WELL CONSTRUCTION PERMIT

for

Kiikii Caprock Monitor Well 2
Well No. 3407-37, Waialua, Oahu

TO: Mr. William Meyer
United States Geological Survey
Water Resource Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 300 ft. deep monitor well, at Tax Map Key: 6-6-023-003, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
AUG 31 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: William Meyer Date: 9/6/95
Printed Name: William Meyer
Firm or Title: USGS

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: Department of Health
   Safe Drinking Water Branch
   Solid and Hazardous Waste Branch
   Ground Water Protection Program
   Honolulu Board of Water Supply
   Kamehameha Schools/Bishop Estate
WELL CONSTRUCTION PERMIT

for

Kilikii Caprock Monitor Well 1
Well No. 3407-36, Waialua, Oahu

TO: Mr. William Meyer
United States Geological Survey
Water Resource Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules § 13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 120 ft. deep monitor well, at Tax Map Key: 6-6-023-003, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

______________________________
MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

AUG 31 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: ________________________________

__________________________
Enc. (Well Completion Report form)
WELL CONSTRUCTION PERMIT

for

Kaiaka Bay Caprock Well
Well No. 3407-35, Waialua, Oahu

TO: Mr. William Meyer
United States Geological Survey
Water Resource Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 280 ft. deep monitor well, at Tax Map Key: 6-7-001-008, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

[Signature]
MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
AUG 31 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: William Meyer
Date: 4/18/

Printed Name: William Meyer

Firm or Title: USGS

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

Enc. (Well Completion Report form)
c: Department of Health
Safe Drinking Water Branch
Solid and Hazardous Waste Branch
Ground Water Protection Program
Honolulu Board of Water Supply
Kamehameha Schools/Bishop Estate
STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT  
P. O. BOX 821  
HONOLULU, HAWAII 96809  

WELL CONSTRUCTION PERMIT  
for  
Puuili Caprock Well  
Well No. 3407-34, Waialua, Oahu  

TO:  Mr. William Meyer  
United States Geological Survey  
Water Resource Division  
677 Ala Moana Blvd., Suite 415  
Honolulu, HI 96813  

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 320 ft. deep monitor well, at Tax Map Key: 6-7-002-004, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

Michael D. Wilson, Chairperson
Commission on Water Resource Management
AUG 31 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: William Meyer Date: 9/6/95
Printed Name: William Meyer
Firm or Title: USGS

Enc. (Well Completion Report form)
c: Department of Health
   Safe Drinking Water Branch
   Solid and Hazardous Waste Branch
   Ground Water Protection Program
   Honolulu Board of Water Supply
   Kamehameha Schools/Bishop Estate
DRILLING AND CONSTRUCTION DATA FOR WELL 3-3407-37, KIIKII EXPLORATORY WELL, OAHU, HAWAII

U.S. GEOLOGICAL SURVEY
Open-File Report 96-426

Prepared in cooperation with the
CITY AND COUNTY OF HONOLULU BOARD OF WATER SUPPLY
DRILLING AND CONSTRUCTION DATA FOR WELL 3-3407-37, KIIKII EXPLORATORY WELL, OAHU, HAWAII

By Todd K. Presley and Delwyn S. Oki

U.S. GEOLOGICAL SURVEY
Open-File Report 96-426

Prepared in cooperation with the
CITY AND COUNTY OF HONOLULU BOARD OF WATER SUPPLY

Honolulu, Hawaii
1996
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Conversion Factors

<table>
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<th>Multiply</th>
<th>By</th>
<th>To obtain</th>
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</thead>
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<td>foot (ft)</td>
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<td>meter</td>
</tr>
<tr>
<td>mile (mi)</td>
<td>1.609</td>
<td>kilometer</td>
</tr>
<tr>
<td>inch (in.)</td>
<td>25.4</td>
<td>millimeter</td>
</tr>
</tbody>
</table>

Elevations in this report are referenced relative to mean sea level.
Drilling and Construction Data for Well 3-3407-37, Kiikii Exploratory Well, Oahu, Hawaii

By Todd K. Presley and Delwyn S. Oki

Abstract

The Kiikii exploratory well (State well number 3-3407-37) was drilled about 1.4 miles southwest of the town of Haleiwa and 4,000 feet west-southwest of Weed Circle. The well is on agricultural land in the Waialua ground-water area. The well penetrates through sedimentary deposits (caprock) and into the underlying basalt aquifer. Well-construction data, logs of drilling notes, and geologic descriptions for the samples are presented for the well. The well is one of 12 exploratory wells drilled in the north-central Oahu area between July, 1993 and May, 1994 in cooperation with the Honolulu Board of Water Supply.

INTRODUCTION

Because of water-supply concerns associated with population increase on the island of Oahu, the Honolulu Board of Water Supply, in cooperation with the U.S. Geological Survey (USGS), conducted a study to assess the availability of ground water in north-central Oahu. This study included drilling 12 exploratory and monitoring wells between July 1993 and May 1994.

This report presents drilling data for the Kiikii exploratory well (State well number 3-3407-37). The well is about 4,000 ft west-southwest of Weed Circle and about 1.4 mi southwest of the town of Haleiwa (figs. 1 and 2). The purpose of the well is to measure the artesian head in the Waialua ground-water area (Rosenau and others, 1971; Dale, 1978; Hunt, in press). The well penetrates through the sedimentary deposits of the coastal confining unit, known locally as “caprock,” into the basalt aquifer.

Regional Setting

The study area is located in north-central Oahu between the crests of the Koolau Range and the Waianae Range (fig. 1). Previous studies (Rosenau and others, 1971; Dale, 1978; Hunt, in press) that describe the physical and geological aspects of the study area are summarized here. The mountain ranges are the eroded remnants of two shield volcanoes. The Mokuleia and Waialua ground-water areas are separated by low-permeability paleosols and saprolite of the Waianae Volcano that lie below the geologic contact between the Waianae and Koolau Volcanoes. The Waialua and Kawaiola ground-water areas are separated by alluvium and weathered basalt in and beneath Anahulu Gulch. Seaward flow of ground water in the Mokuleia and Waialua ground-water areas is impeded by a coastal confining unit that is composed of marine and terrestrial sediment known locally as “caprock.” The caprock creates a confined artesian condition at low elevations near the shore. Further inland however, the aquifer is unconfined.

Water levels in the Waialua and Kawaiola ground-water areas are about 12 ft and 4 ft above mean sea level, respectively. Water levels in the Mokuleia ground-water area are about 20 ft. Withdrawal from the Waialua, Kawaiola and Mokuleia ground-water areas is primarily for sugarcane irrigation, although there are also several municipal wells and numerous small capacity private wells. Natural ground-water discharge occurs at springs and by subsurface flow through the caprock to the ocean (Rosenau and others, 1971).

Acknowledgments

The USGS gratefully acknowledges the Waialua Sugar Company for their assistance in identifying and
Figure 1. Ground-water areas of north-central Oahu (modified from Hunt, in press) and wells drilled during the study, Hawaii.
preparing the drill site. The USGS also thanks the Castle and Cooke Land Company for permission to drill on their land.

**DRILLING AND CONSTRUCTION DATA**

The Kiikii exploratory well (State well number 3-3407-37) is on the periphery of a sugarcane field near the bank of the Kiikii Stream. Well-construction data is provided in table 1 and construction details are shown in figure 3.

The well was drilled using an air-rotary system and an 8 5/8-in. outside-diameter casing-advance drilling system with flush-jointed 4 1/2-in. diameter drill pipe. Drilling foam and polymer were injected into the air-circulation system to assist the removal of drill cuttings and to stabilize the hole. The elevation in the area of the drill site is about 5 ft. A 17 1/2-in. diameter hole was drilled 121 ft to an elevation of about -115 ft. The hole penetrated unstable alluvial material. A 12 3/4-in. outside-diameter casing was driven to an elevation of -98 ft, and in the process of driving the casing, a flowing artesian condition developed. At this point, the 8 5/8-in. outside-diameter casing-advance system was used to deepen the well to the basalt through the soft and incompetent alluvium. The 8 5/8-in. outside-diameter casing was advanced to an elevation of -115 ft. To insure that the basalt aquifer had been penetrated, a 6 3/4-in. diameter hole was drilled inside the 8 5/8-in. outside-diameter casing to an elevation of -125 ft. To eliminate leakage within and into the caprock, the 123/4-in. outside-diameter casing was removed and the annulus between the 8 5/8-in. outside-diameter casing and the 17 1/2-in. diameter hole was grouted using bentonite and cement. A plug formed in the bottom of the 8 5/8-in. outside-diameter casing during the grouting process. Once the cement had hardened, the hole was drilled through the cement plug to the -135 ft elevation using a 6 3/4-in. diameter drill bit where the artesian condition was re-established. The well was then cased with 4 1/2-in. outside-diameter PVC casing. A 20-ft section of 4 1/2-in. outside-diameter PVC screen with 0.02-in. horizontal slots was installed at the bottom of the casing. Samples of the materials expelled by the circulation system while drilling were collected every 5 ft when possible. The geologic log (geologic descriptions of the recovered samples from drilling) is presented in table 2, and the driller’s log (driller’s observations while drilling) is presented in table 3. From the surface, the bore penetrated about 10 ft of dark-red clay, 20 ft of sticky, brown clay and 50 ft of brown, silty clay. Between depths of 130 and 140 ft, slightly weathered vesicular basalt was penetrated.

The measuring point (elevation 14.68 ft) for water-level determination is located on the west side of the aluminum well-cap bracket affixed to the top of the 8 5/8-in. outside-diameter steel surface casing. An additional reference mark (elevation 5.62 ft) for the well site is located on the top of a stainless steel bolt emplaced into the concrete pad surrounding the well.

**ADDITIONAL INFORMATION**

Information for the 12 wells drilled during the north-central Oahu study is listed in table 4. Nine of the wells, including the Kiikii exploratory well (3-3407-37), were drilled in the Waialua ground-water area, and three wells were drilled north of Anahulu Gulch in the Kawaiola ground-water area. Water-level time-series data were collected for all of the wells drilled and for numerous other existing wells as part of the overall monitoring effort for the project (unpublished data in files of the USGS, Honolulu). Data were collected using electronic data loggers coupled to shaft encoder-float systems or pressure transducers.

**REFERENCES CITED**


Figure 3. Construction details for Kiiikii exploratory well (State well number 3-3407-37), Oahu, Hawaii.

References Cited 5
Table 1. Construction data for Kiikii exploratory well, Oahu, Hawaii.
[Elevation datum is mean sea level]

<table>
<thead>
<tr>
<th>Well name</th>
<th>Kiikii exploratory well</th>
</tr>
</thead>
<tbody>
<tr>
<td>State well number</td>
<td>3-3407-37</td>
</tr>
<tr>
<td>Latitude and longitude</td>
<td>21°34'28&quot;N, 158°07'16&quot;W</td>
</tr>
<tr>
<td>Hawaii tax map key number</td>
<td>6-6-23-3</td>
</tr>
<tr>
<td>Landowner</td>
<td>Castle and Cooke Land Company</td>
</tr>
<tr>
<td>Leaseholder</td>
<td>Waialua Sugar Company</td>
</tr>
<tr>
<td>Well completed</td>
<td>April 21, 1994</td>
</tr>
<tr>
<td>Working days to complete</td>
<td>27 days</td>
</tr>
<tr>
<td>Drillers</td>
<td>Wayne Heick, Fred Thibedeau; USGS</td>
</tr>
<tr>
<td>Surface hole diameter</td>
<td>17 1/2 in.</td>
</tr>
<tr>
<td>Bottom of surface casing elevation</td>
<td>-115 ft</td>
</tr>
<tr>
<td>Surface casing diameter and type</td>
<td>8 5/8-in. od steel, 0.188-in. thick wall</td>
</tr>
<tr>
<td>Bottom of cement seal elevation</td>
<td>-125 ft</td>
</tr>
<tr>
<td>Final hole diameter</td>
<td>6 3/4 in.</td>
</tr>
<tr>
<td>Bottom of well elevation</td>
<td>-135 ft</td>
</tr>
<tr>
<td>Open interval elevations</td>
<td>-125 ft to -135 ft</td>
</tr>
<tr>
<td>Inner casing diameter and type</td>
<td>4 1/2-in. od PVC, flush-jointed</td>
</tr>
<tr>
<td>Screen type</td>
<td>4 1/2-in. od PVC, flush-jointed, 0.02-in. horizontal slots</td>
</tr>
<tr>
<td>Screened interval elevations</td>
<td>-115 ft to -135 ft</td>
</tr>
<tr>
<td>Reference mark elevation (bolt)</td>
<td>5.62 ft</td>
</tr>
<tr>
<td>Top of casing measuring point elevation</td>
<td>14.68 ft (top of aluminum well-cap bracket)</td>
</tr>
<tr>
<td>Water level and date of measurement</td>
<td>11.70 ft on February 13, 1995</td>
</tr>
</tbody>
</table>

Table 2. Geologic log for Kiikii exploratory well (State well number 3-3407-37), Oahu, Hawaii.
[Elevation datum is mean sea level]

<table>
<thead>
<tr>
<th>Depth below grade (feet)</th>
<th>Elevation (feet)</th>
<th>Sample description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>5 to 0</td>
<td>Dark, reddish-brown clay</td>
<td>Mud</td>
</tr>
<tr>
<td>5 to 10</td>
<td>0 to -5</td>
<td>Dark, reddish-brown clay</td>
<td>Mud</td>
</tr>
<tr>
<td>10 to 24</td>
<td>-5 to -19</td>
<td>Dark-brown, sticky clay</td>
<td></td>
</tr>
<tr>
<td>24 to 30</td>
<td>-19 to -25</td>
<td>Dark-brown clay</td>
<td></td>
</tr>
<tr>
<td>30 to 40</td>
<td>-25 to -35</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>40 to 50</td>
<td>-35 to -45</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>50 to 60</td>
<td>-45 to -55</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>60 to 70</td>
<td>-55 to -65</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>70 to 80</td>
<td>-65 to -75</td>
<td>Brown, silty clay</td>
<td>Slightly darker than above</td>
</tr>
<tr>
<td>80 to 90</td>
<td>-75 to -85</td>
<td>Brown, silty clay</td>
<td>Similar to above</td>
</tr>
<tr>
<td>123 to 127</td>
<td>-118 to -122</td>
<td>Brownish-grey, friable saprolite</td>
<td></td>
</tr>
<tr>
<td>130 to 140</td>
<td>-125 to -135</td>
<td>Grey, slightly weathered, vesicular basalt</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Driller's log for the Kiikii exploratory well (State well number 3-3407-37), Oahu, Hawaii.
[Elevation datum is mean sea level]

<table>
<thead>
<tr>
<th>Depth below grade (feet)</th>
<th>Elevation (feet)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>5 to 0</td>
<td>Black, moist clay</td>
</tr>
<tr>
<td>5 to 50</td>
<td>0 to -45</td>
<td>Black, silty sand; wet, very mucky</td>
</tr>
<tr>
<td>50 to 118</td>
<td>-45 to -113</td>
<td>Gravel and silt; very unstable hole</td>
</tr>
<tr>
<td>118 to 140</td>
<td>-113 to -135</td>
<td>Basalt; artesian water at 121 ft.</td>
</tr>
</tbody>
</table>
Table 4. Construction data for wells drilled during the study, Oahu, Hawaii

<table>
<thead>
<tr>
<th>State well number</th>
<th>Well name</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Hawaii state tax map key number</th>
<th>Landowner</th>
<th>Well completed</th>
<th>Working days to complete</th>
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</thead>
<tbody>
<tr>
<td>3-3204-01</td>
<td>Kaheaka exploratory well</td>
<td>21°32'52&quot;</td>
<td>158°04'52&quot;</td>
<td>6-5-01-2</td>
<td>Castle and Cooke Land Company</td>
<td>March 2, 1994</td>
<td>16 days</td>
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<tr>
<td>3-3307-20</td>
<td>Thompson Corner exploratory well I</td>
<td>21°33'41&quot;</td>
<td>158°07'02&quot;</td>
<td>6-5-01-1</td>
<td>Castle and Cooke Land Company</td>
<td>July 9, 1993</td>
<td>14 days</td>
</tr>
<tr>
<td>3-3307-21</td>
<td>Thompson Corner exploratory well II</td>
<td>21°33'41&quot;</td>
<td>158°07'02&quot;</td>
<td>6-5-01-1</td>
<td>Castle and Cooke Land Company</td>
<td>August 9, 1993</td>
<td>15 days</td>
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<tr>
<td>3-3406-12</td>
<td>Twin Bridge Road deep monitor well</td>
<td>21°34'56&quot;</td>
<td>158°06'10&quot;</td>
<td>6-4-01-1</td>
<td>Castle and Cooke Land Company</td>
<td>March 9, 1994</td>
<td>27 days</td>
</tr>
<tr>
<td>3-3406-13</td>
<td>Kaamooloa exploratory well</td>
<td>21°34'06&quot;</td>
<td>158°06'36&quot;</td>
<td>6-5-01-2</td>
<td>Castle and Cooke Land Company</td>
<td>January 12, 1994</td>
<td>4 days</td>
</tr>
<tr>
<td>3-3406-14</td>
<td>Helemano exploratory well I</td>
<td>21°34'58&quot;</td>
<td>158°06'21&quot;</td>
<td>6-2-07-11</td>
<td>Castle and Cooke Land Company</td>
<td>October 15, 1993</td>
<td>11 days</td>
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<tr>
<td>3-3406-15</td>
<td>Helemano exploratory well II</td>
<td>21°34'58&quot;</td>
<td>158°06'21&quot;</td>
<td>6-2-07-11</td>
<td>Castle and Cooke Land Company</td>
<td>November 15, 1993</td>
<td>15 days</td>
</tr>
<tr>
<td>3-3407-37</td>
<td>Kiikii exploratory well</td>
<td>21°34'28&quot;</td>
<td>158°07'16&quot;</td>
<td>6-6-23-3</td>
<td>Castle and Cooke Land Company</td>
<td>April 21, 1994</td>
<td>27 days</td>
</tr>
<tr>
<td>3-3503-01</td>
<td>North Upper Anahulu exploratory well</td>
<td>21°35'30&quot;</td>
<td>158°03'25&quot;</td>
<td>6-2-09-1</td>
<td>Bishop Estate</td>
<td>May 5, 1994</td>
<td>8 days</td>
</tr>
<tr>
<td>3-3505-25</td>
<td>North Lower Anahulu exploratory well</td>
<td>21°35'45&quot;</td>
<td>158°05'04&quot;</td>
<td>6-2-09-1</td>
<td>Bishop Estate</td>
<td>December 23, 1993</td>
<td>7 days</td>
</tr>
<tr>
<td>3-3505-26</td>
<td>Opaeula exploratory well</td>
<td>21°35'11&quot;</td>
<td>158°05'14&quot;</td>
<td>6-2-10-1</td>
<td>Bishop Estate</td>
<td>October 4, 1993</td>
<td>10 days</td>
</tr>
<tr>
<td>3-3604-01</td>
<td>Kawailoa deep monitor well</td>
<td>21°36'24&quot;</td>
<td>158°04'44&quot;</td>
<td>6-1-05-1</td>
<td>Bishop Estate</td>
<td>January 9, 1994</td>
<td>28 days</td>
</tr>
</tbody>
</table>
### Table 4. Construction data for wells drilled during the study, Oahu, Hawaii—Continued

<table>
<thead>
<tr>
<th>State well number</th>
<th>Well name</th>
<th>Bottom of surface casing elevation (feet)</th>
<th>Surface casing outside diameter (Inch)</th>
<th>Hole diameter (Inch)</th>
<th>Bottom of well elevation (feet)</th>
<th>Open interval elevations (feet)</th>
<th>Inner casing outside diameter (Inch) and type</th>
<th>Screened interval elevations (feet)</th>
<th>Measuring point elevation (feet)</th>
<th>Water level</th>
<th>Height above sea level (feet)</th>
<th>Date and time</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-3204-01</td>
<td>Kaheaka exploratory well</td>
<td>643</td>
<td>8 5/8</td>
<td>6 3/4</td>
<td>-55</td>
<td>643 to -55</td>
<td>4 1/2, steel</td>
<td>25 to -55</td>
<td>741.59</td>
<td>12.44</td>
<td>Jan. 27, 1995</td>
<td>17:20</td>
</tr>
<tr>
<td>3-3307-20</td>
<td>Thompson Corner exploratory well</td>
<td>-65</td>
<td>12 5/8</td>
<td>12 1/4</td>
<td>-82</td>
<td>-65 to -82</td>
<td>12 5/8, steel (top of casing)</td>
<td>99.10 (bolt)</td>
<td>11.32</td>
<td>Aug 5, 1993</td>
<td>15:51</td>
<td></td>
</tr>
<tr>
<td>3-3307-21</td>
<td>Thompson Corner exploratory well</td>
<td>17</td>
<td>8 5/8</td>
<td>7 7/8</td>
<td>17 to -80</td>
<td>20 to -80</td>
<td>4 1/2, PVC (top of casing)</td>
<td>101.40 (top of casing)</td>
<td>11.29</td>
<td>Aug 5, 1993</td>
<td>15:51</td>
<td></td>
</tr>
<tr>
<td>3-3406-12</td>
<td>Twin Bridge Road deep monitor well</td>
<td>9</td>
<td>6 5/8</td>
<td>6 1/4</td>
<td>-96</td>
<td>9 to -596</td>
<td>4 1/2, steel (top of casing)</td>
<td>53.10 (top of casing)</td>
<td>11.10</td>
<td>Feb. 15, 1995</td>
<td>12:09</td>
<td></td>
</tr>
<tr>
<td>3-3406-13</td>
<td>Kaamooloa exploratory well</td>
<td>10</td>
<td>6 5/8</td>
<td>6 1/4</td>
<td>-10</td>
<td>10 to -10</td>
<td>4 1/2, PVC (top of casing)</td>
<td>42.35 (top of casing)</td>
<td>11.87</td>
<td>Feb. 13, 1995</td>
<td>14:45</td>
<td></td>
</tr>
<tr>
<td>3-3406-14</td>
<td>Helemano exploratory well I</td>
<td>-51</td>
<td>8 5/8</td>
<td>7 7/8</td>
<td>-78.5</td>
<td>-72 to -78.5</td>
<td>4 1/2, PVC (top of casing)</td>
<td>13.79 (top of casing)</td>
<td>11.02</td>
<td>Feb. 15, 1995</td>
<td>12:26</td>
<td></td>
</tr>
<tr>
<td>3-3503-01</td>
<td>North Upper Anahulu exploratory well</td>
<td>592</td>
<td>8 5/8</td>
<td>6 3/4</td>
<td>-103</td>
<td>592 to -103</td>
<td>4 1/2, steel (top of casing)</td>
<td>671.74 (top of casing)</td>
<td>7.15</td>
<td>Feb 14, 1995</td>
<td>13:54</td>
<td></td>
</tr>
<tr>
<td>3-3505-25</td>
<td>North Lower Anahulu exploratory well</td>
<td>182</td>
<td>8 5/8</td>
<td>7 7/8</td>
<td>-18</td>
<td>182 to -18</td>
<td>4 1/2, PVC (top of casing)</td>
<td>234.24 (top of casing)</td>
<td>4.75</td>
<td>Feb. 14, 1995</td>
<td>15:08</td>
<td></td>
</tr>
<tr>
<td>3-3505-26</td>
<td>Opaeula exploratory well</td>
<td>229</td>
<td>6 5/8</td>
<td>6 1/4</td>
<td>-65</td>
<td>229 to -65</td>
<td>4 1/2, PVC (top of casing)</td>
<td>288.08 (top of casing)</td>
<td>10.52</td>
<td>Feb. 15, 1995</td>
<td>11:14</td>
<td></td>
</tr>
<tr>
<td>3-3604-01</td>
<td>Kawailoa deep monitor well</td>
<td>190</td>
<td>6 5/8</td>
<td>6 1/4</td>
<td>-392</td>
<td>190 to -392</td>
<td>4 1/2, steel (top of casing)</td>
<td>309.01 (top of casing)</td>
<td>4.40</td>
<td>Feb. 14, 1995</td>
<td>14:18</td>
<td></td>
</tr>
</tbody>
</table>
WELL COMPLETION REPORT

3/20/96 WCR Form

(Check Appropriate Box) □ Well Construction □ (Permanent) Pump Installation

Instructions: Please print or type and submit completed report within 30 days after well completion to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. An as-built drawing of the well and chemical analysis should also be submitted. For assistance call the Commission Regulation Branch at 587-0225, or 1-800-468-4644 Extension 70225.

1. State Well No.: 3-3407-37 Well Name: Kiki, Exploratory Island: Oahu
2. Location/Address: Next to Kiki stream or Waiehu Tax Map Key: 6-4-23-3

PART I. WELL CONSTRUCTION REPORT

4. Name of driller who performed work: Fred Tiberdeau / Wayne Hack
5. Type of rig/construction: Tap head air rotary
6. Date(s) Well Construction and pump tests (if any) completed: 4/4/94
7. GROUND ELEVATION (referenced to mean sea level, msl): __________ ft.
   Well Bench Mark (description/location): __________ Elevation(msl): 562 ft.
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)
   Depth (ft.) Rock Description, Water Level, Dates, etc. Depth (ft.) Rock Description, Water Level, Dates, etc.
   __________ to __________ see attached __________ to __________
   (If more space is needed, continue on back.)
9. Total depth of well below ground: __________ ft.
10. Hole size: __________ inch dia. from __________ ft. to __________ ft. below ground
    __________ inch dia. from __________ ft. to __________ ft. below ground
    __________ inch dia. from __________ ft. to __________ ft. below ground
11. Casing installed: __________ in. I.D. x __________ in. wall solid section to __________ ft. below ground
    __________ in. I.D. x __________ in. wall perforated section to __________ ft. below ground
    Casing Material/Slot Size: See 1/4 WC 3/06 x 0.02 ind
12. Annulus: Grouted from __________ ft. below ground to __________ ft. below ground
    Gravel packed from __________ ft. below ground to __________ ft. below ground
13. Initial water level: __________ ft. below ground. Date and time of measurement: __________
14. Initial chloride: __________ ppm Date and time of sampling:
15. Initial temperature: __________ °F Date and time of measurement:
16. PUMPING TESTS: Reference Point (R.P.) used: __________, which elevation is __________ ft.
    (1) Step-Drawdown Test Date __________
        Start water level __________ ft. below R.P.
        End water level __________ ft. below R.P.
    (2) Long-term Aquifer Test Date __________
        Start water level __________ ft. below R.P.
        End water level __________ 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)

Signature __________ Date 5/21/96

Signature __________ Date 5/21/96

Applicant (print) U.S. Geological Survey
Signature __________ Date 5/21/96
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 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):

   Water Level Dates Water Level Dates
   Depth (ft.) Rock Description, Remarks, Depth (ft.) Rock Description, Remarks,
   ___________ to ___________ ___________ to ___________
   ___________ to ___________ ___________ to ___________
   ___________ to ___________ ___________ to ___________
   ___________ to ___________ ___________ to ___________
   ___________ to ___________ ___________ to ___________
   ___________ to ___________ ___________ to ___________

19. & 25. Remarks:
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
Figure 3. Construction details for Kiiiki exploratory well (State well number 3-3407-37), Oahu, Hawaii.
Table 1. Construction data for Kiikii exploratory well, Oahu, Hawaii.
[Elevation datum is mean sea level]

<table>
<thead>
<tr>
<th>Well name</th>
<th>Kiikii exploratory well</th>
</tr>
</thead>
<tbody>
<tr>
<td>State well number</td>
<td>3-3407-37</td>
</tr>
<tr>
<td>Latitude and longitude</td>
<td>21°34'28&quot;N, 158°07'16&quot;W</td>
</tr>
<tr>
<td>Hawaii tax map key number</td>
<td>6-6-23-3</td>
</tr>
<tr>
<td>Landowner</td>
<td>Castle and Cooke Land Company</td>
</tr>
<tr>
<td>Leaseholder</td>
<td>Waialua Sugar Company</td>
</tr>
<tr>
<td>Well completed</td>
<td>April 21, 1994</td>
</tr>
<tr>
<td>Working days to complete</td>
<td>27 days</td>
</tr>
<tr>
<td>Drillers</td>
<td>Wayne Heick, Fred Thibedeau; USGS</td>
</tr>
<tr>
<td>Surface hole diameter</td>
<td>17 1/2 in.</td>
</tr>
<tr>
<td>Bottom of surface casing elevation</td>
<td>-115 ft</td>
</tr>
<tr>
<td>Surface casing diameter and type</td>
<td>8 5/8-in. od steel, 0.188-in. thick wall</td>
</tr>
<tr>
<td>Bottom of cement seal elevation</td>
<td>-125 ft</td>
</tr>
<tr>
<td>Final hole diameter</td>
<td>6 3/4 in.</td>
</tr>
<tr>
<td>Bottom of well elevation</td>
<td>-135 ft</td>
</tr>
<tr>
<td>Open interval elevations</td>
<td>-125 ft to -135 ft</td>
</tr>
<tr>
<td>Inner casing diameter and type</td>
<td>4 1/2-in. od PVC, flush-jointed</td>
</tr>
<tr>
<td>Screen type</td>
<td>4 1/2-in. od PVC, flush-jointed, 0.02-in. horizontal slots</td>
</tr>
<tr>
<td>Screened interval elevations</td>
<td>-115 ft to -135 ft</td>
</tr>
<tr>
<td>Reference mark elevation (bolt)</td>
<td>5.62 ft</td>
</tr>
<tr>
<td>Top of casing measuring point elevation</td>
<td>14.68 ft (top of aluminum well-cap bracket)</td>
</tr>
<tr>
<td>Water level and date of measurement</td>
<td>11.70 ft on February 13, 1995</td>
</tr>
</tbody>
</table>

Table 2. Geologic log for Kiikii exploratory well (State well number 3-3407-37), Oahu, Hawaii.
[Elevation datum is mean sea level]

<table>
<thead>
<tr>
<th>Depth below grade (feet)</th>
<th>Elevation (feet)</th>
<th>Sample description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>5 to 0</td>
<td>Dark, reddish-brown clay</td>
<td>Mud</td>
</tr>
<tr>
<td>5 to 10</td>
<td>0 to -5</td>
<td>Dark, reddish-brown clay</td>
<td></td>
</tr>
<tr>
<td>10 to 24</td>
<td>-5 to -19</td>
<td>Dark-brown, sticky clay</td>
<td></td>
</tr>
<tr>
<td>24 to 30</td>
<td>-19 to -25</td>
<td>Dark-brown clay</td>
<td></td>
</tr>
<tr>
<td>30 to 40</td>
<td>-25 to -35</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>40 to 50</td>
<td>-35 to -45</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>50 to 60</td>
<td>-45 to -55</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>60 to 70</td>
<td>-55 to -65</td>
<td>Brown, silty clay</td>
<td></td>
</tr>
<tr>
<td>70 to 80</td>
<td>-65 to -75</td>
<td>Brown, silty clay</td>
<td>Slightly darker than above</td>
</tr>
<tr>
<td>80 to 90</td>
<td>-75 to -85</td>
<td>Brown, silty clay</td>
<td>Similar to above</td>
</tr>
<tr>
<td>123 to 127</td>
<td>-118 to -122</td>
<td>Brownish-grey, friable saprolite</td>
<td></td>
</tr>
<tr>
<td>130 to 140</td>
<td>-125 to -135</td>
<td>Grey, slightly weathered, vesicular basalt</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Driller's log for the Kiikii exploratory well (State well number 3-3407-37), Oahu, Hawaii.
[Elevation datum is mean sea level]

<table>
<thead>
<tr>
<th>Depth below grade (feet)</th>
<th>Elevation (feet)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>5 to 0</td>
<td>Black, moist clay</td>
</tr>
<tr>
<td>5 to 50</td>
<td>0 to -45</td>
<td>Black, silty sand; wet, very mucky</td>
</tr>
<tr>
<td>50 to 118</td>
<td>-45 to -113</td>
<td>Gravel and silt; very unstable hole</td>
</tr>
<tr>
<td>118 to 140</td>
<td>-113 to -135</td>
<td>Basalt; artesian water at 121 ft.</td>
</tr>
</tbody>
</table>
## Well Construction & Pump Installation Permit Application

**Island of HAWAII**

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Well Name</th>
<th>Applicant</th>
<th>Type</th>
<th>Rcvd</th>
<th>Accept</th>
<th>Issued</th>
<th>WCR mgd</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-3155-01</td>
<td>Kealakekua Obs.</td>
<td>U.S. Geological Survey</td>
<td>OBS</td>
<td>12/3/90</td>
<td>1/1/91</td>
<td>oth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-7345-03</td>
<td>Kohala Expl. A</td>
<td>U.S. Geological Survey</td>
<td>WELL</td>
<td>2/16/89</td>
<td>2/16/89</td>
<td>6/1/90</td>
<td>Oth</td>
<td></td>
</tr>
<tr>
<td>8-7347-03</td>
<td>Haleda Makai</td>
<td>U.S. Geological Survey</td>
<td>WELL</td>
<td>2/16/89</td>
<td>2/16/89</td>
<td>6/1/90</td>
<td>Oth</td>
<td></td>
</tr>
<tr>
<td>8-7448-05</td>
<td>Kohala Expl. F</td>
<td>U.S. Geological Survey</td>
<td>WELL</td>
<td>2/16/89</td>
<td>2/16/89</td>
<td>6/2/90</td>
<td>oth</td>
<td></td>
</tr>
</tbody>
</table>

- **Kauai**

2-0023-01 | Pukanuus Mon | U.S. Geological Survey | WELL | 12/19/95 | 12/19/95 | 1/28/96 | obs |
2-0124-01 | NE Kihana | U.S. Geological Survey | WELL | 3/14/95 | 3/31/95 | oth |
2-0126-01 | NW Kihana | U.S. Geological Survey | WELL | 3/14/95 | 3/31/95 | oth |
- 2-0923-08 | Hanamaulu T.Z | U.S. Geological Survey | WELL | 3/14/95 | 3/31/95 | oth |

- **Oahu**

3-2400-07 | Wailea-USGS Ob | U.S. Geological Survey | WELL | 8/15/91 | 8/21/91 | obs |
3-3307-21 | Thomp Corr Obs | U.S. Geological Survey | WELL | 3/12/93 | 4/26/93 | obs |
3-3406-13 | Kamooloo Obs | U.S. Geological Survey | WELL | 8/10/93 | 6/25/93 | obs |
3-3406-14 | Helimano Cpr | U.S. Geological Survey | WELL | 8/10/93 | 6/25/93 | obs |
3-3406-15 | Helimano Cpr | U.S. Geological Survey | WELL | 8/10/93 | 6/25/93 | obs |
3-3406-34 | Puupu Caprec | U.S. Geological Survey | WELL | 8/10/93 | 6/25/93 | obs |
3-3406-35 | Kaeakats Bcy Cpr | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3407-36 | Kiihi Cpr Mon | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3407-37 | Kiihi Cpr Mon | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3505-26 | Anahulu Gulch | U.S. Geological Survey | WELL | 1/13/93 | 8/3/93 | obs |
3-3505-29 | Opea Ob | U.S. Geological Survey | WELL | 5/13/93 | 8/3/93 | obs |
3-3663-16 | Helimano Cpr | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | obs |
3-3663-17 | Helimano Cpr | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | obs |
3-3663-18 | Lower Opoea | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3663-19 | Lower Opoea | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3663-20 | Paalea Kii Cpr | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3663-21 | Paalea Kii Cpr | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | mon |
3-3604-01 | Kawaihae Deep | U.S. Geological Survey | WELL | 8/10/93 | 8/25/93 | obs |

**Note:** Lined out wells were permitted, but never drilled. Canceled in helical DAP and taken off of well map.
WELL CONSTRUCTION PERMIT

for

Puuili Caprock Well
Well No. 3407-34, Waialua, Oahu

TO: Mr. William Meyer
United States Geological Survey
Water Resource Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 320 ft. deep monitor well, at Tax Map Key: 6-7-002-004, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

__________________________
MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

AUG 31 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.

Enc. (Well Completion Report form)
c: Department of Health
   Safe Drinking Water Branch
   Solid and Hazardous Waste Branch
   Ground Water Protection Program
   Honolulu Board of Water Supply
   Kamehameha Schools/Bishop Estate
TO: Mr. William Meyer  
United States Geological Survey  
Water Resource Division  
677 Ala Moana Blvd., Suite 415  
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 280 ft. deep monitor well, at Tax Map Key: 6-7-001-008, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

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.

Enc. (Well Completion Report form)

Department of Health
Safe Drinking Water Branch
Solid and Hazardous Waste Branch
Ground Water Protection Program
Honolulu Board of Water Supply
Kamehameha Schools/Bishop Estate
TO: Mr. William Meyer  
United States Geological Survey  
Water Resource Division  
677 Ala Moana Blvd., Suite 415  
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 120 ft. deep monitor well, at Tax Map Key: 6-6-023-003, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

Michael D. Wilson, Chairperson
Commission on Water Resource Management

Aug 31 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.

Enc. (Well Completion Report form)
c: Department of Health
Safe Drinking Water Branch
Solid and Hazardous Waste Branch
Ground Water Protection Program
Honolulu Board of Water Supply
Kamehameha Schools/Bishop Estate
WELL CONSTRUCTION PERMIT

for

Kiikii Caprock Monitor Well 2
Well No. 3407-37, Waialua, Oahu

TO: Mr. William Meyer
United States Geological Survey
Water Resource Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

In accordance with Hawaii Administrative Rules §13-168, Water Use, Wells, and Stream Diversion Works, and the February 15, 1989 Commission action authorizing Chairperson discretion, your application to construct a 6-inch diameter, 300 ft. deep monitor well, at Tax Map Key: 6-6-023-003, 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 applicant shall comply with all applicable laws, rules, and ordinances.

3. The well shall be used for ground water quality monitoring, sampling, and testing only.

4. The following shall be submitted to the Commission within 30 days after completion of the well:
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

5. The applicant shall comply with all applicable laws, rules, and ordinances.
6. This 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 (6) months. The work proposed in the permit application shall be completed within two (2) years from the date of permit approval.

7. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
AUG 31 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.

Enc. (Well Completion Report form)
c: Department of Health
   Safe Drinking Water Branch
   Solid and Hazardous Waste Branch
   Ground Water Protection Program
   Honolulu Board of Water Supply
   Kamehameha Schools/Bishop Estate
Mr. William Meyer  
United States Geological Survey  
677 Ala Moana Blvd., Suite 415  
Honolulu, HI 96813  

Dear Mr. Meyer:

Assignment of Well Numbers  
Waialua Ground Water Management Area, Oahu

We have assigned the following well numbers to your recently permitted wells at Waialua, Oahu:

<table>
<thead>
<tr>
<th>WELL NAME</th>
<th>WELL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Twin Bridge Road Deep Monitor</td>
<td>3406-12</td>
</tr>
<tr>
<td>2. Puuiki Caprock</td>
<td>3407-34</td>
</tr>
<tr>
<td>3. Kamooloa Observation</td>
<td>3406-13</td>
</tr>
<tr>
<td>4. Helemano Caprock Monitor Well 1</td>
<td>3406-14</td>
</tr>
<tr>
<td>5. Helemano Caprock Monitor Well 2</td>
<td>3406-15</td>
</tr>
<tr>
<td>6. Kaheaka Observation</td>
<td>3304-01</td>
</tr>
<tr>
<td>7. Kaiaka Bay Caprock</td>
<td>3407-35</td>
</tr>
<tr>
<td>8. Kiikii Caprock Monitor Well 1</td>
<td>3407-36</td>
</tr>
<tr>
<td>9. Kiikii Caprock Monitor Well 2</td>
<td>3407-37</td>
</tr>
<tr>
<td>10. Paalaa Kai Deep Observation</td>
<td>3506-15</td>
</tr>
<tr>
<td>11. Northern Upper Anahulu Gulch Monitor</td>
<td>3503-01</td>
</tr>
<tr>
<td>12. Southern Upper Anahulu Gulch Monitor</td>
<td>3503-02</td>
</tr>
<tr>
<td>13. Haleiwa Caprock Well 1</td>
<td>3506-16</td>
</tr>
<tr>
<td>14. Haleiwa Caprock Well 2</td>
<td>3506-17</td>
</tr>
<tr>
<td>15. Lower Opaeula Monitor Well 1</td>
<td>3506-18</td>
</tr>
<tr>
<td>16. Lower Opaeula Monitor Well 2</td>
<td>3506-19</td>
</tr>
<tr>
<td>17. Kawaiola Deep Observation</td>
<td>3604-01</td>
</tr>
<tr>
<td>18. Paalaa Kai Caprock Monitor Well 1</td>
<td>3506-20</td>
</tr>
<tr>
<td>19. Paalaa Kai Caprock Monitor Well 2</td>
<td>3506-21</td>
</tr>
</tbody>
</table>

Please let us know if there are any changes in location, design, etc. of the proposed wells. If you have any questions, please contact Ed Sakoda at [redacted].

Sincerely,

[Signature]

RAE M. LOUI  
Deputy Director
Mr. William Meyer
United States Geological Survey
677 Ala Moana Blvd. Suite 415
Honolulu, HI 96813

Dear Mr. Meyer:

Applications for Well Construction Permits
Waialua, Oahu

We have received your applications for well construction permits for the following nineteen (19) monitor wells:

1. Twin Bridge Road Deep Monitor (3406-12)
2. Puuiki Caprock (3407-34)
3. Ka'umooloa Observation (3406-13)
4. Helemano Caprock Monitor Well 1 (3406-14)
5. Helemano Caprock Monitor Well 2 (3406-15)
6. Kaheleka Observation (3304-01)
7. Kaiake Bay Caprock (3407-35)
8. Kiikii Caprock Monitor Well 1 (3407-36)
9. Kiikii Caprock Monitor Well 2 (3407-37)
11. Northern Upper Anahulu Gulch Monitor (3503-01)
12. Southern Upper Anahulu Gulch Monitor (3503-02)
13. Haleiwa Caprock Well 1 (3506-16)
14. Haleiwa Caprock Well 2 (3506-17)
15. Lower Opaekua Monitor Well 1 (3506-18)
16. Lower Opaekua Monitor Well 2 (3506-19)
17. Kawaino Deep Observation (3604-01)
18. Paalaa Kai Caprock Monitor Well 1 (3506-20)
19. Paalaa Kai Caprock Monitor Well 2 (3506-21)
These applications for well construction permits are hereby approved for exploratory and monitoring purposes only and subject to the standard well construction conditions attached. If necessary, we will be assigning them State Well Nos. and will notify you as soon as possible.

If you have any questions, please contact Ms. Rae M. Loui, Deputy Director, at

Very truly yours,

KEITH W. AHUE
STANDARD WELL CONSTRUCTION PERMIT CONDITIONS

1. The Commission shall be notified before work commences.

2. The well construction permit shall be for construction, testing, and monitoring purposes only. If required, the applicant shall coordinate with the Commission and conduct a pumping test in accordance with the protocol established by the Commission. A means to accurately measure water levels, acceptable to the Commission, shall also be provided. The applicant shall submit to the Commission the test results and proposed permanent pump information, based on the test, for approval by the Chairperson. No permanent pump may be installed and no water used from the well without the Chairperson's approval.

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 construct and 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 for future pump capacity.

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

5. If water is withdrawn from the monitor wells, the applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Any water usage shall be measured on a monthly basis and reported to the Commission.

6. The well construction 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. The work proposed in the well construction permit application shall be completed within two years from the date of permit approval.

7. The following shall be submitted to the Commission within thirty (30) days after completion of work:
   a. Well completion report.
   b. Elevations of well (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 water quality data.
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 771, 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: Kiikii Caprock Monitor Well Z Island Oahu

Address: Wailua Sugar Plantation, near Kaamooloa Tax Map Key 6-6-23-03

(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: U.S. Geological Survey
Contact Person: William Meyer
Address: 677 Ala Moana Blvd., Suite 415, Honolulu, HI, 96813 Ph. (808) 541-2537

(b) LANDOWNER:

Firm Name: DOLE FOOD COMPANY, INC.
Contact Person: George W.Y. Yim
Address: P.O. Box 2990 Honolulu, Hawaii 96802 Ph. (808) 541-2537

3. PROPOSED CONTRACTOR:

Name: U.S. Geological Survey
Address: 677 Ala Moana Blvd., Suite 415, Honolulu, HI, 96813 Ph. (808) 541-2537

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) Monitor Well

6. PROPOSED AMOUNT OF WITHDRAWAL: ________ gallons per day

7. PROPOSED PUMP INFORMATION:

Pump Type:
☐ Vertical Turbine ☐ Diesel
☐ Submersible ☐ Gas
☐ Centrifugal ☐ Electric, at a rated horsepower of ________

Rated Pump Capacity: Gallons per minute ________

For Official Use Only:

Well Owner (print) William Meyer Landowner (print) DOLE FOOD COMPANY, INC. By its Agent, George W.Y. Yim, President, Castle & Cooke Land Co

Signature ____________________________ Signature ____________________________

Date 6/12/92 Date 8/12/92

Field Checked By ____________________________ Latitude ____________________________

State Well No. 3407-37

Date ____________________________ Longitude ____________________________
Briefly describe the proposed work:

A monitor well will be drilled to approximately 75% of the thickness of the aquifer under the caprock. The well will be completed such that measurements of the water levels will be representative of the head at depth under the caprock. The data from this well will be used in comparison with data from the shallower well at the same site to ascertain aquifer flow in the caprock region.

**PROPOSED SECTION OF WELL**

<table>
<thead>
<tr>
<th><strong>Elevation at top of casing:</strong></th>
<th>15 ft., msl.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cement Grout:</strong></td>
<td>20 ft.</td>
</tr>
<tr>
<td><strong>Surface Hole Diameter:</strong></td>
<td>10 in.</td>
</tr>
<tr>
<td><strong>Total Depth:</strong></td>
<td>300 ft.</td>
</tr>
<tr>
<td><strong>Rock Packing:</strong></td>
<td>6 ft.</td>
</tr>
<tr>
<td><strong>Depth to Water:</strong></td>
<td>10 ft.</td>
</tr>
<tr>
<td><strong>Thickness of Caprock:</strong></td>
<td>100 ft.</td>
</tr>
<tr>
<td><strong>Elevation at bottom of casing:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ground Elevation:</strong></td>
<td>13 ft., msl</td>
</tr>
<tr>
<td><strong>Surface Solid Casing:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Material:</strong></td>
<td>PVC</td>
</tr>
<tr>
<td><strong>Length:</strong></td>
<td>200 ft.</td>
</tr>
<tr>
<td><strong>Diameter:</strong></td>
<td>6 in.</td>
</tr>
<tr>
<td><strong>Wall thickness:</strong></td>
<td>1.9 in.</td>
</tr>
<tr>
<td><strong>Inner Casing:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Material:</strong></td>
<td>PVC</td>
</tr>
<tr>
<td><strong>Length:</strong></td>
<td>40 ft.</td>
</tr>
<tr>
<td><strong>Diameter:</strong></td>
<td>4 in.</td>
</tr>
<tr>
<td><strong>Wall thickness:</strong></td>
<td>1.9 in.</td>
</tr>
<tr>
<td><strong>Openings:</strong></td>
<td>2.5 sq. in./L.F.</td>
</tr>
<tr>
<td><strong>Aquifer Bore:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Length:</strong></td>
<td>20 ft.</td>
</tr>
<tr>
<td><strong>Diameter:</strong></td>
<td>5 3/4 in.</td>
</tr>
</tbody>
</table>

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.*
APPLICATION FOR: ☐ Well Construction 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 waive for government agencies.) If necessary, phone ___________ Hydrology/Geology Section for assistance.

1. WELL LOCATION/NAME: Kiikii Caprock Monitor Well | Island Oahu
Address: Wailua Sugar Plantation, near Kasmooloa Tax Map Key 6-6-23-03
(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: U.S. Geological Survey
   Contact Person: William Meyer
   Address: 677 Ala Moana Blvd, Suite 415 Honolulu, HI, 96813 Ph (808) ___________

   (b) LANDOWNER:
   Firm Name: DOLE FOOD COMPANY, INC.
   Contact Person: George W.Y. Yim
   Address: P.O. Box 2990 Honolulu, Hawaii 96802 Ph (808) ___________

3. PROPOSED CONTRACTOR:
   Name: U.S. Geological Survey
   Address: 677 Ala Moana Blvd, Suite 415, Honolulu, HI, 96813 Ph (808) ___________
   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.) ☐ Military
   ☐ Domestic (Individual, noncommercial water sys.) ☐ Industrial
   ☐ Irrigation (specify) _________ ☐ Other (specify) Monitor Well

6. PROPOSED AMOUNT OF WITHDRAWAL: _________ gallons per day

7. PROPOSED PUMP INFORMATION:
   Pump Type:
   ☐ Vertical Turbine ☐ Submersible ☐ Centrifugal
   Motor:
   ☐ Diesel ☐ Gas ☐ Electric, at a rated horsepower of _________
   Rated Pump Capacity:
   Gallons per minute _________

Well Owner (print) William Meyer Landowner (print) DOLE FOOD COMPANY, INC. By its
Signature ___________ Signature ___________
Date 6/21/93 Date 8/1/93

For Official Use Only:
Field Checked By _________ Latitude ___________
Date _________ Hydrologic Unit State Well No. _________

Dole FOOD COMPANY, INC. By its
Agent, George W.Y. Yim
President, Castle & Cooke Land Co.
Briefly describe the proposed work:

A monitor well will be drilled to measure head and record water levels directly beneath the contact between the caprock and the basalt aquifer.

PROPOSED SECTION OF WELL

Elevation at top of casing: 15 ft., msl.

Ground Elevation: 13 ft., msl*

Cement Grout: 100 ft.

Surface Hole Diameter: 10 in.

Total Depth: 120 ft.

Rock Packing: 6 ft.

Depth to Water: 10 ft.

Thickness of Caprock: ~ 100 ft.

Surface Solid Casing:

- Material: STEEL
- Length: 100 ft.
- Diameter: 6 in.
- Wall thickness: .185 in.
- Inner Casing: [ ] Perforated  [ ] Screen

- Material: PVC
- Length: 15 + 20 ft.
- Diameter: 4 in.
- Wall thickness: .25 in.
- Openings: square in/L.F.

Aquifer Bore

- Length: 20
- Diameter: 5 3/4 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
APPLICATION FOR: ☐ Well Construction 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:  Kailaka Bay Caprock Well  Island Oahu
   Address: Waialua Sugar Plantation, near Kailaka Bay  Tax Map Key: 6-7-01-08
   (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: U.S. Geological Survey
   Contact Person: William Meyer
   Address: 677 Ala Moana Blvd, Suite 415
   Honolulu, HI. 96813  Ph. (808)

(b) LANDOWNER:
   Firm Name: DOLE FOOD COMPANY, INC.
   Contact Person: George W.Y. Yim
   Address: P.O. Box 2990
   Honolulu, Hawaii 96802
   Ph. (808)

3. PROPOSED CONTRACTOR:
   Name: U.S. Geological Survey
   Contractor’s License No.
   Address: 677 Ala Moana Blvd, Suite 415
   Honolulu, HI. 96813
   Ph. (808)

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)  Monitor Well

6. PROPOSED AMOUNT OF WITHDRAWAL: ________ gallons per day

7. PROPOSED PUMP INFORMATION:
   Pump Type:
     ☐ Vertical Turbine  ☐ Diesel
     ☐ Submersible  ☐ Gas
     ☐ Centrifugal  ☐ Electric, at a rated horsepower of ________
   Motor:
   Rated Pump Capacity:
   Gallons per minute ________

Well Owner (print): William Meyer  Landowner (print): DOLE FOOD COMPANY, INC. By its Agent, George W.Y. Yim,
President, Castle & Cooke Land Co

Signature: __________________________  Signature: __________________________
Date: 6/21/93  Date: 8/2/93

For Official Use Only:
Field Checked By: __________________________  Latitude: __________________________  Hydrologic Unit: __________________________
Date: __________________________  Longitude: __________________________  State Well No.: 3407-35
**PROPOSED SECTION OF WELL**

- **Elevation at top of casing:** 12 ft., msl.
- **Cement Grout:** 260 ft.
- **Surface Hole Diameter:** 10 in.
- **Total Depth:** 280 ft.
- **Rock Packing:** 6 ft.
- **Depth to Water:** 0 ft.
- **Thickness of Caprock:** 250 ft.
- **Ground Elevation:** 10 ft., msl
- **Surface Solid Casing:**
  - Material: STEEL
  - Length: 260 ft.
  - Diameter: 6 in.
  - Wall thickness: 0.188 in.
- **Inner Casing:** Perforated
  - Material: PVC
  - Length: 260 ft.
  - Diameter: 4 in.
  - Wall thickness: 0.25 in.
  - Openings: __sq.in./L.F.
- **Aquifer Bore**
  - Length: 25 ft.
  - Diameter: 5 3/4 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.*
APPLICATION FOR: □ Well Construction 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: Puuiki Caprock Monitor Well
   Island: Oahu
   Address: Wailua Sugar Plantation, near Waialua H. School
   Tax Map Key: 6-7-02-04
   (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: U.S. Geological Survey
   Contact Person: William Meyer
   Address: 677 Ala Moana Blvd., Suite 415
   Honolulu, HI. 96813 Ph. (808) ___

(b) LANDOWNER:
   Firm Name: DOLE FOOD COMPANY, INC.
   Contact Person: George W.Y. Yim
   Address: P.O. Box 2990
   Honolulu, Hawaii 96802 Ph. (808) ___

3. PROPOSED CONTRACTOR:
   Name: U.S. Geological Survey
   Contractor's License No.: ___
   Address: 677 Ala Moana Blvd., Suite 415, Honolulu, HI. 96813 Ph. (808) ___

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) Monitor Well

6. PROPOSED AMOUNT OF WITHDRAWAL: ______ gallons per day

7. PROPOSED PUMP INFORMATION:
   Pump Type:
   □ Vertical Turbine   □ Diesel
   □ Submersible   □ Gas
   □ Centrifugal   □ Electric, at a rated horsepower of ___

   Motor:
   □ Diesel   □ Gas
   □ Electric

   Rated Pump Capacity: ___
   Gallons per minute

Well Owner (print): William Meyer
Signature: ___
Date: ___

Landowner (print): DOLE FOOD COMPANY, INC. By its Agent, George W.Y. Yim,
Signature: ___
President, Castle & Cooke Land ___

For Official Use Only:
Field Checked By: ___
Latitude: ___
State Well No.: ___
Longitude: ___
Hydrologic Unit: ___
Date: ___
___
___
___

Briefly describe the proposed work:

A monitor well will be drilled to measure head and record water levels directly beneath the contact between the caprock and the basalt aquifer.

PROPOSED SECTION OF WELL

Elevation at top of casing: 52 ft., msl.

Cement Grout: 300 ft.

Surface Hole Diameter: 10 in.

Total Depth: 520 ft.

Rock Packing: 0 ft.

Depth to Water: 40 ft.

Thickness of Caprock: 250 ft.

Ground Elevation: 50 ft., msl

Surface Solid Casing:

Material: Steel
Length: 300 ft.
Diameter: 6 in.
Wall thickness: 1.25 in.

Inner Casing: □ Perforated □ Screen

Material: PVC
Length: 300 ft. from 20 ft. above
Diameter: 4 in.
Wall thickness: 4.25 in.
Openings ______ sq. in./L.F.

Aquifer Bore
Length: 20
Diameter: 6 3/4 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.