Waihee 1&2
(Well No. 5631-02,03)
**CHECKLIST**

**WELL CONSTRUCTION PERMIT**

**WELL NAME or LOCATION:** North Wailuku Well, 182 ISLAND: Maui

**WELL NUMBER:** 5631-02803 **Tax Map Key:** 3-2-014

**OWNER/OPERATOR:**
- Firm Name: __________________________
- Contact Person: _____________________
- Address: _____________________________
- Phone: ______________________________

**LANDOWNER:**
- Firm Name: __________________________
- Contact Person: _____________________
- Address: _____________________________
- Phone: ______________________________

**Date application received:** 9-21-92

**Date acknowledged receipt/request more info:**

**Date application accepted:**

**Suspense date (90 days):**

**Date filing fee deposited:**

**Application sent to following:**

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<th>Date sent</th>
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| Dept. of Health          |           |                   |
| Office of Hawn. Affairs  |           |                   |
| State Hist Pres Div      |           |                   |
| Dept/Bd of Water Supply  |           |                   |
| Sierra Club L. D. F.     |           |                   |
| Koolauoa NB #20 (Oahu)   |           |                   |
| Dept Pub. Wrks (Hawaii)  |           |                   |
| Additional List (Molokai) |           |                   |
| Eric Hirano             |           |                   |

**Date agenda due:** 2 Dec 92

**Date submittal due:** 2 Dec 92

**Date submittal sent to applicant:**

**Date application approved or disapproved:** 16 Dec 92

**Date applicant notified of decision:**

**REMARKS:** *also request site 1525, 0 filing fees (per fee per well)*

4 mph wind (2 wind = backup) per Mike Nunn 1-22-93
Continued in Folder #2
CLOSING AGREEMENT

By and Between
BOARD OF WATER SUPPLY and
WAILUKU AGRIBUSINESS CO., INC.
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This Agreement is made this 21st day of December, 1995, by and between the BOARD OF WATER SUPPLY of the County of Maui, 200 South High Street, Wailuku, Maui, Hawaii 96793 (the "BOARD") and WAILUKU AGRIBUSINESS CO., INC., a Hawaii corporation, 90 Waiko Road, P.O. Box 520, Wailuku, Maui, Hawaii 96793 ("WAILUKU").

RECITALS: WAILUKU owns certain land in North Waihee Maui described in Exhibits "1" through "7" attached hereto and made a part hereof containing 2 improved wells and several well sites and easement areas, together with certain agreements, plans and specifications, and permits as further described in Exhibit "5" attached hereto. The purpose of this Agreement is to set forth the terms and conditions under which the parties shall close the transfer of certain real property title and other interests described in Section 5 below (collectively, the "Property") from WAILUKU to the BOARD for the consideration related below.

AGREEMENT: For valuable consideration WAILUKU and the BOARD mutually agree as follows:

1. Definitions. The following terms shall have the following means:

   a. "Sector A Property" shall mean that real property comprising approximately 5,306 acres, identified as TMK 3-2-14:01, more particularly reflected on Exhibit "1" and shown in yellow and purple on Exhibit "2".

   b. "Sector A-1 Property" shall mean that portion of Sector A Property comprising approximately 2,000 + acres, being sometimes referred to as the North Waihee Aquifer Recharge Area and shown in yellow on Exhibit "2".

   c. "Sector A-2 Property" shall mean that portion of Sector A Property comprising approximately 3,000 + acres, sometimes referred to as the Conservation Easement area and shown in purple on Exhibit "2".

   d. "Sector B Property" shall mean that real property comprising of approximately 380.318 acres, being that property sometimes referred to the Well Field/Easement area, more particularly described in Exhibit "3" and shown in pink on Exhibit "2".

   e. "Sector C Property" shall mean that real property referred to as the Pipeline Easement area, more particularly reflected in Exhibit "4" and shown in green on Exhibit "2".
f. "Personal Property" shall mean the two improved well sites on Sector B, the engineering studies, plans and specifications, permits, reports and other matters, all more particularly described and delineated on Exhibit "5".

g. "The Aquifer" or "The North Waihe Aquifer" shall mean the ground water resource(s) north of Waihe stream, including the recharge area of the North Waihe Aquifer as shown in yellow on Exhibit "2".

2. **Sale of Property.** WAILUKU agrees to sell and the BOARD agrees to purchase the Property on the terms and conditions set forth herein.

3. **Purchase Price.** The purchase price for the Property shall be approximately $3,820,000 (U.S. dollars)\(^1\), which shall be paid by the BOARD to WAILUKU in cash at closing. The price will be adjusted at closing to reflect the agreed upon reimbursement costs (currently estimated at $270,000).

4. **Closing Date.** For the purpose of this Agreement, closing shall be the date when all appropriate conveyance documents are recorded. WAILUKU and the BOARD agree to promptly execute appropriate and customary documents when requested by escrow to do so. The "scheduled closing date" shall be on or before February 15, 1996. There is no automatic right to extend. Time is of the essence and the "scheduled closing date" may not be extended unless both the BOARD and WAILUKU so agree in writing. This transaction shall be escrowed by Title Guaranty Escrow Services of Hawaii (Wailuku branch).

5. **Conveyances at Closing.** At closing, WAILUKU will convey the Property and the BOARD will pay to WAILUKU the total purchase price in cash, all as follows:

   a. **Sector A.** WAILUKU shall convey to the BOARD an undivided approximate 40% interest in Sector A, such that WAILUKU and the BOARD shall hold Sector A as tenants in common subject to all encumbrances and covenant

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\(^1\) The price has been allocated as follows: $2,500,000 for Sector A Property; $700,000 for the existing improvements, including the two existing wells; $350,000 for the easements on Sectors B and C to be conveyed at closing; $270,000 representing the estimate of expenses expended by WAILUKU (or affiliates) to be reimbursed by the BOARD for all engineering and entitlement costs (plans, studies, governmental processing costs) the final expense to be determined during the due diligence period.
concerning the same and further subject to the tenancy in common agreement, further described below.

1. **Covenants Concerning Sector A.** The deed to Sector A Property to be executed by the parties will be subject to existing encumbrances including, but not limited to, the Deed of Exchange between Hawaiian Commercial and Sugar Company and Wailuku Sugar Company dated June 23, 1924, as amended by Agreement dated March 24, 1937 and will have the following covenants (and other covenants which may be agreed to by the parties prior to closing).

   a. Within Sector A, there will be a covenant that neither party will take any action including the creation of improvements, which would result in any significant negative impact to the surface or ground water resources within or emanating from the area. The parties would agree that there would be no further surface or ground water development by either party within Sector A without the mutual consent of both parties. The consent of either party shall not be unreasonably withheld, provided, it is agreed that consent is not unreasonably withheld, if the reason for the withholding is that the proposed activity will either have a significant negative impact on (1) the aquifer, or (2) the rights emanating from the aquifer, or (3) the ground or surface water sources and rights related to the aquifer, or (4) that the requesting party is in breach of its covenants relating to Sectors A, B or C. ("Significant negative impacts" shall be defined in the closing documents).

   b. For water source development within Sector A, WAILUKU will be granted a right of first refusal to participate in the source development on a pro rata (cost of development) basis up to 50 percent (50%) of the resource. Any joint development would be implemented consistent with the Board of Water Supply rules concerning source development and source credits.

   c. WAILUKU will have the right and ability to satisfy any rights and obligations to maintain the stream and the existing surface water system improvements within the area, at its discretion and consistent with past practices. WAILUKU would provide to the Board of Water Supply a periodic plan of surface water system maintenance within the area.
d. The parties would provide notice to each other if they wish to undertake any type of activity within the area other than WAILUKU’s on-going maintenance of the surface water systems within the area.

b. **Sector B.** WAILUKU shall grant easements to the BOARD encumbering Sector B Property with the well site easements, access easements, tank site easements and pipeline easements, as more particularly defined in Exhibits "6" and "7".

At closing, WAILUKU and the BOARD will execute a declaration on Sector B Property reflecting that the BOARD, with the consent of WAILUKU, would have the ability to modify the location of the well site areas. WAILUKU’s consent would not unreasonably be withheld, and the obligation of the BOARD and WAILUKU would be to identify a needed relocated site which would have the least amount of impact on the utility of Sector B property. Within Sector B, WAILUKU would reserve and be granted the right of first refusal to participate in any ground water source development by the BOARD in excess of five million gallons per day from Sector B. The right of first refusal would be on a pro rata basis (cost of development) up to 50% of the resource, consistent with the BOARD’s rules and water source development and credits.

(The specifics of the right of first refusal for Sectors A and B, including the election period procedures, shall be provided in the closing documents).

c. **Sector C.** WAILUKU shall grant a pipeline easement to the BOARD encumbering Sector C Property with said pipeline easement as more particularly described in Exhibits "6" and "7".

At closing WAILUKU would create a declaration on Sector C Property covenying that it would not create new improvements or other activity within Sector C which would have a negative impact on the volume of ground water developed by the BOARD within Sector B.

d. **Personal Property.** WAILUKU shall convey and assign to the BOARD all of that personal property identified in Exhibit "5".

e. **Tenancy in Common Agreement.** WAILUKU and the BOARD shall enter into a tenancy in common agreement concerning their joint interests in Sector A. The tenancy in common agreement will identify the rights and obligations of the parties concerning Sector A-1 and A-2, as well as providing for the subdivision of Sector A into Sectors A-1 and A-2 and the conveyance of A-1 Property from WAILUKU to the BOARD after the subdivision of Sector A-1 from
Sector A and the release by the BOARD to WAILUKU of its remaining undivided interest in Sector A-2. The tenancy in common agreement will provide for the grant of a conservation easement from WAILUKU to the BOARD concerning Sector A-2 Property after Sector A-2 is subdivided from Sector A. The agreement shall also authorize the BOARD to subdivide Sector A Property and will provide that the BOARD will perform all services and all acts and pay all costs necessary to create the referenced subdivision. The agreement will provide that the Property will remain in a tenancy in common status with the BOARD and WAILUKU maintaining their tenancy in common interests should the Property not be subdivided. The tenancy in common agreement will contain other covenants, as agreed upon between the BOARD and WAILUKU, concerning the respective rights, obligations and material declarations and covenants concerning Sector A.

6. **Due Diligence.** The BOARD shall have a "due diligence period" from the date of this Agreement to January 31, 1996, during which the BOARD may review all aspects of the Property, perform studies, tests, and generally to satisfy itself that the Property is acceptable to the BOARD in the BOARD’s discretion. During this period, the following will also occur:

   a. Within five (5) days after the execution of this Agreement by both parties, WAILUKU will provide to the BOARD a copy of all WAILUKU’s studies, plans, surveys, environmental assessments, permits, approvals, and other reports relevant to the Property for the BOARD’s review.

   b. The BOARD and its agents may enter the Property for the purpose of conducting surveys, tests and other work as the BOARD may deem appropriate, provided that if the ground is disturbed, the BOARD, at its expense, shall return the surface to the grade as existed prior to it being disturbed.

   c. WAILUKU shall obtain and deliver to the BOARD a title report on the Property from Title Guaranty of Hawaii, Inc. (together with copies of all encumbrance documents).

   d. Counsel for WAILUKU and the BOARD will prepare closing documents in the form satisfactory to each counsel, including the deed of the BOARD’s interest in Sector A from WAILUKU to BOARD; the deed shall convey title and warrant the same during the period WAILUKU has had title, subject to all encumbrances identified therein or shown on said title report or visible upon physical inspection of the Property. The closing documents shall also include the easements and the transfer of personal property as provided herein.

   e. The BOARD and WAILUKU shall petition the Commission on Water Resource Management to transfer the pump installation permit from
WAILUKU to the BOARD such that, at closing, the BOARD shall obtain and hold said permit under terms satisfactory to the BOARD.

If the BOARD is not satisfied as to any matter referred to above or any other matter, whether related to the Property or not related to the Property, the BOARD may cancel this Agreement by written notice to WAILUKU no later than January 31, 1996, in which event this Agreement will terminate. If counsel for the BOARD and WAILUKU shall be unable to agree on the form and content of all closing documents, WAILUKU may cancel this Agreement by written notice to the BOARD no later than January 31, 1996. In each such instance, prior to February 1, 1996, the BOARD will return to WAILUKU all of WAILUKU's studies, plans and other material in the BOARD's possession and the parties shall be relieved from any liability hereunder.

7. Closing Costs.

a. WAILUKU will pay for the preliminary title report, cost of preparing the deed, Hawaii conveyance tax, one-half of the escrow fee and WAILUKU's legal fees. BOARD will pay the cost of BOARD's title insurance, recording fees for the deed, one-half of the escrow fee and BOARD's legal fees.

b. Although BOARD agrees to pay the purchase price in cash at closing, WAILUKU may request that BOARD participate in a Section 1031 tax deferred exchange for the benefit of WAILUKU. In that event, WAILUKU may assign its interest in this Agreement to a "qualified intermediary" (as defined in the Internal Revenue Code or IRS regulations) as part of an exchange agreement and BOARD agrees to cooperate in said transaction and participate with WAILUKU in accepting the tax-deferred exchange, provided, however, that: (a) BOARD shall not be required to pay any additional costs or assume any exposure of liability with respect to the exchange; and (b) BOARD shall have no liability concerning the legal or tax effects of the exchange.

8. Default/Remedies.

a. In the event BOARD fails to perform BOARD's obligations under this Agreement, (WAILUKU not being in default), WAILUKU may (a) bring an action for damages for breach of contract, and (b) BOARD shall be responsible for any costs incurred in accordance with this Agreement.

b. In the event WAILUKU fails to perform WAILUKU's obligations under this Agreement (BOARD not being in default), BOARD may (a) bring an action for damages for breach of contract, (b) seek specific performance of this
Agreement, and (c) WAILUKU shall be responsible for any costs incurred in accordance with this Agreement.

c. The foregoing shall not exclude any other remedies available under this Agreement to either WAILUKU or BOARD on account of the other party’s default.

d. In the event of default by a party and/or a legal action, the prevailing party shall be entitled to recover all costs incurred, including reasonable attorney’s fees. All expenses incurred by escrow shall be deducted from any deposited funds prior to any disbursement to the prevailing party.

9. Acceptance of Property As-Is. BOARD accepts the Property in completely "as-is" condition without any representations or warranties whatsoever by WAILUKU, express or implied, except as otherwise expressly provided in this Agreement.

10. Facsimiles. Fax (facsimile) copies of the executed Agreement shall be fully binding and effective for all purposes whether or not originally executed documents are transmitted to escrow. Fax signatures on documents will be treated the same as original signatures. However, each party agrees that it will promptly forward originally executed documents to each other. The parties understand that they must physically execute and deliver original conveyance and other recordable documents prior to closing.

11. Counterparts. This Agreement may be executed in counterparts and all counterparts together shall constitute the agreement among all of the parties hereto, in the same way as if the parties physically signed the same document.

12. Notices. Any notice by one party to the other shall be deemed effective: (a) personally delivered; (b) 36 hours after mailing by first-class U.S. mail, postage prepaid, to the other party at its address stated at the beginning of this Agreement; (c) or at such other address as said other party shall have notified the party giving the notice as the address for receiving notices hereunder. Notices sent by telecopier (fax) shall be effective when transmitted to the current fax number of the receiving party at the said address provided that the sending party shall receive the electronic confirmation that the fax transmission was received at the said number, and the sending party mails a confirming copy on the same date to the receiving party at said address.

13. Consent/Approval of Agreement. Whenever a party is requested herein, to consent to, to agree to, or to provide any approval of the actions, plans, or requirements of the other party, the party being requested to "consent/approve,
agree to" shall consider the same in good faith and shall not unreasonably withhold or delay such consent, approval or agreement.

14. **Survival of Warranties, Covenants and Representations.** The warranties, covenants and representations of WAILUKU and the BOARD shall survive the closing of the transaction and shall not be binding to any person or entity not a party to this Agreement other than the successors and assigns of the parties.

15. **Miscellaneous.** Time is of the essence of this Agreement. WAILUKU and the BOARD will comply with all requirements of HRPTA and FRPTA (if applicable) and the other applicable laws.

16. **Governing Law.** This Agreement shall be governed by the laws of Hawaii.

17. **Agreement Under Threat of Condemnation.** The parties hereto agree that this Agreement is being executed by the parties under its right of condemnation by the BOARD and the Agreement is entered by into by WAILUKU in lieu of, and as a compromise alternative to, the condemnation proceedings threatened by the BOARD.

IN WITNESS WHEREOF, the parties have signed this Agreement on the date indicated above.

WAILUKU AGRIBUSINESS CO., INC.
a Hawaii corporation

By [Signature]
Its: Chairperson

By [Signature]
Its: Vice president
BOARD OF WATER SUPPLY

By  

Marie Kimmey

Its: Chairperson

By  


Its:

APPROVED AS TO FORM AND LEGALITY:

GARY M. BARTON

Director, Surface Water Division
County of Maui
On this 21st day of December, 1995, before me personally appeared Kent T. Lucero and W.K. Tallett, to me personally known, who, being by me duly sworn, did say that they are the Vice president and Vice President respectively, of Wailuku Agribusiness Co., Inc., a Hawaii corporation, and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the free act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

[Signature]
Notary Public, State of Hawaii.

My commission expires: 02/10/96
STATE OF HAWAII  )
        ) SS.
COUNTY OF MAUI  )

On this 26th day of December, 1995, before me appeared MARIE KIMMEY, to me personally known, being by me duly sworn, did say that she is the Chairperson of the BOARD OF WATER SUPPLY of the County of Maui, and that the seal affixed to the foregoing instrument is the lawful seal of the said BOARD OF WATER SUPPLY, and that the said instrument was signed and sealed on behalf of the said BOARD OF WATER SUPPLY, and the said MARIE KIMMEY acknowledged the said instrument to be the free act and deed of the said BOARD OF WATER SUPPLY.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

[Signature]

Notary Public, State of Hawaii

My commission expires: 4/19/96
STATE OF HAWAI'I

COUNTY OF MAUI

On this ___ day of __________, 1995, before me personally appeared ____________________________, to me personally known, who being by me duly sworn, did say that he is the Chairman of the Board of Water Supply of the County of Maui, a political subdivision of the State of Hawaii, and that the seal affixed to the foregoing instrument is the lawful seal of the said County of Maui, and that the said instrument was signed and sealed on behalf of said County of Maui, and the said officer acknowledged the said instrument to be the free act and deed of the said County of Maui.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

____________________________________
Notary Public, State of Hawaii.

My commission expires: ____________
STATE OF HAWAI'I   )
COUNTY OF MAUI    ) SS.

On this ___ day of ________, 1995, before me personally appeared
________________________________ and ________________________, to me
personally known, who being by me duly sworn, did say that they are the Chairman
and ________, respectively, of the Board of Water Supply of the County of
Maui, a political subdivision of the State of Hawaii, and that the seal affixed to the
foregoing instrument is the lawful seal of the said County of Maui, and that the said
instrument was signed and sealed on behalf of said County of Maui, and the said
officers acknowledged the said instrument to be the free act and deed of the said
County of Maui.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

________________________________
Notary Public, State of Hawaii.

My commission expires: _____________
At the meeting on Maui on January 24, 1996, you asked the staff to look into the best way to include the North Waihe'e wells in the proposed Iao Aquifer ground water designation. The two options are described below along with time estimates:

1. DESIGNATE THE WAIHEE AQUIFER SYSTEM

**Process:**
- Recommendation to initiate designation by the chairperson at a regular meeting.
- Chair consults with Mayor and Board of Water Supply.
- Decision to proceed within 60 days.
- CWRM holds public hearing on Maui.
- Staff prepares Findings of Fact Report.
- Chair consults with Council and BWS.
- CWRM designates.

**Time:** 7 months plus

**Analysis:**

The criteria for ground water designation are listed in HRS §174C-44. The criterion that may be met is HRS §174C-44(1):

- Whether an increase in water use or authorized planned use may cause the maximum rate of withdrawal from the ground water source to reach ninety percent of the sustainable yield of the proposed water management area.

In the Windward Oahu designation, all areas of Oahu connected by water transmission infrastructure were included in the calculation of authorized planned use and sustainable yield. Similarly, the sustainable yields of both Iao and Waihe'e Aquifers should be included. The sustainable yield of Iao Aquifer is 20 mgd and for Waihe'e Aquifer it is 8 mgd, totalling 28 mgd.
Authorized planned use means the use or projected use of water by a development that has received the proper state land use designation and county development plan/community plan approvals. There are two possible ways to calculate the authorized planned use for the Maui situation: 1) the Board's water commitments, and 2) projected water use from land use plans.

The Board has notified the Commission that they have about 8.4 mgd in water commitments, which would put the authorized planned use at 101% of the combined sustainable yields for Iao and Waihee Aquifers (28 mgd). The Maui Water Use and Development Plan projects a demand of 25 to 30 mgd by the year 2010 for the Wailuku System. This would calculate to 89% to 107% of the combined sustainable yields of the Iao and Waihee Aquifers (28 mgd).

2. **AMEND THE BOUNDARY OF THE IAO AQUIFER TO INCLUDE THE NORTH WAIHEE WELLS**

**Process:**
- Hold a noticed public hearing to amend the Hawaii Water Plan (90 days notice required).
- Hold a decision-making meeting immediately after the hearing.

**Time:** 4 months

**Analysis:**

The reason to amend the boundary would have to be given. There appears to be no hydrologic reason why there should be separate Iao and Waihee aquifers. Although this method appears shorter, the CWRM may need to go through the entire Iao Aquifer designation process again because the boundaries are different.

2. I will appreciate your comments and thoughts on these options.
Ms. Marie Kimmey, Chairperson
Maui Board of Water Supply
P.O. Box 1109
Wailuku, Hawaii 96793-7109

Dear Ms. Kimmey:

Pump Installation Permit Transfer
North Waihee Wells 1 & 2
(Well Nos. 5631-02 & 03)

By your February 20, 1996 letter, the Commission on Water Resource Management acknowledges the transfer of the captioned permit from C. Brewer Properties, Inc. to the Maui Board of Water Supply.

Enclosed are copies of the permit and its extensions. Please be advised that the permit requires that work be started by May 14, 1996, and be completed by March 1, 1997. Should you be unable to meet those deadlines, please submit a request to extend them, showing cause why the permit should not be revoked.

Aloha,

Michael D. Wilson
Chairperson

Enclosures

c: C. Brewer Homes, Inc.
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P. O. BOX 1109
200 S. HIGH STREET, 5TH FLOOR
WAILUKU, HAWAII 96793-7109
FAX NO. 243-7951
TELEPHONE NO. (808) 243-7816

FAX TRANSMITTAL

DATE: 7/29/94

TO: Rae Loui

Fax No. 808. 587.0719

Subject: NTP N. Waiehe Wells

No. of Pages (including this transmittal): 2

REMARKS:

Transmitter: D. Radrick

NOTE: If you have not received all of the pages, please call

@ (808) 243-7816
February 29, 1996

Mr. Warren Unemori
Warren S. Unemori Engineering, Inc.
2145 Wells Street, Suite 403
Wailuku, Maui, Hawaii 96793

Dear Mr. Unemori:

Subject: Independent Professional Services for the Development of North Waihee Wells

This letter constitutes NOTICE TO PROCEED for all work under the subject project.

You are hereby notified that the official commencement date of this project shall be February 29, 1996. The time allowed to complete the required services is specified in the contract, exclusive of time required for governmental review.

Please acknowledge receipt of this notice in the space provided below on the original and two copies and return them to the Department of Water Supply. Please keep the third copy of this letter for your files.

A copy of the fully executed contract will be forwarded for your files.

Sincerely,

David R. Craddick
Director

hk

cc: DWS Fiscal
DWS Contractor
DWS Engineer
Director

NOTICE TO PROCEED RECEIVED THIS 29th DAY OF February 1996.

Warren S. Unemori
Selected critical path items for the four source alternatives are listed below:

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<th>Source Alternative</th>
<th>Milestones</th>
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<td>Waihee/Iao Ditch</td>
<td>Obtain membranes by March 1, 1996</td>
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<td>Reach land use agreement by April 1, 1996</td>
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<td></td>
<td>Complete design, EA and permits by Aug 1, 1996</td>
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<td>Bid line construction by Aug. 1, 1996</td>
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<td></td>
<td>Award line construction bid by Nov. 1, 1996</td>
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<td></td>
<td>Install membranes by Nov 1, 1996</td>
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<td>North Waihee</td>
<td>Execute purchase agreement by February 15, 1996</td>
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<td>Issue bid specs by July 1, 1996</td>
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<td>Award Bid by Sept 1, 1996</td>
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<td>Start pump installation by Nov. 1, 1996</td>
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<td>Complete pump installation by March 1, 1997</td>
</tr>
<tr>
<td></td>
<td>Complete construction by Aug 1, 1997</td>
</tr>
<tr>
<td>Wailuku Shaft</td>
<td>Extend use agreement by Aug 1, 1996</td>
</tr>
<tr>
<td></td>
<td>Complete design by Feb 1, 1997</td>
</tr>
<tr>
<td></td>
<td>Obtain pipe easements by May 1, 1997</td>
</tr>
<tr>
<td>Waikapu Tank Well</td>
<td>Obtain well site agreement by June 1, 1996</td>
</tr>
<tr>
<td></td>
<td>Complete design by June 1, 1996</td>
</tr>
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<td>Complete EA by June 1, 1996</td>
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<tr>
<td></td>
<td>Issue bids by Sept 1, 1996</td>
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<tr>
<td></td>
<td>Award Bids by Nov 1, 1996</td>
</tr>
<tr>
<td></td>
<td>Complete construction by May 1, 1997</td>
</tr>
</tbody>
</table>

Status of C. Brewer agreement: (1/31/96 telecon with Dave Craddick)

- Purchase includes 3000 acres of a conservation easement, 2000 acres in fee simple. C. Brewer would retain about 400 acres at the mauka end.

- Due diligence extended to Feb. 7 from Jan. 31.

- C. Brewer asking for things that MBWS cannot agree to:
  1. MBWS can't transfer land interest after acquisition
  2. MBWS must underground electric lines
  3. C. Brewer wants to be the arbitrator if existing uses (C. Brewer's ditches and tunnels) are impacted

- Dave says it doesn't look good, expects to negotiate over the weekend for a special Board meeting on **Tuesday, Feb. 6.**
C. Brewer Homes, Inc.

February 20, 1996

Ms. Rae M. Loui
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii  96809

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2
(Well Nos. 5631-02 & 03)

Dear Ms. Loui:

Pursuant to your letter dated February 1, 1996 relative to the subject permits, we are writing to inform you that the transaction between Wailuku Agribusiness Co., Inc. and the Maui Board of Water Supply, has closed as of this date. This transaction, pursuant to the parties' earlier agreement, will enable the installation of the pumps, and construction of other improvements, by the Board of Water Supply, to augment the water resources of Central Maui.

As a result, we hereby respectfully request that you, as previously authorized by the Commission, transfer the subject permits to the Board of Water Supply, according to the terms of the agreement.

Thank you for your assistance in this matter.

Sincerely,

C. BREWER HOMES, INC.

By __________________________
Vice-President
Facsimile Transmittal

To Facsimile Number:  587-0219
Pages including this cover:  7
Please deliver directly to:

Ms. Rae M. Loui
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii  96809

Date of Transmission:  February 23, 1996
Regarding:  North Waihee Wells 1 & 2
Client Matter Number:

From:
Douglas W. MacDougal, Esq.
Ashford & Wriston
Telephone Direct Line
Facsimile Direct Line

Comments:

See attached letter.
February 23, 1996

VIA FACSIMILE

Ms. Rae M. Loui
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Re: Pump Installation Permits for North Waihee Wells 1 and 2
(Well Nos. 5631-02 & 03)

Dear Ms. Loui:

Attached is a copy of the formal notification letter dated February 20, 1996 to the Commission on Water Resource Management confirming the closing of the County of Maui BWS/Wailuku Agribusiness North Waihee transaction. The letter is signed by C. Brewer Homes, Inc., Wailuku Agribusiness Company and the Maui Board of Water Supply.

The original of this letter will be forwarded to you for your files as soon as we receive it from escrow.

Yours truly,

DWM:met
Enclosure

cc: Mr. David Craddock (via facsimile)
Gary Zakian, Esq. (via facsimile)
February 20, 1996

Ms. Rae M. Loui
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2
(Well Nos. 5631-02 & 03)

Dear Ms. Loui:

Pursuant to your letter dated February 1, 1996 relative to the subject permits, we are writing to inform you that the transaction between Wailuku Agribusiness Co., Inc. and the Maui Board of Water Supply, has closed as of this date. This transaction, pursuant to the parties' earlier agreement, will enable the installation of the pumps, and construction of other improvements, by the Board of Water Supply, to augment the water resources of Central Maui.

As a result, we hereby respectfully request that you, as previously authorized by the Commission, transfer the subject permits to the Board of Water Supply, according to the terms of the agreement.

Thank you for your assistance in this matter.

Sincerely,

C. BREWER HOMES, INC.

By

[Signature]
Senior Vice President

By

[Signature]
its Vice-President
Ms. Rae M. Loui  
February 20, 1996  
Page 2

By Kathleen T. Brown  
Secretary

WAILUKU AGRIBUSINESS COMPANY

By J. Alan Kealoha  
its CHAIRMAN OF THE BOARD

BOARD OF WATER SUPPLY,  
COUNTY OF MAUI

By Brian Walker  
its Authorized Signature
STATE OF HAWAII
CITY & COUNTY OF HONOLULU

On this 21st day of FEBRUARY, 1996, before me personally appeared CRAIG CHAMPION and G. C. WENTWORTH, to me personally known, who, being by me duly sworn, did say that they are the Senior Vice President and Vice President, respectively, of C. BREWER HOMES, INC., a Delaware corporation, that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the free act and deed of said corporation.

Notary Public, State of Hawaii
My Commission Expires: 1/2/97
On this 21st day of FEBRUARY, 1996, before me personally appeared J. ALAN KUGLE and KATHLEEN F. OSHIRO, to me personally known, who, being by me duly sworn, did say that they are the Chairman of the Board and Secretary, respectively, of WAILUKU AGRIBUSINESS CO., INC., a Hawaii corporation, that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the true act and deed of said corporation.

Notary Public, State of Hawaii

My Commission Expires: 11/2/97
STATE OF HAWAII  
COUNTY OF MAUI  

On this 20th day of February, 1996, before me appeared BYRON WALTERS, to me personally known, who, being by me duly sworn, did say that he is a Member of the Board of Water Supply of the County of Maui, and was authorized by the BOARD OF WATER SUPPLY on February 15, 1996 to execute any and all documents as set forth in the COUNTY OF MAUI BOARD OF WATER SUPPLY RESOLUTION RELATING TO THE PURCHASE OF THE WAIHEE VALLEY PROPERTY, and that the said instrument was signed on behalf of the said Board of Water Supply, and the said BYRON WALTERS acknowledged the said instrument to be the free act and deed of the said Board of Water Supply.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

[Signature]
Notary Public, State of Hawaii

My commission expires: 11/25/96
DATE: February 22, 1996

TO: J Charley Ice, Water Commission
    C. Brewer Homes: ATT: Val Milton Arakawa

FROM: Paul R. Mancini

SUBJECT: North Waihee Wells

This communication contains confidential and privileged information. It is exempt from disclosure under applicable law. If you received it in error, please notify the sender immediately by telephone or fax and return the original by mail.

TRANSMITTING THE FOLLOWING:

Copy of letter dated February 20, 1996 to Department of Land and Natural Resources, Commission on Water Resource Management from C. Brewer Homes, Inc.

REMARKS:

KAHULUI, HAWAII, 96732.

Mancini, Rowland & Welch
The Kahului Building
33 Lono Avenue, Suite 470
Kahului, Maui, Hawaii 96732
Telephone: (808) [REDACTED]
Fax: (808) [REDACTED]

Fax Memorandum

February 22, 1996

TO: J Charley Ice, Water Commission
    C. Brewer Homes: ATT: Val Milton Arakawa

FROM: Paul R. Mancini

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Telephone: (808) [REDACTED]
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TRANSMITTING THE FOLLOWING:

Copy of letter dated February 20, 1996 to Department of Land and Natural Resources, Commission on Water Resource Management from C. Brewer Homes, Inc.

REMARKS:

KAHULUI, HAWAII, 96732.
February 20, 1996

Ms. Rae M. Loui
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2
(Well Nos. 5831-02 & 03)

Dear Ms. Loui:

Pursuant to your letter dated February 1, 1996 relative to the subject permits, we
are writing to inform you that the transaction between Wailuku Agribusiness Co., Inc.
and the Maui Board of Water Supply, has closed as of this date. This transaction,
pursuant to the parties' earlier agreement, will enable the installation of the pumps, and
construction of other improvements, by the Board of Water Supply, to augment the
water resources of Central Maui.

As a result, we hereby respectfully request that you, as previously authorized by
the Commission, transfer the subject permits to the Board of Water Supply, according
to the terms of the agreement.

Thank you for your assistance in this matter.

Sincerely,

C. BREWER HOMES, INC.

By /s/ C. Brewer
Senior Vice President

By /s/ A. W. Frey
Its Vice President
Ms. Rae M. Loui  
February 20, 1996  
Page 2

WAILUKU AGRIBUSINESS COMPANY

By Kathleen L. Ochs  
Secretary

BOARD OF WATER SUPPLY, COUNTY OF MAUI

By Ryan Walker  
Authorized Signature

By J. Alan Knight  
Chairman of the Board
STATE OF HAWAII

CITY & COUNTY OF HONOLULU

On this 21st day of FEBRUARY, 1996, before me personally appeared CRAIG CHAMPION and G. C. WENTWORTH, to me personally known, who, being by me duly sworn, did say that they are the Senior Vice President and Vice President, respectively, of C. BREWER HOMES, INC., a Delaware corporation, that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the free act and deed of said corporation.

[Signature]
Notary Public, State of Hawaii

My Commission Expires: 11/2/97
STATE OF HAWAII  
CITY & COUNTY OF HONOLULU

On this 21st day of February, 1998, before me personally appeared J. ALAN KUGLE and KATHLEEN F. OSHIRO, to me personally known, who, being by me duly sworn, did say that they are the Chairman of the Board and Secretary, respectively, of WAILUKU AGRIBUSINESS CO., INC., a Hawaii corporation, that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the free act and deed of said corporation.

Notary Public, State of Hawaii

My Commission Expires: 11/2/97
STATE OF HAWAII

COUNTY OF MAUI

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IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public, State of Hawaii

My commission expires: 11/25/96
Ms. Rae M. Loui
February 20, 1996
Page 2

WAILUKU AGROBUSINESS COMPANY

By [Signature]

Its CHAIRMAN OF THE BOARD

BOARD OF WATER SUPPLY,
COUNTY OF MAUI

By [Signature]

Its Authorized Signatory
On this 21st day of February, 1996, before me personally appeared CRAIG CHAMPION and G. C. WENTWORTH, to me personally known, who, being by me duly sworn, did say that they are the Senior Vice President and Vice President, respectively, of C. BREWER HOMES, INC., a Delaware corporation, that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the free act and deed of said corporation.
On this 21st day of February, 1996, before me personally appeared J. ALAN KUGLE and KATHLEEN F. OSHIRO, to me personally known, who, being by me duly sworn, did say that they are the Chairman of the Board and Secretary, respectively, of WAILUKU AGribusiness Co., Inc., a Hawaii corporation, that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors, and the said officers acknowledged said instrument to be the free act and deed of said corporation.

Notary Public, State of Hawaii

My Commission Expires: 11/2/97
On this 20th day of February, 1996, before me appeared BYRON WALTERS, to me personally known, who, being by me duly sworn, did say that he is a Member of the Board of Water Supply of the County of Maui, and was authorized by the BOARD OF WATER SUPPLY on February 15, 1996 to execute any and all documents as set forth in the COUNTY OF MAUI BOARD OF WATER SUPPLY RESOLUTION RELATING TO THE PURCHASE OF THE WAIHEE VALLEY PROPERTY, and that the said instrument was signed on behalf of the said Board of Water Supply, and the said BYRON WALTERS acknowledged the said instrument to be the free act and deed of the said Board of Water Supply.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

[Signature]

Notary Public, State of Hawaii

My commission expires: 11/25/96
NEWS RELEASE
February 15, 1996

Media Contact: David Craddick
Phone No. 

Wailuku, Maui - on Thursday, February 15, 1996, the Maui Board of Water Supply approved the purchase of watershed land from Wailuku Agribusiness for 2000 acres north of Waihee Stream, and a conservation easement of 3000 acres south of the Waihee Stream in the Waihee watershed area.

In addition to the watershed purchase, the Board acquired two existing wells and easements for eight additional well sites, a reservoir site, and the transmission pipeline to develop water from the North Waihee Aquifer. The sustainable yield for North Waihee Aquifer is approximately 8 million gallons per day. The purchase price is $3.84 million.

The purchase represents long hours of work by Gary W. Zakian, Deputy Corporation Counsel, with the assistance of Douglas W. MacDougal and Jill M. Teutsch with the law firm of Ashford and Wriston, working for the Board, and local attorney Paul R. Mancini, representing Wailuku Agribusiness. The Board of Water Supply has held meetings over the past four years to conclude this agreement.

- end -

"By Water All Things Find Life"
Mr. James M. Murray
C. Brewer Homes, Inc.
24 North Church Street, Suite 205
Wailuku, Hawaii 96793

Dear Mr. Murray:

Extension of Start Date for Pump Installation Permits
North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03)

At its January 24, 1996 regular meeting, the Commission granted relief from its revocation of the captioned permits and approved a four-month extension of the start date to May 14, 1996, contingent upon receipt of written confirmation by February 25, 1996 that the Agreement between Wailuku Agribusiness Co., Inc. and the Maui Board of Water Supply has been closed.

If confirmation is not received by that date, the permit shall be immediately revoked.

The Chairperson is authorized to transfer the pump installation permits to the agreed party, according to the terms of the Agreement, upon receipt of a petition properly signed by the Board, Wailuku Agribusiness, and the permittee’s successor in interest C. Brewer Homes, Inc.

If you have any questions, please contact Charley Ice at [contact information]

Sincerely,

RAE M. LOUI
Deputy Director
STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT
January 24, 1996
Wailuku, Maui

C. Brewer Properties, Inc.
Request for Extension of Start Date
North Waihee Wells 1 & 2, (Well Nos. 5631-02 & 03)
Request to Install 1400 gpm Pumps for Domestic Use

APPLICANT: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

LANDOWNER: Wailuku Agribusiness Company, Inc.
P.O. Box 520
Wailuku, HI 96793

ACTION REQUESTED:
Permission to extend start date four months, from January 14, 1996 to May 14, 1996, for installing a 1400 gpm (gallons per minute) pump in each of two North Waihee Wells for private municipal use.

WELL LOCATION/TAX MAP KEY:
The wells are located at Waihee Valley, Maui, at Tax Map Key: 3-2-1:4 (Exhibit 1).

BACKGROUND:

March 25, 1993 Pump Installation Permits for North Waihee Wells 1 & 2 were issued. Due to delays in other aspects of the residential development project, action on the permits was also delayed. Several requests for extension of the start date were made and administratively approved.

March 1, 1995 Pump Installation Permits were extended, with a new expiration date of March 1, 1997. The start date was set to expire in two months, to require applicant to return to the Commission if delays continued. The permits were issued March 14, 1995.

AGENDA 2
Item 2
each well. Potential water use from the Waihee System by the year 2010 is estimated to be up to 8 mgd by the Maui Water Use and Development Plan, although the Plan acknowledges that withdrawals above 4 mgd would require justification through field demonstration.

ANALYSIS:

The well will develop fresh, basal water for municipal use; the applicant is negotiating dedication of the wells to the County. The wells tap an aquifer with a static head standing about 10 feet above sea level. John Mink has observed that, because the stream channel in this vicinity is 200 feet above sea level, the wells should have no effect upon it. Further, John Mink's assessment of the Pump tests is that the drawdown from heavy pumping is relatively minor, with full recovery nearly instantaneous. Salinity is very low.

RECOMMENDATION:

A. That the Commission grant relief from its revocation of the pump installation permits for North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03) and approve a four-month extension of the start date of the pump installation permits for North Waihee Wells to May 14, 1996, contingent upon receipt of confirmation, by February 25, 1996, that the Agreement between the parties has closed. If confirmation is not received by that date, the permit shall be immediately revoked.

B. That the Commission authorize the Chairperson to transfer the pump installation permits to the agreed party upon receipt of a petition properly signed by the Board, Wailuku Agribusiness, and the permittee's successor in interest, C. Brewer Homes, Inc.

Respectfully submitted,

[Signature]
RAE M. LOUI
Deputy Director

Attachments

APPROVED FOR SUBMITTAL:

[Signature]
MICHAEL D. WILSON, Chairperson
Mr. James M. Murray  
C. Brewer Homes, Inc.  
24 North Church St., Suite 205  
Wailuku, Hawaii 96793  

Dear Mr. Murray:  

Transfer of Pump Installation Permits  

We received your letter of January 9, 1996, requesting confirmation of the process for transferring the pump installation permits for North Waihee Wells 1 & 2 (Well Nos. 5631-01 & 02) from C. Brewer Properties, Inc. to the Maui Board of Water Supply (Board).  

You have indicated by phone that an escrow company will be handling the technical details of the "Closing Agreement" between the Board and Wailuku Agribusiness Co., Inc. upon conclusion of the due diligence period January 31, 1996, and wish to have confirmation from our office that the Commission on Water Resource Management (Commission) will officially transfer the pump installation permits to the Board upon fulfillment of procedural requirements.  

The "Closing Agreement" states (item 6e, page 5) that, during the due diligence period, the Board and Wailuku Agribusiness Co., Inc. shall petition the Commission to transfer the pump installation permit from Wailuku (sic) to the Board such that, at closing, the Board shall hold the permit under terms satisfactory to the Board. The petition can be in letter form addressed to the Chairperson, in simple language, and should be signed by both parties to the Agreement, as well as by the permittee's successor in interest, C. Brewer Homes, Inc. Staff is recommending that the Chairperson be authorized to respond by letter upon receipt of such petition.  

If you have any questions, please call Charley Ice at [redacted]  

Sincerely,  

RAE M. LOUI  
Deputy Director
FROM: [Name]
TO: [Name]

REGULATION BRANCH
- E. Sakoda
- D. Higa
- L. Nakama
- C. Ice
- R. Jinnai
- S. Swanston

PLANNING BRANCH
- S. Edmunds
- L. Mizuno

DATE: [Date]

APPROVAL SIGNATURE INFORMATION

PLEASE:
See Me
Review & Comment
Take Action
Type Draft
Type Final
File
Xerox copies

[Handwritten note: there's no permit until Jan 95; correct]
January 9, 1996

Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2
(Well Nos. 5631-02 and 5631-03) Waihee, Maui, Hawaii

Dear Ms. Loui:

We have submitted to you a letter dated January 2, 1996 requesting that the subject pump installation permits be extended. As noted in the letter, the County of Maui Board of Water Supply and Wailuku Agribusiness Co. Inc. have executed a "Closing Agreement" which would allow the Board of Water Supply to be the responsible implementing entity for the project which includes the installation of pumps at North Waihee Wells 1 and 2. The "Closing Agreement" requires, in part, that the pump installation permits be transferred to the Board of Water Supply.

The applicant for the original pump installation permits was C. Brewer Properties, Inc. As discussed with the CWRM staff, we would like to confirm that, in order to transfer the permits, C. Brewer Homes, Inc. (the successor company to C. Brewer Properties, Inc.) and the County of Maui Board of Water Supply must write a letter requesting that the permits be transferred; and that, upon receiving the letter, CWRM staff will transfer the permits to the Board of Water Supply.
Please confirm your understanding of this process, and inform us in writing as soon as possible. The due diligence period for the "Closing Agreement" ends January 31, 1996. If you or your staff have any questions, please feel free to call me. Thank you for your kind consideration.

Very truly yours,

C. BREWER HOMES, INC.

[Signature]

James M. Murray
Project Manager

JMM:vp
cc: David Craddick, Director, Department of Water Supply
    Paul Mancini, Mancini, Rowland & Welch
    Milton Arakawa, Munekiyo & Arakawa, Inc.
To: Charley Ice
Commission on Water Resource Management

From: Milton Arakawa

Subject: Pump Installation Permit for North Waihee Wells 1 and 2

Attached is a copy of the letter from C. Brewer Homes requesting a response from the CWRM staff regarding the transfer of the subject permits. An expedited response would be appreciated. If you have any questions, please feel free to call me. Thank you.

(Initials)

If you have any problems or do not receive the entire fax, kindly call me at [Contact Information].

CONFIDENTIAL COMMUNICATION: This message is intended for the use of the designated recipient(s) named above. If you have received this message in error, kindly notify us immediately by telephone. Thank you.
January 9, 1996

Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2
(Well Nos. 5631-02 and 5631-03) Waihee, Maui, Hawaii

Dear Ms. Loui:

We have submitted to you a letter dated January 2, 1996 requesting that the subject pump installation permits be extended. As noted in the letter, the County of Maui Board of Water Supply and Wailuku Agribusiness Co. Inc. have executed a “Closing Agreement” which would allow the Board of Water Supply to be the responsible implementing entity for the project which includes the installation of pumps at North Waihee Wells 1 and 2. The “Closing Agreement” requires, in part, that the pump installation permits be transferred to the Board of Water Supply.

The applicant for the original pump installation permits was C. Brewer Properties, Inc. As discussed with the CWRM staff, we would like to confirm that, in order to transfer the permits, C. Brewer Homes, Inc. (the successor company to C. Brewer Properties, Inc.) and the County of Maui Board of Water Supply must write a letter requesting that the permits be transferred; and that, upon receiving the letter, CWRM staff will transfer the permits to the Board of Water Supply.
Please confirm your understanding of this process, and inform us in writing as soon as possible. The due diligence period for the "Closing Agreement" ends January 31, 1996. If you or your staff have any questions, please feel free to call me. Thank you for your kind consideration.

Very truly yours,

C. BREWER HOMES, INC.

James M. Murray
Project Manager

JMM: vp
cc: David Craddick, Director, Department of Water Supply
    Paul Mancini, Mancini, Rowland & Welch
    Milton Arakawa, Munekiyo & Arakawa, Inc.
January 2, 1996

Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2 (Well Nos. 5631-02 and 5631-03) Waihee, Maui, Hawaii

Dear Ms. Loui:

At its regular meeting of November 8, 1995, the Commission on Water Resource Management (CWRM) considered the extension of the construction start date for the subject project. The CWRM determined that if two (2) conditions were met within 60 days, or by January 8, 1996, relief from revocation of the permit would be possible. The two (2) conditions imposed by the CWRM are:

1. C. Brewer Properties, Inc. and the Maui Department of Water Supply can document an agreement causing the initiation of the pump installation work and submit it to the CWRM; and

2. A schedule of actual installation work is provided by the permittee to the CWRM.

With regard to Condition No. 1, we have enclosed a copy of the "Closing Agreement" between the Board of Water Supply and Wailuku Agribusiness, Co. Inc. which sets forth the transfer of certain real property title and other interests from Wailuku Agribusiness to the Board of Water Supply. (For clarification purposes, Wailuku Agribusiness Co., Inc. is the landowner of the property and is a subsidiary of C. Brewer & Co., Ltd. At the time of application for the pump installation permit, C. Brewer Properties, Inc. was also a subsidiary of C. Brewer & Co., Ltd. Since then, C. Brewer Homes, Inc. was formed through a stock offering and is the successor company of C. Brewer Properties, Inc. However, C. Brewer Homes Inc. is not a subsidiary of C. Brewer and Company, Limited.)
The purpose of the transfer of property is to allow the Board of Water Supply to be the responsible implementing entity for the project which includes the use of Waihee Well Nos. 1 and 2, installation of production pumps (pursuant to the referenced permits), and appurtenant facilities, construction of a new 500,000 gallon water tank, and approximately 4.26 miles of underground waterline.

It should be noted that the "Closing Agreement" provides for a due diligence period which extends to January 31, 1996. Upon the subsequent closing of the transaction, the Agreement calls for the transfer of the pump installation permit to the Board of Water Supply. Refer to Item 6.e. of the Agreement.

With regard to Condition No. 2, we have attached a schedule of proposed construction for the project which includes the installation work for the pumps. The schedule has been developed by the Department of Water Supply. The schedule anticipates that pump installation for testing will be initiated by May 1, 1996. Thus, we request that construction start for the pump installation permits be extended to this date.

We respectfully request that the issue of extension of the permit be placed on the Commission's January 24, 1996 agenda. If you or your staff have any questions, please feel free to call me. Thank you for your kind consideration.

Very truly yours,

James M. Murray
Project Manager

cc: David Craddick, Director, Department of Water Supply (with enclosures)
cbhnww.ext.1e42
Mr. James Herberk  
C. Brewer Properties, Inc.  
P.O. Box 1437  
Wailuku, Hawaii  96793

Dear Mr. Herberk:

Revocation of Pump Installation Permits  
North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03)

At its regular meeting of November 8, 1995, at which a representative from C. Brewer Properties, Inc. was present, the Commission on Water Resource Management (CWRM) directed staff to notify the permittee that the permit shall be revoked on January 13, 1996. However, if two conditions were met within sixty (60) days, or by January 8, 1996, relief from revocation would be possible. The two conditions imposed by the CWRM are:

1. C. Brewer Properties, Inc. and the Maui Department of Water Supply can document an agreement causing the initiation of the pump installation work and submit it to the CWRM.

2. A schedule of actual installation work is provided by the permittee to the CWRM.

The next regularly scheduled CWRM meeting is January 24, 1996. The CWRM will reconsider this revocation matter on that date if conditions 1 and 2 are met by January 8, 1996.

Very truly yours,

MICHAEL D. WILSON
### Environmental Assessment

<table>
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<td>Jan</td>
<td>Feb</td>
<td>May</td>
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- **Renew Permits as needed**
- **Civil/Mech/Elec/P&ID/Struct**
- **Review & Approval**
- **Bid & Award**
- **Pump Installation for Testing**
- **Water Quality Data**
- **Preliminary Engineering Report**
- **Construction**

### First 1 MGD On-Line

- Environmental Assessment
- Renew Permits as needed
- Design/Study/Survey/Soils
- Civil/Mech/Elec/P&ID/Struct
- Review & Approval
- Bid & Award
- Pump Installation for Testing
- Water Quality Data
- Preliminary Engineering Report
- Construction

### All 3 MGD On-Line

- Pump Installed with 1 MGD Phase
- UQ Data with 1 MGD Phase
- Preliminary Engineering Report submitted with 1 MGD Phase
- Environmental Assessment
- Renew Permits as needed
- Design/Study/Survey/Soils
- Civil/Mech/Elec/P&ID/Struct
- Review & Approval
- Bid & Award
- Pump Installation for Testing
- Water Quality Data
- Preliminary Engineering Report
- Construction
C. Brewer Properties, Inc.
Request for Extension of Start Date
North Waihee Wells 1 & 2, (Well Nos. 5631-02 & 03)
Request to Install 1400 gpm Pumps for Domestic Use

Applicant: C. Brewer Properties, Inc.
Landowner: Wailuku Agribusiness Company, Inc.
P.O. Box 1437
P.O. Box 520
Wailuku, HI 96793
Wailuku, HI 96793

Action Requested: Permission to extend start date two months, from November 14, 1995 to January 14, 1996, for installing a 1400 gpm (gallons per minute) pump in each of two North Waihee Wells for private municipal use.

Well Location/Tax Map Key: The wells are located at Waihee Valley, Maui at Tax Map Key: 3-2-1:4 (Attachment A).

Background:
March 25, 1993
Pump Installation Permits for North Waihee Wells 1 & 2 were issued. Due to delays in other aspects of the residential development project, action on the permits was also delayed. Several requests for extension of the start date were made and administratively approved.

March 1, 1995
Pump Installation Permits were extended, with a new expiration date of March 1, 1997. The start date was set to expire in 2 months, to require applicant to return to the Commission if delays continued. The permits were issued March 14, 1995.

May 5, 1995
The start date for work under the Pump Installation Permits was extended two months, from May 14, 1995 to July 14, 1995, following the applicant’s request for a four-month extension.

July 19, 1995
The start date for work under the Pump Installation Permits was extended two months, from July 14, 1995, to September 14, 1995, following the applicant’s request for a six-month extension.
September 13, 1995  The start date for work under the Pump Installation Permits was extended two months, from September 14, 1995 to November 14, 1995, following the applicant's request for a six-month extension. The applicant and the Maui Department of Water Supply believed that the two parties were close to an agreement. The Commissioners expressed the inclination to deny further extensions if the matters under consideration were not resolved.

October 26, 1995  The applicant requested a two-month extension of the start date, from November 14, 1995 to January 14, 1995, stating that the parties had agreed "in principle" to purchase of land in fee, requisite easements, and reimbursements for certain development costs (See Attachment C). It was anticipated that a letter of intent by the Maui Board of Water Supply would be ready for action at a November 7, 1995 Board Meeting.

**Well Description** (See Attachment B):

<table>
<thead>
<tr>
<th>Ground elevation:</th>
<th>283 ft.</th>
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<tbody>
<tr>
<td>Casing diameter:</td>
<td>16 inches</td>
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<tr>
<td>Solid casing depth:</td>
<td>289 ft.</td>
</tr>
<tr>
<td>Screen casing depth:</td>
<td>309 ft.</td>
</tr>
<tr>
<td>Open hole:</td>
<td>79 ft.</td>
</tr>
<tr>
<td>Total depth:</td>
<td>363 ft.</td>
</tr>
<tr>
<td>Grouted annulus:</td>
<td>0 to 200 ft.</td>
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<tr>
<td>Proposed pump capacity:</td>
<td>1400 gpm (each)</td>
</tr>
</tbody>
</table>

**Water Availability:** The wells are located in the Waihee System near the Waihee-Iao Aquifer System boundary of the Wailuku Sector of Maui. Sustainable yield for the Waihee Aquifer System is estimated at 8 mgd, while that of Iao is 20 mgd. There are no existing ground water uses from the Waihee Aquifer System at present. Total proposed use is 4 mgd; 2 mgd from each well. Potential water use from the Waihee System by the year 2010 is estimated to be up to 8 mgd by the Maui Water Use and Development Plan, although the Plan acknowledges that withdrawals above 4 mgd would require justification through field demonstration.

**Analysis:** The well will develop fresh, basal water for municipal use; the applicant is negotiating dedication of the wells to the County. The wells tap an aquifer with a static head standing about 10 feet above sea level. John Mink has opined that pump tests from May 14 to 19, 1989 have demonstrated that the drawdown from heavy pumping is relatively minor, with full recovery nearly instantaneous, while salinity is very low during these tests. However, staff has only received pump test data from 1982.

According to § 13-168-12(j), HAR:

*Every Well construction and pump installation permit issued or caused to be issued by the commission shall be for a specified period not to exceed two years, unless otherwise specified in the permit and shall contain the commencement and completion dates for the permitted activity. In determining the commencement and completion dates of the activity, the commission shall take into consideration the:*  

(1) *Cost and magnitude of the project;*  
(2) *Engineering and physical features involved;*
(3) Existing conditions; and
(4) Public interest affected.

The commission may extend the completion dates of the activity prescribed in any permit upon a showing of good cause and good-faith performance. If the commencement or completion date is not complied with, the commission shall cause the permittee to be notified by certified mail that the permit shall be revoked within sixty days unless the permittee can show good cause that it should not be revoked.

Staff believes this rule implies that the well construction and pump installation permits and timelines are specifically aimed at the actual well construction and pump installation activities rather than the planning or negotiation stages of a ground water development project. Since the history of this permit has been more in the arena of planning and negotiations, staff believes that the permittee should reapply when they are ready to actually install their pump. However, staff has, again, been informed by the permittee that the actual installation date is near.

RECOMMENDATION:

That the Commission approve the extension of the start date of the pump installation permits for North Waihee Wells to March 14, 1996 if:

1. By November 8, 1995, both C. Brewer Properties, Inc. and the Maui Department of Water Supply can show that an agreement which will cause initiation of the pump installation work has been reached;

2. A schedule of actual installation work is provided by the permittee to the Commission.

3. All past pump test data for both wells is provided by the permittee to the Commission.

If items 1, 2, and 3 are not met by the permittee by November 8, 1995, then staff recommends that the Commission direct staff to notify the permittee that the permit shall be revoked on January 13, 1996, in accordance with §13-168-12(f), HAR.

Respectfully submitted,

W. Roy James
RAE M. LOUI
Deputy Director

Attachments

APPROVED FOR SUBMITTAL:

MICHAEL D. WILSON, Chairperson
Waihee 1&2
(Well No. 5631-02,03)

Attachment A
PROPOSED SECTION OF WELL

Elevation at top of casing: 284 ft., msl.

Ground Elevation: 283 ft., msl*

Cement Grout: 200 ft.

Solid Casing: ASTM Designation A-242
USS Cor-ten, Kaiser
Material: Steel Kaisaloy
Length: 289 ft.
Diameter: 16 in.
Wall thickness: 0.3125 in.

Hole Diameter: 20 in.

Casing: ☐ Perforated ☐ Screen
USS Cor-ten, Kaiser
Material: Steel Kaisaloy
Length: 20 ft.
Diameter: 16 in.
Wall thickness: 0.25 in.
Openings: 100 sq. in./F.

Total Depth: 363 ft.

Rock Packing: 108 ft.

Open Hole:
Length: 79 ft.
Diameter: 15 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.
October 26, 1995

Ms. Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihe`e Wells 1 and 2 (Well Nos. 5631-02 and 5631-03) Waihe`e, Maui, Hawaii

Dear Ms. Loui:

At its regular meeting of September 13, 1995, the Commission on Water Resource Management approved the extension of the start date for work on the pump installation permits for the subject wells to November 14, 1995. We would like to respectfully request an extension of the start date to January 14, 1996.

We are pleased to note that after a number of discussions with the County of Maui Board and Department of Water Supply, we have reached an agreement “in principle” with the Board on October 24, 1995. After a Board of Water Supply proposal and C. Brewer Homes, Inc. counter proposal were discussed in September and October, the agreement “in principle” involves Board of Water Supply purchase of land in fee simple, a perpetual conservation easement and other necessary easements, and reimbursement for engineering and other development costs expended thus far by C. Brewer Homes, Inc.

At this point, we are anticipating that a letter of intent will be drafted by the Department of Water Supply for review by C. Brewer Homes, Inc. It is hoped that the letter of intent can be accepted by C. Brewer Homes, Inc. and the acceptance confirmed by the Board of Water Supply at its November 7, 1995 meeting.

For your information, we have attached an updated chronology of the major project tasks which have taken place since the project’s inception, and a status report on the various permits required for development.

Attachment C
We ask that our pump installation permit extension request be placed on the Commission's November 8, 1995 agenda. If you have any questions, please feel free to call me. Thank you for your kind consideration.

Very truly yours,

James M. Murray, Jr.
Project Manager

Attachments
cc: Milton Arakawa, Munekiyo and Arakawa, Inc.
nww2
Comments: Charley, attached for your information is a copy of Appendix C which was included in the Final Environmental Assessment for the project.

If you have any problems or do not receive the entire fax, kindly call me at [Redacted].

CONFIDENTIAL COMMUNICATION: This message is intended for the use of the designated recipient(s) named above. If you have received this message in error, kindly notify us immediately by telephone. Thank you.
Appendix C

Excerpts from Central Maui Water Source Development, Norman Saito Engineering Consultants, Inc. and John F. Mink
Source Area 1: Waihee Aquifer System (Waihee to Kahakuloa)

The region between Waihee Valley and Kahakuloa Valley embraces about 12 square miles of humid, mountainous terrain where rainfall varies from an annual average of 40 inches at the coast to more than 300 inches at the headwaters of Waihee Stream. The combination of moderate to very high rainfall with geology featuring both poorly permeable and highly permeable rocks has created a complex suite of water resources. The major streams of Waihee, Makamakaole and Kahakuloa are perennial while lesser ones are not. Marshes form the headwaters of streams, and groundwater occurs in high level as well as basal aquifers.

Waihee Stream is one of the largest water courses in the State, discharging an average of 55 mgd and never experiencing a low of less than 14 mgd. The minimum flow of record (approximately 7 years) was 14.2 mgd in early 1985 following the most severe drought of the century. Below the USGS gaging station the river is diverted into the Waihee Ditch, and still further downstream into the Spreckels Ditch. The average combined flow of these ditches is 37 mgd on a 24 hour basis, placing Waihee among the most prolific sources of ditch water in the State.

The large base flow of Waihee is sustained principally by seepage from high level dike water and secondarily by headwater marshes. The low flow of Makamakaole, on the other hand, originates entirely in marshes and the perched aquifers that sustain them. Kahakuloa receives about equal volumes of low flow from perched water marshes and dike aquifers. Wailena is perennial at its origin where it is fed by perched water, but low flows are quickly lost by infiltration in the mid and lower reaches of the stream.

In contrast to the extraordinary discharges of Waihee Stream, those in Kahakuloa and Makamakaole are modest. The average flow at 330 feet elevation in Kahakuloa as measured at the USGS gage
station is 10 mgd, and the base flow, which is exceeded more than 90 percent of the time, is 3.5 mgd. For the Left Branch of Makamakaole at elevation 1500 feet the average is 1.9 mgd and the base flow is about 0.6 mgd. The large base flow of Waihee, about 20 to 25 mgd, and the smaller yet significant base flow of Kahakuloa are manifestation of the presence of voluminous dike impounded groundwater resources in the region. Nearer the coast basal aquifers occur.

Hydrogeology and Groundwater Occurrence

The primary geological formation underlying the entire region is basaltic lava of the Wailuku volcanic series. All major aquifers, both high level dike and basal, occur in this formation. The Wailuku series is analogous to the Honomanu series in East Maui and the Koolau series in Oahu, and like these formations it is extremely permeable. To the south the productive Iao aquifer consists of Wailuku basalt.

Over much of the region the Wailuku series is covered by the much paler Honolua formation. Composed of andesite and trachyte, the Honolua is normally dense, massive and light gray in contrast to the dark, more broken lavas of the Wailuku formation. Its permeability is significantly lower than that of the older basalt. It does not constitute major aquifers but carries the perched water that sustains marshes.

The Honolua formation forms a blanket, hundreds of feet thick at times, reaching from Eke to the coast. Its characteristics are most strikingly illustrated in the resistant trachyte dome of Puu Olai on the coast between Wailena and Waiolai Gulches. Other prominent trachyte domes are Eke, Puu Koae and Puu Olelo.

In the reach between Waihee and Makamakaole the Honolua may behave as a caprock on the Wailuku basalt aquifer, creating high heads a short distance inland. The head no more than 2000 feet
from the coast is 10 feet, which would be impossible in an unconfined basal aquifer. An alternative explanation for the high head is that groundwater flow is controlled by dikes.

Striking northerly from the original volcanic caldera in upper Iao Valley is a rift zone which passes through the Waihee Aquifer System, especially its northern part. The dikes trend from NNW to N to NNE but appear to favor the NNE strike. The rift formed during extrusion of the Wailuku formation, but dikes of the later Honolua series also follow the trend. The Wailuku dikes are normally one to two feet thick and black in fresh exposures. The Honolua dikes, which occur much less frequently, tend to be thicker and lighter in color.

The trachyte domes at Puu Koae and Puu Olai are contemporaneous with Puu Eke, which suggests that Honolua dikes cut through the region and may control groundwater movement even toward the coast. A large trachyte dike is exposed at the ditch intake on Waihee Stream, and its projected trace lies between Makamakaoale and Waihee. Whether or not it affects groundwater behavior will be determined when a Makamakaoale exploratory well is finally drilled.

As far as is known from experience elsewhere in West Maui, high level dike water is restricted to basalts of the Wailuku volcanic series and is far more voluminous than perched water in Honolua andesites. The seaward boundary of the high level aquifers by coincidence is about along the Forest Reserve line. In Kahakuloa a major spring (Kapuna Spring) overflows from a dike compartment where the stream leaves the Forest Reserve, and in Waihee the first visible dike spring cascades from the valley wall about two miles inland of the line. High level groundwater, however, seeps into the stream channel for a considerable distance downstream of this first dramatic canyon wall spring.
One or more basal aquifers exist seaward of the rift zone but are not hydraulically connected all the way from Waihee to Kahakuloa. These aquifers between Waihee and Makamakaole are probably confined at the coast, but beyond Makamakaole toward Wailena they are likely to be unconfined because the Honolua formation pinches out.

**Groundwater Development**

Aside from diversions to Waihee and Spreckels Ditches, only a small quantity of groundwater is being developed at this time, but not by wells, galleries or other common extraction techniques. Groundwater that collects as seepage in streams is withdrawn either at the source or, more often, downstream by users. The total volume taken is negligible, no more than thousands of gallons per day on the average.

Two successful wells were drilled on the north bank of Waihee in 1981 by C. Brewer Co. but have not yet been connected to a distribution system. These wells penetrated an aquifer of Wailuku basalt and produced low salinity (less than 50 mg/l chlorides) water at rates to 1700 gpm during the initial testing. In May of this year a more comprehensive test was conducted using one well for pumping while the other served as an observation well. Also used as an observation well was the monitor boring drilled at Kanoa during the field phase of the investigation. The recent test confirmed the earlier indications of the presence of a sizeable aquifer capable of being developed with high capacity pumps.

**Pump Test Results**

The test was conducted uninterruptedly between 12 noon May 15 and 12 noon May 19, a total of 96 hours. North Waihee Well 2 (makai well) was pumped at an average rate of 2450 gpm (3.5 mgd). North Waihee Well 1 (mauka well) and Kanoa served as principal observation wells. Each was equipped with a continuous water level recorder. A recorder was also placed on an unused well in Wailena
Gulch, and tape measurements of water levels were made in boring A-1 in the Iao basal aquifer. Neither the Wailena well nor A-1 exhibited fluctuations induced by pumping. Both are too far away from the North Waihee wells, and in the case of A-1 an effective barrier consisting of the Waihee Valley fill and possibly dikes separate the Iao aquifer from North Waihee.

Maximum drawdown at the pumping well was 6.85 feet when the rate was temporarily at 2900 gpm; at the steady rate of 2450 gpm it was stable at 5.1 feet. These were expected values on the basis of the original step drawdown test in 1981. When the pump was turned off, recovery to within a few tenths of a foot of the original static level was instantaneous.

The curve of drawdown at observation wells as a function of time at constant pumping rate yields fundamental information about aquifer characteristics. Data from observation wells are uncluttered by perturbations except for the harmonic tidal swing. Analyses of drawdown at both observation wells give an aquifer transmissivity of 320,000 sq.ft./day and storativity in the range of .05 to .30. Transmissivity is the measure of how easily water moves through an aquifer; the results indicate a highly permeable aquifer comparable in properties to the Iao and Lahaina aquifers. A further calculation gives hydraulic conductivity of approximately 2000 ft./day, which is capable of handling high capacity pumps. Storativity is equivalent to effective porosity, or the pore volume which gives up water to pumping. The high value is typical of unconfined conditions. The aquifer sector between the North Waihee wells and the Kanoa boring is not confined, but near the coast the cap of Honolua trachyte covering the Wailuku formation may be a confining stratum.

If aquifer barriers are encountered during a pump test, the drawdown curve will deflect so that the rate of drawdown will increase. No such deflections occur in the data from either North
Waihee 1 or Kanoa. Evidently potential impediments to groundwater flow, such as dikes, do not behave as barriers but are subsumed in the aquifer's global characteristics. This means that groundwater moves freely in the reach between North Waihee and Kanoa and for a considerable distance beyond. Application of groundwater hydraulics equations to the data suggest that the minimum distance to an effective barrier is more than a mile away.

Salinity of the pumped water was very low, less than 30 mg/l chloride, and did not vary over the period of the test. The low and invariant salinity in view of the high pump rate suggests that the fresh water portion of the aquifer is poorly connected to sea water.

The test was highly successful in providing fundamental information about aquifer characteristics as well as extent and exploitability.

**Potential Development and Sustainable Yield**

The North Waihee aquifer is highly permeable, enjoys a high static water level, and is extensive. It has never been forcibly drafted for municipal or irrigation needs. It presents an opportunity to add a significant increment of new water to the Central Maui Water System.

The recommended first phase in development of the aquifer is to drill two new wells to add to the already existing two North Waihee wells. The new wells will be in the reach between North Waihee and Kupaa Gulch. Access is easy and pipeline layout and construction should not pose unusual problems. Each well can be equipped with a 2 mgd (1400 gpm) pump, providing a total installed capacity of 8 mgd. However, average output of the aquifer on an annual basis must not exceed 4 mgd. The full capacity of the wells could be used temporarily during high demand periods as long as the annual average is held.
Another increment of several mgd is likely to be developable between Kupaa and Makamakaole, and several more beyond. Beyond Kupaa the cost of development and transmission construction will increase sharply because of the inhospitable terrain. The expectable sustainable yield in the 3.5 mile distance from Waihee to Kahakuloa is at least 10 mgd and may be 12 to 15 mgd. Not all of it may be feasibly developable, but in the next few years it should not be difficult to add an average of 4 mgd to the Central Maui network.
FACSIMILE COVER SHEET

November 2, 1995

To: Charley Ice
Commission on Water Resource Management

Fax No.: (808) [redacted]

From: Milton Arakawa

No. of Pages Including Cover Letter: 6

Subject: North Waihee Wells 1 and 2

Attached is/are:

<table>
<thead>
<tr>
<th>Copies</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
</table>

Comments: Charley, attached is a copy of the summary report of the North Waihee Wells Pump Test, as you requested.

cc: Jim Murray (Fax no. [redacted])

(Initials) [redacted]

If you have any problems or do not receive the entire fax, kindly call me at [redacted].

CONFIDENTIAL COMMUNICATION: This message is intended for the use of the designated recipient(s) named above. If you have received this message in error, kindly notify us immediately by telephone. Thank you.
NORTH WAIHEE WELLS PUMP TEST
May 15 - 19, 1989
Summary Report
John F. Mink and Norman Saito Engineering Inc.
June 3, 1989

In 1981 two deep wells were drilled for C. Brewer on the north bank of Waihee Stream from an elevation of 282 feet, about 2300 feet upstream of Kahekili Highway. They were tested and proved capable of yielding more than 2 mgd per well but were never fitted with pumps and have remained idle since then. The aquifer which they penetrate appears to be so poorly connected to the main Iao-Waiehu aquifer as to be virtually independent of it. The northward extent toward Kahakuloa is uncertain but likely reaches to beyond Makamakaole. One of the objectives of the recent pump test was to determine whether low permeability boundaries constrain the size of the aquifer; no boundaries could be detected by analysis of the test results.

In 1987 a reconnaissance hydrological survey of the region from Waihee to Kahakuloa was made as part of an effort to identify additional water sources for Central Maui. A test boring was drilled at the nose of Kanoa Ridge about 2000 feet north of the North Waihee wells to measure fresh water head, and another was planned for a site where Makamakaole Stream crosses the highway. The Makamakaole boring has not been drilled because the State Department of Water Resources Management plans eventually to drill an exploratory well
there, one large enough to be pumped. The water table in the
Kanoa boring is about the same as at North Waihee, suggesting
aquifer continuity between the two sites. The Kanoa boring
was carefully monitored during the recent test and clearly
established that continuity does indeed exist in the region.

The delay by the State in drilling the Makamakaole
exploratory well denied the opportunity to ascertain whether
the aquifer continued to and beyond Makamakaole Valley.
Drilling a small diameter boring, which was originally
planned by the Joint Venture, was raised again, but the cost
seemed excessive for the type of data obtainable (water level
and salinity). The alternative of a long term pump test, the
results of which could be analyzed to give aquifer parameters
and an estimate of extent, was selected instead.

Pump Test and Results

The test was conducted uninterruptedly between 12 noon
May 15 and 12 noon May 19, a total of 96 hours. North Waihee
Well 2 (makai well) was pumped at a rate of 2400 gpm (3.43
mgd) except for a period of 9 to 10 hours on May 18 when the
rate was raised to 2900 gpm (4.1 mgd) in response to an
incorrect belief that the steady rate had decreased. The
average rate for the 96 hour period was 2450 gpm (3.5 mgd).

North Waihee Well 1 (mauka well) and Kanoa served as
principal observation wells. Each was equipped with a
continuous water level recorder. A recorder was also placed
on the Wailena well, and tape measurements of water levels
were made in boring A-1 in the Waiehu-Iao aquifer. Neither
the Wailena well nor A-1 exhibited fluctuations induced by
pumping. Both are too far away, and in the case of A-1 an
effective barrier consisting of Waihee Valley fill and
perhaps dikes separates Waiehu-Iao from North Waihee.

Maximum drawdown at the pumping well was 6.85 feet when
the rate was 2900 gpm; at the steady rate of 2400 gpm
drawdown was stable at 5.1 feet. These were expected values
on the basis of the original step drawdown tests in 1981.
When the pump was turned off, recovery to within a few tenths
of a foot of the original static level was instantaneous.

At North Waihee 1 the static head before the start of
pumping was 11.45 feet. At the end of the test maximum
drawdown was 0.70 feet. North Waihee 1 is just 178 feet from
North Waihee 2. Water levels respond to sea tides, displaying
a tidal efficiency of about 4 percent (range of .07 feet).
Distance from the sea is 4000 feet.

The pre-test static water level at Kanoa was 12.42 feet.
Maximum drawdown at the end of the test was 0.44 feet (tape
measurement). The distance between North Waihee 2 and Kanoa
is 2000 feet. Tidal efficiency is about 6 percent (range 0.11
feet), which is greater than at North Waihee 1 because Kanoa
is only 2000 feet from the coast. Tidal efficiencies are
interesting because they suggest the ease with which water
moves through an aquifer. Manifestly the North Waihee aquifer
is very permeable.
The curve of drawdown as a function of time at constant pumping rate yields fundamental information about aquifer characteristics. Data from observation wells are uncluttered by perturbations except for the harmonic tidal swing. Preliminary analyses of drawdown at both observation wells give an aquifer transmissivity of 320,000 sq.ft./day and storativity in the range .05 to .30. Transmissivity is the measure of how easily water moves through an aquifer; the results indicate a highly permeable aquifer comparable in properties to the Waiehu-Iao and Lahaina aquifers. A further calculation gives hydraulic conductivity of about 2000 ft./day, which is capable of handling high capacity pumps.

Storativity is equivalent to effective porosity, or the pore volume which gives up water to pumping. The high value is typical of unconfined conditions. The aquifer sector between North Waihee 1 and Kanoa is not confined, but near the coast the cap of Honolua trachyte covering the Wailuku formation may be a confining stratum.

If aquifer barriers are encountered during a pump test, the drawdown curve will deflect so that the rate of drawdown will increase. No such deflections occur in the data from either North Waihee 1 or Kanoa. Evidently potential impediments to groundwater flow, such as dikes, do not behave as barriers but are subsumed in the aquifer's global characteristics. This means that groundwater moves freely in the reach between North Waihee and Kanoa and for a considerable distance beyond. Application of groundwater
Hydraulics equations to the data suggest that the minimum distance to an effective barrier is more than a mile away.

The salinity of the pumped water was very low, less than 30 mg/l chloride as determined from Hach kit analyses, and did not vary over the period of the test. The low and invariant salinity in view of the high pump rate suggests that the fresh water portion of the aquifer is poorly connected with sea water.

In summary, the test was very successful in providing fundamental information about aquifer characteristics as well as extent and exploitability. The final report will include technical appendices dealing with the test protocol, data, analysis of results, and determination of aquifer properties and groundwater flow behavior.

Preliminary Conclusions and Recommendations

The North Waihee aquifer is highly permeable, enjoys a high static water level, and is extensive. This combination of features will allow it to be developed with moderately large wells yielding a total average of 4 mgd in the region between Waihee Valley and the land boundary just north of Kupaa Gulch. Four wells can be located in this region, two of which (North Waihee) already exist. Each well can be equipped with a 2 mgd (1400 gpm) pump. Average output of the aquifer on an annual basis must not exceed 4 mgd. The full capacity of the wells (8 mgd) can be used temporarily in high demand periods, however, so long as the annual average is held.
C. Brewer Homes, Inc.

October 26, 1995

Ms. Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihe`e Wells 1 and 2 (Well Nos. 5631-02 and 5631-03) Waihe`e, Maui, Hawaii

Dear Ms. Loui:

At its regular meeting of September 13, 1995, the Commission on Water Resource Management approved the extension of the start date for work on the pump installation permits for the subject wells to November 14, 1995. We would like to respectfully request an extension of the start date to January 14, 1996.

We are pleased to note that after a number of discussions with the County of Maui Board and Department of Water Supply, we have reached an agreement “in principle” with the Board on October 24, 1995. After a Board of Water Supply proposal and C. Brewer Homes, Inc. counter proposal were discussed in September and October, the agreement “in principle” involves Board of Water Supply purchase of land in fee simple, a perpetual conservation easement and other necessary easements, and reimbursement for engineering and other development costs expended thus far by C. Brewer Homes, Inc.

At this point, we are anticipating that a letter of intent will be drafted by the Department of Water Supply for review by C. Brewer Homes, Inc. It is hoped that the letter of intent can be accepted by C. Brewer Homes, Inc. and the acceptance confirmed by the Board of Water Supply at its November 7, 1995 meeting.

For your information, we have attached an updated chronology of the major project tasks which have taken place since the project’s inception, and a status report on the various permits required for development.
Ms. Rae M. Loui, Deputy Director
October 26, 1995
Page 2

We ask that our pump installation permit extension request be placed on the Commission’s November 8, 1995 agenda. If you have any questions, please feel free to call me. Thank you for your kind consideration.

Very truly yours,

James M. Murray, Jr.
Project Manager

Attachments
cc: Milton Arakawa, Munekiyo and Arakawa, Inc.
NORTH WAIHEE SOURCE/TRANSMISSION PROJECT
Chronology of Source Development Program

1981
North Waihee Wells (2) are drilled and pump tested by C. Brewer, proving water availability and quality

1985-1990
Various discussions with DWS Directors regarding the development attractiveness of the Waihee source

May 1989
Wells are pump tested again, confirming earlier results. 4 mgd initial development program recommended

November 1989
Central Maui Water Study Part II estimates aquifer capacity (to Kahakuloa) at 10 mgd, up to 12 or 15 mgd

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## North Waihee Wells, Storage & Transmission System

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C. Brewer Homes, Inc.

October 26, 1995

Ms. Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT:  Pump Installation Permits for North Waiheʻe Wells 1 and 2 (Well Nos. 5631-02 and 5631-03)
Waiheʻe, Maui, Hawaii

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(Old road ROW at Waihee Stream)
BOARD OF WATER SUPPLY, COUNTY OF MAUI
SPECIAL MEETING

DATE: Tuesday, October 17, 1995
TIME: 9:00 a.m.
PLACE: Board of Water Supply Conference Room
County Building, Fifth Floor
200 South High Street
Wailuku, Maui, Hawaii

AGENDA

I. CALL TO ORDER

II. ATTENDANCE

III. DISCUSSION AND POSSIBLE ACTION ON C. BREWER'S RESPONSE TO THE OFFER MADE BY THE BOARD REGARDING THE NORTH WAIHEE AQUIFER.

For this matter, the board may convene in executive session pursuant to HRS 92-5(3) in order to deliberate concerning the authority of persons designated by the board to conduct labor negotiations or to negotiate the acquisition of public property, or during the conduct of such negotiations; and pursuant to HRS 92-5(4) in order to consult with its attorney on questions and issues pertaining to the board's powers, duties, privileges, immunities, and liabilities.

IV. ADJOURNMENT

If you have special needs or require an accommodation that will assist in your successful participation in the meeting (i.e. large print, taped materials, Sign Language interpreter, accessible parking, etc.), please call Jerry Wells at [redacted] on or before October 12, 1995.
STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

September 13, 1995
Honolulu, Hawaii

C. Brewer Properties, Inc.
Request for Extension of Start Date
North Waihee Wells 1 & 2, (Well Nos. 5631-02 & 03)
Request to Install 1400 gpm Pumps for Domestic Use

Well Location/Tax Map Key: The wells are located at Waihee Valley, Maui at Tax Map Key: 3-2-1:4 (Attachment A).

Action Requested: Permission to extend start date six months, from July 14, 1995 to January 14, 1996, for installing a 1400 gpm (gallons per minute) pump in each of two North Waihee Wells for private municipal use.

Background:

March 25, 1993 Pump Installation Permits for North Waihee Wells 1 & 2 were issued. Due to delays in other aspects of the residential development project, action on the permits was also delayed. Several requests for extension of the start date were made and administratively approved.
March 1, 1995

Pump Installation Permits were extended, with a new expiration date of March 1, 1997. The start date was set to expire in two (2) months, to require applicant to return to the Commission if delays continued. The permits were issued March 14, 1995.

May 5, 1995

The start date for work under the Pump Installation Permits was extended two (2) months, from May 14, 1995 to July 14, 1995, following the applicant’s request for a four-month extension.

July 19, 1995

The start date for work under the Pump Installation Permits was extended two months, from July 14, 1995, to September 14, 1995, following the applicant’s request for a six-month extension.

August 24, 1995

The applicant requested a six-month extension of the start date, to March 14, 1996, due to continuing discussions with the Maui Department of Water Supply. In response to Commission comments at the July 19, 1995 meeting, the applicant attached a chronology of the source development program and a table showing the status of various relevant permits (see Attachments C & D). Under separate cover, the applicant also sent construction drawings for the pump assembly (Attachment E). The letter also emphasizes that plans and specifications for well improvements and related facilities were transmitted to the Department of Water Supply on March 10, 1995.

Well Description: (See Attachment B)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Ground elevation:</td>
<td>283 ft.</td>
</tr>
<tr>
<td>Casing diameter:</td>
<td>16 inches</td>
</tr>
<tr>
<td>Solid casing depth:</td>
<td>289 ft.</td>
</tr>
<tr>
<td>Screen casing depth:</td>
<td>309 ft.</td>
</tr>
<tr>
<td>Open hole:</td>
<td>79 ft.</td>
</tr>
<tr>
<td>Total depth:</td>
<td>363 ft.</td>
</tr>
<tr>
<td>Grouted annulus:</td>
<td>0 to 200 ft.</td>
</tr>
<tr>
<td>Proposed pump capacity:</td>
<td>1400 gpm (each)</td>
</tr>
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</table>
Staff Submittal September 13, 1995

Water Availability: The wells are located in the Waihee Aquifer System near the Waihee-Iao Aquifer System boundary of the Wailuku Sector of Maui. Sustainable yield for the Waihee Aquifer System is estimated at 8 mgd, while that of Iao is 20 mgd. There are no existing ground water uses from the Waihee Aquifer System at present. Total proposed use is 4 mgd; 2 mgd from each well. Potential water use from the Waihee System by the year 2010 is estimated to be up to 8 mgd by the Maui Water Use and Development Plan, although the Plan acknowledges that withdrawals above 4 mgd would require justification through field demonstration.

Hydrologic Analysis: The well will develop fresh, basal water for municipal use; the applicant is negotiating dedication of the wells to the County. The wells tap an aquifer with a static head standing about 10 feet above sea level. John Mink has observed that, because the stream channel in this vicinity is 200 feet above sea level, the wells should have no effect upon it. Pump tests have demonstrated that the drawdown from heavy pumping is relatively minor, with full recovery nearly instantaneous. Salinity is very low.

RECOMMENDATION:

That the Commission approve the extension of the start date of the pump installation permits for North Waihee Wells to March 14, 1996. The conditions of the permit issued March 14, 1995 remain in effect except for the start date. Discussions and reviews described by the applicant may be reasonably expected to require six months for completion, prior to pump installation.

Respectfully submitted,

RAE M. LOUI
Deputy Director

Attachments

APPROVED FOR SUBMITTAL:

MICHAEL D. WILSON, Chairperson
January 1995  Paul Mancini provides revised draft with all new points

February 1995  BWS Technical & Planning Committee directs further work on draft agreement (2/17)

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August 1995  BWS special meeting (8/24) to discuss settlement position/options for acquisition of the project

BWS offer made to CB for a new well; will be needed in next 3 months.

BWS agency to consider own well this month.
## North Waihee Wells, Storage & Transmission System

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Mr. James Herberg, Manager
Maui Operations
C. Brewer Properties
P.O. Box 1437
Wailuku, Hawaii 96793

Dear Mr. Herberg:

Request for Extension of Start Date of Pump Installation
North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03)

At its regular meeting of September 13, 1995, the Commission on Water Resource Management (Commission) approved the extension of the start date for work on the pump installation permit issued March 14, 1995.

By this letter, the start date is extended two months, from September 14, 1995 to November 14, 1995. The completion date remains March 14, 1997.

Any requests for additional extensions must be submitted for consideration by the Commission prior to November 14, 1995.

Aloha,

Michael D. Wilson
BOARD OF WATER SUPPLY, COUNTY OF MAUI
RULES COMMITTEE MEETING

DATE: Thursday, September 14, 1995
TIME: 11:00 a.m.
PLACE: Board of Water Supply Conference Room
County Building, Fifth Floor
200 South High Street
Wailuku, Maui, Hawaii

AGENDA

I. CALL TO ORDER

II. ATTENDANCE

III. APPROVAL OF MINUTES

IV. COMMITTEE DISCUSSION/ACTION

A. Com. 95-22. Request from Wayne Arakaki for a waiver of the subdivision requirements for water, Paehau Subdivision, TMK 2-1-08:3, SD 91-54.

B. Com. 95-28. Request from Greg Davidge for a waiver to install a domestic water storage tank and buy water to fill the tank, TMK 2-2-06:109, SD 95-21.

C. Com. 95-29. Request from Wayne Arakaki for a 50% reimbursement after the installation of the waterline for the Garrison Subdivision, TMK 2-4-5:73.

D. Com. 95-30. Request from Cindy Moelter for approval of a non-conforming private water system to satisfy the subdivision requirements for domestic use and fire protection, Pali Uli Subdivision, TMK 2-2-004:088, SD 95-2.

E. Com. 95-31. Request from Valerie Harte for a waiver of the shortage declaration, Virginia Caires Subdivision, TMK 2-7-014:062.

V. ADJOURNMENT

If you have special needs or require an accommodation that will assist in your successful participation in the meeting (i.e. large print, taped materials, Sign Language interpreter, accessible parking, etc.), please call Jerry Wells at [phone number] on or before September 12, 1995.
BOARD OF WATER SUPPLY, COUNTY OF MAUI
FINANCE COMMITTEE MEETING

DATE: Thursday, September 14, 1995
TIME: 1:00 p.m.
PLACE: Board of Water Supply Conference Room
County Building, Fifth Floor
200 South High Street
Wailuku, Maui, Hawaii

AGENDA

I. CALL TO ORDER

II. ATTENDANCE

III. APPROVAL OF MINUTES

IV. COMMITTEE DISCUSSION/ACTION

A. Discussion/possible action on proposed new rates.

B. Discussion/possible action on C. Brewer’s response to the offer made by the Board regarding the North Waihee Aquifer.

For this matter, the board may convene in executive session pursuant to HRS 92-5(3) in order to deliberate concerning the authority of persons designated by the board to conduct labor negotiations or to negotiate the acquisition of public property, or during the conduct of such negotiations; and HRS 92-5(4) in order to consult with its attorney on questions and issues pertaining to the board’s powers, duties, privileges, immunities, and liabilities.

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Well Nos. 5631-02 and 5631-03  
Waihe`e, Maui, Hawaii  

Dear Ms. Loui:

At its regular meeting of July 19, 1995, the Commission on Water Resource Management approved the extension of the start date for work on the pump installation permits for the subject wells to September 14, 1995. We would like to respectfully request a six (6) month extension of the start date to March 14, 1996.

There has been a significant amount of work done on the project to date in securing permits and in engineering. For your consideration and review, we have included a chronology of the major project tasks which have taken place since the project’s inception, and a status report on the various permits required for development. We should also emphasize that the plans and specifications for the well improvements and related facilities were transmitted to the Department of Water Supply on March 10 of this year. These were prepared by Warren S. Unemori Engineering, Inc.

We are continuing to discuss our involvement in this project with the Department of Water Supply, and progress is being made in these discussions. Our intent is to continue working with the Department of Water Supply to bring this project to fruition. We ask that we be allowed to continue pursuing the implementation of this project through a further extension of the pump installation permits.
If you have any questions, please feel free to call me. Thank you for your consideration.

Sincerely,

James M. Murray, Jr.
Project Manager

Attachments
cc: Milton Arakawa, Munekiyo & Arakawa, Inc.
Date: August 25, 1995
To: Charles Ice - DLNR
From: Jim Murray
Re: Waihee Wells Pump Installation Permit Extension

Attached is material I sent to Rae Loui yesterday on this subject; this fax copy is provided for your immediate use as required. Milton Arakawa had indicated that today is the deadline for submittals for the September 13 meeting.

If you have any questions, don’t hesitate to call me. Thanks for your help.

[Signature]
SUBJECT: Pump Installation Permits for North Waihe'e Wells 1 and 2
Well Nos. 5631-02 and 5631-03
Waihe'e, Maui, Hawaii

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We are continuing to discuss our involvement in this project with the Department of Water Supply, and progress is being made in these discussions. Our intent is to continue working with the Department of Water Supply to bring this project to fruition. We ask that we be allowed to continue pursuing the implementation of this project through a further extension of the pump installation permits.
If you have any questions, please feel free to call me. Thank you for your consideration.

Sincerely,

James M. Murray, Jr.
Project Manager

Attachments
cc: Milton Arakawa, Munekiyo & Arakawa, Inc.
NORTH WAIHEE SOURCE/TRANSMISSION PROJECT
Chronology of Source Development Program

1981
North Waihee Wells (2) are drilled and pump tested by C. Brewer, proving water availability and quality

1985-1990
Various discussions with DWS Directors regarding the development attractiveness of the Waihee source

May 1989
Wells are pump tested again, confirming earlier results. 4 mgd initial development program recommended.

November 1989
Central Maui Water Study Part II estimates aquifer capacity (to Kahakuloa) at 10 mgd, up to 12 or 15 mgd.

November 1990
Joint venture discussions initiated with DWS.

January 1991
First letter to DWS with draft business points.

September 1991
First substantive meeting towards joint venture.

June 1992
C Brewer approached for private party joint venture.

October 1992
BWS Technical & Planning committee approves draft joint venture business points; forwards to full board.

March 1993
BWS approves business points; directs CBHI to work with staff to finalize details

March 1993
Pump Installation Permit request approved by CWRM

April 1993
BWS approves new source/transmission/storage fees

August 1993
CBHI initiates engineering for transmission line

January 1994
Draft agreement by Paul Mancini based on discussions

April 1994
Project Environmental Assessment approved

November 1994
Department of the Army Permit approved

March 1993 to November 1994
Discussions and negotiations with DWS staff: Ed Kagehiro, Gary Ishikawa, Kim Nuyen, Dave Craddick

November 1994
CB initiates engineering for pump installation

December 1994
Basic agreement on detail points (Dave Craddick/JMM)
| January 1995 | Paul Mancini provides revised draft with all new points |
| March 1995  | CWRM extends pump installation permit (3/1) |
| March 1995  | Stream Channel Alteration Permit approved (3/1) |
| March 1995  | BWS special meeting (3/7) declines to pursue agreement |
| March 1995  | BWS forms two committees to assess alternatives |
| March 1995  | Well development plans submitted to DWS for review and approval (3/10) |
| April 1995  | BWS/CBHI agree to attempt to negotiate for CB rights |
| June 1995   | BWS/CBHI select Judge Fong to mediate settlement |
| July 1995   | First meeting with all parties and Judge Fong (7/19) |
| July 1995   | CWRM extends pump installation permit (7/19) |
| August 1995 | BWS/CBHI meet w/Judge Fong (8/10) to hear his review of both parties' presentations; agreement to continue the discussions is reached |
| August 1995 | BWS special meeting (8/24) to discuss settlement position/options for acquisition of the project |
## North Waihee Wells, Storage & Transmission System Permit Status

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<thead>
<tr>
<th>Permit or other requirement</th>
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<tr>
<td>Pump Installation Permit</td>
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<td>3/25/93</td>
<td>requesting 6 month extension</td>
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<td>Environmental Assessment</td>
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<td>Department of the Army Permit</td>
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<td>approved</td>
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for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

July 19, 1995
Honolulu, Hawaii

C. Brewer Properties, Inc.
Request for Extension of Start Date
North Waihee Wells 1 & 2, (Well Nos. 5631-02 & 03)
Request to Install 1400 gpm Pumps for Domestic Use
TMK 3-2-1:4 Waihee, Wailuku, Maui

Applicant:
C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

Landowner:
Wailuku Agribusiness Company, Inc.
P.O. Box 520
Wailuku, HI 96793

Action Requested: Permission to extend start date six months, from July 14, 1995 to January 14, 1996, for installing a 1400 gpm (gallons per minute) pump in each of two North Waihee Wells for private municipal use.

Well Location/Tax Map Key: The wells are located at Waihee Valley, Maui at Tax Map Key: 3-2-1:4 (Attachment A).

Background:

March 25, 1993  Pump Installation Permits for North Waihee Wells 1 & 2 were issued. Due to delays in other aspects of the residential development project, action on the permits was also delayed. Several requests for extension of the start date were made and administratively approved.

March 1, 1995  Pump Installation Permits were extended, with a new completion date of March 1, 1997. The start date was set to expire in 2 months, to require applicant to return to the Commission if delays continued. The permits were issued March 14, 1995.
May 5, 1995

The start date for work under the Pump Installation Permits was extended two months, from May 14, 1995 to July 14, 1995, following the applicant's request for a four-month extension.

June 30, 1995

The applicant requested a six-month extension of the start date, to January 14, 1995, due to other ongoing, related regulation requirements. Preparation of a response to the Department of Health comments concerning a Section 401 Water Quality Certification and a still-pending application for a Coastal Zone Management Program Consistency Assessment are required before work can begin. A Department of the Army Permit and a Stream Channel Alteration Permit have been conditionally approved. Work on pump improvement design is nearing completion.

Well Description:

- Ground elevation: 283 ft.
- Casing diameter: 16 inches
- Solid casing depth: 289 ft.
- Screen casing depth: 309 ft.
- Open hole: 79 ft.
- Total depth: 363 ft.
- Grouted annulus: 0 to 200 ft.
- Proposed pump capacity: 1400 gpm (each)

Water Availability: The wells are located on the Waihee side of the Waihee-Iao Aquifer System boundary of the Wailuku Sector of Maui. Sustainable yield for the Waihee Aquifer System is estimated at 8 mgd, while that of Iao is 20 mgd. There are no existing ground water uses from the Waihee Aquifer System at present. Proposed use is 2 mgd from both wells together. Potential water use from the Waihee System by the year 2010 is estimated to be up to 8 mgd by the Maui Water Use and Development Plan.

Hydrologic Analysis: The well will develop fresh, basal water for municipal use; the applicant is negotiating dedication of the wells to the County. The wells tap an aquifer with a static head standing about 10 feet above sea level. John Mink has observed that, because the stream channel in this vicinity is 200 feet above sea level, the wells should have no effect upon it.
RECOMMENDATION:

That the Commission approve the extension of the start date of the pump installation permits for North Waihee Wells to January 14, 1996. The conditions of the permit issued March 14, 1995 remain in effect except for the start date. Pending work described by the applicant may be reasonably expected to require six months for completion, prior to pump installation.

Respectfully submitted,

 Rae M. Loui
 Deputy Director

Attachment

APPROVED FOR SUBMITTAL:

Michael D. Wilson, Chairperson
TO: Charley Ice  
Commission on Water Resource Management  
1151 Punchbowl, Room 227  
Honolulu, Hawaii 96813  

DATE: September 5, 1995  

SUBJECT: Pump Installation Permit Extension for North Waihee Wells 1 & 2

Enclosed is/are:

<table>
<thead>
<tr>
<th>Copies</th>
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<td>1</td>
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<td>Pump Unit and Piping Plan</td>
</tr>
</tbody>
</table>

( ) For approval  
( ) For your use  
(x) As requested  
( ) Returned for corrections  
( ) For your files  
( ) For necessary action  
( ) For review and comment  
( ) For your signature  
( ) Returning

REMARKS: Attached is the Pump Unit and Piping Plan, as you requested. Please call me if you have any questions.

Signed: Milton Arakawa

Planning - Environmental Studies - Project Management  
1823 Wells Street, Suite 3 - Wailuku, Hawaii 96793 - Phone: (808) 244-2015 - Fax: (808) 244-8729
TO: Mr. Charley Ice  
Commission on Water Resource Management  
P. O. Box 621  
Honolulu, Hawaii 96809

DATE: August 28, 1995

SUBJECT: Waihee Wells Pump Installation Permit Extension

---

Enclosed is/are:

<table>
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<tr>
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<td>Site Plan for Wells 1 and 2</td>
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</table>

( ) For approval  
(x) For your use  
(x) As requested  
( ) Returned for corrections  
( ) For your files

( ) For necessary action  
( ) For review and comment  
( ) For your signature  
( ) Returning

REMARKS: The attached site plan is submitted pursuant to your request.

Signed: [Signature]
Milton Arakawa

Copy to: Jim Murray (w/ enclosure)
C. Brewer Homes, Inc.

June 30, 1995

Rae M. Loui, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihe’e Wells 1 and 2
Wells Nos. 5631-02 and 5631-03
Waihe’e, Maui Hawaii

Dear Ms. Loui:

At its regular meeting of May 5, 1995, the Commission on Water Resource Management approved the extension of the start date for work on the pump installation permits for the subject wells to July 14, 1995. We would like to respectfully request an extension of the start date to January 14, 1996.

We are continuing to discuss our involvement in this project with the Department of Water Supply, but have not reached agreement regarding implementation of the project.

We have recently received comments from the State Department of Health regarding the Section 401 Water Quality Certification application on the project and will provide a response in order to seek final approval. The Coastal Zone Management Program Consistency Assessment application is still pending. Other permits, such as the Department of the Army Permit and the Stream Channel Alteration Permit have been conditionally approved.

We continue to pursue the engineering of the project, which has been contracted to Warren S. Unemori Engineering, Inc. Design of the pump improvements, and related facilities, is nearing completion.
We feel that implementation of this project is important to provide supplies of water needed to meet the near-term needs of Central and South Maui. We ask that we be allowed to continue pursuing the implementation of this project.

If you have any questions, please feel free to call me. Thank you for your kind consideration.

Very truly yours,

James M. Murray, Jr.
Project Manager

cc: Milton Arakawa, Munekiyo & Arakawa, Inc.

M-Water
Mr. David W. Blane  
C. Brewer Properties  
P.O. Box 1437  
Wailuku, Hawaii 96793

Dear Mr. Blane:

Request for Extension of Start Date of Pump Installation  
North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03)

At its regular meeting of July 19, 1995, the Commission on Water Resource Management approved the extension of the start date for work on pump installation for the permit issued March 14, 1995.

By this letter, the start date is extended two months, from July 14, 1995, to September 14, 1995. The completion date remains March 14, 1997.

Should delays prevent work from starting by September 14, 1995, additional extension must be approved by the Commission prior to that date. The Commission requires that such a request be accompanied by a written report of the status of the pump installation project, including a sketch of the pump improvement design.

Aloha,

[Signature]

MICHAEL D. WILSON
ITEM 1  MINUTES OF THE JULY 5, 1995 MEETING

UNANIMOUSLY APPROVED. (NOBRIGA/GIRALD)

ITEM 2  OLD BUSINESS/ANNOUNCEMENTS

NONE.

ITEM 3  C.BREWER PROPERTIES, INC. REQUEST FOR EXTENSION OF START DATE, NORTH WAIHEE WELLS 1 & 2, (WELL NOS. 5631-02 & 03), REQUEST TO INSTALL 1400 GPM PUMPS FOR DOMESTIC USE, WAIHEE, WAILUKU, MAUI (TMK 3-2-1:4)

STAFF PRESENTATION: Mr. Charley Ice

STAFF RECOMMENDATION:

Staff recommended that the Commission approve the extension of the start date of the pump installation permits for North Waihee Wells to January 14, 1996. The conditions of the permit extensions issued March 14, 1995 remain in effect except for the start date. Pending work described by the applicant may be reasonably expected to require six months for completion, prior to pump installation.

TESTIMONIES:

Mr. David Craddick of the Maui Department of Water Supply stated that he would prefer a two month extension. Future requests for extension should include a status report, including construction drawings for the well and pump assembly.

AMENDMENT: Commissioner Nobriga moved to amend the staff's recommendation for an extension of the start date from six months to two months, and to require a status report, including construction plans.
UNANIMOUSLY APPROVED AS AMENDED. (NOBRIGA/GIRALD)

ITEM 4

WAIALUA SUGAR COMPANY VOLUNTARY REDUCTION OF PERMITTED WATER USE, PUMPS 25 & 26 (WELL NOS. 3203-01 & 02), WAHIAWA GROUNDWATER MANAGEMENT AREA, OAHU (TMK 6-4-03:1)

PRESENTATION OF SUBMITTAL: Ms. Lenore Nakama

STAFF RECOMMENDATION:

Staff recommended that the Commission:

1. Revoke the water use permit, permanently and in whole, for Pump 25 (Well No. 3203-01).

2. Require the owner or former operator of Pump 25 (Well No. 3203-01) to properly secure the well, in accordance with the requirements of Chapter 13-168, Water Use, Wells and Stream Diversion Works, Hawaii Administrative Rules, to prevent contamination of the groundwater aquifer.

3. Accept Waialua Sugar Company's voluntary permanent reduction in the allocation to Pump 26 (Well No. 3203-02) from 2.76 mgd to 1.72 mgd.

AMENDMENT: Staff requested to amend the staff recommendation by removing the word "permanently" and "permanent" in #1 and #3 to read as follows:

1. Revoke the water use permit, in whole, for Pump 25 (Well No. 3203-01).

2. Require the owner or former operator of Pump 25 (Well No. 3203-01) to properly secure the well, in accordance with the requirements of Chapter 13-168, Water Use, Wells and Stream Diversion Works, Hawaii Administrative Rules, to prevent contamination of the groundwater aquifer.

3. Accept Waialua Sugar Company's voluntary reduction in the allocation to Pump 26 (Well No. 3203-02) from 2.76 mgd to 1.72 mgd.
STAFF SUBMITTAL

for the meeting of the

COMMISSION ON WATER RESOURCE MANAGEMENT

July 19, 1995
Honolulu, Hawaii

C. Brewer Properties, Inc.
Request for Extension of Start Date
North Waihee Wells 1 & 2, (Well Nos. 5631-02 & 03)
Request to Install 1400 gpm Pumps for Domestic Use

Well Location/Tax Map Key: The wells are located at Waihee Valley, Maui at Tax Map Key: 3-2-1:4 (Attachment A).

Action Requested: Permission to extend start date six months, from July 14, 1995 to January 14, 1996, for installing a 1400 gpm (gallons per minute) pump in each of two North Waihee Wells for private municipal use.

Background:

March 25, 1993
Pump Installation Permits for North Waihee Wells 1 & 2 were issued. Due to delays in other aspects of the residential development project, action on the permits was also delayed. Several requests for extension of the start date were made and administratively approved.

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RECOMMENDATION:

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Respectfully submitted,

[Signature]

RAE M. LOUI
Deputy Director

Attachment

APPROVED FOR SUBMITTAL:

[Signature]

MICHAEL D. WILSON, Chairperson
Attachment A

Waihee 1&2
[Well No. 5631-02,03]
Mr. David W. Blane  
C. Brewer Properties  
P.O. Box 1437  
Wailuku, Hawaii 96793

Dear Mr. Blane:

Request for Extension of  
Start Date of Pump Installation  
North Waihee Wells 1 & 2  
(Well Nos. 5631-02 & 03)

At its regular meeting of May 5, 1995, the Commission on Water Resource Management approved the extension of the start date for work on pump installation for the permit issued March 14, 1995.

By this letter, the start date is extended two months, from May 14, 1995 to July 14, 1995. The completion date remains March 14, 1997.

Should delays prevent work from starting by July 14, 1995, additional extension must be approved by the Commission prior to that date.

Sincerely,

RAE M. LOUI  
Deputy Director
1) Extend 2 mo. in keeping with Rubriga's amendment?

2) Comment on "resource valuation"?

Charly - would you draft a submission for May 5 to o.o 1

Start date to Sept. 14, 1985. [See two options (i) & (ii) for submission]

(i) Approval (ii) denial w/out prejudice
SUBJECT: Pump Installation Permits for North Waihe‘e Wells 1 and 2
Wells Nos. 5631-02 and 5631-03
Waihe‘e, Maui, Hawaii

Dear Ms. Loui:

Pump installation permits for the subject wells were extended by the Commission on Water Resource Management on March 1, 1995. We have enclosed a signed copy of the extension for your files.

Condition No. 6 of the extension notes in part that the "permit may be revoked if work is not started within two (2) months after the date of issuance or if work is suspended or abandoned for two (2) months, unless otherwise specified."

Since the Commission action on March 1, 1995, we have met a number of times with the Board of Water Supply (BWS) regarding the implementation of this project. As you know, the project involves Waihe‘e Well Nos. 1 and 2 as well as construction of a new 500,000 gallon water tank and approximately 4.26 miles of transmission lines to link with the existing County water system.

Although a joint venture with the BWS has been discussed over the past several years, an agreement has not been reached. The current approach favored by the BWS involves purchase of the wells and implementation of the entire project by the BWS. We are currently working with the BWS on the valuation of the well resource as well as the value of work done on the project thus far by C. Brewer Homes, Inc. and our consultants.
In the interim, construction plans for installation of the pumps have been submitted to the Department of Water Supply for approval.

We would like to request that the construction start date for Waihe'e Well Nos. 1 and 2 be extended to September 14, 1995 which is six (6) months after the issuance for the extension. We believe that progress is being made toward the implementation of this important project and we will continue to work with the BWS in coming up with a mutually agreeable solution.

If you have any questions, please feel free to call me. Thank you for your consideration of our request.

Very truly yours,

[Signature]

David W. Blane
Senior Vice President

Attachment - Pump Installation Permit Extension
cc: David Craddick, Department of Water Supply (w/attachment)  
Milton Arakawa, Munekiyo & Arakawa, Inc. (w/attachment)
EXTENSION
PUMP INSTALLATION PERMIT
for
North Waihee Wells 1 & 2
Well Nos. 5631-02 & 03
Waihee, Maui

TO: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your request to extend the permit to install pumps in North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03), is approved subject to the following conditions:

STANDARD PUMP INSTALLATION PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, before any work covered by this permit commences.

2. The pump installation permits shall be for installation of a 1400 gpm capacity, or less, pump in each well. A means to accurately measure water levels, acceptable to the Commission, shall be provided.

3. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

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

5. 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, which conforms with the Commission's September 16, 1992 direction on reporting requirements.
EXTENSION OF PUMP INSTALLATION PERMIT

Well Nos. 5631-02 & 03

6. The permit may be revoked if work is not started within two (2) months after the date of issuance or if work is suspended or abandoned for two (2) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

7. An as-built sectional drawing of the pump installation shall be submitted to the Commission within thirty (30) days after completion of work.

8. The pump installation permit application and staff submittals, approved by the Commission at its March 3, 1993 and March 1, 1995 meetings, are incorporated into the permit by reference.

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
MAR 14 1995
Date of Issuance

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: /s/ Date: April 15/95

Printed Name: /s/ David W. Blake

Firm or Title: S.R. Up. C. Brewer Homes, Inc.

Please sign and return one copy of this permit to the Commission and retain a copy for your record.

cc: USGS
Department of Health
Safe Drinking Water Branch
Ground Water Protection Program
Wastewater Branch
Maui Department of Water Supply
EXTENSION
PUMP INSTALLATION PERMIT

for

North Waihee Wells 1 & 2
Well Nos. 5631-02 & 03
Waihee, Maui

TO: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your request to extend the permit to install pumps in North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03), is approved subject to the following conditions:

STANDARD PUMP INSTALLATION PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, before any work covered by this permit commences.

2. The pump installation permits shall be for installation of a 1400 gpm capacity, or less, pump in each well. A means to accurately measure water levels, acceptable to the Commission, shall be provided.

3. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

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

5. 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, which conforms with the Commission's September 16, 1992 direction on reporting requirements.
EXTENSION OF PUMP INSTALLATION PERMIT
Well Nos. 5631-02 & 03

6. The permit may be revoked if work is not started within two (2) months after the date of issuance or if work is suspended or abandoned for two (2) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

7. An as-built sectional drawing of the pump installation shall be submitted to the Commission within thirty (30) days after completion of work.

8. The pump installation permit application and staff submittals, approved by the Commission at its March 3, 1993 and March 1, 1995 meetings, are incorporated into the permit by reference.

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
MAR 14 1995
Date of Issuance

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 and return one copy of this permit to the Commission and retain a copy for your record.

cc: USGS
Department of Health
Safe Drinking Water Branch
Ground Water Protection Program
Wastewater Branch
Maui Department of Water Supply
Chairperson and Members
Commission on Water Resource Management
State of Hawaii

Gentlemen:

Request for Extension
C. Brewer Properties, Inc.
Request to Install 1400 gpm Pumps in
North Waihee Wells 1 & 2, (Well Nos. 5631-02 & 03)

Well Location/Tax Map Key: The wells are located at Waihee Valley, Maui at Tax Map Key: 3-2-1:4 (see attached map).

Well Description:
- Ground elevation: 283 ft.
- Casing diameter: 16 inches
- Solid casing depth: 289 ft.
- Screen casing depth: 309 ft.
- Open hole: 79 ft.
- Total depth: 363 ft.
- Grouted annulus: 0 to 200 ft.
- Proposed pump capacity: 1400 gpm (each)

Background: Pump Installation Permits for North Waihee Wells 1 & 2 were issued on March 25, 1993. Due to delays in other aspects of the residential development project, action on the permits was also delayed. Several requests for extension of the start date were made and administratively approved. In December, the applicant inquired as to a preferred approach to the coming March permit expiration date, and consequently submitted this request to extend the permit.

Water Availability: The wells are located on the Waihee side of the Waihee-Iao Aquifer System boundary of the Wailuku Sector of Maui. Sustainable yield for the Waihee Aquifer System is estimated at 8 mgd, while that of Iao is 20 mgd. There are no existing ground water uses from the Waihee Aquifer System at present. Proposed use is 2 mgd from both wells together. Potential water use from the Waihee System by the year 2010 is estimated to be up to 8 mgd.
Chairperson and Members  
Commission on Water Resource Management  
March 1, 1995  

RECOMMENDATION:

That the Commission approve the extension of the pump installation permits for North Waihee Wells, subject to the same following original conditions:

STANDARD PUMP INSTALLATION PERMIT CONDITIONS

1. The Commission shall be notified before work commences.

2. The pump installation permits shall be for installation of a 1400 gpm capacity, or less, pump in each well. A means to accurately measure water levels, acceptable to the Commission, shall be provided.

3. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

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

5. 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, which conforms with the Commission’s September 16, 1992 direction on reporting requirements.

6. The permit may be revoked if work is not started within six (6) months after the date of issuance or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

7. An as-built sectional drawing of the pump installation shall be submitted to the Commission within thirty (30) days after completion of work.

8. The pump installation permit application and staff submittal approved by the Commission at its March 3, 1993 and March 1, 1995 meetings are incorporated into the permit by reference.

Respectfully submitted,

[Signature]

RAE M. LOUI  
Deputy Director

Attachment
ITEM 14 REQUEST FOR EXTENSION, C. BREWER PROPERTIES, INC., REQUEST TO INSTALL 1400 GPM PUMPS IN NORTH WAIHEE WELLS 1 & 2 (WELL NOS. 5631-02 & 03), TMK 3-2-1:4, WAIHEE, MAUI

PRESENTATION OF SUBMITTAL: Edwin Sakoda

AMENDMENT: Staff recommended approval with an amendment to delete the word "original" from the Recommendation, so as to read:

"That the Commission approve the extension of the pump installation permits for North Waihee Wells, subject to the same following conditions."

PRESENTATION BY APPLICANT: None; however, Mr. Jim Murray of C. Brewer Homes was present and available for questioning.

TESTIMONIES:

Mr. David Craddick of the Maui Board of Water Supply asked to have an amendment to the staff recommendation (#6) so that the applicant must face the Commission again for review if work is not started within six months.

QUESTIONS/CLARIFICATIONS:

Commissioner Nobriga wondered whether six months was too long.

Mr. Murray responded that, in regards to time table, they are in the "engineering" process for this project. They are also in the final stages of discussing, with the Board of Water Supply, the manner in which this will be developed. Also, C. Brewer anticipates that this will become the Board of Water Supply's project. He is very confident that the project will be started within the six months; less than that will be too "tight".

Commissioner Nobriga asked if the Board of Water Supply is ready to take over the project, once it's developed. He also asked why C. Brewer is taking so long to complete the project and turn it over to the Board of Water Supply.

Mr. Craddick replied that is what they are negotiating for. The Board meeting will be held on March 7, 1995 and the terms of the agreement will be discussed at that time. After the meeting, they will know whether they will be able to start the project within six months.

AMENDMENT: Page Two, Condition # 6 was amended from six (6) months to two (2) months.

UNANIMOUSLY APPROVED AS AMENDED. (NOBRIGA/NAKATA)
Briefly describe the proposed work:

Subject wells were drilled and tested between March and August 1981.

PROPOSED SECTION OF WELL

Elevation at top of casing: 284 ft., msl.

Cement Grout: 200 ft.
Hole Diameter: 20 in.
Total Depth: 363 ft.
Rock Packing: 108 ft.

Ground Elevation: 283 ft., msl

Solid Casing: ASTM Designation A-242
USS Cor-ten, Kaiser
Material Steel Kaisaloy
Length 289 ft.
Diameter 16 in.
Wall thickness 0.3125 in.

Casing: ☐ Perforated ☐ Screen
USS Cor-ten, Kaiser
Material Steel Kaisaloy
Length 20 ft.
Diameter 16 in.
Wall thickness 0.25 in.
Openings 100 sq. in./L.F.

Open Hole:
Length 79 in.
Diameter 15 in.
Waihee 1&2
(Well No. 5631–02,03)
Mr. David W. Blane  
C. Brewer Homes  
24 N. Church Street, #205  
Wailuku, HI 96793-1437

Extension of Pump Installation Permits  
North Waihee Wells 1 & 2 (5631-02, 03)  
Waihee, Maui

Dear Mr. Blane:

We have received your request for an eighteen (18) month extension of the pump installation permit approved by the Commission on Water Resource Management on March 25, 1993.

Please be advised that we intend to submit this request to the Commission at its regular meeting on March 1, 1995, in Honolulu. Please call Ed Sakoda at [xxx-xxxx] if you have any questions.

Sincerely,

RAE M. LOUI  
Deputy Director

cc: Mr. Milton Arakawa, Munekiyo & Arakawa
TO: Rae M. Loui  
Deputy Director  
Commission of Water Resource Management  
Department of Land & Natural Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809


SUBJECT: Waihe'e Wells and Transmission System

Enclosed is/are:

<table>
<thead>
<tr>
<th>Copies</th>
<th>Date</th>
<th>Description</th>
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<td>Orig.</td>
<td>12/20/94</td>
<td>Letter from David W. Blane to Commission of Water Resource Management</td>
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</tbody>
</table>

( ) For approval  
( ) For your use  
( ) As requested  
( ) Returned  
( ) For your files

(X) For necessary action  
( ) For review and comment  
( ) For your signature  
( ) Returning

REMARKS: Please refer to the attached letter.

Signed: [Signature]
Milton Arakawa

Copy to: David W. Blane, C. Brewer Homes, Inc. (w/enclosure, via fax)  
Warren Unemori, Warren S. Unemori Engineering, Inc. (w/enclosures, via fax)  
David Craddick, Department of Water Supply (w/enclosure, via fax)
December 20, 1994

Rae M. Loui, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Pump Installation Permits for North Waihe'e Wells 1 and 2
Well Nos. 5631-02 and 5631-03
Waihe'e, Maui, Hawaii

Dear Ms. Loui:

Pump installation permits for the subject wells were issued with conditions by the Commission on Water Resource Management on March 25, 1993. Condition No. 8 of both permits note in part that the work must be started within six (6) months of the date of permit issuance. Moreover, construction must be completed within two (2) years of the date of permit issuance, or by March 25, 1995.

Extensions on the construction start date have been granted administratively, to January 25, 1995.

We would like to request a six (6) month extension of the construction start date to July 25, 1995 and an eighteen (18) month extension of the construction completion date to September 25, 1996.

As you recall, we are working with the County of Maui, Department of Water Supply (DWS), on improvements to the water system including two (2) additional wells to be drilled and equipped by the DWS, a water storage tank, and approximately 4.26 miles of waterline. Before we proceed with installation of the pumps, we would like to be reasonably certain that a connection to the County water system can be made and that applicable governmental approvals can be obtained in a timely manner. We have been working on securing the necessary permits to implement the entire project.

The Final Environmental Assessment for the project was filed in April 1994 and this process is completed.
Since the proposed waterline crosses five (5) streams or gulches, other permit requirements apply to the subject project. These include the U.S. Department of the Army permit, Section 401 Water Quality Certification, Coastal Zone Management (CZM) Consistency, and Stream Alteration Permit. The Army, Section 401, CZM and Stream Alteration Permit applications were submitted to the appropriate agencies in July 1994. A Department of the Army Provisional Nationwide Permit was issued on November 30, 1994. Action on the Section 401, CZM and Stream Alteration Permit applications are still pending.

In this regard, our requests for time extensions will allow us to continue working with the State Department of Health, the Office of State Planning and the Commission on Water Resource Management to secure the respective permit approvals for project implementation. If you or your staff have any questions, please feel free to call me. Thank you for your consideration.

Very truly yours,

C. BREWER HOMES, INC.

David W. Blane
Senior Vice-President

cc: David Craddick, Department of Water Supply
   Milton Arakawa, Munekiyo & Arakawa, Inc.
Mr. David W. Blane, Senior Vice-President  
C. Brewer Homes, Inc.  
P.O. Box 1437  
Wailuku, HI 96793-1437

Dear Mr. Blane:

Request for Second Extension of Start of Construction Date for North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03)

We acknowledge receipt of your letter requesting a ten-month extension of the start of construction date. By this letter we are extending your start date an additional ten months to January 25, 1995. Please note that the well should be completed by March 25, 1995, two years from the date the permit was issued.

Please notify the Commission on Water Resource Management, in writing, before any work covered by the permit begins, or if work cannot begin by January 25, 1995.

Sincerely,

RAE M. LOUI  
Deputy Director

ES:ky

cc: Pete C. Moynahan, C. Brewer Properties, Inc.  
David Craddick, Maui Department of Water Supply  
Milton Arakawa, Munekiyo & Arakawa, Inc.
Rae M. Loui, Deputy Director  
Commission on Water Resource Management  
Department of Land and Natural Resources  
State of Hawaii  
P.O. Box 621  
Honolulu, Hawaii 96809  

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2  
Well Nos. 5631-02 and 5631-03  
Waihee, Maui, Hawaii  

Dear Ms. Loui:

We would like to request a ten (10) month extension (to January 25, 1995) on the start date for the above pump installation permits.

Permits for the subject wells were issued with conditions by the Commission on Water Resource Management on March 25, 1993. Condition No. 8 of both permits state in part that 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." Accordingly, a six month extension on the start date was granted to March 25, 1994.

Our intent is to install the pumps in accordance with the other conditions of the permits, including the condition that construction be completed by March 25, 1995. Should difficulties arise regarding construction start and completion dates, we will notify the Commission in January 1995.

Before we proceed with installing the pumps, we would like some assurance that a connection to the existing County water system can be made and that applicable governmental approvals can be obtained in a timely manner. The pump installation permits are envisioned to be part of a larger project jointly undertaken by C. Brewer Homes, Inc. and the County of Maui, Department of Water Supply (DWS). This includes two additional wells to be drilled and equipped by the DWS, a water storage tank, and approximately 4.26 miles of waterline.

We have been working on filing the Final Environmental Assessment (EA) for the project. Public comments raised during the 30-day comment period of the Draft EA were
researched and addressed. The negative declaration was published in the Office of Environmental Quality Control Bulletin of April 8, 1994.

Work is also ongoing for several permits required for waterline crossings of five streams and gulches. These include the Corps of Engineers Permit, Section 401 Water Quality Certification, Coastal Zone Management Consistency, and Stream Channel Alteration Permit. Filing of these permits is anticipated in mid-1994.

If you or your staff have any questions, please feel free to call me.

Very truly yours,

David W. Blane
Senior Vice-President
C. Brewer Homes, Inc.

DWB:lt
cc: Pete C. Moynahan, C. Brewer Properties, Inc.
    David Craddick, Department of Water Supply
    Milton Arakawa, Munekiyo & Arakawa, Inc.
Request for Extension of Start of Construction Date for North Waimea Wells 1 & 2 (Well Nos. 5631-02 & 03)

We acknowledge receipt of your letter requesting a six-month extension of the start of construction date. By this letter we are extending your start date an additional six months to March 25, 1994. Please note that the well should be completed by March 25, 1995, two years from the date the permit was issued.

Please notify the Commission on Water Resource Management, in writing, before any work covered by the permit begins, or if work cannot begin by March 25, 1994.

Sincerely,

RAE M. LOUI
Deputy Director

ES:fc

c. Michael T. Munekiyo Consulting, Inc.
David Craddick, Maui Department of Water Supply
Dear Ms. Loui:

SUBJECT: Pump Installation Permits for North Waihee Wells 1 and 2
Well Nos. 5631-02 and 5631-03
Waihee, Maui, Hawaii

Pump installation permits for the subject wells were issued with conditions by the Commission on Water Resource Management on March 25, 1993. Condition No. 8 of both permits state in part that the "permit may be revoked if work is not started within six (6) months of the date of issuance or if work is suspended or abandoned for six months."

We would like to request a six (6) month extension to the start date for the work on the subject wells. Our request would extend the start date for work on the wells to March 25, 1994. Our intent is to install the pumps in accordance with the other conditions of the permits. However, before we proceed with installing the pumps, we would like some assurance that a connection to the existing County water system can be made. The County is also interested in drilling additional wells in the area to the north of Well Nos. 5631-02 and 5631-03.

We are working with the County of Maui, Department of Water Supply (DWS), on improvements to the water system including two additional wells to be drilled and equipped by the DWS, a water storage tank, and approximately 4.36 miles of waterline. A Draft Environmental Assessment has been filed with the Office of Environmental Quality Control. The 30-day review period for the Draft EA started on August 23, 1993. Should there be no significant environmental impacts as a result of the project, then the EA process should be completed prior to March 1994. Our intent is to start work covered by the subject pump installation permits upon completion of the environmental review process.
If you or your staff have any questions, please feel free to call me. Thank you for your consideration.

Very truly yours,

David W. Blane
Senior Vice President
C. Brewer Properties, Inc.

cc: Pete Moynahan, C. Brewer Properties, Inc.
    Michael T. Munekiyo, Michael T. Munekiyo Consulting, Inc.
    David Craddick, Department of Water Supply
PUMP INSTALLATION PERMIT

for

North Waihee Well 2
Well No. 5631-03
Waihee, Maui

TO: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

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 a pump in Waihee Well 2 for private/municipal use is approved, subject to the following conditions:

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified in writing before any work covered by this permit commences.

2. The permit shall be for installation of up to a 1400 gpm capacity pump in the well. The total pumpage from North Waihee Wells 1 & 2 shall average 2 mgd or less.

3. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from the well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

4. 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.
5. The permit application and staff submittal approved by the Commission at its meeting on March 3, 1993 shall be incorporated herein by reference.

6. The following shall be submitted to the Commission staff within 30 days after completion of the work:
   a. Well Completion Report.
   b. As-built sectional drawing of the installed pump.

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

8. 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 proposed in the permit application shall be completed within two years from the date of permit issuance.

KEITH W. AHUE, Chairperson
Commission on Water Resource Management

MAR 25 1993
Date of Issuance
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: [Signature] Date: 3/29/93
Printed Name: DAVIO W. BLANE
Firm or Title: SR. V.P. / C. BREWER PROPERTIES

Please sign and return one copy of this permit to the Commission and retain a copy for your record.

Enc. (Well Completion Report form) c: USGS
Department of Health
Safe Drinking Water Branch
Ground Water Protection Program
Maui Department of Water Supply
Michael T. Munekiyo Consulting, Inc.
Mink & Yuen, Inc.
PUMP INSTALLATION PERMIT

for

North Waihee Well 1
Well No. 5631-02
Waihee, Maui

TO: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

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 a pump in Waihee Well 1 for private/municipal use is approved, subject to the following conditions:

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified in writing before any work covered by this permit commences.

2. The permit shall be for installation of up to a 1400 gpm capacity pump in the well. The total pumpage from North Waihee Wells 1 & 2 shall average 2 mgd or less.

3. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from the well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

4. 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.
5. The permit application and staff submittal approved by the Commission at its meeting on March 3, 1993 shall be incorporated herein by reference.

6. The following shall be submitted to the Commission staff within 30 days after completion of the work:
   a. Well Completion Report.
   b. As-built sectional drawing of the installed pump.

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

8. 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 proposed in the permit application shall be completed within two years from the date of permit issuance.

KEITH W. AHUE, Chairperson
Commission on Water Resource Management

MAR 25 1993

Date of Issuance
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: [Signature]

Printed Name: Davin W. Blake

Firm or Title: Sr. V.P. / C. Brewer Properties

Date: 3/29/93

Please sign and return one copy of this permit to the Commission and retain a copy for your record.

Enc. (Well Completion Report form)

C: USGS
   Department of Health
   Safe Drinking Water Branch
   Ground Water Protection Program
   Maui Department of Water Supply
   Michael T. Munekiyo Consulting, Inc.
   Mink & Yuen, Inc.
Chairperson and Members
Commission on Water Resource Management
State of Hawaii
Honolulu, Hawaii

Gentlemen:

C. Brewer Properties, Inc.
Application for Pump Installation Permits
North Waihee Wells 1 & 2, Waihee, Maui

Applicant: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

Landowner: Wailuku Agribusiness Company, Inc.
P.O. Box 520
Wailuku, HI 96793

Action Requested: Permission to install 1400 gallons per minute (gpm) pumps in North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03) for private/municipal use. The proposed total amount of use from both wells is 2,000,000 gallons per day (2 mgd).

Well Location/Tax Map Key: The wells are located at Tax Map Key: 3-2-01:4 (see attached map).

Well Description (typical):

- Ground elevation: 283 ft.
- Casing diameter: 16 inches
- Solid casing depth: 289 ft.
- Screen casing depth: 309 ft.
- Open hole: 79 ft.
- Total depth: 388 ft.
- Proposed pump capacity: 1400 gpm per well

Agency Review: The application has been sent to the Maui Department of Water Supply, the State Historic Preservation Division, the Office of Hawaiian Affairs, and to the State Departments of Health and Hawaiian Home Lands for review. There have been no objections to the project.

Analysis: The well will develop fresh, basal water, for private/municipal use. The wells tap a basal aquifer with a static head standing about 10 ft. above mean sea level. John Mink, in a letter to C. Brewer Properties, Inc. states, "The water table in the North Waihee wells lies 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above sea level. A small depression in the water table caused by pumping will not
Chairperson and Members
Commission on Water Resource Management

March 3, 1993

Water Availability: The wells are located in the Wailuku Sector, Waihee System of Maui. Sustainable yield of the Waihee System is estimated at 8 mgd. There is no pumpage from the aquifer. Ground water use from the aquifer system is expected to be about 4.2 mgd by the year 2010. The wells are listed for potential development in the Maui County Water Use and Development Plan.

RECOMMENDATION:

That the Commission approve the issuance of pump installation permits for North Waihee Wells 1 & 2, subject to the following conditions:

1. The Commission on Water Resource Management (Commission) shall be notified before work commences.

2. The permits shall be for installation of 1400 gpm capacity pumps in the wells. The total pumpage from both wells shall average 2 mgd.

3. The proposed uses shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. These permits or the authorization to pump water from the wells shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from each well could be reduced by the Commission in the future. These permits are not a commitment that the pump capacities permitted here or even some lesser amount are guaranteed in the future.

4. 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.

5. The following shall be submitted to the Commission within 30 days after completion of the work:
   a. Well Completion Reports.
   b. As-built sectional drawings of the pump installations.

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

7. These permits may be revoked if work is not started within six months of the dates of issuance or if work is suspended or abandoned for six months. The work proposed in these permit applications shall be completed within two years from the dates of permit issuance.

Respectfully submitted,

[Signature]

[Seal]
Mr. Nakata asked for the location of the wells in relation to the stream. Mr. Sakoda said the wells were about 400-500 feet from the stream but were on a slope. Discussion followed regarding any relationship between the stream and the surrounding wetlands. Mr. Nakata was concerned about where the water for the wetlands was coming from and whether or not there was a relationship between the basal and the wetland. Mr. Sakoda explained that the water would come from the overflow of the dikes plus whatever recharge. In regards to the relationship, Mr. Sakoda said there must be a relationship but was not sure what it was. Mr. Bauer pointed out that the heads on the south side of the stream (the basal portion) was higher than the north side. Therefore, there are wetlands on the south side but not on the north.

Mr. Jim Murray of C. Brewer summarized the project and answered questions of the Commission. He stated that the water distribution system would be dedicated to the County Department of Water Supply and the final terms of the joint development agreement are being worked out. A meeting was scheduled for Friday, March 5th. Mr. Murray said the DWS had encouraged them to submit this application.

Mr. Ing asked Mr. Murray if he had seen Mr. Craddick’s letter of March 3 indicating that negotiations have not yet resulted in an agreement with C. Brewer and also commented that he would not want to see any action taken by the Commission that would infringe on the need to supply water to the area. Mr. Ing asked for the status of the negotiations. Mr. Murray had not seen the letter, but explained that a meeting was held last week and that there was a conceptual agreement on how to proceed on the development of the source. This conceptual agreement would be presented to the DWS Technical Committee.

Mr. Craddick explained that he was not asking that the application be deferred but that it be approved. Negotiations have been ongoing since 1986, although it has not resulted in any agreements. He hoped the agreement would be resolved this month then DWS may not need to drill their well and could look at other areas where a well would be more beneficial.

Discussion followed regarding locations of proposed DWS wells in the area, spacing, which aquifer systems they would impact. The applicant’s well would be located in Waihee aquifer while the proposed DWS well would be in the Iao aquifer with the Waihee Stream as the dividing point between the two aquifers (if streams can be that definitive). Mr. Craddick said it is known that the head on one side of the stream is 10 feet while the other side has a 14 foot head.

Ms. Loui added that the USGS model for Pearl Harbor showed that cones of depression can cross non-conformities so even if there is a difference in heads there could still be some effects. Mr. Craddick said that was the reason for his letter but he did not intend to stop the permit. He felt staff’s recommendations were sufficient to handle the situation mentioned by Ms. Loui.

Mr. Nakata asked if there would be any impact on the stream or wetlands from the proposed DWS well and if USGS had been asked to look at it. Mr. Sakoda did not think it would affect the stream but effects on the wetlands needs to be looked at more closely. The USGS were given copies of John Mink’s letter and they have not stated any objections. Ms. Loui added that not enough is known on whether or not the stream is gaining and where it’s gaining, therefore Mr. Meyer from USGS
significant amount with the intent of having some reserved right to use the water. The nature of that right has not been determined but it would be a sharing of the source.

Mr. Craddick added that when an agreement is reached, DHHL would have water made available to them.

Staff recommendation unanimously approved (Fujimura/Lewin).

**ITEM 5**

**EXTENSION: HUEHUE RANCH ASSOCIATES, L.P., PUMP INSTALLATION PERMITS, KUKIO IRRIGATION (K) WELLS 1 TO 3, KUKIO, NORTH KONA, HAWAII**

Mr. Dustin Crimmins, representing the applicant, stated approval had been received for the Water Quality Monitoring and Management Plan from the Department of Health. A copy of the approved permit would be sent to the Commission's staff.

Staff recommendation unanimously approved (Fujimura/Lewin).

**ITEM 6**

**JOHN D. MOOD JR., APPLICATION FOR A STREAM CHANNEL ALTERATION PERMIT, A STREAM DIVERSION WORKS PERMIT, AND AN AMENDMENT TO THE INTERIM INSTREAM FLOW STANDARD FOR HUALOLO STREAM, NINOLE, HAWAII**

Mr. Martin questioned whether or not the approval of all landowners adjacent to the streams was needed before the stream was restored. Ms. Loui said several letters were received from landowners who were in favor of restoring the stream. The first step would be to determine who built the diversion, then work with the landowners.

Staff recommendation unanimously approved (Nakata/Lewin).

**ITEM 7**

**BOUNDARY RECLASSIFICATIONS WITHIN THE HONOLULU, PEARL HARBOR, AND WAIALUA GROUND WATER MANAGEMENT AREAS INCLUDING THE PEARL HARBOR CAPROCK AREA, OAHU**

Mr. Hardy explained the boundaries and sectors being presented to the Commission.

Mr. Martin stated (testimony in Commission file) that in future refinement of the aquifer system and sector boundaries, the Commission should "utilize readily available additional output from USGS modelling that was not mentioned nor presented at the public information meeting".

Mr. Bowles cautioned that if boundaries and definition of rules and regulations become too rigid, the real purpose will be lost. Ground water modeling is helpful as a tool but field knowledge is equally, if not more important and that if modeling is not working it should be modified.

Since at the informational meeting the Windward area was numbers were left blank, Mr. Gary Lee asked if the information included on the map presented by Mr. Hardy was for information only or would the Commission be acting on that also. Mr. Hardy said it was just general information which was attached at the request of the Commission. The Windward area numbers were approved at an earlier
Mr. Nakata asked for the location of the wells in relation to the stream. Mr. Sakoda said the wells were about 400-500 feet from the stream but were on a slope. Discussion followed regarding the any relationship between the stream and the surrounding wetlands. Mr. Nakata was concerned about where the water for the wetlands was coming from and whether or not there was a relationship between the basal and the wetland. Mr. Sakoda explained that the water would come from the overflow of the dikes plus whatever recharge. In regards to the relationship, Mr. Sakoda said there must be a relationship but was not sure what it was. Mr. Bauer pointed out that the heads on the south side of the stream (the basal portion) was higher than the north side. Therefore, there are wetlands on the south side but not on the north.

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Staff recommendation unanimously approved (Fujimura/Lewin).

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Mr. Dustin Grimmins, representing the applicant, stated approval had been received for the Water Quality Monitoring and Management Plan from the Department of Health. A copy of the approved permit would be sent to the Commission's staff.

Staff recommendation unanimously approved (Fujimura/Ing).

**ITEM 6**

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Chairperson and Members
Commission on Water Resource Management
State of Hawaii
Honolulu, Hawaii

Gentlemen:

C. Brewer Properties, Inc.
Application for Pump Installation Permits
North Waihee Wells 1 & 2, Waihee, Maui

Applicant: C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, HI 96793

Landowner: Wailuku Agribusiness Company, Inc.
P.O. Box 520
Wailuku, HI 96793

Action Requested: Permission to install 1400 gallons per minute (gpm) pumps in North Waihee Wells 1 & 2 (Well Nos. 5631-02 & 03) for private/municipal use. The proposed total amount of use from both wells is 2,000,000 gallons per day (2 mgd).

Well Location/Tax Map Key: The wells are located at Tax Map Key: 3-2-01:4 (see attached map).

Well Description (typical):

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground elevation</td>
<td>283 ft</td>
</tr>
<tr>
<td>Casing diameter</td>
<td>16 inches</td>
</tr>
<tr>
<td>Solid casing depth</td>
<td>289 ft</td>
</tr>
<tr>
<td>Screen casing depth</td>
<td>309 ft</td>
</tr>
<tr>
<td>Open hole</td>
<td>79 ft</td>
</tr>
<tr>
<td>Total depth</td>
<td>388 ft</td>
</tr>
<tr>
<td>Proposed pump capacity</td>
<td>1400 gpm per well</td>
</tr>
</tbody>
</table>

Agency Review: The application has been sent to the Maui Department of Water Supply, the State Historic Preservation Division, the Office of Hawaiian Affairs, and to the State Departments of Health and Hawaiian Home Lands for review. There have been no objections to the project.

Analysis: The well will develop fresh, basal water, for private/municipal use. The wells tap a basal aquifer with a static head standing about 10 ft. above mean sea level. John Mink, in a letter to C. Brewer Properties, Inc. states, "The water table in the North Waihee wells lies 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above sea level. A small depression in the water table caused by pumping will not influence Waihee upstream of the wells. Nor is it likely that the stream will suffer in the process.

March 3, 1993
Water Availability: The wells are located in the Wailuku Sector, Waihee System of Maui. Sustainable yield of the Waihee System is estimated at 8 mgd. There is no pumpage from the aquifer. Ground water use from the aquifer system is expected to be about 4.2 mgd by the year 2010. The wells are listed for potential development in the Maui County Water Use and Development Plan.

RECOMMENDATION:

That the Commission approve the issuance of pump installation permits for North Waihee Wells 1 & 2, subject to the following conditions:

1. The Commission on Water Resource Management (Commission) shall be notified before work commences.

2. The permits shall be for installation of 1400 gpm capacity pumps in the wells. The total pumpage from both wells shall average 2 mgd.

3. The proposed uses shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. These permits or the authorization to pump water from the wells shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from each well could be reduced by the Commission in the future. These permits are not a commitment that the pump capacities permitted here or even some lesser amount are guaranteed in the future.

4. 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.

5. The following shall be submitted to the Commission within 30 days after completion of the work:
   a. Well Completion Reports.
   b. As-built sectional drawings of the pump installations.

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

7. These permits may be revoked if work is not started within six months of the dates of issuance or if work is suspended or abandoned for six months. The work proposed in these permit applications shall be completed within two years from the dates of permit issuance.

Respectfully submitted,
Waihee 1&2
(Well No. 5631-02,03)
Meyer agrees w/ Minkel on Washington.

Go ahead.

[Signature]

From desk of: RAE M. LOUI
March 3, 1993

Mr. John Keppeler, II
Acting Director
Commission on Water Resource Management
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Keppeler:

We are planning on constructing a well along the south side of N. Waihee stream at about the 200 foot elevation. The purpose of the well is to spread the pumping of Iao aquifer and to supply the new Department of Hawaiian Homes subdivision of Waiehu Kou and other Hawaiian Homes areas in Waiehu. Withdrawal would be in the amount of 1 MGD.

The County of Maui Board of Water Supply has been negotiating with Brewer on joint development of water in this area. These negotiations have not resulted in agreement at this time. We would not want any action taken here to infringe on our need to supply water to the areas listed above.

Thank you for your consideration in this matter.

Sincerely,

David Craddick, Director
DRC/ao/N Waihee wells

cc: Charles Ice, Dept of Hawaiian Home Lands
    David Blane, C. Brewer Properties
FACSIMILE TRANSMITTAL PAGE

Please deliver the following pages to:

Name: Bill Meyer
Company: USGS
From: Ed Sakoda
Date: 2/22/93
Time: 12:13 pm


Total number of pages (including Transmittal Page): 4

* * * * * * *

If you do not receive all of the pages legibly, please call back: (808) 587-0225

Sending Facsimile Number: (808) [redacted]
Receiving Facsimile Number: (---) 341-3611

TRANSMISSION REPORT

THIS DOCUMENT (REDUCED SAMPLE ABOVE) WAS SENT

** COUNT **
# 4

*** SEND ***

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<th>DURATION</th>
<th>#PAGES</th>
<th>COMMENT</th>
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<td>4</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL 0:03'35" 4  XEROX TELECOPIER 7020
Date: February 16, 1993

To: Ed Sakoda
   Dept. of Land and Natural Resources

From: Michael T. Munekiyo

Fax No.: [Redacted]

Telephone No.: [Redacted]

No. of Pages Including Cover Letter: 4

Subject: C. Brewer Properties, Inc., North Waihee Wells No. 1 and 2

Comments: Ed, per our telephone conversation this morning, attached is John Mink's letter response regarding the effects of the North Waihee Wells on Waihee Stream flows. Please call me after you have had a chance to review to discuss placing this matter back on the Commission's agenda. Thank you.

cc: David W. Blane (242-7068)

(Initials) [Signature]

If you have any problems or do not receive the entire fax, kindly call me at 244-2015.
February 12, 1993

Dear David:

Subject: Effect of North Waihee Wells 1 and 2 pumpage on Waihee Stream flow.

I understand that C. Brewer Properties, Inc. application for pump installation permits to install a 1400 gpm pump in each of the North Waihee wells (nos. 1 and 2) was delayed because a point was raised concerning the possible effect pumping the wells might have on Waihee stream flow. This is an exaggerated concern in view of the position of the water level in the aquifer with respect to the channel invert of Waihee Stream.

The water table in the North Waihee wells lies at 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above sea level (see attached location map). A small depression in the water table caused by pumping will not influence Waihee upstream of the wells. Nor is it likely that the stream will suffer in the downstream direction because of the high invert of the channel compared to the position of the water table.

A pump test conducted between May 15 and May 19, 1989, using Well 2 as the pumping well and Well 1 along with a specially drilled boring at Kanoa (see map) as observation wells, showed that the aquifer is extensive and potentially very productive. Well 2 was pumped at 2480 gpm (3.57 mgd) and experienced drawdown of just 5 feet. Recovery was virtually instantaneous following 96 hours of continuous pumping. The salinity of the water was constant at less than 20 mg/l chloride.

Although each well will be fitted with a 1400 gpm pump (2 mgd) to give a total capacity of 4 mgd, during normal operations only 2 mgd will be pumped, and annually the
average will be 2 mgd. Eventually additional wells may be drilled in the aquifer about half a mile north of the existing wells to allow total average pumpage of 4 mgd.

Sincerely,

John F. Mink
TO: Mr. Ed Sakoda  
Department of Land and Natural Resources  
Water Resources Management  
P. O. Box 621  
Honolulu, HI 96809

DATE: February 4, 1993

SUBJECT: C. Brewer Properties, Inc., Application for Pump Installation Permit, North Waihee Wells 1 & 2, Waihee, Maui

Enclosed is/are:

<table>
<thead>
<tr>
<th>Copies</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2/4/93</td>
<td>Check #2221 in the amount of $25.00 for permit fee</td>
</tr>
</tbody>
</table>

( ) For approval  (x) For necessary action
( ) For your use  ( ) For review and comment
( ) As requested  ( ) For your signature
( ) Returned for corrections ( ) Returning
( ) For your files

REMARKS: Ed, as we discussed we are enclosing the permit fee to cover the second well.

Signed: Michael T. Munekiyo, A.I.C.P.

Copy to:
MICHAEL T. MUNEKIYO CONSULTING, INC.
1623 Wells St., #3
WAILUKU, HI 96793

PAY TO THE ORDER OF: Department of Land and Natural Resources

Feb. 4, 1993

$25.00

***Twenty five and no/100***

DOLLARS

First Hawaiian Bank
WAILUKU BRANCH

CBP-N. Waihee Wells
Well No.: 5631-02, 03
Filing fee: [Redacted]

[Redacted]
While you were out

Wants to see you

Urgent:

Phone

Wanted to see you

Please call

Without call

Returned your call

Consumer

Your call

Message: Spoke w/ Mike 2-0-15

Wants to see you

Urgent:
Ms. Rae Loui, Deputy Director  
Commission on Water Resource Management  
Department of Land and Natural Resources  
State of Hawaii  
P.O. Box 621  
Honolulu, Hawaii 96809  

Dear Ms. Loui:  

SUBJECT: PUMP INSTALLATION PERMIT APPLICATION  
WAIHEE WELLS 1 AND 2  
STATE WELL NOS. 5631-02 AND -03  
WAIHEE, MAUI  

Thank you for the opportunity to review and comment on the subject document. We have examined the application and have the following comments to offer:  

1. The application indicates that the subject wells will be for domestic use. If the wells will serve 25 or more individuals at least 60 days per year or will have a minimum of 15 service connections, the applicant will be required to comply with Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems.  

2. Section 11-20-29 of Chapter 20 requires that a new source of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.  

3. The proposed wells are situated above the Underground Injection Control (UIC) line. Land areas above the UIC line are considered to contain underground sources of drinking water. Thus, it is essential that the wells be designed and constructed to prevent the possibility of groundwater contamination. For example, each well should have a concrete well pad and full grouting to prevent seepage or floodwaters from migrating down the well shaft.  

4. If the wells are also used for irrigation purposes, adequate measures must be taken to eliminate cross-connections and backflow conditions. The potable and irrigation water systems should be clearly labeled and
physically separated by an air gap or an approved backflow preventer to avoid contaminating the potable water supply.

If you should have any questions, please contact Stuart Yamada of the Safe Drinking Water Branch at [contact information hidden].

Sincerely,

THOMAS E. ARIZUMI, P.E., Chief
Environmental Management Division

SY:la

c: David Blane
C. Brewer Properties, Inc.
P.O. Box 1437
Wailuku, Maui, HI 96793
Mr. David Blane  
C. Brewer Properties, Inc.  
P.O. Box 1437  
Wailuku, HI 96793  

Dear Mr. Blane:

We have received your application and filing fee for a permit to install pumps in two wells (Well Nos. 5631-02,03) at Waihee, Maui, (TMK: 3-2-01:4). We are reviewing the application for completeness.

Should you have questions, please call the Commission on Water Resource Management staff at [REDACTED]

Sincerely,

RAE M. LOUI  
Deputy Director

JZ:ky
Honorable Hoaliku Drake  
Director  
Department of Hawaiian Home Lands  
State of Hawaii  
P.O. Box 1879  
Honolulu, Hawaii 96805

Dear Ms. Drake:

Well Construction and Pump Installation Permit Applications

Transmitted for your review and comment are copies of the following permit applications:

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Applicant Type</th>
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<td>Maui</td>
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<td>Pump Installation</td>
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Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact Rae M. Loui, Deputy Director, at 587-0214.

Very truly yours,

[Signature]

WILLIAM W. PATY

JZ:ky
Enc.
Mr. Clayton H.W. Hee  
Chairman & Trustee At Large  
Office of Hawaiian Affairs  
711 Kapiolani Blvd., Suite 500  
Honolulu, Hawaii 96813-5249

Attn: Ms. Linda Delaney, Land & Natural Resources Division

Dear Mr. Hee:

Well Construction and Pump Installation Permit Applications

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Should you have any questions, please contact Rae M. Loui, Deputy Director, at [REDACTED]

Very truly yours,

[REDACTED]

William W. Paty
Deputy

JZ:ky
Enc.
Mr. Thomas Arizumi, Chief
Environmental Management Division
State Department of Health
Five Waterfront Plaza
500 Ala Moana Blvd., Suite 250
Honolulu, Hawaii 96813

Attn: Mr. William Wong

Dear Mr. Arizumi:

Well Construction and Pump Installation Permit Applications

Transmitted for your review and comment are copies of the following permit applications:

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Should you have any questions, please contact the Commission on Water Resource Management staff at [redacted]

Sincerely,

[Signature]

RAE M. LOUI
Deputy Director

JZ:ky
Enc.
Ms. Marjorie Ziegler  
Sierra Club Legal Defense Fund, Inc.  
212 Merchant Street, Room 202  
Honolulu, Hawaii 96813

Dear Ms. Ziegler:

Well Construction and Pump Installation Permit Applications

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Should you have any questions, please contact the Commission on Water Resource Management staff at [Contact Information]

Sincerely,

RAE M. LOUI  
Deputy Director
MEMORANDUM

TO: Don Hibbard, Director
    Historic Preservation Program
FROM: Rae M. Loui, Deputy Director
    Commission on Water Resource Management
SUBJECT: Well Construction and Pump Installation Permit Applications

Transmitted for your review and comment are copies of the following permit applications:

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Applicant Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maui</td>
<td>Wahikuli-MAU</td>
<td>5441-01</td>
<td>Well and Pump</td>
</tr>
<tr>
<td>Maui</td>
<td>Waihee 1&amp;2</td>
<td>5631-02,03</td>
<td>Pump Installation</td>
</tr>
</tbody>
</table>

Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact the Commission on Water Resource Management staff at [phone number].

JZ:ky
Enc.
Mr. Dave Craddick, Director  
Department of Water Supply  
County of Maui  
200 South High Street  
Wailuku, Maui, Hawaii 96793  

Dear Mr. Craddick:  

Well Construction and Pump Installation Permit Applications  

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Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact the Commission on Water Resource Management staff at [Contact Information].

Sincerely,

[Signature]

RAE M. LOUI  
Deputy Director

JZ:ky  
Enc.
Mr. Kazu Hayashida  
Manager and Chief Engineer  
Board of Water Supply  
630 South Beretania Street  
Honolulu, Hawaii 96813  

Dear Mr. Hayashida:

Well Construction and Pump Installation Permit Applications

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Should you have any questions, please contact the Commission on Water Resource Management staff at

Sincerely,

RAE M. LOUI  
Deputy Director

JZ:ky
Enc.
MEMORANDUM

TO: Rae M. Loui, Deputy Director
Commission on Water Resource Management

FROM: Don Hibbard, Administrator

SUBJECT: Historic Preservation Review of Well Construction and Pump Installation Permit Applications
Waihee, Wailuku & Wahikuli, Lahaina, Maui
TMK 3-2-1: 4 & 4-5-14: 14

We believe that both applications will have "no effect" on significant historic sites. The wells in Waihee already exist in farmed land and the proposed well in Wahikuli will be located along the highway, an area that has been previously disturbed. Both areas are not likely to contain historic sites.

Please call Annie Griffin at extension 7-0013 if you have any questions.

AG:aal
TO: Ed Sakoda  
DLNR  
Div. of Water Resources  
Management  
P. O. Box 621  
Honolulu, HI 96809

Enclosed is/are:

<table>
<thead>
<tr>
<th>Copies</th>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>---</td>
<td>Application for Pump Installation Permit with attachments</td>
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<tr>
<td>1</td>
<td>---</td>
<td>$25.00 Filing Fee</td>
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</tbody>
</table>

() For approval   (x) For necessary action  
() For your use   () For review and comment  
() As requested   () For your signature  
() Returned for corrections  
() For your files

REMARKS: The attached materials are submitted for processing. If there are any questions or if additional information is needed, please call me at [redacted]. Thank you.

Signed: [signature]  
Michael T. Munekiyo, A.I.C.P.

Copy to: Planning • Environmental Studies • Project Management  
2035 Main Street • Wailuku, Hawaii 96793 • Phone: (808) [redacted] • Fax: (808) [redacted]
PAY TO THE ORDER OF
Department of Land and Natural Resources
$25.00

September 17th, 92

Michael T. Munekiyo
4015 MAIN ST.
WAILUKU, HI 96793

Michael T. Munekiyo
Consul, Inc.
APPLICATION FOR: □ Well Construction or □ Pump Installation PERMIT

Instructions: Please print or type and send completed application with attachments to the Div. of Water Resource Management, P.O. Box 373, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone Hydrology/Geology Section for assistance.

1. WELL LOCATION/NAME: North Waihee Wells 1 and 2
   Island: Maui
   Address: Waihee, Maui, Hawaii
   Tax Map Key: 3-2-01:4
   (Attach a USGS map, scale 1"=2000', and a property tax map showing well location referenced to established property boundaries.)

2. (a) WELL OWNER:
   Firm Name: C. Brewer Properties, Inc.
   Contact Person: David Blane
   Address: P. O. Box 1437
   Wailuku, HI 96793 Ph. [blank]

2. (b) LANDOWNER:
   Firm Name: Wailuku Agribusiness Company, Inc.
   Contact Person: Stephen W. Knox
   Address: P. O. Box 520
   Wailuku, HI 96793 Ph. [blank]

3. PROPOSED CONTRACTOR:
   Name: Not available. Project to be bid following receipt of permit.
   Contractor's License No.: [blank]
   Ph: [blank]

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 sys.) □ Industrial
   □ Irrigation (specify) □ Other (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL:
   4.0 Million gallons per day Total
   (2.0 MGD per well)

7. PROPOSED PUMP INFORMATION:
   Pump Type: □ Vertical Turbine
   Motor: □ Diesel
   Rated Pump Capacity: Gallons per minute 1400
Briefly describe the proposed work:

Subject wells were drilled and tested between March and August 1981.

---

PROPOSED SECTION OF WELL

Elevation at top of casing: 284 ft., msl.

Cement Grout: 200 ft.

Hole Diameter: 20 in.

Total Depth: 363 ft.

Rock Packing: 108 ft.

Ground Elevation: 283 ft., msl

Solid Casing: ASTM Designation A-242
USS Cor-ten, Kaiser
Material: Steel Kaisaloy
Length: 289 ft.
Diameter: 16 in.
Wall thickness: 0.3125 in.

Casing: ☑ Perforated ☐ Screen
USS Cor-ten, Kaiser
Material: Steel Kaisaloy
Length: 20 ft.
Diameter: 16 in.
Wall thickness: 0.25 in.
Openings: 100 sq. in./L.F.

Open Hole:
Length: 79
Diameter: 15 in.
APPLICATION FOR: □ Well Construction or □ Pump Installation PERMIT

Instructions: Please print or type and send completed application with attachments to the Div. of Water Resource Management, P.O. Box 373, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone Hydrology/Geology Section for assistance.

1. WELL LOCATION/NAME: State Well Nos. 5631-02 and 5631-03
   Island Maui
   Address Waihee, Maui, Hawaii
   Tax Map Key 3-2-01:4
   (Attach a USGS map, scale 1"=2000', and a property tax map showing well location referenced to established property boundaries.)

2. (a) WELL OWNER:
   Firm Name C. Brewer Properties, Inc.
   Contact Person David Blane
   Address P.O. Box 1437
   Wailuku, HI 96793
   Ph:

   (b) LANDOWNER:
   Firm Name Wailuku Agribusiness Company, Inc.
   Contact Person Stephen W. Knox
   Address P.O. Box 520
   Wailuku, HI 96793
   Ph:

3. PROPOSED CONTRACTOR: Not available. Project to be bid following receipt of permit. Contractor's License No.

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.)
   □ Domestic (individual, noncommercial water sys.)
   □ Irrigation (specify)  □ Military
   □ Industrial  □ Other (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL: 4.0 Million gallons per day Total
   (2.0 MGD per well)

7. PROPOSED PUMP INFORMATION:
   Pump Type:  □ Diesel
   Motor:
   Rated Pump Capacity: Gallons per minute 1400
Briefly describe the proposed work:

Subject wells were drilled and tested between March and August 1981.

---

PROPOSED SECTION OF WELL

Elevation at top of casing:

284 ft., msl.

Ground Elevation: 283 ft., msl

Cement Grout: 200 ft.

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Solid Casing: ASTM Designation A-242
USS Corten, Kaiser
Material Steel Kaisaloy
Length 289 ft.
Diameter 16 in.
Wall thickness 0.3125 in.

Casing: Perforated Screen
USS Corten, Kaiser
Material Steel Kaisaloy
Length 20 ft.
Diameter 16 in.
Wall thickness 0.25 in.
Openings 100 sq. in/L.F.

Open Hole:
Length 79
Diameter 15 in.
**PROPOSED SECTION OF WELL**

- **Elevation at top of casing:** 284 ft., msl.
- **Ground Elevation:** 283 ft., msl.
- **Solid Casing:**
  - **Material:** Steel Kaisaloy
  - **Length:** 289 ft.
  - **Diameter:** 16 in.
  - **Wall thickness:** 0.3125 in.
- **Casing:**
  - **Material:** Steel Kaisaloy
  - **Length:** 20 ft.
  - **Diameter:** 16 in.
  - **Wall thickness:** 0.25 in.
  - **Openings:** 100 sq. in./L.F.
- **Open Hole:**
  - **Length:** 79 ft.
  - **Diameter:** 15 in.

**Briefly describe the proposed work:**

Subject wells were drilled and tested between March and August 1981.
Dr. David Henderson Brown, M.D.
RR#1 Box 138
Wailuku, HI 96793

Dear Dr. Brown:

Waihee Valley Wells 1 & 2 (Well Nos. 5631-02 & 03)

Your letter indicates that you are looking for a way to require Wailuku Agribusiness to do an environmental assessment and an environmental impact statement before they draw any water from the Waihee Valley Wells.

The administrative rules of the State Water Code require only that a water user obtain a pump installation permit from the Commission on Water Resource Management prior to installing a pump in a well. In designated water management areas, an additional water use permit is required. Presently, there are no water management areas on Maui.

The State Water Code also provides for dispute resolution and citizen complaints for water-related matters whether or not they are in a water management area.

An environmental assessment and environmental impact statement are not required by the Commission on Water Resource Management prior to the owner or applicant using water from the Waihee Valley Wells. However, they must obtain a pump installation permit from the Commission. If there are any disputes or complaints about the issuance of such a permit, the Commission will hear them and act accordingly.

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

Sincerely,

MANABU TAGOMORI
Deputy Director
June 13, 1990

Department of Land & Natural Resources
Commission on Water Resource Management
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Gentlemen:

Re: PUMP INSTALLATION PERMITS

Pursuant to your letter of May 30, 1990, we are submitting applications for pump installation permits for the following projects:

1. Honokahua-Well A, Repair of Controls.
3. Waiehu Heights Pump #2, Pump Replacement. 5430-02
4. Hamoa Well, Pump Installation. 4300-02
5. Kepaua Well, Pump Installation. 0801-03

Additional information requested are as follows:

1. Wakiu Wells "A" and "B" both have 40 horsepower motors and have capacities of 350 gpm.

2. Waihee Wells #1, #2, and #3 all flow through the same meter.

If any additional information is required, please contact us.

Sincerely,

Vince G. Bagoyo, Jr.
Director

ab
Enclosures
North Waihee Wells  
Pump Test Protocol  

John F. Mink  
April 4, 1989  

The pump rate will be held constant at 2000 gpm over a continuous period of 96 hours. The continuous rate may be prolonged another 24 hours at the discretion of the test supervisor.

In the Waihee-Kahakuloa sector water level measurements will be taken in the pumping well, the other North Waihee well, the Kanoa boring and the Wailena well. In the Waihee-Waiehu sector, measurements will be taken in Test Hole A-1. The unpumped North Waihee well is outfitted with a continuous water level recorder and in the Kanoa boring a bubbler will be installed. The Wailena well and A-1 are open. Manual measurements will be made with an insulated copper wire equipped with an electrode, or a steel tape.

Static water level measurements by steel tape or wire will be taken as follows.

1. Both North Waihee wells and the Kanoa boring.
   a. Three days before the start of the test in the A.M.
   b. One day before the start, also A.M.
   c. 30 minutes before the start.

2. Wailena well.
   a. Within five days of the start of the test.
   b. The day of the start of the test.

3. Test Hole A-1.
   a. Within five days of the start of the test.
   b. The day of the start of the test.

After the test is started, water level measurements will be taken as follows.

1. Pumping North Waihee well (manual measurements preferred; airline if manual not possible).
   a. 1 reading per minute for 5 minutes.
   b. 1 reading per 5 minutes for 25 minutes.
   c. 1 reading per 10 minutes for 60 minutes.
   d. 1 reading every hour thereafter.
2. Unpumped North Waihee well. Drawdowns will be traced on the continuous recorder, but manual measurements should be made as follows to check the reliability of the recorder:
   a. At 10 minutes
   b. At 30 minutes.
   c. Every hour thereafter.

3. Kanoa boring. Drawdowns will be determined by the bubbler arrangement but need to be checked manually. Recognizable drawdown of about 0.1 feet will not occur until 48 hours after the start of the test if the aquifer is unconfined and not narrowly bounded. If the aquifer is confined, drawdown will be measureable sooner. The sequence of readings should be:
   a. At 10 minutes.
   b. At 30 minutes.
   c. Every hour thereafter.

4. Wailena well. The Wailena well is so distant from North Waihee that drawdown of 0.1 feet and more isn't likely to occur unless the aquifer is confined. Nevertheless, manual measurements should be made as follows.
   a. At 6 hours.
   b. At 24 hours.
   c. At 30 hours.
   d. At 48 hours.
   e. At 54 hours.
   f. At 72 hours.
   g. At 78 hours.
   h. At 96 hours.

   If a response is noted, the frequency of measurements will be increased as practicable.

5. Test Hole A-1. Same schedule as the Wailena well.

   Recoveries will be measured after the pump is turned off. Recovery measurements at the pumped well, the unpumped North Waihee well and the Kanoa boring will follow the same schedule as the drawdown measurements over a period of 12 hours. Thereafter single measurements will be made in the A.M. for the following 5 days. Recovery measurements will be made at Wailena and A-1 only if these wells experienced measurable drawdown. The schedule for such measurements will be drawn up before the end of the test.
Memo To: Joint Venture  
From: John F. Mink and Norman Saito Engineering  
Re: Location of new well sites in aquifer north of Waihee Valley  
Date: July 17, 1989

The aquifer starting at Waihee Valley and extending northward toward Makamakaole is capable of providing approximately 4 mgd on a sustained basis. To meet maximum demands pumpage can be greater temporarily, but over the long term the average draft should be restricted to 4 mgd. This is the sustainable yield that has been estimated from analysis of the successful pumping test conducted recently on one of the North Waihee wells.

The high groundwater head in the aquifer will allow withdrawal of potable water employing relatively high capacity pumps. Drawdowns during the test were modest and recovery was rapid. Pumps having a capacity of 2 mgd (1400 gpm) each are recommended for the existing two North Waihee wells and the proposed two new wells between Waihee and Kupaa Gulch.

Sites for the new wells are plotted on the accompanying map. Three sites have been selected, but only two new wells are recommended at this time. The remaining site should be reserved for a future well in the event the sustainable yield of the aquifer proves to be greater than the estimate of 4 mgd. The first new well should be drilled at Site 2, and the next at Site 3. Site 1 is the reserve location.
Site 2 is close by the Kanoa test boring where an unnamed gulch becomes too narrow to allow uncomplicated land development. The new well can be drilled within 150 feet of the test boring at an elevation of about 300 feet. The boring will be an important monitor to track behavior of the aquifer. The site is 2000 feet north of the North Waihee wells. An access road already exists.

Site 3, where the second new well should be drilled, is on the south bank of Kupaa Gulch where it is crossed by Kahekili Highway. The useable space is small but adequate for drilling operations and construction of a pumping station. Clearing and leveling will be required. Otherwise, north of Site 2 the terrain is difficult and elevation quickly rises above 400 feet. Elevation at the site is about 350 feet; distance north of Site 2 is 1000 feet.

The reserve location, Site 1, is 500 feet south of Site 2 and 1500 feet northeast of the North Waihee wells at elevation 300 to 350 feet. The site is on the slope forming the head of an attractive small valley.

Although four wells, each fitted with a 2 mgd pump, are proposed for the reach between Waihee valley and Kupaa Gulch, on the average only 4 mgd will be pumped. The total capacity of 8 mgd can be exercised during periods of unusual demand, but on an annual basis pumpage should be equivalent to 4 mgd.

The average of 4 mgd should not be taken from the two North Waihee wells alone. One of these wells should act as a standby except during the highest demand periods.
### WAILENA WELL

**ELEVATION = 608.23**  
(At top of pipe)

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<th>Date</th>
<th>Top Water Elevation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>02/17/89</td>
<td>x</td>
<td>Poor reading - chloride content 87.5 mg/l</td>
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<tr>
<td>03/01/89</td>
<td>6.63</td>
<td>Good results; 3:00 p.m. - NaCl 87.5 mg/l</td>
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<tr>
<td>03/08/89</td>
<td>6.67</td>
<td>4:30 p.m.; river nearby flowing</td>
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<tr>
<td>03/15/89</td>
<td>6.44</td>
<td>4:00 p.m.; river not flowing</td>
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<tr>
<td>03/22/89</td>
<td>6.16</td>
<td>4:00 p.m.; river not flowing</td>
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<tr>
<td>04/03/89</td>
<td>6.61</td>
<td>10:15 a.m.; no water in river</td>
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<td>04/11/89</td>
<td>6.54</td>
<td>1:30 a.m.; 150 mg/l - river running strong</td>
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<td>04/17/89</td>
<td>6.20</td>
<td>9:00 a.m.; from chart</td>
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</table>
# PUMP TEST AT WELL A-1

ELEVATION = 248.11
(Water Level In Feet)

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<th>TIME</th>
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<th>5/16/89</th>
<th>5/17/89</th>
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<td>18.05</td>
<td>17.99</td>
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WELL A-1

Elevation: 248.11 feet
(Water Level in Feet)

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<tr>
<td>5/20/89</td>
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<td>18.08</td>
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All measurements taken by steel tape.

The A-1 well is located far enough away from the test well, North Waihee #2, that any effect on A-1 would be doubtful.

A final reading of Well A-1 was taken on Monday, May 22, 1989 at 8:00 a.m. with a water level elevation of 18.08 feet above sea level.
TEST WELL DATA
NORTH WAIHEE WELL #2

Test well elevation at top of casing 281.98
Measure point at base of gearing 282.73
Pump location (-300 feet from M.P.) -17.27
Air line location (top of bowl assembly) -6.27
Pressure gauge reading at beginning of test (to 1/10) 17.5

Distance from North Waihee Well #1 to North Waihee Well #2 176 feet

Chloride readings were taken twice daily. All were between 37.5 mg/l and 50 mg/l. NaCl measured with the HACH chloride test kit, Model 7-P, using low range measure 0-250 mg/l.
### PUMP TEST AT
NORTH WAIKEE WELL NO. 2

**MP Elevation = 202.73 (Bottom of Housing)**

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<th>DATE</th>
<th>TIME</th>
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<th>RATE (GPM)</th>
<th>WATER LEVEL (FT.) (AT GUAGE)</th>
<th>WATER ELEVATION</th>
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<td>Noon</td>
<td>Begin Pump Test</td>
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<tr>
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<td>436445</td>
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<td>Increased Pump Rotation</td>
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<td>Reduced Pump Rotation</td>
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<td>RECORDER LEVEL (Mg/l)</td>
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**PUMP TEST AT NORTH WAIHEE WELL NO. 2**

MP Elevation = 282.73 (Bottom of Housing)

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Flow more water in well.

At 6 p.m. 5/15 reduced rpm's to 1700. Water level went up to 12.0

Sub. Consent . . . 

Flowing 2 ft. at 2800.
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**Scale:**

- **Water Level ELEV.**
- **NaCl:** 50.16
- **Date:** 5/16/87 - 5/17/87
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Figure 2

NORTH WAIHEE WELLS 1 AND 2
STEP DRAWDOWN PUMP TEST

APRIL 15, 1981 (WELL NO. 1)
AUGUST 3, 1981 (WELL NO. 2)
5/18/89  17:10
Cell from El Remmel -

Bill Moore, meter not reading correctly,
C 1700 RPM, Q = 2400 gpm
C 1900 RPM (which change was made on 5/18/89) Q = 2400 gpm
Order to reduce to 1700 RPM. Will calculate from
by other means.

5/19/89  07:30  Call from El Remmel.

Bill Moore calculated rate of 2900 gpm when RPM = 2400
- from 5/18 am to 5/18 1800 (?) at this rate. Cut back to
2400 gpm (1700 RPM). New pump boasts, i.e. pump should be
operating properly. Confusion caused by malfunction of meter valve.
The pump test at North Waihee Well #2 began on Monday, May at noon.

Pumping was to be at a constant rate of 2,400-2,500 gpm for 5 days.

Between 6:00 p.m. on Wednesday, May 17 and 9:00 a.m. on Thursday, May 18 the in-line flow meter malfunctioned. Not knowing this, we increased the pump's rpm to keep up the 2,450 gpm rate.

The pumping was at this increased rate (1,900 rpm) from 9:00 a.m. on Thursday, May 17 to 6:00 p.m. on Thursday, May 17. At that time the pumping was reduced to approximately 2,450 gpm by reducing the pump rotation to the original 1,700 rpm. The remainder of the test was run at this rate.

Pumping at the test well was stopped at 12:00 p.m. (noon) on Friday, May 18, 1989.

Recovery was almost immediate and by 2:00 p.m. the pressure gauge at the test well read 17.2 feet. By 5:00 p.m., Friday it was back to the original 17.5 feet on the gauge.

On Saturday at 8:00 a.m. the water level at the test well was measured by tape to be 11.25 feet above sea level. At this time the gauge was at 17.5 feet.

With the air line at -6.27 feet and water level at 11.25 feet, the gauge reading should be at 17.52 feet. The gauge reading correlates well with these results.
KANOA WELL
WELL ELEVATION
305.94 ft. AT
2 1/2 IN. CASING

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**KANOA WELL**

Elevation: 305.94 feet
(Bubbler System)

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*noon-begin test*

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*noon-stop test*

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*5:30 pm 12.20*

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*Measured by steel tape.*

On Monday, May 22, 1989, at 8:30 a.m. a final measure was taken by tape to read 12.35 feet.
# KANOA WELL

**Elevation = 305.94**  
*(Bubbler System)*

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Shiley \( h_0 = 12.42 \) top 0930 hmax by 1430 when \( h_{t} \).

5/19/89 \( h = 11.98 \) (by top) \( h = 12.42 - 11.98 = .44 \)

11:15 \( h = 12.14 \) \( \Delta = 0 \) 23.8 Prayer luncheon

\( h = 12.14 \)
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<tr>
<td>1/1/89</td>
<td>11.96</td>
<td>11 am</td>
</tr>
<tr>
<td>1/13/89</td>
<td>11.09</td>
<td>10 am</td>
</tr>
<tr>
<td>1/20/89</td>
<td>11.59</td>
<td>4 pm</td>
</tr>
<tr>
<td>1/24/89</td>
<td>11.55</td>
<td>5 pm</td>
</tr>
<tr>
<td>2/13/89</td>
<td>11.59</td>
<td>2 pm</td>
</tr>
<tr>
<td>2/16/89</td>
<td>11.59</td>
<td>4 pm</td>
</tr>
<tr>
<td>2/20/89</td>
<td>11.57</td>
<td>3 pm</td>
</tr>
<tr>
<td>2/24/89</td>
<td>11.50</td>
<td>4 pm</td>
</tr>
<tr>
<td>3/11/89</td>
<td>11.52</td>
<td>4 pm</td>
</tr>
<tr>
<td>3/18/89</td>
<td>11.66</td>
<td>3 pm</td>
</tr>
<tr>
<td>3/15/89</td>
<td>11.60</td>
<td>5 pm</td>
</tr>
<tr>
<td>3/22/89</td>
<td>11.60</td>
<td>4 pm</td>
</tr>
<tr>
<td>4/10/89</td>
<td>11.54</td>
<td>2 pm</td>
</tr>
<tr>
<td>4-10-89</td>
<td>11.54</td>
<td>1:30 pm Cl content 35 mg/l</td>
</tr>
<tr>
<td>5-12-89</td>
<td>12.34</td>
<td>11:30 am</td>
</tr>
<tr>
<td>5-15-89</td>
<td>12.92</td>
<td>9:30 am Pumps in the rig</td>
</tr>
<tr>
<td>5-18-89</td>
<td>12.31</td>
<td>8:30 pm</td>
</tr>
<tr>
<td>5-19-89</td>
<td>12.14</td>
<td>9:00 am</td>
</tr>
<tr>
<td>5-17-89</td>
<td>12.05</td>
<td>9 am (chart reading)</td>
</tr>
</tbody>
</table>
NORTH WAIHEE WELLS
Site Description
Pump Test Results

JOHN F. MINK

Submitted to:
Hawaiiana Investment Co., Inc.
October 20, 1981
NORTH WAIHEE WELLS

Summary

The basal aquifer extending southward from Waihee Stream to Waikapu Stream, which is now referred to as the Waiehu aquifer, is being exploited nearly to the limit of its sustainable yield, and an additional significant contribution from it to Central Maui's water supply is not reasonable to expect. To develop more water different sources must be explored, and to this purpose an exploration-production well field was proposed in the region north of Waihee Stream where the aquifer was thought to be either separate or only poorly connected to the aquifer south of the valley. A separate aquifer would provide a new exploitable source of water supply, while proof of connection with the Waiehu aquifer would extend the limits of that aquifer and increase the overall allowable sustainable yield.

Two wells have now been drilled on the north side of Waihee Valley by Roscoe Moss Co. for Hawaiiana Investment Co., Inc. (See Figure 1 for location). Both have been successfully tested and have proved that a substantial, highly transmissive aquifer extends toward Kohakuloa from Waihee. A sustained rate of about 1,700 gpm over 48 hours was pumped from each well with very small drawdown and with no change in
the low initial salinity (15 mg/l chloride). Interpretation
of the initial conditions and the pump test results indicate
that the aquifer, to be referred to as the North Waihee
aquifer, is essentially independent of the Waiehu basal
aquifer. If a hydraulic connection exists, it is very weak.

The two wells can be safely fitted with 1,750 gpm
pumps. The North Waihee aquifer is large enough to support
more production than can be provided by the completed well
field. The site of the next well is proposed in the small
valley about 1,600 feet northward at a ground elevation of 400
to 500 feet.

**North Waihee Aquifer**

The region north of Waihee Stream toward Kohakuloa
over a width of about two miles is probably underlain by a
basal aquifer, perhaps modified by stray dikes, in the
Wailuku volcanic series, a highly permeable basaltic formation.
Dense trachytic flows of the Honolua series overlie the
Wailuku series except in the deeper valleys where erosion
has exposed the basaltic rocks. The trachytes do not
constitute a principal aquifer and should be avoided if
possible because they are difficult to drill through.

The North Waihee wells were located to avoid the
trachyte but as a result had to penetrate about 100 feet of
talus and alluvium before striking the basalt. Drilling logs indicate that bedrocks of the Wailuku series was encountered 70 to 100 feet below ground surface. The deep alluvial fill of Waihee Valley was successfully avoided. Dikes were not observed in the vicinity of the well field but are known to occur about 3,500 feet upstream, approximately coincident with the forest reserve line. The rift zone is close enough to the wells that local geohydrologic conditions may be dike-basal rather than strictly basal.

The Wells

The North Waihee wells lie 2,150 feet inland of Kahekili Highway about 250 feet from the stream channel. Ground elevation is 280 to 283 feet. The wells are fitted with 16 inch casing and were drilled to a depth of 105 feet below sea level. The casing is perforated from five to 25 feet below sea level, and the remainder of the bore is open (uncased). The wells are on a line parallel to the stream, 178\(\frac{1}{2}\) feet apart. The most inland well is called North Waihee 1, the other is called North Waihee 2. They are identical in design and nearly so in performance. The first well was completed in March of 1981 and tested in April and June. The second well was completed in July and tested in August.
Pump Tests

Step Drawdown

Step drawdown tests were conducted on North Waihee 1 on April 15 and June 3 and on North Waihee 2 on August 3. Initial head was nine to ten feet at each well and initial chloride about 15 mg/l. Behavior of the wells was similar during pumping; in each drawdown was small even at high rates of draft and recovery was instantaneous. The specific capacity of Well 1 was 450 gpm/ft. drawdown at 1,765 gpm, and of Well 2 550 gpm/ft. drawdown at 1,715 gpm. Tables 1 and 2 list the step drawdown results and Figure 2 shows a plot of $s = f(Q)$ for each.
TABLE 1
NORTH WAIHEE WELL 1
Step Drawdown Pump Test
April 15, 1981

Ground elev. 283 ft.; Bowls set 309.5 ft.; Airline at 310 ft.; uncased.

<table>
<thead>
<tr>
<th>Time</th>
<th>Min.</th>
<th>P.S.I.</th>
<th>D.D. Rate</th>
<th>Rate GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:14</td>
<td>0</td>
<td>17.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>08:16</td>
<td>2</td>
<td>17.1</td>
<td>.92</td>
<td>577</td>
</tr>
<tr>
<td>08:19</td>
<td>5</td>
<td>17.0</td>
<td>1.16</td>
<td>588</td>
</tr>
<tr>
<td>08:26</td>
<td>12</td>
<td>17.0</td>
<td>1.16</td>
<td>732</td>
</tr>
<tr>
<td>08:38</td>
<td>24</td>
<td>17.0</td>
<td>1.16</td>
<td>750</td>
</tr>
<tr>
<td>08:43</td>
<td>29</td>
<td>17.0</td>
<td>1.16</td>
<td>769</td>
</tr>
<tr>
<td>08:48</td>
<td>34</td>
<td>17.0</td>
<td>1.16</td>
<td>769</td>
</tr>
<tr>
<td>08:50</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:52</td>
<td>38</td>
<td>16.75</td>
<td>1.73</td>
<td>1071</td>
</tr>
<tr>
<td>09:00</td>
<td>46</td>
<td>16.75</td>
<td>1.73</td>
<td>1071</td>
</tr>
<tr>
<td>09:43</td>
<td>89</td>
<td>16.75</td>
<td>1.73</td>
<td>1071</td>
</tr>
<tr>
<td>09:44</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09:45</td>
<td>91</td>
<td>16.5</td>
<td>2.31</td>
<td>1364</td>
</tr>
<tr>
<td>09:48</td>
<td>94</td>
<td>16.5</td>
<td>2.31</td>
<td>1333</td>
</tr>
<tr>
<td>10:13</td>
<td>119</td>
<td>16.4</td>
<td>2.54</td>
<td>1333</td>
</tr>
<tr>
<td>10:38</td>
<td>144</td>
<td>16.5</td>
<td>2.31</td>
<td>1333</td>
</tr>
<tr>
<td>10:39</td>
<td>145</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:43</td>
<td>149</td>
<td>15.8</td>
<td>3.93</td>
<td>1765</td>
</tr>
<tr>
<td>10:51</td>
<td>157</td>
<td>15.8</td>
<td>3.93</td>
<td>1765</td>
</tr>
<tr>
<td>11:12</td>
<td>178</td>
<td>15.8</td>
<td>3.93</td>
<td>1765</td>
</tr>
<tr>
<td>11:17</td>
<td>183</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:18</td>
<td>184</td>
<td>17.5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Increase Rate

Increase Rate

Increase Rate

Shut Down
TABLE 2

NORTH WAIHEE WELL 2
Step Drawdown Test
August 3, 1981

Ground elevation 282.21 feet; airline set 304 feet; cased.

<table>
<thead>
<tr>
<th>Time</th>
<th>Min.</th>
<th>P.S.I.</th>
<th>D.D. Ft.</th>
<th>Rate GPM</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:15</td>
<td>0</td>
<td>13.75</td>
<td>0</td>
<td>0</td>
<td>Start pump</td>
</tr>
<tr>
<td>08:20</td>
<td>5</td>
<td>13.25</td>
<td>1.16</td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>08:23</td>
<td>8</td>
<td>13.25</td>
<td>1.16</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>08:35</td>
<td>20</td>
<td>13.50</td>
<td>0.58</td>
<td>346</td>
<td></td>
</tr>
<tr>
<td>08:38</td>
<td>23</td>
<td>13.50</td>
<td></td>
<td></td>
<td>Increase rate</td>
</tr>
<tr>
<td>08:39</td>
<td>24</td>
<td>13.0</td>
<td>1.73</td>
<td>1,111</td>
<td></td>
</tr>
<tr>
<td>08:41</td>
<td>26</td>
<td></td>
<td></td>
<td>1,071</td>
<td></td>
</tr>
<tr>
<td>08:47</td>
<td>32</td>
<td>13.0</td>
<td>1.73</td>
<td>1,111</td>
<td></td>
</tr>
<tr>
<td>09:00</td>
<td>45</td>
<td>13.0</td>
<td>1.73</td>
<td>1,071</td>
<td></td>
</tr>
<tr>
<td>09:13</td>
<td>58</td>
<td>13.0</td>
<td>1.73</td>
<td>1,132</td>
<td></td>
</tr>
<tr>
<td>09:39</td>
<td>84</td>
<td>13.0</td>
<td>1.73</td>
<td>1,111</td>
<td></td>
</tr>
<tr>
<td>09:40</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td>Increase rate</td>
</tr>
<tr>
<td>09:48</td>
<td>93</td>
<td></td>
<td></td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>09:57</td>
<td>102</td>
<td>12.6</td>
<td>2.66</td>
<td>1,539</td>
<td></td>
</tr>
<tr>
<td>10:10</td>
<td>115</td>
<td>12.6</td>
<td>2.66</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>10:15</td>
<td>120</td>
<td>12.5</td>
<td>2.89</td>
<td>1,715</td>
<td>Increase rate</td>
</tr>
<tr>
<td>10:38</td>
<td>143</td>
<td>12.4</td>
<td>3.12</td>
<td>1,715</td>
<td></td>
</tr>
<tr>
<td>10:43</td>
<td>148</td>
<td></td>
<td></td>
<td></td>
<td>Stop. Instant recovery.</td>
</tr>
</tbody>
</table>
Sustained Pump Test

Both wells were subjected to 48 hours of continuous pumping at a constant rate. The first well was tested before the second was drilled so that drawdown measurements were restricted to the pumping well. While Well 2 was being pumped, Well 1 was available for use as an observation well. Sustained pumping at Well 1 at 1,715 gpm for 48 hours was successful on the first try and the results indicated the aquifer to be highly transmissive. At Well 2, two attempts to sustain a constant rate for 48 hours failed, the first after 30 hours and the other after 26 hours, but the third attempt succeeded at a rate of 1,680 gpm. During all three attempts, drawdown measurements were taken at Well 1, a distance of 178½ feet away. With these drawdown observation it was possible to compute the transmissivity and specific yield of the aquifer. Drawdown at Well 1 caused by draft at Well 2 and a summary of aquifer characteristics is given in Figure 3. The aquifer was proved to be extensive and highly transmissive, conditions needed for successful exploitation.

Drawdown at pumping wells during sustained tests give well efficiency but generally are not adaptable for calculating aquifer characteristics. The North Waihee wells are very efficient, having specific capacities in excess of
500 gpm/ft. drawdown. During the sustained test at Well 1 drawdown stabilized at 2.54 feet at 1,715 gpm and at Well 2 it stabilized at 3.0 feet at 1,680 gpm.

The drawdowns induced at Well 1 by constant pumping at Well 2 were carefully analyzed to determine, in addition to the aquifer constants, the following:

1. whether the aquifer is effectively closed by impermeable boundaries at short to moderate distances from the well field
2. whether the aquifer has unimpeded hydraulic connection with the Waiehu aquifer
3. whether the aquifer is extensive and effectively unconnected, or poorly connected, with the Waiehu aquifer.

The values for transmissivity and specific yield (effective porosity) were computed by employing the short form (Jacob's method) of the non-equilibrium well hydraulic formula. The short form is permissible because the drawdown data at Well 1 for sustained Test 1 at Well 2 includes early and late measurements that fall on a continuous curve expressed by:

\[ s = \frac{Q \cdot W(u)}{4\pi T} \]

in which \( s \) is drawdown, \( Q \) is constant pumping rate, \( T \) is transmissivity, and \( W(u) \) is the solution for the series
that expands the variable, \( u = \frac{r^2 S}{4T t} \), in which

\( r \) is distance between the pumping and observation wells, \( S \) is specific yield, and \( t \) is time. Units are in feet and days. Proof that the \( s = f(u) \) curve is continuous was demonstrated by assuming that the straight line portion of the plot (after about three hours) fit the Jacob criteria, then employing the computed \( S \) and \( T \) values in calculating the ratio, \( s/W(u) \), for the early part of the curve to check its values against the fixed value of \( Q/4\pi T \). The accord is good and thus it is permissible to conclude that all of the drawdowns fall along a continuous curve. Table 3 below summarizes the computations.

**TABLE 3**

Aquifer Characteristics by Jacob Method

Continuity of \( s = f(u) \)

\( (T = 320,000 \text{ ft}^2/\text{d}; S = .284; r = 178 \text{ ft.}; Q/4\pi T = .0737) \)

<table>
<thead>
<tr>
<th>Time Days</th>
<th>( u )</th>
<th>( W(u) )</th>
<th>( s(\text{ft.}) )</th>
<th>( s/W(u) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0417</td>
<td>1.686</td>
<td>1.3648</td>
<td>0.11</td>
<td>0.0805</td>
</tr>
<tr>
<td>.0625</td>
<td>1.125</td>
<td>1.7172</td>
<td>0.12</td>
<td>0.0699</td>
</tr>
<tr>
<td>.0833</td>
<td>0.844</td>
<td>1.9777</td>
<td>0.14</td>
<td>0.0698</td>
</tr>
<tr>
<td>.1042</td>
<td>0.675</td>
<td>2.1853</td>
<td>0.16</td>
<td>0.0709</td>
</tr>
<tr>
<td>.1250</td>
<td>0.0562</td>
<td>2.3564</td>
<td>0.17</td>
<td>0.0717</td>
</tr>
<tr>
<td>.50</td>
<td>0.0141</td>
<td>3.7012</td>
<td>0.26</td>
<td>0.0702</td>
</tr>
<tr>
<td>1.0</td>
<td>0.0070</td>
<td>4.3874</td>
<td>0.32</td>
<td>0.0738</td>
</tr>
<tr>
<td>2.0</td>
<td>0.0035</td>
<td>5.0770</td>
<td>0.38</td>
<td>0.0739</td>
</tr>
</tbody>
</table>
The aquifer parameters are comparable to those of the best aquifers in Hawaii. The transmissivity is about 320,000 ft$^2$/day, which implies a hydraulic conductivity of 2,000 to 3,000 ft./day, based on partial penetration of 100 feet in the saturated aquifer, and an average specific yield of at least .20.

Continuity of the early and later drawdown data implies that the aquifer is extensive. On the other hand, hydraulic connection between it and the Waiehu aquifer is, at best, very weak. The nearest test hole in the Waiehu aquifer is A-1, which lies 5,100 feet south of the North Waihee wells. Head in this test hole quickly responds to pumping by the Mokuhaun and Waiehu wells in the Waiehu aquifer, and the speed of the response indicates that head changes are transmitted under confined aquifer conditions. No such response showed up on the recorder chart at A-1 as a result of the pumping at North Waihee. If continuous confined conditions existed between North Waihee and A-1, a drawdown of 0.1 feet would have been recorded at A-1 within 70 minutes of the start of each pump test.

For unconfined conditions between the two sites almost ten days would be required for transmittal of 0.1 feet of drawdown. The record at A-1 is too responsive to pumping starts and stops at the Mokuhaun and Waiehu wells to unambiguously display any long term effects from North Waihee
if they occurred. Following is a summary of behavior at A-1 during the North Waihee tests.

TEST 4

Head Changes at A-1
Pump Tests at North Waihee

<table>
<thead>
<tr>
<th>Date</th>
<th>Time of Test</th>
<th>Type of Test</th>
<th>Rate (GPM)</th>
<th>Head-changes at A-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/15/81</td>
<td>08:14 - 11:18</td>
<td>Step</td>
<td>1765</td>
<td>No change.</td>
</tr>
<tr>
<td>6/3 - 5/81</td>
<td>07:30 - 07:30</td>
<td>Sustained</td>
<td>1715</td>
<td>No significant change during test; slight gain in head 6/3-6/10; abrupt drawdown of 0.1 ft. on 6/12, probably caused by Mokuhau-Waiehu pump start up. Gradual increase of 0.15 ft. by 6/18. Head at A-1 20.5 to 21.0 ft.</td>
</tr>
<tr>
<td>8/3/81</td>
<td>08:15 - 10:43</td>
<td>Step</td>
<td>1715</td>
<td>No change.</td>
</tr>
<tr>
<td>8/3 - 4/81</td>
<td>13:00 - 19:00</td>
<td>Sustained</td>
<td>1540)</td>
<td>Head at A-1 about 15.5 ft. Variable</td>
</tr>
<tr>
<td>8/10 - 11/81</td>
<td>09:00 - 11:00</td>
<td>Sustained</td>
<td>1580)</td>
<td>small head changes, up and down. Same head at end of period as at start.</td>
</tr>
<tr>
<td>8/12 - 14/81</td>
<td>15:00 - 15:00</td>
<td>Sustained</td>
<td>1680)</td>
<td>start.</td>
</tr>
</tbody>
</table>

A more telling argument against free hydraulic connection between North Waihee and Waiehu is the large difference in head between A-1 and the new wells. At A-1 the head is about 20 feet when Mokuhau and Waiehu are not pumping,
or 15 to 16 feet when they are, while at North Waihee the head is nine to ten feet. The hydraulic gradient in the Waiehu aquifer is 1 ft./mile, but between A-1 and North Waihee it is five to ten feet per mile, an impossible gradient if free connection prevailed. Whatever connection exists is highly damped by the alluvial fill and weathered rock in Waihee Valley. For planning purposes it is reasonable to consider the North Waihee aquifer to be effectively separate from the Waiehu aquifer.

**Water Quality**

Analyses by Brewer Analytical Laboratories of water collected in April during the pump test at Well 1 and in August at Well 2 showed no change in chloride from 15 mg/l. A more complete analysis for Well 1 is given below.

**TABLE 5**

North Waihee Water Quality

- pH 7.58
- Conductance 272 micromhos
- Alkalinity as CaCO₃ 108 mg/l
- Sodium 9.43 mg/l
- Chloride 14.0 mg/l
- Nitrate-Nitrogen 2.03 mg/l
- Calcium 10.7 mg/l
- Magnesium 8.94 mg/l
The quality of the water is excellent for any purpose. Chloride content did not increase during the tests.

**Conclusions and Recommendations**

The North Waihee aquifer is extensive and potentially very productive. The aquifer consists of Wailuku basalt with hydraulic conductivity of 2,000 to 3,000 ft./day and specific yield of .20. The aquifer is basal, possibly affected by widespread dikes, with a static head of about ten feet. The two wells drilled to date are very efficient, displaying specific capacities in excess of 500 gpm/ft. drawdown at high pumping rates. Water quality is excellent.

The two wells at North Waihee could safely be outfitted with 1,750 gpm pumps to provide a potential field output of five mgd. Northward toward Kohakuloa more water could be developed from the aquifer. When an additional water supply is planned, a well field could be located in the next valley about 0.3 miles north of Waihee Stream at an elevation of 400 to 500 feet (See Figure 1).

JOHN F. MINK
SUSTAINED PUMP TEST
NORTH WAIHEE WELL FIELD, MAUI
WELL 2 PUMPING : WELL 1 OBSERVATION

<table>
<thead>
<tr>
<th>TEST</th>
<th>DATE</th>
<th>WELL 2 RATE GPM</th>
<th>T FT²/DAY</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/3 (1300)</td>
<td>1540</td>
<td>320,000</td>
<td>.28</td>
</tr>
<tr>
<td>2</td>
<td>8/10 (0900)</td>
<td>1580</td>
<td>328,000</td>
<td>.28</td>
</tr>
<tr>
<td>3</td>
<td>8/12 (1500)</td>
<td>1680</td>
<td>329,000</td>
<td>.21</td>
</tr>
</tbody>
</table>
NORTH WAIHEE WELLS 1 AND 2
STEP DRAWDOWN PUMP TEST

APRIL 15, 1981 (WELL NO. 1)
AUGUST 3, 1981 (WELL NO. 2)

DR. "PUMP RATE IN GPM
ATTACHMENT

TO

STATE OF HAWAII
DEPT. LAND & NAT’L RESOURCES
ATTN: Ed Sakodo
DIV OF WATER & LAND DEVELOPMENT

1/18/82
No. Waihee Wells-
Sustained Pump-Test Results.

Attached are copies of the sustained
pump test results Wells No. 1&2,
North Waihee, Maui.

[Signature]

[Stamp]
Pump Test #1, Well, Start 7:40 a.m.
Well No. 1

<table>
<thead>
<tr>
<th>Time (a.m.)</th>
<th>EVERY HR</th>
<th>GPM</th>
<th>Airline</th>
<th>Water Level (Direct)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:40</td>
<td>740</td>
<td>600</td>
<td>17.5</td>
<td>271</td>
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<td>8:15</td>
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<td>15</td>
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<td>275</td>
<td>275</td>
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<tr>
<td>Time</td>
<td>GPM</td>
<td>Acute</td>
<td>Water Fuel Dry</td>
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<td>1700</td>
<td>15.5</td>
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<tr>
<td>8</td>
<td>1700</td>
<td>16.5</td>
<td>275 End of Test</td>
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</table>
November 4, 1981

Mr. Warren A. Suzuki
Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, Hawaii 96793

Dear Mr. Suzuki:

Thank you for sending the location maps for Waihee Valley Wells 1 & 2, State Well Numbers 5631-02 and 5631-03.

We appreciate your cooperation very much.

Very truly yours,

ROBERT T. CHUCK
Manager-Chief Engineer

ES:ko
October 19, 1981

Mr. Robert T. Chuck  
Manager - Chief Engineer  
State of Hawaii  
Dept. of Land and Natural Resources  
Division of Water and Land Development  
P. O. Box 373  
Honolulu, Hawaii  96809

Dear Mr. Chuck,

Subject: Request for Location of Waihee Valley Wells 1 & 2  

As per your request, we are transmitting herewith:

1. Two (2) copies of map showing location of subject wells.  
2) One (1) print location map.

If you need any additional information, please feel free to call me.

Mahalo,

Warren A. Suzuki

cc: Dave Wissmar
October 2, 1981

Mr. Warren S. Unemori
2145 Wells St., Suite 403
Wailuku, Maui, Hawaii 96793

Dear Mr. Unemori:

Request for Location of Waihee Valley
Wells 1 & 2

Enclosed herewith is a map of the two Waihee Valley wells project. Please send us a surveyed plot plan of the wells, if available; or accurately mark the location of the wells on the enclosed map and return to our office. Thank you very much for your cooperation.

Very truly yours,

ROBERT T. CHUCK
Manager-Chief Engineer

RTC:MO:ko
Encl.
Date of report: Sept. 3, 1981  
Person filing report: Loran H. Runnells

A. OWNER Hawaiian Invest. WELL NAME: Waihee Valley # 1  
ISLAND: Maui

B. GENERAL LOCATION: Waihee

C. DRILLING COMPANY: Roscoe Moss Company

D. TYPE OF RIG: 28L  
DRILLING COMPLETED: 6-81  
DRILLER: R. Bourn

E. ELEVATION, msl: Top of drilling platform: 281.35 ft.  
Height of drilling platform above ground surface: 0 ft.

F. HOLE SIZE: 20 in. dia. to 320 ft. below drilling platform.  
16 in. dia. to 387 ft. below drilling platform.

G. CASING INSTALLED: 16 in. I.D. x 312 in. wall solid section to 290 ft. below drilling platform.  
16 in. I.D. x 312 in. wall perforated section to 310 ft. below drilling platform.

H. ANNULUS: Grouted 0 ft. to 160 ft. below drilling platform.

Gravel packed 0 ft. to 30 ft. below drilling platform.

I. PERMANENT PUMP INSTALLATION:
- Pump type, make, serial no.  
Motor type, H.P., voltage, r.p.m.
- Depth of pump intake setting: ft. below  
which elevation is: ft.
- Depth of bottom of airline: ft. below  
which elevation is: ft.

J. INITIAL WATER LEVEL: 271 ft. below drilling platform. Date of measurement: June 3, 1981

K. INITIAL CHLORIDE: 25 ppm, total depth of well: 287 ft. below drilling platform. Sampling Date: 6-3-81

L. PUMPING TESTS:

<table>
<thead>
<tr>
<th>Date</th>
<th>Start water level</th>
<th>Depth of well</th>
<th>Rate (gpm)</th>
<th>Drawdown (ft.)</th>
<th>CI (ppm)</th>
<th>Temp. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 3, 1981</td>
<td>271 ft. below R.P.</td>
<td>387 ft. below R.P.</td>
<td>8.15</td>
<td>600</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.30</td>
<td>1000</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.30</td>
<td>1700</td>
<td>4</td>
<td>25</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>48 hour test</td>
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M. DRILLER'S LOG:

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<th></th>
<th></th>
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<tr>
<td>0 to 4</td>
<td>hard</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>4 to 15</td>
<td>loose rock, clay</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>15 to 52</td>
<td>Mud rock</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>52 to 92</td>
<td>Puka rock</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
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<tr>
<td>92 to 112</td>
<td>Puka hard streak</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>112 to 116</td>
<td>Blue rock</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>116 to 372</td>
<td>Puka hard streak</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>372 to 380</td>
<td>Blue rock</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>380 to 387</td>
<td>Puka, Red</td>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
</tbody>
</table>

N. REMARKS:

FOR REMARKS:

INSTRUCTIONS: Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 373, Honolulu, Hawaii 96809.

REFERENCES: Chapter 178, entitled "Artesian Wells, Generally," HRS, as amended.
TO

Department of Land &
Natural Resources
Division of Water and Land Development
P.O. Box 373
Honolulu, Hawaii 96809

GENTLEMEN:

WE ARE SENDING YOU  □ Attached  □ Under separate cover via __________________ the following items:

□ Shop drawings  □ Prints  □ Plans  □ Samples  □ Specifications
□ Copy of letter  □ Change order  □ __________________

<table>
<thead>
<tr>
<th>COPIES</th>
<th>DATE</th>
<th>NO.</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Drillers Reports for Waihee Valley #1 and 2</td>
</tr>
</tbody>
</table>

THESE ARE TRANSMITTED as checked below:

□ For approval  □ Approved as submitted  □ Resubmit_____ copies for approval
□ For your use  □ Approved as noted  □ Submit_____ copies for distribution
□ As requested  □ Returned for corrections  □ Return_____ corrected prints
□ For review and comment  □ __________________
□ FOR BIDS DUE __________  _______ 19 ______ □ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO

SIGNED:

FORM 240-2 - Available from P.B.S. Townsend, Mass. 01468

If enclosures are not as noted, kindly notify us at once.
From: ___________________________ Date: ___________________________
File In: 5631-02/03

To Initial: ___________________________

- Robert T. Chuck
- Takeo Fujii
- James Yoshimoto
- Manabu Tagomori
- George Morimoto
- Hong Fong Chang
- Herbert Morimatsu
- George Miyashiro
- Harold Sakai
- Leslie Asari
- Albert Ching
- George Matsumoto
- Daniel Lum
- Paul Matsuo
- Noboru Kaneshiro
- Edwin Sakoda

See Me
Take action by
Route to your branch
Review & comment
Draft reply by
For information
Xerox distributed
Acknowledge receipt

Jane Sakai
Doris Hamada
Lorraine Nanbu
Jean Stavot
Elsie Yonamine

9/22/81 reminded E. B. about "non<ul>
"note new yet"<× 7/2/82
6/21/82 Contacted Warren Suzuki - he will contact Hawaiian Trust.
and send request data.
December 15, 1980

Mr. Robert Chuck  
State of Hawaii  
Dept. of Water & Land Development  
P. O. Box 373  
Honolulu, HI 96809

Dear Mr. Chuck,

Subject: Well, Waihee, Maui, within Tax Map Key 3-2-01:1

The Department of Water Supply is requesting a copy of an "as-built" sectional drawing of the well, and a copy of the pumping test records.

Your assistance and response would be appreciated concerning this matter.

Sincerely,

William S. Haines, Director

CK/tm

cc: Engr. File  
Waihee Well

Enclosure
WELL DRILLING PERMIT

TO: Wailuku Sugar Company and its subsidiary, Hawaiiana Investment Co., Inc.  
2180 Main Street, Suite 417  
Wailuku, Maui 96793

Your application, received on October 14, 1980, for a permit to drill two wells within Tax Map Key 3-2-01:1 at Waihee, Maui, is approved subject to the following conditions:

1. That within 30 days after completion of the well, the applicant shall submit a completed Driller's Report, a copy of the Driller's logs, an "as-built" sectional drawing of the well, and a copy of the pumping test records.

2. That the user of the wells shall submit a monthly record of water pumpage and use.

3. That this well drilling permit does not confer or imply any rights regarding the use of water from the wells.

November 26, 1980  
Date of issuance

cc: Maui Dept of Water Supply
WELL DRILLING PERMIT

TO: Wailuku Sugar Company and its subsidiary, Hawaiiana Investment Co., Inc.
2180 Main Street, Suite 417
Wailuku, Maui 96793

Your application, received on October 14, 1980, for a permit to drill two wells within Tax Map Key 3-2-01:1 at Waihee, Maui, is approved subject to the following conditions:

1. That within 30 days after completion of the well, the applicant shall submit a completed Driller's Report, a copy of the Driller's logs, an "as-built" sectional drawing of the well, and a copy of the pumping test records.

2. That the user of the wells shall submit a monthly record of water pumpage and use.

3. That this well drilling permit does not confer or imply any rights regarding the use of water from the wells.

Susumu Ono, Chairman, Board of Land and Natural Resources

November 26, 1980
Date of issuance

cc: Maui Dept of Water Supply
November 17, 1980

Mr. Robert T. Chuck  
Manager-Chief Engineer  
Division of Water & Land Development  
Department of Land & Natural Resources  
State of Hawaii  
P. O. Box 373  
Honolulu, Hawaii 96809

Dear Bob:

Subject: Application for Well Drilling Permit by Wailuku Sugar Company, TMK 3-2-01:1

In response to your letter of November 3, 1980, the subject application is being coordinated with our office. We have been informed by Hawaiiana Investment Company that if the tests successfully show that the safe yield of the proposed wells is sufficient, the two completed wells will be dedicated to the Department of Water Supply, County of Maui, via a second Central Maui Joint Venture to which Hawaiiana Investment Company will be a party.

Hawaiiana Investment Company is anxious to proceed with the test drilling at the site as soon as possible in order to verify the quantity of water available prior to formulation of the Joint Venture. We are in agreement with this approach.

Sincerely,

William S. Haines, Director  
Department of Water Supply

"By Water All Things Find Life"
November 3, 1980

Mr. William Haines
Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Maui 96793

Dear Bill:

For your information, transmitted is a copy of the Application for Well Drilling Permit submitted to us by Warren S. Unemori Engineering, Incorporated on behalf of Wailuku Sugar Company and its subsidiary, Hawaiianana Investment Company.

We intend to issue them a permit under the provisions of Regulation 9. of the Department of Land and Natural Resources. Before we issue this permit will you please let us know if this proposal is being coordinated with your office.

Very truly yours,

ROBERT T. CHUCK
Manager-Chief Engineer

Encl.
ES:ai
APPLICATION FOR (check one)

[ ] WELL DRILLING PERMIT  [ ] WELL MODIFICATION PERMIT

Instructions: Send completed application and attachments to Department of Land and Natural Resources, P.O. Box 373, Honolulu, Hawaii 96809.

Reference: Regulation 9, Dept. of Land & Natural Resources.

Is the well located in a Designated Ground Water Control Area?  [ ] Yes  [X] No

If "yes", application must be accompanied by a Water Use and/or Water Supply Permit and a non-refundable filing fee of $100 payable to the Department of Land & Natural Resources. However, if application is for minor modification of well, filing fee may be waived. If "no", no filing fee is required. Filing fee is waived for federal, state, and county government agencies.

1. WELL LOCATION: Island Maui  Tax Map Key 3-2-01:1. Attach a plot plan showing well location referenced to established property boundaries. Walluku Sugar Company and its subsidiaries, Hawaiiana Investment Co., Inc.

2. WATER USER: [ ] subsidiary, Hawaiiana Investment Co., Inc.  Telephone Address Suite 417, 2180 Main Street, Wailuku, Maui, HI.  Zip Code 96793

3. PROPOSED DRILLING COMPANY: Water Resources International or Roscoe Moss Company

4. PROPOSED WORK: [X] Drill new well  [ ] Deepen  [ ] Redrill  [ ] Alter  [ ] Seal  [ ] Abandon  [ ] Install new pump  [ ] Replace pump  [ ] Modify pump

Fill in the diagram and briefly describe the proposed work (use back of form if necessary):

PROPOSED SECTION OF WELL

Elevation at top of casing 321' 2" ft. msl.

Ground Elev 320 1/2" ft. msl.

Cement Grout 200 ft.

Hole Dia.  16 in.

Total Depth 420 ft.

Rock Packing 125 ft.

*Approximate elev. at filing. Final elev. (msl) by a surveyor licensed by the State must be submitted at start of construction.

5. PROPOSED USE:  [ ] Municipal  [ ] Military  [X] Agriculture  [ ] Industrial  [ ] Domestic  [ ] Disposal  [ ] Other (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL: Check most appropriate box and fill in amount.

[ ] Daily 4 million gallons total  [ ] Monthly gallons  [ ] Yearly gallons

(2 M.G. or more per well)

7. PROPOSED PUMP OR FLOW CAPACITY: 1500 gpm per well for total of gallons per minute

8.4 3,000
October 9, 1980

Department of Land and Natural Resources
P. O. Box 373
Honolulu, Hawaii 96809

Gentlemen:

Re: Regulation 9, Dept. of Land and Natural Resources
Application for Well Drilling Permit

We are submitting herewith a well drilling permit application for our client, Wailuku Sugar Company and its subsidiary, Hawaiiana Investment Co., Inc., in accordance with Regulation 9. Also enclosed for your use are the following:

1. 2000 scale U.S.G.S. map which shows the approximate elevation of the proposed well site.
2. Two copies of tax maps.
3. One print of 100 scale survey map which shows the relative locations of the proposed well site to a known boundary corner.

We believe all the information needed for evaluation have been provided. If not, please call us. We will be working with Hydrologist, John Mink, on this project.

Very truly yours,

Warren S. Unemori

cc: Charles G. Street, Jr.
    John Mink
    Don Cataluna
APPLICATION FOR (check one)

☐ WELL DRILLING PERMIT  ☐ WELL MODIFICATION PERMIT

Instructions: Send completed application and attachments to Department of Land and Natural Resources, P.O. Box 373, Honolulu, Hawaii 96809.

Reference: Regulation 9, Dept. of Land & Natural Resources.

Is the well located in a Designated Ground Water Control Area?  ☐ Yes  ☐ No

If "yes", application must be accompanied by a Water Use and/or Water Supply Permit and a non-refundable filing fee of $100 payable to the Department of Land & Natural Resources. However, if application is for minor modification of well, filing fee may be waived. If "no", no filing fee is required. Filing fee is waived for federal, state, and county government agencies.

1. WELL LOCATION: Island Maui  Tax Map Key 3-2-01:1. Attach a plot plan showing well location referenced to established property boundaries.

2. WATER USER   subsidiary, Hawaiiana Investment Co., Inc  Telephone __________________________

Address Suite 417, 2180 Main Street, Wailuku, Maui, HI.  Zip Code 96793

3. PROPOSED DRILLING COMPANY: Water Resources International or Roscoe Moss Company

4. PROPOSED WORK: ☐ Drill new well(s)  ☐ Deepen  ☐ Redrill  ☐ Alter  ☐ Seal  ☐ Abandon  ☐ Install new pump  ☐ Replace pump  ☐ Modify pump

Fill in the diagram and briefly describe the proposed work (use back of form if necessary):

5. PROPOSED USE: ☐ Municipal  ☐ Military  ☐ Agriculture  ☐ Industrial  ☐ Domestic  ☐ Disposal  ☐ Other (specify)__________________________

6. PROPOSED AMOUNT OF WITHDRAWAL: Check most appropriate box and fill in amount.

☐ Daily 4 million gallons total  ☐ Monthly  ___ gallons  ☐ Yearly  ___ gallons

(2 M.G. or more per well)

7. PROPOSED PUMP OR FLOW CAPACITY: 1500 gpm per well for total of ___ gallons per minute

(provided by [assistant])
Assessed Values reflect tax year 2008.

Search criteria: TMK Taxkey 2-3-2-1-3

PUBLIC RECORD DATA

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<tr>
<th>Taxkey</th>
<th>Subdiv/Condo</th>
<th>Tnr</th>
<th>Address</th>
<th>Owner/Lessee</th>
<th>Bds</th>
<th>Bths</th>
<th>Land area</th>
<th>Liv area</th>
<th>Last Sale Instr</th>
<th>P</th>
<th>Instr</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3-2-1-3</td>
<td>Waihee</td>
<td>F</td>
<td>OFF KOOLAU</td>
<td>KAHIKILI CATTLE</td>
<td>0</td>
<td>0</td>
<td>369.96 ac</td>
<td>0</td>
<td>11/16/2005</td>
<td>QD</td>
<td>$2,571,</td>
</tr>
</tbody>
</table>

This information has been supplied by third parties and has not been independently verified by Hawaii Information Service and is, therefore, not guaranteed.

Copyright ©10/22/2008 by Hawaii Information Service

originally owned by Wailuka Agribiz, original agreement by MDWS was executed with; does MDWS know it's changed?
**SECTION 1: WELL LOCATION INFORMATION**

<table>
<thead>
<tr>
<th>Island</th>
<th>MAUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer System</td>
<td>WAILEKU</td>
</tr>
<tr>
<td>Aquifer Sector</td>
<td>WAHEE</td>
</tr>
</tbody>
</table>

**Proposed Use**
- Municipal

**Proposed Withdrawal**
- System Sustainable Yield
  - Not provided

**SECTION 2: WELL SECTION DATA**

<table>
<thead>
<tr>
<th>Elevation at top of casing</th>
<th>577 ft., m.s.l.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Elevation</td>
<td>575 ft., m.s.l.</td>
</tr>
<tr>
<td>Cement Grout</td>
<td>575 ft.</td>
</tr>
<tr>
<td>Rock Packing</td>
<td>0 ft.</td>
</tr>
<tr>
<td>Hole Diameter</td>
<td>0 in.</td>
</tr>
<tr>
<td>Total Depth</td>
<td>525 ft.</td>
</tr>
<tr>
<td>Estimated Head</td>
<td>2 ft., m.s.l.</td>
</tr>
<tr>
<td>Calculated Aquifer Thickness</td>
<td>0 ft.</td>
</tr>
</tbody>
</table>

**Solid Casing**
- Material: Steel
- Designation: ASTM A252
- Length: 575 ft.
- Diameter: 16 in.
- Wall Thickness: 0.375 in.

**Casing**
- Material: Not provided
- Designation: Not provided
- Length: 20 ft.
- Diameter: 16 in.
- Wall Thickness: Not provided
- Openings: 0 sq.in./ft.
- Open Hole Length: 50 ft.
- Diameter: 10 in.

**SECTION 3: CHECKLIST**

<table>
<thead>
<tr>
<th>Well Depth</th>
<th>Theoretical Thickness of Aquifer</th>
<th>0 ft.</th>
<th>(refer to HWCPIS Section 2.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/4 Aquifer Thickness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depth of Well below Sea Level</td>
<td>50 ft.</td>
<td>too deep</td>
</tr>
</tbody>
</table>

**Well Casing**
- Minimum Wall Thickness
  - Material: Steel
  - County or Non-County: County
  - Minimum Thickness per standards: 0.375 in.
  - Wall Thickness Provided: 0.375 in. okay (refer to HWCPIS Section 2.4 c)

- Minimum Length of Solid Casing
  - 90% of ground to top of aquifer: 517.5 ft.
  - Length of solid casing Provided: 575 ft. okay (refer to HWCPIS Section 2.4 d)
  - Casing Material: ASTM A 242

**Annular Space**
- Depth of Grouting
  - Calculated Depth of Grouting: 402.5 ft.
  - Depth of Grouting provided: 575 ft. okay (refer to HWCPIS Section 2.6 c)
- Thickness of Annular Space
  - 3 in. too small (refer to HWCPIS Section 2.6 d)
FROM: Charley  
DATE: 20 Apr 09  

TO: IMATA, R.  
TO: KAWAHARA, K.  
TO: HARDY, R.  
TO: SAKODA, E.  
TO: CHONG, R.  
TO: NAKAMA, L.  
TO: CHENG, C.  
TO: TORRES, R.  
TO: LAROUX, E.  
TO: OHYE, M.  
TO: FUJII, N.  
TO: YOSHINAGA, M.  
TO: SWANSON, S.  
TO: DANBARA, S.  
TO: KUNIMURA, I.  
TO: YODA, K.  

PLEASE:  
Review & Comment  
Type Draft  
Type Final  
File  
Copies:  
Take Action:  
Please See Me

PLEASE:  
Review & Comment  
Type Draft  
Type Final  
File  
Copies:  
Take Action:  
Please See Me

photos printed 2nd time; lost routing slipper please see memo field; folder finally lost routed materials.  

Can't Takami passed away?!
April 21, 2009

Mr. Jeffrey K. Eng
County of Maui
Department of Water Supply
200 South High Street
Wailuku, HI 96793

Dear Mr. Eng:

Certificate of Pump Installation Completion for Kupaa I Well
Well No. 5731-03 (TMK (2) 3-2-001:003)

We are pleased to inform you that the Pump Installation work permitted for the Kupaa I Well (Well No. 5731-03) is complete and acceptable. This certificate of pump installation completion allows you to commence pumping your well for reasonable & beneficial water use.

To protect Hawaii’s natural ground water resources for the benefit of all, the following requirements apply to the use of your well:

1. If the well is not in use it must be properly capped.

2. If the well is to be abandoned then the landowner must cause a licensed contractor to apply for a well abandonment permit in accordance with §13-168-12(f), HAR, prior to any well sealing or plugging work.

3. In the event that the well operator and/or landowner changes, the Commission shall be notified prior to the change.

4. In the event the benchmark in the concrete base of the well is altered in any way, an updated version of the Well Elevation page of the Well Completion Report Part I shall be submitted to the Commission. If a licensed surveyor had estimated the original benchmark elevation then a licensed surveyor must establish the new benchmark elevation. The Well Elevation portion of the Well Completion Report Part I can be obtained by contacting Commission staff or at www.hawaii.gov/dlnr/cwrm/forms.htm.
5. Your approved pump has a capacity of **1200** gpm at a head of **680** ft. In the future, pump replacements of equal or lesser capacity will not require an additional permit from the Commission, but will require the submission of a Well Completion Report Part II by the licensed pump installer. If the pump replacement is greater than the existing pump, you will need to apply for a new pump installation permit.

6. The landowner shall cause the well operator to maintain the installed meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Chairperson (attached), in accordance with §13-168-7, HAR. Blank water use report forms are also available at www.hawaii.gov/dlnr/cwrm/resources_permits.htm

7. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. The authorization to drill a well and/or install a pump shall not constitute a determination of correlative water rights. The landowner and well operator are notified that the quantity of water taken from the well and/or the pump capacity could be reduced by the Commission in the future.

Because ground water in Hawaii is a public trust, and adverse effects at one well may affect other water resources, any violation of the above conditions or any other provision of the Hawaii Administrative Rules may be subject to fines of up to $5,000 per day. The Commission needs your help and asks that you do your part in utilizing this shared resource. We prefer to work with you in meeting the goal of protecting our ground water resources together.

If you have any questions, please contact Charley Ice of the Commission staff at or toll-free at (Maui), extension 70218.

Sincerely,

KEN C. KAWAHARA, P.E.
Deputy Director

Cl:ss
Encl: Water Use Report Forms

c: Mel's Water Works
Mr. Mel Lima  
Mel's Water Works  
95-646 Lawena Street  
Mililani, HI 96789  

Dear Mr. Lima:

**Well Completion Report Part II for Well No. 5731-03**

We received your Well Completion Report Part II for the Kupaa I (Well No. 5731-03) on February 7, 2009 and acknowledge that it is complete.

This completes your obligations under the pump installation permit. A certificate of pump installation completion will be issued to the well operator/landowner and you will receive a copy. The certificate transfers responsibility of all aspects of well usage and maintenance from you to the well operator/landowner.

If you have any questions, please contact Charley Ice of the Commission staff at [number redacted] or toll-free at [number redacted] (Maui), extension 70218.

Sincerely,

KEN C. KAWAHARA, P.E.  
Deputy Director  

CI:ss  
c: Maui DWS
**WELL CONSTRUCTION AND PUMP INSTALLATION PERMIT APPLICATIONS**

**PERMIT TYPE:** PUMP

**WELL NO:** 5731-03 Kupaa 1

**MAUI:** 6 60103 3-2-001:003

**PROPOSED PUMP CAPACITY:** 1,200 1,728 1,152,000 MUN

**WELL OWNER:** Maui DWS

**LANDOWNER:** Koolau Cattle Co., LTD.

**200 South High Street** 808 270-7616

**Wailuku** Hi 96793

**635 Kenolio Road** 808 879-5375

**Kihei** Hi 96753 808 879-5159

**APPLICATION FOR PERMIT:**
- 9/1/2008 10/6/2008
- 11/28/2008

**WELL CONSTRUCTION PERMIT:**
- Yes 1/12/2009

**PUMP INSTALLATION PERMIT:**
- 12/15/2008
- 12/30/2008 8/26/2005

**MEMO:** no copies. 10/06/08 copies revd. CI-20Apr08: catch up w/workpaper pau. Original work completed in 2005, but problems w/storage tank and death of original contracting agent (C.Takumi) caused delinquency in follow-up. PIP expired, original installer reapplied, permit reissued, wcr2 transmitted, photos complete 2/07/09; acceptance routed 20Apr09.
Hi Charley,

Requested pictures.

Mel

----- Original Message ----- 
From: Charley.F.Ice@hawaii.gov
To: vlima@hawaii.rr.com ; vlima@hawaii.rr.com
Sent: Tuesday, January 20, 2009 4:47 PM
Subject: Kupaa WCR2

Your emailed WCR2 is dated August, 2005 -- do you have one for the current PIP? We also need a wellhead photo for this job.

Charley Ice
Hydrologist
Hawaii Water Commission
1151 Punchbowl 227 Kalanimoku
P. O. Box 621, Honolulu 96809

KAPAA WELL 001.zip
**WCR 2 Check for Well No. 5731-03**

1. From Charley/Denise/Ryan

2. **Pump Tests Check**
   - Special condition of PIP? Yes/No: D. England
   - Analysis by Mitch & England
   - Add T to database.

   - Step-Drawdown Test:
     - Followed WCPI Stds
     - Analysis attached

   - Aquifer Pump Test:
     - Followed WCPI Stds
     - T & S analysis attached

   - Potential Well Interference:
   - Potential Stream Impacts:
   - Additional Testing or Data Required:
   - Pump Test Comments Attached:
   - Proposed Pump Capacity is OK:

3. **Pump Installation Check**
   - Mitch Ohye
   - R. Torres
   - data complete
   - followed Special Cond & Elev.
   - well database updated

4. **Charley/Denise/Ryan**
   - Take action based on above analysis

   - ATTACHMENTS FOR ACCEPTANCE:
     1. WCR2 ACCEPTANCE LETTER
     2. PUMP INST. COMPLETION CERTIFICATE
     3. METER INSTALL. REPORT (IF NECESSARY)
     4. WUR FORM (if necessary)
     5. USGS MAP UPDATED
     6. PARCEL CHECK
     7. WELL DATABASE INPUT CHECK
     8. PUMP TEST WORKSHEET
     9. PUMP As-Built CHECK PRINT

5. Roy
   - check(Entered WCR 2/PICC accept date into database)

6. Susan Hoagbin
   - finalize

7. Ken
   - signature

8. Faith Ching
   - enter into WUR database

9. Charley/Denise/Ryan
   - File
December 15, 2008

Mr. Mel Lima
Mel's Water Works
95-646 Lawena Street
Mililani, HI 96789

Dear Mr. Lima:

Pump Installation Permit
Kupaa Well (Well No. 5731-03)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned well(s) that authorize permanent pump installation work for your well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 12:

**Special Conditions**

1. If the elevation benchmark needs to be altered, the permittee, well operator, and/or well owner shall ensure that the benchmark is transferred (or the well resurveyed) and documentation of the new benchmark shall be submitted to the Commission within sixty (60) days after the pump is installed.
2. Attached for your information are copies of the Department of Health's (DOH) review comments. Please note DOH's requirements related to discharge of effluent from well drilling and testing activities. Also, please contact the Noise Radiation and Indoor Air Quality Branch at [contact information] to check compliance with construction noise permit requirements for this project.
3. Attached for your information is a copy of the State Department of Land and Natural Resources Land Division's comments related to water lease requirements.
4. Attached for your information is a copy of your county’s Department of Planning comments related to their concerns.

The permittee is responsible for all conditions of the permit. This includes ensuring the submission of a completed Well Completion Report Part II form within sixty (60) days after the pump installation work is completed. Be advised that you may be subject to fines of up to $5,000 per day for any violations of your permit conditions starting from the permit approval date.

Please sign both permit originals and return one for our files.

**IMPORTANT** - Pump installation shall not commence until a fully signed permit is returned to the Commission.

If you have any questions, please call Charley Ice of the Commission staff at [contact information] or toll-free at [contact information] (Maui), extension 70218.

Sincerely,

[Signature]
LAURA H. THIELEN
Chairperson

Enclosure

C: Maui DWS (with applicable comments – DOH SDWB, WWB, CWB, Land Division, DHP, DWS) USGS
PUMP INSTALLATION PER
Kupaa Well, Well No. 5731

Note: This permit shall be prominently displayed at the site.

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management Administrative Rules, Section 13-168, entitled “Water Use, Wells, and Stream Pump Installation Standards (HWCPIS - February 2004) which include but are

1. The Chairperson to the Commission on Water Resource Management (Comm notified, in writing, at least two (2) weeks before any work covered by this permit installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. No withdrawal of water shall be made other than for testing until a Certificate of Completion is issued.

3. This permit shall be prominently displayed, or made available, at the site of construction.

4. The pump installation permit shall be for installation of a 1200 gpm rated capacity, or less, pump in the well. This permanent capacity may be reduced in the event that the pump test data does not support the capacity.

5. A water-level measurement access shall be permanently installed, in a manner acceptable to the Chairperson, to accurately record water levels.

6. The permittee shall install an approved meter or other appropriate means for measuring and reporting withdrawals and appropriate devices or means for measuring chlorides and temperature at the well head.

7. Well Completion Report Part II shall be submitted to the Chairperson within 60 days after completion of work. This form can be obtained by contacting staff or on the internet at www.hawaii.gov/dlnr/cwrm.

8. The permittee, well operator, and/or well owner shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

9. The pump installation permit application and any related staff submittal approved by the Commission are incorporated into this permit by reference. This permit is also subject to the HWCPIS. If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result. Any variances from the HWCPIS shall be approved by the Chairperson prior to invoking the variance.

10. The work proposed in the pump installation permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than the date the permit expires.

11. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.

12. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: November 28, 2008
Expiration Date: November 28, 2010

LAURA H. THIELEN, 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 and understand that I shall not commence work until I and the pump installer have signed, dated, and returned the permit to the Commission. I understand that this permit is not to be transferred to any other entity. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $5,000 per day starting from the permit date of approval.

Installer's Signature: Mel Lima C-57, C-57a, or A License #: C-18254 Date: 12-30-08
Printed Name: Mel Lima Firm or Title: Mel's Water Works

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

Attachments
### WELL COMPLETION REPORT - PART II

#### Pump Installation

**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. No reports with handwritten entries will be accepted. Only one copy will be accepted per well. If you have any questions, please call the Hawaii Island Branch at 808-961-8041. Please note that all reports with missing information will be returned for completion. Please call 808-961-8041 for further information or a pre-printed application. Visit the Commission website at [www.hawaii.gov/wrm](http://www.hawaii.gov/wrm).

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. State Well No.</td>
<td>2731.03</td>
</tr>
<tr>
<td>2. Well Name</td>
<td>Pu'ula, Well #1</td>
</tr>
<tr>
<td>3. Island</td>
<td>Maui</td>
</tr>
<tr>
<td>5. Date Pump Installed</td>
<td>Aug 14, 2000</td>
</tr>
<tr>
<td>6. PERMANENT PUMP INFORMATION</td>
<td></td>
</tr>
<tr>
<td>Pump Type</td>
<td>Deep Well Turbine</td>
</tr>
<tr>
<td>Make / Serial No.</td>
<td>MLS Model, Caliper 100</td>
</tr>
<tr>
<td>Rated Capacity</td>
<td>1800 gpm</td>
</tr>
<tr>
<td>Motor Type</td>
<td>120V, 3 phase, 60 Hz, 1800 rpm</td>
</tr>
<tr>
<td>Pump Type (check one)</td>
<td></td>
</tr>
<tr>
<td>Submersible</td>
<td>Tick</td>
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<tr>
<td>Centrifugal</td>
<td>Cross</td>
</tr>
<tr>
<td>7. Method of flow measurement</td>
<td></td>
</tr>
<tr>
<td>Flowmeter + totalizer</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Other, explain and attach schematic</td>
<td></td>
</tr>
<tr>
<td>8. Attach the rating curve for the installed pump</td>
<td></td>
</tr>
<tr>
<td>9. Attach photograph of well clearly showing the benchmark on the concrete pad, the well head, and the method of flow measurement</td>
<td></td>
</tr>
<tr>
<td>10. Well Owner</td>
<td>Company</td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td></td>
</tr>
<tr>
<td>11. Land Owner</td>
<td>Company</td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td></td>
</tr>
<tr>
<td>12. Remarks</td>
<td></td>
</tr>
</tbody>
</table>

**Pump Installation Contractor**

**Signature**  
[Signature]  
[Date: 09-07-2000]
Bench mark elevation
surveyed to nearest 0.01 ft = mean sea level.

Pump intake depth = \frac{1}{2} ft
referenced to bench mark.

Gravel type depth = \frac{3}{4} ft
referenced to bench mark.

Trench fill
Trench fill elevation
\frac{1}{4} ft mean sea level.
Ref: 5731-03 pip

December 15, 2008

Mr. Mel Lima
Mel's Water Works
95-646 Lawena Street
Mililani, HI 96789

Dear Mr. Lima:

Pump Installation Permit
Kupaa Well (Well No. 5731-03)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned well(s) that authorize permanent pump installation work for your well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 12:

Special Conditions

1. If the elevation benchmark needs to be altered, the permittee, well operator, and/or well owner shall ensure that the benchmark is transferred (or the well resurveyed) and documentation of the new benchmark shall be submitted to the Commission within sixty (60) days after the pump is installed.

2. Attached for your information are copies of the Department of Health's (DOH) review comments. Please note DOH's requirements related to discharge of effluent from well drilling and testing activities. Also, please contact the Noise Radiation and Indoor Air Quality Branch at [phone number] to check compliance with construction noise permit requirements for this project.

3. Attached for your information is a copy of the State Department of Land and Natural Resources Land Division's comments related to water lease requirements.

4. Attached for your information is a copy of your county's Department of Planning comments related to their concerns.

The permittee is responsible for all conditions of the permit. This includes ensuring the submission of a completed Well Completion Report Part II form within sixty (60) days after the pump installation work is completed. Be advised that you may be subject to fines of up to $5,000 per day for any violations of your permit conditions starting from the permit approval date.

Please sign both permit originals and return one for our files.

IMPORTANT - Pump installation shall not commence until a fully signed permit is returned to the Commission.

If you have any questions, please call Charley Ice of the Commission staff at [phone number] or toll-free at [phone number] (Maui), extension 70218.

Sincerely,

[Signature]
Laura H. Thielen
Chairperson

Enclosure

c: Maui DWS (with applicable comments – DOH SDWB, WWB, CWB, Land Division, DHP, DWS)
USGS
PUMP INSTALLATION PERMIT
Kupaa Well, Well No. 5731-03

Note: This permit shall be prominently displayed at the site until the work is completed

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for Kupaa Well (Well No. 5731-03) at TMK (2) 3-2-001:003, Maui, subject to the Hawaii Well Construction & Pump Installation Standards (HWCPIS - February 2004) which include but are not limited to the following conditions:

1. The Chairperson to the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. No withdrawal of water shall be made other than for testing until a Certificate of Pump Installation Completion has been issued by the Commission.

3. This permit shall be prominently displayed, or made available, at the site of construction work until work is completed.

4. The pump installation permit shall be for installation of a 1200 gpm rated capacity, or less, pump in the well. This permanent capacity may be reduced in the event that the pump test data does not support the capacity.

5. A water-level measurement access shall be permanently installed, in a manner acceptable to the Chairperson, to accurately record water levels.

6. The permittee shall install an approved meter or other appropriate means for measuring and reporting withdrawals and appropriate devices or means for measuring chlorides and temperature at the well head.

7. Well Completion Report Part II shall be submitted to the Chairperson within 60 days after completion of work. This form can be obtained by contacting staff or on the internet at www.hawaii.gov/dlnr/cwrm.

8. The permittee, well operator, and/or well owner shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

9. The pump installation permit application and any related staff submittal approved by the Commission are incorporated into this permit by reference. This permit is also subject to the HWCPIS. If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result. Any variances from the HWCPIS shall be approved by the Chairperson prior to invoking the variance.

10. The work proposed in the pump installation permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than the date the permit expires.

11. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.

12. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: November 28, 2008
Expiration Date: November 28, 2010

LAURA H. THIELEN, 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 and understand that I shall not commence work until I and the pump installer have signed, dated, and returned the permit to the Commission. I understand that this permit is not to be transferred to any other entity. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $5,000 per day starting from the permit date of approval.

Installer's Signature: [Signature]
C-57, C-57a, or A License #: C-18254 Date: [Signature]

Printed Name: Mel Lima
Firm or Title: Mel's Water Works

Please sign both copies of this permit, return one to the Chairperson, and retain the other for your records.
CC: MISSION ON WATER RESOURCE MANAGEMENT
ROUTE SLIP FOR PERMIT ISSUANCE 5/19/05

FROM: CHARLEY

TO: ANAKALEA, P.
BAUER, G.
CHING, F.
DANBARA, S.
FUJI, N.
GOODING, K.
HARDY, R.
HIGA, D.
ICE, C.
IMATA, R.
KUNIMURA, I.
NAKAMA, L.
NAKANO, D.
OHYE, M.
SAKODA, E.
SUBIA, S.
SWANSON, S.
UYENO, D.
YODA, K.
YOSHINAGA, M.

DATE: 5/19/05

SUSPENSE DATE: 10/08

TO DEC 08

PLEASE:

1. Review & Comment
2. Type Final
3. Print
4. Xerox copies

WELL NUMBER 5731-03

Kupaa Well 1

WELL CONSTRUCTION

ATTACHMENTS FOR WELL CONSTRUCTION PERMIT:
1. COVER LETTER
2. PERMIT (2x)
3. SDWB
4. WWB
5. CWB
6. HEER
7. LD
8. HP
9. OCCL
10. SMA
11. WELL CHECK PRINTOUT

TO BE SENT TO APPLICANT

FOR OFFICE USE ONLY

PUMP INSTALLATION

ATTACHMENTS FOR PUMP INSTALLATION PERMIT:
1. COVER LETTER
2. PERMIT (2x)
3. SDWB
4. WWB
5. CWB
6. HEER
7. LD
8. HP
9. OCCL
10. SMA
11. GLENN'S WORKSHEET

TO BE SENT TO APPLICANT

FOR OFFICE USE ONLY

Maui Plan

FOR OFFICE USE ONLY
Aloha!

Please see the attached.

Mahalo,

Venus

Venus P. Bolosan  
Clerk Typist  
County of Maui-Dept. of Planning; Current Division  
phone [redacted] or  
venus.bolosan@mauicounty.gov

---

County of Maui.

IT Security measures will reject attachments larger than 12 MB, and will block or quarantine high-risk file types in attachments.

CommentsCWRM.pdf
Mr. Jeffrey Hunt, Director
Planning Department
County of Maui
250 South High Street
Wailuku, HI 96793

Dear Mr. Hunt:

Special Management Area Use Permit Requirements for Pump Installation Permit Application Kupaa 1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the SMA permitting requirements specific to your division. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at

Sincerely,

LAURA H. THIELEN
Chairperson

RESPONSE:

[X] This well project [ ] requires [ ] does not require a SMA. If a SMA is required it [ ] has [ ] has not been approved and [ ] is [ ] is not currently active.

[ ] Other relevant rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments: Would have concerns should well impact County's ability to provide water.

Contact Person: Robyn L. Loudermilk Phone: 

Signed: Robyn L. Loudermilk Date: 11/20/08
STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 20
HONOLULU HAWAII 96829

OCT 28, 2008

TO: Honorable Chiyome L. Fukino, M.D., Director
Department of Health

Attention: Director's Office
Tomas See, Chief, Wastewater Branch
Stuart Yamada, Chief, Safe Drinking Water Branch
Alec Wong, Chief, Clean Water Branch
Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response

FROM: Laura H. Thielen, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kupaa 1 (Well No. 5731-03)

TRANSMITTED FOR REVIEW AND COMMENT DATED OCTOBER 28, 2008

TO: Laura H. Thielen, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kupaa 1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley ICE of the Commission staff at

CLASS ATTACHMENT(S)

RESPONSE: UIC: No remarks. CHH 11/19/08

Get 11/24/08

This well qualifies as a source which will serve as a source of possible water to a public water system (defined as serving 25 or more people at least 60 days per year or 10 service connections) and must be registered with the Director of Health under Part 140 Title 11 of Hawaii Administrative Rules (HARS), Title 11, Chapter 140 Rules Relating to Public Water Systems, 11-121-1 through 11-121-7.

If the well is not a public source serving a public water system, survey less than 25 people or more people at least 60 days per year or 10 service connections) and if the well water is used for drinking, the permit holder shall test for bacteriological and chemical presence before using such water and regularly monitor the water quality thereafter. However, if health-planned use, i.e., that source are not to meet public water system definitions, then Director of Health approval is required prior to implementation.

If the well is not only a public and non-potable source in a single system, the user shall eliminate cross-connections and backflow preventers by physically separating possible and non-potable sources by an air gap or an approved backflow preventer, and by clearly labeling all non-potable sources with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention components should be routinely inspected and tested.

It does not appear that the well will be used for commercial purposes and is not subject to Safe Drinking Water Regulations.

For the applicant's information, a source of possible contamination is 1.1.1 located near the proposed well site (formation attached).

An NPDES permit is required.

Other relevant DOH rules regulations, information, or recommendations are attached.

In the event that the location of the well changes, is not shown within the parcel described on this application, our Division considers the comments to still be applicable, and we do not need to request the new location.

No consumption protected well.

Contact Person: Michelle M. K. Higa
Phone: 586-4258

Signed: LINDA LINGE
Phone: 586-4258

Date: 11/24/08
CWRM Application Source: Kupaa 1 (Well No. 5731-03)

Safe Drinking Water Branch Engineering Section

1. This well qualifies as a source that serves a regulated public water system. Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems.

2. All new public water systems are required to demonstrate and meet minimum capacity requirements prior to their establishment. This requirement involves demonstration that the system will have satisfactory technical, managerial, and financial capacity to enable the system to comply with safe drinking water standards and requirements.

3. Projects that propose development of new sources of potable water serving or proposed to serve a public water system must comply with the terms of HAR 11-20-29 titled: Use of new source of raw water for public water systems. This section requires that all new public water system sources be approved by the Director of Health prior to its use. Such approval is based primarily upon the submission of a satisfactory engineering report, which addresses the requirements set in Section 11-20-29.

4. The engineering report must identify all potential sources of contamination and evaluate alternative control measures, which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses for all regulated contaminants, performed by a laboratory certified by the State Laboratories Division of the state of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional parameters may be required by the Director for this submittal or additional tests required upon his or her review of the information submitted.

5. All public water system sources must undergo a source water assessment, which will delineate a source water protection

CWRM Well Application Standard Comments (SDWB) Vers. 6/1/07
area. This process is preliminary to the creation of a source water protection plan for that source and activities which will take place to protect the drinking water source.

5. Projects proposing to develop new public water systems or proposing substantial modifications to existing public water systems must receive approval by the Director of Health prior to construction of the proposed system or modification. These projects include treatment, storage and distribution systems of public water systems. The approval authority for projects owned and operated by a County Board or Department of Water or Water Supply has been delegated to them.

7. All public water systems must be operated by certified distribution system and water treatment plant operators as defined by Hawaii Administrative Rules, Title 11, Chapter 11-25 titled; Rules Pertaining to Certification of Public Water System Operators.

8. All projects which propose the use of dual water systems or the use of a non-potable water system in proximity to an existing potable water system to meet irrigation or other needs must be carefully designed and operated these systems to prevent the cross-connection of these systems and prevent the possibility of backflow of water from the non-potable system to the potable system. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow prevention devices to avoid contaminating the potable water supply. In addition backflow devices must be tested periodically to assure their proper operation. Further, all non-potable spigots and irrigated areas should be clearly labeled with warning signs to prevent the inadvertent consumption on non-potable water. Compliance with Hawaii Administrative Rules, Title 11, Chapter 11-21 titled; Cross-Connection and Backflow Control is also required.

9. All projects which propose the establishment of a potentially contaminating activity (as identified in the Hawai’i Source Water Assessment Plan) within the source water protection area of an existing source of water for a public water supply should address this potential and activities that will be implemented to prevent or reduce the potential for contamination of the drinking water.
source.

10. The proposed well section details appear to be in error and should be corrected.

For further information concerning the application of capacity, new source approval, operator certification, source water assessment, backflow/cross-connection prevention or other regulated public water system programs, please contact the Safe Drinking Water Branch Engineering Section at 586-4258.
TO: Morris Atta, Administrator  
Land Division  

FROM: Ken C. Kawahara, P.E., Deputy Director  
Commission on Water Resource Management  

SUBJECT: Pump Installation Permit Application  
Kupaa I (Well No. 5731-03) TMK 3-2-001:003  

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.  

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.  

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [blank].  

RESPONSE:  
[ ] A water lease/permit is required of this applicant and an application for such will be requested by our division.  

XX A water lease/permit is not required of this applicant.  

[ ] A water lease/permit has been obtained by the applicant through lease no. [blank].  

[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.  

[ ] No objections  

[ ] Other comments:  

Contact Person: Gary Martin  
Phone: 587-0421  

Signed: [Signature]  
Date: [Blank]
STATE OF HAWAII
OFFICE OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 921
HONOLULU, HAWAI'I 96820

October 28, 2008

TO: Honorable Chiyome L. Fukine, M.D., Director
Department of Health
Attention: Director's Office
Tomas See, Chief, Wastewater Branch
Stuart Yamada, Chief, Safe Drinking Water Branch
Alex Wong, Chief, Clean Water Branch
Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response

FROM: Laura H. Thielen, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kupapa'1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Lee of the Commission staff at 587-0218.

Class: Attachment(s)

RESPONSE:

[Response: This well qualifies as a source which will serve as a source of public water to a public water system (defined as serving 25 or more people at least 60 days per year of this 15 or more service connections) and must receive Division of Health approval. It is not in comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, 111-20-29.]

[Response: This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year of 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before using such water and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition, Director of Health approval is required prior to implementation.]

[Response: If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross contamination and backflow preventers by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable outlets with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.]

[Response: It does not appear that this well will be used for commercial purposes and is not subject to Safe Drinking Water Regulations.]

[Response: For the applicant information, a source of possible waste water contamination (this is not located near the proposed well site) (information attached).]

[Response: An NPDES permit is required.]

[Response: Other relevant DOWW regulations, information, or recommendations are attached.]

[Response: In the event that the setback of the well changes due to soil within the parcel described in this application, our division considers the comments to still be applicable, and we do not need to review the new location.]

No comments/observations

Contact Person: Richard Palmer
Phone: 586-0857
Signed: Richard Palmer
Date: 13 Nov. 2008

CITATION: 586-0857
The Department of Health, Clean Water Branch (CWB) has the following comments:

1. For Well-Drilling Activities

Any discharge to State waters of treated process wastewater effluent associated with well drilling activities is regulated by Hawaii Administrative Rules (HAR), Title 11, Chapter 55, Appendix I, effective October 22, 2007. Treated process wastewater effluent covered by this general permit includes well drilling slurries, lubricating fluids wastewater, and well purge wastewater. This general permit does not cover well pump testing. The applicable Notice of Intent (NOI) Forms and filing fee shall be submitted at least 30 calendar days before the start of discharge to the:

Department of Health
Clean Water Branch
919 Ala Moana Boulevard, Room 301
Honolulu, Hawaii 96814-4920

The CWB-NOI Forms are available online at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/ni-index.html. Inquiries may be directed to the CWB at  or by fax

2. For Well Pump Testing

The discharger shall take all measures necessary to prevent the discharge of pollutants from entering State waters. Such measures shall include, if necessary, containment of initial discharge until the discharge is essentially free of pollutants. If the discharge is entering a stream or river bed, best management practices shall be implemented to prevent the discharge from disturbing the clarity of the receiving water. If the discharge is entering a storm drain, the discharger must obtain written permission from the owner of the storm drain prior to discharge. Furthermore, best management practices shall be implemented to prevent the discharge from collecting sediments and other pollutants prior to entering the storm drain.
3. For Construction Activities Disturbing One (1) or More Acres of Total Land Area

By HAR, Title 11, Chapter 55, Appendix C, effective October 22, 2007, an NPDES permit or Notice of General Permit Coverage is required before the start of the construction activities that result in the disturbance of one (1) or more acres of total land area, including clearing, grading, and excavation. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NOI (see Comment No. 1, above) shall be submitted 30 calendar days before to the start of construction activities.
TO: Honorable Chiveme L. Fukino, M.D., Director
Department of Health
Attention: Director's Office
Tomas See, Chief, Wastewater Branch
Stuart Yarnada, Chief, Safe Drinking Water Branch
Alec Wong, Chief, Clean Water Branch
Dr. Keith Kawana, Office of Hazard Evaluation and Emergency Response

FROM: Laura H. Thieilen, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kupaa 1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [redacted].

Ci:ss
Attachment(s)

RESPONSE:

1. This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR) Title 11, Chapter 20, Rules Relating to Potable Water Systems. §11-20-29.

2. This well does not qualify as a source serving a public water system (serve less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should not be considered biological and chemical presence before testing such water and routine measure the water quality thereafter. However, if future planned use that this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

3. If the well is used to supply both potable and non-potable purposes in a single system, the water shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all potable systems with warning signs to prevent inadvertent contamination of non-potable water. Backflow prevention device should be routinely inspected and tested.

4. It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

5. For the applicant's information, a source of possible wastewater contamination [redacted] is located near the proposed well site (information attached).

6. An NDOES permit is required.

M. Other relevant DOH rules/regulations, information, or recommendations are attached.

In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

[redacted]
Contact Person: James L. Seo
Phone: 986-4700
Date: 11-6-08
TO: Honorable Chiyome L. Fukino, M.D., Director
                    Department of Health
                    Attention: Director's Office
                    lomas See, Chief, Wastewater Branch
                    Stuart Yamada, Chief, Safe Drinking Water Branch
                    Alec Wong, Chief, Clean Water Branch
                    Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response
                    FROM: Laura H. Thielen, Chairperson
                    Commission on Water Resource Management
                    SUBJECT: Pump Installation Permit Application
                    Kupaa I (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [redacted]

Class: Attachment(s)

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

This well does not qualify as a source serving a public water system (serves less than 25 people or serves less than 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

For the applicant's information, a source of possible wastewater contamination [is [is not] located near the proposed well site (information attached).

An NPDES permit is required.

Other relevant DOH rules/regulations, information, or recommendations are attached.

In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

No comments/objections No Results

Contact Person: Roland Tejano on Maui

Signed: [redacted]

Date: 11-08-08
October 28, 2008

Mr. Mel Lima
Mel's Water Works
95-646 Lawena Street
Mililani, HI 96789

Dear Mr. Lima:

Pump Installation Permit Application for Well No. 5731-03

We acknowledge receipt, on October 6, 2008, of your completed Pump Installation permit application and filing fee for the Kupaa 1 (Well No. 5731-03). You can expect your application to be processed within ninety (90) days from this date.

For your information, the attached table describes the process, responsible parties, and deadline requirements for drilling or modifying a well and installing, modifying, or replacing a pump.

By this acceptance letter, we are also notifying the well operator/landowner that water may not be pumped for purposes other than testing until the certificate of pump installation completion letter is issued to the well operator and landowner. Additionally, the permitted pump capacity described on the pump installation permit may be reduced in the event that the pump test does not support the capacity. No certificate of pump installation will be issued until the Commission has determined that the pump capacity will not have adverse effects on the aquifer, other nearby wells, or streams. In other words, you may need to remove the pump and install a smaller pump at the Commission’s discretion before you can withdraw water for purposes other than testing.

If you have any questions about your permit application, please contact Charley Ice of the Commission staff at [number] or toll-free at [number] (Maui), extension 70218.

Sincerely,

KEN C. KAWAHARA, P.E.
Deputy Director

CI:ss
Attachment

c: Maui Department of Water Supply
Koolau Cattle Company
TO: Honorable Chiyome L. Fukino, M.D., Director
   Department of Health
   Attention: Director's Office
   Tomas See, Chief, Wastewater Branch
   Stuart Yamada, Chief, Safe Drinking Water Branch
   Alec Wong, Chief, Clean Water Branch
   Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response

FROM: Laura H. Thielen, Chairperson
   Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
   Kupaa 1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [contact information]

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title I, Chapter 20, Rules Relating to Potable Water Systems, §§20-5-29.

This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

For the applicant's information, a source of possible wastewater contamination is not located near the proposed well site (information attached)

An NPDES permit is required.

Other relevant DOH rules/regulations, information, or recommendations are attached.

In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

No comments/objections

Contact Person: ____________________________ Phone: _________________

Signed: ____________________________ Date: _________________
TO: Morris Atta, Administrator  
Land Division
FROM: Ken C. Kawahara, P.E., Deputy Director  
Commission on Water Resource Management
SUBJECT: Pump Installation Permit Application  
Kupaa I (Well No. 5731-03) TMK 3-2-001:003

October 28, 2008

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. **Please respond by returning this cover memo form by November 28, 2008.** If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [redacted].

RESPONSE:

[ ] A water lease/permit is required of this applicant and an application for such will be requested by our division.

[ ] A water lease/permit is **not** required of this applicant.

[ ] A water lease/permit has been obtained by the applicant through lease no. ________________.

[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments:

Contact Person: ___________________________ Phone: ____________

Signed: ___________________________ Date: ____________
October 28, 2008

TO: Dr. Puaalaokalani Aiu, Administrator
    Historic Preservation

FROM: Ken C. Kawahara, P.E., Deputy Director
     Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
         Kupaa 1 (Well No. 5731-03) TMK 3-2-001:003

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application or request additional review time, please contact Charley Ice of the Commission staff at [Contact Information]. If you require additional information regarding specific information that can be provided by the applicant, please contact the applicant directly at the contact information provided on the application form.

CLASS
Attachment(s)

RESPONSE:

[ ] This is a [ ] public (county or state) project [ ] private project and [ ] will [ ] may disturb historic sites.

[ ] We concur that the work described under this permit will not disturb historic sites.

[ ] We do not concur that the work described under this permit will not disturb historic sites. We require the following for our concurrence:

Contact Person: ___________________________ Phone: ___________________________

Signed: ___________________________ Date: ___________________________
Mr. Jeffrey Hunt, Director  
Planning Department  
County of Maui  
250 South High Street  
Wailuku, HI 96793  

Dear Mr. Hunt:  

Special Management Area Use Permit Requirements for  
Pump Installation Permit Application  
Kupaa I (Well No. 5731-03)  

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.  

We would appreciate your comments on the captioned application with regard to the SMA permitting requirements specific to your division. Please respond by returning this cover memo form by November 28, 2008. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.  

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [Contact Information]  

Sincerely,  

Laura H. Thieen  
Chairperson  

RESPONSE:  

[ ] This well project [ ] requires [ ] does not require a SMA. If a SMA is required it [ ] has [ ] has not been approved and [ ] is [ ] is not currently active.  

[ ] Other relevant rules/regulations, information, or recommendations are attached.  

[ ] No objections  

[ ] Other comments:  

Contact Person: ____________________________ Phone: ____________________________  
Signed: ____________________________ Date: ____________________________
October 28, 2008

Mr. Jeffery K. Eng, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, HI 96793

Dear Mr. Eng:

Pump Installation Permit Review
Pump Installation Permit Application
Kupaa 1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application. If you have any comments on this application, please submit them by November 28, 2008. If we do not receive comments we will assume you have no comments.

If you have any questions about this permit application, please contact Charley Ice of the Commission staff at [redacted]

Sincerely,

[Signature]

Chairperson

Cl: ss
COMMISSION ON WATER RESOURCE MANAGEMENT
ROUTE SLIP FOR NEW APPLICATIONS

FROM: CHARLEY
DATE: 21-Oct-08
SUSPENSE DATE: 28-Oct-08

TO: CHING, F.
INIT: 
TO: KUNIMURA, I.
INIT: 

TO: FUJII, N.
INIT: 
TO: NAKIMURA, I.
INIT: 

TO: GOODING, K.
INIT: 
TO: OHYE, M.
INIT: 

TO: HARDY, R.
INIT: 
TO: SAKODA, E.
INIT: 

TO: HIGA, D.
INIT: 
TO: SWANSON, S.
INIT: 

TO: HOAGBIN, S.
INIT: 
TO: UYENO, D.
INIT: 

TO: ICE, C.
INIT: 
TO: YODA, K.
INIT: 

TO: IMATA, R.
INIT: 
TO: YOSHINAGA, M.
INIT: 

TO: KAWAHARA, K.
INIT: 

PLEASE:

1 Approval
2 Type Draft acknow letter
3 Signature
4 Information
1 See Me
1 Review & Comment
1 Take Action
1 Type Final, label file folder, update People cb
1 File
1 Xerox copies

WELL NUMBER 5731-03
WELL NAME Kupaa 1
WUP Number _________________

[ ] WELL CONSTRUCTION
[ ] PUMP INSTALLATION

ATTACHMENTS FOR APPLICATION PROCESSING - Both applicant & staff generated

1 TRANS. LETTER
2 PERMIT PROCESS TABLE
3 CWRM MAP
4 APPL. FORM (11 COPIES)
5 USGS MAPS (4 COPIES)
6 TAX MAPS (4 COPIES)
7 PARCEL OWNER VERIF.
8 CONTRACTOR VERIF.
9 ALL INFO FILLED IN
10 BACKGROUND CHECK
11 $25 FEE DEPOSIT SLIP
12 HP/CDUP/SMAP pre-screen

(SMA map printout http://gis.hicentral.com/website/parcelzoning/viewer.htm, or INGRID'S SMA/CD MAP)
(LUC map printout http://luc.state.hi.us/luc_maps.htm, or INGRID'S SMA/CD MAP)

_FOLDER: [ ] MADE NEW FILE FOLDER, ATTACHED
[ ] FILE FOLDER ALREADY MADE, IN FILE CABINET

INCOMPLETE ACTION DATES:

DATE ACTION
22 Oct 08 notified MNBs of parcel ownership change

copied installer on PIPA correction

10/7/08

acceptable now?

18/10/08 [R]

[Process]
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**TOTAL** $25.00

**REMARKS**: LINE (1) 5731-003 (WCPIP)
LINE (2)
LINE (3)
LINE (4)
LINE (5)
LINE (6)
LINE (7)
LINE (8)
LINE (9)
LINE (10)
STATE OF H., All
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
APPLICATION FOR A WELL CONSTRUCTION / PUMP INSTALLATION PERMIT

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. Application must be accompanied by 10 copies and a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulations Branch at 397-6611. For further information and updates to this application form, visit http://www.hawaii.gov/dlrh/cwm.

WELL LOCATION INFORMATION

1. STATE, WELL NO. (if already assigned)  57-31-03
2. WELL NAME  pungua well 1
3. ISLAND  Kauai
4. TMK  3 02 01 03

The following must be attached before this application is accepted as complete:
- Portion of 7.5-Minute Series USGS topographic map (scale 1:24,000) with well location labeled and include the name of the quad map
- Property tax map showing well location referenced to established boundaries
- Photograph of the proposed well site
- A schematic diagram showing the well site, access road and proposed well infrastructure

For dug wells, attach a grading plan with cross section profiles showing existing and finish grades.

5. WELL OPERATOR’S NAME / COMPANY  Koolau Cattle Company, LLC
6. LANDOWNER’S NAME / COMPANY  635 Kenolio Road Kiihi 96753

PROPOSED WELL CONSTRUCTION

- Construction Type
  - New Well
  - Abandon/Seal Well

- Drilled
- Shaft
- Tunnel

PROPOSED PUMP INSTALLATION

- Proposed Work
  - Construct New Well
  - Modify Existing Well

9. Is this well part of a battery of wells?  Yes  No

10. Proposed Pumping Rate, gpm (gallons per minute)
    - 4200

11. Method of flow measurement
    - Flowmeter

12. Proposed Amount of Withdrawal, gpd (gallons per day)
    - 1152.00

13. License number (a surveyor is required for all Well Construction Permits and may be required for some Pump Installation Permits)

PROPOSED USE

- Municipal (water systems serving greater than 25 individuals or 15 service connections)
- Domestic
- Industrial (describe)
- Irrigation (describe crop and number of acres)
- Military (describe)
- Other (describe)

OTHER LEGAL REQUIREMENTS

15. Conservation District Use Permit (CDUP)
   - Well is in Conservation District
     - Required, CDUP #
     - Not Required, CDUP #
     - Not Required (attach documentation from CDCL)
     - I have not checked with CDCL about whether or not a CDUP is required. I understand that checking with CDCL prior to making this application may expedite my review. I further understand that issues raised by this agency may delay or result in denial of the permit issuance, or revocation of the permit after it is issued.

16. Special Management Area Permit (SMAP)
   - Well is in Special Management Area
     - Required, SMA #
     - Not Required (attach documentation from applicable County agency)
     - I have not checked with the county about whether or not an SMA Permit is required. I understand that checking with the County prior to making this application may expedite my review. I further understand that issues raised by this agency may delay or result in denial of the permit issuance, or revocation of the permit after it is issued.

17. State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources
   - I have consulted with the SHPD regarding potential impacts of well construction activities on historic sites. I have attached applicable documentation from the HPD.
   - I have not consulted with the SHPD regarding potential impacts of well construction activities on historic sites. I understand that checking with the HPD and any work done while the permit is in suspension will be in violation of the HPD’s regulations.

Original contractor: Myers through Carl Takehara to Wailea Drilling

Additional remarks:

NOTE: Signing belower, the principal contractor shall submit event the applicable permit is suspended.

24. WELL DRILLER

- License number
- License holder name
- Signature

25. PUMP INSTALLER

- License number
- License holder name
- Signature

For Official Use Only:

RECEIVED 08 OCT 06 9:16

WPCI Application Form 02/28/2007
**PROPOSED WELL SECTION**  (Please attach schematic different from diagram provided below)

| Elevation at top of casing: 
| Hole Diameter: 2.2 in. |
| Minimum of 2" Radius & 4" Thick Concrete Pad to contain benchmark surveyed to nearest 0.01 ft. |
| Ground Elevation: 632 ft., msl* |

- **Cement Grout:** 623 ft. (min. 70% of distance from ground elevation to top of water surface or 500 ft., whichever is less.)
- **Annular space between hole and casing:** (1.5" for positive displacement, 3" for other methods)
- **Rock or Gravel Packing:** 56 ft.
- **Total Depth:** 687 ft.
- **Estimated Water Level Elevation:** 7.4 ft., msl*
- **Solid Casing:** (≤ 90% x (Ground Elev.-Water Level Elev))
  - Total Length: 632 ft.
  - Nominal Diameter: 1.6 in.
  - Wall Thickness: 0.184 in.
  - Bottom Elevation: -4 ft., msl*
- **Open Casing:**
  - Perforated or Screen
  - Total Length: 56 ft.
  - Nominal Diameter: 1.6 in.
  - Wall Thickness: 0.184 in.
  - Bottom Elevation: -4 ft., msl*

* Note: Neither bentonite nor mud should be used in saturated zone during drilling.

---

**Solid Casing Material:**
- **Carbon Steel:** compliant with (check one or more):
  - ANSI/AWWA C200
  - API Spec. 5L
  - ASTM A53
  - ASTM A139
  - ASTM A242 (or A606)
  - Type E
  - Type S
  - Grade B
  - Other
- **Stainless Steel:** (check one):
  - ASTM A409 (production wells)
  - ASTM A312 (monitor wells)
  - ASTM A53
  - ASTM A139
  - ASTM A242 (or A606)
  - Type E
  - Type S
  - Grade B
  - Other
- **ABS Plastic** conforming to ASTM F480 and ASTM D1527:
  - Schedule 40
  - Schedule 80
- **PVC Plastic** conforming to ASTM F480 and (ASTM D1785 or ASTM D2241):
  - Schedule 40
  - Schedule 80
  - Schedule 120

**Open Casing Material:**
- **Carbon Steel:** compliant with (check one or more):
  - ANSI/AWWA C200
  - API Spec. 5L
  - ASTM A53
  - ASTM A139
  - ASTM A242 (or A606)
  - Type E
  - Type S
  - Grade B
  - Other
- **Stainless Steel:** (check one):
  - ASTM A409 (production wells)
  - ASTM A312 (monitor wells)
  - ASTM A53
  - ASTM A139
  - ASTM A242 (or A606)
  - Type E
  - Type S
  - Grade B
  - Other
- **ABS Plastic** conforming to ASTM F480 and ASTM D1527:
  - Schedule 40
  - Schedule 80
- **PVC Plastic** conforming to ASTM F480 and (ASTM D1785 or ASTM D2241):
  - Schedule 40
  - Schedule 80
  - Schedule 120

---

* The approximate elevation must be referenced to mean sea level (msl) at the time of application filing. Final elevations of well components shall be submitted in the Well Completion/Well Abandonment reports and referenced to a benchmark which has been established by a surveyor licensed by the State.

For non-salt water Basal Wells - bottom elevation of well should not be deeper than 1/4 of aquifer thickness or:

\[
\text{Bottom Elevation of Well Limit} = \left( \frac{\text{Water Elevation} - \text{Water Level Elev}}{4} \right) - 18.5 \text{ ft.}
\]

Example: Estimated + 2 ft. Water Level Elev. --> Bottom Elevation of Well Limit = \left( \frac{\text{Water Elevation} - \text{Water Level Elev}}{4} \right) - 18.5 ft.
## COMMISSION ON WATER RESOURCE MANAGEMENT
### ROUTE SLIP FOR NEW APPLICATIONS

**From:** CHARLEY  
**Date:** 16-Sep-08  
**Suspense Date:** 23-Sep-08

### TO:  
- CHING, F.  
- FUJII, N.  
- GOODING, K.  
- HARDY, R.  
- HIGA, D.  
- HIGASHI, S.  
- ICE, C.  
- IMATA, R.  
- KAWAHARA, K.  
- KUNIMURA, I.  
- NAKAMA, L.  
- OHYE, M.  
- SAKODA, E.  
- SWANSON, S.  
- UYENO, D.  
- YODA, K.  
- YOSHINAGA, M.

### FOR:  
- 1 Approval  
- 3 Signature  
- 4 Information  
- 5 Information  
- 4 Information

### PLEASE:  
- See Me  
- Review & Comment  
- Take Action  
- Type Draft letter  
- Type Final, label file folder, update People db  
- File  
- Xerox copies

### WELL NUMBER 5731-03
### WELL NAME Kupaa 1

### ATTRACTIONS FOR APPLICATION PROCESSING - Both applicant & staff generated

1. TRANS. LETTER  
2. PERMIT PROCESS TABLE  
3. CWRM MAP  
4. APPL. FORM (11 COPIES)  
5. USGS MAPS (11 COPIES)  
6. TAX MAPS (11 COPIES)  
7. PARCEL OWNER VERIF.  
8. CONTRACTOR VERIF.  
9. ALL INFO FILLED IN  
10. BACKGROUND CHECK  
11. $25 FEE DEPOSIT SLIP  
12. DHPC/DUP/SMAP pre-screen

### FOLDER:  
- MADE NEW FILE FOLDER, ATTACHED  
- FILE FOLDER ALREADY MADE, IN FILE CABINET

### INCOMPLETE ACTION DATES:

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Tuesday, September 16, 2008
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**Tuesday, September 16, 2008**

Page 2 of 2
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
APPLICATION FOR A WELL CONSTRUCTION / PUMP INSTALLATION PERMIT

For Official Use Only
RECEIVED
SEP 11  P5:14

WELL LOCATION INFORMATION

1. STATE WELI NO. (if already assigned)
2. WELL NAME
3. ISLAND
4. TAH

5781-03
Macawley Well
C
3
CA
E1
C2
C3

The following must be attached to the application if accepted as complete:
- Fillable 1:1 Minute Scale U.S.G.S. topographic map, scale 1:25,000, with well location located and include the name of the quad map
- Property tax map showing well location relative to established property boundaries
- Photograph of the proposed well site
- A schematic diagram showing the well site, access road and proposed well infrastructure
- For dug wells, attach a grading plan with cross-section profiles showing existing and future grades

MACAWLEY ENTERPRISES
Well Operator's Name/Company
Well Cleaning Company
LANDSCAPING NAME/COMPANY
Lawman's Contact

120 South High Street
Waialua, Hawaii 96793
226-2241

PROPOSED WELL CONSTRUCTION

7. Proposed Work
- Core New Well
- Modify Existing Well
- Abandon/Seal Well

8. Construction Type
- Drilled

9. Single Well
- Drilled

PROPOSED PUMP INSTALLATION

10. Proposed Work
- Install New Pump
- Repair Pump

11. Proposed Pumping Rate (gpm)
- 1200

12. Method of flow replacement
- None

13. Other comments
- None

14. Proposed Surveyor's Name and License number (if a surveyor is required for all Well Construction Permits and may be required for some Pump Installation Permits)

PROPOSED USE

15. Municipal (water systems serving more than 25 individuals or 15 service connections)

16. Domestic

17. Industrial (describe)

18. Irrigation (describe crop and no. of acres)

19. Military (describe)

20. Other (describe)

OTHER LEGAL REQUIREMENTS

21. Conservation District Use Permit (CDUP)
- Well is in Conservation District
  - Required CDUP # date approved
  - Not Required (attach documentation from CDU)

22. Special Management Area Permit (SMAP)
- Required SMAP # date approved
- Not Required (attach documentation from applicable County agency)

23. State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources
- I have consulted with the SHPD regarding potential impacts of well construction activities on historic sites. I have attached applicable documentation from the SHPD.
- I have not consulted with the SHPD regarding potential impacts of well construction activities on historic sites. I understand that checking the box above may expedite my review. (Further understand that issues raised by this agency may delay or result in denial of the permit issuance or revocation of the permit after it is issued)

24. WELL DRAILLER (Must be listed on application for Well Construction)
- Company/business name
- C11 License No
- Signature
- Print
- Date

25. PUMP INSTALLER (Must be listed on application for Pump Installation)
- Company/business name
- C11 License No
- Signature
- Print
- Date

NOTE: Signing below indicates that the signature is valid and that the information provided is accurate and true to the best of their knowledge. Further, the applicant understands that the application is the completed within 15 days of the approval date. The contractor shall submit to the Commission a well/completion monitoring report within 60 days after the completion date of the permitted work. If the event that the application is not completed correctly, any permit may be suspended until the form is brought to compliance and any work done while the permits is in suspension may result in fees of up to $5000/day.

VCIH Application Form 02/26/2007
Hi Charley,

See attachments for the Kupaa Well #1.

 Mel Well completion report part II KW.pdf  kupaa Well #1, Pump installation permit.pdf  Test Curve, Kupaa #1.pdf
**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 921, 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 at the Regulation Branch at 587-0225. For updates to this form or additional information, please visit our website at http://www.hawaii.gov/dlnr/wrm.

| 1 | State Well No. | 5731-03 | Well Name | Kupua Well #1 | Island | Maui |
| 2 | Address | | | | |
| 3 | Pump Installation Company | Malt's Water Works Hawaii, Inc. |
| 4 | Date Pump Installed | August 26, 2003 |
| 5 | PERMANENT PUMP INFORMATION |
| | Pump Type, Make, Serial No. | Submersible, Goulds, 12E14E-10 |
| | Rated Capacity | 120 gpm at head of 680 ft |
| | Motor Type, H.P., Voltage, rpm | Submersible, 3HP, 440V, 1800 |
| | Pump type (check one). | Submersible |
| | Method of flow measurement | Flowmeter w/ totalizer |
| | Manufacturer | Model no | Size |
| | Other, explain and attach schematic | |
| 6 | 7 | Fill in the as-built section on the other side of this sheet |
| 8 | 9 | Attach the rating curve for the installed pump |
| 10 | Attach photograph of well clearly showing the benchmark on the concrete pad, the well head, and the method of flow measurement |
| 11 | Well Owner Company | Dept. of Water, Maui |
| | Address | 200 South August Street, Wailuku, HI 96793 |
| | Phone | 808-270-7966 |
| | Fax | |
| 12 | Remarks | |
| 13 | Well Owner Company | Malt's Water Works Hawaii, Inc. |
| | Address | 460 Wailea Road, PO Box 526, Wailuku, HI 96793 |
| | Phone | 808-244-7816 |
| | Fax | |

**For Official Use Only:**

Pump Installation Contractor (print)  
Malt's Water Works Hawaii, Inc.  
Lic No: C-18254  
Signature:  
Date: August 30, 2003
7. AS-BUILT PUMP SECTION

Bench mark elevation surveyed to nearest 0.01 ft = 64.3 ft mean sea level

Elevation of top of chase tube 68.1 ft mean sea level

Pump intake depth = 14.3 ft (referenced to bench mark)

Chase tube depth = 68.1 ft (referenced to bench mark)

If airline installed, bottom of airline elevation = 40 ft mean sea level
Selection list: ---

Search Criteria:
- Flow: 1200 US gpm
- Head: 680 ft
- Tolerance: --- % of head

Fluid: Water
- Temperature: 60 °F
- SG: 1
- Viscosity: 1.105 cP
- Vapor pressure: 0.2563 psi
- Air pressure: 14.7 psi

NPSHa: --- ft

Advanced Criteria
- Preferred Operating Area: ---
- Secondary Operating Point: ---
- Max temperature: --- °F
- Max suction pressure: --- psi
- Max sphere size: --- in
- Max power: --- bhp
- Max suction specific speed: --- (Nss)
- Min temp: --- % of max diameter
- Min head rise: --- % to shutoff

Warnings: See the second page for a description of the warnings associated with this pump

Curve Corrections: none

--- Data Point ---
- Flow: 1200 US gpm
- Head: 703 ft
- Eff: 85.9%
- Power: 247 bhp
- NPSHr: 16.4 ft

--- Design Curve ---
- Shutoff Head: 879 ft
- Shutoff dP: 380 psi
- Min Flow: --- US gpm
- BEP: 86.9% eff
  @ 1089 US gpm
- NOL Pwr: 269 bhp
  @ 1710 US gpm

--- Max Curve ---
- Max Pwr: 273 bhp
  @ 1723 US gpm

--- Curve Corrections ---
- None

--- PUMP DATA SHEET ---

Catalog: Goulds Sub 60Hz vers 2.03

Pump: 12CHC (10 stages)
- Type: Submersible
- Synch speed: 1800 rpm
- Speed: 1760 rpm
- Dia: 8.625 in
- Curve no.: E6412CCPC4

Specific Speeds
- Ns: 2100
- Nss: ---

Dimensions
- Suction: --- in
- Discharge: --- in

Vertical Turbine
- Bowl size: 11.75 in
- Max lateral: 1 in
- Thrust K factor: 7.5 lb/ft

Pump Limits:
- Temperature: 120 °F
- Pressure: 340 psi
- Sphere size: 0.73 in
- Power: --- bhp

Motor: 300 hp
- Speed: 1800
- Frame: "14"
- Standard: NEMA
- Enclosure: SUB
- Sizing criteria: Max Power on Design Curve

--- Pump Notes ---
- Suction Size: 8",10" Discharge Sizes: 6",8",10"

Turbine Pump Selection vers 7.1
| WELL NO  | Head | Diameter | Aquifer Thickness | Active Length | THEIS | COOPER-JACOB $\text{10}^4$ | HARR $\text{10}^6$ | RECOVERY | ZANGAR | POLUBARIN | THOMAS O'VA | THOMAS SON | AVERAGE |
|---------|------|----------|------------------|--------------|-------|----------------|----------------|-----------|---------|-----------|-------------|-------------|----------|---------|
| 5530-04 | 2.0  | 0.30     | 21.3             | 26.3         |       |                  |                |           |         |           |             |             | 30       |
| 5540-01 | 2.3  | 0.41     | 9.0              | 9.0          |       |                  |                |           |         |           |             |             | 40       |
| 5615-06 | 1.5  | 0.15     | 6.1              | 12.5         |       |                  |                |           |         |           |             |             | 80       |
| 5616-02 | 1.7  | 0.10     | 6.1              | 13.6         | 40    | 60               | 130            | 90        |         |           |             |             | 240      |
| 5617-05 | 1.8  | 0.15     | 6.5              | 9.2          |       |                  |                |           |         |           |             |             | 1800     |
| 5620-04 | 0.6  | 0.15     | 6.7              | 8.6          | 2     | 2                  | 3              | 2         |         |           |             |             | 2        |
| 5620-05 | 1.1  | 0.15     | 5.8              | 9.4          |       |                  |                |           |         |           |             |             | 370      |
| 5620-06 | 1.1  | 0.15     | 6.1              | 7.5          |       |                  |                |           |         |           |             |             | 130      |
| 5631-02 | 3.2  | 0.41     | 29.6             | 35.5         |       |                  |                |           |         |           |             |             | 520      |
| 5631-03 | 4.3  | 0.41     | 26.5             | 36.6         | 300   | 320               | 1100           | 520       |         |           |             |             | 510      |
| 5631-03 | 4.3  | 0.41     | 26.5             | 36.6         |       |                  |                |           |         |           |             |             | 510      |
| 5638-03 | 5.5  | 0.36     | 16.2             | 18.6         |       |                  |                |           |         |           |             |             | 480      |
| 5731-02 | 2.4  | 0.41     | 16.5             | 17.9         | 1700  | 2300              | 550            | 500       | 1800    | 1000      | 1100        | 1600       | 1300     |
| 5731-03 | 2.3  | 0.41     | 16.5             | 17.5         |       |                  |                |           |         |           |             |             | 980      |
| 5731-04 | 2.1  | 0.41     | 16.8             | 18.0         | 1100  | 1500              | 320            | 290       | 420     | 530       | 580         | 850        | 700      |
| 5731-05 | 1.7  | 0.05     | 18.5             | 18.5         |       |                  |                |           |         |           |             |             | 980      |
| 5738-01 | 1.7  | 0.41     | 12.2             | 12.7         | 240   | 310               | 90             | 80        | 10      | 630       | 700         | 1100       | 400      |
| 5739-01 | 1.5  | 0.41     | 17.4             | 16.2         | 230   | 190               | 70             | 60        | 220     | 240       | 360         | 190        | 190      |
| 5739-02 | 1.8  | 0.41     | 14.6             | 16.1         |       |                  |                |           |         |           |             |             | 520      |
| 5741-01 | 0.4  | 0.15     | 6.1              | 8.3          | 520   | 430               | 600            | 400       |         |           |             |             | 490      |
| 5832-03 | 2.1  | 0.20     | 8.2              | 8.2          | 130   | 200               | 200            | 130       |         |           |             |             | 170      |
| 5838-01 | 1.4  | 0.30     | 10.1             | 11.5         | 870   | 1100              | 310            | 270       | 1200    | 590       | 650         | 940        | 740      |
| 5838-02 | 1.9  | 0.30     | 10.1             | 11.7         | 340   | 280               | 260            | 190       | 2300    | 430       | 480         | 660        | 620      |
| 5838-03 | 2.1  | 0.36     | 9.4              | 11.5         | 110   | 100               | 60             | 40        | 230     | 120       | 130         | 180        | 120      |
| 5838-04 | 1.8  | 0.36     | 6.1              | 8.2          | 1600  | 2400              | 500            | 460       |         |           |             |             | 1200     |
| 5839-02 | 0.5  | 0.20     | 23.8             | 24.9         | 240   | 230               | 200            | 150       | 350     | 380       | 470         | 290        | 290      |
| 5840-01 | 0.8  | 0.20     | 3.0              | 6.0          |       |                  |                |           |         | 120       |             |             | 120      |
| 5840-04 | 0.8  | 0.15     | 6.0              | 6.0          |       |                  |                |           |         | 1100      |             |             | 1100     |
| 5938-02 | 2.1  | 0.36     | 18.5             | 18.5         |       |                  |                |           |         |           |             |             | 650      |
| 5938-03 | 1.6  | 0.36     | 12.2             | 14.5         |       |                  |                |           |         |           |             |             | 460      |
| 5938-04 | 1.5  | 0.38     | 23.2             | 23.2         | 390   | 440               | 260            | 200       | 730     |           |             |             | 400      |
| 5939-02 | 0.1  | 0.15     | 3.0              | 12.0         |       |                  |                |           | 150     | 240       | 280         | 130        | 200      |
FROM: Charley
DATE: April 08

TO:
___ IMATA, R.
___ UYENO, D.
___ CHONG, R.
___ KIMURA, J.
___ OHYE, M.
___ FUJII, N.
___ YOSHINAGA, M.
___ SWANSON, S.
___ KUNIMURA, I.
___ ENGLAND, D.

INIT.

TO:
___ KAWAHARA, K.
___ HARDY, R.
___ SAKODA, E.
___ NAKAMA, L.
___ DANBARA, S
___ HOAGBIN, S.
___ YODA, K.
___ CHING, F.

INIT.

FOR:
___ Approval
___ Signature
___ Information

PLEASE:
___ Review & Comment
___ Type Draft
___ Type Final
___ File
___ Xerox ___ copies
___ Take Action

___ Please See Me
April 24, 2008

Mr. Jeffrey A. Eng, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, HI 96793

Dear Mr. Eng:

Cancellation of Pump Installation Permit
Kupaa Well #1 (Well No. 5731-03)

Our records indicate that the captioned well permit has expired. Please be aware that the permit is being cleared from our processing. You may reapply at any time without penalty or prejudice.

If you have any questions, please contact Charley Ice of our staff at [redacted] or toll-free at [redacted] (Maui), extension 70251.

Sincerely,

KEN C. KAWAHARA, P.E.
Deputy Director

CI: ss
Revised Measuring-Point Elevations for Selected Wells in the Waihee and iao Aquifer Areas on the Island of Maui

The USGS has been working with the National Geodetic Survey (NGS) to update benchmark and well measuring-point elevations in central Maui as part of a ground-water availability study with the Maui Department of Water Supply. The purpose of this effort is to ensure that water-level monitoring wells used in this study are tied to a common and accurate vertical datum.

Benchmark and reference-mark elevations were determined by the NGS using differential GPS (Global Positioning System) methods during September 2-4, and November 18-20, 2003.

Well measuring-point elevations were determined by the USGS using vertical leveling surveys from NGS benchmarks and USGS reference marks during September 22-26, and December 15-19, 2003.

Measuring-point elevations for selected wells in the Waihee and iao aquifer areas are provided below. The difference between the previously reported and the revised measuring-point elevation for each well is also provided. Leveling notes and photographs of the measuring points are available in well folders maintained by the USGS Water Resources office in Honolulu.

It is important to recognize that the revised well measuring-point elevations will result in a modification of the absolute water levels (referenced to mean sea level), but not the relative change in water levels measured over time (trend).

Historical water levels measured in these wells may be revised pending further research into possible causes for the differences between the previously reported and the revised well measuring-point elevations. Future water-level measurements will be based on the revised well measuring-point elevations.

Related links:
Ground-Water Availability in Central Maui - Project description
Recent Hydrologic Conditions, iao Aquifer area, Maui - Updated every three months

<table>
<thead>
<tr>
<th>Well measuring-point elevations, in feet above mean sea level, for selected wells in the Waihee and iao aquifer areas on Maui</th>
</tr>
</thead>
<tbody>
<tr>
<td>Released January 6, 2004; Updated May 21, 2004 using final NGS benchmark elevations.</td>
</tr>
<tr>
<td>[RM, reference mark; MP, measuring point; ft, feet; --, no data]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Well name</th>
<th>Well no.</th>
<th>Revised¹</th>
<th>Previous</th>
<th>Difference²</th>
<th>Notes regarding previous well measuring-point elevations ³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kupaa 1</td>
<td>5731-03</td>
<td>638.77</td>
<td>639.37</td>
<td>-0.60</td>
<td>C. Takumi Engineering report (1/31/00) provides MP elevation of 639.37 ft for top of casing, based on leveling from a benchmark elevation of 631.87 ft located about 200 ft from well (Exhibit A-1, Mink &amp; Yuen, 6/21/99). Driller's well-completion report provides MP elevation of 638.10 ft for top of casing (5/20/99). No record of MP survey notes and initial benchmark. Wailani Drilling and Ed Valera (surveyor) combined trigonometric leveling (using a total station and vertical angles) from Tanaka's work and a carpenter's level to get the initial height of casing.</td>
</tr>
<tr>
<td>Facility</td>
<td>RM No.</td>
<td>BGT</td>
<td>MTG</td>
<td>Diff</td>
<td></td>
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<td>---------------</td>
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<td>-------</td>
<td></td>
</tr>
<tr>
<td>Kanoa TH</td>
<td>5731-05</td>
<td>303.56</td>
<td>305.22</td>
<td>-1.66</td>
<td></td>
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<tr>
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<td></td>
<td>USGS reports MP elevation of 305.22 ft for top of casing, based on leveling from nearby RM - 1-inch pipe (1/22/03). RM elevation of 304.50 ft provided by C. Takumi Engineering. No record of RM survey notes and initial benchmark. K. Tanaka set the 1/2-in. pipe using trigonometric leveling (using a total station and vertical angles).</td>
</tr>
<tr>
<td>Kanoa 1</td>
<td>5731-02</td>
<td>308.14</td>
<td>--</td>
<td>--</td>
<td>Driller's well-completion report has elevation of 309.15 ft for top of pump base plate (5/29/99). No record of MP survey or initial benchmark.</td>
</tr>
<tr>
<td>Kanoa 2</td>
<td>5731-04</td>
<td>280.48</td>
<td>--</td>
<td>--</td>
<td>Driller's well-completion report has MP elevation 281.83 ft for top of sounding tube (6/7/00). C. Takumi Engineering report (Aug. 2000) has 281.38 ft for top of sounding tube (Exhibit A, Mink &amp; Yuen, 7/12/00).</td>
</tr>
<tr>
<td>North Waihee 1</td>
<td>5631-02</td>
<td>283.76</td>
<td>285.23</td>
<td>-1.47</td>
<td></td>
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<tr>
<td></td>
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<td>USGS reports MP elevation of 285.23 ft for top of measuring tube, based on leveling from nearby RM - 3/4 inch pipe (8/12/97). RM elevation of 266.63 ft given by W.S. Unemori Engineering. No record of RM survey notes and initial benchmark in well folder, however, Unemori confirms this elevation from their notes. From information provided by Reed Ariyoshi of W.S. Unemori, and Wendy Taomoto, MDWS, the best estimate of the difference between the top of the casing prior to pump installation and the measuring tube after installation is 1.01 ft (old casing higher in elevation). As a result, the old mp for data prior to August 1997, 284.78 ft, is very close to the new measuring tube elevation plus 1.01 ft (284.77 ft).</td>
</tr>
<tr>
<td>North Waihee 2</td>
<td>5631-03</td>
<td>283.62</td>
<td>--</td>
<td>--</td>
<td>Height of measuring point modified after pump installation. Measuring tube modified twice since pump installation in 1997 and leveling on 8/12/97. USGS reports MP elevation of 284.39 ft for top of measuring tube on 8/12/97. USGS reports MP elevation of 284.33 ft for top of measuring tube on 3/30/99 after first modification, based on measuring up from base plate elevation of 284.11 ft. Previous leveling on 8/12/97 and 3/30/99 are based on RM (3/4-inch pipe) elevation of 286.63 ft provided by W.S. Unemori Engineering. No record of RM survey notes and initial benchmark in well folder, however, Unemori confirms this elevation.</td>
</tr>
<tr>
<td>Location</td>
<td>Site ID</td>
<td>24-Oct-74</td>
<td>24-Nov-74</td>
<td>Change</td>
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<tr>
<td>Waihee TH A1</td>
<td>5631-01</td>
<td>246.17</td>
<td>248.05</td>
<td>-1.88</td>
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<tr>
<td>Waiheu TH D</td>
<td>5430-04</td>
<td>380.95</td>
<td>380.66</td>
<td>0.29</td>
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<tr>
<td>Waiheu Deep</td>
<td>5430-05</td>
<td>381.16</td>
<td>380.84</td>
<td>0.32</td>
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<tr>
<td>Waiheu TH B</td>
<td>5431-01</td>
<td>492.15</td>
<td>492.51</td>
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<tr>
<td>Waiehu Heights 2</td>
<td>5430-02</td>
<td>338.05</td>
<td>--</td>
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<tr>
<td>Waiehu TH E</td>
<td>5430-03</td>
<td>415.65</td>
<td>416.75</td>
<td>-1.10</td>
<td></td>
</tr>
</tbody>
</table>


USGS reports MP elevation of 380.66 ft for top of 1.75-inch PVC casing, based on leveling from nearby RM - "X" chiseled in concrete at entrance to TH D shelter (8/23/85). RM elevation of 380.01 ft provided by Dan Lum, DOWALD (6/29/83). No record of RM survey notes and initial benchmark.

USGS reports MP elevation of 380.84 ft for top of 10-inch casing, based on leveling from RM - "X" chiseled in concrete at entrance to TH D shelter (8/23/85). RM elevation of 380.01 ft provided by Dan Lum, DOWALD (6/29/83). No record of RM survey notes and initial benchmark.

USGS reports MP elevation of 492.51 ft for top of 1.5-inch PVC casing (9/24/75). However, later field notes show top of casing as 491.79, and top of surrounding wooden box as 492.51. No record of MP survey notes and initial benchmark. Probably surveyed from State of Hawaii benchmark U-6: 250.37 ft (1974). Driller's report provides elevation of 493.97 ft for top of drilling platform. Well has been measured from top of wooden box since USGS started measuring well in July, 1982. Well modified 3/31/04 by USGS, adding 0.74 ft to top of PVC casing. Revised MP (top of PVC casing) combines changes due to recent surveying and modification. Elevation of top of box was lowered by 0.42 ft from results of 2003/2004 surveying.

Notes in well folder show pump refurbishment in 1998. Measurement tube likely installed at that time. No prior leveling notes or references in USGS well folder.

<table>
<thead>
<tr>
<th>Location</th>
<th>Well No.</th>
<th>Meas. 1</th>
<th>Meas. 2</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mokuhau 1</td>
<td>5330-09</td>
<td>353.37</td>
<td>353.79</td>
<td>-0.42</td>
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<td>(Pump 2)</td>
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<tr>
<td>Wailuku Shaft 33</td>
<td>5330-05</td>
<td>32.33</td>
<td>32.17</td>
<td>0.16</td>
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<td>Waikapu 1</td>
<td>5130-01</td>
<td>551.04</td>
<td>551.33</td>
<td>-0.29</td>
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<tr>
<td>Waikapu 2</td>
<td>5130-02</td>
<td>518.96</td>
<td>519.33</td>
<td>-0.37</td>
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<tr>
<td>DWS Waikapu</td>
<td>5131-01</td>
<td>764.87</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Mauka</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

USGS reports MP elevation of 353.79 ft (12/1/99). No record of MP survey and initial benchmark. Dan Lum (DOWALD) provides MP elevation of 353.57 ft for access port at base of pump (1/17/72).

H.A.R. Austin Engineering provides elevation of 353.17 ft for top of casing (6/4/53).

USGS reports MP elevation of 32.17 ft for top of casing, based on leveling from Wailuku Courthouse NGS benchmark elevation of 331.066 ft (4/17/97).

USGS reports MP elevation of 551.33 ft for top of 6-inch coupling, based on leveling from RM - 0.5 inch pipe located on the east side of the concrete foundation (4/11/75). RM elevation of 550.61 ft provided by Norman Saito Engineering, based on leveling from Wailuku Courthouse NGS benchmark (12/74). Dan Lum (DOWALD) provides elevation of 552.08 ft for top of 8-inch casing, and 551.15 ft for top of conductor pipe (5/14/74).

USGS reports MP elevation of 519.33 ft for top of casing, based on leveling from Waikapu 1 well MP elevation of 551.33 ft (6/21/83). DOWALD as-built drawing provides elevation of 519.47 ft for top of 20-inch casing.

USGS surveying on 12/29/03 to top of 6-inch threaded coupling welded to plate that is welded to the top of the 18-inch casing (highest point after removing plug). CWRM well completion report and Water Resources International as-built drawing provides elevation of 764.7 ft for top plate welded to 18-inch casing.

1 Revised well measuring-point elevations were determined by the USGS using vertical leveling from National Geodetic Survey benchmarks and reference marks in December 2003. NGS benchmark and reference mark elevations provided by NGS on 1/20/04. Levelling notes and photographs of the measuring points are available in well folders maintained by the USGS Hawaii District Office.

2 Difference calculated by subtracting the previous from the revised well measuring-point elevation.

3 All information contained in USGS well folder.

4 Maui Department of Water Supply refers to this well as Mokuhaupump 2 (Well 502) whereas Commission on Water Resource Management well index refers to this well as Mokuhau 1.
May 31, 2005

Mr. George Y. Tengan, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, HI 96793

Dear Mr. Tengan:

Extension of Pump Installation Permit
Kupaa Well #1 (Well No. 5731-03)

Thank you for your letter dated May 26, 2005 requesting an extension of the captioned permit. We understand that the pump is on site and may have work completed by the existing permit expiration date of June 26, 2005, but that a cushion of six months would be appreciated.

By this letter, your permit is extended six months, to expire December 26, 2005. All other conditions of your permit remain the same. Please file this letter with your permit.

If you have any questions, please call Charley Ice of the Commission staff at [redacted] or toll-free at [redacted] extension 70251.

Sincerely,

DEAN A. NAKANO
Acting Deputy Director

Cl:ss

C: Carl Takumi Engineering, Inc.
May 26, 2005

Mr. Peter Young
Commission on Water Resource Management
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Young:

Subject: KUPAA WELL #1 (Well No. 5731-03)
Pump Installation Permit

It is our understanding that the pump installation permit of the Kupaa Well No. 1 will be expiring shortly. Our contractor is planning to have the pump installation completed by the end of the second week in June. If he meets his schedule, the pump will be installed prior to the expiration date of the pump installation permit.

At this time, we would like to request an extension to the pump installation permit. The purpose of obtaining an extension would be to allow for any unforeseen circumstances which may delay the pump installation. Your favorable response will be appreciated.

Should you have any questions, please contact Myles Fujinaka of our engineering division at [contact information]

Sincerely,

GEORGE Y. TENGAN
Director

"By Water All Things Find Life"
July 23, 2003

MEMORANDUM

TO: Ernest Y.W. Lau, Deputy Director  
Commission on Water Resource Management  
LOG NO: 2003.1271

FROM: P. Holly McEldowney, Acting Administrator  
State Historic Preservation Division  
DOC NO: 0307CD43

SUBJECT: Chapter 6E-8 Historic Preservation Review – Pump Installation Permit Application  
For the Proposed Kupa’a #1 (Well No.5731-03) [State/COWRM]  
Waihe’e Ahupua’a, Wailuku District, Island of Maui  
TMK: (2) 3-2-001:003

Thank you for the opportunity to review and comment on the Pump Installation Permit Application for the proposed Kupa’a #1 (Well No.5731-03), which was received by our staff June 23, 2003. Our review is based on reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was conducted of the subject property.

This area in general is likely to have once been the location of pre-Contact farming, perhaps with scattered houses. A search of our records indicates an archaeological inventory survey has not been conducted of the proposed project area. Our records indicate historic sites have been identified during archaeological investigations conducted of several locations within TMK: 3-2-001:003. In 1998 Xamanek Researches conducted an archaeological inventory survey of phases IV and V of the North Waihe’e Water Source Project (Fredericksen and Fredericksen 1998), located to the east of the proposed undertaking. Two new historic sites were identified (SIHP 50-00-4474, an historic road, and SIHP 4475, an historic wall) and a previously identified site was relocated (SIHP-3196, terrace/possible ceremonial site). In 2000, Xamanek Researches conducted an archaeological reconnaissance survey of a proposed easement corridor for the installation of a 6-inch waterline for the County of Maui, located north of the proposed undertaking (Fredericksen 2000). At least two sites (an old access road, possible retaining walls) and an isolated artifact were identified. Additional sites were noted during the reconnaissance which were outside of the
project area. In 2001 Scientific Consultant Services conducted an archaeological inventory survey for a water pipeline corridor (Calis 2001) located to the east of the proposed project area. One site was identified (SIHP 50-50-04-5179, remnant retaining wall). Given the above information, we believe it is likely that historic sites are present in the proposed project area.

Therefore, in order to determine the effect of the proposed undertaking on historic sites, we recommend that no action be taken on the subject permit application until an archaeological inventory survey has been conducted of the proposed project area and access roadways to determine whether significant historic sites are present. An acceptable report documenting the findings of the survey will need to be submitted to this office for review. If significant historic sites are identified, a mitigation plan may need to be developed, in consultation with this office, and executed.

If you have any questions, please call Cathleen A. Dagher at [redacted]

CD:jcn

c: Michael Foley, Director, Dept of Planning, 250 South High Street, Wailuku, HI 96793
Cultural Resources Commission, Planning Dept, 250 S. High Street, Wailuku, HI 96793
July 2, 2003

Ref: 5731-03.pip

Mr. George Tengan
County of Maui
Department of Water Supply
200 South High Street
Wailuku, HI 96793

Dear Mr. Tengan:

Pump Installation Permit
Kupaa 1 Well (Well No. 5731-03)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned well(s) that authorize permanent pump installation work for your well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 11:

Special Conditions

1. If the elevation benchmark needs to be altered, the permittee, well operator, and/or well owner shall ensure that the benchmark is transferred (or the well resurveyed) and documentation of the new benchmark shall be submitted to the Commission within sixty (60) days after the pump is installed.

2. Attached for your information is a copy of the Department of Health's (DOH) review comments.

3. Please enclose the pump specification and rating curve for the installed pump with the Well Completion Report.

The permittee, well operator, and/or well owner are responsible for all conditions of the permit. This includes ensuring that the pump installation contractor submits a completed Part II of the Well Completion Report form (enclosed) within sixty (60) days after the pump installation work is completed. Be advised that you may be subject to fines of up to $1000 per day for any violations of your permit conditions starting from the permit approval date.

Please sign and have the contractor sign both permit originals and return one for our files. A copy of the Well Completion Report (Part II) and a copy of your water use report form are enclosed for your use.
IMPORTANT - Pump installation shall not commence until a fully signed permit is returned to the Commission. Except for the monthly water use report form, please provide copies of all the information in this packet to your pump installation contractor.

If you have any questions, please call Charley Ice of the Commission staff at [redacted] or toll-free at [redacted] extension 70251.

Sincerely,

[Signature]

Peter T. Young
Chairperson

Enclosure

C: C. Takumi Engineering, Inc.
PUMP INSTALLATION PERMIT
Kupaa 1 Well, Well No. 5731-03

Note: This permit shall be prominently displayed at the site until the work is completed

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for Kupaa 1 Well (Well No. 5731-03) at Kahakii Highway, Kupaa Ridge, Wailuku, Maui, TMK 3-2-1:3, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

1. The Chairperson to the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 1200 gpm rated capacity at unknown ft. of head, or less, pump in the well.

3. The permittee, well operator, and/or well owner shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Chairperson (attached).

4. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee, well operator, and/or well owner are notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The permittee, well operator, and/or well owner shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Chairperson within sixty (60) days after completion of work.

6. The permittee, well operator, and/or well owner shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

7. The pump installation permit application and any related staff submittal approved by the Commission are incorporated into this permit by reference. This permit is also subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97). If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result.

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee, well operator, and/or well owner notice of the proposed action and an opportunity to be heard.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee, well operator, and/or well owner must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

10. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: June 26, 2003
Expiry Date: June 26, 2005

PETER T. YOUNG, 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 and understand that I shall not commence work until I and the pump installer have signed, dated, and returned the permit to the Commission. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day starting from the permit date of approval.

Permittee’s Signature: ___________________________ Date: __________

Printed Name: ___________________________ Firm or Title: ___________________________

Installer's Signature: ___________________________ C-57, C-57a, or A License #: __________ Date: __________

Printed Name: ___________________________ Firm or Title: ___________________________

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

Attachments:
C: USGS
Department of Health/ Safe Drinking Water & Wastewater Branch
Maui Department of Water Supply
C. Takumi Engineering, Inc.

C-57, C-57a, or A License #:
**MISSION ON WATER RESOURCE MANAGEMENT**


DATE: 01 July 03  SUSPENSE DATE: __________

TO: KUNIMURA, I. MATHIAS, T. NAKAMA, L. NAKANO, D. NISHIOKA, L. OHYE, M. YODA, K.

PLEASE:
- 3 Approval
- 3 Signature
- 4 Information
- 1 Review & Comment
- 2 Type Final
- ___ Take Action
- ___ Type Draft
- ___ Xerox ___ copies

WELL NUMBER 5731-03  WELL NAME Kupaa 1

- WELL CONSTRUCTION

ATTACHMENTS FOR WELL CONSTRUCTION PERMIT:
1 COVER LETTER
2 PERMIT (2x)
3 SDWB
4 WWB
5 CWB
6 HEER
7 LD
8 HP
9 PUMP TEST
10 WCR I FORM
11 WELL CHECK PRINTOUT

TO BE SENT TO APPLICANT

FOR OFFICE USE ONLY

- PUMP INSTALLATION

ATTACHMENTS FOR PUMP INSTALLATION PERMIT:
1 COVER LETTER
2 PERMIT (2x)
3 SDWB
4 WWB
5 CWB
6 HEER
7 LD
8 HP
9 WCR II FORM
10 WUR FORM
11 GLENN'S WORKSHEET

TO BE SENT TO APPLICANT

FOR OFFICE USE ONLY

Charley, Good review. will be 343 completed!
June 18, 2003

TO:       Dede Mamiya, Administrator
            Land Division

FROM:    Ernest Y.W. Lau, Deputy Director
            Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
            Kupaa #1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. **Please respond by returning this cover memo form by July 30, 2003.** If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [ ]

Class
Attachment(s) [ ]

RESPONSE:
[ ] A water lease/permit is required of this applicant and an application for such will be requested by our division.

☒ [ ] A water lease/permit is **not** required of this applicant.

[ ] A water lease/permit has been obtained by the applicant through lease no. ________

☒ [ ] This well project [ ] requires [ ] does not require a CDUP. If a CDUP is required it [ ] has [ ] has not been approved and [ ] is [ ] is not currently active.

[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.

[ ] No objections

☒ [ ] Other comments: Original source of private title is Land Commission Award No. 7713: 24 issued between 1845 and 1855.

Contact Person: Gary Martin  Phone: 587-0423

Signed:  Date: JUN 27 2003
STATE MESSENGER DELIVERY

Date: June 26

To: Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawaii

Attn: Charley Lee

From: Lori Kajiwara
Planning & Design Section

Subject: Well Construction/Pump Installation Permit/Water Use Permit for
Well No. 5731-03
Kupaa #1

Please find enclosed the application of the above subject project.
Facsimile Request and Cover Sheet
Wastewater Branch
919 Ala Moana Blvd. Room 309
Honolulu, Hawaii 96814-4920
(808) 586-4294 Fax (808) 586-4300

Date: June 25, 2003

To: Roland Tejano, Maui District Health Office

From: Lori Kajiwara, Planning/Design Section
Email: lkajiwara@eha.health.state.hi.us

Subject: Request for Information

Do you have any IWS files or records on or nearby for the following well site:
(2) 3-2-1:3 Kupaa Well 1 (5731-03)
Ha'ena, Maui

Please check all that apply:
[ ] sewered [ ] no record [ ] cesspool [ ] septic tank [ ] aerobic unit

File # if applicable: 会引起 # of Bedrooms
Record Date:
Submit Date:
Plan Approval Date:
Inspection Date:
System “Approval for Use” Date:

Other:

Please fax site/plot plan if available. Thank you.
June 18, 2003

TO:         Honorable Chiyoue L. Fukino, M.D., Director
            Department of Health
            Attention:  Harold Yee, Wastewater Branch
            William Wong, Safe Drinking Water Branch
            Dr. Keith Kawaoka, Hazardous Evaluation and Emergency Response
            Alec Wong, Clean Water Branch

FROM:  Peter T. Young, Chairperson
        Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
          Kupaa #1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by July 30, 2003. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Icie of the Commission staff.

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner shall test for microbiological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

For the applicant's information, a source of possible wastewater contamination is not located near the proposed well site (information attached).

An NPDES permit is required.

Other relevant DOH rules/regulations, information, or recommendations are attached.

No comments/protests.

Contact Person: Lon N Kajiwara  Phone: 566-4294  Date: 6-26-2003

Signed:  Xan N Kajiwara
June 18, 2003

TO: Honorable Chiyome L. Fukino, M.D., Director
Department of Health
Attention: Harold Yee, Wastewater Branch
William Wong, Safe Drinking Water Branch
Dr. Keith Kawaoka, Hazardous Evaluation and Emergency Response
Alec Wong, Clean Water Branch

FROM: Peter T. Young, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kupaa #1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by July 30, 2003. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [Contact Information]

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-29.

This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

For the applicant's information, a source of possible wastewater contamination [if any] is not located near the proposed well site (information attached).

An NPDES permit is required.

Other relevant DOH rules/regulations, information, or recommendations are attached.

[Response continued]

Contact Person: Bill Wong
Phone: 586-4258

Signed: Bill Wong
Date: Jul 26, 2003
TO: Honorable Chiyome L. Fukino, M.D., Director  
Department of Health  
Attention: Harold Yee, Wastewater Branch  
William Wong, Safe Drinking Water Branch  
Dr. Keith Kawaoka, Hazardous Evaluation and Emergency Response  
Alec Wong, Clean Water Branch  
FROM: Peter T. Young, Chairperson  
Commission on Water Resource Management  
SUBJECT: Pump Installation Permit Application  
Kupaa #1 (Well No. 5731-03)  

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by July 30, 2003. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [censored].

Class: Attachment(s)

RESPONSE:

[1] This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Public Water Systems, §11-20-29.

[1] This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

[1] If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

[1] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

[1] For the applicant's information, a source of possible wastewater contamination [ ] is [ ] not located near the proposed well site (information attached).

[ ] An NPDES permit is required.

[ ] Other relevant DOH rules/regulations, information, or recommendations are attached.

[ ] No comments/objections.

Contact Person: Alec Wong  
Phone: 586-4309  
Date: 6/26/03

Signed: Alec Wong  
Date: 6/26/03
The Department of Health, Clean Water Branch has the following comments:

1. **For Well-Drilling Activities**

Any discharge to State waters of treated process wastewater effluent associated with well drilling activities is regulated by Hawaii Administrative Rules, Title 11, Chapter 55, Appendix I, effective September 22, 1997. Treated process wastewater effluent covered by this general permit includes well drilling slurries, lubricating fluids wastewaters, and well purge wastewaters. This general permit does not cover well pump testing. The applicable Notice of Intent Forms and filing fee shall be submitted at least thirty (30) days before the start of discharge to the Department of Health, Clean Water Branch at 919 Ala Moana Boulevard, Room 301, Honolulu, Hawaii 96814-4920 or P.O. Box 3378, Honolulu, Hawaii 96801-3378. Inquiries may be directed to the Clean Water Branch at [contact information] or by fax at [fax number].

2. **For Well Pump Testing**

The discharger shall take all measures necessary to prevent the discharge of pollutants from entering State waters. Such measures shall include, if necessary, containment of the initial discharge until the discharge is essentially free of pollutants. If the discharge is entering a stream or river bed, best management practices shall be implemented to prevent the discharge from disturbing the clarity of the receiving water. If the discharge is entering a storm drain, the discharger must obtain written permission from the owner of that storm drain prior to discharge. Furthermore, best management practices shall be implemented to prevent the discharge from collecting sediments and other pollutants prior to entering the storm drain.

JS/cr
June 18, 2003

TO: Honorable Chiyome L. Fukino, M.D., Director
   Department of Health
   Attention: Harold Yee, Wastewater Branch
   William Wong, Safe Drinking Water Branch
   Dr. Keith Kawaoka, Hazardous Evaluation and Emergency Response
   Alec Wong, Clean Water Branch

FROM: Peter T. Young, Chairperson
   Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
   Kupaa #1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by July 30, 2003. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [Contact Information]

Class
Attachment(s)

RESPONSE:

1. This well qualifies as a source which will serve as a source of possible water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-20.

1. This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the person owning a health test for bacteriological and chemical presence. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

1. The well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections between potable and non-potable systems by an air gap or an approved backflow prevention device and by clearly identifying all non-potable spouts with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

1. It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

1. The applicant's information, a source of possible wastewater contamination [ ] is [ ] well located near the proposed well site (information attached).

1. An NPDES permit is required.

1. Other relevant DOH rules/regulations, information, or recommendations are attached.

No comments/objections

Contact Person: Dr. Keith Kawaoka Phone: 586-4249
Signed: [Signature] Date: 6/24/03

Fax to: Commission on Water Resources Mgt.
TO: Honorable Chiyome L. Fukino, M.D., Director
Department of Health
Attention: Harold Yee, Wastewater Branch
William Wong, Safe Drinking Water Branch
Dr. Keith Kawaoka, Hazardous Evaluation and Emergency Response
Alec Wong, Clean Water Branch

FROM: Peter T. Young, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kupaa #1 (Well No. 5731-03)

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Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [Contact Information]

Cl: ss
Attachment(s)

RESPONSE:

[ ] This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people and at least 50 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

[ ] This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

[ ] If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

[ ] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

[ ] For the applicant’s information, a source of possible wastewater contamination is not located near the proposed well site (information attached).

[ ] An NPDES permit is required.

[ ] Other relevant DOH rules/regulations, information, or recommendations are attached.

[ ] No comments/objections

Contact Person: ___________________________ Phone: ____________

Signed: ___________________________ Date: ____________
June 18, 2003

TO: Dede Mamiya, Administrator
    Land Division
FROM: Ernest Y.W. Lau, Deputy Director
      Commission on Water Resource Management
SUBJECT: Pump Installation Permit Application
         Kupaa #1 (Well No. 5731-03)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by July 30, 2003. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [__________]

RESPONSE:
[ ] A water lease/permit is required of this applicant and an application for such will be requested by our division.
[ ] A water lease/permit is not required of this applicant.
[ ] A water lease/permit has been obtained by the applicant through lease no. ____________________
[ ] This well project [ ] requires [ ] does not require a CDUP. If a CDUP is required it [ ] has [ ] has not been approved and [ ] is [ ] is not currently active.
[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.
[ ] No objections
[ ] Other comments:

Contact Person: ___________________________ Phone: ______________

Signed: ___________________________ Date: ______________
June 18, 2003

TO: Holly McEldowney, Acting Administrator
   Historic Preservation

FROM: Ernest Y.W. Lau, Deputy Director
      Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
         Kupaa #1 (Well No. 5731-03)

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We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by July 30, 2003. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at __________

RESPONSE:

[ ] There may be areas in the vicinity of the well site that contain subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal.

[ ] Other relevant Historic Preservation rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments:

Contact Person: ____________________________  Phone: ____________

Signed: ____________________________  Date: ____________
June 18, 2003

Mr. George Tengan, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, HI 96793

Dear Mr. Tengan:

Pump Installation Permit Application for Well No. 5731-03

We acknowledge receipt, on June 13, 2003, of the OEQC announcement of a FONSI for the Kupaa #1 (Well No. 5731-03), and accept your completed Pump Installation permit application as of that date. You can expect your application to be processed within 90 days from that date.

If you have any questions about your permit application, please contact Charley Ice of the Commission staff at [number] or toll-free at [number] extension 70251.

Sincerely,

[Signature]
ERNEST Y.W. LAU
Deputy Director

Cl: ss

c: C. Takumi Engineering, Inc.
FROM: Charley

INIT. TO: INIT. FOR: PLEASE:

1. BAUER, G. 1. HARDY, R. 1. Approval 1. Review & Comment
2. GOODING, K. 2. SAKODA, E. 2. Signature 2. Type Draft
3. FUJII, N. 3. NAKANO, D. 3. Information 3. Type Final
4. OHYE, M. 4. LAU, E 4. File
5. YOSHINAGA, M. 5. DANBARRA, S
6. SWANSON, S. 6. SUBIA, S.
7. KUNIMURA, I. 7. YODA, K.
8. IMATA, R. 8. CHING, F.
9. NAKAMA, L. 9. ANAKALEA, P.
10. HIGA, D.
11. UYENO, D.
12. MATHIAS, T.

DATE: 17 June 03 SUSPENSE DATE

Please:

1. Review & Comment
2. Type Draft
3. Type Final
4. File
5. Xerox copies
6. Take Action
7. Please See Me

Waikiki well. 393 law makes it easier for county to compete w/developers, will continue.
Final Environmental Assessments/Findings of No Significant Impacts (FONSI)

(2) Kupa'a Well No. 1 and Transmission Line

District: Wailuku
TMK: 3-2-001:003 (Portion)
Applicant: County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawai'i 96793
Contact: Herbert Kogisaka

Approving Agency/Accepting Authority: Same as above.
Consultant: Chris Hart & Partners
Landscape Architecture and Planning
1955 Main Street, Suite 200
Wailuku, Hawai'i 96793
Contact: Rory Frampton

Status: FEA/FONSI issued, project may proceed.
Permits Required: Pump Installation, Building

The County of Maui, Department of Water Supply (DWS), is proposing the development of Kupa'a Well No. 1, and an associated 16-inch transmission waterline, on the northern slopes of the West Maui Mountains, north of the village of Waihe'e and approximately one mile north of Waihe'e Stream. Waihe'e, Maui, Hawai'i. The proposed well and waterline are part of the larger North Waihe'e Water Source Project, which is intended to relieve stress on the 'Iao Aquifer by providing alternative sources of water for the Central Maui Water System. The development of Kupa'a Well No. 1, which will be the fifth well developed within the system, will provide additional alternatives to service the region's population and economic centers.

The project site is situated approximately 1,000 feet mauka (west) of Kahului Highway, at an approximate elevation of 640 feet above mean sea level and approximately 4,000 feet from the ocean. The nearest residence is over 1,000 feet north of the well site.

Development of the project will consist of clearing, grubbing, grading; installation of a pump and related electrical controls; 500,000 gallon reservoir; equipment building with disinfection and electrical equipment; piping, fencing, and related work. A 16-inch transmission waterline is planned to carry water from the Kupa'a 500,000 gallon reservoir to Kanoa Well No. 1 where the water will then be transported via an existing 24-inch transmission line to the Central Maui Water System. The short-term impacts associated with these activities are not anticipated to have a significant impact upon existing land uses at the site or in the region.

The project is not anticipated to have any adverse impacts upon existing environmental features such as flora and fauna, topography, soils, or air quality. The project is not anticipated to have an impact upon archaeological or historical features.

The proposed project will not have an adverse impact upon existing socio-economic conditions nor will it have an adverse effect upon existing public services or infrastructure.

In light of the foregoing, the proposed project will not result in significant environmental impacts to the environment and a Finding of No Significant Impact (FONSI) is warranted.

Previously Published Projects Pending Public Comments

Environmental Impact Statement Preparation Notices

Lahaina Watershed Flood Control Project
Applicant: County of Maui
Department of Public Works and Waste Management
200 South High Street
Wailuku, Hawai'i 96793
Contact: Joe Krieger

Approving Agency/Accepting Authority: Mayor, County of Maui
200 South High Street
Wailuku, Hawai'i 96793

Public Comment Deadline: June 7, 2002 (see also, page 16).
March 22, 2001

Chairperson and Boardmembers
Board of Water Supply
County of Maui
Wailuku, Maui, Hawaii 96793

Dear Mr. Chairman and Boardmembers:

Subject: Maluhia Well Site

The Department requests approval to transfer funds appropriated for drilling Kupaa Well 2 to be used to exploratory well at a site beyond the Kupaa Well No. 1. The proposed site will be located about 1500 feet north of Kupaa Well No. 1, within the Camp Maluhia boundaries, shown on the attached map.

Based on statements by Dr. John F. Mink who prepared a report dated July 12, 2000 in his capacity as the hydrogeologist for the North Waihee Water Source Project, the sustainable yield from the existing wells of North Waihee, Kupaa 1 and Kanoa Wells should be estimated at 4 mgd. (The report is enclosed) The development of Kupaa Well No. 2 will fall within the southern segment of the aquifer.

In order to tap the sustainable yield of 8 mgd in the North Waihee Aquifer System, subsequent wells should be developed in the northerly segment of the aquifer. The proposed site is located in State land which is leased by Maluhia Boy Scout Camp.

Sincerely,

David R. Craddick
Director

hk
enc
NORTH WAHEE AQUIFER SYSTEM
KANOA 2 WELL

Well Completion and Testing

John F. Mink
Mink and Yuen, Inc.

July 12, 2000

Kanoa 2 (5731-04) was completed and tested in April, 2000, and the well completion report was submitted to CWRM by Mike Robertson (Wailani Drilling Co.) on June 7, 2000. The driller's log and pump test results were also submitted.

Kanoa 2, like Kupaa and Kanoa 1, is an excellent well, and its water levels reacted to pumping during the tests very similarly to the previously drilled wells. Quality of the pumped water among the three wells is identical, having a salinity of only 20 to 25 mg/l chloride.

The completed configuration of Kanoa 2 is as follows.

- Ground elevation ... 281 feet
- Depth ... 331 feet (50 feet BSL)
- Measuring point (sounding tube) elevation ... 281.38 feet
- Depth to water at start of test ... 274.67 feet
- Head ... 7.16 feet
- Boring diameter 22.5 inches, 0 to 330 feet
- Blank casing diameter 16 inches, 0 to 277 feet
- Perforated casing diameter 16 inches, 277 to 330 feet
- Grout, 0 to 263 feet
- Gravel, 263 to 330 feet

The head measured at Kanoa 2 before the start of the initial step drawdown test was 7.16 feet, which is comparable to 7.8 feet at Kanoa 1 and 7.41 feet at Kupaa, also measured before testing a year earlier in March - May, 1999. It is not possible to unambiguously identify the thickness of the Honolua formation and the thickness of the weathered zone of the underlying Wailuku basalt from the
driller's log, but the unconformity probably lies at a depth similar to that at Kanoa 1, about 70 to 130 feet below ground level. The driller's log has been submitted to CWRM by Wailani Drilling Co. and C. Takumi Engineering, Inc.

Pump Test Results and Interpretation

A step drawdown test was conducted on April 28, 2000, over a period of 2.5 hours. The drawdown results as measured with a tape and as estimated from the transducer record are as follows.

<table>
<thead>
<tr>
<th>Rate (gpm)</th>
<th>Tape Drawdown (ft)</th>
<th>Transducer Drawdown (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>0.76</td>
<td>0.58</td>
</tr>
<tr>
<td>600</td>
<td>1.18</td>
<td>1.14</td>
</tr>
<tr>
<td>900</td>
<td>2.01</td>
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</tr>
<tr>
<td>1300</td>
<td>3.40</td>
<td>3.35</td>
</tr>
</tbody>
</table>

The stable drawdown toward the end of the continuous test at 1200 gpm was 2.80 feet.

Assuming total drawdown is stable for each step of the step drawdown test and that it can be decomposed into aquifer (laminar) and well loss (turbulent) drawdowns, the computed transmissivity (T) is approximately 150,000 sq.ft./day. This is comparable to the T values computed for the step drawdown tests at Kanoa 1 (124,770 sq.ft./day) and Kupaa (178,930 sq.ft./day). The data for Kanoa 2 does not plot as neatly as for Kanoa 1 and Kupaa.

The drawdown and recovery data for the Kanoa 2 continuous test (4 days, 1200 gpm) also is less coherent than that for Kanoa 1 and Kupaa. However, the somewhat erratic drawdown data inserted into the computer program, THEISFIT, yields a T value of 345,370 sq.ft./day with an S (storage coefficient) approaching zero (which is not realistic). The straight Jacob plot gives a T of approximately 265,000 sq.ft./day and S = .014. The drawdowns used in the calculations occurred during the first 90 minutes of the test during which time a steady, though small, increase in drawdown took place.

All of the calculated values for T are similar in magnitude to the T computed for the North Waihee wells (1 and 2), Kanoa 1 and Kupaa. Exact values are not possible to determine because water levels were measured in the pumping wells and are therefore inherently ambiguous. The meaningful conclusion is that the transmissivity of the aquifer is very high and hydraulic conductivity (k) exceeds 1,000 ft./day. The T and k values pose no constraint on pump capacity in any of
the wells; the primary constraint is the threat of up-coning if pump capacity is excessive.

No attempt was made to employ the North Waihee wells and Kanoa 1 as observation wells. A transducer was placed in Kupaa, but the well is too distant from Kanoa 2 to have yielded usable data. Kanoa 1 and the North Waihee wells were being pumped during the tests to help relieve demand on the lao Aquifer.

**Recommended Pump Size**

The recommended pump size is 1200 gpm (1.73 mgd), the same as recommended for Kanoa 1 and Kupaa. For the DWS factor of .444, average production will be 0.77 mgd; for the liberal factor of .67, the average will be 1.15 mgd.

**Concluding Remarks About the North Waihee Aquifer System**

A serious misrepresentation about the sustainable yield of the North Waihee, Kupaa and Kanoa wells as totalling 8 mgd has appeared in newspaper reports and repeated at public hearings. The sustainable yield of 8 mgd is that proposed for the entire North Waihee Aquifer System, which extends from the axis of Waihee Valley to Kahakuloa Valley. The portion of the System to be exploited by the existing wells extends from Waihee Valley to the Brewer property line at the south boundary of the Makamakaole drainage. For this segment of the North Waihee Aquifer System the sustainable yield has been estimated at just 4 mgd.

If the three new wells (Kanoa 1 and 2, and Kupaa) are controlled by the .444 factor, the average production will be 2.3 mgd, while with the .67 factor it will be 3.5 mgd. In addition to these new wells, North Waihee 1 and 2 are in this portion of the Aquifer System. With all five wells pumping at capacity as amended by the factors, a sustainable yield of 4 mgd can be readily obtained.
PRELIMINARY ENGINEERING REPORT
FOR NEW
POTABLE WATER SOURCE
KUPAA WELL NO. 1
(State Well No. 5731-03)
Waihee, Maui, Hawaii

PREPARED FOR:
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, HAWAII 96793

PREPARED BY:
C. TAKUMI ENGINEERING, INC.
18 CENTRAL AVENUE
WAILUKU, HAWAII 96793

JANUARY 31, 2000
February 14, 2000

The Honorable Timothy Johns  
Chairman of the Board  
Attn: Ms. Linnel Nishioka, Deputy Director  
Department of Land and Natural Resources  
1151 Punchbowl Street  
Honolulu, HI 96813

Dear Mr. Johns:

SUBJECT: PROPOSED SOURCE OF POTABLE WATER

Enclosed for your review and comments is a copy of the engineering report for the following source:

Kupaa Well  
State Well No. 6-5731-03  
Waihee, Maui

This report has been prepared pursuant to Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, section 11-20-29.

The Department of Health will use your comments in determining the potential impacts, which may result by the proposed project.

Please submit your comments to the Safe Drinking Water Branch within 30 days from the date of this letter. You may also return the engineering report to this office if you do not need it for future reference.

If you should have any questions, please call Queenie Komori of the Safe Drinking Water Branch, Engineering Section, at [contact information]

Sincerely,

Thomas E. Arizumi, P.E., Chief  
Environmental Management Division

QK:1a
Enclosure
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<td>NAKAMA, L.</td>
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<td>KUNIMURA, I.</td>
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**COMMISSION ON WATER RESOURCE MANAGEMENT**

FROM: LINNEL  DATE: FEB 18  SUSPENSE DATE 3/8

TO: INIT. FOR: TO INIT. FOR: TO INIT. FOR: TO INIT. FOR: TO INIT. FOR:

**Approval**  **Signature**  **Information**  **See Me**  **Review & Comment**  **Take Action**  **Type Draft**  **Type Final**  **File**  **Xerox copies**

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This item of PII is confidential and shall be treated as such by all who have access to this file. Please do not forward this item of PII outside your department.
PRELIMINARY ENGINEERING REPORT
FOR NEW
POTABLE WATER SOURCE
KUPAA WELL NO. 1
(State Well No. 5731-03)
Waihee, Maui, Hawaii

PREPARED FOR:
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, HAWAII 96793

PREPARED BY:
C. TAKUMI ENGINEERING, INC.
18 CENTRAL AVENUE
WAILUKU, HAWAII 96793

JANUARY 31, 2000
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## FIGURES

Well Location (USGS Map)
Kupaa 1 Well Site - Site Topographic Map & Preliminary Site Plan
Water System Service Area
Example Pump Curve

## EXHIBITS

Exhibit A: The North Waihee Aquifer, An Additional Water Supply Source
Exhibit A-1: North Waihee Aquifer, Kupaa 1 and Kanoa 1 Wells Test Results and interpretation
Exhibit B: Water Quality Testing Results
Exhibit C: Soils Investigation
Exhibit D: OEQC Bulletin
The undersigned, being a licensed professional engineer, certifies that:

1. He has prepared the attached report and the information contained therein is true to the best of his information and belief; and

2. The water produced by Kupaa Well No. 1 (State Well No. 5731-03), the potable water system identified in the attached report, will comply with the State primary potable water regulations contained in Hawaii Administrative Rule, Title 11, Chapter 20, Rules Relating to Potable Water Systems, and will comply with the Rules and Regulations of the Department of Water Supply, County of Maui, when said drinking water system is operated and maintained in accordance with the instructions and information contained in this report.

This work was prepared by me or under my supervision.

[Signature]
Carl K. Takumi, P. E.
C. Takumi Engineering, Inc.
PRELIMINARY ENGINEERING REPORT
FOR NEW
POTABLE WATER SOURCE
KUPAA WELL NO. 1

1. Introduction

This Preliminary Engineering Report was prepared to conform to the provisions of Hawaii Administrative Rules, Title 11, Chapter 20, relating to new potable water source development. The rules requires all new potable water sources serving a public water system be approved by the Director of Health prior to its use.

2. General Information

a. Description of project and location, including phasing schedule, persons served by new water source and/or service connection, name and public water system number.

The Kupaa Well No. 1 (State Well No. 5731-03) project is part of the North Waihee Water Source Development Project and consists of developing a basal well located on the northern slopes of West Maui Mountains on the Island of Maui. The project consists of clearing, grubbing, grading, installation of a pump and related electrical controls, 500,000 gallon reservoir, equipment building with disinfection and electrical equipment, piping, fencing and related work.

Water from Kupaa Well No. 1 will be used to service the Department of Water Supply’s Wailuku District or commonly known as the Central Maui Water System (CMWS) which provides water for the Central Maui area bounded by the communities of Paia-Kuau on the east, Kihei-Makena on the south, Maalaea on the west and Waihee on the north. The project is needed to supplement the rising demands for water in the Central Maui Region and relieve some of the stresses being made on the Iao Aquifer.

The North Waihee Wells 1 and 2 (State Well No. 5631-02 & 5631-03 respectively), is also located in the Waihee Aquifer (60103) and have been placed into operation. Kanoa Well No. 1 (State Well No. 5731-02), also in the Waihee Aquifer, is in the process of being developed by the Department of Water Supply. Provisions have been made with the landowner for two future wells which may be later developed in the area.
b. **Owner and authorized representative**

The owner of the Kupaa Well No. 1 (State Well No. 5731-03) facility will be the Board of Water Supply, County of Maui. Upon completion, the Maui County Department of Water Supply (DWS) will operate and maintain the facility. The landowner is Wailuku Agribusiness, Inc. and the Board has a perpetual easement for the well and its appurtenances.

c. **Site Plan with contours and drawn to scale.**

A preliminary site grading plan with existing and proposed contours is attached. Besides the well and pump, the site will have disinfection/electrical building, 500,000 gallon reservoir for pump control/disinfection, parking, fencing and related site work.

3. **Physical and Hydrological Characteristics of Area**

   a. **Location.**

      The project is on the northern slopes of the West Maui Mountains north of the village of Waihee and Waihee Stream on the Island of Maui. The tax map key for the parcel is TMK (2) 3-2-1: 3. A location map is attached. Kupaa Well No. 1 is located within pasture land. The well is located on a one acre perpetual easement at approximate elevation 640 mean sea level (MSL) and approximately 4,000 feet from the ocean. The nearest residence is over a 1,000 feet north of the well.

   b. **Climate.**

      The site is influenced by the northeasterly trade winds as is typical of windward areas of the Hawaiian Islands. The annual rainfall at the site averages 30 to 40 inches with average temperatures in mid 60's to mid 80's range.

   c. **Topography including detailed study of project site.**

      A preliminary site grading plan with existing and proposed contours is attached. The site is located at about elevation 640 mean sea level (msl). The area slopes in the mauka-makai direction with slopes around 20%.

   d. **Geology and foundation conditions.**

      The geological profile of the area consists of alluvium at the surface above

---

*Kupaa Well No. 1*  
State Well No. 5731-03
Honolua series andesitic basalt lavas and the highly permeable Wailuku series basalts. The alluvium and andesitic lavas are fairly low permeability which suggests that wells to basal ground water would not interfere with stream flows above the low permeability layers. A foundation investigation has been performed for the 500,000 reservoir and is attached.

e. **Earthquake considerations and design parameters.**

According to Seismic Zone Maps in the Uniform Building Code, the island of Maui is in Zone 2B. This translates to only moderate seismic hazard. All structures will be designed accordingly. On Maui, there is no record of deep well casings being damaged by earthquakes.

f. **Groundwater conditions.**

The Central Maui Water System has been primarily dependent on water from the lao Aquifer and withdraw from the lao Aquifer is nearing the aquifer’s 20 MGD sustainable yield as set by the State Commission on Water Resource Management (CWRM). Hence, the Department of Water Supply started seeking new sources of water to meet the increasing demand. Attention was given to developing of groundwater in East Maui; however, the East Maui initiative has been delayed due to the discovery of pesticides in the wells and legal challenges, leaving the North Waihee groundwater source as the choice for timely development. The “Water Resource Protection Plan, Volume I & II,” CWRM, June 1990, estimates that the sustainable yield for the Waihee Aquifer (60103) is 8 MGD.

Groundwater studies “The North Waihee Aquifer, An Additional Water Supply Source for Central Maui,” Dr. John Mink, Mink and Yuen, Inc. dated April 10, 1997 provides initial studies for the project. Since information on the aquifer and other groundwater conditions is limited in the area, this project will help with the accumulation of data on the North Waihee Aquifer. In summary, the report states that the North Waihee Aquifer is a adjacent and hydraulically connected to the lao Aquifer; however, the lack of response in the test holes within the lao Aquifer during test pumping of the North Waihee Wells suggests that the Waihee Aquifer is quasi-independent aquifer. The estimated sustainable yield of the Waihee Aquifer is 8 MGD. The North Waihee Wells has a pumping capacity of 1.5 MGD for each well but it is anticipated that the pumps will not run simultaneously nor run continuously except under emergency conditions. The Kupaa Well is the northern most of the five planned well fields and will aid in determining the extent of the aquifer, better quantify the aquifer sustainable yield and generally provide better information of
the Waihee Aquifer for future development potential including the development of Well Field 3 (Kanoa Well No. 2) and Well Field 4 (Kupaa Well No. 2).

g. **Flood problems including tsunami inundation zones and preventive measures that may be used.**

The elevation of the site makes it obvious that the site is not located within any tsunami inundation zone. According to the Federal Emergency Management Agency (FEMA) Flood Zone maps, the site is in an area of minimal flooding (zone c). A Drainage and Erosion Control Plan conforming to the Maui County Grading Permit requirements will be prepared to mitigate local flooding prior to beginning the well development project. The development of the site should have no significant impact of its surroundings.

h. **Information confirming the conformance with local land use planning and zoning regulations.**

The site is located within an area designated as “Agricultural” by the State Land Use Commission. The Maui County Wailuku-Kahului Community Plan designates the project site as within “Agricultural” land use. The proposed project is considered as a minor utility facility and a permitted use within the “Agricultural” designation.

i. **Discussion of water rights and future uses by others.**

The wells within the Waihee Aquifer on record with the CWRM are as follows:

<table>
<thead>
<tr>
<th>State Well No.</th>
<th>Well Name</th>
</tr>
</thead>
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<tr>
<td>5631-02</td>
<td>North Waihe‘e Well 1 (DWS)</td>
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<tr>
<td>5631-03</td>
<td>North Waihe‘e Well 2 (DWS)</td>
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<td>Marino Well A (Private)</td>
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<td>Mendes Well (Private)</td>
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<tr>
<td>5731-02</td>
<td>Kanoa Well 1 (Under construction)</td>
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<tr>
<td>5731-03</td>
<td>Kupa’a Well 1 (Project well)</td>
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<td>Kahakuloa Acres (Private)</td>
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<td>5832-03</td>
<td>Kahakuloa Acres (Wailena) (Private)</td>
</tr>
</tbody>
</table>
The Board of Water Supply, by agreement with Wailuku Agribusiness Co., Inc. has perpetual easements for the development of 5 well fields within Wailuku Agribusiness Company properties between Waihee Stream and Kupaa Gulch. North Waihe'e Well 1 & 2 (5631-02 & 5631-03) is in well field one; well field three is the Kanoa Well No. 1 (5731-02) presently under construction; this project, the Kupa’a Well No. 1 (5731-03) is located in well field five. The DWS has received a well drilling permit for Kanoa Well No. 2 (5731-04) which will be located in well field 2. The DWS can potentially develop one additional wells (well field 4); however, future well development will require well drilling and pump installation permits from the CWRM and analysis of pump test results. The CWRM has received no new well applications for wells in this aquifer.

4. Extent of Water Works System.

a. Description of the nature and extent of the existing area and future area to be served.

The North Waihee Water Source Development project will be used to service the Maui County Department of Water Supply’s Wailuku District Water System which serves the eastern slopes of the West Maui Mountains, the central isthmus of Maui, and the lower western slopes of Haleakala. The water system service area is bounded by Paia/Kuau to the east, Kihei/Makena to the south, Makalae on the west and Waihee on the north and includes the communities of Wailuku/Kahului, Waikapu, Makalae, Kihei/Makena, Waiehu, Waihee, Spreckelsville, Paia/Kuau, Kihei, Makalae and Puunene. The water system service area is shown in the attached figure.

Upon completion of the proposed improvements, the well will be connected to an existing nearby water transmission line at the North Waihee Wells source which is already serving the Central Maui Water System.

b. Description of population served, land use and consumption data including forecasting the water demands.

The Central Maui area varies in land use, population and services. The Kahului-Wailuku communities serves as the business-industrial hub and the population center of the island with Kahului Airport and Kahului Harbor as the main transportation centers for traveling off the island and importing and exporting goods and produce. Wailuku is also the governmental center of Maui. Destination resorts of Wailea and Makena are also served
by the Central Maui Water System. Paia-Kuau present a more residential setting with small stores serving the community and limited tourist activity. The Maui County Water Use and Development Plan, 1992, estimates that residential consumption for Wailuku to be about 52%, compared to Kihei at 72% and Kahului at 48%.

Anticipated water demand from the Maui County Water Use and Development Plan (Water Use and Development Plan), 1992, estimates that the future demand within the Central Maui Water System to range between 25 million gallons per day (mgd) to 30 mgd depending upon the method of forecast used. The “Historical Trend” used in the Water Use and Development Plan uses a linear extrapolation of 0.5 mgd/year with a forecasted water use of 17.1 mgd in 1995. The 1995 water consumption reported in the Annual Report for Fiscal Years 1994, 1995, Board of Water Supply, County of Maui for the Wailuku District averaged nearly 18.7 mgd or a 8.5% deviation.

Using the linear extrapolation of 0.5 mgd/year, the estimated water use in 1997 is 18.1 mgd. Comparatively, the water consumption reported by the Annual Report for Fiscal Year 1997, Board of Water Supply, County of Maui, averaged 19.3 MGD or a 6.6% deviation and a 2 year increase in water demand of 0.6 MGD.

c. Appraisal of the future requirements for service, including existing and potential industrial, commercial, institutional and other water supply needs.

The future requirements of service as forecasted above is based upon a mix of residential, commercial, institutional and other needs of the community as development occurs. The Community Plans for the Kihei-Makena, Wailuku-Kahului, and Paia-Haiku are the primary planning documents adopted by the County to assess and zone potential growth areas within the Central Maui Water System. The Department of Water Supply is charged with the responsibility of providing a sufficient water supply for the area. Potential growth and future requirements may vary due to changes in the Community Plans, economy, and population changes. As stated previously, the Department of Water Supply uses a linear demand model based upon historical experience for predicting future water demand. The model includes potential residential, industrial, commercial, institutional and other water supply needs.

Water withdrawal from the lao Aquifer is nearing the sustainable yield and the Department have embarked upon developing the North Waihee Kupaa Well No. 1 State Well No. 5731-03
Aquifer not only for future anticipated water demand but to reduce the stress being placed upon the Iao Aquifer.

d. Provisions for extending water works system to include consideration of additional area required, easements, and right-of-way acquisition for facilities and utilities.

A 16-inch transmission waterline is planned to be constructed as part of this project to connect to an existing 24-inch transmission waterline approximately 3,000 feet from the well site.

As mentioned previously, the Maui County Board of Water Supply has secured easements from Wailuku Agribusiness Company, Inc. for the development of five well fields. The North Waihee Wells No. 1 & 2 have been placed into service (well field #1). The Kupaa Well (well field #5) is at the northern limit of Wailuku Agribusiness Company, Inc. property and the Board of Water Supply is in the process of obtaining the final metes and bounds location of this well field, along with appropriate easements for the transmission waterline needed to connect this well site to the Central Maui Water System.

e. Required capacity to meet fire protection and pressure requirements.

The DWS generally plans reservoirs within the local service area to provide fire protection and assure adequate pressure for its users. A 500,000 gallon reservoir is planned at the Kupaa Well site as part of this project. The reservoir will act primarily as a control reservoir and disinfection purposes; however, the reservoir will also add to the available storage for fire protection and to maintain adequate water system pressures.

f. Alternative solutions considered and supporting data for recommended plan.

Approximately 90% of the water used to serve the Central Maui Water System comes from the Iao Aquifer. Since the Iao Aquifer is close to being pumped to its sustainable yield, the DWS began pumping from the North Waihee Aquifer. Two wells have been placed on line within the water system. The third well, Kanoa Well No. 1, (State Well No. 5731-02) is presently being developed into a production well. Kanoa Well No. 2 (5731-04) is in the drilling and well testing phase. If successful, the Kanoa Well No. 2 will be placed into production. The Kupaa Well has been tested; the next phase will be to place the well into production.
The Kupaa Well and the Kanoa Well will reduce DWS dependence on the Iao Aquifer and the possibility of over pumping the Iao Aquifer.

The East Maui Development Plan prepared by the DWS planned for additional sources from east Maui. Two wells in the Hamakuapoko area have been drilled; however, the East Maui Development Plan has been held up until an Environmental Impact Statement can be finalized. It may be several years before any East Maui Sources can be utilized for Central Maui.

g. Environmental and economic impact.

The land is presently undeveloped and used as range land. Environmental impacts once the facility is in place should not be significant. An environmental assessment (EA) was prepared for the project prior to drilling the exploratory well. A finding of no significant impact (FONSI) was published in the OEQC bulletin on June 23, 1997. A copy of the OEQC Bulletin is attached as an Exhibit D. Another Environmental Assessment is being processed for the development of the Kupaa Well. The development of the Kupaa Well will relieve the stress being placed upon the Iao Aquifer and provide an adequate water supply for the growth anticipated in the County Community Plans. The project is not being completed to encourage any special development nor any single developer. This will enable the Department of Water Supply to continue to provide water to its consumers without restriction.

The short term economic impacts of the project by itself creates construction jobs. The monies will come from the Board of Water Supply. The long term economic impacts of the project will mean continuous maintenance, electrical and the purchase of disinfectants.

5. Potential Sources of Contamination.

a. Description of well site:

1) coordinates (latitude, longitude), State Well No., and Tax Map Key Number.

Latitude: 20° 57' 24"
Longitude: 156° 31' 37"
State Well No. 5731-03
Tax Map Key: (2) 3-2-1: 0.3
2) land surface elevation, topographic map of well site.

A preliminary site plan and topographic map of the well site is attached. The ground elevation at the well is approximately 640 feet MSL.

3) Size and topography of catchment area, slope of ground surface.

The "Water Resources Protection Plan," Commission on Water Resource Management, Department of Land and Natural Resources, State of Hawaii, June 1990, reports that the aquifer catchment area is approximately 12.87 square miles. Elevation ranges from sea level to elevation 4,480 at Eke Crater over a distance of approximately 24,000 feet from the ocean to the top of the crater. This equates to an average overall slope of 18%.

4) general summary of soil and substrata.

"The North Waihee Aquifer, An Additional Water Supply for Central Maui," Mink & Yuen, April 10, 1997 was initially prepared for this project; the report is attached as Exhibit A. The report also provides insight as to the soil and substrata and the initial design criteria for the well.

The "North Waihee Aquifer System, Kupaa 1 and Kanoa 1 Wells Test Results and Interpretation," John F. Mink, Mink & Yuen, June 2, 1999 presents soil data encountered during the drilling Kupaa 1 Well. The report is attached as Exhibit A-1.

5) anticipated well depth and depth of groundwater.

The well has been drilled 685 feet below ground surface or about 47 feet below mean sea level (MSL). The water surface elevation of the basal aquifer encountered is at elevation 7.8 feet MSL.

b. Design well draft.

The design well draft is 1,200 gpm.

c. Water quality data on any existing wells in the area.

Water quality data was taken at North Waihee Well 2 (State Well No. Kupaa Well No. 1 9 State Well No. 5731-03
5631-03) and the results of the analysis is attached as Exhibit B-1. The North Waihee Well 2 is also in the same basal aquifer as the Kupaa Well. A water quality sample was taken during the well testing of the Kanoa Well No. 1 (State Well No. 5731-02) and is attached as Exhibit B-2. The water quality analysis for the sample taken during this well test is attached as Exhibit B-3.

d. Land use classification of surrounding area.

Land Use Classification of the surrounding area is Agricultural

e. Existing or potential sources of contamination in recharge area:

1) extent of recharge area likely to contribute water to source including population.

2) type of contaminants.

3) distance to proposed well.

4) method of disposal, i.e. surface, subsurface - above groundwater table, subsurface - in groundwater table.

5) depth from base on contaminant source to groundwater table including but not limited to urban development, agricultural areas, pasture lands, feedlots, sanitary landfills, dumps, subsurface disposal units.

The recharge area estimated for the Waihee Aquifer is about 12 square miles. Located between the Waihee and Kahakuloa Valleys. The well is located within an agricultural zoned area. The area is relatively undeveloped and is used as rangeland; no known pesticides have been used on the property for decades. There is no public (County) wastewater system servicing the area and existing residences are serviced by individual wastewater disposal systems. The nearest existing residence is located more than 1,000 feet northeast (makai) of the well. Forest reserve lands are approximately 2,000 feet southwest (mauka) of the site. The State of Hawaii owns lands north of the site which is presently being leased by the Maui County Council of the Boy Scouts of America as part of Camp Maluhia. Camp Maluhia is approximately 2,000 north of the project.

The Kupaa Well is located in a recharge area composed of conservation and agricultural lands and away from dense populated areas, potential for contamination from external sources appears unlikely. The agricultural zoned areas will allow for limited residences to be built. However, no development can occur in the conservation zoned forest reserve area without proper permits and authorizations. The geology of the area, consisting
of a thick andesite layer makes potential for contamination unlikely from sources makai of the well.

Presently, there are no known sources of agricultural and industrial pollutant sources in the area that would affect the source. The area is being used as rangeland and has been for a very long time. The agricultural/conservation zoning within the recharge area limits land use and population. There are no feedlots, sanitary landfills or public dumps within the aquifer recharge area. Wastewater disposal for the few residences are limited to individual wastewater disposal units.

f. Approximate groundwater contour.

"North Waihee Aquifer System, Kupaa 1 and Kanoa 1 Wells Test Results and Interpretation," prepared by John F. Mink, Mink & Yuen, Inc., June 21, 1999 provides well data, pump test results, estimated ground water contours and transmissivity of the aquifer. The report is attached as Exhibit A-1.

6. Sources of Water Supply.

a. Nature of soil and stratum within and overlaying the water source, with special emphasis on identification of fissures and faults as it relates to the natural purification or treatment of percolating fluids from existing or future activities.

Discussed previously.

b. The probability and effect of surface drainage or contaminated underground water entering the subject water source.

Discussed previously.

c. Depth to water table, location and description of wells in vicinity in use and/or abandoned.

Discussed previously.

d. Slope of water table, preferably as determined from observation wells, or studies of wells in the area.

Discussed previously.
e. Site data relating to potential flooding and/or earthquake data.

Discussed previously.

f. Data relating to quality and quantity of the source waters under normal conditions and during stress periods of drought or heavy precipitation, as determined by field and laboratory analysis and investigations of available records; if records are not available or are inadequate to determine source quality under stress conditions, an estimate of expected quality and quantity during stress conditions should be established and related to the hydrologic budget to the aquifer or isopiestic area. At a minimum, analysis for all of the contaminants listed in the table “Contaminants to be Tested in All New Sources of Potable Water” shall be performed by the Department of Health, State Laboratories Division, for all sources being addressed in the report. For example, when approval of a well field is being sought, all of the wells must be tested for all of the required contaminants.

Laboratories performing the analysis must be currently certified by the Hawaii Department of Health, State Laboratories Division. While the lab data has often been conveniently summarized in a table, some reports have failed to note when analyses have been subcontracted to another lab. The lab reports from all of the laboratories involved must be included in the engineering report to allow the Department to verify that the analyses were performed by an approved lab. Failure to do so may delay the review process.

A water sample of the aquifer at Kupaa Well was taken during well testing. The sample was analyzed by Montgomery Watson Laboratories. The results are included in this report as Exhibit B-3. Water sample analysis from the North Waihee Well #2 and Kanoa Well 1 are included as Exhibit B-1 and B-2 respectively. The North Waihee Wells and the Kanoa Well are also in the same aquifer as the Kupaa Well.

g. Identification of all significant factors having potential for contaminating or reducing the quality of the water source or which would cause the quality of water delivered to users of the system to be in violation of any state primary drinking water regulation.

h. For each present and projected potential source of contamination, identification and evaluation of alternative control measures which could be implemented to reduce or eliminate the potential for contamination of the water source, including treatment of the water
source if subject to contamination, and evaluation of the physical, economic and social effects of implementing such control measures.

The lands surrounding the site is zoned either agricultural or conservation. The zoning in itself limits the potential for contamination. The conservation lands are mauka of the site. Conservation land uses are severely restricted and requires a permit to develop the land. Similarly, agricultural development has limited uses. Presently, the lands are used mainly for cattle grazing. Waste water treatment facilities for the existing homes in the area do not penetrate down to the aquifer and water quality samples show that individual waste water treatment facilities have not affected the quality of water from the aquifer. Changes in potential sources of contamination may change if the Community plan designations of these lands change; however, if zoning changes occur, the changes can be mitigated by changes in method of wastewater disposal.

i. A summary section indicating how the proposed development and improvements will provide reasonable assurance that the new water source is not subject to actual or potential contamination such as may result in the water not complying with any state primary drinking water regulation or as may otherwise adversely affect the health of persons.

The geology of the area, consisting of a thick andesite layer, makes potential of contamination unlikely from sources makai of the well.

The Maui County Community plan for the area shows that the lands have been designated as either agricultural lands or conservation lands. The conservation lands are above the project site.

7. Proposed Treatment Works. In addition to information required under sections 2 through 4, the engineering report shall include the items below. Pilot studies may also be required.

a. Summary description of proposed processes and unit parameters for treating the specific water under consideration. Include pertinent information on built up and packaged plant systems.

Water samples taken during well testing show only disinfection will be needed. Water from the well will be treated by a 12.5% premixed sodium hypochlorite solution disinfection system. To obtain a chlorine residual of 0.9 ppm (value DWS currently trying to obtain), the solution will have to be
injected at a rate of 0.5 gallons per hour. The hypochlorite solution will be injected before the water enters the 500,000 gallon control reservoir. The reservoir should provide sufficient contact period to allow thorough disinfection of the basal waters. The system located in a separate room within the control building (electrical and chlorine residual analyzer to be located in adjacent electrical room) at the proposed well site includes the following:

- Storage for 12.5% sodium hypochlorite solution with spill containment.
- Potable water supply.
- Metering pumps.
- Plastic tubing accessories and PVC Schedule 80 piping within the control building, below ground to a common injection point.

Operation and maintenance consist of field visits to the site primarily to measure chlorine residual and to resupply sodium hypochlorite solution when required. Adjustments to chlorine injection will be made to assure adequate chlorine residual.

b. Site: Discuss various sites available indicating proximity to developed areas, availability of utilities, and accessibility of plant site. Show on a topographic map the treatment plant and arrangement of present and proposed treatment facilities.

The project is a water development project within the Waihee Aquifer, located north of Waihee Stream. The Kupaa Well site is one of five well fields that is available to the Department of Water Supply. The remainder of the well fields are located between the North Waihee Wells (State Well No. 5631-02 & 5631-03) and this Kupaa Well (5731-03). A preliminary site plan of the proposed well development site is attached. Electrical power will be brought to the site by Maui Electric Company, the local electric utility.

c. Basis of Design:
1) Design Period
2) Design population and flow demand data
3) Nature and characteristics of flow
4) Design flow rate for plant
5) Reserve capacity
6) Treatment processes and unit parameters including calculations for design of units. Include description of equipment, capacities, size, operational factors and plant

Kupaa Well No. 1
State Well No. 5731-03
The sustainable yield of the lao Aquifer is 20 MGD. In the past, the DWS has come close to pumping near the sustainable yield levels. It is important to provide additional sources of water to reduce the stress being placed on the lao Aquifer and to provide an adequate source of water to meet the demands of the water system. The well, pumping, storage and appurtenances will be designed and constructed in compliance with the County of Maui Department of Water Supply and State Department of Health Drinking Water Standards. The facility will be owned by the Maui County Board of Water Supply and operated by the DWS. Their staff is thoroughly familiar with and have the experience and qualified personnel that are committed to provide water that will be in compliance with the requirements of the State Safe Drinking Water Regulations. Water samples taken from the North Waihee Well, Kanca Well 1 and this Well during the well testing phases of each well indicate that disinfection is the only treatment needed for the water. The proposed treatment process was described earlier.

d. Waste Disposal: Discuss various wastes from the water treatment plant, their volume, proposed treatment and disposal, and points of discharge.

No wastes are anticipated for the treatment process.

e. Operation and maintenance: provide general information operation and maintenance requirements, automatic equipment and justification for system proposed.

The operation and maintenance of the disinfection system will be by the Maui County Department of Water Supply. The Department has several similar disinfection systems and the qualified personnel to operate and maintain the equipment. Regularly scheduled field visits will be made to the site to measure chlorine residual and to resupply hypochlorite solution for injection.

8. Pumping Facilities. In addition to information required under sections 2 through 4, the following information should be provided in the engineering report:

a. Purpose of service

b. Pumping layout and sizing of force main
c. Design flow requirements including maximum, average, minimum, variations in demand, and effect of storage

d. Liquid characteristics

e. Pump selection including system and characteristic curves

f. Pumping arrangement.

Submersible deep well pumps are planned for the project. The layout of the project site is shown in attached figure. Potable water will service the CMWS. The pumping facility will have the following attributes:

- **Pump Type:** Deepwell Submersible
- **Pump Rating:** 1,200 gpm @ 680' TDH
- **Motor:** Submersible, 350 HP, 1750 RPM
- **Power Supply:** 480 volt, 3 phase, 60 Hz.
- **Piping:** Ductile Iron
- **Appurtenances:** Check Valve, Air and Vacuum Valve.
- **Flow Tubes:** Cast Iron with a bronze liner with transmitters and receivers.

**Pump Control:** Pump controls will be through a pressure sensing line (water level) placed in the 500,000 gallon reservoir. A signal proportional to tank level will be sent to a receiver in the control building on site. As water level in the reservoir reaches a certain level (to be set by operator), the pump will turn on. After reservoir fills, the pump will turn off by signal from the reservoir level sensor. High level and low level alarms will be installed to warn operator of malfunction.

**Well level control:** An electronic well drawdown sensing device will be placed in a well level monitoring tube to record water levels within the well. The information will be used as part of the data gathering information that will provide better understanding of aquifer conditions of the Waihee Aquifer and will set off an alarm if well level get below a certain draw down.

A 16-inch transmission waterline is planned to carry water from the Kupaa 500,000 gallon reservoir to an existing 24-inch transmission waterline from the North Waihee Well Project where the water will then be transported to the Central Maui Water System. A flow control valve at the 24-inch transmission waterline connection will open when the system calls for water. The control is located at the existing North Waihee Reservoir where the same flow controller will operate a booster pump system. The 16-inch waterline will have a design flow of 3 mgd which allows for a future second well.

Kupaa Well No. 1
State Well No. 5731-03
The Kupaa Well is part of a system of wells planned for the area by the Department of Water Supply. The design and operation of the well will be in conformance with the “Water System Standards,” Department of Water Supply, County of Maui, 1985. Since the Maui County Department of Water Supply is a public agency, the pumping unit must go through a bidding process. A specific pumping unit with pump curves cannot be presented at this time; however, an example pump curve is attached. The pump parameters were previously provided.

g. **Electric power available**: Electrical power will be brought to the site. Electrical power will be supplied by Maui Electric Company. At present, no emergency power is planned. Existing wells in the water system has emergency power available and would be sufficient to provide for water requirements should power fail.

h. **Proposed building and other structural improvements**

A control building will be constructed as part of the project. The building will house the electrical equipment for the pump motor controls, reservoir level, well level, SCADA equipment and other electrical appliances. A separate, enclosed room will house the disinfection facility. The building will be a slab on grade, CMU building with asphalt shingle roofing.

A 500,000 gallon concrete control reservoir will also be constructed as part of the project. The reservoir will be used to control the pump, allow a 30 minute disinfection contact period and provide storage for the system.

i. **Water hammer consideration.**

Water hammer effects will be mitigated by the use of slow opening/slow closing pump control valves and check valves.

j. **Descriptions of essential features of construction and operation, including staging sequence if applicable**

The staging sequence will be left up to the contractor; however, the following is the most likely staging sequence for the project construction:

a. Mobilize.
b. Clear and grub site.
c. Grading and earthwork at the reservoir site and construct access road.
d. Grass exposed slopes.
e. Install piping under the reservoir.

f. Begin reservoir construction. The construction of the reservoir is the critical path on the schedule. Concrete pours will start with the piping under the reservoir. The reservoir floor will take two concrete pours. The concrete walls of the reservoir will take three concrete pours while the roof will be poured at one time. There are concrete curing intervals of at least 14 days between pours, installing and removing form work. Concrete columns within the reservoir will also need time to form, pour and cure.

g. In the meantime, the building can be constructed, the pump and related piping installed and the paved area prepared for paving.

h. Complete the paving within the reservoir site.

i. Electrical and telemetry equipment installation simultaneously with the disinfection equipment. Meanwhile, MECO will provide power to the site.

j. Finally, the fence can be completed.

k. **Electrical system including provisions in the event of power failure, and telemetering and supervisory control systems**

Electrical Power will be obtained from Maui Electric Company, the local power company providing service to the island. In the event of power failure, the control valve will automatically close. The Department of Water Supply has other wells in the system with stand-by power which can be activated during power emergencies.

9. **Finished Water Storage. Describe location, type and sizing of storage facilities. Include discussion on drains, overflows, telemetering and supervisory controls, painting and protective coating and other important and pertinent considerations.**

A concrete 500,000 gallon reservoir will be used to store the finished water. The reservoir is large enough to allow at least a 30 minute contact period for disinfection purposes. Separate pipes will be installed for inflow and outflow to obtain reasonable circulation within the tank. The site will be drained to an existing swale east of the project. The tank overflow will also be connected to the drainage system.

Protective coating within the tank consist of Sikagard Hi-Bild Prime Coat and a finish coat of Sikagard Hi-Bild. Interior metal shall be either copper or stainless steel (unpainted) except for the inflow, outflow and overflow piping which will be ductile iron pipe with cement lining.
Exterior surfaces of the concrete tank shall be Ramuc Exterior Masonry paint or approved equal. Exterior metal surfaces except copper, stainless steel or bronze shall be coated with rust inhibitive primer and two coats of Sherwin Williams Enameloid or approved equal.

Water level sensors will be placed within the tank to control the well pump. The controller shall have a pump off setting, pump on setting and a low level alarm. The system will be connected to the Department of Water Supply SCADA system for monitoring at their Central Maui Baseyard.


a. Provide general layout of the system.
b. Indicate materials, valves, hydrants, meters, etc.
c. Proximity of other utilities
d. Include effects of incremental or phased construction, possibilities of future developments as applicable
e. Provide information, profiles or sections showing pipe cover, location, groundwater conditions and other important data affecting installation of the distribution system.

The Central Maui System service area has been described previously. A layout of the Central Maui Water System is attached. A description of the total service area was previously described. The water distribution system is one of the existing public water systems maintained by the Maui County Department of Water Supply. The water system materials, construction and maintenance are in accordance to the standards set forth by the Maui County Department of Water Supply. This project is not planned for any specific development but to meet the rising demand for water throughout the water system and to reduce stressing the Iao Aquifer.

11. Financing. Provide information on estimated costs of installation, phasing, operation and maintenance and other related information.

The project will be funded by the Maui County Board of Water Supply. A preliminary cost estimate is attached. Operation and maintenance will be performed by the Department of Water Supply as part of their daily operations on all of the wells in the area.

An estimate of the project construction cost are as follows:

Site improvements including pump, reservoir, electrical/equipment building,
electrical, disinfection, fencing, paving, drainage and miscellaneous piping: $1,330,000.00

16" Transmission Waterline from site to connect to existing transmission line including flow regulating valve, gate valve and connection to existing waterline:

$955,000.00

Total construction estimate for project: $2,285,000.00
Contingencies: $457,000.00
Total project cost not including MECO charges: $2,742,000.00
REFERENCES

8. East Maui Development Plan, Department of Water Supply
KUPAA WELL NO. 1

FIGURES

WELL LOCATION (USGS MAP)

KUPAA 1 WELL SITE TOPOGRAPHIC MAP & PRELIMINARY SITE PLAN

WATER SYSTEM SERVICE AREA

EXAMPLE PUMP CURVE
**PER STAGE PERFORMANCE FOR:***

**Bowl Pattern No.** 547612-A-RO
**Impeller Pattern No.** 547611-A-R0

### NO. OF STAGES
1
2
3

### EFF. CHANGE (NO. OF POINTS)
-3
-1
-0

**HORSEPOWER WILL BE EFFECTED BY CHANGE IN EFFICIENCY**

**PERFORMANCE FOR:**

**Bowl Pattern No.:** 547612-A-RO
**Imp. Pattern No.:** 547611-A-R0

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<td>Maximum Head (FT.) *</td>
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### NOTES
Performance indicated based on cold water with a specific gravity of 1.0.

* Standard construction.
** Minimum submergence over lip of bell to prevent vortexing.

Efficiency improvements are available in certain instances. Please contact the factory.

---

**PER STAGE PERFORMANCE FOR:***

**Bowl Pattern No.** 545320-A-RO
**Impeller Pattern No.** 545324-A-R1

### NO. OF STAGES
1
2
3

### EFF. CHANGE (NO. OF POINTS)
-2½
-1
-0

**HORSEPOWER WILL BE EFFECTED BY CHANGE IN EFFICIENCY**

**PERFORMANCE FOR:**

**Bowl Pattern No.:** 545320-A-RO
**Imp. Pattern No.:** 545324-A-R1

### PUMP DATA

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### NOTES
Performance indicated based on cold water with a specific gravity of 1.0.

* Standard construction.
** Minimum submergence over lip of bell to prevent vortexing.

Efficiency improvements are available in certain instances. Please contact the factory.
EXHIBIT A

THE NORTH WAIHEE AQUIFER, AN ADDITIONAL WATER SOURCE

MINK & YUEN, INC.
THE NORTH WAIHEE AQUIFER
AN ADDITIONAL WATER SUPPLY SOURCE FOR CENTRAL MAUI

John F. Mink
Mink and Yuen, Inc.
April 10, 1997

Introduction
The Iao Aquifer System, which for managerial purposes is defined as the region between Waikapu Valley and Waihee Valley, has satisfactorily supplied Central Maui with drinking water since the Mokuhau wells were drilled more than 30 years ago. The aquifer system is large with an assigned sustainable yield of 20 mgd, but demand has already reached this level and threatens to substantially exceed it in the next few years. New sources of drinking water are needed to meet increasing demand.

As the exploitation of the Iao Aquifer was undergoing considerable expansion with the drilling of the Waiehu Heights and Waiehu wells in the late 1970s and the early 1980s, it became evident that additional sources needed to be located and put on line a decade or so in the future. The region north of Waihee Valley was considered a prime
candidate for groundwater production, but at first most attention was given to developing groundwater in East Maui. The East Maui initiative has been delayed, however, by the discovery of pesticides in newly drilled wells and by legal challenges, leaving the North Waihee groundwater resource as the obvious choice for timely additional development.

Construction of a pipeline connecting North Waihee with the Central Maui distribution network is underway, and two potential production wells are in place. The North Waihee Aquifer will be developed in phases, the first of which incorporates the existing wells and the drilling of two new wells. Details of future phases will depend on the behavior of the aquifer in response to pumping following completion of the first phase.

Relationship Between Iao and North Waihee Aquifer Systems

After it was recognized that production from the Iao Aquifer System would not be able to match the increasing demand in Central Maui, attention turned to the region north of Waihee Valley as a prospective source of additional groundwater. In 1980 Dan Lum, then hydrologist with the State Department of Water and Land Development (DOWALD), suggested that exploratory drilling be attempted on the slope of the ridge
just north of the Waihee River to test whether the area was an extension of the Iao Aquifer System or could be treated as an independent groundwater province. About at the same time Stephen Bowles, consulting hydrologist, recommended essentially the same course of action. Subsequently John F. Mink was retained by C. Brewer Co., owner of the land, to locate drilling sites and design a drilling and testing program.

Two wells were drilled in 1981 and the groundwater data compared with the original premise that if North Waihee was an uninterrupted extension of the Iao Aquifer System, the head should be at least 15 feet, based on the head at Test Hole A-1 located 4000 feet across the valley to the south, and the corollary that if the head were 5 feet or less, the aquifer would be independent of the Iao System. In fact, the head at the exploratory wells was about 10 feet while the head at Test Hole A-1 was nearly 20 feet. This relationship suggested that the Iao Aquifer System was hydraulically connected to North Waihee but that Waihee Valley behaved as a low permeability impediment to hydraulic continuity. The lack of response of groundwater levels at Test Hole A-1 to pumping at the North Waihee wells further suggested that North Waihee could be treated as a quasi-independent aquifer.
system.

The connection between the Iao and North Waihee Aquifer Systems, as well as the dampening effect on hydraulic continuity excercised by the low permeability associated with the alluvium and weathered zone in Waihee Valley, is indicated by comparing the continuous head records at Test Hole A-1 and North Waihee Well 1. The head trace for the test hole is synchronous with that at North Waihee but higher by about 7 feet. If the normal groundwater gradient in basal aquifers of the shield basalts characteristic of every island in Hawaii governed flow, the difference in head would be less than 1 foot. The exaggerated difference is a result of head loss as the groundwater moves through the valley. Global hydraulic conductivity in the valley is at least two magnitudes less than in the unweathered basalt aquifer. A derivation based on Darcy's law indicates that the global hydraulic conductivity of the impediment is about 25 ft./day compared with normal basalt conductivity of 1500 ft./day.

Knowledge of the hydrogeology of both the Iao and North Waihee Aquifer Systems is insufficient to unequivocally establish the pattern of groundwater flow in and from the
aquifers. However, assuming that the general direction of groundwater flow in the Iao Aquifer is toward and across Waihee Valley, the North Waihee System would then be recharged by excess groundwater from Iao as well as by recharge from the high rainfall region north of Waihee Valley. As a result, the sustainable yield of the North Waihee System is substantial. Its magnitude, now estimated to be 8 mgd, will be more accurately determined after an operational record of pumping is established. The sustainable yield refers to the entire North Waihee Aquifer System, which extends from Waihee Valley north to Kahakuloa Valley.

Hydrogeology of the North Waihee Aquifer System

In the Iao Aquifer System the basal aquifer in the Wailuku basalt formation is covered by a caprock of sediments extending to approximately 8000 feet inland of the coast. The inland boundary of the basal aquifer is the rift zone lying about 12,000 feet from the coast and approximately parallel to it. Heads are high in the aquifer because the low permeability of the caprock sediments prevent easy discharge of the groundwater.

This sedimentary blanket, which north of Iao Valley is more
than 1200 feet deep at the coast, is truncated at Waihee Valley. North of Waihee the volcanic rock formations reach to the coast; if a sedimentary blanket exists, it lies below sea level and does not play a role in the North Waihee hydrogeology. The absence of sediments north of Waihee Valley suggests that the sector to the south was displaced downward as a result faulting, and that the fault itself is along what is now Waihee Valley. South of Iao Valley the deep sediments continue beyond Waikapu, but are absent where the Isthmus terminates. The faulted block, therefore, is a wedge truncated on the north at Waihee Valley and ending in the south where the isthmus sediments abut the basalt bedrock.

Although a sedimentary caprock does not exist in the North Waihee Aquifer System, nevertheless north of Waihee Valley a caprock composed of a volcanic formation resists drainage from the basal lens into the sea. The formation constituting the aquifer is the Wailuku basalt, a highly permeable medium equivalent to other premium aquifers such as the Koolau basalt of Oahu in its water bearing properties. In the region between Waihee Valley and Waiolai Gulch, and perhaps beyond to Wailena Gulch, the Wailuku basalt is covered by the Honolua formation, a low permeability combination of
andesite and trachyte in which even lower permeability soil and ash layers are stratified. The Honolua averages about 100 feet in thickness and completely caps the Wailuku basalt to the coast and out to sea. This formation behaves as a caprock in the region where the proposed additional groundwater development is to take place. Figure 1 illustrates the geology of the region.

The Honolua formation is a pale tan to gray to white rock, massive and dense with platy cleavage. Individual andesite layers average about 40 feet thick, and trachyte layers are as much as 150 feet thick. In contrast, the primitive basalt of the Wailuku formation is piled in layers normally 10 feet or less thick throughout which many highly permeable clinker layers occur. A weak unconformity separates the Wailuku from the overlying Honolua, but the volcanism that produced these rocks was continuous, though eruptions were less frequent during the extrusion of the Honolua formation. Nowhere in West Maui is the Honolua exploited as an aquifer.

For convenience in classification and management, the North Waihee Aquifer System is defined as the region extending northward from Waihee Valley to Kahakuloa Valley. The basal portion may be disrupted near Makamakaole Valley by massive
Honolua dikes that connect the trachyte eruptive centers at Puu Kukui and Eke at the crest of the West Maui Mountains with trachyte bulbous domes near the coast, such as Puu Olai (Figure 1). Inland the basal sector ends at the rift zone which is about at and parallel to the Forest Reserve boundary 7000 feet from the coast. In the entire North Waihee Aquifer System the sustainable yield is estimated as 8 mgd; between Waihee and Makamakaole it is less.

North Waihee Wells 1 and 2: Drilling and Testing

In 1981 C. Brewer Co. had two wells drilled in its property on the north bank of Waihee Valley. The wells are located about 500 feet from the axis of the valley and 5200 feet inland from the valley mouth at Waihee Point. The purpose of drilling was exploratory, to determine aquifer characteristics, ground water levels and quality, but the wells were constructed and completed for use as production wells. The locations of wells in the North Waihee Aquifer System is given in Figure 2.

The wells were located to avoid a deep section of valley fill sediments. They were driven from elevation 280 feet through 100 feet of talus into the the Wailuku basalt. The Honolua formation is missing at this level on the slope of
the ridge. The initial head was 9 to 10 feet, which was higher than expected if the aquifer were independent of the Iao Aquifer System to the south yet lower if it were connected. At the time the head at Test Hole A-1, 4000 feet to the south in the Iao Aquifer, was 20 feet during periods of low to no pumping at the Mokuau and Waiehu wells.

Each well was drilled to 105 feet below sea level (BSL) and fitted with 16 inch diameter blank casing to 5 feet BSL, and screen between 5 and 25 feet BSL. The remaining 80 feet was left open.

The pump test in 1982 employed North Waihee 2 as the pumping well and North Waihee 1 as an observation well. The wells are on a line parallel to the valley, 176 feet apart. A continuous 48 hour test at a rate of 1700 gpm (2.45 mgd) was performed. Analysis of the test results determined the transmissivity of the aquifer as 325,000 sq.ft./day and the storage coefficient as .25. Salinity of the pumped water was very low and constant at 15 mg/l chloride. No effect on the head at Test Hole A-1 could be detected, nor were any boundary effects indicated by the drawdown curve.

The test proved the occurrence of a substantial groundwater
resource north of Waihee Valley, and the results implied that the connection with the Iao Aquifer System was weak. The wells were capped. Interest in them flagged because draft in the Iao Aquifer System was still significantly less than the assigned sustainable yield.

Interest was rekindled in 1989 when Iao pumpage began to approach sustainable yield. A longer test with expanded data collection opportunities was designed. An observation well was drilled in Kanoa Valley about 2000 feet north of the North Waihee wells and equipped with a continuous water level recorder. An existing small diameter well in Wailena, 13,500 feet north of the North Waihee wells, was also equipped with a continuous water level recorder. The Wailena well had been drilled in 1987. Test Hole A-1 and North Waihee Well 1 also had continuous water level recorders. North Waihee 2 was selected as the pumping well. Another well in the region, the Mendes well (Figure 2), was not available for measurements. This well has a 4 inch diameter casing and is fitted with a 5 HP pump capable of yielding 20 to 30 gpm. It is infrequently pumped.

Ground elevation at the Kanoa observation well is 305 feet. The drilling log places the Honolua/Wailuku contact at depth
248 feet (57 feet ASL). The initial head was 12.4 feet. The Wailena well ground surface is at 608 feet, and the well lies at the inland turn of the road nearly on the axis of the valley. The Honolua formation is absent in Wailena, and the well penetrated only the Wailuku basalt. The initial head at completion of drilling in 1987 was 6.4 feet while just before commencement of the test it was 6.6 feet. At the start of the test head in North Waihee 1 was 11.5 feet and in North Waihee 2 it was 10.7 feet. At Test Hole A-1 in the Iao Aquifer System the head was 18.1 feet. Heads at Kanoa and North Waihee were inconsistent with a flow net that would have groundwater passing northward from Waihee Valley toward Makamakaole as might be interpreted if flow crossed Waihee Valley from Iao to North Waihee.

The pump test lasted four days, from May 15 to May 19, 1989. The average rate of pumping over the 96 hours was 2400 gpm (3.46 mgd). Drawdown in North Waihee 2, the pumping well, stabilized at 5.5 feet, and in North Waihee 1, 176 feet away, it reached 0.7 feet. At the Kanoa observation well drawdown peaked at 0.4 feet. Tidal efficiency at Kanoa is high because the well lies just 2000 feet from the coast, and the range and distribution of drawdowns on the chart reflected this efficiency. At Wailena and Test Hole A-1 no
change in head attributable to the pumping could be detected. The drawdown curves for North Waihee 1 and Kanoa did not indicate the presence of flow boundaries.

The test results were evaluated both graphically and by computer program to yield values for the fundamental aquifer properties of transmissivity and storage coefficient (effective porosity). At North Waihee 1 transmissivity computed from drawdown data was 320,000 sq.ft./day and storage coefficient .30, about the same as that determined for the 1982 test. The Kanoa data was not as easily interpreted because of the imposition of the tidal signal on the drawdown values. Transmissivity fell between 260,000 and 334,000 sq.ft./day and storage coefficient between .013 and .034. The transmissivity values are consistent with those obtained at North Waihee 1, but the storage coefficient values are a magnitude lower. At the North Waihee wells the computed storage coefficients may represent local phenomena, whereas the values determined at Kanoa may reflect a regional characteristic. For planning the arrangement of a well field the smaller storage coefficient is likely to be more realistic than the larger one. In the Pearl Harbor region of Southern Oahu, for example, where the Koolau formation resembles the Wailuku basalt the regional storage
coefficient is about .05.

For predictive purposes a transmissivity of 325,000 sq.ft./day and coefficient of storage of .05 will be employed. The transmissivity is representative of a highly permeable aquifer having a substantial depth of fresh water flow. Assuming a hydraulic conductivity of 1500 ft./day, which ia a value typical of primitive basalts like the Wailuku formation, and accepting the Ghyben-Herzberg relationship that depth below sea level to the 50 percent sea water isochlorn is 40 times the head, the thickness of the fresh water core is calculated as 217 feet and that of the upper limb of the transition zone as $40h - 217$ (e.g. for a 10 feet head the upper limb would be 183 feet thick). The calculated thickness of the fresh water core is further constrained by the assumption that the groundwater flow contributing to transmissivity is restricted to this zone. These assumptions lead to approximate, not accurate, estimates of zonation in the basal lens. Nevertheless it is clear that the fresh water core is thick because even under the intense stress of pumping 3.46 mgd from a single well the salinity of the pumped water did not increase.
**Proposed Development of the North Waihee Aquifer**

The first phase of the North Waihee groundwater development program calls for activation of the two existing North Waihee wells and drilling two new wells. The existing wells were completed to construction standards meeting both the Department of Health and Commission on Water Resources Management recommendations. One of the new wells, Kupaa 1, will be located at an elevation of approximately 575 feet near the C. Brewer Co. property boundary line on a slope inland of Kahekili Highway. The other, Kanoa 1, will be drilled about 75 to 100 feet inland of the existing Kanoa monitor well.

The North Waihee wells are 16 inch diameter (casing) and bottom at 105 feet BSL. The new wells also will be completed as 16 inch diameter wells after testing proves acceptable production capability. However, the first stage in the drilling protocol for the new wells will consist of a pilot hole driven to 50 feet BSL into which a pump can be lowered for a preliminary test. An option will be included to drill deeper in 25 feet increments if results of the preliminary test fail to predict adequate production.

General specifications and the drilling protocol for the two
new wells are as follows.

1. Drill pilot hole to depth 50 feet BSL.
2. Conduct preliminary pump test in open hole; duration two hours or less.
3. Option to deepen drilling in 25 feet increments if preliminary tests fail to show sufficient production capability.
4. At selected depth, ream boring so it can hold 16 inch diameter casing while allowing for a 3 inch annular space for grouting.
5. Conduct another preliminary test of a few hours duration.
6. Select length of blank casing on basis of preliminary tests.
7. Screen is optional; at most, 10 to 20 feet of screen, the remainder of boring open hole.
8. Grout to water table, which is expected to lie about 10 feet above sea level.

Although the North Waihee 2 well was tested for a continuous run of 96 hours at 3.46 mgd, this rate is about twice that allowable for a production well. Upon reviewing the results of the pumping tests of 1982 and 1989, the preliminary recommendation was to fit the wells with 2 mgd (1390 gpm) pumps. This recommendation envisioned a single well field
comprising two wells in the North Waihee Aquifer. Expansion to more than two wells justifies a more prudent recommendation of 1.5 mgd (1040 gpm) per well. The new wells will be tested to determine whether a 1.5 mgd pump would be appropriate, but final pump size will depend on the results of the long term continuous test.

Total well capacity will be 6.0 mgd if each of the four wells is fitted with a 1.5 mgd pump. A scenario in which one of the existing North Waihee wells serves as an inactive stand-by but the other three wells are producers, and assuming that a peaking factor of 1.5 times average output is exercised for the three active wells, average production will total 3.0 mgd. If the capacity of the inactive well is included, the average output will be 4.0 mgd. Whether or not the North Waihee Aquifer between the C. Brewer Co. property line and Waihee Valley can sustain an average yield of 4.0 mgd is not predictable until a record of the effects of pumping operations on water levels and the quality of the pumped water accumulates.

The proposed location of Kupaa 1 is 1000 feet from the Mendes well and 2 miles south of the new Wailena well. At the time of testing the Wailena well had a 4 inch diameter
casing. In 1994 a new well with 6 inch diameter casing was drilled and successfully tested at 200 gpm. Pumping at Kupaa and Kanoa should not affect the Wailena well because of its distance from the proposed wells. The capacity of the Mendes well is too small for either the quality or quantity of its pumpage to be affected.
Figure 1
NORTH WAIHEE
(Waihee Valley to Kahanakula Valley)
Scale: 1" = 1 mile.

- D: Existing Wells
- O: Proposed Wells

Geology:
- Ra: Recent alluvium and dunes
- Pa: Old alluvium
- Th: Honolulu formation
- Tw: Wailuku formation

Features:
- Wailena
- Mendes
- Kupaa 1
- Kanoa 1
- North Waihee 1,2
Figure 2.
NORTH WAIHEE REGION
WELL SITES

Scale: 1 inch = 2000 feet.
EXHIBIT A - 1

NORTH WAIHEE AQUIFER SYSTEM
KUPAA 1 AND KANOA 1 WELLS
TEST RESULTS AND INTERPRETATION

JOHN F. MINK
MINK & YUEN
Kupaa 1

The location of the well, which was completed in March of 1999, is plotted on Figure 1. The completed configuration of the well is as follows.

- Depth 687 ft. (49 ft. BSL)
- Boring diameter, 21 in.
- Blank casing diameter, 16 in.; depth 633 ft. (4 ft. ASL)
- Perforated casing, diameter 16 in.; length 53 ft.
- Grout, 0 to 630 ft. (7 ft. ASL)
- Gravel, 633 to 686 ft.

Further details are given in the Driller's Well Completion Form, which is attached. Note that the measuring point (MP) on the form differs from the surveyed elevation. The driller's MP elevation on the top of the casing is listed as 638.1 feet; the actual elevation is 639.37 feet, which is based on a vertical survey from a benchmark elevation of 631.87 feet located about 200 feet from the well. This correction affects computation of head but not of drawdown measured during the pumping tests.

Examination of the drill cuttings indicates that the unconformity between the overlying Honolua trachyte formation and the Wailuku basalt formation is 70 to 80 feet below ground surface, and that the weathering zone of the Wailuku extends another 55 feet before fresh Wailuku basalt is struck. The driller's lithology log is attached. Also attached is a drawing illustrating the relationship between the Honolua and Wailuku at both the Kupaa and Kanoa wells.
Step Drawdown Test

Head before pumping started was 7.41 feet (MP 639.37 ft. – DTW 631.96 ft = 7.41 ft.), as measured with the Driller’s tape. Putative stable drawdown at each pumping rate was:

<table>
<thead>
<tr>
<th>Rate (gpm)</th>
<th>Drawdown (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>.35</td>
</tr>
<tr>
<td>700</td>
<td>.82</td>
</tr>
<tr>
<td>1000</td>
<td>1.34</td>
</tr>
<tr>
<td>1400</td>
<td>2.14</td>
</tr>
</tbody>
</table>

In the Appendix these data are used to calculate a transmissivity (T) value of 178,928 sq.ft./day employing the standard laminar-turbulent flow relationship between drawdown and pumping rate. Assuming depth of flow to the well equal to penetration of the well below the water table (about 50 feet), hydraulic conductivity (k) is 3566 ft./day This value is of the magnitude consistent with the usual values derived for other primary basalt aquifers in Hawaii.

Constant Rate Pump Test

The constant rate test at 1200 gpm began at 0900 on March 15, 1999, and went on for four days (96 hours). Initial drawdown was rapid, but after about 40 minutes it no longer decreased monotonically but began to oscillate within a range of approximately 0.5 feet. Tidal and barometric perturbations, randomized by apparent hysterisis in the transducer readings, contributed too much noise to the record to allow an accurate extraction of drawdowns due to pumping alone.

For the first 44 minutes of the test, however, the monotonic drawdowns can be employed in the Theis equation to derive an approximate value of T. The computer program, THEISFIT, yields a T value of 91,363 sq.ft./day, which for a 50 feet depth of flow translates to hydraulic conductivity of 1827 ft./day. This value is of the same magnitude as the one obtained from the step drawdown test data but is probably more accurate and is more consistent with typical values for other Hawaiian basalt aquifers (e.g. The Koolau aquifer of southern Oahu, which has an average hydraulic conductivity of 1500 ft./day). The printout of the THEISFIT computation is included in the Appendix. A realistic value for storage coefficient (S) is impossible to derive because a meaningful radius value for the pumping well is unknowable. The total bore diameter may be one or two feet, but the apparent diameter is likely to be greater.
The effort to disassociate tidal changes in groundwater level from drawdown did not produce clearly identifiable results. However, the tidal efficiency at the well site and Kanoa is 5 to 10 percent. For the maximum tidal change, about 2 feet, the effect on the water level in the well would be 0.10 to 0.20 feet. Change of this magnitude could not be discriminated from barometric and random perturbations after drawdown reached approximately 1.35 feet in less than an hour following the start of the test.

An effort was made to measure water levels in nearby wells during the test. The North Waihee wells were shut down to avoid interference. None of the wells (Kanoa monitor, Mendes, North Waihee) provided unambiguous, interpretable drawdown data.

During the four days of the test chloride content remained steady at 20 to 25 mg/l and temperature was 68 F. The temperature indicates that the source of recharge is from higher elevations where rainfall is copious, and the steady chloride content confirms that at 1200 gpm sea water intrusion does not affect the pumped water. A full spectrum analysis shows that the water is not contaminated with either volatile organics or heavy metals.

**Recommended Pump Size**

The sustained constant rate, 1200 gpm (1.73 mgd), is the recommended pump size. Initial head at Kupaa was 7.41 feet, which is adequate to avoid upconing of sea water during pumping in a well penetrating 50 to 100 feet below the water table. Should adherence to the full breadth of the DWS protocol on pumping be required, average daily yield will be 0.77 mgd (.444 x 1.73 mgd); if only the 16 hr/day pumping portion of the protocol were followed, average yield would be 1.15 mgd (.667 x 1.73 mgd).

**Kanoa 1**

Kanoa 1 was completed in April and tested in May, 1999. Its location is plotted on Figure 1. Final configuration of the well is as follows.

- **Depth**: 359 ft. (50 ft. BSL)
- **Boring diameter**: 22 in.
- **Blank casing diameter**: 16 in.; depth
- **Perforated casing diameter**: 16 in.;
- **Grout**: 0 to 300 ft.
- **Gravel**: 300 to 389 ft.
Further details are given in the attached Drillers Well Completion Form. The measuring point is 309.15 feet above sea level, and the depth to water (DTW) before testing was 301.34 feet, giving a head of 7.81 feet, 0.4 feet higher than at Kupaa 1 a month earlier.

The lithology log places the Honolua/Wailuku unconformity at an elevation of about 64 feet, which is virtually identical to the placement identified by well cuttings from the Kanoa monitor well. The thickness of the Honolua and unconformity is approximately 245 feet. The greater thickness at Kanoa than at Kupaa (75 feet) is due to the topography on to which the Honolua lavas flowed; the Kanoa site is in a pre-existing valley, while the Kupaa site is on a pre-existing ridge.

**Step Drawdown Test**

The step drawdown test was conducted on May 14, 1999, at rates to 1400 gpm. The results are summarized as follows.

<table>
<thead>
<tr>
<th>Rate (gpm)</th>
<th>Drawdown (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>350</td>
<td>.46</td>
</tr>
<tr>
<td>375</td>
<td>.51</td>
</tr>
<tr>
<td>500</td>
<td>.66</td>
</tr>
<tr>
<td>700</td>
<td>1.26</td>
</tr>
<tr>
<td>1100</td>
<td>2.16</td>
</tr>
<tr>
<td>1400</td>
<td>3.36</td>
</tr>
</tbody>
</table>

The computed transmissivity is 124,770 sq.ft./day (see Appendix), which, if the depth of flow is 50 feet, yields hydraulic conductivity of 2495 ft./day. The computed T is comparable to that determined by step drawdown data for Kupaa 1. However, values derived from step drawdown results are indicative rather than absolute; in both wells they are of the same high magnitude that indicates the Wailuku basalt is very permeable.

**Constant Rate Pump Test**

The 1200 gpm constant rate pump test was started at 0900, May 17, and completed at 0900, May 21, 1999, a period of 4 days. Maximum drawdown at the pumping well, uncorrected for tidal and barometric influences, was 2.77 feet. Instantaneous drawdown over the first few moments after the pump was turned on was 2.58 feet, which suggests a maximum aquifer drawdown of 0.19 feet. Transducers were placed in North Waihee Wells 1 and 2, but unambiguous drawdown data could not be deciphered from the computer print-out. Tidal efficiency and barometric
fluctuations compounded by inconsistencies in transducer readings relegate the use of the data to speculation. Similarly the transducer data from the Kanoa monitor well evidently did not reliably reflect pumping drawdown. During testing transducer readings have to be supplemented by tape measurements to check their accuracy and reliability.

Chloride content during the test remained constant at 20 to 24 mg/l (see Appendix), the same as at Kupaa, and temperature fell between 69 and 71 F.

Clearly the North Waihee aquifer is highly permeable and capable of supplying low salinity water at satisfactory pumping rates. When the North Waihee 1 and North Waihee 2 wells were tested in 1981 and 1989, the transmissivity values were 325,000 sq.ft./day for the original test, and 320,000 sq.ft./day for the 1989 test. The associated storage coefficient values were .25 and .30.

**Recommended Pump Size**

As for Kupaa, the recommended pump size is 1200 gpm (1.73 mgd). For the DWS standard factor of .444, average production will be 0.77 mgd, for the more liberal factor of .667, the average will be 1.15 mgd.
APPENDIX

Kupaa 1 Step Drawdown

A value of transmissivity (T) can be calculated from a step drawdown test by assuming that drawdown at each rate is stable and that it is expressed by the equation,

\[ s = aQ + bQ \]

in which \( s \) is drawdown, \( Q \) is pump rate, \( a \) is the laminar flow (aquifer) constant, and \( b \) is the turbulent flow (well loss) constant. The equation is linearized by dividing by \( Q \),

\[ s/Q = a + bQ \]

which plots as a straight line with \( s/Q \) as the ordinate and \( Q \) the abscissa. The value, \( a \), is the intercept, and \( b \) is the slope of the line. An attached graph shows the linear form of the step drawdown curve for Kupaa 1.

To determine \( T \), the intercept, \( a \), is substituted in the Thiem steady state formula for drawdown as a function of pumping. The Thiem equation is,

\[ s = \frac{Q}{2\pi T} \ln \left( \frac{R}{r} \right) \]

in which \( R \) is the nearest distance from the well where \( s = 0 \), and \( r \) is the effective radius of the well. The value of \( R \) is unknown and has to be approximated.

Because \( s = aQ \) in the step drawdown equation refers to laminar flow in the aquifer, substitution in the Thiem equation gives,

\[ aQ = \frac{Q}{2\pi T} \ln \left( \frac{R}{r} \right), \]

and,

\[ T = \frac{1}{2\pi a} \ln \left( \frac{R}{r} \right). \]

The intercept, \( a \), has a value of .00067 (see graph), thus,

\[ T = (237.6) \ln \left( \frac{R}{r} \right). \]
The value of $R$ is estimated as equal to the length of penetration of the well below the water table (Zanger; Polybarunova-Kochina), and assuming the radius of the well as 1 foot,

$$T = (237.6) \ln (50) = 929.5 \text{ gpm/ft}$$

which when converted to consistent units (feet and days) is,

$$T = 178,928 \text{ sq.ft./day}.$$  

For a depth of flow of 50 feet, $k = 3566$ ft/day.

**Kupaa 1 Constant Rate**

Drawdown during the period of monotonic decline before oscillation of the water level set in is plotted on an attached graph. If the Jacob simplification is employed, the $T$ value from the graph is calculated as,

$$T = (264) (1200)/\Delta s$$

In which $\Delta s$ is drawdown over one log cycle of time. Thus, $T = 70,588 \text{ sq.ft./day}$, which is comparable to the THEISFIT value of 91,363 sq.ft./day.

Unfortunately, none of the test result data allows for calculation of storage coefficient ($S$). In the most thoroughly studied Hawaii basaltic aquifer similar to the Wailuku basalt, the Koolau aquifer, storage coefficient as effective porosity is approximately .05, but rigorously conducted tests at North Waihee 1 and North Waihee 2 in 1981 and 1989 gave $S$ values of .25 and .30, respectively.

**Kanoa 1 Step Drawdown**

Employing the same applicable parameters as for the Kupaa 1 step drawdown analysis and a value of .0009606 ft./gpm for the aquifer constant, $a$, the computed value of $T$ is 124,770 sq.ft./day. If depth of flow is equal to depth of penetration of the well below the water table (50 ft.), hydraulic conductivity is 2495 ft./day.

**Kanoa 1 Constant Rate**

The water level data derived from transducer readings was too imprecise to allow for realistic determination of aquifer parameters.
Figure 1 - Vicinity Map
Proposed Exploratory Well Sites
Kupaa Well NO.1 & Kanoa Well No.2
Waihee, Maui, Hawaii
**WELL COMPLETION REPORT**

4/25/97 WCR Form

1. **State Well No.:** 5734-03  **Well Name:** Kona’s Well  **island:** Maui
2. **Location/Address:** North Waihe’e, Wailuku  **Tax Map Key:** 3-3-1-3

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### PART I. WELL CONSTRUCTION REPORT

3. **Drilling Company:** Wailani Drilling Inc.
4. **Name of driller who performed work:** Mike Robertson
5. **Type of rig/construction:** Air Rotary
6. **Date(s) Well Construction and pump tests (if any) completed:** 5/18/99
7. **GROUND ELEVATION** (referenced to mean sea level, msl): 637 ft.
   - **Well Bench Mark (description/location):** Top of Casing
   - **Elevation (msl):** 638.10 ft.
8. **DRILLER’S LOG:** Please attach geologic log (if available or if required by permit)
   - **Depths (ft.)**
     - 0 to 6  **Red Clay**
     - 6 to 10  **Tan Clay & Assorted Rock**
     - 10 to 18  **Grey Clay**
     - (If more space is needed, continue on back)
9. **Total depth of well below ground:** 687 ft.
10. **Hole size:** 2 1/2 inch dia. from 0 ft. to 687 ft. below ground
    - 6 to 10 inch dia. from 6 to 18 ft. below ground
    - 10 to 18 inch dia. from 18 to 36 ft. below ground
11. **Casing installed:** 1 1/2 in. I.D. x 3/8 in. wall solid section to 633 ft. below ground
    - 1 1/2 in. I.D. x 5/16 in. wall perforated section to 636 ft. below ground
12. **Annulus:** Grouted from 0 ft. below ground to 630 ft. below ground
    - Gravel packed from 633 ft. below ground to 686 ft. below ground
13. **Initial water level:** 631.35 ft. below ground
    - **Date and time of measurement:** 3/4/99
14. **Initial chloride:** 2.5 ppm
    - **Date and time of sampling:** 3/4/99
15. **Initial temperature:** 71 °F
    - **Date and time of measurement:** 3/4/99
16. **PUMPING TESTS:** Reference Point (R.P.) used: **well casing** which elevation is 638.10 ft.
    - **(1) Step-Drawdown Test Data:**
      - **Start water level:** 631.9 ft. below R.P.
      - **End water level:** 632.85 ft. below R.P.
    - **(2) Long-term Aquifer Test Date:** 3/5/99
      - **Start water level:** 631.90 ft. below R.P.
      - **End water level:** 632.20 ft. below R.P.
17. **Aquifer Pump Test Procedures data & graphs (1/96 LTAT Form) attached?** Yes No
18. **As-built drawings attached?** Yes No
19. **Other remarks/comments:** (On back of this form)

---

**Well Drilling Contractor (print):** Wailani Drilling Inc., C-57 Lic. No. C-20115
**Signature:** Mike Robertson  **Date:** 5/20/99

**Surveyor (print):** EUGARDO V. VALERA  **Lic. No.:** L.P.L.S. # 5076
**Signature:**  **Date:** May 24, 1999

**Applicant (print):** Dept. of Water Supply
**Signature:**  **Date:** 6/27/99
### PART II. (PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company: 

21. Name of person performing work: 

22. Date Pump Installation Completed: 

23. PUMP INSTALLATION:

<table>
<thead>
<tr>
<th>Pump Type, Make, Serial No.</th>
<th>Depth of Pump Intake Setting</th>
<th>Depth to bottom of airliner</th>
<th>Pumping Head</th>
<th>Type of flow meter</th>
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</thead>
</table>

24. As-built drawings attached? Yes _ No

25. Other remarks/comments. (See below)

<table>
<thead>
<tr>
<th>Pump installation Contractor (print)</th>
<th>C-57 Lic. No.</th>
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<tbody>
<tr>
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<td>Date</td>
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<tr>
<td>Applicant (print)</td>
<td>Date</td>
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### DRILLER'S LOG (cont'd):

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<tr>
<th>Dates (ft)</th>
<th>Water Level</th>
<th>Depth (ft)</th>
<th>Rock Description, Remarks</th>
<th>Water Level</th>
<th>Depth (ft)</th>
<th>Rock Description, Remarks</th>
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<tr>
<td>41 to 59</td>
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<tr>
<td>80 to 110</td>
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19 & 25. Remarks:

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<th>Date/Time</th>
<th>Depth</th>
<th>Drill pipe</th>
<th>Drift Degree</th>
<th>Tooling/Geologic Formation</th>
<th>Air Press.</th>
<th>Bit Press.</th>
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<tbody>
<tr>
<td>8/27  3:30</td>
<td>0-6</td>
<td>N.A.</td>
<td></td>
<td>12 in. HAMMER + STAB = 7 ft. - TOP SUB = 2 ft. RED CLAY</td>
<td>150</td>
<td>N.A.</td>
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<tr>
<td></td>
<td>6-10</td>
<td>&quot;</td>
<td></td>
<td>add 18 ft x 12 in. stabilizer/ TAN CLAY AND ASSORTED ROCK</td>
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<tr>
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<td>10-18</td>
<td>&quot;</td>
<td></td>
<td>GREY CLAY</td>
<td></td>
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<td>5:00</td>
<td>18-25</td>
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<td>0.25</td>
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</tr>
<tr>
<td>7/28</td>
<td>25-31</td>
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<td>add 58x12 inch stabilizer / GREY CLAY AND ASSORTED ROCK</td>
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<td>31-36</td>
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<td>36-41</td>
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<td>49-54</td>
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<td>54-60</td>
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<td>60-80</td>
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<td>110-135</td>
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<td>135-160</td>
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<td>210-235</td>
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<td>235-260</td>
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<tr>
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<td>260-285</td>
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<tr>
<td>1:50-3:50</td>
<td>285-310</td>
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<td>DENSE BASALT (Bluerock)</td>
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</table>
## Well Log

**Kupaa well #1**

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<tr>
<th>Date / Time</th>
<th>Drill pipe no.</th>
<th>Depth</th>
<th>Drift Degree</th>
<th>Tooling / Geologic Formation</th>
<th>Air Press.</th>
<th>Bit Press.</th>
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<tbody>
<tr>
<td>9/2/98</td>
<td>Rain- No Drilling Today</td>
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<tr>
<td>9/3 11:00</td>
<td>#11</td>
<td>310-315</td>
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<td>HARD BASALT</td>
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<td>315-325</td>
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<td>SOFTER BASALT</td>
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<td>12:00</td>
<td>&quot;</td>
<td>325-335</td>
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<tr>
<td>12:15</td>
<td>#12</td>
<td>335-340</td>
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<td>TAN CLAY AND BASALT</td>
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<td>340-355</td>
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<td>SOFTER BASALT</td>
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<td>#18</td>
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<td>635-660</td>
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<td>660-675</td>
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<td>675-685</td>
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Kupaa 1 Step Drawdown Test

Rank 1 Eqn 8160 [Line Robust None, Gaussian Errors] \( y = a + bx \)

\( r^2 = 0.9667889 \) DF Adj \( r^2 = 0.90036669 \) FitStdErr=6.1934602e-05 Fstat=58.220822

\( a = 0.00066990868 \)

\( b = 6.386758e-07 \)
CALCULATION OF 'BEST FIT' TRANSMISSIVITY AND STORAGE COEFFICIENT BY AUTOMATICALLY FITTING EXPERIMENTAL PUMPTEST DATA TO THE THEIS EQUATION IN A LEAST SQUARES SENSE.

constant rate test

INPUT DATA

ENGLISH UNITS

PUMPAGE RATE: 1200 [GAL/MIN]
OBSERVATION DISTANCE FROM PUMPING WELL: 1 [FT]
NUMBER OF ENTERED TIME-DRAWDOWN DATA PAIRS: 8

EXPERIMENTAL TIME-DRAWDOWN DATA

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<th>DRAWDOWN [FT]</th>
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<td>1.35</td>
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CALCULATED GUESS FOR TRANSMISSIVITY SC: 475.845 [GAL/MIN/FT]
CALCULATED GUESS FOR STORAGE COEFFICIENT SC: 7.113292

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<td>ITERATION 7</td>
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Kupaa 1 Pump Test 1200 gpm 3/15/99
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<td>3/18/99</td>
<td>25</td>
</tr>
<tr>
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<td>22</td>
<td>@ 0900 by WS</td>
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<tr>
<td>3/15/99</td>
<td>22</td>
<td>@ 0900 by WS</td>
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<tr>
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<td>20</td>
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<tr>
<td>@ 0900 by ?</td>
<td>20</td>
<td>@ 0900 by NW</td>
<td></td>
</tr>
<tr>
<td>3/16/99</td>
<td>20</td>
<td>3/19/99</td>
<td>21</td>
</tr>
<tr>
<td>@ 2100 by MR</td>
<td>3/17/99</td>
<td>@ 0900 by MR</td>
<td></td>
</tr>
<tr>
<td>@ 0900 by MR</td>
<td></td>
<td>3/17/99</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>@ 2100 by MR</td>
<td>25</td>
</tr>
</tbody>
</table>

APPROVED BY: C. CERIZO
W.M. IV
WELL COMPLETION REPORT

PART I. WELL CONSTRUCTION REPORT

3. Drilling Company: Wai'anae Drilling Inc.
4. Name of driller who performed work: Mike Robertson
5. Type of rig/construction: Air Rotary
6. Date(s) Well Construction and pump tests (if any) completed: 5/15/99
7. GROUND ELEVATION (referenced to mean sea level, msl): 303.716 ft.
   Well Bench Mark (description/location): Top of pump base plate; Elevation(msl) 303.15 ft.
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Rock Description, Water Level, Dates, etc.</th>
<th>Depth (ft.)</th>
<th>Rock Description, Water Level, Dates, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 38</td>
<td>Gray Weathered Rock &amp; Clay (&lt;0 to 10</td>
<td>Gray Rock</td>
<td></td>
</tr>
<tr>
<td>38 to 60</td>
<td>Same with less Clay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Total depth of well below ground: 359 ft.
10. Hole size: 20 in, dia. ft. to 359 ft. below ground
    20 in, dia. ft. to 359 ft. below ground
    20 in, dia. ft. to 359 ft. below ground
11. Casing installed: 16 in. I.D. x 3/8 in. wall solid section to 305 ft. below ground
    16 in. I.D. x 3/8 in. wall perforated section to 359 ft. below ground
    Casing Material/Slot Size: 1/4" full wall, Lauered
12. Annulus: Grouted from 300 ft. to 359 ft. below ground
    Gravel packed from 300 ft. below ground to 359 ft. below ground
13. Initial water level: 299.63 ft. below ground.
    Date and time of measurement: 5/17/99
    Date and time of sampling: 5/17/99
15. Initial temperature: 69°F
    Date and time of measurement: 5/17/99
16. PUMPING TESTS: Reference Point (R.P.) used: Pump base plate, which elevation is 303.15 ft.

(1) Step-Drawdown Test Date 5/14/99
   Start water level: 301.39 ft. below R.P.
   End water level: 301.3 ft. below R.P.

(2) Long-term Aquifer Test Date 5/17/99
   Start water level: 301.39 ft. below R.P.
   End water level: 301.3 ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs (1/96 LTAT Form) attached? Yes No
18. As-built drawings attached attached? Yes No
19. Other remarks/comments: (On back of this form)

Well Drilling Contractor (print): Mike Robertson C-57 Lic. No. 20115
Signature: Mike Robertson Date 5/15/99

Surveyor (print): EDUARDO A.C. ALEPA
Lic. No. L.P. 57174 May 13, 1986
Signature: Date

Applicant (print): DEPARTMENT OF WATER SUPPLY
Signature: Date 6/23/99
### PART II. (PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company: 

21. Name of person performing work: 

22. Date Pump Installation Completed: 

23. PUMP INSTALLATION:
   - Pump Type, Make, Serial No.: 
   - Capacity: gpm
   - Motor type, H.P., Voltage, rpm: 
   - Depth of Pump Intake Setting: ft. below , which elevation is ft.
   - Depth to bottom of airlift: ft. below , which elevation is ft.
   - Pumping Head is ft. Type of flow meter: , which measures in:

24. As-built drawings attached? Yes No

25. Other remarks/comments: (See below) 

---

#### Pump Installation Contractor:

Signature __________________________ Date ____________

C-57 Lic. No. __________________________

#### Applicant:

Signature __________________________ Date ____________

---

### 8. (cont’d) DRILLER’S LOG (cont’d):

<table>
<thead>
<tr>
<th>Water Level</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks</th>
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</thead>
<tbody>
<tr>
<td>Dates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95 to 135</td>
<td>Hard Basalt Bluerock</td>
<td></td>
</tr>
<tr>
<td>135 to 225</td>
<td>Weathered Basalt</td>
<td></td>
</tr>
<tr>
<td>225 to 240</td>
<td>Hard Basalt</td>
<td></td>
</tr>
<tr>
<td>240 to 250</td>
<td>Hard Tan Rock</td>
<td></td>
</tr>
<tr>
<td>250 to 260</td>
<td>Weathered Basalt</td>
<td></td>
</tr>
<tr>
<td>260 to 305</td>
<td>Softer Black Lava (3a)</td>
<td></td>
</tr>
<tr>
<td>305 to 325</td>
<td>Dense Bluerock</td>
<td></td>
</tr>
<tr>
<td>325 to 329</td>
<td>Black + Red Cinders + Water</td>
<td></td>
</tr>
</tbody>
</table>

---

19 & 25. Remarks:

---
<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Drill Pipe #</th>
<th>Drift Degrees</th>
<th>Depth in Feet</th>
<th>Tooling/Geologic Formation</th>
<th>Air Press.</th>
<th>Bit Press.</th>
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<tbody>
<tr>
<td>3/15/99</td>
<td>1</td>
<td>0.3</td>
<td>70-85</td>
<td>gray rock - weathered basalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:30</td>
<td>2</td>
<td>0.4</td>
<td>85-110</td>
<td>hard basalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:15</td>
<td>3</td>
<td>0.5</td>
<td>115-135</td>
<td>same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:45</td>
<td>4</td>
<td>0.5</td>
<td>135-160</td>
<td>same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:20</td>
<td>5</td>
<td>0.3</td>
<td>160-185</td>
<td>same</td>
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<td></td>
</tr>
<tr>
<td>11:15</td>
<td>6</td>
<td>0.7</td>
<td>185-210</td>
<td>same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:10</td>
<td>7</td>
<td>0.3</td>
<td>225</td>
<td>hard dense basalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:15</td>
<td>8</td>
<td>0.5</td>
<td>235-240</td>
<td>same</td>
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<td></td>
</tr>
<tr>
<td>4:10</td>
<td>9</td>
<td>0.3</td>
<td>260-285</td>
<td>soft black lava (aa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:40</td>
<td>10</td>
<td>0.6</td>
<td>285-305</td>
<td>same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/17/99</td>
<td>11</td>
<td>0.4</td>
<td>310-325</td>
<td>same</td>
<td>125</td>
<td>0</td>
</tr>
<tr>
<td>8:00</td>
<td></td>
<td></td>
<td>325-335</td>
<td>black and red cinders - hit water table</td>
<td>150</td>
<td>18</td>
</tr>
<tr>
<td>10:10</td>
<td>12</td>
<td></td>
<td>335-359</td>
<td>black and red cinders - water bearing</td>
<td>163</td>
<td>32</td>
</tr>
</tbody>
</table>

Static Water Level = 299.68 ft.
Reference elevation point = 307.76 ft.
Static Head = 8.08 ft.
Kanoa 1 Step Drawdown 5/14/99

![Graph showing the relationship between Pump Rate (gpm) and Drawdown/Rate (ft/gpm). The graph includes a straight line and several data points.]
REPORT DATE: JUNE 2, 1999

CLIENT: TAKUMI ENGINEERING
18 CENTRAL AVENUE
WAILUKU, MAUI, HAWAII 96793
PHONE #: [Redacted]

MATRIX: WATER

SAELPER:

EPA METHOD: CHLORIDE: 4500-CI

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>CHLORIDE</th>
<th>SAMPLE ID</th>
<th>CHLORIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KANOA WELL 1</td>
<td>mg/L</td>
<td>KANOA WELL 1</td>
<td>mg/L</td>
</tr>
<tr>
<td>5/14/99 by WS</td>
<td>20</td>
<td>5/19/99 @ 0900 by MR</td>
<td>24</td>
</tr>
<tr>
<td>5/17/99 @ 0930 by WS</td>
<td>20</td>
<td>5/20/99 @ 1430 by WS</td>
<td>24</td>
</tr>
<tr>
<td>5/18/99 @ 0820 by LP</td>
<td>21</td>
<td>5/21/99 @ 0900 by WS</td>
<td>24</td>
</tr>
</tbody>
</table>

ANALYST: L. AMANO

APPROVED BY: C. GERIZO
W. M. IV
EXHIBIT B

WATER QUALITY TESTING RESULTS
EXHIBIT B-1

WATER QUALITY ANALYSIS

NORTH WAIHEE WELL NO. 2
REPORT DATE: JUNE 23, 1997

SITE: NORTH WAIHEE WELL # 2
USGS 56-31-03

MATRIX: WATER

D. TE/TIME SAMPLED: 6/09/97 @ 1000
SAMPLER: K.KUBA

D. TE/TIME RECEIVED: 6/09/97 @ 1228
TEMP. CONTROL: 7.0 °C

METHOD:
- TOTAL COLIFORM: 9222B
- FECAL COLIFORM: 9221C
- HPC: 9215B

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>TOTAL COLIFORM BACTERIA [# / 100 ML]</th>
<th>FECAL COLIFORM VERIFICATION</th>
<th>HPC [CFU/100 ML]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORTH WAIHEE WELL #2 [S-574]</td>
<td>NOT FOUND</td>
<td></td>
<td>610</td>
</tr>
</tbody>
</table>

ANALYST: L.POOLE
APPROVED BY: C.CERIZO
CHEMIST
County of Maui
Department of Water Supply
Water Quality Laboratory
614 Palapala Drive
Kahului, Maui, Hawaii 96732

June 23, 1997

Location: NORTH WAIHEE WELL #2
USGS 56-31-03

Date Sampled Collected: June 9, 1997
Sampler: K.Kuba

<table>
<thead>
<tr>
<th>TEST</th>
<th>UNITS</th>
<th>METHOD</th>
<th>MCL</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity</td>
<td>uS/cm</td>
<td>2510B</td>
<td>-</td>
<td>292</td>
</tr>
<tr>
<td>pH</td>
<td>-</td>
<td>4500H</td>
<td>6.5-8.5</td>
<td>7.2</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td>22°C</td>
</tr>
<tr>
<td>Turbidity</td>
<td>N.T.U.</td>
<td>2130B</td>
<td>&lt; 1.0</td>
<td>0.88</td>
</tr>
</tbody>
</table>
Laboratory Report #34716
Montgomery Watson Laboratories
555 Walnut Street
Pasedena, California 91101
618-562-6540 Fax 618-562-8725
Toll Free 1-800-562-1523

Maui, County of, Department of Water Supply
Cari Cerizo
614 Palapala Dr
Kahului, HI 96732

Samples Received
10-Jun-1997 12:45:04

---

**N. WAINEE WELL 2**

- **USGS 563103 (970610016)**
- **Sampled on 06/09/97**

<table>
<thead>
<tr>
<th>Analytes</th>
<th>Result</th>
<th>Units</th>
<th>MDL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alkalinity</strong></td>
<td>110</td>
<td>mg/l</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Asbestos by TEM</strong></td>
<td>&lt;0.13</td>
<td>MFL</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>Calcium, Total, ICAP</strong></td>
<td>13</td>
<td>mg/l</td>
<td>1.0</td>
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<tr>
<td><strong>Cyanide</strong></td>
<td>ND</td>
<td>ug/l</td>
<td>0.025</td>
</tr>
<tr>
<td><strong>Endothall</strong></td>
<td>ND</td>
<td>ug/l</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Fluoride</strong></td>
<td>0.20</td>
<td>mg/l</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Glyphosate</strong></td>
<td>ND</td>
<td>ug/l</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Mercury</strong></td>
<td>ND</td>
<td>ug/l</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Nitrite, Nitrogen by IC</strong></td>
<td>ND</td>
<td>mg/l</td>
<td>0.63</td>
</tr>
</tbody>
</table>

**525 Semivolatiles by GC/MS**

- **06/19/97 (ML/EPA 325.2)**
  - 2,4-Dinitrotoluene
    - ND
    - ug/l
    - 0.10
  - alpha-Chlordane
    - ND
    - ug/l
    - 0.050
  - Acreaphylenone
    - ND
    - ug/l
    - 0.10
  - Dacchlor
    - ND
    - ug/l
    - 0.050
  - Aldrin
    - ND
    - ug/l
    - 0.050
  - Anthracene
    - ND
    - ug/l
    - 0.020
  - Atrazine
    - ND
    - ug/l
    - 0.050
  - Benz(a)Anthracene
    - ND
    - ug/l
    - 0.050
  - Benzo(a)pyrene
    - ND
    - ug/l
    - 0.020
  - Benzo(b)Fluoranthene
    - ND
    - ug/l
    - 0.020
  - Benzo(g,h,i)Perylene
    - ND
    - ug/l
    - 0.050
  - Benzo(k)Fluoranthene
    - ND
    - ug/l
    - 0.020
  - Di(2-Ethylhexyl)phthalate
    - ND
    - ug/l
    - 0.50
  - Butylbenzylphthalate
    - ND
    - ug/l
    - 2.0
  - Bromacil
    - ND
    - ug/l
    - 0.050
  - Butachlor
    - ND
    - ug/l
    - 0.020
  - Caffeine
    - ND
    - ug/l
    - 0.020
  - Chrysene
    - ND
    - ug/l
    - 0.020
  - Dibenzo(a,h)Anthracene
    - ND
    - ug/l
    - 0.050

---

Page 1
<table>
<thead>
<tr>
<th>Date</th>
<th>Analyte</th>
<th>Result</th>
<th>Units</th>
<th>MDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/19/97</td>
<td>Di-(2-Ethylhexyl) adipate</td>
<td>ND</td>
<td>ug/l</td>
<td>0.60</td>
</tr>
<tr>
<td>06/19/97</td>
<td>Diethylphthalate</td>
<td>ND</td>
<td>ug/l</td>
<td>0.50</td>
</tr>
<tr>
<td>06/19/97</td>
<td>Dieldrin</td>
<td>ND</td>
<td>ug/l</td>
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</tr>
<tr>
<td>06/19/97</td>
<td>Dimethylphthalate</td>
<td>ND</td>
<td>ug/l</td>
<td>0.50</td>
</tr>
<tr>
<td>06/19/97</td>
<td>Dimecachlorobenzene</td>
<td>ND</td>
<td>ug/l</td>
<td>0.50</td>
</tr>
<tr>
<td>06/19/97</td>
<td>Hexachlorodiphenylethane</td>
<td>ND</td>
<td>ug/l</td>
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<td>Hexachlorocyclopentadiene</td>
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<td>Heptachlor</td>
<td>ND</td>
<td>ug/l</td>
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<tr>
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<td>Heptachlor Epoxide</td>
<td>ND</td>
<td>ug/l</td>
<td>0.050</td>
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<tr>
<td>06/19/97</td>
<td>Indeno(1,2,3-cd) Pyrene</td>
<td>ND</td>
<td>ug/l</td>
<td>0.050</td>
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<tr>
<td>04/19/97</td>
<td>Isophorone</td>
<td>ND</td>
<td>ug/l</td>
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<tr>
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<td>Lindane</td>
<td>ND</td>
<td>ug/l</td>
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<tr>
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<td>Methoxycarbarylchlorine</td>
<td>ND</td>
<td>ug/l</td>
<td>0.20</td>
</tr>
<tr>
<td>06/19/97</td>
<td>Methoxychloroacetate</td>
<td>ND</td>
<td>ug/l</td>
<td>0.050</td>
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<td>06/19/97</td>
<td>Molinate</td>
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<td>ug/l</td>
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<tr>
<td>06/19/97</td>
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<td>ND</td>
<td>ug/l</td>
<td>0.050</td>
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<tr>
<td>06/19/97</td>
<td>trans-Nonachlor</td>
<td>ND</td>
<td>ug/l</td>
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<tr>
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<td>Pentachlorophenol</td>
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<td>ND</td>
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<tr>
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<td>Aldicarb</td>
<td>ND</td>
<td>ug/l</td>
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<tr>
<td>06/17/97</td>
<td>B-Hydroxycarbofuran</td>
<td>ND</td>
<td>ug/l</td>
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<td>06/17/97</td>
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<td>ND</td>
<td>ug/l</td>
<td>0.80</td>
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Maui, County of, Department of Water Supply
(continued)

<table>
<thead>
<tr>
<th>Anal. Date</th>
<th>Method</th>
<th>Analyte</th>
<th>Result</th>
<th>Units</th>
<th>MDL</th>
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<tbody>
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<td>Aldicarb sulfoxide</td>
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<td>ug/l</td>
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<td>Baygon</td>
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<td>MDL</td>
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**Nitrate by IC as NO3 & N**

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<th>Result</th>
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<th>MDL</th>
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**SDWA Pesticides**

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<tbody>
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<td>Units</td>
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**Volatile Organic Compounds**

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<th>MDL</th>
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### Anal Method Analyte

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Maui, County of, Department of Water Supply
(continued)

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Laboratory Report

for

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului, HI 96732

Attention: Cari Cerizo

JUN 11 1999

Report#: 54445
The following samples were received from you on 05/20/99. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Montgomery Watson Laboratories.

<table>
<thead>
<tr>
<th>Sample#</th>
<th>Sample Id</th>
<th>Tests Scheduled</th>
<th>Matrix</th>
<th>Sample Date</th>
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<td>@DIQUAT @EDB-DBC @MET-HI @ML502.2 @ML525 TCDD-DW ALK</td>
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Test Acronym | Description
---|---
@DIQUAT | Diquat and Paragquat
@EDB-DBC | EDB and DBCP by GC-ECD
@MET-HI | ICPMS Metals
@ML502.2 | Volatile Organic Compounds
@ML525 | 525 Semivolatiles by GC/MS
@ML531 | Aldicarbs
@NPS3 | Herbicides by 515.1
@PESTSDW | SDWA Pesticides
ALK | Alkalinity
CA | Calcium, Total, ICAP
CNDW | Cyanide
ENDOTHAL | Endothall
F | Fluoride
GLYPHOS | Glyphosate
HG | Mercury
NO2-N | Nitrite, Nitrogen by IC
NO3 | Nitrate-N by IC
TCDD-DW | 2,3,7,8 - TCDD
## Chain of Custody Record

### Project Name:
- County of Maui

### Project Job # / P.O. #:

### Analyses Required:

### Sampler(s):
- PRINTED NAME AND SIGNATURE: L. POOLE

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<td>KANOA WELL</td>
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<td>SEE</td>
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### Signature and Print Name:
- PRINT NAME: L. POOLE
- COMPANY/TITLE: DWS-MAUI
- DATE: 5/19/99
- TIME: 0800
- RECEIVED BY: L. POOLE

### Purchasing Information:
- FED EX #
- COOLER #
- DESTINATION: MONTGOMERY WATSON LABORATORIES
- OTHER:

---

**C.O.C #**

1. ORIGINAL COPY: SEND WITH SAMPLE
2. YELLOW COPY: RETAINED BY SAMPLER
3. PINK: OFFICE COPY

PAGE ___ OF ___
Report Summary of positive results, PR54445

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### Laboratory Report

**Sample #: 990520027 | Sample ID: HAHOA WELL | Project: PHASEV

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**Laboratory:** Maui, County of, Department of Water Supply

**Address:** 614 Palapala Dr, Kahului, HI 96732

**ATTN:** Cari Cerizo

**Report #: 54445**
**Diquat and Paraquat** (ML/EPA 549.1)

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Sample #: 396520027
Sample ID: KANOA WELL
Project: PHASEV
Sample Type: Water
Sampled: 18-May-1999
Received: 20-May-1999
Reported: 11-Jun-1999

MONTGOMERY WATSON LABORATORIES
555 East Walnut Street
Pasadena, California 91101
Tel: 800-566-LABS (800-566-5227)
Fax: 1-800-566-5229

Maui, County of, Department of Water Supply
614 Palapala Dr
Kahului, HI 96732
ATTN: Cari Cerizo

Report #: 54445
**Laboratory Report**

Maui, County of, Department of Water Supply
614 Palapala Dr

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Report #: 54445
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### Volatile Organic Compounds (ML/EPA 502.2)

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Data Entry: 05/26/99
**Sample ID: KANOA WELL**

**Sample Type: Water**

**Sample Date: 18-May-1999**

**Received Date: 20-May-1999**

**Reported Date: 11-Jun-1999**

### 525 Semivolatiles by GC/MS (ML/EPA 525.2)

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**Sample Type** Water  
**Sampled** 18-May-1999  
**Received** 20-May-1999  
**Reported** 11-Jun-1999  

**525 Semivolatiles by GC/MS** *(ML/EPA 525.2)*

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Report Id: 54445
# Laboratory Report

**Sample** # 990520027  **Sample ID** KANOA WELL  **Project** PHASEV

Sample Type Water  Sampled 10-May-1999  Received 20-May-1999  Reported 11-Jun-1999

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## Aldicarbs (ML/EPA 531.1)

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Report #: 54445
### Laboratory Report

**Sample ID:** KANOA WELL  
**Sample Type:** Water  
**Sampled:** 18-may-1999  
**Received:** 20-may-1999  
**Reported:** 11 jun-1999

#### SDWA Pesticides (ML/EPA 508)

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<th>By</th>
<th>Analyzed</th>
<th>By</th>
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<tbody>
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<tr>
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<td>ug/l</td>
<td>ND</td>
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<tr>
<td>Beta-BHC</td>
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<td>ND</td>
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<td>21-may-1999</td>
<td>kkc</td>
<td>27-may-1999</td>
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<tr>
<td>p,p'DDD</td>
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<td>kkc</td>
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<td>21-may-1999</td>
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<tr>
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<td>ND</td>
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<tr>
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<td>Endosulphan II (beta)</td>
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<td>21-may-1999</td>
<td>kkc</td>
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<td>Data Entry</td>
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</tr>
</tbody>
</table>

**Report #:** 51445
Laboratory Report

for

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului, HI 96732

Attention: Cari Cerizo

REPORT SUBMITTED ON

JUL 3, 1999

HDS

Report #: 55058
**To** Nanny Estrada  
Tanterra Environmental Services  
0 Riverside Parkway  
Riverside, CA 95605  

**To Receiver**: FEDEX ACCT: 2060-8019-1  
6) 373-5600  

**Montgomery Watson Laboratories**  
555 East Walnut Street  
Pasadena, CA 91101  
Ph (626) 568-6400 Fax (626) 568-6324

---

**To** Nanny Estrada  
Tanterra Environmental Services  
0 Riverside Parkway  
Riverside, CA 95605  

**To Recipient**: FEDEX ACCT: 2060-8019-1  
6) 373-5600  

**Montgomery Watson Laboratories**  
555 East Walnut Street  
Pasadena, CA 91101  
Ph (626) 568-6400 Fax (626) 568-6324

---

**Reporting**: One report for this MWL Project Number: 55058  
*Do Not Combine Report with any other samples submitted under different MWL project numbers!*  
Report & Invoice must have the MWL Project Number and Sub PO#: 99-0669  
Report all quality control data according to Method. Include dates analyzed, date extracted (if extracted) and Method reference on the report. Fax results to 626-568-6324  
Fax results must have complete data & QC. Hardcopy report is due in hand on due date.  
Please advise us immediately if Due Date will be missed.

**Hardcopy Report, forms, & invoice must be sent to attention**  
Martha Frost, Sub-contracting Administrator  
Montgomery Watson Laboratories 555 East Walnut Street Pasadena, CA 91101  
Ph (626) 568-6437 Fax (626) 568-6324

---

<table>
<thead>
<tr>
<th>QTY</th>
<th>Test Code</th>
<th>Lab # for ID</th>
<th>Client Sample ID for reference only</th>
<th>Analysis Requested</th>
<th>Sample Date</th>
<th>Matrix</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TCDD DW</td>
<td>990661009</td>
<td>KANOA WELL (99052027)</td>
<td>Dioxin in drinking water 1613b</td>
<td>05/18/99</td>
<td>dw</td>
<td>1L amber glass / no preservative</td>
</tr>
</tbody>
</table>

---

**RECEIVED IN GOOD CONDITION UNDER COC**  
**JUN 12 1999**  

**Sample Control**:  
Date 06/11/99 Time 11:42  
An Acknowledgement of Receipt is requested to attn: Martha Frost
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Result</th>
<th>Conc.</th>
<th>%Rec</th>
<th>Dilution</th>
<th>Exp. Limit</th>
<th>Prepared By</th>
<th>Analyzed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD</td>
<td>mg/L</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Sample ID: KANOA WELL (990520027)
Sample Type: Water
Sampled: 10-May-1999
Received: 11-Jun-1999
Reported: 30-Jun-1999

Kahului, HI 96732
ATTN: Carl Cerizo

Report #: 55058
ANALYTICAL REPORT

PROJECT NO. 55058

Lot #: G9F120155

Martha Frost
Montgomery Laboratories

QUANTERRA INCORPORATED

Nanny Estrada
Project Manager

June 28, 1999
Group Validation Comments

TCDD by Qunaterra (G9F120155)
June 28, 1999

QUANTERRA INCORPORATED PROJECT NUMBER: G9F120155
PO/CONTRACT: 99-0669

Martha Frost
Montgomery Laboratories
555 East Walnut Street
Pasadena, CA 91101

Dear Ms. Frost,

This report contains the analytical results for the aqueous sample received under chain of custody by Quanterra Incorporated on June 12, 1999. This sample is associated with your project number 55058.

All applicable quality control procedures met method-specified acceptance criteria.

If you have any questions, please feel free to call me.

Sincerely,

[Signature]

Nanny Estrada
Project Manager
## SAMPLE SUMMARY

**G9F120155**

<table>
<thead>
<tr>
<th>WC #</th>
<th>SAMPLE#</th>
<th>CLIENT SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
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<tbody>
<tr>
<td>CWT3F</td>
<td>001</td>
<td>990611009</td>
<td></td>
<td>05/18/99</td>
</tr>
</tbody>
</table>

**NOTE(S):**

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as 'ND' were not detected at or above the stated limits.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.
Sample Preparation and Analysis Control Numbers

<table>
<thead>
<tr>
<th>SAMPLE#</th>
<th>MATRIX</th>
<th>ANALYTICAL METHOD</th>
<th>LEACH BATCH #</th>
<th>PREP BATCH #</th>
<th>MS RUN#</th>
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<tbody>
<tr>
<td>001</td>
<td>WATER</td>
<td>EPA-5 1613B-Tetra</td>
<td></td>
<td>9167334</td>
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</table>
Lot-Sample #: G9F120155-001  Work Order #: CWTJF101  Matrix: WATER
Date Sampled: 05/18/99  Date Received: 06/12/99
Prep Date: 06/18/99  Analysis Date: 06/26/99
Prep Batch #: 9167334
Dilution Factor: 1

<table>
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<tr>
<th>PARAMETER</th>
<th>RESULT</th>
<th>DETECTION LIMIT</th>
<th>METHOD</th>
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<tbody>
<tr>
<td>2,3,7,8-TCDD</td>
<td>ND</td>
<td>2.5</td>
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<tr>
<td>INTERNAL STANDARDS</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>13C-2,3,7,8-TCDD</td>
<td>111</td>
<td></td>
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<table>
<thead>
<tr>
<th>MATRICES</th>
<th>UNITS</th>
<th>METHOD</th>
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</thead>
<tbody>
<tr>
<td>WATER</td>
<td>pg/L</td>
<td>ZPA-5 1613B-Tetra</td>
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# METHOD BLANK REPORT

**Dioxins**

Client Lot #: G9F120155  
MB Lot-Sample #: G9F160000-334

Analysis Date: 06/25/99  
Prep Date: 06/13/99

Dilution Factor: 1  
Prep Batch #: 9157334

Work Order #: C00CE101  
Matrix: WATER

<table>
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<th>RESULT</th>
<th>DETECTION</th>
<th>LIMIT</th>
<th>UNITS</th>
<th>METHOD</th>
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<tbody>
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<td>112</td>
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**NOTE(S):**

Calculations are performed before rounding to avoid round-off errors in calculated results.
LABORATORY CONTROL SAMPLE DATA REPORT

Dioxins

Client Lot #: G9F120155  Work Order #: CX0CE102  Matrix: WATER
LCS Lot-Sample#: G9F160000-334
Prep Date..... 06/18/99  Analysis Date.: 06/25/99
Prep Batch #: 9167334
Dilution Factor: 1

<table>
<thead>
<tr>
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<th>SPIKE AMOUNT</th>
<th>MEASURED AMOUNT</th>
<th>UNITS</th>
<th>PERCENT RECOVERY</th>
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<tr>
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<td>200</td>
<td>223</td>
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INTERNAL STANDARD

<table>
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<th>13C-2,3,7,8-TCDD</th>
<th>PERCENT RECOVERY</th>
<th>RECOVERY LIMITS</th>
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<tr>
<td>105</td>
<td></td>
<td>(25 - 141)</td>
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</table>

NOTE(S):
Calculus are performed before rounding to avoid round-off errors in calculated results.
Bold print denotes control parameters.
**LABORATORY CONTROL SAMPLE EVALUATION REPORT**

**Dioxins**

Client Lot #: G9F120155  
LCS Lot-Sample#: G9F150000-334  
Prep Date......: 06/18/99  
Prep Batch #: 9187334  
Dilution Factor: 1

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<th>LIMITS</th>
<th>METHOD</th>
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<td>111</td>
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<td>(73 - 146)</td>
<td>EPA-5 1613B-Tetras</td>
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**INTERNAL STANDARD**

<table>
<thead>
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<th>RECOVERY</th>
<th>LIMITS</th>
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<tr>
<td>13C-2,3,7,8-TCDD</td>
<td>106</td>
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<td>(25 - 141)</td>
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</table>

**NOTE(S):**

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters.
EXHIBIT B-3

WATER QUALITY ANALYSIS

KUPAA WELL NO. 1
STATE WELL 5731-03
# Water Quality Lab Report

**County of Maui**

**Department of Water Supply**

**Water Quality Lab**

614 Palapala Drive

Kahului, Maui, Hawaii 96732

---

**Report Date:** MAR 22, 1999

**Client:** TAKUMI ENGINEERING

18 CENTRAL AVENUE

WAILUKU, MAUI, HAWAII 96793

**Phone #:**

---

**Matrix:** WATER

---

**Sampler:**

---

**EPA Method:** CHLORIDE: 4500-Cl

---

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Chloride (mg/L)</th>
<th>Sample ID</th>
<th>Chloride (mg/L)</th>
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<tbody>
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<td>KUPAA WELL 1</td>
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<td>KUPAA WELL 1</td>
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<tr>
<td>3/15/99 @ 0935 by WS</td>
<td>20</td>
<td>3/18/99 @ 0806 by KK</td>
<td>25</td>
</tr>
<tr>
<td>3/15/99 @ 2100 by ?</td>
<td>22</td>
<td>3/18/99 @ 0900 by WS</td>
<td>25</td>
</tr>
<tr>
<td>3/16/99 @ 0900 by ?</td>
<td>22</td>
<td>3/18/99 @ 2100 by MR</td>
<td>20</td>
</tr>
<tr>
<td>3/16/99 @ 2100 by MR</td>
<td>20</td>
<td>3/19/99 @ 0900 by NR</td>
<td>21</td>
</tr>
<tr>
<td>3/17/99 @ 0900 by MR</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/17/99 @ 2100 by MR</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Approved by:** C. Cerizo

W.M. IV

---

The table above details the chloride concentrations measured in samples collected from the Kupaa Well 1 over the period of March 15th to 17th, 1999. The concentrations range from 20 to 25 mg/L, with the most consistent values being around 22 mg/L.
Laboratory Report

for

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului, HI 96732

Attention: Cari Cerizo
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Result</th>
<th>Conc. (%)</th>
<th>Mcc</th>
<th>Dilution</th>
<th>Det. Limit</th>
<th>Prepared By</th>
<th>Analyzed By</th>
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</thead>
<tbody>
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<td>Diquat</td>
<td>ug/l</td>
<td>ND</td>
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<td>Units</td>
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<td>Conc.</td>
<td>% RSD</td>
<td>Dilution</td>
<td>Det. Limit</td>
<td>Prepared</td>
<td>By</td>
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<tr>
<td>---------------------------</td>
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</tr>
<tr>
<td>Alkalinity</td>
<td>(ML/SM/210)</td>
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<tr>
<td>Calcium, Total, ICAP</td>
<td>(ML/EPA 200.7)</td>
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<td>Cyanide</td>
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<tr>
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Report #: 52800
Laboratory Report

Maui, County of, Department of Water Supply
614 Palapala Dr
Kahului , HI 96732
ATTN: Cari Cerizo

EDB and DBCP by GC-ECD (ML/EDA 504.1 )

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Data Entry: 03/31/99
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# Laboratory Report

**Sample ID:** KUPAA WELL  
**Project:** PHASE  
**Sample Type:** Water  
**Sampled:** 18-mar-1999  
**Received:** 19-mar-1999  
**Reported:** 19-apr-1999

## Volatile Organic Compounds (ML/EPA 502.2)

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<th>Conc.</th>
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Report ID: 52800

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**Laboratory:** BOO 566 LABS  
**Address:** 614 Palapala Dr  
**City:** Kahului  
**State:** HI  
**Zip Code:** 96732  
**Phone:** 967-2121
### Volatile Organic Compounds (ML/EPA 502.2)

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<th>Units</th>
<th>Result</th>
<th>Conc.</th>
<th>MEq</th>
<th>Dilution</th>
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**Sample ID:** KUPAA WELL

**Sample Type:** Water

**Sampled:** 18-Mar-1999

**Received:** 19-Mar-1999

**Reported:** 19-Apr-1999

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**525 Semivolatile s by GC/MS (ML/EPA 525.2)**

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Data Entry: 01 31 99
### Laboratory Report

Maui, County of, Department of Water Supply
614 Paipala Dr.

Kahului, HI 96732

ATTN: Cari Cerizo

---

**Sample ID:** EUPAA WELL

**Sample Type:** Water

**Sampled:** 19-mar-1999

**Received:** 19-mar-1999

**Reported:** 19-apr-1999

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Report #: 52800

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Report Entry: 01/22/99
METHOD BLANK REPORT

Dioxins

Client Lot #: G9C240155
MB Lot-Sample #: G9C300000-266

Work Order #: CT55C101
Prep Date: 03/30/99

Matrix: WATER
Prep Batch #: 9089266

Analysis Date: 04/06/99
Dilution Factor: 1

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NOTE(S):
Calculations are performed before rounding to avoid round-off errors in calculated results.
**Dioxins**

Client Sample ID: 990319269

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EXHIBIT C

SOILS INVESTIGATION
REPORT
SOILS INVESTIGATION

PROPOSED NORTH WAIHEE 500,000 GALLON RESERVOIR
WAIHEE, MAUI, HAWAII
TMK: (2) 3-2-1: 3 (portion)

for

C. TAKUMI ENGINEERING, INC.

Project No. 99214-FM
April 28, 1999
April 28, 1999  
Project No. 99214-FM

C. Takumi Engineering, Inc.  
18 Central Avenue  
Wailuku, Maui, Hawaii 96793

Attention: Mr. Carl Takumi, P.E.

Gentlemen:

The attached report presents the results of a soils investigation at the site of the proposed North Waihee 500,000 Gallon Reservoir project to be located in Waihee, Maui, Hawaii.

A summary of the findings is as follows:

1) Two (2) test borings were drilled to depths of 38.1 and 40 feet below the existing ground surface.

   At Boring 1, moderately stiff CLAY was found at the surface to a depth of 1.5 feet where the CLAY graded very stiff to a depth of 10 feet. From 10 feet to the final depth of the boring at 38.1 feet, very stiff to hard SILT and sandy SILT with gravel were encountered.

   At Boring 2, moderately stiff to stiff CLAY was found at the surface to a depth of 1.5 feet where the CLAY graded very stiff to a depth of 18.5 feet then stiff to a depth of 23.5 feet. At 23.5 feet, stiff sandy SILT with gravel was encountered and extended to the final depth of the boring at 40 feet below existing grade.

2) No groundwater was encountered in any of the test borings at the time of the investigation.

3) Based on the findings and observations, it is concluded that the proposed structures can be supported on spread or continuous footings.
4) The existing surface of the site slopes at about 5 horizontal to 1 vertical. The proposed site grading will require excavations of up to 15 feet deep in order to create a flat reservoir pad.

HARD ROCK was not encountered in either of the test borings and excavation into the underlying soils may be accomplished with conventional excavation equipment.

The soils below 6 feet from existing grade were found to be wet (indicated by high moisture content on the boring logs). It is recommended that once the subgrade elevation for the reservoir pad has been reached, the top 6 inches of the reservoir subgrade be aerated to adjust the moisture content of the soil to near optimum moisture content (ASTM D 1557-91). The reservoir subgrade should then be proof-rolled (compacted) with a vibratory sheepsfoot compactor weighing not less than 10,000 pounds.

Details of the findings and recommendations are presented in the attached report.

This investigation was made in accordance with generally accepted engineering procedures and included such field and laboratory tests considered necessary for the project. In the opinion of the undersigned, the accompanying report has been substantiated by mathematical data in conformity with generally accepted engineering principles and presents fairly the design information requested by your organization. No other warranty is either expressed or given.

Respectfully submitted,

ISLAND GEOTECHNICAL ENGINEERING, INC.

Charles K. Biegel, P.E.
President

This work was prepared by me or under my supervision.
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INTRODUCTION
This investigation was made for the purpose of obtaining information on the subsurface conditions from which to base recommendations for foundation design for the proposed North Waihee 500,000 Gallon Reservoir to be located in Waihee, Maui, Hawaii. The location of the site, relative to the existing streets and landmarks, is shown on the Vicinity Map, Plate 1.

SCOPE OF WORK
The services included drilling 2 test borings to depths of 38.1 & 40 feet, obtaining samples of the underlying soils, performing laboratory tests on the samples, and performing an engineering analysis from the data gathered. In general, the following information is provided for use by the Architect and/or Engineer:
1. General subsurface conditions, as disclosed by the borings.
2. Physical characteristics of the soils encountered.
3. Recommendations for foundation design, including bearing values, embedment depth and estimated settlement.
4. Recommendations for placement of fill and backfill.
5. Special considerations.

PLANNED DEVELOPMENT
From the information provided, the project will consist of developing the site for a 70-foot diameter, 500,000 gallon reservoir. The proposed site grading will require an excavation
of the reservoir pad on the order of 1 to 15 feet (+/-).

SITE CONDITIONS

Surface

The property, designated by Tax Map Key number 3-2-1: 3 (portion), is located on the mauka side of Kahekili Highway in Waihee, Maui. The site is located 50 feet south of Kupaa Well No. 1 which was being installed during our field work.

At the time of the field investigation, the site was covered with weeds to 3 feet in height.

From the topographic map provided by C. Takumi Engineering, Inc. (dated 8-1-97), existing surface elevations at the reservoir site range from about +642 feet at the northeast side of the reservoir to +658 feet at the southwest side of the reservoir. Elevations shown on the test boring logs in this report were estimated by taping from existing features on the site and then performing a rough field interpolation of the above topographic map.

Subsurface

The subsurface conditions at the site were explored by drilling 2 test borings to depths of 38.1 and 40 feet. The locations of the test borings are shown on the Plot Plan, Plate 2. Detailed logs of the test borings are presented in the Appendix to this report.
At Boring 1, moderately stiff CLAY was found at the surface to a depth of 1.5 feet where the CLAY graded very stiff to a depth of 10 feet. From 10 feet to the final depth of the boring at 38.1 feet, very stiff to hard SILT and sandy SILT with gravel were encountered.

At Boring 2, moderately stiff to stiff CLAY was found at the surface to a depth of 1.5 feet where the CLAY graded very stiff to a depth of 18.5 feet then stiff to a depth of 23.5 feet. At 23.5 feet, stiff sandy SILT with gravel was encountered and extended to the final depth of the boring at 40 feet below existing grade.

No groundwater was encountered in any of the test borings at the time of the investigation.

From the USDA Soil Conservation Service "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", the site is located in an area designated as Naiwa silty clay loam, 3 to 20 percent slopes (NAC). The Naiwa Series consist of well-drained soils on uplands on the islands of Lanai, Molokai and Maui. These soils developed in volcanic ash and material weathered from basic igneous rock (USDA, 1972, pp. 97 and Plate 98).

Geology

The island of Maui is a volcanic doublet believed to have formed during the late Tertiary (between 1 and 12 million years ago) when lavas from Haleakala ponded against the older
West Maui Mountains.

The site is located on the easterly flank of the West Maui Mountains which was built by lavas flowing from rift zones trending north and south and a central vent. The lava flows which form the mountain have been separated into three groups: Wailuku, Honolua, and Lahaina Volcanic Series (Stearns and MacDonald, 1942). The main lava mass that makes up the West Maui Mountains is known as the Wailuku Volcanic Series which consist of primitive olivine basalts and associates pyroclastic and intrusive rock.

The on-site residual soils developed from weathering of the underlying parent bedrock.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on the findings and observations, it is concluded that the site may be developed for the intended use. Proposed structures can be supported on spread or continuous footings.

Special Considerations

The existing surface of the site slopes at about 5 horizontal to 1 vertical. The proposed site grading will require excavations of up to 15 feet deep in order to create a flat reservoir pad.

HARD ROCK was not encountered in either of the test borings and excavation into the
underlying soils may be accomplished with conventional excavation equipment.

The soils below 6 feet from existing grade were found to be wet (indicated by high moisture content on the boring logs). It is recommended that once the subgrade elevation for the reservoir pad has been reached, the top 6 inches of the reservoir subgrade be aerated to adjust the moisture content of the soil to near optimum moisture content (ASTM D 1557-91). The reservoir subgrade should then be proof-rolled (compacted) with a vibratory sheepfoot compactor weighing not less than 10,000 pounds.

Foundations

For footings bearing on the underlying stiff to very stiff on-site soils or properly compacted structural fill, an allowable bearing value of 3,000 psf may be used. The minimum footing embedment depth shall be 12 inches below the lowest adjacent grade (measured to bottom of footing).

For footings located adjacent to new or existing utility trenches, the bottom of the footing shall be deepened below a 1 horizontal to 1 vertical plane projected upwards from the edge of the utility trench.

For footings located on or adjacent to slopes, the footing shall be deepened such that there is a minimum horizontal distance of 5 feet from the edge of the footing to the slope face.
The bearing value is for dead plus live loads and may be increased by one-third for momentary loads due to wind or seismic forces. If any footing is eccentrically loaded, the maximum edge pressure shall not exceed the bearing pressure for permanent or for momentary loads.

All loose and disturbed soil at the bottom of footing excavations shall be removed to firm soil or the disturbed soil shall be compacted prior to laying of steel or placing of concrete.

**Settlement**

Under the reservoir, it is estimated that settlement on the order of 1/2 inch will occur in the center of the tank, 3/4 inch on the downhill edge of the tank and 1/4 inch at the uphill edge of the tank. All footings shall bear on stiff to very stiff on-site soils or properly compacted structural fill.

Differential settlement between footings will vary according to the size and bearing pressure of the footing.

**Lateral Resistance**

For resistance of lateral loads, such as wind or seismic forces, an allowable passive resistance equivalent to that exerted by a fluid weighing 300 pounds per cubic foot may be used for footings, or other structural elements, provided the vertical surface is in direct
contact with undisturbed soil or properly compacted fill.

Frictional resistance between footings and the underlying on-site soils may be assumed as 0.4 times the dead load.

Lateral resistance and friction may be combined.

Retaining Walls

Foundations for retaining walls shall be designed as per the foundation section of this report.

Depending on the type of backfill material within a 1H:2V plane projected upwards from the bottom edge of the retaining wall footing, the following active earth pressures may be used for design of free-standing retaining walls:

On-site CLAY/SILT as retaining wall backfill material (*):

<table>
<thead>
<tr>
<th>Backfill Slope</th>
<th>Horizontal Component (psf/ft.)</th>
<th>Vertical Component (psf/ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td>3H:1V</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>2H:1V</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

(* It should be noted that some of the on-site soils (below 6 feet from existing grade) were found to be wet and will require drying in order to achieve proper compaction for wall backfill.)
Imported granular soil as retaining wall backfill material:

<table>
<thead>
<tr>
<th>Backfill Slope</th>
<th>Horizontal Component (psf/ft.)</th>
<th>Vertical Component (psf/ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>3H:1V</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>2H:1V</td>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>

Drainage for the retaining wall backfill shall be accomplished by providing 4-inch diameter weepholes spaced 6-feet on-center (horizontally as well as vertically) or by using a minimum 4-inch diameter perforated PVC footing drain pipe. A 2-foot thick layer of crushed gravel, which is wrapped with geotextile filter fabric, shall be placed above the pipe; the crushed gravel shall be continuous from weephole to weephole, or in the case of a footing drain pipe, laid throughout the full length of the pipe. Geotextile fabric shall be AMOCO 4545 or similar.

The backfill for the retaining wall shall be properly compacted in accordance with the Site Preparation and Grading section to this report.

The above active pressures do not include surcharge loads such as footings located within a 45 degree plane projected upwards from the heel of the footing, and/or from hydrostatic pressures. If such conditions occur, the active pressure shall be increased accordingly.

**Slab-on-Grade**

For maintenance buildings and exterior pedestrian sidewalks, concrete slabs-on-grade may
be designed using a minimum of 4-inches of concrete on 6 inches of base course gravel. The top 6 inches of the slab area subgrade shall be moisture conditioned to near optimum moisture content (ASTM D 1557-91) and compacted to a minimum of 95% of the maximum dry density as determined by ASTM D 1557-91 test procedure. Reinforcement for slabs shall be provided by others.

Site grading should be designed to minimize ponding of water adjacent to slab and footing areas.

It is recommended that floor slabs with moisture sensitive floor covering be protected with a moisture barrier.

**Slopes**
Cut and fill slopes shall not exceed 2 horizontal to 1 vertical. Exposed slopes shall be covered as soon as practical after construction to minimize erosion.

Fill slopes shall be constructed by either overfilling and cutting back to compacted soil.

**Pavement Design**
It is recommended that flexible pavement section consist of 2 inches of asphaltic concrete, 6 inches of base course gravel and 6 inches of compacted subgrade. In areas that
anticipate heavy axle loading (single axle loads in excess of 9,000 pounds), the asphaltic concrete thickness shall be increased to a minimum of 2.5 inches.

The base course gravel and top 6 inches of subgrade shall be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D1557-91 test procedure.

All material quality requirements for the pavement section shall be in accordance with the "Hawaii Standard Specifications for Road, Bridge and Public Works Construction", dated 1994.

Site Preparation and Grading

It is recommended that the site be prepared in the following manner:

1. All vegetation, weeds, brush, roots, stumps, rubbish, debris, soft soil and other deleterious material shall be removed and disposed of off-site.

2. In areas to receive fill and at finished subgrade in cut areas, the exposed surface shall then be scarified to a depth of 6 inches, moisture conditioned to near optimum moisture (may require drying, see Special Considerations section of this report) and then compacted to the degree of compaction specified below. If soft or loose spots are encountered, the loose/soft areas shall be removed to firm material and the resulting depression shall be filled with properly compacted fill.
3. Where fill is placed on existing ground that is steeper than 5 horizontal to 1 vertical, the existing ground surface shall be benched into firm soil as the fill is placed.

4. **Fill and Backfill in Structural Areas:** Structural areas shall be defined as areas beneath and 3 feet beyond the edges of the reservoir, buildings and pavement areas.

   Structural fill and backfill material shall consist of material which is free of organics and debris and is non-expansive. In the upper 3 feet from finished grade, the structural fill and backfill material shall be less than 3 inches in greatest dimension. Below 3 feet from finished grade, the structural fill material shall be less than 6 inches in greatest dimension, provided there is sufficient fines to fill the interstices. The on-site soils are acceptable for use as fill provided the above size requirements can be met.

   Each layer of structural fill and backfill material shall be placed in lifts not exceeding 6 inches in compacted thickness. Each layer of structural fill and backfill shall be thoroughly compacted prior to placing of any subsequent lifts. Structural fill and backfill shall be compacted to at least 95 percent of the maximum dry density. The maximum dry density shall be determined by the ASTM D 1557-91 test procedure.
5. **Fill and Backfill in Non-Structural Areas:** Non-structural areas shall be defined as areas beyond 3 feet from the edge of any building and pavement areas.

Non-structural fill and backfill material shall consist of material which is free of organics and debris. In the upper 3 feet from finished grade, the fill and backfill material shall be less than 3 inches in greatest dimension. Below 3 feet from finished grade, the fill material shall be less than 12 inches in greatest dimension, provided there is sufficient fines to fill the interstices. The on-site soils are acceptable for use as non-structural fill provided the above size requirements can be met.

Each layer of non-structural fill and backfill material shall be placed in lifts not exceeding 12 inches in compacted thickness. Each layer of non-structural fill and backfill shall be thoroughly compacted prior to placing of any subsequent lifts. The top 2 feet of non-structural fill and backfill shall be compacted to at least 90 percent of the maximum dry determined by the ASTM D 1557-91 test procedure. Non-structural fill and backfill below 2 feet from finished grade shall be compacted to at least 85 percent of the maximum dry density as determined by the ASTM D 1557-91 test procedure.

6. **Backfill Behind Retaining Walls** Retaining wall backfill shall be defined as backfill
that extends from the stem of the retaining wall to 6 inches beyond the heel of the wall footing or the footing excavation line, whichever is greater.

All retaining wall backfill material shall consist of material that is in accordance with the project plans and specifications and meets the design criteria of the structural engineer.

Each layer of backfill shall be placed in layers not exceeding 6 inches in compacted thickness. Each layer of backfill shall be thoroughly compacted prior to placing of any subsequent lifts. All retaining wall backfill shall be compacted to at least 90 percent of the maximum dry density as determined by the ASTM D 1557-91 test procedure. Retaining wall backfill that will support structures or roadways shall be placed and compacted in accordance with the above requirements for Fill and Backfill in Structural Areas.

7. During construction, drainage shall be provided to minimize ponding of water adjacent to or on foundation and pavement areas. Ponded areas shall be drained immediately or water pumped out without damaging adjacent structures and property. If water accumulation softens the subgrade materials, the affected soils shall be removed and replaced with properly compacted fill.
It is particularly important to see that all fill and backfill soils are properly compacted in order to maintain the recommended design parameters provided in this report.

**INSPECTION**

During the progress of construction, so as to evaluate compliance with the design concepts, specifications and recommendations contained in this report, a representative from this office should be present to observe the following operations:

1. Site preparation.
2. Placement of fill and backfill.
3. Footing excavations.

**REMARKS**

The conclusions and recommendations contained herein are based on the findings and observations made at the test boring locations. If conditions are encountered during construction which appear to differ from those disclosed by the explorations, this office shall be notified so as to consider the need for modifications.

This report has been prepared for the exclusive use of C. Takumi Engineering, Inc. and their respective design consultants. It shall not be used by or transferred to any other party or to another project without the consent and/or thorough review by this facility. Should the project be delayed beyond the period of one year from the date of this report, the report
shall be reviewed relative to possible changed conditions.

Samples obtained in this investigation will deteriorate with time and will be unsuitable for further laboratory tests within one (1) month from the date of this report. Unless otherwise advised, the samples will be discarded at that time.

The following are included and complete this report:

- Vicinity Map  Plate 1
- Plot Plan  Plate 2

Appendix

- Field Investigation
- Laboratory Testing
- Logs of Test Borings
- Results of Laboratory Tests
APPENDIX

FIELD INVESTIGATION AND LABORATORY TESTING
FIELD INVESTIGATION

General

The field investigation consisted of performing explorations at the locations shown on the Plot Plan. The method used for the exploratory work is shown on the respective exploration log. A description of the various method or methods used is presented below.

Test Borings Using Truck-Mounted Drilling Equipment

Truck-mounted borings are drilled using a gas-powered drilling rig. The hole is advanced using continuous flight augers, wash boring and/or NX coring.

Auger drilling is used in soils where caving does not occur. The augers are 4-1/2 inch diameter continuous helical flight augers with the lead auger having a head equipped with changeable cutting teeth. Soil cuttings are brought to the surface by the continuous flights. After the bore hole is advanced to the required depth and cleaned of cuttings by additional rotation of the augers, the augers are retracted for soil sampling or in-situ testing.

In soils where caving of the bore hole occurs, the hole is advanced by wash boring or hollow-stem augering. Wash boring consists of advancing steel casing by rotary action and water pressure to flush the soil from the casing. The lead section of the casing is equipped with a carbide or diamond casing bit. After the casing has been advanced to the required depth, soil samples are obtained through the inside of the casing. Hollow-stem drilling consists of advancing the hole with 7-5/8 inch outside diameter and 4-1/4 inch inside diameter augers. The leading drill bit is connected to drilling rods through the central portion of the auger. At the required sampling depth, the interior drill rods and lead bit are removed, and the soil sample is taken by driving a sampler
through the "hollow" section of the augers.

Coring is used for hard formations such as rock, coral or boulders. The core barrel, consisting of a 5-foot long double tube, hardened steel barrel with either a carbide or diamond bit, is attached to drilling rods and set on the hard formation. The core barrel is advanced through the formation by rotation of the core barrel. Water is used to flush out the cuttings. Upon completion of the core run, the sample is removed from the core barrel and inspected. The total core recovery length and the sum of all intact pieces over 4-inch in length are measured. The length of core recovery divided by the length of the core run is the recovery ratio. The combined length of the 4-inch or longer pieces divided by the length of core run is the Rock Quality Designation (RQD). The values provide an indication of the quality of the formation.

Test Borings Using Portable Drilling Equipment
In areas inaccessible to truck-mounted equipment, portable drilling equipment is used to drill the test boring. The boring is advanced by either 1) continuous drive sampling or by 2) using a small gas-powered drill rig with continuous flight augers, wash boring or NX coring.

Soil samples are obtained with a tripod and cathead assembly using soil sampling methods described below.

Test Pits Using Excavators/Hoporto
Test pits are excavated using a hopto or backhoe. Material excavated from the pit and the sides and bottom of the pit are visually inspected and a continuous log of the hole is kept.
Explorations Using Hand Tools

In inaccessible areas requiring only shallow explorations, borings and test pits are made using hand equipment. Borings are drilled using hand augers. Test pits are excavated using hand tools. Cuttings from the boring and/or pit are inspected and visually classified.

Soil Sampling

Relatively undisturbed samples of the underlying soils are obtained from borings by driving a sampling tube into the subsurface material using a 140-pound safety hammer falling from a height of 30 inches. Ring samples are obtained using a 3-inch outside diameter, 2.5 inch inside diameter steel sampling tube with an interior lining of one-inch long, thin brass rings. The tube is driven approximately 18 inches into the soil and a section of the central portion is placed in a close fitting waterproof container in order to retain field conditions until completion of the laboratory tests. Standard Penetration Test (SPT) values and disturbed soil samples are obtained with a 2-inch (outside diameter) split-barrel sampler instead of the 3-inch sampler. The number of blows required to drive the sampler into the ground is recorded at 6-inch intervals. The blow count for the last 12-inches is shown on the boring logs.

From test pit excavations, relatively undisturbed soil samples are obtained by pushing the 3 inch outside diameter sampling tube (mentioned above) into the ground with the backhoe bucket. In addition, undisturbed bulk samples are retained from cohesive type soil formations and disturbed bulk samples are retained from friable and cohesionless soil formations.

The soil samples are visually classified in the field using the Unified Soil Classification System. Samples are packed in moisture proof containers and transported to the laboratory for testing.
LABORATORY TESTING

General
Laboratory tests are performed on various soil samples to determine their engineering properties. Description of the various tests are listed below.

Unit Weight and Moisture Content
The in-place moisture content and unit weight of the samples are used to correlate similar soils at various depths. The sample is weighed, the volume determined, and a portion of the sample is placed in the oven. After oven-drying, the sample is again weighed to determine the moisture loss. The data is used to determine the wet-density, dry-density and in-place moisture content.

Direct Shear
Direct shear tests are performed to determine the strength characteristics of the representative soil samples. The test consists of placing the sample into a shear box, applying a normal load and then shearing the sample at a constant rate of strain. The shearing resistance is recorded at various rates of strain. By varying the normal load, the angle of internal friction and cohesion can be determined.

Consolidation Test
Consolidation tests are performed to obtain data from which time rates of consolidation and amounts of settlement may be estimated. The test is performed by placing a specimen in a consolidation apparatus. Loads are applied in increments to the circular face of a one (1) inch high sample. Deformation or changes in thickness of the specimen are recorded at selected time intervals. Water is introduced to or allowed to drain from the sample through porous disks placed
against the top and bottom faces of the specimen. The data is then used to plot a stress-volume strain curve which is used in estimating settlement.

**Expansion Index Test**

Expansion Index of fine-grained soils is determined in accordance with ASTM D 4829-88 test procedure. The soil specimen is compacted into a metal ring so that the degree of saturation is between 40 and 60 percent. The specimen and the ring are placed in a consolidometer. A vertical confining pressure of 1 psi is applied to the specimen and then the specimen is inundated with water. The deformation of the specimen is recorded for 24 hours. The data is used to determine the expansion potential of the soil.

**Classification Tests**

The soil samples are classified using the Unified Soil Classification System. Classification tests include sieve and hydrometer analysis to determine grain size distribution, and Atterberg Limits to determine the liquid limit, plastic limit and plasticity index.

**California Bearing Ratio Test**

California Bearing Ratio (CBR) tests are performed on materials to determine the bearing strength of the soil for determination of pavement sections. The sample is compacted into a 6-inch diameter mold in 5 equal layers. Each layer is compacted with a 10-pound hammer falling from a height of 18-inches, with each layer receiving 56 blows. The mold is then placed in a water bath for 4-days and the vertical swell is measured under a surcharge weight of 10 pounds. After the soaking period, the sample is placed in a CBR apparatus that has a 3-square inch penetrometer. The penetrometer is pressed vertically into the soil at constant strain and the loads required to
press the penetrometer are recorded. A plot of the load-strain relationship is made to determine the CBR value.

**Maximum Dry Density/Optimum Moisture Content**

The maximum dry density and optimum moisture content of the material is determined in accordance with the ASTM D1557-91 test procedure. The sample is compacted into a mold in 5 equal layers using a 10 pound hammer falling from a height of 18 inches. The diameter of the mold is either 4-inches or 6-inches depending on the proportion of gravel in the sample. The sample is compacted at various moisture contents to develop a compaction curve for the soil. The curve is usually bell-shaped with a peak indicating the maximum dry density and optimum moisture content.

**Penetrometer Test**

Penetrometer tests are performed on clayey soils to determine the consistency of the material and an approximate value of the unconfined compressive strength.

**Torvane**

Torvane tests are used to determine the approximate undrained shear strength of clayey soils. The torvane apparatus consists of a torque device with a small diameter plate that has vanes situated perpendicular to the plate. The vanes are pushed into the soil and torque is applied until failure occurs. The torque required to cause failure is converted to approximate undrained strength of the soil.
LOG OF BORING NO. 1

EQUIPMENT USED: Simco Truck Mounted Drill Rig

DATE DRILLED: March 25, 1999

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>UNIFIED CLASSIFICATION</th>
<th>DESCRIPTION</th>
<th>SAMPLE</th>
<th>BLOW/SF/FOOT</th>
<th>COLOR</th>
<th>MOISTURE</th>
<th>CONSISTENCY</th>
<th>DRY DENSITY (SPC)</th>
<th>MOISTURE CONTENT (% OF DRY WT)</th>
<th>PERMEABILITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CL</td>
<td>CLAY, with roots</td>
<td>0</td>
<td></td>
<td>dark reddish brown</td>
<td>moist to very moist</td>
<td>mod. stiff</td>
<td>89.0</td>
<td>27.8</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>---no roots</td>
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<td>dusky red</td>
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<td>very stiff</td>
<td>100.0</td>
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</tr>
<tr>
<td>3</td>
<td>ML</td>
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<td></td>
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<td>very moist</td>
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<td>36.1</td>
<td>4.5</td>
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<tr>
<td>6</td>
<td>SM-ML</td>
<td>sandy SILT with gravel (highly to completely</td>
<td>14</td>
<td></td>
<td>yellowish brown</td>
<td></td>
<td>43.8</td>
<td>89.7</td>
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<tr>
<td></td>
<td></td>
<td>weathered rock)</td>
<td></td>
<td></td>
<td>light olive brown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ELEVATION: +658' (estimate)

DEPTH OF BORING: 38.1

DEPTH TO GROUNDWATER: unknown

PROJECT NAME: NORTH WAIHEE 500,000 GALLON RESERVOIR

PROJECT NO.: 99214-FM

ISLAND GEOTECHNICAL ENGINEERING, INC.

PLATE

Geotechnical Consultants 3
### LOG OF BORING NO. 1

**EQUIPMENT USED:** Simco Truck Mounted Drill Rig  
**DATE DRILLED:** March 25, 1999

**ELEVATION:** +658' (estimate)  
**DEPTH OF BORING:** 38.1  
**DEPTH TO GROUNDWATER:** unknown

<table>
<thead>
<tr>
<th>DEPTH (FT.)</th>
<th>GRAPHIC SYMBOL</th>
<th>UNIFORM CLASSIFICATION</th>
<th>DESCRIPTION</th>
<th>SAMPLE BLOWS/FOOT</th>
<th>SAMPLE COLOR</th>
<th>MOISTURE</th>
<th>CONSISTENCY</th>
<th>DRY DENSITY</th>
<th>MOISTURE CONTENT % OF DRY WT.</th>
<th>PENETROMETER (TSP)</th>
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<tbody>
<tr>
<td>23</td>
<td>SM-ML</td>
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<td>light olive brown</td>
<td>very moist</td>
<td>very stiff</td>
<td>hard</td>
<td>61.6</td>
<td>62.3</td>
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<tr>
<td>27</td>
<td>ML</td>
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<tr>
<td>29</td>
<td></td>
<td></td>
<td>---rocky structure</td>
<td>24</td>
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<td>58.9</td>
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<td>END OF BORING</td>
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**PROJECT NAME:** NORTH WAIHEE 500,000 GALLON RESERVOIR  
**PROJECT NO.:** 99214-FM  
**ISLAND GEOTECHNICAL ENGINEERING, INC.**  
**PLATE:** 3
# LOG OF BORING NO. 2

**EQUIPMENT USED:** Simco Truck Mounted Drill Rig

**DATE DRILLED:** March 25, 1999

**ELEVATION:** +644' (estimate)

**DEPTH OF BORING:** 40

**DEPTH TO GROUNDWATER:** unknown

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>GRAPHIC SYMBOL</th>
<th>UNIFIED SOIL CLASSIFICATION</th>
<th>DESCRIPTION</th>
<th>SAMPLE</th>
<th>BLOWS/FOOT</th>
<th>COLOR</th>
<th>MOISTURE</th>
<th>CONSISTENCY</th>
<th>DRY DENSITY (pcf)</th>
<th>MOISTURE (%) OF DRY WT</th>
<th>PENETROMETER (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CL</td>
<td>CLAY</td>
<td></td>
<td></td>
<td>34</td>
<td>dark reddish brown</td>
<td>moist</td>
<td>mod. stiff</td>
<td>stiff</td>
<td>109.2</td>
<td>21.8</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>dusty red</td>
<td>moist to very moist</td>
<td></td>
<td></td>
<td>128.2</td>
<td>21.7</td>
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<tr>
<td>4</td>
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<td>28</td>
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<td>very moist</td>
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<td>102.0</td>
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<td>6</td>
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<td>32</td>
<td>dark reddish brown</td>
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<td>very moist</td>
<td></td>
<td>100.1</td>
<td>34.7</td>
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<tr>
<td>8</td>
<td></td>
<td></td>
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<td></td>
<td>35</td>
<td>light yellowish brown</td>
<td></td>
<td>very moist</td>
<td></td>
<td>69.4</td>
<td>57.3</td>
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<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td></td>
<td></td>
<td>stiff</td>
<td></td>
<td>58.4</td>
<td>55.9</td>
</tr>
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</table>

--- Atterberg Limits at 4.0':

\[LL = 40 \quad PL = 21\]

--- few gravel and sand
LOG OF BORING NO. 2

EQUIPMENT USED: Simco Truck Mounted Drill Rig

DATE DRILLED: March 25, 1999

ELEVATION: +644' (estimate)

DEPTH OF BORING: 40

DEPTH TO GROUNDWATER: unknown

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>GRAPHIC SYMBOL</th>
<th>UNIFIED CLASSIFICATION</th>
<th>DESCRIPTION</th>
<th>SAMPLE BLAST FOOT</th>
<th>COLOR</th>
<th>MOISTURE</th>
<th>CONSISTENCY</th>
<th>DRY DENSITY (pcf)</th>
<th>MOISTURE CONTENT (% OF DRY WT)</th>
<th>PENETROMETER TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>CL</td>
<td>CLAY</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>SM-ML</td>
<td>sandy SILT with gravel (highly to completely weathered rock)</td>
<td>18</td>
<td>light yellowish brown</td>
<td>very moist</td>
<td>stiff</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>27</td>
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<td>39</td>
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<td>41</td>
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<td></td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

END OF BORING

PROJECT NAME: NORTH WAIHEE 500,000 GALLON RESERVOIR

ISLAND GEOTECHNICAL ENGINEERING, INC.

PROJECT NO.: 99214-FM

Geotechnical Consultants
DIRECT SHEAR TEST

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DEPTH (ft.)</th>
<th>COHESION (psf)</th>
<th>ANGLE OF INTERNAL FRICTION</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boring 1</td>
<td>4 to 4.5</td>
<td>600</td>
<td>33°</td>
<td>Field Density: Peak Strength</td>
</tr>
<tr>
<td>Boring 1</td>
<td>7 to 7.5</td>
<td>700</td>
<td>48°</td>
<td>Field Density: Peak Strength</td>
</tr>
</tbody>
</table>
CONSOLIDATION TEST REPORT

MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Natural</th>
<th>Dry Dens. (pcf)</th>
<th>LL</th>
<th>PI</th>
<th>Sp. Gr.</th>
<th>Overburden (ksf)</th>
<th>P_c (ksf)</th>
<th>C_c</th>
<th>C_s</th>
<th>Swell Press. (ksf)</th>
<th>Swell %</th>
<th>e_0</th>
</tr>
</thead>
<tbody>
<tr>
<td>94.3 %</td>
<td>34.3 %</td>
<td>99.2</td>
<td>3.77</td>
<td>0.81</td>
<td>2.77</td>
<td>0.09</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
<td>1.372</td>
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</tbody>
</table>

MATERIAL DESCRIPTION

dusky red CLAY

USCS | AASHTO
---|---
CL | CL

Project No. 99214-FM

Client:

Project: NORTH WAIHEE 500,000 GALLON RESERVOIR

Location: Boring 2 at 7 feet.

Remarks:
1. Undisturbed sample.
MATERIAL DESCRIPTION

USCS AASHTO

dark reddish brown CLAY

CL

Project No. 99214-FM
Client:
Project: NORTH WAIHEE 500,000 GALLON RESERVOIR

Location: Boring 2 at 9.5 feet.

Remarks:
1. Undisturbed sample.

CONSOLIDATION TEST REPORT

Island Geotechnical Engineering, Inc.
# EXPANSION INDEX TEST REPORT

**ASTM D 4829-95**

<table>
<thead>
<tr>
<th>SAMPLE LOCATION</th>
<th>DEPTH</th>
<th>INITIAL WATER CONTENT (%)</th>
<th>INITIAL DRY DENSITY (PCF)</th>
<th>FINAL WATER CONTENT (%)</th>
<th>EXPANSION INDEX MEASURED</th>
<th>CORR. E.I. AT 50% SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boring 2</td>
<td>4.0'</td>
<td>18.4%</td>
<td>104.5</td>
<td>55.4</td>
<td>28.9%</td>
<td>8.2</td>
</tr>
</tbody>
</table>

**Note A:** The specific gravity was determined in accordance with ASTM D 854-92 and the results indicate this soil has a specific gravity of 3.77.

## EXPANSION CLASSIFICATION

<table>
<thead>
<tr>
<th>Expansion Index, El</th>
<th>Potential Expansion</th>
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<tbody>
<tr>
<td>0 to 20</td>
<td>Very Low</td>
</tr>
<tr>
<td>21 to 50</td>
<td>Low</td>
</tr>
<tr>
<td>51 to 90</td>
<td>Medium</td>
</tr>
<tr>
<td>91 to 130</td>
<td>High</td>
</tr>
<tr>
<td>over 130</td>
<td>Very High</td>
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</tbody>
</table>
### FIELD-DENSITY EXPANSION TEST REPORT

ASTM D 4546-96: Method B modified (note 1)

<table>
<thead>
<tr>
<th>SAMPLE LOCATION</th>
<th>DEPTH</th>
<th>INITIAL WATER CONTENT</th>
<th>INITIAL DRY DENSITY (PCF)</th>
<th>INITIAL % SAT. CONTENT</th>
<th>FINAL WATER CONTENT</th>
<th>MEASURED EXPANSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boring 2</td>
<td>4.0'</td>
<td>19.9%</td>
<td>129.4</td>
<td>91.7</td>
<td>21.4%</td>
<td>0.2%</td>
</tr>
<tr>
<td>&quot;</td>
<td>&quot;</td>
<td>20.2%</td>
<td>125.1</td>
<td>86.5</td>
<td>22.2%</td>
<td>0.5% (note 3)</td>
</tr>
</tbody>
</table>

**note 1:** This test was performed by placing the undisturbed sample ring (2.375 inch diameter & 1 inch height) into an expansion apparatus. A 144 psf surcharge was then placed on the sample. The sample was then submerged in water and the change in vertical height was recorded.

**note 2:** The specific gravity was determined in accordance with ASTM D 854-92 and the results indicate this soil has a specific gravity of 3.77.

**note 3:** This sample was air-dried to 2.7% moisture content prior to submerging in water.
EXHIBIT D

OEOC BULLETIN
(3) North Waihee Exploratory Wells
(Kupaa Well No. 1 and Kanoa Well No. 1)

District: Wailuku
TMK: 3-2-01:por. 3
Applicant: County of Maui, Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793
Contact: David Craddick

Consultant: C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793
Contact: Carl Takumi (249-411)

Public Challenge
Deadline: July 23, 1997
Status: FEA/FONSI issued, project may proceed.

The County of Maui, Department Water Supply (DWS) is proposing the drilling of Kupaa Well No. 1 and Kanoa Well No. 1 in order to conduct pumping tests to gather data regarding the North Waihee Aquifer. The proposed exploratory well sites are located to the north of the existing North Waihee Well Nos. 1 and 2. Kupaa Well No. 1 is located approximately 650 feet mauka (west) of Kahekili Highway at approximate elevation of 600 feet above sea level. Kanoa Well No. 1 is located mauka (west) of Kahekili Highway, approximately 100 feet inland from the existing Kanoa monitoring well and at approximate elevation of 300 feet above sea level.

The project will comply with the Hawaii Well Construction Standards prepared by the Department of Land and Natural Resources Commission on Water Resource Management.

The proposed action will also include the temporary installation of diesel powered test pumps and appurtenant facilities in order to conduct well pump testing. In addition, testing will be conducted to determine if the water quality conforms to the State Department of Health's Drinking Water Standards. After completion of the well testing, the pumps and other appurtenant facilities will be removed. The wells will then be capped until the well pump data and water quality can be carefully reviewed. If data shows that allowable withdrawals can be successfully accomplished, DWS will then proceed with the development of the wells by installing a pump and necessary appurtenances and then connecting them to the Central Maui Water System.

Access to Kupaa Well No. 1 will be via an existing dirt road which traverses undeveloped pasture land. Kupaa Well No. 1 is easily accessible from the dirt road and therefore will not require any roadway improvements or grading.

Access to Kanoa Well No. 1 will be via an existing unimproved access easement which also traverses undeveloped pasture land. The access easement is on slightly sloping lands which are relatively easy to access and therefore will not require any roadway improvements or grading.

The proposed project is not anticipated to have any significant environmental impacts, therefore, a "Finding of No Significant Impact" has been made by DWS.

National Environmental Policy Act (NEPA)

(4) Kahului Airport Wildlife Hazard Management (FONSI)

District: Wailuku
Applicant: U.S. Department of Agriculture
Animal Damage Control
3375 Koapaka Street, Suite H420
Honolulu, Hawaii 96819

USDA, Animal and Plant Health Inspection Service, Animal Damage Control (ADC) has reviewed its current activities at Kahului Airport in managing wildlife hazards to protect human safety. APHIS-ADC has determined that the need for action and those issues identified in the March 1997 environmental assessment are best addressed by continuing the existing program.

Any comments relative to this decision should be addressed to: State Director, USDA. APHIS-Animal Damage Control, 720 O'Leary St., SW, Olympia, Washington 98502 or by calling (360) 753-9884.
Mr. David Craddick  
County of Maui  
Department of Water Supply  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Pump Installation Permit  
Kupaa #1 Well (Well No. 5731-03)

We have received your pump installation permit application and Preliminary Engineering Report for the Kupaa #1 Well (Well No. 5731-03). However, matters which must be addressed before we accept your application as complete are as follows:

1. Documentation that Chapter 343 process is complete.
2. Completion and transmittal of Well Completion Report for Waikapu Mauka Well (Well No. 5131-01).

Upon receipt of the above information, we will accept your application as complete and you can then expect your application to be processed within ninety (90) days.

If you have any questions about your permit application, please contact Charley Ice of the Commission staff at (808) 587-0702 or toll free at (800) 967-9477 extension 70251.

Sincerely,

LINNEL T. NISHIOKA  
Deputy Director
Mr. David Craddick  
County of Maui  
Department of Water Supply  
200 South High Street  
Wailuku, Hawaii 96793

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Sincerely,

LINNEL T. NISHIOKA  
Deputy Director

CI:28
<table>
<thead>
<tr>
<th>TO</th>
<th>INIT</th>
<th>TO</th>
<th>INIT</th>
<th>FOR</th>
<th>PLEASE</th>
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<tbody>
<tr>
<td>BAUER, G.</td>
<td></td>
<td>LUM, A.</td>
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<td>Approval</td>
<td>See Me</td>
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<tr>
<td>CHING, F.</td>
<td></td>
<td>NAKAMA, L.</td>
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<td>Review &amp; Comment</td>
<td>Take Action</td>
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<tr>
<td>DANBARA, S.</td>
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<td>NAKANO, D.</td>
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<tr>
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<td>NISHIOKA, L.</td>
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<td>SUBIA, S.</td>
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<td>JINNAI, R.</td>
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<td>YODA, K.</td>
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</tbody>
</table>

Please: See Me, Review & Comment, Take Action, Type Draft, Type Final, File, Xerox copies.
State of Hawaii

COMMISSION OF WATER RESOURCE MANAGEMENT

Department of Land and Natural Resources

APPLICATION FOR PERMIT

☐ Well Construction or ☐ Pump Installation

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 808-587-0040. Also, please check our website at http://www.hawaii.gov/dlnr/dwrm/dwrm.html

APPLICANT INFORMATION: (Fill out all three, if applicable, and place a check next to the primary contact)

1. (a) WELL OWNER: Maui Dept. of Water Supply Contact Person: David Craddick
   Mailing Address: 200 South High Street, Wailuku, HI 96793
   Fax: (808) ___________ E-mail: ___________

2. LAND OWNER: Maui Agribusiness Co.
   Contact Person: Phone: (808) 244-9570
   Mailing Address: 90 Wailea Road, O.D. Box 520, Wailuku, HI 96793
   Fax: ___________ E-mail: ___________

3. CONTRACTOR: __________________________
   Mailing Address: __________________________
   Fax: ___________ E-mail: ___________

WELL & PUMP INFORMATION: (Please fill in the diagram on the back of this form.)

2. WELL LOCATION/NAME: Kapua Well 1 (5231-03) Island: Maui
   Address: Wailea, Maui, Hawaii
   Tax Map Key: (2) 3-02-01: 03

3. PROPOSED WORK:
   (Check all that apply)
   ☐ Drill New Well ☐ Deepen ☐ Install New Pump
   ☐ Modify Existing Well ☐ Redrill ☐ Modify Pump
   ☐ Abandon/Seal ☐ Replace Pump

   * Well No.: Be sure to complete and submit well abandonment report upon completion of work.

4. CONSTRUCTION:
   ☐ Dug ☐ Bored ☐ Driven ☐ Drilled ☐ Radial
   Is this well a part of a battery of wells? ☐ Yes ☐ No (Please describe.)

5. PROPOSED PUMP INFORMATION: Rated Pump Capacity: 1,200 gallons per minute
   Pump Type (Check one):
   ☐ Deep Well Turbine ☐ Rotary ☐ Propeller
   ☐ Submersible ☐ Rotary-Displacement ☐ Reciprocating
   ☐ Centrifugal ☐ Rotary-Gear ☐ Impulse
   ☐ Powered by:
   ☐ Diesel ☐ Gas ☐ Electric, rated horsepower: ___________

6. PROPOSED USE:
   (Check all that apply)
   ☐ Municipal (including hotels, stores, etc.) ☐ Domestic (individual, noncommercial water system)
   ☐ Irrigation (crop) ☐ Industrial
   ☐ No. of Dwelling Units: ☐ No. of Acres:
   ☐ Other (explain): ___________

7. (a) PROPOSED AMOUNT OF WITHDRAWAL: 1,152,000 gallons per day
   (b) METHOD OF FLOW MEASUREMENT: ☐ Flowmeter ☐ Open-pipe ☐ Weir ☐ Orifice ☐ Other (explain)

OTHER IMPORTANT INFORMATION:

8. PENDING ACTIONS:
   ☐ CDEA ☐ EMA ☐ EIS ☐ EA ☐ NONE ☐ Other (explain)


10. REMARKS, EXPLANATIONS: (If more space is needed, please attach additional sheet)

I understand that approval of this application attaches the following standard conditions: 1) the proposed work is to be completed within two (2) years of the approval date; 2) the contractor shall submit to the Commission a well completion/abandonment report within 30 days after the completion date of the permitted work; 3) monthly water use data shall be submitted to the Commission; 4) such approval shall not constitute a determination of correlative water rights and shall not guarantee the pump capacity of future use or the permitted pump capacity.

Well Owner: Maui Dept. of Water Supply

Landowner: Maui Agribusiness Co.

Contractor: ___________

Signature: ___________

Date: ___________

Field Checked By: ___________

Longitude: ___________

Aquifer System Name: ___________

Date: ___________

Latitude: ___________

State Well No.: ___________

WCPIFORM (2/23/99)
9. PROPOSED WELL SECTION

Hole Diameter: 2 2 in
Minimum of 2' Radius & 4' Thick Concrete Pad

Ground Elevation: 637.0 ft, msl*

Elevation at top of casing: 639.31 ft
(Survey to nearest 0.01 ft.)

Cement Grout: 623 ft.
(min. 70% of distance from ground elevation to top of water surface or 500 ft., whichever is less.)

Minimum annular space between hole and casing ≥ 3'

Total Depth: __ ft.

Rock or Gravel Packing: __ ft.

Material: ☐ Crushed Basalt ☐ Rounded Gravel

Water Level Elevation: 7.41 ft, msl*

Minimum cover from ground level to water level ≥ 15 ft.

Solid Casing: (≥ 90%) (Ground Elev.-Water Level Elev)
Material: ☐ Steel ☐ Stainless Steel
Material Standard: ASTM A325
Length: __ ft.
Diameter: __ in.
Well Thickness: __ in.
Bottom Elevation: __ ft, msl*

Open Casing: ☐ Perforated ☐ Screen
Material: ☐ Steel ☐ Stainless Steel
Material Standard: ASTM A325
Length: __ ft.
Diameter: __ in.
Well Thickness: __ in.
Openings: __ sq. in./ft.
Bottom Elevation: __ ft, msl*

Open Hole:
Length: __ ft.
Diameter: __ in.
Bottom Elevation: __ ft, msl*

For non-salt water Basal Wells - bottom elevation of well should not be deeper than 1/4 of aquifer thickness or,
Bottom Elevation of Well Limit = (Water Elevation - 4 x Water Level Elevation )
Example: Estimated = 2 ft. Water Level Elev. → Bottom Elevation of Well Limit = (2 - 4 x 7.41) = 16.5 ft.

* The approximate elevation must be referenced to mean sea level (msl) at the time of application filing. Final elevations of well components shall be submitted in the Well Completion/Well Abandonment reports and referenced to a benchmark which has been established by a surveyor licensed by the State.

Solid Casing Material:
Steel: compliant with (check one or more):
☐ ANSI/AWWA C200 ☐ API Spec. 5L ☐ ASTM A53 ☐ ASTM A139
And compliant with (check one or more):
☐ ASTM A242 ☐ Type E ☐ Type S ☐ Grade B ☐ Other

Steel: compliant with (check one or more):
☐ ASTM A409 ☐ ASTM A312

ABS Plastic conforming to ASTM F490 and ASTM D1527: (check one) ☐ Schedule 40 ☐ Schedule 80
PVC Plastic conforming to ASTM F490 and (ASTM D1785 or ASTM D2241): (check one): ☐ Schedule 40 ☐ Schedule 80

Thermoset Plastic: (check one):
☐ Filament Wound Resin Pipe conforming to ASTM D2996
☐ Centrifugally Cast Resin Pipe conforming to ASTM D2997
☐ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3617
☐ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C960
☐ PTFE Fluorocarbon Tubing conforming to ASTM D3206
☐ FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:
Steel: compliant with (check one or more):
☐ ANSI/AWWA C200 ☐ API Spec. 5L ☐ ASTM A53 ☐ ASTM A139
And compliant with (check one or more):
☐ ASTM A242 ☐ Type E ☐ Type S ☐ Grade B ☐ Other

Steel: compliant with (check one or more):
☐ ASTM A409 ☐ ASTM A312

ABS Plastic conforming to ASTM F490 and ASTM D1527: (check one) ☐ Schedule 40 ☐ Schedule 80
PVC Plastic conforming to ASTM F490 and (ASTM D1785 or ASTM D2241): (check one): ☐ Schedule 40 ☐ Schedule 80

Thermoset Plastic: (check one):
☐ Filament Wound Resin Pipe conforming to ASTM D2996
☐ Centrifugally Cast Resin Pipe conforming to ASTM D2997
☐ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3617
☐ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C960
☐ PTFE Fluorocarbon Tubing conforming to ASTM D3206
☐ FEP Fluorocarbon Tubing conforming to ASTM D3296
May 8, 2000

Commission on Water Resource Management
P.O. Box 621
Honolulu, HI 96809

SUBJECT: Kupaa Well No. 1
Waihee, Maui, Hawaii
State Well No. 5731-03

Dear Sir:

On behalf of the Maui County Department of Water Supply, we are submitting the pump installation permit application for the Kupaa Well #1 (State Well #5731-03) at Waihee, Maui, Hawaii. In addition to the permit application, we are attaching a copy of the Preliminary Engineering Report for New Potable Water Sources as submitted to the State Department of Health, Drinking Water Branch. The report contains an analysis of the "North Waihee Aquifer System, Kupaa I and Kanoa Well I Wells Test Results and Interpretation," John F. Mink, Mink & Yuen, June 21, 1999 and water quality analysis of the well during pump testing.

A draft environmental assessment of the well construction was previously published. The pump installation permit is for the Maui County Department of Water Supply. No filing fee is being submitted.

If you have any questions, please do not hesitate to call Carl Takumi, C. Takumi Engineering, Inc. at [redacted] or Herb Kogasaka, Maui Department of Water Supply at [redacted]

Very truly yours,

C. Takumi Engineering, Inc.

Carl K. Takumi, P.E.

cc: Department of Water Supply
KUPAA WELL 1 (STATE WELL NO. 5731-03)
APPROXIMATE SCALE 1"=2000'
KUPAA WELL 1
(STATE WELL NO. 5731-03)
Mr. David Craddick, Director  
Department of Water Supply  
County of Maui  
200 South High Street  
Wailuku, Hawaii 96793  

Dear Mr. Craddick:

Pump Installation Permit  
Kupaa #1 Well (Well No. 5731-03)

The permit issued October 21, 1999 is hereby voided. Our apologies for the confusion. The pump installation is supported by the Well Completion Report and pump tests, but no application has been received for the Kupaa Well pump.

Our understanding is that, although the Kanoa and Kupaa Wells have been handled simultaneously to this point, the Kupaa Well site does not have its easements secured and will be addressed at a later date.

If you have any questions, please call Charley Ice at [redacted] or toll-free at [redacted] extension 70251.

Sincerely,

LINNEL T. NISHIOKA  
Deputy Director
Mr. David Craddick, Director  
Department of Water Supply  
County of Maui  
200 S. High Street  
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Pump Installation Permit  
Kupaa #1 Well (Well No. 5731-03)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned well(s) that authorize permanent pump installation work for your well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 11:

Special Conditions

1. None

The permittee is responsible for all conditions of the permit. This includes ensuring that the pump installation contractor, or other party who installs the pump, submits a completed Part II of the Well Completion Report form (enclosed) within sixty (60) days after the pump installation work is completed. Be advised that you may be subject to fines of up to $1000 per day for any violations of your permit conditions starting from the permit approval date.

To validate your pump installation permit, please sign and have the contractor sign both permit originals and return one for our files. A copy of the Well Completion Report (Part II) and a copy of your water use report form are enclosed for your use.

IMPORTANT - Unless specifically exempted, pump installation may not proceed without a validated permit returned to the Commission. Except for the monthly water use report form, please provide copies of all the information in this packet to your pump installation contractor.

Finally, this letter is notice that we have accepted your Well Completion Report - Part I as complete.

If you have any questions, please call the Commission staff at [redacted] or toll-free at [redacted] extension 70251.

Aloha,

TIMOTHY E. JOHNS  
Chairperson

Enclosure
PUMP INSTALLATION PERMIT
Kupaa #1 Well (Well No. 5731-03)

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-168, entitled “Water Use, Wells, and Stream Diversion Works”, this document permits the pump installation for Kupaa #1 Well (Well No. 5731-03) at, Kupaa, North Waihe'e, Maui, TMK 3-2-13, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

1. The Chairperson to the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 1200 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly/yearly or annual (choose reporting period) basis, on forms provided by the Chairperson (attached).

4. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The permittee shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Chairperson within sixty (60) days after completion of work.

6. The permittee shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

7. The pump installation permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97). If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result.

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

10. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: September 27, 1999
Expiration Date: September 27, 2001
TIMOTHY E. JOHNS, 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 and understand that I do not hold a valid permit until I and the pump installer have signed, dated, and returned the permit to the Commission. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day starting from the permit date of approval.

Permittee's Signature: ___________________________ Date: __________
Printed Name: ________________________________ Firm or Title: ________________________________

Installer's Signature: ___________________________ Date: __________
Printed Name: ________________________________ Firm or Title: ________________________________

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

Attachments
C: USGS
Department of Health/ Safe Drinking Water & Wastewater Branch
1. **Pump Tests Check** Glenn Bauer (initial)  

<table>
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<th>Step-Drawdown Test:</th>
<th>Yes</th>
<th>No</th>
<th>If no, describe deficiency</th>
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<tr>
<td>followed WCPI Stds</td>
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<tr>
<td>T &amp; S analysis attached</td>
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<th>Well Interference:</th>
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<td>estimated Steady-State drawdown at 1-mile radius is _________ ft.</td>
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<th>Stream Surface Water Impacted:</th>
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<th>If no, describe deficiency</th>
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2. **Construction Check** Mitch Ohye (initial)  

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LETTER OF TRANSMITTAL

TO: COMMISSION ON WATER RESOURCE MANAGEMENT
    State of Hawaii
    P.O. Box 621
    Honolulu, HI 96809

DATE: June 22, 1999
JOB NO. CWS-002

SUBJECT: NORTH WAIHEE WATER SOURCE PROJECT
DEVELOPMENT OF KANOA WELL 1 AND KUPAA WELL
TMK: (2) 3-2-01: 03

We are sending you X Attached Under separate cover the following:

<table>
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<th>NO. OF COPIES</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Well Completion Report-Kupaa Well 1 (State well 5731-03)</td>
</tr>
<tr>
<td>1</td>
<td>As-Builts of Well</td>
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<tr>
<td>1</td>
<td>Water Quality Report</td>
</tr>
</tbody>
</table>

THESE ARE TRANSMITTED (AS CHECKED BELOW):

For Signature/Approval X For Information/Use
For Review and Comment As Requested

REMARKS:

C. TAKUMI ENGINEERING, INC.

Wade Shimabukuro

cc: Mink & Yuen
PART I. WELL CONSTRUCTION REPORT

4. Name of driller who performed work: Mike Robertson
5. Type of rig/construction: Air Rotary
6. Date(s) Well Construction and pump tests (if any) completed: 5/18/99
7. GROUND ELEVATION (referenced to mean sea level, msl): 637.0 ft.
   Well Bench Mark (description/location): Top of Casing
   Elevation (msl): 638.10 ft.
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)
   Depths (ft.) Rock Description, Water Level, Dates, etc.

| Depth to 6 | Red Clay |
|----------------|
| Rock to 10 | Tan Clay & Assorted Rock |
| 10 to 36 | Grey Clay & Assorted Rock |

9. Total depth of well below ground: 687.0 ft.
10. Hole size: 2.2 inch dia. from 0 ft. to 687 ft. below ground
    __________ inch dia. from __________ ft. to __________ ft. below ground
    __________ inch dia. from __________ ft. to __________ ft. below ground
11. Casing installed: 16 in. I.D. x 3/8 in. wall solid section to 633 ft. below ground
    16 in. I.D. x 5/16 in. wall perforated section to 686 ft. below ground
    Casing Material/Slot Size:__________________________
12. Annulus: Grouted from 0 ft. below ground to 630 ft. below ground
    Gravel packed from 633 ft. below ground to 686 ft. below ground
13. Initial water level: 631.35 ft. below ground.
15. Initial temperature: 71 °F
16. PUMPING TESTS: Reference Point (R.P.) used: well casing, which elevation is 638.10 ft.
    (1) Step-Drawdown Test Date 3/12/99
        Start water level 631.9 ft. below R.P.
        End water level 632.05 ft. below R.P.
    (2) Long-term Aquifer Test Date 3/15/99
        Start water level 631.90 ft. below R.P.
        End water level 632.20 ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs (1/9/96 LTAT Form) attached? Yes No
18. As-built drawings attached attached? Yes No
19. Other remarks/comments: (On back of this form)

Signature Mike Robertson Date 5/20/99
Surveyor (print) EDGARDO V. VALERA
Signature
Applicant (print) Dept of Water Supply
Signature Date 6/22/99
PART II.
(PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company: ____________________________

21. Name of person performing work: __________________________

22. Date Pump Installation Completed: ____________

23. PUMP INSTALLATION:

   Pump Type, Make, Serial No.: ____________________________
   Motor type, H.P., Voltage, rpm: ____________________________
   Depth of Pump Intake Setting _________ ft. below ____________, which elevation is _________ ft.
   Depth to bottom of airline _________ ft. below ____________, which elevation is _________ ft.
   Pumping Head is _________ ft. Type of flow meter: ____________, which measures in _________

24. As-built drawings attached?  __ Yes   __ No

25. Other remarks/comments: (See below)

Pump Installation Contractor (print) ______________ C-57 Lic. No. ______________
Signature ____________________________ Date ______________

Applicant (print) ____________________________
Signature ____________________________ Date ______________

8.(cont'd) DRILLER'S LOG (cont'd):

<table>
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<tr>
<th>Water Level</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks,</th>
<th>Water Level</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks,</th>
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<td>36 to 41</td>
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<td>Weathered Basalt</td>
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<td>41 to 59</td>
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<td>Blue Rock</td>
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<td>Softer Basalt</td>
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<td>325 to 340</td>
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<td>Black &amp; Red Cinders</td>
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19. & 25. Remarks:

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________
## CONSTANT-RATE PUMP TEST DATA

**Pumped Well No.** 5731-03  
**Pumped Well Name** Kupaa Well  
**Target Q** 1200 gpm  
**Observation well no.**  
**Distance between Obs. & Pumped Well** 633.10 ft.  
**Reference pt. for depth to water** 638.10 ft. msl  
**Static Water Level @ start of test** 631.9 ft. msl  

Water level measurements by:  
- ✔ steel tape  
- ✔ pressure transducer  
- □ airline

**START TEST** Date: 3/15/99  
**Time of day:** 8:00 a.m.

**Flow Meter Reading Start:** 3095600 gals

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<tr>
<th>Suggested elapsed time (min)</th>
<th>Actual elapsed time (min)</th>
<th>Depth to water (nearest 0.1 ft)</th>
<th>Drawdown (unadjusted to nearest 0.1 ft)</th>
<th>Pumping rate Q (gpm)</th>
<th>EC ps/cm (inches)</th>
<th>Cl⁻ (mg/l)</th>
<th>Temp. (°F or °C)</th>
<th>Remarks</th>
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Data in this table is for:  
- ✔ Pumped Well  
- □ Observation Well

Remarks:  
- COMMISSION WATER REUSEMENT  
- RETURNED  
- 39 JUN 23 PL: 41
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1 Chloride sampling required
2 Use same ending drawdown figure as start for recovery

---

Table 2 (CRPTD Form 12/17/97)

Max possible duration, water level or quality did not stabilize for any 24 period

Begin recovery data next page
Flow meter reading at end of pumped period: 10324500 gals
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<th>Actual elapsed time (min)</th>
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<th>Recovery Drawdown (unadjusted to nearest 0.1 ft)</th>
<th>Pumping rate (gpm)</th>
<th>EC (µhos)</th>
<th>Cl- (mg/l)</th>
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END TEST  Date: 3/15/95  Time of day: 1:40 pm

ADDITIONAL REMARKS:

Person in charge of pump test (print):  Mike Robertson

Signature:  Mike Robertson

The signature above indicates that the data reported on this form is accurate and true to the best
### AQUIFER TEST DATA

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<th>Adjustment (ft)</th>
<th>Q (gpm)</th>
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**County**: Maui  
**Location**: Mendez Well  
**Observation well no.:**  
**Pumped well no.:**  
**Average Q:**  
**Distance between Observation & Pumped Well:**  

**Remarks:**

---

**Notes:**  
- Records from [REDACTED]  
- **Resource:** [REDACTED]  
- **Received:** [REDACTED]  
- **Plm.:** [REDACTED]
**COUNTY OF MAUI**  
DEPARTMENT OF WATER SUPPLY  
WATER QUALITY LAB  
614 PALAPALA DRIVE  
KAHULUI, MAUI, HAWAII 96732

**REPORT DATE:** MAR 22, 1999

**CLIENT:** TAKUMI ENGINEERING  
18 CENTRAL AVENUE  
WAILUKU, MAUI, HAWAII 96793  
PHONE #: [REDACTED]

**MATRIX:** WATER

**SAMPLER:**

**EPA METHOD:** CHLORIDE: 4500-Cl

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<th>SAMPLE ID</th>
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**APPROVED BY:** C. CERIZO  
W.M. IV
### Table 1 (SDPTO Form 12/17/97)

**STEP-DRAWDOWN PUMP TEST DATA**

(not required for wells producing < 100,000 gpd or 70 gpm)

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<th>Kupaa well</th>
<th>Observation well no.</th>
<th>Distance between Obs. &amp; Pumped Well</th>
<th>ft.</th>
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Water level measurements by:  
- [x] steel tape  
- [x] pressure transducer  
- [ ] airline

**START TEST** Date: 3/12/99  
Time of day: 10:23 a.m.

Flow Meter Reading Start: 289.400 gals

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<th>Actual Elapsed Time</th>
<th>Depth to Water (nearest 0.1 ft)</th>
<th>Drawdown S (unadjusted to nearest 0.1 ft)</th>
<th>Pumping rate Q (at least 3 steps) (gpm)</th>
<th>EC</th>
<th>Cl⁻</th>
<th>Temp. °F or °C</th>
<th>Remarks</th>
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Data in this table is for:
- [x] Pumped Well
- [ ] Observation Well

Remarks:
- Step 2 begin?
- Chloride sample taken
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<th>Drawdown S (nearest 0.1 ft)</th>
<th>Pumping rate Q (at least 3 steps) (gpm)</th>
<th>EC (μmhos)</th>
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<th>Observations</th>
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- ✔ Pumped Well
- Observation Well

Remarks

Max possible duration, water level or quality did not stabilize for any 24 period

Begin recovery data next page

Flow meter reading at end of pumped period: 3695600 gals

1 starting pumping rate Q
2 minimum length of step period of constant pumping rate
3 minimum mandatory Chloride (Cl⁻) measurement/sampling at end of every step
4 Use same ending drawdown figure as start for recovery
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<th>Pumping rate Q (gpm)</th>
<th>EC ( \mu S / c m ) (unadjusted)</th>
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END TEST  Date: 3/12/99  Time of day: 2:39 pm

ADDITIONAL REMARKS:

Person in charge of pump test (print): Mike Robertson
Signature: [Signature]

The signature above indicates that the data reported on this form is accurate and true to the best of the person's knowledge who operated this pump test.
Step-Drawdown Pump Test
Kupaa Well 1
NORTH WAIHEE AQUIFER SYSTEM

Kupaa 1 and Kanoa 1 Wells
Test Results and Interpretation

John F. Mink
Mink and Yuen, Inc.
June 21, 1999

Kupaa 1

The location of the well, which was completed in March of 1999, is plotted on Figure 1. The completed configuration of the well is as follows.

Depth 687 ft. (49 ft. BSL)
Boring diameter, 21 in.
Blank casing diameter, 16 in.; depth 633 ft. (4 ft. ASL)
Perforated casing, diameter 16 in.; length 53 ft.
Grout, 0 to 630 ft. (7 ft. ASL)
Gravel, 633 to 686 ft.

Further details are given in the Driller's Well Completion Form, which is attached. Note that the measuring point (MP) on the form differs from the surveyed elevation. The driller's MP elevation on the top of the casing is listed as 638.1 feet; the actual elevation is 639.37 feet, which is based on a vertical survey from a benchmark elevation of 631.87 feet located about 200 feet from the well. This correction affects computation of head but not of drawdown measured during the pumping tests.

Examination of the drill cuttings indicates that the unconformity between the overlying Honolua trachyte formation and the Wailuku basalt formation is 70 to 80 feet below ground surface, and that the weathering zone of the Wailuku extends another 55 feet before fresh Wailuku basalt is struck. The driller’s lithology log is attached. Also attached is a drawing illustrating the relationship between the Honolua and Wailuku at both the Kupaa and Kanoa wells.
Step Drawdown Test

Head before pumping started was 7.41 feet (MP 639.37 ft. - DTW 631.96 ft. = 7.41 ft.), as measured with the Driller’s tape. Putative stable drawdown at each pumping rate was:

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<th>Drawdown (ft)</th>
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In the Appendix these data are used to calculate a transmissivity (T) value of 178,928 sq.ft./day employing the standard laminar-turbulent flow relationship between drawdown and pumping rate. Assuming depth of flow to the well equal to penetration of the well below the water table (about 50 feet), hydraulic conductivity (k) is 3566 ft./day This value is of the magnitude consistent with the usual values derived for other primary basalt aquifers in Hawaii.

Constant Rate Pump Test

The constant rate test at 1200 gpm began at 0900 on March 15, 1999, and went on for four days (96 hours). Initial drawdown was rapid, but after about 40 minutes it no longer decreased monotonically but began to oscillate within a range of approximately 0.5 feet. Tidal and barometric perturbations, randomized by apparent hysterisis in the transducer readings, contributed too much noise to the record to allow an accurate extraction of drawdowns due to pumping alone.

For the first 44 minutes of the test, however, the monotonic drawdowns can be employed in the Theis equation to derive an approximate value of T. The computer program, THEISFIT, yields a T value of 91,363 sq.ft./day, which for a 50 feet depth of flow translates to hydraulic conductivity of 1827 ft./day. This value is of the same magnitude as the one obtained from the step drawdown test data but is probably more accurate and is more consistent with typical values for other Hawaiian basalt aquifers (e.g. The Koolau aquifer of southern Oahu, which has an average hydraulic conductivity of 1500 ft./day). The printout of the THEISFIT computation is included in the Appendix. A realistic value for storage coefficient (S) is impossible to derive because a meaningful radius value for the pumping well is unknowable. The total bore diameter may be one or two feet, but the apparent diameter is likely to be greater.
The effort to disassociate tidal changes in groundwater level from drawdown did not produce clearly identifiable results. However, the tidal efficiency at the well site and Kanoa is 5 to 10 percent. For the maximum tidal change, about 2 feet, the effect on the water level in the well would be 0.10 to 0.20 feet. Change of this magnitude could not be discriminated from barometric and random perturbations after drawdown reached approximately 1.35 feet in less than an hour following the start of the test.

An effort was made to measure water levels in nearby wells during the test. The North Waihee wells were shut down to avoid interference. None of the wells (Kanoa monitor, Mendes, North Waihee) provided unambiguous, interpretable drawdown data.

During the four days of the test chloride content remained steady at 20 to 25 mg/l and temperature was 68 F. The temperature indicates that the source of recharge is from higher elevations where rainfall is copious, and the steady chloride content confirms that at 1200 gpm sea water intrusion does not affect the pumped water. A full spectrum analysis shows that the water is not contaminated with either volatile organics or heavy metals.

**Recommended Pump Size**

The sustained constant rate, 1200 gpm (1.73 mgd), is the recommended pump size. Initial head at Kupaa was 7.41 feet, which is adequate to avoid upconing of sea water during pumping in a well penetrating 50 to 100 feet below the water table. Should adherence to the full breadth of the DWS protocol on pumping be required, average daily yield will be 0.77 mgd (.444 x 1.73 mgd); if only the 16 hr/day pumping portion of the protocol were followed, average yield would be 1.15 mgd (.667 x 1.73 mgd).

**Kanoa 1**

Kanoa 1 was completed in April and tested in May, 1999. Its location is plotted on Figure 1. Final configuration of the well is as follows.

- Depth: 359 ft. (50 ft. BSL)
- Boring diameter: 22 in.
- Blank casing diameter: 16 in.; depth
- Perforated casing diameter: 16 in.;
- Grout: 0 to 300 ft.
- Gravel: 300 to 389 ft.
fluctuations compounded by inconsistencies in transducer readings relegate the use of the data to speculation. Similarly the transducer data from the Kanoa monitor well evidently did not reliably reflect pumping drawdown. During testing transducer readings have to be supplemented by tape measurements to check their accuracy and reliability.

Chloride content during the test remained constant at 20 to 24 mg/l (see Appendix), the same as at Kupaa, and temperature fell between 69 and 71 F.

Clearly the North Waihee aquifer is highly permeable and capable of supplying low salinity water at satisfactory pumping rates. When the North Waihee 1 and North Waihee 2 wells were tested in 1981 and 1989, the transmissivity values were 325,000 sq.ft./day for the original test, and 320,000 sq.ft./day for the 1989 test. The associated storage coefficient values were .25 and .30.

**Recommended Pump Size**

As for Kupaa, the recommended pump size is 1200 gpm (1.73 mgd). For the DWS standard factor of .444, average production will be 0.77 mgd, for the more liberal factor of .667, the average will be 1.15 mgd.
APPENDIX

Kupaa 1 Step Drawdown

A value of transmissivity (T) can be calculated from a step drawdown test by assuming that drawdown at each rate is stable and that it is expressed by the equation,

\[ s = aQ + bQ^2 \]

in which \( s \) is drawdown, \( Q \) is pump rate, \( a \) is the laminar flow (aquifer) constant, and \( b \) is the turbulent flow (well loss) constant. The equation is linearized by dividing by \( Q \),

\[ \frac{s}{Q} = a + bQ \]

which plots as a straight line with \( s/Q \) as the ordinate and \( Q \) the abcissa. The value, \( a \), is the intercept, and \( b \) is the slope of the line. An attached graph shows the linear form of the step drawdown curve for Kupaa 1.

To determine \( T \), the intercept, \( a \), is substituted in the Thiem steady state formula for drawdown as a function of pumping. The Thiem equation is,

\[ s = \left(\frac{Q}{2\pi T}\right) \ln \left(\frac{R}{r}\right) \]

in which \( R \) is the nearest distance from the well where \( s = 0 \), and \( r \) is the effective radius of the well. The value of \( R \) is unknown and has to be approximated.

Because \( s = aQ \) in the step drawdown equation refers to laminar flow in the aquifer, substitution in the Thiem equation gives,

\[ aQ = \left(\frac{Q}{2\pi T}\right) \ln \left(\frac{R}{r}\right), \]

and,

\[ T = \frac{1}{2\pi a} \ln \left(\frac{R}{r}\right). \]

The intercept, \( a \), has a value of .00067 (see graph), thus,

\[ T = (237.6) \ln \left(\frac{R}{r}\right). \]
The value of R is estimated as equal to the length of penetration of the well below the water table (Zanger; Polybarunova-Kochina), and assuming the radius of the well as 1 foot,

\[ T = (237.6) \ln (50) = 929.5 \text{ gpm/ft} \]

which when converted to consistent units (feet and days) is,

\[ T = 178,928 \text{ sq.ft./day} \]

For a depth of flow of 50 feet, \( k = 3566 \text{ ft/day} \).

**Kupaa 1 Constant Rate**

Drawdown during the period of monotonic decline before oscillation of the water level set in is plotted on an attached graph. If the Jacob simplification is employed, the \( T \) value from the graph is calculated as,

\[ T = (264) (1200)/\Delta s \]

In which \( \Delta s \) is drawdown over one log cycle of time. Thus, \( T = 70,588 \text{ sq.ft./day} \), which is comparable to the THEISFIT value of 91,363 sq.ft./day.

Unfortunately, none of the test result data allows for calculation of storage coefficient (S). In the most thoroughly studied Hawaii basaltic aquifer similar to the Wailuku basalt, the Koolau aquifer, storage coefficient as effective porosity is approximately .05, but rigorously conducted tests at North Waihee 1 and North Waihee 2 in 1981 and 1989 gave S values of .25 and .30, respectively.

**Kanoa 1 Step Drawdown**

Employing the same applicable parameters as for the Kupaa 1 step drawdown analysis and a value of .0009606 ft./gpm for the aquifer constant, \( a \), the computed value of \( T \) is 124,770 sq.ft./day. If depth of flow is equal to depth of penetration of the well below the water table (50 ft.), hydraulic conductivity is 2495 ft./day.

**Kanoa 1 Constant Rate**

The water level data derived from transducer readings was too imprecise to allow for realistic determination of aquifer parameters.
Figure 1 - Vicinity Map
Proposed Exploratory Well Sites
Kupaa Well NO.1 & Kanoa Well No.2
Waihee, Maui, Hawaii

Source: USGS Map Mauka and Kahakuloa Quadrangles
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

FAX: Transmitting 11 pages, including this one; call  with any reception problems.

TO: Ed Sentinella
Date: 16 March 99

FROM: Charley Ice

transmitting pages from 2 files:
1) Wells 5731-02 & 03 "North Waiale'e Wells 3 & 4", or
    Kawa Wai Well 5731-02
    Kupa'a Well 5731-03
    permits & transmittal ltr
    (4 pp)

2) Kahakuloa Acre Well 5832-03
    1990 ltr from Commission Deputy to Council Chair
    Pump Installation Permit (final step)
    map
    (6 pp)

Return Fax:  Return Post: P.O. Box 621, Honolulu 96809
Laboratory Report

for

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului, HI 96732

Attention: Cari Cerizo
Sample ID: EUPAA WELL  
Sample Type: Water  
Sampled: 22-mar-1999  
Received: 22-mar-1999  
Reported: 25-mar-1999

<table>
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<th>%Rec</th>
<th>Dilution</th>
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<th>Analyzed By</th>
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Report #: 52000
## Laboratory Report

**Sample #** 990312162  
**Sample ID** KUPAA WELL  
**Sample Type** Water  
**Sampled** 18-Mar-1999  
**Received** 19-Mar-1999  
**Reported** 19-Apr-1999  

### Diquat and Paraquat (ML/EPA 549.1)

| Parameter | Units | Result | Conc. %Rec | Dilution | Det. Limit | Prepared | Analyzed | By |  
|-----------|-------|--------|------------|----------|------------|----------|----------|    |  
| Diquat    | ug/l  | ND     |            | 0.4      | 23-Mar-1999| ylp      | 26-Mar-1999|    |  

Report #: 62800
Sample #: 52800, Sample ID: ROYAN WELL

EDB and DBCP by GC-ECD (ML/EPA 504.1)

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<th>Analyzed By</th>
<th>Date Prepared</th>
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Report #: 52800
## ICPMS Metals (ML 200.8)

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## Laboratory Report

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### Volatile Organic Compounds (ML/EPA 502.2)

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<th>Rec</th>
<th>Dilution</th>
<th>Det. Limit</th>
<th>Prepared By</th>
<th>Analyzed By</th>
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Report #: 52800
**Volatile Organic Compounds (ML/EPA 502.2)**

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<th>By</th>
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# Laboratory Report

Mai, County of, Department of Water Supply  
614 Palapala Dr  
Kahului, HI 96732

ATH: Cari Cerigo

## Volatile Organic Compounds (ML/EPA 502.2)

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Sample Type Water  Sampled 19-mar-1999  Received 24-mar-1999  Reported 29-mar-1999

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Report #: 52060
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(ML/EPA 531.1)

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**Sample #: 93011926**  
Sample ID: KUPAA WELL  
Sample Type: Water  
Sampled: 18-mar-1999  
Received: 19-mar-1999  
Reported: 19-apr-1999  

**Laboratory Report**

Maui, County of, Department of Water Supply  
614 Palapala Dr  
Kahului, HI 96732  
ATTN: Cari Cerizo  

Report #: 52800  

Page 27
Herbicides by 515.1 (ML/EPA 515.1)

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**METHOD BLANK REPORT**

**Dioxins**

**Client Lot #**: G9C240155  
**MB Lot-Sample #**: G9C300000-266

**Work Order #**: CT55C101  
**Matrix**: WATER

**Analysis Date**: 04/06/99  
**Prep Date**: 03/30/99

**Dilution Factor**: 1  
**Prep Batch #**: 9089266

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**INTERNAL STANDARDS**

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**NOTE(S):**
Calculations are performed before rounding to avoid round-off errors in calculated results.
## Client Sample ID: 990319269

### Dioxins

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**Lot-Sample #:** G9C240155-001  **Work Order #:** CRX0Q101  **Matrix:** WATER

**Date Sampled:** 03/18/99  **Date Received:** 03/24/99

**Prep Date:** 03/30/99  **Analysis Date:** 04/07/99

**Prep Batch #:** 9089266

**Dilution Factor:** 1
THEIS DRAWDOWN CALCULATION

FILE NAME = Kupaa Well 1
TEST NAME = Long-Term Test
DATE = March 15-19, 1999

INPUT PARAMETERS

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<td>Time</td>
<td>200,000 days</td>
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<tr>
<td>Pumping Rate</td>
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Aquifer thickness = 304 ft

Green Values

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Theoretical drawdown a mile (5,280 ft) from the pumping well when u < 0.01

T = 91.363 ft²/day
Sp. yield = 0.2
Time = 365 days
s = 0.345 ft
UPCONING EQUATION GIVEN BY BEAR AND DAGAN (1968) FROM HERMAN BOUWER "GROUNDWATER HYDROLOGY"

Predicted rise of the saltwater interface

\[ Z_t = \frac{pfQ}{2\pi(ps-pf)KxL} \left( 1 - \frac{2pnL}{(ps-pf)Kz} \right) \]

Where:

- \( Z_t \) = rise of cone center at time \( t \)
- \( Q \) (ft\(^3\)/d) = well discharge
- \( L \) = Depth of mid-pt. below bottom of well before pumping
- \( Kx \) = Horizontal K
- \( Kz \) = Vertical K
- \( n \) = porosity of aquifer
- \( ps \) = density of salt water
- \( pf \) = density of freshwater

Assume \( Kx/Kz = 200 \)

Well Name: Kupaa Well 5731-03
Kx analysis by: Glenn Bauer

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<th>( t ) (years)</th>
<th>( Z_t )</th>
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To: Charlie Ice  
For: Water Resource Commission  

Dear Charlie:  

This is to provide written notice for starting work on the following well:  

Kupa’a Well State Well # 5731-03  

Please fax a response to me to confirm.  

Thank You;  

Mike Robertson  
dba Wailani Drilling Inc.

Certified By The National Groundwater Association
July 17, 1998

Mr. Michael D. Wilson
Commission on Water Resource Management
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Wilson:

Subject: Well Construction Permit
Kanoa Well 1 and Kupaa Well 1 (Well No. 5731-02 & 03)

We are enclosing the signed copies of the permits. The Department has awarded the contract for both wells to Wailani Drilling Company. The Contractor will be drilling one well at a time starting with Kupaa Well No. 1.

If there are any questions, please call our Engineering Division at [redacted].

Sincerely,

David R. Craddick
Director

hk
enc.

"By Water All Things Find Life"
Mr. David Craddick, Director
Maui Department of Water Supply
200 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Extension of Start Work Deadline
Waikapū Mauka Well (Well No. 5131-01)
Kānoa #1 & Kūpaa #1 Wells (5731-02 & 03)

We received your May 19, 1998 request for an additional three-month extension of your start work deadline (permit condition #10) on the Waikapū Mauka Well, and a second two-month extension of the start date for Kānoa and Kūpaa Wells. We understand that the contracts for construction are being finalized.

By this letter, your request is approved. All other conditions of your permit remain the same. Your new deadlines to start work are:

Waikapū Mauka Well (Well No. 5131-01) - August 12, 1998
Kānoa #1 and Kūpaa #1 Wells (Well No. 5731-02 & 03) - July 22, 1998

If you have any questions, please call Charley Ice at [redacted] or toll-free at [redacted] (Maui), extension 70251.

Sincerely,

TIMOTHY E. JOHNS
Deputy Director

Cl:ss
May 19, 1998

Mr. Edwin T. Sakoda, Acting Deputy Director  
Commission on Water Resource Management  
Department of Land and Natural Resources  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Sakoda:

Subject: Kanoa and Kupa’a Well (Well No 5731-02 and 03)

The Department has selected Wailani Drilling to perform the well construction work and is in the process of executing a contract with them. We anticipate the contractor to start within a month from now. As such we respectfully request a two month extension for the start work deadline.

If there are any questions, please call me at [redacted]

Sincerely,

[Signature]

David R. Craddick  
Director

hk
Ed Sakoda, Acting Deputy Director  
Commission on Water Resource Management  
Department of Land & Natural Resources  
PO Box 621  
Honolulu, Hawaii 96809  

RE: Transmitting Signed Well Construction Permits for Wells  
5131-01 Waikapu Mauka Well; 5731-02 Kanoa Well; 5731-03 Kupaa Well  

April 30, 1998  

Dear Mr. Sakoda,  

Transmitted herewith are signed well construction permits for the subject wells.  

Please feel free to contact me at [redacted] Ellen Kraftsow of my Water Resources & Planning Division staff at [redacted] or Ed Kagehiro of my Engineering Division staff at [redacted] should you require further information.  

Sincerely,  

David Craddick  
Director  

By Water All Things Find Life
Mr. David Craddick, Director  
Maui Department of Water Supply  
200 S. High Street  
Wailuku HI 96793

Dear Mr. Craddick:

Extension of Start Work Deadline  
Waikapū Mauka Well (Well No. 5131-01)  
Kānoa #1 and Kūpa’a #1 Wells (5731-02 and 03)

We received your request for a two-month extension of your six-month start work deadline (permit condition #10). We understand that the bidding process has been initiated but that more time is needed to secure a contractor for the well drilling.

By this letter, your request is approved. All other conditions of your permit remain the same. Your new deadlines to start work are:

Waikapū Mauka (Well No. 5131-01) - May 12, 1998  
Kānoa & Kūpa’a (Well No. 5731-02 and 03) - May 22, 1998

If you have any questions, please call Charley Ice at [redacted] or toll-free at [redacted] (Maui), extension 70251.

Sincerely,

EDWIN T. SAKODA  
Acting Deputy Director
March 5, 1998

Mr. Michael D. Wilson, Chairperson
Commission on Water Resource Management
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Wilson:

Subject: Well Construction Permit
Kanoa Well 1 and Kupaa Well 1 (Well Nos. 5731-02 & 03)

The Department of Water Supply, County of Maui respectfully requests an extension of time to start work on the subject well. The bidding process is initiated but selection of the contractor has not been completed. A two-month extension for the start of work will provide us with sufficient time to assure securing a contractor for the well drilling.

Thank you for your support. If there are any questions, please call our Engineering Division at (808) [redacted]

Sincerely,

David R. Craddick
Director

hk

cc: Carl Takumi
Mr. David Craddick, Director  
Maui Department of Water Supply  
200 South High Street  
Wailuku, Hawaii 96793  

Dear Mr. Craddick:

Well Construction Permit  
Kānoa Well 1 and Kūpaa Well 1 (Well Nos. 5731-02 & 03)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s) which authorizes well construction activities but excludes installation work for your permanent pump. As part of the Chairperson’s approval, the following special conditions were added and are part of your permit under Permit Condition 12:

Special Conditions

1. The hole diameter shall allow for a minimum three-inch grouted annulus for the casing.
2. The depth of the well shall not exceed one-quarter of the thickness of the aquifer.
3. Casing materials shall conform to the strength and thickness specifications of the Hawaii Well Construction and Pump Installation Standards.

This permit does not authorize work for your permanent pump installation. Approval and issuance of your pump installation permit is contingent upon information provided to and accepted by Commission staff as required in the Well Construction & Pump Installation Standards (1/23/97) and any special conditions performed under this permit. Please note that special conditions may simply highlight application deviations from the Standards.

The well owner is responsible for all conditions of the permit. This includes ensuring that the well construction contractor, or other party who constructs the well(s), submits a completed Part I of the Well Completion Report form (enclosed) within sixty (60) days after the well construction work is completed. Be advised that you may be subject to fines of up to $1000 per day for any violations of your permit conditions.

To validate your permit, please sign and have the contractor sign both permit originals and return one for our files. Also, copies of the aquifer pump test worksheet and the well completion report form are enclosed for your use. Please provide all the information in this packet to your well drilling contractor.

Also attached for your information is a copy of the Department of Health’s review comments.

If you have any questions, please call the Commission staff at 587-0251 or toll-free at [redacted] (Maui), extension 70251.

Aloha,

[Signature]

Michael D. Wilson  
Chairperson

Enclosures
WELL CONSTRUCTION PERMIT
Kūpaa Well, Well No. 5731-03

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-168, entitled “Water Use, Wells, and Stream Diversion Works”, this document permits the construction and testing of Kūpaa’s Well (Well No. 5731-03) at North Wai`e‘e, Waikuku, Maui, TMK 3-2-13, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

1. The Chairperson of the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work authorized by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Chairperson, to accurately record water levels. The permittee shall coordinate with the Chairperson and conduct a pumping test in accordance with the Standards (a pump testing worksheet is attached). The permittee shall submit to the Chairperson the test results as a basis for applying an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Chairperson.

3. In basal ground water, the depth of the well may not exceed one-fourth (1/4) of the theoretical thickness (41 times initial head) of the basal ground water unless otherwise authorized by the Chairperson.

4. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

5. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department’s Historic Preservation Division immediately.

6. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to construct the well shall not constitute a determination of correlative water rights.

7. The following shall be submitted to the Chairperson within sixty (60) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other data.

8. The permittee shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

9. The well construction permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97).

10. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

11. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

12. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: September 22, 1997
Expiration Date: September 22, 1999

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. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day.

Permittee's Signature: ______________________ Date: 4/27/98
Printed Name: ___________________________ Firm or Title: Director/Water Supply

Driller's Signature: ________________________ License #: Date: ____________
Printed Name: ___________________________ Firm or Title: ___________________________

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

Attachment
C: USGS
Department of Health/ Safe Drinking Water, Wastewater, and Clean Water Branches
WELL CONSTRUCTION PERMIT
Kūpaa Well, Well No. 5731-03

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-168, entitled “Water Use, Wells, and Stream Diversion Works”, this document permits the construction and testing of Kūpaa Well (Well No. 5731-03) at North Wai‘ale‘ale, Wailuku, Maui, TMK 3-2-1-3, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

1. The Chairperson of the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work authorized by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Chairperson, to accurately record water levels. The permittee shall coordinate with the Chairperson and conduct a pumping test in accordance with the Standards (a pump testing worksheet is attached). The permittee shall submit to the Chairperson the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Chairperson.

3. In basal ground water, the depth of the well may not exceed one-fourth (1/4) of the theoretical thickness (41 times initial head) of the basal ground water unless otherwise authorized by the Chairperson.

4. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

5. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shell or charcoal are encountered during construction, the permittee shall stop work and contact the Department’s Historic Preservation Division immediately.

6. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to construct the well shall not constitute a determination of correlative water rights.

7. The following shall be submitted to the Chairperson within sixty (60) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other data.

8. The permittee shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

9. The well construction permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97).

10. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

11. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee must apply for a well abandonment permit in accordance with §13-168-12(1) prior to any well sealing or plugging work.

12. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: September 22, 1997
Expiration Date: September 22, 1999

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. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day.

Permittee’s Signature: ____________________________ Date: __________

Printed Name: ____________________________________ Firm or Title: ________________

Driller’s Signature: ________________________________ License #: ________________ Date: __________

Printed Name: ____________________________________ Firm or Title: ________________

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

Attachment C: USGS Department of Health/ Safe Drinking Water, Wastewater, and Clean Water Branches
Mr. David Craddick, Director  
Maui Department of Water Supply  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Well Construction Permit  
Kānoa Well 1 and Kūpaa Well 1 (Well Nos. 5731-02 & 03)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s) which authorizes well construction activities but excludes installation work for your permanent pump. As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 12:

**Special Conditions**

1. The hole diameter shall allow for a minimum three-inch grouted annulus for the casing.
2. The depth of the well shall not exceed one-quarter of the thickness of the aquifer.
3. Casing materials shall conform to the strength and thickness specifications of the Hawaii Well Construction and Pump Installation Standards.

This permit does not authorize work for your permanent pump installation. Approval and issuance of your pump installation permit is contingent upon information provided to and accepted by Commission staff as required in the Well Construction & Pump Installation Standards (1/23/97) and any special conditions performed under this permit. Please note that special conditions may simply highlight application deviations from the Standards.

The well owner is responsible for all conditions of the permit. This includes ensuring that the well construction contractor, or other party who constructs the well(s), submits a completed Part I of the Well Completion Report form (enclosed) within sixty (60) days after the well construction work is completed. Be advised that you may be subject to fines of up to $1000 per day for any violations of your permit conditions.

To validate your permit, please sign and have the contractor sign both permit originals and return one for our files. Also, copies of the aquifer pump test worksheet and the well completion report form are enclosed for your use. Please provide all the information in this packet to your well drilling contractor.

Also attached for your information is a copy of the Department of Health's review comments.

If you have any questions, please call the Commission staff at [redacted] or toll-free at [redacted] (Maui), extension 70251.

Aloha,

MICHAEL D. WILSON  
Chairperson

Enclosures
WELL CONSTRUCTION PERMIT
Kūpaa Well, Well No. 5731-03

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of Kūpaa Well (Well No. 5731-03) at North Waihe'e, Wailuku, Maui, TMK 3-2-1-3, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

1. The Chairperson of the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work authorized by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Chairperson, to accurately record water levels. The permittee shall coordinate with the Chairperson and conduct a pumping test in accordance with the Standards (a pump testing worksheet is attached). The permittee shall submit to the Chairperson the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Chairperson.

3. In basal ground water, the depth of the well may not exceed one-fourth (1/4) of the theoretical thickness (41 times initial head) of the basal ground water unless otherwise authorized by the Chairperson.

4. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

5. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department's Historic Preservation Division immediately.

6. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to construct the well shall not constitute a determination of correlative water rights.

7. The following shall be submitted to the Chairperson within sixty (60) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other data.

8. The permittee shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

9. The well construction permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97).

10. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

11. If the well is to be used it must be properly capped. If the well is to be abandoned then the permittee must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

12. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: September 22, 1997
Expiration Date: September 22, 1999

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. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day.

Permittee's Signature: [Signature]
Date: 7/11/98

Printed Name: David Craddick
Firm or Title: Director of Water Supply

Driller's Signature: [Signature]
License #: 2015
Date: 7/18/98

Printed Name: Michael Robertson
Firm or Title: Maui Drilling, Inc.

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

Attachment
C:\ USGS
Department of Health/ Safe Drinking Water, Wastewater, and Clean Water Branches
WHILE YOU WERE OUT

TO ______________________

DATE __________________ TIME __________________

WHILE YOU WERE OUT

M __________________________
of __________________________

Phone ______________________

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RETURNED YOUR CALL

Message

Operator
TO: Honorable Lawrence Miike, Director  
Department of Health  
Attention: Dennis Tulang, Wastewater Branch  
William Wong, Safe Drinking Water Branch

FROM: Michael D. Wilson, Chairperson  
Commission on Water Resource Management

SUBJECT: Well Construction Permit Application  
Kānoa Well #1 and Kūpa’a Well #1 (Well No. 5731-02 & 03)

Transmitted for your review and comment is a copy of the captioned well application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by August 1, 1997.

Please find a map, attached, to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at 587-0251.

CI:ss  
Attachment(s)

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (serving 25 or more people at least 60 days per year or has 16 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

This well does not qualify as a source serving a public water system (serving less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

For the applicant’s information, a source of possible wastewater contamination [ ] is not located near the proposed well site (information attached).

Other relevant DOH rules/regulations, information, or recommendations are attached.

No comments/objections

Contact Person: William Wong  
Phone: 587-0258

Signed: William Wong  
Date: 7/3/97
TO:    Honorable Lawrence Miike, Director  
       Department of Health  
       Attention:    Dennis Tulang, Wastewater Branch  
                        William Wong, Safe Drinking Water Branch

FROM:  Michael D. Wilson, Chairperson  
       Commission on Water Resource Management

SUBJECT:  Well Construction Permit Application  
           Kānoa Well #1 and Kūpā’a Well #1 (Well No. 5731-02 & 03)

Transmitted for your review and comment is a copy of the captioned well application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by August 1, 1997.

Please find a map, attached, to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at

Response:

[ ] This well qualifies as a source which will serve as a source of potable water to a public water system (serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawai‘i Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

[ ] This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

[ ] If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

[ ] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

[ ] For the applicant’s information, a source of possible wastewater contamination [ ] is not located near the proposed well site (information attached).

[ ] Other relevant DOH rules/regulations, information, or recommendations are attached.

[ ] No comments/objections

Contact Person:  Lori N. Kajiwara  
                  Phone:  808-429-6894

Signed:      LORI N. KAJIWARA  
              Date:  7/25/97
Mr. David Craddick  
Maui Department of Water Supply  
200 South High Street  
Wailuku, HI 96793

Dear Mr. Craddick:

Well Construction Permit Application for Well No. 5731-02 & 03

We acknowledge receipt, on July 14, 1997, of your completed well construction permit application for the Kānoa Well #1 and Kūpā’a Well #1 (Well Nos. 5731-02 & 03). You can expect your application to be processed within ninety (90) days from this date.

For your information, the process of constructing a well is normally regulated and permitted in two (2) steps. First, a well construction permit is issued for drilling and testing purposes only. Based upon information provided by you through a Well Completion Report Part I (Well Construction), a pump installation permit may then be issued to authorize pump work. If a pump is installed then a Well Completion Report Part 2 (Pump Installation) is required.

If you have any questions about your permit application, please contact Charley Ice of the Commission staff at [redacted] or toll-free at [redacted] extension 70251.

Sincerely,

RAE M. LOUI  
Deputy Director

C: ss
TO: Honorable Lawrence Miike, Director  
Department of Health  
Attention: Dennis Tulang, Wastewater Branch  
William Wong, Safe Drinking Water Branch

FROM: Michael D. Wilson, Chairperson  
Commission on Water Resource Management

SUBJECT: Well Construction Permit Application  
Kānoa Well #1 and Kūpa’a Well #1 (Well No. 5731-02 & 03)

Transmitted for your review and comment is a copy of the captioned well application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by August 1, 1997.

Please find a map, attached, to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Charley Ice of the Commission staff at [Contact Information]

RESPONSE:

[ ] This well qualifies as a source which will serve as a source of potable water to a public water system (serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

[ ] This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

[ ] If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

[ ] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

[ ] For the applicant’s information, a source of possible wastewater contamination [] is [] is not located near the proposed well site (information attached).

[ ] Other relevant DOH rules/regulations, information, or recommendations are attached.

[ ] No comments/objections

Contact Person: ____________________________ Phone: ____________________

Signed: ____________________________ Date: ____________________
July 3, 1997

Ms. Rae Loui  
Commission on Water Resource Management  
Department of Land and Natural Resources  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Ms. Loui:

Subject: North Waihee Exploratory Wells  
Kupaa Well No. 1 and Kanoa Well No. 1  
TMK: (2) 3-2-01:003

We are enclosing completed applications and two copies of well construction permit for Kupaa Well No. 1 and for Kanoa Well No. 1 for approval. We understand that the filing fees is not required of the Department.

The final environmental assessment and finding of no substantial impact is published in the June 23, 1997 OEQC Bulletin.

If there are any questions, please call our Engineering Division at ____

Sincerely,

David R. Craddick  
Director

hk
enc.
cc. Carl Takumi Engineering

“By Water All Things Find Life”
APPLICATION FOR PERMIT

1. APPLICANT: (circle primary contact a, b, or c) 
   (a) WELL OWNER
      County: Maui
      Address: 200 South High St, Wailuku, HI 96793
      Landowner: Waikului Agribusiness Co., Inc.
      Contact: David C. Campbell
      Phone: 245-7730
      Address: Wailuku, HI 96793
   (b) LANDOWNER
      Address:
   (c) CONTRACTOR
      Address:

2. WELL LOCATION/NAME:
   Name: Kupaa Well #1 (N. Waiehe Well Site #5)
   Island: Maui
   Address: Wailuku, HI 96793
   Tax Map Key: 3-2-01-03
   (Attach a USGS map, scale 1"=2000', and a properly tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK
   (b) WELL TYPE:
      | Option | Description |
      |--------|-------------|
      | Drill New Well | * After Location |
      | Modify Existing Well | * Replacment Pump |
      | Deepen Abandon/Deeple |
      | Install New Pump | * Modify Pump |
      | Submersible |
      | Rotary Displacement |
      | Reciprocating |
      | Centrugal |
      | Rotary/Two |
      | Gas |
      | Electric, rated horsepower of |
      | Municipal (including hotels, stores, etc) |
      | Rural |
      | Domestic (individual, noncommercial water use) |
      | Industrial |
      | Irrigation (crop) |
      | Other (explain) |

4. PROPOSED PUMP INFORMATION:
   Rated Pump Capacity: 1400 gallons per minute
   Motor:
   Pump Type:
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Well Turbine</td>
<td></td>
</tr>
<tr>
<td>Submersible</td>
<td></td>
</tr>
<tr>
<td>Rotary</td>
<td></td>
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<tr>
<td>Centrugal</td>
<td></td>
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<tr>
<td>Impulse</td>
<td></td>
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<tr>
<td>Propeller</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
</tr>
<tr>
<td>Electric, rated horsepower of</td>
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5. PROPOSED USE:
<table>
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<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military</td>
<td></td>
</tr>
<tr>
<td>State Land Use District:</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
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<tr>
<td>Rural</td>
<td></td>
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<tr>
<td>Conservation</td>
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<tr>
<td>Other (explain)</td>
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<tr>
<td>County/Interim</td>
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<td>(If more space is needed, continue below under remarks, explanations)</td>
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6. (a) PROPOSED AMOUNT OF WITHDRAWAL:
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Flow meter</td>
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</tr>
<tr>
<td>Open pipe</td>
<td></td>
</tr>
<tr>
<td>Office Plate</td>
<td></td>
</tr>
<tr>
<td>Web</td>
<td></td>
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<tr>
<td>Other (explain)</td>
<td></td>
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<td>(In more space is needed, continue on back)</td>
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7. PENDING ACTIONS:
<table>
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<th>Option</th>
<th>Description</th>
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<tr>
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<tr>
<td>DMA</td>
<td></td>
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<tr>
<td>EDB</td>
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<tr>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>Other (explain)</td>
<td></td>
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<tr>
<td>Completion Date</td>
<td></td>
</tr>
</tbody>
</table>

8. REMARKS, EXPLANATIONS:
   Preliminary test in pilot hole at depth of 625' (elev.-90').
   Option to increase pilot hole in 25 foot increments. Final depth of blank
   16" diam. casing to be determined later.
   (In more space is needed, continue on back)

Well Owner
Signature
Date 11/1/97
Landowner
Signature
Date
Contractor
Signature
Date
Compliance Date

For Official Use Only:
Date Received
Date Approved
Field Completed

Longitude
Aquifer System Name
State Well No.

Horizontal Datum
Vertical Datum
8. Remarks, Explanations:

Grout to extend to bottom of blank casing.

10 to 20 feet of screen may be added to bottom of solid casing depending on test results.

9. PROPOSED WELL SECTION

Elevation at top of casing: 575 ft., mast.

Cement Grout: 575 ft.

Rock Packing: 0 ft.

Hole Diameter: ___ in.

Total Depth: 625 ft.

Ground Elevation: 575 ft., mast.

Solid Casing:

Material: steel
Length: 575 ft.
Diameter: 16 in.
Wall Thickness: 0.375 in.

Casing: [ ] Perforated [ ] Screen

Material
Length: 10 to 20 ft.
Diameter: 16 in.
Wall Thickness: ___ in.
Openings: ___ sq. in./A.F.

Open Hole:

Length: 50 ft.
Diameter: 10 in.

*Approximate elevation at time of filing application. Ground elevation above mean sea level (msl) by a surveyor licensed by the State must be submitted at start of construction. Final elevations of well components shall be submitted in the well completion/well abandonment reports.