November 5, 1993

Mr. Keith W. Ahue, Chairperson
Commission on Resource Management
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ahue:

RE: Honokowai Well A (State Well No. 5637-05)
Honokowai, Maui, Hawaii

This letter is a follow-up to our April 29, 1993 letter, whereby we had requested a nine-month extension to commence installation of the pump for the subject well. We respectfully request that the subject pump installation permit be withdrawn at the present time due to a change in the development scheduling of our well systems. Amfac’s development efforts will be concentrated on its Kaanapali P-1 and P-2 wells. (State Well Nos. 5539-01 and -02, respectively.)

Prior to the rescheduling of the development of the subject wells, a resubmittal of the pump installation permit will be pursued.

If you have any questions, feel free to call me direct at 543-8980.

Sincerely,

Don Fujimoto
Director of Development

LY:tg

xc: Ivan Nakatsuka - ATA
Mr. Don Fujimoto, Director of Development  
AMFAC/JMB HAWAII, INC.  
2530 Kekaa Drive  
Lahaina, HI 96761  

Dear Mr. Fujimoto:

Request for Extension of Start of Construction Date for  
Honokowai Well (Well No. 5637-05)  

We acknowledge receipt of your letter requesting a nine-month extension of the start of construction date. By this letter we are extending your start date an additional nine months to October 16, 1993. Please note that the well should be completed by July 20, 1994, 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 October 16, 1993.

Sincerely,

Rae M. Loui  

cc: Ivan Nakatsuka - Austin, Tsutsumi & Associates, Inc.
April 29, 1993

Mr. Keith W. Ahue, Chairperson
Commission on Water Resource Management
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ahue:

RE: Request for Extension of Pump Installation Permit for Honokowai Well A (State
Well No. 5637-05), Honokowai, Maui, Hawaii

We regretfully wish to inform you that the six-month period required for commencement of the
pump installation for our Honokowai Well A has lapsed and respectfully request a nine-month
extension to this condition. The requested extension is pursuant to the Commission's July 16,
1992 approval to install a pump in this well.

It is still our intent to complete installation of the pump within the allotted 24-month period from
the approval date, and will keep the Commission apprised of any deviation from this intent.

We appreciate your consideration of this nine-month extension of our commencement of the
pump installation. Please do not hesitate to contact us if you have any questions.

Sincerely,

Donald Fujimoto
Director of Development

cc: Ivan Nakatsuka - Austin, Tsutsumi & Associates, Inc.
PUMP INSTALLATION PERMIT

for

Honokowai Well A
Well No. 5637-05
Honokowai, Maui

TO: Pioneer Mill Company, Ltd.
P.O. Box 727
Lahaina, HI 96761

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 replace a pump in Honokowai Well A (Well No. 5637-05), for municipal use, is approved subject to the following conditions:

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

2. 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.

3. The permit shall be for installation of a 900 gpm capacity pump in the well.

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 staff within 30 days after completion of the work:
   a. Well Completion Report.
   b. As-built sectional drawing of the installed pump.

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

7. 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.

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.

c: USGS
   Department of Health
   Safe Drinking Water Branch
   Ground Water Protection Program
   Maui Department of Water Supply
June 9, 1992

Mr. William Paty, Chairperson
Commission on Water Resource Management
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

RE: Pump Installation Permit Application for Honokowai Well A (State Well No. 5637-05)

Amfac Property Investment Corp., on behalf of Pioneer Mill Co., respectfully requests the Commission’s approval of the enclosed Pump Installation Permit Application for the replacement of an existing pump at Honokowai Well A.

Attached for your information and review are the Pump Application permit, location map, tax map of the well site, and filing fee check of $25.00.

Thank you very much for your time and consideration concerning this matter. Please do not hesitate to call me at 945-8655 should any questions arise.

Sincerely,

Don Fujimoto
Director of Development

Enclosures

xc: Ivan Nakatsuka-Austin, Tsutsumi & Associates
Dave Morrell-Pioneer Mill Co., Ltd.
APPLICATION FOR

WELL CONSTRUCTION PERMIT

XX PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water and Land Development, P.O. Box 372, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $125.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-7543, Hydrology/Geology Section for assistance.

1. WELL LOCATION

Island Maui Tax Map Key 4-4-07:01
Address N/A

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

2. WELL OWNER

Firm Name Pioneer Mill Co., Ltd.
Contact Person Don Fujimoto
Address 2530 Kekaa Dr.
Lahaina, Hawaii 96761
Phone 667-7411

LANDOWNER

Firm Name Pioneer Mill Company, Ltd.
Contact Person Dave Morrell
Address P.O. Box 727
Lahaina, Hawaii 96761
Phone 661-3129

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

Name Roscoe Moss Company
Address 830 Ahua Street
Honoalui, Hawaii 96819

Contractor's License No. C-2101

4. PROPOSED WORK

☐ Drill New Well ☐ Deepen ☐ Alter ☐ Seal ☐ Install New Pump ☐ Replace Pump ☐ Redrill ☐ Abandon ☐ 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.) ☐ Industrial
☐Domestic (individual, noncommercial water systems) ☐ Other (specify)
☐ Irrigation (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL 1,000,000 gallons per day

7. PROPOSED PUMP INFORMATION

Pump Type: ☐ Vertical Turbine ☐ Submersible ☐ Centrifugal
Motor: ☐ Diesel ☐ Gas ☐ Electric: 50 Rated Horsepower
Rated Pump Capacity 900 gallons per minute (gpm)

Well Owner (print) PIONEER MILL COMPANY, LTD. Landowner (print) PIONEER MILL COMPANY, LTD.

Signature Date 1/1/12

For Official Use Only:

Field Checked By Latitude Hydrologic Unit
Date Longitude State Well No.
Briefly describe the proposed work:
Replace existing submersible pump. Well was drilled in 1965, and has been registered with DLNR as Honokowai Well A (State Well No. 5637-05).

PROPOSED SECTION OF WELL

Elevation at top of casing 1,450.5 ft., msl.

Ground Elevation 1,450 ft., msl

Cement Grout 60 ft.

Hole Dia. 20 in.

Total Depth 160 ft.

Rock Packing 30 ft.

Solid Casing:
- Material: Steel
- Length: 60 ft.
- Diameter: 12 in.
- Wall thickness: -- in.

Casing: / /Perforated /X/Screen
- Material: Steel
- Length: 20 ft.
- Diameter: 12 in.
- Wall thickness: -- in.
- Openings -- sq. in./L.F.

Open Hole:
- Length: 80 ft.
- Diameter: 13 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.
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**REMITTANCE ADVICE**

- **CHECK NUMBER:** 400834
- **CHECK DATE:** 06/10/92
- **CHECK AMOUNT:** 25.00

**INVOICE**

- **VENDOR:** 08309
- **DEPT OF LAND & NATURAL**

**CHECK**

- **DATE:** 06/10/92
- **AMOUNT:** **25.00**

**CHECK**

- **DATE:** 06/10/92
- **AMOUNT:** **25.00**

**DEPT OF LAND & NATURAL RESOURCES**

- **P.O. BOX 373**
- **HONOLULU, HI 96809**

**SIGNATURE**

- **PAY TO THE ORDER OF:** DEPT OF LAND & NATURAL RESOURCES

**TWO SIGNATURES REQUIRED FOR AMOUNTS EXCEEDING $10,000.00**
February 4, 1966

Mr. Charles Farr
Staff Engineer
AmFac Properties, Inc.
745 Fort Street
Honolulu, Hawaii 96813

Dear Sir:

Subject: Honokowai Gulch Well

A. Pump Tests

After much rainy weather and problems with the access road the pump testing for the subject Honokowai Gulch Exploratory Well was completed. During the five day period of operation and stopping a total of 4,870,000 gallons was discharged from the well. This places the overall average discharge at slightly less than 1 M.G.D.; however, actual pumping was conducted only over a 98 hour period so that the pumping rate (when in operation) averaged more than 1 M.G.D.

Two significant areas of the pump curves, which are shown in the accompanying Exhibits 2 through 7, occur from 7:15 a.m. on January 17, 1966, to shutdown at 3:05 p.m. on the same day; and from 9:00 a.m. to 4:00 p.m. on January 20, 1966. Both of these sections of the curve show the drawdown to be stabilized at a discharge of 700 g.p.m. (one million gallons per day).

It is also significant that the recovery curves of 2:00 p.m. of January 16, 1966, 10:00 a.m. of January 18, 1966, and of the final reading of January 30, 1966, all leveled out at or very near 21 feet 9 inches. No reading was taken between 4:00 p.m. of January 20 and January 30 because of weather and inaccessibility to the site. The actual time of recovery is, therefore, unknown for that curve.

It is our conclusion that this well will produce 700 g.p.m. (1 M.G.D.) during the wet winter months with a drawdown of approximately 8 feet,
which means a lift of 28 or 29 feet to bring the water to the ground surface. It is impossible to compute the recharge rate during dry summer months but two possibilities are probable. One possibility is that the recharge will be substantially less so that rest periods in pumping might be required. That is, drawdown might be so great as to require automatic cutouts to shut down the pump for short recovery periods. Another possibility is that the recharge rate will balance out the pump rate at a lower elevation so that a stable drawdown may again be reached some 40 or 50 feet below the surface.

It is our studied opinion that this well will be capable of producing one million gallons of water per day maximum with a year 'round average discharge somewhere near 750,000 gallons per day. This quantity is more than twice the present domestic demand at Kaanapali.

It is our recommendation that a 700 g.p.m. pump be placed in this well with a setting 70 feet below the surface to allow a safe drawdown of 40 feet (60 feet below the surface) which is five times the actual drawdown obtained in the tests. A cross-section of the pump test results and recommended pump setting location are shown in Exhibit 1.

B. Pipeline to the Site

It is our opinion that the pipeline should be removed from the stream bed area as soon as possible in order that severe damage during flash floods will be eliminated. We, therefore, recommend the existing footpath alignment, which was once the old flume line leading from Kapaloa and Amalu Streams. Approximately 6,000 feet of pipeline will be required to bring the water out of the gulch to a point where it will descend by gravity to Kaanapali. During this 6,000 feet the rise is from 1,460 feet to 1,540+ feet, a distance of 80 feet vertically. If the water level while pumping stands at 40 feet below the surface, the total lift required will be 120 feet. To this, the friction losses within the pipe must be added.

The friction losses within an 8 inch pipe having a friction factor of 120 (Hazen & Williams) will use up 10.8 feet/1000 linear feet of pipe for overcoming these losses. A 12 inch pipe under the same conditions will only use 1.5 feet/1000 linear feet of pipe. The difference is 9+ feet per thousand for a total of 54 feet in the overall 6,000 feet.
Using the normal pumping cost of 8 cents to lift a million foot gallons of water the cost to overcome this friction would be \(54 \times 0.08\) or \$4.32\) per day or \$129.60 per month when discharge is 700 g.p.m. The total cost to compensate for this friction factor would be \$129.60 \times 600\) for a 50 year period or \$77,760. It is estimated that the cost of placing 6,000 feet of 12 inch pipe will be \$24,000\) over the cost of 8 inch pipe. We, therefore, recommend the 12 inch pipe be used for the first 6,000 feet, then 8 inch may be used where friction becomes less than the slope of the land.

C. **Pipeline Vs. Existing Ditch**

It is quite probable that the question will arise as to the economics of placing a new pipeline when an existing ditch is available. We, therefore, present this argument: The well will produce domestic quality water free from contamination and turbidity; the ditch will not unless treated and filtered.

In either case, the cost of the wells, pumping units and pipeline as far as the Honokowai Ditch will be the same. The question of economics enters only in the additional 10,000 feet of 12 inch and 8 inch pipe necessary to enter the gulch and reach the well site as compared with additional filter units and their operation.

1. **Cost of Pipeline**

   a. 4,000 feet of 8" @ \$12.00  
      \$ 48,000
   b. 6,000 feet of 12" @ \$16.00  
      \$ 96,000
      \$144,000 capital outlay

2. **Cost of Using Honokowai Ditch**

   a. 1,000 feet of 8" pipe @ \$16  
      (well to tunnel)  
      \$ 16,000
   b. 2 new filters to have 1 M.G.  
      capacity  
      \$ 36,000
   c. Settling basin - 1 M.G.  
      capacity  
      \$ 55,000
      \$107,000 capital outlay

   **Difference**  
   \$ 37,000 in favor of ditch
2A. Additional Operational Costs Under 2 Above

a. Chlorine @ 15 cents/lb. (@ 1 M.G.D.) $1.50 per day
b. Operation of 2 extra filters 1.50 per day
   $3.00 per day

Say $100.00 per month.

Over a 50 year period the additional operating costs under the ditch and treatment system would be

$100.00 x 600 months or $60,000

2B. Loss of Revenue Under 2 Above

It has been estimated that 750,000 gallons per day will be pumped from the well. Normal losses through the sedimentation basin and filter backwashing would be 10% or 75,000 gallons per day. During periods of high turbidity the backwash cycle could even be greater than 10%. At a retail price of 30 cents per 1,000 gallons the daily loss of revenue from the 75,000 gallons would be 75 x $0.30 or $22.50, totaling $675.00 per month.

Although the capital expenditure to place the pipeline would be $37,000 more than using the ditch system, we strongly recommend it be used to insure continual domestic quality water to Kaanapali. When additional operational costs and loss of revenue are considered it appears quite conclusive that this is the more economical way to bring domestic water to the resort area.

D. Economics of Honokowai Gulch Water

A quick review of the Kaanapali water system indicates that the economics of a well supply in Honokowai Gulch is both economical and profitable.

Our preliminary review is as follows:

1. Cost of existing system $600,000
2. Cost of exploration 50,000
3. Installation of new pipeline and wells 475,000
   Total Cost $1,125,000
Mr. Charles Farr

February 4, 1966

4. Depreciation (replace completely in 50 years) $1,125,000
5. Pumps replaced each 15 years (3 times) $100,000

$2,350,000

In 50 years the well system should produce (at 750,000 g.p.d.)
.75 M.G. x (50 x 365) = 13,687 million gallons of water.

Cost per million gallons = $2,350,000 or $172.00 per M.G.

Cost of pumping @ $.08 per million foot gallons, 1,420 to 1,540 feet
elevation = 120' + 10' friction head = 130 x $.08 or $10.40

$182.40 per M.G.

Based on all of the foregoing information it is our recommendation that the well system be developed in Honokowai Gulch. In order to assure reliability, however, a standby well must be provided. Whether this standby well should be in the same dike compartment or in an adjacent compartment of equal productive capability is of consideration. A second well within the same dike compartment will give mechanical reliability only. If the well were in an equally productive second dike compartment both mechanical reliability and the possibility of greater productivity is provided. I feel that this should be discussed with Dr. Stearns prior to our proceeding with the second well after this present rainy season.

Sincerely,

AUSTIN, SMITH & ASSOCIATES, INC.

By DONALD S. AUSTIN
President

DSA:RLS:BE
Encls. Exhibits 1 - 7

cc. A.W. McKelvey w/encl.
    Dr. Stearns w/encl.
HONOKOWAI GULCH WELL
PUMP TEST CURVES
1-18-23

Austin, Smith & Assoc., Inc.
1530 Richard Street
Honolulu, Hawaii 96818

EXHIBIT 4.
April 25, 1966

Dr. Harold T. Stearns

Subject: Kanapali Water Development

Dear Dr. Stearns:

Enclosed you will find two copies of the Kanapali Water Development conference which has been executed by all parties involved in the discussion. I am sending a carbon copy of this letter plus a copy of the conference to the individuals mentioned below.

Mr. John Local and I will discuss the proposal with Mr. Williamson tomorrow in the Pioneer Mill Company's office. If a decision is made to follow our suggestions, I will either call or give you a Registered Letter in order that you might make plans to fly out for our test well locations.

Sincerely yours,

Charles Farr
Staff Engineer
Amfac Properties, Inc.

cc: Hasara:
R. R. Nolchiff
R. A. Swoboda
A. V. Melalvey
John Loomis
Russell L. Smith, Jr.
Karl Berg
R. C. Williamson
Tec d'Antonin
Louis van der Linde
Frank Harper
KAANAPALI AREA WATER DEVELOPMENT CONFERENCE

A meeting was held on April 1, 1966 in Mr. John Loomis' office. Those in attendance were: Messrs. Harold Stearns, Russell Smith, Jr., John Loomis, and Charles Farr. Water needs for Kaanapali include present daily demand of approximately 400,000 gallons plus growing demands of the Kaanapali area which must be served until desalting of brackish ground water becomes economically feasible. It is estimated that at least 2 million gallons of water per day will be necessary, in excess of the present water supply from Honokowai to meet the demand during the unknown interim period. Three possibilities are: (1) Water from the A & B Honokohau Ditch system, which must be filtered; (2) Water from new wells in Honokowai Gulch; or (3) Development of additional high-level water in Honokohau Gulch by tunnels on A & B land to replace water borrowed from the plantation Honokowai supply. The ditch water would have to be boosted from Mahinahina to Horner Reservoir from which the Honokowai water is distributed.

The old Honokowai development tunnel yields a minimum of 2.0 mgd. while the newly completed well in Honokowai probably could produce an additional 0.7 mgd. which, together, would supply the interim demand. However, the plantation will require any water taken from the Honokowai development tunnel to be replaced by an equal amount of water from another source. The estimated cost of water from Honokohau Ditch at Mahinahina is $60 a million gallons which must be filtered at an additional cost of about $80 a million gallons to make it domestic quality. Based on these estimated costs, it would be preferable to develop water from wells on American Pacific property, if feasible, with a 600-foot lift or less. Well water would not require filtering. Based on the foregoing assumptions, Dr. Stearns recommended development in Honokowai from wells, to avoid developing
water on A & B land in Honokohau Gulch especially as all Honokowai water must be filtered when delivered through the Honokohau Ditch system to Mahinahina. As a basis for comparing the alternative replacement costs of furnishing replacement irrigation water to the plantation at Horner Reservoir in the event the Honokowai Development Tunnel water is to be used only for domestic use, the costs of developing additional water for irrigation purposes by extending the A & B Honokohau Tunnels should be evaluated. Maui Pineapple Company is reported to be investigating the possibility of developing a well field for domestic use rather than drawing raw water from the Honokohau Ditch; hence it is assumed that no depletion of flow will occur in the Honokohau Ditch due to domestic demands of A & B resort developments. However, before trying to sink additional wells in Honokowai Gulch, it will be necessary to ascertain the elevation of the water confined by dikes upstream from Pump R.

It is recommended that a test hole program at about 4,000 foot intervals above Pump R be commenced at sites designated by Dr. Stearns. An access road exists on the gulch floor. This program would involve 3 test holes in addition to Pump R and the existing well. The test holes would ascertain the profile of the water table from Pump R to the existing exploratory well. (elev. 1,460 ft.) at the Amalu-Kapaloa forks. The test holes would need to be large enough in diameter to receive a 6" casing for pump testing, and should be drilled by the most economical method possible, presumably by a large rotary rig. They should be drilled to a minimum depth of 50 feet below a permanent ground-water level. The holes should be cased with cheap temporary casing and be measured at least once a week with an electrical
measuring device to ascertain the fluctuation of the water levels. After one year of records, it should be possible to determine where to sink a well, or wells, for developing additional water. The known geological structures indicate that the water levels will rise, stair-way fashion, in the several test holes from near sea level at Pump R to approximately 1,440 feet above sea level at the Amalu Fork. The purpose of the test holes is to determine that most economical place to develop water in relation to the pump lift and the quality and quantity. The test holes should be sampled and if they show any salt, should then be tested regularly for their salt content.

The program should be started immediately in order to obtain as long a record of water level measurements as possible. The cost of the test holes will be paid from the money still available in the fund already budgeted for exploratory drilling.

April 17, 1966

Harold T. Etienne

April 17, 1966

J. D. Johnson

21 April 1966

Charles W. Farr

25 April 1966

Walter T. Steed
MEMO

DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

TO:
Mr. Dan A. Davis

FROM:
Walter O. Watson

OFFICE:
USGS

DATE:
Feb. 7, 1966

SUBJECT:
Assignment of Well Number for Honokowai Well, Maui

MESSAGE:

Attached is a map showing the location of a high-level dike water well recently drilled and tested by Ocean View Drilling Co. for American Factors, Ltd. The well lies northeast of Lahaina town and the enclosed map is from the Lahaina 1:24,000 quadrangle map. Drilling logs are not available.

We would appreciate your assigning a number to the above well and informing us.

DL:dh

WALTER O. WATSON, JR.

REPLY:
Attach.

Our records indicate that on Oct. 1964, we furnished your office the number 307 for a well located on Pioneer Mill Co., Ltd's land below the confluence of Amalu and Papaloa Stream in Honokowai Gulch, Tax Key 4-407.

Is it possible that a single well is involved? If not, please furnish us with a map showing how the new well is situated in relation to Well #307.

SIGNATURE
JACK ROSEMAU

PERSON RECEIVING MEMO—RETAIN THIS COPY FOR YOUR RECORD.
**PU:-ING TEST RECORD**

for

Well (No.)

Island **MAU** Project or Job No. **19**

**Description of Well**--
1. Elevation: ground surface ____ ft., top of casing ____ ft., table ____ ft., referenced to ____ benchmark
2. Total depth of well ____ ft.; or ____ ft. elevation, msl
3. ____ in. solid casing to ____ ft. depth, perforated to ____ ft. depth
4. Static water level on ____ ft. below ground surface, top of casing; or ____ ft. elevation, msl measured ____ method

**Description of Pump and Pump Setting**--
5. ____ type pump with ____ stage bowl assembly
6. Gasoline diesel, electric, power with ____ horsepower
7. Shaft speed: ____ rpm at ____ gpm flow
8. Depth of pump intake: ____ ft. below ____; or ____ ft. elevation, msl
9. Depth of airline bottom: ____ ft. below ____; or ____ ft. elevation, msl
10. Center of gage: ____ ft. elevation, msl. Flow measured with ____

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### PUMPING TEST RECORD

For

**Well**

(name)  
(No.)

**Island**  
Project or Job No.  
19

#### Description of Well--

1. Elevation: ground surface _ft., top of casing _ft., _ft., referenced to benchmark

2. Total depth of well _ft.; or _ft. elevation, msl

3. _in. solid casing to _ft. depth, perforated to _ft. depth

4. Static water level on _ft. below ground surface, top of casing; or _ft. elevation, msl measured _method

#### Description of Pump and Pump Setting--

5. _type pump with _stage bowl assembly

6. Gasoline diesel, electric, power with _horsepower

7. Shaft speed: _rpm at _gpm flow

8. Depth of pump intake: _ft. below _; or _ft. elevation, msl

9. Depth of airline bottom: _ft. below _; or _ft. elevation, msl

10. Center of gage: _ft. elevation, msl. Flow measured with _

11. Test conducted by _

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Rate (gpm)</th>
<th>Airline, manometer Rdgs</th>
<th>Drawdown (feet)</th>
<th>Chlorides (ppm)</th>
<th>Temperature (°F)</th>
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**Recovery**

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PUMPING TEST RECORD

for

Well (No.)

name

Island Project or Job No. 19

Description of Well--
1. Elevation: ground surface ft., top of casing ft., table ft., referenced to benchmark
2. Total depth of well ft.; or ft. elevation, msl
3. in. solid casing to ft. depth, perforated to ft. depth
4. Static water level on ft. below ground surface, top of casing; or ft. elevation, msl measured method

Description of Pump and Pump Setting--
5. type pump with stage bowl assembly
6. Gasoline diesel, electric, power with horsepower
7. Shaft speed: rpm at gpm flow
8. Depth of pump intake: ft. below ; or ft. elevation, msl
9. Depth of airline bottom: ft. below ; or ft. elevation, msl
10. Center of gage: ft. elevation, msl. Flow measured with

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PUMPING TEST RECORD
for

Well (No.)

Island ___________ Project or Job No. _____ 19

Description of Well--
1. Elevation: ground surface ___ ft., top of casing ___ ft., table ___ ft., referenced to ___ benchmark
2. Total depth of well ___ ft.; or ___ ft. elevation, msl
3. ___ in. solid casing to ___ ft. depth, perforated to ___ ft. depth
4. Static water level on ___ 19: ___ ft. below ground surface, top of casing; or ___ ft. elevation, msl

measured ___ method

Description of Pump and Pump Setting--
5. ___ type pump with ___ stage bowl assembly
6. Gasoline diesel, electric, power with ___ horsepower
7. Shaft speed: ___ rpm at ___ gpm flow
8. Depth of pump intake: ___ ft. below ___; or ___ ft. elevation, msl
9. Depth of airline bottom: ___ ft. below ___; or ___ ft. elevation, msl
10. Center of gage: ___ ft. elevation, msl. Flow measured with ___
11. Test conducted by ___

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<th>Airline, manometer Rdgs</th>
<th>Drawdown (feet)</th>
<th>Chlorides (ppm)</th>
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PUMPING TEST RECORD
for

(name)  Well (No.)

Island  Project or Job No. 19

Description of Well--
1. Elevation: ground surface ft., top of casing ft., table ft., referenced to benchmark
2. Total depth of well ft.; or ft. elevation, msl
3. in. solid casing to ft. depth, perforated to ft. depth
4. Static water level on 19: ft. below ground surface, top of casing; or ft. elevation, msl measured method

Description of Pump and Pump Setting--
5. type pump with stage bowl assembly
6. Gasoline diesel, electric, power with horsepower
7. Shaft speed: rpm at gpm flow
8. Depth of pump intake: ft. below ; or ft. elevation, msl
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10. Center of gage: ft. elevation, msl. Flow measured with
11. Test conducted by

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PUMPING TEST RECORD

for

Well (name) (No.)

Island Project or Job No. 19

Description of Well--
1. Elevation: ground surface ft., top of casing ft., table ft., referenced to benchmark
2. Total depth of well ft.; or ft. elevation, msl
3. in. solid casing to ft. depth, perforated to ft. depth
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11. Test conducted by

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Chlorides Temperatures
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\]
\[
\frac{\Delta q}{\Delta t} = 500 \text{ gpm} = 3000 \text{ gal/hr}
\]
\[
\frac{3000}{0.05} = 67,000 \text{ gal/ft}
\]
Assume aquifer porosity = 10%
Area of pipe compartment
\[
= \frac{67,000 \text{ gal/ft}}{500,000 \text{ gpd/acre-ft} \times 0.10}
\]
\[
= 2.2 \text{ acres} \leftarrow \text{realistic?}
\]
\[
\frac{\Delta q_n}{\Delta t} = \frac{\Delta q_e}{\Delta t} - \frac{\Delta q_r}{\Delta t} = \text{Net withdrawal from aquifer storage}
\]
\[
q_e = \text{rate at pumping}
\]
\[
q_r = \text{rate of recharge}
\]
\[ \Delta h = \text{Observed Drawdown} - \text{Residual Drawdown} \]

\[ \Delta h = bg \]

Honokowai Gulch Well
Maui
\[
\frac{\Delta L}{\Delta x} = \tan \theta = \frac{\Delta h}{\Delta x}
\]

\[k = 260 \text{ gpm/ft}.
\]

<table>
<thead>
<tr>
<th>Time (t)</th>
<th>(\Delta h)</th>
<th>(\Delta L/\Delta x)</th>
<th>(\text{gpm/ft})</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6.5 h</td>
<td>0.20</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>6.5 - 12.5</td>
<td>0.85</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>12.5 - 19</td>
<td>1.35</td>
<td>430</td>
<td>430</td>
</tr>
<tr>
<td>19 - 29</td>
<td>1.30</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>29 - 39</td>
<td>1.55</td>
<td>660</td>
<td>660</td>
</tr>
<tr>
<td>39 - 49</td>
<td>2.00</td>
<td>720</td>
<td>720</td>
</tr>
<tr>
<td>49 - 59</td>
<td>2.15</td>
<td>560</td>
<td>560</td>
</tr>
<tr>
<td>59 - 69</td>
<td>1.30</td>
<td>340</td>
<td>340</td>
</tr>
</tbody>
</table>