WELL MODIFICATION PERMIT

for
Kekaha Shaft 12
State Well No. 5843-01
Kekaha, Kauai

TO: Kauai Department of Water
P.O. Box 1706
Lihue, Hawaii 96766

In accordance with Chapter 166 of Title 13, "Rules for the Control of Ground Water Use in the State of Hawaii", your application to replace two existing 200 gpm pumps with one 225 gpm vertical turbine pump and appurtenances at State Well No. 5843-01 for municipal use is approved subject to the following conditions:

1. A Driller's Well Completion Report (enclosed) shall be submitted to the Division of Water and Land Development (P.O. Box 373, Honolulu, Hawaii 96809) within 60 days after completion of the work.

2. Pumping test data shall be submitted within 60 days after testing of the well.

3. Reports of pumpage shall be submitted monthly after the well is put into production.

4. An "as-built" drawing of the well shall be submitted upon completion of the well.

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

Date of Issuance

Enc. (Driller's Report Form)
cc: USGS
   Dept. of Health,
   Drinking Water Program
# Driller's Report

## Description

**Date of Report:** August 24, 1987  
**Person Filing Report:**  
**Department of Water, County of Kauai**

**A. Owner:** Department of Water  
**Well Name:** Replacement of Pump & Controls, Kekaha Shaft 12 (5843-01)  
**Island:** Kauai

**B. General Location:** 0.5 ± mile north of Kekaha Town

**C. Drilling Company:**

**D. Type of Rig:**

**E. Elevation, msl:** Top of drilling platform — ft.  
**Height of Drilling Platform Above Ground Surface:** ft.  
**Elevation:** ft.

**F. Hole Size:**  
- Inch dia. to ft. below drilling platform.  
- Inch dia. to ft. below drilling platform.

**G. Casing Installed:**  
- In. I.D. X in. wall solid section to ft. below drilling platform.  
- In. I.D. X in. wall perforated section to ft. below drilling platform.

**H. Annulus:** Grouted ft. to ft. below drilling platform.  
**Gravel packed:** ft. to ft. below drilling platform.

**I. Permanent Pump Installation:**  
- Pump type, make, serial no.: Floway, 8KJL, 9 stage, S/N 87-01025  
- Capacity: 300 ± g.p.m.  
- Motor type, H.P., voltage, r.p.m.: U. S. Electric, 20 H.P., 460 volts, 1770 RPM  
- Depth of pump intake setting: 51.81 ft. below top of conc. pad which elevation is 57.92 ft.  
- Depth of bottom of airline: 53.31 ft. below top of conc. pad which elevation is 57.92 ft.

## Hydrology

**J. Initial Water Level:** ft. below drilling platform.  
**Date of Measurement:**

**K. Initial Chloride:** ppm, total depth of well — ft. below drilling platform  
**Sampling Date:**

**L. Pumping Tests:**  
**Reference Point (R.P.) Used:** which elevation is ft.

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Rate (gpm)</th>
<th>Draw-down (ft.)</th>
<th>Temp. °F</th>
<th>Elapsed Time (hours)</th>
<th>Rate (gpm)</th>
<th>Draw-down (ft.)</th>
<th>Temp. °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
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</tbody>
</table>

## Subsurface Formation

**M. Driller's Log:**

<table>
<thead>
<tr>
<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
<th>Water Level, ft.</th>
<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
<th>Water Level, ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
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</tr>
</tbody>
</table>

**N. Remarks:**

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**FOR OFFICIAL USE**

**Latitude:** 21 58 51  
**Longitude:** 59 43 01

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**FOR DRILLER'S USE**

**Job Name:**

**Job No.:**

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**INSTRUCTIONS:** Send three(3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 373, Honolulu, Hawaii 96809.

**REFERENCES:**  
September 14, 1981

Mr. Raymond H. Sato
Manager-Chief Engineer
Department of Water
County of Kauai
4396 Rice Street
Lihue, Hawaii 96766-5706

Dear Mr. Sato:

Thank you for sending the pump installation date for Kekaha Shaft (State Well No. 5843-01). We appreciate your cooperation.

Sincerely,

MANABU TAGOMORI
Manager-Chief Engineer

ES:ko
August 18, 1987

Mr. Manabu Tagomori
Manager & Chief Engineer
Division of Water & Land Dev.
P. O. Box 373
Honolulu, HI 96809

Re: Job No. 85-6, Replacement of Pump and Controls, Kekaha Shaft 12 (5843-01), Kekaha, Kauai, Hawaii

In compliance with Chapter 166 of Title 13, "Rules for the Control of Groundwater Use in the State of Hawaii", we are submitting three(3) copies of the Driller's Report for the subject project.

Raymond H. Sato
Manager and Chief Engineer

BL:rm
May 4, 1987

Mr. Manabu Tagomori
Manager and Chief Engineer
Division of Water & Land Development
P.O. Box 373
Honolulu, HI 96809

Re: Well Modification Permits for Kekaha Shaft 12
(5843-01)

Enclosed is one (1) completed application form for well modification permit of the subject well.

[Signature]
Raymond H. Sato
Manager and Chief Engineer

MM:at
Enclosure
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 Kauai Tax Map Key 1-2-02:3. Attach a plot plan showing well location referenced to established property boundaries.

2. WATER USER Department of Water Address P.O. Box 1706, Lihue, Hawaii Telephone 245-6986 Zip Code 96766

3. PROPOSED DRILLING COMPANY: N/A

4. PROPOSED WORK: 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):

Replace two (2) existing 200 gpm vertical turbine pumps with one (1) new 225 gpm vertical turbine pump and appurtenances.

PROPOSED SECTION OF WELL

Kekaha Shaft 12

Well No. 5843-01 (See Exhibit II)

Elevation at top of casing ft. msl.

Ground Elev. ft. msl*

Cement Grout ft.

Hole Dia. in.

Total Depth ft.

Rock Packing ft.

Open Hole:

Length ft.

Diameter in.

*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 ☑ Agriculture ☑ Industrial ☑ Domestic ☑ Disposal ☑ Other (specify)

6. PROPOSED AMOUNT OF WITHDRAWAL: Check most appropriate box and fill in amount.

☑ Daily 324,000 gallons ☑ Monthly 225 gallons ☑ Yearly 225 gallons

7. PROPOSED PUMP OR FLOW CAPACITY: 225 gallons per minute

Signature: Water User Date: 5/11/87

Signature: Landowner of Well Site Date: 5/11/87

For Official Use:

State Well No.

DLNR Permit No.

DLNR Application No.
EXHIBIT II

EXISTING KEKAHA SHAFT 12
NOT TO SCALE
September 22, 1967

Mr. Walter L. Briant, Jr.
Manager & Chief Engineer
Board of Water Supply
County of Kauai
Lihue, Kauai

Dear Walt:

Waimea and Kekaha Domestic Sources

We have reviewed the chemical analyses of water from your Board's Waimea Shaft 9 and Kekaha Shaft 12 sources. Preliminary indications are that the basal water tapped by these sources is affected by contamination from agricultural activities, i.e., leaching of fertilizers by rainfall and irrigation. Secondly, the higher-than-expected chloride contents of these sources may be due to contamination by leaching of fertilizer and/or by mixing of fresh water with saline water.

A preliminary study on Oahu suggests that contamination by agricultural fertilizers is recognizable by increases in nitrate (NO₃) and silica (SiO₂) contents. Results of the study show the following average nitrate and silica contents (ppm) of a number of selected wells:

<table>
<thead>
<tr>
<th></th>
<th>Non-irrigated Areas</th>
<th>Mid-portion Irrigated Areas</th>
<th>Makai-portion Irrigated Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₃</td>
<td>1.0</td>
<td>2.7</td>
<td>8.2</td>
</tr>
<tr>
<td>SiO₂</td>
<td>34</td>
<td>54</td>
<td>63</td>
</tr>
</tbody>
</table>

The Waimea and Kekaha sources show nitrate contents of 2.9 and 4.1 ppm and silica contents of 35 and 54 ppm, respectively; suggesting possible contamination by agricultural activities.
The reasons for higher-than-expected chloride contents in the Waimea and Kekaha sources are not as apparent. According to a 1959 report, Kekaha Sugar Co. uses muriate of potassium (KCl) in fertilizing its cane. Whether a significant quantity, if any, of chloride is leached to the basal aquifer to affect chloride contents is not known, but KCl appears a possible source of chloride contamination. On the other hand, chloride contamination by saline water is possible, as suggested by test results on the Waimea exploratory well 26. At a depth of -52 ft. mean sea level, the well produced water having chlorides ranging upward from 90 ppm and at a depth of -23 ft. it produced water having a chloride content of 25–35 ppm.

Exploratory test hole drilling to penetrate 100 to 200 feet of the basal aquifer would be required to investigate further the extent of contamination by leaching of fertilizers and by mixing of saline water. Such exploration would involve the logging of the chemical quality of the aquifer with depth to determine whether or not fresher potable water can be developed from lower parts of the aquifer below any artificially contaminated zones. The Waimea Shaft 9 source, situated inland, appears to have more merit for exploration than the Kekaha source.

Very truly yours,

Robert T. Chuck
Manager-Chief Engineer
September 5, 1967

Mr. Daniel Lum
Division of Water & Land Development
P. O. Box 373
Honolulu, Hawaii

Per your request, through Mr. Walter Briant, enclosed are copies of the chemical analysis results for the Waimea and Kekaha county domestic water sources.

Larry Nishikawa
Deputy Manager-Engineer

Enc.
August 22, 1967

To: Supervisor, Sanitary Engineering Service (Through Official Channels)

From: Public Health Chemist, Laboratories Branch

Subject: WATER, CHEMICAL ANALYSIS: Kauka Storage Tank, Kahala, Pearl City, (County), 8/7/67

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>7.1</td>
</tr>
<tr>
<td>Hydroxide Alkalinity</td>
<td>0 ppm</td>
</tr>
<tr>
<td>Carbonate Alkalinity</td>
<td>6 ppm</td>
</tr>
<tr>
<td>Bicarbonate Alkalinity</td>
<td>45.2 ppm as CaCO3</td>
</tr>
<tr>
<td>Total Alkalinity</td>
<td>46.8 ppm as CaCO3</td>
</tr>
<tr>
<td>Total Carbonates</td>
<td>68 ppm</td>
</tr>
<tr>
<td>Chlorides</td>
<td>59.0 ppm</td>
</tr>
<tr>
<td>Cu</td>
<td>less than 0.001 ppm</td>
</tr>
<tr>
<td>Zn</td>
<td>less than 0.001 ppm</td>
</tr>
<tr>
<td>Pb</td>
<td>2.3 ppm</td>
</tr>
<tr>
<td>Sr</td>
<td>19.9 ppm</td>
</tr>
<tr>
<td>Ba</td>
<td>70 ppm</td>
</tr>
<tr>
<td>Cd</td>
<td>17.0 ppm</td>
</tr>
<tr>
<td>Pb</td>
<td>0.3 ppm</td>
</tr>
<tr>
<td>As</td>
<td>less than 0.004 ppm</td>
</tr>
<tr>
<td>F</td>
<td>less than 0.001 ppm</td>
</tr>
<tr>
<td>Mg</td>
<td>less than 0.005 ppm</td>
</tr>
<tr>
<td>F</td>
<td>less than 0.001 ppm</td>
</tr>
<tr>
<td>Cl</td>
<td>102 ppm</td>
</tr>
<tr>
<td>Sr</td>
<td>less than 0.001 ppm</td>
</tr>
<tr>
<td>Zn</td>
<td>less than 0.001 ppm</td>
</tr>
</tbody>
</table>

FORWARDED

KINGSTON S. WILLERS

PUBLIC HEALTH CHEMIST, PH.D.

WATER ANALYST, LABORATORIES BRANCH
August 21, 1967

Mr. Walter Briant
Manager and Engineer
Board of Water Supply
County of Kauai
P. O. Box 1706
Lihue, Kauai 96766

Dear Walt:

Below is the result of our chloride titration analyses of water samples from your Kekaha and Waimea sources.

<table>
<thead>
<tr>
<th>Source</th>
<th>Sample Taken</th>
<th>Chlorides (ppm)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kekaha</td>
<td>7:30 a.m. 8/7/67</td>
<td>110</td>
<td>Pump Running</td>
</tr>
<tr>
<td>Waimea</td>
<td>8:00 a.m. 8/7/67</td>
<td>190</td>
<td>Pump Running</td>
</tr>
</tbody>
</table>

This result compares with your analyses of 103 ppm and 184 ppm for Kekaha and Waimea sources, respectively.

Very truly yours,

Robert T. Chuck
Manager-Chief Engineer
August 9, 1967

Mr. Dan Lum
Division of Water & Land Development
P. O. Box 373
Honolulu, Hawaii

Under separate cover you will receive two separate water samples properly labeled. These are the samples you requested through Mr. Briant at a meeting in your office during the first week of August.

We have made an independent chloride test of the same stock samples with our portable titration kit, namely for comparative purposes in order to be able to determine whether our test chemical has deteriorated to some degree to give the high chloride readings we have been having.

The results of this test (all in total chloride) were:

- Waimea: 184 ppm
- Kekaha: 103 ppm

Chemical analysis samples were also sent to the State Dept. of Health as per your request. We will forward results to you as soon as we can.

Thank you for your help.

Larry Nishikawa
Deputy Manager-Engineer
2 pumps running – 1 1/2" water hammer, about 50 psi.

Head records:
- 48"-10" 1957 – 11" was reported.
- 48"-6'" (m.p.h) 1964
- 49"-5" (3 pump) 1967 → 8.25'

Pump lowered 2" on 7/6.
- Port of shaft 3.5".
### 8JLO Turbine Pump - 7 Stages - Outline

<table>
<thead>
<tr>
<th>ORDER NUMBER</th>
<th>MATERIAL SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCALE</td>
<td>PART NO.</td>
</tr>
<tr>
<td>DRAWN BY</td>
<td>DATE</td>
</tr>
<tr>
<td>CHECKED BY</td>
<td>DATE</td>
</tr>
<tr>
<td>APPROVED BY</td>
<td>DATE</td>
</tr>
</tbody>
</table>

**U.S. PUMPS inc.**

Los Angeles, California

**Ref.: Pump #1, Kekaha, Kauai County Water System**

Fractional dimensions ± 1/64 unless otherwise noted.

- **1-1/2 NS - S - LH**
- **5.67 in.**
- **6.617 - 8 NS - 3 PH**
- **Minor dia. - 6.500**
- **Pitch dia. - 6.670**
- **Min. major dia. - 6.610**
- **Max. minor dia. - 9.490**

**Order Numbers: 58-02**