MEMORANDUM FOR THE RECORD

From: Lenore Nåkama
Subject: Phone call from Rudy Tobler re: Wup No. 163

7/14/2003 Rudy Tobler (ph. [redacted]) called re: the interim status of Wup No. 163. The interim permit was issued on 1/21/97 with Standard Condition 17 stating that a final determination of the use quantity shall be made within 5 years of the filing of the application. Mr. Tobler inquired as to agency action since the 5 year timeframe has passed. I informed Mr. Tobler that the interim permit is still valid. The law requires a review of permitted uses at least once every 20 years, and we will be revisiting the permit when we do an aquifer-wide review. In the meantime, I advised Mr. Tobler to report water usage, as that will be one of the conditions of the permit that we will be reviewing.
GROUND WATER USE PERMIT
WUP NO. 163

PERMITTEE

Applicant/Water User
Address KALAELOA PARTNERS, L.P.

Landowner of Source
Address HAWAIIAN ELECTRIC CO., INC.

PERMITTED SOURCE INFORMATION

Island OAHU
Water Management Area EWA CAPROCK
Aquifer Sector EWA CAPROCK
Aquifer System EWA CAPROCK
System Sustainable Yield NA
Well Name KALAELOA 1 to 9
State Well No. 1805-04 to 12

PERMITTED USE INFORMATION

Reasonable beneficial use INDUSTRIAL
Withdrawal (12 month moving ave.) 3.168 mgd
Location of water use
TMK # 9-1-31;23
Address 91-111 KALAELOA BLVD.
State land use classification NA
County zoning classification NA

Pursuant to Hawaii's State Constitution, Article XI, Section 7, Hawaii Revised Statutes, Chapter 174C; Hawaii Administrative Rules, Chapters 13-167 through 13-171; and Hawaii decisional law and custom, the applicant is hereby authorized to use ground water from the sources and in the amount and from and upon the locations described above; subject however, to the requirements of law including but not limited to the following conditions:
1. The ground water described in the water use permit may only be taken from the location described, used for the reasonable-beneficial use described, and at the location described above and in the attachments. Reasonable-beneficial use means “the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is not wasteful and is both reasonable and consistent with the state and county land use plans and the public interest.” (HAR §13-171-2).

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HAR §13-171-13 which means that it:

   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in section §13-171-2;
   c. Will not interfere with any existing legal use of water;
   d. Is consistent with the public interest;
   e. Is consistent with state and county general plans and land use designations;
   f. Is consistent with county land use plans and policies; and
   g. Will not interfere with the rights of the Department of Hawaiian Home Lands as provided in section 221 of the Hawaiian Homes Commission Act and 174C-101(a), HRS.

4. The ground water use approved must not interfere with surface or ground water rights or reservations.

5. The ground water use approved must not interfere with interim or permanent instream flow standards. If it does, then:

   a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
   b. The interim or permanent instream flow standard, as applicable, must be amended.

6. The water use permit is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

7. The permit application and staff submittal approved by the Commission at its September 15, 1993 meeting are incorporated into the permit by reference.

8. Any modification of the permit terms, conditions, or uses can only be made with the express written consent of the Commission on Water Resource Management.

9. The water use permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:

   a. Protect water sources in quantity, quality, or both;
   b. Meet other legal obligations including other correlative rights;
   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June 1987, shall be protected;
   f. Meet legal obligations to the Department of Hawaiian Homes, if applicable; or
   g. Carry out such other necessary and proper exercise of the State's and the Commissions's police powers under law as may be required.

   Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

10. If the ground water source does not presently exist, the new well shall be completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

11. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a yearly basis in accordance with the Commission's September 16, 1992 action on reporting requirements;

12. The water use permit shall be subject to the Commission's periodic review of the applicable aquifer's sustainable yield. The amount of ground water use authorized by the permit may be reduced by the Commission if the sustainable yield of the Caprock Aquifer System, or relevant modified aquifer, is reduced;
13. The water use permit may not be transferred or the use rights granted by this permit sold or in any other way alienated. Pursuant to HAR §13-171-25 and the requirements of Chapter 174C, the Commission has the authority to allow the transfer of the permit and the use rights granted by the permit in a manner consistent with HAR §13-171-25. Any such transfer shall only occur with the Commission's prior express written approval. Any sale, assignment, lease, alienation, or other transfer of any interest in this permit shall be void.

14. The use(s) authorized by law and by the water use permit do not constitute ownership rights.

15. The permittee shall request modification of the permit when necessary to comply with all applicable laws, rules, and ordinances which will affect the permittee's water use.

16. The permittee shall prepare and submit a water shortage plan within 30 days of issuance of the permit to assist the Commission in fulfilling HAR §13-171-42(c). The permittee's water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the Ewa Caprock Ground Water Management Area.

17. The water use permit granted shall be an interim water use permit, pursuant to HAR §13-171-21. The final determination of the water use quantity shall be made within five years of the filing of the application to continue the existing use.

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed.

Applicant's Signature: ___________________________ Date: ______/____/______

Printed Name: Gayle M. Bayer

Firm or Title: Manager - Project Admin.

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment
Ms. Gayle Baker, Manager - Project Administration
Kalaeloa Partners, L.P.

Dear Ms. Baker:

Issuance of Water Use Permit for Well Nos. 1805-04 to 12
Ewa Caprock Ground Water Management Area, Oahu

We are transmitting a new water use permit for Kalaeloa 1 to 9 Wells (Well Nos. 1805-04 to 12) for use of 3.168 million gallons per day (mgd) of water on a 12-month moving average basis that was approved by the Commission on Water Resource Management (Commission) on September 15, 1993. This water use permit, which correctly identifies the landowner at the source is Hawaiian Electric Co., Inc., and not Hawaiian Refinery, Inc., supersedes the water use permit that was transmitted to you on January 21, 1997.

As part of the Commission’s approval, the following special conditions were added and are part of your permit under Standard Permit Condition 20:

Special Conditions

(NONE)

Enclosed with this letter of approval are the following:

1. Your water use permit
2. Your official monthly water use report forms

Please be sure to read the conditions of your approved permit. If you accept these terms, please sign and return one copy of this permit to the Commission and retain a copy for your record.

We draw your attention to Standard Condition 11 which requires you to keep a record of your monthly total pumpage, water level, salinity, and water temperature. This information must be submitted to the Commission on a regular yearly basis using the enclosed water use report form. You should make copies of the enclosed report form as needed.

Because your industrial use requires salt water underlying the Ewa Caprock Aquifer, and not fresh or brackish groundwater (chlorides \( \geq \) 1000 ppm), we are administratively waiving the requirement for a water shortage plan under Standard Condition 16.

If you have any questions, please call Rae M. Loui, Deputy Director, at [redacted].

Aloha,

Michael D. Wilson
Chairperson

Attachments
**GROUND WATER USE PERMIT**

**WUP NO. 163**

**PERMITTEE**

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<thead>
<tr>
<th>Applicant/Water User</th>
<th>Landowner of Source</th>
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**PERMITTED SOURCE INFORMATION**

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**PERMITTED USE INFORMATION**

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<td>Location of water use</td>
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<td>9-1-31:23</td>
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<td>Address</td>
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<tr>
<td>State land use classification</td>
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<td>County zoning classification</td>
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Pursuant to Hawaii's State Constitution, Article XI, Section 7, Hawaii Revised Statutes, Chapter 174C; Hawaii Administrative Rules, Chapters 13-167 through 13-171; and Hawaii decisional law and custom, the applicant is hereby authorized to use ground water from the sources and in the amount and from and upon the locations described above; subject however, to the requirements of law including but not limited to the following conditions:
1. The ground water described in the water use permit may only be taken from the location described, used for the reasonable-beneficial use described, and at the location described above and in the attachments. Reasonable-beneficial use means "the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is not wasteful and is both reasonable and consistent with the state and county land use plans and the public interest." (HAR §13-171-2).

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HAR §13-171-13 which means that it:
   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in section §13-171-2;
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   f. Is consistent with county land use plans and policies; and
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4. The ground water use approved must not interfere with surface or ground water rights or reservations.

5. The ground water use approved must not interfere with interim or permanent instream flow standards. If it does, then:
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6. The water use permit is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

7. The permit application and staff submittal approved by the Commission at its September 15, 1993 meeting are incorporated into the permit by reference.

8. Any modification of the permit terms, conditions, or uses can only be made with the express written consent of the Commission on Water Resource Management.

9. The water use permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
   a. Protect water sources in quantity, quality, or both;
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   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June 1987, shall be protected;
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   Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

10. If the ground water source does not presently exist, the new well shall be completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

11. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a yearly basis in accordance with the Commission's September 16, 1992 action on reporting requirements;

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I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed.

Applicant's Signature: ___________________________ Date: _______________________

Printed Name: ___________________________ Firm or Title: ___________________________

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

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As part of the Commission’s approval, the following special conditions were added and are part of your permit under Standard Permit Condition 20:

Special Conditions

(NONE)

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Chairperson

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GROUND WATER USE PERMIT
WUP NO. 163

PERMITTEE

Applicant/Water User
Address: KALELOA PARTNERS, L.P.

Landowner of Source
Address: HAWAI REFINERY, INC.

PERMITTED SOURCE INFORMATION

Island: OAHU
Water Management Area: EWA CAPROCK
Aquifer Sector: EWA CAPROCK
Aquifer System: EWA CAPROCK
System Sustainable Yield: NA
Well Name: KALELOA 1 to 9
State Well No.: 1805-04 to 12

PERMITTED USE INFORMATION

Reasonable beneficial use: INDUSTRIAL
Withdrawal (12 month moving ave.): 3.168 mgd

Location of water use
   TMK #: 9-1-31:23
   Address: 91-111 KALELOA BLVD.
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MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed.

Applicant’s Signature: ___________________ Date: ___________________

Printed Name: ___________________________ Firm or Title: ___________________________

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment
CHECKLIST

--- WELL CONSTRUCTION PERMIT ---

WELL NAME or LOCATION: Kalaekoa Cogeneration Plant
ISLAND: Oahu

WELL NUMBER: 3-1805-046-09
Tax Map Key: 9-1-31:23

OWNER/OPERATOR:
Firm Name: Kalaekoa Cogeneration Plant
Contact Person: William S. Nagasawa

LANDOWNER:
Firm Name: Hawaiian Independent Refinery, Inc.
Contact Person: Faye Curren

Date application received: 7-5-90
Date acknowledged receipt/request more info: 7-13-90
Date application accepted: 
Suspense date (90 days): 
Date filing fee deposited: 

Application sent to following:

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Date agenda due: 
Date submittal due: 
Date submittal sent to applicant: 

Date application approved or disapproved: 9-19-90

Date applicant notified of decision: 10-02-90

REMARKS:

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________
**CHECKLIST for WATER USE PERMITS**

**SOURCE NAME or LOCATION:** Kalaheo Cogeneration Plant

**WELL NUMBER:** 1805-04 to 09

**OWNER or OPERATOR:** Kalaheo Partners, L.P. c/o Energy Ventures, Inc.

**TELEPHONE (contact person):** William J. Snarponis

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**Suspense date for objections** 7 MAR 90

**Date of hearing, if any**

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**Date application approved or disapproved** 4-18-90

**Date applicant notified of decision**

**REMARKS:**

| Remarks | |
|---------| |

| Remarks | |
|---------| |
Facsimile Transmittal Page

Please deliver the following pages to:

Name: Sail Baker
Company: Kilaeua Partners, L.P.
From: Neal Fujii
Date: Aug 10, 1993  Time: 14:45

Message: Here is the water use permit and water use report form.
Please send us your water use record history for the wells listed.
Along with this, please send us any additional water quality information you have for the wells.
If you have questions, please contact Neal Fujii at 587-0264.

Total number of pages (including Transmittal Page): 5

If you do not receive all of the pages legibly, please call back: (808) 587-0264

Sending Facsimile Number: [Redacted]

Transmission Report

This document (reduced sample above) was sent

** Count **
# 5

** Send ***

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Total 0:03'29" 5 Xerox Telexcopier 7020
FACSIMILE TRANSMITTAL PAGE

Please deliver the following pages to:

Name: ____________________________
Company: Kalaeloa Partners, L.P.
From: Neal Fujii
Date: Aug 10, 1993  Time: 14:45

Message: Here is the water use permit and water use report form. Please send us your water use record history for the wells listed. Along with this, please send us any additional water quality information you have for the wells.
If you have questions, please contact Neal Fujii at [redacted]

Total number of pages (including Transmittal Page): 5

* * * * * * * *

If you do not receive all of the pages legibly, please call back: [redacted]
Sending Facsimile Number: [redacted]
### MONTHLY GROUND WATER USE REPORT FOR

**KALAELOA PARTNERS, L.P.**  
C/O ENERGY VENTURES, INC.  
104 CARNEGIE CTR., STE 201  
PRINCETON, NJ 08540

Month of __________, 19__

Date Measurement(s) Taken  
( Month / Day / Year )

---

**INSTRUCTIONS:** Please TYPE or PRINT CLEARLY. Complete this form to report total monthly ground water use, and, if required, other information from each of your well sources. Mail to: Commission on Water Resource Management, P.O. Box 621, Honolulu HI 96809. For assistance, please call 587-0265 (Oahu only) or 1-800-468-4644 (neighbor islands).

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[Other comments or additional information:]

Submitted by (print) ___________________________________________  
Signature ___________________________________________________

When possible, please return two (2) completed copies of this form to the address above.
ITEM 3  KALELOA PARTNERS, L.P. APPLICATION FOR A WATER USE PERMIT. CAMPBELL INDUSTRIAL PARK, OAHU

Mr. Sakoda made a correction to the submittal, under proposed water use the fifth well will be for "standby use".

Referring to Campbell Estates' testimony submitted by Mr. Samuel Keala (copies distributed to Commission), Mr. Cox asked if the wells are into salt water or if they were brackish. Mr. Sakoda replied the water is brackish at about 3000 ppm but it's not pure salt water. He explained that the applicant had factored into their calculations that the water will get saltier with time.

Dr. Chun said the Commission could not prohibit as a condition one party from raising objections, they can raise the objections and the Commission will determine how to deal with it.

Mr. Cox agreed with Dr. Chun, but suggested that the applicant be made aware that the quality of the water will be saltier.

Mr. John Ward of Harding Lawson and Assoc., representing the applicant, stated they did the testing and prepared the technical documents for the application of the permit. They were aware of the water quality and that was part of the test — water quality at various depths, the longevity of the resource, and effects it may have on plant operations. The design of the plant and withdrawal wells were made to take into consideration that the caprock aquifer contained brackish water and that the resource may not be there in a few years. Although they are using brackish water, the plant is designed to handle any salinity up to seawater concentration and will cause no problem when the salinity level goes up.

Dr. Chun asked why seawater is not being used now if it's been designed to handle it.

Mr. Ward replied it's a short-term benefit to use the brackish water now, they do not have to run the water through the cooling system and the pumpage will be less if they use less saline water. The wells and the pumps would be turned up to accommodate the greater need for water when it becomes more saline.

In reply to Dr. Chun's question on what would happen to the water source if these wells do not go in, Mr. Sakoda replied it would still deteriorate with the other uses in that area, it's just a matter of time.

Mr. Walter Yoshimitsu of Campbell Estate gave their reasons for the testimony that was distributed to the Commission. When they had looked at the application and looked at the depth at which Kalaeeolua Partners were going to take water they were under the impression that the applicant was relying on a certain quality of water that might be sustainable. They have other projects within Campbell Industrial Park that draw water from the same caprock and they know from the Mink report that the water quality is going to deteriorate and do not want their future projects to be stopped because the water quality had deteriorated. Mr. Ward's statement that the plant is designed to take salt water has answered their concerns and they no longer have any objections to the project.

Unanimously approved (Nakata/Cox).
Chairperson and Members  
Commission on Water Resource Management  
State of Hawaii  
Honolulu, Hawaii  

Gentlemen:

Kalaeloa Partners, L.P.  
Application for a Water Use Permit  
Campbell Industrial Park, Oahu

Applicant:  
Kalaeloa Partners, L.P.  
c/o Energy Ventures, Inc.

Landowner:  
Hawaiian Independent Refinery, Inc.

Action Requested:  Approval of a water use permit to use 3.168 million gallons per day (mgd) for industrial use.


Project Location: The project site and wells are at Campbell Industrial Park, near the corner of Kalaeloa Blvd and Olai Street, Barbers Point, Oahu. The project area is about 2,500 feet east of the AES Barbers Point Cogeneration Plant and the H-POWER Plant.

Proposed Water Use: The proposed Kalaeloa Cogeneration Power Plant will utilize salt water from the caprock aquifer for plant cooling requirements. Four wells, each pumping at a nominal rate of about 330 gpm, will satisfy normal plant cooling requirements of 1,330 gpm. A fifth well will be for standby use; and a sixth well will be used for emergency bypass cooling at 870 gpm, bringing the peak system capacity to about 2,200 gpm (3.168 mgd).

Water Availability and Impact on Surrounding Wells: The Kalaeloa Project, the AES Project, and the H-POWER Project will draw water from the same aquifer. Data from test wells indicate that the use from the projects will not interfere with each other. The H-POWER Project has a water use permit for 2.26 mgd and the AES Project has a water use permit for 13 mgd.

Public Notice: In accordance with DLNR Administrative Rules, a public notice was published in the Star Bulletin on February 14 and 21, 1990. In addition, copies of the public notice were sent to the Mayor's office, the Department of Health, the Honolulu BWS, the H-POWER Project, the AES Project, Oahu Sugar Company, and to The Estate of James Campbell. Written objections to the proposed permit were to be submitted to the Commission by March 7, 1990. Campbell Estate expressed concerns about the long-term quality of the caprock water but did not object to the quantity of water requested. No objections have been filed.
Chairperson and Members
Commission on Water Resource Management

April 18, 1990

RECOMMENDATION:

That the Commission approve the issuance of a water use permit to Kalaeloa Partners, L.P. to use 3.168 mgd of salt water for industrial use from Well Nos. 1805-04 to 09, subject to the following conditions:

General Conditions:

(1) the water use authorized by the permit must be for the reasonable-beneficial use described in the permit;

(2) the use must not interfere with any existing legal uses of water;

(3) modification of any permit condition must be approved by the Commission; and

(4) the applicant must comply with all other applicable laws, rules, and ordinances.

Additional Conditions:

(1) Approved flowmeters must be installed to measure withdrawals and a record of the withdrawals must be kept and reported;

(2) The development of the ground water source shall be completed within 24 months from the date of permit issuance.

Respectfully submitted,

MANABU TAGOMORI
Deputy Director

APPROVAL FOR SUBMITTAL:

WILLIAM W. PATY, Chairperson
Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Gentlemen:

I am pleased to inform you that the Commission on Water Resource Management approved your application for a water use permit for the Kalaeloa Cogeneration Power Plant Wells (Well Nos. 1805-04 to 09) at its meeting on April 18, 1990.

The permit is being prepared and will be sent to the Attorney General for review prior to being issued.

If you have any questions, please call Manabu Tagomori at [redacted].

Very truly yours,

WILLIAM W. PATY

cc: Harding Lawson Associates
Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Gentlemen:

The Commission on Water Resource Management will be acting on your water use permit application for the Kalaeloa Cogeneration Power Plant at its regular meeting on Wednesday, April 18, 1990, at 2:00 p.m.

Your application will be included on the agenda as Item 3 (enclosed).

You or your representative are invited to attend the meeting.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:fc
Encl.
cc: Harding Lawson Associates
March 13, 1990

Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Gentlemen:

We have received a letter from The Estate of James Campbell regarding your pending application for a Water Use Permit for the Kalaeloa Cogeneration Plant. They do not have any objections to the quantity of water requested but have some concerns about the quality of the water.

We enclose a copy of the letter for your information.

If you have any questions please contact Ed Sakoda at [redacted].

Sincerely,

[Signature]
MANABU TAGOMORI
Deputy Director

encl.

cc: Harding - Lawson Associates
Spoke w/Sah R. on 3/20/90 - they are not objecting - just relating some concerns. Ed
March 6, 1990

Mr. William W. Paty, Chairperson
Commission on Water Resource Management
State of Hawaii

Dear Mr. Paty:

An application to use approximately 3.168 million gallons of water per day from the caprock aquifer in the Campbell Industrial Park (TMK: 9-1-31:23) was submitted by Kalaeloa Partners. The Campbell Estate owns much of the surrounding land, and we plan to use a large quantity of water from the same aquifer.

Although we do not have any objection to the quantity of water requested, we do have some concerns about the sustained quality of the caprock water. The salinity of the water will increase as the quantity drawn from the aquifer increases. If Kalaeloa Partners is relying on a sustained quality of water equivalent to what tests show at this time, they will have a problem because of the other projects being planned for the area.

The Campbell Estate does not want to be precluded from drawing water from the caprock because it might affect the salinity of the water being used by Kalaeloa Partners. John Mink's report stated that the salinity of the water cannot be controlled, and we concur. Since the Campbell Estate is aware of the problem, any development we are involved with requiring caprock water will assume that salinity will approximate sea water.

Thank you for allowing us to comment on the application.

Very truly yours,

Samuel L. Keala, Jr.
Manager, Engineering

Samuel L. Keala, Jr.
Manager, Engineering

Suite 500, 828 Fort Street Mall, Honolulu, Hawaii 96813-4380 (808) 536-1961
Mr. William W. Paty, Chairperson  
Commission on Water Resource Management  
State of Hawaii

Dear Mr. Paty:

An application to use approximately 3.168 million gallons of water per day from the caprock aquifer in the Campbell Industrial Park (TMK: 9-1-31:23) was submitted by Kalaeloa Partners. The Campbell Estate owns much of the surrounding land, and we plan to use a large quantity of water from the same aquifer.

Although we do not have any objection to the quantity of water requested, we do have some concerns about the sustained quality of the caprock water. The salinity of the water will increase as the quantity drawn from the aquifer increases. If Kalaeloa Partners is relying on a sustained quality of water equivalent to what tests show at this time, they will have a problem because of the other projects being planned for the area.

The Campbell Estate does not want to be precluded from drawing water from the caprock because it might affect the salinity of the water being used by Kalaeloa Partners. John Mink's report stated that the salinity of the water cannot be controlled, and we concur. Since the Campbell Estate is aware of the problem, any development we are involved with requiring caprock water will assume that salinity will approximate sea water.

Thank you for allowing us to comment on the application.

Very truly yours,

Samuel L. Keala, Jr.
Manager, Engineering

cg:55001
Dr. John C. Lewin  
Director of Health  
Department of Health

Dear Dr. Lewin:

Public Notice for Water Use Permit Application  
Kualoa Cogeneration Plant  
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7, 1990.

Very truly yours,

WILLIAM W. PATY

Enc.
Honorable Frank F. Fasi
Mayor, City and County of Honolulu
City Hall
Honolulu, Hawaii

Dear Mayor Fasi:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7, 1990.

Very truly yours,

WILLIAM W. PATY

Enc.
PUBLIC NOTICE

Application for a Water Use Permit
Pearl Harbor Water Management Area, Oahu

An application for a water use permit has been received and is hereby made public in accordance with Chapter 13-171, Hawaii Administrative Rules, "Designation and Regulation of Water Management Areas".

Applicant: Kaeloal Partners, L.P.
c/o Energy Ventures, Inc.

Date Application Received: January 24, 1990

Source of Water Supply: Caprock (salt water) aquifer, Pearl Harbor WMA

Location of Well: Kaeloal Cogeneration Plant at Tax Map Key: 9-1-31:23

Quantity Requested: 3.168 million gallons per day

Proposed Water Use: Cooling water for the plant

Place of Water Use: Kaeloal Blvd. and Olai Street, at Campbell Industrial Park, Honolulu, Ewa, Oahu

Written objections or other comments on the application for water use may be filed by any person who has a property interest in any land within the hydrologic unit of the source of water supply or who will be directly and immediately affected by the proposed water use. Written objections shall: (1) state the property or other interest in the matter; (2) set forth questions of procedure, fact, law, or policy to which objections are taken; and (3) state all grounds for objections to the proposed permit. Send written comments by March 7, 1990 to the Division of Water and Land Development, State of Hawaii Commission on Water Resource Management

/s/ WILLIAM W. PATY

WILLIAM W. PATY, Chairperson

Dated: FEB 2 1990

Publish in the Honolulu Star-Bulletin, issues of February 14 and 21, 1990
February 20, 1990

AES Barbers Point, Inc.

Gentlemen:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7, 1990.

Sincerely,

MANABU TAGUCHI
Deputy Director

ES:ko
Enc.
February 20, 1990

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu

Dear Mr. Hayashida:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
        Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7, 1990.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
February 20, 1990

Harding Lawson Associates
Pearl City Business Plaza

Gentlemen:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources
Administrative Rules, Section 13-171-17(a), we are sending you a public
notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7,
1990.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
February 26, 1990

Mr. William D. Balfour, Jr.
President and Manager
Oahu Sugar Company, Ltd.

Dear Mr. Balfour:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources
Administrative Rules, Section 13-171-17(a), we are sending you a public
notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7,
1990.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
February 20, 1990

Mr. Clinton Churchill
Chief Executive Officer
The Estate of James Campbell
Honolulu, Hawaii

Dear Mr. Churchill:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7, 1990.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
February 20, 1990

Mr. A.A. Tuzes
Project Director
Honolulu Resource Recovery Venture

Dear Mr. Tuzes:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice which was published in the Star Bulletin.

If you have any comments, please submit them to us by March 7, 1990.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
February 20, 1990

Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Gentlemen:

Public Notice for Water Use Permit Application
Kalaeloa Cogeneration Plant
Pearl Harbor Water Management Area, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a public notice concerning your application which was published in the Star Bulletin.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
PUBLIC NOTICE

Application for a Water Use Permit
Pearl Harbor Water Management Area, Oahu

An application for a water use permit has been received and is hereby made public in accordance with Chapter 13-171, Hawaii Administrative Rules, "Designation and Regulation of Water Management Areas".

Applicant: Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Date Application Received: January 24, 1990

Source of Water Supply: Caprock (salt water) aquifer, Pearl Harbor WMA

Location of Well: Kalaeloa Cogneration Plant at Tax Map Key: 9-1-31:23

Quantity Requested: 3.168 million gallons per day

Proposed Water Use: Cooling water for the plant

Place of Water Use: Kalaeloa Blvd. and Olai Street, at Campbell Industrial Park, Honolulu, Ewa, Oahu

Written objections or other comments on the application for water use may be filed by any person who has a property interest in any land within the hydrologic unit of the source of water supply or who will be directly and immediately affected by the proposed water use. Written objections shall: (1) state the property or other interest in the matter; (2) set forth questions of procedure, fact, law, or policy to which objections are taken; and (3) state all grounds for objections to the proposed permit. Send written comments by March 7, 1990 to the Division of Water and Land Development, P.O.

State of Hawaii
Commission on Water Resource Management

/s/ WILLIAM W. PATY

WILLIAM W. PATY, Chairperson

Dated: FEB 2 1990

Publish in the Honolulu Star-Bulletin, issues of February 14 and 21, 1990
PUBLIC NOTICE

Application for a Water Use Permit
Pearl Harbor Water Management Area, Oahu

An application for a water use permit has been received and is hereby made public in accordance with Hawaii Administrative Rules, Chapter 13-171, "Designation and Regulation of Water Management Areas".

Applicant: Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Date Application Received: January 24, 1990

Source of Water Supply: Caprock (salt water) aquifer, Pearl Harbor WMA

Location of Well: Kalaeloa Cogeneration Plant at Tax Map Key: 9-1-31:23

Quantity Requested: 3.168 million gallons per day

Proposed Water Use: Cooling water for the plant

Place of Water Use: Kalaeloa Blvd. and Oail Street, at Campbell Industrial Park, Honolulu, Ewa, Oahu

Written objections or other comments on the application for water use may be filed by any person who has a property interest in any land within the hydrologic unit of the source of water supply or who will be directly and immediately affected by the proposed water use. Written objections shall: (1) state the property or other interest in the matter; (2) set forth questions of procedure, fact, law, or policy to which objections are taken; and (3) state all grounds for objections to the proposed permit. Send written comments by March 7, 1990 to the Division of Water and Land Development, State of Hawaii, Commission on Water Resource Management.

/s/ WILLIAM W. PATY

WILLIAM W. PATY, Chairperson

Dated: FEB 2 1990

Publish in the Honolulu Star-Bulletin, issues of February 14 and 21, 1990
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February 5, 1990

Kalaeloa Partners, L.P.
c/o Energy Ventures, Inc.

Gentlemen:

We have received your application and $25.00 filing fee for a water use permit for cooling water from six wells (Well Nos. 1805-04 to 09 for the Kalaeloa Cogeneration Plant.

We are reviewing your application for completeness and will contact you if we need further information.

If you have any questions, please contact Ed Sakoda at

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
cc: Harding Lawson Associates
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</tr>
<tr>
<td>T. Nakama</td>
<td></td>
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</tbody>
</table>
PAY $25.00 TO THE ORDER OF Department of Land and Natural Resources

<table>
<thead>
<tr>
<th>DATE</th>
<th>NO.</th>
<th>DESCRIPTION</th>
<th>AMOUNT</th>
</tr>
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<tr>
<td>1-23-90</td>
<td>220000</td>
<td>Job #19032,001.06 Per #23842</td>
<td>25.00</td>
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</tbody>
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*Water Use Permit Application
KALAELOA COGENERATION POWER PLANT
January 24, 1990

19032,001.06
0324MI

State of Hawaii
Department of Land and
Natural Resources
Division of Water and
Land Development

Honolulu, Hawaii

Attention: Mr. Ed Sakoda

Gentlemen:

Application for Water Use Permit
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park

Enclosed are a $25 filing fee and an application for Water Use Permit for withdrawal of ground water for cooling use at the Kalaeloa Cogeneration Power Plant. A report documenting results of water-supply development and testing is also enclosed for your evaluation of the application.

Please call if you have any questions or require additional information or documentation.

Very truly yours,

HARDING LAWSON ASSOCIATES

John J. Ward
Associate Hydrogeologist

JJW/rmc
Enclosures: Application for Water Use Permit
Filing Fee ($25)
Report: Results of Aquifer Testing
Production Well PW-1
Kalaeloa Cogeneration Plant
Campbell Industrial Park
Ewa Beach, Oahu, Hawaii
(January 12, 1990)

cc w/application;
w/o enclosures: Kalaeloa Partners, L.P./Mr. William J. Snarponis
ABB Energy Services, Inc./Mr. H.C. Hauck
ABB Energy Services, Inc./Mr. J. Harrelson
Belt Collins & Associates/Mr. John Goody
application for water use permit

Groundwater or Surface Water

INSTRUCTIONS: Please print or type and send completed application to the Division of Water Resource Management, P.O. Box 373, Honolulu, Hawaii 96802. Application must be accompanied by a non-refundable filing fee of $35.00 payable to the Department of Land and Natural Resources. (Filing fee waives for government agencies.) If necessary, phone 548-7543, Hydrology/Geology Section for assistance.

1. WATER MANAGEMENT AREA
   Pearl Harbor Water Management Area, Oahu

2. (a) WELL/DIVERSION OWNER:
   Firm Name: Kalaeloa Partners, L.P.
   Contact Person: Mr. William J. Snarponis
   Address: c/o Energy Ventures, Inc.

   (b) LANDOWNER:
   Firm Name: Hawaiian Independent Refinery, Inc.
   Contact Person: Faye Curren
   Address: Hawaiian Independent Refinery, Inc.

3. SOURCE TYPE:
   [ ] Spring
   [ ] Dike-confined
   [ ] Stream
   [ ] Perched
   [ ] Basal
   [ ] Caprock

4. SOURCE NAME AND NUMBER
   State Well Nos.: 1805-11 through 1805-16
   (well or stream diversion name/number)

5. SOURCE LOCATION:
   Island: Oahu
   Tax Map Key: 9-1-31:23
   Address: [Attach a USGS map (scale 1"=2000') and property tax map showing source location referenced to established property boundaries.]

6. LOCATION OF PROPOSED WATER USE (if different from #5)
   See Attached Plate
   (Indicate location of water use on same map showing source location.)

7. QUANTITY OF WATER REQUESTED
   3.168 x 10^6 gallons per day

8. QUALITY OF WATER REQUESTED
   [ ] Fresh
   [ ] Brackish
   [ ] Saline
   [ ] Potable
   [ ] Non-Potable

9. PROPOSED USE
   [ ] Municipal (including hotels, stores, etc)
   [ ] Military
   [ ] Domestic (individual, noncommercial water sys.)
   [ ] Industrial
   [ ] Irrigation (specify)
   [ ] Other (specify)

10. DESCRIBE ANY POTENTIAL RESTRICTIONS ON USE (i.e., instream standards, seasonal variations)
    None

11. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION
    Continuous (24 hrs/day)

12. PROPOSED METHOD OF TAKING THE WATER
    [ ] Artesian Flow
    [ ] Diverted Flow
    [ ] Centrifugal Pump
    [ ] Submersible Pump
    [ ] Vertical Turbine Pump

13. NO. OF RESIDENTIAL OR COMMERCIAL UNITS TO BE SERVED (specify)
    None

14. TOTAL ACRES PROPOSED FOR IRRIGATION
    None

15. REMARKS, EXPLANATIONS
    See Attached Results of Drilling and Testing
    (If more space is needed, continue on back side)

For Official Use Only:

Date Received

Date Accepted

Date

Hydrologic Unit

Diversion Works No.

State Well No.
PRESENT LANDOWNER: Hawaiian Independent Refinery, Inc. (HIRI) leased to Kalaeloa Partners, L.P. Land on which power plant and supply wells are located is on contract for sale to Honolulu Electric Company (HECO).
WATER USE PERMIT NO. 163

This report has been prepared in accordance with 13-171-22(b) of the Hawaii Revised Statutes requiring a 20-year review of issued water use permits to determine permit compliance. Following is a summary of permit information, site characteristics, methodology, findings, and recommendations for this State permit file.

Permit Information

<table>
<thead>
<tr>
<th>Water User</th>
<th>Kalaeloa Partners, L.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landowner of Source</td>
<td>Hawaiian Electric Company</td>
</tr>
<tr>
<td>Permitted Withdrawal Rate</td>
<td>3.168 mgd (Based upon a 12-month moving average)</td>
</tr>
<tr>
<td>Water Management Area</td>
<td>Malakole</td>
</tr>
<tr>
<td>Island</td>
<td>Oahu</td>
</tr>
<tr>
<td>Aquifer Sector/System</td>
<td>Ewa Caprock/Malakole</td>
</tr>
<tr>
<td>System Sustainable Yield</td>
<td>1000 mg/L</td>
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<tr>
<td>Water Type</td>
<td>Brackish, Non-Potable</td>
</tr>
<tr>
<td>Original CWRM Date</td>
<td>April 18th, 1990</td>
</tr>
<tr>
<td>Standard Conditions</td>
<td>1-11, 13-14, 16, 20-22</td>
</tr>
<tr>
<td>Special Conditions</td>
<td>None</td>
</tr>
</tbody>
</table>

Water Source

| State Well Number(s): | 1805-04 thru 1805-12 |
| Well Name:            | Kalaeloa 1-9 |
| Water Source TMK Number(s): | 1st Division, 9-1-031:023 |
| State Land Use Classification(s): | Urban |
| County Zoning Classification(s): | I-2 |
| Geographical Coordinates: | |
| State Well No. 1805-04 (Well 1): | Latitude 21° 18' 08.0" North  
                             Longitude 158° 05' 48.0" West |
| State Well No. 1805-07 (Well 2): | Latitude 21° 18' 09.0" North  
                             Longitude 158° 05' 47.0" West |
| State Well No. 1805-05 (Well 3): | Latitude 21° 18' 09.0" North  
                             Longitude 158° 05' 46.0" West |
State Well No. 1805-08 (Well 4): Latitude 21° 18' 09.0" North
Longitude 158° 05' 45.0" West

State Well No. 1805-06 (Well 5): Latitude 21° 18' 09.0" North
Longitude 158° 05' 44.0" West

State Well No. 1805-09 (Well 6): Latitude 21° 18' 09.0" North
Longitude 158° 05' 43.0" West

State Well No. 1805-10 (Well 7): Latitude 21° 18' 05.0" North
Longitude 158° 05' 50.0" West

State Well No. 1805-11 (Well 8): Latitude 21° 18' 06.0" North
Longitude 158° 05' 50.0" West

State Well No. 1805-12 (Well 9): Latitude 21° 18' 06.0" North
Longitude 158° 05' 49.0" West

End Use

End Use TMK Number(s): 1st Division, 9-1-031:023
State Land Use Classification(s): Urban
County Zoning Classification(s): I-2
Beneficial Use Explanation: Use for cogeneration plant cooling tower and
emergency backup supply

Background Information

The original water use permit governing the nine aforementioned wells previously listed was
issued in 1990. In January of 1997, the permit was re-issued to correct an incorrect address listed
in the original permit. There are a total of nine wells at this project site that draw brackish water
for use in the cogeneration plant’s cooling tower. The permittee is allocated 3.168 mgd
collectively from the nine wells. Consistent water use reporting records are available for the past
four years. The permittee’s 12-month moving average has not exceeded the permitted amount of
3.168 mgd since that time. There are no salinity records on file for the well battery. Reference
the permit file for additional information on reporting history.

Although the land for Water Use Permit 163 is owned by HECO, Kalaeloa Partners and Alstom
Power, which are the entities that run the power plant, are separate organizations and are not
affiliated with HECO.

Water Use Permit 163 was approved during the April 18th, 1990 Commission on Water Resource
Management meeting. This water source has been in use for approximately 18 years with
Kalaeloa Partners being the only known permittee during this period. Standard conditions 1-11,
13-14, 16, & 20-22 are the governing conditions for this water use permit. A complete list of all standard and special conditions is given in the permit file.

**Field Investigation Information**

<table>
<thead>
<tr>
<th>Contact</th>
<th>Michael Rossio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Address:</td>
<td></td>
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</tbody>
</table>

Brown and Caldwell conducted a field investigation on January 15th, 2008 from 12:00 p.m. until 2:00 p.m. with Mr. Michael Rossio. During this time, type of water usage was verified, GPS coordinates of well head(s) were recorded, flow meter installation and functionality were documented, and property TMK information was verified. The wellhead, its related appurtenances, and water usage area were visually inspected to assess compliance with permit conditions. Visual inspection of water loss/waste was limited to outdoor areas within the usage boundary. The physical location of the site is at the Kalaeloa Cogeneration Plant, which is approximately ¼-mile before the end of Kalaeloa Rd. on the left hand side. Reference the TMK and GIS maps in the permit file for a visual representation of the project site.

**Summary of Findings for Water Use Permit No. 163**

There are a total of nine wells located on the Kalaeloa Cogeneration Plant property (TMK 9-1-031:023) with the GPS coordinates listed in the ‘Water Source’ section of this report. All have real time accuracies in the range of ±10-15 feet.

Water is currently being drawn from State Well Nos. 1805-04 thru 1805-05 and 1805-07 thru 1805-09 (Wells 1-4 & 6). State Well No. 1805-06 (Well 5) is not currently in use and is simply capped with two pieces of wood (Figure 5). The permittee has advised that this well is being serviced and that it is planned to be back online in the future. Until that time comes, the permittee plans to replace the wood cap with a more water tight solution as to avoid contamination to the well from outside elements. State Wells 1805-10 thru 1805-12 (Wells 7-9) are not in use but are available for emergency backup purposes and/or to replace some of the Honouliuli Treatment plant reuse water the cogeneration plant currently utilizes on the premises. Wells 1805-10 and 1805-11 (Wells 7-8) are capped with circular wooden stops. Well 1805-12 (Well 9) is capped with a 5-gallon plastic bucket (Figure 9). The permittee has advised that this well will be covered with a PVC cap in the near future.

The five wells that are currently operational supply the cooling towers with a continual supply of brackish water in the range of 800-1000 gallons per minute. Water is sent via underground
piping, metered, and then pumped into the cooling tower system. Reference the Appendix for photographs of the system components and water usage area.

The following are a list of standard condition(s) that the permittee is found to be in non-compliance with:

(10) An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a yearly basis in accordance with the Commission's September 16, 1992 action on reporting requirements.

Since no salinity records are being submitted for this well battery, the permittee is found to be in violation of Standard Condition (10).

Based upon visual inspection of the system, all components appear to be in full working order. The permittee demonstrated functionality of an installed flow meter and provided access to the site grounds where no wasting of water or water loss was observed. Visual inspection also confirmed that water use was within the permitted TMK boundaries. Water use is currently being reported on a monthly basis with no recent evidence of overpumpage violations. However, since salinity records are not being submitted, full permit compliance has not been achieved.

Recommendations

- Address the following discrepancies between the Commission’s electronic database and actual field investigation findings:
  - Change permittee contact to Michael Rossio at [number](x225)
  - State land use and county zoning classifications
- Address violation of Standard Condition (10) regarding lack of reporting of salinity levels.
20-Year Water Use Permit Review
Water Use Permit No. 163

APPENDIX

Field Investigation Photographs
Figure 1 – State Well No. 1805-04 (Well 1)

Figure 2 – State Well No. 1805-07 (Well 2)
Figure 3 – State Well No. 1805-05 (Well 3)

Figure 4 – State Well No. 1805-08 (Well 4)
Figure 5 – State Well No. 1805-09 (Well 5)

Figure 6 – State Well No. 1805-09 (Well 6)
Figure 7 – State Well No. 1805-10 (Well 7)

Figure 8 – State Well No. 1805-11 (Well 8)
Figure 9 – State Well No. 1805-12 (Well 9)

Figure 10 – Operational Flow Meter
Figure 11 – Water Use for Cooling Towers
**Water Use Permit Survey**

(Please complete one survey form for each WUP)

**WUP Number:** 163  
**Well Number(s):** 1805 - 04 to 12  
**RECEIVED**  
BROWN & CALDWELL  
HONOLULU  
Nov. 27 2007

**Contact Information** (of the person who will be present at site visit):

- **Name:** Michael Rosso
- **Phone (for phone interview):**
- **Best time to reach for phone interview:** Weekday afternoons

**Property Information** (of the water use/well location):

- **Address:**
- **Zip:**
- **Well Location TMK (list all if multiple wells present):** 9-1-31:23
- **Water Use TMK (list all if used on multiple lots):** 4

**Water Use/Well Information:**

- **Is the water source currently in use?** Yes [x]  No [ ]
- **What are you currently using the water for?**
  - (example: "Use for 45acea of diversified agriculture and 3residences"): Cooling Tower

- **Is a flow meter installed and working properly?** Yes [x]  No [ ]
- **Do you submit monthly water use reports to the State?** Yes [x]  No [ ]

**Field Investigations:**

A representative from Brown and Caldwell will be visiting wells in your area over the next several months between the times of 9:00 am and 5:00 pm. Each site investigation will take approximately 1-2 hours. Please indicate up to three potential days of the week and availability times for an on-site inspection of the well location and verification of water use compliance. The permit holder must provide Brown and Caldwell with at least five (5) working days notice of the need to reschedule.

| Option #1 | Date (M-F): **Th** | Time: 9:00 am [x] 12:00 pm [x] 3:00 pm [ ]
| Option #2 | Date (M-TH): **Wed** | Time: 9:00 am [ ] 12:00 pm [x] 3:00 pm [x]
| Option #3 | Date (M-F): **Tu** | Time: 9:00 am [x] 12:00 pm [x] 3:00 pm [ ]

Once this survey is returned, a Brown and Caldwell representative will be contacting you to conduct a phone interview and finalize the exact date and time of your field investigation. Please fax/mail completed surveys by December 12th, 2007 and direct any questions related to this survey to Mr. Milo Smith of Brown and Caldwell at:

1099 Alakea Street, Suite #2400  
Honolulu, HI 96813  
Tel: (808) 203-2661  
Fax: (808) 533-0226  
mcsmith@brownandcaldwell.com

For Official Use Only

- **Received:** 11/27/07  
- **Information Updated:** 11/27/07  
- **Phone Interview Complete:** 11/20/07

**Notes/Comments:**
Phone Interview

WUP Number: 163 Well Number(s): 1805-04-10-12

Contact Name: Michael Rossio

Attempt #1: Date/Time: 1/6/06 (9:35 am) Phone Number: ____________ Result: Left Message

Attempt #2: Date/Time: 1/6/06 (10:30 am) Result: Call Returned

Well Location TMK(s): 9-1-031-023

Water Use TMK(s): 9-1-031-023

Water Source Address: ________________________________ Zip Code: ____________

City: Kapaia

Currently using water source? Yes ☒ No ☐

Notes/Comments: Use for cooling towers

How often is the water source being used? Daily ☒ Weekly ☐ Monthly ☐

Notes/Comments: Use on a continual basis

How long have you been using this water source? Since Approx 1960

Has there been any rezoning of the water source/water use properties? Yes ☐ No ☒

Have you reported the rezoning to the State? Yes ☐ No ☐ N/A ☒

If no, explain: N/A

Scheduled field investigation day/time: 1/5/06 @ 12:00 p.m.

Notes (Special directions, site conditions, potential hazards, general notes, etc.):

• Almost to the end of the road on the (L) @ the Kalaiaoa Cogeneration Plant
• Press buzzer at gate for directions

Comments To Make:

• Although we prefer that you do not change your scheduled field investigation time, if you require a reschedule, you must provide Brown and Caldwell with at least five (5) working days notice of the need to reschedule.
• A representative from Brown & Caldwell will be making a reminder phone call to you sometime during the week prior to your scheduled field investigation.
• It is very important that you provide access to the site at the day and time agreed upon. Due to a very tight schedule, if you fail to provide access at the agreed upon time and/or do not reschedule with at least a five (5) working day notice, a makeup date will not be allowed.
• If for some reason you don’t know where your well head is located, it would be a good idea to locate it prior to your field investigation to help make the visit go quickly and smoothly.

Interviewed By: M S Date: 1/6/06 Time: 10:30
Field Investigation Checklist

WUP Number: 163 Well Number(s): 1605-041 to -12

Water Source
Well Location TMK(s): 9-1-031:023
Well Head GPS Coordinates: Latitude: See Below Longitude: See Below
Well Type: Well Pump Brackish, Non-Potable
Currently using water source? Yes ☑ No ☐
Notes/Comments: ________________________________

Is there a flow meter installed? Yes ☑ No ☐
Is the flow meter operational? Yes ☑ No ☐
Notes/Comments: Pumping at 1000 gpm

Water Use
Water Use TMK(s): 9-1-031:023
What is the water being used for? Cooling tower & emergency back-up

Is the water being used within the permitted boundaries? Yes ☑ No ☐
If no, explain: ________________________________

Is there any observed wasting of water or water loss? Yes ☐ No ☑
If no, explain: ________________________________

Are the permit conditions being complied with? Yes ☑ No ☐
If no, explain: ________________________________

Other
Photographs of: Water Source ☑ Usage Area ☐ Water Meter ☑ Pump/Motor ☑

General Notes/Comments: 1605-06: 1°18.157' W, 156°05.741' W (+12 ft)
1605-07: 2°13.151' W, 156°05.758' W (+12 ft)
1605-06: 2°13.157' W, 156°05.759' W (+13 ft)
1605-09: 1°18.101' N, 156°05.717' W (+12 ft)
1605-10: 2°13.090' N, 156°06.836' W (+15 ft)
1605-11: 2°18.102' N, 156°05.637' W (+14 ft)
1605-12: 2°18.104' N, 156°05.621' W (+15 ft)

Investigated By: M S Date: 1/15/09 Time: 11:30 A.M.
Standard Conditions List

1. The water described in this water use permit may only be taken from the location described and used for the reasonable beneficial use described at the location described above. Reasonable beneficial uses means "the use of water in such a quantity as is necessary for economic and efficient utilization, which is both reasonable and consistent with State and County land use plans and the public interest." (HRS § 174C-3)

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HRS § 174C-49(a), which means that it:
   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in HRS § 174C-3;
   c. Will not interfere with any existing legal use of water;
   d. Is consistent with the public interest;
   e. Is consistent with State and County general plans and land use designations;
   f. Is consistent with County land use plans and policies; and
   g. Will not interfere with the rights of the Department of Hawaiian Home Lands as provided in Section 221 of the Hawaiian Homes Commission Act and HRS § 174C-101(a).

4. The ground-water use here must not interfere with surface or other ground-water rights or reservations.

5. The ground-water use here must not interfere with interim or permanent instream flow standards. If it does, then:
   a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
   b. The interim or permanent instream flow standard, as applicable, must be amended.

6. The water use authorized here is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

7. The water use permit application and submittal, as amended, approved by the Commission at its <Insert Date> meeting are incorporated into this permit by reference.

8. Any modification of the permit terms, conditions, or uses may only be made with the express written consent of the Commission.

Variations of Standard Condition (8) are as follows:
   i. Modification of any permit condition shall be approved by the Commission. Modification of any permit condition without notification may result in the revocation of the water use permit.
9. This permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
   a. Protect the water sources (quantity or quality);
   b. Meet other legal obligations including other correlative rights;
   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June, 1987 shall be protected;
   f. Meet legal obligations to the Department of Hawaiian Home Lands, if applicable; or
   g. Carry out such other necessary and proper exercise of the State’s and the Commission’s police powers under law as may be required.

Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

10. An approved flowmeter(s) must be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a monthly basis (attached).

Variations of Standard Condition (10) are as follows:
   i. The applicant shall keep monthly pumpage estimates to be submitted annually to the Commission.
   ii. An approved flowmeter(s) need not be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a yearly basis (attached).
   iii. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a monthly basis in accordance with the Commission's September 16, 1992 action on reporting requirements.
   iv. Approved flowmeters must be installed to measure monthly withdrawals and a monthly record of withdrawals must be kept and reported to the Commission on Water Resource Management on a monthly basis.
   v. An approved flowmeter(s) must be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a quarterly/yearly basis (attached).
   vi. An approved flowmeter shall be installed to measure water withdrawals.
   vii. An approved flowmeter(s) must be installed to measure withdrawals; and a record of the withdrawals must be kept and reported to the Department of
Land and Natural Resources, Division of Water and Land Development, P.O. Box 373, Honolulu, HI 96809, on a monthly basis.

viii. Although not stated as a condition of the permit §13-168-7 HAR requires you to keep a record of your monthly total pumpage, water level, salinity, and water temperature. This information must be submitted to the Commission on a regular monthly basis using the enclosed water use report form.

ix. An approved flowmeter shall be installed and the withdrawal from Well 1851-73 shall be recorded and reported to DLNR on a monthly basis by the owner and/or operator of the well.

x. The withdrawals from these wells shall be recorded and reported to the DLNR on a monthly basis by the BWS.

xi. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting water usage on a monthly basis.

xii. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission.

xiii. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission along with water level and salinity measurements.

11. This permit shall be subject to the Commission’s periodic review of the <Aquifer> Aquifer System’s sustainable yield. The amount of water authorized by this permit may be reduced by the Commission if the sustainable yield of the <Aquifer> Aquifer System, or relevant modified aquifer(s), is reduced.

12. A permit may be transferred, in whole or in part, from the permittee to another, if:
   a. The conditions of use of the permit, including, but not limited to, place, quantity, and purpose of use, remain the same; and
   b. The Commission is informed of the transfer within ninety days.

Failure to inform the department of the transfer invalidates the transfer and constitutes a ground for revocation of the permit. A transfer, which involves a change in any condition of the permit, including a change in use covered in HRS § 174C-57, is also invalid and constitutes a ground for revocation.

13. The uses(s) authorized by law and by this permit do not constitute ownership rights.

14. The permittee shall request modification of the permit as necessary to comply with all applicable laws, rules, and ordinances that will affect the permittee’s water use.

15. The permittee understands that under HRS § 174C-58(4), that partial or total nonuse, for reasons other than conservations, of the water allowed by this permit for a period of four (4) continuous years or more may result in a permanent revocation as to the amount of water not in use. The Commission and the permittee may enter
into a written agreement that, for reasons satisfactory to the Commission, any period of nonuse may not apply towards the four-year period. Any period of nonuse which is caused by a declaration of water shortage pursuant to section HRS § 174C-62 shall not apply towards the four-year period or forfeiture.

16. The permittee shall prepare and submit a water shortage plan within 30 days of the issuance of this permit as required by HAR § 13-171-42(c). The permittee’s water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the <Aquifer>Ground-Water Management Area.

17. The water use permit shall be subject to the Commission’s establishment of instream standards and policies relating to the Stream Protection and Management (SPAM) program, as well as legislative mandates to protect stream resources.

18. The permittee understands that any willful violation of any of the above conditions or any provisions of HRS § 174C or HAR § 13-171 may result in the suspension or revocation of this permit.

19. Special conditions in the attached cover transmittal letter or attached exhibits are incorporated herein by reference.

20. If the ground-water source does not presently exist, the new well shall be completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

Variations of Standard Condition (20) are as follows:

i. The permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work proposed in the permit application shall be completed within two years from the date of permit issuance.

21. This permit may not be transferred or the use rights granted by this permit sold or in any other way alienated. Pursuant to HRS § 174C-59 and the requirements of Chapter 174C, the Commission on Water Resource Management has the authority to allow the transfer of the permit and the use rights granted by this permit in a manner consistent with HRS § 174C-59. Any such transfer shall only occur with the Commission’s prior express written approval. Any sale, assignment, lease, alienation, or other transfer of any interest in this permit shall be void.

22. The water use permit granted shall be an interim water use permit, pursuant to HRS § 174C-50. The final determination of the water use quantity shall be made within five (5) years of the filing of the application to continue the existing use.

23. The water use permit shall be issued only after agricultural review.

24. That scheduled adjustments to Oahu Sugar Co. permitted use shall be initiated upon discontinuance of agricultural uses.
25. The issuance of this permit was approved by the Commission on Water Resource Management at its meeting on <Insert Date>.

26. The permit shall be subject to the review by the Attorney General.

27. The permit holder may be required to relinquish this permit at any time or specified time after issuance to the Board of Land and Natural Resources in accordance with Chapter 166 of Title 13.

28. The applicant shall obtain the necessary land acquisition documents from the Hawaii Housing Authority.
Special Conditions List

1. Should an alternate permanent source of water be found for this use, then the Commission reserves the right to revoke this permit, after a hearing.

2. In the event that the tax map key at the location of the water use is changed, the permittee shall notify the Commission in writing of the tax map key change within thirty (30) days after the permittee receives notice of the tax map key change.

3. The applicant shall contact the Environmental Management Division, State Department of Health, at 586-4304, concerning “GUIDELINES APPLICABLE TO GOLF COURSES IN HAWAII” date <Insert Date & Version #>.

4. Standard Condition 10 is emphasized, to report consumption on a regular basis.

5. The applicant may continue this existing use of ground water within the limits approved by the Commission, and the actual issuance of the interim permit shall not be a reason to interrupt this existing use.

6. This interim water use permit shall cease to become interim and shall be subject to HRS § 174C-55 upon administrative review of the quantity within five (5) years, provided that all conditions of the use (including the review of the quantity which shall not be greater than the amount initially granted) remain the same. Enforcement of the allocation limit shall be stayed pending staff’s review and issuance of a permanent water use permit.

7. As-built drawings of the well and pump, and a complete pumping test record shall be submitted within sixty (60) days.

8. In the event the pump tests show that aquifer boundary conditions do not support the requested withdrawals, the Commission reserves the right to amend this permit, after a hearing, to a level that is supported by the pump tests.

9. The existing use may be continued within the levels approved by the Commission, and the actual issuance of the permit document shall not be a reason to interrupt the approved level of use.

10. The filing of an application by Kukui, Inc. for a new or modified water use permit for the Kualapuu Aquifer in excess of 2.0 mgd (total system withdrawal) shall be just cause for re-consideration of this interim permit by the Commission.

11. Upon completion of a new transmission line for the transport of water use by Well #17, the permit shall be modified to reduce the allocation amount by the additional 79,220 gallons per day allocated for use of the Molokai Irrigation System.

12. Within six (6) months from the date of approval of a water use permit for the well, the applicant shall conduct a feasibility study and submit a report describing
alternative sources of nonpotable water for irrigation uses at the resort area. It is suggested that the developer consider use of dual lines in the subdivisions so that effluent may be used in the existing reuse system. Another consideration is the development of brackish water wells in the Kaluakoi Aquifer system for mixing with the effluent generated at the resort.

13. Within six (6) months from the date of approval of a water use permit for the well, the application shall evaluate the filter back discharges into Kakaako Gulch to determine if excessive preventable waste is occurring and identify possible measures to eliminate or reduce such waste. The evaluation shall be conducted in cooperation with the Commission staff and staff of the Department of Health’s Safe Drinking Water Branch, which regulates the drinking water system.

14. Within six (6) months from the date of approval of a water use permit for the well, the applicant shall 1) implement a leakage control and detection system and compete repairs to prevent such leakage and 2) implement use of xeriscaping and low-flow fixtures.

15. Action on the future use portion of the water use permit application for Well #17 (Well No. 0901-01) is deferred pending the establishment of existing uses in the aquifer. Kukui Inc.’s application for uses in excess of those uses existing on July 15, 1992 will be considered “new” uses and will be taken up by the Commission as soon as other existing use applications have been decided. In the interim,

a. The Commission shall recognize that there is disagreement between the applicant’s staff calculations of reasonable-beneficial existing use

b. The Applicant will have the burden of proof to show within six (6) months reasonable-beneficial existing use calculations that support the applicant’s request as opposed to staff’s calculations.

c. The Commission’s enforcement of the approved existing use allocation will be suspended for six (6) months.

16. The permittee shall submit a notice of intent and written request to continue the use at least ninety (90) days prior to the expiration of the interim five-year permit.

17. The Commission shall delegate to Maui Department of Water Supply the authority to allocate the use of water for municipal purposes, as provided in §174C-48(b).

18. Maui Department of Water Supply shall be exempt from the requirements for permit modifications, as provided in §174C-57(c).

19. The permittee must meter water use and monitor chloride concentrations on a monthly basis and submit monthly reports of water use and chloride concentrations to the Commission.

20. Standard Condition 16 is waived for saltwater wells.

21. The permit will be revoked if (1) stream monitoring shows that pumping the well reduces stream flow, or (2) the electromagnetic resistivity survey indicates that the
well was drilled into a dike compartment, unless the applicant submits a petition for an amendment to the interim instream flow standard with the well completion report. However, no use of the water may be made without a Pump Installation Permit, which cannot be issued during consideration of the amendment of the interim instream flow standard.

22. The applicant shall present the results of the electromagnetic resistivity survey, pump tests, and stream monitoring to a community meeting as well as to the Commission.

23. A final determination of water use quantity shall be made within five (5) years of the filing date of the application (<Insert Date>) to continue existing use.

24. The applicant shall implement, by December 31, 1995, a biological and hydraulic monitoring program for a minimum 2-year period that: 1) documents the existing operating procedure, 2) seeks to identify the impacts of all operating alternatives on Waikolu Stream, and 3) seeks to identify the effectiveness of weir modifications (Dam No. 1). This program shall incorporate the three new wells, Wells #4-6 (Well Nos. 0855-06, -05, & -04, respectively), which may be pumped within the approved limits, for monitoring and testing purposes only. Further, semi-annual reports summarizing data and preliminary findings shall be submitted to the Commission. It is suggested that the Department of Agriculture work with the State Division of Aquatic Resources and other affected agencies to prepare the monitoring program in light of the difficult technical questions raised by this application. A particular concern is the coordination of this monitoring program with the ongoing National Park Service study by Anne Brasher. A draft of this plan shall be submitted to the Commission staff within ninety (90) days for technical review and comment. Results of the monitoring program shall be used to make recommendations to the Commission on any additional use of the wells, and shall be made readily available to all interested parties.

25. That the Commission approves the well construction permit for the Kamiloloa-Waiola Well (Well No. 0759-01), subject to the standard well construction conditions and the special conditions for the pumping well for the aquifer tests.

26. That the Commission authorizes the Chairperson to approve and issue a pump installation permit upon acceptance of adequate pump test result, subject to the standard pump installation conditions.

27. Should the well be used for back-up domestic supply, applicant is advised to contact DOH or otherwise ensure safe drinking water quality is maintained.

28. The applicant shall follow the agreed monitoring plan.

29. If pesticides used by the applicant are found in ground or surface water and can be traced to the applicant's use, the CWRM may revoke the permit immediately upon such finding.
30. Issuance of the interim permit shall be withheld until the reservation of water for DHHL is set by rule. Applicant may continue this existing use within the approved limits.

31. The applicant shall submit well modification and pump installation permit applications for administrative approval by chairperson prior to beginning any work required to complete well.

32. Should any stream flow impacts result from use, petition to amend interim instream flow standards shall be submitted.

33. Should any dewatering result from use, pumping shall cease immediately.

34. Shall submit accurate schematic diagram of distribution system for the battery of 5 wells.

35. Shall be subject to a 6-month independent audit & monitoring.

36. Final pump capacity shall be determined from pump test results & approved administratively by signature of chair.

37. The permittee shall seek and submit to the Commission within ninety (90) days written confirmation from the Department of Land Utilization of the non-conforming use.

38. Pumping shall cease immediately if the chloride reports show that the brackish water developed in the well exceeds 1,000 mg/l of chloride, unless a variance from the chloride limit has been granted. The authority to approve future variance requests is delegated to the chairperson.

39. The duration of the interim permit shall be:
   a. To July 1, 2006, or
   b. Until treated wastewater is available and acceptable for use, or
   c. Until such time that a significant change in permitted, actual, or projected uses or water supply occurs.

40. Action on any interim permit may be initiated by the Commission or any permittee upon letter request or pursuant to §174C-57 Haw. Rev. Stat. (Modification of permit terms).

41. This permit is approved under the assumption that wastewater will become available for reuse as an alternative supply source.

42. Require adherence to the chloride sampling protocol and the submittal of weekly chloride data. The authority to approve variances from the weekly reporting requirement is delegated to the Chairperson.

43. Require adherence to the Conservation Conditions.
44. In the event a water shortage is declared by the Commission, permittees in the <Insert Aquifer System> shall comply with the <Insert Aquifer System> water shortage plan adopted by the Commission.

45. The permittee shall contact the Department of Health, Clean Water Branch and obtain the necessary discharge permit(s).

46. Permit shall be interim and replaces existing WUP for 2051-07 & 11.

47. Applicant shall submit an acceptable archaeological inventory survey report to DHP. If historic sites affected, a plan to mitigate these affects must be accepted by DHP and completed by applicant.

48. Should the well be used for back-up domestic supply, applicant is advised to contact DOH or otherwise ensure safe drinking water quality is maintained.

49. (The permittee) may report monthly pumpage on yearly basis.

50. Prior to issuance of any permits, must submit filing fee for after-the-fact pump installation permit.

51. The term of this permit shall be twenty years from the date of issuance of the permit with a five-year Board review to determine compliance with the provisions of the permit.

52. The amount of water to be withdrawn under this permit shall be 0.19 mgd, averaged annually, for irrigation use. This permitted use of 0.19 mgd when added to a preserved use of 0.27 mgd amounts to a total of 0.46 mgd, averaged annually, which may be withdrawn from well 1646-01.

53. The use authorized by the permit must not interfered substantially and materially with existing individual household uses and existing uses.

54. The use of this well shall be subject to the shortage and emergency powers of the Board of Land and Natural Resources (BLNR).

55. This permit may be suspended or revoked, in accordance with Chapter 166.

56. The permit holder may be required to relinquish this permit to BLNR, in accordance with Chapter 166.

57. The withdrawal from Well 1646-10 shall be recorded and reported to DLNR on a monthly basis by the permittee.

58. In the event that emergency water use occurs, the permittee shall notify the Commission in writing within one (1) day of pumping, to in form the Commission as to the nature of the emergency and the expected duration of the emergency. A water
use report shall also be filed pursuant to Standard Condition 10 and Administrative Rule 13-168-7.

59. Note DOH’s requirements related to non-potable water systems (attached to original permit).

60. Standard Condition 16 requiring the submittal of a water shortage plan is waived.

61. All non-potable spigots and piping shall be clearly labeled as “DO NOT DRINK, NON-POTABLE” to prevent direct human consumption.

62. Standard Condition 10 is modified. Due to the inability to take water level measurements, the requirement to measure monthly water levels is waived. In addition, as long as the U.S. Geological Survey is collecting and analyzing the chloride content of the well water, the requirement for the permittee to measure and report chlorides is also waived.

63. Well elevation components must be surveyed by a licensed surveyor and this information must be submitted to commission prior to issuance of permanent permit.

64. The permittee shall obtain approvals from the Department of Health and the U.S. Environmental Protection Agency prior to use of the water.

65. This water use permit, WUP No. <Insert #>, shall supersede WUP No. <Insert #>.

66. WUP No. <Insert #> is revoked

67. Standard Condition 17 is waived.

68. Standard Condition 22 for interim water use permits shall not apply.

69. To supplement our records, we request that you provide a map of the Galbraith Est. lands west of Wahiawa (2100 ac+) and the associated TMK’s for use area.

70. Deferred action on portion requested for golf course irrigation pending further refinement of irrigation requirement and a feasibility study for utilization of surface water sources, including Wahiawa Reservoir.

71. Written justification be provided for any 'cushion' of 0.5 mgd.

72. The water use permit shall be an interim permit. The duration of the interim permit shall be until treated wastewater is available and acceptable for use. The permittee shall continue discussions with Honolulu Board of Water Supply regarding the use of reclaimed water.

73. The permittee is put on notice that this is a qualified approval in that this permit may be modified or revoked prior to the expiration of the interim permit if the
Commission decides that the use of additional basal ground water for dust control and landscape irrigation is not reasonable-beneficial use.

74. The permittee encouraged to use drought-tolerant landscaping to conserve water.

75. Should the applicant provide written evidence that the county DHCD approves a 201E exemption for the elderly affordable housing project then the applicant may modify a corresponding portion of their existing aquacultural use to be used by the exemption approved project within the Commission approved water use permit limits under recommendation 5.

76. The applicant shall obtain a water lease/permit from Land Division prior to actual use of the well water.

77. Require the permittee to sign a contract by May 14, 1998 with the City Department of Wastewater Management to buy and use 0.400 mgd of R-1 water for a corresponding reduction in allocation for Well Nos. 1900-02, 17 to 20, and 1901-03.

78. Standard Condition 9 is waived.

79. Standard Condition 10 is modified to exempt the permittee from monthly measurements of salinity and temperature.

80. Standard Condition 10 is waived.

81. Applicant must seek a determination from BLNR and Land Mgt Div as to whether water license required. If required, license must be obtained prior to issuance of permit. If not, permit will be issued w/out further action.

82. Commission defers action on use in excess of 452,000 gpd pending additional info from BWS and further staff analysis.

83. The permit shall be subject to the Commission’s sustainable yield review by December 1990.

84. The Commission shall delegate to the Honolulu Board of Water Supply the authority to allocate the use of water for municipal purposes, in accordance with §174C-48(b) HRS.

85. Honolulu Board of Water Supply shall be exempt from the requirements of permit modifications as provided in §174C-57.

86. BWS must participate in discussions, to be coordinated by Commission Staff, regarding a monitoring program to address impacts to Kaneohe Bay water quality, prior to any action on applications for future municipal uses.

87. A pump installation permit application must be made and approved prior to the installation of a permanent pump.
88. The water withdrawn shall be 0.7 mgd for municipal use.

89. The installed pump capacity of the well shall not be more than 700 gpm or 1.01 mgd.

90. The term of permit shall automatically expire twelve months from the date of issuance.

91. The Honolulu Board of Water Supply may continue to submit monthly water data on their own form, provided that the data are submitted in a format that is acceptable to the Commission staff.

92. Standard Condition 7 shall not apply.

93. Standard Condition 22 shall not apply.

94. Standard Condition 10 is modified to exempt the permittee from monthly measurements of salinity and temperature.

95. This permit shall be subject to conditions providing for stream restoration if the Commission determines that additional water should be returned to the streams.

96. HECO 1 mgd for industrial use

97. Campbell Estate 1 mgd for municipal use through BWS, by separate agreement with HECO

98. BWS 1 mgd for municipal use.

99. The permit shall be subject to the Commission's sustainable yield review by <Insert Date>.

100. The applicant shall obtain the current version of the Department of Health's Guidelines Applicable to Golf Courses in Hawaii. Where relevant and viable, items of the guidelines should be implemented and sustained appropriately. To obtain the current version, contact the Safe Drinking Water Branch, Environmental Management Division at 808-586-4258 (Honolulu).

101. The future use portion of the application shall be deferred until existing uses in the Koolauloa area are established.

102. The water to be withdrawn under this permit shall be a total of 0.03 mgd (0.02 mgd preserved plus an additional 0.01 mgd permitted use), averaged annually, for domestic and irrigation use

103. Existing well 1851-09 shall be properly sealed by a licensed drilling contractor. A well modification permit application, enclosed, shall be submitted to the Department for approval of the well sealing. A filing fee for sealing the well will not be required.
104. The permittee is required to test the source using a certified private laboratory and submit the test results to the Commission within three (3) months. The Commission will then forward the results to the Department of Health for their review. The Department of Health recommends that the well be routinely tested for microbiological and chemical parameters thereafter.

105. The permittee is required to submit a completed Registration of Well and Declaration of Water use by <Insert Date>.

106. The permittee shall contact the Department of Health for a written determination on the status of their water system and comply with any Department of Health requirements for monitoring and testing.

107. In the event that the original spring source decontaminates, the new well authorized will be shut down.

108. That within each aquifer the total permitted use shall not exceed the sustainable yield.

109. That any water available for allocation shall be for in-district use.

110. That scheduled reductions to Oahu Sugar Co. permitted use shall be initiated upon final termination of an Osco lease or sub-lease, whichever occurs later.

111. That permits for water use issued in accordance with the proposed schedule shall be interim permits subject to review and adjustment by 1995.

112. That the permit shall be an interim permit for a new use which is afforded to existing users as specified in §13-171-20.

113. That the original allocation of 0.200 mgd shall be taken to hearing for possible revocation at a later date to complete the transfer of the water use permit entirely to Well No. 3407-02. This revocation would reduce the current allocation afforded to the Kunihiro Well (Well No. 3406-06) to zero.

114. This allocation incorporates the unspecified domestic needs of the applicant and therefore necessitates a single meter be installed at the well.

115. Should any impacts to nearby wells or streams be established by the use of this well, the applicant shall address these issues to the satisfaction of the Commission.

116. If an economically feasible nonpotable source is identified, the applicant shall convert to the alternative nonpotable source.

117. The permit shall be subject to the Chairperson’s approval of a water use plan recommending possible measures to prevent or minimize saltwater contamination and establish courses of action to follow should the aquifer become to saline to use.
118. Permittee shall provide the necessary end-use information on the 10th residence to allow regulation of the use under Chapter 174C.

119. Standard Conditions 10 & 18 shall not apply.

120. Standard Condition 10 is modified to exempt the permittee from the requirement to install a flowmeter. Salt water withdrawals may instead be estimated based on pumping capacity and run time.

121. The applicant shall review the existing year long period of pumpage and streamflow data and provide analysis on ground and surface water interaction. Deadline is January 25, 1994.

122. The water use permit for Well Nos. 2301-27 to -32 for 0.75 mgd (WUP No. 419) shall be revoked upon issuance of a pump installation permit for the well.

123. The permittee shall use mulching to decrease evaporative losses and manage irrigation scheduling to minimize water demand.

124. The permittee shall submit a detailed agricultural plan to support any future water use permit application for increased agricultural use at this parcel.

125. If not already obtained, the permittee shall seek and obtain any necessary permits from the Department of Health for the proposed discharge to Malaekahana Stream.

126. Standard Condition 10 is modified to waive the requirement for installing a water meter on Well Nos. 2358-21, 22, and 29. The permittee shall install a water meter on Well No. 2358-26 to measure total monthly flow through the discharge line. This quantity should then be assumed to be the rate of natural flow from the other three wells for monthly reporting purposes.

127. The permit shall be effective upon submittal of documentation by Navy that it has met the DOH requirements for a public system.

128. This WUP shall be subject to Army's application for a WUP to reduce the permitted use of the Army's Schofield Shaft (2901-02 to 04, 10) by 0.208 mgd to a new total of 5.648 mgd. The Army's application shall be submitted within 60 days after the approval of this WUP or this WUP shall be void. Approval of the modification request shall be obtained from the CWRM prior to use of Well No. 3100-02 and issuance of this WUP.

129. Navy shall submit an after-the-fact PIPA, and approval of the permit shall be obtained prior to use of the well.

130. The well shall not be used for drinking water purposes unless it is properly tested and treated.
131. This permit is approved subject to reclaimed water becoming a practical alternative and provided that the Department of Health approves the reuse application.

132. Should any opae ula be recovered in the well water, the permittee shall notify the Division of Aquatic Resources and provide specimens to the Division of Aquatic Resources for analysis.

133. If a single meter at the well is used, the Commission shall allow an additional 1,000 gallons per day to the water use permit amount for the domestic needs of two residences, although a permit for individual domestic consumption is not required. Otherwise, the applicant must provide a meter to separately measure the irrigation consumption.

134. This permit is approved under the requirement that conversion to either: 1) treated wastewater becoming available for reuse as an alternative supply source, provided that Department of Health concerns over the use of treated effluent over the potable water aquifer have been addressed; and/or 2) other nonpotable source becoming available will occur in a timely manner.

135. These permits shall be subject to a review of actual use within four years for possible modification of the permitted amount.

136. The permit shall be reviewed in two (2) years for possible additional revocation due to nonuse.

137. The allocation is based on the projects listed in Exhibit 5 (of Item 10 of the May 20, 1998 Staff Submittal), except for the Queen’s Beach GC (TMK 139-11-2,3), Lot 9 (TMK 139-17-51), and Varsity Place (TMK 128-24-35).

138. Kamehameha Schools Bishop Estate/Honolulu Board of Water Supply shall transfer the water use permit within ninety (90) days of the effective date of the transfer of the pump station to the Honolulu Board of Water Supply, pursuant to §174C-59 Hawaii Revised Statutes.

139. The permittee shall ensure that the water is recycled by either directing it into the Waiahole Ditch for use by downstream farmers (subject to the approval of the Agribusiness Development Corporation’s Board) or into Waikele Farm’s existing irrigation system.

140. The permittee shall file a completed application to modify WUP No. 758 to reduce the allocation by 0.100 mgd within 60 days. If a completed water use permit modification application is not received within 60 days from this submittal’s date, then the subject water use permit application (WUPA No. 767) shall be deemed denied without prejudice without the need for another hearing.

141. The water withdrawn shall be for municipal use. No improvements to the existing sources are required as the existing source capacities are greater than the increase.
142. Water license must be determined through LM.

143. Proposed other uses will be considered at a later date.
Ms. Gayle Baker, Manager - Project Administration
Kalaeloa Partners, L.P.

Dear Ms. Baker:

Issuance of Water Use Permit for Well Nos. 1805-04 to 12
Ewa Caprock Ground Water Management Area, Oahu

We are transmitting a new water use permit for Kalaeloa 1 to 9 Wells (Well Nos. 1805-04 to 12) for use of 3.168 million gallons per day (mgd) of water on a 12-month moving average basis that was approved by the Commission on Water Resource Management (Commission) on September 15, 1993. This water use permit, which correctly identifies the landowner at the source is Hawaiian Electric Co., Inc., and not Hawaiian Refinery, Inc., supersedes the water use permit that was transmitted to you on January 21, 1997.

As part of the Commission's approval, the following special conditions were added and are part of your permit under Standard Permit Condition 20:

Special Conditions

(NONE)

Enclosed with this letter of approval are the following:

1. Your water use permit
2. Your official monthly water use report forms

Please be sure to read the conditions of your approved permit. If you accept these terms, please sign and return one copy of this permit to the Commission and retain a copy for your record.

We draw your attention to Standard Condition 11 which requires you to keep a record of your monthly total pumpage, water level, salinity, and water temperature. This information must be submitted to the Commission on a regular yearly basis using the enclosed water use report form. You should make copies of the enclosed report form as needed.

Because your industrial use requires salt water underlying the Ewa Caprock Aquifer, and not fresh or brackish groundwater (chlorides \( \geq \) 1000 ppm), we are administratively waiving the requirement for a water shortage plan under Standard Condition 16.

If you have any questions, please call Rae M. Loui, Deputy Director, at 5

Aloha,

MICHAEL D. WILSON
Chairperson

Attachments
GROUND WATER USE PERMIT
WUP NO. 163

PERMITTEE

Applicant/Water User
KALAELOA PARTNERS, L.P.

Landowner of Source
HAWAIIAN ELECTRIC CO., INC.

PERMITTED SOURCE INFORMATION

Island
OAHU

Water Management Area
EWAPROCK

Aquifer Sector
EWAPROCK

Aquifer System
EWAPROCK

System Sustainable Yield
NA

Well Name
KALAELOA 1 to 9

State Well No.
1805-04 to 12

PERMITTED USE INFORMATION

Reasonable beneficial use
INDUSTRIAL

Withdrawal (12 month moving ave.)
3.168 mgd

Location of water use

TMK #
9-1-31:23

Address
91-111 KALAELOA BLVD.

State land use classification
NA

County zoning classification
NA

Pursuant to Hawaii's State Constitution, Article XI, Section 7, Hawaii Revised Statutes, Chapter 174C; Hawaii Administrative Rules, Chapters 13-167 through 13-171; and Hawaii decisional law and custom, the applicant is hereby authorized to use ground water from the sources and in the amount and from and upon the locations described above; subject however, to the requirements of law including but not limited to the following conditions:
1. The ground water described in the water use permit may only be taken from the location described, used for the reasonable-beneficial use described, and at the location described above and in the attachments. Reasonable-beneficial use means "the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is not wasteful and is both reasonable and consistent with the state and county land use plans and the public interest." (HAR §13-171-2).

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HAR §13-171-13 which means that it:
   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in section §13-171-2;
   c. Will not interfere with any existing legal use of water;
   d. Is consistent with the public interest;
   e. Is consistent with state and county general plans and land use designations;
   f. Is consistent with county land use plans and policies; and
   g. Will not interfere with the rights of the Department of Hawaiian Homelands as provided in section 221 of the Hawaiian Homes Commission Act and 174C-101(a), HRS.

4. The ground water use approved must not interfere with surface or ground water rights or reservations.

5. The ground water use approved must not interfere with interim or permanent instream flow standards. If it does, then:
   a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
   b. The interim or permanent instream flow standard, as applicable, must be amended.

6. The water use permit is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

7. The permit application and staff submittal approved by the Commission at its September 15, 1993 meeting are incorporated into the permit by reference.

8. Any modification of the permit terms, conditions, or uses can only be made with the express written consent of the Commission on Water Resource Management.

9. The water use permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
   a. Protect water sources in quantity, quality, or both;
   b. Meet other legal obligations including other correlative rights;
   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June 1987, shall be protected;
   f. Meet legal obligations to the Department of Hawaiian Homes, if applicable; or
   g. Carry out such other necessary and proper exercise of the State's and the Commission's police powers under law as may be required.

   Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

10. If the ground water source does not presently exist, the new well shall be completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

11. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a yearly basis in accordance with the Commission's September 16, 1992 action on reporting requirements;

12. The water use permit shall be subject to the Commission's periodic review of the applicable aquifer's sustainable yield. The amount of ground water use authorized by the permit may be reduced by the Commission if the sustainable yield of the Caprock Aquifer System, or relevant modified aquifer, is reduced;
13. The water use permit may not be transferred or the use rights granted by this permit sold or in any other way alienated. Pursuant to HAR §13-171-25 and the requirements of Chapter 174C, the Commission has the authority to allow the transfer of the permit and the use rights granted by the permit in a manner consistent with HAR §13-171-25. Any such transfer shall only occur with the Commission's prior express written approval. Any sale, assignment, lease, alienation, or other transfer of any interest in this permit shall be void.

14. The use(s) authorized by law and by the water use permit do not constitute ownership rights.

15. The permittee shall request modification of the permit when necessary to comply with all applicable laws, rules, and ordinances which will affect the permittee's water use.

16. The permittee shall prepare and submit a water shortage plan within 30 days of issuance of the permit to assist the Commission in fulfilling HAR §13-171-42(c). The permittee's water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the Ewa Caprock Ground Water Management Area.

17. The water use permit granted shall be an interim water use permit, pursuant to HAR §13-171-21. The final determination of the water use quantity shall be made within five years of the filing of the application to continue the existing use.

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed.

Applicant's Signature: ___________________________ Date: ___________________________

Printed Name: ___________________________ Firm or Title: ___________________________

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment
Harding Lawson Associates

Environmental Services
A Report Prepared for
Kalaeloa Partners, L.P.

RESULTS OF AQUIFER TESTING
PRODUCTION WELL PW-1 (1805.04) 1805.04
KALAELOA COGENERATION PLANT
CAMPBELL INDUSTRIAL PARK,
EWA BEACH, OAHU, HAWAII

HIA Job No. 19032,001.06

by

Patti Walsh
Staff Geologist

John J. Ward
Associate Hydrogeologist
Geologist - 4101 (California)

Harding Lawson Associates
803 Kamehameha Highway, Room 404
Pearl City, Hawaii 96782

January 12, 1990

0072R
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I INTRODUCTION

This report presents results of aquifer testing and analysis of data at the Kalaeloa Cogeneration Plant (Plate 1). The tests were conducted in support of the application for Water Use Permit required by the State of Hawaii Commission on Water Resource Management.

The Kalaeloa Cogeneration Power Plant is located in the Ewa District on the island of Oahu in Campbell Industrial Park, Pearl Harbor Water Management Area, Hawaii. The power plant will produce 180 MW of electrical energy from two oil-fired steam generators, and will operate on a continuous basis, providing electricity to Hawaiian Electric Company.

The supply of cooling water to the plant will be from six wells drawing their water from the caprock aquifer. The locations of these wells, PW-1 through PW-6, are shown on Plate 2. Four wells, each pumping at a nominal rate of about 330 gallons per minute (gpm), will satisfy normal plant cooling requirements of 1,330 gpm. A fifth well will be for standby use; and a sixth will be used for emergency bypass cooling at 870 gpm, bringing the peak system capacity to 2,200 gpm (3.2 million gallons per day [mgd]).

Disposal of the heated water will be through injection into one of two wells located along the southern plant boundary (INU-3 and INU-4, Plate 2). Results of drilling and testing of these injection wells are being submitted to the State of Hawaii Department of Health as part of the application for an Underground Injection Control (UIC) Permit.
II HYDROGEOLOGIC SETTING

Central Oahu was formed as basaltic lava flows from the Koolau shield volcano overlapped older flows from the Waianae shield volcano. Extensive erosion following the cessation of volcanic activity, approximately two million years ago, deposited basaltic sand, gravel, and cobbles, and alluvial silts and clays derived from the weathering of these rocks. Concurrent with this erosion and deposition, a gradual subsidence of the landmass caused much of the coastal area to become inundated by the sea. Barrier and fringing reefs developed near and on the coastline. Continued subsidence and sea level fluctuations resulted in the development of a thick coastal shelf and extensive deposition of alternating coralline limestone layers with lagoonal or alluvial deposits (Stearns and Chamberlain, 1967).

Stearns (1978) identified the Ewa Coastal Plain as an emerged coralline limestone reef that developed when the sea level stood about 25 feet above present sea level, approximately 125,000 years ago. The Ewa Coastal Plain is underlain by terrestrial alluvium, marine sedimentary deposits, calcareous reef deposits, weathered basalts and pyroclastic rocks from post-erosional volcanic activity. This layer of heterogeneous material forms a geologic unit known locally as caprock. This caprock is estimated to reach a maximum thickness of about 600 feet at the coastline near Barbers Point (Mink et al., 1988) and gradually decreases in thickness with distance inland, pinching out near the H-1 Freeway.

Within the Campbell Industrial Park area, the caprock has been explored to depths of 350 feet on site (Well ABBEX-2, Plate 3), 300 feet at the site of the Conoco-Dillingham Refinery (Dames and Moore, 1972) and 260 feet at the Hawaii Can Plant (Reynolds Metals Co., 1985). None of these borings fully penetrate the caprock.

On the basis of lithologic evidence presented in boring logs and on results of aquifer tests and chemical analyses, the caprock is considered to be a thick, layered aquifer system of moderate to extremely high permea-
bility, at least to the depths explored of 350 feet. Zones of highest permeability are associated with cavernous reef limestone. Zones of lower permeability are associated with marls, silts, and coralline rubble. On-site aquifer testing (HLA, 1989a; 1989b; 1989c) indicates that hydraulic conductivity within the upper 50 feet of saturated thickness ranges between 2,000 and 10,000 feet/day. Caprock material in this interval is primarily cavernous limestone.

At depth, more fine-grained material is encountered; this material comprises about 60 percent of the total depth of Exploratory Boring EX-2 (Plate 3). Aquifer tests of the 220- to 270-foot limestone interval in this well indicated a hydraulic conductivity of about 1,000 feet/day.

Although the marls, silts, fine sands, and coralline rubble encountered at depths are lower in permeability than the cavernous limestone/coral reef formations, there is little information to indicate these have regional extent. Nor would these materials be expected to have such low permeabilities that they would behave as effective confining beds.

Ground water is first encountered on site at about 12 feet below grade as a basal lens of brackish water. Salinity varies from about 2,500 milligrams per liter (mg/l) total dissolved solids (TDS) at the water table to about 3,500 mg/l at 25 feet, the depth of the production wells. At depths below about 50 to 80 feet, ground water is saline with the approximate composition of seawater. The variation of salinity with depth of the plant site is shown on Plate 4. Ground water is non-potable at all depths.
III DRILLING AND TESTING PROGRAM

An exploratory boring, EX-1 (Well 1805-10M), was drilled in April 1989 to provide geologic, hydrologic and water quality information, allowing evaluation of the suitability of the upper portions of the caprock aquifer for sustained withdrawals of water for cooling purposes. The boring was drilled using continuous coring methods to a depth of 50 feet and completed as an observation well. The geologic log and well completion details are shown on Plate 5.

Short-term testing at this well indicated that the aquifer was prolific and could sustain pumping at high rates. Water quality was brackish, of a sodium-chloride type, at approximately 13 percent of seawater concentrations. Results of these tests were submitted in reports to Kalaeloa Partners and to the State Department of Land and Natural Resources (DLNR) in May 1989 (HIA, 1989a).

Initially, the production well field was to consist of three wells, PW-1, PW-2, and PW-3. These were drilled to depths of 50 feet and completed with temporary steel casings, perforated between the water table and 50 feet. Aquifer testing indicated that the wells could readily yield the planned production requirements of 1,300 gpm each. Results of a 72-hour aquifer test at PW-1 were submitted in May 1989 (HIA, 1989b) to Kalaeloa Partners and to DLNR in October 1989.

Water-quality analyses, however, indicated that silica and magnesium concentrations, at 43 to 45 mg/l, and 260 to 290 mg/l, respectively, would, according to plant designers, cause unacceptable scaling problems in the cooling system. To assess the hydraulic behavior and water quality at depth, Well PW-2 was deepened in 20-foot intervals and re-tested. Analysis of water at 110 feet from PW-2 indicated that silica, at 10 mg/l, and magnesium, at 1,385 mg/l, were still considered unacceptable. Results of this testing were submitted to Kalaeloa Partners in July 1989 (HIA, 1989c).

As a result of these tests, the plant designers decided that the shallowest ground water at the site may yield acceptable volumes and quality.
of cooling water. Accordingly, a well field consisting of the three previously constructed wells and three additional wells (PW-4, PW-5, and PW-6) was designed. To minimize drawdown and upward coning of saline water into the pumping wells, planned pumping rates were reduced to 330 gpm per well from five wells: four wells pumping continuously and one reserve well. A sixth well would be used for bypass operations, at 870 gpm. Wells PW-1 through PW-5 will comprise the normal duty and reserve wells; PW-6 will be a 40-foot-deep bypass well.

In October 1989, PW-1 was filled with grout to a depth of 25 feet and re-completed with 12-inch casing, screened between 25- and 17-foot depths. Well completion details are shown on Plate 5. The well was re-tested from November 1 through November 8, 1989, by pumping at a constant rate of 340 gpm for seven days. During this test and subsequent recovery period, water levels were continuously monitored in Wells PW-1, EX-1, and PW-3 (Plate 6), using pressure transducers and data loggers. Flow measurements are listed in Table 1. Water-level measurements for all three wells, together with the predicted tidal response for Ewa Beach, are plotted on Plates 7 and 8.

Water chemistry was also monitored in all three wells before, during, and subsequent to the pumping period. Monitoring consisted of temperature and specific conductance measurements at several depths in the water column of each well, and at the discharge water. Several samples were collected and analyzed for chloride, silica, TDS, and magnesium content. A plot of the relationship between chloride and conductivity is shown on Plate 9.

Calculated chloride concentrations at various depths in each of the wells, using the regression equation shown on Plate 9, are plotted on Plate 10.

Near the end of the pumping period, additional water samples were collected for analysis of major ions. Results of these analyses are listed in Table 2 and in the Appendix.
IV RESULTS OF TESTING

A. Tidal Efficiency

The ground-water response to tidal effects is evident from the plots on Plates 7 and 8. The tidal efficiency (defined as the ratio of water-level amplitude to tidal amplitude) for all three wells is approximately 40 percent. The lag time is approximately two hours.

B. Hydraulic Response to Pumping

Water-level responses to pumping were measured in the pumping well, PW-1, and in the observation well, EX-1 (Plate 7), 16 feet from PW-1. Well PW-3 (Plate 8), 355 feet away, did not show a response to pumping PW-1 at 340 gpm.

Water-level declines caused by pumping (drawdowns) were calculated for Wells PW-1 and EX-1, and are plotted on Plate 11. Maximum drawdown was about 0.12 feet in PW-1 and 0.05 feet in EX-1, which are one-fifth to one-tenth of the tidal response. Drawdowns appeared to completely stabilize within about 100 minutes of pumping.

Two methods were used to analyze the aquifer response to pumping. For the transient portion of the test, data were analyzed using the Jacob approximation (Cooper and Jacob, 1946) to the transient (Theis) radial flow equation. For the steady state portion of the test, data were analyzed using the Thiem equation for water-table aquifers (Jacob, 1963; Hantush, 1962). Although assumptions behind each approach are violated for analysis of this aquifer system, values obtained appear reasonable.

The transient response to pumping (Plate 11) is described by:

\[ T = \frac{2.3Q}{4\pi\Delta s} \quad S = \frac{2.25T\tau\phi}{r^2} \]

where 
- \( T \) = aquifer transmissivity (L²/T)
- \( S \) = storage coefficient
- \( Q \) = pumping rate (L³/T)
- \( \Delta s \) = drawdown per log cycle of time (L)
- \( r \) = distance between pumped and observation wells (L)
- \( \tau\phi \) = time intercept of the best fit straight line through the data at zero drawdown (T)
Using the best fit lines of the transient responses in PW-1 and EX-1 (Plate 11) for Q = 340 gpm, the following are calculated:

\[ T_{PW-1} = 600,000 \text{ ft}^2/\text{day} \]
\[ T_{EX-1} = 800,000 \text{ ft}^2/\text{day} \]
\[ S = 0.10 \]

Assuming that the thickness of the aquifer is 100 feet, a hydraulic conductivity (equal to transmissivity divided by aquifer thickness) of 6,000 to 8,000 ft/day is calculated.

Steady-state conditions prevailed from about 100 minutes pumping time through the duration of the test. The Thiem equation describes radial, steady-state flow in the vicinity of a pumping well:

\[ K = \frac{Q}{\pi} \ln \left( \frac{r_1}{r_2} \right) \frac{1}{h_1^2 - h_2^2} \]

where \( K \) = hydraulic conductivity (L/T)

\( h_1, h_2 \) = height of the water column above the base of the aquifer at distances \( r_1 \) and \( r_2 \) (L).

Assuming aquifer thickness equals 100 feet, then

\[ h_1 = 100 \text{ ft} - 0.12 \text{ ft} = 99.88 \text{ ft at } r_1 = 0.5 \text{ feet} \]
\[ h_2 = 100 \text{ ft} - 0.05 \text{ ft} = 99.95 \text{ ft at } r_2 = 16.2 \text{ feet} \]
\[ K = 5,000 \text{ ft/day} \]

From the average of these results, reasonable estimates of hydraulic parameters of the upper caprock aquifer are:

- Transmissivity: 600,000 ft\(^2\)/day
- Hydraulic Conductivity: 6,000 ft/day
- Storage Coefficient: 0.10
- Aquifer Thickness: 100 feet
C. Ground-Water Quality

The ground water to be used for cooling at the Plant is brackish basal water within the caprock aquifer. The salinity profile (Plate 4) and water-level elevations indicate that the water becomes essentially saline below about 50 feet.

Ground-water salinity was monitored at several depths in the pumping and observation wells to assess pumping-induced upconing of the saline water. The conductivity was measured using a conductivity meter (YSI Model 33), and the measurements were converted to equivalent chloride concentrations by correlating measured conductivities and chloride concentrations of eight samples. The correlation is shown on Plate 9.

The salinity variations in PW-1, EX-1 and PW-3 are shown on Plate 10. Results of chemical analyses of water collected during pumping are listed in Table 2. The following observations are evident from these results:

1. Chloride concentrations within the screened interval of the pumping well are between 1200 and 2400 mg/l. Pumping induced about a 300 mg/l increase in chloride concentration in the discharge water.

2. A slight, regional increase in salinity of the uppermost water is evident in the PW-3 chloride plot. This trend was evident both before and after pumping.

3. Discharge water appeared to chemically stabilize within about 48 pumping hours. Chemical fluctuations during the remainder of the test are similar to the regional trends discussed above.

4. Large chloride fluctuations in the deeper samples of EX-1 and PW-3 correlate with water-level fluctuations due to tides. That is, at high tide the level of the saline water interface rises, and at low tide, the interface drops.

D. Predicted Response to Ground-Water Withdrawals

Planned withdrawal rates are 1,330 gpm under normal operations and 2,200 gpm under short-term bypass operations. During the test, the water-level drawdowns were less than 0.1 foot, 16 feet from the pumped well. The
Harding Lawson Associates

aquifer reached steady-state flow conditions shortly after pumping commenced. The source of the water to the well is partly from upward leakage of saline water (estimated to be about 2 percent of the total). Most of the water is interpreted to be from the vicinity of the pumping well within interconnected cavities near the water table.

The nearest off-site water supply well is nearly 2,000 feet east of the ABB wells, on HIRI property. It is considered highly unlikely that the cone of depression created by ABB production wells and that from HIRI ground-water withdrawals would overlap.

To evaluate the impact of ABB withdrawals on water levels of the caprock aquifer, a composite cone of depression was calculated from five wells pumping at a cumulative rate of 2,200 gpm, evenly placed along a 500-foot interval. The wells were considered to partially penetrate a 100-foot-thick aquifer with a hydraulic conductivity of 6,000 ft/day. The only source of aquifer recharge that was considered was the ocean, 2,100 feet from the wells.

The maximum calculated drawdown within the well field, after 30 years of continuous pumping, was approximately 0.5 feet. The maximum extent of the cone of depression, defined as the distance to 0.1 foot of drawdown, was 800 feet from the well field.

We thus conclude that the impacts from planned ABB ground-water withdrawals on the caprock aquifer are extremely small, and are limited to the immediate vicinity of the well field itself.
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Komohama Street, Ewa Beach, Hawaii.

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their bearing on the geologic history of the central pacific basin,
Pacific Science, vol. 21, no. 2.
Table 1. Summary of Discharge Measurements, Pumping Well PW-1.

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<th>Elapsed Time (Minutes)</th>
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Totals: 9,876 3,322,795 336
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State Well No.: 1805-13M

Well Completion as of 06-05-89

Equipment: Bucyrus E ire 60L Cable Tool

Elevation: 13 feet MSL Date: 06/02/89

0 10 20 30 40 50 60 70 80

Depth (ft)

Sample

TAN CORALLINE LIMESTONE -
moderately, hard

24-INCH STEEL SURFACE CASING TO 4 FEET

13.65 feet MSL

24-INCH DIAMETER BORING TO 42 FEET

GRAY CORALLINE LIMESTONE -
hard

16-INCH DIAMETER PERFORATED STEEL CASING (TORCH CUT) TO 43 FEET

SILTY SAND (SM) with gravel, loose.

16-INCH DIAMETER BORING TO 57 FEET

PINK CORALLINE LIMESTONE -
moderately hard

End of boring at 57 feet.
Ground-Water Levels in Pumping and Observation Wells
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Harling Lawson Associates
Engineering and Environmental Services

PLATE 7

DRAWN: kar
JOB NUMBER: 19032,001.06
APPROVED: 1/90
CONDUCTIVITY - CHLORIDE

PW-1 PUMPING TEST

Slope = 0.36 • SC - 326

Plot of Conductivity-Chloride Correlation
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii
Chloride Concentrations in Pumping and Observation Wells
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Bottom of Well
Water Table
38 ft.
25 ft.
Pump On
Pump Off

Bottom of Well
Discharge
APPENDIX
HECO CHEMISTRY LABORATORY
ENVIRONMENTAL DEPARTMENT
Wellwater Analysis Report

Report Date: Nov. 8, 1989
Site: Kalaeloa Wells
Well: PW-1 Discharge

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<tbody>
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<td>Ca</td>
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<tr>
<td>Chloride</td>
<td>1,550</td>
<td>1,536</td>
<td>1,545</td>
<td>1,417</td>
</tr>
<tr>
<td>Magnesium</td>
<td>122</td>
<td>114</td>
<td>120</td>
<td>118</td>
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<tr>
<td>Total Silica</td>
<td>36</td>
<td>28</td>
<td>31</td>
<td>39</td>
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<tr>
<td>Total Dissolved Solids</td>
<td>2,912</td>
<td>2,918</td>
<td>2,940</td>
<td>2,970</td>
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</table>

Results (mg/L)

C. Kishimoto/G. Kitsuwa/E. Wong

Analyzed by:

Approved by: George Yasutome
Senior Chemist

A-1
HECO CHEMISTRY LABORATORY  
ENVIRONMENTAL DEPARTMENT  
Wellwater Analysis Report

<table>
<thead>
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<th>Report Date:</th>
<th>Nov. 15, 1989</th>
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<td>Site: Kalaeloa Wells</td>
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<td>Well: ABB</td>
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Results (mg/L)

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<td>Date:</td>
<td>11/08/89</td>
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<table>
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<tr>
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<td>Chloride</td>
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<td>Total Dissolved Solids</td>
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<td>Nitrate</td>
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<td>Magnesium</td>
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<td>Sodium</td>
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<td>Potassium</td>
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<tr>
<td>Manganese</td>
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<tr>
<td>Iron</td>
<td>&lt; 0.1</td>
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Analyzed by: G. Katsuwa/E. Wong/V. Inouye

Approved by: George Yasutome  
Senior Chemist
<table>
<thead>
<tr>
<th>Sample No:</th>
<th>PW-1 14 ft</th>
<th>EX-1 13 ft</th>
<th>EX-1 38 ft</th>
<th>EX-1 49 ft</th>
<th>PW-3 13 ft</th>
<th>PW-3 25 ft</th>
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<tr>
<td>Chloride</td>
<td>1328</td>
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<td>5593</td>
<td>7340</td>
<td>734</td>
<td>1084</td>
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</table>

Report Date: Nov. 15, 1989
Site: Kalaeloa Wells
Well: ABB

Results (mg/L)

Analyzed by: E Wong
Approved by: George Yasutome
Senior Chemist
RESULTS OF AQUIFER TESTING
PRODUCTION WELL PW-1
KALAELOA COGENERATION PLANT
CAMPBELL INDUSTRIAL PARK
EWA BEACH, OAHU, HAWAII
JANUARY 12, 1990

1 copy: Kalaeloa Partners, L.P.
Attention: Mr. William J. Snarponis

1 copy: ABB Energy Services, Inc.
Attention: Mr. H.C. Hauck

1 copy: ABB Energy Services, Inc.
Kalaeloa Cogeneration Plant
Attention: Mr. J. Harrelson

1 copy: Belt Collins & Associates
Attention: Mr. John Goody

1 copy: State of Hawaii
Department of Land and Natural Resources
Division of Water and Land Development
Attention: Mr. Ed Sakoda

(continued)
DISTRIBUTION

RESULTS OF AQUIFER TESTING
PRODUCTION WELL PW-1
KALAELOA COGENERATION PLANT
CAMPBELL INDUSTRIAL PARK
EWA BEACH, OAHU, HAWAII
JANUARY 12, 1990

1 copy: HLA - Novato (Unbound) 6
2 copies: Office Files: HLA - Honolulu 7 - 8

JJW/rpb:0072R

QUALITY CONTROL REVIEWER

[Signature]

Ronald L. Soroos
Engineering Geologist - 1056 (California)
February 24, 2005

Ref: 1805-04 to 07 & 09.wcr

Mr. H.R. Tobler
General Manager
Kalaeloa Partners, L.P.

Dear Mr. Tobler:

Well Completion Report for Well Nos. 1805-04 to 07 & 09

We received your Well Completion Report Part II for the Kalaeloa PW-1, PW-2, PW-3, PW-4, and PW-6 Wells (Well Nos. 1805-04 to 07 & 09) on February 10, 2005.

On February 18, 2005, the reports were amended following a telephone conversation with Mr. Emerson Lee, Kalaeloa Health and Safety Officer, to indicate the pumps are set at 20 ft. below the benchmark in all five wells. Further, we understand that no pump is installed in Well No. 1805-08. We have accepted the amended Well Completion Reports Part II as complete on February 18, 2005.

If you have any questions, please contact Lenore Y. Nakama of the Commission staff at [redacted]

Sincerely,

DEAN A. NAKANO
Acting Deputy Director

LYN:ss
MEMORANDUM FOR THE RECORD

FROM: Lenore Nakama
SUBJECT: Pump Installation Completion Reports for Well Nos. 1805-04 to 09

1/05 Rudy Tobler called inquiring about the process for installing permanent pumps in 3 existing wells (1805-10 to 12). Directed him to our website to download the pump installation permit application form. He said they are still discussing whether to develop the wells or not, and if they decide to install pumps, he will submit the applications.

I inquired as to the status of the other six wells (1805-04 to 09), for which pump permits expired on 10/1/1992, but were never followed up on. Mr. Tobler informed me that pumps had been installed in the six wells. I requested that he complete the WCR 2 to the best of his ability. He said he would.

Because the old owners had done the work, Mr. Tobler said they had no contractor information.

2/10/05 received WCR2s for 5 of the wells. Issues:
WCR 2 missing for 1805-08.
Pump intake elevations coincide with the bottom of the hole.
For Well No. 1805-05, pump intake elevation is ~25 ft deeper than bottom of the hole.

2/17/05 left message for Mr. Tobler to call me.

2/18/05 Emerson Lee returned my call. Mr. Lee is the Health & Safety Officer for Kalaeloa (ext. 221) & prepared the WCR2s. According to Mr. Lee:
There is no pump in 1805-08.
All the pumps are set at 20 ft.
Well No. 1805-04 was backfilled by previous owners. The well depth is 25 ft.
Told Mr. Lee that I would amend the WCR2s accordingly.
February 9, 2005

Deputy Director Yvonne Izu
Department of Land & Natural Resources

Ref: WUP NO. 163
Kalaeloa Cogeneration Facility

Subj: Production Well Pump Information

Dear Ms. Izu,

Enclosed please find the information sheets of the pumps presently installed in KPLP’s production wells. These sheets were filled out to the best of our knowledge considering all available data at the plant.

The pump installation date is an approximate date as we have no records as to exactly when and who, i.e., which contractor installed these pumps. This work was done by the plant’s previous owner.

We estimated the pump installation date to be in 1990 to 1991 time frame since the plant achieved commercial operation on May 16, 1991, at which point in time the pump must have been in service.

Please review the enclosed data sheets and do not hesitate to contact us should you have any questions.

Best Regards,

H.R. Tobler
General Manager

enclosure
1. State Well No.: 1805-09  
   Well Name: PW-6  
   Island: Oahu

2. Address: [Redacted]  
   Tax Map Key: 9-1-31:23

3. Pump Installation Company: [Redacted]

4. Date Pump Installed: 05-30-91

5. PERMANENT PUMP INFORMATION
   Pump Type, Make, Serial No.: VT-CT/Lmp Full (Goulds)
   Rated Capacity: 870 gpm at head of: [Redacted] ft.
   Motor Type, H.P., Voltage, rpm: Reliance 25 HP 1770 rpm Volts 460
   Type of flow meter: KROHNE Magnet which measures in gpm
   Model Number: IPC 080  
   Serial Number: A49330

   Pump type (check one):
   - Deep Well Turbine
   - Submersible
   - Centrifugal
   - Rotary
   - Rotary-Displacement
   - Rotary-Gear
   - Propeller
   - Reciprocating
   - Impulse
   - Propeller
   - Reciprocating
   - Impulse

6. Method of flow measurement:
   - Flowmeter
   - Manufacturer
   - Make
   - Size
   - Weir
   - Open Pipe
   - Orifice*
   - Other*, explain below

   *attach schematic

7. Fill in the as-built section on the other side of this sheet.

8. Attach photograph of well and concrete pad clearly showing benchmark on concrete pad.

9. Other remarks/comments:
   Pumps are periodically removed for overhaul. All pump maintenance and installation has been by Alston Power since 1991.

---

Pump Installation Contractor (print) ________________ C-57/C-57a/A Lic. No. ________________
Signature ___________________ Date ________________

Permittee (print) ____________________
Signature ___________________ Date ________________

* amended per 2/18/05 tele con w/ Emerson Lee, Health

Safety for Kalaheo. 672-5344 ext 221
Bench mark elevation surveyed to nearest 0.01 ft. = 12.88 ft. mean sea level

Elevation of top of chase tube = 13.8 ft. mean sea level

Pump intake depth = 40 ft. (referenced to bench mark)

Chase tube depth = ___ ft. (referenced to bench mark)

If airline installed, bottom of airline elevation = ___ ft. mean sea level
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources
WELL COMPLETION REPORT - PART II
Pump Installation

Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. The Commission may not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at 587-0225. For updates to this form or additional information, please visit our website at http://www.hawaii.gov/dlnr/cwrm/

For Official Use Only:

<table>
<thead>
<tr>
<th>1. State Well No.:</th>
<th>1805-07</th>
<th>Well Name: PW-4</th>
<th>Island: Oahu</th>
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<tbody>
<tr>
<td>2. Address:</td>
<td></td>
<td>Tax Map Key: 9-1-31:23</td>
<td></td>
</tr>
<tr>
<td>3. Pump Installation Company:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Date Pump Installed:</td>
<td>1992-01</td>
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</tr>
<tr>
<td>5. PERMANENT PUMP INFORMATION</td>
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</tr>
<tr>
<td>Pump Type, Make, Serial No.:</td>
<td>VIT-CT Goulds 10WALC-2 405026</td>
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</tr>
<tr>
<td>Rated Capacity:</td>
<td>320 gpm at head of: 6 ft.</td>
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<tr>
<td>Motor Type, H.P., Voltage, rpm:</td>
<td>Reliance 7.5 HP 1760 RPM Volts 460</td>
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<tr>
<td>Type of flow meter:</td>
<td>KROHNE Magnetic which measures in gpm</td>
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<tr>
<td>Model Number</td>
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<tr>
<td>Serial Number</td>
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<td>Pump type (check one):</td>
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<tr>
<td>□ Rotary</td>
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<tr>
<td>□ Submersible</td>
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<td>□ Centrifugal</td>
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<tr>
<td>□ Rotary-Displacement</td>
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<tr>
<td>□ Reciprocating</td>
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<tr>
<td>□ Rotary-Gear</td>
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<tr>
<td>□ Impulse</td>
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<td>6. Method of flow measurement:</td>
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<td>Manufacturer</td>
<td>Make</td>
<td>Size</td>
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<td>□ Weir</td>
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<tr>
<td>□ Open Pipe</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>□ Orifice*</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>□ Other*, explain below</td>
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<td></td>
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</tr>
<tr>
<td>*attach schematic</td>
<td></td>
<td></td>
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<tr>
<td>7. Fill in the as-built section on the other side of this sheet.</td>
<td></td>
<td></td>
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<tr>
<td>8. Attach photograph of well and concrete pad clearly showing benchmark on concrete pad.</td>
<td></td>
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<tr>
<td>9. Other remarks/comments:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumps are periodically removed for overhaul. All pump maintenance &amp; installation has been by Alston Roes since 1991</td>
<td></td>
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</table>

Pump Installation Contractor (print) ________________ C-57/C-57a/A Lic. No. ________________

Signature ___________________________ Date ___________________________

Permittee (print) ___________________________

Signature ___________________________ Date ___________________________
Bench mark elevation surveyed to nearest 0.01 ft. = ______ ft. mean sea level

Elevation of top of chase tube ______ ft. mean sea level

Pump intake depth = ______ ft. (referenced to bench mark)

Chase tube depth = ______ ft. (referenced to bench mark)

If airline installed, bottom of airline elevation = ______ ft. mean sea level
1. State Well No.: 1805-06  
   Well Name: PW-3  
   Island: Oahu

2. Address:  
   Tax Map Key: 9-1-31-23

3. Pump Installation Company:  

4. Date Pump Installed: 1980-01

5. PERMANENT PUMP INFORMATION
   Pump Type, Make, Serial No.: VIT-CT GOWLS 10WALC-2 405026
   Motor Type, H.P., Voltage, rpm: Reliance 7.5 HP 1760 RPM VOLT 460
   Type of flow meter: KROHN E Magnet
   Model Number 270580 Serial Number A9H 330
   Pump type (check one):
   - Deep Well Turbine
   - Rotary
   - Propeller
   - Submersible
   - Rotary-Displacement
   - Reciprocating
   - Centrifugal
   - Rotary-Gear
   - Impulse
   Method of flow measurement:
   - Flowmeter
   - Manufacturer
   - Make
   - Size
   - Weir
   - Open Pipe
   - Orifice
   - Other, explain below
   *attach schematic

6. Fill in the as-built section on the other side of this sheet.

7. Attach photograph of well and concrete pad clearly showing benchmark on concrete pad.

8. Other remarks/comments:

   Pumps are periodically removed for arachid. All pump maintenance and installation has been by Alston Lauren since 1991.

---

Pump Installation Contractor (print) C-57/C-57a/A Lic. No.  
Signature Date

Permittee (print)  
Signature Date
Bench mark elevation surveyed to nearest 0.01 ft. = ___ ft. mean sea level

Elevation of top of chase tube = 13.5 ft. mean sea level

Pump intake depth = 15 ft. (referenced to bench mark)

Chase tube depth = ___ ft. (referenced to bench mark)

If airline installed, bottom of airline elevation = ___ ft. mean sea level

3-1809-06 KALAELOA PW-3
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources
WELL COMPLETION REPORT - PART II
Pump Installation

Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. The Commission may not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at 587-0225. For updates to this form or additional information, please visit our website at http://www.hawaii.gov/dlnr/cwrm/

1. State Well No.: 1805-05  Well Name: PW-2  Island: Oahu
2. Address:  Tax Map Key: 9-1-31:23
3. Pump Installation Company:
4. Date Pump Installed: 1/2090-71

5. PERMANENT PUMP INFORMATION
   Pump Type, Make, Serial No.: VIT GOULDS MODEL 104MLC-2 405026
   Motor Type, H.P., Voltage, rpm: Reliance 7.5 HP 1760 RPM Volts 460
   Type of flow meter: KROHNE MAGNUS  which measures in  gpm
       Model Number JFC080  Serial Number 494330

   Pump type (check one):
   ☑ Deep Well Turbine  ☐ Rotary  ☐ Propeller
   ☐ Submersible  ☐ Rotary-Displacement  ☐ Reciprocating
   ☐ Centrifugal  ☐ Rotary-Gear  ☐ Impulse

6. Method of flow measurement:
   ☑ Flowmeter  ☐ Weir  ☐ Open Pipe  ☐ Orifice*  ☐ Other*, explain below
   *attach schematic

7. Fill in the as-built section on the other side of this sheet.
8. Attach photograph of well and concrete pad clearly showing benchmark on concrete pad.
9. Other remarks/comments:
Pumps are periodically removed for overhaul. All pump maintenance and installation has been by Alston Power since 1991.

Pump Installation Contractor (print) C-57/C-57a/A Lic. No.
Signature Date

Permittee (print)
Signature Date
Bench mark elevation surveyed to nearest 0.01 ft. = 13.3 ft. mean sea level

Elevation of top of chase tube 13.3 ft. mean sea level

Pump intake depth = 20 ft. (referenced to bench mark)

Chase tube depth = _____ ft. (referenced to bench mark)

If airline installed, bottom of airline elevation = _____ ft. mean sea level
State of Hawaii  
COMMISSION ON WATER RESOURCE MANAGEMENT  
Department of Land and Natural Resources  
WELL COMPLETION REPORT - PART II  
Pump Installation

Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. The Commission may not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at 587-0225. For updates to this form or additional information, please visit our website at http://www.hawaii.gov/dlnr/cwrm/

| 1. State Well No.: | 1805-04 | Well Name: | PW - 81 | Island: | Oahu |
| 2. Address: | | | | | |
| 3. Pump Installation Company: | ALSTOM Power |
| 4. Date Pump Installed: | 1/2/91 |
| 5. PERMANENT PUMP INFORMATION |
| Pump Type, Make, Serial No.: | GOULD'S 10WALC-2 VIT-CT 405D26 |
| Rated Capacity: | 330 gpm at head of: 46 ft. |
| Motor Type, H.P., Voltage, rpm: | RELIANCE 7.5 HP 1700 RPM VOLT 460 |
| Type of flow meter: | KOHNE MAGNETIC which measures in 9 gpm |
| Model Number | IF C 050 |
| Serial Number | A94330 |
| Pump type (check one): | Deep Well Turbine |
| Submersible | |
| Centrifugal | |
| Box | 
| 6. Method of flow measurement: | Flowmeter |
| Manufacturer | | Make | Size |
| | | | |
| Weir | Open Pipe | Orifice* | Other*, explain below |
| *attach schematic |
| 7. Fill in the as-built section on the other side of this sheet. |
| 8. Attach photograph of well and concrete pad clearly showing benchmark on concrete pad. |
| 9. Other remarks/comments: |
| Pumps are periodically removed for overhauls. All pump maintenance and installation has been by ALSTOM power since 1991. |

Pump Installation Contractor (print) | C-57/C-57a/A Lic. No. |
| Signature | Date |

Permittee (print) | |
| Signature | Date |
Bench mark elevation surveyed to nearest 0.01 ft. = 43.19 ft. mean sea level.

Elevation of top of chase tube 12.5 ft. mean sea level.

Pump intake depth = 28.5 ft. (referenced to bench mark)

Chase tube depth = _____ ft. (referenced to bench mark)

If airline installed, bottom of airline elevation = _____ ft. mean sea level.
PROJECT TITLE  EWA CAPROCK GROUNDWATER QUALITY SURVEY

WELL DESCRIPTION:
Well Name: Kalaeloa Well No. 1
Well I.D. No.: 3-1805-04
Well Location: Kalaeloa Cogeneration Plant
Well Owner: Jeff Moore
Contact Person: Jeff Moore
Type: Industrial
Flow
Remarks:

WELL CONSTRUCTION: (Proposed)
Casing Stick Up (A) 1 ft.
Ground Elevation (B) 13 ft.
Diameter of Boring (C) 24 in.
Total Depth of Boring (D) 20-50 ft.
Grouted Interval (E) 10 ft.
Filter-Pack Interval (F) ft.
Mrd Dpth to Wtr Tbl/ Approx Elev/ Elev Per DLNR Indx (G) ft.

<table>
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<tr>
<th></th>
<th>DIAMETER (IN)</th>
<th>LENGTH (FT)</th>
<th>TOP/BOT.ELEV.(FT)</th>
<th>MATERIAL</th>
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</thead>
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<td></td>
<td>PVC or SS</td>
</tr>
<tr>
<td>Perforated Casing (I)</td>
<td>14</td>
<td>10-40</td>
<td></td>
<td>PVC or SS</td>
</tr>
<tr>
<td>Open Hole (J)</td>
<td>16</td>
<td>10-40</td>
<td></td>
<td>PVC or SS</td>
</tr>
</tbody>
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JOURNAL OF SAMPLE COLLECTIONS:
Date  November 30, 1992  February 12, 1993  February 22, 1993  June 1, 1993
Time  11:40 a.m.  9:44 a.m.  11:45 a.m.  10:00 a.m.
Person JT, KW, MB, CH, NU JT, CH JT, JR, CH, NU CH, NU, KW, JR
Weather Drizzling  Fair  Fair  Fair
Remarks Sampled at well head Sampled at well head Sampled at well head Sampled at well head
<table>
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<tr>
<th>Date of Sample Collection</th>
<th>11/30/92</th>
<th>02/12/93</th>
<th>02/22/93</th>
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</thead>
<tbody>
<tr>
<td><strong>ANALYTICAL PARAMETERS</strong></td>
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<td>(ppb)</td>
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(a) - Fecal Positive
(b) - Fecal Negative
(c) - Sample Holding Time Exceeded
(d) - Lost in Extraction

DRAFT
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<th>Date of Sample Collection</th>
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<th>02/12/93</th>
<th>02/22/93</th>
<th>06/01/93</th>
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<tr>
<td>Methylene Chloride (ppb)</td>
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(a) - Fecal Positive  
(b) - Fecal Negative  
(c) - Sample Holding Time Exceeded  
(d) - Lost in Extraction  
(TNTC - Too Numerous To Count)  
(NF - None Found)
### KALAELOA WELL NO. 1

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<th>02/12/93</th>
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<td>(ppb)</td>
<td>&lt;1.79</td>
<td>&lt;0.5</td>
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<tr>
<td>Pentachlorophenol</td>
<td>(ppb)</td>
<td>0.158</td>
<td>&lt;0.2</td>
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<tr>
<td>2,4,5-TP</td>
<td>(ppb)</td>
<td>&lt;0.130</td>
<td>&lt;0.2</td>
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<tr>
<td>Dinoseb</td>
<td>(ppb)</td>
<td>&lt;1.70</td>
<td>&lt;2.5</td>
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<tr>
<td>Picloram</td>
<td>(ppb)</td>
<td>&lt;1.62</td>
<td>&lt;1</td>
<td></td>
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<tr>
<td>Lindane</td>
<td>(ppb)</td>
<td>&lt;0.140 *</td>
<td></td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Alachlor</td>
<td>(ppb)</td>
<td>&lt;1.00</td>
<td>&lt;2.0</td>
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<tr>
<td>Heptachlor</td>
<td>(ppb)</td>
<td>&lt;0.200</td>
<td>&lt;0.1</td>
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<td>Heptachlor Epox.</td>
<td>(ppb)</td>
<td>&lt;0.120</td>
<td>&lt;0.1</td>
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<tr>
<td>Endrin</td>
<td>(ppb)</td>
<td>&lt;0.140</td>
<td>&lt;0.1</td>
<td></td>
</tr>
<tr>
<td>Methoxychlor</td>
<td>(ppb)</td>
<td>&lt;1.70</td>
<td>&lt;0.5</td>
<td></td>
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<tr>
<td>Chlordane</td>
<td>(ppb)</td>
<td>&lt;2.00</td>
<td>&lt;1.0</td>
<td></td>
</tr>
<tr>
<td>Toxaphene</td>
<td>(ppb)</td>
<td>&lt;2.00</td>
<td>&lt;1.0</td>
<td></td>
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<tr>
<td>Atrazine</td>
<td>(ppb)</td>
<td>&lt;1.10 **</td>
<td></td>
<td>&lt;0.5</td>
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<tr>
<td>Simazine</td>
<td>(ppb)</td>
<td>&lt;0.710</td>
<td>&lt;0.5</td>
<td></td>
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<tr>
<td>Bromacil</td>
<td>(ppb)</td>
<td>&lt;0.350</td>
<td>&lt;3.0</td>
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<tr>
<td>Hexazinone</td>
<td>(ppb)</td>
<td>&lt;1.80</td>
<td>&lt;1.0</td>
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<tr>
<td>Mevinphos</td>
<td>(ppb)</td>
<td>&lt;2.40</td>
<td>&lt;5.0</td>
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</table>

(a) - Fecal Positive
(b) - Fecal Negative
(c) - Sample Holding Time Exceeded
(d) - Lost in Extraction

**NOTES**

- TNTC - Too Numerous To Count
- NF - None Found
- * - Found 0.096 ppb Lindane
- ** - Found 0.23 ppb Atrazine

---

**DRAFT**
September 29, 1995

State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management

Attention: Neal Fujii

Subject: Monthly Groundwater Use Reports

Dear Neal:

Attached please find monthly groundwater use reports for July & August 1995.

As a follow-up to our discussion on Wednesday, September 27, 1995, Kalaeloa will be discontinuing individual pump flow-meter readings and will instead report total usage from all six supply wells. This total water flow reading will be obtained from a magnetic totalizer located at our cooling tower inlet piping. We expect to have the new totalizer in service sometime in October. Until then, we will continue taking individual flow-meter readings off the pumps. Based upon your geologist’s recommendation, we will continue to provide month’s end conductivity and temperature measurements from each of the six supply wells.

We appreciate your cooperation in allowing us to replace the traditional method of accounting for our groundwater use with this newer more efficient program.

If you have any questions, please call me at ☑️.

Sincerely,
Kalaeloa Partners, L.P.

Gayle M. Baker
Manager-Project Administration

copy: (w/o attachments)
L. Dorsey
R. Tobler
M. Ash

KALAOA COGENERATION PLANT
Campbell Industrial Park
1-111 Kalaeloa Blvd.
Kapolei, HI 96707
e: (808) 682-5288
t: (808) 682-4996

202 Carnegie Center
Suite 100
Princeton, NJ 08540
t: (609) 243-7550
t: (609) 243-9175
Ms. Lynn D. Dorsey
General Manager
Kalaeloa Partners, L.P.

Dear Ms. Dorsey:

Kalaeloa Power Plant Supply Wells (Well Nos. 1805-04 to 09)

Thank you for your letter of August 29, 1994, requesting confirmation that treatment of your production wells with the product "Slimicide C-97" to remove excessive algae growth, complies with permits issued by the Commission on Water Resource Management (Commission).

The Commission generally defers matters of water quality to the Department of Health. In this instance, especially, since the biocide will be carried over into the cooling tower and subsequently into the injection wells, we recommend that you contact the Department of Health's Underground Injection Control Program for their approval.

Call Ed Sakoda at [redacted] if you have any questions.

Sincerely,

RAE M. LOUI
Deputy Director

ES:ss

c: DOH, Underground Injection Control Program
August 29, 1994

Mr. Edwin T. Sakoda
Chief Engineer
Regulatory Branch
Department of Land and Natural Resources

Subject: Kalaeloa Power Plant Supply Wells

Dear Mr. Sakoda:

Kalaeloa power plant has six (6) production wells which provide the necessary cooling water for the power plant. Water from these wells is used in our cooling tower to replace water lost to evaporation and "blowdown" from the cooling tower and is then injected into our two (2) injection wells.

Recently we have experienced excessive algae growth on the screens of our production wells, which is reducing the flow rate from these wells. We have investigated this problem with our water treatment chemical supplier, Betz Industrial, and they have recommended treatment with their product, "Slimicide C-97", to improve our well plugging problem.

I have enclosed a copy of a letter from our operations and maintenance contractor and the relevant data sheets from Betz for your information. Please review this information as appropriate and confirm that this treatment will comply with our permits. Thank you.

Sincerely,
Kalaeloa Partners, L.P.

Lynn D. Dorsey
General Manager

cc: R. Tobler
    J. Rachford

enclosure
August 17, 1994

Mr. Lynn Dorsey
General Manager
Kalaeloa Partners, L.P.

Re: Make up water for cooling tower (production wells)

Dear Mr. Dorsey:

As discussed in our meeting regarding the production well plugging problem we have taken the following actions.

Per our request Betz Industrial recommended 'Slimicide C-97', a non-oxidizing biocide, that is best suited for our situation. The dosage recommended by Betz is about 20 gal per treatment; with suggested treatment frequency of once or twice a year.

Before starting this treatment we must ensure that we are in compliance with all state/federal environmental laws and permits. We know that the above mentioned biocide will be carried over into the cooling tower and subsequently into the injection wells. Our UIC permit # is UO-1496. The Groundwater Use Permit is still pending but we think that we need DOH's approval to start treating the wells.
Please contact DOH and have them look into this matter.

I have attached a letter from Betz which suggests there should be no conflicts with our permit limits.

Also, I'm enclosing the MSDS sheets for the relevant biocide.

Sincerely,

Jiri Rivola
Senior Plant Engineer

cc: R. Tobler ABB O&M Site Manager
August 11, 1994

Kalealoa Partners, LP


Dear Sir:

This letter is written as an addendum to the letter forwarded to your attention on June 22, 1994 regarding the use of these biocides in your deepwell injection system. As stated before, it is our professional opinion that these biocides should not pose a threat to your facility's Underground Injection Control (UIC) permit.

It is my understanding that the biocides may also be fed to the cooling make-up well water prior to addition to the cooling tower. I suggest that the State of Hawaii be informed prior to feeding these biocides to the make-up wells for an official opinion. If there is no language in the facility's UIC permit prohibiting such treatment, then addition of these biocides to the well water may be acceptable.

If you have additional questions, please call me at [redacted]

Sincerely,

BETZ WATER MANAGEMENT GROUP

Ted Ledeboer
Environmental Specialist
Environmental/Regulatory Affairs
BETZ® Slimicide C-97

MICROBIAL CONTROL AGENT

- Patented, synergistic blend of biocide actives *
- Synergistic with oxidizing halogens *
- Effective at high pH
- Reduced environmental impact
- Improved safety features

DESCRIPTION AND USE

Slimicide C-97 is a unique blend of biocide actives in a water-based solvent system. It is EPA registered for control of bacteria, algae and fungi in recirculating cooling systems and related influent systems. It is also registered for use in water scrubbing systems and brewery pasteurizers.

The actives in Slimicide C-97 consist of a quaternary ammonium compound and bromo-nitropropane-diol (aka BNPD or bronopol). Fed together, these active ingredients have been shown to provide enhanced microbial control over a wide pH range. Chlorine or bromine based biocide programs also benefit from use of Slimicide C-97. The surface-active nature of the quat component aids removal of deposits from surfaces while the bronopol molecule is synergistic with oxidizing halogens giving a higher level of microbial kill. Use of this product either alone or in combination with oxidizing biocide programs will allow cooling system equipment to run at maximum efficiency and reduce the risk of under-deposit corrosion.

The toxicology of the actives in Slimicide C-97 has been well studied and this product poses a greatly reduced health-risk compared to many water treatment biocides. The water-based formulation is also safer to store and handle than solvent-based formulations. In the environment, both Slimicide C-97 actives undergo natural degradation which reduces their toxicity to non-target organisms.

TREATMENT AND FEEDING REQUIREMENTS

Treatment levels and treatment frequency will depend on system cleanliness as well as on system operating characteristics. Apply the product based on control parameters established by Betz Industrial for a given system. In all cases, the product must be applied in accordance with use instructions on the Betz Slimicide C-97 label.

Dosage – When the system is noticeably fouled, apply Betz Slimicide C-97 at a rate of 2.63 – 5.0 lb per 1000 gal of water in the system. Repeat this treatment until control is achieved. When microbial control is evident, add 2.63 – 4.0 lb per 1000 gal of water in the system as needed to maintain control. These dosages represent the extreme upper limit of product use requirements. In many systems, lower levels may prove effective. Evaluate product requirements through appropriate microbiological monitoring. Consult Betz Industrial for technical advice on specific applications.

Feed Point – Apply Slimicide C-97 at a point where turbulence, flow patterns, etc. will provide good mixing with the water to be treated. The product may be fed intermittently or continuously to maintain the recommended dosage.

Dilution – If necessary Slimicide C-97 may be diluted immediately before use. Storage in diluted form is not recommended.

Feed Equipment – Slimicide C-97 is compatible with stainless steel, many common plastics (polypropylene, HDCL polyethylene, PVC, Kynar, Teflon, Halar and polysulfone) and elastomers (Buna N and S, EPR and Viton). Avoid the use of mild steel, copper and copper alloys, aluminum, galvanized metals, low density polyethylene, natural rubber, Neoprene, Hysol and polyurethane. This product may be fed using Betz PaceSetter® or System 13000® control apparatus. When using chemical feed pumps, make sure liquid side components are made of or coated with compatible materials.
GENERAL PROPERTIES

Active Ingredients:
10% N-alkyl dimethylbenzyl ammonium chloride
5.3% 2-bromo-2-nitropropane-1,3-diol

Inert Ingredients: 84.7%

Appearance: Light yellow liquid
Density @70 °F (21 °C): 8.81 lb/gal
Flash Point (closed cup): > 200 °F (93 °C)
Freeze Point: -19 °F (-28 °C)
Initial Crystallization Point: -19 °F (-28 °C)
pH (neat): 2.5
Specific Gravity @70 °F: 1.058
Viscosity @ 70 °F: 5 cP
EPA Registration Number: 3876-147

PACKAGING INFORMATION

Betz Slimicide C-97 is a blended liquid and is supplied in 55 gal (208 L), bung-type, nonreturnable, lined steel drums. The approximate net weight is 475 lb (216 kg) per drum. Slimicide C-97 is available under Betz Point of Feed® and Betz Semi Bulk Control® Service programs for contracted quantities in certain geographic areas.

SAFETY PRECAUTIONS

Use of eye protection and gauntlet type gloves is recommended when handling this product. Material Safety Data Sheets containing detailed information about this product are available upon request.

* Purchase of Slimicide C-97 from Betz Industrial includes a license to practice the processes covered by U.S. Patents 4,725,624, and 4,855,296.
PRODUCT: SLIMICIDE C-97W

AQUATIC TOXICOLOGY

Fathead Minnow 96 Hour Static Renewal Bioassay

LC50: 5.3 mg/L
No Effect Level: 2.7

Daphnia magna 48 Hour Static Renewal Bioassay

LC50: .25 mg/L
No Effect Level: .2

Mysid Shrimp 96 Hour Static Renewal Bioassay

LC50: 1.2 mg/L
No Effect Level: .16

Menidia beryllina (Silversides) 96 Hour Static Renewal Bioassay

LC50: 6.8 mg/L
No Effect Level: 2.5

BIODEGRADATION

COD (mg/gm): 335 Calculated
TOC (mg/gm): 96 Calculated

BOD-5 (mg/gm): 8 Calculated
BOD-28 (mg/gm): 8 Calculated

Closed Bottle Test
% Degradation in 28 days: 6 Calculated

Zahn-Wellens Test
% Degradation in 28 days: 0 Calculated

MAMMALIAN TOXICOLOGY

Oral LD50 RAT: 1,240 MG/KG

Dermal LD50 RABBIT: >2,000 MG/KG
PRODUCT: SLIMICIDE C-97W

PRODUCT APPLICATION: WATER-BASED MICROBIAL CONTROL AGENT.

SECTION 1 - HAZARDOUS INGREDIENTS

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL’S AND TLV’S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

(C12-16)ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE***CAS# 68424-85-1; CORROSIVE (SKIN AND EYES); PEL: NOT DETERMINED; TLV: NOT DETERMINED

2-BROMO-2-NITROPROPANE-1,3-DIOL***CAS# 52-51-7; EYE IRRITANT; POTENTIAL SKIN SENSITIZER; PEL: NOT DETERMINED; TLV: NOT DETERMINED

ETHYL ALCOHOL (ETHANOL)***CAS# 64-17-5; FLAMMABLE; EYE IRRITANT; POTENTIAL LIVER AND KIDNEY TOXIN. MAY CAUSE CNS DEPRESSION; PEL: 1000PPM; TLV: 1000PPM

SECTION 2 - TYPICAL PHYSICAL DATA

PH: AS IS (APPROX.) 1.9
FL. Pt. (DEG. F): > 200 P-M (CC)
VAPOR PRESSURE (mmHG): 18.0
VISC cPs70F: 16
EVAP RATE: < 1.00 (ETHER=1)
PHYSICAL STATE: LIQUID

SECTION 3 - REACTIVITY DATA

STABLE. MAY REACT WITH STRONG OXIDIZERS. DO NOT CONTAMINATE. BETZ TANK CLEAN-OUT CATEGORY ‘B’

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.
PRODUCT: SLIMICIDE C-97W

SECTION 4: HEALTH HAZARD EFFECTS

ACUTE SKIN EFFECTS
*** PRIMARY ROUTE OF EXPOSURE
MAY CAUSE MODERATE IRRITATION TO THE SKIN. POTENTIAL SKIN SENSITIZER

ACUTE EYE EFFECTS
CORROSIVE TO THE EYES

ACUTE RESPIRATORY EFFECTS
VAPORS, GASES, MISTS OR AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT. PROLONGED EXPOSURE MAY CAUSE DIZZINESS AND HEADACHE.

CHRONIC EFFECTS OF OVEREXPOSURE
PROLONGED OR REPEATED EXPOSURES MAY CAUSE LIVER AND KIDNEY TOXICITY, CNS DEPRESSION AND SKIN SENSITIZATION.

MEDICAL CONDITIONS AGGRAVATED
NOT KNOWN

SYMPTOMS OF EXPOSURE
MAY CAUSE REDNESS OR ITCHING OF SKIN, IRRITATION AND/OR TEARING OF EYES (DIRECT CONTACT).

SECTION 5: FIRST AID INSTRUCTIONS

SKIN CONTACT
REMOVE CLOTHING. WASH AREA WITH LARGE AMOUNTS OF SOAP SOLUTION OR WATER FOR 15 MIN. IMMEDIATELY CONTACT PHYSICIAN

EYE CONTACT
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES. IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE
REMOVE VICTIM FROM CONTAMINATED AREA. APPLY NECESSARY FIRST AID TREATMENT. IMMEDIATELY CONTACT A PHYSICIAN.

INGESTION
DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM. DO NOT INDUCE VOMITING. IMMEDIATELY CONTACT PHYSICIAN. DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

SECTION 6: SPILL, DISPOSAL AND FIRE INSTRUCTIONS

SPILL INSTRUCTIONS
VENTILATE AREA. USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE CONTAMINATED ABSORBENT SHOULD BE CONSIDERED A PESTICIDE AND DISPOSED OF IN AN APPROVED PESTICIDE LANDFILL. SEE PRODUCT LABEL STORAGE AND DISPOSAL INSTRUCTIONS.

FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS
WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY, IN ACCORDANCE WITH ANY LOCAL AGREEMENT. A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT PRODUCT (AS IS).

DISPOSE OF IN APPROVED PESTICIDE FACILITY OR ACCORDING TO LABEL INSTRUCTIONS.

FIRE EXTINGUISHING INSTRUCTIONS
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE). PROPER FIRE EXTINGUISHING MEDIA: DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER.
PRODUCT: SLIMICIDE C-97W

----SECTION 7-----------SPECIAL PROTECTIVE EQUIPMENT-------------
USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.
VENTILATION PROTECTION***
ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS
RECOMMENDED RESPIRATORY PROTECTION***
IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE & DUST/MIST PREFILTER
RECOMMENDED SKIN PROTECTION***
NEOPRENE GLOVES
WASH OFF AFTER EACH USE REPLACE AS NECESSARY.
RECOMMENDED EYE PROTECTION***
SPLASH PROOF CHEMICAL GOGGLES

----SECTION 8-----------STORAGE AND HANDLING PRECAUTIONS-----------
STORAGE INSTRUCTIONS***
KEEP CONTAINERS CLOSED WHEN NOT IN USE.
PROTECT FROM FREEZING
HANDLING INSTRUCTIONS***
ACIDIC, CORROSIVE (EYES). DO NOT MIX WITH ALKALINE MATERIAL.

************************************************************************
THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD
************************************************************************

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: THIS IS AN EPA REGISTERED BIOCID AND IS EXEMPT FROM TSCA INVENTORY REQUIREMENTS
...FIFRA(40CFR): EPA REG.NO.: 3876-147
...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:
NO REGULATED CONSTITUENT PRESENT AT OSHA THRESHOLDS
...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE, THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: D002-CORROSIVE(PH, STEEL)
...DOT HAZARD/UN#/ER GUIDE# IS: CORROSIVE TO STEEL/UN1760/#60
...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS:
NO REGULATED CONSTITUENT PRESENT AT OSHA THRESHOLDS
...SARA SECTION 302 CHEMICALS:
NO REGULATED CONSTITUENT PRESENT AT OSHA THRESHOLDS
SARA SECTION 313 CHEMICALS:
NO REGULATED CONSTITUENT PRESENT AT OSHA THRESHOLDS
SARA SECTION 312 HAZARD CLASS: IMMEDIATE (ACUTE); DELAYED (CHRONIC)
...MICHIGAN CRITICAL MATERIALS:
NO REGULATED CONSTITUENT PRESENT AT OSHA THRESHOLDS
NFPA/HMIS: HEALTH - 3; FIRE - 1; REACTIVITY - 0; SPECIAL - CORR; PE - B
April 5, 1990

19032,001.06
0371MI

State of Hawaii
Department of Land and Natural Resources
Division of Water and Land Development

Attention: Mr. Ed Sakoda

Gentlemen:

Well Construction Permits issued in February 1989 for the subject wells, we are submitting the enclosed Well Completion Reports. Additionally, we are enclosing a copy of our report dated February 21, 1990, of the final construction and testing of the Production Wells at the KalaAloa Cogeneration Plant. This report includes data required under items 3b through 3f of the Well Construction Permit.

If you have any questions about the enclosed materials, please call.

Sincerely yours,

HARDING LAWSON ASSOCIATES

John J. Ward
Associate Hydrogeologist

Enclosures

cc: KalaAloa Partners, L.P./Mr. William Snarponis (w/o report)
ABB Energy Services/Mr. Jim Harrelson (w/o report)
Belt Collins & Associates/Mr. John Goody (w/o report)
PUMP INSTALLATION PERMIT
for
Kalaeloa Wells
Well Nos. 1805-04 to 09
Ewa Beach, Oahu

TO: Kalaeloa Partners

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to install 330 gallons per minute (gpm) pumps into five wells (Well Nos. 1805-04 to 08) and an 870 gpm pump into one well (Well No. 1805-09) for industrial use is approved, subject to the following conditions:

1. The Division of Water Resource Management (DWRM), Geology-Hydrology Section, shall be notified at 548-7543, before any work covered by this permit commences.

2. The proposed use shall not adversely affect existing legal uses in the area.

3. The applicant shall comply with all applicable laws, rules, and ordinances.

4. The applicant shall submit Well Completion Reports to the DWRM within 30 days after completion of the work.

5. This permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.

OCT 2 1990

Date of Issuance

cc: USGS
    Department of Health
    Drinking Water Branch
    Ground Water Protection Program
    Honolulu Board of Water Supply

WILLIAM W. PATY, Chairperson
Commission on Water Resource Management
The Honorable William W. Paty, Chairperson
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii

Dear Mr. Paty:

SUBJECT: PUMP INSTALLATION PERMIT APPLICATIONS
KALAELOA COGENERATION PLANT WELLS
(PRODUCTION WELLS PW-1 THROUGH PW-6)
STATE WELL NOS. 1805-04 THROUGH -09
EWABEACH, OAHU

Thank you for the opportunity to review and comment on the subject applications.

Since the proposed wells will be used to supply cooling water for the cogeneration facility, the Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems," are not applicable. However, in the event that the proposed use were to change, please inform the Safe Drinking Water Branch.

If you should have any questions, please contact the Safe Drinking Water Branch at [redacted]

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

cc: William Snarponis
Kalaeloa Partners, Limited Partnership
Honorable John C. Lewin, M.D.
Director
Department of Health
State of Hawaii

Attn. Mr. Thomas Arizumi, Drinking Water Branch

Dear Dr. Lewin:

Pump Installation Permit Applications

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168-12(c), we are sending you a copy of the following permit applications for your review:

Gora Estate Well (Well No. 2359-10)
Kalaeloa Cogeneration Plant Wells (Well Nos. 1805-04 to 09)

Please submit your comments to us, orally or in writing, by August 3, 1990.

Please contact Manabu Tagomori at [redacted] if you have any questions.

Very truly yours,

WILLIAM W. PATY

Encl.
Kalaeloa Partners, L.P.

Dear Kalaeloa Partners, L.P.:

We have received your application and $25.00 filing fee to install pumps in Kalaeloa Cogeneration Power Plant Wells (Well Nos. 1805-04 to 09) at Tax Map Key: 9-1-31:23, Ewa Beach, Hawaii.

We are reviewing your application for completeness and will contact you if we need more information.

Please call Ed Sakoda at [redacted] if you have any questions.

Sincerely,

[Signature]

MANABU TAGOMORI
Deputy Director

ES: mh
DIVISION OF WATER RESOURCE MANAGEMENT

FROM: __________________________ DATE: ________ FILE IN: ________

TO: INITIAL: _____________________ PLEASE: See Me

____ M. TAGOMORI ______ Take Action By__________

____ G. Matsumoto ______ Route to Your Branch

____ G. Akita ______ Review & Comment

____ L. Chang ______ Draft Reply

____ Y. Shiroma ______ Acknowledge Receipt

____ E. Sakoda ______ Xerox ___ copies

____ D. Nakano ______ File

____ W. Rozeboom ______ Mail

____ S. Samuels ______ For Information

____ E. Hirano ______ S. Kokubun

____ T. Kam ______ L. Nanbu

____ A. Monden ______ F. Ching

____ H. Young ______ L. Choo

____ D. Lee ______

____ G. Miyashiro ______

REMARKS:

WUP = 3.168 mgd

≈ 3.2 mgd

4 well @ 350 ppm

1 well @ 870 ppm
July 2, 1990

State of Hawaii
Division of Water and Land Development

Attention: Mr. Ed Sakoda

Gentlemen:

**Pump Installation Permit Application**

Enclosed are applications for pump installation permits for Kalaeloa Cogeneration Power Plant wells (State Well Nos. 1805-04 to -09). Also enclosed is the $25.00 filing fee.

Please call if you have any questions.

Very truly yours,

HARDING LAWSON ASSOCIATES

John J. Ward
Associate Hydrogeologist

JJW/rpb

Enclosures
<table>
<thead>
<tr>
<th>DATE</th>
<th>NO.</th>
<th>DESCRIPTION</th>
<th>TOTAL AMOUNT</th>
<th>DEDUCTIONS</th>
<th>NET AMOUNT</th>
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</table>
| 7-2-90 | 220000 | Permit Fee  
Job #19032,001.06  
Well Nos. 1805-0409 | 25.00        |            | 25.00      |
PAY **** Twenty Five and no/100 ****

DOLLARS $25.00

TO THE ORDER OF Department of Land and Natural Resources

P.O. Box 373
Honolulu, HI 96809

July 2, 1990

DELUXE FORM WVO-3 V-4

<table>
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<th>INVOICE DATE</th>
<th>NO.</th>
<th>DESCRIPTION</th>
<th>TOTAL AMOUNT</th>
<th>DEDUCTIONS</th>
<th>NET AMOUNT</th>
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Well Nos. 1805 - 04 & 09
APPLICATION FOR

WELL CONSTRUCTION PERMIT
X PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water and Land Development, P.O. Box 313, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-1342, Hydrology/Geology Section for assistance.

1. WELL LOCATION

Island Oahu Tax Map Key 9-1-31:23
Address 91-111 Kalaeloa Blvd., Ewa Beach, Hawaii

(Append a USGS map (scale 1"=2000') and property tax map showing well location referenced to established property boundaries.)

2. WELL OWNER

Firm Name Kalaeloa Partners, L.P.
Contact Person Mr. William Snarponis
Address
Phone

3. LANDOWNER

Firm Name Hawaiian Independent Refinery, Inc.
Contact Person Faye Curren
Address
Phone

3. PROPOSED CONTRACTOR FOR:

☐ Well Drilling ☒ Pump Installation
Name Chicago Bridge and Iron Services, Inc.
Address Freemont, California
Contractor's License No. AC 13463

4. PROPOSED WORK

☐ Drill New Well ☐ Deepen ☐ Redrill
☐ Alter ☐ Install New Pump ☐ Replace Pump
☐ Modify Pump

(Briefly describe the proposed work and fill in the diagram on the back of this form.)

5. PROPOSED USE

☐ Municipal (including hotels, stores, etc.) ☐ Military
☐ Domestic (individual, noncommercial water systems) ☐ Industrial
☐ Irrigation (specify) ☐ Other (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL

☐ 330 gallons per day

7. PROPOSED PUMP INFORMATION

Pump Type: ☐ Vertical Turbine ☐ Submersible
Motor: ☐ Diesel ☐ Electric: 7.5 HP Centrifugal
Rated Pump Capacity 330 gpm
Gallons per minute (gpm)

Well Owner (print) W. Snarponis
Signature Date 6/23/90

Landowner (print) Hawaiian Independent Refinery, Inc.
Signature Date 6/23/90

For Official Use Only:
Field Checked By ___________________
Latitude ___________________
Hydrologic Unit ___________________
State Well No. 1805-04-008

Date ___________________
Longitude ___________________
Briefly describe the proposed work:
Installation of vertical turbine pumps in 5 wells

State Well Numbers 1805-04 through 1805-08

Production Wells PW-1 through PW-5 on attached site plan

PROPOSED SECTION OF WELL

Elevation at top of casing 13.5 ft., msl.

Cement Grout 16 ft.

Hole Dia. 24 in.

Total Depth 25 ft.

Rock Packing 9 ft.

Ground Elev. 13 ft., msl

Solid Casing:
Material PVC
Length 17 ft.
Diameter 11.37" (ID) in.
Wall thickness 0.687 in.

Casing: /X/Perforated /X/Screen(PW-1)
Material PVC (Stainless Steel for PW-1)
Length 8 ft.
Diameter 11.37" (ID) in.
Wall thickness 0.687 in.
Openings 77.16 sq. in./L.F.

Open Hole:
Length 0
Diameter ___________ in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
APPLICATION FOR

WELL CONSTRUCTION PERMIT

X PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water and Land Development, P.O. Box 373, Honolulu, Hawaii 96849. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-7543, Hydrology/Geology Section for assistance.

1. WELL LOCATION

Island Oahu

Tax Map Key 9-1-31:23

Address [redacted], Hawaii

(Attach a USGS map (scale 1"=2000') and property tax map showing well location referenced to established property boundaries.)

2. WELL OWNER

Firm Name Kalaeloa Partners, L.P.

Contact Person Mr. William Snarponis

Address [redacted]

Phone [redacted]

LANDOWNER

Firm Name Hawaiian Independent Refinery, Inc.

Contact Person Faye Curren

Address [redacted]

Phone [redacted]

3. PROPOSED CONTRACTOR FOR:  □ Well Drilling  □ Pump Installation

Name Chicago Bridge and Iron Services, Inc.

Address Fremont California

Contractor's License No. AC 13463

4. PROPOSED WORK

□ Drill New Well  □ Deepen  □ Redrill

□ Alter  □ Seal  □ Abandon

□ Install New Pump  □ Replace Pump  □ Modify Pump

(Briefly describe the proposed work and fill in the diagram on the back of this form.)

5. PROPOSED USE

□ Municipal (including hotels, stores, etc.)  □ Military

□ Domestic (individual, noncommercial water systems)  □ Industrial

□ Irrigation (specify)  □ Other (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL 870 gallons per day

7. PROPOSED PUMP INFORMATION

Pump Type: □ Vertical Turbine  □ Submersible

Motor: □ Diesel  □ Gas  □ Electric: 25  □ Centrifugal

Rated Pump Capacity 870 gallons per minute (gpm)

Well Owner (print) W. Snarponis

Signature

Date 7/20/90

Landowner (print) Hawaiian Independent Refin

Inc

Signature

Date 6/18/90

For Official Use Only:

Field Checked By

Latitude

Hydrologic Unit

State Well No. 1805-09

Longitude
Briefly describe the proposed work:
Installation of vertical turbine pump

State Well Number 1805-09

Production Well PW-6 on attached site plan

PROPOSED SECTION OF WELL

Elevation at top of casing
13.58 ft., msl.

Cement Grout 15 ft.

Hole Dia. 24 in.

Total Depth 42 ft.

Rock Packing 27 ft.

Ground Elev. 13 ft., msl*

Solid Casing:
Material PVC
Length 17 ft.
Diameter 14.31" (ID) in.
Wall thickness 0.84 in.

Casing: /X/Perforated / /Screen
Material PVC
Length 25 ft.
Diameter 14.31" (ID) in.
Wall thickness 0.84 in.
Openings 108 sq. in./L.F.

Open Hole:
Length 0
Diameter in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
Chairperson and Members
Commission on Water Resource Management
State of Hawaii
Honolulu, Hawaii

Gentlemen:

Kalaeloa Partners, L.P.
Application for Pump Installation Permits
Kalaeloa Wells, Ewa Beach, Oahu

Applicant: Kalaeloa Partners, L.P.
Landowner: Hawaiian Independent Refinery, Inc.

Action Requested: Permission to install 330 gallons per minute (gpm) pumps into five wells (Well Nos. 1805-04 to 08) and an 870 gpm pump into one well (Well No. 1805-09) for industrial use.

Proposed Amount of Withdrawal: Four wells will supply about 1,320 gallons per minute for normal plant cooling requirements. A fifth well will be for standby use. A sixth well will be used for emergency bypass cooling at 870 gpm. The peak system capacity will be about 2,200 gpm or about 3.168 mgd.

Well Description:

<table>
<thead>
<tr>
<th>Ground elevation</th>
<th>Wells 1805-04 to 08</th>
<th>Well 1805-09</th>
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<td>13 ft.</td>
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<td>330 gpm</td>
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<td>870 gpm</td>
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</table>

Analysis: The wells will develop brackish water from the caprock aquifer. No adverse impacts are expected.

Water Availability: The well is located in the Ewa Plain Caprock Aquifer, Oahu. The applicant has a water use permit from the Commission to use 3.168 mgd for industrial use.

RECOMMENDATION:

That the Commission approve the issuance of pump installation permits for the Kalaeloa Wells, subject to the following conditions:
Chairperson and Member  
Commission on Water Resource Management  
September 19, 1990

(1) The Division of Water Resource Management (DWRM) shall be notified before work commences.

(2) Well Completion Reports shall be submitted to DWRM within 30 days after completion of the work.

(3) The proposed use shall not adversely affect existing legal uses in the area.

(4) The applicant shall comply with all applicable laws, rules, and ordinances.

(5) The permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.

Respectfully submitted,

MANABU TAGOMORI  
Deputy Director

Attach.

APPROVAL FOR SUBMITTAL:

WILLIAM W. PATY, Chairperson
WELL COMPLETION REPORT

INSTRUCTIONS: Please print or type and submit completed report within 30 days of well completion to the Division of Water & Land Development, P.O. Box 375, Honolulu, HI 96805. An as-built drawing of the well and chemical analysis, if available, should also be submitted. If necessary, phone 548-1543. Hydrology, Geology Section for assistance.

A. STATE WELL NO. 1805-09
   WELL NAME  KALAELOA PW-5
   MUNICIPAL
   ISLAND OAHU

B. LOCATION
   TAX MAP KEY 9-1-31:23
   WELL OWNER KALAELOA PARTNERS, L.P.

C. DRILLING OR PUMP INSTALLATION CONTRACTOR CMZ-DRILLER; ROSCOE MOSS - WELL CONST.

D. TYPE OF RIW WATSON 2000
   DRILLER JIM LAMBOTT

E. DATE OF WELL COMPLETION 1-24-90
   DATE OF PUMP INSTALLATION N/A

F. GROUND ELEVATION (mal) 13.58 ft.
   Top of Drilling Platform (mal) N/A ft.
   Height of drilling platform above ground surface N/A ft.

G. TOTAL DEPTH OF WELL BELOW GROUND 40.0 feet
   HOLE SIZE: 24 inch dia. from 0 ft. to 42 ft. below ground
   LOCATION

H. CASING INSTALLED:
   14.3 in. I.D. x 0.84 in. wall solid section to 40.0 ft. below ground
   30.0 in. I.D. x 0.125 in. wall perforated section to 40.0 ft. below ground
   Type of perforation U.D.C. 1 3/8 inch slotted casing

I. ANNUAL:
   Grouted from 0 ft. to 15.0 ft. below ground
   Gravel packed from 0 ft. to 42 ft. below ground

J. PERMANENT PUMP INSTALLATION:
   Pump type, make, serial No. N/A
   Motor type, H.P., voltage, r.p.m.
   Capacity gpm
   Depth of pump intake setting 40.0 ft. below ground
   Depth of bottom of airline 40.0 ft. below ground
   Which elevation is ft.
   Which elevation is ft.

K. PROPOSED USE
   INDUSTRIAL

L. INITIAL WATER LEVEL 11.8 ft. below ground.
   Date and time of measurement 1-9-90 / 11:00 AM

M. INITIAL CHLORIDE ppm.
   Date and time of sampling

N. PUMPING TESTS:
   Reference point (R.P.) used: LEVEL which elevation is 13.50 ft.

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<th>End water level</th>
<th>Depth of well</th>
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<th>Draw down</th>
<th>Temp.</th>
<th>Time (hours)</th>
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Well PW-6

15" PVC Slip Cap
Br. Pin Elev: 13.58 feet

Cement Grout

24-Inch Diameter
Boring to 42 Feet

14.5/16" (I.D.) PVC Blank Casing Schedule 80

Monterey Filter Gravel
1/4-3/8" and 3/8-3/4"

14.5/16" (I.D.) PVC Slotted Casing Sch. 80
0.125" Slot Size
20% Open Area

End of boring at 42 feet

State Well No.
1805-16M

Equipment 24" Auger

Elevation 13 feet MSL Date 1/4/90

BROWN SANDY LIMESTONE - moderately hard, with cobbles-sized pieces of coral and small twigs.

WHITE TO LIGHT TAN CORALLINE LIMESTONE - hard, massive.

YELLOW TO ORANGE CORALLINE LIMESTONE - moderately soft, loose with shell pieces.

Water level at 11.8 feet.

GRAY CORALLINE LIMESTONE - soft

WHITE TO LIGHT TAN CORALLINE LIMESTONE - soft at 16 feet.

Log and Construction Detail, Well PW-6
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii
## Summary of Ground-Water Chemistry

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**WELL COMPLETION REPORT**

**INSTRUCTIONS:** Please print or type and submit completed report within 30 days of well completion to the Division of Water & Land Development, P.O. Box 373, Honolulu, HI 96809. An as-built drawing of the well and chemical analysis, if available, should also be submitted. If necessary, phone 548-7543, Hydrology, Geology Section for assistance.

<table>
<thead>
<tr>
<th>A. STATE WELL NO.</th>
<th>1805-08</th>
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<tr>
<td>B. LOCATION</td>
<td>HAWAII</td>
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<tr>
<td></td>
<td>TAX MAP KEY 9-1-31:23</td>
</tr>
<tr>
<td>C. WELL OWNER</td>
<td>KALAELOA PARTNERS, L.P.</td>
</tr>
<tr>
<td>D. DRILLING OR PUMP INSTALLATION CONTRACTOR</td>
<td>CMZ - DRILLER; ROSCOE MOSS - WELL CONST.</td>
</tr>
<tr>
<td>E. TYPE OF RIG</td>
<td>WATSON 2000</td>
</tr>
<tr>
<td>F. DATE OF WELL COMPLETION</td>
<td>1-24-90</td>
</tr>
<tr>
<td></td>
<td>DATE OF PUMP INSTALLATION: N/A</td>
</tr>
<tr>
<td>G. GROUND ELEVATION (mal): 13.48 ft.</td>
<td></td>
</tr>
<tr>
<td>H. TOTAL DEPTH OF WELL BELOW GROUND: 25.0 feet</td>
<td></td>
</tr>
<tr>
<td>I. HOLE SIZE: 25 inch dia. from 0 ft. to 25.6 ft. below ground</td>
<td></td>
</tr>
<tr>
<td>J. CASING INSTALLED: 11.36 in. I.D. x 0.69 in. wall solid section to 25 ft. below ground.</td>
<td></td>
</tr>
<tr>
<td>K. ANNULUS: Grouted from 0 ft. to 15.5 ft. below ground.</td>
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</tr>
<tr>
<td>L. PERMANENT PUMP INSTALLATION: Capacity N/A</td>
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<tr>
<td>M. PROPOSED USE: INDUSTRIAL</td>
<td></td>
</tr>
<tr>
<td>N. INITIAL WATER LEVEL: Date and time of measurement: 1-9-90 11:00AM</td>
<td></td>
</tr>
<tr>
<td>O. INITIAL CHLORIDE: Date and time of sampling:</td>
<td></td>
</tr>
<tr>
<td>P. PUMPING TESTS: Reference point (R.P.) used: LEVEL which elevation is 13.3 ft.</td>
<td></td>
</tr>
</tbody>
</table>

| T | Start water level | 12.0 | ft. below R. P. |
| T | End water level | 11.7 | ft. below R. P. |
| T | Depth of well | 25.6 | ft. below R. P. |
| T | Elapsed Time (hours): | to | |
| T | Rate Draw (gpm): | to | |
| T | Down (ft.): | to | |
| T | Temp. (°F): | to | |
| T | Depth, ft.: | to | |
| T | Rock Description & Remarks: | see attached sheet | |

| T | Start water level | 12.0 | ft. below R. P. |
| T | End water level | 11.7 | ft. below R. P. |
| T | Depth of well | 25.6 | ft. below R. P. |
| T | Elapsed Time (hours): | to | |
| T | Rate Draw (gpm): | to | |
| T | Down (ft.): | to | |
| T | Temp. (°F): | to | |
| T | Depth, ft.: | to | |
| T | Rock Description & Remarks: | | |

**Q. DRILLER’S LOG:**

| T | Depth, ft.: | to | |
| T | Rock Description & Remarks: | see attached sheet | |
| T | Water Level ft.: | to | |

**REMARKS:** C & C Street Monument, Kalaeloa Blvd. and Kuhela Street, Elevation = 10.08

Submitted by (print) **JOHN J. WARD**

Signature **JOHN J. WARD**

Date **April 4, 1990**

**ASSOCIATE HYDROGEOLOGIST**

HARDING LAWSON ASSOCIATES
Well PW-5

12" PVC Slip Cap
Br Pin Elev 13.48 feet
Cement Grout

11-3/8" (I.D.) PVC
Blank Casing Schedule 80

24-inch Diameter
Boring to 25.8 Feet

Bentonite

Monterey Filter Gravel
1/4"-3/8" and 3/8"-3/4"

11-3/8" (I.D.) PVC Slotted
Casing Sch 80
0.125" Slot Size
18% Open Area

12" PVC Slip Cap

WHITE TO LIGHT TAN CORALLINE
LIMESTONE - hard

TAN TO ORANGE CORALLINE
LIMESTONE - medium hard
grading to soft

Water level at 12 feet

End of boring at 25.8 feet

STATE WELL NO.
1805-15M
Summary of Ground-Water Chemistry

<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNITS</th>
<th>PW-5 1805-15</th>
<th>1/16/90</th>
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<tbody>
<tr>
<td><strong>Field Data:</strong></td>
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<tr>
<td>Sample Temp.</td>
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<tr>
<td>pH</td>
<td>pH units</td>
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<tr>
<td>Dissolved Oxygen</td>
<td>mg/l</td>
<td>2.1</td>
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<tr>
<td>Conductivity</td>
<td>umhos @ 25 C</td>
<td>4904</td>
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<tr>
<td>Alkalinity</td>
<td>mg/l</td>
<td>365</td>
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<tr>
<td>Salinity</td>
<td>mg/l</td>
<td>3.1</td>
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<tr>
<td><strong>Lab Determinations:</strong></td>
<td></td>
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<tr>
<td>Chloride</td>
<td>mg/l</td>
<td>1450</td>
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<tr>
<td>Bicarbonate</td>
<td>mg/l</td>
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<td>Sulfate</td>
<td>mg/l</td>
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<tr>
<td>Nitrate</td>
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<td>2.5</td>
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<tr>
<td>Total Silica</td>
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<td>Reactive Silica</td>
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<td>Sodium</td>
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<td>Potassium</td>
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<tr>
<td>Total Iron</td>
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<td>&lt;0.1</td>
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<tr>
<td>Manganese</td>
<td>mg/l</td>
<td>&lt;0.1</td>
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<tr>
<td>Barium</td>
<td>mg/l</td>
<td>&lt;1.0</td>
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<tr>
<td>Strontium</td>
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<tr>
<td>Total Organic Carbon</td>
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<tr>
<td>Total Diss. Solids</td>
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<tr>
<td><strong>Sum of Cations</strong></td>
<td>meq/l</td>
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<td><strong>Sum of Anions</strong></td>
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<tr>
<td><strong>Cation-Anion Balance</strong></td>
<td>%</td>
<td>-4.88</td>
<td></td>
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</tbody>
</table>
**WELL COMPLETION REPORT**

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<table>
<thead>
<tr>
<th>A. STATE WELL NO.</th>
<th>1805-07</th>
<th>WELL NAME</th>
<th>KALELOA PW-4</th>
<th>ISLAND</th>
<th>OAHU</th>
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<tbody>
<tr>
<td>B. LOCATION</td>
<td>1805-4A</td>
<td>TAX MAP KEY</td>
<td>9-1-31:23</td>
<td></td>
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<tr>
<td>C. WELL OWNER</td>
<td>KALELOA PARTNERS, L.P.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. DRILLING OR PUMP INSTALLATION CONTRACTOR</td>
<td>CMZ - DRILLER; ROSCOA MOSS - WELL CONST.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. TYPE OF RIG</td>
<td>WATSON 2000</td>
<td>DRILLER</td>
<td>JIM LAMOTT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. DATE OF WELL COMPLETION</td>
<td>1-24-90</td>
<td>DATE OF PUMP INSTALLATION</td>
<td>N/A</td>
<td></td>
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<tr>
<td>G. GROUND ELEVATION(mal)</td>
<td>13.52 ft.</td>
<td>Top of Drilling Platform (mal)</td>
<td>N/A ft.</td>
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<tr>
<td>J. CASING INSTALLED</td>
<td>11.38 in. I.D. x 0.69 in. wall solid section to 25 ft. below ground</td>
<td>in. I.D. x 0.76 in. wall perforated section to 25 ft. below ground</td>
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<tr>
<td>K. ANNULUS:</td>
<td>Grouted from 0 ft. to 15.0 ft. below ground</td>
<td>Gravel packed from 15.0 ft. to 25.0 ft. below ground</td>
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<td>L. PERMANENT PUMP INSTALLATION:</td>
<td>N/A</td>
<td>Capacity</td>
<td>gpm</td>
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<td>M. PROPOSED USE</td>
<td>INDUSTRIAL</td>
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<tr>
<td>N. INITIAL WATER LEVEL</td>
<td>12.4 ft. below ground</td>
<td>Date and time of measurement</td>
<td>1-9-90 / 11:00 AM</td>
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<tr>
<td>O. INITIAL CHLORIDE</td>
<td>N/A ppm.</td>
<td>Date and time of sampling</td>
<td></td>
<td></td>
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<tr>
<td>P. PUMPING TESTS:</td>
<td>Reference point (R.P.) used: LEVEL which elevation is 13.3 ft.</td>
<td></td>
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</table>

**MARKS:**

**Driller's Log:**

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</tbody>
</table>

**Remarks:**

C & C Street Monument, Kalaeloa Blvd. and Kuhela Street, Elevation = 10.08

Submitted by (print)  
JOHN J. WARD  
Signature (print)  
April 4, 1990
Well PW-4

12" PVC Slip Cap
Br Pin Elev 13.52 feet
Cement Grout

11-3/8" (I.D.) PVC Blank Casing Schedule 80

24-Inch Diameter Boring to 255 Feet

Bentonite

Monterey Filter Gravel
1/4-3/8" and 3/8-3/4"

11-3/8" (I.D.) PVC Slotted Casing Sch 80
0.125" Slot Size
18% Open Area

12" PVC Slip Cap

STATE WELL NO
1805-14M

Equipment 24" Auger

Date 1/3/90

Sample

Elevation 13 feet MSL

WHITE TO LIGHT TAN CORALLINE LIMESTONE - very hard grading to moderately hard

TAN TO ORANGE CORALLINE LIMESTONE - moderately hard grading to soft

Water level at 12.4 feet

End of boring at 25.5 feet

Harding Lawson Associates
Engineering and Environmental Services
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

DRAWN
FMCG/gwl
19032.003.06

APPROVED
02/90

REVISED
## Summary of Ground-Water Chemistry

<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNITS</th>
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<tbody>
<tr>
<td><strong>Sample Temp.</strong></td>
<td>Deg C</td>
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<tr>
<td><strong>pH</strong></td>
<td>pH units</td>
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<tr>
<td><strong>Dissolved Oxygen</strong></td>
<td>mg/l</td>
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<tr>
<td><strong>Conductivity</strong></td>
<td>mhos @ 25 C</td>
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<tr>
<td><strong>Alkalinity</strong></td>
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<td><strong>Chloride</strong></td>
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<td><strong>Nitrate</strong></td>
<td>mg/l</td>
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<td><strong>Total Silica</strong></td>
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<td><strong>Reactive Silica</strong></td>
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<td><strong>Calcium</strong></td>
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<tr>
<td><strong>Manganese</strong></td>
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<td><strong>Barium</strong></td>
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<td><strong>Strontium</strong></td>
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<tr>
<td><strong>Total Organic Carbon</strong></td>
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<td><strong>Total Diss. Solids</strong></td>
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<td><strong>Sum of Cations</strong></td>
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<td><strong>Sum of Anions</strong></td>
<td>meq/l</td>
</tr>
<tr>
<td><strong>Cation-Anion Balance</strong></td>
<td>%</td>
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LEGEND

- INJ-1 Injection Well Location and Designation
- PW-1 Production Well Location and Designation
- EX-1 Exploration Well Location and Designation
- Foundation Exploration Boring by Dames & Moore (1988)

REFERENCE: General Layout Map HTOA 002107 (June 13, 1988)

Site Plan and Location of Wells and Exploratory Boring
Kaloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

HLA
Harding Leamen Associates
Engineers, Geologists & Geophysicists

Kanoa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Map/Scale
19032.001.06
11/89
STATE WELL NO. 1805-06 WELL NAME PW-3 ISLAND OAHU

A. STATE WELL NO. 1805-06
B. LOCATION TAX MAP KEY 9-1-31:23
C. WELL OWNER KALAOA PARTNERS, L.P.
D. DRILLING OR PUMP INSTALLATION CONTRACTOR ROSCOE MOSS COMPANY
E. TYPE OF RIG BUCYRUS 60L CABLE TOOL DRILLER JERRY BOURN
F. DATE OF WELL COMPLETION 1-24-90 DATE OF PUMP INSTALLATION N/A

G. GROUND ELEVATION (msl) 13.42 ft. Height of drilling platform above ground surface N/A ft. Bench mark and method used to determine ground elevation See remarks ft.
H. TOTAL DEPTH OF WELL BELOW GROUND 25.0 feet
I. HOLE SIZE: 24 inch dia. from 0 ft. to 25 ft. below ground
J. CASING INSTALLED: 11.38 in. I.D. x 0.69 in. wall solid section to 25.0 ft. below ground
K. ANNUALUS: Grouted from 0 ft. to 15.5 ft. below ground Gravel packed from 15.5 ft. to 25.0 ft. below ground
L. PERMANENT PUMP INSTALLATION: Pump type, make, serial No. N/A Capacity gpm

M. PROPOSED USE INDUSTRIAL

N. INITIAL WATER LEVEL 12.5 ft. below ground. Date and time of measurement 1-9-90 11:00 AM
O. INITIAL CHLORIDE N/A ppm. Date and time of sampling

P. PUMPING TESTS: Reference point (R.P.) used: LEVEL which elevation is 13.4 ft.

Q. DRILLER'S LOG:

R ENVY: C & C Street Monument, Kalaaoa Blvd. and Kuhela Street, Elevation = 10.08

Submit by (print) JOHN I. WARD
Signature

ASSOCIATE HYDROGEOLOGIST
HARDING LAWSON ASSOCIATES
Title

Date April 4, 1990
Well PW-3

12" PVC Slip Cap
Br Pin Elev 13 42 feet

11-3/8" I.D. PVC Blank Casing Schedule 80
Cement Grout
24-inch Diameter Boring to 42 Feet

Bentonite
Monterey Filter Gravel: 1/4-3/8" and 3/8-3/4"

11-3/8" I.D. PVC Slotted Casing Sch 80
0.125" Slot Size
18% Open Area
12" PVC Slip Cap
Cement Grout
Coralline Sand

Water level at 12.6 feet.

GRAY CORALLINE LIMESTONE - hard

SILTY SAND (SM) with gravel, loose.

Equipment
Bucyrus Eire 60L Cable Tool

Elevation 13 feet MSL Date 6/2/89

WHITE TO LIGHT TAN CORALLINE LIMESTONE - moderately hard

Log and Construction Detail, Well PW-3
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

PLATE 4

DRAWN
FMC/gwl

JOB NUMBER
19032, 003 06

APPROVED

DATE
02/90

REVISED DATE
STATE WELL NO 1805-12M

16-inch Diameter Boring to 57 Feet

Coralline Sand

SILTY SAND (SM) with gravel, loose

PINK CORALLINE LIMESTONE - moderately hard

End of boring at 57 feet

Log and Construction Detail, Well PW-3 (Continuation)
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

HLA
Harding Lawson Associates
Engineering and Environmental Services

PLATE 4

DRAWN
FMC/gwl

JOB NUMBER
19032.003.06

APPROVED

DATE
02/90

REVISED DATE
Summary of Ground-Water Chemistry

<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNITS</th>
<th>1805-13M 1/18/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Data:</td>
<td></td>
<td></td>
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<tr>
<td>Sample Temp.</td>
<td>Deg C</td>
<td>27</td>
</tr>
<tr>
<td>pH</td>
<td>pH units</td>
<td>6.91</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>mg/l</td>
<td>1.95</td>
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<tr>
<td>Conductivity</td>
<td>umhos @ 25 C</td>
<td>4807</td>
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<tr>
<td>Alkalinity</td>
<td>mg/l</td>
<td>360</td>
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<tr>
<td>Salinity</td>
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<td>2.9</td>
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<td>Lab Determinations:</td>
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<tr>
<td>Chloride</td>
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<td>1330</td>
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<tr>
<td>Bicarbonate</td>
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<tr>
<td>Sulfate</td>
<td>mg/l</td>
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<td>mg/l</td>
<td>1.9</td>
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<tr>
<td>Total Silica</td>
<td>mg/l</td>
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<tr>
<td>Reactive Silica</td>
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<td>Calcium</td>
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<tr>
<td>Total Iron</td>
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<td>&lt;0.1</td>
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<tr>
<td>Manganese</td>
<td>mg/l</td>
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<tr>
<td>Barium</td>
<td>mg/l</td>
<td>&lt;1.0</td>
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<tr>
<td>Strontium</td>
<td>mg/l</td>
<td>2.54</td>
</tr>
<tr>
<td>Total Organic Carbon</td>
<td>mg/l</td>
<td>1.6</td>
</tr>
<tr>
<td>Total Diss. Solids</td>
<td>mg/l</td>
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<td>Sum of Cations</td>
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<tr>
<td>Cation-Anion Balance</td>
<td>%</td>
<td>-2.72</td>
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</tbody>
</table>
INSTRUCTIONS: Please print or type and submit completed report within 30 days of well completion to the Division of Water & Land Development, P.O. Box 373, Honolulu, HI 98809. An as-built drawing of the well and chemical analysis, if available, should also be submitted. If necessary, phone 548-7543, Hydrology, Geology Section for assistance.

A. STATE WELL NO. 1805-05
B. WELL NAME
C. LOCATION
D. DRILLING OR PUMP INSTALLATION CONTRACTOR
E. TYPE OF RIG
F. DATE OF WELL COMPLETION
G. GROUND ELEVATION (mal) 13.5 ft.
H. TOTAL DEPTH OF WELL BELOW GROUND
I. HOLE SIZE: 24 inch dia. from 0 ft. to 26.5 ft. below ground
J. CASING INSTALLED: 11.38 in. I.D. x 0.69 in. wall solid section to 25 ft. below ground
K. ARIALS: Grouted from 0 ft. to 16.0 ft. below ground
L. PERMANENT PUMP INSTALLATION:
M. PROPOSED USE
N. INITIAL WATER LEVEL
O. INITIAL CHLORIDE
P. PUMPING TESTS: Reference point (R.P.) used:
Q. DRILLER'S LOG:
R. REMARKS:

--- Table ---

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Rock Description &amp; Remarks</th>
<th>Water Level (ft.)</th>
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<tr>
<td>0</td>
<td></td>
<td>12.2</td>
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<tr>
<td>0-10</td>
<td></td>
<td>35.4</td>
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<tr>
<td>10-20</td>
<td></td>
<td>45.7</td>
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<td>20-30</td>
<td></td>
<td>52.0</td>
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<th>End water level (ft. below R.P.)</th>
<th>Elapsed Time (hours)</th>
<th>Rate (gpm)</th>
<th>Drawdown (ft)</th>
<th>Cl (ppm)</th>
<th>Temp. (°F)</th>
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<tr>
<td>1-12-90</td>
<td>12.2</td>
<td>25.0</td>
<td>11:50 - 13:00</td>
<td>340</td>
<td>0.7</td>
<td>1.5</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
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--- Table ---

<table>
<thead>
<tr>
<th>Date</th>
<th>Start water level (ft. below R.P.)</th>
<th>End water level (ft. below R.P.)</th>
<th>Elapsed Time (hours)</th>
<th>Rate (gpm)</th>
<th>Drawdown (ft)</th>
<th>Cl (ppm)</th>
<th>Temp. (°F)</th>
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<tbody>
<tr>
<td></td>
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--- Table ---

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Rock Description &amp; Remarks</th>
<th>Water Level (ft.)</th>
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<tr>
<td>Lat. 21° 18′ 20″</td>
<td></td>
<td>18.0</td>
</tr>
<tr>
<td>Long. 158° 05′ 56″</td>
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<td>18.0</td>
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--- Table ---

<table>
<thead>
<tr>
<th>Date</th>
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--- Table ---

<table>
<thead>
<tr>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>C &amp; C Street Monument, Kalaeloa Blvd. and Kuhela Street, Elevation = 10.08</td>
</tr>
</tbody>
</table>

Submitted by (print) JOHN J. WARD
Signature

ASSOCIATE HYDROGEOLOGIST
Title HARDING LAWSON ASSOCIATES

Date April 4, 1990
Well PW-2

12" PVC Slip Cap

Cement grout

24-inch Diameter Boring to 266 feet

11-3/8" (ID) PVC Blank Casing Schedule 80

Bentonite

Monterey Filter Gravel

1/4-3/8" and 3/8-3/4"

11-3/8" (ID) PVC Slotted Casing Sch. 80

0.125" Slot Size

18% Open Area

12" PVC Slip Cap

STATE WELL NO.
1805-11M

Equipment: Bucyrus Erie 60L Cable Tool (Boring)

1/3/90 (Well)

Elevation: 13 feet MSL

Date: 6/12/89 (Boring)

WHITE TO LIGHT TAN CORALLINE LIMESTONE - hard

TAN TO ORANGE CORALLINE LIMESTONE - moderately hard

Water level at 12.2 feet

TAN LIMESTONE WITH SAND - soft, caving

Log and Construction Detail, Well PW-2

Harding Lawson Associates
Engineering and Environmental Services

PLATE

Kalaeanoa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

DRAWN
FMC/gwl

JOE NUMBER
19032.00306

APPROVED

DATE
02/90

REVISED DATE
(Continuation of Log)

- TAN LIMESTONE WITH SAND - soft, caving
- TAN CORALLINE LIMESTONE - medium hard.
  - at 44 feet, hard coral

- TAN MEDIUM-GRAINED SAND - caving

- TAN LIMESTONE - hard
  - at 77 feet, color change to WHITE, soft
(Continuation of Log)

80
85
90
95
100
105
110
115
120

Sample

Depth (ft)

WHITE LIMESTONE - soft

WHITE SILTY LIMESTONE WITH SAND, harder than above.

End of boring at 110 feet

Log and Construction Detail,
Well PW-2 (Continuation)
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii
## Summary of Ground-Water Chemistry

<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNITS</th>
<th>1/12/90</th>
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</thead>
<tbody>
<tr>
<td><strong>Field Data:</strong></td>
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<td></td>
</tr>
<tr>
<td>Sample Temp.</td>
<td>Deg C</td>
<td>27.2</td>
</tr>
<tr>
<td>pH</td>
<td>pH units</td>
<td>6.93</td>
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<tr>
<td>Dissolved Oxygen</td>
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<tr>
<td>Conductivity</td>
<td>umhos @ 25 C</td>
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<tr>
<td>Alkalinity</td>
<td>mg/l</td>
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<tr>
<td>Salinity</td>
<td>mg/l</td>
<td>3.4</td>
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<td><strong>Lab Determinations:</strong></td>
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<tr>
<td>Chloride</td>
<td>mg/l</td>
<td>1594</td>
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<tr>
<td>Bicarbonate</td>
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<tr>
<td>Nitrate</td>
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<tr>
<td>Total Silica</td>
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<tr>
<td>Reactive Silica</td>
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<tr>
<td>Manganese</td>
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<td>&lt;0.1</td>
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<tr>
<td>Barium</td>
<td>mg/l</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Strontium</td>
<td>mg/l</td>
<td>2.94</td>
</tr>
<tr>
<td>Total Organic Carbon</td>
<td>mg/l</td>
<td>6.6</td>
</tr>
<tr>
<td>Total Diss. Solids</td>
<td>mg/l</td>
<td>3372</td>
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<table>
<thead>
<tr>
<th></th>
<th>meq/l</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Sum of Anions</td>
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<tr>
<td>Cation-Anion Balance</td>
<td>%</td>
<td>-3.07</td>
</tr>
</tbody>
</table>
**INSTRUCTIONS:** Please print or type and submit completed report within 30 days of well completion to the Division of Water & Land Development, P.O. Box 323, Honolulu, HI 96803. An as-built drawing of the well and chemical analysis, if available, should also be submitted. If necessary, phone 348-1543, Hydrology, Geology Section for assistance.

### A. STATE WELL NO. 1805-04  
**WELL NAME** KALAELOA  
**ISLAND** OAHU

### B. LOCATION KALAELOA PARTNERS, L.P.  
**TAX MAP KEY** 9-1-31:23

### C. WELL OWNER KALAELOA PARTNERS, L.P.

### D. DRILLING OR PUMP INSTALLATION CONTRACTOR  
**ROSCOE MOSS COMPANY**  
**TYPE OF RIG** BUCYRUS ERIE 60L CABLE TOOL

### E. DATE OF WELL COMPLETION 1/24/90  
**DATE OF PUMP INSTALLATION** N/A

### F. GROUND ELEVATION (m) 12.61 ft.  
**Top of Drilling Platform (m) N/A** ft.  
**Height of drilling platform above ground surface N/A** ft.  
**Bench mark and method used to determine ground elevation** See remarks ft.

### H. TOTAL DEPTH OF WELL BELOW GROUND 25.0 feet

### I. HOLE SIZE:  
- 24 in. dia. from 0 ft. to 25 ft. below ground
- 24 in. dia. from 0 ft. to 25 ft. below ground

### J. CASING INSTALLED:  
- 12.25 in. I.D. x 0.25 in. wall solid section to 25.0 ft. below ground
- 12.25 in. I.D. x 0.25 in. wall perforated section to 25.0 ft. below ground

### K. ANNULS:  
- Grouted from 0 ft. to 16 ft. below ground
- Gravel packed from 16.0 ft. to 25.0 ft. below ground

### L. PERMANENT PUMP INSTALLATION:  
- **Capacity** gpm
- **Motor type, make, serial No.** N/A

### M. PROPOSED USE    
**INDUSTRIAL**

### N. INITIAL WATER LEVEL 10 ft. below ground.  
**Date and time of measurement** 11-1-89 / 17:38

### O. INITIAL CHLORIDE 1.250 ppm.  
**Date and time of sampling** 10-31-89 / 7:50

### P. PUMPING TESTS: Reference point (R.P.) used:  
**TOC which elevation was 14.96 ft.**

<table>
<thead>
<tr>
<th>Date</th>
<th>Start water level</th>
<th>End water level</th>
<th>Depth of well</th>
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<tbody>
<tr>
<td>11-1-89 through 11-8-89</td>
<td>12.0</td>
<td>13.7</td>
<td>28</td>
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</table>

### Q. DRILLER'S LOG:  
**Depth ft.**  
**Rock Description & Remarks** see attached sheet  
**Water Level ft.**  
**Depth ft.**  
**Rock Description & Remarks** see attached sheet  
**Water Level ft.**

### REMARKS:  
C & C Street Monument, Kalaeloa Blvd. and Kuheloa Street, Elevation = 10.08

Submitted by (print)  
**ASSOCIATE HYDROGEOLOGIST**  
**Title** HARDING LAWSON ASSOCIATES  
**Signature**  
**Date** April 4, 1990
Well PW-1

12" PVC Slip Cap

Brass Pin Elev 12.61 Feet

Cement grout

24-Inch Diameter Boring to 50.0 Feet

12" (I.D.) Stainless Steel Casing

Bentonite

Monterey Filter Gravel: 1/4-3/8"

12" (I.D.) Stainless Steel Well Screen

0.125" Slot Size

60% Open Area

Welded Steel Plate

Crushed Basalt

Cement Plug

Log and Construction Detail, Well PW-1

Kalaeloa Cogeneration Plant

Campbell Industrial Park, Oahu, Hawaii

PLATE

19032.003.06
12/89
End of boring at 505 feet

--- Cement Plug

STATE WELL NO 1805-**

White Limestone - poorly cemented very fine-grained matrix, with clay and calcite at 426 feet, becoming well cemented no clay, shell fragments, minor iron oxide staining at 463 feet, color change to PALE YELLOWISH ORANGE, moderately well cemented
**Summary of Ground-Water Chemistry**

<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNITS</th>
<th>11/8/89</th>
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<tr>
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<tr>
<td>Sample Temp.</td>
<td>Deg C</td>
<td>27</td>
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<tr>
<td>pH</td>
<td>pH units</td>
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<td>Dissolved Oxygen</td>
<td>mg/l</td>
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<td>Conductivity</td>
<td>umhos @ 25 C</td>
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<td>Alkalinity</td>
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<td>Salinity</td>
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<td><strong>Lab Determinations:</strong></td>
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<td>Chloride</td>
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<td>Reactive Silica</td>
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<tr>
<td>Manganese</td>
<td>mg/l</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Barium</td>
<td>mg/l</td>
<td>NA</td>
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<tr>
<td>Strontium</td>
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<tr>
<td>Total Organic Carbon</td>
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<tr>
<td>Total Diss. Solids</td>
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LEGEND

INJ-1 Injection Well Location and Designation
PW-1 Production Well Location and Designation
EX-1 Exploration Well Location and Designation
3 Foundation Exploration Boring by Dames & Moore (1988)

REFERENCE: General Layout Map HTDA 002107 (June 13, 1988).

Site Plan and Location of Wells and Exploratory Borings
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Title: Site Plan and Location of Wells and Exploratory Borings

Scale: 1:100 feet

HLA
Harding Lummus Association
Engineers Geologists & Geophysicists

Drawn by: 19032.001.06

11/89
February 21, 1990

19032,003.06
00372MI

Kalaeloa Partners, L.P.

Attention: Mr. William SnaIponis

Gentlemen:

Report
Results of Drilling and Testing
Production Wells
Kalaeloa Cogeneration Plant
Campbell Industrial Park
Oahu, Hawaii

The following presents a summary of our activities and analysis of data collected during the drilling and testing of the production wells at the Kalaeloa Cogeneration Plant.

All the production wells are located along the northern property boundary (Plate 1). Wells PW-1 through PW-5 were completed to depths of 25 feet and designed to be capable of providing 340 gallons per minute (gpm) with minimal drawdown. Well PW-6 was completed to a depth of 40 feet and is capable of providing 870 gpm with minimal drawdown. Well PW-6 will be used as an emergency bypass well.

Disposal of the plant effluent will be through injection into one of two wells located at the southern property boundary. Results of drilling and testing of these injection wells were submitted to the state Department of Health as part of the application for an Underground Injection Control (UIC) Permit on February 12, 1990. A copy of this report was also sent to you on February 12, 1990.

SUMMARY OF WELL DRILLING AND TESTING

In October 1989, PW-1, initially drilled to 51 feet and completed with temporary casing to that depth, was filled with cement grout to a depth of 25 feet and recompleted with 12-inch stainless steel casing, screened between 17 and 25 feet. Well completion details are shown on Plate 2. The well was tested from November 1 through November 8, 1989, by pumping at a constant rate of 340 gpm. The results of this test were presented in
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0372MI
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Kalaeloa Partners, L.P.
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our January 12, 1990 report to you. Test results indicated that this well design would meet the plant cooling requirements, and we were authorized to construct the remaining five wells.

At the request of Mr. Kim Hornbuckle of ABB Energy Services, FW-2 was abandoned and redrilled several feet north of its original position. The well was abandoned by filling with coralline sand. Wells FW-2, FW-4, and FW-5 were drilled with a 24-inch-diameter auger to a depth of 25 feet. Well FW-6 was drilled to a depth of 40 feet with a 24-inch-diameter auger. Well FW-3 was backfilled from its original depth of 50 feet to a depth of 25 feet. Original and final completion details of all on-site wells are shown on Table 1.

Twelve-inch-diameter PVC casing was installed in Wells FW-2 through FW-5, perforated with 0.125-inch slots between 17 and 25 feet. Fifteen-inch-diameter PVC casing was installed in FW-6, perforated with 0.125-inch slots between 17 and 40 feet. Well completion details are shown on Plates 3 through 7.

Each well was developed by surging and by stepped-rate pumping between approximately 200 and 1000 gallons per minute (gpm). Development continued until the pumped water had no apparent turbidity or sand content. Each well was then tested by pumping at its nominal production rate for approximately four hours. During these tests, water levels and field chemistry parameters were measured. Field chemistry measurements consisted of temperature, specific conductance, salinity, alkalinity, pH and dissolved oxygen. Near the end of the pumping period, a water sample was collected for laboratory analysis. Results of these analyses are listed in Table 2. Laboratory analysis reports are appended.

RESULTS OF TESTING

Hydraulic Response to Pumping

The results from the step-drawdown tests are shown on Plate 8. This graph demonstrates that all wells have very little drawdown at planned pumping rates. Curvature upward shown by Wells FW-2 and FW-3 indicates decreasing well efficiency at high rates, due to turbulent flow in the well vicinity.
Water-level declines (drawdowns) and field chemical parameters measured during the constant rate test (330 gpm for Wells PW2 through PW-5 and 870 gpm for Well PW-6) are listed in Table 3. The maximum drawdown observed for any of these wells at its nominal production rate was 0.7 feet.

These data were analyzed using the Thiem equation for water-table aquifers (Jacob, 1963; Hantush, 1962):

\[ K = \frac{Q \cdot \ln\left(\frac{r_1}{r_2}\right)}{\pi \left(h_1^2 - h_2^2\right)} \]

- \( Q \) = pumping rate \((L^3/T)\)
- \( K \) = hydraulic conductivity \((L/T)\)
- \( h_1, h_2 \) = height of the water column above the base of the aquifer at distances \( r_1 \) and \( r_2 \) \((L)\)

The calculated hydraulic conductivities are:

- PW-2: 1,400 ft/day
- PW-3: 2,100 ft/day
- PW-4: 4,200 ft/day
- PW-5: 6,000 ft/day
- PW-6: 4,200 ft/day

Variations in hydraulic conductivity are expected due to aquifer heterogeneity.

Because Wells PW-5 and PW-3 are close to each other, they may have overlapping cones of depression. The potential drawdown at each well due to overlapping cones of depression was calculated using the Thiem equation. The increase in drawdown in Well PW-3 caused by pumping Well PW-5 may be 0.16 feet. The increase in drawdown in Well PW-5 caused by pumping Well PW-3 may be 0.39 feet. Because Wells PW-5 and PW-3 are the two wells closest to each other and will therefore show the greatest drawdown caused by overlapping cones of depression, we recommend that one of these two be reserved as the stand-by well.


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Ground-Water Quality

Results of chemical analyses of the water samples are listed in Table 2. These analyses show that the chemistry of all six production wells are very similar. The analysis of Well PW-6 indicates a higher concentration of several chemical parameters, including sodium, potassium, and chloride. This is expected because the greater depth and higher discharge rate of PW-6 will cause it to draw from a deeper part of the aquifer with a larger saline water component.

The Stiff diagram (Plate 9) provides a graphical representation of the dominant ions in each well. The width of the pattern is an approximate indication of total ionic content. The water in all six wells is of a sodium-chloride type. With greater salinity, magnesium and sulfate increase. Silica concentrations remain in the 40 to 45 mg/l range.

A copy of this report and data has been sent to the state Department of Land and Natural Resources as part of the well construction permit requirements.

Yours very truly,

HARDING LAWSON ASSOCIATES

Patti Walsh
Staff Geologist

John J. Ward
Geologist - 4101 (California)

JJW/PW/rpb:0082R
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Enclosures:  Table 1:  Completion Details of On-Site Wells
Table 2:  Ground-Water Chemistry Summary
Table 3:  Results of Constant Rate Tests
Plate 1:  Site Plan
Plates 2-7:  Well Logs and Completion Details
Plate 8:  Results of Step-Drawdown Test
Plate 9:  Stiff Diagram
Laboratory Analysis Report

cc:  ABB Energy Services, Inc./Mr. H.A. Hauck
Kalaeloa Cogeneration Plant/Mr. J. Harrelson
Belt Collins & Associates/ Mr. J. Goody
Table 2. Ground-Water Chemistry Summary

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NA: not analyzed
<: not detected at indicated detection limit
Table 3. Results of Constant Rate Tests

**WELL PW-2 (1805-05)**
330 GPM  
January 12, 1990

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<th>TIME</th>
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<th>SPEC. COND. (lumhos @ 25C)</th>
<th>pH</th>
<th>SALINITY (ppt)</th>
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</tr>
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**WELL PW-3 (1805-06)**
330 GPM  
January 18, 1990

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<th>pH</th>
<th>SALINITY (ppt)</th>
<th>ALKALINITY (mg/l)</th>
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330 GPM
January 11, 1990

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WELL PW-5 (1805-08)
330 GPM
January 16, 1990

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Table 3. Results of Constant Rate Tests (Continued)

WELL PW-6
870 GPM
January 19, 1990

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<th>SPEC. WATER DRAWDOWN COND.</th>
<th>TEMP. (deg.C)</th>
<th>SPEC. COND. (umhos @ 25C)</th>
<th>SALINITY (ppt)</th>
<th>ALKALINITY (mg/l)</th>
<th>OXYGEN (ppm)</th>
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Well PW-1

12" PVC Slip Cap
Brass Pin Elev 12.61 Feet
Cement grout
24-inch Diameter Boring to 500 Feet
12" (ID) Stainless Steel Casing

Bentonite
Monterey Filter Gravel
1/4-3/8"
12" (ID) Stainless Steel Well Screen
0.125" Slot Size
60% Open Area
Welded Steel Plate
Crushed Basalt
Cement Plug

WHITE SILTY GRAVEL IG:
- Dry, loose, [ill]

WHITE LIMESTONE - blocky, moderate, fractured, moderately hard, moderately weathered
- At 25 feet hard
- At 50 feet, very fine- to coarse-grained, porosity < 5 percent calcite cement inclusions, iron oxide staining

very soft drilling 8 to 95 feet
- At 100 feet, skeletal grains, many small cavities, 1 percent clay infilling, moderately hard, moderately weathered
- At 13 to 135 feet, micrite partings with medium grained sand and iron oxide
- At 151 feet, color change to GRAYISH ORANGE
- At 161 feet, fracture at 45 degrees to vertical
- At 179 feet, color change to WHITE large vugs up to 1/2-inch diameter solution channels, moderately well cemented

at 233 feet, large mollusk shell imprints, increase in porosity to 25 percent, white sparry calcite infilling 1 percent

at 273 feet, becoming very hard, < 10 percent fine- to coarse-grained sand, infilling in cavities very well cemented
- At 291 feet, cavities up to 2-inch diameter with secondary aragonite crystals, iron oxide staining

at 340 feet, becoming poorly cemented, very fine-grained matrix clay, white, plastic in bottom of sample

at 396 feet, decreasing clay content, increasing calcite concentration
WHITE LIMESTONE - poorly cemented very fine-grained matrix with clay and calcite  
at 42.6 feet, becoming well cemented no clay, shell fragments, minor iron oxide staining  
at 46.3 feet, color change to PALE YELLOWISH ORANGE, moderately well cemented  
End of boring at 50.5 feet
Well PW-2

12" PVC Slip Cap

Cement grout

24-inch Diameter Boring to 266 Feet

11-3/8" ID PVC Blank Casing Schedule 80

Bentonite

Monterey Filter Gravel 1/4, 3/8" and 3/8-3/4" in

11-3/8" ID PVC Slotted Casing Sch 80

0.125" Slot Size 18% Open Area

12" PVC Slip Cap

STATE WELL NO
1805-05

WHITE TO LIGHT TAN CORALLINE
LIMESTONE - hard

TAN TO ORANGE CORALLINE
LIMESTONE - moderately hard

Water level at 12.2 feet

TAN LIMESTONE WITH SAND - soft, caving
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample</th>
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<tbody>
<tr>
<td>40</td>
<td>TAN LIMESTONE WITH SAND - soft, caving</td>
</tr>
<tr>
<td>44</td>
<td>TAN CORALLINE LIMESTONE - medium hard</td>
</tr>
<tr>
<td></td>
<td>at 44 feet, hard coral</td>
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<tr>
<td>45</td>
<td>TAN MEDIUM-GRAINED SAND - caving</td>
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<tr>
<td>50</td>
<td>TAN LIMESTONE - hard</td>
</tr>
<tr>
<td>77</td>
<td>at 77 feet, color change to WHITE</td>
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<tr>
<td>80</td>
<td>soft</td>
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Log and Construction Detail, Well PW-2 (Continuation)
Kaiaka Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

Drawn: FMC/gwi  Job Number: 19032 003 06
Approved: 03/90

PLATE 3
(Continuation of Log)

WHITE LIMESTONE - soft

WHITE SILTY LIMESTONE WITH SAND harder than above

End of boring at 110 feet
Well PW-3

12" PVC Slip Cap
Br Pin Elev 13' 42 feet
11-3/8" (I.D.) PVC Blank Casing Schedule 80
Cement Grout
24-Inch Diameter Boring to 42 Feet

Equipment Bucyrus Eire 60L Cable Tool

Elevation 13 feet MSL Date 6/2/89

WHITE TO LIGHT TAN CORALLINE LIMESTONE - moderately hard

Water level at 126 feet

GRAY CORALLINE LIMESTONE - hard

SILTY SAND (SM) with gravel, loose

Log and Construction Detail, Well PW-3
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii
Coralline Sand

16-inch Diameter
Boring to 57 Feet

SILTY SAND (SM) with gravel, loose

PINK CORALLINE LIMESTONE -
moderately hard

End of boring at 57 feet
Log and Construction Detail, Well PW-4

12" PVC Slip Cap
Br. Pin Elev. 13.52 feet
Cement Grout

11.3/8" (ID) PVC Blank Casing Schedule 80
24-inch Diameter Boring to 255 feet

Monterey Filter Gravel
1/4-3/8" and 3/8-3/4"

11.3/8" (ID) PVC Slotted Casing Sch. 80
0.125" Slot Size
18% Open Area

Bentonite

12" PVC Slip Cap

STATE WELL NO
1805-14M

Equipment 24" Auger
Elevation 13 feet MSL Date 1/3/90

WHITE TO LIGHT TAN CORALLINE LIMESTONE - very hard grading to moderate, hard

TAN TO ORANGE CORALLINE LIMESTONE - moderately hard grading to soft

Water e.w. at 124 feet
End of boring at 255 feet

Harding Lawson Associates
Engineering and Environmental Services
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

DRAWN
FMC/gwl

JOB NUMBER
19032.003.06

APPROVED

DATE
02/90

REVISED DATE

PLATE

5
Well PW-5

Equipment: 24" Auger
Elevation: 13 feet MSL  Date: 1/3/90

- 12" PVC Slip Cap
- Br PIR Elev 13.48 feet
- Cement Grout
- 11-3/8" ID: PVC Blank Casing Schedule 80
- 24-inch Diameter Boring to 258 Feet
- Water level at 12 feet
- End of boring at 258 feet
- 12" PVC Slip Cap

Monterey Filter Gravel
1/4-3/8" and 3/8-3/4

TAN TO ORANGE CORALLINE LIMESTONE - medium hard grading to soft

PLATE 6
Log and Construction Detail, Well PW-5
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii
Well PW-6

15" PVC Stub Cap
Br. Pin Elev. 13.58 feet

Cement Grout

24-inch Diameter
Boring to 42 Feet

14.5/16" (ID) PVC Blank Casing Schedule 80

Bentonite

Monterey Filter Gravel
1/4-3/8" and 3/8-3/4"

14.5/16" (ID) PVC Slotted Casing Sc. 80
0.125 Slot Size
20% Open Area

5" PVC Slip Cap

Elevation 13 feet MSL Date 1/4/90

Equipment 24" Auger

Elevation
Sample

End of boring at 42 feet

STATE WELL NO
1805-16M

Log and Construction Detail, Well PW-6
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawai'i

Harding Lawson Associates
Engineering and Environmental Services

PLATE 7

DRAWN: PMC/gwl
JOB NUMBER: 19032 003 06
APPROVED: DATE: REVISED DATE: 02/90
Step-Drawdown Testing of Production Wells
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

PLATE 8

Harding Lawson Associates
Engineering and Environmental Services

DRAWN JOB NUMBER APPROVED DATE REVISED DATE
kar 19032,003.06 MW 2/90
CONCENTRATION (MEQ/L)

Na+K
Ca
Mg
Sr

Ca
Mg
Sr

HCO₃

PW-1 (2872)
PW-2 (3372)
PW-3 (2787)
PW-4 (3143)
PW-5 (3051)
PW-6 (5519)

(5519) = Total Dissolved Solids (mg/l)

Stiff Diagram of Major Ionic Concentrations
Kalaeloa Cogeneration Power Plant
Campbell Industrial Park, Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

DRAWN: gw1
JOB NUMBER: 19032.003.06
APPROVED: [Signature]
DATE: 2/90
REVISED DATE: 2/90
| Sample No: | 9002005 & 90030013 & 9002001 & 90030009 & 90030017 & 90030018 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Site:     | Kalaeloa Wells  | AB8             | PW-2            | PW-3            | PW-4            |
| Well:     |                 |                 |                 |                 |                 |
| Date:     | 1/12/90         | 1/18/90         | 1/11/90         | 1/16/90         | 1/19/90         |
| Alkalinity| 318             | 358             | 297             | 351             | 336             |
| Chloride  | 1,594           | 1,330           | 1,467           | 1,450           | 2,820           |
| Nitrate   | 3.9             | 1.9             | 3.8             | 2.5             | 4.1             |
| Sulfate   | 265             | 200             | 245             | 212             | 390             |
| Reactive Silica | 40   | 40             | 40             | 41             | 36             |
| Total Silica | 45        | 42             | 43             | 43             | 40             |
| Tot. Diss. Solids | 3,372   | 2,787           | 3,143           | 3,051           | 5,519           |
| Tot. Org. Carbon | 6.6     | 1.6            | <1.0            | 1.6             | 1.4             |
| Sodium    | 856             | 694             | 783             | 767             | 1,489           |
| Potassium | 38              | 32              | 36              | 35              | 59              |
| Calcium   | 128             | 149             | 145             | 121             | 147             |
| Magnesium | 101             | 86              | 84              | 79              | 138             |
| Iron      | <0.10           | <0.10           | <0.10           | <0.10           | <0.10           |
| Manganese | <0.10           | <0.10           | <0.10           | <0.10           | <0.10           |
| Barium    | <1.0            | <1.0            | <1.0            | <1.0            | <1.0            |
| Strontium | 2.94            | 2.54            | 2.95            | 2.67            | 3.41            |

Results (mg/L)

Analyzed by: V. Inouye, C. Kishimoto, G. Kitsuwa, E. Wong

Approved by: George Yasutome
Senior Chemist
June 27, 1989

Mr. Damon R. Runyan
Harding Lawson Associates
Pearl City Business Pl.

Dear Mr. Runyan:

This is regarding your letter of June 14, 1989, requesting to amend the well construction permit issued by the Commission on February 27, 1989 for the Kalacoola Monitor Test Holes, well numbers 1805-1904 to 1905.

By this letter, we are approving your request to deepen the wells from 50 feet to between 100 and 150 feet deep. All other conditions of the original permit remain in effect.

If you have any questions, please contact Dan Lum at [REDACTED]

Sincerely,

[Signature]

MANABU TAGOMORI
Deputy Director
June 14, 1989

19032,001.06

State of Hawaii
Commission on Water Resource Management
P.O. Box 621

Attention: Mr. Manabu Tagomori
Deputy Director

Gentlemen:

Well Construction Permits
Well Nos. 1805-10M to 19M 04-09
Kalaeloa Cogeneration Plant
Campbell Industrial Park, Oahu, Hawaii

This letter requests an amendment to the Well Construction Permit issued on February 27, 1989 for the subject wells. The wells originally were anticipated to be a maximum of 50 feet deep, but plant design criteria limit the acceptable silica concentration in the cooling water to less than exists in water in the top 40 feet of the caprock aquifer. We believe that wells between 100 and 150 feet deep may yield water with sufficiently low silica concentrations. Therefore, we request that the Well Construction Permit be amended to show these greater depths. As the plant already is under construction, processing this application as quickly as possible will be appreciated.

An amended application form showing changes in the well configurations is enclosed in case it is needed.

Thank you for your assistance. If there are any questions, please call.

Sincerely,

HARDING LAWSON ASSOCIATES

Damon R. Runyan
Associate Engineer

DRR/bh:WELLPRMT

Enclosure
June 14, 1989

19032,001.06

State of Hawaii
Commission on Water Resource Management

Attention: Mr. Manabu Tagomori
Deputy Director

Gentlemen:

Well Construction Permits
Well Nos. 1805-10M to 19M 04-09
Kalaeola Cogeneration Plant
Campbell Industrial Park, Oahu, Hawaii

This letter requests an amendment to the Well Construction Permit issued on February 27, 1989 for the subject wells. The wells originally were anticipated to be a maximum of 50 feet deep, but plant design criteria limit the acceptable silica concentration in the cooling water to less than exists in water in the top 40 feet of the caprock aquifer. We believe that wells between 100 and 150 feet deep may yield water with sufficiently low silica concentrations. Therefore, we request that the Well Construction Permit be amended to show these greater depths. As the plant already is under construction, processing this application as quickly as possible will be appreciated.

An amended application form showing changes in the well configurations is enclosed in case it is needed.

Thank you for your assistance. If there are any questions, please call.

Sincerely,

HARDING LAWSON ASSOCIATES

Damon R. Runyan
Associate Engineer

DRR/bh:WELLPRMT

Enclosure
APPLICATION FOR

WELL CONSTRUCTION PERMIT

PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water and Land Development, P.O. Box 371, Honolulu, Hawaii 96819. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-7543, Hydrology/Geology Section for assistance.

1. WELL LOCATION

Island Oahu
Tax Map Key 9-1-31:23
Address [Redacted]

(Attach a USGS map (scale 1"=2000') and property tax map showing well location referenced to established property boundaries.) See Attachments 1 and 2.

2. WELL OWNER

Firm Name Kalaeloa Partners, L.P.
Contact Person Bill Snaponis
Address c/o ABB Energy Ventures, Inc.

LANDOWNER

Firm Name The Estate of James Campbell
Contact Person David H. McCoy
Address [Redacted]

3. PROPOSED CONTRACTOR FOR:

Drilling [ ] Pump Installation [ ]

Name Roscoe Moss Co.
Address [Redacted]

Contractor's License No. C2101

4. PROPOSED WORK

[ ] Drill New Well [ ] Deepen [ ] Redrill
[ ] Alter [ ] Seal [ ] Abandon
[ ] Install New Pump [ ] Replace Pump [ ] Modify Pump

(Briefly describe the proposed work and fill in the diagram on the back of this form.) (See attached)

5. PROPOSED USE

[ ] Municipal (including hotels, stores, etc.) [ ] Military
[ ] Domestic (individual, noncommercial water systems) [ ] Industrial
[ ] Irrigation (specify) [ ] Other (specify) cooling

6. PROPOSED AMOUNT OF WITHDRAWAL

1.9 million gallons per day maximum total from approximately 3 wells

7. PROPOSED PUMP INFORMATION

Pump Type: [ ] Vertical Turbine [ ] Submersible [ ] Centrifugal
Motor: [ ] Diesel [ ] Gas [ ] Electric: [ ]
Rated Pump Capacity 1,300 gallons per minute (gpm)

Well Owner (print) Kalaeloa Partners, L.P. Landowner (print) The Estate of James Campbell

Signature ___________________________ Signature ___________________________
Date ___________________________ Date ___________________________

For Official Use Only:
Field Checked By ___________________________ Latitude ___________________________
Date ___________________________ Hydrologic Unit ___________________________

State Well No. ___________________________
Briefly describe the proposed work:
At least three and as many as ten wells may be needed to provide the required maximum 1.9 million gallons per day of cooling water. Planned wells will be from 100 to 150 feet deep. Wells will be tested for quantity and quality at depths below 50 feet, and final depths determined by the test data.

PROPOSED SECTION OF WELL

Elevation at top of casing
14 ft., msl.*

Cement
Grout
Hole
Dis. 24 in.

Total Depth
100- 150 ft.

Rock Packing
50- 100 ft.

Ground Elev. 13 ft., msl*

Solid Casing:
Material PVC or Stainless Steel
Length 50 min. ft.
Diameter 16 in.
Wall thickness 0.3125 in.

Casing: / /Perforated /X/Screen
Material PVC OR Stainless Steel
Length 50-100 ft.
Diameter 14 in.
Wall thickness 0.3125 in.
Openings 251 sq. in./L.F.

Open Hole:
Length none
Diameter in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
SURVEY BRANCH
Division of Water Resource Management

FROM: Ed
TO: INITIAL:

PLEASE:

REMARKS:
The following met on 4/4/89 at Dowald

Dan Lum John Goody, BCA
Ed Sakoda John Ward, HLA

The attached proposal was discussed. Dan recommended a
72hr. test instead of the proposed 48hr. test. Dan or Ed will be notified when
cores from 350' hole are available
for observation/photography.

- Ave. 25 hr/day use = 1300 gpm.
- 1/2 to 2/3 volume to be reinjected.
10/25/09
John Ward / John Goode
ABB Beneficial Use Permit
1200 gpm
2400 bph, per rate (emergency)
KALAELOA COGENERATION PLANT

PROPOSAL FOR TESTING AND EVALUATION FOR USE OF EWA PLAIN LIMESTONE (CAPROCK) AQUIFER

LOCATION. Campbell Industrial Park, Malakole Sector, approximately 4,000 feet seaward of Malakole Road.

STATUS OF APPLICATION. Well construction permit issued for monitoring and testing only on 27 February, 1989. By letter of 20 January, 1989, the Water Commission returned an application for a water use permit for the same site. Potential impact on the other two proposed cooling water well projects (H-Power, AES) was cited, and "adequate and appropriate" testing was suggested.

AFFECTED PARTIES CONTACTED. Authorized representatives of the following parties have reviewed and consented to the concepts expressed under VALUES TO BE PRESERVED:

* Estate of James Campbell
* Hawaiian Electric Co, Inc
* Applied Energy Services, Inc
* Kalaeloa Partners, L.P.
* Asea Brown Boveri Energy Services, Inc

VALUES TO BE PRESERVED IN MALAKOLE SECTOR OF THE LIMESTONE AQUIFER SOUTH OF MALAKOLE RD.

* Thermal integrity of the upper aquifer.
* Prevention of interference among adjacent existing and proposed users for both cooling and fire protection purposes.
* Preservation of the function of the lower aquifers as receiving bodies for waste water.

PROPOSED KALAELOA WELL SITE PLAN. Cooling water will be drawn from three 50 foot deep wells of approximately 1300 gpm capacity each, sited 100' to 150' apart along the northern property line. One well for normal use, one for surge requirements, and one for backup. Wells will be used in rotation. Cooling tower water will be injected into deep wells located along the southern boundary of the power plant site after use. UIC permits to construct the injection wells have been received.

PROPOSED TESTING PLAN. Attached

REQUESTED ACTIONS.

Review and comment upon proposed site and testing plan, with regard to concerns of the Water Commission for management of the Ewa/Malakole Sector and the information required to make a complete application.

A general time frame for action on our water use permit application after submission, (completeness determination and public hearing requirement), as the economic feasibility of the project depends upon use of ground water for cooling.
Proposed Aquifer Testing Plan

1. **Purpose.** To evaluate the aquifer response to pumping for cooling water supply at a rate of 1,300 gpm to 2,600 gpm for a period of 40 years. Evaluation includes well hydraulics and efficiency, aquifer flow regime (Darcian or non-Darcian), and prediction of long-term aquifer drawdown.

2. **Testing Procedures.** Three wells are proposed, each with a capacity of 1,300 gpm. The first well will be completed to a depth of approximately 50 feet, developed and tested. A well at approximately 20 feet from the pumped well will serve as an observation point for drawdown measurements. The well will be tested at 1,300 gpm for approximately 48 hours, or less if the drawdown cone stabilizes. Water levels will be measured in the pumped and observation wells, and in several nearby shallow wells on site. Salinity will be monitored in the pumped well discharge, and vertical salinity distribution measured in the observation wells.

3. **Analysis.** Aquifer transmissivity and storage will be calculated from analysis of drawdown data. Displacement of the salt-water interface in the vicinity of the pumping well may be evaluated if salinity measurements allow interpretation. Well efficiencies will be calculated and used to design the remaining two wells.

The aquifer parameters will be used to predict the extent of impact of withdrawals from the three-well system over a period of 40 years. Analytical solutions based on the assumption of Darcian porous-media flow will be used.
PEARL HARBOR GROUND WATER MANAGEMENT AREA

WELL CONSTRUCTION PERMIT

for

Barbers Pt.-Kalaeloa Monitor Test Holes
State Well Nos. 1805-10M to 19M-04-09
Campbell Industrial Park, Oahu

TO:  Kalaeloa Partners, L.P.

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to construct and test ten monitor test holes within Tax Map Key: 9-1-31:23 is approved subject to the following conditions:

1. The Division of Water and Land Development (DOWALD), Geology-Hydrology Section, shall be notified at 548-7619, before any work covered by this permit commences.

2. The wells shall be used for monitoring and testing only.

3. The following shall be submitted to DOWALD, P.O. Box 373, Honolulu, Hawaii 96809 within 60 days after completion of the wells:

   a. Well Completion Reports (forms enclosed).

   b. Elevation (referenced to mean sea level) survey by a Hawaii-licensed surveyor.

   c. As-built sectional drawings of the wells.
d. Plot plan and map showing the exact locations of the wells.

e. Driller's logs, geologic logs, and salinity logs.

f. Periodic reports of monitoring and testing results.

4. The applicant shall comply with all applicable laws, rules, and ordinances.

5. This permit may be revoked if work is not started within six months of date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.

6. Upon completion of monitoring operations, the applicant shall obtain a Well Construction Permit to seal the wells with cement grout in a manner approved by the Commission.

FEB 27 1989

WILLIAM W. PATY

Date of Issuance

Enc. (Well Completion Report form) cc:

USGS Department of Health,
Drinking Water Program
Ground Water Protection Program
Honolulu Board of Water Supply
Harding Lawson Associates
P.R. Drilling Co., Inc.
The Honorable William W. Paty, Chairperson
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii

Dear Mr. Paty:

SUBJECT: WELL CONSTRUCTION PERMIT APPLICATION
BARBERS POINT-KALELOA WELLS
STATE WELL NOS. 1805-04 AND 05 1805-04-09
EWA BEACH, OAHU

Thank you for the opportunity to review and comment on the subject application.

We have determined that the Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems," are not applicable because the proposed wells are intended to be used to supply cooling water.

If you should have any questions, please contact the Drinking Water Program at [redacted]

Very truly yours,

John C. Lewin, M.D.
Director of Health
Dear Mr. Paty:

Subject: Your Letter of January 26, 1989 on Well Construction Permit Application

Thank you for the opportunity to comment on the applications. We have the following comments on each of the well applications:

1. **Bellows AFS Monitor Holes, State Well Nos. 2143-01M to 04M.** We have no objection to these monitor wells.

2. **Kaneohe MCAS Monitor Test Holes, State Well Nos. 2644-01M to 08M, 2645-01M.** We have no objection to these monitor wells.

3. **Barbers Point-Kalaealoa Wells, State Well Nos. 1804-04-09 and 05.** Since these wells do not affect potable water, we do not object to these wells. The wells should be evaluated for the additional impact on the planned extensive use of the upper limestone aquifer for cooling water.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

---

*Pure Water... man's greatest need - use it wisely*
January 20, 1989

Kalaeloa Partners, L.P.
c/o ABB Energy Services, Inc.
Gentlemen:

We have received an application for a well construction permit and an application for a water use permit for up to 1.739 million gallons per day (mgd) of non-potable caprock water for the cooling of generators at your proposed power cogeneration facility at Campbell Industrial Park, Oahu.

There are presently two other facilities in the vicinity which propose to draw brackish caprock water for cooling purposes—the Honolulu Resource Recovery Venture for H-Power, located at 91-174 Manua Street; and the adjacent AES (Applied Energy Services) Barbers Point, Inc. coal-fired cogeneration facility.

My staff will begin to process your well construction permit application for two wells which will be considered for construction and testing only. Because of the potential impact on the two other proposed cooling water well projects, we suggest that adequate and appropriate testing be conducted to determine whether or not the proposed use of your well will not result in any adverse impact. Should you plan to use the wells after successful testing, you must then apply for a pump installation permit as well as a water use permit.

We have deposited one twenty-five dollar check for the well construction permit application, and we are returning the other twenty-five dollar check and the application for a water use permit.

If you have any questions, please contact Mr. Dan Lum at 99-

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Encl.
cc: Harding Lawson Associates
Honorable John C. Lewin  
Director of Health  
Department of Health  
Honolulu, Hawaii  

ATTENTION: Mr. Tom Arizumi, Drinking Water Program  

Dear Dr. Lewin:  

Well Construction Permit Applications  

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168-12(c), enclosed are the following well construction permit applications with maps for your review and comments:  

(1) Barbers Point-Kalaeloa Wells, State Well Nos. 1805-04, 05, 06, 07M to 09M  
(2) Kaneohe MCAS Monitor Test Holes, State Well Nos. 2644-01M to 08M, 2645-01M  
(3) Mauna Lani Irrigation Wells, State Well Nos. 5651-01 and 5750-03 (Kohala Coast)  
(4) Koloa Well E, State Well No. 5427-03 (Koloa, Kauai)  
(5) Bellows AFS Monitor Test Holes, State Well Nos. 2143-01M to 04M  

Please submit any comments to us, orally or in writing, within three weeks from the date of this letter. If you have any questions, please contact Manabu Tagomori at [contact information].  

Very truly yours,  

WILLIAM W. PATY  

Enc.
Mr. Kazu Hayashida  
Manager and Chief Engineer  
Board of Water Supply  
City & County of Honolulu  

Dear Mr. Hayashida,

Well Construction Permit Applications

We would appreciate your review and comments of the following well construction permit applications:

(1) Bellows AFS Monitor Test Holes, State Well Nos. 2143-01M to 04M, Waimanalo, Oahu; submitted by the U.S. Air Force

(2) Kaneohe MCAS Monitor Test Holes, State Well Nos. 2644-01M to 08M, 2645-01M, Kaneohe, Oahu; submitted by the U.S. Marine Corps

(3) Barbers Point-Kalaeloa Wells, State Well Nos. 1805-04 and 05, Barbers Point, Oahu; submitted by Kalaeloa Partners, L.P.

Please submit any comments to us, orally or in writing, within three weeks from the date of this letter.

If you have any questions, please contact Manabu Tagomori at [Contact Information].

Very truly yours,

[Signature]

WILLIAM W. PATY

Enc.
January 3, 1989
19032,001.06

Division of Water and Land Development

Gentlemen:

Enclosed are the following:

1. Application for water use permit with signatures of Kalaeloa Partners, L.P., and the Estate of James Campbell;

2. Application for well construction permit with signatures of Kalaeloa Partners, L. P., and the Estate of James Campbell;

3. Well location map;

4. Map of site; and

5. Two checks, each for $25.00, sent by BBC.

Very truly yours,

HARDING LAWSON ASSOCIATES

Ronald L. Soroos

RLS/JTC/jll:WATERDEV

Enclosures
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources
Division of Water Resource Management

APPLICATION FOR

X WELL CONSTRUCTION PERMIT
__ PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water and Land Development, P.O. Box 373, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $50.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-7543, Hydrology/Geology Section for assistance.

1. WELL LOCATION

Island __ Oahu __ Tax Map Key 9-1-3123
Address ________________________________

(Attach a USGS map (scale 1"=2000') and property tax map showing well location referenced to established property boundaries.) See Attachments 1 and 2.

2. WELL OWNER

Firm Name Kalaeloa Partners, L.P.
Contact Person Mike Shevade
Address 1125 AHE ENERGY SERVICES, INC.
Phone ________________________________

LANDOWNER

Firm Name The Estate of James Campbell
Contact Person David H. McCoy
Address ________________________________
Phone ________________________________

3. PROPOSED CONTRACTOR FOR:

☐ Well Drilling ☐ Pump Installation

Name P.R. Drilling Co., Inc.
Phone ________________________________

Address ________________________________

Contractor's License No. C9627

4. PROPOSED WORK

☐ Drill New Well ☐ Alter ☐ Deepen ☐ Redrill
☐ Install New Pump ☐ Replace Pump ☐ Abandon
☐ Modify Pump

(Briefly describe the proposed work and fill in the diagram on the back of this form.)

(See attached)

5. PROPOSED USE

☐ Municipal (including hotels, stores, etc.) ☐ Military
☐ Domestic (individual, noncommercial water systems) ☐ Industrial
☐ Irrigation (specify) ☐ Other (specify) Cooling

6. PROPOSED AMOUNT OF WITHDRAWAL

1.739 gallons per day maximum total from approximately 5 wells

7. PROPOSED PUMP INFORMATION

Pump Type: ☐ Vertical Turbine ☐ Submersible ☐ Centrifugal
Motor: ☐ Diesel ☐ Gas ☐ Electric: ______ Rated Horsepower
Rated Pump Capacity 1,300 gallons per minute (gpm)

Well Owner (Print) Kalaeloa Partners, L.P.
Landowner (Print) The Estate of James Campbell

Signature ________________________________ Date 12/14/88

For Official Use Only:
Field Checked By ________________ Latitude ________________
Date ________________ Hydrologic Unit ________________

State Well No. 1805-10MA1HM

04-09
Briefly describe the proposed work:

At least two and as many as ten wells may be needed to provide the required maximum 1.734 million gallons per day of cooling water. It is assumed that water having the lowest total dissolved solids is at the shallowest depth. Therefore, planned wells will be from 20 to 50 feet deep. Wells will be tested for quantity and quality at depths of 20 and 50 feet, and final depths determined by the test data.

*These are preliminary test holes, not fail. (Ken Forros 2/3/09)

**PROPOSED SECTION OF WELL**

<table>
<thead>
<tr>
<th>Elevation at top of casing</th>
<th>14 ft., msl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement Grout</td>
<td>10 ft.</td>
</tr>
<tr>
<td>Hole Diameter</td>
<td>24 in.</td>
</tr>
<tr>
<td>Total Depth</td>
<td>20-50 ft.</td>
</tr>
<tr>
<td>Rock Packing</td>
<td>feet</td>
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</tbody>
</table>

Ground Elev. 13 ft., msl

**Solid Casing:**
- Material: PVC or Stainless Steel
- Length: 10 ft.
- Diameter: 16 in.
- Wall thickness: 0.3125 in.

**Casing:** /Perforated /X/Screen
- Material: PVC or Stainless Steel
- Length: 10-40 ft.
- Diameter: 14 in.
- Wall thickness: 0.3125 in.
- Openings: 251 sq. in./L.F.

150 Slot
- Open Hole:
  - Length: 10-40
  - Diameter: 16 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.*
ISLAND OF OAHU

PROJECT AREA

KAHUKU
WAIMEA
HAUULA
KAAAWA
WAIKANE
WAIELUA
MAKAHA
NANAKULI
EWA
AIEA
HONOLULU
DIAMOND HEAD
KAILUA
WAIMANALO
Hanauma Bay
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<td>01-Nov-89</td>
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<td>158 05'57.76</td>
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<td>10</td>
<td>10.81</td>
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<td>806.61</td>
<td>21 18'02.77</td>
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<td>Dual Completion Piezometer</td>
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<tr>
<td>PW-1 1895-04</td>
<td>Apr-89</td>
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<td>INJ-2 NA</td>
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<tr>
<td>INJ-3 NA</td>
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<td>INJ-4 NA</td>
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<td>305</td>
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<td>11.75 (to 305 ft)</td>
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<td>Phase II Injection Wells</td>
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* Brass Pin Elevation
TOC: 10.81 feet MSL
TOC: 10.51 feet MSL
Steel Casing
Cement Grout
6 1/2-inch Boring
Sand Pack CSSI 8x12
2-inch Dia. PVC Blank Casing, Sch. 80

Log and Construction Details of Monitoring Well ABBEX 2

Equipment: Mobile Drill B-61 Wireline Core
Elevation: +10 ft. MSL
Date: April-May, 1989

2-inch Dia. PVC Blank Casing, Sch. 80

2-inch Dia. PVC Slotted Casing, Sch. 80, (0.020" slots)

5-inch Slotted Casing

Crushed Basalt
Cement Grout

4-inch Boring

Sand Pack, CSSI 8x12

2-inch Dia. PVC Slotted Casing, Sch. 80, (0.020" slots)

Crushed Basalt

20/39

Gamma Counts, CPS/DIV

 Crushed Basalt

Cement Grout

TOC: 10.81 feet MSL
TOC: 10.51 feet MSL
Steel Casing
Cement Grout
6 1/2-inch Boring
Sand Pack CSSI 8x12
2-inch Dia. PVC Blank Casing, Sch. 80

Total Depth: 351 feet

- Water level at 10 feet
- At 25.3 to 35 feet, dense, vuggy and massive coral
- At 40.5 feet, grading to CORALLINE RUBBLE
- At 51.5 feet, grading pink and chalky
- At 60 feet, grading to CORALLINE RUBBLE
- At 95 feet, grading to CORALLINE RUBBLE
- At 140 feet, grading with chalky fines
- FINE TO MEDIUM SAND
  - Silty sand at 159.5 feet
  - At 165 feet, grading with thin zones of coral reef coral
  - Silty coralline sand and gravel at 178 feet
  - WHITE WEATHERED CORALLINE LIMESTONE with coralline rubble

- LIGHT BROWN CORALLINE SANDY SILT
  (highly weathered coral)
- LIGHT BROWN CORALLINE RUBBLE
- WHITE WEATHERED CORALLINE LIMESTONE
- WHITE CORALLINE RUBBLE with silty fines
- WHITE CORALLINE LIMESTONE, chalky, weathered
  - At 233 feet, grading less weathered

- At 245 feet, grading with massive coral
- At 255 feet, grading with coralline rubble
- WHITE CORALLINE RUBBLE, chalky and silty
  - At 288 feet, grading light gray-brown

- LIGHT BROWN CORALLINE LIMESTONE
  grading to medium to coarse grained coralline sandstone
- WHITE CORALLINE RUBBLE, sandy
  - At 319 feet, very silty
- WHITE POORLY-GRADED CORALLINE SAND with silt and gravel
- WHITE TO LIGHT BROWN CORALLINE RUBBLE, silty
  - At 349 feet, grading light brown

Bottom of boring at 351.5 feet, 05/01/89.
Equipment: Bucyrus Erie 60L Cable Tool

Elevation: ± 12 feet Date: April 1989

WHITE SILTY GRAVEL (CP)
dry, loose, (silty)
- blocky, moderately
distributed, moderately hard, moderately
weathered

at 2.5 feet, hard

at 5.0 feet, very fine- to coarse-grained, porosity < 5 percent, calcite cement inclusions, iron oxide staining

very soft drilling 8 to 9.5 feet

at 10.0 feet, skeletal grains, many small cavities, 1 percent clay infilling, moderately hard, moderately weathered

at 11.5 feet, highly cemented with cryptocrystalline calcite, solution vugs

at 13 to 13.5 feet, micrite partings with medium grained sand and iron oxide

at 15.1 feet, color change to GRAYISH ORANGE

at 16.1 feet, fracture at 45 degrees to vertical

at 17.9 feet, color change to WHITE, large vugs up to 1/2-inch diameter, solution channels, moderately well cemented

at 23.3 feet, large mollusk shell imprints, increase in porosity to 25 percent, white sparry calcite infilling 1 percent

at 27.3 feet, becoming very hard, < 10 percent fine- to coarse-grained sand, infilling in cavities, very well cemented

at 29.1 feet, cavities up to 2-inch diameter with secondary aragonite crystals, iron oxide staining

at 34.0 feet, becoming poorly cemented, very fine-grained matrix, clay, white, plastic in bottom of sample

at 39.6 feet, decreasing clay content, increasing calcite concentration

at 42.6 feet, becoming well cemented, no clay, shell fragments, minor iron oxide staining

at 46.3 feet, color change to PALE YELLOWISH ORANGE, moderately well cemented
<table>
<thead>
<tr>
<th>Well Name</th>
<th>State</th>
<th>Date Drilled</th>
<th>Boring Depth (ft)</th>
<th>Well No.</th>
<th>Date</th>
<th>Boring Depth (ft)</th>
<th>Boring Diameter (Inches)</th>
<th>Casing I.D. (Inches)</th>
<th>Material</th>
<th>Casing O.D. (Inches)</th>
<th>Material</th>
<th>Screened or Open</th>
<th>Interval (ft)</th>
<th>Elevations</th>
<th>Survey Date</th>
<th>Plant Site Coordinates</th>
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<td>50.5</td>
<td>1805-10H</td>
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<td>9.5 - 49.5</td>
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<td>13.19*</td>
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<td>Apr-89</td>
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<td>Apr-89</td>
<td>923.20, 646.37</td>
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<td>PV-5</td>
<td></td>
<td>Dec-09</td>
<td>40</td>
<td>1965-08-1</td>
<td></td>
<td>40</td>
<td>24.0</td>
<td>16.0</td>
<td>Steel</td>
<td>12 - 50</td>
<td>Stainless-Steel</td>
<td>12</td>
<td>12.39*</td>
<td>Apr-89</td>
<td>923.20, 646.37</td>
<td>21 18'20.22, 158 05'57.87</td>
<td>Completed Jan., 1990</td>
</tr>
<tr>
<td>PV-6</td>
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<td>42</td>
<td>1965-08-1</td>
<td></td>
<td>42</td>
<td>24.0</td>
<td>16.0</td>
<td>Steel</td>
<td>12 - 50</td>
<td>Stainless-Steel</td>
<td>12</td>
<td>12.39*</td>
<td>Apr-89</td>
<td>923.20, 646.37</td>
<td>21 18'20.22, 158 05'57.87</td>
<td>Completed Jan., 1990</td>
</tr>
<tr>
<td>INJ-1</td>
<td></td>
<td>Feb-09</td>
<td>60</td>
<td>NA</td>
<td></td>
<td>60</td>
<td>6.0</td>
<td>4.0</td>
<td>PVC Sch 40</td>
<td>4.50</td>
<td>18.5 - 28.5</td>
<td>11</td>
<td>-</td>
<td>637.14, 846.00</td>
<td>21 18'11.27, 158 05'51.52</td>
<td>Phase I Injection Wells</td>
<td></td>
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<tr>
<td>INJ-2</td>
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<td>NA</td>
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<td>60</td>
<td>6.0</td>
<td>4.0</td>
<td>PVC Sch 40</td>
<td>4.50</td>
<td>18.5 - 28.5</td>
<td>11</td>
<td>-</td>
<td>597.14, 846.00</td>
<td>21 18'11.27, 158 05'51.52</td>
<td>Phase I Injection Wells</td>
<td></td>
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<tr>
<td>INJ-3</td>
<td></td>
<td>Jul-09</td>
<td>270</td>
<td>NA</td>
<td></td>
<td>270</td>
<td>17.5 (to 220 ft)</td>
<td>11.75</td>
<td>PVC Sch 80</td>
<td>11.75 (to 270 ft)</td>
<td>Open Hole</td>
<td>220 - 270</td>
<td>10</td>
<td>10.76</td>
<td>06-Oct-89</td>
<td>268.20, 667.77</td>
<td>21 18'02.78, 158 05'59.11</td>
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<tr>
<td>INJ-4</td>
<td></td>
<td>Aug-09</td>
<td>305</td>
<td>NA</td>
<td></td>
<td>305</td>
<td>17.5 (to 220 ft)</td>
<td>11.75</td>
<td>PVC Sch 80</td>
<td>11.75 (to 305 ft)</td>
<td>Open Hole</td>
<td>220 - 305</td>
<td>10</td>
<td>10.42</td>
<td>06-Oct-89</td>
<td>259.40, 696.30</td>
<td>21 18'03.38, 158 05'57.35</td>
</tr>
</tbody>
</table>

* Brass Pin Elevation
LEGEND

INJ-1 Injection Well Location and Designation
PW-1 Production Well Location and Designation
EX-1 Exploration Well Location and Designation

Foundation Exploration Boring by Dames & Moore (1988)

REFERENCE: General Layout Map HTDA 002107 (June 13, 1988).
State Well No: 1805-20M

Total Depth: 351 feet

Top of Boring at 10 feet MSL: 10/51/89

At 25.3 to 35 feet: dense, vuggy, and massive coral

At 40.5 feet: grading to CORALLINE RUBBLE

At 51.5 feet: grading pink and chalky

At 60 feet: grading to CORALLINE RUBBLE

At 95 feet: grading to CORALLINE RUBBLE

At 140 feet: medium sand grading to CORALLINE RUBBLE

At 253 feet: grading less weathered

At 288 feet: grading light gray-brown

At 349 feet: grading light brown

Bottom of boring at 351.5 feet.
TOC: 14.96 feet MSL
(11/69 only)

12-inch (I.D.) Stainless Steel Casing

24-inch (Nom.) Diameter Borehole

Gravel Pack: Monterey Filter Gravel
1/4" x 3/8"

Bentonite

Crushed Basalt

Cement Plug

6-inch (Nom.) Diameter Borehole

Drill Cuttings

Gravel Pack: 3/8" River Gravel

4-inch (I.D.) Schedule 40 PVC Well Casing

4-inch Diameter Schedule 40 PVC Well Screen
0.020" Slot Size

Well Slip Cap

Concrete Surface Seal

Threaded Bottom Cap

Equipment: Bucyrus Erie 60L Cable Tool
Elevation: ± 12 feet Date: April 1989

WHITE SILTY GRAVEL (CP)
dry, loose, (ill)

WHITE LIMESTONE – blocky, moderately fractured, moderately hard, moderately weathered
at 2.5 feet, hard
at 5.0 feet, very fine- to coarse-grained, porosity < 5 percent; calcite cement inclusions, iron oxide staining
very soft drilling 8 to 9.5 feet
at 10.0 feet, skeletal grains, many small cavities, 1 percent clay infilling, moderately hard, moderately weathered
at 11.8 feet, highly cemented with cryptocrystalline calcite, solution vugs
at 13 to 13.5 feet, micrite partings with medium grained sand and iron oxide
at 15.1 feet, color change to GRAYISH ORANGE
at 16.1 feet, fracture at 45 degrees to vertical
at 17.9 feet, color change to WHITE, large vugs up to 1/2-inch diameter, solution channels, moderately well cemented
at 23.3 feet, large mollusk shell imprints, increase in porosity to 25 percent, white sparry calcite infilling 1 percent
at 27.3 feet, becoming very hard, < 10 percent fine- to coarse-grained sand, infilling in cavities, very well cemented
at 29.1 feet, cavities up to 2-inch diameter with secondary aragonite crystals, iron oxide staining
at 34.0 feet, becoming poorly cemented, very fine-grained matrix, clay, white, plastic in bottom of sample
at 39.6 feet, decreasing clay content, increasing calcite concentration
at 42.6 feet, becoming well cemented, no clay, shell fragments, minor iron oxide staining
at 46.3 feet, color change to PALE YELLOWISH ORANGE, moderately well cemented
REFERENCE: General Layout Map HTDA 002107 (June 13, 1988).