HONOLULU GROUND WATER CONTROL AREA

WELL DRILLING PERMIT

for
Honolulu Fire Department Exploratory Caprock Well
State Well No. 2056-04
Moanalua, Oahu

TO: Honolulu Fire Department
1455 South Beretania Street, 3rd Flr.
Honolulu, Hawaii 96814

In accordance with Chapter 166 of Title 13, "Rules for the Control of Ground Water Use in the State of Hawaii", your application to drill an exploratory caprock well at TMK: 1-1-02:12 (State Well No. 2056-04) 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 well.

2. Pumping test data shall be submitted to the Division of Water and Land Development within 60 days after testing of the well.

3. An "as-built" drawing of the well and a map showing the exact location of the well shall be submitted upon completion of the well.

4. This well drilling permit is for drilling and testing only and the well shall be suitably capped after completion. No pump may be installed and no water used from this well without the necessary well modification and water use permits from the Department of Land and Natural Resources under Administrative Rules, Chapter 166 of Title 13.

5. The issuance of this drilling permit shall in no way prejudice any future consideration by the Board of Land and Natural Resources on the issuance or non-issuance of a permit to withdraw and use water from this well.

6. The applicant comply with all applicable laws, rules, and ordinances.
7. This permit may be revoked if work is not started within six months of date of issuance or if work is suspended or abandoned for six months.

DEC 16 1987

Date of Issuance

Enc. (Driller's Report Form)
cc: USGS
Department of Health,
   Drinking Water Program
   Ground Water Protection Program
Honolulu Board of Water Supply

WILLIAM W. PATY
Chairperson of the Board
Summary

Feasibility of development of a water source for training purposes at the Valkenburgh site of the Fire Department has been successfully demonstrated with the drilling and testing of two shallow wells. Both wells were tested at 500 gpm and showed drawdowns of less than 2 feet. Although not actually tested at 1,000 gpm, analytical technique indicates that at 1,000 gpm, drawdown would be less than 6 feet for one well pumping. For two wells yielding a total of 2,000 gpm, drawdowns should be less than 8 feet. Although the water is presently mildly brackish with chloride ranging between 420 and 920 ppm, salinity is expected to rise considerably with more use. In order to conserve the water and minimize increase of salinity, water used for training should be recharged into the ground either through use of the wells or through another well drilled to the area of use.

A decision is required on how to best utilize the source as it relates to the purposes of the Honolulu Fire Department (HFD). A meeting to be attended by HFD, Board of Water Supply (BWS), and Building Department should be held to discuss the various alternatives available.

Drilling of Wells

Two wells were completed at the HFD Valkenburgh Firefighting Training Center in January and February 1989. The two wells, State well Nos. 2056-05 and 06, respectively, were drilled at
the ewa portion of the property as shown on Figure 1. Both wells encountered sticky clay derived from volcanic ash to depths of approximately 12 feet, followed by hard, consolidated volcanic ash to 45 feet, and reef deposits to 80 feet (see Table 1).

Both wells are constructed of 12-inch PVC casing and 20 feet of PVC well screen placed into 20-inch holes and backfilled with No. 4 crushed rock. A concrete collar and a protective steel casing protect the wellhead as in Figure 2.

Testing of Wells
The water is derived from reef deposits which yield water freely to pumping. Both wells were tested up to 500 gallons per minute. Drawdowns were less than 2 feet as shown in Figures 3 and 4. Projected to 1,000 gpm, drawdown increases to only 6 feet. With both wells pumping at 1,000 gpm, drawdowns will increase only slightly.

Well No. 2056-03, the first well, shows greater salinity during pumping as shown in Table 2. Chloride concentration began at 420 parts per million (ppm) and rose to 920 ppm at the end of 5 hours. The deeper pump setting for this test apparently contributed to this behavior. The second well (2056-08), which is 2 feet shallower, had a somewhat shallower pump setting at 24 feet and exhibited beginning and
ending chlorides of 380 ppm and 560 ppm, respectively. These initial differences will probably diminish as the wells are pumped. Water quality at present is satisfactory for irrigation of non-sensitive plants such as the present grasses and trees on the premises. Water is expected to degrade to higher levels of salinity as the wells are pumped over time, especially at rates over 100 gpm. Degradation rate and final quality of water is not determinable at this time except for the above generalizations. Only operational data from these wells will give this information.

Source Development
Because the water table stands 1.8 feet above mean sea level and 22.6 feet below ground surface, ordinary suction type pumps are unable to lift the water from this depth. Line shaft turbine pumps or submersible pump types would be required unless pits are constructed. Owing to the corrosive nature of brackish and saline water, corrosion-resistant pumps are required. A local pump supplier estimates the cost of a 1,000 gpm pump of this type would be approximately $15,000 using a simple starter and switch system.

Whether a small or large reservoir is required depends on the method needed for training purposes. If truck pumps are part of the training, then the length of the training period determines the minimum size of the reservoir.
For example, a 1,000 gpm well output matches five fire hoses delivering 200 gpm. A 10,000 gallon tank would provide storage for 50 minutes for a single hose and permit six hoses to be operated with such a system. This system relies on the well pump to meet demand. Standpipes on blowoffs and storage in the reservoir could be used to handle surges when hoses are turned off. Lower costs and simplicity are the outstanding advantages of such a system. If two 1,000 gpm pumps are installed, the second could be used for standby or increasing the number of hoses to 11 connections.

The above comments are only suggestions on one way to develop the source. Since there are many other methods that may suit training needs better, a meeting attended by HFD, Building Department, and BWS should be held on the subject.
<table>
<thead>
<tr>
<th>Depth Interval (ft.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-35</td>
<td>Gray-green crystal lithic palagonite tuff (from Makalapa crater?)</td>
</tr>
<tr>
<td>35-45</td>
<td>Mixture of tuff and coral</td>
</tr>
<tr>
<td>45-50</td>
<td>Coral with minor amount of tuff present</td>
</tr>
<tr>
<td>50-55</td>
<td>Coral</td>
</tr>
<tr>
<td>55-70</td>
<td>Mixture of coral and rounded sand particles</td>
</tr>
<tr>
<td>70-75</td>
<td>Coral &gt;&gt; sand</td>
</tr>
<tr>
<td>75-80</td>
<td>Coral - sample contains a small basaltic stream pebble</td>
</tr>
</tbody>
</table>
# TABLE 1B

## FIRE DEPARTMENT TRAINING CENTER WELL NO. 2

### GEOLOGIC LOG

<table>
<thead>
<tr>
<th>Depth Interval (ft.)</th>
<th>Description</th>
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<tbody>
<tr>
<td>0-35</td>
<td>Greenish-brown palagonite tuff</td>
</tr>
<tr>
<td>35-45</td>
<td>Mixture of palagonite tuff and coral</td>
</tr>
<tr>
<td>45-50</td>
<td>Same as above; coral &gt;&gt; tuff</td>
</tr>
<tr>
<td>50-70</td>
<td>Mixture of white coral and tan to yellow sand with rounded basaltic pebbles</td>
</tr>
<tr>
<td>70-75</td>
<td>Same as above, except basaltic pebbles are very small and more the size of coarse sand</td>
</tr>
<tr>
<td>75-78</td>
<td>Same as above, basaltic pebbles present</td>
</tr>
</tbody>
</table>
HFD Training Center Well No. 2056-05(NO.2)

Specific Capacity

K * Σ

DRAWDOWN (ft.)

LOGARITHMIC 2 x 2 CYCLES
KEUPFEL & FESER CO. WODEN, MONT.

0 (gpm)

L.H.M.
2/28/89

Fig. 4
**TABLE 2A**

**FIRE DEPARTMENT VALKENBURGH STREET**  
**WELL SAMPLES**  
**Well no. 1**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Time</th>
<th>°F</th>
<th>Gpm Rate</th>
<th>Alk</th>
<th>Hrd</th>
<th>Cl</th>
<th>pH</th>
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<tbody>
<tr>
<td>1</td>
<td>8:25</td>
<td>80.0</td>
<td>60</td>
<td>292</td>
<td>395</td>
<td>420</td>
<td>7.75</td>
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<tr>
<td>2</td>
<td>8:55</td>
<td>79.8</td>
<td>162</td>
<td>250</td>
<td>340</td>
<td>570</td>
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<td>3</td>
<td>9:46</td>
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<td>400</td>
<td>290</td>
<td>460</td>
<td>720</td>
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<td>4</td>
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<td>79.5</td>
<td>500</td>
<td>490</td>
<td>700</td>
<td>850</td>
<td>3470</td>
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<td>5</td>
<td>13:15</td>
<td>79.5</td>
<td>500</td>
<td>290</td>
<td>540</td>
<td>920</td>
<td>7.80</td>
</tr>
<tr>
<td>Time</td>
<td>Q (gpm)</td>
<td>Drawdown (ft.)</td>
<td>Cl (ppm)</td>
<td>Temp. (°F)</td>
<td>Sp. Cond. (umhos.)</td>
<td>Drawdown Well #1 (ft.)</td>
<td>Remarks</td>
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<tr>
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<td>---------</td>
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<td>----------</td>
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<td>-----------------</td>
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<td>67</td>
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<td>70</td>
<td>0.11</td>
<td>0.03</td>
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<td>70</td>
<td>0.11</td>
<td>380</td>
<td>79.9</td>
<td>1,870</td>
<td>0.04</td>
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<td></td>
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</tr>
<tr>
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<td>163</td>
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<td>79.8</td>
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<td>0.08</td>
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</tr>
<tr>
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<td>400</td>
<td>79.6</td>
<td>2,010</td>
<td>0.10</td>
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<td>1000</td>
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<td>407</td>
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<td>79.5</td>
<td>2,230</td>
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<td>Changed rate</td>
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<tr>
<td>1403</td>
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<td>0.21</td>
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<td></td>
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<td>0.20</td>
</tr>
</tbody>
</table>
**DESCRIPTION**

Date of report: March 16, 1989  
Person filing report: L.H. Runnells  
DOWALD Form 71(1)  
STATE  

A. OWNER C&C OF HONOLULU  
**NAME** Well #2  

B. GENERAL LOCATION Fire Training Center, 890 Valkenburgh St.

C. DRILLING COMPANY: Roscoe Moss Company  
**DIV. OF WATER & LAND DEVELOPMENT**

D. TYPE OF RIG: 60L  
**DRILLING COMPLETED:** 03/ 89  

E. ELEVATION, msl: Top of drilling platform  

F. HOLE SIZE:  

G. CASING INSTALLED:  

H. ANNULUS: Grouted

I. PERMANENT PUMP INSTALLATION:

**HYDROLOGY**

J. INITIAL WATER LEVEL  

K. INITIAL CHLORIDE:  

L. PUMPING TESTS:  

**SUBSURFACE FORMATION**

M. DRILLER’S LOG:

N. REMARKS:

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

DATE OF REPORT: March 17, 1989  
PERSON FILING REPORT: Chester Lao  
WELL NAME: Valkenburg No. 1  
ISLAND: Oahu  

A. OWNER: HFD  
B. GENERAL LOCATION: Valkenburg  
C. DRILLING COMPANY: Rosco Moss  

D. TYPE OF RIG: Cable tool  
DRILLING COMPLETED:   

E. ELEVATION, msl: Top of drilling platform ft.  
Height of drilling platform above ground surface ft.  
Bench mark and method used to determine elevation:  
Constructs:  

F. HOLE SIZE:  
inch dia. ft. below drilling platform.  
inch dia. ft. below drilling platform.  
inch dia. ft. below drilling platform.  

G. CASING INSTALLED:  
12 in. I.D. x .1/2 in. wall solid section to ft. below drilling platform.  
12 in. I.D. x .1/2 in. wall perforated section to ft. below drilling platform.  
Type of perforation: Machine sawn PVC  

H. ANNULUS: Grouted to ft. below drilling platform.  
Gravel packed to ft. below drilling platform.  

I. PERMANENT PUMP INSTALLATION:  
- Pump type, make, serial no.:  
- Capacity g.p.m.  
- Motor type, H.P., voltage, r.p.m.  
- Depth of pump intake setting ft. below which elevation is ft.  
- Depth of bottom of airline ft. below which elevation is ft.  

J. INITIAL WATER LEVEL: ft. below drilling platform.  
Date:  

K. INITIAL CHLORIDE: ppm, total depth of well ft. below drilling platform.  
Sampling Date:  

L. PUMPING TESTS:  
Reference point (R.P.) used:  
Ground which elevation is ft.  
Date:  

M. DRILLER'S LOG:  

N. REMARKS:  

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

FOR OFFICIAL USE  
Latitude 21° 20' 37"  
Longitude 157° 54' 12"  
Well No. 2056-04  

FOR DRILLER'S USE  
Job Name  
Job No.  

STATEMENT: I hereby certify that the foregoing report is true and correct to the best of my knowledge and belief.
FOR OFFICIAL USE

State of Hawaii
DEPARTMENT OF LAND & NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT

DRILLER'S REPORT

DESCRIPTION

Date of report: March 16, 1989
Person filing report: L.H. Runnells

A. OWNER: C. & C. of Honolulu
   NAME: Well #1

B. GENERAL LOCATION: Fire Training Center, Valkenburgh St.

C. DRILLING COMPANY: Roscoe Moss Company

D. TYPE OF RIG: 60L
   DRILLING COMPLETED: Feb. 1989

E. ELEVATION, msl: Top of drilling platform 74.5 ft.
   Height of drilling platform above ground surface 0 ft.
   Bench mark and method used to determine elevation: 25 ft. or

F. HOLE SIZE:
   24 inch dia. to 80 ft. below drilling platform.
   24 inch dia. to 80 ft. below drilling platform.
   24 inch dia. to 80 ft. below drilling platform.

G. CASING INSTALLED:
   .24 in. I.D. x .125 in. solid section to 60 ft.
   .24 in. I.D. x .125 in. solid section to 60 ft.
   .24 in. I.D. x .125 in. solid section to 60 ft.

H. ANNULUS:
   Grouted 0 ft. to 3 ft. below drilling platform.
   Gravel packed 3 ft. to 80 ft. below drilling platform.

I. PERMANENT PUMP INSTALLATION:
   Pump type, make, serial no. Capacity g.p.m.
   Motor type, H.P., voltage, r.p.m.
   Depth of pump intake setting ft. below which elevation is ft.
   Depth of bottom of airline ft. below which elevation is ft.

HYDROLOGY

J. INITIAL WATER LEVEL ft. below drilling platform.
K. INITIAL CHLORIDE ppm, total depth of well ft. below drilling platform.

L. PUMPING TESTS:
   Reference point (R.P.) used: which elevation is ft.
   Date: Feb. 09, 1989
   Start water level 25 ft. below R. P.
   End water level 25 ft. below R. P.
   Depth of well 80 ft. below R. P.
   Time (hours) Rate (gpm) Drawdown (ft.) Temp. °F
   9:00 to 10:00 70 .12 to
   10:00 to 11:00 165 .25 to
   11:00 to 12:00 300 .92 to
   12:00 to 1:00 500 .35 to

SUBSURFACE FORMATION

M. DRILLER'S LOG:
   Water Level ft.
   Depth, ft.
   Rock Description & Remarks
   0. to 35. Mud Rock - hard...
   35. to 64. Coral...
   64. to 80. Hard coral...

   Water Level ft.
   Depth, ft.
   Rock Description & Remarks

N. REMARKS:

FOR DRILLER'S USE

Job Name
Job No.

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

**APPLICATION FOR (check one)**

- [ ] WELL DRILLING PERMIT
- [ ] WELL AND PUMPING 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?  
- [x] 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 [Oahu]  
   Tax Map Key __________________________.  
   Attach a plot plan showing well location referenced to established property boundaries.

2. **WATER USER**  
   Honolulu Fire Department  
   Telephone 943-3301  
   Address 1455 South Beretania St., 3rd Flr., Honolulu, HI  
   Zip Code 96814

3. **PROPOSED DRILLING COMPANY:** Board of Water Supply

4. **PROPOSED WORK:**  
   - [x] Drill new well  
   - [ ] Deepen  
   - [ ] Redrill  
   - [ ] Alter  
   - [ ] Abandon  
   - [ ] Install new pump  
   - [ ] Replace pump  
   - [ ] Modify pump

Fill in the diagram and briefly describe the proposed work (use back of form if necessary):

Drill and case shallow caprock well for the Fire Department's Training Center. To provide water for the purpose of extinguishing training fires.

**PROPOSED SECTION OF WELL**

- **Elevation at top of casing:** 24 ft, msl
- **Cement Grout:** 3 ft
- **Hole Dia.:** 24 in
- **Total Depth:** 78 ft
- **Rock:** 75 ft

*Approximate elev. at casing, by a surveyor licensed by the State must be submitted at start of construction.

**Solid casing**

- Material: PVC
- Length: 33 ft
- Diameter: 1 OD in
- Wall thickness: 1/2 in

**PVC Screen**

- Length: 20 ft
- Diameter: 1 OD in
- Wall thickness: 1/4 in
- Openings: sq. in. L.F.

**Open Hole**

- Length: ft
- Diameter: in

5. **PROPOSED USE:**  
   - [ ] Municipal  
   - [ ] Military  
   - [ ] Agriculture  
   - [ ] Industrial  
   - [ ] Domestic  
   - [x] Disposal  
   - [ ] Other (specify) for HFD Training Cen

6. **PROPOSED AMOUNT OF WITHDRAWAL:** Check most appropriate box and fill in amount.  
   - Daily __________ gallons  
   - Monthly __________ gallons  
   - Yearly __________ gallons

7. **PROPOSED PUMP OR FLOW CAPACITY:** unknown __________ gallons per minute

**Signature:** [illegible]  
**Date:** 8-26-87

**CONSENT OF LANDOWNER IS GRANTED**

**Signature:** [illegible]  
**Date:** 11/10/87

**For Official Use:**  
**State Well No.:** 2056-05  
**DLNR Permit No.:**  
**DLNR Application No.:**
TELEPHONED
CALLED TO SEE YOU
WANTS TO SEE YOU
RETURNED YOUR CALL

MESSAGE: is there a well permit for the Vachsenberg Fire Facility?
Faculty issued to Co. Blerg or fire dept. (out in capable area) Sherre
DRILLING TO START SOON - Chester

LAD - 1/12/1-
Mr. William Paty, Chairperson  
Board of Land and Natural Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Well Drilling Permit Application for the Honolulu Fire Department Training Center's Shallow Caprock Well

We submit a Well Drilling Permit Application for a shallow exploratory caprock well, which we propose to drill at the Honolulu Fire Department's Training Center, located on Valkenburgh Street. If the yield is adequate, water from the well will be used for their firefighting training. We are assisting the Fire Department in the development of the well.

If you have any questions, please contact Chester Lao at 527-5276.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer

Attachment
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.

1. WELL LOCATION: Island Oahu Tax Map Key. Attach a plot plan showing well location referenced to established property boundaries.

2. WATER USER: Honolulu Fire Department Telephone 943-3301 Address 1455 South Beretania St., 3rd Flr., Honolulu, HI Zip Code 96814

3. PROPOSED DRILLING COMPANY: Board of Water Supply

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):

Drill and case shallow caprock well for the Fire Department's Training Center. To provide water for the purpose of extinguishing training fires.

PROPOSED SECTION OF WELL

Elevation at top of casing 22 ft. ma.

Ground Elevation 20 ft. ma.

Cement

Grout 2 ft.

Hole Dia. 24 in.

Total Depth 35 ft.

Rock Packing 33 ft.

Solid casing:

Material Steel

Length 15 ft.

Diameter 14 OD in.

Wall thickness 3/16 in.

Casing:

Perforated Screen

Material Steel

Length 20 ft.

Diameter 14 OD in.

Wall thickness 3/16 in.

Openings

Approximate elev. at filing, final elev. (ma) 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) for HFD Training Center

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

☐ Daily _______ gallons  ☒ Monthly 30,000 gallons  ☐ Yearly glasses

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

Signature: ______________________________ Date: 8-26-87

Water User

CONSENT OF LANDOWNER IS GRANTED

Signature: ______________________________ Date: 11-12-87

Landowner of Well Site

For Official Use:

State Well No. _________

DLNR Permit No. _________

DLNR Application No. _________
EXISTING GROUND

CONCRETE

GRAVEL PACKED
ANNULUS (BY BWS)

SOLID CASING
(BY BWS)

WELL SCREEN
(BY BWS)

GRAVEL PACKED
ANNULUS (BY BWS)

24" MINIMUM DIAMETER

WELL SECTION
Scale: 3/4" = 1' - 0"

HONOLULU FIRE DEPARTMENT
VALKENBURGH STREET
WATER DEVELOPMENT

WELL SECTION

APPROVED:

CHIEF, PLANNING AND ENGINEERING DIVISION
PLAN

BAR CAP LOCK DETAILS

SECTION A

COVER DETAIL

SHEET 4 OF 4 SHEETS