Revised Well Site

KOHALA RANCH WELL NO.3

(6649-01)
**LABORATORY ANALYSIS REPORT (1)**

**TO:** BELT, COLLINS & ASSOCIATES  
**ATTN:** MR. TOM NANGE

**ADDRESS:** 680 ALA MOANA BLVD.  
**PHONE:**

**SAMPLES OF:** Potable Water

**SAMPLED BY:** G. Fukumitsu  
**SAMPLING DATE:** As noted  
**RECEIPT DATE:** 04/02/90

**DATE SAMPLE ANALYZED** | 4/2/90 | 4/2/90 | 4/2/90 | 4/2/90
---|---|---|---|---
**TIME SAMPLE ANALYZED** | 1145 | 1145 | 1145 | 1145

**SAMPLE TYPE**

**SAMPLE DESCRIPTION**  
Kohala Well #3  
Kohala Well #3  
Kohala Well #3  
Kohala Well #3

**UNITS**  
3/29/90  
3/30/90  
3/31/90  
4/01/90

**CHLORIDES**  
mg/L  
35  
35  
35  
35

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Units</th>
<th>Kohala Well #3</th>
<th>Maximum Contaminant Level mg/L</th>
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<tr>
<td>Arsenic</td>
<td>mg/L</td>
<td>≤0.002</td>
<td>0.05</td>
</tr>
<tr>
<td>Barium</td>
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<tr>
<td>Cadmium</td>
<td>mg/L</td>
<td>≤0.005</td>
<td>0.010</td>
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<tr>
<td>Chromium</td>
<td>mg/L</td>
<td>0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>Lead</td>
<td>mg/L</td>
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<td>0.05</td>
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<tr>
<td>Mercury</td>
<td>mg/L</td>
<td>0.0004</td>
<td>0.002</td>
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<td>Selenium</td>
<td>mg/L</td>
<td>≤0.002</td>
<td>0.01</td>
</tr>
<tr>
<td>Silver</td>
<td>mg/L</td>
<td>≤0.01</td>
<td>0.05</td>
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<tr>
<td>Fluoride</td>
<td>mg/L</td>
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<tr>
<td>Nitrogen, Nitrate</td>
<td>mg/L</td>
<td>0.94</td>
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<tr>
<td>Silica</td>
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<tr>
<td>Endrin</td>
<td>mg/L</td>
<td>≤0.0002</td>
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<tr>
<td>Lindane</td>
<td>mg/L</td>
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<td>0.004</td>
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<tr>
<td>Methoxychlor</td>
<td>mg/L</td>
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<td>0.1</td>
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<tr>
<td>Toxaphene</td>
<td>mg/L</td>
<td>&lt;0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>2,4-D</td>
<td>mg/L</td>
<td>≤0.1</td>
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</tr>
<tr>
<td>2,4,5-TP (Silvex)</td>
<td>mg/L</td>
<td>≤0.01</td>
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### Table 1

**Summary of Pump Test Results for Kohala Ranch Well No. 3**

<table>
<thead>
<tr>
<th>Day</th>
<th>Time of Day</th>
<th>Elapsed Time (Minutes)</th>
<th>Flowrate (GPM)</th>
<th>Airline (PSI)</th>
<th>Drawdown (Feet)</th>
<th>Reading By</th>
</tr>
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<tbody>
<tr>
<td>Mar 28</td>
<td>9:40 AM</td>
<td>Prior to Start 0</td>
<td>0</td>
<td>66.7</td>
<td>(Static Level)</td>
<td>TN</td>
</tr>
<tr>
<td></td>
<td>9:42</td>
<td>Start Pump 855</td>
<td>855</td>
<td>66.7</td>
<td>2.3</td>
<td>TN</td>
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<td></td>
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<td></td>
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<td>2.3</td>
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<td></td>
<td>10:05</td>
<td></td>
<td></td>
<td>66.7</td>
<td>2.8</td>
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<td></td>
<td>10:20</td>
<td></td>
<td></td>
<td>66.5</td>
<td>2.8</td>
<td>TN</td>
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<tr>
<td></td>
<td>10:25</td>
<td></td>
<td></td>
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<td>2.8</td>
<td>TN</td>
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<tr>
<td></td>
<td>10:30</td>
<td></td>
<td></td>
<td>66.5</td>
<td>3.6</td>
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</tr>
<tr>
<td></td>
<td>10:35</td>
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<td></td>
<td>66.15</td>
<td>3.6</td>
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<td></td>
<td>10:40</td>
<td></td>
<td></td>
<td>66.15</td>
<td>3.6</td>
<td>TN</td>
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<tr>
<td></td>
<td>12:00 PM</td>
<td>136</td>
<td>1190</td>
<td>66.2</td>
<td>3.5</td>
<td>AA</td>
</tr>
<tr>
<td></td>
<td>2:00</td>
<td>256</td>
<td>1193</td>
<td>66.1</td>
<td>3.7</td>
<td>AA</td>
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<tr>
<td></td>
<td>6:00</td>
<td>498</td>
<td>1198</td>
<td>66.1</td>
<td>3.7</td>
<td>AA</td>
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<tr>
<td></td>
<td>10:00</td>
<td>733</td>
<td>1215</td>
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<tr>
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<td>978</td>
<td>1220</td>
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<td>3.7</td>
<td>AA</td>
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<tr>
<td></td>
<td>6:00</td>
<td>1218</td>
<td>1220</td>
<td>66.0</td>
<td>3.9</td>
<td>AA</td>
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<tr>
<td></td>
<td>12:00 AM</td>
<td>1578</td>
<td>1183</td>
<td>66.1</td>
<td>3.7</td>
<td>AA</td>
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<tr>
<td></td>
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<td>66.0</td>
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<td>3.9</td>
<td>AA</td>
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<td>1181</td>
<td>66.0</td>
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<td>AA</td>
</tr>
<tr>
<td></td>
<td>12:00 PM</td>
<td>4458</td>
<td>1181</td>
<td>66.0</td>
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<td>AA</td>
</tr>
<tr>
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<td>4818</td>
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</tr>
<tr>
<td>Apr 01</td>
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<td>12:00 AM</td>
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<td>AA</td>
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<td></td>
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<td>1175</td>
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<td>4.1</td>
<td>GF</td>
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<td></td>
<td>9:43</td>
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</table>

**Recovery Data**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Elapsed Time (Minutes)</th>
<th>Airline (PSI)</th>
<th>Residual Drawdown (Feet)</th>
<th>Reading By</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:48</td>
<td>Pump Stops Backspin</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9:57</td>
<td></td>
<td>7215</td>
<td>67.1</td>
<td>1.6</td>
</tr>
<tr>
<td>10:07</td>
<td></td>
<td>7225</td>
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<td>1.4</td>
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<td>7235</td>
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<td>1.2</td>
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<td>7245</td>
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<td>1.2</td>
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<td>10:40</td>
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<td>7258</td>
<td>67.3</td>
<td>0.9</td>
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<tr>
<td>12:30 PM</td>
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<td>7368</td>
<td>67.4</td>
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<td>6:00</td>
<td></td>
<td>7698</td>
<td>67.6</td>
<td>0.2</td>
</tr>
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</table>

**Note:**  Data was taken by Tom Nance (TN), Greg Fukumitsu (GF), and Art Abe (AA).
During the 6-day pump test of Well No. 2, water levels in boreholes BHP and BHP-1 were recorded. Water level in BHP-1 is indicated by the graph below. Scales: 1:5 vertical, 0.1 inch/hour horizontal.

Pump test of Well No. 2 on April 24th at 9:00 am.
Figure 2

Graph Title: Performance of Hydraulic Fracture Wells NE 3

Legend:
1. Component (Perforated)
2. No Fracture

Y-axis: Feet
X-axis: Produced Rate (Gallons Per Minute)

Graph Description:
- Two lines represent the performance of hydraulic fracture wells.
- The line for the fractured well shows a higher rate compared to the non-fractured well.
expected diurnal barometric variations of water level were not recorded. These problems do not detract from the two important conclusions that can be drawn from this record, however. First, pumping at Well No. 3 had no perceptible effect on Well No. 1. This is not surprising in view of their respective locations and heads, the 4300-foot distance between the wells, and the small drawdown in Well No. 3. However, it is still nice to have confirmation of this fact. Second, there was no measured drawdown in Well No. 1 in response to pumping of Well No. 2. It is possible that a small response was masked by friction of the line on the casing, but it is also clear that a large response does not occur.

**Summary Conclusions**

In case some or most of the foregoing is too technical to be easily understood, the following summary conclusions are offered:

1) The well penetrates a previously unknown high level groundwater aquifer of excellent quality.

2) Although the areal extent of the aquifer has yet to be established, it is clearly of significant size rather than merely a small compartment.

3) The pump test results establish that a supply in excess of one million gallons per day can be safely developed from the new well.

4) Well No. 3 can be operated without adversely affecting Well Nos. 1 and 2.

Sincerely,

[Signature]

Tom Nance

TN:It

Enclosures
Pump Test Results

The test pump was started on the afternoon of March 26 and run intermittently until the morning of March 28 at rates from 1000 to 1200 GPM to thoroughly clean and develop the well. Following a shutdown of about an hour, the five-day pump test was begun. Initially, step-drawdown data were taken for rates between 855 and 1195 gallons per minute (GPM). The low end of this range was as low as could be sustained with the test set-up. At the high end of the range, the engines were at their maximum speed. The step-drawdown data are shown on the arithmetic plot on Figure 2. The well's hydraulic capacity is excellent; drawdown is just 3.6 feet at 1195 GPM. I have separated the drawdown into linear and second power components on the graph using a simple curve fitting technique. As a reasonable approximation, the linear component represents a true aquifer drawdown whereas the second power component reflects turbulent losses within and in the near vicinity of the well.

After the step-drawdown values had been obtained, the full pumping rate was maintained for the remainder of the five-day test. Table 1 and Figure 3 present these results. The rate for the remainder of the test averaged 1185 GPM (equivalent to 1.7 MGD). Water samples were taken at approximately the same time each morning for chloride analysis by Brewer Analytical Laboratory. All of these samples tested at 35 milligrams per liter. This is about one-half the chloride concentration in water pumped by Well Nos. 1 and 2. The complete set of inorganic and organic chemical constituents required by the Department of Health to certify the well as a new potable source were also analyzed by Brewer. The enclosed laboratory report demonstrates that all chemical concentrations are below allowable contaminant levels.

The plot of five days of drawdown on Figure 3 is quite significant. There is a small but definite time-dependent component which is a characteristic response of bounded groundwater bodies in Hawaii. The slopes of drawdown and recovery indicate that the aquifer's transmissivity is in the range of 400,000 to more than 1,000,000 gallons per day per foot. As a basis of comparison, the rate of drawdown in the Waikoloa Aquifer during a long-term pump test in 1972 is also shown on Figure 3. Transmissivities in both aquifers are comparable, although neither of the Waikoloa wells are as hydraulically efficient as Kohala Ranch Well No. 3.

It is also apparent from Figure 3 that no boundary effects were in evidence during five days of pumping. This is most likely a result of the nearest boundary being at substantial distance. This would also mean that the aquifer is relatively extensive rather than a small compartment. An alternative, though less likely, interpretation is that on-going recharge masks any boundary influence on drawdown. In either case, it provides evidence of the substantial, long-term sustainable yield of the resource.

Recorded Water Level in Kohala Ranch Well No. 1

Figure 4 presents the measured water level fluctuations in Well No. 1 during and following the pump test of Well No. 3. A Stevens Type F recorder was used to make this record. There is a break in the record from early evening of the first day to late morning of the second day when the problem was discovered and corrected. Also, it appears that the response of the float in the well was somewhat muted by friction of the wire from the float to the recorder rubbing on the casing because
Mr. Harry Otsuji  
Kohala Ranch  
737 Bishop Street, Suite 2775  
Honolulu, Hawaii 96813  

Dear Harry:

Summary Results and Initial Interpretations of Kohala Ranch Well No. 3

Results of the recently completed five-day pump test of Well No. 3 establish that the well is capable of supplying in excess of one million gallons per day (MGD) of potable quality water. This letter and its enclosures summarizes these results.

As-Built Dimensions of the Well

Figure 1 schematically depicts the well's configuration. Its 18-inch casing extends 1905 feet below ground with the lower 200 feet being a shutter-type screen. The annular space outside the screen has not been gravel packed. Cement baskets above the screen retain aggregate and grout in the upper 1695 feet of the annulus.

Plumbness and alignment test results showing that the well meets contract specifications were submitted to you previously. The contractor's use of a line shaft, vertical turbine pump for the pump test provides pragmatic evidence of the well's satisfactory alignment. The pump was installed without problems and ran smoothly throughout the test. As a point of interest, this test featured the deepest vertical turbine pump setting in Hawaii and possibly in the U.S. mainland as well.

Static Water Level in the Well

The static water level in the well is between 145 and 150 feet above sea level. A 148-foot level was first measured on November 28, 1989 after completion of the 12-inch pilot borehole using the contractor's equipment. I measured a 146-foot level on April 6, 1990 after the test pump had been removed. The accuracy of both measurements is to several feet. They clearly establish that the water level in Well No. 3 is dramatically higher than the six- to seven-foot levels in Well Nos. 1 and 2. This means that a hydrologic discontinuity exists somewhere in the 4300-foot distance between Well No. 3 and the first two wells.

The exact location, extent, and nature of the hydrologic discontinuity is not yet known. Possibilities include dikes, compressed and weathered layers of soil or ash, or relatively massive flows of lesser permeability lava. Geophysical investigations currently being conducted by Blackhawk Geosciences will attempt to map and characterize this feature. If successful, it will be of significant help in interpreting the ultimately sustainable yield of this high level aquifer.
B. Summary Results and Initial Interpretations of Kohala Ranch Well No. 3 (April 16, 1990 letter to Harry Otsui from Tom Nance with enclosures)
- MOTOR DATA -

MANUFACTURER       BYRON JACKSON
TYPE "H" SUBMERSIBLE MECHANICAL SEALED

DIAMETER - 16-1/8"
LENGTH - 12'-0"
NAME PLATE HORSE POWER - 450
RPM AT FULL LOAD - 1760
PHASE - THREE (3)
FREQUENCY - 60 HZ
VOLTAGE 4000
FULL LOAD AMPERES 63
LOCKED ROTOR CURRENT 576% FL AMP
POWER FACTOR (100%) = 83 (75%) = 79 (50%) = 70

EFFICIENCY (100%) = 89 (75%) = 88 (50%) = 87

WEIGHT 4390"

SERVICE FACTOR 1.0
3960x 1750 = 331
700x 1750
TOTAL DYNAMIC HEAD: 1750 GALLONS PER MIN.

OPERATING CONDITIONS

TOTAL LENGTH OF PUMP 21'-6".
TOP STAGES BOTTOM 50 DUCTILE

SHELL MATERIAL: IN. AL. BRONZE - B148A1958
SHELL IDA: 14-3/4"

SHAFT MATERIAL: NITRONICS 50 ASTM A276-4779
SHAFT DIA: 1.937"

SPEED: 1760 RPM

OPERATING

19 NO. STAGES

MODEL: 1510

MANUFACTURER: BYRON JACKSON

PUMP DATA
DATE _______ April 19, 1990 _______
NAME OF CUSTOMER ______ Belt Collins and Assoc. _______

PROPOSITION NO ______ SS 76 364 _______

ORDER NO _______  ____________________ _______
PURCHASE ORDER NO _______  ____________________ _______

NO OF UNITS _______ One _______

SURFACE PLATE _______ 27 ______ OD ______ 3 ______ THK _______

8-7/8" FOUNDATION HOLES. STR. 0 ON _______ 25 ______ 8" _______

8" ------ 8 T.P.I. - 3/4" TAPER T&C STD COLUMN _______

8" ------ 150' F.F. (STEEL) DISCHARGE FLANGE _______

BOWL ASSEMBLY _______ 15 LO _______ 19 STGS _______

450 ______ H.P. ______ 1760 ______ RPM ______ B.J. SUBM. MOTOR TYPE ______ H _______

16-1/8 ______ SIZE ______ 3 ______ PH ______ 60 ______ CYCLE ______ 4000 ______ VOLT _______

700 ______ GPM ______ 1750 ______ TDW _______

CABLE SIZE ______ #2 ______ VOLTAGE ______ 6KV ______ LENGTH ______ 1900 _______

REMARKS: Three Lakewood type column check values. Pipe K55 API round thread with .365" wall with short coupling _______

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED _______

JOB NO _______  ____________________ _______
PROP. NO _______  ____________________ _______
CERTIFIED _______  ____________________ _______
CORRECT _______  ____________________ _______
DATE _______  ____________________ _______
Appendix

A. Pump and Motor Data

B. Summary Results and Initial Interpretations

C. Observation of Kohala Ranch Well No. 3
I. Water Hammer Considerations

Control measures have been incorporated into the design to avoid water hammer. There are nine pressure reducing valve stations throughout the system. Secondary pressure relief valves are provided at each station to protect against water hammer caused by sudden valve closure or malfunction.

J. Essential Features of Construction and Operation

The well pump will be controlled automatically by water level sensors in Tank No. 4A.

K. Electrical System

The well pump will require 4160-volt, 3-phase electrical power. The power will be provided by HELCO.

IX. FINISHED WATER STORAGE

With the completion of the 0.5 MG tank next to Well No. 3, there will be nine storage tanks throughout the system. These range in size from 25,000 to 500,000 gallons.

X. WATER DISTRIBUTION SYSTEM

A. General Layout

The distribution system from the reservoirs will consist of approximately 146,000 feet of 6-, 8-, and 12-inch DI pipe and pressure reducing valve stations (see Figure 2).

B. Distribution System Materials

The system complies with the County Department of Water Supply's standards for construction materials for pipelines, valves, fittings and miscellaneous appurtenances.

C. Proximity to Other Utilities

Design of the water and electrical facilities for the KRWCo system has been coordinated with other utilities. These include power and telephone.

D. Increments of Phased Construction

The deep well pump and 0.50 MG tank will be installed as a single construction increment to comply with subdivision requirements. Future construction increments have not been planned but are expected to occur on an as-needed basis.

XI. FINANCING

The project will be funded by Kohala Ranch Water Company (KRWCo). KRWCo is wholly owned by Kohala Joint Venture (KJV). The water system will be privately owned, operated and maintained by KRWCo.
E. Waste Disposal

The chlorination system will not generate any waste.

F. Operation and Maintenance

The operation of the system is almost entirely automatic. The gas feed is vacuum actuated with automatic switchover when one cylinder is emptied. Maintenance of the system will include regular replacement of the chlorine cylinders and inspection of the system components.

VIII. PUMPING FACILITIES

A. Purpose of Service

The system will provide high quality water at appropriate pressure throughout the development. Well pumps, booster pumps, storage tanks, and pipelines have been designed to accomplish this.

B. Pump Layout and Sizing of Force Main

Well 6649–01 will be outfitted with 700 GPM submersible pump. The pump will lift water into the 500,000–gallon Tank No. 4A through an 8–inch pipeline.

C. Design Flow Requirements and Effects of Storage

The well pump has been designed to provide a maximum supply of 1,000,000 gallons per day. Storage tanks will provide the difference between this source inflow rate and variable use in the distribution system.

D. Liquid Characteristics

The system will be used exclusively for the transmission and distribution of potable water.

E. Electric Power

Electric power for the well pump will be provided by HELCO.

F. Pumping Arrangement

Kohala Ranch Well No. 3 will pump into the proposed 0.5 MG tank. Level sensors in the tank will start and stop the pump automatically.

G. Pump Selection

The well pump will be a multi-stage submersible vertical turbine. The Appendix contains specific pump and motor data.

H. Proposed Buildings and Structures

One additional storage tank proposed for the water system. It will be located next to Well No. 3 and designated Tank 4A.
D. **Slope of Water Table**

In general, a slope of 2 to 3 feet per mile prevails for the regional basal aquifer. No gradient is available for the higher level groundwater body tapped by Well No. 3.

E. **Potential Flooding and Earthquake Risk**

Flooding problems are not anticipated anywhere along the system. Potential seismic activity will be taken into account in the design of all structures.

F. **Quality and Quantity of Source Water During Normal and Stress Periods**

Virtually no effects on the quality and quantity of the source water are expected during normal and drought periods as long as pumping rates are kept comfortably below the sustainable groundwater yield. Choices of pump capacities are made with this in mind.

G. **Potential Sources of Contamination**

As stated in Section V.e, the potential sources of contamination are remote and not expected to influence the quality of the well water.

H. **Summary**

The absence of development in the primary recharge area of the Kohala Mountains and the depth to the water table make contamination of the source water highly unlikely. In addition, provisions for chlorination will be an integral part of the water system to insure a safe potable water supply.

VII. **PROPOSED TREATMENT WORKS**

A. **Description**

The only treatment apparatus for the water system will be a chlorinator unit. The unit will be a chlorine gas type utilizing direct solution feed. Two chlorine gas cylinders will be used with an automatic switchover control unit. The selected unit will be an Advance Model 201C5 Automatic Switchover Chlorinator System.

B. **Site**

The chlorinator will be located at the site of Well 6649-01 which is adjacent to proposed Tank No. 4A. Chlorination will occur on the influent line to the tank.

C. **Plant Modifications**

The chlorinator unit will be designed for the 700 GPM (1 MGD) capacity of the well pump. Although the unit is capable of handling up to 2800 GPM, there are no plans at present to increase the pumping capacity beyond 700 GPM.

D. **Basis of Design**

The chlorinator unit is designed to achieve up to 3.0 ppm in the source water. This translates to a rate of up to 25 pounds per day for a 1 MGD flow. Two 150-pound chlorine gas cylinders with automatic switchover will be utilized. The system will allow continuous chlorination even during replacement of the empty cylinder.
C. Water Quality Data on Existing Wells in the Area

Data from the Kohala Ranch Wells (6549–01 and 6549–02) indicate that the groundwater is a high quality source with a chloride level of about 80 mg/l. Private irrigation wells at lower elevations within Kohala Estates produce groundwater with higher chlorides concentrations. The only other wells in the area are two exploratory wells drilled near Kawaihae and close to the shoreline. These produced brackish water with chlorides ranging from 1000 to 2500 mg/l.

Laboratory analyses of all three KRWCo potable wells can be found in the Appendix of this report. All the wells meet DOH water quality criteria.

D. Land Use Classification for the Surrounding Area

Almost the entire surrounding area is designated Agricultural under the State Land Use classification. A narrow tract of land between the coast and an area just above the Akoni Pule Highway is designated Urban.

E. Potential Sources of Contamination in Recharge Area

Potential sources of groundwater contamination from the recharge area near the summit of Kohala Mountain are virtually non-existent. This recharge area is used for pasture or is forest watershed. There is no development in this area. Contamination due to runoff from the existing Waimea–Kohala Road is highly unlikely. Contamination from residential cesspools within the proposed Kohala Ranch lots poses only a minimal threat due to the low density of development (one residence on each 3– to 20–acre parcel) and the depth to the groundwater table. In addition, cesspools and stormwater dry wells will not be permitted within 1500 feet of each potable well to minimize the possibility of direct seepage into one of the well columns.

F. Approximate Groundwater Contours

The substantial difference in water level at Well No. 3 as compared to KRWCo's first two wells and the private wells at lower elevations suggests a hydrologic discontinuity separates Well No. 3 from the regional basal lens.

VI. SOURCES OF WATER SUPPLY

A. Soil Stratum Overlying the Water Source

The upper soil layers are typically a few inches to 3 to 4 feet thick overlying layers of lava flows from Kohala volcano.

B. Probability of Surface Drainage and Contamination of Source

No surface drainage problems are anticipated. The design of the water facilities will accommodate local surface runoff. Since the depth to the groundwater table is approximately 1700 feet at Well No. 3, the possibility of contamination is extremely remote.

C. Summary of Wells in Use and/or Abandoned

The first two KRWCo wells supply the KRWCo system. Well No. 3 will be added to this system as a new source. The private wells at lower elevations in Kohala Estates have non-potable uses at relatively modest pumping rates.
<table>
<thead>
<tr>
<th></th>
<th>Kohala Well No. 1</th>
<th>Kohala Well No. 2</th>
<th>Kohala Well No. 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Well Number</td>
<td>6549-01</td>
<td>6549-02</td>
<td>6649-01</td>
</tr>
<tr>
<td>Well Name</td>
<td>Kohala</td>
<td>Kohala</td>
<td>Kohala</td>
</tr>
<tr>
<td>Ground Elevation (FT)</td>
<td>1459.9</td>
<td>1449.0</td>
<td>1840</td>
</tr>
<tr>
<td>Nominal Casing Diameter (IN)</td>
<td>12</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Total Well Depth (FT)</td>
<td>1550</td>
<td>1560</td>
<td>1920</td>
</tr>
<tr>
<td>Length of Solid Casing (FT)</td>
<td>1430</td>
<td>1460</td>
<td>1705</td>
</tr>
<tr>
<td>Length of Perforated Casing (FT)</td>
<td>120</td>
<td>100</td>
<td>200</td>
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<tr>
<td>Length of Open Hole Below Casing (FT)</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Elevation of Bottom of Hole (FT-MSL)</td>
<td>-90</td>
<td>-111</td>
<td>-80</td>
</tr>
<tr>
<td>Still Water Level (FT-MSL)</td>
<td>7</td>
<td>7</td>
<td>±145</td>
</tr>
<tr>
<td>Representative Chloride Content (MGL)</td>
<td>80</td>
<td>80</td>
<td>35</td>
</tr>
<tr>
<td>Pump Test Flow Rate and Drawdown (FT @ GPM)</td>
<td>5.7 @ 700</td>
<td>Not Available</td>
<td>3.6 @ 1200</td>
</tr>
</tbody>
</table>
F. **Environmental and Economic Impact**

Construction and operation of the water system will create only minimal impacts on the natural environment. Construction activities will be limited to small areas along the distribution pipeline, at well sites, and at the storage tanks. All construction will be in accordance with building and grading requirements of the County of Hawaii.

V. **POTENTIAL SOURCES OF CONTAMINATION**

A. **Well Site Description**

1. **Coordinates of Well 6649-01 in Kohala Ranch are:**
   
   - Latitude: 20° 06' 04"
   - Longitude: 155° 49' 08"

2. **Topography and Land Surface Elevation.** The well is located 3.4 miles from the shoreline at elevation 1840 feet. Ground slope in the vicinity of the well ranges from 8 to 12 percent.

3. **Size and Topography of Catchment Area.** There is virtually no surface catchment of water for facilities of the system. The primary recharge area for the wells is in the summit area of the West Kohala Mountains above 3000-foot elevation.

4. **Summary of Soil and Substrata.** There are three general classifications of soil in the corridor of the water system. The first soil type extends from the coast roughly 2.3 miles inland to about 1200 feet. The soil is classified as "Kawaihae very rocky, very fine sandy loam, 6 to 12 percent slopes" (Reference b, page 26). The second soil type extends to about 2700 feet and is classified as "Puu Pa extremely stony, very fine sandy loam, 6 to 20 percent slopes" (Reference b, pages 50-51). The third soil type extends to the 3200-foot level near the Waimea-Kohala Road and is classified as "Waimea very fine sandy loam, 6 to 12 percent slopes" (Reference b, pages 53-54). All three soils vary from a few inches to 3 or 4 feet deep. Lava rock lies beneath the soil strata and also outcrops in numerous areas.

5. **Well and Groundwater Depths.** KRWCo's first well (6549-01) is located at elevation 1460 feet and extends 1550 feet below ground surface to -90 feet (msl). The groundwater stands about six feet above mean sea level. The second well (6549-02) is located about 250 feet to the northwest of the first well and extends 1560 feet below ground to -110 feet (msl). Kohala Ranch Well No. 3 (State No. 6649-01) is located at elevation 1840 feet and extends 1920 feet below ground to -80 feet (msl). The groundwater stands 145 to 150 feet above mean sea level. Well and groundwater data are summarized in Table 2.

B. **Design Well Draft**

The pump for Kohala Ranch Well No. 3 has been sized to deliver 700 GPM into the adjacent storage tank.
I. Water Rights and Future Uses by Others

The water system is being developed to serve the Kohala Ranch project and other, nearby parcels. The system will be added to incrementally meet increases in water use but it is expected that all the supply wells will be located on Kohala Ranch property.

IV. EXTENT OF THE WATERWORKS SYSTEM

A. Description of the Area to be Served

The water system’s service area includes Kohala Estates subdivision, the Kohala Ranch project, Kahua Ranch, and other, nearby parcels makai of Akoni Pule Highway.

B. Land Use, Population, Existing and Future Water Demand

The land use in the Kohala Ranch project area is agricultural under State land use and County zoning classifications. Kohala Estates subdivision consists of 45 ag-subdivision lots. Kahua Ranch settlement is comprised of 50 residences. Full build-out of the service area could ultimately require a supply of 2 to 3 MGD.

C. Provisions for Extending the System

The water system will be added to incrementally as new areas of Kohala Ranch are developed.

D. Fire Protection and Pressure Requirements

The proposed Kohala Ranch subdivision consists of agricultural lots which range from 3 to 20 acres. The Hawaii County Department of Water Supply standards have no fire flow requirements for agricultural subdivisions with lots greater than one acre in size. However, County Ordinance 866 regarding Kohala Ranch requires a fire protection system to be incorporated into the water system. The intent is to provide protection against small, localized fires. Fire standpipes will be spaced 1000 to 1500 feet apart. The system has been designed to provide a fire flow of 500 GPM for one hour. The minimum residual pressure at any standpipe will be 20 pounds per square inch (psi) during coincident maximum day flowrates throughout the system.

E. Alternate Solutions Considered

Two water supply alternatives were considered for the Kohala Ranch subdivision. The first would pump water from the County Water system in Kawaihae to the Kohala Ranch development. However, supply available in Kawaihae is not adequate and will not be in the foreseeable future.

The second alternative would follow a plan put forward by the State Department of Land and Natural Resources, Division of Water and Land Development (DOWALD) in 1969. Kehena ditch near the summit of the Kohala Mountain was to be the source of supply. Its water was to be conveyed 2.5 miles from the ditch to a proposed 60–million gallon reservoir located just south of the North–South Kohala boundary line and above the Kohala Ranch project area. The water would have been treated at a filter plant and transmitted 5.5 miles down to the coastal area. Some initial work on the system was begun in the early 1970s but was never been completed. Subsequent development on KRWCo’s first two wells provided a more practical alternative; higher quality water could be obtained from a more reliable source at far less initial construction cost.
Figure 4
Well Water Level and Chloride Concentration in Relation to Distance From the Shoreline
Table 1
Available Data From Wells in Kohala Estates and Kohala Ranch

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Owner</th>
<th>Ground Elevation (Feet)</th>
<th>Distance From Shoreline (Feet)</th>
<th>Elevation at Well Bottom (Feet msl)</th>
<th>Static Water Level (Feet msl)</th>
<th>Chloride Concentration (MGL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6451-02</td>
<td>Kawamata</td>
<td>238</td>
<td>1950</td>
<td>-7.4</td>
<td>2.6</td>
<td>1250</td>
</tr>
<tr>
<td>6451-03</td>
<td>Kawamata</td>
<td>397</td>
<td>3250</td>
<td>-8.3</td>
<td>6.7</td>
<td>700</td>
</tr>
<tr>
<td>6450-01</td>
<td>Place</td>
<td>400±</td>
<td>3650</td>
<td>-15±</td>
<td>Not Available</td>
<td>1260 to 1560</td>
</tr>
<tr>
<td>6550-01</td>
<td>Sherrod</td>
<td>675</td>
<td>7000</td>
<td>-25.4</td>
<td>3.7</td>
<td>245</td>
</tr>
<tr>
<td>6450-02</td>
<td>Walsh</td>
<td>750 to 800</td>
<td>7650</td>
<td>Not Available</td>
<td>3.3±</td>
<td>150 to 180</td>
</tr>
<tr>
<td>6549-01</td>
<td>KFWC</td>
<td>1459.9</td>
<td>13,900</td>
<td>-111</td>
<td>5.2 - 6.5</td>
<td>80</td>
</tr>
<tr>
<td>6549-02</td>
<td>KFWC</td>
<td>1449.0</td>
<td>13,900</td>
<td>-111</td>
<td>Not Available</td>
<td>80</td>
</tr>
</tbody>
</table>
C. **Topography**

Ground slopes range from 6 to 12 percent in the lower coastal area and 12 to 16 percent at higher elevations. The water system's service area ranges from elevation 120 feet at Akoni Pule Highway near the coast to 3200 feet along the Waimea-Kohala Road.

D. **Geology and Foundation Conditions**

Soil in the project area is a few inches to 3 or 4 feet deep and is underlain by basaltic flow lavas which outcrop in several areas. Drilling logs for the two Kohala Ranch wells show that the lava flows exist continually to below sea level.

E. **Earthquake Considerations and Design Parameters**

The Island of Hawaii is considered the most active seismic area in the State and is classified as Seismic Zone 3 (Reference a, page 146). Seismic activity has been taken into consideration in the design of all structures.

F. **Groundwater Conditions**

Information on groundwater comes from the several wells that have been drilled in the near vicinity. Five private water wells have been drilled on various Kohala Estates lots (see Figure 3). Groundwater at these locations occurs as a thin basal lens in hydraulic contact with underlying saltwater and there is a definite salinity response to pumping rates in these wells.

The first two KRWCo wells are located further inland than the private wells but their water levels and chloride content generally fit within the expectations of a regional basal lens (Table 1 and Figure 4). Due to the wells' distance from contaminating seawater salts, the quality of their water is potable.

Results from Kohala Ranch Well No. 3 show that a hydrologic discontinuity separates the groundwater body it taps from the regional basal lens. The water level is 145 to 150 feet above sea level (compared to the 6-foot level at the first two KRWCo wells) and chloride concentrations, at 35 milligrams per liter, are also less. The geologic feature creating the discontinuity is not known, but geophysical investigations are being undertaken to try to map and identify it.

G. **Flooding Problems Including Tsunami Inundation Zones**

No flooding problems are anticipated along the water system. Tsunami inundation is highly unlikely as the lowest elevation near the coast is along Akoni Pule Highway and it is more than 120 feet above sea level.

H. **Conformance With Local Land Use Planning and Zoning Regulations**

The water system will be located on land designated as Agricultural under the State Land Use classification. County zoning is Agriculture (A-20a, A-10a, A-5a, and A-3a) with a small portion classified as Unplanned. Pipelines, storage tanks, and related water system facilities are permitted under these land use and zoning regulations.
Figure 2

A Ranch Water System

Existent Koi Subdi

PRV Elev. 195

PRV Elev. 435

PRV Elev. 600

PRV Elev. 2640

PRV Elev. 2900

RESV No. 7
50,000 Gall.
Elev. 2940
200 GPM Pump Station

RESV No. 6
50,000 Gall.
Elev. 2560
200 GPM Pump Station

Exist. Kahua Ranch Resv
100,000 Gall.
Elev. 3420

35 GPM Pump Station
Elev. 3160

6" Gravity Line

500:1000

Feet

Scale

TRUE NORTH
Existing Facilities:

- The two existing wells are outfitted with Johnston line shaft turbine pumps, each with 700-gallon per minute (GPM) capacity. The depth to groundwater is approximately 1450 feet in both wells.

- There are six storage tanks. Five are located along the main road through Kohala Ranch subdivision and the sixth is located about 500 feet above the Waimea–Kohala Road (see Figure 2).

- The storage tanks establish primary service pressure zones. PRV stations delineate subzone within these primary zones.

- The uppermost tank provides water to the Kahua Ranch settlement through a pump station and 7000-foot, four-inch pipeline (see Figure 2).

Future Improvements:

- The third potable well, the subject of this report, has been drilled and tested. This well will be outfitted with a one-million gallon per day (MGD) pump.

- A 0.5-MG tank will be constructed adjacent to Well No. 3.

- Other wells, tanks, and pipelines will be added on an as-needed basis in the future.

B. Owner and Operator of the System

Costs to outfit the wells, construct the storage tanks and install pipelines and appurtenances will be borne by Kohala Ranch Water Company (KRWCo). This company is wholly owned by Kohala Joint Venture (KJV), the developers of the Kohala Ranch project, and is regulated by the PUC. The system will be owned, operated, and maintained by KRWCo.

III. PHYSICAL AND HYDROLOGICAL CHARACTERISTICS OF THE AREA

A. Location

The water system is within the Kohala Ranch project area in North Kohala. The project area borders Akoni Pule Highway on its makai (west) side and a small portion borders the Waimea–Kohala Road on the mauka (east) side. Its southern boundary coincides with the North and South Kohala District boundary.

B. Climate

The climate in the project area is generally warm and dry. Mean temperature ranges from approximately 68° to 77° F. Annual rainfall is typically 10 to 20 inches near the coast. At elevations of 1000 to 3000 feet, rainfall averages between 20 to 40 inches a year.
I. INTRODUCTION

This report is prepared pursuant to Chapter 20 of Title 11, Administrative Rules of the Department of Health which requires submittal of plans and supporting data to the State Department of Health when a new source of water supply is added as a public water system.* The format of this report follows the "Guidelines for Preparation of Preliminary Engineering Reports for New Potable Water Sources," Drinking Water Program of the State Department of Health in April 1981. The information it contains has been gathered from the reports and documents listed below, preliminary design of the water system, and results of drilling and pump testing the new well.


G. "Summary Results and Initial Interpretations of Kohala Ranch Well No. 3", letter of April 16, 1990 from Tom Nance to Harry Otsuji.

II. GENERAL INFORMATION

A. Project Description

Kohala Ranch Well No. 3 (6649–01) has been constructed as an additional source for the Kohala Ranch Water System. The system is located in North Kohala adjacent to the North–South Kohala District Boundary Line (see Figure 1). The water system serves the Kohala Ranch project, Kohala Estates subdivision, and Kahua Ranch settlement. The existing system includes the first two Kohala Ranch Wells (6549–01 and 6549–02), storage tanks, and transmission and distribution pipelines.

Kohala Ranch subdivision is being developed in phases. Most of the water system was built in the first and second phases which are now complete. Incremental additions will be made in the subsequent phases. Details of the water system are as follows:

* The use of "public water system" in this instance is as defined in the National Interim Primary Drinking Water Regulations and regulations of the State Department of Health. However, ownership and operation of the system will be private.
Engineering Report
Kohala Ranch Well No. 3
New Potable Water Source
Kohala Ranch Water System
North Kohala, Hawaii

Submittal to
Hawaii State Department of Health
Drinking Water Program

Prepared by
Tom Nance Water Resources Engineering

On Behalf of
Kohala Ranch Water Company

May 1990
COMMISSION ON WATER RESOURCE MANAGEMENT
ROUTE SLIP FOR NEW APPLICATIONS

FROM: RYAN
DATE: 13-Jun-06
SUSPENSE DATE: 20-Jun-06

TO: CHING, F.
INIT: 4
TO: NAKAMA, L.
INIT: 1
FOR: Approval

TO: FUJI, N.
INIT: 5
TO: NAKANO, D.
INIT: 1
FOR: Signature

TO: GOODING, K.
INIT: 6
TO: OHYE, M.
INIT: 1
FOR: Information

TO: HARDY, R.
INIT: 7
TO: SAKODA, E.
INIT: 1
FOR: Information

TO: HIGA, D.
INIT: 8
TO: SWANSON, S.
INIT: 1
FOR: Information

TO: HOAGBIN, S.
INIT: 9
TO: UYENO, D.
INIT: 1
FOR: Information

TO: ICE, C.
INIT: 10
TO: YODA, K.
INIT: 1
FOR: Information

TO: IMATA, R.
INIT: 11
TO: YOSHINAGA, M.
INIT: 1
FOR: Information

PLEASE:

See Me
1
Review & Comment
1
Take Action

Type Draft acknow letter
2
Type Final w NEC, signat., label file folder

File
4
Xerox
copies

WELL NUMBER 6649-01
WELL NAME Kohala Ranch 3

☐ WELL CONSTRUCTION
☒ PUMP INSTALLATION
☐ BOTH

ATTACHMENTS FOR APPLICATION PROCESSING - Both applicant & staff generated
1 TRANS. LETTER
2 PERMIT PROCESS TABLE
3 CWRM MAP
4 APPL. FORM (11 COPIES)
5 USGS MAPS (11 COPIES)
6 TAP MAPS (11 COPIES)
7 PARCEL OWNER VERIF.
8 CONTRACTOR VERIF.
9 ALL INFO FILLED IN
10 BACKGROUND CHECK
11 $25 FEE DEPOSIT SLIP
12 DHPC/CDUP/SMA pre-screen

MLS PRINTOUT
DCCA LICENSE SCREEN PRINTOUT
(SMA map printout http://gis.hicentral.com/website/parce/zoning/viewer.htm, or INGRID'S SMA/CD MAP)
(LUC map printout http://luc.state.hi.us/luc_maps.htm, or INGRID'S SMA/CD MAP)

FOLDER:
☐ MADE NEW FILE FOLDER, ATTACHED
☒ FILE FOLDER ALREADY MADE, IN FILE CABINET

INCOMPLETE ACTION DATES:

DATE ACTION

parcel number changed from WCP! Who was driller?
called Dan Babalis & Sheldon Taus Cals

Answer re: 21, 22, 23 = 0/10/06

accept date

not cors,
not sma.

driller has not signed
yet, so not official
accept date.
June 26, 2006

Mr. Dan Bowles
Kohala Ranch Water Company
59-916 Kohala Ranch Road
Kamuela, HI 96743

Dear Mr. Bowles:

Pump Installation Permit Application for Well No. 6649-01

We have received your Pump Installation permit application and filing fee for the Kohala Ranch 3 Well (Well No. 6649-01). However, applications for permits are required to be made by a contractor with a valid and active C-57, C-57a, or A license and who will perform the work, in accordance with the State Water Code, §174C-84(a). Because you have not identified a qualifying contractor, your application will not be accepted as complete until a qualifying contractor signs and completes sections 24 & 25 on the application form. However, we will process your incomplete application for review, and if the review warrants the issuance of a permit, a letter of assurance will be issued in lieu of the permit. The letter of assurance will indicate that a permit will be issued when the contractor signs the application, and the following conditions are met: a) the contractor has no outstanding issues with the Commission; b) there have been no significant changes to the application; c) there have been no significant changes to applicable laws, rules, regulations; d) there have been no significant changes to hydrologic conditions.

For your information, the attached table describes the process, responsible parties, and deadline requirements for drilling or modifying a well and installing, modifying, or replacing a pump.

By this letter, we are also notifying the well operator/landowner that water may not be pumped for purposes other than testing until the certificate of pump installation completion letter is issued to the well operator and landowner. Additionally, the permitted pump capacity described on the pump installation permit may be reduced in the event that the pump test does not support the capacity. No certificate of pump installation will be issued until the Commission has determined that the pump capacity will not have adverse effects on the aquifer, other nearby wells, or streams. In other words, you may need to remove the pump and install a smaller pump at the Commission’s discretion before you can withdraw water for purposes other than testing.

If you have any questions about your permit application, please contact Ryan Imata of the Commission staff at 587-0255 or toll-free at 974-4000 (Hawaii), 274-3141 (Kauai), 984-2400 (Maui), or 1-800-468-4644 (Lanai & Molokai), extension 70255.

Sincerely,

DEAN A. NAKANO
Acting Deputy Director

RI:ss
Attachment
June 26, 2006

TO: Honorable Chiyome L. Fukino, M.D., Director
Department of Health
Attention: Director’s Office
Harold Yee, Wastewater Branch
Acting Branch Chief, Safe Drinking Water Branch
Alec Wong, Clean Water Branch

FROM: Peter T. Young, Chairperson
Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
Kohala Ranch 3 Well (Well No. 6649-01)

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by August 4, 2006. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255.

REQUEST:
Attachment(s)

RESPONSE:
[ ] This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

[ ] This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

[ ] If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

[ ] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

[ ] For the applicant’s information, a source of possible wastewater contamination is not located near the proposed well site (information attached).

[ ] An NPDES permit is required.

[ ] Other relevant DOH rules/regulations, information, or recommendations are attached.

[ ] In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

[ ] No comments/objections

Contact Person: _____________________________ Phone: _____________________________
Signed: ___________________________ Date: ___________________________
June 26, 2006

TO: Russell Tsuji, Administrator
    Land Division

FROM: Dean A. Nakano, Acting Deputy Director
      Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
         Kohala Ranch 3 Well (Well No. 6649-01) TMK 5-9-010: 061

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by August 4, 2006. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255.

RI: ss
Attachment(s)

RESPONSE:

[ ] A water lease/permit is required of this applicant and an application for such will be requested by our division.

[ ] A water lease/permit is not required of this applicant.

[ ] A water lease/permit has been obtained by the applicant through lease no. __________________________.

[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments:

Contact Person: ___________________________ Phone: ____________

Signed: ___________________________ Date: ____________
June 26, 2006

TO: Melanie Chinan, Administrator
    Historic Preservation

FROM: Dean A. Nakano, Acting Deputy Director
    Commission on Water Resource Management

SUBJECT: Pump Installation Permit Application
    Kohala Ranch 3 Well (Well No. 6649-01) TMK: 5-9-010: 061

Transmitted for your review and comment is a copy of the captioned Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by August 4, 2006. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255. If you require additional information regarding specific information that can be provided by the applicant, please contact the applicant directly at the contact information provided on the application form.

RI:ss
Attachment(s)

RESPONSE:

[ ] This is a [ ] public (county or state) project [ ] private project and [ ] will [ ] may disturb historic sites.

[ ] We concur that the work described under this permit will not disturb historic sites.

[ ] We do not concur that the work described under this permit will not disturb historic sites. We require the following for our concurrence:

Contact Person: _______________________________ Phone: ___________________ 

Signed: _______________________________ Date: ___________________
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<th>Bds</th>
<th>Bths</th>
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This information has been supplied by third parties and has not been independently verified by Hawaii Information Service and is, therefore, not guaranteed.
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<td>TOTAL</td>
<td>$25.00</td>
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</tbody>
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REMARKS: LINE (1) Kohala Ranch Well #3  
LINE (2)  
LINE (3)  
LINE (4)  
LINE (5)  
LINE (6)  
LINE (7)  
LINE (8)  
LINE (9)  
LINE (10)
To: Commission on Water Resource Management  
Department of Land and Natural Resources  
State of Hawaii  
P.O. Box 621  
Honolulu, Hawaii 96809

Attention: Mr. Ryan Imata

Project: Kohala Ranch Well No. 3  
TMK: 5-9-10:061  
A&A Job No.: KRWC05-01

Subject: Pump Installation Permit

We are sending you herewith:

<table>
<thead>
<tr>
<th>No. of copies</th>
<th>Description</th>
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</thead>
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<tr>
<td>10</td>
<td>Application for a Pump Installation Permit</td>
</tr>
<tr>
<td>1</td>
<td>Check ($25.00) Filing Fee</td>
</tr>
</tbody>
</table>

For:  

- Action
- Use

Remarks:

We submit the attached application for a Pump Installation Permit and Filing Fee on behalf of Kohala Ranch Water Company for processing.

Please call the undersigned if you have questions.

Very truly yours,

Sheldon T. Yamasato

cc. S. Yamasato; w/o attach; Bill Moore, Kohala Ranch Water Company  
DLNR_060506.doc

Transmittal Form
STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
APPLICATION FOR A WELL CONSTRUCTION / PUMP INSTALLATION PERMIT

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. Application must be accompanied by 10 copies and a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 808-643-0625. For further information and updates to this application form, visit http://www.hawaii.gov/dlnr/wrm.

WELL LOCATION INFORMATION
1. STATE WELL NO. (If already assigned) 6649-01
2. WELL NAME KOHALA RANCH WELL NO. 3
3. ISLAND HAWAII
4. TMK 9 - 10 - 61
5. 6. WELL OPERATOR'S NAME/COMPANY
KOHALA RANCH WATER CO.
Well Operator's Contact DAN BOWLES
7. LANDOWNER'S NAME/COMPANY
KOHALA RANCH WATER CO.
Landowner's Contact WILLIAM L. MOORE
9. Is this well part of a battery of wells? ☐ Yes ☐ No

PROPOSED WELL CONSTRUCTION
7. Proposed Work
☐ Construct New Well
☐ Modify Existing Well
☐ Abandon/Seal Well
8. Construction Type
☐ Drilled
☐ Daughter
☐ Shaft
☐ Tunnel
10. Proposed Work
☐ Replace Pump
XX Install New Pump

PROPOSED PUMP INSTALLATION
11. Proposed Pumping Rate, gpm
(50 gallons per minute) 700
12. Proposed Amount of Withdrawal, gpd (gallons per day) 1,000,000
13. Method of Flow measurement
☐ Flowmeter
☐ Open Pipe
☐ Vair
☐ Orifice
☐ Other (explain)

OTHER LEGAL REQUIREMENTS
If required, items 21. and 22. must be obtained before the Commission can legally issue a permit:
21. Conservation District Use Permit (CDUP)
☐ Required, CDUP # , date approved
☐ Not Required (attach documentation from OCCI)
☐ I have not checked with OCCI about whether or not a CDUP is required. I understand that checking with OCCI prior to making this application will expedite my review. I further understand that issues raised by this agency may delay or result in denial of the permit issuance, or revocation of the permit after it is issued.
22. Special Management Area Permit (SMAP)
☐ Required, SMA # , date approved
☐ Not Required (attach documentation from applicable County agency)
☐ I have not checked with the county about whether or not an SMA Permit is required. I understand that checking with the County prior to making this application will expedite my review. I further understand that issues raised by this agency may delay or result in denial of the permit issuance, or revocation of the permit after it is issued.
23. Historic Preservation Division (HPD) of the Department of Land and Natural Resources
☐ I have consulted with the HPD regarding potential impacts of well construction activities on historic sites. I have attached applicable documentation from the HPD.
☐ I have not consulted with the HPD regarding potential impacts of well construction activities on historic sites. I understand that checking with the HPD prior to making this application will expedite my review. I further understand that issues raised by this agency may delay or result in denial of the permit issuance, or revocation of the permit after it is issued. Additionally, the history of past land use is attached.

Additional remarks, explanations, etc. (attach additional sheet if more space is needed)

NOTE: Signing below indicates that the signatories understand and swear that the information provided is accurate and true to the best of their knowledge. Further, the signatories understand that upon permit approval: 1) the proposed work is to be completed within two (2) years of the approval date; 2) the contractor shall submit to the Commission a well completion/abandonment report within 60 days after the completion date of the permitted work; 3) in the event the application is not completed correctly, any permit may be suspended until the item is brought in to compliance, and any work done while the permit is in suspension may result in fines of up to $5000/day.

24. WELL DRILLER (Must be filled out if application is for Well Construction)
Licensee business name C-57 License No.
Signature Print Date
Address Phone Fax E-mail

25. PUMP INSTALLER (Must be filled out if application is for Pump Installation)
To be Determined
Licensee business name C-57/C-57a/A License No.
Signature Print Date
Address Phone Fax E-mail

WCPI Application Form 05/12/2005
PROPOSED WELL SECTION (Please attach schematic if different from diagram provided below)

Elevation at top of casing: 1343 ft, msl
Hole Diameter: 24 in.

Cement Grout: 600 ft
(min. 70% of distance from ground elevation to top of water surface or 500 ft, whichever is less.)

Annular space between hole and casing if 5° for positive displacement, 3° for other methods:
2 5/8 in.

Rock or Gravel Packing:

1095 ft
Material:
X Crushed Basalt
□ Rounded Gravel

Estimated Water Level Elevation:
146 ft, msl

Solid Casing: (2.90% x (Ground Elev.-Water Level Elev.))
Total Length: 1705 ft
Nominal Diameter: 18.75 in.
Wall Thickness: 3/8 in.
Bottom Elevation: 135 ft, msl

Open Casing: □ Perforated □ Screen
Total Length: 200 ft
Nominal Diameter: 23\textsuperscript{n in.
Wall Thickness: 3/8 in.
Bottom Elevation: -65 ft, msl

note: Neither bentonite nor mud should be used in saturated zone during drilling

Open Hole:
Length: 15 ft
Diameter: 24 in.
Bottom Elevation: -60 ft, msl

* The approximate elevation must be referenced to mean sea level (msl) at the time of application filing. Final elevations of well components shall be submitted in the Well Completion/Well Abandonment reports and referenced to a benchmark which has been established by a surveyor licensed by the State.

For non-salt water Basalt Wells - bottom elevation of well should not be deeper than 1/4 of aquifer thickness or,
Bottom Elevation of Well Limit = \left( \frac{\text{Water Elevation} - \text{Estimated Water Level Elevation}}{4} \right)

Example: Estimated + 2 ft, Water Level Elev. → Bottom Elevation of Well Limit = \left( \frac{2 - \text{Estimated Water Level Elevation}}{4} \right) = -18.5 ft.

Solid Casing Material:
Carbon Steel: compliant with (check one or more):
□ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM A139
And compliant with (check one or more):
□ ASTM A242 (or A606) □ Type E □ Type S □ Grade B □ Other

Stainless Steel: (check one):
□ ASTM A409 (production welds) □ ASTM A312 (monitor welds)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80
PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one):
□ Schedule 40 □ Schedule 80 □ Schedule 120

Thermoset Plastic: (check one):
□ Filament Wound Resin Pipe conforming to ASTM D2996
□ Centrifugally Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:
Carbon Steel: compliant with (check one or more):
□ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM A139
And compliant with (check one or more):
□ ASTM A242 (or A606) □ Type E □ Type S □ Grade B □ Other

Stainless Steel: (check one):
□ ASTM A409 (production welds) □ ASTM A312 (monitor welds)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80
PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one):
□ Schedule 40 □ Schedule 80 □ Schedule 120

Thermoset Plastic: (check one):
□ Filament Wound Resin Pipe conforming to ASTM D2996
□ Centrifugally Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296
DIVISION OF WATER RESOURCE MANAGEMENT

FROM: [Signature]

DATE: 1/15/91

FILE IN: [Signature]

TO: INITIAL:

PLEASE:

See Me
Take Action By
Route to Your Branch
Review & Comment
Draft Reply
Acknowledge Receipt
Xerox copies
File
Mail

FOR YOUR:

Approval
Signature
Information

M. TAGOMORI
S. Kokubun
5278 Makalena Street
Honolulu, HI 96821
January 11, 1991

Dear Mr. Iwamoto,

In reply to your question about the use of potable well water for irrigation at your proposed Kohala Ranch Golf Course and Development, I have discussed the matter with Mr. Manabu Tagomori of the State Land and Natural Resources and State Water Commission. According to Mr. Tagomori, you will need to apply for and obtain a permit to drill a well (one or more) in accordance with the State Water Code. The permit application will need to specify the location, proposed depth, diameter, construction details, pumping rate, and proposed use of the water. The State will review the application and if it meets with the Commission's standards, a permit for the well will be issued. The County is not involved in the well drilling permit.

The State will probably encourage (not mandatory at this time) the use of brackish water for irrigation. The State will not control the use and quantity of potable groundwater unless the aquifer is in danger of being overdeveloped, at which time the State will designate the aquifer as a "water management area" for regulation under the State Water Code. At present, the State has no intention of designating the Kohala aquifer as being endangered, now or in the immediate future.

If you have any questions, feel free to call on me.

Very truly yours,

Francis K. I. Mau

cc: M. Tagomori
DESCRIPTION

Date of report: July 2, 1990
Person filing report: Kathy Watanabe

A. OWNER: Kohala Joint Venture
WELL NAME: Kohala Ranch Well No. 30 JUL 16.
LOCATION: North Kohala District, Hawaii

B. GENERAL LOCATION: Water Resources International, Inc.

C. DRILLING COMPANY: North Kohala District.

D. TYPE OF RIG: Rotary

E. ELEVATION, msl: Top of drilling platform: 1852 ft. Bench mark and method used to determine
Height of drilling platform above ground surface: 12 ft. elevation.

F. HOLE SIZE: 24 inch dia. to 1937 ft. below drilling platform.

G. CASING INSTALLED: 18 in. I.D. x 3/8 in. wall solid section to 1717 ft. below drilling platform.

H. ANNULUS: Grouted 12 ft. to 612 ft. below drilling platform.
Gravel packed 612 ft. to 1707 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: 1716 ft. below drilling platform. Date of measurement: 11/28/89.

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: March 28, 1990
   - Start water level: 1716 ft. below R. P.
   - End water level: ft. below R. P.
   - Depth of well: ft. below R. P.

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<tr>
<th>Date</th>
<th>Elapsed Time (hours)</th>
<th>Rate (gpm)</th>
<th>Draw-down (ft.)</th>
<th>CI (ppm)</th>
<th>Temp. °F</th>
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SUBSURFACE FORMATION

M. DRILLER’S LOG:

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<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
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<td>1000 to 1140</td>
<td>Dense, hard rock</td>
<td>1140 to 1260</td>
<td>Med. hard rock</td>
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<tr>
<td>40 to 70</td>
<td>Med. hard lava rock</td>
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<td>1260 to 1390</td>
<td>Broken aa &amp; clinker</td>
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<td>1390 to 1540</td>
<td>Med. hard lava rock</td>
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<td>100 to 130</td>
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N. REMARKS:

FOR OFFICIAL USE
Latitude: 20 06 04
Longitude: 155 49 07
Well No.: 6649-01

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

FROM: [Signature]  DATE: 6-2-90  FILE IN: __________

TO: INITIAL: ____________________________

PLEASE:  
- See Me
- Take Action By __________
- Route to Your Branch
- Review & Comment
- Draft Reply
- Acknowledge Receipt
- Xerox ______ copies
- File
- Mail
- For Information

_______ E. Sakoda
_______ D. Nakano
_______ W. Rozeboom
_______ S. Samuels
_______ E. Hirano
_______ T. Kam
_______ A. Monden
_______ H. Young
_______ D. Lee
_______ G. Miyashiro

_______ S. Kokubun
_______ L. Nanbu
_______ F. Ching
_______ L. Choo

_______ Call Bill W. — 6-19-90
_______ No objections

REMARKS: Keep copy of Request.

[Handwritten note: Check request. Need approval.
Use to determine next move.]

[Handwritten note: Rev. 1/90]
Mr. William Paty  
Chairman of the Board  
Dept. of Land & Natural Resources  
1151 Punchbowl Street  
Honolulu, HI 96813

Dear Mr. Paty:

SUBJECT: PRELIMINARY ENGINEERING REPORT FOR  
KOHALA RANCH WELL NO. 3  
WELL NO. 6649-01

Transmitted herewith for your review and comments is a copy of the  
preliminary engineering report for Well No. 6649-01, Kohala Ranch Well.  
This report has been prepared pursuant to Section 11-20-29, Chapter 20, Title  
11, Administrative Rules, Potable Water Systems.

Your review and comments are solicited as your concerns, knowledge and  
expertise in this area may assist us in determining potential impacts which  
may result by the proposed project.

Your early attention and reply to this matter will be greatly  
appreciated. Please respond by June 15, 1990 or earlier.

Please return the preliminary engineering report with your comments.

Very truly yours,

JOHN C. LEWIN, M.D.  
Director of Health

Enclosure
August 11, 1989

Kohala Joint Venture
737 Bishop Street, Suite 2775
Honolulu, Hawaii 96813

Gentlemen:

We acknowledge and approve your request to relocate Kohala Ranch Well No. 3 higher upslope to a ground elevation of 1,840 feet. The new location (see attached map) will change the well number from 6549-03 to 6649-01. All conditions of the permit issued by the Commission on Water Resource Management on July 26, 1989 remain the same.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:bm
Enc.
cc: Tom Nance
USGS
Department of Health
Drinking Water Program
Ground Water Protection Program
Hawaii Department of Water Supply
Revised Well Site

KOHALA RANCH WELL NO. 3
(6649-01)

Initial Well Site
SURVEY BRANCH

FROM: ___________________________ DATE: 8/9/89 FILE IN: ___________________________

TO: INITIAL: PLEASE: REMARKS:

--- D. LUM --- See Me
--- E. Sakoda --- Call
--- D. Nakano --- Review & Comment
--- P. Haraguchi --- Take Action
--- W. Rozeboom --- Investigate & Report
--- R. Jinnai --- Draft Reply
--- M. Ohye --- Acknowledge Receipt
--- Type Draft
--- Type Final cc: ______
--- Xerox ______ copies
--- File
--- Mail

--- D. Hamada
--- K. Oshiro
--- M. Tagomori
--- G. Matsumoto
--- G. Akita
--- L. Chang
--- S. Kokubun
--- Y. Shiroma
---
---

FOR YOUR

--- Approval
--- Signature
--- Information

Manabu:

Tom Nance sent this letter last week. Do you have the original? If not, please process this as usual and route to Ed Sakoda please.
August 1, 1989
89-1387  (853-0202)

Mr. Manabu Tagomori
Deputy Director
Commission on Water Resource Management
P. O. Box 979
Honolulu, Hawaii  96809

Dear Manabu:

Relocation of Kohala Ranch Well No. 3

At its July 1989 meeting, the State Commission on Water Resource Management granted Kohala Ranch a drilling permit for its Well No. 3. This site is designated "Initial Well No. 3 Site" on the enclosed map. After filing the drilling application, a revision of Kohala Ranch's plans has been made and it will require moving the location of the third well. This new site is higher up the mountain slope, at ground elevation 1840 feet, and is designated "Revised Well No. 3 Site" on the map.

We are hoping that the new location can be accommodated as an administrative matter and ask your concurrence on this point. Kohala Ranch is anxious to start work on the well. Going through the entire permit process again would cause severe hardship. Thank you for your consideration. I look forward to hearing from you.

Sincerely,

[Signature]

Tom Nance

TN:it

cc:  Harry Otsuji - Kohala Ranch

Enclosure
TO: DONALD

FAX NO: 548-6052

ATTENTION: Ed Sekada

FROM: Tom Price

SUBJECT: Koloa Ranch Well No 3

No. of Pages (including header): 3

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE TELEPHONE OR TELEX IMMEDIATELY.

Copy of the letter to Mardon
WELL CONSTRUCTION PERMIT

for

Kohala Ranch Well No. 3
Well No. 6549-03
North Kohala, Hawaii

TO: Kohala Joint Venture
737 Bishop Street, Ste. 2775
Honolulu, Hawaii 96813

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to construct and test Well No. 6549-03 within Tax Map Key: 5-9-10:44, for municipal use, is approved subject to the following conditions:

1. The Division of Water and Land Development (DOWALD), Geology-Hydrology Section, shall be notified at 548-7619, before any work covered by this permit commences.

2. The permit shall be for construction and testing only. No permanent pump may be installed and no water used from the well without the necessary pump installation permit from the Commission.

3. The grouted annulus shall be a minimum of from 0 to 500 ft. instead of from 0 to 200 ft. as proposed.

4. The following shall be submitted to DOWALD within 30 days after completion of the well:

   a. Well Completion Report.
   b. Elevation (referenced to mean sea level) 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 record; including time, pumping rate, drawdown, chloride content, and water quality data.
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 months of date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.

Date of Issuance

cc: USGS
Department of Health, Drinking Water Program
Ground Water Protection Program
Hawaii Department of Water Supply
Tom Nance called this a.m. re: Kohala Ranch No. 3 Well (6549-03) well construction permit appl. status. Said he spoke to you several months ago & wanted us to process the permit. I told him we would put it on the agenda for the July CWRM meeting. Ed

D. Lum

Ed
July 11, 1989

Kohala Joint Venture  
737 Bishop Street, Suite 2775  
Honolulu, Hawaii 96813

Gentlemen:

The Commission on Water Resource Management will be acting on your permit application for Kohala Ranch Well No. 2 (6549-03) at their regularly scheduled meeting on July 19, 1989, at 2:00 p.m. in Board Room 132, 1151 Punchbowl Street, Honolulu.

Your application will be included on the agenda as Item 8 (attached).

You or your representative are invited to attend the meeting.

Sincerely,

MANABU TAGONORI  
Deputy Director

ES:bm  
Enc.
June 13, 1989

Mr. William Sewake, Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Sewake:

Well Construction Permit Applications

We are sending you a copy of the following permit applications for your review and comments.

Kohala Ranch Well No. 3 (6549-03)

Please submit your comments to us, orally or in writing, within three weeks from the date of this letter.

If you have any questions, please contact Dan Lum at 548-7643.

Sincerely,

HARABU TAGOMORI
Deputy Director

ES:ko
Enc.
June 13, 1989

Mr. Hugh Y. Ono
Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Ono:

Well Construction Permit Application

We are sending you a copy of the following permit application for your review and comments.

Kohala Ranch Well No. 3 (6549-03)

Please submit your comments to us, orally or in writing, within three weeks from the date of this letter.

If you have any questions, please contact Dan Jum at 548-7643.

Sincerely,

MANABU TAGOMORI
Deputy Director

Enc.
December 9, 1988

Holt Collins & Associates
630 Ala Moana Blvd., Ste. 200
Honolulu, Hawaii 96813

Gentlemen:

This is to acknowledge receipt of your two applications for a Well Construction Permit and a Water Use Permit and accompanying $55.00 fees for each permit for Kohala Ranch Well No. 3.

We are returning the $25.00 filing fee for the Water Use Permit only. A filing fee for water use is not necessary since the proposed well is not in a ground water management area.

Our staff is reviewing the application and will call you should there be any questions.

Sincerely,

[Signature]

GABRIEL ZAGHERI
Deputy Director
DIVISION OF WATER RESOURCE MANAGEMENT

FROM: [Signature]  DATE: 14-30  FILE IN: [Blank]

TO: INITIAL: [Blank]  PLEASE: [Blank]  REMARKS: [Blank]

M. TAGOMORI [Blank]  See Me  [Blank]
D. Lum [Blank]  Take Action By [Blank]
G. Matsumoto [Blank]  Route to Your Branch  [Blank]
G. Akita [Blank]  Review & Comment  [Blank]
L. Chang [Blank]  Draft Reply [Blank]
Y. Shiroma [Blank]  Acknowledge Receipt  [Blank]

E. Sakoda [Blank]  Xerox copies [Blank]
D. Nakano [Blank]  File [Blank]
S. Miyamoto [Blank]  Mail [Blank]
S. Samuels [Blank]  For Information [Blank]
S. Matsuo [Blank]  [Blank]
H. Young [Blank]  S. Kokubun [Blank]
N. Kaneshiro [Blank]  L. Nanbu [Blank]
[Blank]  F. Ching [Blank]

[Blank]  [Blank]  [Blank]  [Blank]  [Blank]  [Blank]
Water & Land Development Division
Department of Land & Natural Resources
State of Hawaii
P. O. Box 373
Honolulu, Hawaii 96809

Attention:  Mr. Manabu Tagomori

Gentlemen:

Enclosed are applications and checks in the amount of $25.00 each for a Well Construction Permit and Groundwater Use Permit.

If you should have any questions, please do not hesitate to call us.

Very truly yours,

Paul P. Wallrabenstein, Jr., P.E.

PPW:gk

Enclosures

cc:  Harry Otsuji
APPLICATION FOR

X WELL CONSTRUCTION PERMIT

PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water Resource Management, P.O. Box 131, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Defense and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-7145, Hydrology/Geology Section for assistance.

1. WELL LOCATION

   Island Hawaii Tax Map Key 5-9-10-44
   Address Kohala Ranch, North Kohala District

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

2. WELL OWNER

   Firm Name Kohala Joint Venture
   Contact Person Mr. Harry Otsuji
   Address 737 Bishop Street, Suite 2775
             Honolulu, Hawaii 96813
   Phone 531-0505

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

   Name To Be Competitively Bid
   Address

   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 systems) □ Industrial
   □ Irrigation (specify) □ Other (specify)

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

7. PROPOSED PUMP INFORMATION

   Pump Type: □ Vertical Turbine □ Submersible 350 □ Centrifugal
   Motor: □ Diesel □ Gas □ Electric: 1,000,000 gallons per minute (gpm)
   Rated Pump Capacity 1,000,000 gallons per minute (gpm)

Well Owner (print) Mr. Harry Otsuji
Signature Date 1/29/86

Landowner (print) Mr. Harry Otsuji
Signature Date 1/29/86

For Official Use Only:

Field Checked By Latitude Hydrologic Unit
Date
Longitude State Well No. 6549-09
PROPOSED SECTION OF WELL
(All Dimensions are Approximate)

Elevation at top of casing 1452 ft., msl.

Ground Elev. 1450 ft., msl*

Cement Grout 200 ft.

Solid Casing:
Material: ASTM A53 Steel
Length: 1445 ft.
Diameter: 14 in.
Wall thickness: 0.375 in.

Hole Dia. 18 in.

Casing:  / /Perforated  / /X/Screen
Material: ASTM A53 Steel
Length: 40 ft.
Diameter: 14 in.
Wall thickness: 0.375 in.
Openings: 80 sq. in./L.F.

Total Depth 1490 ft.

Rock Packing None ft.

Open Hole:
Length: 10 Feet (Optional)
Diameter: 13 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
APPLICATION FOR WATER USE PERMIT

☐ GROUNDWATER  or  ☐ SURFACE WATER

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water Resource Management, P.O. Box 1793, Honolulu, Hawaii 96804. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 586-7341. Hydrology/Geology Section for assistance.

1. WATER MANAGEMENT AREA
   North Kohala (Kawaihae to Mahukona)

2. (a) WELL/DIVERSION OWNER:
   Firm Name: Kohala Joint Venture
   Contact Person: Mr. Harry Otsuji
   Address: 737 Bishop Street, Suite 2775
   Honolulu, HI 96813 Phone 531-0505

(b) LANDOWNER:
   Firm Name: Kohala Joint Venture
   Contact Person: Mr. Harry Otsuji
   Address: 737 Bishop Street, Suite 2775
   Honolulu, HI 96813 Phone 531-0505

3. SOURCE TYPE:
   ☐ Spring  ☐ Stream
   ☐ Dike-confined  ☐ Perched
   ☐ Caprock  ☐ Basal

4. SOURCE NAME AND NUMBER
   Will be Well No. 6549-0X in North Kohala
   (well or stream diversion name/number)

5. SOURCE LOCATION:
   Island: Hawaii  Tax Map Key: 5-9-10-44
   Address: Kohala Ranch, North Kohala District
   (Attach a USGS map (scale 1"=2000') and property tax map showing source location referenced to established property boundaries.)

6. LOCATION OF PROPOSED WATER USE (if different from #5)
   See USGS Map
   (Indicate location of water use on same map showing source location.)

7. QUANTITY OF WATER REQUESTED
   1,000,000 gallons per day

8. QUALITY OF WATER REQUESTED
   ☐ Fresh  ☐ Brackish  ☐ Salt  ☐ Potable  ☐ Non-Potable

9. PROPOSED USE
   ☐ Municipal (including hotels, stores, etc)  ☐ Military
   ☐ Domestic (individual, noncommercial water sys.)  ☐ Industrial
   ☐ Irrigation (specify)  ☐ Other (specify)

10. DESCRIBE ANY POTENTIAL RESTRICTIONS ON USE (i.e., instream standards, seasonal variations)
    Well to be incorporated into Kohala Ranch Water System.

11. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION
    As required by system demand.
    (Indicate hours of operation)

12. PROPOSED METHOD OF TAKING THE WATER
    ☐ Artesian Flow  ☐ Diverted Flow  ☐ Centrifugal Pump
    ☐ Submersible Pump  ☐ Vertical Turbine Pump

13. NO. OF RESIDENTIAL OR COMMERCIAL UNITS TO BE SERVED
    (specify) 1600
    Not Applicable

14. TOTAL ACRES PROPOSED FOR IRRIGATION
    Applicable
    Type of Crop: Not Applicable

15. REMARKS, EXPLANATIONS
    (Refer to Back Side)
    (If more space is needed, continue on back side)

Owner (print): Mr. Harry Otsuji
Signature: ____________________________ Date: ______/____/____

Landowner (print): Mr. Harry Otsuji
Signature: ____________________________ Date: ______/____/____

For Official Use Only:
Date Received: ____________________________ Hydrologic Unit: ____________________________
Date Accepted: ____________________________ Diversion Works No.: ____________________________
State Well No.: 6549-04
development as sewage effluent becomes available for golf course irrigation.
The well will initially be for golf course irrigation and will ultimately be used for residential.

15. REMARKS, EXPLANATIONS
August 1, 1989
89-1387 (853-0202)

Mr. Manabu Tagomori
Deputy Director
Commission on Water Resource Management
P. O. Box 373
Honolulu, Hawaii 96809

Dear Manabu:

Relocation of Kohala Ranch Well No. 3

At its July 1989 meeting, the State Commission on Water Resource Management granted Kohala Ranch a drilling permit for its Well No. 3. This site is designated "Initial Well No. 3 Site" on the enclosed map. After filing the drilling application, a revision of Kohala Ranch's plans has been made and it will require moving the location of the third well. This new site is higher up the mountain slope, at ground elevation 1840 feet, and is designated "Revised Well No. 3 Site" on the map.

We are hoping that the new location can be accommodated as an administrative matter and ask your concurrence on this point. Kohala Ranch is anxious to start work on the well. Going through the entire permit process again would cause severe hardship. Thank you for your consideration. I look forward to hearing from you.

Sincerely,

Tom Nance

TN:It

cc: Harry Otsui - Kohala Ranch

Enclosure
Revised Well Site

KOHALA RANCH WELL NO.3

(6649-01)

Initial Well Site