambient 24 hour concentration of hydrogen chloride (52 ug/m^3) is less than 0.01 of the occupational standard (70 ug/m3). Some explanation should be given as to why the HPOWER emissions of hydrogen chloride, although 20 times greater than the German emission standard, will cause no environmental problem.

Page IV-36

The statement that ". . . the winning bidder would be bound by the (sulfur emission) rates given in their technical proposals" seems questionable. In actuality they will be limited by the conditions of the Federal and State permits which should preclude any violations of standards.

Page IV-37

Table IV-24. Contrary to the statement in the Table, it appears that UOP would contribute to a violation of the Federal 24-hour SO_2 standard as well as the State standard.

Page IV-44

Amfac/CE Facility. It should be noted whether Jack Hall Housing is air conditioned since this would be a factor in evaluating the noise impact on these residences.

Page IV-53

Hydrologic Impacts. What impacts on neighboring uses will result from the discharge of water vapor from the

cooling towers?

Page IV-58

Water Use. While Amfac/CE proposes to make up their 1.133 mgd of consumptive use by conservation measures at the Oahu Sugar Co., it is reasonable to assume that this reduction will be in non-consumptive uses. Therefore, unless evidence to the contrary is presented, it must be concluded that total consumptive uses in the basin will be increased by 1.133 mgd as a result of the Amfac/CE project.

Page IV-75

Potential HPOWER-Related Vectors. What is the magnitude of the rodent population at the Waipahu incinerator and what would this indicate regarding potential problems at an HPOWER facility?

Page IV-80

Traffic Impacts. Future traffic increases in Campbell Industrial Park associated with the new deep-draft harbor should also be considered.

Page VI-1

Alternatives. The alternative of landfilling and methane recovery should be discussed.

Page IX-1

No mention is made in this list or in the text for FAA clearance regarding stack heights.

We thank you for the opportunity to review the subject EIS.

Sincerely,

RLOConnell

Richard L. O'Connell
Director

cc: Dept. of Public Works
Belt Collins & Associates

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-541

October 10, 1980

Office of Environmental Quality Control
State of Hawaii
Room 301
550 Halekauwila Street
Honolulu, Hawaii 96813

Gentlemen:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 9, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document. Item-by-item responses to your comments are presented below.

General

Mention of the financial support received for the preparation of the EIS from the U. S. Department of Energy and the State of Hawaii Office of Environmental Quality Control was unintentionally omitted. It will now be acknowledged on the title page of the EIS.

Your comment regarding the use of the words "should" and "could," rather than the stronger "would" or "will" is well taken. However, in many cases, the procurement method that is being used prevents us from committing to specific mitigation measures at the present time. Bidders are committing themselves to meet all applicable environmental standards, but they retain flexibility as to the methods that would be used.

A clause requiring conformance with all applicable environmental regulations is included in the contract documents for the project. Hence, the winning bidder is legally bound to take necessary mitigative steps. We believe that this provision, together with the careful screening of technical proposals that has been conducted before allowing the submission of price bids, insures that an acceptable level of environmental quality will be maintained.

Because of the handling and processing arrangements incorporated in its design, it is extremely unlikely that the UOP facility would create an odor problem. Raw waste is stored only in the receiving pit, and this area is kept under negative pressure by fans which draw air from the receiving area into the boiler for combustion. Combustion air is heated to a temperature of over 1,600 degrees Fahrenheit, and this is sufficient to destroy odor-causing chemicals before they are released to the atmosphere. The ash and residue from the boiler is essentially free of putrescible material; hence, it is not expected to be malodorous.

Since the UOP facility has two boilers, only one of which would be shut down for regular maintenance at any one time, the negative pressure would be maintained under all normal operating conditions. Only when malfunctions caused both boilers to be taken out of operation at the same time could odors escape from the facility. This would occur extremely infrequently. Given the relatively isolated location of the sites under consideration by UOP, it appears unlikely that problems would arise. This judgement is supported by a letter from the operators of a chocolate factory situated adjacent to the Chicago Northwest Incinerator, a facility very similar to that proposed by UOP for HPOWER. The letter indicates that the firm's chocolate, which is extremely susceptible to contamination by odors, has not been adversely affected by the operation of the resource recovery facility there.

Theoretically, the RDF system proposed by Amfac/C-E is more likely to experience odor problems than is UOP's mass-burning operation because air from the receiving area is not subject to high temperatures before its release to the atmosphere and because there are two areas, rather than one, where refuse is stored. In practice, however, it appears unlikely that it would produce odors offensive to neighbors. Among the reasons for this are the following:

- Raw waste is not allowed to remain for long periods in the receiving pit. Under normal operating conditions, mobile equipment operating on the floor of the pit delivers all of the raw refuse to the processing equipment each day. Hence, it is possible to thoroughly clean the area on a daily basis. This is done at the City's existing Keehi Transfer Station, and no bad odors are noticeable in the vicinity of that facility.

- Processed waste, i.e., refuse derived fuel (RDF), would be stored in a fully enclosed building. While the building would not be under negative pressure, neither would it exhaust a great deal of air. Finally, a review of experience with RDF facilities on the mainland has shown that odors are not a problem so long as good housekeeping procedures are followed. The one exception that we are aware of is the resource recovery facility situated at Garden City, New York; its problems stem from the fact that it utilizes an entirely different fuel preparation technique involving a wet process.

- Ash and residue from the boiler would contain virtually no putrescibles or other odor-producing materials.

o Recovered materials would be relatively free of organic material and other odor-inducing substances, and these materials would be removed from the HPOWER site at frequent intervals.

Page II-13

No new power transmission lines would be required for the Amfac/C-E proposal. Instead, the HPOWER facility would tie into the Hawaiian Electric Company's existing 46-KV network at the eastern end of the Oahu Sugar Company site. Similarly, the Malakole Road site is served by an existing power line that fronts the parcel, and construction of an HPOWER facility there would not entail new power line construction. A 46-KV power transmission line runs parallel to the old railroad right-of-way just north of the Waipio Peninsula site. A facility located on any of the parcels in this area would require the addition of a power line along Waipahu Depot Road. Overhead lines are already in place to serve the Waipahu Incinerator, and the addition of the necessary new transmission equipment would not significantly alter the situation.

Page III-7

You are correct, the statement made under the Policy No. 7 discussion was inconsistent with statements made in the air quality impact section of the report. The text has been modified to indicate that all proposals would have to meet existing environmental standards prior to acceptance by the City.

It should also be noted that changes have been made to the Amfac/C-E proposal that eliminate the particulate matter problems that were noted in the report. In addition to this, more detailed analysis of the meteorological data now indicates that Federal ambient air quality standards would not be violated under actual "worst-case" conditions. Violations of the exceedingly stringent existing State standards for sulfur dioxide could still occur. However, the State Department of Health has indicated in writing that it is reviewing its regulations, with the intent of bringing them in line with the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some relaxation of the standards will occur.

Page IV-6

If the Navy surplus parcel were used, surplus effluent from the Oahu Sugar Company mud line would have to be disposed of elsewhere on the Waipio Peninsula. Sufficient land exists to relocate the ponds, but new pumping facilities and other arrangements would be required. These improvements would be part of the HPOWER project.

Page IV-8

The following discussion of fugitive dust emissions has been added to the EIS immediately preceding "Discussion and Conclusions" on page IV-36:

Fugitive Dust

In general, the proposed HPOWER project would not generate significant amounts of fugitive dust. The vast majority of each site would be covered with buildings, roadways, and other impermeable surfaces. The remainder would contain irrigated landscaping. Trucks carrying material to and from the site would be covered. Only during the site preparation phase of the construction period would one expect sufficient earth to be exposed for there to be an increased potential for entrainment of particulates. This period would be of short duration. Moreover, with the possible exception of the north parcel on the Waipio Peninsula and the Amfac/C-E site, the areas under consideration for HPOWER are well-removed from sensitive adjoining uses. Since the Amfac/C-E site currently contains dirt roads and considerable other bare soil areas, it is possible that the erosion measures that will be applied during construction will cause fugitive dust emissions from the site to remain at or below their current levels. However, a more likely scenario is that they would increase somewhat during the early phases of construction.

The one aspect of the project that does cause some concern is the potential that truck traffic associated with HPOWER has for increasing fugitive dust emissions from the cane haul road that would be used for access to the Amfac/C-E site. While the road is paved, loose dirt from adjacent fields and from the tires and contents of the cane haul trucks themselves does collect on it. Refuse trucks moving to and from the HPOWER site would not contribute significantly to the amount of dust present, but they would tend to lift more of it into the air, thereby increasing atmospheric dust concentrations.

In order to avoid this problem, it is essential that the cane haul road be kept as clean as possible and/or constantly wetted. Of these two approaches, cleaning appears by far the better. In dry, sunny weather, water would evaporate rapidly from the impermeable road surface. Use of a sweeper such as is employed on public roads and at airports probably provides the best means of preventing the creation of a dust problem, but other techniques might be employed as well. The cost of these dust mitigation measures would be absorbed by the HPOWER contractor.

Page IV-11

The "Modeled Range of Annual Means" shown in the fourth column of Table IV-3 is at the site of the existing Department of Health (DOH) monitoring station. The modeled figures for this location were given so that they could be compared with the measured "Annual Mean" data from the DOH monitoring station, given in the third column of this table. For the "worst-case" existing condition, the "Modeled Maximum Annual Mean," column five of the table, shows the average annual concentration expected at the locations which modeling indicates have the highest pollutant levels at the present time. The table has been revised to make this clear.

Page IV-17

The ambient air quality figures shown in Table IV-7 do not reflect emissions from naval ships in Pearl Harbor. However, the vast majority of ships operating in the harbor are to the east of Ford Island, more than three miles from the Waipio Peninsula site and four miles from the Amfac/C-E site. The ships themselves vary so significantly in number, location, and emission rates, and appear to be such minor contributors of pollutants, that we chose not to include them in our calculations.

Page IV-23

As explained in the EIS, the emission rates that were used in our analysis were those supplied by the individual bidders. While the significant differences in projected emission rates for each of the two plants led us to question them at the time, we were reluctant to substitute our own estimates for those of the bidders who would have to stand behind them. However, following publication of the EIS, we have undertaken additional research in an attempt to arrive at a uniform emission rate that is applicable to both proposals. Based on a review of the available information, a decision has been made to use the 2.5 pounds of sulfur dioxide per ton of raw refuse that is given in the U.S. Environmental Protection Agency's publication AP-42 as the estimated emission rate for both the Amfac/C-E and UOP facilities. However, it should be noted that, while the emission rates per unit input are now the same, inherent differences in the firing rates of the two different proposals mean that total sulfur dioxide emissions (in tons per unit of time) are still somewhat different.

Table IV-13 is a summary of average annual emissions. HPOWER is primarily a refuse-fired facility, and oil would be used only as an emergency back-up during brief periods when the flow of refuse fuel has been temporarily interrupted. Because of this, it would be inappropriate to give annual emissions when burning oil.

In assessing the short-term sulfur dioxide impacts on ambient air quality (i.e., 3-hour and 24-hour), the possibility that fuel oil would be used was considered. In the case of UOP, it was assumed that 0.5-percent sulfur oil would be used. Because of a desire to utilize the Oahu Sugar Company's existing storage and transmission facilities, Amfac/C-E is proposing use of 2.0-percent sulfur oil. The emission rates and total emissions used for each of the proposals are as follows:

Bidder	Sulfur Dioxide Emission Rate when burning oil (in pounds/hour)	Sulfur Dioxide Emissions when burning oil (in tons/day)
Amfac/C-E	970	11.6
UOP	307	3.7

Page IV-26a

The EPA's National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61.52), which set an emission limit of 3,200 grams of mercury per day for sewage sludge incinerators, is not applicable to resource recovery facilities. However, it is pertinent in the sense that it provides a reference point that can be used to help judge the significance of mercury emissions from HPOWER.

The standard corresponds to 1.28 tons per year assuming 365 days per year of operation. Comparing this to the range of estimates for HPOWER's mercury emissions given on page IV-26, i.e., 0.4 tons per year to 8.0 tons per year, tells us only that the emissions could be as little as one-third or as much as seven times the limit for sewage sludge incinerators. However, it should be noted that the levels from the Braintree, Massachusetts resource recovery facility that represent the upper end of the range are much higher than those reported elsewhere. With the data now in hand, it appears much more likely that the HPOWER facility would be at the lower end of the reported range along with most other municipal incinerators.

Page IV-26b

The column in Table IV-15 that was titled "RDF-Fired" has been changed to read "RDF/Coal Co-Fired."

Page IV-29

Your observation is correct. The last sentence in the paragraph on page IV-29 entitled "Annual Averages" has been altered to read:

> UOP would also not contribute to violations of annual Federal air quality standards. However, the State's annual standard for sulfur dioxide (20 micrograms per cubic meter) is far exceeded, and the UOP facility would contribute to this. The contribution is so slight, 0.1 micrograms per cubic meter out of a total of 78.3 micrograms per cubic meter, that HPOWER's effects do not appear to be significant.

Pages IV-31, IV-32, and IV-34

Notes indicating that "oil" refers to fuel oil with an average sulfur content of 0.5 percent for UOP and 2.0 percent for Amfac/C-E have been added to the tables as you requested.

Page IV-35

A specific statement to the effect that the highest ambient 24-hour concentrations of hydrogen chloride (HCl) is less than one one-hundreth of the occupational standard of 7,000 micrograms per cubic meter has been inserted on page IV-35 of the EIS.

The important factor in assessing the significance of air pollutants is their time-averaged ambient concentration, not the emission rate; and the available toxicological data indicates that the hydrogen chloride concentrations that would result from HPOWER would not constitute a hazard. We do not know the basis of the extremely stringent West German standard. However, two possibilities suggest themselves. The first is that the country's high concentration of heavy industry has already produced dangerously high ambient concentrations of HCl and that the strict emission limitation is designed to prevent further degradation. The second possibility is that their standard is designed to incorporate an extremely large margin of safety for the prevention of adverse effects.

Page IV-36

The consultants who prepared this portion of the EIS were under the mistaken impression that bidders would be held to the emission rates given in their technical proposals. As you noted in your letter, this is not the case. In actuality, they will be limited only by the need to comply with Federal and State air quality standards and with any conditions that may be attached to the construction and/or operating permits. Therefore, the statement quoted in your letter has been removed.

Page IV-37

You are correct, the information presented in Table IV-19 (page IV-31) indicates that a UOP facility located in Campbell Industrial Park would contribute to a violation of the Federal, as well as the State, 24-hour SO_2 standard. As indicated elsewhere in this letter, more detailed analysis using probable "worst-case" meteorology derived from actual data rather than the assumed conditions employed previously has shown that the proposed facility would comply with Federal standards.

Page IV-44

The Jack Hall Housing project adjacent to the Amfac/C-E site is, in fact, air-conditioned. A note to this effect has been inserted in the text on page IV-44.

Page IV-53

The discharge of water vapor from the cooling towers would have no significant effect on neighboring uses. Problems have been reported with very large cooling towers in cold climates, but HPOWER is about one-twentieth the size of the projects that have produced troublesome plumes and/or influenced local weather patterns, and the climate is simply not conducive to plume formation.

The plume potential of a cooling tower is a function of the temperature and vapor pressure of the exiting air and of the temperature and relative humidity of the ambient air into which it is discharged. The visible plume is condensed water vapor which results when the warm, saturated air leaving the tower is cooled to ambient dry bulb temperatures and becomes supersaturated. The temperature of the air exiting the tower is roughly the average of the ambient air temperature and the inlet water temperature. Hence, as the wet bulb temperature of the ambient air drops, the temperature of the air discharged from the tower also drops.

The most severe pluming occurs when the ambient air is at 100 percent humidity and is cold. While this occurs regularly during wet winter periods in areas with a temperate climate, in Honolulu it is extremely rare. The worst situation here would probably occur early on a winter morning when the temperature drops to 55° Fahrenheit and there is little or no wind to cause mixing. Even then, the humidity would have to reach about 90 percent before a plume would appear, and this seldom, if ever, occurs. Under the "worst-case" conditions described above, a vapor plume could form above the cooling tower. However, it would disappear within a few tens of feet as the excess moisture is dispersed through the surrounding air. The rapid dissipation of the plume is facilitated by the relatively small amount of excess moisture that is involved and by the multiple-unit layout of the cooling tower that is proposed.

Page IV-58

The effect that the project would have on consumptive water use is not as clear-cut as you suggest. The 1.133 MGD of water that would be consumed by the Amfac/C-E facility is currently used to irrigate sugar cane fields on the Waipio Peninsula. As indicated on page IV-60 of the EIS, the amount of wastewater that is currently generated by operation of the sugar mill and disposed of on the Waipio Peninsula exceeds the 10,000 gallons per acre per day that is considered optimal for irrigation. It is applied to the fields as a means of disposing of silty effluent that cannot legally be discharged to Pearl Harbor or economically transported to other, more distant, fields. Most of the excess water percolates to the water table without contributing to the growth of the crop. In fact, the over-irrigation is believed to result in somewhat reduced sugar yields from these fields. The lowered productivity is accepted because of the essential disposal function that is served. For all practical purposes, then, the excess water that would be diverted for HPOWER is already being used consumptively because it is put to a non-productive use.

There is, however, a difference between water that would be consumed by the Amfac/C-E HPOWER facility and water that is "consumed" in over-irrigating the Waipio fields. The difference is that, under the present arrangement, the surplus wastewater from the sugar mill could be diverted to a productive use if the opportunity should arise, whereas water lost from the cooling tower of an HPOWER facility would be permanently committed. More significantly, perhaps, it might be argued by some that if Oahu Sugar Company is able to surrender to the HPOWER project some of the water it now uses, then it is currently using too much water and should be required to take conservation measures regardless of whether or not the HPOWER contract is awarded to the Amfac/C-E consortium.

The Amfac/C-E proposal makes it clear that a reduction in water use by the mill (and the consumptive loss of water to over-irrigation that goes with it) is possible. However, the necessary adjustments in mill operations would presumably increase costs to the sugar mill, and it might be unfair to force the Oahu Sugar Company to bear these costs without benefitting from the HPOWER project.

Page IV-75

Possible vector-related impacts of HPOWER were studied in some depth for the EIS. As part of this work, visits were made to the existing Waipahu Incinerator and the Keehi Transfer Station.

The Waipahu Incinerator is a ten-year-old "mass-burning" type facility situated about 2,000 feet from the nearest human population. A limited vector control program is presently in effect. Because of the facility's remote location and proximity to the existing ash disposal operations, there is evidence of the presence of rodents and insects on the site. For the existing operation and location, the rodent and insect population is tolerable. However, were the facility located closer to urbanized areas, it is likely that much more active control measures would be required to avoid complaints from surrounding residents and businesses.

The proposed HPOWER facility could be expected to house similar vector populations if suitable sanitation, maintenance, and pest control programs were not instituted. The key to the acceptability of HPOWER lies in the fact that the physical plant would be designed to minimize the potential vector habitat and that there would be very active sanitation and vector control programs. The absence of vector problems at the Keehi Transfer Station, which employs a daily clean-up program similar to that which would be used at an HPOWER facility, indicates that the potential problems can be avoided.

Page IV-80

Traffic projections for Kalaeloa Boulevard, but not for Malakole Road, are contained in the Revised Environmental Impact Statement for the Barbers Point Deep-Draft Harbor on Oahu prepared by M & E Pacific, Inc. Based on these figures, it appears that the HPOWER project would contribute only about 2.5 percent of the peak-hour traffic on Kalaeloa Boulevard (60 vehicle trips of a total of nearly 2,600) and would not cause the capacity of the upgraded roadways to be exceeded.

Page IV-1

Recent sharp increases in energy costs have led to increased interest in the recovery and utilization of methane recovered from landfills. However, as of January 1980, only six landfill gas recovery operations are known to be operational. Of these, only Reserve Synthetic Fuel, Incorporated's high-Btu processing system at the Palos Verdes Landfill was in operation when the HPOWER procurement process was initiated, and it had been on-line for less than a year. Because the concept is still in the development phase, it was not considered a viable alternative to HPOWER. However, for your information we have attached a copy of a recent article from Solid Wastes Management reviewing the status of methane recovery programs in the United States.

As we noted in the EIS, the City will continue to operate sanitary landfills even if HPOWER is implemented. As the technology develops, we will consider incorporating methane recovery systems in new landfills and/or retrofitting old landfills with the equipment necessary to collect and transport the gas that they produce.

Page IX-1

The need for clearance from the FAA has been noted on this page. According to information obtained from the FAA during the course of the study and confirmed recently, all of the proposals conform to existing FAA guidelines.

Thank you again for your thoughtful comments. We hope that the information provided above answers the questions that you raised. If you have any further questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
Attachment
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

landfill

Landfill methane: 23 sites are developing recovery programs

by Robert P. Stearns, President, SCS Engineers, Inc., environmental engineering consulting firm, Long Beach, CA.

The rapid rise in the cost of energy has prompted increased interest in the recovery and utilization of landfill gas (LFG) at many locations throughout the United States. The U.S. Department of Energy (DOE) has estimated that the sanitary landfills in the United States generate 200 billion cubic feet of methane gas per year. The energy represented by this gas would fill about one per cent of the total energy needs of the United States.

LFG recovery efforts

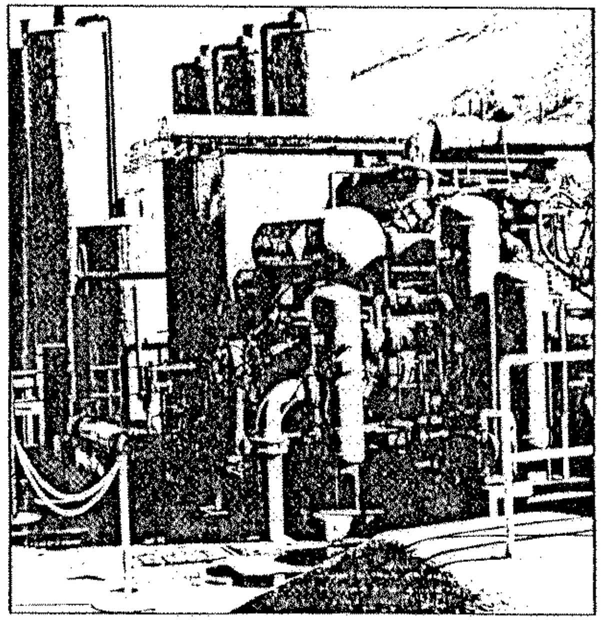
Initial efforts to recover LFG occurred at the Palos Verdes landfill operated by the Los Angeles County Sanitation Districts in the mid-1960s. From this modest beginning, LFG recovery technology has been successfully applied at five other landfills and is under active consideration at another 17 disposal locations.

As Table 1 shows, a total of 23 landfills located in four states are in advanced states of development for LFG recovery. The tabulated information has been obtained from a variety of sources and is believed to be complete as of January of this year. The locations listed had either an ongoing LFG recovery program or a feasibility study including extraction tests in progress or completed as of that time.

Some observations can be made from the tabulated information. Only six of the 23 landfills are currently operational in terms of LFG recovery; two are identified as being in the start-up phase. The remainder of the sites are undergoing a formal feasibility study, including pumping tests. Pumping tests are reportedly under way at some 15 disposal sites.

The sites listed are about evenly divided between public and private ownership. Of the six sites where an operational LFG recovery system exists, three are private sites. Of the 23 sites listed, 13 are still active as disposal sites.

Possibly reflecting the location where LFG recovery activities began, the majority of the sites listed are located in California — 13 of 23. Seven of the remaining 10 disposal sites are located in Colorado and are the subject of a single combined feasibility study being conducted by the author's firm.



Part of the methane gas treatment plant at Palos Verdes, CA, landfill

The LFG recovery system owner/operator is predominately private industry on the operating sites. Reserve Synthetic Fuels (now Getty Sythetic Fuels) is identified as the owner/operator of six of the operating and/or proposed LFG recovery systems. Watson Energy Systems, Azusa Land Reclamation Co., and Gas Recovery Systems, Inc., are identified with one location each. Public ownership of recovery facilities is anticipated for the remaining 14 sites, including the seven in Colorado mentioned previously.

The fact that a relatively few LFG recovery system disigners are represented in Table 1 reflects the maturity level of the technology. The leader in the field, Reserve Synthetic Fuels, is the system designer for the six sites identified with that firm. SCS Engineers is identified with nine sites representing three locations. A scattering of other firms or public entities are identified with the remaining sites.

A wide range in landfill sizes is found in the table. The smallest site, the 38-acre Ascon facility in Wilmington, CA, is small by comparison to the 1,214-acre Puente Hills site operated by the Los Angeles County Sanitation Districts. The average size of the landfills represented is about 160 acres. Although relatively small in acreage, the Ascon facility is an excellent producer of LFG and a highly successful LFG recovery operation.

Landfill depth ranged from a shallow 20 ft. in one of the Colorado sites to 300 ft. or more at the Operating Industries site in California. The average depth of the landfills is about 100 ft.

The quantity of LFG recovered, in millions of cubic feet per day, ranged from 0.25 at the Cinnaminson, NJ, facility to the whopping 8 mmcf/day at the Operating Industries facility currently under startup. The average recovery rate from the sites is a little

Table 1: Status of existing and planned landfill gas (LFG) recovery facilities*

Site name/location	Adams County/Commerce City, CO (7 sites)	Ascon/Wilmington, CA	Azusa Landfill/Azusa, CA	Bradley East Landfill/ Los Angeles, CA	CID/Chicago, IL	Cinnaminson Landfill/ Newark, NJ	Coyote Canyon Landfill Irvine, CA	Fresh Kills Landfill/ Staten Island, NY (2 separate projects)	GROWS Landfill Bucks County, PA
Landfill status	1 Active, 6 Inactive	Active	Inactive	Active	Active	Inactive	Active	Active	Active
Landfill/recovery system owners	Various public and private owners/Adams County	Watson Energy Systems, Inc.	Azusa Land Reclamation Co.	Consolidated Rock/Gas Recovery Systems, Inc.	Waste Management/Reserve Synthetic Fuels, Inc.	PSG & E	Irvine Company	City of New York/Reserve Synthetic Fuels, Inc.	Not Determined
Design engineer	SCS Engineers	SCS Engineers	Hobbs-Bannerman/Lockman & Associates	Gas Recovery Systems, Inc.	Reserve Synthetic Fuels, Inc.	PSG & E	Negotiations pending	Reserve Synthetic Fuels, Inc. Leonard Wegman	Applied Geotechnical & Environmental Service Corp.
Landfill acreage (total)	452	38	50	67	150	Unknown	200	Unknown	50
Landfill acreage (gas extraction)	400	38	80	67	150	40	200	40 (400)	50
Average landfill depth (ft.)	22 (range 10-60)	90	170	120	100	110	200	40-50	70
Lfg quantity (mmcf/day)	2.2	1.3	0.7	2	8	0.25	4	Unknown	Unknown
Number and depth of extraction wells	Unknown	40 @ 50 to 80 ft	Unknown	16 @ 100 ft.	13 @ 75-100 ft.	Unknown	Unknown	Unknown	Unknown
Gas processing (gas quality)	Dehydration (500 Btu/scf)	Dehydration (530 Btu/scf)	Dehydration and acid removal (500 Btu/scf)	Dehydration (500 Btu/scf)	Dehydration and CO_2 removal (1,000 Btu/scf)	Dehydration and sulfur removal (550 Btu/scf)	Undetermined @ present	Dehydration (500 Btu/scf)	Dehydration (500 Btu/scf)
Gas user	Not determined	Shell Oil Refinery (Process fuel)	Reichhold Chemical Co. (Boiler fuel)	Valley Stream Generation Plant (Los Angeles City)	Natural Gas Pipeline of America	Hoeganaes (steel plant) (Boiler fuels)	Not determined	Electricity production	Not determined
Current status	Feasibility study under way	Operational since October 1978	Operational since 1978	Under construction (startup scheduled in October 1980)	Operational November 1980	Operational since September 1979	Testing scheduled for spring 1980	Feasibility Studies (2) underway (one by Wegman under Federal grant, second one by Reserve Synthetic Fuels)	Feasibility study completed in 1978

Site name/location	Industry Hills, City of Industry, CA	Menlo Park, Menlo Park, CA	Mountainview Landfill Mountainview, CA	Operating Industries Landfill/ Monterey Park, CA	Palos Verdes Landfill Rolling Hills, CA	Puente Hills Landfill/ Los Angeles County	Scholl Canyon Landfill Glendale, CA	Sheldon-Arleta Landfill Sun Valley, CA	Sunshine Canyon Landfill Los Angeles, CA
Landfill status	Inactive since 1970	Active	Active	Active	Active	Active	Active	Inactive since 1972	Active
Landfill/recovery system owners	City of Industry	Menlo Park/Reserve Synthetic Fuels, Inc.	City of Mountainview/PG&E	Operating Industries/Reserve Synthetic Fuels, Inc.	L.A. County Sanitation District/ Reserve Synthetic Fuels, Inc.	L.A. County Sanitation District	City of Glendale	City of Los Angeles	Browning Ferris Industries/ Reserve Synthetic Fuels, Inc.
Design engineer	SCS Engineers	Reserve Synthetic Fuels, Inc.	PG & E	Reserve Synthetic Fuels, Inc.	Reserve Synthetic Fuels, Inc.	L.A. County Sanitation District	Alpha National/ Lockman & Assoc.	City of Los Angeles	Reserve Synthetic Fuels, Inc.
Landfill acreage (total)	120	100	300	150	178	1,214	Unknown	40	100
Landfill acreage (gas extraction)	120	100	30	150	44	Not determined	45	40	30
Average landfill depth (ft.)	35 to 40	50	40	300	150	140	200	125	200
Lfg quantity (mmcf/day)	0.8	Not determined	0.9	8.0	1.8	Not determined	1.2	2.9	1.0
Number and depth of extraction wells	30 @ up to 70 ft.	Not determined	Unknown	81 @ 70 to 200 ft.	12 @ 100-150 ft.	Not determined	Unknown	Unknown	8 @ 200 ft.
Gas processing (gas quality)	Dehydration (500 Btu/scf)	Dehydration (500 Btu/scf)	Dehydration and partial CO_2 removal (700 Btu/scf)	Dehydration and CO_2 removal (1,000 Btu/scf)	Dehydration and CO_2 removal (1,000 Btu/scf)	Dehydration (500 Btu/scf)	Dehydration (450 Btu/scf)	Dehydrated (550 Btu/scf)	Dehydration (500 Btu/scf)
Gas user	Industrial Exhibit-Conference Ctr (Boilers for pool and buildings)	Not determined	PG&E (Natural gas distribution)	Southern California Gas Co. (natural gas distribution)	Southern California Gas Co.	Rio Hondo College, So. Calif Edison & an industrial park are potential markets	Electricity generation for on-site use	Valley Steam Generation Plant (Boiler fuel)	Sale user being negotiated
Current status	Startup	Field test work completed	Demonstration operation since 1978	Startup since August, 1979	Operational since 1977	Testing in progress	In design	Operational since Oct. 1979	Design complete

*Table compiled by SCS Engineers; information current as of Jan., 1980

more than 2 mmcf/day of LFG.

Table 2 presents the indicated LFG recovery rate for each site derived from the reported LFG quantity, the average landfill depth, and the landfill acreage under recovery operation. An average landfill density of 1,200 lb./cu. yd. was assumed in making the calculation. It can be seen that the recovery rate (actual and anticipated) varies within a fairly narrow range (0.01-0.14 cf/lb.-year) between sites, averaging 0.055 cf/lb.-yr. The previously noted high rate of gas production for the Ascon facility (0.13 cf/lb-yr) is evident in a review of these data. The elevated rate of gas production is believed to be due to certain high pH liquid wastes received at the Ascon site and high moisture levels within the deposited wastes.

The average production rate for the six operating facilities was 0.08 cf/lb.-year.

Gas processing is primarily a function of the market for the recovered LFG. Two primary forms of gas processing are employed: minimal cleanup

Table 2: LFG recovery rates

Site Name	Estimated LFG Recovery (mmcf/day)	Calculated LFG Recovery Rate (cf/lb-year)*
Adams County/Commerce City (7 sites)	2.2	0.04
Ascon	1.3†	0.13
Azusa	0.7†	0.05
Bradley East	2.0	0.05
CID	5.0	0.06
Cinnaminson	0.25†	0.01
Coyote Canyon	4.0	0.02
Industry Hills	0.6	0.03
Mountainview	0.9†	0.14
Operating Industries	8.0	0.03
Palos Verdes	1.8†	0.05
Scholl Canyon	1.2	0.02
Sheldon-Arleta	2.9†	0.11
Sunshine Canyon	1.0	0.03
TOTAL	31.85 mmcf/day	
Average (all locations)	2.3 mmcf/day	0.055 cf/lb-year
Average (operating facilities only)	1.3 mmcf/day	0.08 cf/lb-year

*Assumes landfill density averages 1200 lb/cu yd
†Actual values reported for operating facilities

to provide a low-Btu gas (averaging 500-550 Btu/scf) and cleanup to pipeline quality (1,000 Btu/scf). In low-Btu gas processing, exemplified by the Ascon and Azusa facilities, treatment consists of dehydration, gas cooling, and removal of heavy hydrocarbons (optional) leaving a gas stream composed of methane and carbon dioxide, usually in about equal quantities. The gas has been found suitable for use as a boiler fuel or as a process fuel for other industrial uses.

In high-Btu processing systems, exemplified by Reserve Synthetic Fuel installations at Operating Industries and Palos Verdes, the gas is processed for the removal of higher hydrocarbons and other trace gases and of carbon dioxide. This process requires considerable capital investment for processing equipment, and is being used at only four of the 23 sites listed on Table 1. The resulting processed gas is essentially pure methane and is suitable for injection directly into natural gas distribution mains or for any activity now utilizing natural gas.

Referring to Table 1, the processed LFG is injected into pipelines at four of the 23 locations. LFG is minimally processed as a low-Btu fuel and utilized in an off-site boiler or as a process fuel at six of the 23 locations. Two sites report the use of low-Btu fuel for on-site purposes.

Future of LFG recovery

There is no doubt that the tremendous increases in energy costs have given LFG recovery a needed "shot in the arm." However, an additional impetus is on its way from the U.S. Environmental Protection Agency (EPA). The RCRA requirements for controlling migration of LFG as dictated by EPA's landfill criteria require methane gas concentrations at the disposal site property line not to exceed 5% by volume. Methane gas concentrations in facility structures may not exceed 1¼% by volume. These requirements will necessitate installations of LFG control systems at many sites.

The installed LFG control system may include some of the same facilities (extraction wells, pumps, etc.) required for an LFG recovery system. If the LFG must be removed, many enterprising site owners will actively seek a profitable market for the gas. It is important to note, however, that gas-extraction for recovery may not fulfill all the requirements for gas migration control. Proper engineering must be applied, and economics and site specific conditions must be considered in integrating gas migration control with LFG recovery.

Finally, the DOE has become increasingly interested in LFG recovery. DOE is supporting a number of projects aimed at improving LFG recovery technology. Legislation supporting LFG recovery has also been introduced at the federal level.

Thus we can expect more LFG recovery projects in future years. Hopefully, the beneficial effects associated with its recovery can dispel some of the negative public reaction to landfilling of our solid wastes while contributing to our national fuel supply inventory. □

University of Hawaii at Manoa

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Telephone (808) 948-7361

Office of the Director

June 6, 1980

RE:0306

Office of the Mayor
City and County of Honolulu
530 South King Street
Honolulu, Hawaii 96813

Dear Mr. Mayor:

Draft Environmental Impact Statement
Honolulu Program of Waste Energy Recovery (HPOWER)

The Environmental Center has reviewed the above cited DEIS with the assistance of Kirk Smith, East West Center, Resource Systems Institute; Anders Daniels, Meteorology; Reginald Young, Civil Engineering; and John Sorensen, Elizabeth Winternitz, Barbara Vogt, Environmental Center. The City's attempt to recover non-renewable resources while decreasing the amount of land needed for landfill is to be applauded.

In general, the DEIS presents the environmental impacts that might be expected to result from the building of the proposed facility in a reasonable and comprehensible manner. However, our reviewers suggest further clarification on the areas of site selection, water consumption, noise, and ultimate disposal of ash residue.

Site Selection

It appears from the initial discussion on bidders (page II-3) that final selection of a contractor will primarily be an economic choice given that certain environmental parameters considerations are complied with. Because of the full-service nature of the contract it is probable that life-cycle costs will be included in the bid. However, it does not necessarily follow that overall as well as cumulative environmental impacts will be given the same consideration. For example, the Amfac/C-E proposal to divert water currently utilized in its sugar operations for use in the HPOWER plant may prove impractical if, in future years, the water available in that area becomes needed primarily for residential use. Another question involves the use of diesel instead of high-grade fuel. Could a point system whereby environmental impacts are considered as trade-offs be devised for use along with the economic aspects?

A comparison between the proposed HPOWER facilities and those in other sites such as Boston or St. Louis would be helpful. Residents of Oahu have not been actively involved in recycling efforts. Therefore the percentage of recoverable metals may be

higher here than in other communities. Future efforts to change citizen behavior may change the amounts of recoverable materials.

Noise

The sites have been analyzed thoroughly for the visual impacts that would be created through their use for the proposed plant, but the noise impact need further discussion. For example, on page III-7 under the policy prohibiting major sources of noise and air pollution from residential areas it states that:

> Consequently, the HPOWER proposals now meet all City and County, State and Federal environmental standards. This is so despite the fact that the Amfac/C-E proposal places the plant in close proximity to a residential area.

Although the "adjacency of a residential area and an industrial one would not be a newly-created situation" (page IV-99) the number and size of vehicles traversing the area is significantly different in noise impact.

Since the annoyance of noise from trucks will be enhanced on quiet evenings, consideration should be given to mitigation measures other than buffer zones to lower the nuisance effect?

Air Pollution

Our reviewers found that the air quality assessments thorough and acceptable. The EPA approved-model definition of "worst case" could be debated but it is probable that more realistic models would probably have shown lower ambient concentrations.

On page IV-32, the assumption of an average of "one week per year" cannot be used as an average. We suggest that the worst possible case such as the last strike situation be used as the worst period during which fuel oil would be needed. In case of a strike, what provision for storage has been made for the waste?

Other Aspects

Youngsters from Jack Hall Housing adjacent areas who wish to play in L'Orange Park would necessarily have to cross a street heavily traversed by trucks. Will some sort of accommodation such as street lights or an overpass be provided for safe crossings?

The assumption that the plant can be operated on refuse 98 percent of the time (needing only one week per year of operation on fossil fuel) must be questioned. A more realistic operational factor should be suggested.

We note that discussion of the potential impact of stacks and other high structures in the Landing/glide path for aircraft at Barbers Point WAS and Hickam Air Force Base/Honolulu

International Airport was missing from the DEIS. Have the impacts been noted as insignificant? We would appreciate further comment on the impact of HPOWER on private collection of refuse disposal in the final EIS.

Thank you for the opportunity to review this document.

Yours very truly,

Doak C. Cox
Director

DC/ck

cc: Dept. of Public Works
OEQC
Kirk Smith
Anders Daniels
Reginald Young
John Sorensen
Elizabeth Winternitz
Barbara Vogt

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R80-542

October 15, 1980

Dr. Doak C. Cox, Director
Environmental Center
University of Hawaii at Manoa
Crawford Hall 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Dr. Cox:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 6, 1980 (RE:0306) regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time that you and other members of the University of Hawaii faculty spent reviewing the document. The remainder of this letter attempts to clarify the issues that you have raised.

Procurement Process

Your conclusion that final selection of a contractor will be based primarily on economic factors is correct. No special bonus is offered to bidders whose facilities perform substantially better than required by the City's Request for Proposals (RFP). However, the procurement process being used for the HPOWER project is designed to insure that both environmental and economic factors are taken into account. Some examples of the performance criteria that must be met by the facility are a minimum net energy recovery efficiency of 450 kilowatt hours (Kwhr) per ton of refuse for water-cooled plants and 430 Kwhr per ton of refuse using air-cooled condensers; weight and volume reduction of at least 75 percent and 90 percent, respectively; and, for an 1,800-ton per day facility, diversion to landfill of no more than 30,000 tons of raw refuse each year. Similarly, the RFP requires that proposals meet all existing environmental regulations, including ambient air quality standards, emission limits, noise criteria, and water quality regulations.

Your letter suggests that it would be desirable to establish a point system that would allow economic and environmental factors to be considered simultaneously. This, of course, involves measuring all of the factors in the same units. While such an approach is desirable, it requires an ability to establish relative values for very dissimilar effects that is well beyond the current state-of-the-art of environmental impact assessment techniques. Hence, in terms of a practical decision-making process, we believe that it is better to determine in advance what levels of impacts are tolerable and to insist that these not be exceeded. This is what has been done with HPOWER, and if one assumes that maintenance of standards assures negligible adverse impacts to the environment, is a tact that cannot be faulted.

Comparison With Other Facilities

It is not clear from your comment what kind of a comparison between HPOWER and other resource recovery facilities you would like to see. Differences in locale between the Honolulu proposals and the other facilities make direct comparisons difficult. Because of this, we do not believe such a discussion would add substantially to the HPOWER EIS. However, for your information, we are enclosing three articles discussing the Boston and St. Louis facilities. It does seem from some of the other remarks in the same paragraph that your primary interest is in the effect that a change in the percentage of recoverable materials present in the waste stream would have on the operation of the proposed facility. If this is the case, we wish to assure you that HPOWER is flexible enough to accommodate changes in the recycling habits of Honolulu residents.

Because of uncertainties over the future concentrations of recoverable materials in the waste stream, as well as the large fluctuations that occur in the market for recovered materials, the City has left materials recovery aspects of the HPOWER project largely in the hands of the bidders. The fact that bidders will receive half of all revenues derived from the sale of recovered materials is expected to act as strong incentive for them to fully exploit the materials recovery potential of Oahu's waste stream. At the same time, the City's competitive bid procurement procedure effectively prevents an overcommitment to unprofitable recycling schemes.

Noise

A very extensive discussion of potential noise impacts is presented on pages IV-39 through IV-52 of the EIS. This section, which is not referenced in your comments, addresses all of the issues raised in your letter, including mitigation measures.

Air Pollution

The HPOWER facility would utilize oil only as an emergency backup when the normal supply of refuse has been interrupted for brief periods. This backup is important because it allows the facility to guarantee firm power to energy customers such as the Hawaiian Electric Company. In the case of prolonged interruption in the supply of refuse that could result from a strike, the HPOWER facility would be shut down because it would be uneconomical to continue its operation for extended periods using fuel oil. Because of this, it is our belief that one week of oil firing per year is a reasonable estimate on which to base the impact assessment. In this regard, it should be noted

that one week of oil firing is sufficient to require the facility's compliance with one-hour, three-hour, eight-hour, and twenty-four hour ambient air quality standards when burning this fuel.

In the case of a strike by HPOWER employees, incoming solid waste would be diverted directly to a sanitary landfill for disposal. Solid waste already at the facility would have to be processed there. If the strike involved only the truck drivers, it would be processed by the regular staff before they close the plant; this would prevent potential pest and odor problems associated with the presence of untreated refuse. If the strike were against the operator of the HPOWER facility, supervisory personnel would slowly process the waste already in the system before shutting down the plant in an orderly fashion.

Other Aspects

At present, there are fences on both sides of the cane haul road separating Hans L'Orange Park from the Jack Hall Housing. Hence, youngsters from the housing project must use Hiapo Street to reach the park. This would not be changed by the proposed HPOWER project.

The bidders have stated that they would burn refuse at least 98 percent of the time during which they are operating (i.e., exclusive of scheduled maintenance periods). Given the redundancy built into the system, we see no reason to doubt them. It should be noted that the availability factor is calculated on 48 weeks of operation per year per boiler. Each boiler would be shut down for four weeks each year to allow for routine maintenance.

The EIS contains no discussion of the potential effect of HPOWER structures on landing/glide paths for aircraft at Barbers Point Naval Air Station or Hickam/HIA because no conflicts exist.

HPOWER would affect private refuse collectors by changing the ultimate destination of their trucks and by altering the per-ton fee charged them for disposal. The exact effect on truck routing will depend on the placement of any transfer stations that are developed as part of the City's overall solid waste management program, and details of the system have not been decided at this time. However, funds to begin implementation of necessary transfer stations are included in the Department's CIP budget, and we expect to proceed with them concurrently with the proposed HPOWER project.

As indicated in the EIS, HPOWER is expected to result in lower long-term disposal costs than would any of the feasible alternatives. These savings would be passed on to private refuse collectors in the form of lower tipping fees than would otherwise prevail. This would be made possible by the fact that income from the sale of energy and recovered materials would help offset the costs of operating the facility.

In considering the impact that HPOWER would have, it should be kept in mind that the present disposal system depends upon sanitary landfills, each of which has a finite life. All of the landfill space now available is expected to be used up about the time HPOWER would come on line. Since new landfill space may not be obtainable in the same areas as the existing landfills, private collectors would be faced with the job of adjusting their operations to a new set of conditions even if landfills were used in lieu of HPOWER. It is our belief that the longer operating life of HPOWER as compared to a landfill will make it possible to develop a collection and transfer system that benefits both private haulers and the Refuse Division.

Thank you again for your thoughtful comments. If we may be of any further assistance, please call Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

Articles attached were:

"RESCO's Saugus plant pioneers solid wastes-to-steam approach," Solid Wastes Management, October 1978.

Report on Status of Technology in the Recovery of Resources from Solid Wastes. County Sanitation Districts of Los Angeles County, California; John D. Parkhurst, Chief Engineer and General Manager.

"St. Louis resource recovery operation may still be alive," Solid Wastes Management, March 1978.

June 6, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, HI 96813

Dear Sir:

This is to acknowledge receipt of the Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER). Leeward Community College has no comment on the report at this time.

Sincerely,

Melvyn K. Sakaguchi
Provost

dk

cc Department of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Melvyn K. Sakaguchi, Provost
Leeward Community College
96-045 Ala Ike Street
Pearl City, Hawaii 96782

Dear Mr. Sakaguchi:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 6, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER). We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

University of Hawaii at Manoa
Hawaii Natural Energy Institute

May 30, 1980

MEMORANDUM

TO: 1. Office of the Mayor
City and County of Honolulu
2. Department of Public Works
City and County of Honolulu

FROM: Paul C. Yuen
Director, HNEI

SUBJECT: Comments on HPOWER EIS by S. M. Siegel

The Hawaii Natural Energy Institute does not ordinarily comment on EIS, but we are making an exception in this case. Dr. Sanford Siegel, who has often assisted us in environmental and other matters, has reviewed the EIS and I am pleased to transmit his review.

The HPOWER project, as you know, has always had my complete support as I consider it a necessary and potentially beneficial natural energy project for Oahu.

cc: Dr. Sanford Siegel

University of Hawaii at Manoa
Department of Botany
St. John Plant Science Laboratory
Room 101 • 3190 Maile Way • Honolulu, Hawaii 96822
Telephone (808) 948-8369 • Cable Address: UNIHAW

TO: 1. Office of the Mayor
City and County of Honolulu
2. Dept. of Public Work
City and County of Honolulu
VIA: Dr. Paul Yuen, Director Hawaii Natural Energy Institute

FROM: S.M. Siegel

RE: HPOWER EIS

DATE: 26 May 1980

Chapter IV of the above document has been reviewed. In general, the descriptions and assessments of probable environmental impacts are well documented and competently presented.

There are concerns which I believe should be taken into account.

Sulfur Dioxide

With respect to borderline SO_2 levels, the parameters of change in the near future at HPOWER sites include future HPOWER tonnages, other emission sources and the possibility that PSD standards may be revised downward. We should urge a vigilant monitoring program to ensure continued compliance and that bidders develop firm contingency plans for emission control.

Mercury

The EPA incinerator emissions standard allows 1600g/24 hr. or approximately 0.6 tons/yr. The conservative figure for an 1800-TPD HPOWER facility of 0.4 tons/yr. is uncomfortably close to this level, and the 20-fold multiplier ascribed to B raintree, Massachusetts facility would create severe problems. It is indeed correct that Hawaii's natural baselines for atmospheric mercury are high by U.S. standards, and the figures cited for Siegel, et al. (1972) have been long since superceded by much more work in the same program UHM. Enclosed are aerometric maps representing a decade of study on four islands. As you can see, these are general windward-leeward as well as distance from source effects. The suggestion that HPOWER replacing conventional incineration may reduce mercury emission is most hopeful, because the actual West Oahu air level, although highly variable, cannot safely carry a higher burden than it now has. The fact that Mauna Loa, Kilauea, the Kilauea East Rift and the Haleakala S.W. Rift all register high overlying air mercury levels is possibly a health and ecological problem that this state may one day have to deal with

AN EQUAL OPPORTUNITY EMPLOYER

notwithstanding, we urge a firm commitment to mercury monitoring in conjunction with HPOWER. Even W. Oahu has its possible highs, one perhaps the result of fossil fuel emissions at Nanikuli, the other the Lualualei Valley anomaly.

The statement that "...there is no evidence that its (HONOLULU REFUSE) mercury content is unusually high," may well be true, but requires more documentation than this simple negative declaration. As the enclosed recent publication (Kama and Siegel, 1980) plants growing in Manoa Valley soil with no history of mercurials application and a low soil level (ca 27 ppb) nevertheless can accumulate appreciable Hg content and revaporize it at substantial rates even when alive.

Assume 200 ug mercury per kg. fresh weight and a dry matter content of 20%. Then each ton of such vegetable matter could, upon incineration, release 1 g of Hg, principally as metal vapor. At 100 tons/day, we have 36.5 kg/yr. This does not seem to be a great deal of mercury however it should be noted that the EPA's 1 ug/m^3 corresponds to only 1 kg in a cube 1 km on a side or ca 5 kg/cu mi.

Acid Precipitation

Perhaps I have overlooked a discussion of possible acid precipitation impact in this document; or perhaps it was implicit in the generally favorable projection for HCl that this need not be a concern. I only suggest that the possibility be given some explicit treatment and not overlooked, because the co-existence of SO_2, NO_x and sunlight favors the formation of SO_3 and H_2SO_4 aerosol.

Bio-indicators

Finally, recognizing that little is known about cumulative multiple intoxication, the use of pollutant-sensitive indicator plants integrated into the landscape planning is recommended. APCA has compiled lists of plants sensitive to specific pollutants and the symptomatology of intoxication.

Pollutant	Examples of Indicator Plants Suitable to Hawaii
Sulfur Dioxide	Morning Glory Zinnia Mulberry Chili Pepper Cotton
Nitrogen Dioxide	Hibiscus Sunflower
Hydrogen Chloride	Tomato
Mercury vapor	Boston Fern Mimosa

These maps have been taken from a study project:

"Geothermal Environmental Overview for the State of Hawaii," Project manager Barbara Z. Siegel, carried out and prepared for the Lawrence Livermore Laboratory's DOE-funded "Overview Program."

Organic Geochemistry, Vol. 2, pp. 99–101
Pergamon Press Ltd 1980. Printed in Great Britain

Volatile mercury release from vascular plants

WILLIAM KAMA and S. M. SIEGEL
Department of Botany, University of Hawaii, Honolulu, HI 96822, U.S.A.

(Received 12 April 1979; accepted in revised form 25 May 1979)

Abstract—Sixty-four species of vascular plants were tested for their ability to release volatile mercury. Rates ranged from 0.001 to 39.5 $\mu g \cdot kg^{-1} \cdot hr^{-1}$ depending upon species and method of measurement. Of 13 monocot families 9 contained at least one species capable of Hg emission and of 19 dicot families, 14 possessed this ability.

XIV-64

THE DETOXIFICATION of harmful metal and metalloids by their conversion to volatile alkyls was described by Challenger and Higgenbottom (1935, 1945a, 1945b) more than 30 years ago. The phenomenon stimulated little interest however, until Jensen and Jernelöv's (1969) report on the microbial synthesis of dimethyl mercury from the ion.

More recently this capability has been shown to be general by Wood (1974) and others (Braman and Foreback, 1973; Chau *et al.*, 1976; Wong *et al.*, 1975). Wood has also pointed out that microbial detoxification of mercury can take place through NADH-dependent enzymatic reduction of Hg^{2+} and volatilization of the Hg^{0} formed thereby. The conversion to Hg^{0} can also be carried out by a light-induced reaction in *Chlorella* (Ben-Bassat and Mayer, 1975, 1977, 1978). The ability of algae to volatilize mercury could apply to higher plants as well (Rankama and Sahama, 1950; Goldschmidt, 1974).

However, Barber *et al.* (1973) reported that mercury was not volatilized in their experiments with *Mentha spicata*, although it was taken up by the roots; they concluded that Hg anomalies over vegetated areas were the result of microbial reduction in soils. Subsequently Siegel *et al.* (1977) reported the release of tissue mercury from leaves of three angiosperms: the garlic vine, avocado and koa-haole.

In a 1977 study (Siegel S. and Siegel, 1977) of the fallout from fumarolic Hg in Hawaii, attention was again focussed on vegetation as a factor of its reintroduction into the atmosphere.

The significance of vascular plants in the return of Hg to the atmosphere cannot be assessed on the basis of two recent studies involving four species. Accordingly, we have now examined 64 species for their ability to release tissue Hg principally as the element.

Leaves were obtained from plantings or natural populations on the University of Hawaii campus at the foot of the Manoa Valley in Honolulu. Soils here have been fertilized in some cases, but have no history of treatment with mercurials. The overall mean soil Hg level of 26.8 ± 12.9 $\mu g \cdot kg^{-1}$ falls in the range usually cited for mean crustal abundance (Fleischer, 1972).

Samples were collected near sunrise, bagged in polyethylene and packed in cracked ice for transfer to the laboratory and immediately used (Siegel *et al.*, 1977). The release of mercury from tissue samples was followed by one of three methods: (a) entrapment of Hg on Cu-turnings in a static system; (b) entrapment of Hg with nitric acid in a flowing air stream, and (c) allowing direct Hg loss from tissue to air in large chambers. The details of these methods and procedures are given in Table 1 together with tissue Hg content and emission rates.

The most common procedure, method a, depends upon amalgamation of mercury and is thus specific for Hg^{0}. The system is closed; hence it does not permit transpiration to take place. Hg^{0} emission may involve cuticular permeation, a phenomenon already demonstrated for uptake of mercury vapor by the succulent *Opuntia* (Siegel *et al.*, 1973). Of 53 species tested via method a, 24 were positive; their mean rate of Hg^{0} release was 0.097 $\mu g \cdot kg^{-1} \cdot hr^{-1}$. One species in each of the following genera released no detectable mercury by method, and are not listed in Table 1: *Acalypha, Agave, Alpinia, Araucaria, Bambusa, Calliandra, Carissa, Cassia, Coleus, Coreopsis, Cyperus, Dieffenbachia, Equisetum, Euphorbia, Gossypium, Hibiscus, Kalanchoë, Myoporum, Opuntia, Passiflora, Rhoeo, Sesbania, Sida, Stephanotis, Thevetia, Tradescantia, Tricholaena, Typha, Wedelia.* Methods b and c do not distinguish between Hg^{0} and volatile organo-mercury compounds and, as flow- and high- (relative) volume closed systems, favor higher rates of release. All three species tested by method b released Hg, and averaged 13.65 $\mu g \cdot kg^{-1} \cdot hr^{-1}$. Similarly, all 8 species in the high volume chambers produced volatile Hg as shown by the differences between half-leaves digested promptly upon return to the laboratory and those retained under experimental conditions for 8 hr. We assume that the mean rate of 0.153 $\mu g \cdot kg^{-1} \cdot hr^{-1}$ reflects the relatively open condition.

Within the scope of this survey are included succulents, woody and herbaceous forms, aquatics, trees

Table 1. Mercury content and emission of mercury vapor by vascular plants

Species	Method	Hg in fresh tissue ($\mu g \cdot kg^{-1}$)	Hg released ($\mu g \cdot kg^{-1} \cdot hr^{-1}$)
Aleurites moluccana	*c*	29	0.20
Aloë barbadensis	*c*	7	0.017 ± 0.095 (4)
Ananas comosus	*c*	17	0.211 ± 0.070 (3)
Bauhinia purpurea	*a*	10	0.176
Bougainvillea spectabilis	*a*	9	0.032
Cocos nucifera	*a*	17	0.051
Codiaeum variegatum	*a*	160	0.148 ± 0.100 (4)
Cordyline terminalis	*c*	18	0.001
Crassula argentea	*a*	6	0.002
Cupressus macrocarpa	*a*	11	0.069
Cyperus papyrus	*a*	138	0.175
Dracaena forbesii	*c*	115	0.119 ± 0.076 (7)
Dicranopteris linearis	*a*	116	0.146 ± 0.054 (5)
Eichornia crassipes	*a*	145	0.002
Hemigraphis colorata	*a*	56	0.381
Hibiscus rosa-sinensis	*a*	160	0.099
Homalocladium platycladum	*a*	9	0.007
Hydrocleys nymphoides	*a*	3	0.009
Kalanchoë pinnata	*a*	3	0.009
Lantana camara	*a*	28	0.162
Leucaena glauca	*b*	68 (10)	0.621 ± 0.30 (10)
Ligustrum india	*a*	100	0.174 (2)
Nymphaea sp.	*a*	62 (5)	0.115 ± 0.101 (8)
Pandanus odoratissimus	*c*	23 (4)	0.530 ± 0.398 (8)
Pereskia grandifolia	*a*	12	0.002 ± 0.001 (8)
Pereskia marginata	*a*	11	0.132 (2)
Persea americana	*b*	63 (6)	0.825 ± 0.044 (6)
Phaeomeria magnifica	*a*	9	0.380 (2)
Pseudocalymma alliaceum	*b*	330 (10)	39.5 ± 1.5 (10)
Rhizophora mangle	*a*	78 (3)	0.032 ± 0.141 (3)
Saccharum officinale	*c*	81 (3)	0.130 ± 0.078 (3)
Sansevieria trifasciata	*a*	110	0.122
Scaevola sericea	*a*	18	0.033
Stapelia nobilis	*a*	142	0.004
Thespesia populnea	*c*	80 (3)	0.014 ± 0.011 (3)

Method *a*: 20–50 mg Cu turnings were suspended over 10–15 g tissue samples, sealed in 500 ml Erlenmeyer flasks for 15 hr at 25°C in light (1000 ft-c. coolwhite fluorescent) together with blank flasks containing Cu traps. Method *b*: 5–30 g tissue samples at 25°C were placed in a humidified air-stream (0.5 l. min^{-1}) which was bubbled through a nitric acid trap for 8 hr under fluorescent lights. Method *c*: leaves were halved and one set digested immediately in nitric acid, the other allowed to remain in a humidified 0.5 m^{3} chamber at 24–26°C under illumination for 8 hr before digestion. Cu traps were also dissolved in nitric acid and all acid solutions and digests analyzed for Hg by flameless atomic absorption. Data from replicated experiments are given as mean ± S.D. with the number of trials in parenthesis. All others represent duplicate trials.

and vines. These samples consist mainly of Angiosperms, but also included vascular cryptogams and two gymnosperms. The Angiosperm species represent 13 monocotyledonous families and 19 dicotyledonous families. These families are: Acanthaceae, Amaryllidaceae, Apocynaceae, Araceae, Asclepidaceae, Bignoniaceae, Bromeliaceae, Butomaceae, Cactaceae, Commelinaceae, Compositae, Crassulaceae, Cyperaceae, Euphorbiaceae, Goodeniaceae, Graminae, Labiatae, Lauraceae, Leguminosae, Liliaceae, Malvaceae, Myoporaceae, Nyctaginaceae, Oleaceae, Palmae, Pandanaceae, Passifloraceae, Pontederiaceae, Rhizophoraceae, Typhaceae, Verbenaceae, Zingiberaceae (Neal, 1968). Of the monocots, 9 (69%) contained at least one species capable of Hg emission; among the dicots, 14 (74%) contained at least on Hg-emitting species.

Although there is no question about the ecological significance of mercury from fumarolic and volcanic sources, the magnitude of biological Hg emissions and their effects on local environments are at present matters of conjecture, dependent upon meteorological and topographic as well as geobotanical factors (Siegel, B. and Siegel, 1979). Presumably the rate and extent of the release process depends upon the form and content of Hg in the soil and its uptake and distribution in the plant.

Barber *et al.*, found that *Mentha* plants concentrated Hg absorbed from $HgCl_2$ solution in their roots but that its translocation in the shoot was virtually nil. Shacklette (1970) drew a similar conclusion but noted the scarcity of analytical data. In 1975–77, however, tissue-soil ratios for 275 vascular plants from Alaska, Hawaii, Iceland, and New England were reported (Siegel *et al.*, 1974; Siegel, B. *et al.*, 1977). In the latter report, it was found that in 72% of the sample sites, shoot/soil Hg ratios ranged from 1.33 to 10-fold or more, and that Hg accumulation was selective, relative to Cu and Fe.

Many vascular plants appear capable of accumulating mercury from the soil, transporting it into the shoot and, after reduction, releasing the vapor into the atmosphere.

Thus, we conclude that vascular plants may play a distinctive role in the biogeochemistry of mercury both as reservoirs and in the transfer of the element between soil and atmosphere.

Acknowledgement—Research carried out under Minorities Biomedical Support Grant NIH-DRR-RRO8125

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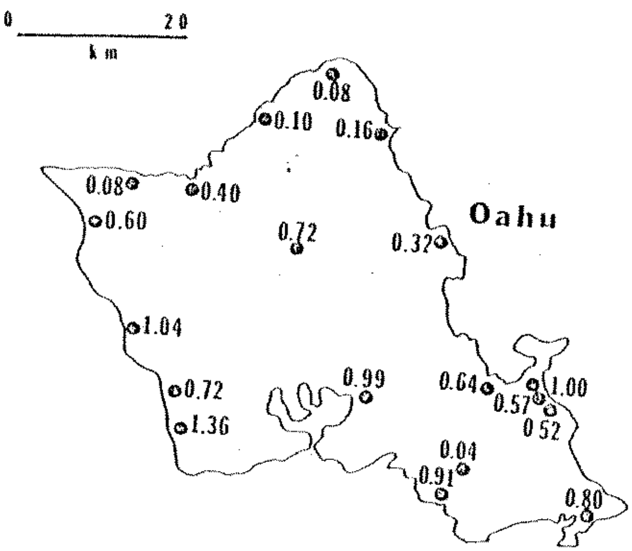

Figure 13. Atmospheric mercury distribution on the Island of Oahu. All values in $\mu g \cdot m^{-3}$ are means of 3-10 determinations over the period 1969-1979. Standard errors are ±20% of their means or less.

3190 Maile Way
University of Hawaii

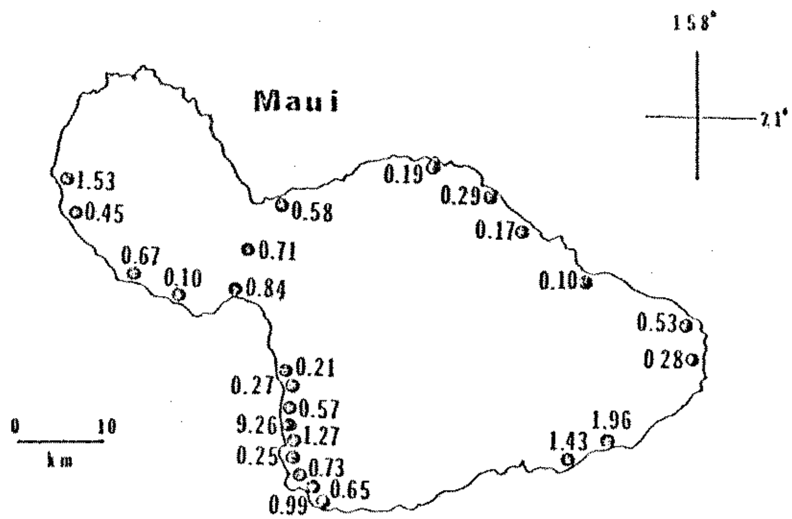

Figure 12. Atmospheric mercury distribution on the Island of Maui. All values in $\mu g \cdot m^{-3}$ are means of 3-10 determinations over the period 1973-1979. Standard errors are ±20% of their means or less.

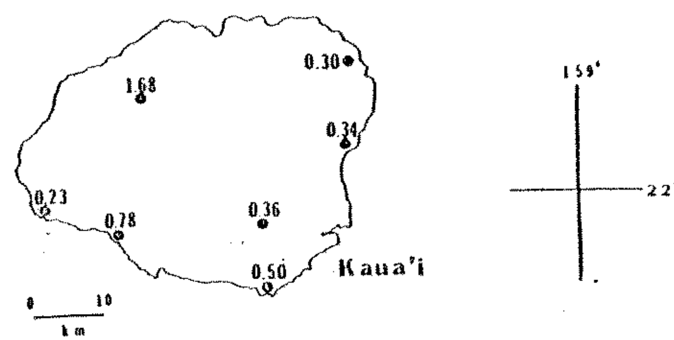

Figure 14. Atmospheric mercury distribution on the Island of Kauai. All values in $\mu g \cdot m^{-3}$ are means of 3-6 determinations over the period 1975-1979. Standard errors are ±25% of their means or less.

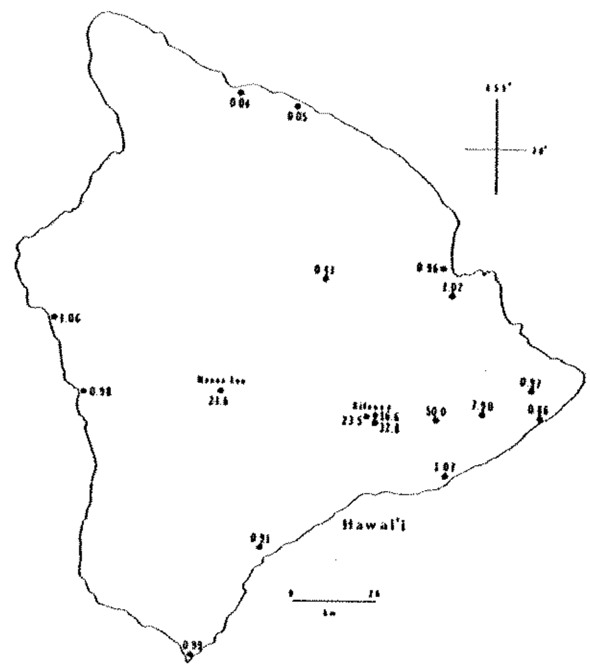

Figure 11. Atmospheric mercury distribution on the Island of Hawaii. All values in $\mu g \cdot m^{-3}$ are means of 4-40 determinations over the period 1970-1979. Standard errors are $\pm 20\%$ of their means or less.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-536

October 10, 1980

Paul C. Yuen, Ph.D., Director
Hawaii Natural Energy Institute
University of Hawaii at Manoa
Honolulu, Hawaii 96822

Dear Dr. Yuen:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your memorandum dated May 30, 1980 transmitting Dr. Sanford M. Siegel's comments on the Environmental Impact Statement for the proposed HPOWER project. We truly appreciate your support for HPOWER. Responses to the concerns raised in Dr. Siegel's memorandum are presented below.

Sulfur Dioxide

Resource recovery facilities such as HPOWER are not normally considered major sources of sulfur dioxide. Hence, the possible violation of air quality standards for sulfur dioxide that were noted in the EIS came as something of a surprise. A review of the data that were used indicates that the modeled violations stemmed largely from the use of the unrealistically high emission rate supplied in the Amfac/C-E technical proposal and from the fact that modeled existing sulfur dioxide levels in the Campbell Industrial Park area are already high. Moreover, the conclusions reached were based on an assumed "worst-case" analysis. Subsequently, a more detailed analysis of the meteorological data that are available has shown that the "worst-case" conditions assumed for our analysis do not occur at all. Under actual "worst-case" conditions, existing Federal standards would not be violated.

Violations of the State of Hawaii standards now in effect could still occur. The very restrictive Hawaii Ambient Air Quality Standards were adopted in 1971 with the idea that they would prevent significant deterioration in the quality of the air as it was believed to exist in 1970. In short, they perform functions that at the Federal level are split between the National Ambient Air Quality Standards and the U.S. Environmental Protection Agency's "Prevention of Significant Deterioration" (PSD) regulations. Unfortunately, the data on which the 1970 estimates of "existing" air quality were based were rather limited. As a result, over the succeeding years, unanticipated problems have arisen. Areas believed to be meeting the standards when they were first promulgated were shown by subsequent monitoring data to be in violation even though no new sources had been constructed in the interim. Of even greater concern was the fact that in some cases large sources employing the best available control technology (BACT) for air pollution control would still be unable to meet some of the State standards. As a result, the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some modification must be made if the State is to avoid the untenable position of trying to enforce standards which cannot be met with current control technology.

When considering potential sulfur dioxide impacts of an HPOWER facility in the Campbell Industrial Park area, it is also important to remember that energy produced by it would be a substitute for power from fossil-fuel-fired generating facilities. Based on: (i) an average sulfur content for Honolulu refuse of 0.19 percent, (ii) an estimated 40 percent of the incoming sulfur leaving in the bottom ash rather than as stack emissions, and (iii) an average heat content of refuse that is only 23.6 percent that of the fuel oil burned by Hawaiian Electric (4,400 Btu's per pound of refuse versus 18,620 Btu's per pound of fuel oil), burning refuse is equivalent to burning oil with a sulfur content of 0.48 percent. This is slightly better than the best available alternative (0.5-percent sulfur fuel oil), and is much better than the 1.5- to 2.0-percent sulfur content oil that is in more abundant supply. The advantage that HPOWER has, as a result of the relatively low sulfur content of the refuse, is partially offset by the fact that a conventional fossil-fuel power plant has lower internal energy requirements and is, therefore, able to export a higher proportion of its gross energy production. Nevertheless, it is evident that, as a sulfur dioxide source, the proposed resource recovery facility would be no worse than, and probably an improvement over, the fossil-fuel-fired generating facilities which would otherwise be called upon to produce the power.

As stated repeatedly in the EIS, the City intends to comply with all applicable air quality regulations. Towards that end, stack testing for sulfur dioxide will be conducted as part of the monitoring program required by the U.S. Environmental Protection Agency. The City is aware of the possibility that regulations may change during the life of the project and is prepared to modify the facility as necessary to insure continued compliance with them.

Mercury

The U.S. Environmental Protection Agency (EPA) has not established a mercury emission limit for resource recovery facilities such as HPOWER. The closest thing to such a standard is the 3,200 grams per day (approximately 1.3 tons per year) limit that has been set on mercury emissions from sewage sludge incinerators. The EPA's estimated mercury emission rate for a facility such as HPOWER is less than one-third of this. The data collected at the Braintree, Massachusetts resource recovery facility show that the plant was emitting mercury at a rate in excess of that allowed for sewage sludge incinerators. However, the mercury emission rate reported for that plant is so much higher than the mercury emission rates recorded elsewhere that it is almost certainly produced by circumstances (probably the presence of industrial wastes with a high mercury content) that would not occur with HPOWER.

We appreciate the significantly updated mercury aerometric data that Dr. Siegel transmitted to us in his memo, as well as the other information he gave our air quality consultant in subsequent conversations. The more recent measurements will be referenced in the EIS. As acknowledged in his memo, there is tremendous variation in the mercury levels that have been recorded. Our review of the material provided suggests that, with the obvious exception of the very high concentrations found in the vicinity of active volcanism on the Big Island, there is no clear explanation for the spatial pattern exhibited by the data.

It is possible, of course, that the preliminary estimates given on the aerometric maps would be born out by a continuous, long-term sampling program. If this were the case, there would be sound reason to be wary of permitting actions which might substantially increase mercury levels. However, in considering the HPOWER project, if the EPA's mercury emission rates are used rather than the anomalous data from the Braintree facility, the projected peak 24-hour mercury concentrations under realistic "worst-case" meteorological conditions would be increased by only 0.01 micrograms per cubic meter. The proposed project's effect on the 30-day average (i.e., the period appropriate for comparison with EPA's suggested threshold of 1.0 microgram per cubic meter) would be only a fraction of that "worst-case" amount. Hence, while the HPOWER project could result in a very slight increase in atmospheric mercury levels, it does not appear that the increase would be significant.

No analyses of the mercury content of Honolulu refuse has been conducted as of this date. Neither have emissions from the existing Waipahu Incinerator been tested for mercury levels. Because of this, our assessment of potential mercury problems was based on emission rates from similar facilities located on the mainland. As you know, tests for pollutants in stack emissions that are done to the U.S. Environmental Protection Agency's rigorous standards are extremely expensive. Because of this, they are normally conducted only when there is evidence that existing data are insufficient. Since there is every reason to believe that mercury emissions from HPOWER would be similar to those measured elsewhere (except at Braintree), those data were used in the EIS. Mercury emissions from HPOWER will be measured during the facility's start-up period, and the results of these tests will be used to evaluate the estimates contained in the EIS.

Acid Precipitation

The acid rain phenomena reported in Europe and, most recently, in Canada and the northeastern United States, has been associated with uncontrolled or inadequately controlled sulfur oxides from very numerous and very large power plants and industrial facilities. The issue has been one of tall stacks to enhance dispersion, long-range transport, conversion of sulfur dioxide to sulfate compounds, and eventual washout or deposition.

The HPOWER facility would be a relatively small emitter of sulfur oxides. In fact, in this respect it is equal to or better than the fossil-fuel-fired electrical power generating units which it would replace. Moreover, it is unlikely that sulfur dioxide from HPOWER would combine with sulfur dioxide from other sources because the few other sources that are nearby are located in such a way that interaction between their respective plumes is unlikely. Such an interaction could occasionally occur far out over the ocean, but the

plumes would already be so widely dispersed as to have very low acid species concentrations. Because of this, it does not appear as though the proposed project would contribute to the occurrence of acid rains in Hawaii or other inhabited areas.

Bio-Indicators

Numerous studies have shown the usefulness of indicator plants in an overall air quality monitoring program. However, because of the high stack through which most pollutants from HPOWER would be emitted, their highest concentrations would occur from one to ten kilometers downwind of the facility rather than on the HPOWER site. Hence, incorporation of bio-indicators into the on-site landscape plan would serve little purpose. In order to be effective, the plants would have to be scattered on plots at some distance from the facility. This, in turn, would make it difficult for the HPOWER operator to monitor the plants or to be sure that any symptoms observed were related to the resource recovery facility rather than other sources.

Thank you again for your comments. If you or Dr. Siegel have any additional questions, please call Mr. Tom Vendetta at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA
HONOLULU, HAWAII 96843

COPY

May 22, 1980

TO : MR. TYRONE T. KUSAO
DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY

We have the following comments to offer on the EIS for the proposed project:

1. We can provide up to 200,000 gpd for the UOP, Inc. proposal. The Amfac/C-E proposal will be served by two sources owned by Amfac's Oahu Sugar Company subsidiary and would not need any water from our system.

2. The developer will be required to pay his proportionate share for source, piping and storage development costs and to improve the distribution system to provide adequate fire protection to the location site.

3. The project should comply with Ordinance 79-27, amending the Plumbing Code, by reusing or recirculating the condenser cooling water.

4. Construction plans of the water connection must be submitted for our review and approval.

Should you have questions or require additional information, please call Lawrence Whang at 548-5221.

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: Dept. of Public Works

Pure Water... man's greatest need – use it wisely

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-488

August 28, 1980

MEMORANDUM

TO: Kazu Hayashida, Manager and Chief Engineer
Honolulu Board of Water Supply

FROM: Wallace Miyahira, Director and Chief Engineer

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 22, 1980 regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document.

The HPOWER bidders have been provided with a copy of your comments. Under the terms of this contract, they are required to comply with all government regulations, including those established by the Honolulu Board of Water Supply.

If you have any further questions regarding the proposed HPOWER project, please call Mr. Tom Vendetta at 523-4774.

Wallace Miyahira
Director and Chief Engineer

WM:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates

BUILDING DEPARTMENT

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

HOWARD M. SHIMA
DIRECTOR AND BUILDING SUPERINTENDENT

PB 80-390

May 30, 1980

TO: HONORABLE FRANK F. FASI

VIA: MR. EDWARD Y. HIRATA, MANAGING DIRECTOR

FROM: HOWARD M. SHIMA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

We have reviewed the Environmental Impact Statement Preparation Notice for the Honolulu Program of Waste Energy Recovery (HPOWER).

Our comments address the Waipio Peninsula Site (pages II-9 and IV-102) which is one of four sites considered for the H-Power plant. Fifteen acres of the north parcel is still needed for the proposed Police Training Facilities. We will proceed with the project as soon as funds are made available.

Thank you for the opportunity to comment.

HOWARD M. SHIMA
Director and Building Superintendent

AF:vk
cc: Dept. of Public Works

R 80-496

September 5, 1980

TO : MR. HOWARD M. SHIMA, DIRECTOR AND BUILDING SUPERINTENDENT

FROM : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

Thank you for your memo of May 30, 1980 (your reference number PB 80-390) regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document.

Your concern that a portion of the North Parcel on the Waipio Peninsula Site is still needed for the proposed Police Training Facility (PTF) has been noted. At our meeting (June 26, 1980) to resolve potential conflicts, we agreed that enough space is available on the North Parcel to accommodate both the PTF and HPOWER facilities.

We will keep you informed of HPOWER developments should the winning bidder select this site. Thank you for your cooperation on this project. If you have any questions, please contact Mr. Tom Vendetta at 523-4774.

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

GEORGE S. MORIGUCHI
CHIEF PLANNING OFFICER

DGP5/80-1226(CT)

June 6, 1980

MEMORANDUM

TO : MR. TYRONE T. KUSAO, DIRECTOR
DEPARTMENT OF LAND UTILIZATION
EIS ACCEPTING AGENCY

FROM : GEORGE S. MORIGUCHI, CHIEF PLANNING OFFICER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR HPOWER, MAY 1980--COMMENTS REQUESTED MAY 6, 1980

We offer the following comments.

Boiler Water Makeup

The impact statement indicates

> ". . . a water-balance . . . shows consumptive use of only 102,000 GPD when the plant is operating at capacity (see Figure IV-3). About 70 percent of this would be used for boiler water makeup, and the extremely high quality required of water employed for this purpose effectively precludes use of recycled water" (p. IV-54, emphasis added).

Some clarification is warranted here, particularly with respect to the term "recycled water."

Generally, the higher the temperature and pressure of turbine steam, the better quality of water is required to minimize turbine blade wear. The greater the treatment of water, the greater is the effort to reuse the water by condensing the steam from the turbine-generators and reusing the water, minimizing boiler water makeup, thus saving on water treatment costs.

The EIS does not indicate what kind of boiler water treatment is expected in the UOP proposal, though the boiler blowdown and demineralizer blowdown chemical constituents are shown for the

Amfac/C-E proposal (p. IV-62). Also, the water balances (Figures IV-3 & 4) do not show the flows from boiler to turbine-generator to cooling apparatus and recycling back to boilers.

Cooling Tower Drift

The Hawaiian Electric Company response to the EIS Preparation Notice calls for discussion of ". . . the impact on the surrounding environs of drift from the evaporative cooling towers" (p. XI-91, Item d).

The water balance for the Amfac/C-E proposal (Figure IV-4, p. IV-59) shows cooling tower consumptive use of water of 1.018 MGD which is lost to the atmosphere.

The impact of this additional moisture in the atmosphere should be discussed.

Energy Recovery

Table IV-37 shows estimated net energy recovery (p. IV-93).

The all-electric energy recovery proposals show 16.9 and 16.0 percent recoveries for UOP and Amfac/C-E, respectively. The UOP proposal, with sale of steam to Standard Oil Company, shows a 31.9 percent energy recovery.

The impact statement indicates that the ". . . possibility (of sale of steam to an industrial user) . . . does not exist for the sites in Waipahu . . ." (p. IV-94). It should be noted, however, that the site of the Amfac/C-E proposed facility is adjacent to the sugar mill which uses steam in sugar recovery operations. Whether the mill has a surplus of energy or a need for additional energy over what it can produce from bagasse should be discussed.

Thermal Impacts

The EIS indicates a consumptive use of water of 1.133 MGD for the Amfac/C-E proposal, mostly for the cooling tower (p. IV-58).

The UOP proposal, however, proposes use of air-cooled condensers, eliminating the cooling function as a consumer of water. This raises the question of thermal impacts--how much hot air will be produced, where will it go? These should be discussed.

The EIS should include a heat balance for each process. The heat balance should show temperatures, pressures, enthalpies for the various streams. This would provide for a better understanding of potential thermal impacts, as well as indicate where prospects for improving thermal energy recovery exist.

Bonded Indebtedness

While it is not possible to predict what interest rates will be at the time of sale, there should be some estimates of debt service, perhaps based on best case and worst case.

Alternative Site

It should be noted that Amfac owns lands close to the Waipahu mill mauka of the Interstate Highway. Locating the HPOWER facility here would eliminate some of the adverse impacts on Waipahu town itself, but this would affect Amfac's plans for development of the mauka lands. The mauka lands presently do not have the necessary Land Use Commission urban zoning for development.

Thank you for affording us the opportunity of reviewing the impact statement.

George Moriguchi
GEORGE S. MORIGUCHI
Chief Planning Officer

GSM:fmt

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R80-538

October 10, 1980

MEMORANDUM

TO: Mr. George S. Moriguchi
Chief Planning Officer
Department of General Planning

FROM: Wallace Miyahira

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your memorandum of June 6, 1980 (your reference DGP5/80-1226/CT) concerning the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and members of your department spent reviewing the document. The discussion presented below responds to the questions you raised.

Boiler Water Makeup

When we stated that the high quality necessary for boiler feedwater "effectively precludes use of recycled water," we did not mean that the proposed facility would use a once-through system. As you correctly observed, there is a strong economic incentive to reuse water in the steam by condensing it, and that is what would be done with the proposed HPOWER facility. The statement you quoted from the EIS is referring to boiler water makeup, not to the entire flow through the boiler/condenser system. The point that we were trying to make was that water from non-potable sources, e.g., the "in-plant sanitary" and "washdown" components shown in Figure IV-3 (Page IV-55), could not reasonably be treated and used to meet a portion of the boiler water makeup requirements.

The UOP facility would utilize a dual-train demineralizing plant of the anion/cation type. It would remove elements such as calcium, magnesium, and silica from the water in order to slow the build-up of these minerals within the boiler and pipes. We did not provide the same water quality data for the UOP proposals as for the Amfac/C-E proposal because the former discharges blowdown water only to materials destined for landfill whereas the latter discharges it to the sewer system.

The water balance diagrams presented in the EIS were intended to illustrate the major external sources and destinations of water that would be consumed by each HPOWER facility. They were not meant to detail the internal flows of water through the plants since they have little, if any, relationship to the impacts of the proposed project. We believe that inclusion in the EIS of a water balance diagram which charted every flow within the facility would have been confusing to the vast majority of readers and would have tended to obscure the more fundamental issues that were discussed.

Cooling Tower

The Hawaiian Electric Company's suggestion that the EIS include a discussion of "...the impact on the surrounding environs of drift from the evaporative cooling towers" probably stemmed from their familiarity with problems that have been encountered with very large power plant cooling towers in the mainland United States and Europe. The Environmental Impact Statement for the proposed HPOWER project did quantify the amount of water that would be discharged through the cooling towers (see, for example, Figure IV-4 on page IV-58 and the discussion on page IV-57). However, it did not discuss the effects of this discharge in detail because none appeared to be significant. The reasons for this are outlined below.

The plume potential of a cooling tower is a function of the temperature and vapor pressure of the exiting air and of the temperature and relative humidity of the ambient air into which it is discharged. The visible plume is condensed water vapor which results when the saturated air leaving the tower is cooled to ambient dry bulb temperatures and becomes supersaturated. The temperature of the air exiting the tower is roughly the average of the ambient air temperature and the inlet water temperature. Hence, as the wet bulb temperature of the ambient air drops, the temperature of the air discharged from the tower also drops.

The most severe pluming occurs when the ambient air is at 100 percent relative humidity and is cold. While this occurs regularly during wet winter periods in areas with a temperate climate, in Honolulu it is extremely rare. The worst case here would probably occur early on a winter morning when the temperature drops to 55^{0} Fahrenheit and there is little or no wind. Even then, the relative humidity would have to reach about 90 percent before a plume would appear, and this occurs very infrequently. Under the worst-case conditions described above, a vapor plume could form above the cooling tower. However, it would disappear within a few tens of feet as the excess moisture is dispersed through the surrounding air. This quick dissipation of the plume is facilitated by the relatively small amount of excess moisture that is involved and by the multiple-unit layout that is proposed.

As indicated in the EIS, in addition to the water which escapes as vapor, some small droplets, i.e., water particles over 50 microns in diameter, would also be carried out of the cooling tower by the draft from the cooling fans. These are referred to as "drift" losses. Data supplied in the Amfac/C-E technical proposal indicates that drift losses from the tower would amount to about ten gallons per minute. This is consistent with drift eliminator manufacturers' guarantees that, in this type of application, their equipment reduces drift losses to 0.02 percent of the total flow through the cooling tower.

The drift droplets carried in the bouyant vapor plume are subject to a number of physical processes. Once emitted from the tower, a droplet moves under the combined influences of gravity and aerodynamic drag forces. Simultaneously, the drop experiences both heat and mass transfer. As a result, the temperature of the drop tends to decrease towards the local wet-bulb temperature, and evaporation occurs so long as the vapor pressure of the drop exceeds that of the ambient air. A 1974 study by C. Hosler et.al. suggested that at ambient relative humidities above 90 percent, essentially no evaporation occurs and that at relative humidities below 65 percent, droplets evaporate completely.

The designers of the cooling towers that would be used for the Amfac/C-E facility have stated that 90 percent of the drift losses from the cooling tower are of such a small size that they would have no appreciable settling rate. According to them, most of the remainder would fall within ten feet of the cooling tower. They report that virtually all droplets that are large enough to settle before evaporating would fall within 100 feet of the tower.

Energy Recovery

As you noted in your memorandum, the Waipahu Sugar Mill uses steam in its operations. While much of the steam is generated using bagasse, it is still necessary for the mill to supplement its bagasse supplies with purchased fuel oil and electricity. Because of this, it might at first appear that it would be possible to sell some of the steam generated by HPOWER to the Oahu Sugar Company, with a consequent increase in the overall energy recovery efficiency of the system. However, the City has been informed that the sugar mill's intermittent and highly variable needs for purchased energy makes the sale of steam from HPOWER to the mill economically infeasible.

HPOWER is expected to operate year-round. The sugar mill purchases significant quantities of energy (fuel oil and electricity) only a portion of the time. Were the equipment necessary to transport steam from HPOWER to the sugar mill installed, it would be utilized only a limited number of weeks during the year; the remainder of the time it would be idle. Overall, the benefits that could be derived by selling steam produced by HPOWER directly to an industrial user would be more than offset by the cost of constructing and maintaining equipment that would be underutilized. Because of this, it would be disadvantageous for HPOWER to enter a steam sales agreement with the Oahu Sugar Company.

Thermal Impacts

The air-cooled condensers proposed for the UOP facility would release approximately 300 million Btu's per hour into the atmosphere in the form of sensible heat. The velocity imparted by the exhaust fans, as well as the natural bouyancy caused by the fact that the cooling tower effluent is warmer than the surrounding air insures that it will rise after leaving the tower. Hence, it would not have any direct effect on areas adjacent to the plant.

The Argonne National Laboratory has conducted a comparative study of potential weather modification effects of wet and dry cooling towers serving a 1,000-megawatt power plant, i.e., one approximately twenty times the size of

HPOWER. The analysis suggests that under potentially unstable atmospheric conditions, the bouyancy and momentum fluxes produced by a 1,000-megawatt plant employing a dry cooling tower could initate convective cloud formation or even "trigger" convective storms, but that the heat released by an evaporative tower of the same size would probably not have a similar effect. This is due to the fact that only ten percent of the heat from a wet cooling tower is in sensible form (as compared to 100 percent for a dry tower) and that sensible heat is the major form of energy for driving the bouyant convection that produces clouds. The amount of sensible heat that would be released by HPOWER is only one-half the amount produced by the wet tower that the Argonne National Laboratory study found would have no significant effect on cloud formation. Hence, no significant impacts are expected.

While we appreciate your desire to see that the thermal energy recovery efficiency of the facility is maximized, we are unable to supply the detailed heat balance data that you requested because of the confidential nature of this aspect of the bidders' proposals. However, we wish to assure you that the HPOWER bidders have strong economic incentives to propose the most efficient thermal processes possible.

Bonded Indebtedness

Net disposal costs for the three alternative HPOWER scenarios shown in Figure II-8 (page II-26) include estimates of debt service based upon a bond interest rate of seven percent. Net disposal costs plotted as lines "B", "C", and "D" in Figure II-8 reflect: (i) the annual capital cost (i.e., debt service), (ii) the annual fixed operation and maintenance expenses, and (iii) the City's share (85 percent) of energy revenues. For the capital costs of \$100 million and \$80 million shown in Figure II-8, the estimated annual debt service costs are \$10 million and \$8 million, respectively. Although we recognize that initially, disposal costs with HPOWER may be slightly higher than those incurred using landfill, the life-cycle costs clearly show that the project will result in lower average net disposal costs over the long run.

Alternative Site

The mauka side of the H-1 Freeway is more than one-half mile from the Oahu Sugar Company's (OSCO) Waipahu Sugar Mill. The first available parcel is even farther. This distance would make it impractical for an HPOWER facility to interface with the mill operations or to benefit from OSCO's existing facilities such as the oil storage tanks, the electrical switching station, and the existing access road. Amfac/C-E has informed us that, because of this, the cost of constructing the project would be raised very significantly.

Finally, as you noted in your letter, the lands mauka of the freeway do not have the necessary State Land Use Commission urban zoning. It seems unlikely that the Special Use permit necessary for a facility such as HPOWER could be obtained for these lands, because, unlike the Malakole Road site or the Waipio Peninsula site, this area is currently used for agricultural purposes.

Thank you again for your thoughtful comments. If we may be of any further assistance, please call Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director

WM/PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates.
DLU

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4181

FRANK F. FASI
MAYOR

EDWARD Y. HIRATA
MANAGING DIRECTOR

BARRY CHUNG
DIRECTOR

MYRA M. TAKASAKI
DEPUTY DIRECTOR

June 3, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Gentlemen:

Subject: Honolulu Program of Waste Energy Recovery (HPOWER) Environmental Impact Statement

We have reviewed the Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery (HPOWER).

If the Waipahu site is selected, we are concerned that the plant will be constructed in a predominantly residential area.

Very truly yours,

Barry Chung

Barry Chung

cc: Environmental Quality Commission
State of Hawaii
Department of Public Works
City and County of Honolulu

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

TO: Mr. Barry Chung, Director
Department of Housing and Community Development

FROM: Wallace Miyahira

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 3, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document.

As indicated in the EIS, the fact that the site proposed for the Amfac/C-E facility is in a built-up urban area makes the implementation of adequate mitigation measures particularly important. These measures are discussed in the EIS and will be implemented during the final design and construction phase of the project.

Very truly yours,

WS

pm Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4411

FRANK F. FASI
MAYOR

TYRONE T. KUSAO
DIRECTOR

79/EC-9(SE)
LU5/80-2062

May 30, 1980

MEMORANDUM

TO : WALLACE MIYAHIRA, DIRECTOR & CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : TYRONE T. KUSAO, DIRECTOR

SUBJECT : COMMENTS ON DRAFT EIS
HONOLULU PROGRAM OF WASTE ENERGY RECOVERY

We have reviewed the above Draft EIS, and feel the document is very thorough and well prepared. We offer these specific comments:

1. Reference: Residue Disposal, p. II-18.

   Comment: The EIS mentions that end product wastes requiring landfill for the UOP facility can be drastically reduced if a market can be found for the aggregate material. What are its potential uses?

2. Reference: Policy Plans, p. II-5.

   Comment: It is stated that the eligibility for the National Register for the Malakole Road site will be withdrawn once the sinkholes have been salvaged. What is the basis of this assumption?

3. Reference: Trace Elements, p. IV-26.

   Comment: The very broad range given that estimates the levels of mercury emissions, makes it difficult to quantify anticipated impacts associated with mercury. Even though it is expected that 99% of the mercury will be in vapor form (p. IV-36), it is not clear what impacts can result from mercury vapor. We do not feel the comparison with mercury levels at Hawaii Volcanoes National Park is a fair one. First, it is not clear at what time the emissions levels cited for the park were sampled (pre, post or during eruption). Second, the park is not an urban area.

It would be helpful to spell out potential impacts of mercury vapor, and the sampling criteria used in the Hawaii Volcanoes National Park Study.

If you have any questions on these comments, please contact Scott Ezer of our staff at 523-4077.

Tyrone T. Kusao
TYRONE T. KUSAO
Director of Land Utilization

TTK:sl

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-538

October 10, 1980

MEMORANDUM

TO: Tyrone T. Kusao, Director
Department of Land Utilization

FROM: Wallace Miyahira, Director and Chief Engineer

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 30, 1980 (Reference 79/EC-9/SE: LU5/80-2062) regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document, and are pleased that you found it thorough and well prepared. Item-by-item responses to your specific comments are given below.

1. Residue Disposal

According to the technical proposal submitted by UOP, the aggregate material recovered from combusted solid waste using its process is generally suitable for asphalt mix, road base, landfill cover, and general fill purposes. It consists primarily of glass, ceramic, stone, dirt, ash, and other inorganic particles, and is substantially free of combustible matter.

2. Policy Plans

The archaeological work completed to date on the Malakole Road parcel makes it clear that the paleontological sites located there have significant research value. It is this potential that has led to their being nominated for entry in the National Register of Historic Places. A detailed discussion of the basis of the nomination is presented on pages IV-112 through IV-114 of the EIS. According to the U.S. Army Corps of Engineers (who commissioned the paleontological and archaeological work described in the EIS as part of their planning work for the proposed Barbers Point Deep Draft Harbor), the Keeper of the National Register has indicated that it would be reasonable to remove the paleontological sites located on the Malakole Road parcel from the Register once the scientific information they contain has been recovered.

3. Trace Elements

We agree that the broad range of mercury emission rates given in the EIS makes it difficult to quantify anticipated impacts associated with that element. Unfortunately, since the actual mercury content of Oahu's refuse is unknown, it was necessary to rely on data collected at a number of facilities operating in other cities. The breadth of the range that was cited simply reflects the great variability in the values that have been recorded.

Atmospheric mercury concentrations measured in the Volcanoes National Park were presented only as a means of providing readers with some idea of the range of levels found naturally in the State. The data from the park was based on measurements made at the Sulfur Banks, Halemaumau caldera, and the Mauna Ulu caldera during the period April 1971 to April 1972. As one would expect, the higher values were associated with increased geothermal activity.

Normally, in assessing the potential impact of the emissions on human health, one would first use the emission rates provided to estimate ambient concentrations; then, these would be compared with ambient standards for the substance. However, no such standards have been adopted for mercury. Hence, the significance of the projected concentrations can only be judged indirectly by comparing them with available toxicological data and with existing levels presently encountered in Hawaii.

According to the January 1980 edition of the Registry of Toxic Effects of Chemical Substances, the lowest concentrations of mercury that have been reported to cause toxic effects as a result of inhalation by humans is 150 micrograms per cubic meter over a period of 46 days. In that instance, effects on both the gastrointestinal tract and the central nervous system were noted. The Federal OSHA standard for mercury exposure is 50 micrograms per cubic meter; it is intended to protect healthy young men during an eight-hour work shift. As noted on page IV-35 of the EIS, the U.S. Environmental Protection Agency has suggested a threshold level of one microgram per cubic meter as a 30-day average, but this has not been adopted as a standard. Our estimate of the highest possible 24-hour atmospheric mercury concentrations that could result from HPOWER (see page IV-35 of the EIS) is 0.5 micrograms per cubic meter, only half the level suggested by the EPA as the threshold for a 30-day average.

It is important to note that our "worst-case" analysis is based on the abnormally high mercury emission rate reported from the Braintree, Massachusetts resource recovery facility and an assumed set of low wind speed/high stability meteorological conditions. If more typical mercury emission rates had been used, the projected peak concentrations under these same meteorological conditions would drop to approximately 0.025 micrograms per cubic meter, or one-twentieth the "worst-case" amount. Finally, if more realistic "worst-case" meteorological conditions based on a computer-assisted analysis of actual data from the Barbers Point Naval Air Station are used instead of the conditions assumed for the EIS, the proposed project's impact on maximum 24-hour average mercury levels appears to be only 0.01 micrograms per cubic meter. This is only one one-hundredth of the threshold level suggested by the EPA for a 30-day average. In view of the above, it must be concluded that adverse effects resulting from elevated atmospheric mercury levels due to HPOWER alone are extremely unlikely.

In comparing the projected 24-hour "worst-case" situation with the EPA's suggested 30-day average threshold, the EIS assumed that existing ambient concentrations of atmospheric mercury followed patterns reported in University of Hawaii professor S.M. Siegel's 1972 analysis of the phenomenon. Subsequently, we have obtained more recent measurements of ambient atmospheric mercury concentrations made by Dr. Siegel over a ten-year period. These data indicate that the present background levels of mercury on Oahu range from 0.04 to 1.36 micrograms per cubic meter and that concentrations in the vicinity of the proposed HPOWER sites are towards the high end of this range.

An environmental impact statement prepared for the CONOCO oil refinery proposed for Campbell Industrial Park in the early 1970's reported ambient particulate mercury concentrations of 0.0001 to 0.0030 micrograms per cubic meter. Based on estimates that about 99 percent of mercury emissions occur as vapor rather than particulates, this is equivalent to total atmospheric mercury concentrations of about 0.01 to 0.3 micrograms per cubic meter. This is towards the lower end of the range reported by Siegel.

If the estimate of total existing atmospheric mercury based on the CONOCO data is correct, then mercury levels do not seem to be a problem. However, if Dr. Siegel's data is truly representative of the long-term average, it appears possible that some parts of Oahu (including those under consideration for HPOWER) are already at or above the suggested threshold level.

Before reaching this conclusion, however, there are several factors which need to be taken into consideration:

1) The atmospheric mercury concentrations attributed to HPOWER were based on "worst-case" meteorology and emission rates. Simply using the EPA's average emission factor, rather than the extraordinarily high rate reported for the Braintree, Massachusetts resource recovery facility that was used in the EIS's "worst-case" scenario, would reduce the projected peak atmospheric mercury concentration caused by the HPOWER project to less than 0.01 micrograms per cubic meter. Using meteorology typical of the worst 30-day period (the averaging time for the EPA's 1.0 microgram per cubic meter threshold value) rather than the worst 24-hour meteorology would reduce the projected concentrations much farther.

2) Dr. Siegel's estimates of the present background levels are based on a limited number of samples (three to ten, depending on the location) over a long time span. While they may well be representative of long-term averages, they would not meet EPA criteria for long-term

monitoring and establishment of background pollutant concentrations. Moreover, except on the Big Island, the significant spatial variation which is exhibited by the measurements cannot be explained at the present time.

While the lack of sufficient data makes any conclusions tentative, it now appears that the proposed project would not contribute significantly to existing levels of atmospheric mercury. If the EPA's suggested threshold level were to be exceeded, it would be due almost entirely to existing natural sources rather than to HPOWER.

Thank you again for your comments. If you have any remaining questions, please contact Mr. Tom Vendetta at 523-4774.

Sincerely,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs

cc: Environmental Quality Commission
Belt, Collins & Associates

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

RAMON DURAN
DIRECTOR

May 14, 1980

MEMORANDUM

TO : WALLACE MIYAHIRA, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : GILBERT SCOTT, SR., ACTING DIRECTOR

SUBJECT: COMMENTS ON ENVIRONMENTAL IMPACT STATEMENT FOR THE HONOLULU PROGRAM OF WASTE ENERGY RECOVERY

As shown on Figure II-1,A, the Waipio Peninsula site which is being considered appears to be partially superimposed on our existing Ted Makalena Golf Course.

For your information, we are in the preliminary planning stages of converting the golf course site into residential use.

Thank you for the opportunity to comment on the EIS.

Warm regards.

Gilbert Scott

GILBERT SCOTT, SR.
Acting Director

GS:lm

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

MEMORANDUM

TO: Gilbert Scott, Sr., Acting Director
Department of Parks and Recreation

FROM: Wallace Miyahira, Director and Chief Engineer

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 14, 1980 regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document.

The Waipio Peninsula site depicted in Figure II-1A of the EIS lies just to the west of the Ted Makalena Golf Course. As indicated in the EIS, an HPOWER facility constructed at that location would be visible from the golf course, but would not otherwise affect it.

Thank you for informing us of the preliminary plans that are being formulated for converting the golf course into a residential area. The City's Waipahu Refuse Incinerator is situated just to the west of the Ted Makalena Golf Course. Plans for other possible industrial uses, including a police training facility and the HPOWER project, are already at an advanced stage. We believe that any possible residential development of land now occupied by the golf course must be undertaken with this in mind so that suitable mitigation measures are taken to protect the housing from noise, dust, and other disturbances generated by industrial activities. If you have any questions regarding this, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

WES

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
✓ Belt, Collins & Associates
Department of Land Utilization

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 S. BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

B. K. AIU
CHIEF

May 14, 1980

TO : HONORABLE FRANK F. FASI, MAYOR

FROM : BONIFACE K. AIU, FIRE CHIEF

SUBJECT: EIS - PREPARATION NOTES FOR THE PROPOSED HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (HPOWER)

The proposed sites shown on page 11-7, figure 11-1, would have adequate fire protection. The two proposed sites in Waipahu; at the Waipahu incinerator and at the Waipahu Sugar Mill, would be adequately serviced by the Engine and Ladder Companies from the Waipahu fire stations, with supportive service from the Pearl City station. The proposed sites in the Campbell Industrial Park would be serviced by the Makakilo Fire Station with supportive fire protection from the Nanakuli and Waipahu stations. Our future plan calls for a fire station in the Campbell Industrial Park area.

Boniface K. Aiu
BONIFACE K. AIU
Fire Chief

BKA:LS:py

cc: Dept. of Public Works

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

MEMORANDUM

TO: Boniface K. Aiu, Chief
Honolulu Fire Department

FROM: Wallace Miyahira, Director and Chief Engineer

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 14, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time spent by you and your staff reviewing the document.

Your letter confirms our conclusion that existing fire stations provide adequate protection for all of the sites under consideration. Should one of the Campbell Industrial Park sites be chosen, it would obviously benefit from the decrease in response time that would accompany the establishment of a fire station within the Industrial Park.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
Belt, Collins & Associates

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813 / TELEPHONE 523-4000

GEORGE AKAHANE, FLOOR LEADER
CHAIRMAN PLANNING COMMITTEE

June 10, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Sir:

Subject: Review of EIS for Honolulu Program of Waste Energy Recovery (HPOWER)

I have no comments on the subject report.

Sincerely,

GEORGE AKAHANE
Councilman

li

cc: Dept. of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Honorable Rudy Pacarro, Chairman
City Council
City and County of Honolulu
Honolulu, Hawaii 96813

Chairman Pacarro:

Subject: Honolulu Program of Waste Energy Recovery

Councilman Akahane's letter of June 10, 1980 informed us that he had no comments on the environmental impact statement for the HPOWER project. We appreciate the time spent by him and his staff reviewing the document.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

WM:PJW:vc

cc: Councilman George Akahane
Environmental Quality Commission
Belt, Collins & Associates

FORWARDED:

EDWARD Y. HIRATA
Managing Director

OAHU CIVIL DEFENSE AGENCY

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

JOHN BOHN
ADMINISTRATOR

May 16, 1980

TO : HONORABLE FRANK F. FASI, MAYOR

THRU : MR. EDWARD Y. HIRATA, MANAGING DIRECTOR

FROM : JOHN BOHN, ADMINISTRATOR, OCDA

SUBJECT : HONOLULU PROGRAM OF WASTE ENERGY RECOVERY (H POWER)

This response is in compliance with State of Hawaii Environmental Quality Commission letter dated May 6, 1980 (Encl. 1).

Reference is made to my letter on this subject addressed to Mr. Wallace Miyahira, Director and Chief Engineer, Department of Public Works dated April 18, 1980 (Encl. 2). No further comments are submitted.

JOHN BOHN
Administrator

Enclosures

cc: Department of Public Works ✓

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
ENVIRONMENTAL QUALITY COMMISSION
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU, HAWAII 96813

DONALD A. BREMNER
Chairman

Executive Secretary

TELEPHONE NO.
(808) 548-6915

MAY 6 1980

OAHU CIVIL
DEFENSE AGENCY

TO:

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) that was prepared pursuant to Chapter 343, Hawaii Revised Statutes and the Rules and Regulations of the Environmental Quality Commission:

Title: Honolulu Program of Waste Energy Recovery (HPOWER)

Location: Oahu

Classification: Agency Action

Your comments or acknowledgement of no comments on the EIS are welcomed. Please submit your reply to the accepting authority or approving agency:

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Please send a copy of your reply to the proposing party:

Dept. of Public Works
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Your comments must be received or postmarked by: June 7, 1980.

If you have no further use for this EIS, please return it to the Commission.

Thank you for your participation in the EIS process.

Enclosure 1

OAHU CIVIL DEFENSE AGENCY

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE: 523-4121

FRANK F. FASI
MAYOR

JOHN BOHN
ADMINISTRATOR

April 18, 1979

TO : Mr. Wallace Miyahira, Director and Chief Engineer

FROM : John Bohn, Administrator, OCDA

SUBJECT : Comments On Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

In reference to your letter of April 10, 1979 asking for comments on the Proposed Honolulu Program of Waste Energy Recovery, the following is submitted:

- There are no apparent adverse effects from the standpoint of Civil Defense planning caused by the construction and operation of the proposed HPOWER facility.
- The proposed HPOWER facility site on the Ewa side of Lehua Ave., Pearl City Peninsula, is within the 100-year flood plain shown on the preliminary copy of National Flood Insurance Program Map Panel No. 150001 0110 A. It is recommended that the Department of Land Utilization, as lead agency of the Flood Insurance Program, be asked for comments in this respect.

JOHN BOHN
Administrator

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-489

August 28, 1980

MEMORANDUM

TO: John Bohn, Administrator
Oahu Civil Defense Agency

FROM: Wallace Miyahira, Director and Chief Engineer

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 16, 1980 regarding the Environmental Impact Statement (EIS) for the proposed HPOWER project. We appreciate the time you spent reviewing the document, and are pleased that you agree that the project would not have any adverse effect on your operations.

As indicated in the EIS, the Pearl City site referred to in your letter is no longer under consideration. Flood hazards on other sites are discussed on pages IV-56, IV-57, and IV-62 of the EIS.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates

Enclosure 2

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 AREA CODE (808) 955-8111

FRANK F. FASI
MAYOR

FRANCIS KEALA
CHIEF

OUR REFERENCE MS-JS

May 13, 1980

TO : HONORABLE FRANK F. FASI, MAYOR
CITY AND COUNTY OF HONOLULU

VIA : EDWARD Y. HIRATA, MANAGING DIRECTOR

FROM : FRANCIS KEALA, HONOLULU POLICE DEPARTMENT

SUBJECT: EIS HPOWER

We have reviewed the Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery submitted by the Department of Public Works. Since the increase in traffic due to this project is not expected to cause the capacity of the roadways or intersections in the immediate vicinity of the sites under consideration to be exceeded, we have no objections to the HPOWER project at this time.

FRANCIS KEALA
Chief of Police

cc: Department of Public Works

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

MEMORANDUM

TO: Francis Keala, Chief
Honolulu Police Department

FROM: Wallace Miyahira, Director and Chief Engineer

SUBJECT: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 13, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
✓ Belt, Collins & Associates

COMMITTEE ON
WAYS AND MEANS

SUBCOMMITTEES:
HEALTH
OVERSIGHT

CECIL "CEC" HEFTEL
1ST DISTRICT, HAWAII

Congress of the United States
House of Representatives
Washington, D.C. 20515

WASHINGTON OFFICE:
322 CANNON HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-2726

DISTRICT OFFICE:
300 ALA MOANA BOULEVARD
ROOM 4104
P.O. BOX 50143
HONOLULU, HAWAII 96850
(808) 546-8997

June 5, 1980

The Honorable Frank F. Fasi
Mayor
City and County of Honolulu
530 So. King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Frank:

Thank you for mailing us a copy of the environmental impact statement on the solid waste processing facility that is proposed for the City and County of Honolulu. I believe that this document culminates a thorough and commendable study worthy of the highest expectations of Congress in passing the National Environmental Policy Act of 1969. The volume of community response to the City's EIS preparation notice was indeed significant.

While I am unable to make a professional judgement on the EIS itself, the Waste Energy Recovery (HPOWER) facility appears to have significant social and economic benefits that may exceed whatever unfavorable environmental effects we would have to tolerate.

I would be interested in the opportunity to study the responses of professional organizations to the EIS itself. In addition, I would be interested in the continuing analysis of the cost of project construction and operation and the rate of return to be realized from the sale of resulting energy and materials. Please keep me abreast of these considerations.

If I can be of any assistance, please do not hesitate to call me.

With warm personal regards and aloha,

Sincerely,

CEC HEFTEL
Member of Congress

CH:aoc

cc: ✓Dept. of Public Works

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Congressman Cecil Heftel
House of Representatives
Washington, D.C. 20515

Dear Congressman Heftel:

Environmental Impact Statement for the
<u>Proposed Honolulu Program of Waste Energy Recovery (HPOWER)</u>

Thank you for your letter of June 5, 1980 concerning the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate your continuing support of the project and the time you and your staff spent reviewing the EIS.

We will send you a copy of the revised EIS containing comments made by professional organizations as soon as it has been completed. Data on construction and operational costs, including revenue projections for the sale of energy and recovered materials, will be forwarded to you after the HPOWER cost proposals have been submitted and validated.

Very truly yours,

fwn Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
✓Belt, Collins & Associates

HOUSE OF REPRESENTATIVES
THE TENTH LEGISLATURE

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

June 4, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Sir:

Subject: Environmental Impact for the proposed Honolulu Program of Waste Energy Recovery

With reference to your letter of May 7, 1980, of the above subject matter, the following comments and concerns are submitted. The comments and concerns are confined to the AMFAC/C-E site mauka of Oahu Sugar Company's Waipahu Sugar Mill.

1. Page IV-33, 3-hour sulfur dioxide averages. AMFAC/C-E facilities show possible violations of the State's 3-hour sulfur dioxide standard.

2. Page IV-4, noise levels. The residents adjacent to the existing cane haul road would be impacted the most. From time to time, complaints were received by me and the community association regarding the truck's noise and the dust problem that comes about with a fast moving vehicle. The residents in areas surrounded by the cane haul road are cognizant of the fact that this road existed prior to the development of the subdivision and have been very tolerant of the situation described above.

a. An increase in the days of high volume truck traffic from 183 days to 313 days per year is a tremendous increase from the present pattern.

b. An increase in the number of truck passes from approximately ten per hour (on a harvesting day) to 100 per hour during the peak refuse delivery hour (8:00 to 9:00 AM) during harvesting season will certainly

generate a great deal of noise and dust problems for the residents adjacent to the cane haul road. Unless a buffer wall is constructed, it would seem to compound the problems that currently exist by 100 percent.

c. Because the cane haul road is a private road, the enforceability of the speed limits is very questionable. The watering of the road also is in question since private and cane haul trucks will be utilizing the same road.

3. Traffic impact. The traffic volume at the Waipahu Street-Kamehameha Highway intersection is expected to increase substantially during the peak refuse hauling period (8:00 AM). It should be noted that the distance from the intersection of Waipahu Street-Kamehameha Highway is approximately 500 feet. The length of each refuse truck will be equivalent to two automobiles. The potential problem that will be encountered is the Honolulu bound lane from Waipahu Street feeding into Kamehameha Highway. Currently, there is no right lane to exit onto Kamehameha Highway from Waipahu Street. That additional lane would be required to facilitate smooth traffic flow.

The egress of vehicles coming out from the cane haul road would crate a hazardous condition because of the sloping condition of Waipahu Street.

4. Economic impact. Economic benefit to the community is very minimal. Although the report reflects employment for 70 employees, 50 of these employees will either transfer from the existing refuse plant or be eliminated, thereby giving a net gain of only 20 employable positions.

5. Social impact. Displacement of 53 existing homes, or 165 persons, will result for the construction of this HPower plant. The moving of families from Waipahu to Ewa town will have a significant social and environmental impact. The movement of families should be well coordinated with the ILWU to have a smooth transition. It should be remembered that only a few years back, a loud outcry of protest resulted when Oahu Sugar Company announced the phasing out of the homes involved.

I must state clearly that I am not against any alternative energy program which will make our state self-sufficient. However, I must carefully weigh the impact on this community I represent and live in.

Sincerely,

Mits Shito
Representative, 20th District

cc: Department of Public Works, City and County of Honolulu
Waipahu Community Association
ILWU, Local 142
Waipahu Businessmen's Association
AMFAC Sugar

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-539

October 10, 1980

Representative Mits Shito
20th Representative District
House of Representatives
State of Hawaii
State Capitol
Honolulu, Hawaii 96813

Dear Representative Shito:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 4, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you spent reviewing the document and have responded below to the specific questions you raised. These answers are in the same order as your comments.

1. Your observation regarding possible violations of the State's three-hour sulfur dioxide standard reported in the EIS is correct. Since the EIS was published, Amfac/C-E has revised its estimates of the facility's sulfur emission rate to bring it in line with the rate suggested for resource recovery facilities by the U.S. Environmental Protection Agency. Similarly, more efficient baghouses have been proposed for the RDF processing equipment, and these result in a lower particulate emission rate for the facility. A revised copy of Table IV-20 incorporating the more accurate emission estimates is attached. As a result of these changes, it now appears that all applicable National Ambient Air Quality Standards would be met.

   Despite the reduction in projected sulfur dioxide concentrations due to the above changes, violations of the State of Hawaii standards now in effect could still occur. The very restrictive Hawaii ambient air quality standards were adopted in 1971 with the idea that they would prevent significant deterioration in the quality of the air as it was believed to exist in 1970. In short, they perform functions that at the Federal level are split between the National Ambient Air Quality Standards and the U.S. Environmental Protection Agency's "Prevention of

Significant Deterioration" (PSD) regulations. Unfortunately, the data on which the 1970 estimates of "existing" air quality were based were rather limited. As a result, over the succeeding years, unanticipated problems have arisen. Areas believed to be meeting the standards when they were first promulgated were shown by subsequent monitoring data to be in violation even though no new sources had been constructed in the interim. Of even greater concern was the fact that in some cases large sources employing the best available control technology (BACT) for air pollution control would still be unable to meet some of the State standards. As a result, the State Department of Health is reviewing its standards with the intent of adopting the Federal standards. While any proposed changes must go through a public review process before final adoption, it seems apparent that some modification must be made if the State is to avoid the untenable position of trying to enforce standards which cannot be met with current control technology.

2. We are very much aware of increased noise and dust problems adjacent to Oahu Sugar Company's cane haul roads that could be generated by truck traffic associated with the Amfac/C-E proposal. The likely noise impacts of the traffic are outlined in considerable detail in pages IV-49 through IV-51 of the EIS. Potential dust problems were not treated explicitly in our original discussion. A new section (a copy of which is attached) that describes the effects that may be expected and the measures that will be used to mitigate them has been added to the document.

The proposed project would result in a major increase in the volume of heavy truck traffic on the existing cane haul road. Because of this, adequate noise and dust mitigation measures have received a great deal of attention during our evaluation of the Amfac/C-E HPOWER proposal. As a result, the bidder has made the following commitment to the project:

> Amfac/C-E is aware of the concern of the residents adjacent to the proposed route into the Amfac/C-E site. Amfac/C-E is also aware of their obligation to provide sound (noise) barrier and appropriate dust control as required to bring the system into compliance with applicable regulations. We acknowledge our obligation to supply the necessary controls, such as walls or paving, as required.

Calculations made for the EIS indicate that the use of Route B as shown on Figure IV-5 (page IV-85) would avoid significant noise and dust problems on the segment of the cane haul road that connects with Waipahu Street. The portion of the cane haul road north of the H-1 freeway is also free of substantial noise and dust impacts.

A problem could exist on the portion of the cane haul road that runs parallel to Paiwa Street between the freeway underpass and the proposed HPOWER facility. There, homes to the west of the cane haul road could experience noise levels of about 59 L sub dn; this is about 4 L sub dn above the State Department of Health limit. (Note: see bottom of page IV-50 for an explanation of some assumptions inherent in this comparison.) Construction of a six- to ten-foot high noise barrier or wall along the western side of the cane haul road would easily reduce noise levels below the 55 L sub dn limit. Special noise mitigation measures would also be required along portions of Route A (see Figure IV-5) as it approaches Waipahu Street.

Your questioning the enforceability of speed limits along the private cane haul road is understandable. Should Amfac/C-E be the successful bidder on the HPOWER project, an easement will be granted by Oahu Sugar Co., Ltd. (OSCO) to the City for use of the existing cane haul road from its entrance at Waipahu Street to the entrance of the HPOWER site west of Paiwa Street. The "easement document" will contain a clause mutually agreed upon by the City and OSCO, giving the City the right to implement and enforce traffic control measures along this section of paved roadway. Watering or street cleaning operations on the roadway can be done so as not to cause interference with private and cane haul truck traffic.

3. Your letter notes that a traffic problem already exists at the Waipahu Street-Kamehameha Highway intersection during the morning rush hour, (i.e., between 6:00 and 8:00 a.m.). This same observation is made in the second full paragraph on page IV-87 of the EIS. The EIS also suggests that flow through the intersection during the peak period could be significantly improved by the construction of a right-turn lane on the south side of Waipahu Street between the H-2 off-ramp and Kamehameha Highway. However, we must emphasize that the problem is an existing one; because HPOWER does not generate substantial traffic volumes until after the present peak, it would not cause a significant increase in congestion on Waipahu Street or at the Kamehameha Highway-Waipahu Street intersection.

At its intersection with the proposed HPOWER access road (Route B on Figure IV-5, page IV-85), Waipahu Street is relatively flat. Moreover, it is at essentially the same elevation as the cane haul road. Route A joins Waipahu Street at an existing at-grade intersection. Hence, we do not believe that vehicles from HPOWER would create a traffic hazard.

4. The HPOWER facility would be operated by a private firm, and it would employ few, if any, of the persons who now work at the City and County's Waipahu Incinerator. Hence, it is likely that the estimate of 70 new jobs given in the EIS is accurate. However, there is no way to insure that the jobs that would be created would go to existing residents of the Waipahu community.

In addition to the direct employment opportunities that would be created, the citizens of Waipahu would also benefit from the lower solid waste disposal costs that HPOWER would permit. Based on the estimates shown in Figure II-8 of the EIS, this could amount to a saving of $20 to $40 per person per year by 2005.

5. Amfac is making a concerted effort to see that families now residing on the potential HPOWER site are relocated with a minimum of disruption and inconvenience. According to the company, this relocation has been planned for some time and will continue whether or not Amfac/C-E obtains the HPOWER contract. The transition is being coordinated with the

I.L.W.U., and the probable impacts of the move are discussed on pages IV-124 through IV-131 of the EIS.

Thank you again for your thoughtful comments. If you would like any additional information, please contact Mr. Tom Vendetta at 523-4774.

Very truly yours,

Wallace Miyahira
Wallace Miyahira
Director

WM:PJW:ghs
Attachments
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

Table IV-20. Estimates of Highest 24-Hour Concentrations in the Vicinity of Waipahu.

Bidder	24-Hour Concentration (ug/m³)[1] Particulate Matter	Sulfur Dioxide (Refuse/Oil)[3]	Nitrogen Dioxide
UOP			
Individual:			
High Terrain	4.5 (3.5 WNW)	11.7/17.9 (3.5 WNW)	12.8 (3.5 WNW)
Flat Terrain	0.7 (10 SSW)	1.8/2.8 (10 SSW)	2.0 (10 SSW)
Cumulative:			
High Terrain	70.5[2] (3.5 WNW)	114/114 (3.5 NW)	88 (3.5 NW)
Flat Terrain	66.7[2] (10 SSW)	7.3/8.0 (10 SSW)	6.9 (10 SSW)
Amfac/C-E			
Individual:			
High Terrain	6.3 (3.5 WNW)	21.0/112 (3.5 WNW)	36.8 (3.5 WNW)
Flat Terrain	27.5 (0.5 SSW)	2.3/12.3 (10 SSW)	4.1 (10 SSW)
Cumulative:			
High Terrain	72.3[2] (3.5 WNW)	114/114 (3.5 NW)	88 (3.5 NW)
Flat Terrain	94[2] (0.5 SSW)	7.9/18.0 (10 SSW)	9.8 (10 SSW)

1 Figures in parentheses indicate approximate distance (km) and direction to area of maximum concentration.

2 The modeled individual concentrations were simply added to the second-highest measured concentration at the DOH station (Pearl City, 1978).

3 Based on UOP firing 0.5 percent sulfur oil and Amfac/C-E firing 2.0 percent sulfur oil.

Source: Morrow, February 1980: Table 24 (revised 9 September, 1980).

Fugitive Dust

In general, the proposed HPOWER project would not generate significant amounts of fugitive dust. The vast majority of each site would be covered with buildings, roadways, and other impermeable surfaces. The remainder would contain irrigated landscaping. Trucks carrying material to and from the site would be covered. Only during the site preparation phase of the construction period would one expect sufficient earth to be exposed for there to be an increased potential for entrainment of particulates. This period would be of short duration. Moreover, with the possible exception of the north parcel on the Waipio Peninsula and the Amfac/C-E site, the areas under consideration for HPOWER are well-removed from sensitive adjoining uses. Since the Amfac/C-E site currently contains dirt roads and considerable other bare soil areas, it is possible that the erosion measures that will be applied during construction will cause fugitive dust emissions from the site to remain at or below their current levels. However, a more likely scenario is that they would increase somewhat during the early phases of construction.

The one aspect of the project that does cause some concern is the potential that truck traffic associated with HPOWER has for increasing fugitive dust emissions from the cane haul road that would be used for access to the Amfac/C-E site. While the road is paved, loose dirt from adjacent fields and from the tires and contents of the cane haul trucks themselves does collect on it. Refuse trucks moving to and from the HPOWER site would not contribute significantly to the amount of dust present, but they would tend to lift more of it into the air, thereby increasing atmospheric dust concentrations.

In order to avoid this problem, it is essential that the cane haul road be kept as clean as possible and/or constantly wetted. Of these two approaches, cleaning appears by far the better. In dry, sunny weather, water would evaporate rapidly from the impermeable road surface. Use of a sweeper such as is employed on public roads and at airports probably provides the best means of preventing the creation of a dust problem, but other techniques might be employed as well. The cost of these dust mitigation measures would be absorbed by the HPOWER contractor.

HAWAIIAN TELEPHONE COMPANY

P. O. BOX 2200 • HONOLULU, HAWAII 96841 • TELEPHONE (808) 537-7111 • CABLE: TELHAWAII

May 15, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street
3rd Floor
Honolulu, Hawaii 96813

EIS for Honolulu Program of Waste
Energy Recovery (HPOWER)

Gentlemen:

We have reviewed the subject EIS and have no comments to offer or any changes to be made to our earlier comments as submitted by letter of May 10, 1979 and of which is shown on Page XI-100 of the EIS.

Sincerely,

R. Mau

Richard Mau
Engineering and Construction
Staff Manager

cc: ✓ Dept. of Public Works
City and County of Honolulu
650 South King Street
11th Floor
Honolulu, Hawaii 96813

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Richard Mau
Engineering and Construction
Staff Manager
Hawaiian Telephone Company
P. O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Mau:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of May 15, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:lt

cc: Environmental Quality Commission
Belt, Collins & Associates

PRI Pacific Resources, Inc.

PRI Tower 733 Bishop Street
P. O. Box 3379 Honolulu, Hawaii 96842
Telephone 808 547-3111 Telex 0634238

June 6, 1980

Mr. Donald Bremner
Director
Environmental Quality Commission
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Bremner:

Thank you for allowing us the opportunity to review your Environmental Impact Statement (EIS) on the Honolulu Program of Waste Energy Revoery (HPOWER).

We have no comments at this time.

Very truly yours,

Francis T. Tanaka
Government Affairs Coordinator

FTT:skk

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

August 15, 1980

Mr. Francis T. Tanaka
Government Affairs Coordinator
Pacific Resources, Inc.
P. O. Box 3379
Honolulu, Hawaii 96842

Dear Mr. Tanaka:

Environmental Impact Statement for the
Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 6, 1980 regarding the Environmental Impact Statement for the proposed Honolulu Program of Waste Energy Recovery (HPOWER) project. We appreciate the time spent by you and your staff reviewing the document.

Very truly yours,

for Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

GREENPEACE

June 3, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, HI 96813

Gentlemen:

We have reviewed the Environmental Impact Statement for the Honolulu Program of Waste Energy Recovery and offer the following comments:

In general, we are very supportive of the concept of the proposed energy and resource recovery facility. However, the EIS prepared for the project is grossly deficient in not dealing with possible negative impacts to endangered waterbirds which frequent the Waipio area nor adequately addressing the problem of rare and endangered plants at the Hanua St. site.

Endangered Waterbirds

Several of the reviewers of the original EIS Preparation Notice expressed concern over the proximity of the original proposed site to the Waiawa Unit of the Pearl Harbor National Wildlife Refuge, yet the body of the EIS contains no mention of endangered waterbirds, the wildlife sanctuary, or other sites the birds may be using in the area. It is stated on page IV-71 that, "No wildlife survey was conducted for the Waipio Peninsula site since it was identified as a possible site after these [wildlife] surveys had already been conducted." This excuse does not seem to make sense, since the new site seems to be virtually adjacent to the original site. A survey certainly should have been conducted which addressed bird usage of whatever project site was proposed at the time, as well as adjacent sites which would have any chance of being impacted.

It is, however, difficult to be sure of the relative positions of the original proposed site, the new proposed site, and the bird sanctuary. None of the maps in the EIS has both the new proposed site and the bird sanctuary, or other areas of bird usage, depicted on it.

It is obviously essential that the EIS contain a complete discussion of present bird usage of the area, both in and out of the proposed project site, as well as a comprehensive discussion of possible negative impacts from such things as loss of habitat, noise, stack emissions, increases in rat populations, and groundwater runoff which may contain pest control substances or other hazardous materials.

Endangered Plant Species

Use of the Hanua St. site would pose significant risk to the endangered plant species on the site. There is not enough data presented in the EIS to allow a determination of whether it will be possible for the site to accomodate both the plants and the facility or even if the developer will make an adequate effort to protect them. Assurances of no significant negative impacts cannot make up for a lack of evidence on which a conclusion can be based. It is essential that data be presented which shows how much of the site will be preserved, what percentage of rare and endangered plants will be lost, what effect their loss will have on the likelihood of survival of the species, a meaningful analysis of possible effects of soil disturbance, contaminated stormwater runoff, stack emissions and vandalism, and a discussion of mitigative measures that will actually be used.

The EIS process is totally useless if project developers are allowed to present such vague plans on how such a critical site as the Hanua one will be used, and to completely omit the subject of endangered waterbirds. It is our recommendation that the EIS be resubmitted when an adequate and thorough presentation can be made to the public.

Sincerely,

Kelley Dobbs

Kelley Dobbs

xc: Dept. of Public Works
City and County of Honolulu

GREENPEACE FOUNDATION • 913 HALEKAUWILA, HONOLULU, HAWAII 96814
A NON PROFIT, TAX EXEMPT ORGANIZATION • (808) 537-9505 • TLX 633175

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-494

September 5, 1980

Mr. Kelley Dobbs
Greenpeace Foundation
913 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. Dobbs:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 3, 1980 regarding the Environmental Impact Statement for the Proposed HPOWER project. We appreciate the time you and other members of the Greenpeace Foundation spent reviewing the document, and are pleased to know of your support for the HPOWER project. We wish to respond to your comments as follows:

Endangered Waterbirds

The reviewers of the original EIS Preparation Notice who mentioned possible effects on the Waiawa Unit of the Pearl Harbor National Wildlife Refuge were concerned because one of the sites then under consideration for HPOWER was situated on the Pearl City Peninsula adjacent to the refuge. However, that location has since been rejected as a possible HPOWER site. As shown on the attached figure, the Waipio Peninsula site discussed in the EIS is approximately 1.4 miles west-southwest of the Waiawa Unit of the Pearl Harbor National Wildlife Refuge; it is about 1.7 miles north-northeast of the refuge's Honouliuli Unit. These distances are more than sufficient to insure that HPOWER would have no adverse impact on either unit of the National Wildlife Refuge.

As we indicated in the EIS, the Waipio Peninsula site was identified as a possible HPOWER location very late in the selection process. A vegetation survey of the site was conducted and indicated that the area was almost certainly not a significant wildlife habitat. Subsequent to the publication of the EIS, Mr. Phil Bruner, a wildlife biologist at the Hawaii Campus of Brigham Young University, was commissioned to undertake an avifaunal survey of the Waipio Peninsula sites as a means of confirming this tentative appraisal.

Mr. Bruner studied the Waipio Peninsula site during June, 1980. He concluded that the site is used by the typical array of exotic species one would expect to find in similar habitat elsewhere on Oahu (see Table 1, attached). The only representative of a native species that was recorded was one Black-crowned Night Heron observed foraging along the banks of the mud settling ponds makai of the Waipahu Incinerator. Based on this work, it does not appear that use of any of the Waipio sites would have a significant adverse effect on the availability of habitat.

With respect to possible effects on off-site areas from noise, stack emissions, increases in rat populations, or ground or surface water contamination, nothing substantial is expected. The existing Waipahu incinerator is a relatively significant noise source, yet no correlation between bird sighting frequency and proximity to the incinerator was noted. In fact, most birds are remarkably insensitive to moderate noise, as numerous studies of bird populations in the vicinity of airports has shown. Air pollutants emitted from an HPOWER facility would affect birds only if they resulted in greatly elevated ambient concentrations of those pollutants. As indicated in the EIS's discussion of air quality impacts, HPOWER-related emissions would have only a slight effect on pollutant levels. Moreover, the highest concentrations that would occur would not be in areas immediately adjacent to the facility but at some distance.

Wherever solid waste is present, there is the potential for a rat problem. However, the vector control programs that would be conducted by the facility operator would sharply limit any potential increase in the number of rats. It should also be noted that the rats would tend to remain within the boundary of the facility, where the concentration of food is greatest, rather than in surrounding areas.

In general, pest control substances would not be placed in areas where they could contaminate surface or groundwater runoff. The security fence around the facility would inhibit access by domestic animals and prevent them from coming in contact with pesticides or traps. All measures taken would be in strict compliance with government regulations designed to insure public safety.

Endangered Plant Species

Your comments on this topic suggest that you may have misconstrued the discussion of the Hanua Street site that was presented in the EIS. I believe that a brief review of the pertinent facts will show that the City has taken the value of the rare and endangered plant species present on the Hanua Street parcel into consideration in its planning for HPOWER.

The Hanua Street site shown in the EIS contains about four times as much land as would be needed for an HPOWER facility. The rare and endangered plant

Mr. Kelley Dobbs
September 5, 1980
Page three

species that are present are all situated on the makai (western) portion of the parcel. There is sufficient room available in the eastern half of the property to accommodate the HPOWER facility and a 200-foot buffer zone. Because of this, it seems fairly certain that construction of the HPOWER plant on this site would not directly affect the endangered species that are present.

Because the portion of the parcel that would be used is adjacent to Hanua Street, there would be no need for construction traffic to cross the area occupied by the endangered species. The perimeter fence around HPOWER would prevent the general public from using the site for access to the shoreline. Stormwater runoff would not cross the sensitive area, and there is no evidence whatsoever that air pollutant concentrations would be even close to the level that might harm vegetation.

We believe that the best means of mitigating possible adverse effects on the endangered species is to stay clear of them, and we plan to do just that. We will also do our utmost to insure that HPOWER does not open the area to others who might harm the plants.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
attachments
cc: Environmental Quality Commission
Belt, Collins & Associates

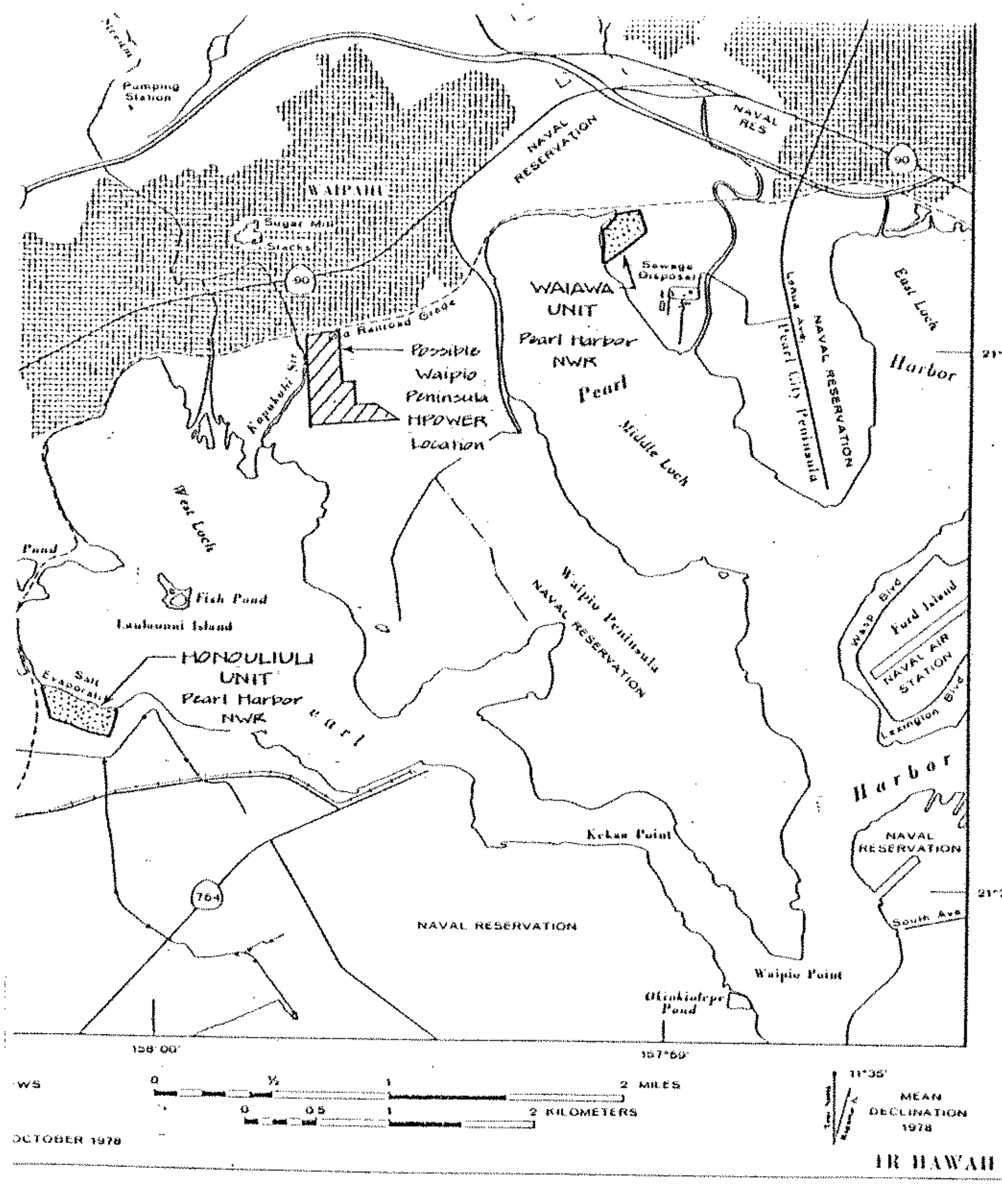

TABLE 1

Distribution and relative abundance of birds observed at the Incinerator site, Waipio Peninsula (21 June 1980).

Species	Distribution*	Relative Abundance*
Black-crowned Night Heron (*Nycticorax nycticorax*)	M	R
Cattle Egret (*Bubulcus ibis*)	G,M,B	C
Golden Plover (*Pluvialis dominica*)	G,M	R
Ruddy Turnstone (*Arenaria interpres*)	G,M	R
Spotted Dove (*Streptopelia chinensis*)	G,B	U
Barred Dove (*Geopelia striata*)	G,B	A
Myna(*Acridotheres tristis*)	G,B,M,O	C
Norbhern Cardinal (*Cardinalis cardinalis*)	B	U
White-eye (*Zosterops japonica*)	B,G	C
House Sparrow (*Passer domesticus*)	B,O	U
Spotted Munia (*Lonchura punctulata*)	G,B	C
Black-headed Munia (*Lonchura malacca*)	G,B	C

Key * Distribution:
G= Grassland
M= Mud flats
B= Brush
O= Open ground

Abundance:
A= Abundant (50+ recorded)
C= Common (25-50 recorded)
U= Uncommon (5-25 recorded)
R= Rare (1-5 recorded)

LIFE OF THE LAND A GROUP FOR ENVIRONMENTAL RESEARCH AND ACTION

June 5, 1980

Wallace Miyahira
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Re: Comments-Draft HPOWER Environmental Impact Statement (EIS)

Do not do a final EIS on HPOWER until the site and type of recovery plant have been selected.

We understand that the final EIS for HPOWER will be done in the same format as the draft EIS: all proposed sites and recovery plants will be discussed. We feel that a final EIS of this type would be inappropriate. A more in-depth study of the specific site and type of recovery plant is essential. All of the social, economic, and environmental aspects of the HPOWER plant could be discussed without irrelevant information on the other sites.

The City is using a "winning bid" policy for the selection of the HPOWER site. We insist that the social and environmental factors be considered as well as the price tag. We urge the City to select the safest and most environmentally sound waste recovery plant.

We have reviewed the draft EIS and have the following comments:

1) Pollution emissions from the plant are discussed briefly in the draft EIS and are within EPA guidelines. However, the HPOWER plant would emit measurable quantaties of fine particles, certain potentially hazardous organic compounds, viruses and bacteria, and toxic elements such as cadnium, lead, and mercury. This type of pollution is of particular concern because: 1) it is inhaled, and 2) biological concentration of heavy metals. Even though these pollutants are within acceptable levels, they are very dangerous over long periods of time. The effects of these emissions should be discussed further in the final EIS. We also feel that the HPOWER plant should not be located in a populated area.

2) Leaching of toxic heavy metals from residues and ash that are landfilled should be addressed.

3) Since the HPOWER plant will be handling virtually all of Oahu's municipal waste, a dicussion on waste storage should be done in the event of a major breakdown or accident at the plant.

4) We support the closed loop cooling system for any plant developed.

5) We re-affirm our position that the plant should be located at Campbell Industrial Park due to the size and industrial look of the recovery plant.

We look foward to reviewing future documents and feel HPOWER is the right direction for the City to pursue in handling its municipal waste problem.

Thankyou for this opportunity to comment.

Sincerly,

Tom Suarez
LOL Staff

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-535

October 10, 1980

Mr. Tom Suarez
Life of the Land
404 Piikoi Street
Honolulu, Hawaii 96814

Dear Mr. Suarez:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of June 5, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and other members of Life of the Land spent reviewing the document. Your letter expresses some concerns regarding the proposed project and the procurement method being used. We wish to respond as follows:

General Comments Regarding the Procurement Procedure

We understand your concern regarding the use of the low-price bid as the ultimate criteria in selecting the winning contractor for HPOWER. However, we wish to point out that the multiple-step procurement process being employed has provided ample opportunity for environmental concerns to play an important role in shaping bidders' proposals and, therefore, in determining the characteristics of the design of the HPOWER facility. A brief review of the major steps that are involved may clarify this point.

As indicated on page II-3 of the EIS, the HPOWER procurement process has involved three steps. They are:

Step IA - Qualification of firms and basic resource recovery technologies.

Step IB - Review, modification, and qualification of specific technical proposals submitted by firms passing the Step IA screening. Only those organizations whose technical proposals meet the City's rigid requirements concerning technical system design, system management, and environmental protection were approved and invited to submit price proposals.

Step II - City opens price proposals, reviews them to insure consistency with the approved technical proposal, and awards the contract to the bidder offering the lowest net disposal cost.

From the viewpoint of environmental protection, Step IB is by far the most important. It is here that decisions regarding the acceptability of different levels of impacts are made. The process is an iterative one, and contractors whose initial designs were judged likely to result in significant adverse effects were given several opportunities to eliminate them by altering their proposal. The fact that only three of the eighteen firms that expressed an interest in bidding on HPOWER (Step IA), were allowed to submit price proposals (Step II) is an indication of how rigorous the screening process has been.

The environmental standards that were used in the screening were drawn from existing State and Federal regulations and guidelines. These served as minimum acceptable performance levels that had to be achieved in order to qualify for participation in Step II. The City considered the possibility of using a selection procedure that would award bonus points to proposals which, from an environmental viewpoint, might be particularly beneficial. However, a review of the evaluation methodologies that are currently available indicated that they are most useful for making gross distinctions between fundamentally different conceptual alternatives. Because of the difficulties associated with attaching precise values to different levels of environmental enhancement or degradation, none of the methodologies now in use provides results sufficiently accurate or authoritative to be used in distinguishing between the different HPOWER proposals.

Because providing pollution abatement in excess of that required by law often involves increased costs that would put their proposals at a disadvantage in the price bids, the bidders have tended to design to the minimum level necessary to comply with existing regulations. Based on the reasonable assumption that societally established standards already provide an acceptable level of protection, additional abatement measures with high associated costs are unwarranted.

Scope of Revised EIS

The City wishes to finalize the EIS prior to receiving price bids so that all necessary mitigation measures that have been identified in it can be incorporated into the bidders' price proposals. If the City were to finalize its impact abatement requirements after a contractor had been selected, the cost of the necessary features could not be incorporated into the price bids.

Your letter expresses concern that the multiplicity of alternatives still under consideration resulted in our dealing cursorily with the impacts that could be expected. However, that is not the case. Potential impacts associated with all of the alternatives under consideration were thoroughly investigated and are reported in the EIS.

Pollutant Emissions

The EIS already contains an extensive discussion of the potential air quality impacts of the proposed project, including fine particles, organic compounds, viruses, bacteria, and toxic elements. It is not clear from your letter why you believe that emissions of these pollutants would be "very dangerous over long periods of time" even if they are "within acceptable levels." We feel that any emissions which constitute a significant health hazard are unacceptable, and we have carefully screened the technical proposals to insure that HPOWER remains environmentally safe over the long run. However, some additional discussion of trace elements may help to clarify the situation.

The HPOWER EIS reported estimates of trace element composition in the emitted particulates, as well as estimates of gross annual emissions. The two are different because the electrostatic precipitators (ESP's) used for emission control would remove about 99 percent (by weight) of all of the particulates contained in the flue gas leaving the boilers. It is important to note that the ESP's are more effective at removing large particles from the exhaust gases than they are at removing small ones. As a result, most of the particulates that do escape are of a respirable size, i.e., they are small enough to be inhaled into the lungs. It is for this reason that the EIS focused on the expected ambient concentrations of the various trace elements and attempted to compare them with standards and known levels of toxicity.

Lead and zinc were chosen initially because they represented the most abundant, potentially toxic, components of the particulate matter emissions. In the case of lead, it was found that the highest 24-hour concentrations that would result from an HPOWER facility under conditions most likely to produce a problem, (i.e., the facility operating at 120 percent of normal and "worst-case" meteorology), would be well under the 90-day-average limit recently promulgated by the EPA. The combination of meterological and operational factors needed to produce the "worst-case" conditions is extremely rare; hence, we may expect the average concentration over a 90-day period to be much lower and, therefore, farther below the point at which it is of potential concern.

Cadmium emissions are expected to be only two to seven percent that of lead. Its ambient concentrations would be proportionately smaller, somewhere in the range of 0.02 to 0.07 micrograms per cubic meter. The Occupational Safety and Health Administration's Threshold Limit Value (TLV) for cadmium is 50 micrograms per cubic meter. As a rule-of-thumb, the safe level for long-term exposure is considered to be one one-hundreth of the TLV. In this case, that would amount to 0.5 micrograms per cubic meter. Ambient concentrations produced by HPOWER are projected to be only a small fraction of that (4 to 14 percent).

Additional information regarding mercury levels has been developed since the EIS was published. First, our air-quality consultant has conducted a more detailed review of hourly meteorologic data from the Barbers Point Naval Air Station for the years 1949-1971. As a result of this analysis, it is now believed that peak 24-hour average atmospheric mercury levels produced by the facility would not exceed 0.2 micrograms per cubic meter even if HPOWER emitted mercury at the extraordinarily high rate reported for the Braintree,

Massachusetts resource recovery facility. With the more likely emission rate suggested by EPA, the maximum 24-hour average concentration would be about 0.01 micrograms per cubic meter. This is only one one-hundredth of the threshold level suggested by the EPA as the limit for a 30-day average. Second, in comparing the projected "worst-case" situation with the EPA's suggested threshold, the EIS assumed that existing ambient concentrations of atmospheric mercury followed patterns reported in University of Hawaii professor S.M. Siegel's 1972 analysis of the phenomenon. Subsequently, we have obtained more recent measurements of ambient atmospheric mercury concentrations made by Dr. Siegel over a ten-year period. These data indicate that the present background levels of mercury on Oahu range from 0.04 to 1.36 micrograms per cubic meter and that concentrations in the vicinity of the proposed HPOWER sites are towards the high end of this range.

An environmental impact statement prepared for the CONOCO oil refinery proposed for Campbell Industrial Park in the early 1970's reported ambient particulate mercury concentrations of 0.0001 to 0.0030 micrograms per cubic meter. Based on estimates that about 99 percent of mercury emissions occur as vapor rather than particulates, this is equivalent to total atmospheric mercury concentrations of about 0.01 to 0.3 micrograms per cubic meter. This is towards the lower end of the range reported by Siegel.

If the estimate of total existing atmospheric mercury based on the CONOCO data is correct, then mercury levels do not seem to be a problem. However, if Dr. Siegel's data is truly representative of the long-term average, it appears possible that some parts of Oahu (including those under consideration for HPOWER) are already at or above the suggested threshold level.

Before reaching this conclusion, however, there are several factors which need to be taken into consideration:

1) The atmospheric mercury concentrations attributed to HPOWER were based on "worst-case" meteorology and emission rates. Simply using the EPA's average emission factor, rather than the extraordinarily high rate reported for the Braintree, Massachusetts resource recovery facility that was used in the EIS's "worst-case" scenario, would reduce the projected peak atmospheric mercury concentration caused by the HPOWER project to less than 0.01 micrograms per cubic meter. Using meteorology typical of the worst 30-day period (the averaging time for the EPA's 1.0 microgram per cubic meter threshold value) rather than the worst 24-hour meteorology would reduce the projected concentrations much farther.

2) Dr. Siegel's estimates of the present background levels are based on a limited number of samples (three to ten, depending on the location) over a long time span. While they may well be representative of long-term averages, they would not meet EPA criteria for long-term monitoring and establishment of background pollutant concentrations. Moreover, except on the Big Island, the significant spatial variation which is exhibited by the measurements cannot be explained at the present time.

While the lack of sufficient data makes any conclusions tentative, it now appears that the proposed project would not contribute significantly to existing levels of atmospheric mercury. If the EPA's suggested threshold level were to be exceeded, it would be due almost entirely to existing natural sources rather than to HPOWER.

Very little work has been done with respect to bacterial emissions from resource recovery facilities, the last potential pollutant emission mentioned in your letter. What there is suggests that they would not be a problem. The most recent data on the subject that is available is contained in a report prepared by D.E. Fischer, et.al. of the Midwest Research Institute and entitled Assessment of Bacteria and Virus Emissions at a Refuse Derived Fuel Plant and Other Waste Handling Facilities. It compares emissions and potential hazards from a municipal incinerator, the St. Louis Refuse Processing Plant (a refuse derived fuel preparation facility with a function similar to the front-end processing at the proposed Amfac/C-E plant), a wastewater treatment plant, a refuse transfer station, and a sanitary landfill. The report stresses the paucity of information that is available regarding bacterial and viral emissions and the inconclusive nature of the data collected during their investigation. However, it goes on to suggest the following conclusions:

- o Airborne bacterial levels, both in-plant and at the property line, were generally slightly higher for the RDF plant than for the other types of waste facilities that were tested, but there is insufficient information, data, or standards to determine the seriousness of the microbiological contaminants that are released;
- o Asbestos emissions from the RDF plant tested were below the Threshold Limit Value (TLV);
- o A fabric filter system applied to the primary source of dust emissions can significantly reduce particulate and bacterial concentrations; and
- o No viral contamination was observed downwind of any of the facilities, probably because it was not present or was below the detection limits of the laboratory procedures that were used.

Leaching of Toxic Heavy Metals

Currently, almost all of the solid waste generated on Oahu is being disposed of in sanitary landfills. A relatively small portion of it (an average of 335 tons per day) is first burned at the Waipahu Incinerator, but even the ash and other residue from that facility are eventually placed in a landfill. Hence, leachate production is not a phenomena unique to HPOWER, but occurs as a natural outgrowth of existing disposal methods as well.

Combustion of the refuse in the HPOWER facility would not add toxic heavy metals to the waste stream. In fact, because some of the heavy metals contained in the raw municipal solid waste would be entrained in the stack emissions from the facility or are associated with materials that would be recovered (i.e., removed) from the waste stream, the ash and residue that

would be landfilled would contain significantly smaller amounts of toxic heavy metals than would the municipal waste now being landfilled. Consequently, other things being equal, the potential for adverse effects would be correspondingly reduced.

The total toxic heavy metal content of the material that is landfilled is not the only factor that determines its water pollution potential. The volumetric concentration of the pollutants, the extent to which they are present in more or less soluable form, and the design, operating methods, and location of the landfill itself all help determine whether or not landfill leachate will have serious adverse impacts. A detailed analysis of these factors for a specific disposal site would most appropriately be addressed in the master plan and EIS for such a facility. However, there is no evidence available at the present time that suggests that development and operation of an environmentally safe landfill for the approximately 400 tons per day of residue and ash that would be produced by an HPOWER facility would be more difficult or hazardous than development and operation of a sanitary landfill handling four times as much raw municipal solid waste. Additional information concerning the types of impacts typically associated with the operation of sanitary landfills may be found in the EIS for the City's Kapa'a Landfill Expansion project.

Provisions for Accidents or Breakdowns

Reliable operation and the provision of back-up handling and disposal methods has been a major concern of the City throughout the HPOWER procurement process. It is the primary reason why the City has required that:

- o only equipment and processes which have demonstrated at least one year of satisfactory commercial operation in a similar capacity may be used;
- o the facility must have at least two complete process lines, any one of which can handle at least 60 percent of the design volume;
- o no more than 30,000 tons of raw refuse per year for an 1,800-ton per day facility (20,000 tons of raw refuse per year for a 1,200-ton per day plant) be diverted to landfill;
- o the facility contain at least three days storage capacity for raw refuse and, where applicable, at least two days storage capacity for refuse derived fuel (RDF); and
- o extensive spare-part inventories be maintained.

While every effort has been made to achieve the highest practical reliability, the possibility always exists that the facility could experience a major equipment failure or accident. In such a case, municipal refuse would be diverted to a sanitary landfill for the duration of the interruption. We must emphasize the point that HPOWER would complement, rather than totally replace, a municipal sanitary landfill operation. Hence, it is assured that a back-up sanitary landfill facility will always remain available for emergency use.

Closed-Loop Cooling System

It is the City's belief that it would be counter-productive to stipulate the type of cooling system that is to be used since it could stifle innovative design solutions which would be environmentally benign. Instead, we have preferred to establish performance standards which assure adequate environmental protection without constraining contractors to a specific cooling technique. In addition, the City and County of Honolulu Board of Water Supply has stipulated that no more than 200,000 gallons of water per day (GPD) would be made available to the project from its sources. Since this is far less than the amount required for evaporative cooling, the 200,000-GPD limit effectively precluded use of such a system except where bidders have access to their own potable source or are able to develop a brackish water cooling system.

Given the present groundwater situation on Oahu, no private development of new freshwater wells is possible. Brackish water systems are technically feasible, but, for a variety of economic and environmental reasons, were not attempted by either of the two HPOWER bidders. Hence, the only possible alternatives were to utilize air-cooling or to divert potable water from an existing use.

UOP, Inc., one of the two organizations expected to submit price bids, is proposing a closed-loop, air-cooled system. As a result, its facility would consume only 100,000 GPD. Amfac/C-E, the other remaining bidder, is proposing an evaporative cooling system consuming over a million gallons per day, but usage at the Oahu Sugar Company (an Amfac subsidiary) would be reduced sufficiently to completely offset this. Such a change in water use in the Pearl Harbor Ground Water Control Area requires the approval of the State Department of Land and Natural Resources (DLNR). The DLNR, which has been charged with insuring that the ground water resources of the Pearl Harbor basin are utilized in an environmentally and socially responsible way, has approved the necessary permit.

Location of the Proposed Facility

We understand your desire that an industrial facility such as HPOWER be located in an appropriate area. However, the City has chosen to allow bidders to utilize the Waipio Peninsula site and to propose locations other than Campbell Industrial Park so long as they can demonstrate that the construction and operation of the facility at such an alternative site would not result in significant adverse impacts. We feel the following are important siting considerations:

- o Other areas under consideration, i.e., the Waipahu Sugar Mill site and the Waipio Peninsula locations, also have an industrial character resulting from existing uses;
- o Campbell Industrial Park is situated far from the island's centroid of waste generation, and this means that the transport costs associated with a resource recovery facility located there are rather high;

- o The pollution controls and features incorporated into the HPOWER design are believed to limit the magnitude of adverse impacts sufficiently to make it an acceptable use at all proposed sites.

Thank you again for your comments. We share your belief that HPOWER represents a positive step towards the solution of Honolulu's solid waste handling problem. If you have any additional questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:ghs
cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

Wailani Neighborhood Association
P. O. Box 546
Waipahu, Hawaii 96797

August 28, 1980

Mr. Donald A. Bremner
Chairman
Environmental Quality Commission
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. Bremner:

The Board of Directors of the Wailani Neighborhood Association are in opposition to having a HPOWER Recovery Facility located in Waipio Pennisula, Waipahu, Oahu. We were unaware of the HPOWER plant and the deadline date for comments to the Commission. We would however, like to inform you in greater detail the many reasons we oppose the proposed site.

The proposed site, Waipio Pennisula, is adjacent to: heavily populated area's, will be in close proximity to our sewage pond, which isn't too far away from the City and County incinerator and will be even closer to the deep draft harbor that will be under construction in the near future. With all this "development" to facilitate the growing population of Oahu, our roads will be so conjested, dangerous and noisy, that we and our neighbors (Waipahu-Pearl City), will feel the impact moreso than others.

We realize that these facilities are necessities, but why must all of them be centralized in our neighborhood.

We also oppose any intention of an airport in Waipahu for the very same reasons as stated above.

Thank you for your time and kind consideration, I remain

Very truly yours,

James Gomes
President

Enc:

The Honorable George R. Ariyoshi, Governor State of Hawaii
The Honorable Sparky Matsunaga, U.S. Senator
The Honorable Daniel Akaka, U.S. House of Representatives
The Honorable Joe Kuroda, State Senator
The Honorable Ben Cayetano, State Senator
The Honorable Norman Mizuguchi, State Senator
The Honorable Patsy Young, State Senator
The Honorable Danny Kihano, State Representative
The Honorable Mits Shito, State Representative
The Honorable George Akahane, Councilman, City and County-Honolulu
Waipahu Community Association
Pearl City Community Association
Harborview Community Association
Crestview/Seaview Community Association

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-547

October 14, 1980

Mr. James Gomes, President
Wailani Neighborhood Association
P. O. Box 546
Waipahu, Hawaii 96797

Dear Mr. Gomes:

Subject: Environmental Impact Statement for the Proposed Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter of August 28, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time you and other members of the Board of Directors of the Wailani Community Association spent reviewing the document. Your opposition to having an HPOWER facility constructed on the Waipio Peninsula is hereby noted.

Your letter expressed a concern over the centralization of public facilities in your neighborhood and cited several reasons for opposing the Waipio Peninsula site. While we respect the position you have taken, we wish to make the following comments:

1. The Waipio Peninsula site that is under consideration for HPOWER is situated in an undeveloped area. The old Oahu Railway and Land Company right-of-way lies between the northern side of the "north parcel" and the closest urban uses. Beyond it are an industrial area and the backyards of eight single-family homes that front on Awanei Street. Projected increases in vehicular traffic could be accommodated by the existing roadways. Accoustical studies conducted for the project and reported on pages IV-39 through IV-52 of the EIS indicate that noise levels would remain within existing standards so long as appropriate noise mitigation measures are taken. Under the proposed HPOWER contract, any contractor using this site would have to meet these standards.

2. The sewage treatment pond situated about one-half mile south of the railroad right-of-way will be deactivated when the Honouliuli Regional Sewage Treatment

Plant opens in 1981, or about two years before HPOWER would become operational.

3. The Waipio Peninsula site is close to the existing Waipahu Incinerator, but it is possible that the City would use the incinerator only as a back-up facility should an 1800-ton per day HPOWER facility be built.

4. The proposed Barbers Point Deep Draft Harbor is more than eight miles from the Waipio Peninsula, and would not directly impact the Wailani community.

If you have any further questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

WALLACE MIYAHIRA
Director and Chief Engineer

cc: Environmental Quality Commission
Belt, Collins & Associates
DLU

"REPRESENTING ALL THE PEOPLE OF WAIPAHU"

Waipahu Community Association

HONOLULU SAVINGS AND LOAN BUILDING
94-229 WAIPAHU DEPOT STREET
WAIPAHU, HAWAII 96797

TELEPHONE 677-4950

June 5, 1980

Office of the Mayor
City and County of Honolulu
530 South King Street, 3rd Floor
Honolulu, HI 96813

Gentlemen:

Review of the Honolulu Program of Waste Energy Recovery (HPOWER) Environmental Impact Statement (EIS), under State of Hawaii, Environmental Quality Commission letter, dated May 6, 1980 has been completed.

The major changes to impact our community initially would be social, caused by loss of Oahu Sugar Company employee housing. Removal of this housing has been planned for, including replacement accommodations.

The actual social adjustments should be minimal, and this item is stated here for the record because the acceleration, or delay, in relation to the scheduled timetable of employee destruction will generate controversy within our community.

Placement of the HPOWER facility at the AMFAC/C-E site would be the exchange of one industrial view for another. Most other considerations that would pertain could be rationalized in a similar manner. We in Waipahu are accustomed to the Sugar Mill as our principal landmark; acceptance of additional industrial facilities on this site would not be unacceptable to the majority of Waipahu residents.

Explanation of traffic increases and the effect on existing roadways approaching the Waipahu HPOWER site would seem more critical than stated in your EIS document. The increase of 645 trucks (one-way) per day generated by HPOWER traffic added to the 1978 traffic count shown in table IV-35, and recognizing all the increased count will enter and exit Kam Hwy at Waipahu Street, a severe traffic problem will exist immediately. Additional traffic, resulting from continuing expansion of Mililani Town and Waipio-Gentry, will add significantly to the congestion, particularly at peak commuter hours.

In the long run, should AMFAC/C-E be the successful bidder, the addition of HPOWER to the economy of Waipahu could be a most contributing and welcome asset.

It is recommended that AMFAC/C-E call a public hearing in Waipahu to inform residents of impact upon the community should they be successful bidders, this action should be accomplished as soon as feasible.

The opportunity to review and comment on this EIS document for the project is appreciated. This association desires to review and comment on all future documents relating to this project.

Sincerely,

President

COA/ls

Copy to: Department of Public Works
Waipahu Business Ass'n.
Waipahu Cultural Garden Park
Councilman George Akahane
file

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

R 80-491

August 29, 1980

Mr. C. O. Anderson, President
Waipahu Community Association
Honolulu Savings and Loan Building
94-229 Waipahu Depot Street
Waipahu, Hawaii 96797

Dear Mr. Anderson:

Environmental Impact Statement for the Proposed
Honolulu Program of Waste Energy Recovery (HPOWER)

Thank you for your letter dated June 5, 1980 regarding the Environmental Impact Statement for the proposed HPOWER project. We appreciate the time spent by you and other members of the Waipahu Community Association reviewing the document. Based on your letter, it appears that you believe that problems associated with Amfac/C-E's proposed use of the Oahu Sugar Company's cane haul road and Waipahu Street may be more severe than was stated in the EIS. We wish to provide clarification on this matter.

1. It should be noted that not all of the vehicle trips summarized in Table IV-33 (page IV-82) would utilize the cane haul road/Waipahu Street route. Visitors (28 trips per day), employees (70 trips per day), and approximately two-thirds of the miscellaneous vehicles (60 trips per day) would enter the facility from Kalaiku Street along the northern boundary of the Amfac/C-E site. This leaves about 500 trips per day that would be made on Waipahu Street.

2. Because HPOWER would generate traffic primarily at off-peak hours, it would not contribute significantly to traffic congestion on Waipahu Street. As shown by the data in Table IV-35 (page IV-88) of the EIS, existing traffic on Waipahu Street and Kamehameha Highway peaks between 6:00 a.m. and 8:00 a.m. By the 8:00 a.m. to 9:00 a.m. period when HPOWER-related traffic begins to be significant, this other traffic has dropped to about half its earlier level. As a result, the addition of HPOWER vehicles would leave total traffic volumes during the hours most affected by the project at less than two-thirds the level now experienced during the morning peak.

3. With respect to problems at the Kamehameha Highway - Waipahu Street intersection, the EIS notes that a problem already exists during the peak morning commuting hours and that flow through the intersection during this period could be significantly eased by minor improvement to the south side of Waipahu Street between the H-2 off-ramp and Kamehameha Highway. However, we must emphasize that the problem is an existing one and, because HPOWER does not generate significant traffic volumes until after the present peak, would not be exacerbated by the proposed project.

We acknowledge your desire to review and comment on all future HPOWER documents and will continue to keep you informed of the status of the project. Should you have additional questions, please contact Mr. Tom Vendetta, our project manager for the EIS, at 523-4774.

Very truly yours,

Wallace Miyahira

Wallace Miyahira
Director and Chief Engineer

WM:PJW:cld

cc: Environmental Quality Commission
Belt, Collins & Associates

APPENDIX A

WORST CASE 24-HOUR AND 3-HOUR METEOROLOGICAL DATA SETS USED IN MODELING OF SHORT-TERM POLLUTANT CONCENTRATIONS IN FLAT TERRAIN

WORST CASE 24-HOUR METEOROLOGY
CAMPBELL INDUSTRIAL PARK SITES

HOUR	WIND DIRECTION	WIND SPEED (m/sec)	STABILITY	LID HEIGHT (m)	TEMPERATURE (°K)
1	86	6.2	4	1534	296
2	66	5.1	4	1576	295
3	76	4.6	4	1618	295
4	86	4.6	4	1660	295
5	86	5.1	4	1702	296
6	86	5.1	4	1743	296
7	76	5.1	4	1785	296
8	86	5.7	4	1827	297
9	76	6.2	4	1869	298
10	66	6.2	4	1911	299
11	86	6.2	4	1953	299
12	96	7.2	4	1994	300
13	86	5.7	4	2036	299
14	86	7.2	4	2078	299
15	86	8.2	4	2078	299
16	86	6.7	4	2078	298
17	96	7.2	4	2078	299
18	86	5.1	4	2072	298
19	86	6.2	4	2045	298
20	86	7.2	4	2017	298
21	56	7.2	4	1990	298
22	86	6.7	4	1963	298
23	86	5.1	4	1936	298
24	86	5.1	4	1908	298

WORST CASE 24-HOUR METEOROLOGY
WAIPAHU SITES

HOUR	WIND DIRECTION	WIND SPEED (m/sec)	STABILITY	LID HEIGHT (m)	TEMPERATURE (°K)
1	23	2.2	4	1534	296
2	23	3.8	4	1576	295
3	23	2.2	4	1618	295
4	23	2.2	4	1660	295
5	23	3.8	4	1702	296
6	23	2.2	4	1743	296
7	23	3.8	4	1785	296
8	23	3.8	4	1827	297
9	23	3.8	4	1869	298
10	23	3.8	4	1911	299
11	23	5.8	4	1953	299
12	23	5.8	4	1994	300
13	23	5.8	4	2036	299
14	45	5.8	4	2078	299
15	23	5.8	4	2078	299
16	23	5.8	4	2078	298
17	23	5.8	4	2078	299
18	23	5.8	4	2072	298
19	23	3.8	4	2045	298
20	23	2.2	4	2017	298
21	23	2.2	4	1990	298
22	23	2.2	4	1963	298
23	23	3.8	4	1936	298
24	23	2.2	4	1908	298

WORST CASE 3-HOUR METEOROLOGY

WAIPAHU SITES

HOUR	WIND DIRECTION	WIND SPEED (m/sec)	STABILITY	LID HEIGHT (m)	TEMPERATURE (°K)
1	23	5.0	2	2036	299
2	23	5.0	2	2078	299
3	23	5.0	2	2078	299

CAMPBELL INDUSTRIAL PARK SITES

HOUR	WIND DIRECTION	WIND SPEED (m/sec)	STABILITY	LID HEIGHT (m)	TEMPERATURE (°K)
1	225	5.0	2	2036	299
2	225	5.0	2	2078	299
3	225	5.0	2	2078	299

APPENDIX B

ACOUSTIC TERMINOLOGY AND SYMBOLS

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the L_{Cdn} with the L_{Adn}.

Although not included in the tables, it is also recommended that "L_{PN}" and "L_{EPN}" be used as symbols for perceived noise levels and effective perceived noise level, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

> The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, L_{eq}, is designated the "equivalent sound level". For L_d, L_n, and L_{dn}, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristic of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, dBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (L_{PN} was found to be 75 dB. L_{PN} = 75 dB.) This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighted Loss of Hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

TABLE I: A-Weighted Recommended Descriptor List

	Term	Symbol
1.	A-Weighted Sound Level	L_A
2.	A-Weighted Sound Power Level	L_{WA}
3.	Maximum A-Weighted Sound Level	L_{max}
4.	Peak A-Weighted Sound Level	L_{Apk}
5.	Level Exceeded x% of the time	L_x
6.	Equivalent Sound Level	L_{eq}
7.	Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8.	Day Sound Level	L_d
9.	Night Sound Level	L_n
10.	Day-Night Sound Level	L_{dn}
11.	Yearly Day-Night Sound Level	$L_{dn(y)}$
12.	Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is L_{eq} (1)). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine.)

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TABLE II: Recommended Descriptor List

	TERM	A-WEIGHTING	ALTERNATIVE(1) A-WEIGHTING	(2) OTHER WEIGHTING	UNWEIGHTED
1.	Sound (Pressure) (3) Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2.	Sound Power Level	L_{WA}		L_{WB}	L_W
3.	Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4.	Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5.	Level Exceeded x% of the time	L_x	L_{Ax}	L_{Bx}	L_{px}
6.	Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7.	Equivalent Sound Level Over Time(T) (4)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8.	Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9.	Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10.	Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11.	Yearly Day-Night Sound Level	$L_{dn(y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12.	Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13.	Energy Average value over (non-time domain) set of observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14.	Level exceeded x% of the total set of (non-time domain) observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15.	Average L_x value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown. Applies also to C,D,E,..... weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., could be specified as $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine)).

APPENDIX C

VEGETATION OBSERVED AT POSSIBLE HPOWER SITES

CHECKLIST OF SPECIES FOR MALAKOLE ROAD SITE

Scientific Name	Common Name Hawaiian Name	Status
MONOCOTYLEDONEAE		
Gramineae - Grass Family		
Chloris inflata Link	Swollen fingergrass Mau'ulei	Exotic
Cynodon dactylon (L.) Pers.	Bermuda grass Mānienie	Exotic
Panicum maximum Jacq.	Guinea grass	Exotic
Pennisetum setosum (Sw.) L.C. Rich. in Pers.	Feathery pennisetum	Exotic
Rhynchelytrum repens (Willd.) C.E. Hubb.	Natal redtop	Exotic
Liliaceae - Lily Family		
Cordyline terminalis (L.) Kunth	Ti Ki	Exotic
DICOTYLEDONEAE		
Acanthaceae - Acanthus Family		
Asystasia gangetica (L.) T. Anders	Asystasia; Chinese violet	Exotic
Amaranthaceae - Amaranth Family		
Achyranthes indica (L.) Mill.		Exotic
Amaranthus spinosus L.	Spiny amaranth Pakai-kukū	Exotic

* native species

Scientific Name	Common Name Hawaiian Name	Status
Capparaceae - Caper Family		
**Capparis sandwichiana* var. *zoharyi* Deg. & Deg.		Endemic
Chenopodiaceae - Goosefoot Family		
Atriplex semibaccata R. Br.	Australian saltbush	Exotic
Atriplex muelleri Benth.		Exotic
Chenopodium murale L.	Nettle-leaved goosefoot	Exotic
Compositae - Sunflower Family		
Pluchea odorata (L.) Cass.	Pluchea; sour bush	Exotic
Verbesina encelioides (Cav.) B. & H. ex Gray	Golden crown-beard	Exotic
Convolvulaceae - Morning-glory Family		
**Ipomoea cairica* var. *cairica* (L.) Sweet	Koali	Indigenous
**Ipomoea congesta* R. Br.	Morning glory Koali-'awania	Indigenous
Ipomoea obscura (L.) Ker-Gawl		Exotic
Cucurbitaceae - Gourd Family		
Cucumis dipsaceus Ehrenb. ex Spach	Wild spiny cucumber	Exotic
Momordica balsamina L.	Balsam apple	Exotic
Euphorbiaceae - Spurge Family		
Euphorbia glomerifera (Millsp.) L.C. Wheeler	Graceful spurge	Exotic
Euphorbia hirta L.	Garden spurge koko-kahiki	Exotic
Ricinus communis L.	Castor bean kolī	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Labiatae - Mint Family		
Leonotis nepetaefolia (L.) Ait.	Lions-ear	Exotic
Lauraceae - Laurel Family		
**Cassytha filiformis* L.	Kauna'oa	Indigenous
Leguminosae - Pea Family		
Acacia farnesiana (L.) Willd.	Klu Kolu	Exotic
Desmanthus virgatus (L.) Willd.	Virgate mimosa	Exotic
Leucaena leucocephala (Lam.) de Wit	False koa Koa-haole	Exotic
Prosopis pallida (Humb. & Bonpl. ex Willd.) HBK.	Mesquite Kiawe	Exotic
Malvaceae - Mallow Family		
Malvastrum coromandelium (L.) Garcke	False mallow Hauuoi	Exotic
**Sida fallax* Walp.	Ilima 'Ilima	Indigenous
Sida spinosa var. *spinosa* L.	Prickly sida	Exotic
Passifloraceae - Passion Flower Family		
Passiflora foetida var. *foetida* L.	Scarlet-fruited passionflower Pohāpohā	Exotic
Plumbaginaceae - Leadwort Family		
Plumbago auriculata Lam.	Blue plumbago	Exotic
Rubiaceae - Coffee Family		
Morinda citrifolia L.	Indian mulberry Noni	Exotic
Sterculiaceae - Cocoa Family		
**Waltheria americana* L.	Waltheria Hi'aloa; 'uhaloa	Indigenous

CHECKLIST OF SPECIES FOR HANUA STREET PARCEL

Scientific Name	Common Name Hawaiian Name	Status
MONOCOTYLEDONEAE		
Gramineae - Grass Family		
Chloris inflata Link	Swollen fingergrass Mau'ulei	Exotic
Cynodon dactylon (L.) Pers.	Bermuda grass Mānienie	Exotic
Panicum maximum Jacq.	Guinea grass	Exotic
Pennisetum setosum (Sw.) L.C. Rich. in Pers.	Feathery pennisetum	Exotic
Unidentified grass (dried)		
DICOTYLEDONEAE		
Acanthaceae - Acanthus Family		
Asystasia gangetica (L.) T. Anders	Asystasia; Chinese violet	Exotic
Aizoaceae - Carpetweed Family		
**Sesuvium portulacastrum* (L.) L.	Sea purslane 'Akulikuli	Indigenous
Amaranthaceae - Amaranth Family		
Achyranthes indica (L.) Mill.		Exotic
***Achyranthes splendens* var. *rotundata* Hbd.		Endemic (Oahu)
Batidaceae - Batis Family		
Batis maritima L.	Pickle weed 'Akulikuli-kai	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Boraginaceae - Heliotrope Family		
**Heliotropium curassavicum* L.	Seaside heliotrope Nena	Indigenous
Chenopodiaceae - Goosefoot Family		
Atriplex semibaccata R. Br.	Australian salt bush	Exotic
Compositae - Sunflower Family		
Pluchea xfosbergii Cooperrider & Galang		Exotic
Pluchea indica (L.) Less.	Indian pluchea	Exotic
Pluchea odorata (L.) Cass.	Pluchea; sour bush	Exotic
Verbesina encelioides (Cav.) B. & H. ex Gray	Golden crown-beard	Exotic
Convolvulaceae		
**Ipomoea cairica* var. *cairica* (L.) Sweet	Koali	Indigenous
Euphorbiaceae - Spurge Family		
Euphorbia glomerifera (Millsp.) L.C. Wheeler	Graceful spurge	Exotic
Euphorbia hirta L.	Garden spurge Koko-kahiki	Exotic
Ricinus communis L.	Castor bean Koli	Exotic
Leguminosae - Pea Family		
Acacia farnesiana (L.) Willd.	Klu Kolū	Exotic
Desmanthus virgatus (L.) Willd.	Virgate mimosa	Exotic
Leucaena leucocephala (Lam.) de Wit	False koa Koa-haole	Exotic
Prosopis pallida (Humb. & Bonpl. ex Willd.) HBK.	Mesquite Kiawe	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Malvaceae - Mallow Family		
**Sida cordifolia* L.	Lei ilima 'ilima	Indigenous
**Sida fallax* Walp.	Ilima 'ilima	Indigenous
Myoporaceae - Naio Family		
**Myoporum sandwicense* var. *stellatum* Webster	False sandalwood Naio	Endemic (Oahu)
Passifloraceae - Passion Flower Family		
Passiflora foetida var. *foetida* L.	Scarlet-fruited passionflower Pohāpohā	Exotic
Solanaceae - Nightshade Family		
Nicotiana glauca Grah.	Tree tobacco Mākahala	Exotic
Sterculiaceae - Cocoa Family		
**Waltheria americana* L.	Waltheria Hi'aloa; 'uhaloa	Indigenous

* Native species

** Endangered species

CHECKLIST OF SPECIES FOR
WAIPIO PENINSULA SITE

Scientific Name	Common Name Hawaiian Name	Status
MONOCOTYLEDONEAE		
Cyperaceae - Sedge Family		
Cyperus rotundus L.	Nut grass Kili'o'opu	Exotic
Gramineae - Grass Family		
Brachiaria mutica (Forsk.) Stapf	California grass	Exotic
Chloris inflata Link	Swollen fingergrass Mau'ulei	Exotic
Cynodon dactylon (L.) Pers.	Bermuda grass Mānienie	Exotic
Panicum maximum Jacq.	Guinea grass	Exotic
Paspalum vaginatum Sw.	Seashore paspalum	Exotic
Pennisetum setosum (Sw.) L.C. Rich in Pers.	Feathery pennisetum	Exotic
Rhynchelytrum repens (Willd.) C.E. Hubb	Natal redtop	Exotic
Tricachne insularis (L.) Nees	Sourgrass	Exotic
DICOTYLEDONEAE		
Amaranthaceae - Amaranth Family		
Amaranthus spinosus L.	Spiny amaranth Pakai-kukū	Exotic
Batidaceae - Batis Family		
Batis maritima L.	Pickle weed 'Ākulikuli-kai	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Boraginaceae - Heliotrope Family		
**Heliotropium curassavicum* L.	Seaside heliotrope Nena	Indigenous
Chenopodiaceae - Goosefoot Family		
Atriplex rosea L.		Exotic
Atriplex semibaccata R. Br.	Australian salt bush	Exotic
Compositae - Sunflower Family		
Emilia javanica (Burm.f.) C.B. Robins.	Red pua-lele	Exotic
Erechtites hieracifolia (L.) Raf.	Fireweed	Exotic
Pluchea xfosbergii Cooperrider & Galang		Exotic
Pluchea indica (L.) Less.	Indian pluchea	Exotic
Pluchea odorata (L.) Cass.	Pluchea; sour bush	Exotic
Convolvulaceae - Morning-glory Family		
Ipomoea obscura (L.) Ker-Gawl		Exotic
**Jacquemontia sandwicensis* var. *sandwicensis* Gray	Jacquemontia Pa'ū-o-hi'i-'aka	Endemic
Euphorbiaceae - Spurge Family		
Euphorbia glomerifera (Millsp.) L.C. Wheeler	Graceful spurge	Exotic
Euphorbia hirta L.	Garden spurge Koko-kahiki	Exotic
Ricinus communis L.	Castor bean Koli	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Labiatae - Mint Family		
Leonotis nepetaefolia (L.) Ait.	Lions-ear	Exotic
Leguminosae - Pea Family		
Cassia spp.	Shower tree	Exotic
Crotalaria incana L.	Fuzzy rattle-pod Kūkae-hoki	Exotic
Desmanthus virgatus (L.) Willd.	Virgate mimosa	Exotic
Leucaena leucocephala (Lam.)de Wit	False koa Koa-haole	Exotic
Prosopis pallida (Humb. & Bonpl. ex Willd.) HBK.	Mesquite Kiawe	Exotic
Malvaceae - Mallow Family		
Abutilon grandifolium (Willd.) Sweet	Hairy abutilon Ma'o	Exotic
Malvastrum coromandelium (L.)Garcke	False mallow Hauuoi	Exotic
Sida spinosa L.	Prickly sida	Exotic
Solanaceae - Nightshade Family		
Nicotiana glauca Grah.	Tree tobacco Mākāhala	Exotic
Sterculiaceae - Cocoa Family		
**Waltheria americana* L.	Waltheria Hi'aloa;'uhaloa	Indigenous

*Native species

CHECKLIST OF SPECIES FOR AMFAC/C-E SITE

Scientific Name	Common Name Hawaiian Name	Status
MONOCOTYLEDONEAE		
Araceae - Arum Family		
Anthurium spp.	Anthurium	Exotic
Monstera deliciosa Liebm.	Monstera	Exotic
Cupressaceae - Cypress Family		
Cupressus spp.	Cypress	Exotic
Gramineae		
Bambusa spp.	Bamboo	Exotic
Cenchrus echinatus L.	Sandbur 'Ume'alu	Exotic
Chloris inflata Link	Swollen fingergrass Mau'ulei	Exotic
Chloris radiata (L.) Sw.	Radiate fingergrass	Exotic
Cynodon dactylon (L.) Pers.	Bermuda grass Mānienie	Exotic
Eleusine indica (L.) Gaertn.	Wiregrass Mānienie-ali'i	Exotic
Panicum maximum Jacq.	Guinea grass	Exotic
Rhynchelytrum repens (Willd.) C.E. Hubb.	Natal redtop	Exotic
Saccharum officinarum L.	Sugar cane Kō	Exotic
Tricachne insularis (L.) Nees	Sourgrass	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Liliaceae - Lily Family		
Cordyline terminalis (L.) Kunth	Ti Kī	Exotic
Aloe spp.	Aloe	Exotic
Pleomele angustifolia (Roxb.) N.E. Br.	Dracaena	Exotic
Allium fistulosum L.	Green onion 'Aka'akai lau	Exotic
Musaceae - Banana Family		
Musa xparadisiaca L.	Banana	Exotic
Orchidaceae - Orchid Family		
Orchid spp.	Orchids	
Palmae - Palm Family		
Cocos nucifera L.	Coconut Niu	Exotic
Zingiberaceae - Ginger Family		
Phaeomeria speciosa (Bl.) Koord.	Torch ginger 'Awapuhi ko'oko'o	Exotic
DICOTYLEDONEAE		
Acanthaceae - Acanthus Family		
Asystasia gangetica (L.) T. Anders	Asystasia; Chinese violet	Exotic
Amaranthaceae - Amaranth Family		
Amaranthus spinosus L.	Spiny amaranth Pakai-kukū	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Anacardiaceae - Mango Family		
Mangifera indica L.	Mango Manakō	Exotic
Apocynaceae - Periwinkle Family		
Plumeria spp.	Plumeria Melia	Exotic
Araliaceae - Ginseng Family		
Brassaia actinophylla Endl.	Octopus tree	Exotic
Polyscias spp.	Panax	Exotic
Bignoniaceae - Bignonia Family		
Spathodea campanulata Beauv.	African tulip tree	Exotic
Caricaceae - Papaya Family		
Carica papaya L.	Papaya Mīkana	Exotic
Compositae - Sunflower Family		
Bidens pilosa var. *pilosa* L.	Beggar's tick Ko-oko'olau	Exotic
Emilia javanica (Burm.f.) C.B. Robins.	Red pua-lele	Exotic
Erechtites hieracifolia (L.) Raf.	Fireweed	Exotic
Convolvulaceae - Morning-glory Family		
Ipomoea batatas (L.) Poir.	Sweet potato 'Uala	Exotic
Cucurbitaceae - Gourd Family, Squash Family		
Cucurbita pepo L.	Field pumpkin Pala'ai	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Euphorbiaceae - Spurge Family		
Codiaeum variegatum (L.) Bl.	Croton	Exotic
Euphorbia hirta L.	Garden spurge Koko-kahiki	Exotic
Phyllanthus debilis Klein ex Willd.	Phyllanthus weed	Exotic
Guttiferae - Mangosteen Family		
Clusia rosea Jacq.	Copey Autograph tree	Exotic
Lauraceae - Laurel Family		
Persea americana Mill	Avocado	Exotic
Leguminosae		
Leucaena leucocephala (Lam.) de Wit	False koa Koa-haole	Exotic
Malvaceae - Mallow Family		
Hibiscus spp.	Hibiscus	
Malvastrum coromandelium (L.) Garcke	False mallow Hauuoi	Exotic
**Sida cordifolia* L.	Lei ilima 'Ilima	Indigenous
Meliaceae - Mahogany Family		
Swietenia mahogoni (L.) Jacq.	Mahogany	Exotic
Myrtaceae - Myrtle Family		
Psidium guajava L.	Guava Kuawa	Exotic
Nyctaginaceae - Four o'clock Family		
Bougainvillea spp.	Bougainvillea	Exotic

Scientific Name	Common Name Hawaiian Name	Status
Polygonaceae - Buckwheat Family		
Antigonon leptopus H. & A.	Mexican creeper	Exotic
Rubiaceae - Coffee Family		
Gardenia spp.	Gardenia	Exotic
Rutaceae - Rue Family		
Citrus spp.		Exotic
Murraya paniculata (L.) Jack	Mock orange Alahe'e-haole	Exotic
Solanaceae - Nightshade Family		
Capsicum annuum L.	Red pepper Nīoi	Exotic
Sterculiaceae - Cocoa Family		
**Waltheria americana* L.	Waltheria Hi'aloa; 'uhaloa	Indigenous

* Native species

APPENDIX D

LISTS OF DISEASES SOMETIMES TRANSMITTED BY VECTORS TO HUMANS

Diseases Potentially Transmitted by Murine Rodents

S	P	N	
		X	Echinostomiasis
	X		Septicemica
		X	Histoplasmosis
		X	Lymphocytic Choriomeningitis
X			Plague
	X		Rat-Bite Fever
	X		Rat-Mite Dermatitis
	X		Rat Tapeworm Infection
		X	Rocky Mountain Spotted Fever
		X	Salivary Gland Virus Infection
	X		Salmonellosis
		X	Schistosomiasis
		X	Bilharziasis
		X	Sporotrichosis
		X	Swine Erysipelas
X			Trichinosis
X			Eosinophilic Meningoencephalitis
X			Leptospirosis
		X	Relapsing Fever
		X	Tularemia
		X	Rickettsial Pox
X			Murine Typhus

Source: Robert W. Jones (1956). "The Public Health Significance of Rodents in California," California Vector News 3:7:32-34.

Diseases Potentially Transmitted by Flies

S	P	N	Known
		X	Typhoid
	X		Bacillary Dysentery
	X		Amebic Dysentery
	X		Diarrheas
		X	Asiatic Cholera
		X	Helminth Infections
	X		Myasisis
		X	Loiasis
		X	Onchocerciasis
		X	Ozzards Filariasis
		X	Leishmaniasis
		X	African Sleeping Sickness (Trypanosomiasis)
	X		Yaws
		X	Tularemia
	X		Bartonellosis
	X		Catarrhal Conjunctivitis
		X	Sandfly Fever
			Suspected
		X	Anthrax
	X		Salmonellosis
	X		Protozoal Infestations
		X	Trachoma
		X	Poliomyelitis
	X		Tuberculosis
		X	Hepatitis

Source: G.W. Hunter, W.W. Frye, and S.C. Swartzwelder (1960). A Manual of Tropical Medicine. W.B. Saunders Co.:Philadelphia.

Diseases Potentially Transmitted by Mosquitoes

S	P	N	
X			Dengue
	X		Encephalitis (St. Louis and Japanese B)
	X		Filariasis
		X	Malaria
X			Yellow Fever
		X	Tularemia
		X	Lymphocytic Choriomeningitis
		X	Melioidosis

Sources: G.W. Hunter, W.W. Frye, and S.C. Swartzwelder (1960). A Manual of Tropical Medicine. W.B. Saunders Co.: Philadelphia.

T.G. Hull (1963). Diseases Transmitted from Animals to Man. Charles C. Thomas: Springfield.

Diseases Potentially Transmitted by Cockroaches

S	P	N	
			Known
	X		Food Poisoning
	X		Dysentery
	X		Diarrhea
			Suspected
	X		Salmonellosis
	X		E. Coli Bacterial Infection

Sources: M.E. Rueger and T.A. Olson (1969). "Cockroaches as Vectors of Food Poisoning and Food Infection Organisms", Journal of Medical Entomology 6:185-89.

R.V. Cardone and J.J. Gauthier (1979). "How Long Will Salmonella Bacteria Survive in German Cockroach Intestines?" Pest Control Magazine 47:6:28-30.

Diseases Potentially Transmitted by Birds

S	P	N	
	X		Ornithosis
	X		Encephalitis
	X		Histoplasmosis
	X		Salmonellosis
	X		Toxoplasmosis
X			Bird Ectoparasite Dermatitis

Source: L.C. Truman, G.W. Bennett, and W.L. Butts (1976). Scientific Guide to Pest Control Operations. Harvest Publishing Co.: Purdue University.

Note: All vector-borne diseases are rated as to their significance as a public health concern in Hawaii. All diseases were ranked as follows:

S = Significant public health concern in Hawaii. Known cases of the disease have occurred here.

P = Possible public health concern in Hawaii. Either the vector species or pathogen exists here.

N = Not presently a public health concern in Hawaii. Neither the vector species nor pathogen exists here.

Rating provided by Mr. James Ikeda (1980) Entomologist, Vector Control Branch, Hawaii State Department of Health, except ratings on bird-transmitted diseases provided by Mr. Allen Y. Miyahira (1980), Extension Specialist in Veterinary Science, University of Hawaii.