Keanae Well No. 2

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

RECEIVED
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OFC. OF ENVIRONMENTAL QUALITY CONTROL

April 21, 1998

Mr. Gary Gill, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR KEANAE WELL NO 2
AT KEANAE, MAUI, HAWAII
TMK 1-1-04:043

The Department of Water Supply, County of Maui has reviewed the comments received during the 30 day public comment period which began on October 8, 1997. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the May 8, 1998 OEQC Environmental Notice. ✓

We have enclosed a completed OEQC Publication Form and four copies of the final EA. If you have any questions or need additional information, please contact our Engineering Division at 243-7835 or the project's Engineering Consultant, Mr. Carl Takumi of C. Takumi Engineering Inc., at 249-0411.

Sincerely,

David R. Craddick
Director

/HK:sc
Enclosure: Notice

cc: Mr. Carl Takumi

43

1998-05-08-MA-FEA-Keanae Well No. 2

FINAL
ENVIRONMENTAL ASSESSMENT

KE'ANAE WELL NO. 2
KE'ANAE, MAUI, HAWAII
TMK: (2) 1-1-04: 43

PREPARED BY:
COUNTY OF MAUI
DEPARTMENT OF WATER SUPPLY
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

CONSULTANT:
C. TAKUMI ENGINEERING, INC.
18 CENTRAL AVENUE
WAILUKU, HAWAII 96793

MARCH 1998

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I. INTRODUCTION

A. IDENTIFICATION OF THE PROPOSING/APPROVING AUTHORITY AND CONSULTANT

Proposing Agency/Accepting Authority:

County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

Consultant:

C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

B. SUMMARY

The Maui County Maui Department of Water Supply is proposing the construction of an exploratory well in Ke'anae, Maui, Hawaii (TMK 1-1-04:43). The proposed well will be located approximately 75 feet from an existing Department of Water Supply Ke'anae Well No. 1 (5108-01). The existing well is presently the only source of water for the Department's water system for the area.

The project will involve the drilling, casing and testing of an exploratory well. The exploratory well will be constructed to the basal aquifer. Well testing will determine the quantity of water available by pump step test and a pump continuous test and sampling during the pump test to determine water quality. Based upon the results of the well tests, the Department will decide whether to install a permanent pump to provide more reliable source water service to the Ke'anae area.

C. BACKGROUND INFORMATION

Ke'anae is a small rural coastal community on the northern slope of Haleakala on the island of Maui. See Figure 1. Water for this community is provided by the Maui County Department of Water Supply. The Ke'anae Water Service area includes the communities of Ke'anae and Wailuanui.

The Ke'anae Water System receives its water from a well developed in the mid 1980's near the intersection of Hana Highway and Wailua Road (TMK: 1-1-04:43). If a malfunction occurred at the Ke'anae Well, a surface water source was the planned emergency back-up source. The surface water source was discontinued, as Safe Drinking Water Standards became more stringent. This leaves the existing Ke'anae Well as the sole source of water for the Ke'anae Water System. The Department of Water Supply is proposing to construct a second well as a back-up to the existing well to provide a more reliable source of water.

According to Annual Reports by the Department of Water Supply, water use in the Ke'anae Water System averaged as follows:

Year	Average Daily Water Use	No. of Services
1992	25,900 gals/day	78
1993	26,150 gals/day	78
1994	24,300 gals/day	78
1995	24,650 gals/day	80

The four-year median is 25,250 gals/day.

The storage available in the system is a 10,000-gallon control tank and a 50,000-gallon reservoir or about a two day supply of water.

D. DESCRIPTION OF PROPOSED ACTION

The proposed project involves the exploratory drilling and pump testing of Ke'anae Well No. 2 approximately 75 feet west of the existing well. See Figure 2 and Site Plan. The location of Ke'anae Well No. 2 is approximately 2,500 feet from the ocean and approximately 220 feet above mean sea level (MSL). The excess dirt and material from drilling will be spread out evenly around the site. The anticipated construction time to drill and test the well is 6 to 8 months. The proposed well section is shown in Exhibit A.

The following guideline will be used in the drilling of Ke'anae Well No. 2:

(1) Drilling of a 14-inch hole to depth of approximately 115 feet below sea level.
(2) Conduct preliminary pump test in open hole; duration 2 hours or less.
(3) Option to deepen drilling in 10 feet increments or more if preliminary test fails to show sufficient production capability. Conduct another preliminary pump test.
(5) Video log boring.
(6) Select length of blank casing on basis of preliminary tests.

(7) Screen or open hole for the remainder of the boring.
(8) Grout annular space from water table, which is expected to lie about 6 feet above sea level to surface.
(9) Conduct pump test and test water quality.

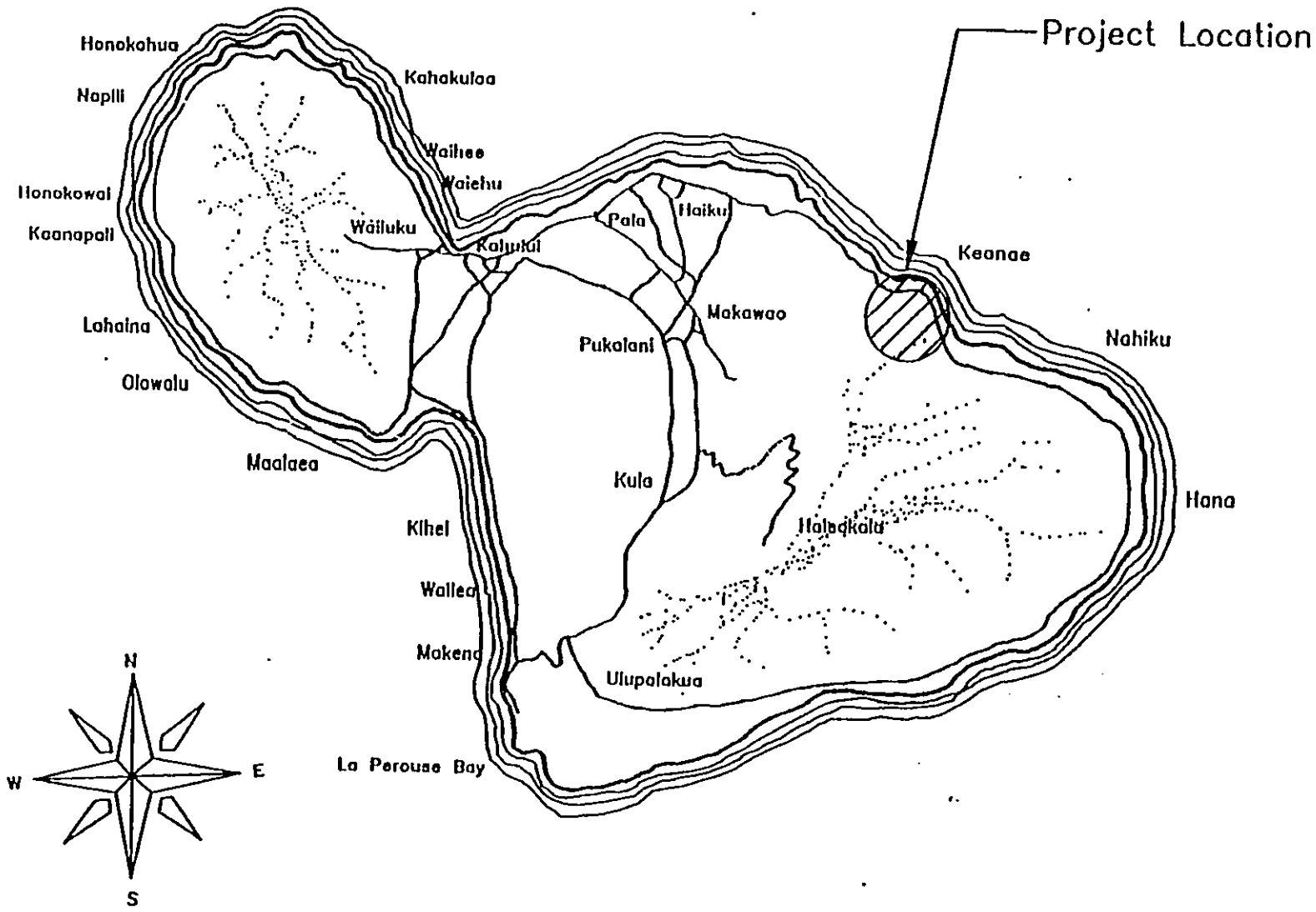
The two types of pump tests that are normally conducted are (1) Step-Draw down Test and (2) Constant-Rate Test. Water samples will be taken throughout the pump tests to determine chloride content. A water quality sample will also be taken toward the end of the continuous rate test to compare with State of Hawaii's Safe Drinking Water Standards. The water from the well tests will be transported and discharged in nearby fields. Pertinent equipment will then be removed after all tests have been conducted. The well is then capped until the water quality data is analyzed. After analysis of the pump test and water quality data, the Department of Water Supply shall determine the feasibility of developing the well. A permanent pump and necessary apparatus shall be installed and connected to the existing Ke'anae Well No. 1.

The project will not require the construction of a road since access to the site already exists.

E. CONSTRUCTION COST AND IMPLEMENTATION

Construction for the proposed project is anticipated to begin in the early of 1998. The construction of the exploratory well is estimated to cost $116,400 and a total estimated construction cost of $423,400 to place the well into production.

The Maui County Board of Water Supply will fund the project as part of their capital improvements program.



ISLAND OF MAUI

Figure 1

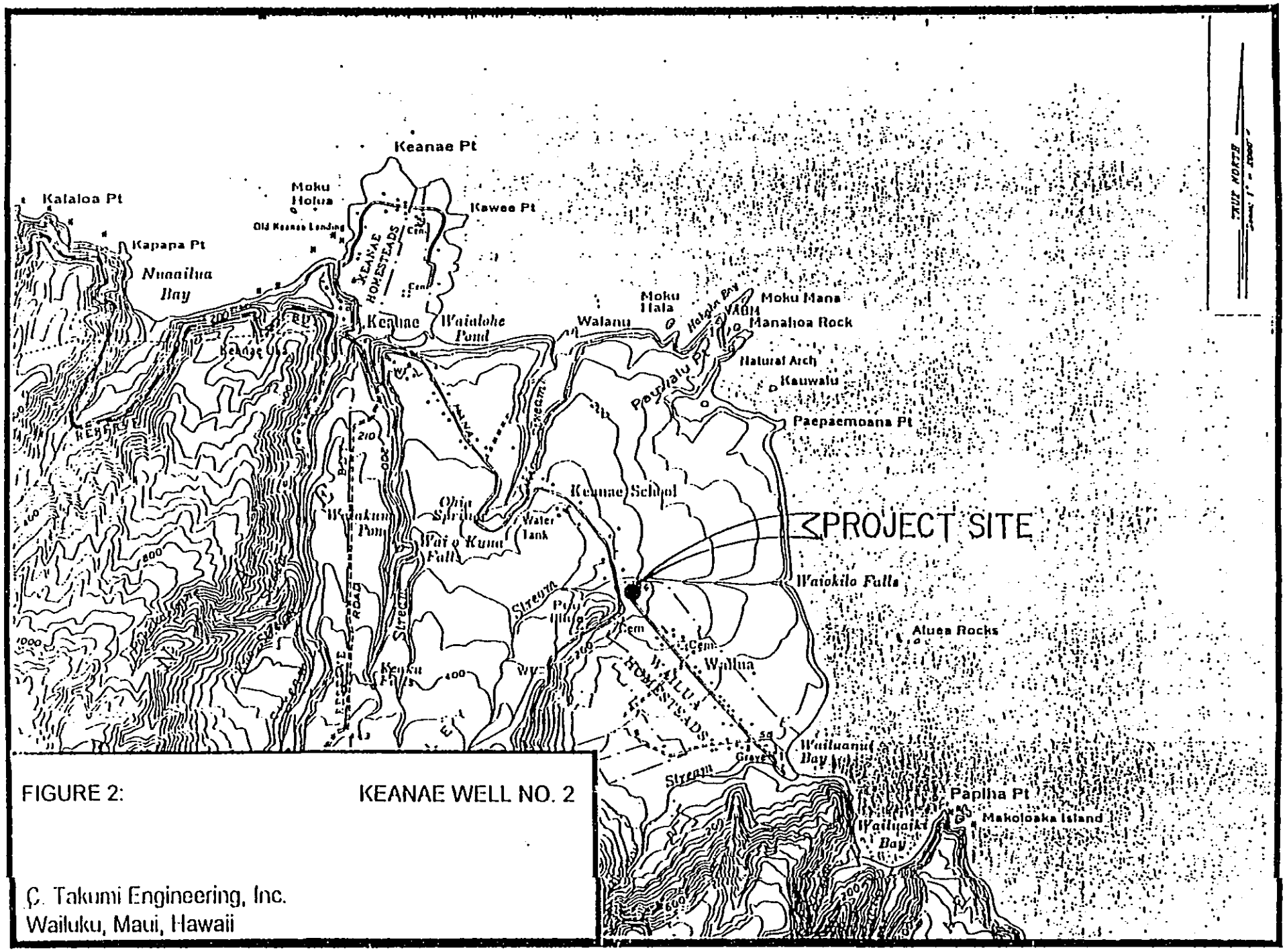
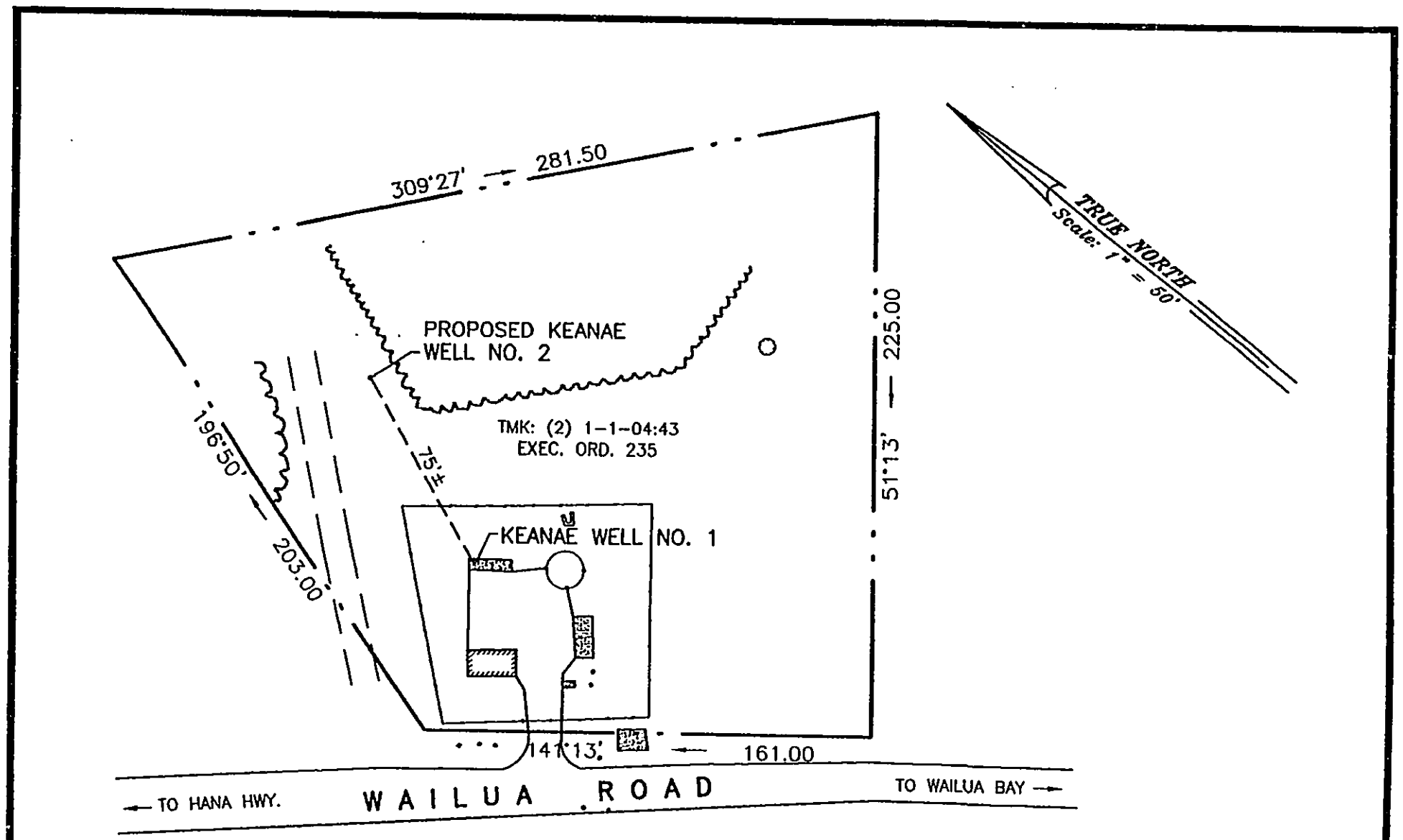


FIGURE 2: KEANAE WELL NO. 2

C. Takumi Engineering, Inc.
Wailuku, Maui, Hawaii



KEANAE WELL – SITE PLAN

II. DESCRIPTION OF THE EXISTING ENVIRONMENTAL SETTING

A. PHYSICAL ENVIRONMENT

1. Existing Land Uses
   The existing well, Ke'anae Well No. 1 is within the same site and approximately 75 feet away from the proposed well. The Ke'anae Well No. 1 site improvements consists of a 10,000 gallon control tank, electrical building, booster pumps, parking and fencing. An existing grassed driveway east of the existing well site goes to the adjacent property north of the site (TMK: (2) 1-1-04: 06. The remainder of the property is undeveloped covered with various species of grass, weeds, bushes, and trees.

2. Surrounding Land Uses
   The land surrounding the project site is mainly for agricultural purposes. Residences are dispersed within Ke'anae's rural setting.

   Adjacent land uses consist of undeveloped lands to the east and west; agricultural cultivated land to the north and an old cemetery and Hawaiian Home Lands to the south. St. Gabriels Church (TMK: 1-1-04: 04) is approximately 500 feet south of the project site.

3. Climate
   The Ke'anae region is usually cool and moderate throughout the year due to the northeasterly tradewinds, which is typical of the windward areas of the Hawaiian Islands. Diurnal heating and cooling of the land is caused from the absence of tradewinds. It produces onshore sea breezes during the day and offshore land breezes at night. Temperatures range from mid 60's to high 80's. The average annual rainfall at the proposed well site is approximately 150 inches a year. Rainfall over the aquifer ranges from 150 inches/year at the coast to 300 inches/year 3 to 4 miles inland. The rainfall over the aquifer averages 185 inches/year.

   The proposed project will not affect the existing climate conditions.

4. Topography
   The elevation at Ke'anae Well No. 2 is approximately 214 feet above mean sea level (MSL). The slope at the well site is relatively flat with an approximate slope of 4%.

   The proposed area does not show any significant topographical constraints.

5. Soils

The surrounding area consists of poorly drained soils known as Tropaquets (TR). This type of soil needs to be periodically flooded in order to grow crops that thrive in water, such as taro or rice. The land underlying the project site has a very thin surface layer consisting of dark-gray soft silt loam. This overlies firm to compact silty clay loam that is usually a mixture of gray, yellow, and brown.

6. Flood Hazard

Ke'anae Well No.2 is located in an area of minimal flood hazard as determined by the Flood Insurance Map for the area.

The proposed project will have no effect on the existing flood areas.

7. Groundwater

The proposed well will be drilled to the basal aquifer lens in the Ke'anae Aquifer System which has a sustainable yield of 96 MGD. The basal water level for Ke'anae Well No. 1 (5108-01), located approximately 75 feet from the site, was recorded at 6.1 feet MSL.

The Ohia and Store Springs are approximately 1/2 and 3/4 mile away from the existing well. The elevation of the two springs is 200 feet above sea level, which is higher than the basal aquifer source of the Ke'anae Well.

The proposed project will have no effects upon the region's high level groundwater. No high level groundwater was encountered during the construction of the existing Ke'anae Well No. 1 (5108-01). If high level ground water is encountered, high level water seepage will be sealed by grouting before continuing with the well drilling operation. Once drilling is completed, the annular space around the casing shall be grouted from just above the water level to the top of the well to keep surface and high level ground water from affecting the basal aquifer. A well section of the proposed well is shown in Appendix A.

8. Surface Water

Waiokamilo Stream and a nearby *'auwai* passes through TMK: (2) 1-1-04: 06, which is adjacent to the proposed well site and supplies irrigation water to the taro patches and other agricultural activities in the Wailua area. The elevation of the stream and *'auwai* is about 200 feet above sea level, which is higher than the basal water source of the Ke'anae Well.

The proposed project is anticipated to have no effects upon the region's surface waters. The proposed well will be drilled to the basal aquifer with an anticipated water level at 6.1 MSL. To mitigate effects upon surface waters, the annular space around the casing shall be grouted from just above the water level to the top of the well to keep surface water from entering the well. A well section shown in Exhibit A.

9. Flora and Fauna
The proposed well site is covered with various weeds, grass, shrubs, and trees (mango, guava and shade). There are no known rare, endangered or threatened plants within the site.

Animals found in Ke'anae are as follows: horses, cattle, mongoose, rodents, chickens, dogs and cats. Avifauna that is typically found in the region are mynas, sparrows, cardinals, doves and finches. The six acre Pauwalu Point bird sanctuary is about a mile away which provides habitat for sea birds including some native and endangered species. Once completed, the project will not affect wildlife in the region.

10. Air Quality
The air quality in Ke'anae is considered good. Automobile emissions coming from Hana Highway are the main contributors of airborne pollutants.

11. Noise Characteristics
The noise level in the project area is relatively low. Natural conditions and traffic coming from the Hana Highway are the only attributes.

12. Archaeological Resources
The State Historic Preservation Division indicated there are no known historic artifacts/sites within the proposed site. The correspondence adds that since prior construction has been made on the site there is unlikely to have any remains of historic sites present.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population and Economy
The estimated 1990 population of the Hana region is 1,895, which includes the Ke'anae region. The Hana Community Plan projects a population of 2,182 by the year 2000 and 2,392 anticipated by 2010 for the region.

Local census place the resident population of the Ke'anae-Wailuanui community at 200 to 250 people. The number of water services installed in the Ke'anae area increased by two in the past 4 years indicating slow change in the area.

Taro cultivation and other agricultural pursuits are considered the most essential element in Ke'anae's economy. Water for *lo'i* (wetland taro patches) are from surface water sources. The proposed well will be drilled to the basal aquifer and the annular space sealed by grouting to keep surface and high level water from entering the well.

C. PUBLIC SERVICES

1. Recreational Facilities

   The Ke'anae region offers several recreational facilities for residents of the area. They are the Ke'anae Arboretum, Kaumahina State Park, Pua'aka'a State Park, the YMCA complex or Camp Ke'anae and the Ke'anae Ball Park.

2. Police and Fire Protection

   The Wailuku Station is the headquarters for Maui County's Police Department. The Hana substation is found at the intersection of Hana Highway and Uakea Road. They patrol the Hana District and Ke'anae area.

   The Department of Fire Control's Hana Station offers fire prevention, suppression and protection for the Ke'anae area. The station is also found at the intersection of Hana Highway and Uakea Road.

3. Health Care

   The Hana Medical Center can be found at the intersection of Hana Highway and Uakea Road. It is the nearest medical facility for the Ke'anae area and provides 24-hour emergency services as well as family practice. If patients need serious medical attention they are transported to the Maui Memorial Hospital.

4. Schools

   The two public schools that serve the Ke'anae area are Hana High and Elementary School, Grades K-12 and Ke'anae School, Grades K-3.

5. Solid Waste

   The Ke'anae district is served by a County refuse system. All solid waste is transported to the Hana Landfill.

D. INFRASTRUCTURE

1. Roadways

Wailua Road is adjacent to the project site. An existing grassed driveway leads from Wailua Road to an existing *'auwai* ditch and wetland *lo'i.* The well will be located makai of the driveway to avoid obstructing the driveway. The driveway will be used to access the proposed well site; therefore, no roadway improvements are needed for the proposed well.

2. Water

Presently, the the Department of Water Supply has only one well (Ke'anae Well No. 1) providing water for the entire Ke'anae Community.

The Ke'anae Well No.1 is located near the intersection of Hana Highway and Wailua Road. It has a pump capacity of 96,000 gallons per day (16 hour operating time). Two booster pumps, pump water through a 6-inch line to a 50,000 gallon storage tank located approximately ½ mile south of Ke'anae School.

3. Wastewater

The County sewer system serves as far as the Ku'au district, therefore the Ke'anae region does not have a sewer system. Since 1988, the State Department of Health has not allowed the usage of cesspools in new developments and disposal of wastewater is by the use septic tanks along with absorption trenches or seepage pits. See attached preconsultation correspondence letter.

New developments within 1,000 feet of the existing well require aerobic units with shallow soil absorption system. The proposed well located 75 feet away from the existing well will not increase any existing requirements for waste water disposal. Water quality sampling will be conducted as part of the project.

4. Drainage

Storm waters sheet flow across the project site in a southeasterly direction. Some of the water will percolate into the ground, while most of the storm water will end up in nearby fields.

Once the project is completed, the top of the well casing shall be terminated above the ground surface and sealed to protect against surface water, pollutants and other contaminants from entering the well.

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. IMPACTS TO THE PHYSICAL ENVIRONMENT

1. Flora and Fauna
   The proposed site exhibits no significant rare, endangered or threatened flora and fauna species. The clearing and grubbing of flora and ousting of fauna on the project site is not considered a significant impact on the environment.

2. Air Quality and Noise Characteristics
   The short-term drilling-related activities may create dust, which will cause an impact on the air quality. Dust control and wind blown emissions will be kept to a minimum through regular watering and sprinkling. Site work, such as clearing and grubbing could generate air-borne particles. Also, the temporary pump used to test the water may be diesel operated and may cause a short-term impact on the quality of the air.

   In the long-term the Ke'anae Well No.2 is not expected to have an impact on the air quality of the Ke'anae area.

   In order to minimize the impact of surrounding noise conditions, the drilling related activities can be limited to daylight working hours. This is to adhere to the State Department of Heath's noise regulations for drilling equipment and out of respect for property owners that live nearby.

   Upon completion of drilling and testing the well, noises level will not be affected since the well will be capped. If the Department proceeds with placing the well into production, the noise levels will be similar to noise levels from the existing well seventy five feet away.

2. Archaeological Resources
   If any artifacts are found during the construction of Ke'anae Well No. 2, work will be stopped. The State Historic Preservation Division will then be contacted for further appropriate measures.

B. SOCIO-ECONOMIC ENVIRONMENT AND PUBLIC SERVICES

1. Local Economy
   The socio-economic impacts that are expected from the proposed project are beneficial. The short-term well construction activities will increase construction and construction-related employment.

The long-term socio-economic impacts will also be favorable since the residents of Ke'anae will have a reliable back-up source of potable water.

2. Police, Fire and Medical Services
   The proposed project will not affect any of the police, fire and medical services of the Ke'anae area.

3. Solid Waste
   The clearing and grubbing of the proposed site will require the proper disposal, thus a plan will be arranged with the Maui County Department of Public Works and Waste Management, Solid Waste Division.

C. INFRASTRUCTURE

1. Roadways
   The construction employee parking will be located on the project site to avoid impact on the local traffic conditions.

IV. RELATIONSHIPS TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission (LUC), establishes the 4 major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation." The proposed project, Ke'anae Well No.2 is located within the "Agricultural" district. See Figure 3.

B. MAUI COUNTY GENERAL PLAN

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and the development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development."

The proposed project, Ke'anae Well No. 2 is keeping within the guidelines of the following Maui County General Plan objectives:

(1) Water

Objective:

To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents.

Policy:

Seek new sources of water by exploration in conjunction with other government agencies.

C. HANA COMMUNITY PLAN

The location of the well site is within the Hana Community Plan region. The Hana Community Plan contains recommendations and standards, which guide the sequencing, patterns and characteristics of future developments in the region.

The Maui County Zoning Map designates the subject property as "Agriculture."

The proposed project conforms with the following Hana Community Plan objectives:

- Ensure that groundwater and surface water resources are preserved and maintained at capacities and levels to meet the current and future domestic, agricultural, commercial, ecological and traditional cultural demands of each area in the Hana district

- Discourage water or land development and activities which threaten the biological diversity of the Hana region and degrade the existing quality of the region's (1) air and noise character, (2) marine, surface and ground water and (3) scenic resources and vistas

V. OTHER REQUIRED PERMITS AND APPROVALS

The required permits that are needed to proceed with the proposed project are a Well Construction Permit from the Commission on Water Resource Management and County of Maui's Special Management Area Permit and an State Department of Health NPDES permit.

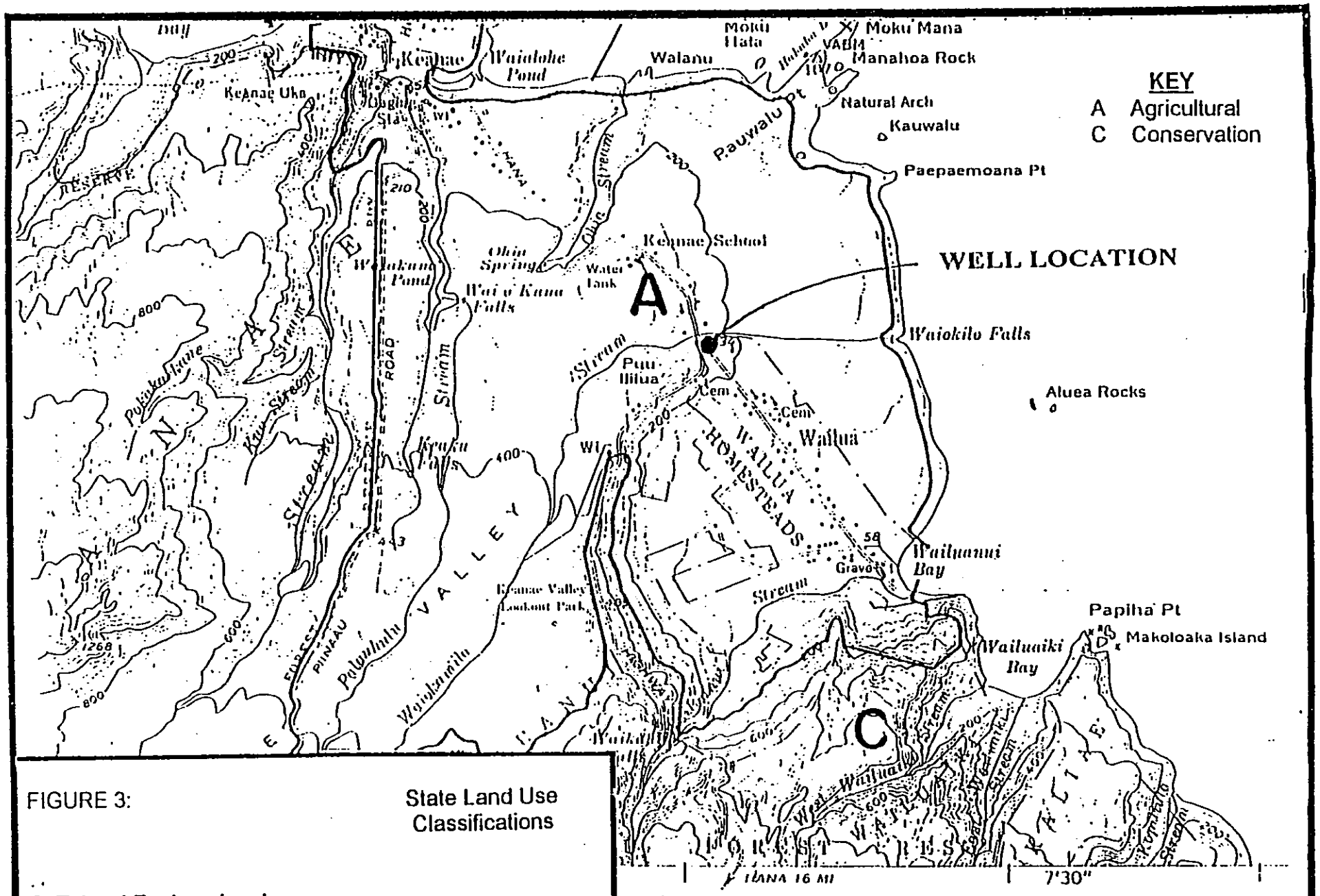
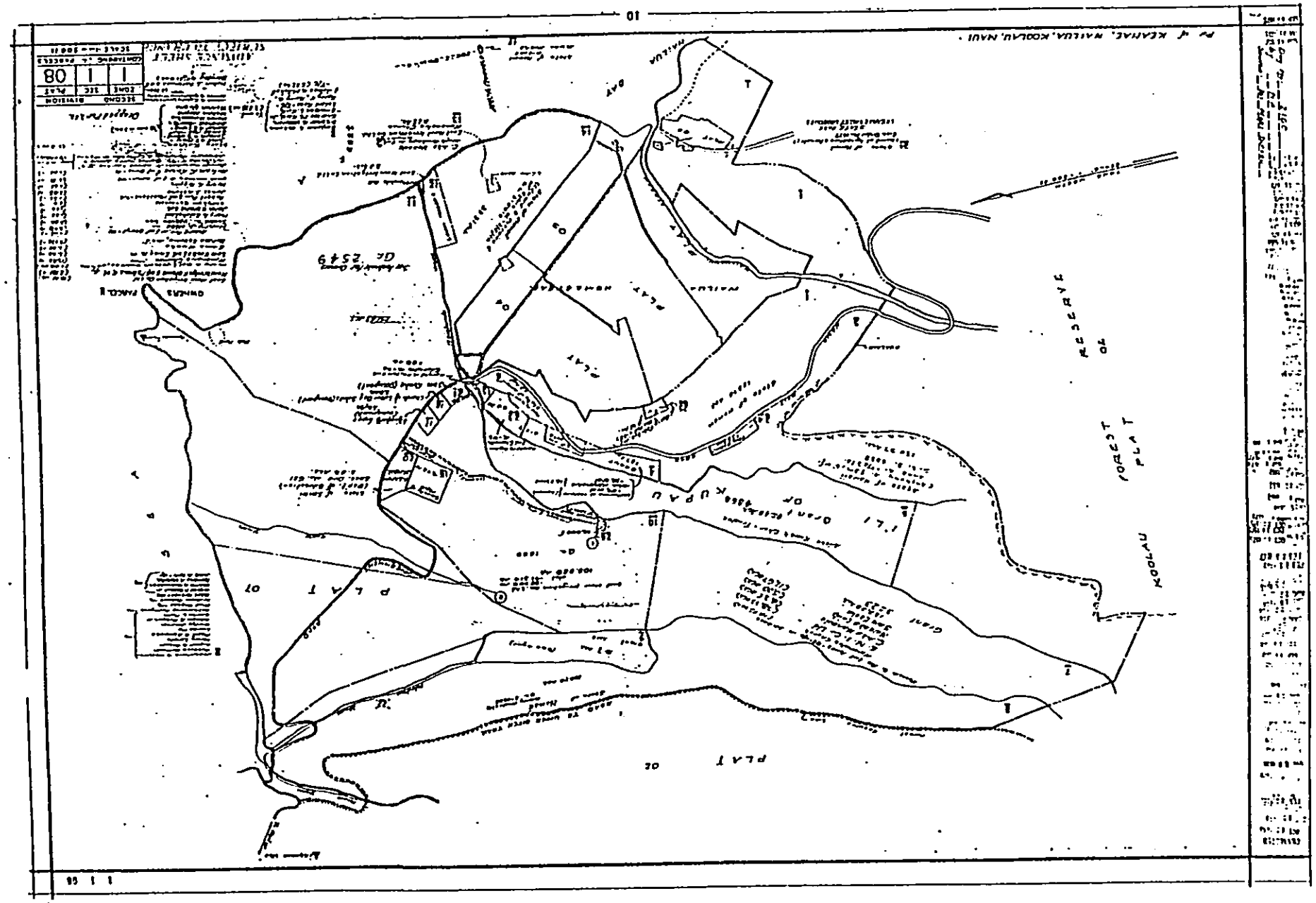
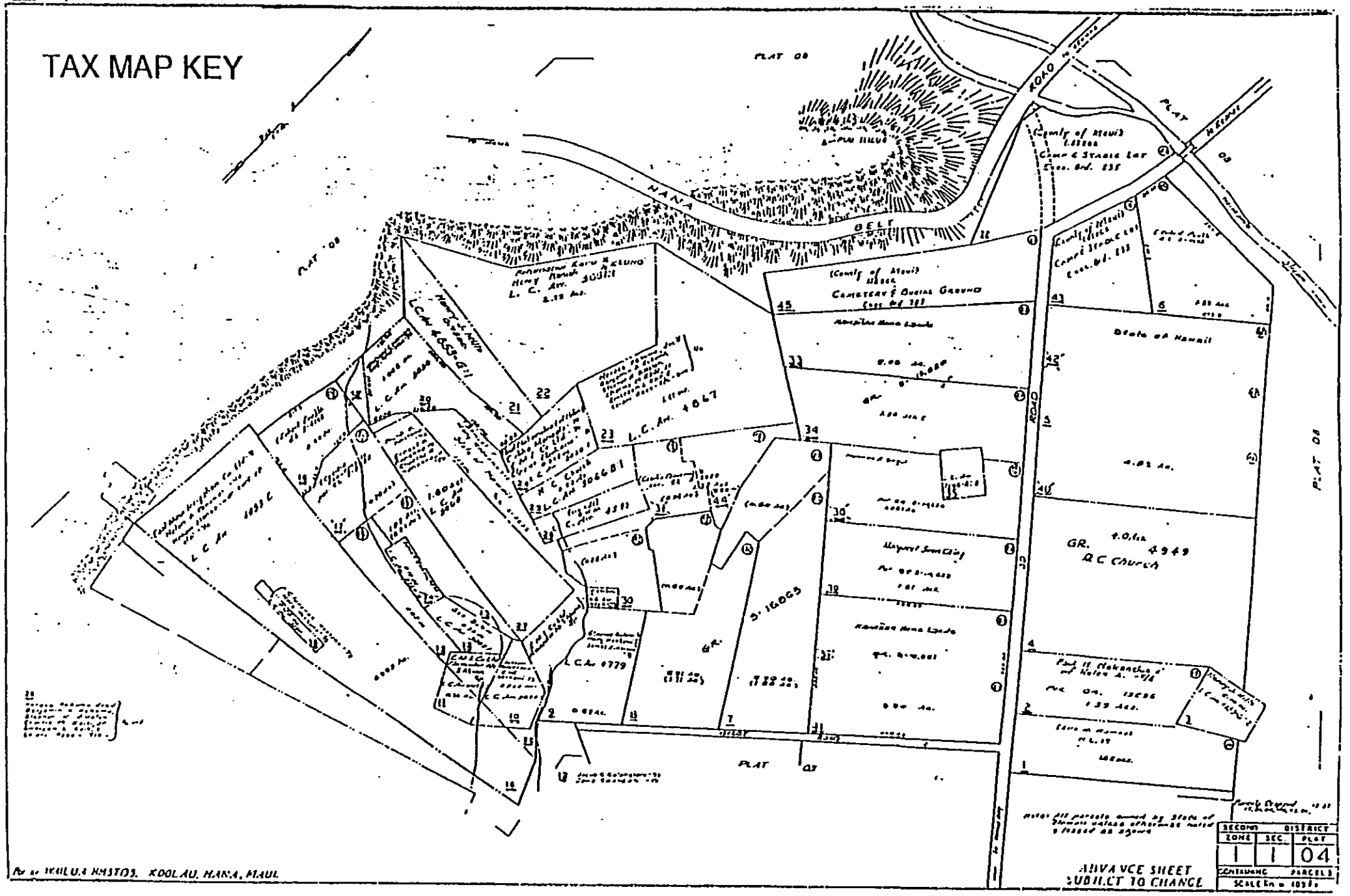


FIGURE 3: State Land Use Classifications

C. Takumi Engineering, Inc.
Wailuku, Maui, Hawaii



TAX MAP KEY



Ref. to WAILUA KHSTOS. KOOLAU, HANA, MAUI

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. NO ACTION

A no action alternative is not acceptable due to the potential threats to public health. The Department of Water Supply is responsible for providing the community with clean, potable water. The existing well is presently the sole source of potable water. The system has sufficient storage in the system for two days supply; if a pump failure occurs, it would take 60 to 90 days for major pump repairs. The community would not have potable water unless other alternatives are considered. Other alternatives considered by the Department are discussed below.

B. ALTERNATIVES

The Department of Water Supply has considered alternatives for providing water to the Ke'anae Water System. Alternatives were discussed during a public information meeting in Ke'anae on July 29, 1997. Participants asked that discussion on these alternatives be presented as part of the environmental assessment process. Five alternatives are presented. Other alternatives discussed at the public meeting are a combination of four alternatives considered.

The following conditions have been used to determine the costs below:

- The design mechanical life of a pump, shaft and motor is 20,000 hours which is equivalent to about 13 years of use for the Ke'anae Water System. The design life of a well is considered permanent; therefore, only pump replacement is considered once the well is completed.
- Water quality requirements are present day.
- Costs are determined in present day costs.

1. New Pump and Well: A pump and well is the alternative considered. The well, once constructed, is considered as permanent. The life of the pump and other mechanical equipment should double since the pump will alternate between the existing well and proposed Ke'anae Well 2. The estimated cost of the pump and well are as follows:

Initial construction of new pump and well:	$423,360
Pump Replacement (for Well No. 1):	$ 25,000
Total	$448,360

Operating and maintenance cost of the new pump and well should not significantly increase since power cost is equivalent to the operation of the existing well and maintenance cost for the second of two pumps is minimal.

This alternative minimizes impact to surface water users. In addition, it allows the Department of Water Supply meet its goal of providing a reliable source of potable water to its users.

2. Surface Water Treatment: This alternative requires treating surface water in compliance with the surface water treatment rules of the State Department of Health. The surface water treatment rules require treatment of all surface water for compliance with the Safe Drinking Water Act. The following is an estimated cost of the water treatment facility:

   Construct treatment facility including pretreatment, filtration and control equipment, building, sedimentation pond, piping and appurtenances, parking and fencing: $700,000
   Surface water intake and piping to water treatment plant: 200,000
   Initial Construction Cost: $900,000
   Equipment replacement: $ 65,000

   A certified water treatment plant operator must operate and maintain the water treatment plant. Presently, the Department does not have an adequate number of certified water treatment plant operators for its existing water treatment facilities. The certified water treatment plant operator is not the same person as the pump maintenance person.

   The treatment facility will need occasional operation to assure that facility will operate properly, a water treatment plant operator will have to visit the plant daily during pump repairs. Under surface water treatment rules, more water quality testing is required to assure that the treatment plant is producing potable water quality even though the plant is on stand by operation. The sedimentation pond must be occasionally maintained. Sediments will have to be hauled to an appropriate disposal site, i.e. solid waste landfill.

   Beside treatment costs, the taking of surface water will impact other surface water users, i.e. taro growing and other agricultural uses. Using a ground water source mitigates the impact of taking surface water sources.

3. Truck potable water: This alternative considers trucking potable water for periods when existing pump fails and need repair. A 4,000 gallon stainless steel truck would need to haul 6 loads of water a day to maintain the average day water usage. 4,000 gallon stainless steel tanker trucks are available on Maui and has been used for similar purposes.

The estimated cost per day is $750/load X 6 trips/day = $4,500/day plus disinfecting the trucks. It is estimated that it would take approximately 60 days for a major pump repair.

Cost to haul water: ($4,500/day X 60 days X 2 incidents)	$540,000
Replace existing pump: (2 times at $25,000 each)	$ 50,000
Total	$565,000

Water conservation could aid in reducing hauling demands. A 20% reduction in hauling cost due to water conservation efforts would result in a cost of $482,000.

4. Spare Pump: Purchase a spare pump and install pump when existing pump needs repair or replacement. The premise of this alternative is that the time to repair a pump is reduced since spare pump and column is already available.

   To assure that the pump is serviceable, a maintenance check will be made annually. The new pump will still need to be installed when pump in existing well fails. In addition, the Department of Water Supply will still need to truck potable drinking water to its consumers within the water system. It is estimated that approximately 40 days will be needed to procure a contractor and install the pump.

Cost of Pump: ($25,000/ea. X 2 times)	$ 50,000
Storage and maintenance: $ 3,000/year for 26 years:	$ 78,000
Cost to haul water @ $4,500/day X 40 days X 2 repairs:	$360,000
Total Cost	$488,000

   A spare pump may also be used on an emergency elsewhere and may not be available when necessary.

5. Truck Potable Water for Drinking and Raw Surface Water for Non Potable Uses: This alternative was introduced at July 29, 1997 public information meeting at Ke'anae. Potable water for consumption to be trucked to Ke'anae and surface water to be used for non-potable domestic and irrigation use. The Department of Water Supply responsibility is toward their consumers and must meet State Drinking Water Regulations. The Department would have to provide an emergency plan to the Department of Health for acceptance before this alternative can be implemented. After discussion with the Drinking Water Branch of the State Department of Health, a scenario for an emergency plan would be as follows:

The Department will need to construct a surface water intake and water line from a surface source to the Ke'anae Water System. The impact of taking surface water has been previously discussed.

When an emergency occurs, the Department of Water Supply will have to notify the public of the change in conditions for the water system. Besides publication, "not for drinking" signs will be posted over all water outlets that may be used by the consumer including all plumbing fixtures within buildings that is connected to the Department's water line.

Potable water for consumers would be trucked to Ke'anae until pump can be repaired. Consumers would have to pick up water at certain designated hours and locations or boil their water.

Once the pump is back in operation, the entire system would have to be disinfected, thoroughly flushed and tested including water at the consumer's outlet. It would take several days to complete the disinfecting, flushing and testing operation due to the length of pipes, tanks and other appurtenances and within homes. Permits and other considerations would have to be included in the emergency plan for the disposal of water during the disinfecting and flushing operation.

The potential risk of using raw surface water cannot be assessed in terms of fines and liability. The Department of Water Supply is not willing to undergo such a risk and this alternative has not been considered any further.

C. Alternative Well Sites

Altogether, there were four sites that were considered. See Figure 4. The recommended site is to locate the well approximately 75 feet west of the existing well (TMK: 1-1-04:43). The proposed well site is located on the same property as the existing well. Since the site already contains the existing well and related facilities, the addition of another well should have minimal consequence to future land uses of the site. The second well would be a stand-by well and running the two wells simultaneously is not anticipated. Therefore, the quantity of water to be withdrawn should not affect existing water uses. Also, the estimated cost of building Ke'anae Well No. 2 at this particular site (TMK: 1-1-04:43) would cost the least out of the four sites reviewed.

An analysis of the four sites has been summarized in Table 1. A tax map key has been attached for your reference.

TABLE 1

KE'ANAE WELL NO.2
SITE ALTERNATIVE SUMMARY

LOCATION	GEOLOGICAL	LANDOWNER	ENVIRONMENTAL	COST
TMK: 1-1-04:43 Existing Well Site	2,500 feet from ocean Location good	County	Area previously disturbed	$423,360
TMK: 1-1-04:32 Camp and Stable Lot	2,700 feet from ocean Location good	County	Area previously disturbed	$450,000
TMK: 1-1-08:2 Old UV site	2,800 feet from ocean Location good	State	Area previously disturbed	$473,340
TMK: 1-1-08:16 Ke'anae School	2,500 feet from ocean Location good	County	Area heavily vegetated and seems undisturbed Archeological Site 5050-07-96,1514,1630 in vicinity	$568,200

VII. EXAMINATION OF SIGNIFICANCE CRITERIA

Involves the loss or destruction of any natural or cultural resource.
The proposed well site is on undeveloped lands with the existing Ke'anae Well No. 1 approximately 75 feet away. Adjacent land already in cultivated agricultural use is northeast of the site less than 100 feet away. No natural or cultural resources were observed at the project site. The State Historic Preservation Division reports that significant historic sites are unlikely. The project does not involve the loss or destruction of any natural or cultural resource.

Curtails the range of beneficial uses of the environment.
The project is on undeveloped lands and is conformance with the community plan land use designation for the area. The existing Ke'anae Well No. 1 is on the same site.

Conflicts with the State's long term goals or guidelines as expressed in Chapter 344, HRS.
The project does not conflict with the State's long term goals or guidelines as expressed in Chapter 344, HRS.

Substantially affects the economic or social welfare of the community or state.
The project does not adversely affect the economic or social welfare of the community or state. On a short-term basis, the project will provide construction-related employment.

The well will aid in the gathering of information on the groundwater conditions in the area. The well, if developed into a production well, will be used as a back-up well to provide more reliable water service to the Ke'anae-Wailuanui community.

Substantially affects public health.
The proposed exploratory well will not affect public health. The well will be disinfected in accordance to the Hawaii Well Construction & Pump Installation Standards, January 1997 of the State Commission on Water Resource Management as part of the well drilling permit. Water quality sample will be taken as part of the well construction process and appropriate treatment for contaminants will be determined to produce water meeting State Drinking Water Standards. The well will be used as a back-up well to provide a more reliable source of water. If water production needs cannot be met or if treatment processes and costs are not feasible, the well may be abandoned or used for monitoring purposes.

Involves substantial secondary effects, such as population changes or infrastructure demands.
The project is an exploratory well consisting of drilling, casing and testing an exploratory well to determine water availability and water quality. Based upon testing results, the Department will determine whether to proceed with well development. The exploratory well, if developed into a production well, will be used as a back-up well to provide a more reliable source of water and will not involve substantial secondary changes such as population changes or infrastructure demands.

Involves a substantially degradation of environmental quality.
The project site was once used for the construction of the Hana Belt Road. Except for the Ke'anae Well No. 1 improvements, the land has since been overgrown in an undeveloped state.

Is individually limited but cumulatively has considerable effect on the environment or involves a commitment to larger actions.
The proposed exploratory well does not have considerable effect on the environment. If testing of the proposed well is determined successful, the Department will proceed with well development by installing a pump and connecting the well to the existing well facility and to the Ke'anae Water System. The well will reinforce the Ke'anae Water System since the water system has only one well serving the area with no back-up.

Substantially affects a rare or threatened species or its habitat.
Water from the well will be from the basal aquifer and should not affect any rare or threatened species or its habitat. No large scale clearing or grubbing will take place to construct the well and no rare or threatened species were observed in the area.

Detrimentally affects air or water quality or ambient noise levels.
Once completed, the well will not have any detrimental effects upon air or water quality or ambient noise levels.

Affects an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion prone area, geologically hazardous land, estuary, freshwater area, or coastal waters.
The proposed well is not located in an environmentally sensitive area such as a flood plain, tsunami zone, erosion prone area, geologically hazardous land, estuary, freshwater area or coastal water.

Substantially affects scenic vistas and viewplanes identified in County or State plans or studies.
The proposed project is located at an existing well site. The proposed well is mainly underground and should not affect any scenic vistas and view planes. The proposed well site is approximately 75 feet from an existing well and will be made a part of the existing well complex.

Requires substantial energy consumption.
The proposed project will be a back-up well to the existing well and will not require substantial energy consumption. The primary source of energy consumption will be the well pump. The well pump will be sized to be similar to the existing well pump. The pumps will then be designed to alternate and only one pump will run at any time.

Involves substantial secondary effects, such as population changes or infrastructure demands.
The project is an exploratory well consisting of drilling, casing and testing an exploratory well to determine water availability and water quality. Based upon testing results, the Department will determine whether to proceed with well development. The exploratory well, if developed into a production well, will be used as a back-up well to provide a more reliable source of water and will not involve substantial secondary changes such as population changes or infrastructure demands.

Involves a substantially degradation of environmental quality.
The project site was once used for the construction of the Hana Belt Road. Except for the Ke'anae Well No. 1 improvements, the land has since been overgrown in an undeveloped state.

Is individually limited but cumulatively has considerable effect on the environment or involves a commitment to larger actions.
The proposed exploratory well does not have considerable effect on the environment. If testing of the proposed well is determined successful, the Department will proceed with well development by installing a pump and connecting the well to the existing well facility and to the Ke'anae Water System. The well will reinforce the Ke'anae Water System since the water system has only one well serving the area with no back-up.

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Once completed, the well will not have any detrimental effects upon air or water quality or ambient noise levels.

Affects an environmentally sensitive area, such as a flood plain, tsunami zone, erosion prone area, geologically hazardous land, estuary, freshwater area, or coastal waters.
The proposed well is not located in an environmentally sensitive area such as a flood plain, tsunami zone, erosion prone area, geologically hazardous land, estuary, freshwater area or coastal water.

VIII. FINDINGS AND CONCLUSIONS

The Ke'anae Well No.2 Project is intended to provide a constant source of potable water and eliminate the total dependence upon the single existing well. The proposed project involves the exploratory drilling and pump testing of Ke'anae Well No.2. Pertinent equipment will be removed after all tests have been conducted. The well is then capped until the water quality data is analyzed. A pump and necessary apparatus shall be installed if results are acceptable. Finally, the Ke'anae Well No.2 shall be connected to the existing raw water line. There are no anticipated effects upon the existing or surrounding land uses in the short or long-term well activities. The proposed project is not expected to affect any existing environmental features. There are no anticipated impacts on any archaeological or historical features. The Ke'anae Well No.2 will not have an unfavorable impact on socio-economic conditions or existing public services and infrastructure.

As a result of the findings of this report, it is concluded that the proposed project will not cause any significant impacts on the environment.

IX. AGENCIES CONTACTED PRIOR TO OR DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT

Department of Land and Natural Resources
State Historic Preservation Division
33 South King street, 6th floor
Honolulu, Hawaii 96813

Department of Planning
County of Maui
220 South High Street
Wailuku, Hawaii 96793

Wastewater Branch
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

X. REFERENCES

Maui County Community Plan Update Program Socio-Economic Forecast Report, Community Resources, Inc., January 1994.

Community Plan: Hana Community Plan, County of Maui, Maui Planning Department.

The General Plan of the County of Maui, County of Maui, Maui Planning Department, 1990 Update.

Maui County Data Book 1995, County of Maui, Office of Economic Development, February 1996.

Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, U.S. Department of Agriculture, Soil Conservation Service in cooperation with the University of Hawaii Agricultural Experiment Station, 1972.

Atlas of Hawaii, Second Edition, University of Hawaii, Department of Geography, University of Hawaii Press. 1983.

KALO KANU O KA 'AINA, A Cultural Landscape Study of Ke'anae and Wailuanui, Island of Maui, Planning Department, County of Maui, July 1995.

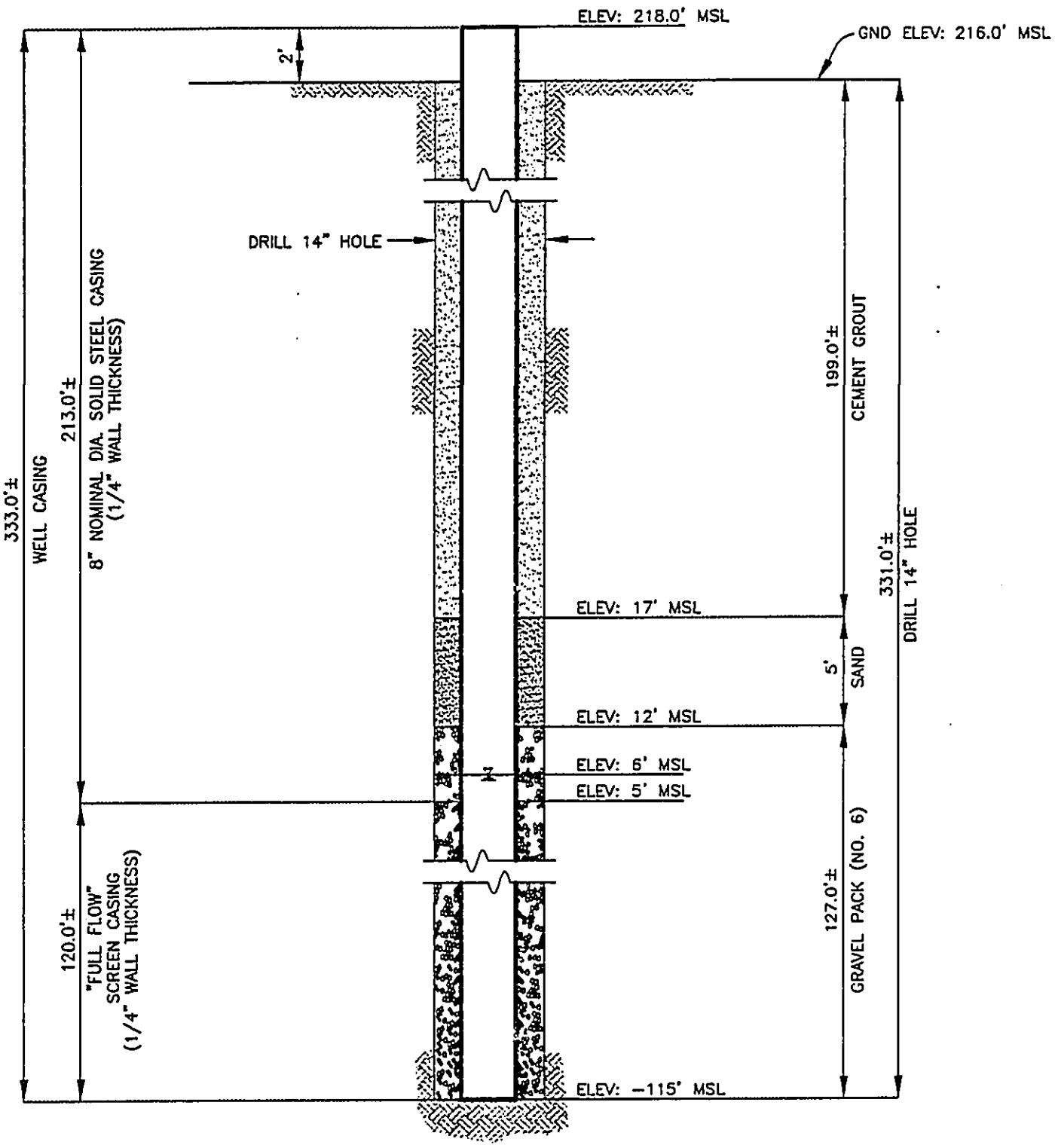
Hawaii Well Construction & Pump Installation Standards, Commission on Water Resource Management, Department of Land and Natural Resources, January 1997.

Groundwater Exploration at Ke'anae Well 5108-01, Maui, Circular C95, Division of Water and Land Development, Department of Land and Natural Resources, State of Hawaii.

EXHIBIT A

TYPICAL WELL SECTION
FOR

KE'ANAE WELL NO. 2



KEANAE WELL NO. 2 SECTION

N.T.S.

EXHIBIT B

GROUNDWATER EXPLORATION OF KE'ANAE WELL 5108-01, MAUI CIRCULAR C95

DIVISION OF WATER AND LAND DEVELOPMENT
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

DOCUMENT CAPTURED AS RECEIVED

GROUNDWATER EXPLORATION AT KEANAE WELL 5108-01, MAUI

Circular C95

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Water and Land Development
Honolulu, Hawaii

GROUNDWATER EXPLORATION
AT KEANAE WELL 5108-01, MAUI

Circular C95

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Water and Land Development

Honolulu, Hawaii
May 1984

GEORGE R. ARIYOSHI
Governor

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EDGAR A. HAMASU, Deputy to the Chairperson

ROBERT T. CHUCK, Manager-Chief Engineer
Division of Water and Land Development

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INTRODUCTION

In February, 1984, the Division of Water and Land Development completed an exploratory well at Keanae on the northern coast of East Maui, as a part of the State's exploratory well drilling program. The well (State No. 5108-01) is the first to be drilled in the area and the drilling/testing results provide new data on East Maui's basal ground water resources. It is located approximately one-half mile from the coastline at an elevation of 214 feet above mean sea level (see Figure 1).

The Keanae well was drilled to explore for and locate a new source of water supply for the Keanae community to replace an existing surface water source that does not meet the Safe Drinking Watr Standards, being subject to frequent turbidity and contamination problems normally associated with such sources. The well was carefully located away from existing spring sources and designed to develop the basal water lens which occurs at sea level elevation, without affecting any streamflows or existing springs in the area (see Figure 1 and 3).

AREA GEOLOGY

The Keanae-Wailua coastal area is situated in an ancient, deeply eroded valley buried by later lava flows that reached the ocean and formed the present coastline (see Figure 2). The oldest rocks, which formed the ancient valley before it was filled, belong to the Honomanu volcanic series of permeable basalts and presently crop out at the surface in the steep remnant valley walls left unburied by later lava flows. These oldest rocks also crop out at the surface near the Keanae well site in Puu Ililua, a small knoll at the junction of the Hana belt road and the road to Wailua.

Almost all of the Keanae-Wailua coastal area, however, is occupied by later, younger lava flows of the Hana volcanic series. Following the island-building period which produced the Honomanu volcanic series of basalts and the subsequent period of volcanic quiet and deep erosion which carved out the ancient and now-buried valley of Keanae, a period of renewed volcanic activity occurred. Lava flows from this period of renewed activity gradually filled and almost buried the ancient valley of Keanae, leaving the present sloping coastal topography.

AREA HYDROLOGY

The three principal streams in the area are: Palauhulu Stream, which drains toward Keanae peninsula; Ohia Stream, which lies 2000 feet Hana-side of Palauhulu and is fed by Ohia Springs at an elevation of 200 feet above sea level; and Waiokamilo Stream, which empties eastward into the ocean near Wailua (see Figure 1). These streams are fed directly from rainfall runoff and indirectly from rainfall that percolates into the rocks and soils and emerges again at the surface as high level springs hundreds of feet above sea level.

Beneath the surface in the permeable Honomanu basalts, ground water occurs along East Maui's northern coastal area in a basal lens of fresh water floating on sea water. This fresh water body is recharged by the heavy rainfall in the high mountain areas and is ultimately discharged into the ocean along the coastline. Prior to the drilling of the Keanae exploratory well, no data was available on the location, quantity, and quality of the basal ground water resources in the Keanae-Wailua area.

DRILLING RESULTS

Geology. The Keanae well site was, in part, chosen with the hopes of encountering permeable Honomanu basalts beneath the weathered and less permeable Hana series lavas. Geologic interpretation of the driller's rock descriptions (see Figure 3) and the driller's logs indicate that the Keanae well encountered two feet of soil

and 208 feet of weathered Hana series lavas that produced mostly "brown clay and boulders" according to the driller's remarks. Beneath the Hana lavas, lies 15 feet of "red clay" the top of which is interpreted as the unconformity between the younger Hana and the older, underlying Honomanu lava flows. However, about 60 feet of the Honomanu lavas apparently are very weathered and poorly permeable to a depth of about 70 feet below sea level. Drill cuttings were logged as "gray-brown clay" by the driller. Fortunately, the lower section of the Honomanu basalts penetrated, were less weathered and, therefore, more permeable. The most permeable rocks were encountered in the bottom 15 feet (101 to 116 ft. below sea level) of the well and in what was described as "cinders" by the driller--probably clinkery aa.

A video log of the well confirmed the depth of casing at 281 feet and revealed lava flows of dense and clinkery aa with fractures.

Hydrology. The deeply weathered lavas from the ground surface to a depth of 285 feet (about 70 feet below sea level) have very low permeability and yield little or not water. During the drilling of this 285 feet, the well could easily be bailed dry. After the installation of casing to 281 feet depth, the well was deepened an additional ten feet to a depth of 295 feet. The well was then bailed dry to a depth of 230 feet (16 feet below sea level) indicating that the well yielded no weater from the lavas above.

Permeable lavas capable of yielding water were encountered below 295 feet depth (81 feet below sea level) when the water basal level stabilized at 6 feet above sea level (Figure 3). The bottom 15 feet (101 to 116 ft. below sea level) is the most permeable section of the well, consisting of unweathered lavas.

No perched ground water sources were encountered above the basal water lens as shown in Figure 3.

The basal water is very fresh and has a very low chloride content of only 12 parts per million.

WATER LEVEL MEASUREMENT

On February 21, 1984, the basal water level was carefully measured with the cable tool rig's sand line. A 25-foot steel tape

measure was used to measure from the water mark on the bailer to the top of casing and a depth to water (DTW) of 208.50 feet was obtained. Based on an elevation of 214.62 feet, mean sea level (msl), for the top of casing, the static water level in the Keanae well is 6.1 feet, msl.

The elevation of the top of casing was transferred by the Department of Water Supply staff from a steel railroad spike set in the pavement of the road to Wailua.

WATER QUALITY

A sample of water obtained on February 17, 1984, during the 4-day pumping test was tested by the U.S. Geological Survey from the usual inorganic chemical constituents. Among the outstanding results are: the below-average chloride content of 11 milligrams per liter (mg/l) which suggests that the basal water lens is not contaminated at all by sea water intrusion, although the well is only 2500 feet from the shore; and, secondly, the very low nitrate content of 0.12 milligrams per liter which suggests that the basal water lens is not contaminated by any animal wastes or chemicals such as fertilizers.

WELL CONSTRUCTION

As shown in Figure 4, the well is cased with 8-inch diameter casing to a depth of 281 feet (67 feet below sea level); the bottom 60 feet of which consists of shutter screen casing. Below the casing, there is 49 feet of 7-inch diameter open hole that extends to a total depth of 330 feet (116 feet below sea level). The well produces basal ground water primarily from this open-hole section.

The annular space surrounding the 8-inch casing was filled with cement grout from the surface to a depth of 120 feet, to seal off what little water there is in the poorly permeable lavas from the well. The cemented section also prevents any possible surface contaminants from reaching the well.

KEANAE WELL, SPRINGS, AND STREAM SOURCES

The Keanae well will have no effect on existing springs or stream sources. Because of early concerns expressed by the community, the Keanae well was located as far away as possible from such spring and stream sources which provide irrigation water for taro cultivation.

Ohia and Store Springs are 1/2 and 3/4 mile away, respectively, from the well; and are at an elevation of 200 feet above sea level--much higher than the basal, sea-level source of the well (see Figure 1). The Waiokamilo and Wailuanui Stream source diversions, which supply irrigation water for taro cultivation in the Wailua area, are 3/4 and 1 mile away, respectively, from the well. Their elevations of 440 and 200 feet above sea level, also are much higher than the basal, sea-level source of the well.

The higher elevations and large distances of over 1/2 mile make it impossible for the existing spring and stream sources for taro irrigation to be affected by the Keanae well. The well itself encountered no perched ground water bodies during drilling all the way down to sea level, because the well was dry each time the well was bailed to remove mud and drill cuttings. Thus, the Keanae well yields no water above sea level. Its source of water is from the basal lens which occurs at sea level (see Figure 3).

Finally, the Keanae well was sealed off from the surrounding lava formations (which happen to yield no water) down to a depth of 120 feet with cement, providing complete assurance that no surface or ground water sources can enter the well or be affected by the well (see Figure 3).

PUMPING TEST RESULTS

Step-Drawdown Test. After completion of the drilling and casing of the well, a diesel-powered test pump was installed and the aquifer was cleaned and developed by pump surging until the pumped water became clear. Afterwards, on February 8, 1984, a step-drawdown test was performed on the well by pumping at three different rates until drawdown of the well became stabilized. The results were: at a

pumping rate of 100 gallons per minute (gpm) the drawdown was 0.7 feet; at 240 gpm the drawdown was 1.8 feet; and at 400 gpm the drawdown was 3.0 feet. After pumping was stopped, the water level recovered almost instantaneously, indicating a very permeable, high-yield basal aquifer. The results of the step-drawdown test are plotted in the drawdown versus pumping rate graph shown in Figure 5.

Four-Day Test. Several days after the step-drawdown test, beginning on February 13, 1984, the well was pump tested for 90 hours at a constant rate of 350 gpm (0.5 million gallons per day) to determine the safe capacity of the well. The results of the test were excellent. The drawdown of the well quickly became stable at 2.35 feet and the water quality of the aquifer was unaffected by the pumping as indicated by an unchanged chloride content of the pumped water of 12 milligrams per liter. Again, the recovery of the water level was virtually instantaneous.

SUMMARY AND CONCLUSION

The Keanae exploratory well, located approximately one-half mile from the coast at an elevation of 214 feet above mean sea level, was successful in exploring for an locating a new source of water supply from the basal ground water body that stands 6 feet above sea level in the Keanae-Wailua coastal area. The well produces water of excellent quality with a very low chloride content of only 12 milligrams per liter, and is safely capable of yielding 350 gallons per minute (0.5 million gallons per day) or more.

The Keanae well will have no effect on existing spring or stream sources in the Keanae-Wailua area. All of the spring and stream sources are located 1/2 to 3/4 mile away from the Keanae well and at elevations much higher than the basal water source (at sea level) of the well. Also as an added precaution, the Keanae well was sealed off from the surrounding lava formations with cement to a depth of 120 feet, although the lava formations penetrated by the well do not yield any water.

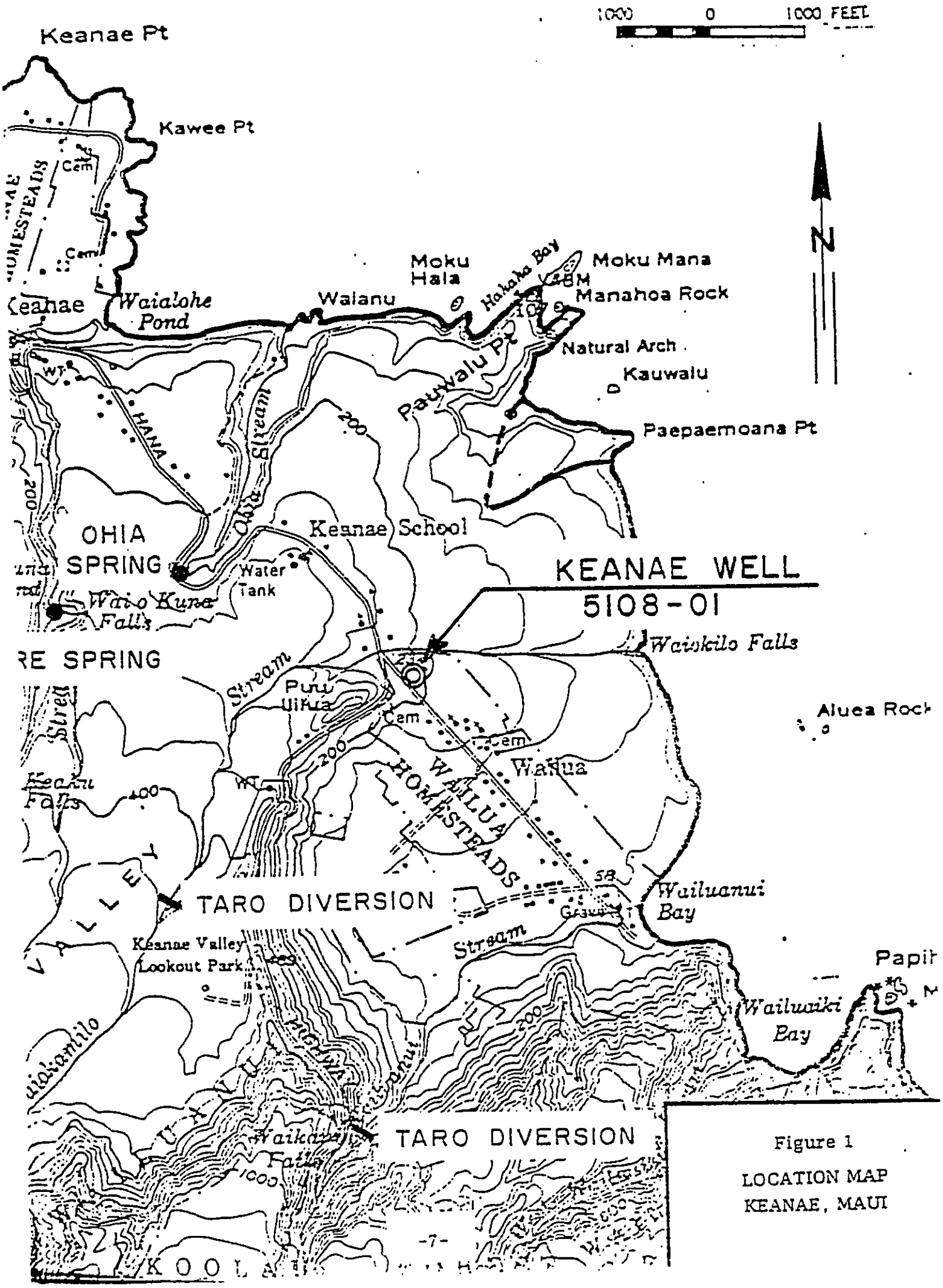


Figure 1

LOCATION MAP

KEANAE, MAUI

Explanation

Ra	Recent Alluvium
Pa	Pleistocene alluvium
Qh	Hana volcanic series lavas
Tk	Kula volcanic series lavas
Tho	Honomanu volcanic series lavas

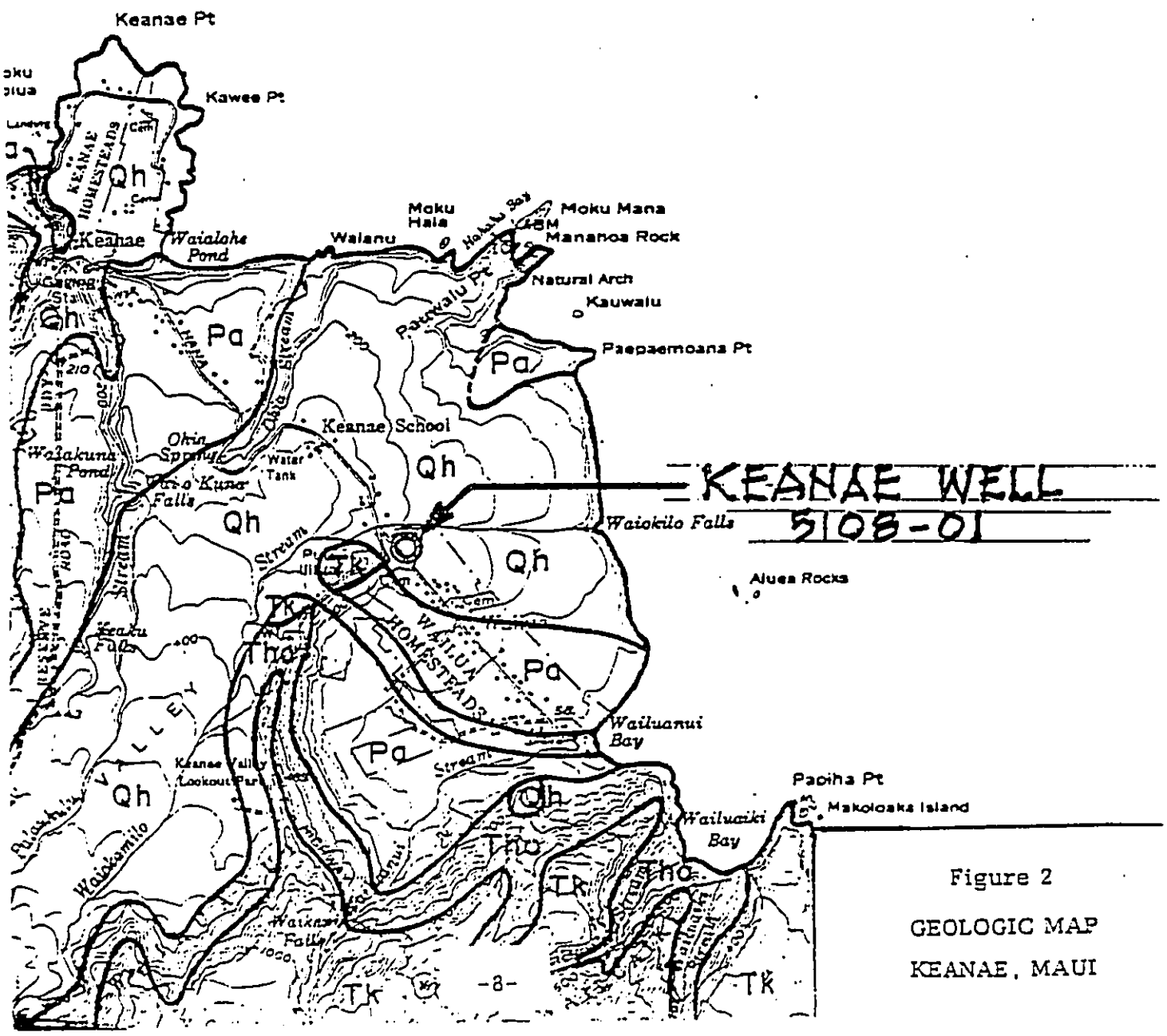


Figure 2

GEOLOGIC MAP

KEANAE, MAUI

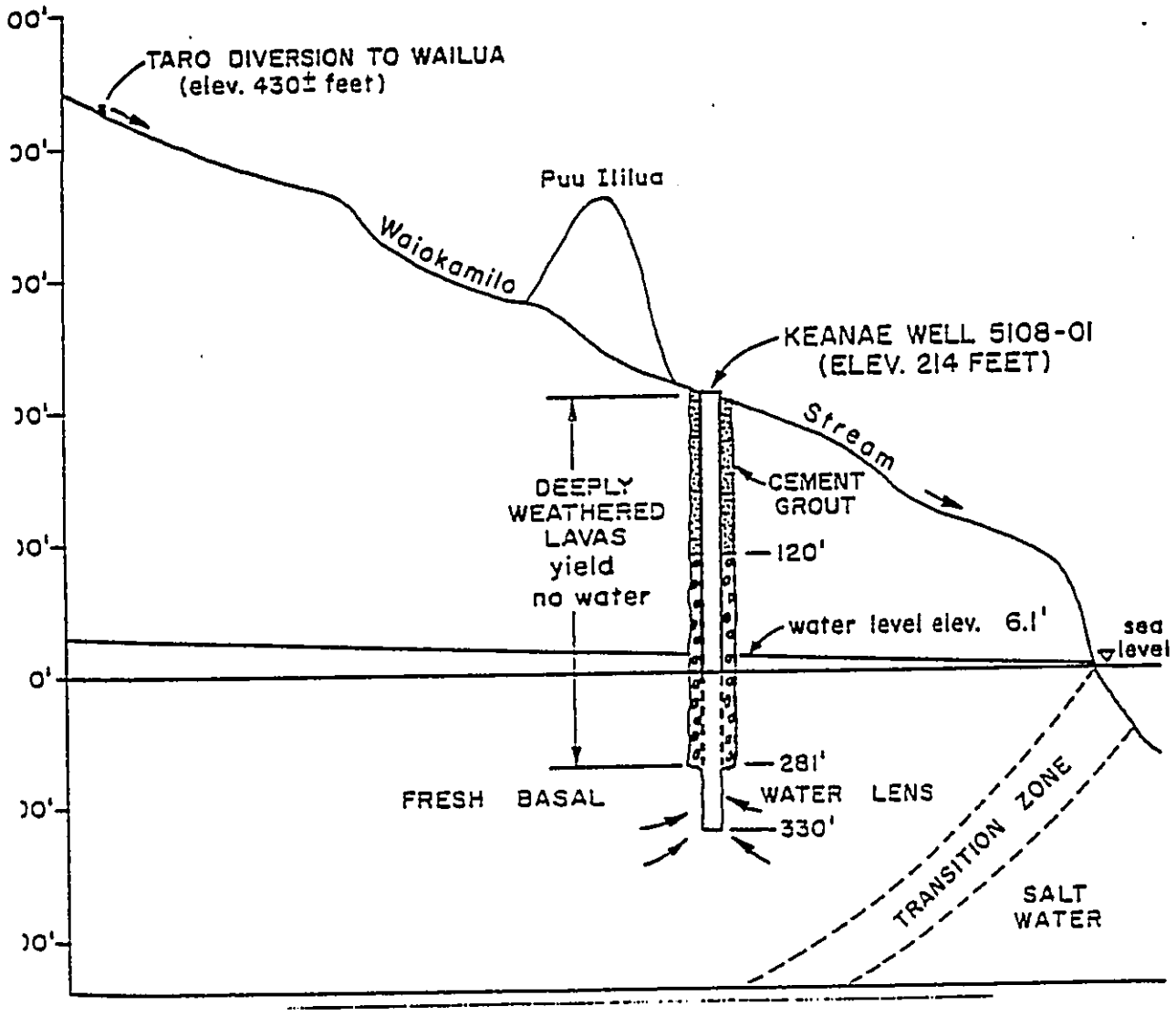


Figure 3

GEOLOGIC-HYDROLOGIC CROSS SECTION
KEANAE WELL 5108-01, MAUI

AS BUILT SECTION
Keanae Well 5108-01

DRILLED: FEB. 1984
DRILLER: ROSCOE MOSS CO.

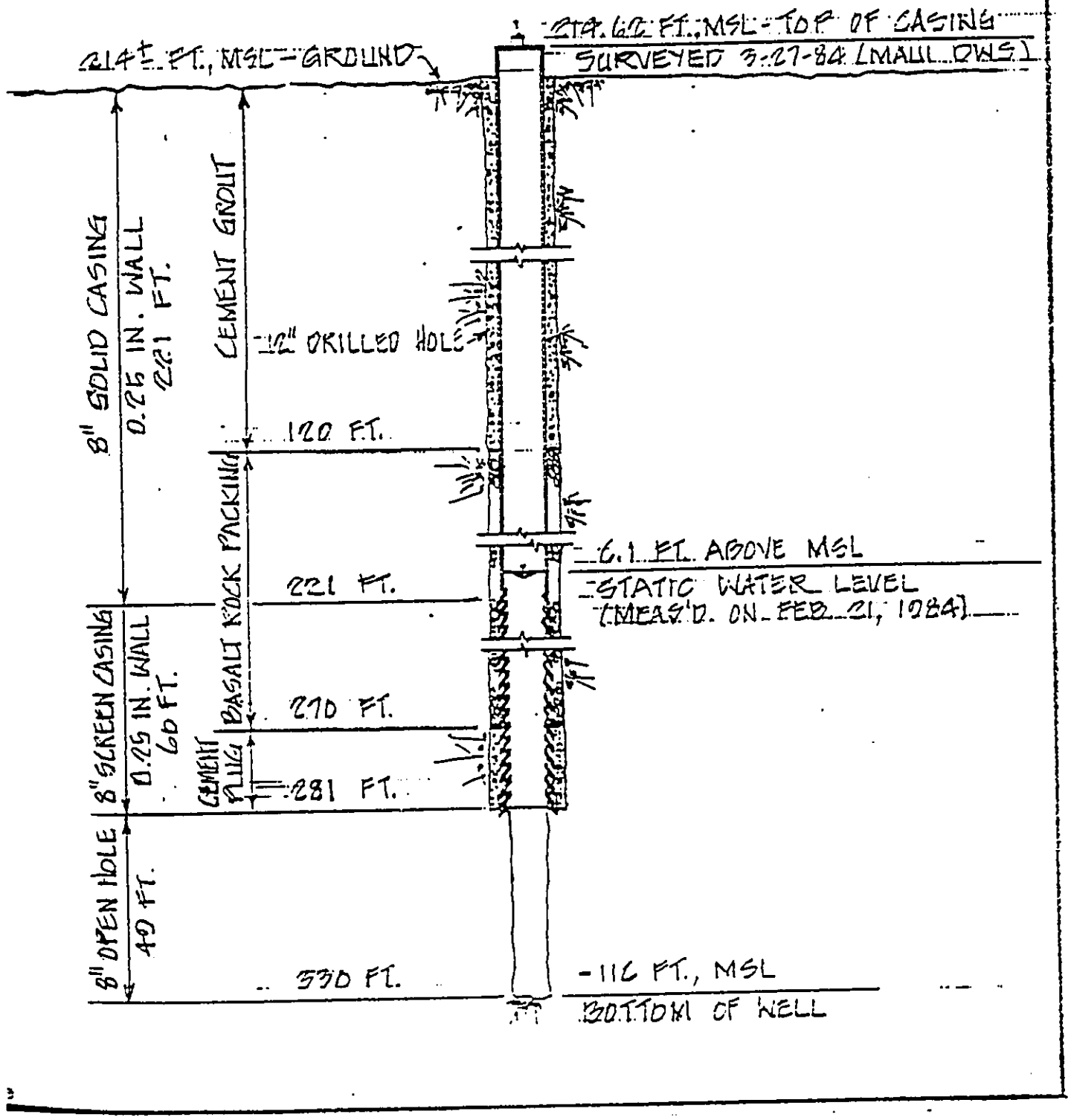


Figure 4

AS-BUILT SECTION OF WELL

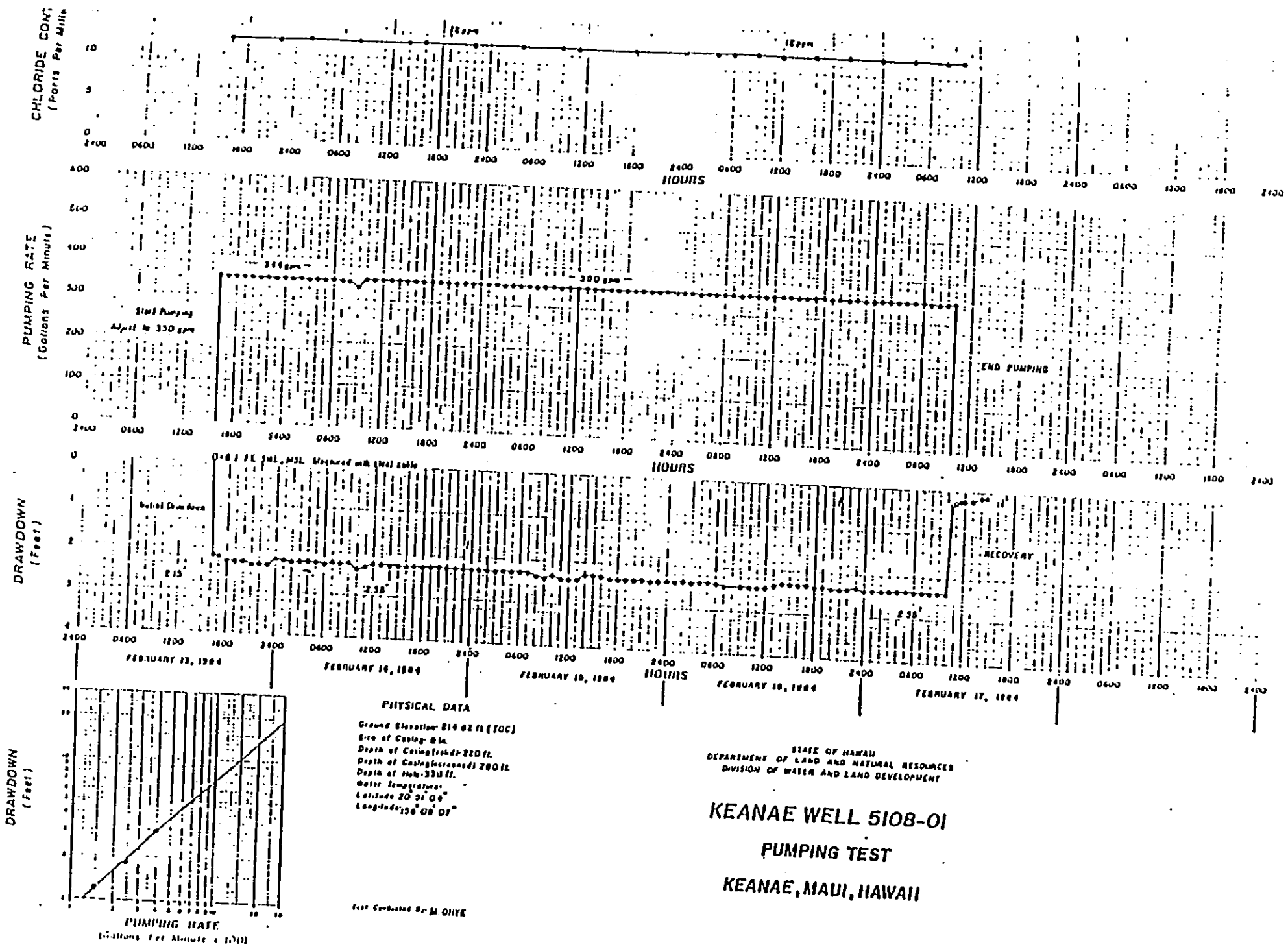


Figure 5. PUMPING TEST GRAPH

Table 1. CHEMICAL ANALYSES OF WATER

Keanae Well 5108-01, Maui

Sample Taken: 10:00 a.m., February 17, 1984
Analyses By: U.S. Geological Survey, March 30, 1984

Lab pH	7.8	
Nitrogen (NO_2+NO_3)	.12	mg/l
Calcium (Ca)	11	"
Magnesium (Mg)	8.9	"
Sodium (Na)	20	"
Potassium (K)	3.9	"
Chloride (Cl)	11	"
Sulfate (SO_4)	4.9	"
Fluoride (F)	.20	"
Silica (S_iO_2)	43	"
Iron (Fe)	12	"
Manganese (Mn)	1	"
Lab specific conductance	214	"
Alkalinity (as $CaCO_3$)	96	"

Table 2. DRILLER'S LOG
Keanae Well 51-8-01, Maui

Date	Depth (ft) From	To	Driller's Description	Remarks
Oct. 1983				
31			Mobilization	
Nov. 1983				
1- 4			"	
7- 9			"	
14-15			"	
16	0 -	2	Top soil (12" bit)	
	2 -	5	Hard rock	
17	5 -	12	Boulders & blue rock	
18	12 -	18	" " "	
21	18 -	26	" " "	
22	26 -	28	" " "	
	28 -	41	Red clay, some rocks	
23	41 -	45	" " " "	
	45 -	58	Brown clay, some rocks	
25	58 -	73	" " " "	
28	73 -	75	Brown clay with boulders	Morning DTW = 42 ft.
29	75 -	85	" " " "	Morning DTW = 43 ft.
30	85 -	90	Gray clay with boulders	Rocks falling in
Dec. 1983				
1	90 -	95	" " " "	Morning DTW = 44 ft.
2	95 -	100	Brown clay with boulders	" " " "
5	100 -	105	" " " "	" " " "
6	105 -	110	" " " "	" " " "
7	110 -	117	" " " "	" " " "
8	117 -	127	" " " "	Morning DTW = 90 ft.
	127 -	132	Loose rocks, no mud	Caveins, cement hole
12			Drilled 5 ft. of cement	Morning DTW = 100 ft.
13	135 -	140	Brown clay with boulders	" " " "
14	140 -	145	" " " "	" " " "
15	145 -	155	" " " "	Morning DTW = 105 ft.
16	155 -	160	" " " "	Morning DTW = 130 ft.
	160 -	165	Rocks, no mud	Caveins 158'-165'
19	160			Stuck in hole
20				" " "
21-23				" " "
27				Re-drill hole
28				Re-drill 150'-163'
29-30				Re-drill 145'-155'

Date	Depth (ft) From	To	Driller's Description	Remarks
Jan. 1984				
3- 4				Install temporary 8" casing to 155'
5				Morning DTW = 136 ft.
6	165 -	175	Blue rock, brown clay	
9	175 -	200	Brown clay, some rocks	Morning DTW = 136 ft.
10	200 -	210	" " " "	
	210 -	215	Red clay and rocks	
11	215 -	225	" " " "	Morning DTW = 135 ft.
	225 -	250	Gray-brown clay	
12	250 -	280	" " "	Morning DTW = 135 ft.
17				Remove temp. 8" casing
18-20				Ream to 12"
23-25				Ream to 12" to 288 ft.
26				Install 8" casing and set cement plug.
27				Gravel pack to 150 ft.
31				Gravel pack to 120 ft. 80 bags cement 100 to 120 ft.
Feb. 1984				
1				40 bags cement 50-100 ft.
2				40 bags cement 0-50 ft.
3	285 -	295	Gray-brown clay & rock	Drill cement plug 270-285 ft. Bail test: 18 gpm, drawdown to 230 ft., recover to 210 ft.
6	295 -	315	Brown clay, blue rock	Morning DTW = 220 ft.
7	315 -	330	Cinders, no mud	Bail test: 23 gpm, 5 ft. drawdown
8-10				Install test pump Pump surge well
13-17				Pump test
20-21				Remove pump
22				Plumbness & alinement test, video log well
23-24				Demobilization

Table 3. PUMPING TEST RECORD

Keanae Well 5108-01, Maui

Ground Elevation	214 ft., msl
T.O.C. Elevation	214.62 ft., msl
Casing Size	8-inch
Blank Casing Depth	221 ft. (-7 ft., msl)
Shutter Screen Casing Depth	281 ft. (-67 ft., msl)
Total Depth of Well	330 ft. (-116 ft., msl)
Static Water Level	6.1 ft., msl (on Feb. 24, 1984)
Bottom of Airline	230 ft.
Test Conducted by	Mitchell Ohye

Date & Time	Pumping Rate (gpm)	Airline Reading (psi)	Drawdown (feet)	Chlorides mg/l
		Step-Drawdown Test		
Feb. 8, 1984				
0925	0	13.5	0	
1940	0	13.5	0	
0945	(Start Pump, Adjust to 100 gpm)			
0955	100	13.2	0.7	12
1000	100	13.2	0.7	
1015	100	13.2	0.7	
1045	100	13.2	0.7	
	(Adjust to 250 gpm)			
1050	240	12.7	1.8	
1100	240	12.7	1.8	
1115	240	12.7	1.8	
1130	240	12.7	1.8	
1145	240	12.7	1.8	
	(Adjust to 400 gpm)			
1150	400	12.2	3.0	
1200	400	12.2	3.0	12
1215	400	12.2	3.0	
1230	400	12.2	3.0	
		Recovery Test		
1235 (elapsed time in min.)	(Stop Pump)			
1	0	13.4	0	
3	0	13.4	0	
5	0	13.4	0	
10	0	13.4	0	
15	0	13.4	0	

EXHIBIT C

WATER QUALITY ANALYSIS

KE'ANAE WATER SYSTEM
(KE'ANAE WELL NO. 1)

2V

SEP 0

Y96 0

Department of Health Laboratories

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & SYNTHETIC ORGANIC CHEMICALS REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine ✓ Special ____

Collection remarks ____

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) AKIDE, ____

Date: 8-22-96 Time: 0925

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by:	Date/Time	Received by:	Date/Time
E Kuba	8-23-96 / 0730		
Delivered to Lab by:	Date/Time	Rec'vd for Laboratory by:	Date/Time
W. Dan	8/23/96 1:30	P8-96-279 Ruth Puesto	8/23/96 1:30

Method of Shipment: HAND CARRIED ____ HAWAIIAN AIR ____ ISLAND AIR ____ OTHER ____

Seal Intact: Yes ____

Sample Lab # Relinquished by:	Date/Time	Received by:	Date/Time
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time

Method: EPA 505

Sample Preservation: Dechlorination: appx 3 mg $Na_2S_2O_3$

(SOC96) (Rev: 6/96)

(over)

	Contaminants	MCL ug/L	ND ug/L	method	results ug/L	date analyzed	analyst	lab number
A	Regulated Organohalides							
	Hexachlorocyclopentadiene	50	<0.05	505		AUG 2 3 1996	AB	PS-96-279
	Hexachlorobenzene	1	<0.05	505				
	Lindane	0.2	<0.02	505				
	Heptaclor	0.4	<0.01	505				
	Heptachlor Epoxide	0.2	<0.01	505				
	Endrin	2	<0.01	505				
	Methoxychlor	40	<0.05	505				
	Alachlor	2	<0.05	505				
B	Unregulated (Phase II)							
	Metribuzin	no MCL	<0.2	505				
	Aldrin	no MCL	<0.01	505				
	Butachlor	no MCL	<0.05	505				
	Dieldrin	no MCL	<0.01	505				
	Metalochlor	no MCL	<0.05	505				

Reported by: [signature] Date: AUG 2 9 1996 QA Check: RK Date: AUG 2 9 1996

Forwarded by: [signature] Date: SEP 0 3 1996

SOC96) (Rev: 6/96)

Department of Health Laboratories

SEP 13 1996

Y96 0

SAFE DRINKING WATER BRANCH CHAIN OF CUSTODY & SYNTHETIC ORGANIC CHEMICALS REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine ✓ Special ____

Collection remarks ____

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) A Kibe, ____

Date: 8-22-96 Time: 0925

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by: Date/Time	Received by: Date/Time
K Kuba 8-23-96/0730	
Delivered to Lab by: Date/Time W. Lee 8/23/96 1:3:	Rec'vd for Laboratory by: Date/Time P8-96-320 Ruth Pineda 8/23/96 1:30

Method of Shipment: HAND CARRIED ____ HAWAIIAN AIR ____ ISLAND AIR ____ OTHER ____

Seal Intact: Yes ____

Sample Lab # Relinquished by: Date/Time	Received by: Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time

Method: EPA 507/508

Sample Preservation: Dechlorination: appx 40 mg $Na_2S_2O_3$

SOP 96) (Rev: 6/96)

(over)

	Contaminants	MCL ug/L	ND ug/L	NQ ug/L	method	results ug/L	date analyzed	analyst	lab number
A	Regulated Organohalides								
	Chlordane	2	<0.10	<0.30	508		AUG 2 8 1996	BP	P8-96-320
	Toxaphene	3	<0.50	<1.5	508				
	Arochlor 1016	**	<0.26	---	508				
	Arochlor 1221	**	<0.19	---	508				
	Arochlor 1232	**	<0.23	---	508				
	Arochlor 1242	**	<0.26	---	508				
	Arochlor 1248	**	<0.30	---	508				
	Arochlor 1254	**	<0.33	---	508				
	Arochlor 1260	**	<0.36	---	508				
	Simazine	4	<0.07	---	507				
	Atrazine	3	<0.05	---	507				
B	Unregulated (Phase II)								
	Propachlor	no MCL	<0.1	---	508*				

Reported by: Ruth Pineda Date: SEP 0 5 1996 QA Check: AK Date: SEP 0 5 1996

Forwarded by: Comn K. Mast Date: SEP 1 0 1996

*using alternate detector

**Any positive Arochlor result would require analysis for total PCB as decachlorobiphenyl by method 508A (MCL = 0.5ug/L). The listed detection limits are the concentration equivalent of 0.5 ug/L decachlorobiphenyl.

(SOC96) (Rev: 6/96)

Y096 158

Department of Health Laboratories

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & INORGANIC METALS CHEMICAL REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

KEANAE SCHOOL

Treatment: A

Collection remarks

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) [illegible]

Date: 4/16/96 Time: 0840

ADMINISTRATION ONLY

Copies Done		Pos. Result	
Sent System		Chem. Pos.	
Sent NI Off.		Incr. Mon.	
Data Entered		Violation	
SDWB Data		Neg. Results	
GIS Data		Reduce Mon.	

Delivered to Airport by:	Date/Time	Received by:	Date/Time
[illegible]	4/16/96 1400		

Delivered to Laboratory by:	Date/Time	Rec'vd for Laboratory	Date/Time
[illegible]	4-17-96 820	R. [illegible]	APR 17 1996 . 0820

Method of Shipment: HAL Seal Intact: Yes

Sample Lab #	Relinquished by:	Date/Time	Received by:	Date/Time
P4-96-309	R. [illegible]	APR 26 1996 0900	M Craddock	APR 26 1996 0900

Sample Lab #	Locked:	Date/Time	Rem'vd	Date/Time

Sample Lab #	Locked in Refrig.	Date/Time	Rem'vd	Date/Time

(Over)

CINORG96,
Rev-2/96)

	Contaminants	MCL*	Lab Results*	Analytical Method	Date Analyzed	Analyst	Lab Number
✓	Arsenic	0.05	<0.002	200.9	AUG 1 9 1996	EN/RS	P4-96-308
	Selenium	0.05	<0.005	200.9	AUG 2 0 1996		
	Mercury	0.002	<0.0005	245.1	MAY 1 0 1996		
	Cadmium	0.005	<0.0002	200.9	AUG 2 0 1996		
	Lead	0.015**	<0.005	200.9	AUG 2 0 1996		
	Chromium	0.1	<0.002	200.9	AUG 1 5 1996		
	Barium	2.0	<0.010	3111B	AUG 1 4 1996		
	Sodium		22	3111B	AUG 1 5 1996		
	Copper	1.3 **	<0.05	3111B	AUG 1 4 1996		
	Nickel	0.1	<0.005	200.9	AUG 2 0 1996		
✓	Antimony	0.006	<0.002	200.9	AUG 1 5 1996		
✓	Beryllium	0.004	<0.0005	200.9	AUG 2 0 1996		
	Thallium	0.002	<0.001	200.9	AUG 1 9 1996		
	Fluoride	1.4	<0.2	4500F-C	APR 2 6 1996	mc	P4-96-309
	Cyanide	0.2					

* Measured in miligrams per liter (mg/L) unless otherwise specified.
** Action Level

			Signature	Date	Lab No.
Container:	METALS	HNO_3 ✓	EN	4/17/96	P4-96-308

9/14/96

Reported by: [signature] mc Date: AUG 2 3 1996 QA Check: [signature] Date: AUG 2 9 1996

Forwarded by: [signature] Date: SEP 0 5 1996

(INORG96)
(Rev-2/96)

Y096 Y096 161

Department of Health Laboratories

SAFE DRINKING WATER BRANCH CHAIN OF CUSTODY & NITRATE, NITRITE CHEMICAL REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of [illegible] Species

Collection remarks

Sample Chlorinated Y /, N ___, ? ___

Sampler(s) [illegible], ___

Date: 4/16/96 Time: 0540

KEANAE SCHOOL

Treatment:A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by:	Date/Time	Received by:	Date/Time
[illegible]	4/16/96 1900		
Delivered to Laboratory by: J Lyon 4-17-96 4-17-96	Date/Time 820	Rec'vd for Laboratory R. Saito	Date/Time APR 17 1996 0820

Method of Shipment: HAL Seal Intact: Yes ___

Sample Lab #	Relinguished by: Date/Time	Received by: Date/Time

Sample Lab #	Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time

(Over)

(NITRAT95)
(Rev-2/95)

	Contaminants	MCL*	Lab Results*	Analytical Method	Date Analyzed	Analyst	Lab Number
	Nitrate (as N)	10.0	0.17	353.1	APR 17 1996	RS/EN	P4-96-310
	Nitrite (as N)	1.0	<0.05	354.1	APR 17 1996	↓	↓

* Measured in miligrams per liter (mg/L) unless otherwise specified.

			Signature	Date	Lab No.
Container:	NO_3NO_2	H_2SO_4 ___	_____	____	_____

eported by: R. Sandi for Date: APR 23 1996 QA Check: [signature] Date: APR 29 1996

orwarded by: [signature] Date: MAY 01 1996

NITRAT95)
Rev-2/95)

Q197 064

Department of Health Laboratories APR 2 1997

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & GLYPHOSATE CONTAMINANT REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine__ Special______

Collection remarks______

Sample Chlorinated Y ✓, N__, ?__ 0.64 42

Sampler(s) Kenson Kubo,

Date: 03-20-97 Time: 0840

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done		Pos. Result	
Sent System		Chem. Pos.	
Sent NI Off.		Incr. Mon.	
Data Entered		Violation	
SDWB Data		Neg. Result	
GIS Data		Reduce Mon.	

Delivered to Airport by: Date/Time	Received by: Date/Time
KKubo 3.21.97 0800	
Delivered to Laboratory by: Date/Time	**Rec'vd for Laboratory by: Date/Time**
[signature] 3-21-97 1200	[signature] MAR 21 1997 1200

Method of Shipment: ______ Seal Intact: Yes______

Sample Lab # Relinquished by: Date/Time	Received by: Date/Time
P3-97-359	
Sample Lab # Locked in Refrig Date/Time	**Rem'vd from Refrig Date/Time**

Regulated Compound	ND ug/l	NQ ug/l	MCL ug/l	RESULT*	Date	Analyst
Glyphosate	<20	<30	700		MAR 24 1997	KB

Method: EPA 547

Sample Preservation:/Dechlorination: appx 4 mg $Na_2S_2O_3$

Reported by: K. Bottle Date MAR 24 1997 QA Check: AJC Date: 3/24/97

Forwarded by: [signature] Date: MAR 24 1997

(GLYP95)
(2/95)

DEC 10 1996

Q496 061

epartment of Health Laboratories

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & GLYPHOSATE CONTAMINANT REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine ✓ Special ____

Collection remarks TOTAL Cl_2 = 2.7 mg/L

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) JERALD SUAREZ

Date: 12-4-96 Time: 1302

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Result	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by:	Date/Time	Received by:	Date/Time
A	12-5-96 1430		
Delivered to Laboratory by:	Date/Time	Rec'vd for Laboratory by:	Date/Time
J. Taylor	12-6-96 1000	Kal Botte	DEC 06 1996 1007

Method of Shipment: HAL Seal Intact: Yes ____

Sample Lab # Relinquished by:	Date/Time	Received by:	Date/Time
PIL-46-67			
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time

Regulated Compound	ND ug/l	NQ ug/l	MCL ug/l	RESULT*	Date	Analyst
Glyphosate	<20	<30	700		DEC 10 1996	KB

Method: EPA 547

Sample Preservation:/Dechlorination:
appx 4 mg $Na_2S_2O_3$

Reported by: K. Botte Date: DEC 10 1996 Check: ML Date: 12/10/96

Forwarded by: [signature] Date: DEC 12 1996

(GLYP95)
(2/95)

0396 0.

Department of Health Laboratories

SEP 10 1996

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & GLYPHOSATE CONTAMINANT REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine ✓ Special

Collection remarks

Sample Chlorinated Y ✓, N __, ? __

Sampler(s) A. Kim

Date: 8-22-96 Time: 0928

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done		Pos. Result	
Sent System		Chem. Pos.	
Sent NI Off.		Incr. Mon.	
Data Entered		Violation	
SDWB Data		Neg. Result	
GIS Data		Reduce Mon.	

Delivered to Airport by:	Date/Time	Received by:	Date/Time
K Kuba	8-23-96 /0730		
Delivered to Laboratory by:	Date/Time	Rec'vd for Laboratory by:	Date/Time
W. Aen	8/23/96 1140	Karl Bitter	8/23/96 1346

Method of Shipment: Seal Intact: Yes

Sample Lab # Relinquished by:	Date/Time	Received by:	Date/Time
P8-96-325			
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time

Regulated Compound	ND ug/l	NQ ug/l	MCL ug/l	RESULT*	Date	Analyst
Glyphosate	✓ <20	<30	700		8/29/96	KB

Method: EPA 547

Sample Preservation:/Dechlorination: appx 4 mg $Na_2S_2O_3$

Reported by: K. Bitter Date: 8/29/96 QA Check: AK Date: 8/29/96

Forwarded by: K. [illegible] Date: SEP 03 1996

(GLYP95)
(2/95)

MONTGOMERY WATSON LABORATORIES

555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6324;
1 800 566 LABS (1 800 566 5227)

Laboratory Report

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului , HI 96732
ATTN: Cari Cerizo

Sample # 960531013 Sample ID KEAHAE Project PHASEV
Sample Type Water Sampled 29-may-1996 Received 31-may-1996 Reported 17-jul-1996

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Alkalinity	(HL/S2320B)	mg/l	92				5			06-jun-1996	acc
Anion Sum	(HL/SM1040)	meq/l	2.35				0.001			17-jun-1996	wim
Calcium, Flame AA	(HL/S3111B)	mg/l	11				1			10-jun-1996	jps
Cation Sum	(HL/SM1040)	meq/l	2.43				0.001			17-jun-1996	wim
Chloride	(HL/EPA 300)	mg/l	14				1			31-may-1996	eyw
Free CO2 (25C)	(HL/S2320-B)	mg/l	5.63				0.001			11-jun-1996	deb
Carbonate as CO3, Calculated	(HL/S2320-B)	mg/l	0.290				0.001			11-jun-1996	deb
Specific Conductance	(HL/S2510B)	umho/cm	235				4			05-jun-1996	sar
Fluoride	(SM4500F-C)	mg/l	0.13				0.1			10-jun-1996	amu
Hardness (Total, as CaCO3)	(HL/SM2340B)	mg/l	69				1			17-jun-1996	wim
Bicarbonate as HCO3, calculated	(HL/S2320B)	mg/l	112				0.001			11-jun-1996	deb
Mercury	(EPA/ML 245.1)	ug/l	ND				0.5	04-jun-1996	gub	05-jun-1996	gub
Potassium, Flame AA	(HL/S3111B)	mg/l	3.8				1			10-jun-1996	jps
Langelier Index - 25 degree	(HL/SM2330B)	None	-0.8				-0.9			17-jun-1996	wim
Magnesium, Flame AA	(HL/S3111B)	mg/l	10				1			10-jun-1996	jps
Sodium, Flame AA	(HL/S3111B)	mg/l	22				1			10-jun-1996	jps
Nitrite, Nitrogen by IC	(HL/EPA 300.0)	mg/l	ND				0.1			31-may-1996	eyw
Nitrate-N by IC	(EPA/ML 300.0)	mg/l	0.2				0.1			31-may-1996	eyw
Hydroxide as OH, Calculated	(HL/S2320B)	mg/l	0.001				0.001			11-jun-1996	deb
Lab pH	(HL/S4500H-B)	Units	7.6				0.001			05-jun-1996	sar
pH of CaCO3 saturation(25C)	(HL/SM2330B)	Units	8.4				0.001			17-jun-1996	wim
pH of CaCO3 saturation(60C)	(HL/SM2330A)	Units	7.9				0.1			17-jun-1996	wim
Sulfate	(HL/EPA 300)	mg/l	4.4				2			31-may-1996	eyw
Total Dissolved Solids	(HL/S2540C)	mg/l	190				10			05-jun-1996	huy

Report #: 27281

MONTGOMERY WATSON LABORATORIES

555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6324;
1 800 566 LABS (1 800 566 5227)

Laboratory Report

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului , HI 96732
ATTN: Cari Cerizo

Sample # 960511013 Sample ID KEAHAE Project PHASEV
Sample Type Water Sampled 29-may-1996 Received 31-may-1996 Reported 17-jul-1996

T-22 Inorg+Gen Min ICPMS Mets (ML 200.8)

Parameter	Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver, Total, ICAP/MS	ug/l	ND			1	10	03-jun-1996	jps	03-jun-1996	jps
Aluminum, Total, ICAP/MS	ug/l	ND			1	50	03-jun-1996	jps	03-jun-1996	jps
Arsenic, Total, ICAP/MS	ug/l	ND			1	5	03-jun-1996	jps	03-jun-1996	jps
Barium, Total, ICAP/MS	ug/l	ND			1	10	03-jun-1996	jps	03-jun-1996	jps
Beryllium, Total, ICAP/MS	ug/l	ND			1	1	03-jun-1996	jps	03-jun-1996	jps
Cadmium, Total, ICAP/MS	ug/l	ND			1	0.5	03-jun-1996	jps	03-jun-1996	jps
Chromium, Total, ICAP/MS	ug/l	8.6			1	5	03-jun-1996	jps	03-jun-1996	jps
Copper, Total, ICAP/MS	ug/l	ND			1	50	03-jun-1996	jps	03-jun-1996	jps
Iron, Total, ICAP/MS	ug/l	140			1	100	03-jun-1996	jps	03-jun-1996	jps
Manganese, Total, ICAP/MS	ug/l	3.9			1	2	03-jun-1996	jps	03-jun-1996	jps
Nickel, Total, ICAP/MS	ug/l	ND			1	5	03-jun-1996	jps	03-jun-1996	jps
Lead, Total, ICAP/MS	ug/l	6.5			1	5	03-jun-1996	jps	03-jun-1996	jps
Antimony, Total, ICAP/MS	ug/l	ND			1	2	03-jun-1996	jps	03-jun-1996	jps
Selenium, Total, ICAP/MS	ug/l	ND			1	5	03-jun-1996	jps	03-jun-1996	jps
Thallium, Total, ICAP/MS	ug/l	ND			1	1	03-jun-1996	jps	03-jun-1996	jps
Zinc, Total, ICAP/MS	ug/l	ND			1	20	03-jun-1996	jps	03-jun-1996	jps

Report #: 27281

APPENDIX A

PRECONSULTATION CORRESPONDENCE

C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Maui, Hawaii 96793
Phone: (808) 249-0411

June 19, 1997

Mr. Dennis Tulang
Wastewater Branch
Department of Health
919 Ala Moana Blvd., Rm. 309
Honolulu, Hawaii 96814

CWS-9702

Subject: Proposed Keanae 2 Well

Job No. ~~8-9604~~

Dear Sir:

We are planning a potable drinking water well in the Keanae area of Maui for the Maui Department of Water Supply. The well will be in the vicinity of the Department's existing well. At present, the proposed well site is approximately 75 feet from the existing potable water well.

In reviewing the Hawaii Well Construction and Pump Installation Standards, we noted that the well should be 1,000 feet from a cesspool, septic tank or subsurface sewage leaching field. The chair person may decrease the distance based upon local geologic or hydrologic conditions.

We would like to know the Wastewater Rules and Regulations regarding cess pools, septic systems, etc. within a 1,000 feet of the well. Can a new individual waste water disposal system i.e. septic tank be constructed within a 1,000 feet of a potable water well. Your response on this matter would be appreciated so we can take to necessary measures to provide a potable water well for the community.

If we can be of any further assistance, please do not hesitate to call me at 249-0411.

Very truly yours,

C. TAKUMI ENGINEERING, INC.

Carl K. Takumi, P.E.

Cc: Herb Kogasaka, Department of Water Supply

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

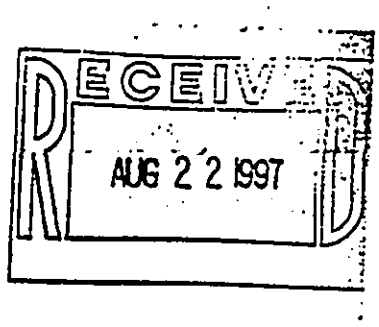
STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EMD / WB

970913
M8-9604.02

August 18, 1997

Mr. Carl K. Takumi, P.E.
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Maui, Hawaii 96793



Dear Mr. Takumi:

Subject: **Property Information Request**
Proposed Keanae 2 Well, Maui
Job Number 8-9604

We have reviewed your letter on the subject project and have the following comments to offer. Section 11-62-32 of the State of Hawaii Department of Health Administrative Rules, Chapter 11-62, "Wastewater Systems" requires a minimum horizontal distance between a potable drinking water well and cesspools, seepage pits or soil absorption systems to be at least 1,000 feet unless otherwise approved by the Director. This section of the rule prohibits construction of new wastewater systems within this setback area. However the section does not address existing dwellings, building modifications or subdivisions within this setback area, nor does it address the situation in which a potable water well is built after wastewater systems are installed.

Therefore, in answer to your inquiry, new individual wastewater systems (IWS) can be constructed within the 1000 foot setback distance between and IWS and potable drinking water well provided that there is only a single IWS per lot of record and the new IWS is an aerobic unit with shallow soil absorption system. The requirement for the use of an aerobic unit can be modified provided that the appropriate water department/agency concurs with the use of a septic tank. However, the Department will not concur with any subdivision proposal or development proposal within the 1000 foot setback area.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules.

Should you have any further questions, please contact Mr. Harold Yee of the Wastewater Branch at telephone 586-4294.

Sincerely,

DENNIS TULANG, P.E.
Chief, Wastewater Branch

CWS-9702

0997001

1997 SEP -2 AM 11:12

DEPT. OF WATER SUPPLY
COUNTY OF MAUI

July 31, 1997

Mr. Edwin U. Matsuda
P. O. Box 94
Hana, Hawaii 96713

Mr. David R. Craddick, Director
County of Maui
Department of Board of Water Supply
P. O. Box 1109
Wailuku, Hawaii 96793-7109

Dear Mr. Craddick:

Re: Public Information Meeting, July 29, 1997,
Keanae Well No. 2 Water Development Project

Thank you very much for the maps, capacity, and cost information regarding the Keanae Well No. 2 which was faxed to me by Jerry.

Unfortunately, due to a previous commitment, I was unable to attend the public meeting on Tuesday, July 29, 1997, in Keanae. However, I made a physical inspection on all four (4) sites including the YMCA campsite on my way to Kahului at noon on July 29, 1997.

Although, I am not a resident of Keanae, my first choice of site would be Site No. 4, TMK: 1-1-08:016, Keanae School, because of the present location of the water tank, centralized distribution, and elevation of the area. The cost of drilling from that altitude was my negative response.

My second site selection would be the present Site No. 1, Existing Well, TMK: 1-1-04:043 or Camp and Stable Lot, TMK: 1-1-04:032 because the cost to join into the main distribution line to the water tank would be minimal.

My concerns are the closeness of Pump No. 1, water capacity, and contents of the existing well site.

Thank you for letting me provide my comments. I wish you and your expertise staff success with the majority of the Keanae residents satisfied in the outcome of this project.

Sincerely,

Edwin U. Matsuda

EUM:ghk

BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

September 5, 1997

Mr. Edwin U. Matsuda
P. O. Box 94
Hana, Hawaii 96713

Dear Mr. Matsuda:

Re: **KEANAE WELL NO. 2 (REFERENCE NO. CWS-9702)**

Thank you for the comments in your dated July 31, 1997 regarding the location of Keanae Well No. 2. After consideration, we have elected to keep the Site No. 1 as the primary site based upon cost considerations. The existing well site allows the use of existing piping, control tank, booster pumps, electricity, disinfection already in place. Potable water from the well site is pumped to a 50,000-gallon reservoir above Keanae School which centralizes the distribution.

Additionally, the new well serves as a back-up well to provide a more reliable source for the community. We anticipate that the wells will be pumped alternately and not simultaneously which means that there should have no effect upon the existing well capacity and ~~contents~~ water quality.

Should you have any questions, please contact our Engineering Division at 243-7835.

Sincerely,

David R. Craddick
Director

xc: Carl Takumi Engineering, Inc.

SEP 0 9 1997

APPENDIX B

DRAFT EA COMMENTS AND RESPONSES

LINDA CROCKETT LINGLE
Mayor

DAVID W. BLANE
Director

LISA M. NUYEN
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING
250 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

October 14, 1997

Mr. Carl Takumi
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

Dear Mr. Takumi:

Re: Draft Environmental Assessment for the Keanae Well No. 2 at TMK: 1-1-004:043, Keanae, Island of Maui, Hawaii

Please be advised that the project location is within the Special Management Area (SMA) boundaries. Therefore, the project must comply with the SMA Rules for the Maui Planning Commission.

Impacts of a mechanical failure on the existing well should be discussed more thoroughly to better consider the "no action alternative" to the proposed action.

Thank you for the opportunity to provide preliminary comments. Should you have any questions, please contact Mr. Daren Suzuki, Staff Planner, of this office at 243-7735.

Very truly yours,

DAVID W. BLANE
Director of Planning

DWB:DMS:ghk
c: Lisa M. Nuyen, Deputy Director of Planning
Clayton Yoshida, AICP, Planning Program Administrator
Daren M. Suzuki, Staff Planner
Project File
General File S:\ALL\DAREN\KAENAE.WEL

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 20, 1998

Mr. David Blane
Department of Planning
County of Maui
220 S. High Street
Wailuku, Hawaii 96793

Subject: **ENVIRONMENTAL ASSESSMENT FOR KEANAE WELL NO. 2**
KEANAE, MAUI, HAWAII

Dear Mr. Blane:

We have received your comments on the Environmental Assessment for the Keanae Well No. 2. We respond to your comments as follows:

The Department will be submitting an application for an SMA Permit to perform the work. The need for the SMA permit has been stated in the Environmental Assessment.

We expand the "no action" alternative as follows:

A "no action" alternative is not acceptable. The Department of Water Supply is responsible for providing the community with clean potable water. The existing well is presently the sole source of potable water. The system has sufficient storage in the system for two days supply; if a pump failure occurs, it would take 60 to 90 days to repair the pump. The community would not have potable water unless other alternatives are considered. Other alternatives considered by the Department are discussed below."

Thank you for your prompt review and response. Your comments are appreciated.

Sincerely,

David R. Craddick
Director
HK:sc

xc: Carl Takumi Engineering

MAR [illegible] 1998

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

October 22, 1997

Mr. Carl K. Takumi, P.E.
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

Dear Mr. Takumi:

Draft Environmental Assessment for Keanae Well No. 2

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas which are important for the maintenance of streams and the replenishment of aquifers.

[X] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[X] A Well Construction Permit and a Pump Installation Permit from the CWRM would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the CWRM would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows. This may require an instream flow standard amendment.

[ ] We recommend that no development take place affecting highly erodible slopes which drain into streams within or adjacent to the project.

[ ] If the proposed project diverts additional water from streams or if new or modified stream diversions are planned, the project may need to obtain a stream diversion works permit and petition to amend the interim instream flow standard for the affected stream(s).

[X] Based on the information provided, it does not appear that a Stream Channel Alteration Permit pursuant to Section 13-169-50, HAR will be required before the project can be implemented.

[ ] An amendment to the instream flow standard from the CWRM would be required before any streamwater is diverted.

[ ] Any new development that is permitted along a stream that is not yet channelized should be based on the express condition that no streams will be channelized to prevent flooding of the development. Development in the open floodplain should not be allowed; other economic uses of the floodplain should be encouraged.

[ ] OTHER:

If there are any questions, please contact Charley Ice at 587-0251.

Sincerely,

RAE M. LOUI
Deputy Director

CI:ss

BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

November 3, 1997

Ms. Rae M. Loui, Deputy Director
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR KEANAE WELL NO. 2
Keanae, Maui, Hawaii

Dear Ms. Loui:

We have received your agency comments dated October 22, 1997 and respond as follows:

1. The proposed Keanae Well No. 2 is consistent with Maui County Water Use and Development Plan. The present well is sufficient to provide for the demands of the Keanae Water System. If a breakdown occurs at the present well, the Department has decided after consideration of several alternatives that a second well is a feasible means of providing a more reliable source of water for the Keanae Water System. The Department will incorporate this project with the update of the Water Use and Development Plan.

2. The Department of Water Supply will submit for a Well Construction and a Pump Installation permit at the appropriate times. A Well Construction Permit Application is presently being prepared.

3. Thank you for informing us that a Stream Channel Alteration Permit does not appear to be required. The Department will make a sincere effort during the design and construction of the well to mitigate effects upon surface waters.

Thank you for your prompt review and response. Your comments are appreciated.

Sincerely,

NOV 0 6 1997

David R. Craddick, Director

"By Water All Things Find Life"

Printed on recycled paper

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND DIVISION
STATE PARKS
WATER AND LAND DEVELOPMENT

October 24, 1997

Mr. Carl Takumi, P.E.
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

LOG NO: 20360 ✓
DOC NO: 9710BD32

Dear Mr. Takumi:

SUBJECT: **Chapter 6E-42 Historic Preservation Review of a Draft EA for Keanae Well No. 2 (Project No. 97-00)**
Wailuanui Ahupua`a, Hana District, Island of Maui
TMK 1-1-04: 43

This letter is a Historic Preservation review of a draft Environmental Assessment for the proposed Keanae Well No. 2 in Wailuanui Ahupua`a. Our review is based on reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field check of the subject property was conducted.

This general area seems likely to have once been the location of pre-Contact native Hawaiian farmlands and perhaps scattered houses. However, the proposed well location appears to be in cleared pasture land immediately adjacent to existing Well No. 1. Consequently, due to prior land alteration, we feel it is unlikely that significant historic sites are present in the project area. We therefore find the proposed construction to have "no effect" on such historic sites.

If you have any questions please contact Boyd Dixon at 243-5169.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

BD:jen

cc. Elizabeth Anderson, Maui County Planning Department (fax: 243-7634)
Ralph Nagamine, Maui County Department of Public Works (fax: 243-7972)

BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

November 3, 1997

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Mr. Hibbard:

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR KEANAE WELL NO. 2.
Wailuanui Ahupua'a, Hana District, Island of Maui

We are in receipt of your agency comments dated October 24, 1997 offering no effec t comments. We appreciate your research and comment.

Thank you for your timely response and continuing cooperation.

Sincerely,

David R. Craddick
Director

NOV 0 o 199Z

LINDA CROCKETT LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

October 31, 1997

Mr. Carl K. Takumi, P.E.
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

Dear Mr. Takumi:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
KEANAE WELL NO. 2 (COUNTY OF MAUI)
TMK (2) 1-1-004:043

We reviewed the subject submittal and have no comments to offer.

If you have any questions, please call David Goode at 243-7845.

Very truly yours,

for CHARLES JENCKS
Director of Public Works
and Waste Management

DG:co/mt
xc: Engineering Division
Solid Waste Division
Wastewater Reclamation Division
S:\LUCA\CZM\KEANAE.

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 20, 1998

Mr. Charles Jencks, Director
Department of Public Works
& Waste Management
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Subject: **ENVIRONMENTAL ASSESSMENT FOR KEANAE WELL NO. 2**
KEANAE, MAUI, HAWAII

We are in receipt of your agency comments dated October 1997 offering no comments.

Thank you for your timely response and continuing cooperation.

Sincerely,

David R. Craddick
Director

HK:sc

xc: Carl Takumi Engineering

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EMD / SDWB

October 20, 1997

Mr. Carl Takumi, P.E.
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

Dear Mr. Takumi:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE KEANAE WELL NO. 2

1. Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems.

2. The proposed project will involve drilling, casing, and testing of an exploratory well. Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director. However, if the water system is under the jurisdiction of the County of Maui, the Maui Department of Water Supply will be responsible for the review and approval of the plans.

3. The draft environmental assessment is proposing the construction of an exploratory well. Section 11-20-29 of Chapter 20 requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.

4. The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses, performed by a laboratory certified in the State of Hawaii, must be submitted as part of the report to demonstrate

compliance with all drinking water standards. Additional tests may be required by the Director upon his review of the information submitted.

If you should have any questions, please contact Ms. Queenie Komori of the Safe Drinking Water Branch at 586-4258.

Sincerely,

Wilfred T. Nagamine

for THOMAS E. ARIZUMI, P.E., Chief
Environmental Management Division

QK:la

c: David Craddick, Maui DWS
Gordon Muraoka, SDWB Sanitarian, Maui

BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

November 6, 1997

Mr. Thomas E. Arizumi
Environmental Management Division
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Arizumi:

Re: **ENVIRONMENTAL ASSESSMENT FOR THE KEANAE WELL NO. 2**
KEANAE, MAUI, HAWAII

We have received your agency comments dated October 20, 1997 and respond as follows:

The proposed project will involve the drilling, casing and testing of an exploratory well. Should the exploratory well prove successful, we intend to develop the well by installing a pump and connecting to the Keanae Water System.

The Keanae Water System is a public water system. We will comply with the Hawaii Administrative Rules, Title 11, Chapter 20 relating to the Public Water Systems.

The Department of Water Supply will review and approve the construction plans prior to connection to the distribution system.

The Department of Water Supply must first review the results of the exploratory well. If a decision is made to develop the well and connect to the Keanae Water System, the Department will make a request to the Director of Health for approval of a new water source. An engineering report in compliance with Section 11-20-29 will be submitted to the Director of Health for approval for the new source.

The engineering report will include identifying potential sources of contamination, evaluation of alternate control measures which

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could be implemented to reduce or eliminate the potential for contamination, and water quality analysis demonstrating compliance with all drinking water standards.

Thank you for your response and cooperation.

Sincerely,

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI

David R. Craddick
Director

HK:as

November 6, 1997

C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

Dear Mr. Takumi:

Members of Na Moku Aupuni O Ko'olau Hui have reviewed the Draft Environmental Assessment (Project No. 97-00) and have voted overwhelmingly against the proposed construction of the exploratory well in Keanae, Maui, Hawaii (TMK 1-1-04:43).

Members feel we have reliable service with well No. One and there is no justification for back up well No. 2 at the present time.

COMMENTS FROM MEMBERS:

1. Re: pg. 3, Number of house water services is approximately 70 and not 80.

2. Re: pg. 6 of Ea, "existing land uses". Location of proposed well is not within pastureland. It is undeveloped land with an access road to TMK 1-1-04:06 consisting of 1.53 acres of wetland taro paddies and a variety of agricultural products as well as the auwai ditch running through TMK 1-1-04:43 to lo'is in Wailuanui, which has been in existence since pre-European contact times. What will happen to the wetland taro farmer cultivating kalo near the proposed well site? Will his access way to lo'i be blocked by pipes and equipment from well No. 2 to existing storage tank?

3. Re: pg. 6, "surrounding land uses". It refers to "undeveloped" lands to the East and West, however St. Gabriel's Church is within 1000 feet of the well site.

4. Re: pg. 8 #8, "surface water". No one knows the effect well No. 2 will have on Waiokamilo Stream. Waiokamilo Stream is located approximately 250 feet from proposed well No. 2. As stated, "The proposed project will have no effects upon the region's surface waters", however this statement is an assumption and not fact.

HC1 Box 62 Wailuanui Rd. - Haiku, Hawaii 96708 - Phone (808) 248 8658 - Fax (808) 248-7097

5. Re: pg. 8, "population". The population in the Keanae-Wailuanui area has decreased in the past three years. The present population is approximately 208, not including several absentee homeowners and homeowners who visit occasionally.

6. Re: pg. 9, "recreational facilities". There are five recreational facilities; the Keanae Arboretum, Kaumahina State Park and Pua'aka'a State Park are geared toward tourists. The YMCA Complex is used primarily by hospices and groups from elsewhere. The YMCA is available to residents occasionally. The fifth recreational facility, the Keanae Ball Park, is located in the lower Keanae Peninsula and residents do have access to this county facility.

7. Re: pg. 9, "roadways". The existing grassed driveway leads to the existing auwai ditch system and wetland lo'i. Proposed well No. 2 and equipment will block access roadway to lo'i.

8. Re: pg. 11, "local economy". The short-term well construction related activities may or may not increase employment within the ahupua'a. The long term socio-impacts is questionable since Well No. 2 is considered an exploratory well.

9. Re: pg. 19, No one can predict whether Keanae Well No. 2 will have a favorable impact on the socio-economic conditions or existing public services and infrastructure.

In conclusion, members of Na Moku Aupuni O Ko'olau Hui strongly recommend a back-up pump and equipment be made available in the event Well No. 1 fails.

Sincerely,

Awapuhi Carmichael

Awapuhi Carmichael, Secretary

cc:David Craddick

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 4, 1998

Na Moku Aupuni o Ko'olau Hui
HC1 Box 62 Wailuanui Road
Haiku, Hawaii 96708

SUBJECT: Environmental Assessment for Keanae Well No. 2
Keanae, Maui, Hawaii
Project No. 97-00

Dear Sir:

Thank you for your comments on the Draft Environmental Assessment for Keanae Well No. 2 dated November 6, 1997. We respond to your comments as follows:

1. The number of water services listed in the environmental assessment is taken from the Board of Water Supply Annual Reports for Fiscal Year 1994-1995. The number of water services are for number of water meters within the Keanae Water System though the number of water services in actual use may be less.

2. We will correct the environmental assessment to reflect that the existing land use as being partially developed.

The access to Harry and Pearl Pahukoa's lot, TMK: (2) 1-1-04:06, does pass mauka of the existing Keanae Well No. 1 facility. We will locate the proposed Keanae Well No. 2 makai of the grassed driveway to mitigate access impact to the Pahukoa lot.

The existing auwai ditch runs through TMK: (2) 1-1-04: 43 and the Pahukoa lot (TMK: (2) 1-1-04: 06) located east of the proposed project site. The proposed well will be drilled and cased to the basal aquifer, near sea level. The annular space of the proposed well will be grouted from just above water level to the ground surface to mitigate effects to the auwai and Waiakamilo Stream.

3. St. Gabriel's Church, TMK: (2) 1-1-04:04, is within 1,000 feet of the Project site; however, the church is not adjacent to the site.

4. Surface water:

The proposed well is located away from Waiakamilo Stream and a nearby auwai. As stated in the environmental assessment, the annular space (the space between the solid casing and the drilled hole) will be grouted from just above the basal water level to the ground surface to keep surface water and high level ground water from entering the well through the annular space. The top of the well will be higher than the surrounding ground to keep surface water from entering the well itself. A typical section of the proposed well is attached.

As *explained in Section 7 - High Level Groundwater (pg. 7): No high level* groundwater was encountered during the construction of Keanae Well No. 1, approximately 75 feet away from the proposed well. Should water be encountered during drilling operations, the water will be sealed off with grout before continuing the drill operation to keep surface and high level ground water from entering the well and basal aquifer. The study of side effects which may occur during the well pump test will indicate if other waters such as surface water and high level ground water are being influenced and be taken into consideration.

Finally, the proposed well is very close to the existing well. The proposed well will be a back-up to the existing Keanae Well No. 1. The pump in each well will be designed to alternate and will not run simultaneously; therefore, it is only reasonable that there will be no observable effect upon surface waters due to the operation of the proposed well.

5. Population: Thank you for the information on the estimated population of the Keanae-Wailuanui area. We will incorporate your information into the environmental assessment.

6. Recreational facilities: Thank you for the information. We will incorporate your information into the environmental assessment.

7. Roadways: Thank you for the information. We will incorporate the your information into the environmental assessment. The proposed well will be located to avoid obstructing the existing grassed driveway; if the well is developed it will be located makai of the existing driveway to avoid conflict of having pipes and equipment block the driveway,.

8. Local economy: The construction activities may not increase employment within the ahupua'a unless qualified workers are available and hired by the

contractor. Employment of workers will come from within the state. In addition, the construction inspection will be performed by Department of Water Supply personnel. The contractor will be required be licensed in the State of Hawaii and pay State taxes.

Since the Keanae Well No. 2 project is a "back-up" well there will be no long term socio-economic impacts due to this project. The intent of the project is to provide a more reliable source of water for the Keanae Water System. The well shall be designed to alternate relieving the dependence of having only one well to supply all of the water needed.

9. Socio-economic conditions: The proposed Keanae Well No. 2 will help determine the water quality and quantity of the Keanae Aquifer. The well will enable the Department of Water Supply to provide a continous source of water to the residents of Keanae-Wailuanui and in that respect, the impact of the well on socio-economic conditions improves. As a backup well, the project will not be a stimulus for unanticipated growth or development in the area. In addition, the well will provide short term employment which will help the economy of the state and county in terms of taxes and local spending.

10. Back-up pump: The alternatives considered have been added to the environmental assessment. The suggestion that a back-up pump be considered by the Department is included as an alternative. Over a long term, it would cost more to store and maintain a back-up pump than the development of a back-up well. However, if the Department determines that the development of the Keanae Well No. 2 is not feasible, the back up pump alternative will be considered.

Thank you for your response and cooperation.

Sincerely,

David R. Craddick
Director

hk
cc: Carl Takumi

TO: C. Takumi Engineering, Inc.
FROM: Elaine S. Wender, SR 93 Ke'anae, Ha'iku, Hawai'i 96708
DATE: November 6, 1997
RE: Comments on Draft Environmental Assessment (DEA) for Ke'anae Well No. 2

The DEA is devoid of information required by law to be provided which would assist decision-makers in evaluating the environmental impacts of this proposal. It fails to discuss alternatives and ignores concerns raised and suggestions made at a public informational meeting (hereinafter "meeting") held by the Dept. of Water Supply (DWS) on July 29, 1997 at Ke'anae School, the published purpose of which was to "seek public input" regarding this proposal.

A. SITE DESCRIPTION

Ke'anae is not merely "a small rural coastal community" (p. 1). Ke'anae-Wailuanui is one of the last remaining traditional Hawaiian taro-farming and fishing communities. The population is unique, composed mainly of small freehold Hawaiian taro farmers who are continuing a centuries-long family tradition. There has been no disturbance from large scale mechanized agriculture or urban development. Many Hawaiian cultural traditions persist, especially wetland taro cultivation which has created a unique Hawaiian landscape, and fishing and gathering. In 1993 the taro farmers of Ke'anae-Wailuanui were presented with a Landscape Preservation Award by the Maui Historical Society. The community was chosen in 1994 by a state cultural landscape task force to be the subject of a model project, recognizing the community as a taro growing area with long continuity of use and with local support for preservation. The result was Kalo Kanu o ka 'Aina, A Cultural Landscape Study of Ke'anae and Wailuanui, Island of Maui, published in May, 1995 by the County of Maui Planning Department and Cultural Resources Commission. Any environmental document concerning this area should cite this study.

B. EFFECT ON STREAMFLOW

Water resources are basic to the maintenance of this way of life. Already, the sugar company exports all of the water flowing above the ditch, and uses 95% of it to water sugar cane. Except during storms, what flows in the streams and feeds the lo'i comes from springs which arise below the ditch. Naturally, we are very protective of our stream water, which is sometimes not sufficient to water the lo'i or support stream life.

The DEA states (p. 8): "The proposed project will have no effects upon the region's surface waters." No data is given in support of this statement. It perpetuates the myth that wells which draw from "basal" water do not affect streamflow. It ignores the recent studies done by the U.S. Geological Survey (USGS) which conclude that the distinction between basal and "high level" groundwater is a false one--that in fact the ground geology in East Maui is saturated so that well withdrawals do invariably affect streamflow. It is shocking that USGS was not even consulted in the preparation of the DEA.

The proposed location of Well No. 2 is closer to Waiokamilo Stream than Well No. 1, which may make the effect on streamflow greater. It is impossible to tell unless monitoring is done. Such monitoring, both pre- and post-construction, should be a condition of any permit.

The concern becomes much greater if both wells are operated at the same time. Although the DEA states (p. 17) that "running the two wells simultaneously is not anticipated", it does not rule out that possibility. If Well No. 2 is constructed, installation of automatic shut-off switches should be required as a condition of any permit in order to prevent the possibility of operating the two pumps simultaneously.

Thus the following conditions (some of which are similar to conditions of the Special Management Area (SMA) Use Permit for Well No. 1 granted by the Maui Planning Commission on June 28, 1984 (see Exhibit A, attached)) should be attached to any permit:

**That the County will warrant that the Ke'anae-Wailua Water System wells will not affect streamflow in Waiokamilo Stream. In the event the flow in Waiokamilo Stream is diminished as a direct result of the operation of the well, the County will remedy any such diminution immediately.

**As soon as all permits are granted and prior to any other work, the DWS shall begin monitoring of the streamflow in Waiokamilo Stream just below the well sites. Such monitoring shall begin at least a year prior to the pumping of Well No. 2 as a production well, and shall continue as long as the well is in operation. The DWS shall consult with USGS and obtain their approval for the form of monitoring.

**Automatic shut-off switches shall be installed to prevent the possibility of operating the pumps for Well No. 1 and Well No. 2 simultaneously.

C. EXPORT OF WATER

With so much of our water already leaving the district (sixty billion gallons of water of year leave East Maui, the largest diversion in the state), we are of course concerned about any possibility of additional water export. A former DWS director told me that after the Ha'iku wells, the DWS was planning to drill wells in Ke'anae to obtain water for export. I understand that the purported purpose of Well No. 2 is as a backup well for the community, but the possibility remains that in the future the water could be exported. This is one reason for considering alternatives (see below). If the well is permitted, the following condition, similar to one attached to the SMA for Well No. 1, should be imposed:

**That all water from the Ke'anae-Wailua Water System wells will be for the use and benefit of residents in the Wailua and Ke'anae areas, and will not be exported.

D. WATER QUALITY

Surprisingly, the references cited on p. 21 of the DEA do not include the final Environmental Impact Statement (EIS) for the Ke'anae Water System Improvements (August, 1984). The EIS revealed that the contaminant levels of sodium, manganese and iron in the water of Well No. 1 all exceeded EPA recommended Maximum Contaminant Levels (MCLs). No results were given for 18 primary contaminants (p. D-35). Current testing information from Well No. 1 should be provided in the DEA as an indicator of what is likely to be found in proposed Well No. 2. Testing for herbicides is especially important as the site is adjacent to a small group of taro patches where herbicide use has been heavy for many years, and also very close to the major taro growing area of Wailua Nui.

E. AESTHETICS

The social, cultural and environmental impact of the proposal includes its visual appearance. The cultural landscape of Ke'anae-Wailuanui includes not only the lo'i, but also incredible scenic vistas and the exquisite yards of local residents. The project area is just off of the Hana Highway, one of the most scenic corridors in the world. Community residents take pride in the beauty of their yards, and spend a great deal of time and energy keeping them picture-perfect. A walk up Wailua Road is a feast for the senses--until you reach the site of Well No. 1. It has been a visual blight since its inception.

The EIS stated, "Once completed, the well pumps and control buildings will be screened by planting hedges around its perimeter." (p. 5-6) "The well site will be screened by a hedge to reduce the visual impact of the well piping and storage tank." (p. 50) Condition 6 of the SMA permit requires: "That the hedge surrounding the 4,400 square foot site shall be properly maintained." (See Exhibit A, attached)

No hedge was ever planted. In 1988 I corresponded with then DWS Director Bagoyo concerning this eyesore. In two letters he promised that a hedge of native species would be planted, and that no chemicals would be used to eradicate weeds. (See Exhibits B, C, D and E, attached) Still, no hedge was planted.

I gave copies of this correspondence to the current DWS director at the July 29 meeting, along with photos showing the unkempt fence and filthy tank (see Exhibit F, attached). This resulted, finally, in the tank getting washed. But still, over three months later, no hedge.

No permits should be granted for this project until the DWS complies with Condition 6 of the SMA for Well No. 1 and establishes and maintains a screening hedge of native plants. Any permit for Well No. 2 should include the following conditions:

**The fence surrounding the well will be completely screened by tall hedges of native plants planted around its perimenter. The hedge shall be properly maintained.

**No chemicals shall be used to eradicate weeds on the site. No burning shall be allowed on the site.

F. ALTERNATIVES

The stated purpose of the well is to serve as a backup to the existing well, which was put into service in 1986. Some sort of backup is needed, but a second well is the most environmentally problematic and expensive choice. The DWS proposes to spend $423,360, or $5,392 for each of the 80 households served, to develop Well No. 2.

One alternative which was proposed at the meeting would be to have a second pump readily available for installation in the existing Well No. 1 if the existing pump fails. We were told this wasn't feasible because, "when you go to use it, it's all rusted out." Surely the technology exists to properly store a pump, with proper protection and lubrication, so that it will not rust out. This excuse is simply not credible.

The second excuse given by the consultant, expressing great concern for the community, was that the DWS might borrow the spare pump to use "temporarily" elsewhere and that it might not be available when needed in Ke'anae. In other words, we need this well to protect ourselves from the actions of the DWS!

The existing total storage capacity of 60,000 gal. is enough for 2½ days at normal usage. However, if residents were informed of an emergency, with conservation it could last much longer.

Another alternative would be to provide individual storage tanks to households. At current usage, a full 5,000 gal. tank would last 16 days--much longer if people knew they had to conserve.

When Well No. 1 was constructed we were told the surface water system would be maintained as a backup. It has been dismantled. It could be rebuilt, along with the UV treatment plant formerly used. This could also serve as an emergency backup system, except for drinking (unless boiled). Bottled drinking water could be brought in. The DWS director told us at the meeting that it would cost $1,000 a day to bring in 280 gal. of water (3½ gal. per household), but he did not explain how he reached that figure. The Hana Tropical Waterworks will provide bottled water delivered to Ke'anae for $1 a gal. or less in 3 or 5 gal. bottles.

At any rate, all of these alternatives should have been discussed and analyzed in the DEA. Data should be provided regarding various repair scenarios and the amount of time required to accomplish them. A cost/benefit analysis should be done of the various alternatives. I believe there is a cheaper and more environmentally benign alternative to drilling Well No. 2.

G. CUMULATIVE IMPACTS

There is no discussion of cumulative impacts. Data should be provided regarding the expected life span of each well and pump, and the long-term plan. The DWS director told us that we are "living on borrowed time" for the pump in Well No. 1 to fail--after only eleven years. What is the plan for the future?

H. MISCELLANEOUS

1. Hawaiian words, including place names, should be spelled correctly, using diacritical marks (at least 'okina): e.g. Ke'anae, Hawai'i. I regret that my machine does not have a mark for kahako.

2. p. 6: I. E. Construction cost: The DEA states that construction is anticipated to begin in the fall of 1997??? What is the source of funding--is there any state funding involved? Does the cost include the existing contract for preparation of the EA? What is the cost of that contract?

3. p. 6: II.A.2. The "agricultural cultivated land" referred to consists of taro patches (lo'i). Waiokamilo Stream is NE of the site and very close to it. It should be shown on the site plan.

4. p. 7: II.A.3. the rainfall figures given (200-250"/yr.) are much too high. The Atlas of Hawai'i (which is cited) shows the rainfall to be about 150"/yr. My own records kept over 12 years show an average of 134"/yr.

5. p. 8: II.A.9. Animal life also includes horses and cattle. The description of avifauna "typically found in the region" is inaccurate and fails to mention that at least a dozen species of native birds frequent the area. The six-acre state bird sanctuary at Pauwalu Point is about a mile away. The 'a'o (Newell's shearwater) and 'ua'u (dark-rumped petrel) are both on the Federal List of Endangered Species, and both frequent the Ke'anae area.

6. p. 8: II.B.1. The population of Ke'anae-Wailuanui is about 250.

7. p. 22: VIII. Preconsultation Correspondence: Both sides of the correspondence should be included. Thus C. Takumi's letter to Dept. of Health and Edwin Matsuda's letter to the BWS should be included. There was also correspondece from a community group which was not included.

I. CONCLUSION

The DEA does not provide the information which by law is required. The potential environmental impacts are significant. An EIS should be prepared.

Thank you for this opportunity to comment.

HANNIBAL TAVARES
Mayor

TOSH ISHIKAWA
Planning Director

CHRISTOPHER HART
Deputy Planning Director

COUNTY OF MAUI
PLANNING DEPARTMENT
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

June 28, 1984

To	Fr	
→		DIRECTOR
→		DEPUTY
		SECRETARY
✓		CHIEF ENGR.
		FISCAL
		FIELD OPS

Mr. William Haines
Director
Department of Water Supply
County of Maui
Wailuku, Hawaii 96790

Dear Mr. Haines:

Re: Special Management Area Use Permit for improvements to the Keanae Water System, TMK 1-1-04: 32 & 43, Keanae, Maui (84/SMA-8).

At its regular meeting of May 22, 1984, the Maui Planning Commission reviewed the above request, and after due deliberation, voted to grant the subject Special Management Area Use Permit approval, with the following conditions:

1. That the County will warrant that the Keanae-Wailua Water System well will not affect stream flow in Waiokamilo Stream. In the event the flow in Waiokamilo Stream is diminished as a direct result of the operation of the well, the County will remedy any such diminition as soon as practicable.

2. That if the alternative for the overflow disposal at the 50,000 gallon storage tank is finally selected, then any overflow will not adversely affect the quality of Waiokamilo Stream.

3. That all water from the Keanae-Wailua Water System well will be for the use and benefit of residents in the Wailua and Keanae homestead areas.

4. That the County will not take any water from Waiokamilo Stream for the Keanae-Wailua Water System.

5. That the shoulder area along Hana Highway on which the six inch water line is to be established shall be restored to or improved beyond its original condition to include but not be limited to replanting and grading.

6. That the hedge surrounding the 4,400 square foot site shall be properly maintained.

EXHIBIT A

7. That construction of the proposed project shall be initiated within one (1) year from the approval date of this SMA permit.

8. That full compliance with all applicable State and County requirements shall be rendered.

A copy of the Staff Report dated May 22, 1984, is enclosed for your reference. Should further clarification be necessary, please contact our office.

Very truly yours,

TOSHIO ISHIKAWA
Planning Director

encl.

cc: LUCA/CZM
LUCA/Building
Health
Legal Aid

SR 93 Ke'anae
Ha'iku, Hawai'i 96708
May 13, 1988

Vince G. Bagoyo, Jr.
Director
Department of Water Supply
County of Maui
Wailuku, Hawai'i 96793

Dear Mr. Bagoyo:

Over two years ago the County completed construction of a new water system for Ke'anae and Wailua. In its August, 1984 Environmental Impact Statement for the project the County stated, "Once completed, the well pumps and control buildings will be screened by planting hedges around its perimeter." (pgs. 5-6) "The well site will be screened by a hedge to reduce the visual impact of the well piping and storage tank." (pg. 50)

As a condition of its Special Management Area Use Permit granted May 22, 1984 the Maui Planning Commission required: "...6. That the hedge surrounding the 4,400 square foot site shall be properly maintained."

No hedge has ever been planted. The site has for years been an eyesore, surrounded by a fence covered with weeds.

Recently, the weeds along the fence and inside the facility were sprayed with poison. The area sprayed includes that immediately surrounding the well and tank. Thus, we now have the added eyesore of dying weeds as well as the possibility of herbicides in our water.

Please let me know when the hedge will be planted. I hope that you will use native species. Also please assure me that poison will never again be sprayed anywhere in or near this site.

I look forward to your reply.

Sincerely,

Elaine S. Wender

EXHIBIT B

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P. O. BOX 1109
WAILUKU, MAUI, HAWAII 96793

May 19, 1988

Ms. Elaine S. Wender
SR 93,Keanae
Haiku, Hawaii 96708

Dear Ms. Wender:

This is in response to your letter of May 13, 1988 regarding the new water system for Keanae.

As required in the 1984 Environmental Impact Statement, the well, pump and control building will be screened by planting hedges around the perimeter. I have advised our Hana District personnel to begin planting the hedges within the next several weeks and, as you have suggested, we will be using native species.

I want to thank you for bringing this matter to our attention. If you have any questions, please feel free to contact me.

Sincerely,

Vince G. Bagoyo, Jr., Director

VGB/ag

cc: John Kahalehoe, District Supervisor
Stan Goshi, Chief of Operations

SR 93 Ke'anae
Ha'iku, Hawai'i 96708
May 27, 1988

Vince G. Bagoyo, Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawai'i 96793

Dear Mr. Bagoyo:

Thank you for your letter of May 19, 1988. I am looking forward to seeing the hedges of native species which your department will be planting around the site of the well and storage tank in Wailua. I was happy to see a county worker weedeating the poisoned grass at the site last week. However, I was not happy to see him set the weeds growing on the fenceline on fire. Not only is such burning illegal; it is also highly dangerous in an area where electrical equipment and a chlorine tank are nearby.

I would appreciate a reply to my concern about the spraying of poison in or near the site which I described in my letter of May 13, 1988.

Thank you for your cooperation.

Sincerely,

Elaine S. Wender

EXHIBIT D

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P. O. BOX 1109
WAILUKU, MAUI, HAWAII 96793

June 13, 1988

Ms. Elaine S. Wender
SR 93 Ke'anae
Haiku, Hawaii 96708

Dear Ms. Wender:

This is in reponse to your May 27, 1988 letter. For your information, I have advised our Hana personnel not to use any chemicals to eradicate weeds in or near any of our water system. As mentioned in my earlier letter to you, our personnel will be planting hedges of native species around the well and storage tank site in Keanae.

Once again, I would like to thank you for bringing this matter to my attention. If you have any questions, please feel free to call me.

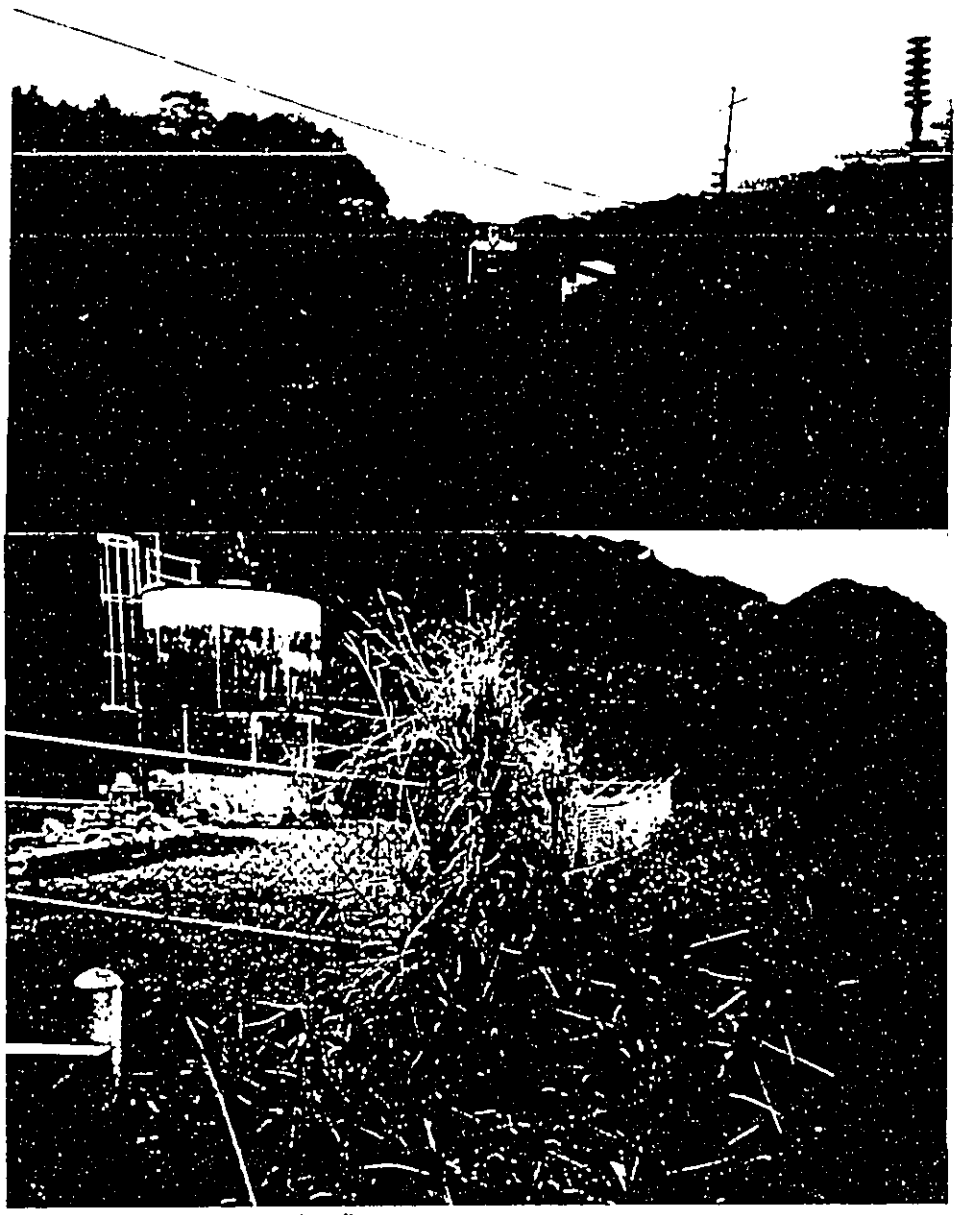
Sincerely,

Vince G. Bagoyo, Jr., Director

VGB/ao

cc: John Kahalehoe, District Supervisor
Stanley Goshi, Chief of Operations

EXHIBIT E



JULY, 1997

KE'ANAE WELL NO. 1

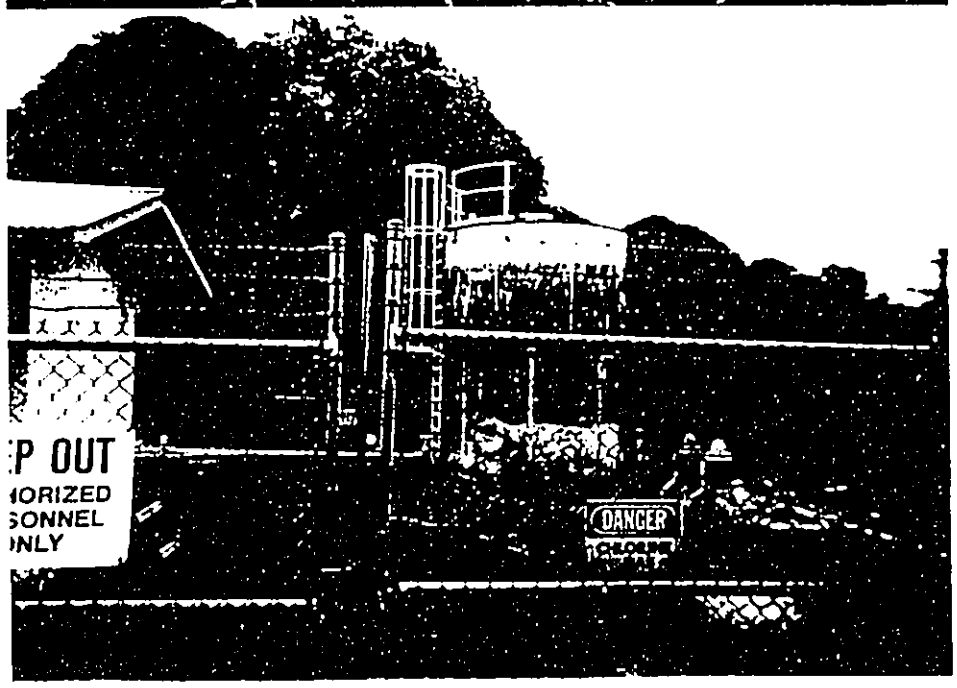


EXHIBIT F

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 5, 1998

Ms. Elaine Wender
SR 93
Ke'anae, Ha'iku, Hawai'i 96708

Subject: Environmental Assessment for Ke'anae Well No. 2
Ke'anae, Maui, Hawaii
Job No. 97-00

Dear Elaine:

Thank you for your comments on the Draft Environmental Assessment for Ke'anae Well No. 2. We respond to your comments as follows:

A. *Site Description*:

- *Kalo Kanu o ka 'Āina, A Cultural Landscape Study of Ke'anae and Wailuanui*. The *Kalo Kanu o ka 'Āina*, a Cultural Landscape Study of Ke'anae and Wailuanui has been reviewed and provides insight to the cultural and historic aspects Ke'anae-Wailuanui area; however, no mention was made on the Department of Water Supply Ke'anae Water System. The Ke'anae Water System must comply with the State Department of Health rules and regulations regarding safe drinking water and the Department of Water Supply's goal of maintaining an adequate water supply for its customers.

B. *Effect upon streamflow:*

- *USGS studies and comments*:
  We have sent the draft environmental assessment to the U. S. Geological Survey (USGS) for review and comment with a 30 day response period requested. The USGS, in cooperation with the Department of Water Supply, will be conducting a ground water and surface water study of the area including Ke'anae. As stated in their comments, the proposed well will help in their studies in the area. Their comments and our response have been included in the environmental assessment.

- *Affect on streamflow in Waiakamilo Stream.*
  The elevation of the Waiakamilo Stream and nearby 'auwai in the vicinity of the well is about 200 feet above mean sea level (MSL) and the anticipated basal aquifer elevation is about 6 feet MSL. We are attaching a "Geologic-Hydrologic Cross Section, Ke'anae Well 5108-01" showing geological results of Ke'anae Well No. 1. The cross section is from the Groundwater Exploration of Ke'anae Well 5108-01, Maui, Circular C95, Department of Land and Natural Resources, Division of Water and Land Development, Honolulu, Hawaii. The circular will be included in the environmental assessment as an exhibit. The circular reported that no surface water or high level ground water was encountered during the drilling of the Well 5108-01. The existing Ke'anae Well No. 1 is located approximately 75 feet away and the same conditions are anticipated.

  If surface water or high level groundwater is encountered during construction, the water will be sealed off to prevent seepage into the well during the drilling operation. This also acts to mitigate effects upon Waiakamilo Stream and the nearby 'auwai. After casing installation, the annular space will be grouted from above the water level to the ground surface to prevent seepage into the well. We are attaching the proposed well section for the project. The well section will be included in the environmental assessment as an exhibit.

  Changes in water level, temperature and other data that are taken during the pump test are indicators that the well may be affecting surface or high level ground water. Similarly, correlative effects upon the existing well indicates that the proposed well is hydraulically connected to the existing well. Data taken during the pump test will be submitted to the Commission on Water Resource Management (CWRM) and to the USGS

prior to installing a permanent pump.

If the pump test data indicates that the stream flow in Waiakamilo Stream is affected by this well, the Department will discuss with the USGS possible remedial measures including monitoring Waiakamilo Stream. If no reasonable remedial measures are available, the Department will abandon the well. The Department will then discuss with the USGS as to whether the well should be used for monitoring or abandoned.

- *Operating two wells simultaneously*
  Based upon the present and anticipated needs of the community, the pumps shall be designed to have only one well pump operate at any time.

C. *Export of Water*
Should the Department proceed with developing the Ke'anae No. 2 well to use as a back-up to the existing Ke'anae Well No. 1 well, the well will be used to benefit the Ke'anae-Wailua Water System. By design, the 8-inch casing will limit the ability of water withdrawal from the well. A typical well section has been added to the environmental assessment and is attached to this letter. The existing pump was designed to pump 100 gallons per minute (gpm); the proposed well, if developed, will be designed to pump 100 gpm as back-up. As stated previously, the pumps shall be designed to have only one pump operate at any time.

D. *Water Quality:*

- *Ke'anae Water System Improvements EIS (August 1994) revealed that contaminant levels of sodium, manganese and iron in the water of well no. 1 exceeded EPA recommended maximum contaminant levels.*
  Sodium, manganese and iron are not primary Safe Drinking Water Act (SDWA) contaminants that are regulated by the EPA or by the State Department of Health Safe Drinking Water Regulations. The water within the Department of Water Supply Ke'anae Water System, currently being provided by Ke'anae Well No. 1, meets State Safe Drinking Water Regulations.

- *No results were given for primary contaminants.*
  Water quality samples will be taken as part of this exploratory well project.

- *Current testing information from Well No. 1 should be provided in the DEA as an indicator of what is likely to be found in well no. 2.*
  We are attaching a water quality analysis for Ke'anae Well No. 1. The water quality analysis will be included in the Environmental Assessment as an exhibit.

- *Testing for herbicides*
  Water quality tests for contaminants listed in State Drinking Water Quality Standards (SDWA) will be performed during the pump testing phase of well construction. The water quality testing will include SDWA organic contaminants. Testing for paraquat will also be made. Based upon the results of well testing, the Department will determine whether to proceed with the development of the well as a back-up well to the existing Ke'anae Well No. 1.

E. *Aesthetics:*

- *Establish and maintain a screen hedge of native plants around project site.*
  The Department of Water Supply is presently proceeding with procuring landscaping of the existing Ke'anae Well No. 1 site. Native plants will be used for landscaping the site. The use of herbicides for the establishment of the screen will be taken into consideration.

F. *Alternatives*: Alternatives discussed at public meeting in Ke'anae held on July 29, 1997 have been included in the environmental assessment. In response to your more specific comments:

Second Pump: Technology does exist to properly store the pump for long periods of time; however, the Department does not have the facilities for proper storage and would have to pay for such storage. A cost analysis have been included in the environmental assessment.

Several alternatives have been considered and included in the environmental assessment. The *surface water system*, *delivering water* to Ke'anae from other sources, and *second pump* are discussed. The Department has a 50,000 gallon storage tank within the system and *individual storage tanks* is not a alternative since water will still have to delivered to Ke'anae.

G. *Cumulative Impacts: Expected life span of each well and pump and the long term plan.* The pump life is based upon 20,000 hours running time. The size

of pump and the water demands basically determines the pump life. For the Ke'anae Water System, the average life span of a pump is calculated to be about 13 years. The life span of a well is very long term and considered as permanent after construction.

H. Miscellaneous:

1. *Hawaiian words*. The environmental assessment has been revised to show diacritical marks for correct Hawaiian word spelling. The spelling for Hawaiian words have been taken from the Hawaiian Dictionary, Pukui and Elbert.

2. *Construction cost:* The anticipated construction time has been postponed until the environmental assessment and permits are resolved. Construction is now anticipated to be in spring of 1998.

Source of Funding: The source of funding for this project is from the Board of Water Supply as part of their capital improvements program, no state or private funding are involved. The estimated cost of the exploratory well is $116,400. The Department of Water Supply shall determine whether to proceed with placing the well into production as a back-up well based upon well construction, water quality and pump testing. An environmental assessment will be prepared after the results have been evaluated and the decision to proceed with placing the well into production is made.

Cost include preparation of EA; cost of contract: The construction cost does not include the cost of preparation of the environmental assessment.

3. *Agricultural cultivated land: Waiakamilo Stream is NE of site and should be shown.* Waiakamilo Stream is shown on several of the Tax Map Keys presented in the environmental assessment.

4. *Rainfall: Atlas of Hawaii shows rainfall to be about 150"/yr not 200"-250" /yr.* Rainfall over the aquifer averages 185 inches per year, ranging from 150 inches at the coast to 300 inches 3 or 4 miles inland. The 150"/yr is appropriate for the average rainfall at the Project site.

5. *Animal Life:*

- *Horses and cattle*. No horses and cattle were observed at the site.

- *Avifauna inaccurate fails to mention that at least dozen species of native birds frequent the area. Bird sanctuary at Pauwalu Point is about a mile away.* Though native birds may frequent the area, no native birds were observed at the site. According to Department of Land and Natural Resources, Pauwalu Point is a sea bird sanctuary; however, the project is not in nor will it affect the Pauwalu is Point sanctuary.

6. *Population of Ke'anae is about 250.* Thank you for the information. The population of Ke'anae will be noted in the environmental assessment.

7. *Preconsultation correspondence: Both sides of the correspondence should be included. C. Takumi's letter to the DOH and Edwin Matsuda to BWS should be included. Correspondence from community group is not included.* Appropriate correspondence have been included in the environmental assessment.

I. *Conclusion*

The findings and reasons for supporting a FONSI determination in accordance with 11-200-12 of the EIS rules have been addressed in the environmental assessment.

Thank you for your comments and cooperation.

Sincerely,

David R. Craddick
Director

hk
cc: Carl Takumi

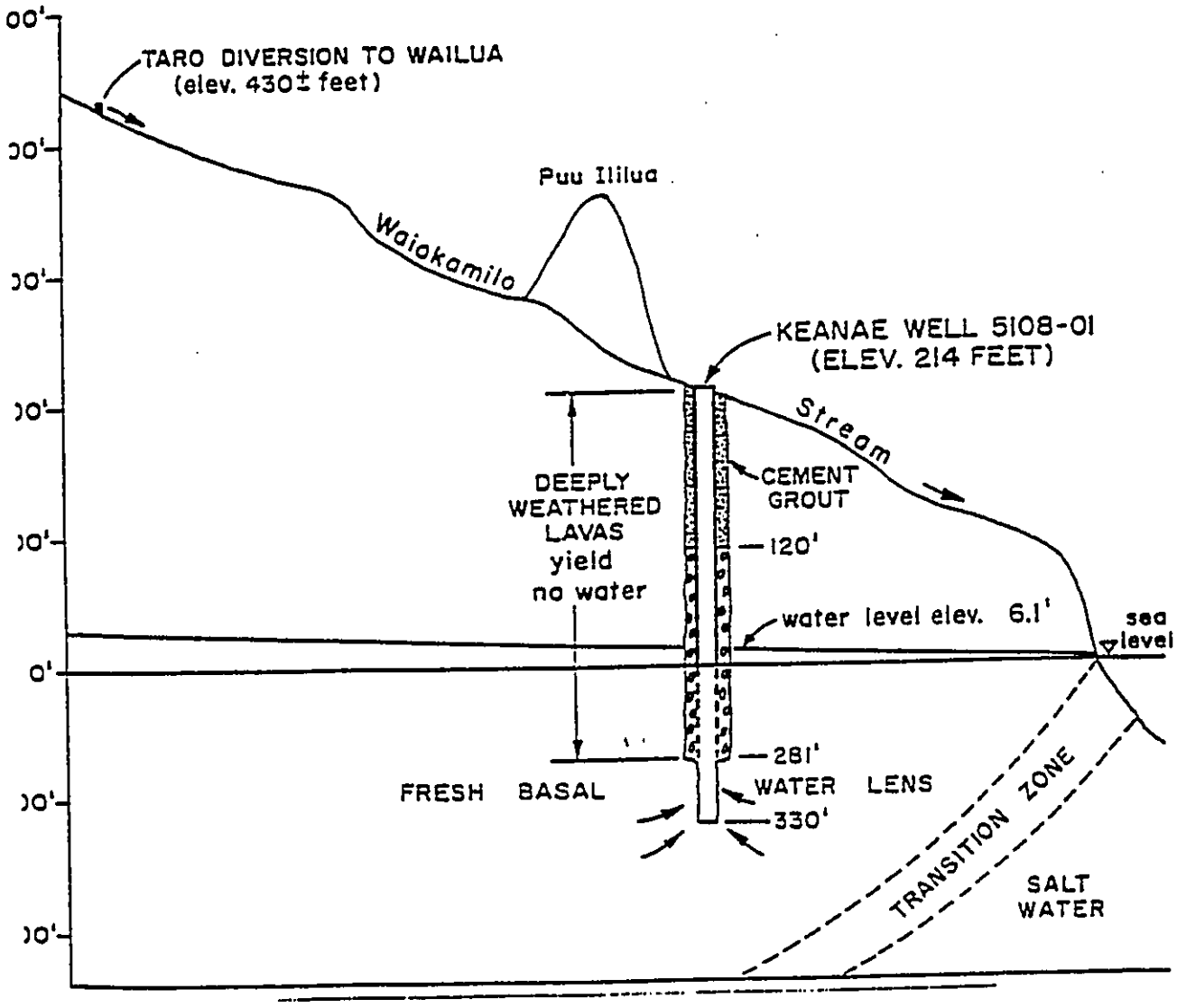
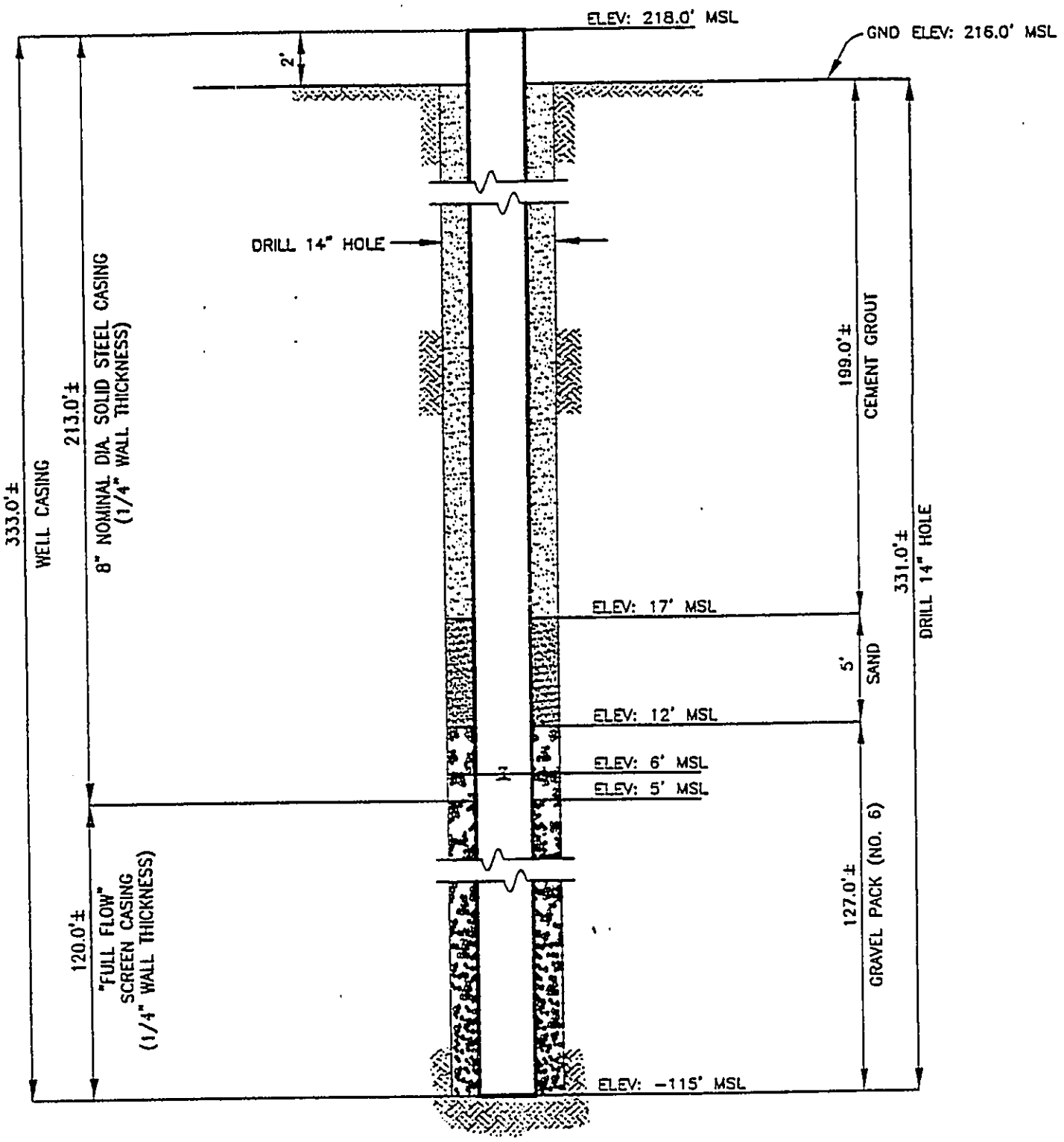


Figure 3

GEOLOGIC-HYDROLOGIC CROSS SECTION
KEANAE WELL 5108-01, MAUI



KEANAE WELL NO. 2 SECTION

N.T.S.

✓ V

SEP 0

Y96 0

epartment of Health Laboratories

SAFE DRINKING WATER BRANCH
HAIN OF CUSTODY & SYNTHETIC ORGANIC
CHEMICALS REPORT

ater System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

ell Log # 5108-01 Sample Point # 219-001

Type of sample: Routine ✓ Special ____

ollection remarks ____

Sample Chlorinated Y ✓, N ___, ? ___

ampler(s) AKiDi , ____

Date: 8-22-96 Time: 0925

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by: Date/Time	Received by: Date/Time
V Kuba 8-23-96 / 0730	
Delivered to Lab by: Date/Time	Rec'vd for Laboratory by: Date/Time
W. [illegible] 8/23/96 1130	88-96-279 [illegible] 8/23/96 1:30

Method of Shipment: HAND CARRIED ____ HAWAIIAN AIR ____ ISLAND AIR ____ OTHER ____

Seal Intact: Yes ____

Sample Lab # Relinquished by: Date/Time	Received by: Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time

ethod: EPA 505

Sample Preservation: Dechlorination: appx 3 mg $Na_2S_2O_3$

(SOC96) (Rev: 6/96)

(over)

Y96 0

Department of Health Laboratories

SEP. 13 1996

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & SYNTHETIC ORGANIC CHEMICALS REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine ✓ Special ____

Collection remarks ____

Sample Chlorinated Y ____, N ____, ? ____

Sampler(s) A. Kiba ____

Date: 8.22.96 Time: 0925

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by: Date/Time	Received by: Date/Time
KKuba 8-23-96/0730	
Delivered to Lab by: Date/Time A. Kiba 8/23/96 1130	Rec'vd for Laboratory by: Date/Time P8-96-320 Ruth Finau 8/23/96 1:30

Method of Shipment: HAND CARRIED ____ HAWAIIAN AIR ____ ISLAND AIR ____ OTHER ____

Seal Intact: Yes ____

Sample Lab # Relinquished by: Date/Time	Received by: Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time

Method: EPA 507/508

Sample Preservation: Dechlorination: appx 40 mg $Na_2S_2O_3$

SOC96) (Rev: 6/96)

(over)

Y096 158

Department of Health Laboratories

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & INORGANIC METALS CHEMICAL REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Collection remarks

Sample Chlorinated Y /, N ___, ? ___

Sampler(s) ___, ___

Date: 4/16/96 Time: 0840

KEANAE SCHOOL

Treatment: A

ADMINISTRATION ONLY			
Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by:	Date/Time	Received by:	Date/Time
Lewis	4/16/96 1400		
Delivered to Laboratory by:	**Date/Time**	**Rec'vd for Laboratory**	**Date/Time**
J Lyle 4-17-96	820	R. Sarba	APR 17 1996 0820

Method of Shipment: HAL Seal Intact: Yes ___

Sample Lab #	Relinguished by:	Date/Time	Received by:	Date/Time
PH-96-309	R. Sarba	APR 26 1996 0900	m craddock	APR 26 1996 0900
Sample Lab #	**Locked:**	**Date/Time**	**Rem'vd**	**Date/Time**
Sample Lab #	**Locked in Refrig.**	**Date/Time**	**Rem'vd**	**Date/Time**

(Over)

(INORG36
Rev-2/95)

1096 1096 161

Department of Health Laboratories

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & NITRATE, NITRITE
CHEMICAL REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type ...

Collection remarks

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) Kanda, ___

Date: 4/16/96 Time: 0840

KEANAE SCHOOL

Treatment:A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Results	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by:	Date/Time	Received by:	Date/Time
Kanda	4/16/96 1900		

Delivered to Laboratory by:	Date/Time	Rec'vd for Laboratory	Date/Time
[illegible]	4-17-96 820	R. [illegible]	APR 17 1996 0820

Method of Shipment: HAL   Seal Intact: Yes ___

Sample Lab #	Relinquished by:	Date/Time	Received by:	Date/Time

Sample Lab #	Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time

(Over)

(NITRAT95)
(Rev-2/95)

6

Q197 064

Department of Health Laboratories

APR 2 1997

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & GLYPHOSATE CONTAMINANT REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of sample: Routine__ Special_____

Collection remarks_____

Sample Chlorinated Y ✓, N___, ?___ 0.64 Cl2

Sampler(s) Kenson Kuba, _____

Date: 03-20-97 Time: 0840

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Result	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by: Date/Time	Received by: Date/Time
KKuba 3.21.97 0800	
Delivered to Laboratory by: Date/Time	Rec'vd for Laboratory by: Date/Time
JByler 3-21-97 1200	Kal Butler MAR 21 1997 1200

Method of Shipment: _____ Seal Intact: Yes_____

Sample Lab # Relinquished by: Date/Time	Received by: Date/Time
P3-97-359	
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time

Regulated Compound	ND ug/l	NQ ug/l	MCL ug/l	RESULT*	Date	Analyst
Glyphosate	<20	<30	700		MAR 24 1997	KB

Method: EPA 547

Sample Preservation:/Dechlorination:
appx 4 mg $Na_2S_2O_3$

Reported by: K. Butler Date MAR 24 1997 QA Check: NJC Date: 3/24/97

Forwarded by: Glenn K. Date: MAR 24 1997

(GLYP95)
(2/95)

DEC 10 1996

Q496 061

Department of Health Laboratories

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & GLYPHOSATE CONTAMINANT REPORT

Water System Name KEANAE (DWS) Number 219

Sample Location KEANAE WELL

Well Log # 5108-01 Sample Point # 219-001

Type of Sample: Routine ✓ Special ____

Collection remarks TOTAL Cl_2 = 2.7 mg/L

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) Jacob Suarez

Date: 12-4-96 Time: 1302

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Result	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by:	Date/Time	Received by:	Date/Time
A. [illegible]	12-5-96 1430		
Delivered to Laboratory by:	Date/Time	Rec'vd for Laboratory by:	Date/Time
J. Lyon	12-6-96 1000	Kal Botte	DEC 06 1996 1007

Method of Shipment: HAL Seal Intact: Yes ____

Sample Lab # Relinquished by:	Date/Time	Received by:	Date/Time
PL-46-67			
Sample Lab # Locked in Refrig	Date/Time	Rem'vd from Refrig	Date/Time

Regulated Compound	ND ug/l	NQ ug/l	MCL ug/l	RESULT*	Date	Analyst
Glyphosate	<20	<30	700		DEC 10 1996	KB

Method: EPA 547

Sample Preservation:/Dechlorination:
appx 4 mg $Na_2S_2O_3$

Reported by: K. Botte for Date: DEC 10 1996 Check: ___ Date: 12/10/96

Forwarded by: [signature] Date: DEC 12 1996

(GLYPSC)
(2/95)

0396 0

Department of Health Laboratories

SEP 10 19[illegible]

SAFE DRINKING WATER BRANCH
CHAIN OF CUSTODY & GLYPHOSATE CONTAMINANT REPORT

Water System Name KEANAE (DWS) Number 219
KEANAE WELL

Sample Location 5108-01 219-001

Well Log # ____-____ Sample Point # ____-____

Type of sample: Routine ✓ Special ____

Collection remarks ____

Sample Chlorinated Y ✓, N ___, ? ___

Sampler(s) A. Kuba, ____

Date: 8-22-96 Time: 0928

KEANAE SCHOOL

Treatment: A

Sample Location

ADMINISTRATION ONLY

Copies Done	___	Pos. Result	___
Sent System	___	Chem. Pos.	___
Sent NI Off.	___	Incr. Mon.	___
Data Entered	___	Violation	___
SDWB Data	___	Neg. Result	___
GIS Data	___	Reduce Mon.	___

Delivered to Airport by: Date/Time	Received by: Date/Time
K Kuba 8.23-96 /0730	
Delivered to Laboratory by: Date/Time	Rec'vd for Laboratory by: Date/Time
W. Lum 8/23/96 1640	Karl Pebbles 8/23/96 1346

Method of Shipment: ____ Seal Intact: Yes____

Sample Lab # Relinquished by: Date/Time	Received by: Date/Time
PS-96-325	
Sample Lab # Locked in Refrig Date/Time	Rem'vd from Refrig Date/Time

Regulated Compound	ND ug/l	NQ ug/l	MCL ug/l	RESULT*	Date	Analyst
Glyphosate	<20	<30	700		8/29/96	KB

Method: EPA 547

Sample Preservation:/Dechlorination:
appx 4 mg $Na_2S_2O_3$

Reported by: K. Pebbles Date: 8/29/96 QA Check: KK Date: 8/29/96

Forwarded by: K. [illegible] Date: SEP 03 1996

(GLYP95)
(2/95)

MONTGOMERY WATSON LABORATORIES

555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6324;
1 800 566 LABS (1 800 566 5227)

Laboratory Report

Haui, County of, Department of Water Supply
614 Palapala Dr

Kahului , HI 96732
ATTN: Cari Cerizo

Sample # 960531011 Sample ID KEANAE Project PHASEV
Sample Type Water Sampled 29-may-1996 Received 31-may-1996 Reported 17-jul-1996

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Alkalinity	(HL/S2320B)	mg/l	92				5.0			06-jun-1996	acc
Anion Sum	(HL/SM1040)	meq/l	2.35				0.001			17-jun-1996	wim
Calcium, Flame AA	(HL/S3111B)	mg/l	11				1			10-jun-1996	jps
Cation Sum	(HL/SM1040)	meq/l	2.43				0.001			17-jun-1996	wim
Chloride	(HL/EPA 300)	mg/l	14				1			31-may-1996	eyw
Free CO2 (25C)	(HL/S2320-B)	mg/l	5.63				0.001			11-jun-1996	deb
Carbonate as CO3, Calculated	(HL/S2320-B)	mg/l	0.290				0.001			11-jun-1996	deb
Specific Conductance	(HL/S2510B)	umho/cm	235				4			05-jun-1996	sar
Fluoride	(SM4500F-C)	mg/l	0.13				0.1			10-jun-1996	amu
Hardness (Total, as CaCO3)	(HL/SM2340B)	mg/l	69				1			17-jun-1996	wim
Bicarbonate as HCO3, Calculated	(HL/S2320B)	mg/l	112				0.001			11-jun-1996	deb
Mercury	(EPA/HL 245.1)	ug/l	ND				0.5	04-jun-1996	gub	05-jun-1996	gub
Potassium, Flame AA	(HL/S3111B)	mg/l	3.8				1			10-jun-1996	jps
Langelier Index - 25 degree	(HL/SM2330B)	None	-0.8				-0.9			17-jun-1996	wim
Magnesium, Flame AA	(HL/S3111B)	mg/l	10				1			10-jun-1996	jps
Sodium, Flame AA	(HL/S3111B)	mg/l	22				1			10-jun-1996	jps
Nitrite, Nitrogen by IC	(HL/EPA 300.0)	mg/l	ND				0.1			31-may-1996	eyw
Nitrate-N by IC	(EPA/HL 300.0)	mg/l	0.2				0.1			31-may-1996	eyw
Hydroxide as OH, Calculated	(HL/S2320B)	mg/l	0.007				0.001			11-jun-1996	deb
Lab pH	(HL/S4500H-B)	Units	7.6				0.001			05-jun-1996	sar
pH of CaCO3 saturation(25C)	(HL/SM2330B)	Units	8.4				0.001			17-jun-1996	wim
pH of CaCO3 saturation(60C)	(HL/SM2330A)	Units	7.9				0.1			17-jun-1996	wim
Sulfate	(HL/EPA 300)	mg/l	4.4				2			31-may-1996	eyw
Total Dissolved Solids	(HL/S2540C)	mg/l	190				10			05-jun-1996	huy

Report #: 27281

MONTGOMERY WATSON LABORATORIES

555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6324;
1 800 566 LABS (1 800 566 5227)

Laboratory Report

Haui, County of, Department of Water Supply
614 Palapala Dr

Kahului , HI 96732
ATTN: Cari Cerizo

Sample # 960531013 Sample ID KEAHAE Project PHASEV
Sample Type Water Sampled 29-may-1996 Received 31-may-1996 Reported 17-jul-1996

T-22 Inorg+Gen Min ICPMS Mets (ML 200.8)

Parameter	Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver, Total, ICAP/MS	ug/l	ND			1	10	03-jun-1996	jps	03-jun-1996	jps
Aluminum, Total, ICAP/MS	ug/l	ND			1	50	03-jun-1996	jps	03-jun-1996	jps
Arsenic, Total, ICAP/MS	ug/l	ND			1	5	03-jun-1996	jps	03-jun-1996	jps
Barium, Total, ICAP/MS	ug/l	ND			1	10	03-jun-1996	jps	03-jun-1996	jps
Beryllium, Total, ICAP/MS	ug/l	ND			1	1	03-jun-1996	jps	03-jun-1996	jps
Cadmium, Total, ICAP/MS	ug/l	ND			1	0.5	03-jun-1996	jps	03-jun-1996	jps
Chromium, Total, ICAP/MS	ug/l	8.6			1	5	03-jun-1996	jps	03-jun-1996	jps
Copper, Total, ICAP/MS	ug/l	ND			1	50	03-jun-1996	jps	03-jun-1996	jps
Iron, Total, ICAP/MS	ug/l	140			1	100	03-jun-1996	jps	03-jun-1996	jps
Manganese, Total, ICAP/MS	ug/l	3.9			1	2	03-jun-1996	jps	03-jun-1996	jps
Nickel, Total, ICAP/MS	ug/l	ND			1	5	03-jun-1996	jps	03-jun-1996	jps
Lead, Total, ICAP/MS	ug/l	6.5			1	5	03-jun-1996	jps	03-jun-1996	jps
Antimony, Total, ICAP/MS	ug/l	ND			1	2	03-jun-1996	jps	03-jun-1996	jps
Selenium, Total, ICAP/MS	ug/l	ND			1	5	03-jun-1996	jps	03-jun-1996	jps
Thallium, Total, ICAP/MS	ug/l	ND			1	1	03-jun-1996	jps	03-jun-1996	jps
Zinc, Total, ICAP/MS	ug/l	ND			1	20	03-jun-1996	jps	03-jun-1996	jps

Report #: 27281

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

November 7, 1997

Mr. David Craddick, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Subject: Draft Environmental Assessment for the Keanae Well No. 2, Maui

Thank you for the opportunity to review the subject document. We have the following comments and questions.

1. **Orientation Maps**

Please provide maps that show the following:

a) General information: location of existing and future wells in the affected aquifer or hydrologic unit;

b) Hydrologic information: aquifer or hydrologic unit boundary, nearby wetlands, known or assumed groundwater flowpaths, and known or assumed water level contours; and

c) Contamination information: Points or regions of known contamination, points of potential contamination (landfills, individual wastewater disposal systems, hazardous waste sites, dry wells and injection wells), known or assumed chloride levels at specified depths in relation to nearest or adjacent wells, and the likely wellhead protection area for the proposed well.

2. **Aquifer or Hydrologic Unit Status**

Please include a description of the aquifer or hydrologic unit status (along with the associated watershed and recharge area) including the following:

* Sustainable yields or other measures of water availability

* Data table presenting the following information as appropriate

  - Current water use totals, including subtotals for individual users
  - Current installed capacity including subtotals for individual wells and/or groups of wells.
  - Pending installed capacity and/or use for the proposed well and subtotals for individual wells and/or groups of wells within the aquifer

3. **Contamination Analysis**

Please present a record of contamination problems in the aquifer or hydrologic unit including but not limited to saltwater intrusion, turbidity, heavy metals, inorganic and organic chemicals, microbiological agents, water quality parameters (such as pH, alkalinity, calcium, conductivity and temperature), and radioactivity. If contamination exists, the sources and duration of the contamination should be listed. Water quality data from nearby wells should be presented as well as any anticipated need for treatment or filtering systems. Discuss past and existing land uses within the likely wellhead protection area and the potential for future contamination from those uses.

Any hazardous materials used and/or produced during drilling and treatment should be described. The method of handling these hazardous materials should also be disclosed.

4. **Hydrologic Impact Analysis**

Please include a discussion of the potential effects the well development may have on affiliated groundwater and wetlands. Relevant hydrologic, physical, chemical, and biological data for potentially affected waters should be included.

The EA should include pump test data on water level, extraction rates, and water quality. Similar data from nearby wells should also be included. The precise criteria used to determine if the well should be converted to production should be described. Any provisions for future use and monitoring of wells not placed into production should also be described.

5. **Financial and Institutional Arrangements**

In some instances, a well is developed by private financing, the transfer of public lands to government or private

developers, or in return for a water allocation credit to supply an urban development. The EA should include a full discussion of any institutional, financial or land use arrangements or commitments related to developing the well and delivering water to end users.

These arrangements may include the formation of public utility companies and subsequent rate-setting, the establishment of county water commitments, the co-funding of state or county water system development, an executive order or other set-aside of state lands, and purchase of land or easements by public entities.

Any or all of these arrangements and all permits or governmental approvals required to fulfill these commitments should be listed.

6. **Watershed and Land Use Analysis**

Please provide an analysis of how the proposed well development may affect land and water uses in the region. The analysis should include a discussion of the following:

* Hawaii State Water Plan and its component parts
* County General, Development, and/or Community Plans
* Any secondary or cumulative impacts caused by promoting land uses that alter the hydrology of the source and/or end-use area
* An assessment of the well's impact on the land owners, water users including farmers and kuleana residents in the region and a declaration if ceded lands are involved.

7. **Alternative Analysis**

Please include a list of alternatives to new groundwater development and discussion of their related costs and benefits. The list should include but not be limited to wastewater reuse, rainfall catchment, conservation, and existing potable and nonpotable water supplies.

8. **Population Growth**

According to the environmental assessment, between 1990 and 2010, the population of the Hana region is expected to increase from 1,895 to 6,469. Please describe the basis for this high population projection. What are the plans to provide adequate water supply for the future residents?

9. **Determination**

Please discuss the findings and reasons for supporting the FONSI determination based on the significant criteria listed in §11-200-12 of the EIS rules. Please see the enclosed example.

If you have any questions please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Gary Gill
Director

c: C. Takumi Engineering, Inc.

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 4, 1998

Mr. Gary Gill, Director
Office of Environmental Quality Control
236 Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Environmental Assessment for the Keanae Well No. 2
Keanae, Maui, Hawaii

We have received your comments on the Environmental Assessment for the Keanae Well No. 2 and respond as follows:

1. *Orientation Maps:*

   - *General Information*: We are attaching a Hydrologic Map of Maui showing the Koolau (604) Sector, Keanae Aquifer (60404) as Exhibit A. The existing well in use in the Keanae Aquifer consist of the Keanae Well No. 1 (Well No. 5108-01) located approximately 75 feet from the proposed Keanae Well No. 2. The Department of Water Supply does not have any planned future wells in the aquifer.

   - *Hydrologic Information*: The hydrologic unit is shown in the attached figure. Based upon the nearby Kèanae Well No. 1 basal aquifer water levels, the anticipated water level is about 6.1 feet. Nearby wetlands consist mainly of the taro patches under cultivation which are fed by surface water sources and springs. As stated in the EA, the annular space of the well will be grouted from just above water level to the ground surface to mitigate impacts on surface and high level ground water. A section of the proposed well is attached and has been added to the environmental assessment as Exhibit B.

No surface/high level ground water was encountered during the construction of Keanae Well No. 1 (Groundwater Exploration of Keanae Well 5108-01, Maui, Circular C95, Department of Land and Natural Resources, Division of Water and Land Development, Honolulu, Hawaii). The circular is attached and will be included in the environmental assessment as Exhibit C. The circular also provides information of the groundwater contours and flow paths. Similar conditions are anticipated for the proposed well, located approximately 75 feet away from the existing Keanae Well No. 1.

- *Contamination Information*. There are no known points of contamination mauka of the site. The County landfill, as stated in the environmental assessment, is in Hana. Other contaminants which may affect the drinking water quality of the well are individual wastewater disposal systems for residences and a church. The latest Department of Water Supply water quality analysis of water from Keanae Well No. 1, approximately 75 feet away shows the water to be of potable quality. The water quality analysis is attached and will be included in the environmental assessment as Exhibit D. Water samples will taken during test pumping of the proposed well and will be examined for drinking water quality to assure that the water can meet drinking water standards. Determination of appropriate treatment to bring the water to drinking water quality will be considered upon analysis of the water quality sample. If costly treatment is required, the Department of Water Supply may abandon the project.

2. *Aquifer or Hydrologic Unit Status*: The aquifer system covers an area of 55.5 square miles, extending along the coast from Keanae Point to Nahiku and inland to Haleakala. Rainfall over the aquifer averages 185 inches per year, ranging from 150 inches at the coast to 300 inches a short 3 to 4 miles inland.
   - *Sustainable Yield*: The Keanae Aquifer has an estimated sustainable yield of 96 MGD.
   - *Current Water Use Totals including totals for individual water users*: Current water use totals were provided in the environmental assessment. The average water use total for 1995 was 24,650 gallons per day.
   - *Current Installed Capacity*: The only producing water well in the aquifer system is the County Department of Water Supply's Keanae Well No. 1 (Well No. 5108-01) located near the proposed well. The well has an

installed pump capacity of 0.144 MGD (100 gpm).

- *Pending Installed Capacity*: According to the Commission on Water Resource Management, there are no other wells pending. If the Department of Water Supply determines that the development of the exploratory well is feasible, the anticipated pump capacity is 0.144 MGD. The proposed well will back-up the existing well and designed for the pumps to run alternately, not simultaneously.

3. *Contamination Analysis*:
   - *Contamination Problems*: Potential contamination problems may be primarily due to use of agricultural herbicides and pesticides and individual wastewater treatment systems. Water quality samples will be taken during the well testing phase of the project. Water quality shall be checked for contaminants required by State Department of Health, Drinking Water Standards.

   - *Hazardous materials used and/or produced during drilling*: No hazardous materials shall be allowed or anticipated to be produced during the well drilling process. The well shall be disinfected prior to the pump test to protect the aquifer against biological contamination of the aquifer.

4. *Hydrologic Impact Analysis*
The proposed Keanae Well No. 2 will be initially constructed as an exploratory well. The exploratory well will be to determine (1) the quantity of water that can be pumped and (2) the water quality of the basal aquifer.

Potential effects on affiliated groundwater, surface water and wetlands shall be mitigated by grouting the annular space from above the water level to ground surface to assure that high level groundwater and seepage does not directly discharge into the basal aquifer through the annular space. The well will be pump tested and water samples taken to determine water quality. If placed into service as a production well, the well will be used to back-up the existing Keanae Well No. 1 and designed so only one pump will operate at any time.

Pump test data on water level, extraction rates, and water quality shall be reported to the Commission on Water Resource Management as part of the well construction permit requirements.

Similar data from other wells. The Keanae Well No. 1 (Well # 5108-01) is

located approximately 75 from the proposed well. The Groundwater Exploration at Keanae Well 5108-01, Maui, Circular C95, prepared by Department of Land and Natural Resources, Division of Water and Land Development, Honolulu, Hawaii is attached as Exhibit C and will be included in the environmental assessment.

The precise criteria used to determine if the well should be converted to production. The criteria for placing the exploratory well into a production well includes a minimum pumping capacity of 100 gpm and water quality with reasonable water treatment costs to meet State Drinking Water Standards. Alternatives to this well project have been examined and added to the environmental assessment; additional treatment costs will be considered in the final assessment.

Provisions for future use and monitoring wells not placed into production should also be described. The U.S. Geological Survey is conducting a study, in cooperation with the Maui County Board of Water Supply, of the groundwater and surface water in East Maui including the Keanae area. The well may continue to be used as a monitoring well if not placed into production.

5. *Financial and Institutional Arrangements*: The well construction will be financed by the Board of Water Supply. No private developers or water allocation credits are involved. The Land is under jurisdiction of the County of Maui.

6. *Watershed and Land Use Analysis*:
   - *Hawaii State Water Plan*:
   - *County General Plan, Development and/or Community Plans*:
   - *Secondary or cumulative impacts caused by promoting land uses that alter to hydrology of the source and/or end use area*:

The proposed project can also be used for groundwater exploration in conformance with the Hawaii State Water Plan. The well will aid the Commission on Water Resource Management to "continue investigations to acquire additional data to improve the information base on water resource availability". A well drilling permit will be obtained from the Commission on Water Resource Management and geological and pump test information will be submitted to the Commission on Water Resource Management. A monitoring tube will be installed in the well for measurement of water levels.

Conformance with the Maui County General Plan and Community Plan is

included in the environmental assessment. Presently, the Keanae Well No. 1 is the only source for the Department of Water Supply's Keanae Water System. The surface intake that was used as a back-up to the well has been abandoned due to the cost of water treatment to meet present drinking water regulations.

The existing well is capable of providing the water needs of the community; this well will be used to back-up the existing well and reinforce the source of water for the water system and should not cause secondary or cumulative impacts.

Assessment of the well's impact on the land owners, water users including farmers and kuleana residents in the region and a declaration if ceded lands are involved: The site is located on crown lands. In 1984, the State of Hawaii placed control and management of the land to the Department of Water Supply. The Keanae Well No. 1 is also located on the present site.

7. *Alternative Analysis*: The section on Alternatives to the proposed action has been expanded in the environmental assessment and includes surface water treatment, providing a stand-by pump (without well), trucking potable water and using non-potable water service during pump breakdown periods. The well, if developed into a potable drinking water source, will serve as a back-up to provide more continuous water service during well pump breakdown periods.

Wastewater is not available in this rural area for reuse as a potable water source and irrigation is primarily by surface water auwai. In this case, a basal aquifer well will have less impact on agricultural irrigation than the use of surface water. Rainfall catchment is not an alternative for this public water system.

8. *Population Growth*: The second and third sentences in Section B.1 Population and Economy has been changed to read: "By the year 2000, an increase to 2,182 is predicted. An increase to 2,392 is anticipated by 2010." The total 20 year increase anticipated is 497 persons. The population project is from the Maui County Community Plan Update Program Socio-Economic Forecast Report listed in the references section. The Hana Community Plan Region is the largest land area region on Maui and includes the Ko'olau, Hana, Kipahulu, Kaupo and Kahikinui districts. Information received from from Keanae-Wailuanui people estimate the population of Keanae-Wailuanui to be in the range of 200 to 250 residents.

As stated in the environmental assessment, the four year median water use for

the Keanae Water System is 25,250 gallons per day. According to the Maui Department of Water Supply Standards, the maximum day demand would then be about 38,000 gallons per day or less than half of the 16 hour design pumpage of 96,000 gallons per day from the well. Again, we reiterate that the proposed well is a back-up to the existing well. The existing well with the Proposed Keanae Well No. 2 as a back-up should be capable of providing a sufficient supply of water for the community for years to come.

9. *Determination*: Findings and reasons for supporting the FONSI determination have been added in the final the environmental assessment after review of comments regarding the draft environmental assessment.

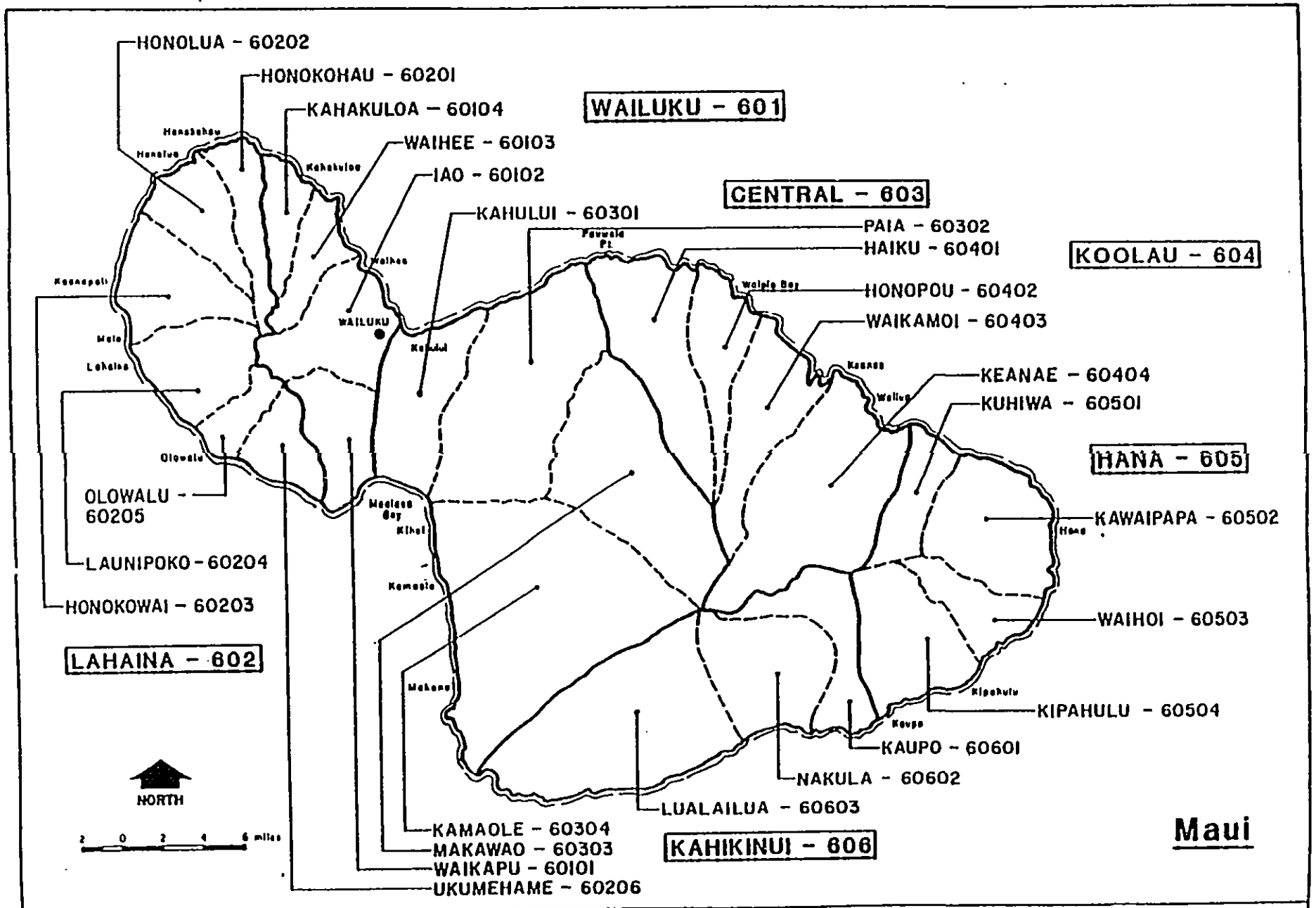
Thank you for your comments and cooperation.

Sincerely,

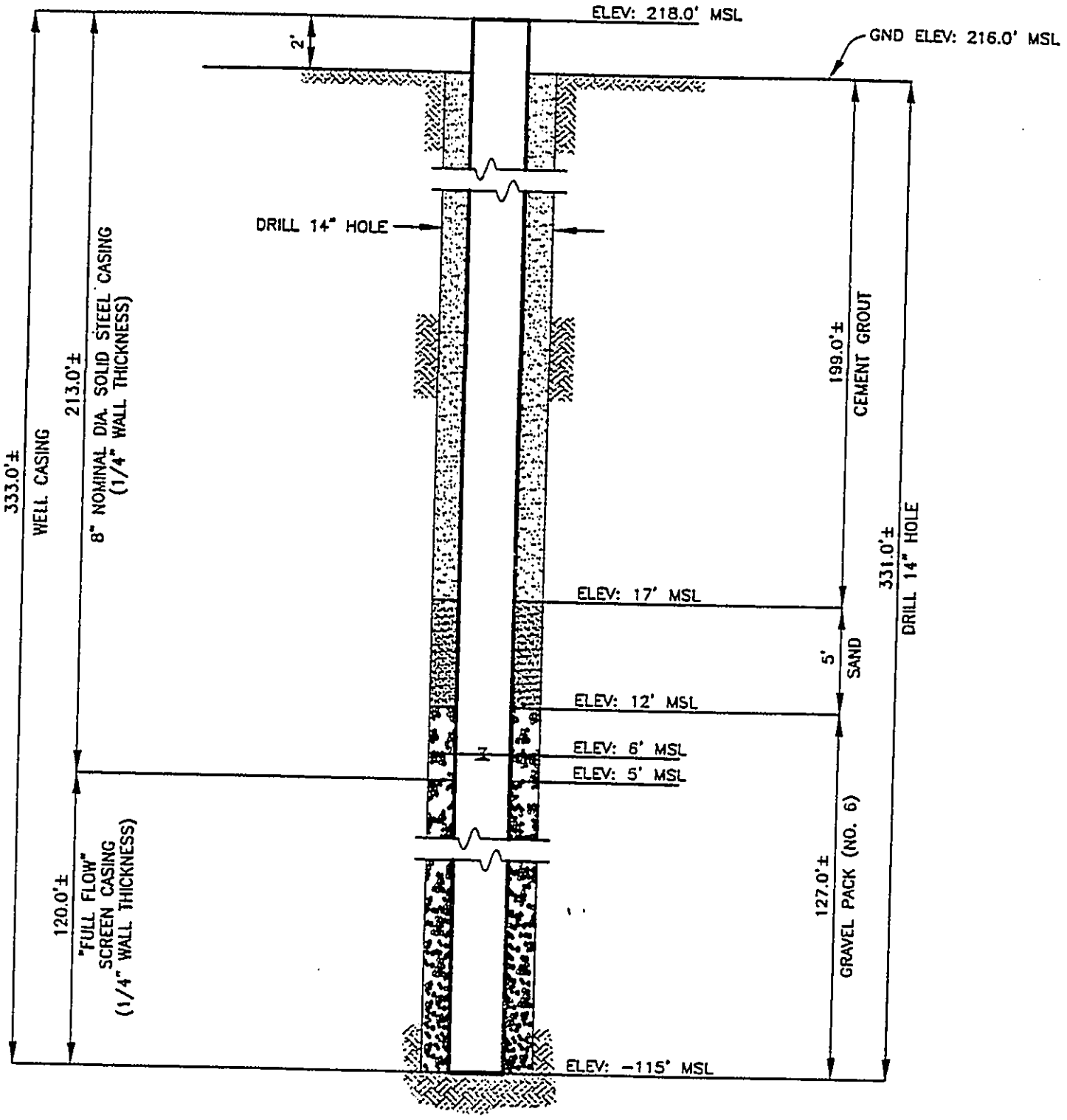
David R. Craddick
Director

hk
cc: Carl Takumi

EXHIBIT "A"



HYDROLOGIC UNITS - ISLAND OF MAUI



KEANAE WELL NO. 2 SECTION

N.T.S.

EXHIBIT "B"

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 ALA MOANA BLVD., SUITE 415
HONOLULU, HAWAII 96813
PHONE (808)522-8292 FAX 522-8298

December 22, 1997

Carl K. Takumi, P.E.
C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

Subject: Draft Environmental Assessment (DEA) for the Keanae Well No. 2 at Keanae, Maui, Hawaii

Dear Mr. Takumi,

As requested in your letter dated November 25, 1997, the staff of the U.S. Geological Survey, WRD, has reviewed the subject DEA and offer the following comments. We are currently conducting a study in cooperation with the Maui County Board of Water Supply of the ground water and surface water on East Maui including the Keanae area. Because of the location of the well, information gathered during drilling would provide useful scientific knowledge of the area. We are specifically interested in the depth at which water is first found in the well and how the depth to water changes as the well is deepened. This information could be obtained by measuring the water level in the well each morning before that day's drilling begins. We would like to request, if possible, that the well drilling specifications include this. Thank you for the chance to review this draft assessment. We have no other comments on the draft at this time. Hopefully we can take advantage of this opportunity to gather important data. If you have any questions please feel free to call Steve Gingerich at (808) 522-8292.

Respectfully,

for William Meyer
District Chief

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 4, 1998

Mr. William Meyer, District Chief
U.S. Geological Survey
Water Resources Division
677 Ala Moana Blvd., Suite 415
Honolulu, Hawaii 96813

SUBJECT: Environmental Assessment for Ke'ane Well No. 2
Ke'anae, Maui, Hawai'i
Job No. 97-00

Dear Mr. Meyer:

Thank you for your comments on the Draft Environmental Assessment. We will incorporate the following information gathering procedure into the construction documents:

1. Measurement water level elevation when first encountered.
2. Measure water level elevation each morning before the day's drilling begins.

We will also submit pump test information upon completion of the project.

Sincerely,

David R. Craddick
Director

hk
cc: Carl Takumi