DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

November 4, 1999

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

Ms. Genevieve Salmonson
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmonson:

Subject: Finding of No Significant Impact (FONSI) for Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1, TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

The Department of Water has reviewed the comments received during the 30-day public comment period that began on April 23, 1999 for the subject Environmental Assessment. We have determined that this project will not have significant environmental effects and are issuing a FONSI. Please publish this notice in the December 8, 1999 OEQC Environmental Notice. ✓

We have enclosed a completed OEQC Publication Form and four copies of the final EA. Please call the Project Engineer, William Eddy, at (808) 245-5412 if you have any questions.

Sincerely,

Ernest Y.W. Lau
Manager and Chief Engineer

WE
c: Sato and Associates, Inc.

--- 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 ---
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/Fiscal/Shop FAX No. (808) 245-5813

1999-12-08-KA-FEA-

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FINAL
ENVIRONMENTAL ASSESSMENT

PUMPS AND CONTROLS
for
PUHI WELL NOS. 5A & 5B
and
MODIFICATION TO PUHI WELL NO. 1

This environmental document prepared pursuant to Chapter 343, HRS

Proposing Agency

Department of Water
County of Kauai
State of Hawaii

November 1999

FINAL
ENVIRONMENTAL ASSESSMENT

PUMPS AND CONTROLS
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PUHI WELL NOS. 5A & 5B
and
MODIFICATION TO PUHI WELL NO. 1

Proposing Agency

Department of Water
County of Kauai
State of Hawaii

Prepared by

Sato & Associates, Inc.
2046 S. King Street
Honolulu, HI 96826

November 1999

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I. EXECUTIVE SUMMARY

The Department of Water is mandated to provide potable water for the Island of Kauai. The proposed action will increase the available source for both the Puhi and Lihue Water Systems to meet projected water demands According to the Kauai Water Use and Development Plan, February 1990, potable water uses within the Hanamaulu Aquifer would increase to 7.55 mgd by the year 2010. Current capacity of the existing potable water wells are 5.07 mgd. See Section VI.D. Ground Water Hydrology.

The Department of Water (DOW), County of Kauai, is proposing to develop two (2) deepwells into production and to modify piping, electrical and control systems, and to install a new radio controlled Supervisory Control and Data Acquisition (SCADA) System.

Four (4) separate sites are included in this project.

Existing Puhi 510 Reservoir Site

This site has been fully developed and includes two(2) concrete water storage reservoirs, and related piping, electrical and control systems.

The DOW has completed two (2) exploratory wells and obtained hydrological data for the wells located within the resources of the Lihue Basin. Test data indicates that the well will produce water meeting the Department of Health safe drinking water standards.

DOW proposes to put into production the two (2) wells by installing deepwell pumps and related piping, electrical work, and construction of a control building.

Existing Puhi Well No. 1 Site

Since additional source is being provided for the Puhi 510 Water System, the DOW also proposes to transfer the Puhi Well No. 1 source to the Lihue 393 Water System. DOW proposes to provide a connection to the Lihue 393 system The existing connection to the Puhi 510 Water System will be retained for emergency purposes.

The existing pump controls will be modified and a new radio system will be installed within the existing control building.

Existing Puhi 393 Reservoir Site

DOW proposes to activate the Puhi Well No. 1 pump from this reservoir. This will require modifying the existing valve controls. A new radio system will be installed in the existing control building.

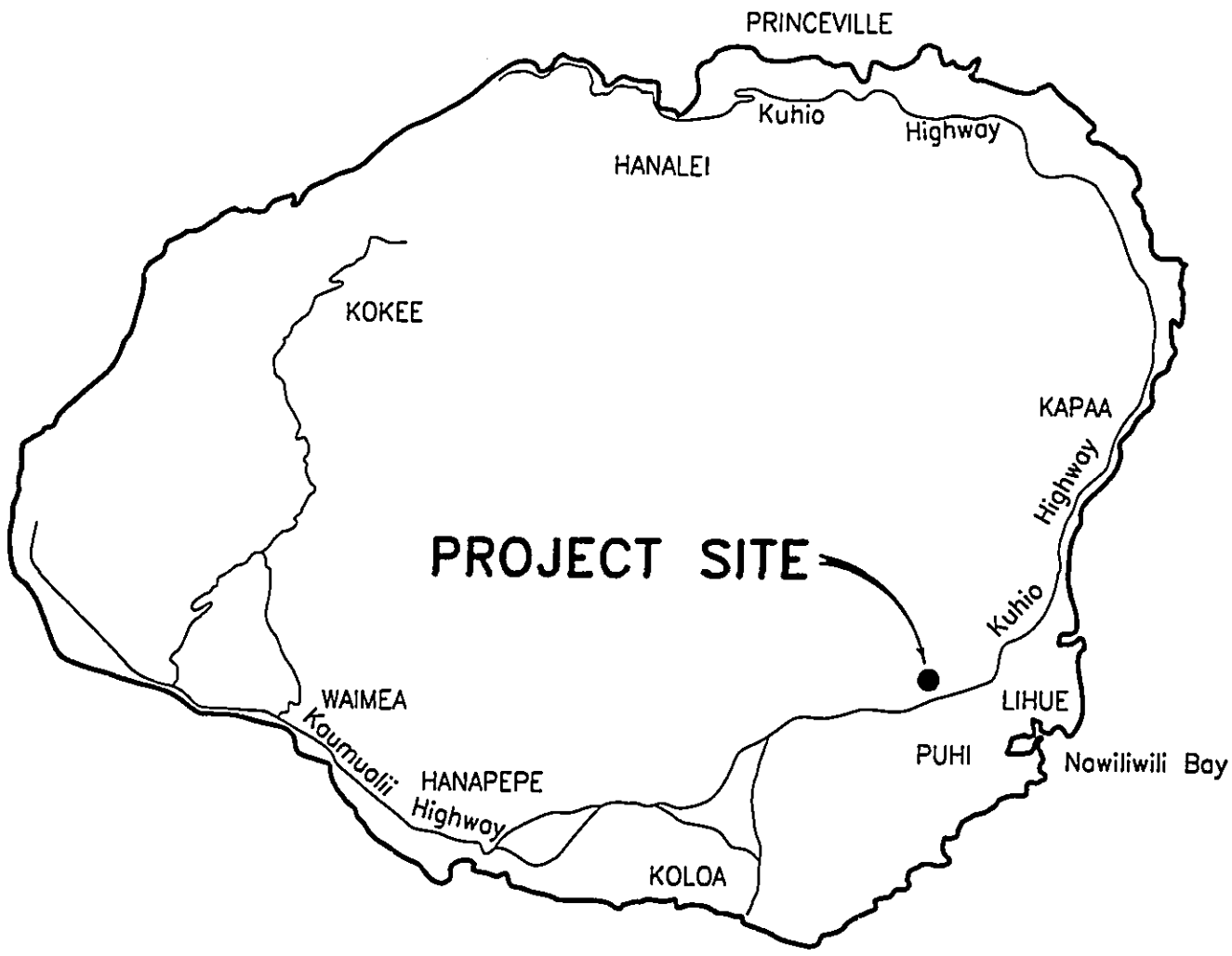
Existing Puhi Well No. 3 Site

A new radio system will be installed within the existing control building.

All four (4) sites are fully developed and are located within the Puhi area on the Island of Kauai approximately two (2) miles west of Lihue. See Figures 1, 2, 3 and 4 for location.

The proposed improvements noted above are anticipated to have limited environmental impacts.

Department of Water, County of Kauai, funds will be used for this development and is, therefore, subject to the Hawaii environmental process and Chapter 343 of the Hawaii Revised Statutes and Chapter 200 of Title 11, Department of Health Administrative Rules.



NORTH

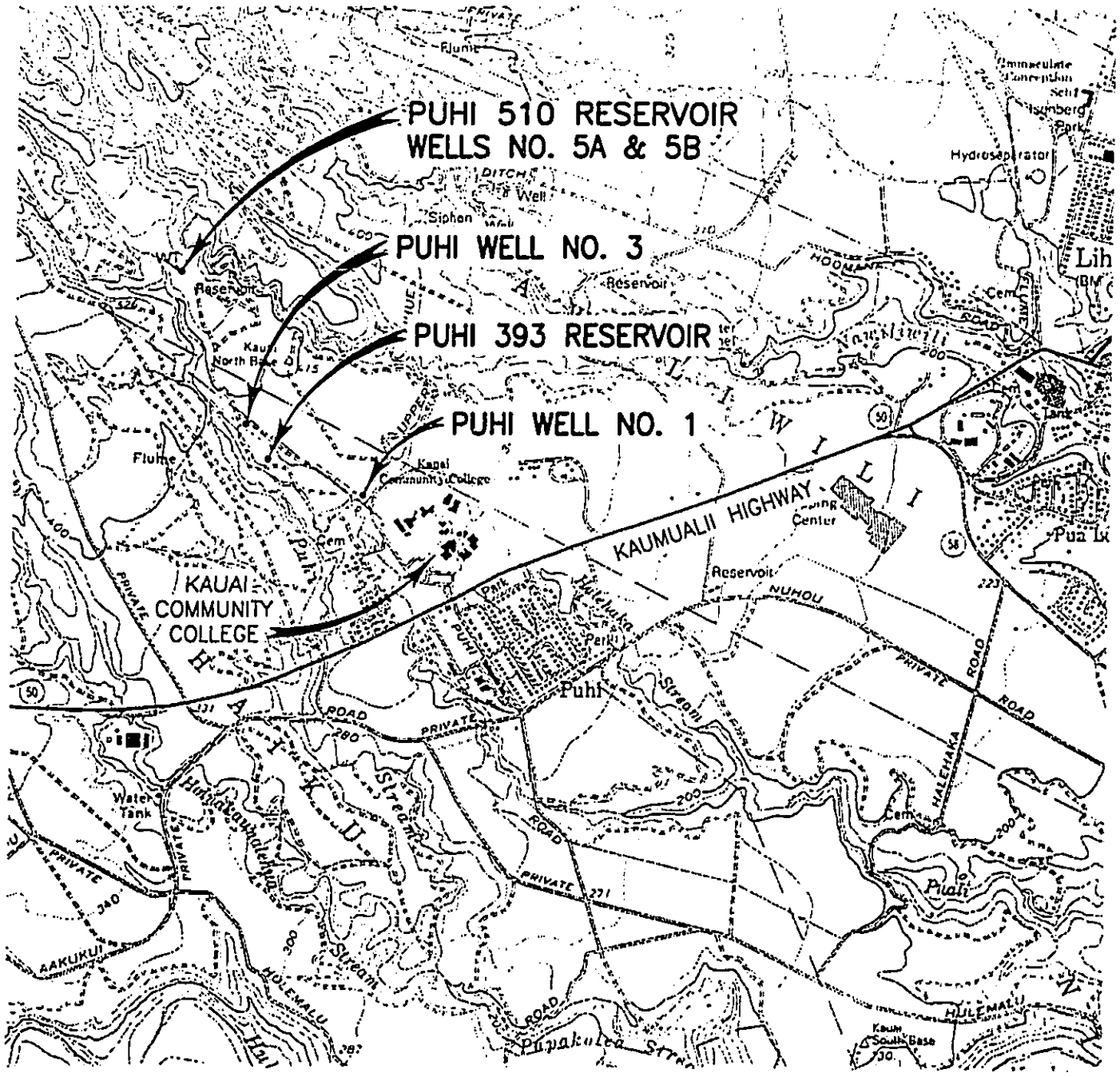
ISLAND OF KAUAI

GRAPHIC SCALE

5 0 5 10

SCALE IN MILES

FIGURE 1



VICINITY PLAN

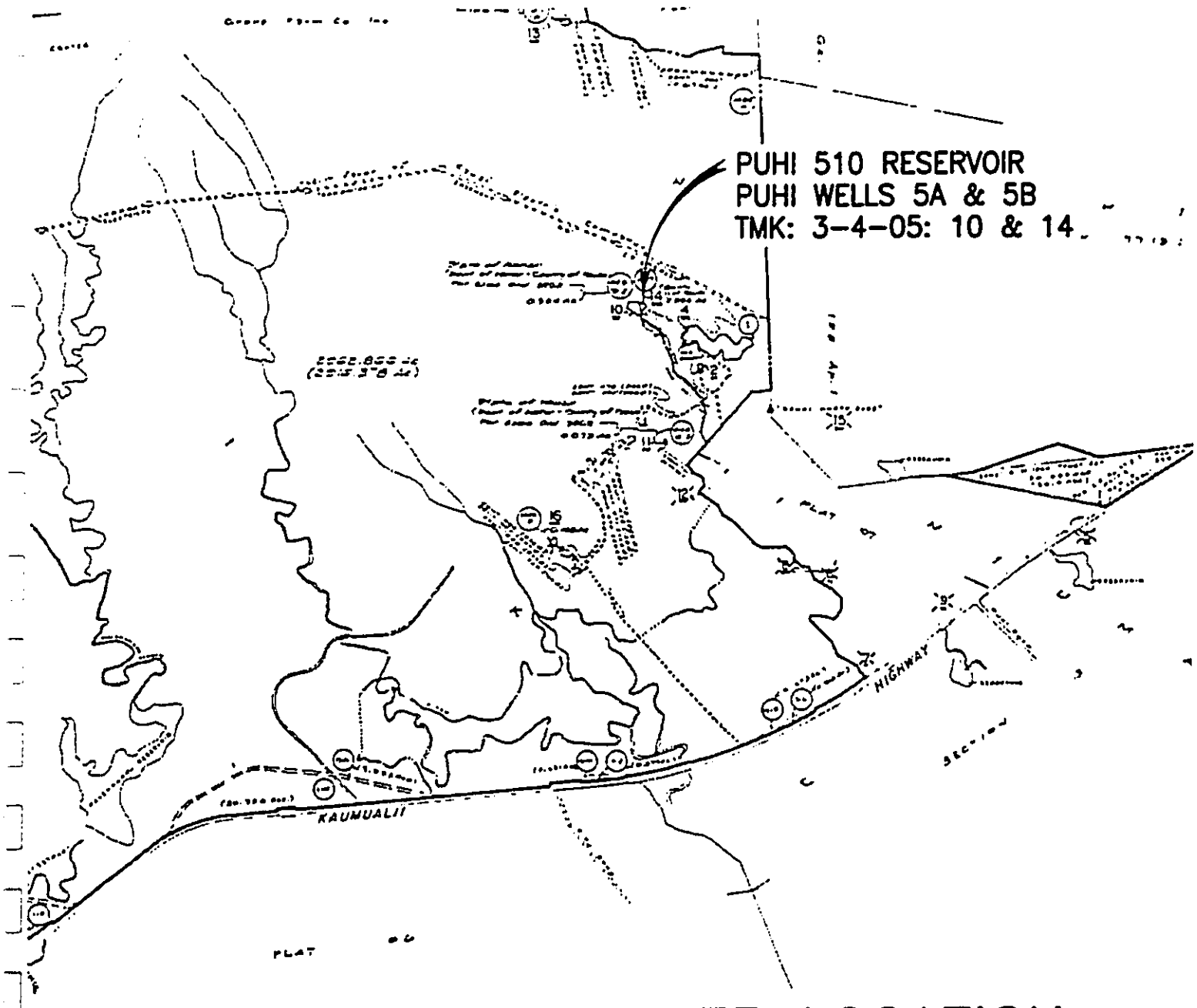
NORTH

GRAPHIC SCALE

2000 0 2000 4000

1" = 2000'

FIGURE 2



TAX MAP SITE LOCATION

SOURCE: TMK: 4-3-4-05

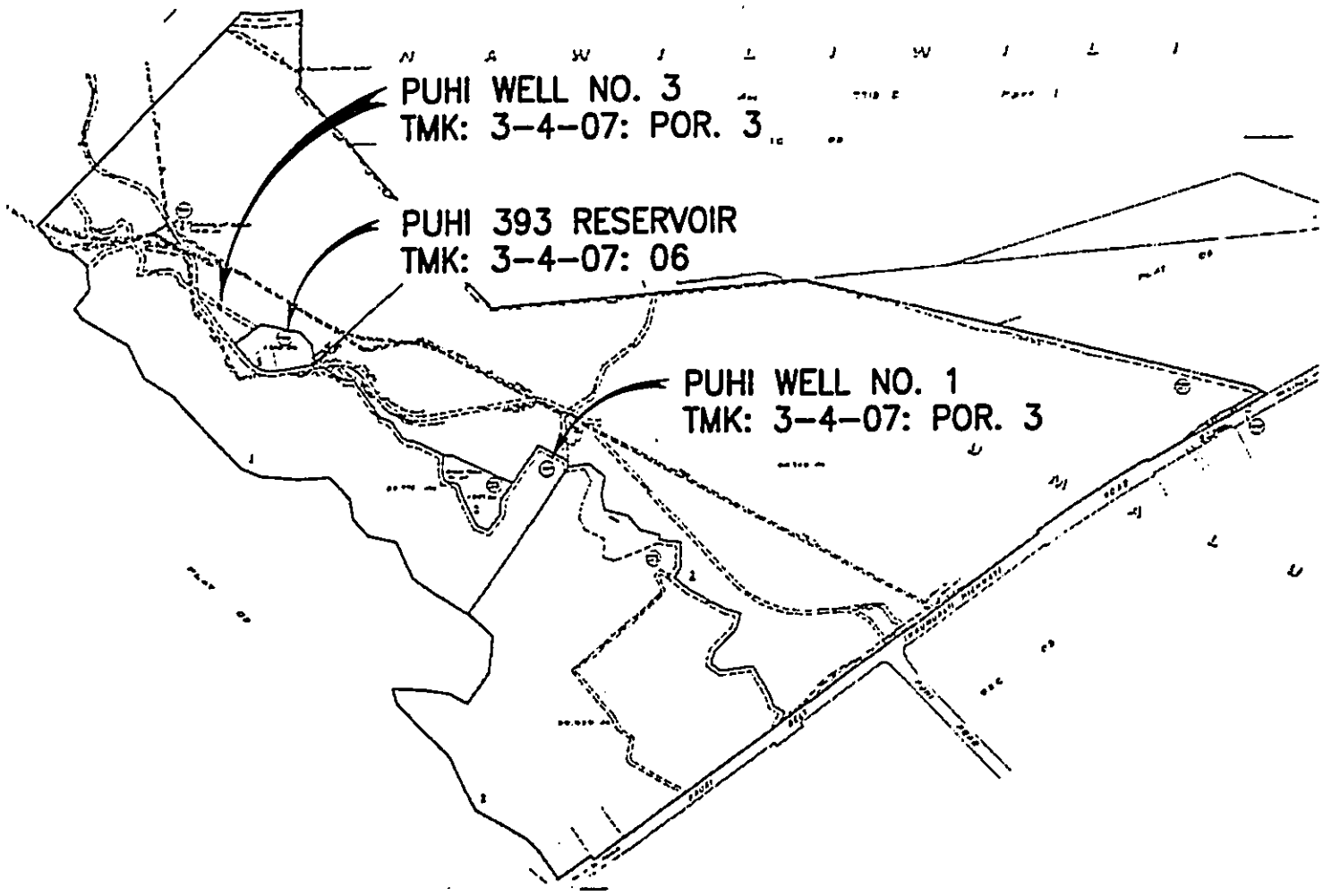
NORTH

GRAPHIC SCALE

2000 0 2000 4000

1" = 2000'

FIGURE 3



TAX MAP SITE LOCATION

SOURCE: TMK: 4-3-4-07

NORTH

GRAPHIC SCALE

800 0 800 1600

1" = 800'

FIGURE 4

II. SUMMARY INFORMATION

Pursuant to Chapter 343, Hawaii Revised Statutes, for Environmental Assessments:

Proposing Agency:	Department of Water, County of Kauai
Accepting Agency:	Department of Water, County of Kauai
Project Name:	Pump and Controls for Puhi Well No. 5A and Puhi Well No. 5B, and Modifications to Puhi Well No. 1
Project Description:	Deepwell pumps installation, modification of existing deepwell pump, and appurtenant piping, electrical and controls
Determination:	Finding of No Significant Impact (FONSI)
Project Location:	Puhi, Kauai, Hawaii
Tax Map Key (Landowner)	3-4-05: 10 & 14 (Department of Water) - Puhi 510 Reservoir 3-4-07: por 03 (University of Hawaii) - Puhi Well Nos. 1 & 3 3-4-07: por 06 (University of Hawaii) - Puhi 393 Reservoir
State Land Use Designation:	Agricultural
County Zoning:	Open and Agriculture

III. PERMITS AND APPROVALS REQUIRED

Conversion of the exploratory wells to development wells and modifications to the existing deepwell pump will require the following permits:

County of Kauai Planning Department: Use Permit for utility installations in agricultural and open space zoned areas.

Commission on Water Resource Management: Permanent Pump Installation Permit for the new pumps and pump modification and a Water Use Permit.

Department of Health, Safe Drinking Water Branch: Approval to develop a potable water source with connection to a public water system.

Department of Health, Clean Water Branch: National Pollutant Discharge Elimination System (NPDES) Permit if there are discharge of hydrotesting or well effluent into State waters through use of the county storm sewer system.

County of Kauai, Department of Public Works, Building Division: Building Permit.

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 the Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems." The Department of Water intends to integrate two new wells, Puhi Well No. 5A and Puhi Well No. 5B into the existing Puhi Water System and accordingly, the Department will comply with the "Rules Relating to Potable Water Systems."

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 that addresses the requirements set in Section 11-20-29.

IV. LISTS OF INDIVIDUALS, COMMUNITY GROUPS AND AGENCIES CONTACTED

The following were contacted for information and consultation during the preparation of the draft EA.

State Agencies

Department of Health, Environmental Management Division, Safe Drinking Water Branch
Department of Health, Environmental Management Division, Solid and Hazardous Waste Branch
Department of Health, Environmental Management Division, Wastewater Branch
Department of Health, Environmental Health Administration, Hazard Evaluation & Emergency Response Office
Department of Land and Natural Resources, Commission on Water Resource Management

Kauai County Agencies

Department of Water
Planning Department

V. PROJECT DESCRIPTION

A. Background

The Puhi Water System is a municipal system serving the Lihue District consisting of commercial, residential and open areas. The primary sources of potable water are from four (4) existing well sites. Puhi Well No. 1 currently operates at approximately 200 gpm, while Puhi Well No. 2 operates at approximately 300 gpm, Puhi Well No. 3 at approximately 300 gpm, and Puhi Well No. 4 at approximately 200 gpm. Ground water from these four (4) deep wells are pumped to the Puhi 510 Reservoirs. The Puhi 510 Reservoir site currently consist of one (1) 0.5 million gallon concrete reservoir and one (1) 1.0 million gallon concrete reservoir.

The Puhi 393 Reservoir is connected to the Lihue Water System and currently receives makeup water from the Puhi 510 Reservoirs. The site consists of one (1) 1.0 million gallon concrete reservoir.

B. Location

The Puhi wells and reservoirs sites are located within the Lihue District on the Island of Kauai, approximately two (2) miles west of Lihue.

The Puhi 510 Reservoir Site is on a 0.59 acre site identified as Tax Map Key (TMK) 3-4-05: 10 and 14 and is owned by the Department of Water. The site is approximately 5,700 feet north of Kaumualii Highway and is situated within former cultivated cane lands.

The Puhi 393 Reservoir Site is on a 1.30 acre site identified as TMK 3-4-07:06. This site is approximately 4,000 feet north of Kaumualii Highway, also surrounded by former cultivated cane lands. The land is owned by the University of Hawaii although the reservoirs are maintained by the Department of Water.

The Puhi Well No. 1 Site and Puhi Well No. 3 Site are located within the parcel identified as 4-3-07:03 owned by the University of Hawaii. The Puhi Well No. 1 site is approximately 1,700 feet north of Kaumualii Highway adjacent to an open field used by the Kauai Community College. The closest building is approximately 500 feet away from the well site. The improvements for the well sites are maintained by the Department of Water.

C. Technical Characteristics

All four (4) of the sites noted below have been fully developed and are secured by chain link fencing. Access to the sites is by agricultural dirt roads now used mainly by DOW personnel for maintenance.

To upgrade system reliability, a new radio controlled Supervisory Control and Data Acquisition (SCADA) System will be installed at the various sites. This will provide a supervisory system capable of remote operation and data collection. The radio SCADA system is being included or added to other DOW water systems.

Existing Puhi 510 Reservoir Site

The Puhi No. 5A and 5B Wells are located within the Puhi 510 Reservoir Site. See Figure 5. The wells were drilled at the entrance to the site adjacent to the 1.0 million gallon reservoir and are approximately 21 feet apart. The expected yield from Well No. 5A is approximately 900,000 gallons per day and approximately 600,000 gallons per day from Well No. 5B. Although only one well pump will normally be utilized, both pumps can be operated at the same time when water demand is high. See Figure 6 for the sections of the existing wells.

The project will include installation of a vertical turbine deepwell pump, valves and piping, and electrical power and controls for each of the wells. The proposed rating for each pump are:

	Well 5A	Well 5B
Rated Capacity, gpm	600	400
Total Head, feet	520	500
Synchronous Speed, rpm	1800	1800
Rated Motor Horsepower	125	75

A control building constructed of concrete masonry units will be provided to house the electrical and control equipment, chlorination system, and well level air piping system. A new radio SCADA (System Command and Data Acquisition) system will be installed within the building with a wood pole mounted antenna, 15 feet high, located next to the control building. The building is proposed to be constructed with slab on grade, concrete masonry walls, and concrete roof. Kauai Electric Company is expected to bring electrical power to the site. The electrical power is likely to be pole mounted and extending from Puhi Well No.3 following the route of the existing power lines.

Additional asphalt concrete paving will also be included to provide easier maintenance access to the existing reservoirs and new deepwell pumps.

The actual quantity of water to be pumped from Wells 5A and 5B is difficult to accurately estimate because the Lihue, Puhi and Hanamaulu Water Systems are all interconnected and water is moved throughout the system as demanded. There are a total of 15 wells (including Wells 5A and 5B) within the Lihue/Puhi/Hanamaulu Water System and the time that each well is in operation will be balanced to prevent excessive pumping of any one well.

For water system planning purposes, the Department of Water uses the Water Systems Standards to determine total pump capacity. The Water System Standards criteria requires that the total system pump capacity meet the maximum daily demand on the water system with an operating time of 16 hours. Therefore, the Department anticipates pumping Well 5A and 5B a maximum of 16 hours per day, 365 days per year.

Based on the above, the maximum daily pumping rate estimates are as follows:

Well No. 5A: 600 gpm @ 16 hrs/day = 576,000 gals/day

Well No. 5B: 400 gpm @ 16 hrs/day = 384,000 gals/day

The Department recognizes the additional constraint on pumping posed by the near proximity of the two wells, which is expected to result in increased drawdown when both wells are in

operation. Therefore, under routine operations it is probable that only one of these wells will be in operation at any time.

Existing Puhi Well No. 1 Site

Puhi Well No. 1 currently pumps directly into Puhi 510 System. Since additional source is provided for the Puhi 510 System with the development of the Puhi 5 wells, modification will be made to allow the well to pump directly into the Lihue 393 System.

To allow the same pumping rate at the lower head, the deepwell pump will be modified by reducing the number of pump stages. This work will require the removal of the deepwell pump, inspection of the pump, removal of the pump stages and reinstallation. The proposed reduction in head will have the following characteristics.

	Existing	Proposed
Rated Capacity, gpm	200	200
Total Head, feet	544	450
Synchronous Speed, rpm	1800	1800
Rated Motor Horsepower	50	50

A new valved pipe connection will be made to the Lihue 393 System by connecting to the existing 16-inch line which runs adjacent to the well site. The existing connection to the Puhi 510 System will remain with the valve closed for emergency purposes.
The existing controls will be modified and a new radio SCADA system will be installed within the existing control building. A new wood pole mounted antenna, 15 feet high will be installed next to the existing control building.

See Figure 7 for the Puhi Well No. 1 Site Plan.

Existing Puhi Well No. 3 Site

The project will involve modifying the existing pump controls and providing a new radio SCADA system within the existing control building. A wood pole mounted antenna, 15 feet high, will be installed adjacent to the existing control building. See Figure 8.

Existing Puhi 393 Reservoir Site

The project will involve modifying the existing valve controls and providing a pad mounted radio SCADA system with a wood pole mounted antenna, 15 feet high. See Figure 9.

D. Construction Schedule and Estimated Costs

The project is expected to take approximately one (1) year for construction at an estimated construction cost of $900,000. Funding for this project will be provided entirely by the State of Hawaii and the DOW.

E. Financial and Institutional Arrangements

The well development project is funded jointly by the State of Hawaii and the County of Kauai, Department of Water. The limits of the project are entirely within property owned by either the

State of Hawaii or the County of Kauai, Department of Water with the exception of the new power transmission line that will be property of Kauai Electric Co. and will cross private property. The project does not involve any institutional, financial or land use arrangements or commitments with other public or private entities, with the exception of the power provided by Kauai Electric Co.

F. Watershed and Land Use Analysis

The State of Hawaii Constitution mandates that "the State has an obligation to protect, control and regulate the use of Hawaii's water resource for the benefit of its people". The State Water Code is the enforcement tool of the state constitution and the Hawaii Water Plan is one of the primary policies of the State Water Code. The Hawaii Water Plan is intended to fulfill a comprehensive planning requirement through four components parts: a water resource protection plan, water use and development plans for each County, a water project plan, and a water quality plan. The proposed project is fully consistent with the Hawaii State Water Plan and its four components.

The County of Kauai General Plan as updated in 1981 lists its goal as follows:

- To maintain the concept of Kauai as "The Garden Isle"; thus, insisting any growth be in consonance with the unique landscape and environmental character of the island
- To insure that all physical growth is consistent with the overall ecology of the island
- To manage growth according to established population growth targets
- To create opportunities for a greater fulfillment of life through the development of a broad spectrum of educational and cultural pursuits
- To promote and protect the health, safety and welfare of all residents and visitors
- To provide opportunities for suitable living quarters for all residents in all income levels
- To provide for a maximum variety of outdoor recreational activities
- To recognize those aspects of the island and its people which are historically and culturally significant and to maintain and enhance such aspects as a continuing expression of the island's physical and social structure
- To promote the improvements and expansion of the island's economy, by recognizing and carefully utilizing land and water resources
- To guide and control development to take full advantage of the island's form, beauty and climate and preserve the opportunity for an improved quality of life
- To guide physical growth so that island and visitor communities will develop in social and economic concert with each other
- To manage implementation through development of social and physical infrastructure based on growth targets, priorities and efficient utilization of facilities and services
- To provide workable planning tools to meet the changing needs of the community
- To create, develop and sustain an economy and a population composition that will encourage the youth of Kauai to live in the County and contribute to society
- To encourage and support efforts to approach self sufficiency in food production and energy

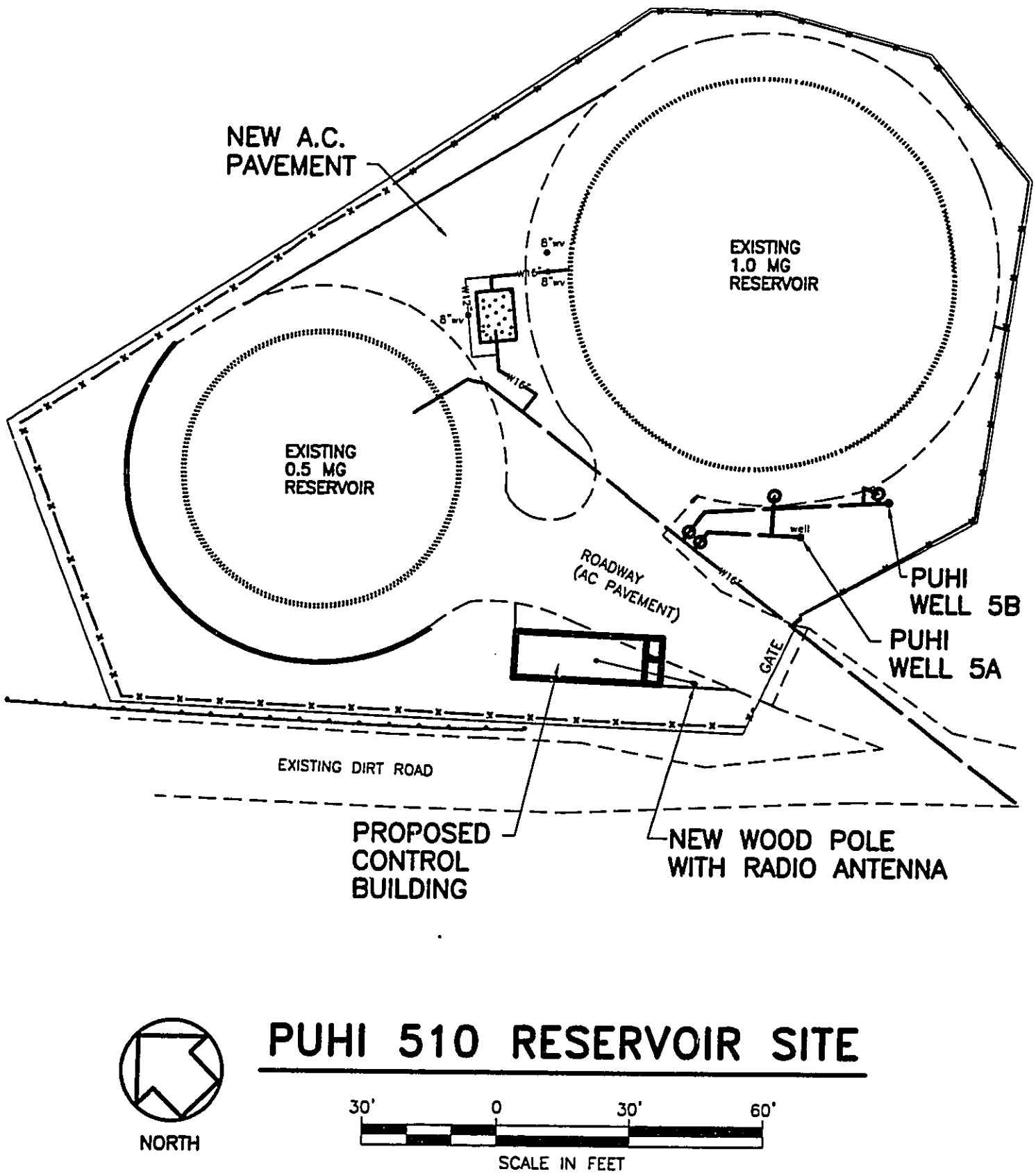
The proposed project is fully consistent with the goals of the County of Kauai General Plan as updated in 1981.

As indicated in Section VI, Part D, the project involves further development of the Hanamaulu Aquifer, which has an estimated sustainable yield of 40 million gallons per day (mgd). Current pumpage, based on data from the State of Hawaii Commission on Water Resource Management , is estimated at a maximum of approximately 10.8 mgd, or approximately 27% of the sustainable yield of the aquifer. The additional ground water production from the proposed will no be significant relative to the aquifer sustainable yield.

The DOW is planning to develop additional wells in the Hanamaulu area that will also produce from the same aquifer, at a considerable distance from the Puhi area. The combined pumping from all known current or proposed wells is expected to remain considerably below the sustainable yield of 40 mgd estimated for the Hanamaulu aquifer.

The proposed project does not promote land uses that will significantly alter the hydogeology of the source or end-use area. The project will provide additional water supplies and address current source water deficiencies within the existing water systems. The project does not involve any land use arrangements or commitments with other public or private entities.

It is anticipated that the project will have no impact on nearby landowners or water users, including farmers or kuleana residents. The majority of the developed property in the vicinity of the project is agricultural land that uses surface water from the irrigation ditch system for irrigation purposes. The project does not involve ceded lands.



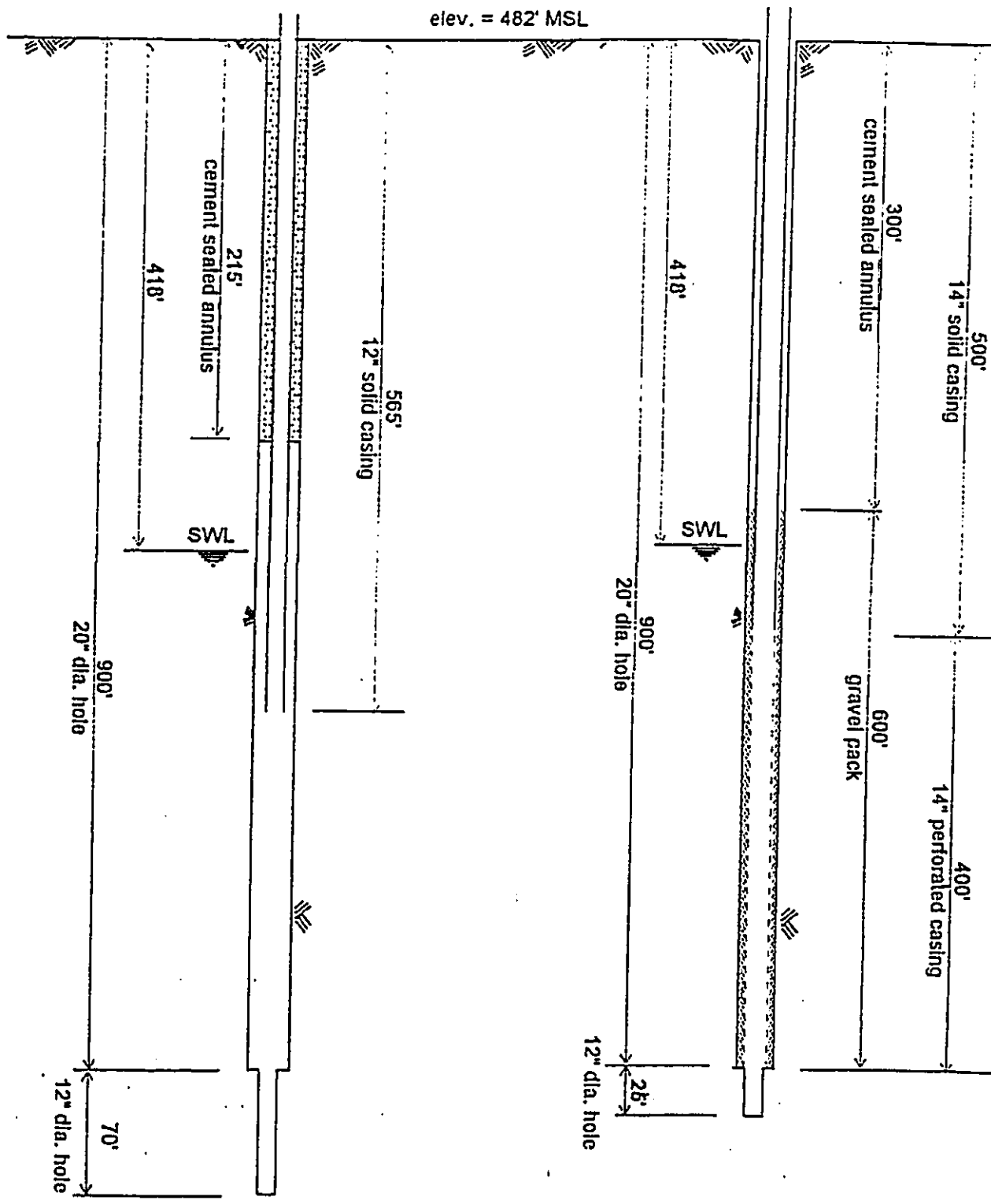
NORTH

PUHI 510 RESERVOIR SITE

30' 0 30' 60'

SCALE IN FEET

FIGURE 5

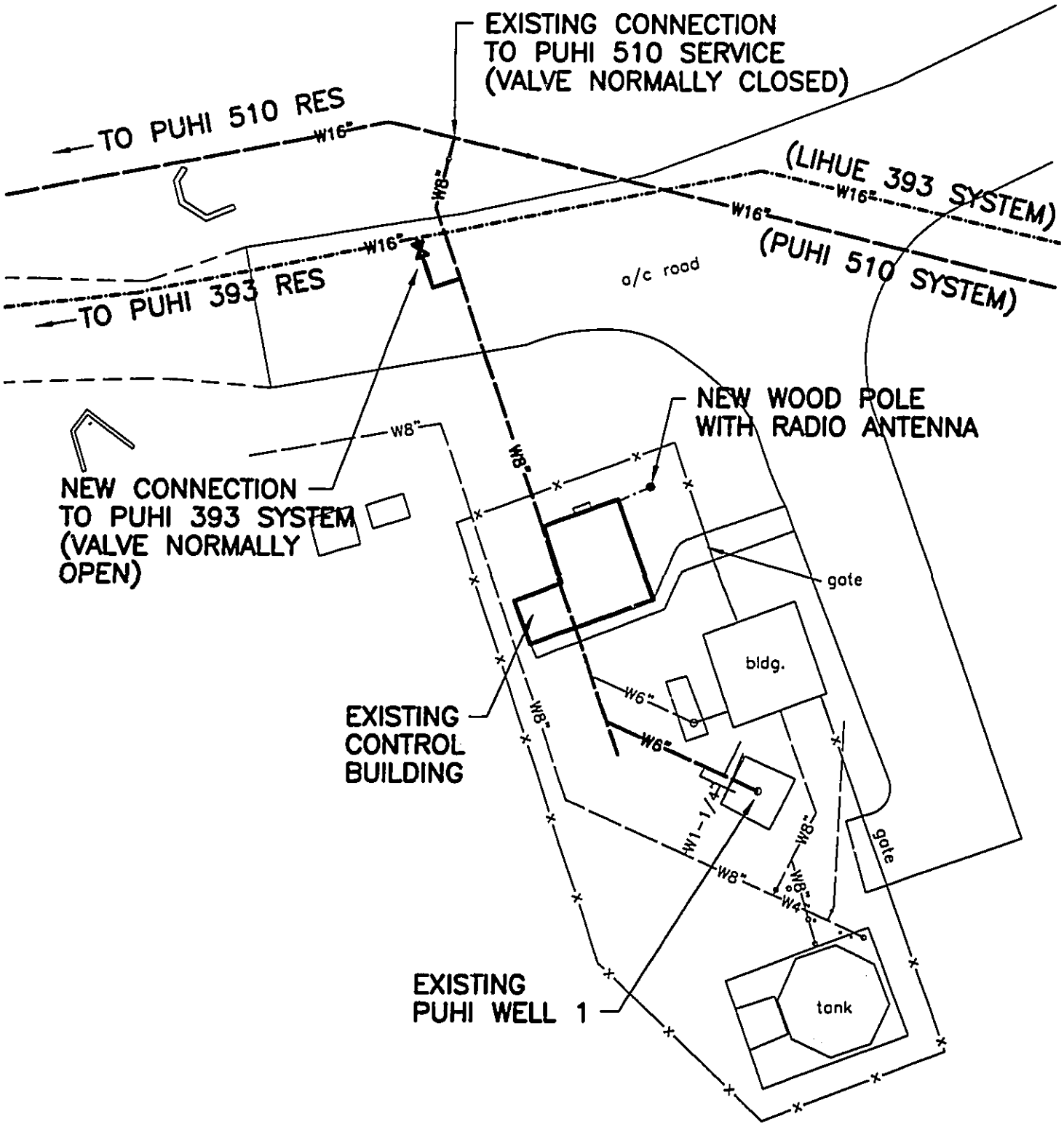


PUHI WELL NO. 5A
STATE WELL NO. 5824-08

PUHI WELL NO. 5B
STATE WELL NO. 5824-09

EXISTING WELL SECTIONS

FIGURE 6



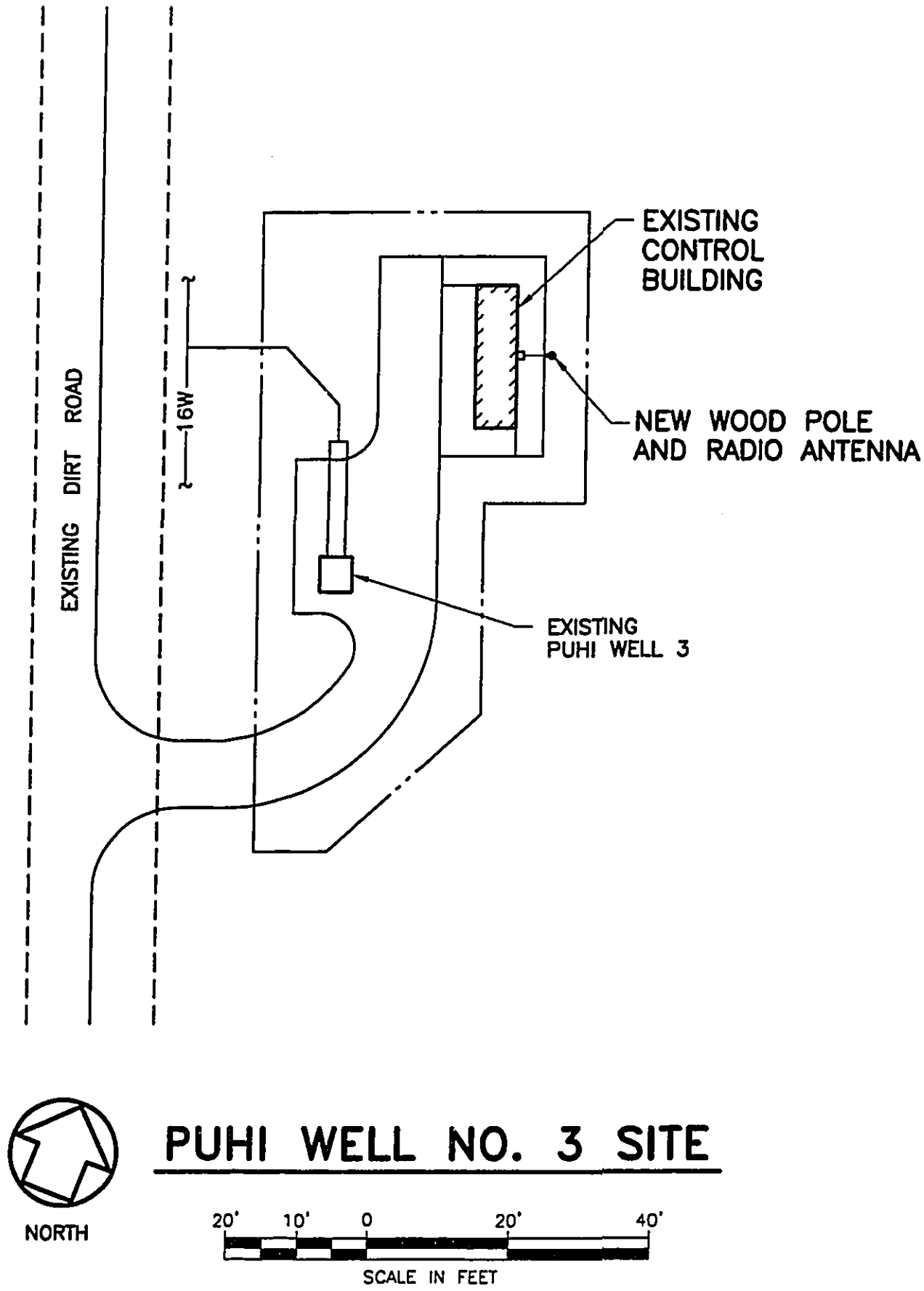
NORTH

PUHI WELL NO. 1 SITE

20' 0 20' 40'

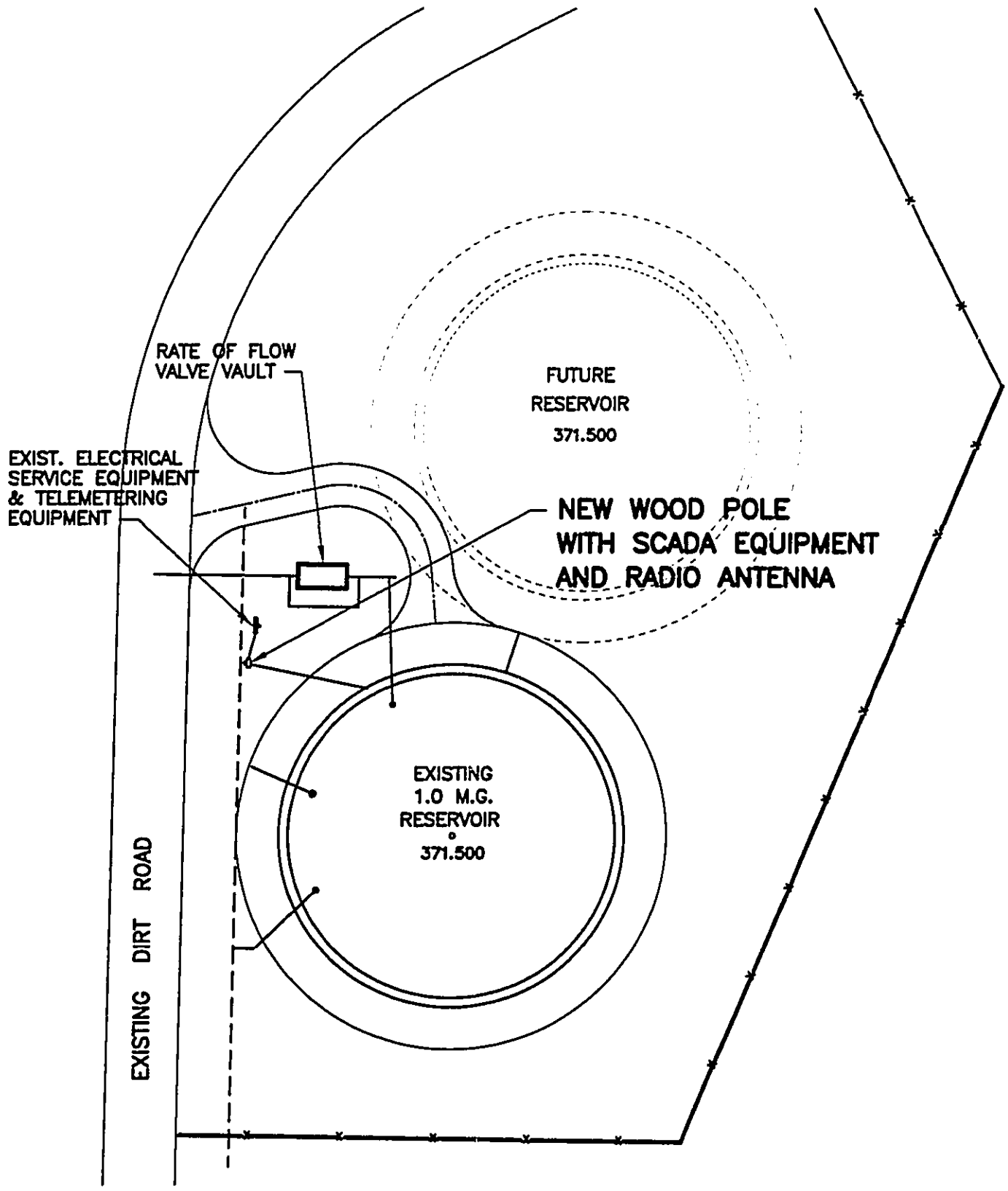
SCALE IN FEET

FIGURE 7



PUHI WELL NO. 3 SITE

FIGURE 8



PUHI 393 RESERVOIR SITE

FIGURE 9

VI. DESCRIPTION OF THE AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

A. Land Use and Ownership

The proposed projects are located within the Lihue District approximately two (2) miles west of Lihue and north of Kaumualii Highway. The area is mixed County zones agriculture and open and currently is undeveloped except for Kauai Community College and the DOW facilities. A plantation camp previously occupied the site west of the College. The State Land Use is agriculture and the County General Plan is open. See Figures 10, 11 and 12.

Both the open and agriculture county zoning will require a County Use Permit for the installation of the deepwell pumps and related work.

Mitigation measures are not proposed or required other than to obtain a County Use Permit.

B. Topography and Climate

The project areas are located north of Kaumualii Highway in a relatively flat area with ground slopes between 2 and 4 percent. There are numerous gullies within the area originating from Kilohana Crater. Although some of the gullies are identified as streams, such as Puhi Stream and Nawiliwili Stream, source of water is basically from rainfall at the crater area. Elevations range from 360 feet msl at the highway to 490' msl at the Puhi 510 Reservoir site. The four sites lie within lands that actively under agricultural cultivation. Access for maintenance to the various DOW sites are by dirt roads previously used for agricultural purposes.

At Lihue Airport, approximately four miles east of the project areas, average temperatures range from 71 deg. F to 79 deg. F and an annual average precipitation 44 inches. The project areas would experience the same variation in temperatures. Average annual rainfall at the project site is 60 inches with the increase due to the higher elevations.

The proposed improvements are not expected to have a long or short term impacts to the topography or climate. Grading and trenching required are being done within areas that have been fully developed.

No mitigation measures are proposed or required.

C. Geology and Soils

The Island of Kauai is the oldest of the major islands in the Hawaiian Chain. The Geological and Topographical Map of the Island of Kauai, a supplement to Bulletin 13 "Geology and Ground-water Resources of the Island of Kauai", by G. A. McDonald, D. A. Davis and D. C. Cox shows that the sites are underlain with basalt from lava flows of the Koloa Volcanic series. Lavas of the Koloa Volcanic series are for the most part poorly to moderately permeable. Basal water occurs in the rocks where they extend below sea level.

According to the United States Department of Agriculture, Soil Conservation Service Soil Survey, and shown on Figure 13, the soils at the various sites are classified as follows:

Puhi 510 Reservoir Site : Kapaa Silty Clay, 8 to 15 percent slopes (KkC)

Puhi Well No. 3 Site: Puhi Silty Clay Loam, 15 to 25 percent slopes (PnD)

Puhi 393 Reservoir Site: Puhi Silty Clay Loam, 15 to 25 percent slopes (PnD)

Puhi Well No. 1 Site: Puhi Silty Clay Loam, 3 to 8 percent slopes (PnB)

The Kapaa silty clay (KkC) is part of Kapaa series found in elevations ranging from 200 to 800 feet and used for agriculture and water supply. On this Soil runoff is slow to medium and the erosion hazard is slight to moderate. Permeability is moderately rapid.

The Puhi silty clay loam (PnB and PnD) is part of the Puhi series found in elevations ranging from 175 feet to 500 feet and used for agriculture, water supply and home sites. On this Soil runoff is slow and erosion is slight on the flatter slopes (PnB). On the steeper slopes (PnD) runoff is medium and the erosion hazard is moderate. Permeability is moderately rapid.

D. Ground Water Hydrology

The project sites are located within the Hanamaulu Aquifer (Code 20102) as described in the Hawaii Water Plan, Water Resources Protection Plan, Volumes I and II (Water Plan), by the Department of Land and Natural Resources, Commission on Water Resource Management, review draft dated March 1992. The Hanamaulu Aquifer which has an area of 55.22 square miles is located within the Southern Lihue Basin as described in the U.S. Geological Survey Water-Resources Investigations Report 98-4031 Ground Water in the Southern Lihue Basin, Kauai, Hawaii, 1998 (USGS Report).

The groundwater system is characterized by low permeability rocks and water levels ranges from sea level at the coast line to hundreds of feet elevation inland. Figure 14 shows a generalized water-table map and profile and Figure 15 has a diagrammatic representation of ground water flow in the Southern Lihue Basin. According to the USGS Report, a larger volume of water is discharged to streams than to the ocean. Streams include Hanamaulu, Nawiliwili and Huleia Streams. The Water Plan estimates the sustainable yield for the Hanamaulu Aquifer as 40 mgd. The sustainable yield is defined as the estimated amount of water that can be safely withdrawn.

The impact of the Wells 5A and 5B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project's hydrogeologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 5A and 5B may reduce the streamflow in Huleia, Hanamaulu and Nawiliwili Streams by as much as 2%. The USGS estimate is based on a comparison of the measured average stream baseflow and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may be found in the section of this EA regarding responses to the Draft EA.

Water Resource Associates, however, assert that Well 5A and 5B will have no measurable short-or-long term effect on Huleia, Hanamaulu and Nawiliwili Streams. The analysis by Water Resource Associates is based on the premise that Wells 5A and 5B will pump water from a

basal aquifer with a head of approximately 64 ft msl which hypothetically cannot contribute to streamflow above an elevation of 64 ft. msl. A copy of the Water Resource Associates findings are contained in a letter report dated October 4, 1999, which may also be found in the section of this EA regarding responses to the Draft EA.

The Huleia and Hanamaulu Streams are gauged by USGS in an ongoing program. It may be possible to evaluate in the future whether any long-term effects on streams in the area have been observed, however a 2% change in streamflow rate may not be discernable with current monitoring techniques. Because of the existing USGS monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new stream-monitoring program.

The following table extracted from information provided by the Department of Land and Natural Resources, Commission on Water Resource Management, there are 53 wells and tunnels tapping into the Hanamaulu Aquifer. See Figure 16 for locations of the major wells. This total includes the Puhi 5A and 5B wells. Of this total, 18 of the wells are in production totaling 10.82 mgd maximum withdrawal per day. This total does not include Puhi Wells Nos. 5A and 5B. According to the Commission on Water Resource Management, the thirteen (13) wells that the Department of Water operates totals 7.28 mgd for domestic use. However, according to current DOW records, the maximum pumping rate of all DOW wells within the Hanamaulu Aquifer is 5.07 mgd.

EXISTING WELL RECORDS
HANAMAULU AQUIFER

STATE WELL NO	WELL NAME	DRILL	OWNER/USER	ELEV	GND DEPTH	WELL USE	MGD	PUMP
0020-01	HANAMAULU SHAFT		LIHUE PLNTN	10	12	UNU		
0020-02	LAGOON SUPPLY	1981	KAUAI HILTON		200	OTH		
0021-01	KALEPA RIDGE	1967	STATE DOWALD	166	276	UNU		
0022-01	HANAMAULU 1	1995	KAUAI DWS	278	700	UNU		
0023-01	PUKAKI RES MON	1996	U S G S	319	1147	OBS		
0120-01	KALEPA RIDGE	1899	KAUAI COUNTY	12	240	IRR	0.96	
0120-02	KALEPA RIDGE	1897	STATE OF HAW	12	312	UNU		
0121-01	SOUTH WAILUA	1995	U S G S	289	1143	OBS		
0124-01	NE KILOHANA	1995	U S G S	466	1033	OBS		
0126-01	NW KILOHANA MON	1996	U S G S	678	1004	OBS		
5625-01	KIPU	1961	RICE WM H	411	470	DOM	0.13	
5626-01	PUAKUKUI SPRINGS	1996	U S G S	484	805	OBS		
5721-01	WESTIN KAUAI	1986	HEMMETER PROP	23	325	UNU		
5725-01	KOKOLAU TUNNEL	1928	KAUAI DWS	300		MUN	0.60	
5725-02	HULEIA NO 1	1953		341	44	UNU		
5725-03	HULEIA NO 2	1953		423	101	UNU		
5725-04	HULEIA NO 3	1953		421	98	UNU		
5727-01	KOLOA H-34	1968	MCBRYDE SUGAR	508	878	UNU		
5820-01	WESTIN KAUAI #3	1987	HEMMETER DEV	138	315	IRR		
5821-01	LIHUE STP	1974	COUNTY KAUAI	121	440	UNU		
5821-02	KAUAI INN TANK	1978	KAUAI DWS	156	300	OBS		
5821-03	WESTIN KAUAI #1	1987	HEMMETER DEV	160	277	IRR	0.57	
5821-04	WESTIN KAUAI #2	1987	HEMMETER DEV	125	375	IRR	0.50	
5821-05	WESTIN KAUAI #4	1987	HEMMETER DEV	100	338	OTH	0.29	
5821-06	WESTIN KAUAI #5	1987	HEMMETER DEV	100	380	OTH	0.29	
5822-01	SUGAR MILL	1965	LIHUE PLNTN	150	700	IND	0.50	
5822-02	LIHUE GRAM SCH	1961	KAUAI DWS	224	745	MUN	0.21	
5823-01	GARLINGHOUSE TUN	1935	KAUAI DWS	187		MUN	1.21	
5823-03	GARLINGHOUSE OBS	1992	KAUAI DWS	213	20	OBS		
5824-01	PUHI 1	1975	KAUAI DWS	361	933	MUN	0.29	
5824-02	KILOHANA D	1979	KAUAI DWS	488	250	UNU		
5824-03	PUHI 2	1980	KAUAI DWS	408	200	MUN	0.43	
5824-04	KILOHANA J	1982	KAUAI DWS	484	475	UNU		
5824-05	PUHI 3	1990	KAUAI DWS	413	346	MUN	0.43	
5824-06	PUHI 4	1993	KAUAI DWS	472	500	MUN	0.29	
5824-07	PUHI OBS 3	1992	GROVE FARM CO	470	407	OBS		
5824-08	PUHI 5	1997	KAUAI DWS	483	970	OBS		
5824-09	PUHI 5B	1997	KAUAI DWS	483	925	UNU		
5825-01	HAIKU MAUKA 1	1993	GROVE FARM CO	459	600	OBS	0.21	
5825-02	HAIKU MAUKA OB 4	1993	GROVE FARM CO	476	450	OBS		
5825-03	HAIKU MAUKA OB 5	1993	GROVE FARM CO	472	450	OBS		
5825-04	HUMANE SOCIETY	1996	HUMANE SOCIETY	465	600	DOM	0.09	
5826-01	GROVE OBS. 2	1994	GROVE FARM CO		384	UNU		
5921-01	KALEPA RIDGE	1954	KAUAI DWS	302	540	UNU		
5923-01	KILOHANA A	1974	KAUAI DWS	371	920	MUN	0.60	
5923-02	KILOHANA B	1977	KAUAI DWS	371	187	MUN	1.00	
5923-03	KILOHANA C	1978	KAUAI DWS	362	272	MUN	0.36	
5923-04	KILOHANA F	1980	KAUAI DWS	369	201	MUN	0.57	
5923-05	KILOHANA G	1981	KAUAI DWS	384	295	MUN	0.29	
5923-06	KILOHANA H	1981	KAUAI DWS	393	240	UNU		
5923-07	KILOHANA I	1982	KAUAI DWS	363	200	MUN	1.00	
5923-08	HANAMAULU TZ	1995	U S G S	272	1002	OBS		
5923-09	HANAMAULU 2	1998	KAUAI DWS	272	751	UNU	___	
						Total	10.82 mgd	
						DOW Total	7.28 mgd	

The proposed development of the Puhi Wells 5A and 5B and the modification of the Puhi Well No. 1 deepwell pumps will not adversely impact the ground water in the Hanamaulu Aquifer. According to Water Resource Associates' reports included in Appendix C, Puhi Well 5A has a sustainable yield of 700 gpm (1.01 mgd) and Puhi Well 5B has a sustainable yield of 400 gpm (0.58 mgd). The existing Puhi Well No. 1 capacity is not being changed. With the additional pumping from the Puhi 5 wells the total withdrawal will still be considerably lower than the sustained yield of 40 mgd. Pumping tests have also been done and the results are shown in the appendix.

No mitigation measures are proposed nor required.

E. Flood Zone

According to the Flood Insurance Rate Map the project areas are located within Zone 'X'. Areas within Zone 'X' are determined to be outside the 500 year flood plain. The area generally slopes toward Kaumualii Highway and is outside of any drainage course or gullies which would carry storm water away to the site.

The potential for flooding is not anticipated to impact the proposed actions.

No mitigation measures are proposed or required for flooding.

F. Flora and Fauna Resources

The project areas were previously cultivated for sugar cane replacing all natural vegetation. The adjacent gulch area includes introduced species such as guava, javaplum, eucalyptus, Christmas berry, pangolagrass, California grass, and Hilo grass.

No threatened or endangered birds are known to inhabit the area. Common urban birds, such as mynah, doves, cardinals, and sparrows are typical visitors to the project sites. Wildlife inhabiting the area include stray cats and rats. These sites are not adjacent to any residential areas.

G. Cultural Resources

There are no identified historic or archaeologically significant locations at the sites or immediate vicinity. The sites are immediate areas have been cultivated for sugar cane for more than 50 years. Access to the sites will be on existing unpaved roads and improvements done within fully developed and fenced in sites. Should any unanticipated sites, artifacts, or remains, such as shell, bone or charcoal deposits, be discovered during construction, the work will be stopped and the State Historic Preservation Office will be contacted.

H. Site Access and Traffic

Main access to the sites is through dirt roads from Kaumualii Highway. Kaumualii Highway is the major roadway extending from Lihue to extreme west end of the island. Kaumualii Highway is a two lane highway under the State jurisdiction. Unpaved (dirt) roads leads from the highway to the project sites. The unpaved roads previously used for agricultural purposes are now primarily used by DOW personnel for maintenance purposes.
The proposed improvements will generate construction related traffic for the duration of

construction for the project. Traffic will be nominal consisting of a minimum number of heavy construction equipment and supply trucks. The existing roadways will be able to accommodate the project related traffic.

Periodic access for maintenance by the DOW is not expected to increase due to the improvements made by this project.

No mitigation measures are proposed nor required for roadway traffic.

I. Air Quality

Air quality on the Island of Kauai is generally good. Puhi Well No. 1 is 1,700 feet from Kaumualii Highway and 500 feet from the closest Kauai Community College building. The other sites are further away and in open undeveloped areas.

Air quality will be degraded only to a minimum degree as a result of the proposed project. The construction contractor will be required to comply with State Department of Health regulations governing air quality (HAR, Title 11, Chapters 59 and 60, Air pollution control.) This will include proper maintenance of internal combustion equipment and related use.

Clearing, grading and trenching for the proposed improvements are minimal. Mitigation measures for dust control would include watering on the access roads and project sites and areas to be graded landscaped.

Chlorine will be used for disinfection. Potential of chlorine gas escaping from the chlorination system is low due to the proven techniques and devices used.

No long term impacts or mitigation measures are required or proposed.

J. Noise

Existing noise levels at the various sites are relatively low. The closest residents are across Kaumualii Highway approximately 1,700 feet away from the closest proposed improvements. The closest Kauai Community College building is 500 feet away.

Audible construction noise will probably be unavoidable during the duration of the construction. Noise generated by construction activity will probably be limited to periods required for delivery of materials and movement of heavy equipment to the sites. The construction noise levels anticipated are not expected to be in the public health and welfare category due to the temporary nature of the work and administrative controls available.

Only improvements at the Puhi 510 Reservoir site would have any long term impacts. Deepwell pumps being installed at this site would create sound. However the site is more than 4,000 feet from the closest building and sound would not be any problem.

No long term impacts or mitigation measures are required or proposed.

K. Surrounding Land Uses

Land uses surrounding the sites include open space and the Kauai Community College. Surrounding areas are zoned open and agricultural and no large residential subdivisions are anticipated.

The 15 feet high wood poles installed at each of the four separated sites would be indistinguishable from Kaumualii Highway.

Kauai Community College and the residents on the opposite side of the highway are not expected to be affected by the proposed project. No long term impacts or mitigation measures are required or proposed.

L. Population

The proposed project located in Puhi is within the Lihue District, County of Kauai. The 1990 resident population of Puhi is 1,910 representing approximately 11.3 percent of the Lihue District resident population of 10,663. The Island of Kauai with 50, 947 resident population had an average household population of 3.09. (The State of Hawaii Data Book, 1997)

Employment centers include the Kukui Grove Shopping Center, Kauai Community College, and the Lihue Town business and commercial shops. State and County employment is located in Lihue.

The proposed project is not expected to result in adverse impacts to employment resources in the area. Construction of the project will require employment for the duration of the project. Most of the workers would commute from other areas in the County and State.

M. Contamination Sources

Approval from the Department of Health, Safe Water Drinking Branch, to develop a potable water source with connection to a public water system is required. Water quality issues will be addressed in detail during the Department of Health permit process.

According to the Department of Health's The Groundwater Contamination Maps for the State of Hawaii, 1997, there are three (3) drinking water sources within the Southern Lihue Basin that have traces of contaminants. These wells are approximately 4,000 feet from the Puhi wells as shown on Figure 17.

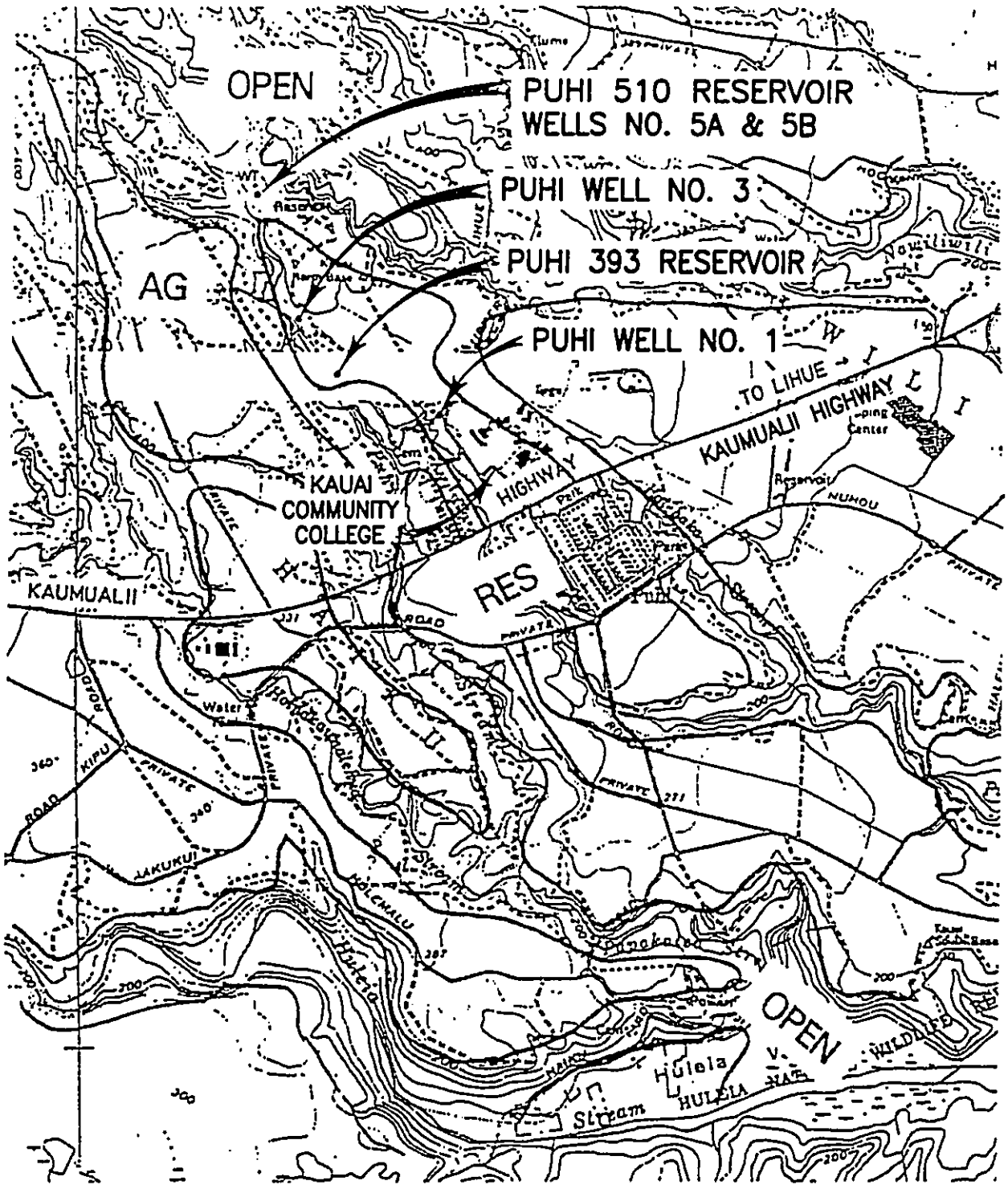
Name	Contaminant	Detected Level
Kilohana C (5923-03)	Atrazine	0.15 ppb
Kilohana G (5923-05)	Atrazine	0.22 ppb
Garlinghouse Tunnel (5823-01)	Atrazine	0.10 ppb

The atrazine levels detected are considerably lower than the maximum contamination level (mcl) of 3.0 ppb and is not considered significant. The probable source of the atrazine is from herbicides used in association with the cultivation of sugar cane.

One potential source of well contamination is at the Kauai Community College (KCC) where chemicals are used at the Natural Science Department and the Autobody Shop. Waste contaminants include reactive solids, phosphorous, oxidizing solids, mercury corrosive and flammable liquids. The State Department of Health, Solid and Hazardous Waste Branch, identifies the College located at 3-1901 Kaumualii Highway as a registered "Small Quantity Generator" of hazardous waste. The Environmental Protection Agency identification number for this facility is HID981633563. According to the Department of Health, Hazard Evaluation and Emergency Response Branch, there are no records of contamination release since 1988. Contamination from KCC should not pose a problem to Wells Nos. 5A and 5B. These wells are up grade and approximately 4,000 feet from KCC.

Existing records for the Southern Lihue Basin do not indicate a contamination problem. The deepwell pumps are standard water lube pumps used by the Department of Water. The proposed project is not expected to result in adverse impacts to the municipal potable water source.

No mitigation measures are proposed or required.



COUNTY ZONING MAP

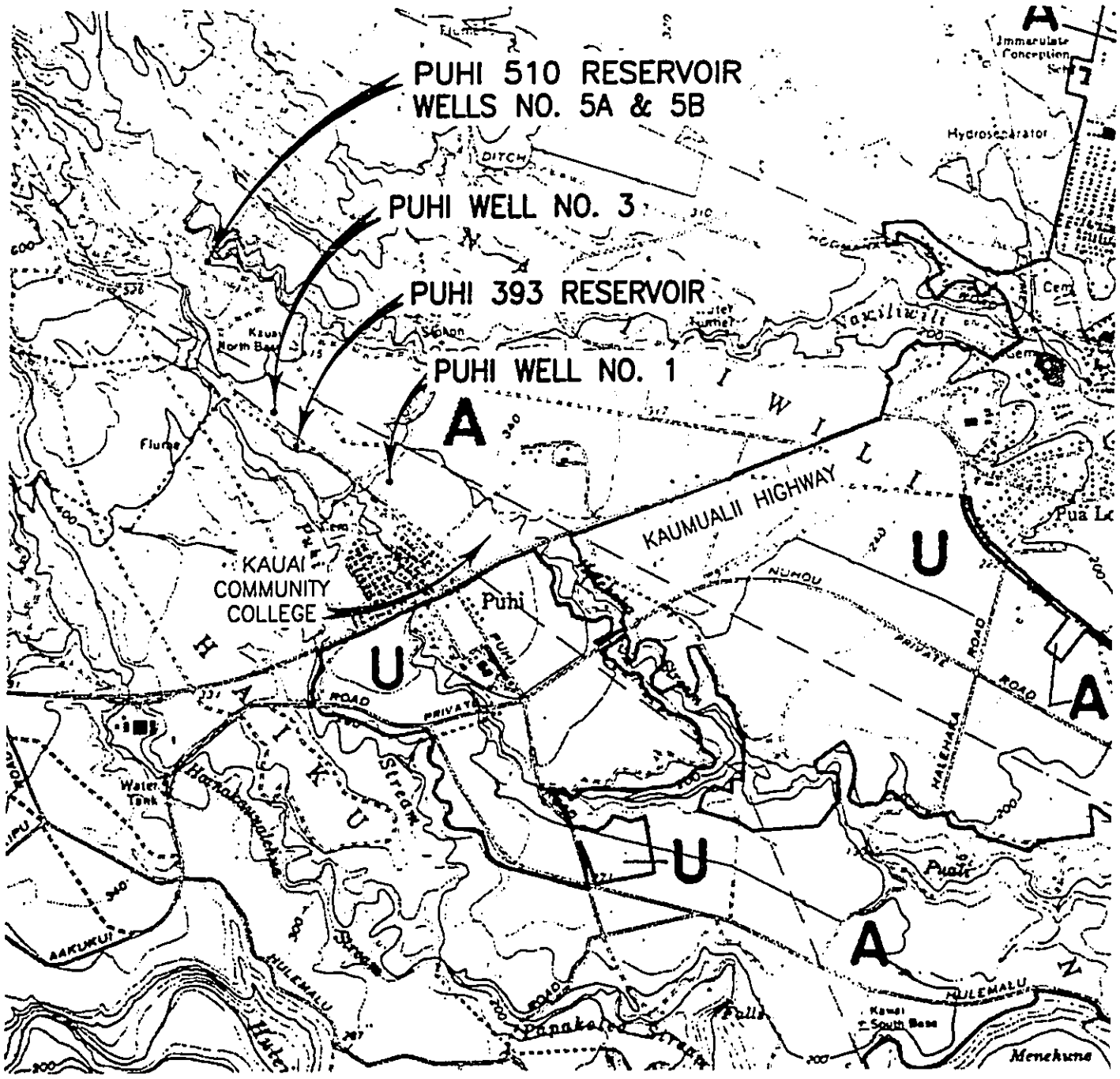
NORTH

GRAPHIC SCALE

2000 0 2000 4000

1" = 2000'

FIGURE 10



NORTH

STATE LAND USE

GRAPHIC SCALE

2000 0 2000 4000

1" = 2000'

FIGURE 11

NORTH

SOIL SURVEY MAP

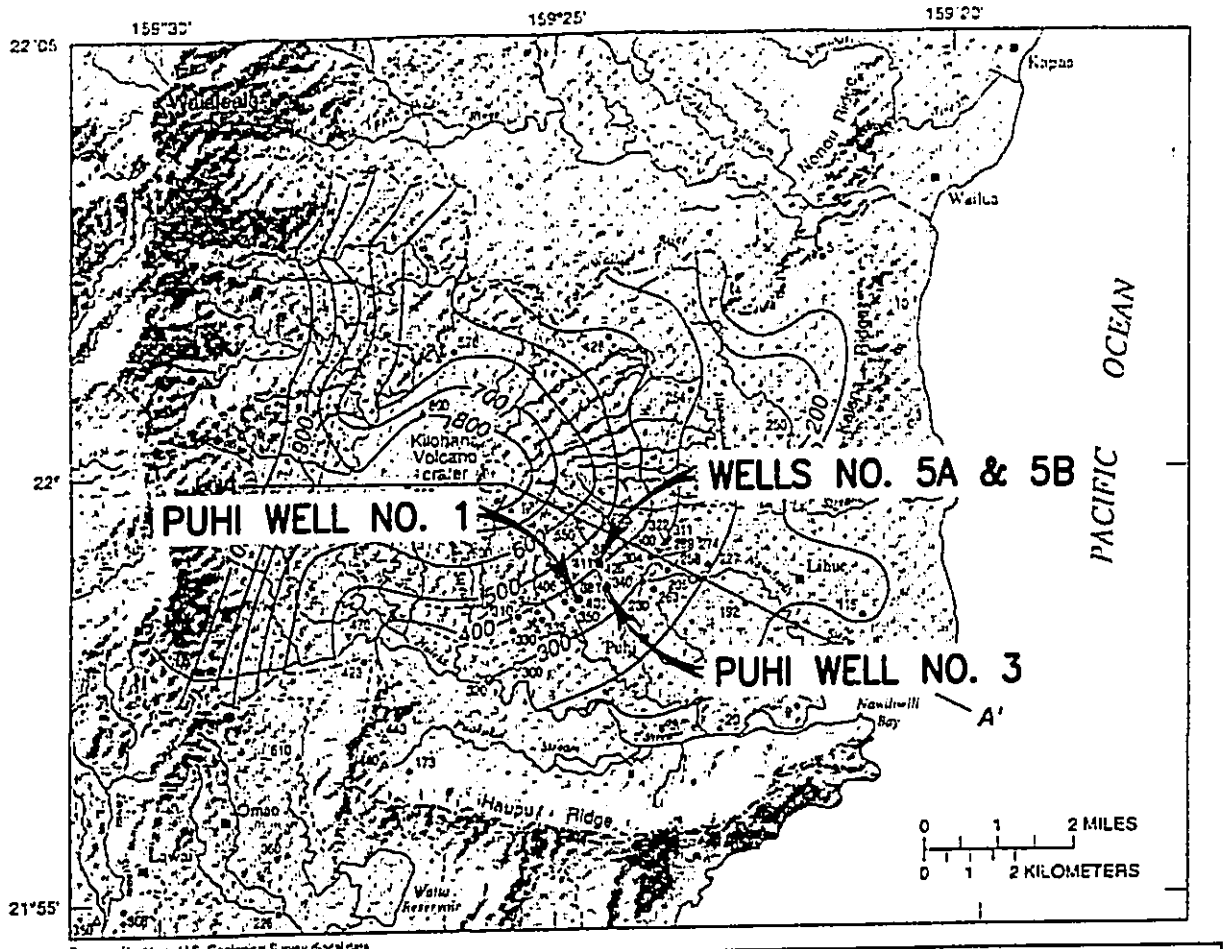
GRAPHIC SCALE

2000 0 2000 4000

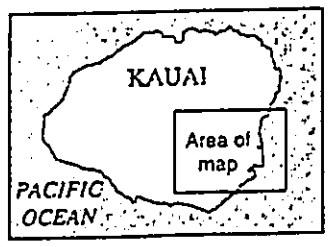
1" = 2000'

SOURCE: US DEPT. OF AGRICULTURE. SOIL CONSERVATION SERVICE, & UNIVERSITY OF HAWAII. SOIL SURVEY OF ISLANDS OF KAUAI, OAHU, MAUI, MOLOKAI, AND LANAI, STATE OF HAWAII. AUGUST 1972.

FIGURE 12



Base modified from U.S. Geological Survey digital data, 1:24,000, 1983, Albers equal area projection, standard parallels 21°55'40" and 22°10'20", central meridian 159°32'30"



EXPLANATION

—100— WATER-TABLE CONTOUR--Shows elevation of water table (1910-96). Interval 100 feet. Datum is mean sea level. Dashed where inferred

BOUNDARY OF THE SOUTHERN LIHUE BASIN

A—A' LINE OF SECTION

IRRIGATION DITCH OR TUNNEL

SAMPLING POINT AND HEAD MEASUREMENT

- Well
- Tunnel
- Marsh
- Spring
- Quarry

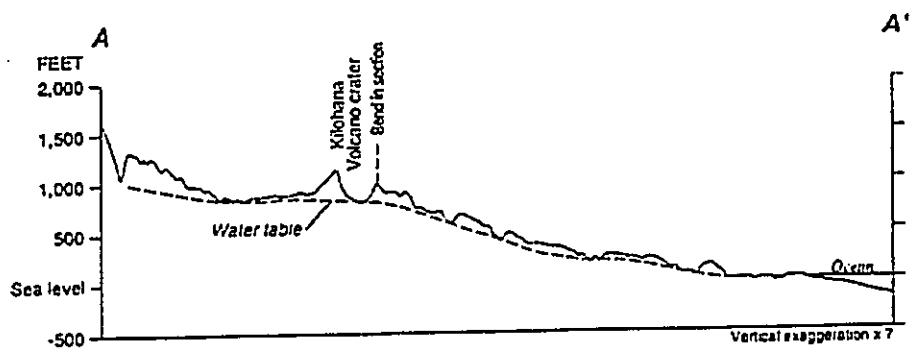


Figure 15. Generalized water-table map and profile for data from 1910 through 1996 for the southern Lihue Basin, Kauai, Hawaii.

WATER TABLE MAP AND PROFILE

SOURCE: U.S. DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY, GROUND WATER IN THE SOUTHERN LIHUE BASIN, KAUAI, HAWAII, 1998.

31

FIGURE 13

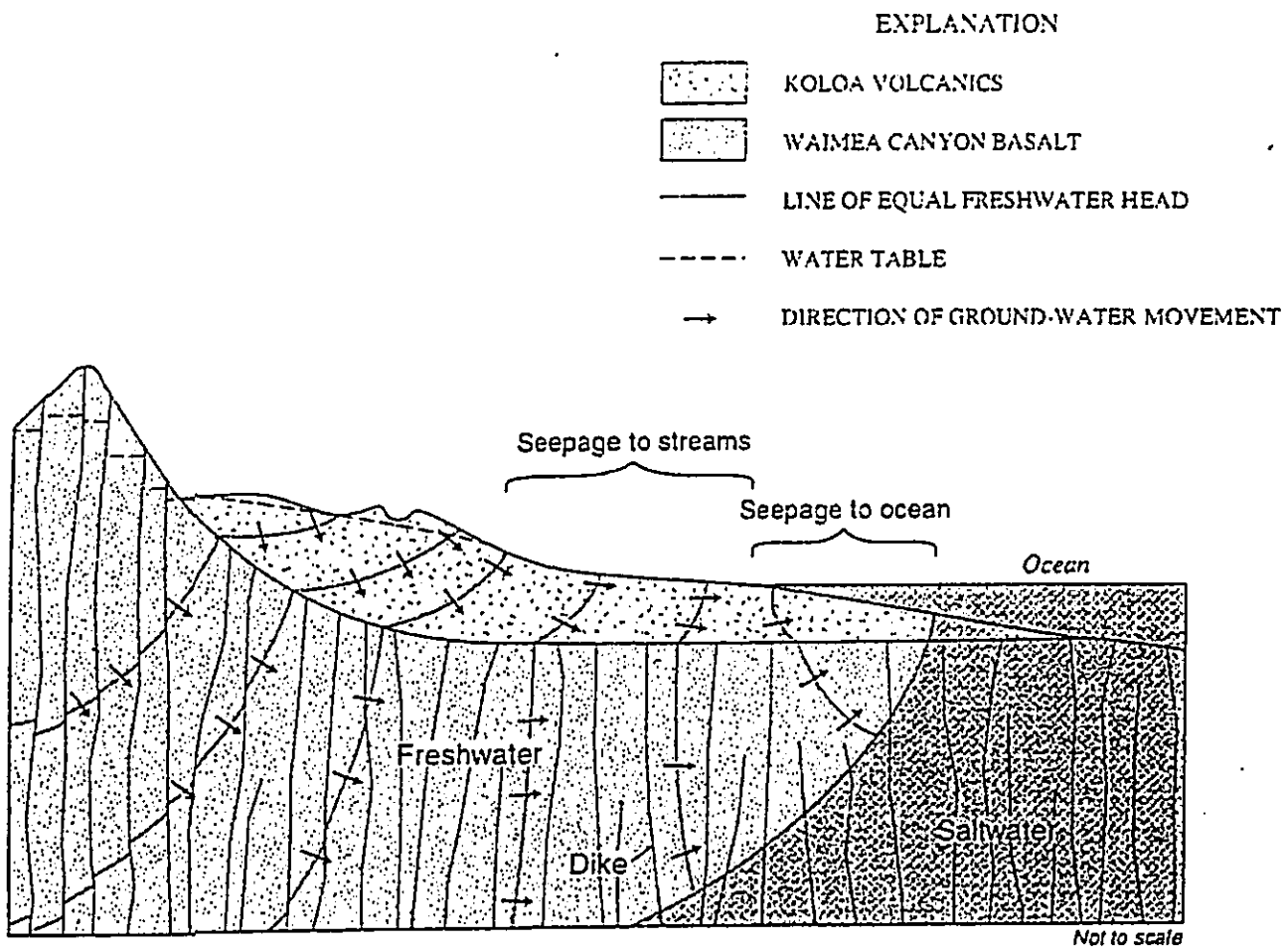
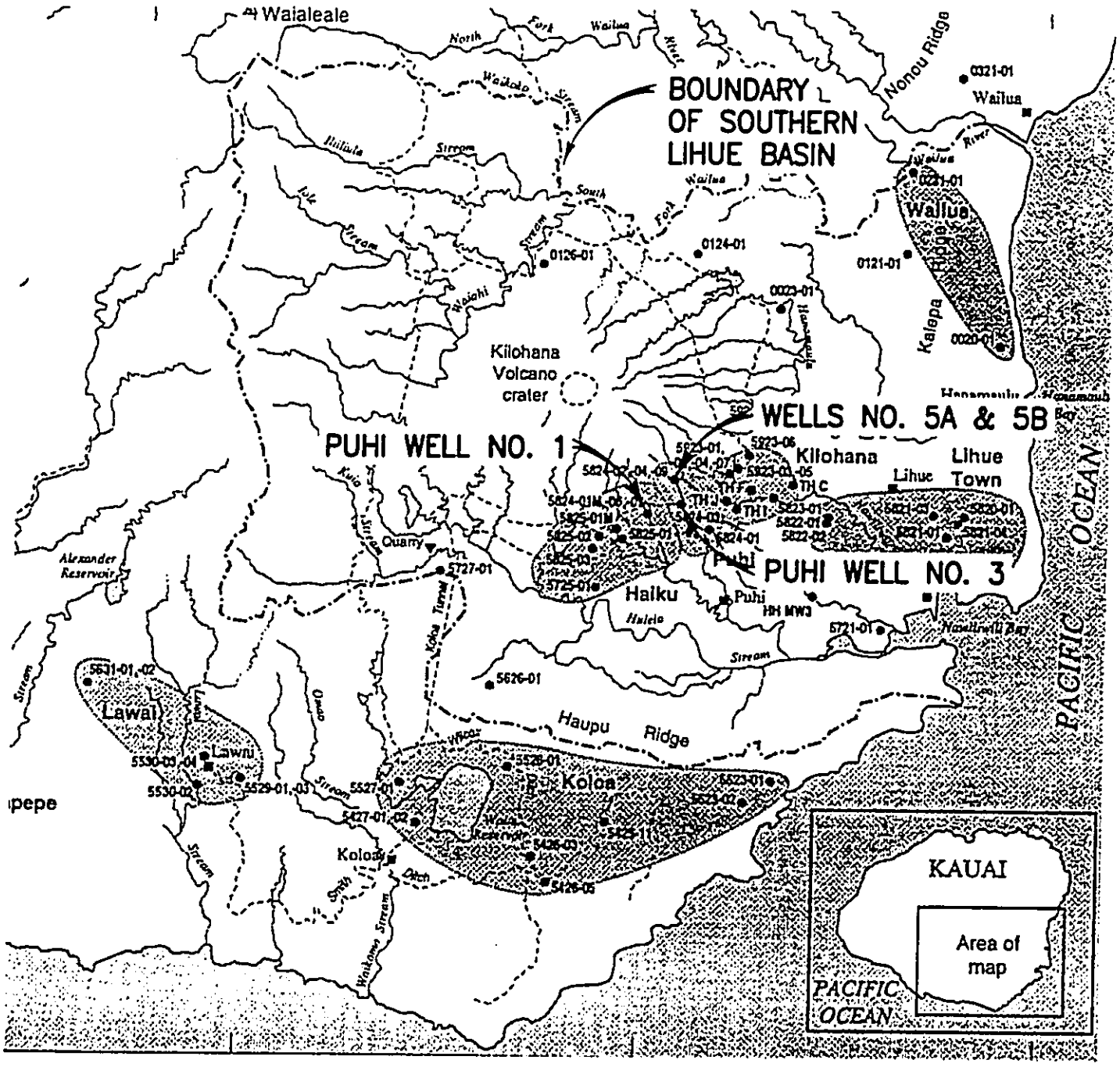


Figure 16. Diagrammatic representation of ground-water flow in the southern Lihue Basin, Kauai, Hawaii.

GROUND WATER FLOW

SOURCE: U.S. DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY, GROUND WATER IN THE SOUTHERN LIHUE BASIN, KAUAI, HAWAII, 1998.

FIGURE 14



WELLS AND WELL FIELDS

NORTH

GRAPHIC SCALE

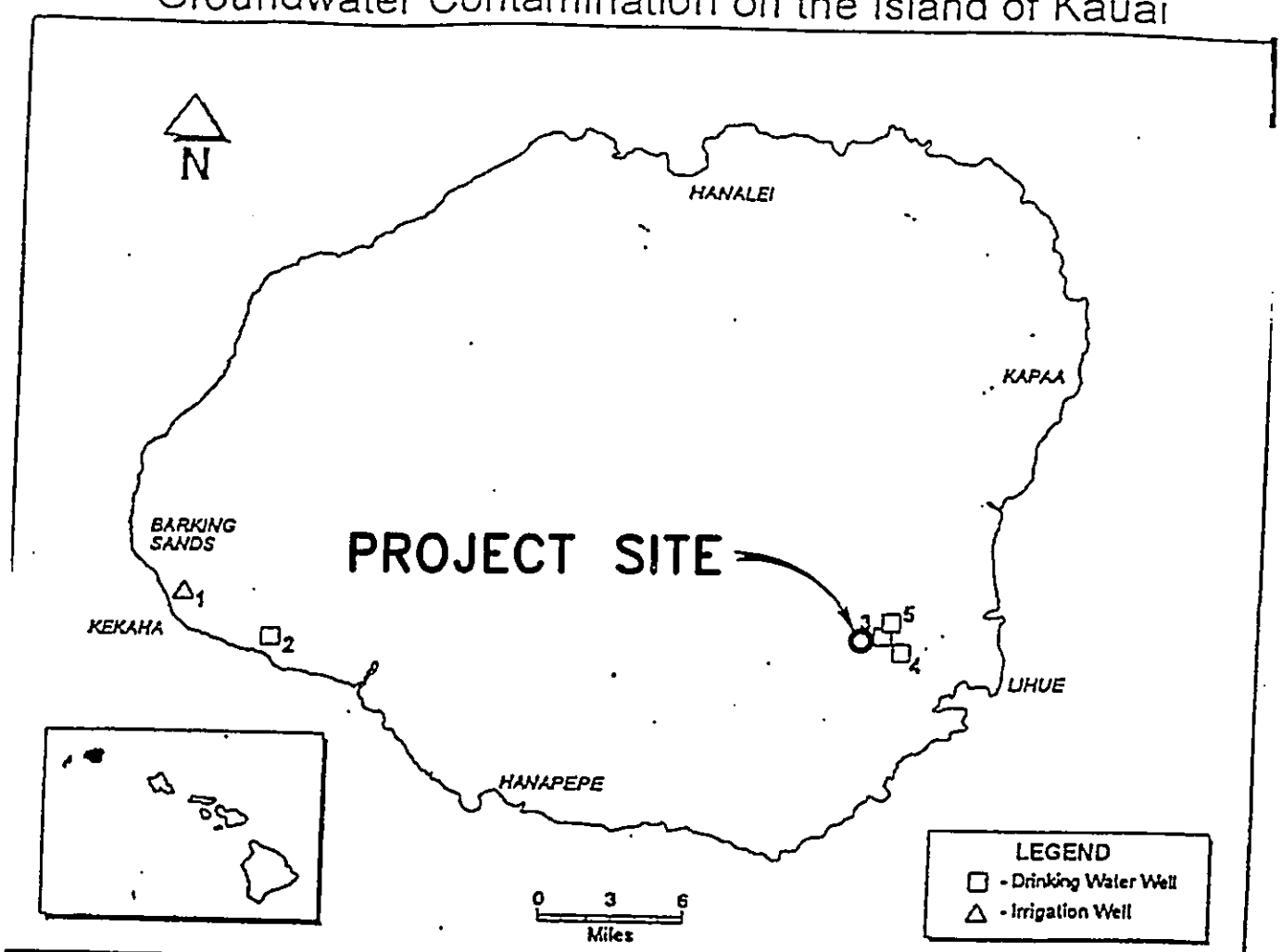
2 0 2 4

SCALE IN MILES

SOURCE: U.S. DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY, GROUND WATER IN THE SOUTHERN LIHUE BASIN, KAUAI, HAWAII, 1998.

FIGURE 15

Groundwater Contamination on the Island of Kauai



This map contains the latest confirmed results from contaminated groundwater wells

NO.	WELL NAME	USE	CONTAMINANT	DETECTED LEVEL (in ppb)		DATE SAMPLED
1	Barking Sands (0045-04)	IRR	Atrazine	3.5		7/12/88
			Ametryn	0.80		7/12/88
			Simazine	0.20		7/12/88
2	Paua Valley 2 (5942-01)	DW	Atrazine	0.06◊		8/20/97
3	Kilohana C (5923-03)	DW	Atrazine	0.15◊		8/20/97
4	Kilohana G (5923-05)	DW	Atrazine	0.22◊		8/20/97
5	Garlinghouse Tunnel (5823-01)	DW	Atrazine	0.10◊		8/20/97
			Desethyl Atrazine	<0.10	NQ	3/9/93

◊ - DOA Immunoassay analysis

Department of Health K-1 September 1997

SOURCE: STATE OF HAWAII, DEPARTMENT OF HEALTH, THE GROUND WATER CONTAMINATION MAPS FOR THE STATE OF HAWAII, 1997.

FIGURE 16

VII. ALTERNATIVES CONSIDERED

A. No Action

The no action alternative would be counterproductive to the objectives of the Kauai Water Use and Development Plan. Production of the Puhi 5 Wells is an integral part of increasing source for future domestic water demands. The proposed radio SCADA system is an integral part of improving system reliability.

B. Alternative Site

The two Puhi 5 Wells have being drilled and tested. Tests results indicate that the wells provide an ample and safe water source. The site is developed and would require a minimum amount of site work to put the wells into production. Locating to another site would require drilling and testing and abandoning of these two wells.

C. Alternative Sources

Surface Waters

Currently, safe drinking water regulations require monitoring, treatment and disinfection of all surface waters utilized for potable water. The operation and maintenance cost necessary to run a surface water treatment facility is significantly higher than groundwater sources. Furthermore, source waters are needed immediately and development of surface water treatment facilities would take a great amount of time to plan and construct. DOW is considering surface water options for the future, should ground water become unavailable or should the costs become competitive.

Desalination

According the Oahu Management Plan, the demonstration desalination plant on Oahu produces approximately 0.5 million gallons of water per day of potable water from brackish water sources. Capital costs for a large scale desalination facility are comparable to developing groundwater in rural areas. However, the operation and maintenance of the facility is approximately ten times the cost of pumping groundwater.

Wastewater Effluent Reuse

The reuse of wastewater effluent for irrigation and industrial usage would reduce the quantity of potable water used for non-potable purposes. This alternative would also provide a viable means of disposing of wastewater effluent. Public health concern and the high cost for installation of the necessary infrastructure, including dual water lines, limit the feasibility of this system. Wastewater reuse does not replace the immediate need for potable water. The Lihue Wastewater Treatment Plants, County and Grove Farm, already reuse their effluent to irrigate golf courses.

Water Conservation

Extensive water conservation programs can be implemented. These include water system and consumer conservation. Water system conservation would include monitoring of all water usage and determine discrepancies within the system to institute conservation measures, including a leak detection program.

Consumer conservation will require long range public information and awareness campaigns to educate the public.

While conservation would have a positive effect of lowering demands for water, development of high quality groundwater sources or other alternatives should not be neglected because water demand fluctuates and the need for reserve supplies will be necessary during peak demand periods.

Among the alternatives considered, the proposed action is recommended because it is an integral part of the overall water resource development and management program of the State and the Department of Water to meet current and future water demands.

VIII. DETERMINATION, FINDINGS, AND REASONS SUPPORTING THE DETERMINATION

In accordance with the provisions of Chapter 343, Hawaii Revised Statutes, and the significance criteria on Section 11-200-12 of Title 11, Chapter 200, this environmental assessment has determined that the project will have no significant impact on the environment.

Significant criteria supporting the anticipation of a Finding of No Significant Impact (FONSI) are presented below:

The project will not involve an irrevocable commitment to loss or destruction of any natural or cultural resource.

The proposed actions are intended to increase domestic water source and to provide a more reliable system to meet future water demands. Pump tests have been made and no adverse effect on the environment was found.

The site has been previously disturbed and it is unlikely that significant cultural resources are evident in the area.

The project will not curtail the range of beneficial use of the environment.

The proposed sites for the project are in areas already developed. The development of the wells are permanent and is classified as a public utility under the County Comprehensive Zoning Ordinance and are permitted uses requiring a Use Permit.

The project will not conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The proposed project is consistent with the environmental policies, goals, and guidelines defined in Chapter 343, HRS. This proposed actions are consistent with long range plans to meet future water demands for the island.

The project will not substantially affect the economic or social welfare of the community or State.

The proposed project is part of the overall plan for providing an adequate long-term water supply for the community and State. The rural character of the Puhi community is not expected to undergo major transformation as a result of the proposed action in the short-term nor in the long-term if the wells are put into production. Available infrastructure in the area will allow excess water to be transmitted to other areas. How long term use of the water is distributed will be up to policy makers of the Water Commission and DOW.

The project will not substantially affect public health.

The proposed project will be performed in accordance with all federal, state, and local regulations to ensure the protection of human health and the environment. Potential impacts on public health are considered insignificant and temporary. Any impacts from the project, which affects public health, will be mitigated by measures defined in this report. Additional electrical power production facilities will not have to be constructed to provide power for the deepwell pump motors.

The project will not involve substantial secondary impacts, such as population change or effects on public facilities.

The proposed action is part of the Department of Water program designed to ensure that high quality drinking water is available and to meet present and future demands. The project in itself, however will not generate new population growth but is only a part of a larger picture.

The project will not involve a substantial degradation of environmental quality.

The proposed actions will be in accordance with the environmental policies of Chapter 343, Hawaii Revised Statues, and the National Environmental Policy Act. The project sites were previously developed and located within open areas.

Is individually limited, but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

The proposed action is only one component of the larger Statewide plan to manage the state water resources. The action will have a positive cumulative effect on the environment as water resources are developed. Future development of water resources will in an organized and rational manner with precautions in place to protect groundwater aquifers and stream flow conditions. The action in itself will not lead to a commitment for larger actions, as it is only one part of the larger picture.

This project will not affect any rare, threatened, or endangered species, or its habitat.

The proposed project sites have been previously disturbed. Surrounding areas were previously used for agricultural purposes.

This project will not detrimentally affect air or water quality or ambient noise levels.

The potential impacts on air, water, and noise levels will be insignificant and limited to the short duration for construction. Any potential impacts from the project will be mitigated by measures defined in this report.

This project will not affect nor is it likely to suffer damage by being located in an environmentally sensitive area.

The proposed project site is not located in an environmentally sensitive area.

This project will not substantially affect scenic vistas and view planes identified in county or State plans or studies.

The proposed action sites are not located in any scenic vistas or view planes identified by county or State plans or studies. The sites are located in a visually unobtrusive area of the agricultural area and screened from view by the existing vegetation in the area.

This project will not require substantial energy consumption.

Energy will be used for the construction of the various actions including transport of equipment and personnel. The installed pumps and accessory units will require long term energy uses. None of the uses are expected to result in use of energy significantly greater than similar projects.

IX. COMMENT AND RESPONSE LETTERS

Notice of availability of the Draft EA (DEA) was published in the Office of Environmental Quality Control Bulletin on April 23, 1999. The DEA was sent to the following listed below. Comment letters are included with response letters, as required in this section.

Agency	DEA Mail Date	Comments Date	Comment/Action Required
FEDERAL			
U.S. Dept of the Interior U.S. Geological Survey	5/25/99	6/24/99	See Response Letter
STATE			
Dept of Accounting & General Services	4/5/99	4/28/99	No Action Required
Dept of Business, Economic Development & Tourism Energy Resources & Technology Div	4/5/99	———	———
Dept of Education Lihue Public Library	4/5/99	———	———
Dept of Health Environmental Planning Office	4/5/99	5/14/99	See Response Letter
Dept of Land and Natural Resources Commission on Water Resource Mgt	4/5/99	5/10/99	See Response Letter
Dept of Land and Natural Resources Historic Preservation Division	4/5/99	4/22/99	No Action Required
Dept of Land and Natural Resources Land Management Division	4/5/99	5/06/99	No Action Required
Dept of Transportation Highways Division	4/5/99	4/20/99	No Action Required
Office of Environmental Quality Control	4/5/99	5/13/99	See Response Letter
University of Hawaii Kauai Community College (Library)	4/5/99	———	———
University of Hawaii Kauai Community College	4/5/99	———	———
COUNTY			
County Council	4/5/99	———	———
Dept of Public Works	4/5/99	4/27/99	No Action Required
Fire Dept	4/5/99	4/16/99	See Response Letter
Housing Agency	4/5/99	———	———
Planning Dept	4/5/99	5/03/99	See Response Letter
ELECTED OFFICIALS			
Mayor Maryanne W. Kusaka	4/5/99	———	———
Senator Jonathan Chun 7th Senatorial District	4/5/99	———	———
Representative Ezra R. Kanoho 13th Representative District	4/5/99	———	———
UTILITY COMPANIES			
GTE Hawaiian Telephone Co	4/5/99	———	———
Kauai Electric Co	4/5/99	———	———
NON-GOVERNMENTAL AGENCIES			
Chamber of Commerce	4/5/99	———	———
The Garden Island Newspaper	4/5/99	———	———
Grove Farm Properties, Inc.	4/5/99	4/13/99	See Response Letter
The Kauai Outdoor Circle	4/5/99	———	———
The Sierra Club, Kauai Chapter	4/5/99	———	———

copies to Eric, Ed T. & Bill 6-28-99

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Water Resources Division
677 Ala Moana Blvd. Suite 415
Honolulu, HI 96813

June 24, 1999

Mr. Ernest Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P.O. Box 1706
Lihue, HI 96766

Ernest

Dear Mr. Lau:

This letter is in response to a request from Sato and Associates, Inc., to review the draft environmental assessment (DEA). *Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1.* Our review focused on the hydrologic aspects of the DEA; our comments are as follows.

41 The proposed pumping rates of 600 gpm and 400 gpm for Puhi 5A and 5B, respectively, seemed optimistically high for long-term production considering what has been learned from recent hydrologic studies in the Lihue Basin. However, after our discussion with you and your staff, we understand that under most conditions, only the 600-gpm well will be used, that the well will normally be pumped for no more than 16 hours per day, and that the 400-gpm well would be pumped only in emergencies. If the 400-gpm well is used, say, only 10 percent of the time, the combined long-term pumpage from the wells amounts to an average long-term pumping rate of about 440 gpm. This amount is less than half the pumping rate one might assume from the pump capacities alone. For assessment of long-term impacts, it would be helpful to add to the DEA some estimates of how much water is expected to be pumped on average over the long term. Without the additional information, we would have been compelled to make the conservative assumption that the wells would be pumped at the pump capacity.

A long-term average rate of 440 gpm rate may still be somewhat high, however. Although the 7-day pump test indicates that the permeability in the Puhi 5 area is high, our recent studies of the Lihue Basin indicate that such high-permeability areas are of limited extent. Long-term drawdowns are more likely to reflect the regional low permeability in the basin than the local high permeability. The long-term drawdown rate may therefore be greater than anticipated from the 7-day pump tests. The DEA indicates, however, that water levels will be monitored during pumping.

The effect of the proposed pumpage on nearby streams was not addressed in the DEA. Although "no adverse effect on the environment was found" (DEA, p. 34) during the pump tests, the likelihood of stream effects still remains. Rarely can the effects of pumpage on streamflow be detected during a short-term pumping test because the effects tend to develop slowly. As we have learned in recent ground-water studies, most streams in the Lihue Basin gain from ground-water discharge. Considering the proximity of the Puhi 5 wells to Huleia, Nawiliwili, and Hanamaulu Streams, we expect pumpage to cause a reduction in baseflow to these streams. However, according to our Lihue Basin study, Huleia and Hanamaulu Streams combined have an estimated average annual flow of 56 mgd and an average annual baseflow of 25 mgd. At most, the 440 gpm (or 0.6 mgd) pumped from the Puhi 5 wells would reduce the combined average annual flow of these streams by only 1%, and the combined average annual baseflow of these streams by about 2%. This computation does not include Nawiliwili Stream because there are no gage data for this stream; consideration of Nawiliwili would lessen the relative impact on the combined flow of the three streams. The effects may not be distributed equally between the three streams and may take several years or more to develop fully.

We hope these comments are helpful for the completion and acceptance of the final environmental assessment. If you have any questions, please feel free to call me at 522-8290.

Sincerely,

William Meyer
District Chief

DEPARTMENT OF WATER
County of Kauai

"Water has no substitute – Conserve it!"

October 29, 1999

Mr. Gordon Tribble, Acting District Chief
United States Geological Survey
Water Resources Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

RECEIVED
NOV - 3 1999
SATO & ASSOC., INC.

Dear Mr. Tribble:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14; (4)3-4-07:3&6

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have made some modifications in the text of the EA to clarify the issues raised in your response letter. The following specific responses indicate how your comments have been incorporated into the EA.

1. The following text has been added to Section V, Part C. of the EA to indicate the long term pumping rates anticipated for wells 5A and 5B:

42

The actual quantity of water to be pumped from Wells 5A and 5B is difficult to accurately estimate because the Lihue, Puhi, and Hanamaulu Water Systems are all interconnected and water is moved throughout the system as demanded. There are a total of 15 wells (including Wells 5A and 5B) within the Lihue/Puhi/Hanamaulu Water System and the time that each well is in operation will be balanced to prevent excessive pumping of any one well.

For water system planning purposes, the Department of Water uses the Water System Standards to determine total pump capacity. The Water System Standards criteria requires that the total system pump capacity meet the maximum daily demand on the water system with an operating time of 16 hours. Therefore, the Department anticipates pumping Well 5A and 5B a maximum of 16 hours per day, 365 days per year.

Based on the above, the maximum daily pumping rate estimates are as follows:

Well No. 5A: 600 gpm @ 16 hrs/day = 576,000gals/day

Well No. 5B: 400 gpm @ 16 hrs/day = 384,000gals/day

The Department recognizes the additional constraint on pumping posed by the near proximity of the two wells, which is expected to result in increased drawdown when both wells are in operation. Therefore, under routine operations it is probable that only one of these wells will be in operation at any time.

2. Your comment that the long-term drawdown may exceed projections based on the seven-day pump test results due to low regional hydraulic conductivity has been noted. This has practical consequences with respect to the depth of the pump setting, and may eventually influence the productivity of the wells. We

— 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 —
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8627 – Engineering/Fiscal/Shop FAX No. (808) 245-5813

are aware of both of these considerations, and the pump setting has been designed accordingly. We will routinely monitor well water levels during the operation of these wells and will gladly share this information with the USGS.

3. We have consulted with Water Resource Associates, a reputable hydrogeologic consulting firm, regarding the potential impact of the new wells to stream flow in the area. Water Resource Associates concludes that wells 5A and 5B will have no measurable short- or long-term effect on Hanamaulu, Nawiliwili, and Huleia Streams. A copy of the their letter report is attached.

In light of your comments and the analysis by Water Resource Associates, the EA has been modified to incorporate discussion on impact stream flow due to Wells 5A and 5B. The following text has been added to Section VI, Part D:

The impact of the Wells 5A and 5B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project's hydrogeologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 5A and 5B may reduce the streamflow in Huleia, Hanamaulu, and Nawiliwili Streams by as much as 2%. The USGS estimate is based on a comparison of the measured average stream baseflow and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may be found in the section of this EA regarding responses to the Draft EA.

Water Resource Associates, however, assert that Well 5A and 5B will have no measurable short- or long-term effect on Huleia, Hanamaulu, and Nawiliwili Streams. The analysis by Water Resource Associates is based on the premise that Wells 5A and 5B will pump water from a basal aquifer with a head of approximately 64 ft. msl which hypothetically cannot contribute to streamflow above an elevation of 64 ft. msl. A copy of the Water Resource Associates findings are contained in a letter report dated October 4, 1999, which may also be found in the section of this EA regarding responses to the Draft EA.

The Huleia and Hanamaulu Streams are gauged by USGS in an ongoing program. It may be possible to evaluate in the future whether any long-term effects on streams in the area have been observed, however a 2% change in streamflow rate may not be discernable with current monitoring techniques. Because of the existing USGS monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new stream-monitoring program.

Once again, we appreciate your comments on this project. If you have any questions, please do not hesitate to call the Project Engineer, William Eddy, at (808)245-5412.

Sincerely,

Edward Tschupp

EY/ Ernest Y.W. Lau
Manager and Chief Engineer

Attachment
c: Sato & Associates, Inc. ✓

98025-00

Water Resource Associates
Hydrology • Geology • Engineering

1188 Bishop Street, Suite 1708 • Honolulu, Hawaii 96813-3307
Phone: 808-528-0074 Fax: 808-528-0808
Email: dlum@worldnet.att.net

October 4, 1999

Mr. Clifford Arakawa
Sato & Associates, Inc.
2046 S. King Street
Honolulu, Hawaii 96826

Dear Mr. Arakawa:

Puhi Wells 5A and 5B, Kauai

Following up on your request of August 3rd and September 12, 1999, we offer the following written response to comments on the DEA for "Pump and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1, Kauai."

Item 1 of State OEQC letter dated 5/13/99--Hydrologic Impact Analysis

Puhi Well 5A and 5B will develop basal ground water from an aquifer having a head of approximately 64 feet above mean sea level (msl). Specifically, Puhi Well 5A has been cased and grouted to a depth of 565 ft., or 83 ft. below msl. Therefore, the Puhi Well A will develop ground water 85 feet below mean sea level from the well's 20-inch diameter open hole which extends 335 ft. below the grouted casing.

Puhi Well 5B has been cased and grouted to a depth of 500 ft., or 18 ft. below msl. Thus, Well 5B will similarly develop basal ground water 18 ft. below mean sea level from the well's perforated casing section which extends 400 ft. below the grouted casing.

Although no adverse effect on the environment was found during the pump tests (DEA, p. 34), the USGS states in their letter to Mr. Ernest Lau, dated June 24, 1999 that "the likelihood of stream effects still remains" and that "considering the proximity of the Puhi 5 wells to Huleia, Nawiliwili, and Hanamaulu Streams we expect pumpage to cause a reduction in baseflow to these streams." The USGS, in their June 24, 1999 letter further states that at most the 440 gpm (0.6 mgd [based upon 24 hour/day pumping]) pumped from the Puhi 5 wells would reduce the 56 mgd average annual flow of Huleia and Hanamaulu Streams by only 1%. However, the above statements by the USGS oversimplify their analysis of impacts on the streams and omit pertinent facts about the Puhi Wells and their relationship to the groundwater hydrology.

Because Puhi Wells 5A and 5B will pump from a basal aquifer with a head of 64 ft. which hypothetically cannot contribute to streamflow above an elevation of 64 ft., the Puhi Wells are expected to have no measurable short- or long-term effect on Hanamaulu, Nawiliwili, and Huleia Streams based upon the following reasons:

1. Puhi Wells 5A and 5B, as constructed, will develop only basal water from an aquifer having a water table of only 64 ft. above mean sea level. Above this elevation, the basal aquifer to be pumped hypothetically cannot contribute to and, therefore, affect the flow occurring above elevation 64 ft. in the above-mentioned streams. Basal ground water lies hundreds of feet below a major portion of the stream profiles.

2. Although no surface water study was conducted, based upon the known regional geology and hydrology it is plausible that virtually all of the flows in the streams originate from direct and residual runoff from high-level groundwater percolation in a deeply weathered, moderately permeable basaltic terrain.

3. The basal aquifer to be pumped by the Puhi Wells presumably discharges to the ocean chiefly along the coastline east of Lihue and Nawiliwili, rather than through a limited area of poorly permeable alluvial sediments traversed by the lower reaches of the above-mentioned streams, as evidenced by the regional seaward basal water gradient inferred from a limited number of wells located east, or seaward, of Lihue and Nawiliwili.

4. Finally, flows in these streams are derived from a drainage area many times greater than the drainage area affected by the Puhi Wells.

Based upon the above and the existing USGS stream gaging in the area, establishment of additional streamflow monitoring would not be appropriate.

Item 3 of State OEQC letter dated 5/13/99--Watershed and Land Use Analysis

- Secondary or Cumulative Impact

No secondary or cumulative impacts, caused by promoting land uses that alter the hydrology of the source area, are expected to occur because the source area of the Puhi wells consists of inland areas of undevelopable rugged terrain on the slopes of Kilohana Crater and the island's interior mountain regions.

The Puhi wells will serve as supplementary and standby sources for the County's Puhi-Lihue Water System. Consequently, any secondary or cumulative impacts caused by

promoting land uses that may alter the hydrology of the end-use area are expected to be minimal. This is because the end-use area is the same as the area served by the water system, which includes the existing urban areas of Puhi and Lihue. The Puhi and Lihue areas are sewered and the underlying groundwater aquifer is partly non-potable and is not the primary source of potable water for municipal use by the County Department of Water. The major potential impact on hydrology in the end-use area will be an increase in surface runoff from resultant new residential development which under existing zoning and building requirements must be appropriately mitigated by existing or new infrastructure capacity, such as silting basins in park areas and by other best management practices.

- Assessment of Well's Impact on Land Owners, Water Users Including Farmers...

Because the Puhi wells will develop basal ground water and will not affect any streams or springs, they will not affect any land owners or water users, including farmers and any kuleana residents, who may utilize surface water or spring sources.

If you have any questions, please call.

44

Sincerely,

DAN LUM

4-30-99

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119 HONOLULU, HAWAII 96810

LETTER NO (P)1297.9

APR 28 1999

Mr. Ernest Y. W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P. O. Box 1706
Lihue, Kauai, Hawaii 96766

Dear Mr. Lau:

Subject: Pumps and Controls for Puhi Wells Nos. 5A and 5B and Modification to Puhi Well No. 1
Draft Environmental Assessment

Thank you for the opportunity to review the subject document. We support your intent to increase the available water source for the Puhi and Lihue water systems.

As you are aware, DAGS is currently designing the Kauai Judiciary complex and the availability of an adequate supply of potable water for the building continues to be a concern of ours. The subject project would enhance the operation of the affected water systems. We therefore support your intent to determine a finding of no significant impact from the subject project.

45

If there are any questions regarding the above, please have your staff call Mr. Ralph Yukumoto of our Planning Branch at 586-0488.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:jy

RECEIVED
APR 29 1999
SATO & ASSOC., INC.

DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

November 1, 1999

Mr. Gordon Matsuoka
Public Works Administrator
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, HI 96810

RECEIVED
NOV - 5 1999
SATO & ASSOC., INC.

Dear Mr. Matsuoka:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

Thank you for your review of the subject Draft Environmental Assessment (EA) and your letter of support for the project. Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

for/ Ernest Y.W. Lau
Manager and Chief Engineer

WE
c: Sato & Associates ✓

-- 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 --
Phone No. (808) 245-5400 -- Administration FAX No. (808) 246-8628 -- Engineering/Fiscal/Shop FAX No. (808) 245-5813

Copy to Bill via ET. 5-17-99

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to File:

May 14, 1999

99-067/epo

Mr. Ernest Y. W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P. O. Box 1706
Lihue, Hawaii 96766

Dear Mr. Lau:

Subject: Draft Environmental Assessment
Pumps and Controls for Puhi Wells Nos. 5A & 5B
and Modification to Puhi Well No. 1
Puhi, Kauai, Hawaii
TMK: 3-4-5: 10 and 14

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Drinking Water

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. As stated on page 8, Section III, Permits and Approvals Required, Puhi Well Nos. 5A and 5B will need to receive approval prior to use. 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.

3. 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.

It is unclear to us whether Appendix D, Laboratory Report, shows analyses done for Puhi Well 5A or Puhi Well 5B. Water quality analyses are required for each proposed well and the results must identify the well name and State well number. 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.

4. Since this water system is under the jurisdiction of the County of Kauai, the Kauai Department of Water Supply will be responsible for the review and approval of the plans.

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

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

c: SDWB

DEPARTMENT OF WATER
County of Kauai

"Water has no substitute – Conserve it!"

November 1, 1999

Mr. Gary Gill
Deputy Director for Environmental Health
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, HI 96801

Dear Mr. Gill:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have made some modifications in the text of the EA to clarify the issues raised in your response letter. The following specific responses indicate how your comments have been incorporated into the EA.

DOW Response to Comments #1 and #2

The following text has been added to the EA, Section III, "Permits and Approvals:"

47 *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 the Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems." The Department of Water intends to integrate two new wells, Puhi Well No. 5A and Puhi Well No. 5B into the existing Puhi Water System and accordingly, the Department will comply with the "Rules Relating to Potable Water Systems."*

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 that addresses the requirements set in Section 11-20-29.

DOW Response to Comment #3

The Department of Water will submit an engineering report identifying all potential sources of contamination and will evaluate control measures that could be implemented to reduce or eliminate the potential for contamination.

The Laboratory Report in Appendix D is a water quality analysis for Puhi Well No. 5A. A separate test will be conducted on Puhi Well No. 5B and submitted in the engineering report. It is understood that additional tests may be required by the Director for Environmental Health upon his review of the information submitted.

— 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 —
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/Fiscal/Shop FAX No. (808) 245-5813

DOW Response to Comment #4

It is understood that the Puhi Water System is under the jurisdiction of the Department of Water and that the review and approval of the plans for the subject project is the responsibility of the County of Kauai, Department of Water.

Once again, we appreciate your comments on this project. Should you have any questions, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

for Ernest Y.W. Lau
Manager and Chief Engineer

Attachment
c: Sato & Associates, Inc. ✓

Copies to E.T. Kaiu
5-12-99

BENJAMIN J. CAYETANO
Governor of Hawaii

TIMOTHY E. JOHNS
Chairperson

BRUCE S. ANDERSON
RICHARD N. COX
ROBERT G. GIRALD
DAVID A. MORRIGA
HERBERT M. RICHARDS, JR.

EDWIN T. SAKODA
Acting Deputy Director

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

May 10, 1999

Mr. Ernest Y.W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P.O. Box 1706
Lihue, HI 96766

RECEIVED
MAY 20 1999
DEPT. OF WATER, KAUAI

Dear Mr. Lau:

Draft Environmental Assessment
Pumps and Controls for Puhi Wells Nos. 5A & 5B and
Modification to Puhi Well No. 1, Puhi, Kauai, Hawaii

48

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.

[ ] We recommend coordination with the county government to incorporate this project into the county's 20-year Water Use and Development Plan, which is subject to regular updates.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the 20-year State Water Projects Plan, which is subject to regular updates.

[ ] 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 would be required before this well(s) is constructed and/or a Pump Installation Permit would be required before ground water is pumped from the well(s) for this 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.

[ ] 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] If the proposed project alters the bed and banks of a stream channel, a stream channel alteration permit may be required.

[X] OTHER:

A pump installation permit was issued for Puhi Well 5B (Well No. 5824-09) on February 2, 1998; this permit will expire on January 28, 2000. An application for a pump installation permit for Puhi Well 5A (Well No. 5824-08) should be made and approved prior to any pump installation work. A permit to modify the existing pump controls is not required for the existing Puhi Well No. 1 (Well No. 5824-01), unless the existing 200 gpm capacity pump is replaced with a larger capacity pump. A water use permit is not required because the Hanamaulu Aquifer System has not been designated a water management area.

If there are any questions, please contact the Commission staff at 587-0218 or toll-free at 274-3141, extension 70218.

Sincerely,

Edwin T. Sakoda

EDWIN T. SAKODA
Acting Deputy Director

LN:ss

DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

November 1, 1999

RECEIVED
NOV – 3 1999
SATO & ASSOC., INC.

Mr. Edwin T. Sakoda, Acting Deputy Director
State of Hawaii, Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Sakoda:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have the following responses to your comments:

1. Pump Installation Permits will be obtain from your office prior to pumping any groundwater from the well. The Pump Installation Permits is listed in Section III, "Permits and Approvals Required."

2. The following discussion on the impact of the proposed project on nearby streams has been added to Section VI, Part D:

49

The impact of the Wells 5A and 5B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project's hydrogeologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 5A and 5B may reduce the streamflow in Huleia, Hanamaulu, and Nawiliwili Streams by as much as 2%. The USGS estimate is based on a comparison of the measured average stream baseflow and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may be found in the section of this EA regarding responses to the Draft EA.

Water Resource Associates, however, assert that Well 5A and 5B will have no measurable short- or long-term effect on Huleia, Hanamauiu, and Nawiliwili Streams. The analysis by Water Resource Associates is based on the premise that Wells 5A and 5B will pump water from a basal aquifer with a head of approximately 64 ft. msl which hypothetically cannot contribute to streamflow above an elevation of 64 ft. msl. A copy of the Water Resource Associates findings are contained in a letter report dated October 4, 1999, which may also be found in the section of this EA regarding responses to the Draft EA.

The Huleia and Hanamaulu Streams are gauged by USGS in an ongoing program. It may be possible to evaluate in the future whether any long-term effects on streams in the area have been observed, however a 2% change in streamflow rate may not be discernable with current monitoring techniques. Because of the existing USGS

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monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new stream monitoring program

Based upon the above analysis, we do not anticipate that the proposed project will alter the bed or bank of any stream, and therefore, we do not propose to apply for a stream channel alteration permit at this time.

3. Puhi Well No. 5A. We will be submitting for a Pump Installation Permit for Well 5A prior to the installation of the pump in this well.

Puhi Well No. 5B. It will be necessary to apply for a time extension of the existing Pump Installation Permit for Well 5B.

Puhi Well No. 1. The flow rate of 200 gpm will not be changed by the proposed project and therefore we will not be submitting for a Well Modification Permit.

Once again, we appreciate your comments on this project. Should you have any questions, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Edward Tschupp

for/ Ernest Y.W. Lau
Manager and Chief Engineer

WE
c: Sato & Associates, Inc. ✓

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

4-29-99

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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JANET E. KAWELO

AQUATIC RESOURCES
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CONVEYANCES
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HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

April 22, 1999

Mr. Ernest Lau, Manager and Chief Engineer
Department of Water/County of Kauai
P.O. Box 1706
Lihue, Kaua'i, Hawaii 96766

LOG NO: 23251 ✓
DOC NO: 9904NM16

Dear Mr. Lau:

SUBJECT: Chapter 6E-42, Historic Preservation Review -DEA for Pumps and Control for Puhi Wells No's. 5A& 5B and modification to Puhi Well No. 1 (Department of Water, County of Kauai)
TMK: 4-3-04-05: 10, 14 and 3-4-07: 3, 6,
Puhi, Lihue,, Kauai

50

A review of our records indicates the absence of historic sites on this property. The wells have already been built and this DEA is for improvements to the already existing infrastructure. Most of the area had been under sugarcane cultivation. Today no historic sites exist in the area. Thus, we believe that your project will have "no effect" on significant historic sites.

If you have any questions, please call Nancy McMahon at 742-7033.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

NM:amk

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DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

November 1, 1999

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NOV - 3 1999
SATO & ASSOC., INC.

Mr. Don Hibbard, Administrator
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dear Mr. Hibbard:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

Thank you for your review and response of no comment to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Edward Tschupp
for/ Ernest Y.W. Lau
Manager and Chief Engineer

WE
c: Sato & Associates ✓

— 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 —
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11/10/99 15:29 FAI 808 245 5813 DEPT OF WATER 002

Copy to Bill via LT. 5-7-99

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

MAY -6 1999

Ref:PS:EH

99 MAY 7 A11:19
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COUNTY OF KAUAI

Mr. Ernest Y. W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P.O. Box 1706
Lihue, Hawaii 96766

Dear Mr. Lau:

Subject: Draft Environmental Assessment (DEA)
Pumps and Controls for Puhi Wells Nos. 5A & 5B
and Modifications to Puhi Well No. 1
Puhi, Kauai, Hawaii

51

We have reviewed the subject DEA document and have no comments to offer regarding the proposed project.

Thank you for the opportunity to review the DEA document.

Should you have any questions or require further assistance, please contact staff planner Ed Henry at (808) 587-0380.

Very truly yours,

Dean Y. Uchida,
Administrator

c.c. KDLO

DEPARTMENT OF WATER
County of Kauai
"Water has no Substitute - Conserve It!"

November 1, 1999

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SATO & ASSOC., INC.

Mr. Dean Y. Uchida, Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Uchida:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

Thank you for your review and response of no comment to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Ernest Y.W. Lau
Manager and Chief Engineer

WE
c: Sato & Associates, Inc. ✓

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98C25-00

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.3374

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

APR 20 1999

Mr. Clifford M. Arakawa
Project Manager
Sato & Associates, Inc.
2046 South King Street
Honolulu, Hawaii 96826

Dear Mr. Arakawa:

Subject: Draft Environmental Assessment
Pumps and Controls for Puhi Wells Nos. 5A & 5B and Modification to
Puhi Well No. 1, Puhi, Kauai, Hawaii

52

Thank you for your letter of April 5, 1999, transmitting the above document for our review and approval.

The proposed project will not adversely impact our State highway facilities.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

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APR 21 1999
SATO & ASSOC., INC.

95C25-00

DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

November 5, 1999

Mr. Kazu Hayashida
State of Hawaii
Department of Transportation
2046 South King Street
Honolulu, HI 96826

Dear Mr. Hayashida:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1

Thank you for your review and response of no comment to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Ernest Y.W. Lau
Manager and Chief Engineer

WE
cc: Sato and Associates

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Bill 5-14-99

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
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

3:19

May 13, 1999

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MAY 20 1999

Mr. Ernest Lau
Department of Water
County of Kauai
4398 Pua Loke Street
Lihue, Hawaii 96766

Dear Mr. Lau:

Subject: Draft Environmental Assessment for Pumps and Controls for Puhi Well Nos. 5A & 5B and Modification to Puhi Well No. 1, Kauai

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

1. Hydrologic Impact Analysis

Please describe the potential effects the well development may have on Hanamaulu, Nawiliwili and Huleia Streams. If potential impacts exist, a monitoring program for the streams should be included.

2. 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.

3. Watershed and Land Use Analysis

Please include a discussion of how waters from the well will be used, and an analysis of how the proposed well development may ~~affect~~ land ~~and~~ water uses on the island and in the region. The analysis should include a discussion of the following (published materials may be referenced):

- Hawaii State Water Plan and its component parts
- County General, Development, and/or Community Plans
- Plans for future water development within the aquifer
- Historical water supply and demand figures for the region
- 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.

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

Sincerely,

Genevieve Salmonson
Director

c: Sato and Associates, Inc.

DEPARTMENT OF WATER
County of Kauai

"Water has no substitute - Conserve it!"

October 29, 1999

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NOV - 3 1999
SATO & ASSOC., INC.

Ms. Genevieve Salmonson
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmonson:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4) 3-4-07:3&6

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have made some modifications in the text of the EA to clarify the issues raised in your response letter. The following specific responses indicate how your comments have been incorporated into the EA.

DOW Response to Comments #1, Hydrologic Impact Analysis

54 The following text has been added to Section VI, Part D, "Groundwater Hydrology:"

The impact of the Wells 5A and 5B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project's hydrogeologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 5A and 5B may reduce the streamflow in Huleia, Hanamaulu, and Nawiliwili Streams by as much as 2%. The USGS estimate is based on a comparison of the measured average stream baseflow and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may be found in the section of this EA regarding responses to the Draft EA.

Water Resource Associates, however, assert that Well 5A and 5B will have no measurable short- or long-term effect on Huleia, Hanamaulu, and Nawiliwili Streams. The analysis by Water Resource Associates is based on the premise that Wells 5A and 5B will pump water from a basal aquifer with a head of approximately 64 ft. msl which hypothetically cannot contribute to streamflow above an elevation of 64 ft. msl. A copy of the Water Resource Associates findings are contained in a letter report dated October 4, 1999, which may also be found in the section of this EA regarding responses to the Draft EA.

The Huleia and Hunamaulu Streams are gauged by USGS in an ongoing program. It may be possible to evaluate in the future whether any long-term effects on streams in the area have been observed, however a 2% change in streamflow rate may not be discernable with current monitoring techniques. Because of the existing USGS monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new stream-monitoring program.

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DOW Response to Comment #2. Financial and Institutional Arrangements

The following section has been added to the EA:

Section V, Part E. "Financial and Institutional Arrangements"

The well development project is funded jointly by the State of Hawaii and the County of Kauai, Department of Water. The limits of the project are entirely within property owned by the either the State of Hawaii or the County of Kauai, Department of Water with the exception of the new power transmission line that will be the property of Kauai Electric Co. and will cross private property. The project does not involve any institutional, financial or land use arrangements or commitments with other public or private entities, with the exception of the power provided by Kauai Electric Co.

DOW Response to Comment #3. Watershed and Land Use Analysis

The following section has been added to the EA:

Section V, Part F, "Watershed and Land Use Analysis"

The State of Hawaii Constitution mandates that "the State has an obligation to protect, control, and regulate the use of Hawaii's water resources for the benefit of its people." The State Water Code is the enforcement tool of the state constitution and the Hawaii Water Plan is one of the primary policies of the State Water Code. The Hawaii Water Plan is intended to fulfill a comprehensive planning requirement through four component parts: a water resource protection plan, water use and development plans for each County, a water project plan, and a water quality plan. The proposed project is fully consistent with the Hawaii State Water Plan and it four components.

The County of Kauai General Plan as updated in 1981 lists its goals as follows:

-To maintain the concept of Kauai as "The Garden Isle"; thus, insisting any growth be in consonance with the unique landscape and environmental character of the island
-To insure that all physical growth is consistent with the overall ecology of the island
-To manage growth according to established population growth targets.
-To create opportunities for a greater fulfillment of life through the development of a broad spectrum of educational and cultural pursuits.
-To promote and protect the health, safety and welfare of all residents and visitors.
-To provide opportunities for suitable living quarters for all residents in all income levels.
-To provide for a maximum variety of outdoor recreational activities.
-To recognize those aspects of the island and its people which are historically and culturally significant, and to maintain and enhance such aspects as a continuing expression of the island's physical and social structure.
-To promote the improvements and expansion of the island's economy, by recognizing and carefully utilizing land and water resources.
-To guide and control development to take full advantage of the island's form, beauty and climate and preserve the opportunity for an improved quality of life.
-To guide physical growth so that island and visitor communities will develop in social and economic concert with each other.

-To manage implementation through development of social and physical infrastructure based on growth targets, priorities and efficient utilization of facilities and services.
-To provide workable planning tools to meet the changing needs of the community.
-To create, develop and sustain an economy and a population composition that will encourage the youth of Kauai to live in the County and contribute to society.
-To encourage and support efforts to approach self sufficiency in food production and energy.

The proposed project is fully consistent with the goals of the County of Kauai General Plan as updated in 1981.

As indicated in Section VI, Part D, the project involves further development of the Hanamaulu Aquifer, which has an estimated sustainable yield of 40 million gallons per day (mgd). Current pumpage, based on data from the State of Hawaii Commission on Water Resource Management, is estimated at a maximum of approximately 10.8 mgd, or approximately 27% of the sustainable yield of the aquifer. The additional ground water production from the proposed project will not be significant relative to the aquifer sustainable yield.

The DOW is planning to develop additional wells in the Hanamaulu area that will also produce from the same aquifer, at a considerable distance from the Puhi area. The combined pumping from all known current or proposed wells is expected to remain considerably below the sustainable yield of 40 mgd estimated for the Hanamaulu aquifer.

55

The proposed project does not promote land uses that will significantly alter the hydrology of the source or end-use area. The project will provide additional water supplies and address current source water deficiencies within the existing water systems. The project does not involve any land use arrangements or commitments with other public or private entities.

It is anticipated that the project will have no impact on nearby landowners or water users, including farmers or kuleana residents. The majority of the developed property in the vicinity of the project is agricultural land that uses surface water from the irrigation ditch system for irrigation purposes. The project does not involve ceded lands.

Once again, we appreciate your comments on this project. Should you have any questions, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Edward Tsutsumi for

for/ Ernest Y.W. Lau
Manager and Chief Engineer

c: Sato & Associates, Inc. √

MARYANNE W. KUSAKA
MAYOR

WALLACE G. REZENTES, SR.
ADMINISTRATIVE ASSISTANT

Copy to Bill 4-27-99

CESAR C. PORTUGAL
COUNTY ENGINEER
TELEPHONE 241-6600

JAN K. COSTA
DEPUTY COUNTY ENGINEER
TELEPHONE 241-6640

AN EQUAL OPPORTUNITY EMPLOYER
COUNTY OF KAUA'I
DEPARTMENT OF PUBLIC WORKS
4444 RICE STREET
MO'IKEHA BUILDING, SUITE 275
LIHU'E, KAUAI, HAWAII 96766

PW4.030

April 27, 1999

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

Attention: Mr. Ernest Lau

56

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
PUMPS AND CONTROLS FOR PUHI WELLS
NOS. 5A & 5be AND MODIFICATION TO
PUHI WELL NO. 1

We received the subject draft environmental assessment and have no comments to offer at this time.

Thank you for the opportunity to review this document. Should you have any questions, please feel free to contact Mr. Wallace Kudo of my staff at 241-6620.

Very truly yours,

CESAR C. PORTUGAL
County Engineer

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[illegible]

WK/cu

cc: Sato & Associates, Inc.

DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

October 29, 1999

Mr. Cesar C. Portugal
County of Kauai
Department of Public Works
4444 Rice Street
Mo'ikeha Building, Suite 275
Lihue, HI 96766

Dear Mr. Portugal:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4) 3-4-05:10&14, (4)3-4-07:3&6

Thank you for your review and response of no comment to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

for/Ernest Y.W. Lau
Manager and Chief Engineer

c: Sato & Associates, Inc. ✓

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Copies to CLT & Bill
4-20-99

MARYANNE W. KUSAKA
MAYOR

DAVID K. SPROAT
FIRE CHIEF

COUNTY OF KAUA'I
FIRE DEPARTMENT
MOTIKEHA BUILDING
4444 RICE STREET, SUITE 295
LIHU'E, KAUA'I, HAWAII

April 16, 1999

Mr. Ernest Y.W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P. O. Box 1706
Lihue, Hawaii 96766

Dear Ernest:

RE: Fire Department Comments
Draft Environmental Assessment
Pumps and Control for Puhi Wells #5A & #5B
and Modifications to Puhi Well #1
Puhi, Kauai, Hawaii

57

The following comments are rendered after review of the submitted documents.. The Fire Department is pleased that these additional resources are being developed to increase the pumping and storage capabilities of the Puhi and Lihue Water Systems. We are simply an end-user of this development during emergency situations. The additional capability enhances our ability to handle incidents in light of the increase of development in the Lihue to Puhi Districts.

However, we are concerned of the decision to install a typical compressed gas chlorination system. The proposed timetable for the construction of this Project appears to occur during the period when the new fire code (1997 UFC) will be implemented in the County. The code addresses "new installations" and follow current nationally-recognized practices for the installation of chlorination systems.

To simplify matters, a single 150# chlorine cylinder in use or storage does not exceed the hazardous materials exempt quantity and would therefore not require any additional equipment. On the other hand, if two or more 150# cylinders were kept at the single site either in use or in storage, any additional cylinder(s) beyond the single cylinder would be required to be enclosed in an approved gas room, exhausted enclosure, or gas cabinet; and/or would be further required to provide additional fire protection, i.e., fire sprinkler systems, etc.

The international fire service community is gravely concerned about issues involving hazardous materials because of its great potential for disaster. This affects not only the value of property, but places extreme risk and danger to occupants, surrounding neighbors, and emergency responders.

We recommend that you consider alternate (safer) technologies to provide the chlorination need or install equipment as suggested above to increase exempt amounts kept on-site.

Please call for further inquiry.

Sincerely,

Mike Kano, Captain
Fire Prevention Bureau
TEL: (808) 241-6511

David K. Sproat
Fire Chief

DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

November 1, 1999

Mr. David K. Sproat, Fire Chief
County of Kauai
Fire Department
4444 Rice Street
Mo'ikeha Building, Suite 295
Lihue, HI 96766

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NOV - 3 1999
SATO & ASSOC., INC.

Dear Mr. Sproat:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: 3-4-05: 10 & 14, 3-4-07: 03 & 06

Thank you for your review of the subject Draft Environmental Assessment (EA) and your letter of support for the project. We acknowledge your safety concern regarding the use of a compressed gas chlorination system. Safety is also the utmost concern for the Department of Water including the safety of our employees and the safety of all Kauai residents.

58 The use of compressed chlorine gas for potable water disinfection has been our standard for several decades and we have an excellent safety record in the use and handling of the disinfectant. Our personnel that maintain the chlorination system are well trained in the handling and installation of the chlorine cylinders. We feel that the system is safe and effective.

We intend to fully comply with the new fire code (1997) and will install not more than a single 150 lb. chlorine cylinder at the proposed well site. Also included at the well site will be chlorine gas detector units to alert persons of danger should there be a gas leak. A set of the construction plans containing the chlorine gas safety equipment will routed to your office during the building permit review process.

Once again, we appreciate your comments on this project. Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Edward Tschupp
for/Ernest Y.W. Lau
Manager and Chief Engineer

WE
c: Sato & Associates, Inc. ✓

— 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 —
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/Fiscal/Shop FAX No. (808) 245-5813

copies to Ernie, Ed T.
& Bill 5-5-99

MARYANNE W. KUSAKA
MAYOR

DEE M. CROWELL
PLANNING DIRECTOR
SHEILAH N. MIYAKE
DEPUTY PLANNING DIRECTOR
TELEPHONE (808) 241-6677
FAX (808) 241-6699

PLANNING DEPARTMENT

May 3, 1999

Mr. Ernest Y. W. Lau
County of Kauai Department of Water
P.O. Box 1706
Lihue, Kauai, HI 96766

SUBJECT: Draft Environmental Assessment
Pumps and Controls for Puhi Wells Nos. 5A & 5B and
Modification to Puhi Well No. 1 at Puhi, Kauai, Hawaii

The Lihue District currently does not have enough potable water to meet existing and projected demands which has limited growth in this area. Being Kauai's principal town, it is important that Lihue develop to provide the island with needed goods and services for both present and future needs. These proposed facilities will help Lihue develop.

59 Please note that construction of the well facilities within the Agriculture and Open zones will require Use Permits which require Public Hearings and Planning Commission approval. Our office should be contacted for more information on permitting requirements well before commencing the project.

We have no additional comments to offer and should you have any questions, please feel free to contact Keith Nitta of my staff at 241-6677.

DEE M. CROWELL
Planning Director

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MAY 7 11 1999

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DEPARTMENT OF WATER
County of Kauai
"Water has no Substitute – Conserve It!"

7/20-25-02

C17

October 29, 1999

Mr. Dee M. Crowell, Planning Director
County of Kauai
Planning Department
4444 Rice Street
Kapule Building, Suite 473
Lihue, HI 96766

Dear Mr. Crowell:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: (4)3-4-05:10&14, (4)3-4-07:5&6

Thank you for your review of the subject Draft Environmental Assessment (EA) and your letter of support for the project. In conformance with your comment regarding construction of the well facilities within Open and Agricultural Zones, we obtained approval of a Use Permit from the Planning Commission at its regular meeting on September 23, 1999.

Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

for/ Ernest Y.W. Lau
Manager and Chief Engineer

c: Sato & Associates, Inc. ✓

RECEIVED
NOV - 3 1999
SATO & ASSOC., INC.

-- 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706 Lihue HI 96766-5706 --
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/FiscalShop FAX No. (808) 245-5813

Copy to Mike 4-20-99

Grove Farm Company
Incorporated

April 13, 1999

Mr. Ernest Y.W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P.O. Box 1706
Lihue, HI 96766

Dear Ernest:

Subject: Draft Environmental Assessment
Pumps and Controls for Puhi Well Nos. 5A and 5B
and Modification to Puhi Well No. 1
Puhi, Kauai, Hawaii

We have reviewed the subject document and have the following comments:

1. On page 18, under "Topography and Climate" the sites are described as lying within abandoned agricultural lands. It is our understanding that these lands are still being actively cultivated.

2. On page 19, top of page, Department of *Agriculture* ...

Thank you for the opportunity to provide comments.

Sincerely,

GROVE FARM COMPANY, INCORPORATED

Michael H. Furukawa
Vice President and Project Manager

RECEIVED
APR 14 1999

P O Box 2069 Puhi Rural Branch Lihue, Hawaii 96766-7069
Phone: (808) 245-3678 FAX (808) 246-9470

DEPARTMENT OF WATER
County of Kauai

"Water has no Substitute – Conserve It!"

October 29, 1999

Mr. Michael H. Furukawa
Vice President and Project Manager
Grove Farm Company, Inc.
P.O. Box 2069, Puhi Rural Branch
Lihue, HI 96766-7069

Dear Mr. Furukawa:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1
TMK: 3-4-05: 10 & 14, 3-4-07: 03 & 06

Thank you for your review and response to the subject Draft Environmental Assessment (EA). We have made the following modifications in the text of the EA to clarify the items pointed out in your response letter:

1. The first paragraph of Section VI, Part B, "Topography and Climate," has been revised to clarify that some of the lands in the vicinity of the project are actively under agricultural cultivation.

2. The second paragraph, first sentence, of Section VI, Part C, "Geology and Soils," has been revised to clarify that it is the Department of Agriculture, not the Department of Soil Conservation.

Once again, we appreciate your comments on this project. Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

for Ernest Y.W. Lau
Manager and Chief Engineer

RECEIVED
NOV - 3 1999
SATO & ASSOC., INC.

c: Sato & Associates, Inc.

– 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 –
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/Field/Shop FAX No. (808) 245-5813

X. REFERENCES

"Ground Water in the Southern Lihue Basin, Kauai, Hawaii," U.S. Dept of the Interior, U.S. Geological Survey, Water Resources Investigations Report 98-4031, 1998.

"Hawaii Water Plan, Kauai Water Use and Development Plan," R.M. Towill Corporation and the Commission on Water Resource Management, Dept of Land and Natural Resources, State of Hawaii, February 1990.

"Hawaii Water Plan, Water Resources Protection Plan," Volumes I & II, Commission on Water Resource Management, Dept of Land and Natural Resources, Review Draft, March 1992.

"Hawaii Water Plan, Water Quality Plan," Commission on Water Resource Management, Dept of Land and Natural Resources, Review Draft, February 1992.

"The Groundwater Contamination Maps for the State of Hawaii, 1997," Dept of Health, State of Hawaii.

"Draft Environmental Assessment for Windward Exploratory Well," prepared for Dept of Land and Natural Resources, State of Hawaii, by Sato and Associates, Inc., July 1998.

Environmental Impact Assessment and Negative Declaration for Drill and Test Puhi Well No. 5," Dept of Water, County of Kauai, by Akinaka and Associates, ltd., April 14, 1994.

"Final Environmental Assessment, Kapalama Wells, Kapalama, Honolulu, Oahu, Hawaii," City and County of Honolulu, Board of Water Supply and R.M. Towill Corporation, May 1998.

"Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii," United States Dept of Agriculture, Soil Conservation Service in cooperation with the University of Hawaii, Agricultural Experiment Station, August 1972.

"Atlas of Hawaii," Third Edition, Dept of Geography, University of Hawai'i at Hilo, edited by Sonia P. Juvik and James O. Juvik.

"The State of Hawaii Data Book," 1997, The Dept of Business, Economic Development & Tourism, State of Hawaii.

APPENDIX A

PUHI WELL 5A

WELL COMPLETION REPORT

AND

REPORT OF PUMP TESTS

State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

97 JUL 7 P4:07

WELL COMPLETION REPORT

3/20/96 WCR Form

(Check Appropriate Box) XX Well Construction ☐ (Permanent) Pump Installation

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

1. State Well No.: 5824-08 Well Name: PUHI WELL NO 5A Island: KAUAI
2. Location/Address: BEHIND KAUAI COMMUNITY COLLEGE Tax Map Key: 3-4-05:10 & POR.

PART I. WELL CONSTRUCTION REPORT

3. Drilling Company: ROSCOE MOSS HAWAII, INC.
4. Name of driller who performed work: JOHN CARROLL & JERRY BOURN
5. Type of rig/construction: AIR ROTARY & CABLE TOOL
6. Date(s) Well Construction and pump tests (if any) completed: 3/12/97 WELL 4/28/97 PUMP
7. GROUND ELEVATION (referenced to mean sea level, msl): 482.77 ft. OF DRAIN
   Well Bench Mark (description/location): MARK ON CONCRETE HEADWALL Elevation(msl): 488.93 ft.
8. DRILLER'S LOG: *Please attach geologic log (if available or if required by permit)*

Depths (ft.)	Rock Description, Water Level, Dates, etc.	Depths (ft.)	Rock Description, Water Level, Dates, etc.
____ to ____	ATTACHED	____ to ____	
____ to ____		____ to ____	

(If more space is needed, continue on back.)

9. Total depth of well below ground: _____ ft.
10. Hole size: 20 inch dia. from 0 ft. to 900 ft. below ground
    11 1/2 inch dia. from 900 ft. to 1058 ft. below ground
    _____ inch dia. from _____ ft. to _____ ft. below ground
11. Casing installed: 12 in. I.D. x .375 in. wall solid section to 565 ft. below ground
    N/A in. I.D. x _____ in. wall perforated section to _____ ft. below ground
    Casing Material/Slot Size: _____
12. Annulus: Grouted from 0 ft. below ground to 200 ft. below ground
    Cemented from 200 ft. below ground to 215.75 ft. below ground
13. Initial water level: 417.88 ft. below ground. Date and time of measurement: 4/16/97 09:00
14. Initial chloride: 24 ppm Date and time of sampling: 04/16/97 09:45
15. Initial temperature: 23.4°C XXFX Date and time of measurement: 4/16/97 09:25
16. PUMPING TESTS: Reference Point (R.P.) used: PUMP BASE, which elevation is 483.73 ft.
    (1) Step-Drawdown Test Date 4-16-97
    Start water level 417.88 ft. below R.P.
    End water level 445.83 ft. below R.P.
    (2) Long-term Aquifer Test Date 4-21-97
    Start water level 418.81 ft. below R.P.
    End water level 452.95 ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs *(1/9/96 LTAT Form)* attached? XX Yes __ No
18. As-built drawings attached attached? XX Yes __ No
19. Other remarks/comments: *(On back of this form)*

Well Drilling Contractor (print) ROSCOE MOSS HAWAII, INC. C-57 Lic. No. C-16437
Signature [signature] Date 7/1/97

Surveyor (print) _____ Lic. No. _____
Signature _____ Date _____

Applicant (print) Ernest Y. W. Lau, Manager & Chief Eng.
Signature [signature] Date 7/21/97

PART II. (PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company: _____
21. Name of person performing work: _____
22. Date Pump Installation Completed: _____
23. PUMP INSTALLATION:
    Pump Type, Make, Serial No.: _____ Capacity: _____ gpm
    Motor type, H.P., Voltage, rpm: _____
    Depth of Pump Intake Setting _____ ft. below _____, which elevation is _____ ft.
    Depth to bottom of airline _____ ft. below _____, which elevation is _____ ft.
    Pumping Head is _____ ft. Type of flow meter: _____ which measures in _____
24. As-built drawings attached attached? __ Yes __ No
25. Other remarks/comments: *(See below)*

Pump Installation Contractor (print) _____ C-57 Lic. No. _____

Signature _____ Date _____

Applicant (print) _____

Signature _____ Date _____

8.(cont'd) DRILLER'S LOG (cont'd):

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

19.& 25. Remarks: WELL 5A WAS DRILLED TO A DEPTH OF 1058' AND BACKFILLED TO 970' DUE TO POOR GEOLOGY

Roscoe
Moss
Hawaii, Inc.

Making Water Work for Hawaii Since 1965

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PUHI NO. 5A ELEVATION 482.77 MSL

DATE	FOOTAGE	BORING LOG	W.L.
3/22/95	0-83	RED BROWN CLAY SOFT	
	83-99	BROWN GREY MED HARD ROCK	
	99-111	BROWN MED HARD ROCK	
	111-123	BROWN GREY HARD	
	123-151	BROWN SOFT ROCK	
	151-168	BROWN GREY MED HARD	78'
	168-251	BLUE ROCK HARD	82.5'
3/30/95	251-300	NO LOG	
4/03/95	PUMP SET	273' SUCTION. AIRLINE 268'	
4/10/95	RUN PUMP		85.66' STATIC
4/13/95	300-353	REDISH BROWN SOFT	
	353-358	BLUE ROCK HARD	
	358-444	BROWN CLAY SOFT	84.1'
	444-472	BLUE ROCK HARD	
	472-478	LOOSE CINDERS	85.15'
	478-510	BLUE ROCK HARD	
	510-539	BROWN GREY ROCK	115.66'
	539-561	BLUE BROWN ROCK HARD	
	561-598	BLUE ROCK HARD	293.0'
	598-604	CINDERS	
	604-640	HARD & SOFT LAYERED BASALT	424.9'
	640-705	BLUE ROCK W/LITTLE GREEN HARD	389.45'
	705-777	BLUE BROWN MED HARD LAYERED	500.9'
	777-819	LOOSE BROKEN HARD ROCKS	437.6'
	819-831	HARD & SOFT LAYERED BASALT	441.3'
	831-870	LOOSE BROKEN HARD ROCK	430.1'
	870-900	BLUE ROCK W/LITTLE GREEN HARD	410.9'
	900-913	RED BROWN PAHOEHOE	
	913-926	GREY PAHOEHOE	413'
	926-932	DECOMPOSED CINDERS	413'
	932-937	DARK GREY AA CLINKER	413'
	937-941	RED BRN DECOMP. ROCK & CINDERS	413'
	941-957	BLUE & BLACK AA	413'
	957-982	REDISH BROWN PAHOEHOE	413'
	982-990	DARK BLACK PAHOEHOE	413'
	990-996	STICKY BLUE ROCK	413'
	996-1001	BLACK LAVA	413'
	1001-1004	BROWN CLAY W/BLACK ROCK	413'

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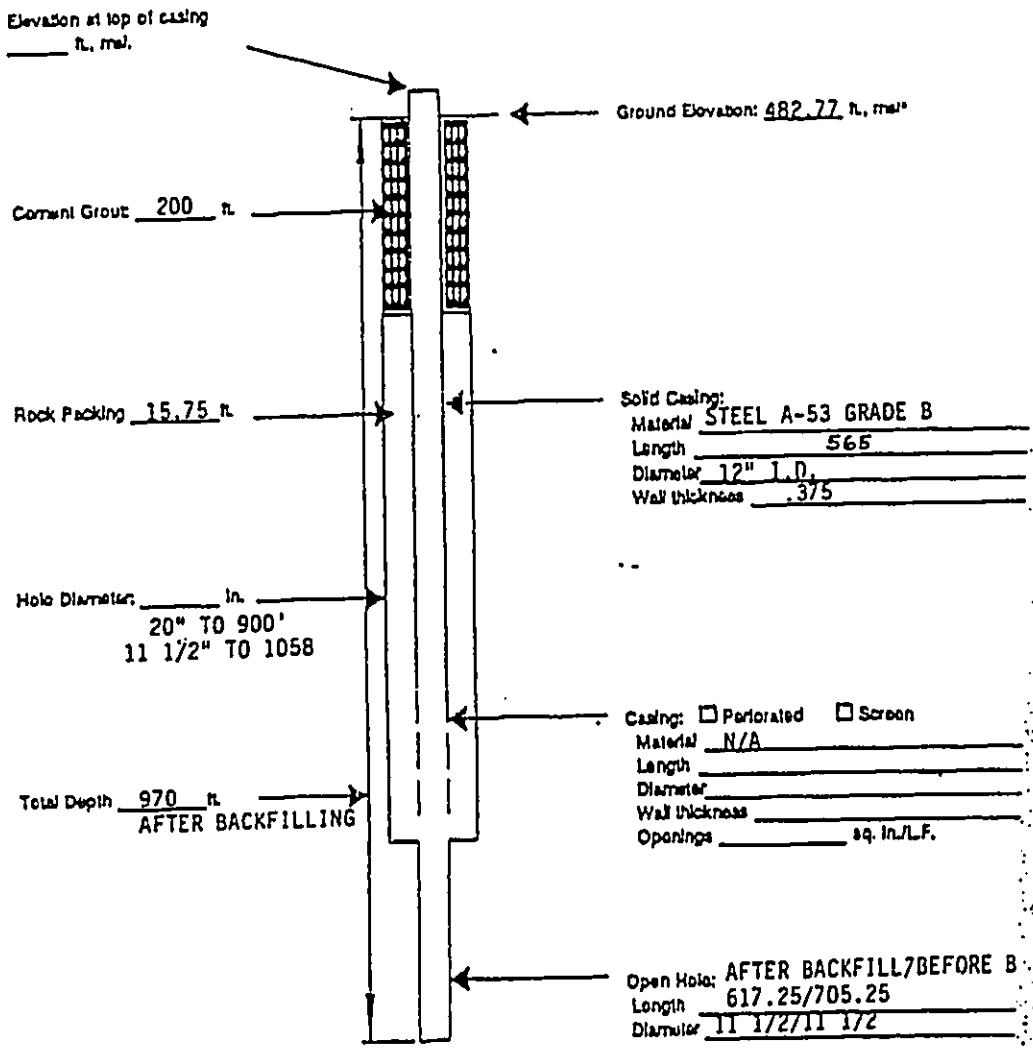
1004-1009	BLACK LAVA SOLID	413'
1009-1023	BLUE CLAY	413'
1023-1029	GREY ROCK W/OLIVINE	413'
1029-1035	BLACK & GREEN DECOMP ROCK	412.75'
1035-1051	DARK BLACK PAHOEHOE	412.75'
1051-1055	RED BROWN PAHOEHOE	
1055-1058	DARK BROWN MUD	413.1'

Remarks, Explanations (cont'd):

PUHI WELL 5A

AS BUILT WELL SECTION



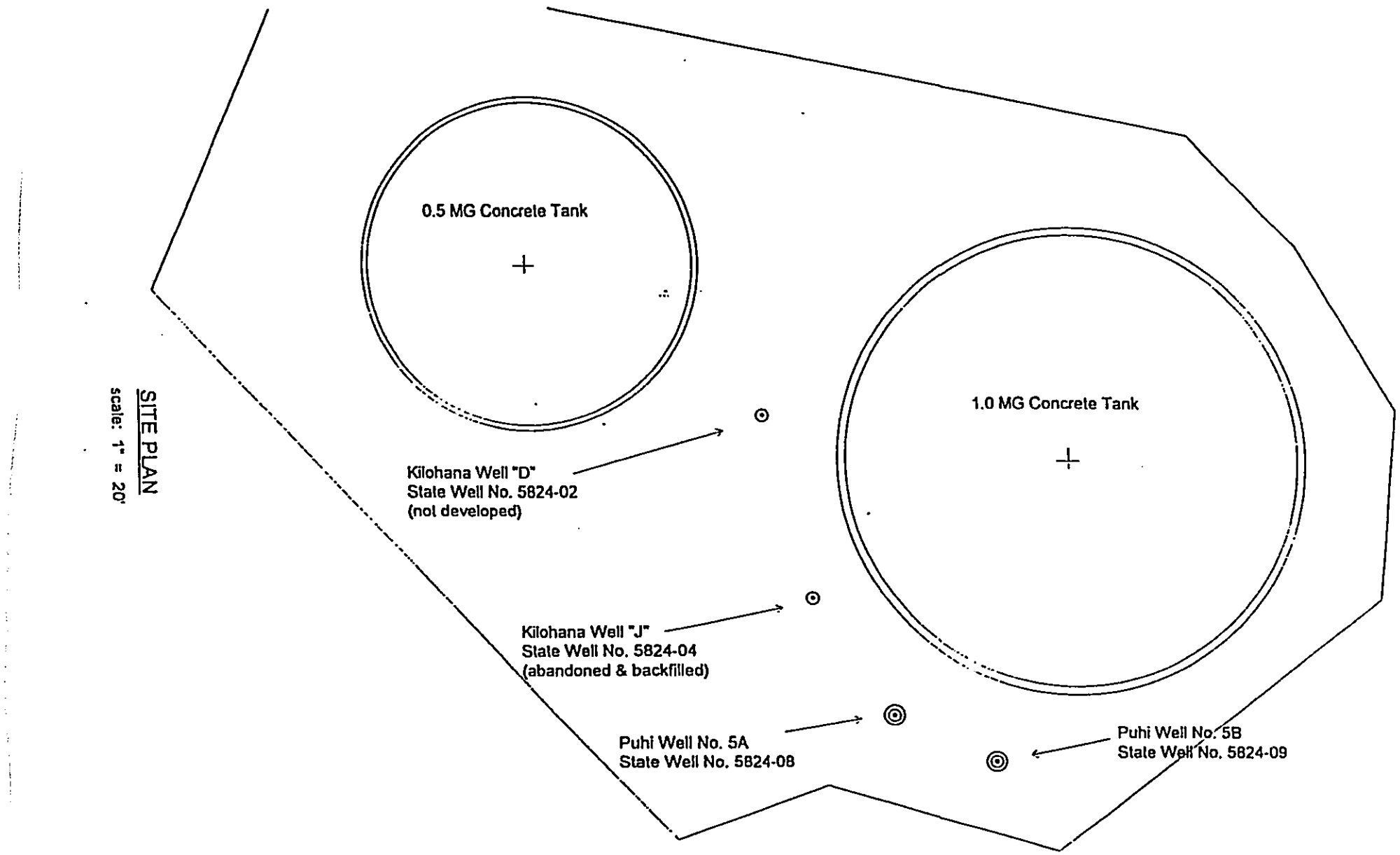
*Approximate elevation at time of filing application. Ground elevation above mean sea level (msl) by a surveyor licensed by the State must be submitted upon completion of construction. Final elevations of well components shall be submitted in the well completion/well abandonment reports.

Report of Pump Tests

Puhi Well No. 5A,
State Well No. 5824-08

County of Kauai, Department of Water

June 1997

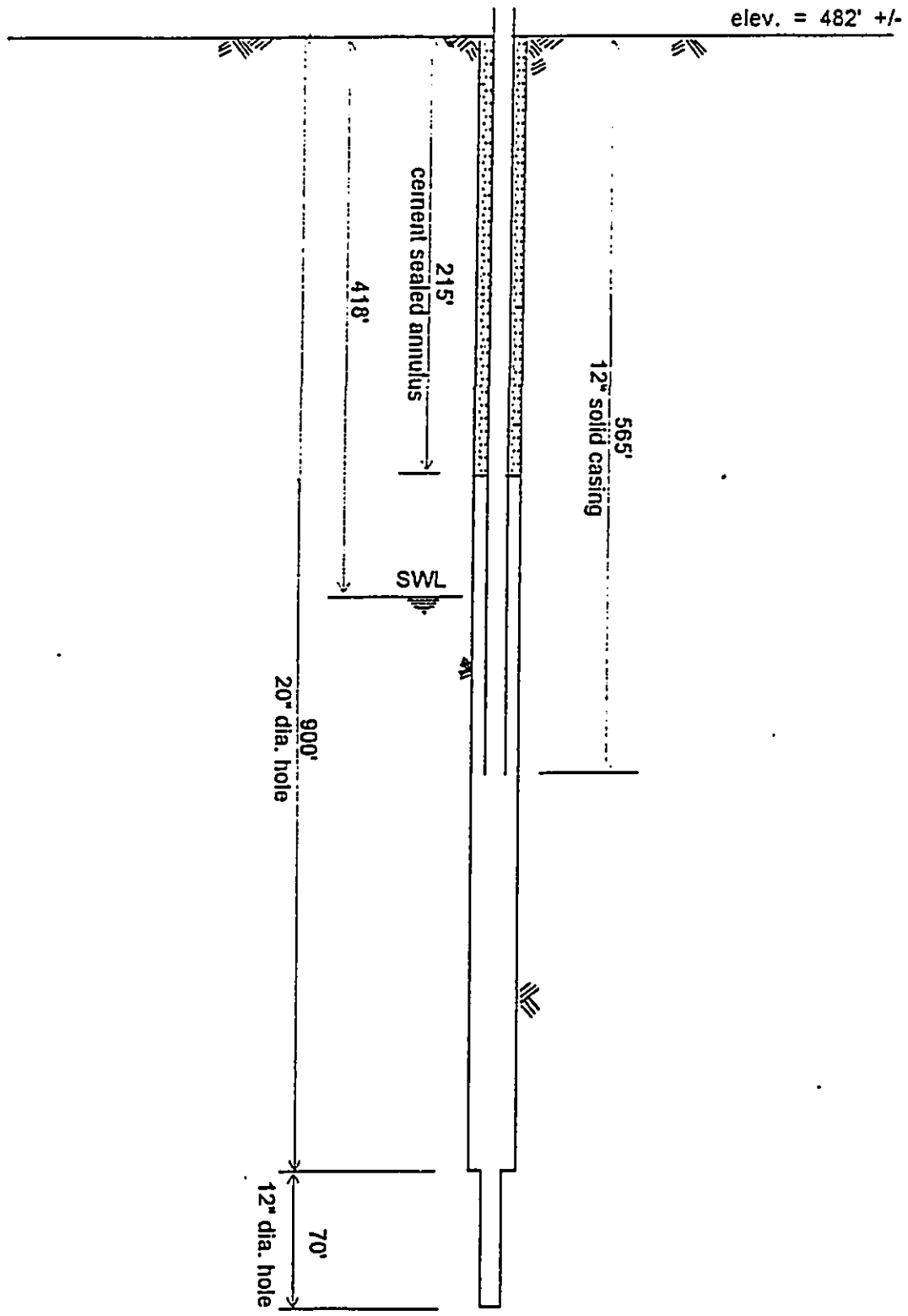


SITE PLAN
scale: 1" = 20'

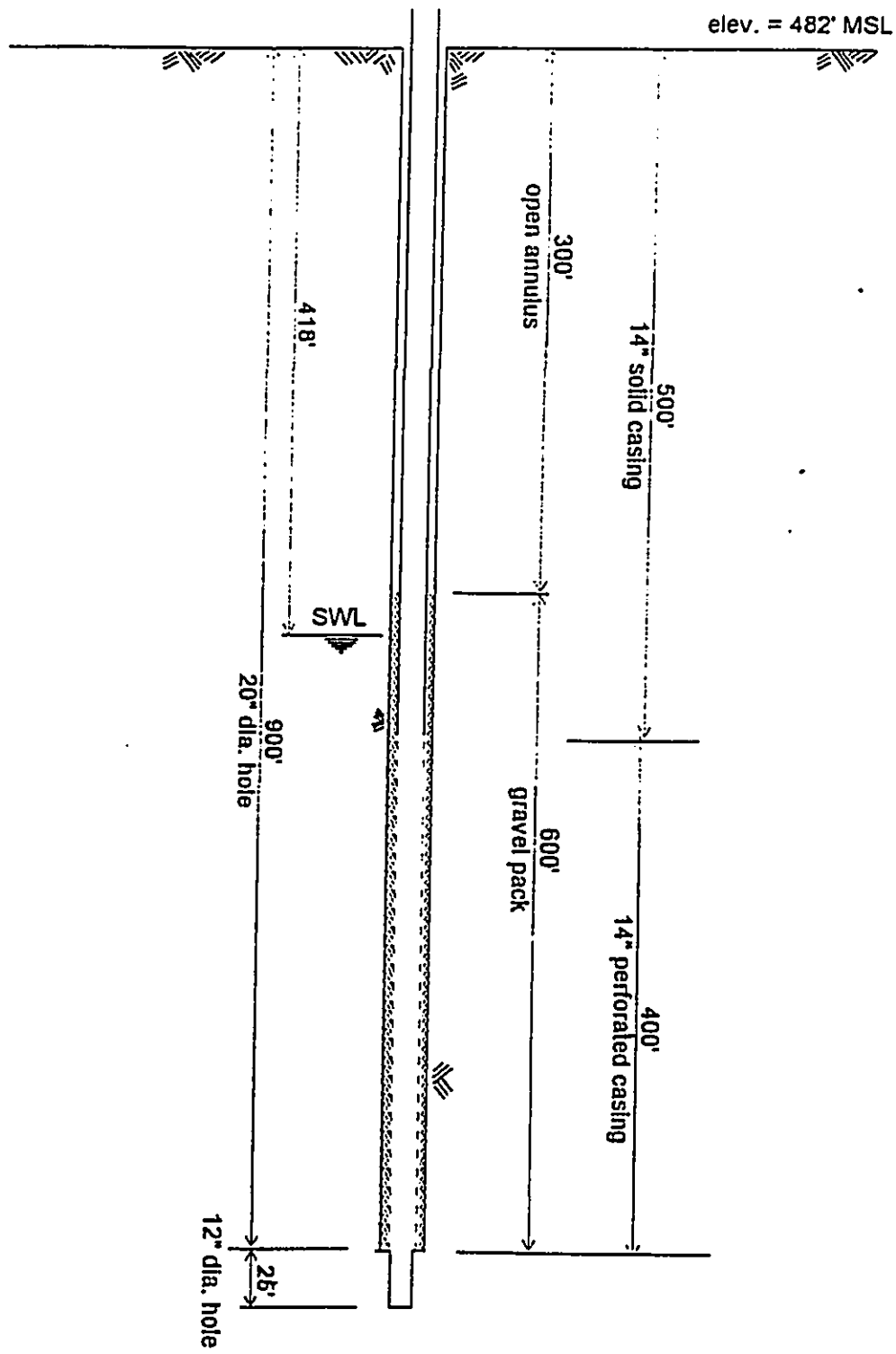
Attachment No. 1

Attachment No. 2

Puhi Well No. 5A (Pump Well)
State Well No. 5824-08

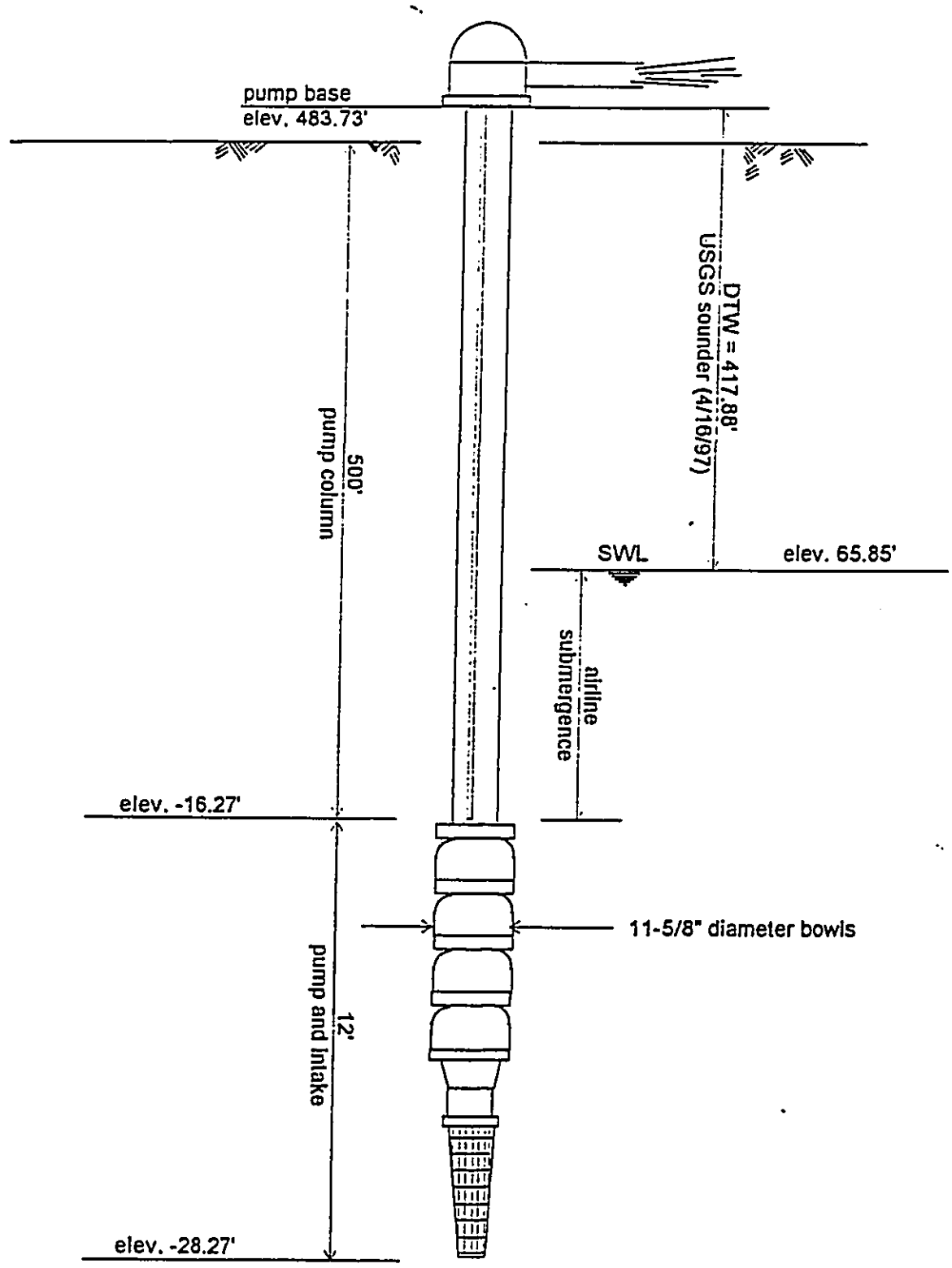


Puhi Well No. 5B - (Observation Well)
State Well No. 5824-09

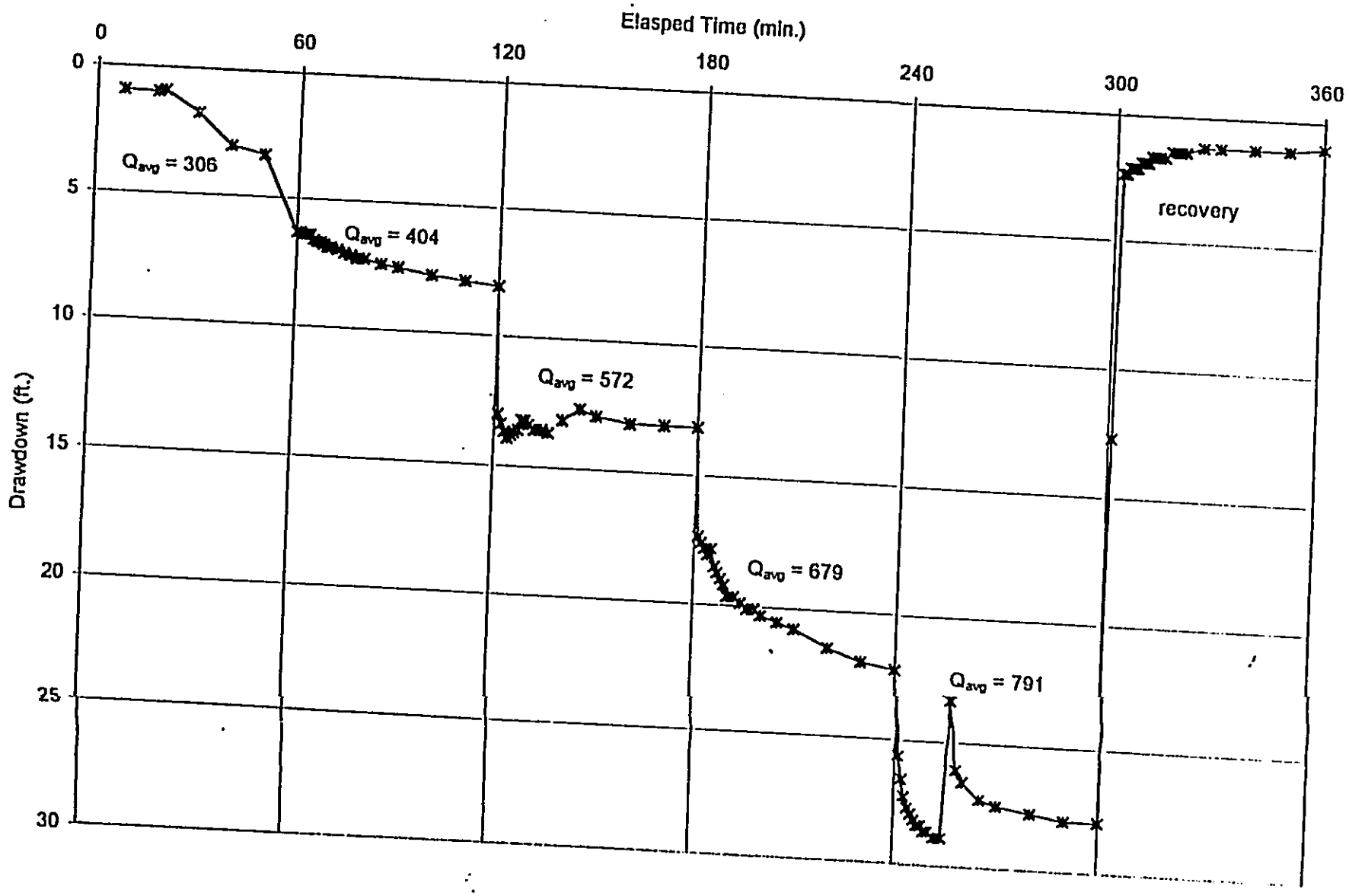


Attachment No. 3

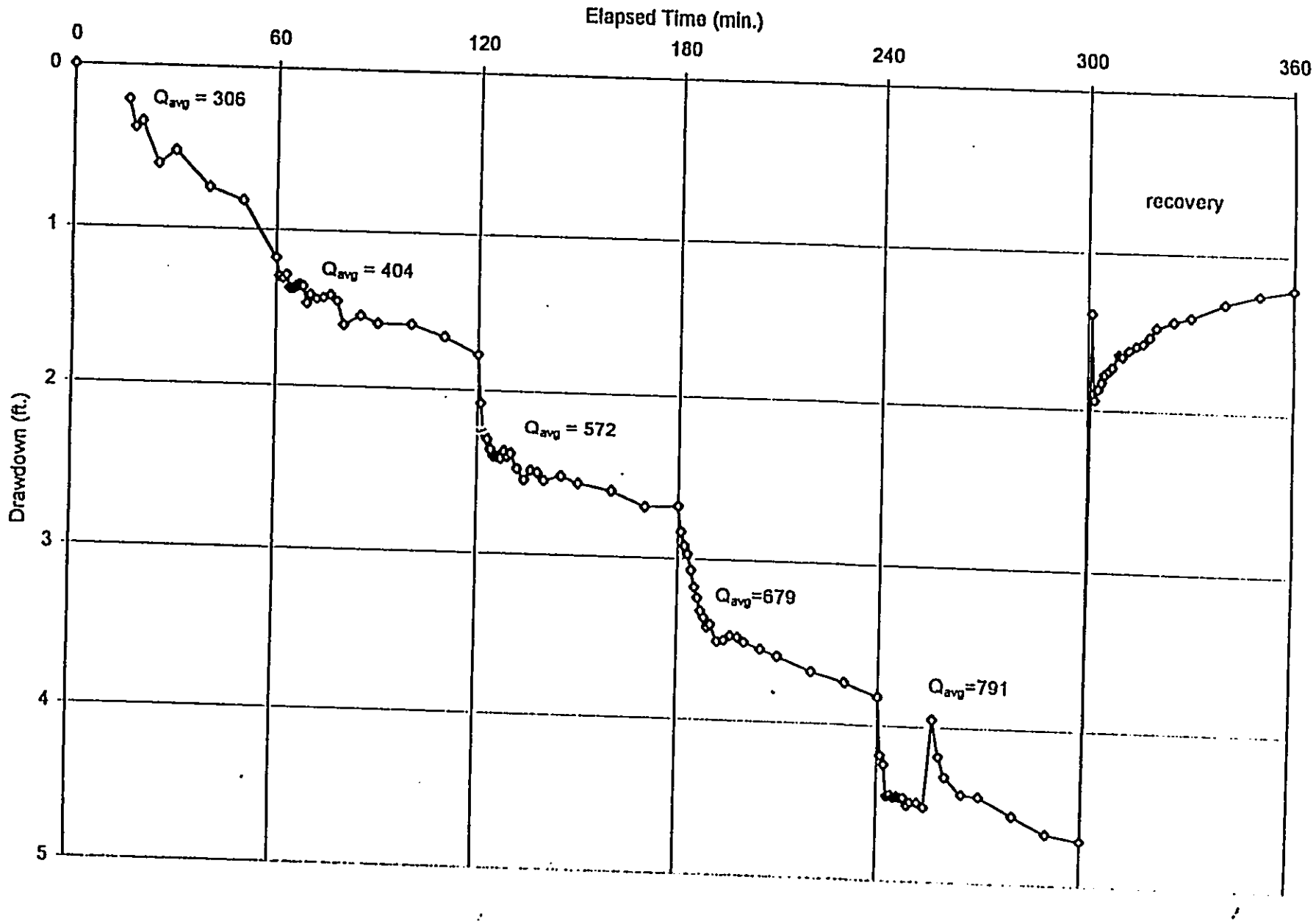
Test Pump Setting - Puhi Well No. 5A



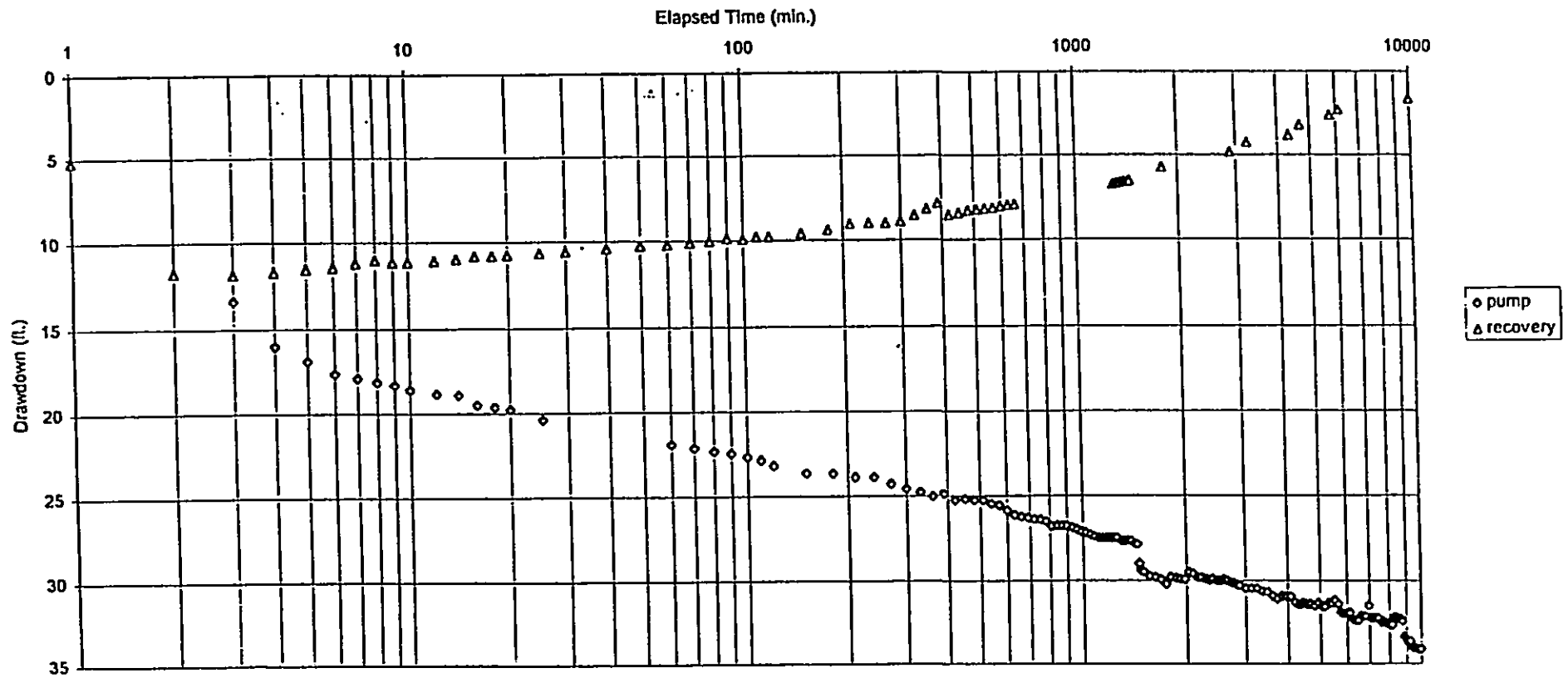
Step-Drawdown Pump Test, Puhi Well No. 5A
Test Date 4/16/97



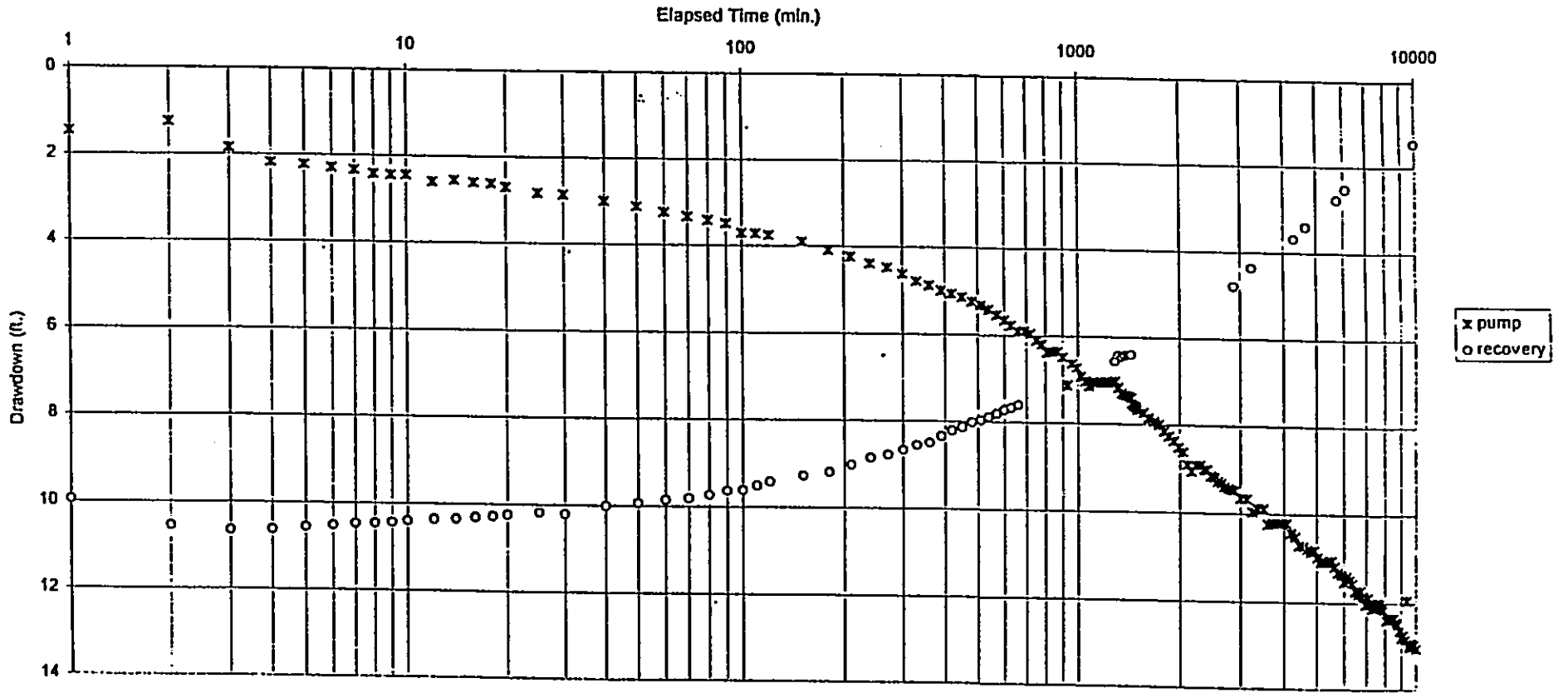
Step-Drawdown Pump Test, Observation Well
Test Date 4/16/97



PUHI WELL NO. 5A
Sustained Rate Test, Q = 700 gpm



OBSERVATION WELL
Sustained Rate Test, Q = 700 gpm



Attachment No. 6

PUHI WELL NO. 5A
SUSTAINED RATE PUMP TEST

CLORIDES

Sample Number	Date	Time	Results
1	4-21-97	0940	1.2 x 20 = 24 ppm
2	4-21-97	2000	1.2 x 20 = 24 ppm
3	4-22-97	0800	1.2 x 20 = 24 ppm
4	4-22-97	2000	1.2 x 20 = 24 ppm
5	4-23-97	0800	1.25 x 20 = 25 ppm
6	4-23-97	2000	1.1 x 20 = 22 ppm
7	4-24-97	0800	1.2 x 20 = 24 ppm
8	4-24-97	2000	1.2 x 20 = 24 ppm
9	4-25-97	0830	1.15 x 20 = 23ppm
10	4-25-97	2000	1.2 x 20 = 24 ppm
11	4-26-97	0800	1.15 x 20 = 23 ppm
12	4-26-97	2000	1.2 x 20 = 24 ppm
13	4-27-97	0800	1.1 x 20 = 22 ppm
14	4-27-97	2000	1.2 x 20 = 24 ppm
15	4-28-97	0800	1.2 x 20 = 24 ppm

APPENDIX B

PUHI WELL 5B

WELL COMPLETION REPORT

AND

REPORT OF PUMP TESTS

State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

97 JUL 17 P1:30

WELL COMPLETION REPORT

3/20/96 WCR Form

(Check Appropriate Box) XX Well Construction ☐ (Permanent) Pump Installation

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

1. State Well No.: 5824-09 Well Name: PUHI WELL No. 5B Island: KAUAI
2. Location/Address: BEHIND KAUAI COMMUNITY COLLEGE Tax Map Key: 3-4-05:10 & POR. 3

PART I. WELL CONSTRUCTION REPORT

3. Drilling Company: ROSCOE MOSS HAWAII, INC.
4. Name of driller who performed work: JOHN CARROLL
5. Type of rig/construction: AIR ROTARY
6. Date(s) Well Construction and pump tests (if any) completed: CONSTRUCTION IS NOT COMPLETE
7. GROUND ELEVATION (referenced to mean sea level, msl): 482.63 ft.
   Well Bench Mark (description/location): MARK ON CONCRETE HEADWALL OF DRAIN Elevation(msl): 488.93 ft.
8. DRILLER'S LOG: *Please attach geologic log (if available or if required by permit)*

Depths (ft.)	Rock Description, Water Level, Dates, etc.	Depths (ft.)	Rock Description, Water Level, Dates, etc.
____ to ____	ATTACHED	____ to ____	
____ to ____		____ to ____	

(If more space is needed, continue on back.)

9. Total depth of well below ground: 925 ft.
10. Hole size:
    24 inch dia. from 0 ft. to 83 ft. below ground
    20 inch dia. from 83 ft. to 900 ft. below ground
    12 inch dia. from 900 ft. to 925 ft. below ground
11. Casing installed: 14 in. I.D. x .312 in. wall solid section to 500 ft. below ground
    14 in. I.D. x .312 in. wall perforated section to 900 ft. below ground
    Casing Material/Slot Size: FULL FLOW
12. Annulus: Grouted from N/A ft. below ground to ____ ft. below ground
    Gravel packed from 900 ft. below ground to 300 ft. below ground
13. Initial water level: 414.75 ft. below ground. Date and time of measurement: 2-26-96
14. Initial chloride: ____ ppm Date and time of sampling: ____
15. Initial temperature: ____ °F Date and time of measurement: ____
16. PUMPING TESTS: Reference Point (R.P.) used: PUMP BASE, which elevation is 483.25 ft.
    (1) Step-Drawdown Test Date 3/6/96
    Start water level 417.15 ft. below R.P.
    End water level 431.53 ft. below R.P.
    (2) Long-term Aquifer Test Date 3/12/96
    Start water level 417.15 ft. below R.P.
    End water level 440.14 ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs *(1/9/96 LTAT Form)* attached? X Yes ___ No
18. As-built drawings attached attached? XX Yes ___ No
19. Other remarks/comments: *(On back of this form)*

Well Drilling Contractor (print) ROSCOE MOSS HAWAII, INC. C-57 Lic. No. C-16437
Signature [signature] Date 7/1/97

Surveyor (print) ____ Lic. No. ____
Signature ____ Date ____

Applicant (print) Ernest Y. W. Lau, Manager & Chief Eng.
Signature [signature] Date 7/21/97

Roscoe
Moss
Hawaii, Inc.

Making Water Work for Hawaii Since 1965

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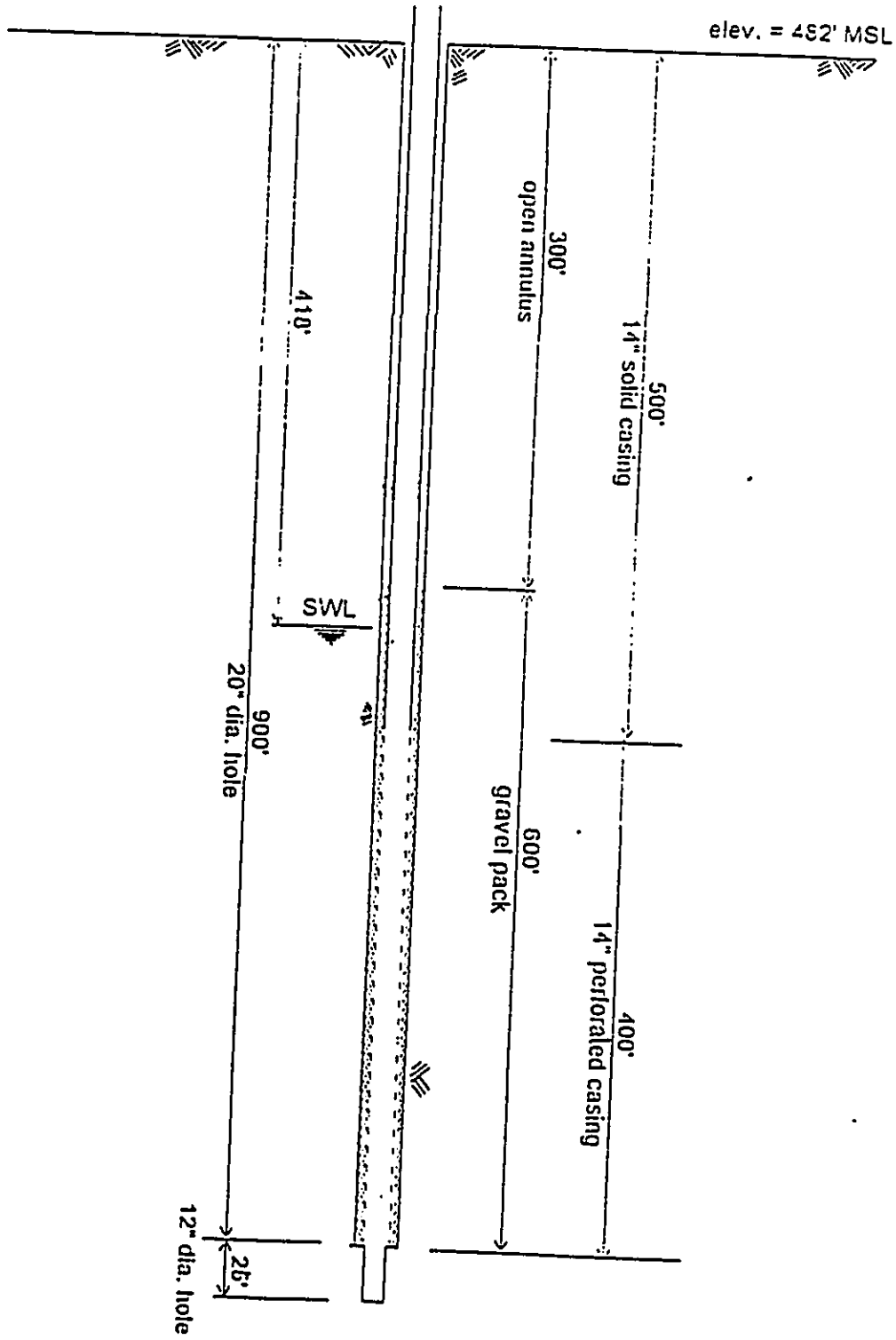
PUHI WELL NO. 5B ELEVATION 482 MSL

DATE	FOOTAGE	DRILLING LOG	W.L.
	0-60	SURFACE FORMATIONS VARIOUS TYPES RED BROWN SOFT CLAY	345'2"
	60-80	MUD ROCK DECOMPOSED MATERIAL	
	80-84	FRACTURE PAHOEHOE	
	84-87	PAHOEHOE BROWN GRAY	
	87-92	BROWN GRAY PAHOEHOE MED HARD	344'7"
	92-99	BROWN GREY PAHOEHOE HARD	
11/21/95	99-107	BROWN GREY BASALT MED HARD	
	107-118	BROWN GREY PAHOEHOE MED HARD	98'4"
	118-129	BROWN GREY BASALT HARD	
	129-152	BROWN GREY PAHOEHOE MED HARD	
11/22/95	152-213	BLUE BASALT TRACE GREY VERY HARD	
12/13/95	213-238	BLUE BASALT VERY HARD	102'3"
	238-241	BLUE BASALT TRACE GREY MED HARD	107'2"
	241-255	BLUE BASALT VERY HARD	
	255-262	BLUE BASALT W/TRACE RED MED HARD	103'1"
	262-274	BLUE BASALT TRACE GREY HARD	
	274-281	BROWN PAHOEHOE TRACE RED MED HARD	
	281-292	BLUE ROCK TRACE GREY HARD	
	292-309	BLUE BRN PAHOEHOE TRACE RED MED HD	
12/16/95	309-351	BROWN PAHOEHOE TRACE RED MED HARD	105'11"
	351-355	BLUE AA CLINKERS LOOSE FORMATION	
12/17/95	355-390	BLUE BRN PAHOEHOE TRACE RED MED HD	108'1"
	390-437	BLUE BASALT TRACE BROWN MED HARD	
	437-459	BLUE BASALT VERY HARD	
	459-461	BLUE AA CLINKERS H2O BEARING LOOSE	110'5"
	461-472	BLUE BASALT VERY HARD	
12/20/95	472-497	BLUE BASALT VERY HARD	
	485	WATER IN FRACTURES	
12/21/95	497-509	BLUE BASALT VERY HARD	119'11"
	509-516	BLUE AA CLINKERS LOOSE	131'7"
	516-524	BLUE ROCK TRACE BROWN VERY HARD	
	524-539	BLUE ROCK TRACE BROWN MEDIUM HARD	
	539-541	BLUE BASALT HARD	
12/22/95	541-545	BLUE BASALT TRACE BROWN HARD	DROP 509'
	545-552	BLUE BRN PAHOEHOE TRACE RED CINDER	344'2"
		INDICATION WATER AT 545'	

Roscoe
Moss
Hawaii, Inc.
Making Water Work for Hawaii Since 1965
91-259A Olai Street, Kapolei, Hawaii 96707 • Phone (808) 682-5856/682-5554 • Fax (808) 682-5866

	552-630	BLUE BASALT SOME FRACTURE AREA HD	
12/26/95		INDICATION WATER AT 612'	
12/27/95	630-636	BLUE ROCK CLINKERS	369'8"
		INDICATION WATER 630'	
	636-664	BLUE BASALT W/OLIVINE HARD	371'11"
12/28/95	664-708	BLUE BASALT W/OLIVINE HARD	413'9"
	708-717	BLUE BASALT TRACE BRN & WHITE HARD	414'1"
	717-726	BLUE BASALT TRACE DECOMP. OLIVINE HD	
1/02/96	726-757	BLUE BASALT TRACE OLIVINE HARD	413'3"
	757-768	BLUE BASALT VERY HARD	
1/04/96	768-783	BLUE BASALT TRACE BROWN MED HARD	413'4"
		INDICATION WATER 768'	
1/05/96	783-793	BLUE BASALT TRACE BROWN MED HARD	413'5"
1/06/96	793-821	BLUE BASALT W/OLIVINE VERY HARD	413'11"
1/09/96	821-826	BLUE BASALT TRACE BRN & OLIVINE	
	826-847	BLUE BASALT W/OLIVINE HARD	417'8"
1/10/96	847-864	AA CLINKERS HARD & SOFT	414'7"
1/11/96	864-903	BLUE BASALT W/OLIVINE VERY HARD	414'8"
	903-918	BLUE PAHOEHOE MED HARD	
	918-925	BLUE PAHOEHOE MED HARD	

Puhi Well No. 5B - (Observation Well)
State Well No. 5824-09

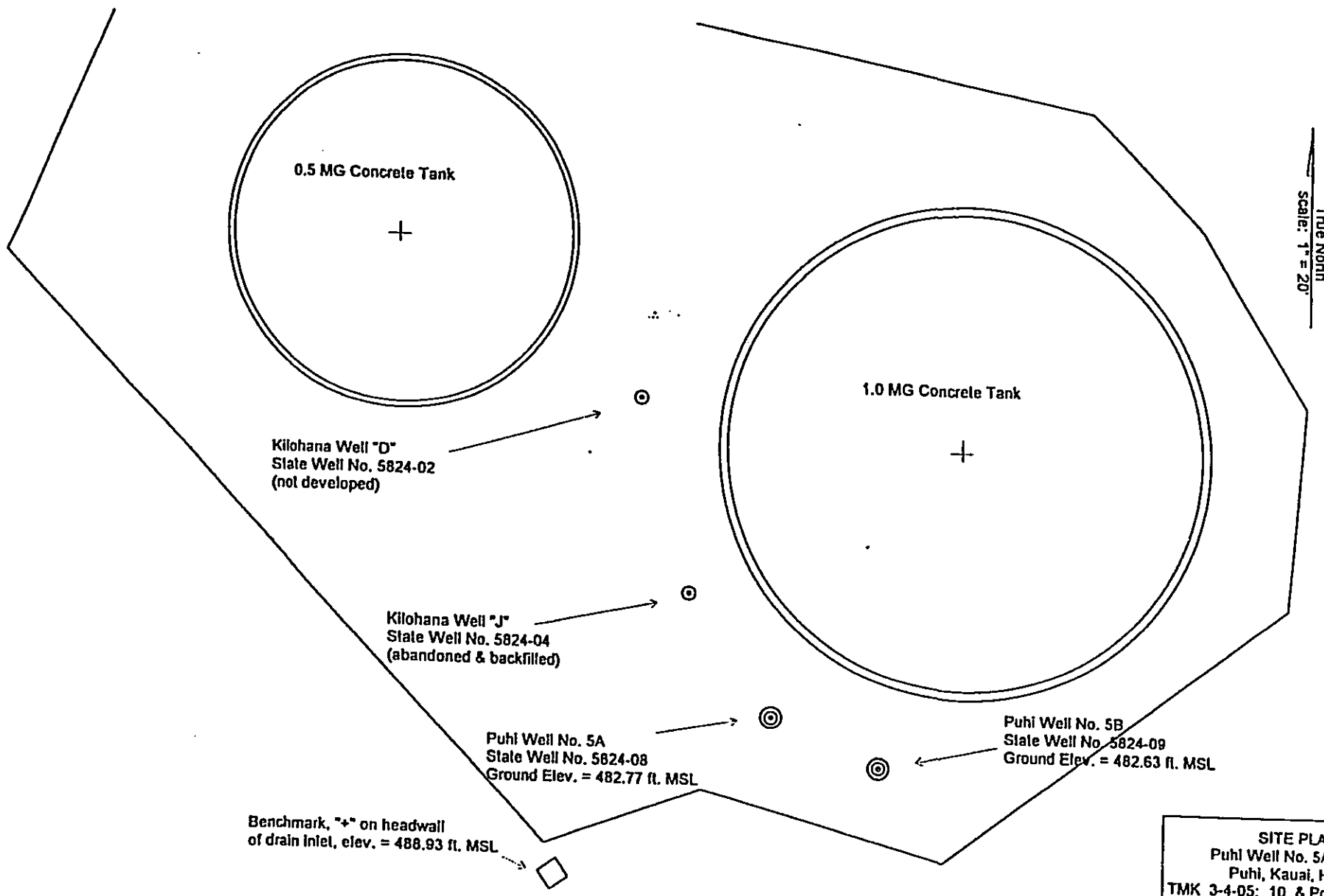


Report of Pump Tests

Puhi Well No. 5B,
State Well No. 5824-09

County of Kauai, Department of Water

April 1996

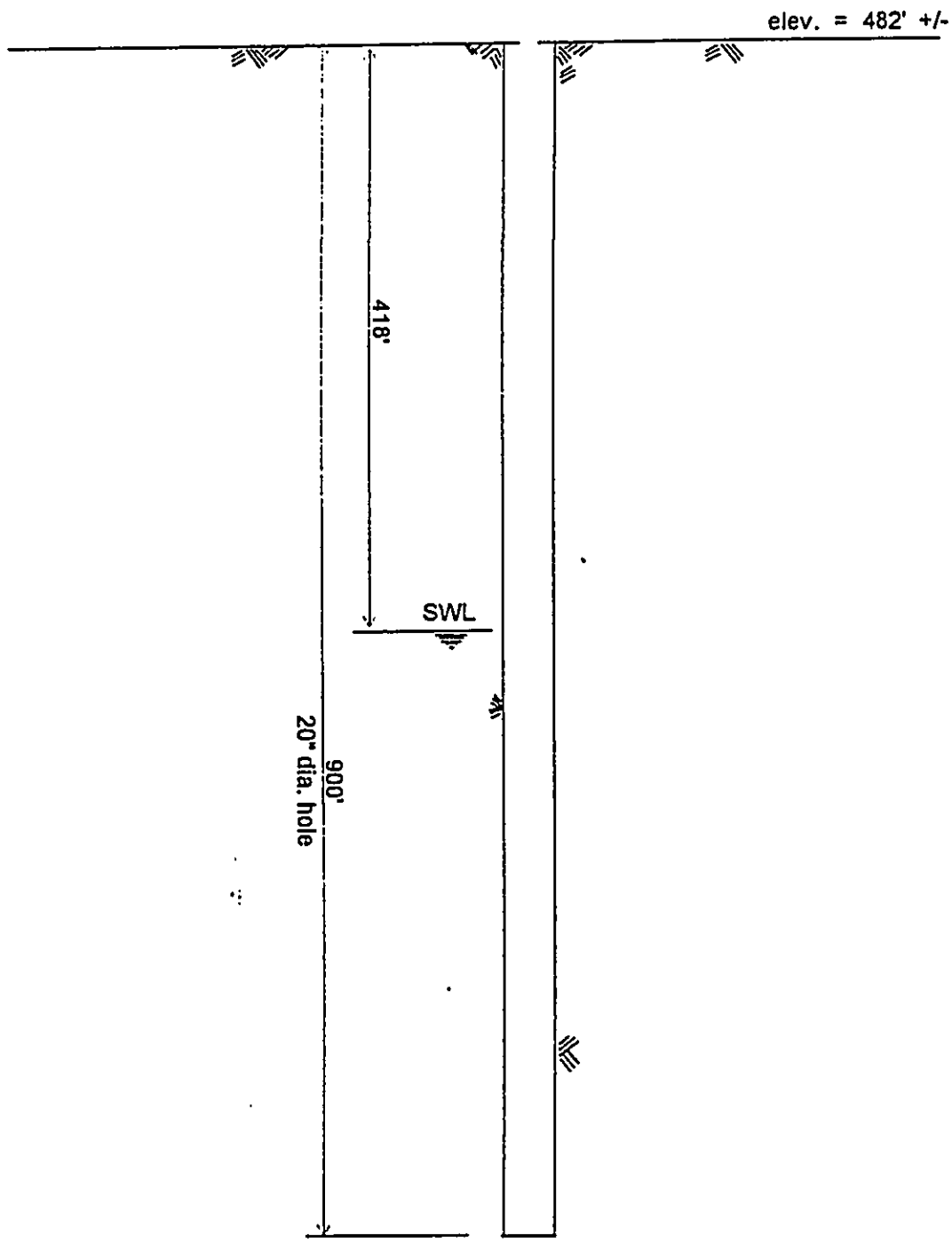


SITE PLAN
Puhi Well No. 5A and 5B
Puhi, Kauai, Hawaii
TMK 3-4-05: 10 & Por. 3 (4th DIV.)

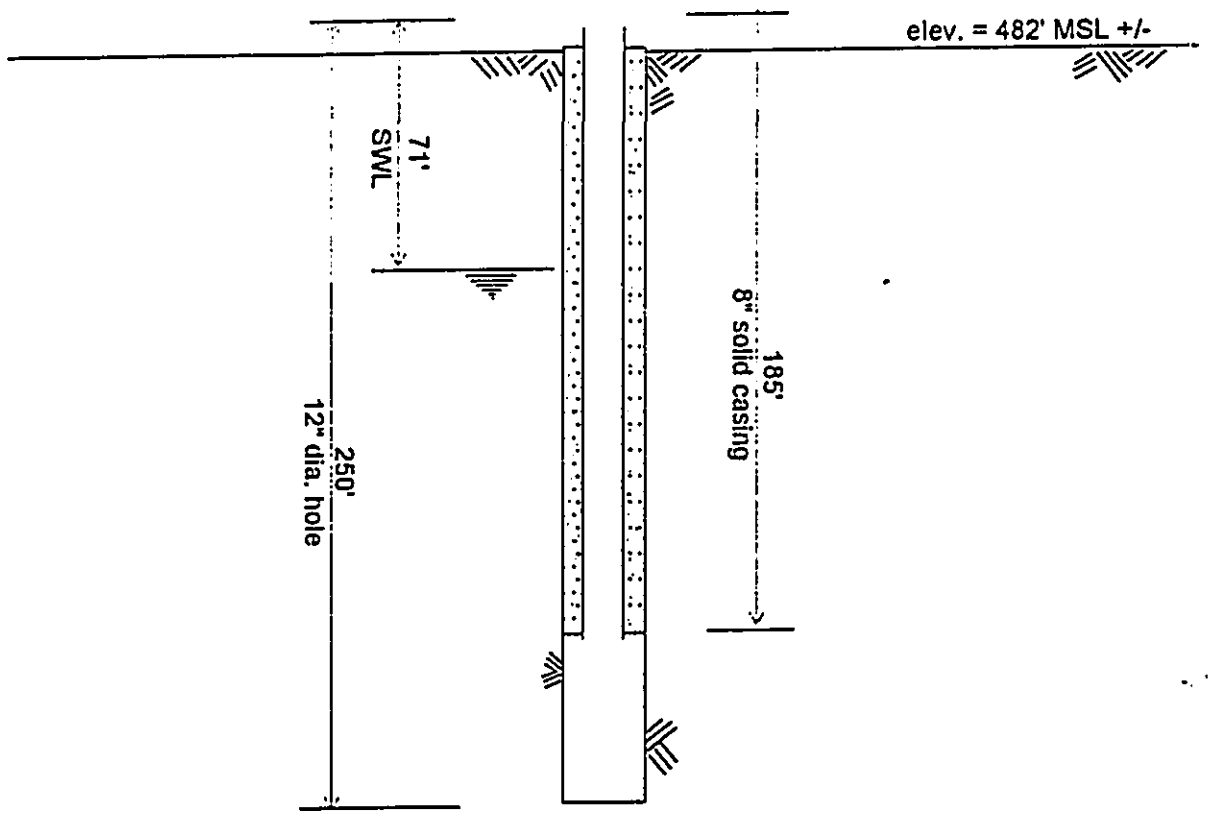
1996

Puhi Well No. 5A (Observation Well)
State Well No. 5824-08

Open Hole



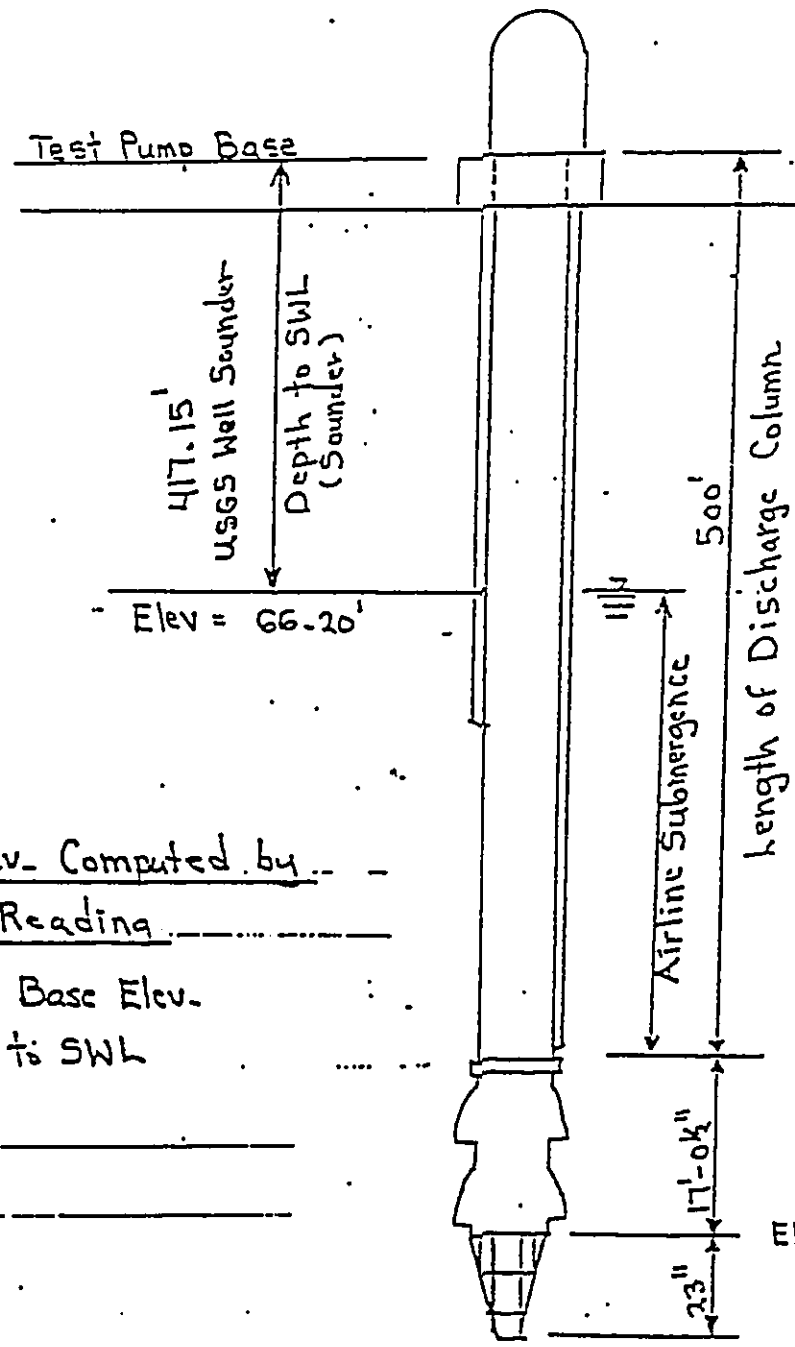
Kilohana Well "D"



well is not developed

Puhi Well No. 5 — Attachment No. 3

Step-Drawdown Test — March 6, 1996



SWL Elev. Computed by Airline Method

Bott. of Airline Elev.

+ Airline Submergence ____

NOTE: Airline not operable because of air leak.

SWL Elev. Computed by

Sounder Reading ____

Test Pump Base Elev.

Depth to SWL ____

____

____

Drill & Test Puhi Well No. 5B

Test Pump Setting

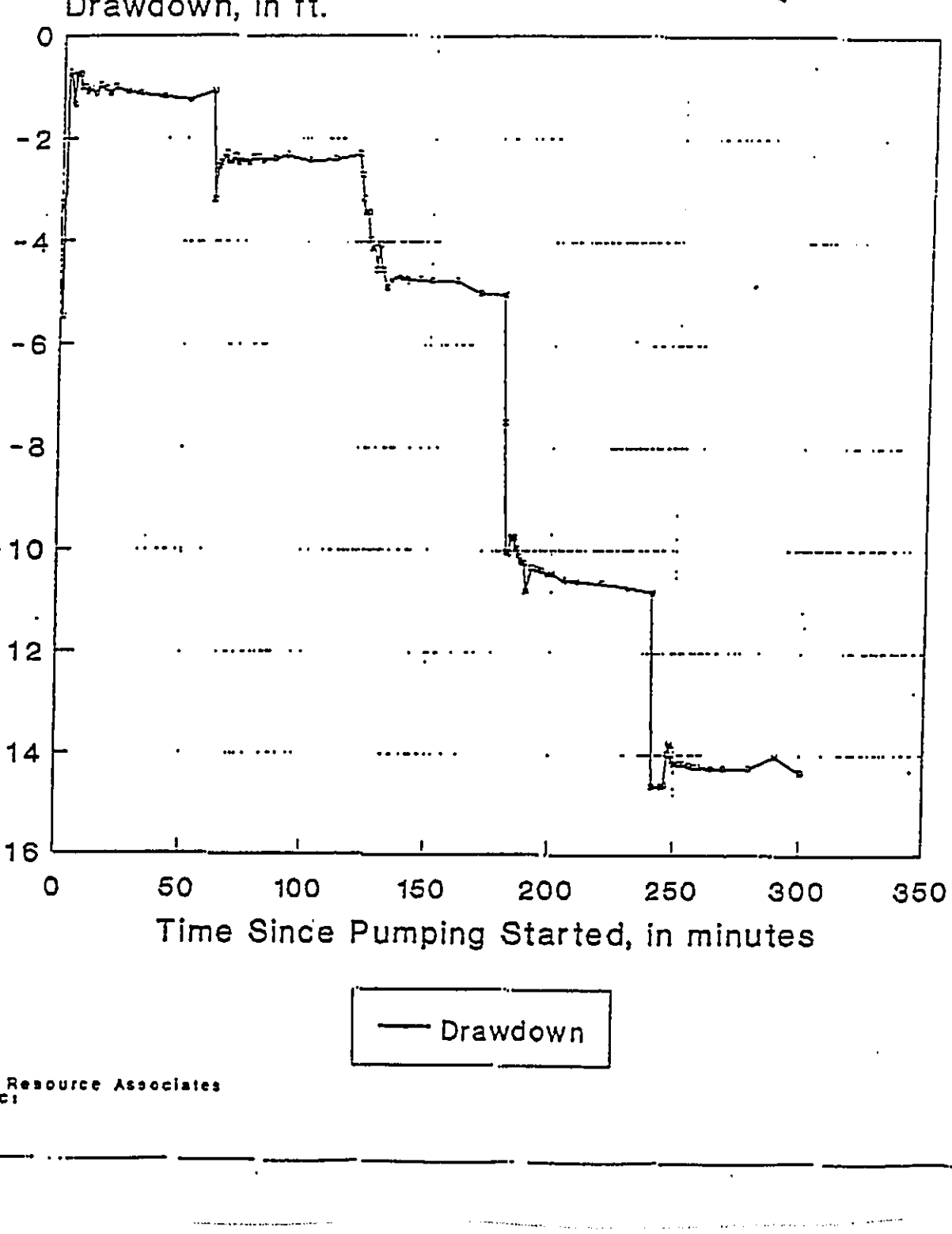
Well 5B

STEP DRAWDOWN CURVE

Puhi Well 5 (redrill) (5824-09), Kauai

Date of Test: March 6, 1996

~~PRELIMINARY~~ FINAL



Water Resource Associates
087SDC1

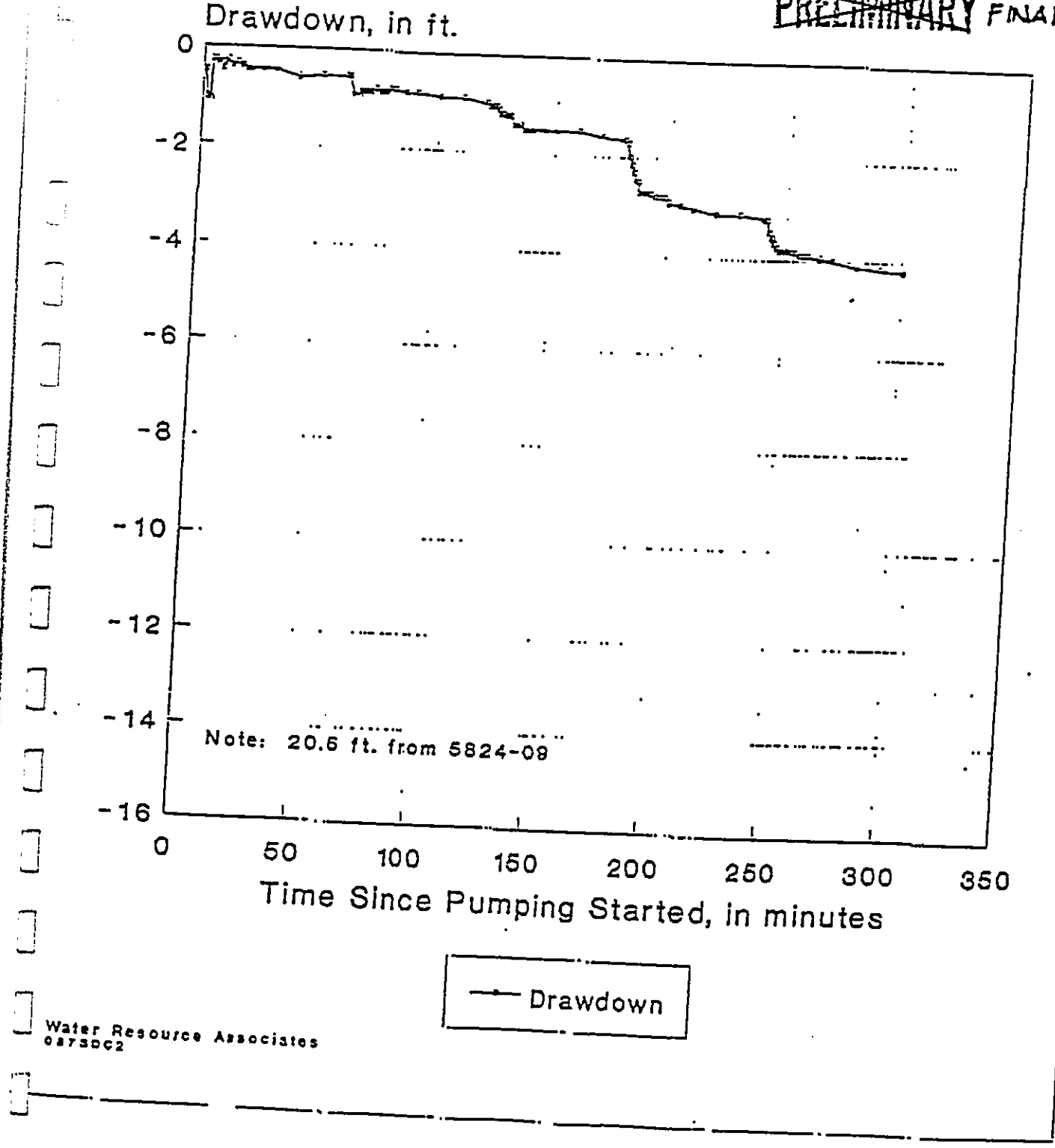
Well 5A

STEP DRAWDOWN CURVE

Puhi Monitor Well (5824-08), Kauai

Date of Test: March 6, 1996

~~PRELIMINARY~~ FINAL



Water Resource Associates
087SDC2

Attachment No. 4

DRILL & TEST PUHI WELL NO. 5
PUHI, KAUAI, HAWAII

Job No. 93-5

PUMPING TEST NO. 1
LONG TERM TEST - ANNULAR SPACE UNFILLED

March 12 to March 22, 1996

NEW WELL

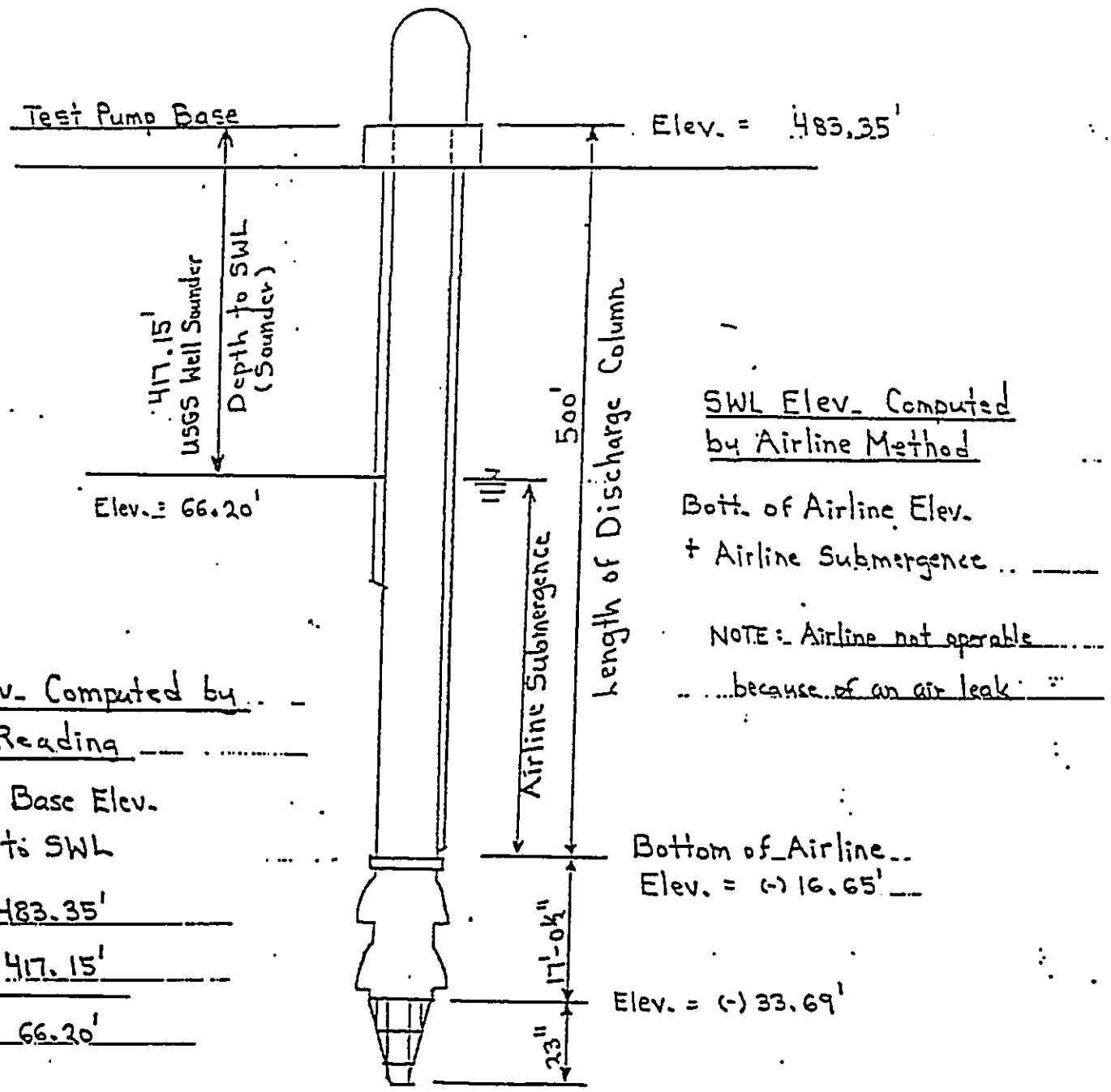
Well 5B

(5824-09)

March 12, 1996

Puhi Well No. 5 (Well 5B)

Test No. 1 - Long Term Test, Annular Space Unfilled



SWL Elev. Computed by Airline Method

Bott. of Airline Elev.
+ Airline Submergence .. ____

NOTE :- Airline not operable
.....because of an air leak

SWL Elev. Computed by
under Reading ____

Test Pump Base Elev.
- Depth to SWL

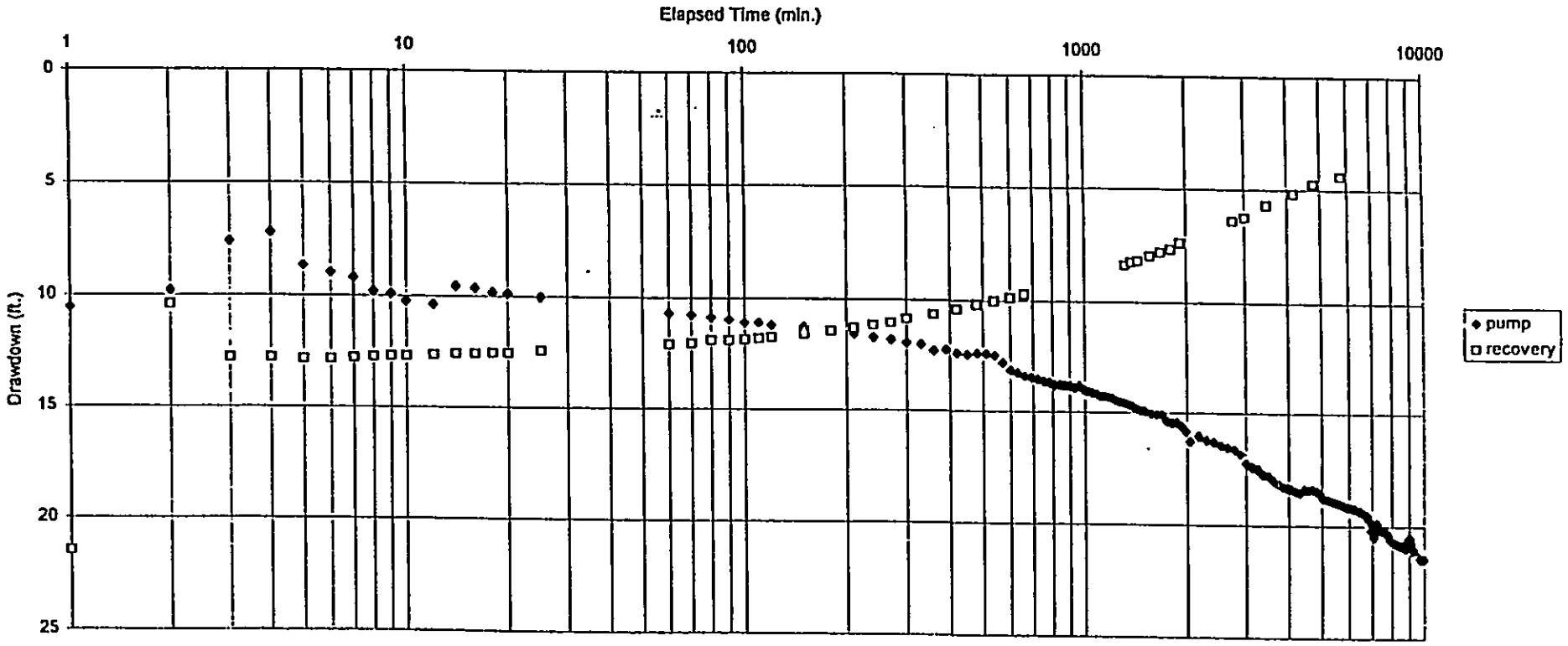
483.35'
- 417.15'
66.20'

1 & Test Puhi Well No. 5 (Well 5B)

t Pump Setting

1996

Puhi Well No. 5B
Sustained Rate Test, Q = 700 gpm



DRILL & TEST PUHI WELL NO. 5
PUHI, KAUAI, HAWAII

Job No. 93-5

PUMPING TEST NO. 1
LONG TERM TEST - ANNULAR SPACE UNFILLED

March 12 to March 22, 1996

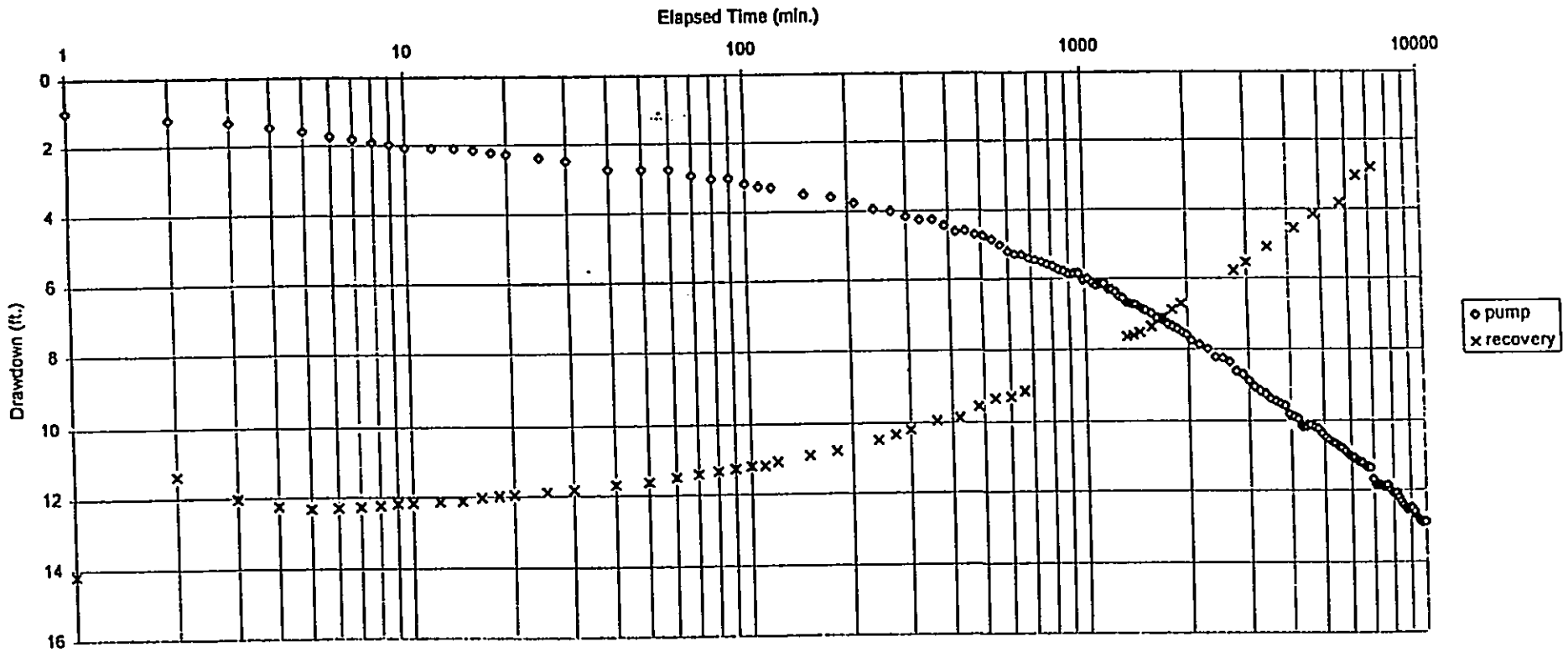
MONITOR WELL

Well 5A

(5824-08)

1996

Puhi Well No. 5A (Observation Well)
Sustained Rate Test, Q = 700 gpm



DRILL & TEST PUHI WELL NO. 5
PUHI, KAUAI, HAWAII

Job No. 93-5

PUMPING TEST NO. 1
LONG TERM TEST - ANNULAR SPACE UNFILLED

March 12 to March 22, 1996

EXISTING 8-INCH WELL

(KILOHANA WELL "D")

PUMPING TEST RECORD

Test No. 1
March 12, 1996

Well Name Existing 8" Well (High Level Water) State Well No. _____
Project Kilohana Well "D" Island Kauai

DEPTH (Below Ground Surface):
Solid Csg: 180' Perforated Csg: None
Total Depth: 250'
Depth to Water: 90.75' (Referenced to Top of Casing)
*Remarks: USGS Well Sounder

ELEVATIONS (Mean Sea Level):
Ground Surface: 482.38 ft.
Top of ~~Casing~~ Casing: 485.66 ft. Rotary Table: _____ ft.
Bot. of Solid Csg: 300.66' Bot. of Perf. Csg: N/A
Bot. of Well: 235.66' Static Water Level: 394.91'

TEST PUMP:
Type: N/A Intake Elev: N/A

DRAWDOWN MEASUREMENT:
☐ Manometer ☐ Pressure Gage ☑ Elect. Probe

DISCHARGE MEASUREMENT: ☐ Flowmeter ☐ Other _____

Elapsed Time (min.)	Date & Time	Pumping Rate (gpm)	☐ Airline ☑ DTW Reading	Observed Drawdown (feet)	Adjusted Drawdown (feet)	Sample No.	Chlorides (ppm)	Temp. (°F)	Cond. (mmhos 25°C)
	3-12-96								
0	0800		90.57	0	Roscoe Moss Well Sounder				
23	0823		90.58	0.01	NOTE: The Existing 8" Well is				
33	0833		90.58	0.01	located 75.5 ft. away from the				
53	0853		90.58	0.01	New Well.				
63	0903		90.59	0.02					
83	0923		90.60	0.03					
103	0943		90.59	0.02					
133	1013		90.58	0.01					
183	1103		90.57	0					
213	1133		90.53	(-) 0.04					
243	1203		90.57	0					
273	1233		90.58	0.01					
333	1333		90.55	(-) 0.02					
423	1503		90.56	(-) 0.01					
513	1633		90.57	0					
603	1803		90.57	0					
	3-13-96								
1380	0700		90.57	0					
1410	0730		90.57	0					
1440	0800		90.57	0					
1500	0900		90.57	0					

umping Test Record (Cont'd)

Well Name: Existing 8" Well Kilohana Well "D" State Well No. _____ Test No. 1

Elapsed Time (min.)	Date & Time	Pumping Rate (gpm)	☐ Airline ☑ DTW Reading	Observed Drawdown (feet)	Adjusted Drawdown (feet)	Sample No.	Chlorides (ppm)	Temp. (°F)	Cond. (mmhos 25°C)
1860	1500		90.57	0					
2040	1800		90.57	0					
	3-14-96								
2880	0800		90.57	0					
3240	1400		90.57	0					
3360	1600		90.57	0					
	3-15-96								
4320	0800		90.55	(-)0.02					
	3-16-96								
5760	0800		90.55	(-)0.02					
6240	1600		90.55	(-)0.02					
	3-17-96								
7200	0800		90.54	(-)0.03					
7680	1600		90.50	(-)0.07					
	3-18-96								
8520	0600		90.50	(-)0.07					
9120	1600		90.50	(-)0.07					
	3-19-96								
9960	0600		90.58	0.01					
10560	1600		90.58	0.01					
	3-20-96								
11520	0800		90.58	0.01					
	3-21-96								
13080	1000		90.58	0.01					
	3-22-96								
14400	0800		90.58	0.01					
Shut down; End of pump test									

Pumping Test Record (Cont'd)

Well Name: Existing 8" Well State Well No. _____ Test No. 1

Kilohana Well "D"

High Level Water RECOVERY

Elapsed Time (min.)	Date & Time	Pumping Rate (gpm)	☐ Airline ☑ DTW Reading	Observed Drawdown (feet)	Adjusted Drawdown (feet)	Sample No.	Chlorides (ppm)	Temp. (°F)	Cond. (micros @ 25°C)
	3-22-96								
480	1600		90.58	0.01					
	3-24-96								
3510	1830		90.58	0.01					
	3-25-96								
4800	1600		90.43	(-) 0.14					
	3-26-96								
5730	0730		90.44	(-) 0.13					
	3-27-96								
7170	0730		90.74	0.17					

APPENDIX C

WATER RESOURCE ASSOCIATES

REPORT

ON

SUSTAINABLE YIELDS AND DRAWDOWN

Post-it™ Fax Note 7671	Date 8-18-97	# of pages ▸ 7
To Bill E. IV	From DAN LUM	
Co. Dept. 245-5813	Co.	
Phone # Original to be	Phone # 528-0074	
Fax # mailed	Fax # 528-0808	

WATER RESOURCE ASS(

Hydrology • Geology • Engineering

August 18, 1997

(87)

Mr. Ernest Lau
Manager & Chief Engineer
Department of Water
County of Kauai
P.O. Box 1706
Lihue, Kauai 96766-5706

Attention: Mr. Bill Eddy

Ernie

Dear Mr. Lau:

Puhi Wells 5A and 5B, Kauai

We have reviewed all of the data, including tests, driller's logs and cuttings for Puhi Wells 5A and 5B. Particular focus was on the 7-day April-May 1997 test for Puhi Well 5A, pumping at 700 gpm, but the 1996 test data for Puhi 5B, pumping at 700 gpm, was also reviewed.

As you know, wells in the Lihue Basin tap a complex suite of geologic formations, exhibited not only by their geologic logs, but also by multiple hydraulic discontinuities observed in the graphical plots of the test data. Because of this complexity, graphical analyses of the time-drawdown curves is the only way that drawdown at various times and pumping rates can be estimated.

Sustainable Yield

Figures 1 and 2 were used to predict drawdowns in Puhi 5A at pumping rates of 700 gpm and 1000 gpm for periods of pumping ranging from 7 days to 700 days. These results are shown in Table 1 below:

Table 1. Predicted Drawdowns in Puhi Well 5A

Days of Continuous Pumping	Drawdown (ft.) @700 gpm	Drawdown (ft.) @1,000 gpm
7	34	61
70	40	69
700	46	77
7000	52 (+12')	85 (-21')

1188 Bishop Street, Suite 1708 • Honolulu, Hawaii 96813-3302 • (808) 528-0074 • Fax 528-0808

The above table assumes 24 hrs/day pumping and no additional hydraulic discontinuities being encountered after seven days of pumping. Because the drawdown is asymptotic (values of approximately 52 ft. at 700 gpm and 85 ft. at 1,000 gpm, after 7,000 days of pumping), the sustainable yield of the well can be estimated from the projected drawdowns. A pump setting designed to accommodate a maximum drawdown of 52 ft. would provide a sustainable yield of 700 gpm and a pump setting designed to accommodate a maximum drawdown of 85 ft. would provide a sustainable yield of 1,000 gpm.

Puhi Well 5A is cased from ground elevation 482 ft. to a depth of 565 ft. (-83 ft., msl), or 147 ft. below static water level of 64 ft., msl. Open hole (20-inch) extends to a depth of 900 ft.(-418 ft.,msl). Therefore, the well can easily accomodate a pump setting which provides for a maximum drawdown of 85 ft.(-23 ft., msl). The above sustainable yield estimate must, on the otherhand, be tempered by the fact that well required 7 days to recover approximately 96 percent from 7 days of pumping at 700 gpm. This slow recovery suggests, prima facie, that in addition to water withdrawn from aquifer storage, recharge of approximately 350 gpm occurred during the test.

In summary, the test data indicates that aquifer tapped by Puhi Well 5A can sustain a yield of 1,000 gpm, based upon an asymptotic drawdown that reaches 85 ft. after 7,000 days of continuous pumping (in practical terms: sustainable). We recommend the maximum design capacity for Puhi Well 5A's 12-inch diameter casing, or 700 gpm, with the pump set for a maximum drawdown of 85 ft.

Completion of Puhi Well 5B

Current status of Puhi Well 5b is as follows:

Gr. Elev.: 482 ft.
Head: 64 ft., approx.
Solid Casing: 0-500 ft.(-18 ft., msl)
Perforated Casing with gravel packing: 500-900 ft.(-418 ft., msl).
Open Hole: 900-925 ft.(-443 ft., msl)

Step drawdown tests performed before and after gravel packing indicate specific capacity of the well is now 7 gpm/foot of drawdown, down from 86 gpm/foot of drawdown (see Figure 3).

Puhi Well 5B, as currently constructed, has a recommended pump capacity of 400 gpm, based upon the step drawdown test data. Using data from the 10-day test in

March 12-22, 1996 for Puhi Well 5B pumping at 700 gpm (see Figure 4), estimated drawdown in Well 5B pumping at a rate of 400 gpm, is approximately 50 ft. after 7 days, 55 ft. after 70 days, 60 ft. after 700 days, and 65 ft. after 7,000 days. Therefore, installation of a 400 gpm permanent pump, set to accomodate a maximum drawdown of 65 ft.(-1 ft., msl) in Puhi Well 5B can be considered without further pump testing.

If a constant rate test is desired to verify the above estimated drawdown characterisics of the well, a minimum 3-day constant-rate test would be okay.

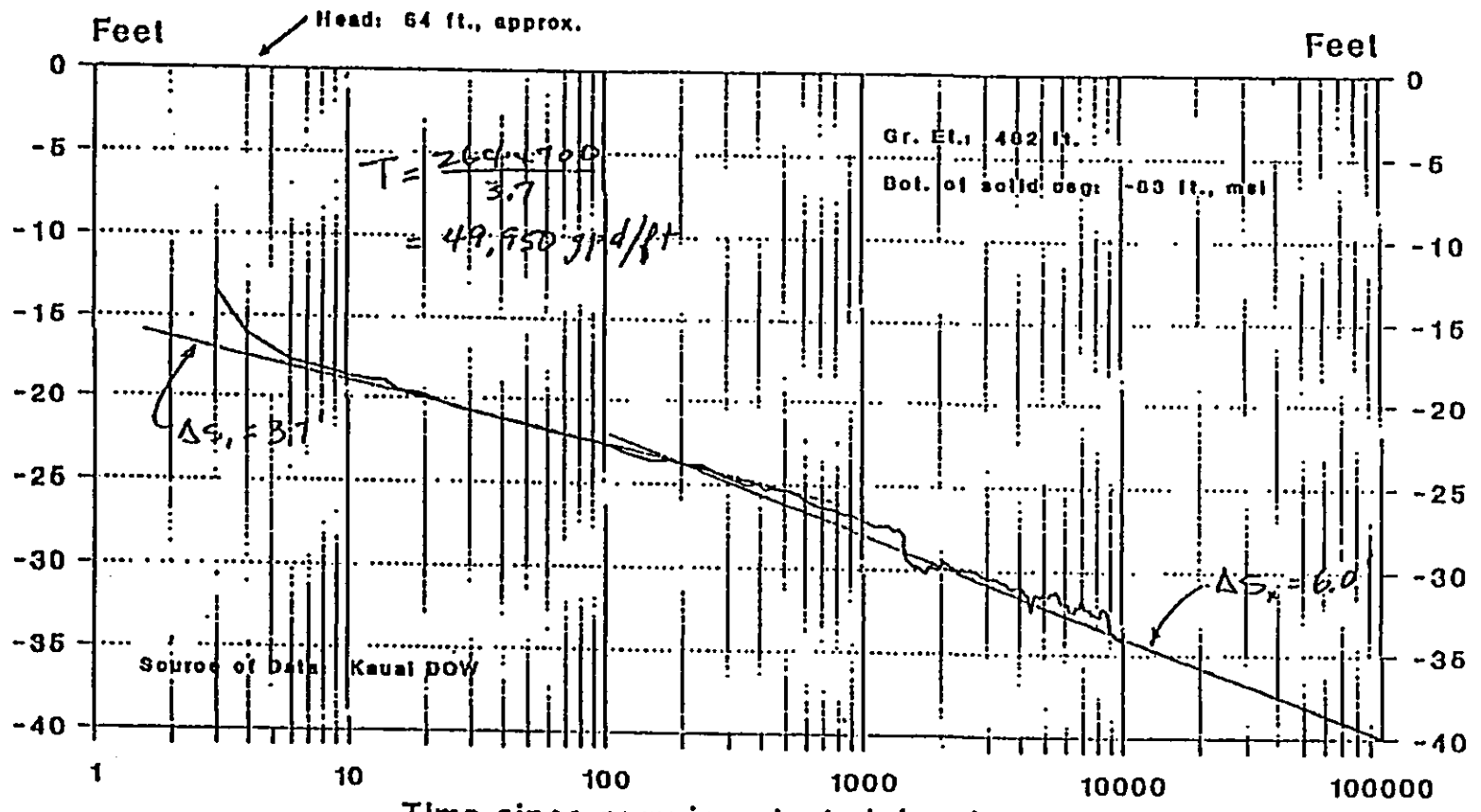
As currently constructed, pumping Puhi Well 5B at a rate of 700 gpm should not be considered, since well efficiency is poor, initial drawdown is estimated at approximately 150 ft.(-86 ft., msl), and cascading water in the dewatered perforated zone might occur.

Please call me if you or your staff have any questions.

Sincerely,

DAN LUM

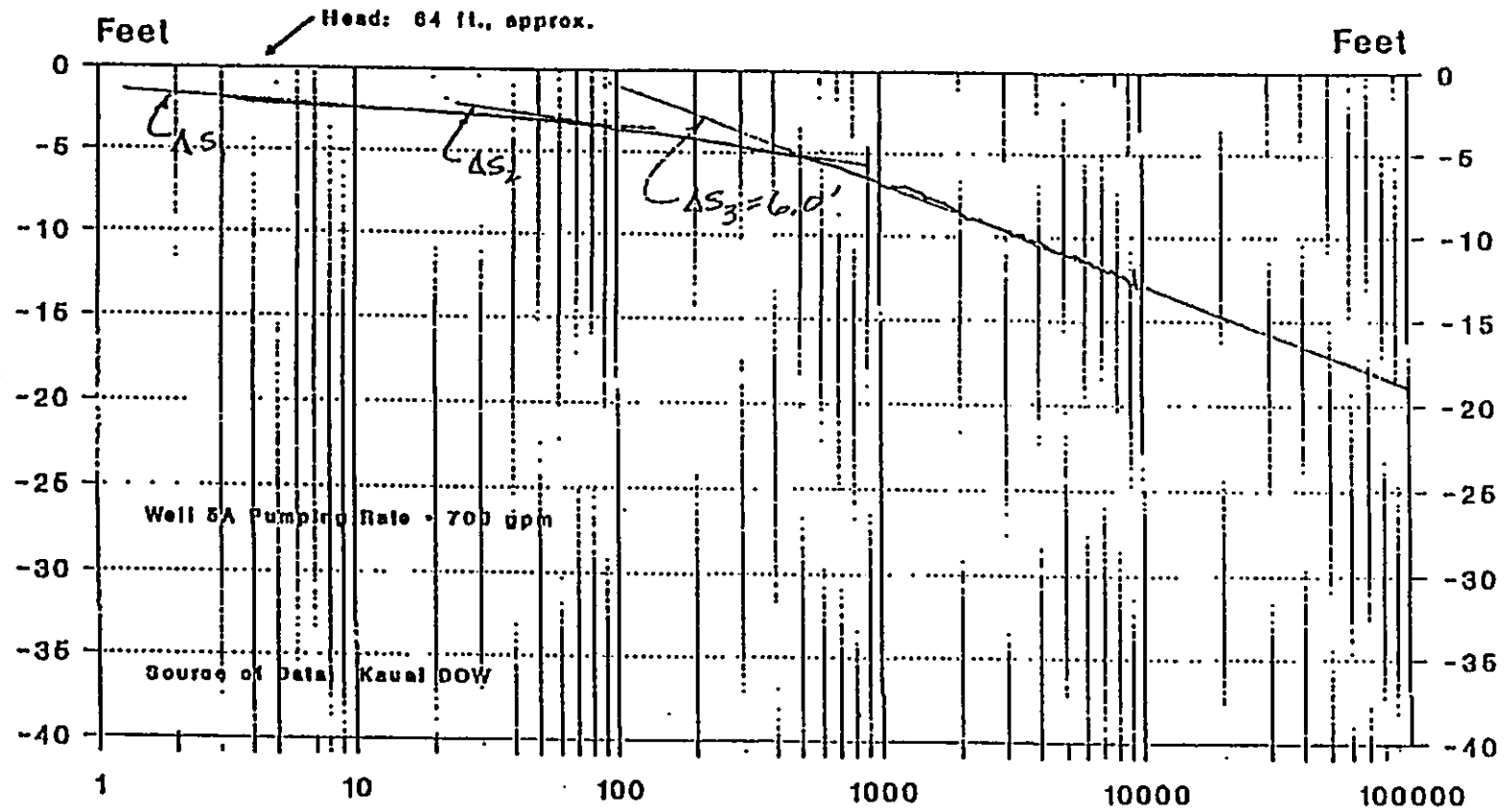
TIME-DRAWDOWN CURVE
Puhi Well No. 5A (Pumping) (5824-08)
Date of Test: April 21-28, 1997



Water Resource Associates
087TDC87AP

Figure 1

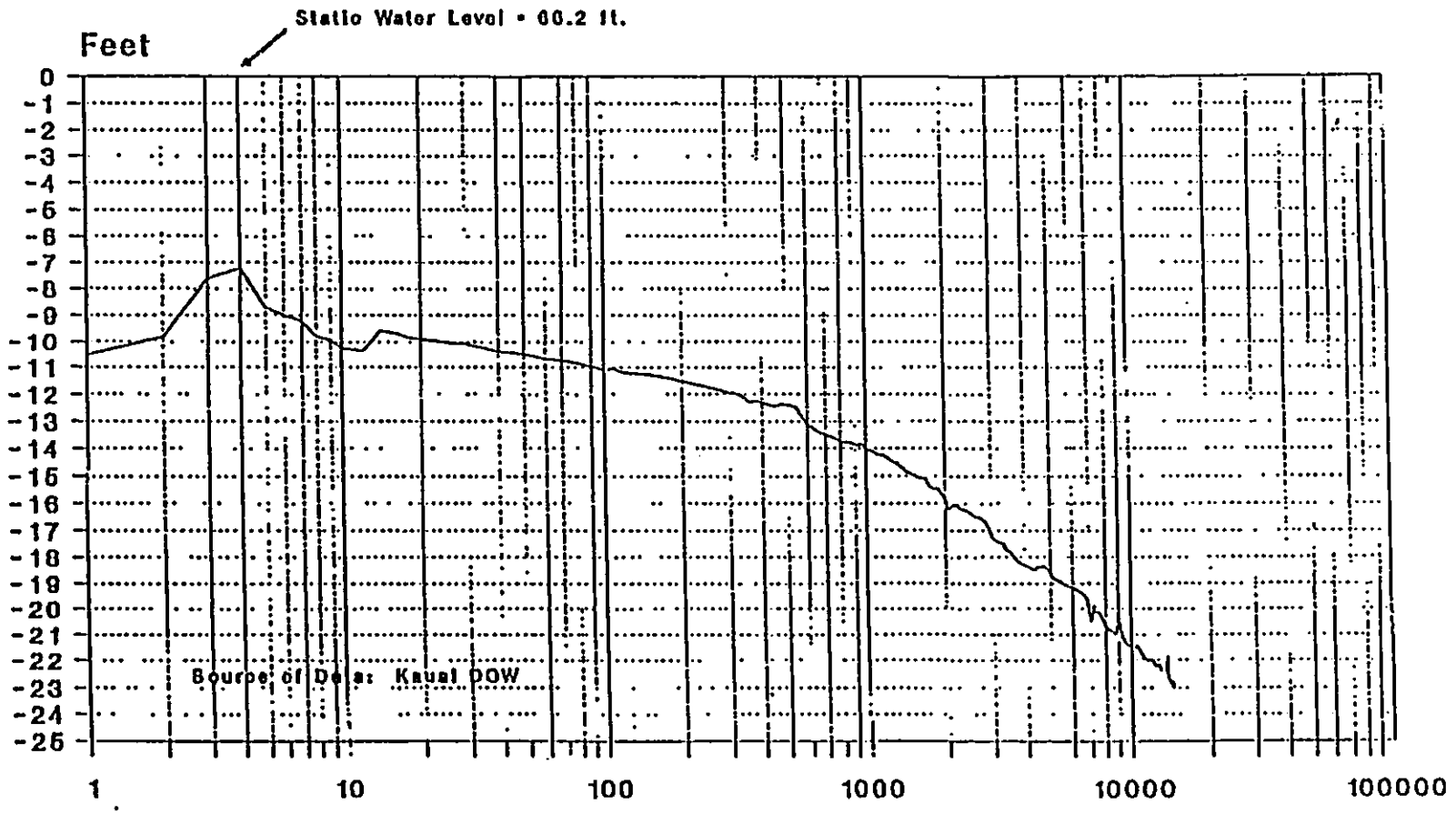
TIME-DRAWDOWN CURVE
Puhi Well 5B (Obs) (5824-09)
Date of Pumping Well 5A: 4/21-28/97



Water Resource Associates
c:\rr\dcs\rpo

Figure 2

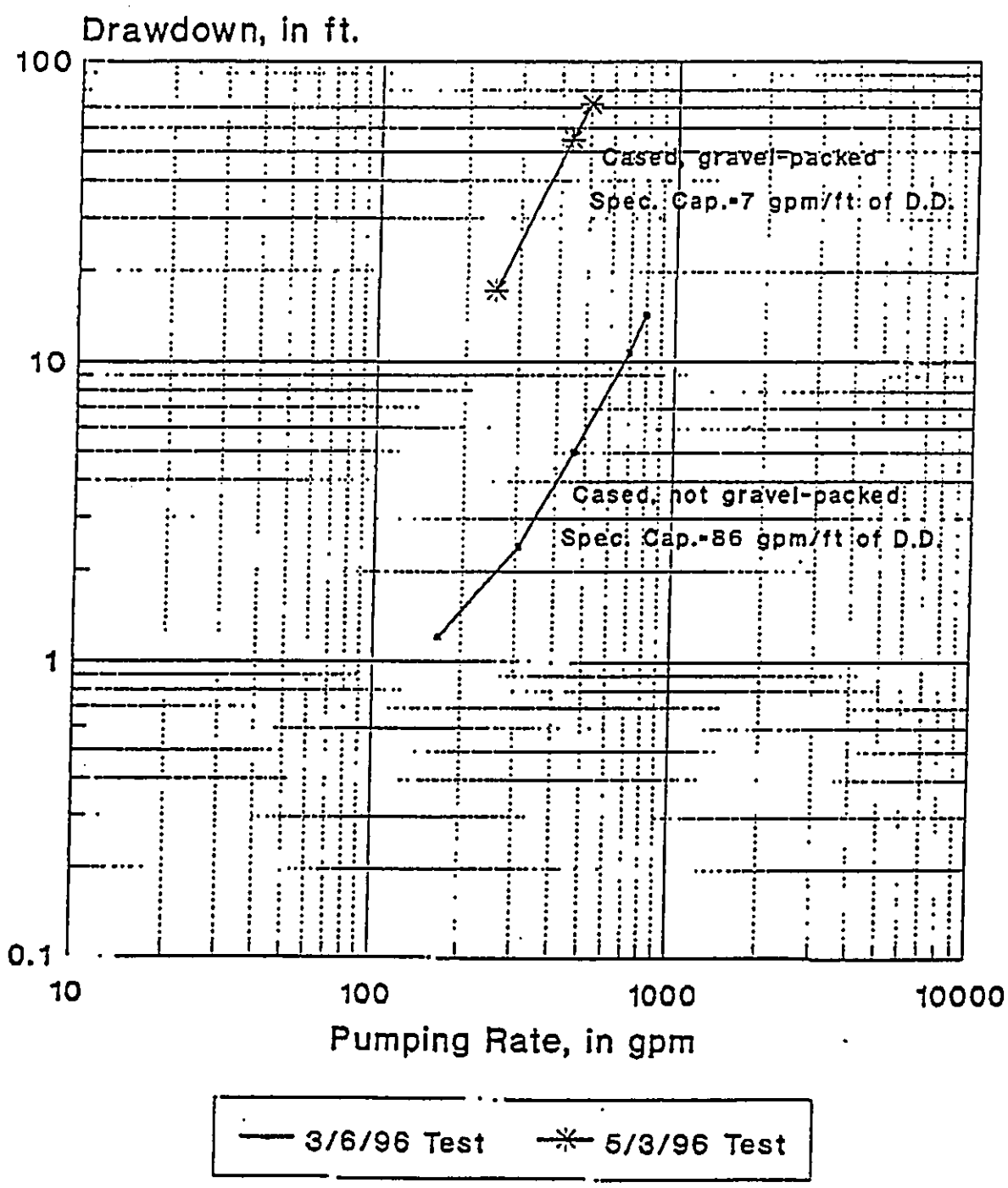
TIME-DRAWDOWN CURVE
Puhi Well 5B (Pumping) (5824-09), Kauai
Date of Test: March 12-22, 1996



Water Resource Associates
067TDC5B66P

Figure 4

PUHI WELL 5B (5824-09)
Drawdown vs Pumping Rate



Water Resource Associates
ddgpmx

Figure 3

Bill

WATER RESOURCE ASSOCIATES

Hydrology • Geology • Engineering

97 SEP 2 A8:54

August 29, 1997

(87)

Mr. Ernest Lau
Manager & Chief Engineer
Department of Water
County of Kauai
P.O. Box 1706
Lihue, Kauai 96766-5706

Attention: Mr. Bill Eddy

Post-it™ Fax Note 7671	Date 8-29-97	# of pages ▶ 2
To BILL EDDY	From DAN LUM	
Co./Dept. ORIG. TO BE MAILED	Co.	
Phone #	Phone # 528-0074	
Fax # 245-5813	Fax # 528-0808	

Ernie

Dear Mr. Lau:

Puhi Wells 5A and 5B, Kauai

This letter supplements our letter of August 18, 1997, regarding Puhi Wells 5A and 5B and presents, at the request of Bill Eddy, our estimate of the drawdowns to be expected in the wells, assuming both wells are pumped simultaneously and continuously (24 hrs/day) for the time periods indicated in Table 1. All other pertinent assumptions and conditions stated in our previous letter, apply.

Table 1. Predicted Drawdowns in Puhi Wells 5A & 5B, Both Pumping

Days of Continuous Pumping	Drawdown (ft.) Well 5A (700 gpm)	Drawdown (ft.) Well 5B (400 gpm)
7	34 + 7 = 41	50 + 13 = 63
70	40 + 12 = 52	55 + 19 = 74
700	46 + 17 = 63	60 + 25 = 85
7000	52 + 22 = 74	65 + 31 = 96

The above table assumes that no additional hydraulic discontinuities will be encountered besides those encountered during the constant-rate pumping tests for both wells.

Puhi Well 5A

Puhi Well 5A is cased with solid casing to a depth of 565 ft. (-83 ft., msl), or 147 ft. below the static water level of 64 ft., msl. Therefore, Puhi Well 5A can easily accomodate a pump setting which provides for the estimated maximum drawdown of 74 ft.(-10 ft., msl), for a 700 gpm pump. It would be okay to set the permanent pump a little deeper to accommodate a drawdown of 85 ft., or -23 ft., msl.

Puhi Well 5B

Current status of Puhi Well 5b is as follows:

Gr. Elev.: 482 ft.
Head: 64 ft., approx.
Solid Casing: 0-500 ft.(-18 ft., msl)
Perforated Casing with gravel packing: 500-900 ft.(-418 ft., msl).
Open Hole: 900-925 ft.(-443 ft., msl)

As indicated above, Puhi Well 5B is cased with solid casing to a depth of 500 ft.(-18 ft., msl), or 82 ft. below the static water level of 64 ft. Perforated casing has also been installed, and it extends 400 ft. below the solid casing. Referring to Table 1, Well 5B will drawdown 85 ft., or 3 ft. into the perforated section of the well, after 700 days of pumping; and, consequently, air entrainment in the pumped water may occur.. To minimize this occurrence, the top of the bowls of the permanent pump should be set, say, 24 ft. lower than the maximum anticipated drawdown of 96 ft., that is, a rounded 120 ft. below static water level (-56 ft., msl).

Please call me if you or your staff have any questions.

Sincerely,

DAN LUM

APPENDIX D

LABORATORY REPORT

CHEMICAL ANALYSIS

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

97 MAY 2 All : 08 97 JUN 2 All : 09

Laboratory Report

for

Rosco Moss Hawaii, Inc.
91-259A Olai Street

Kapolei , HI 96707

Attention: Tracy Runnells
Fax: (808) 682-5866

MONTGOMERY WATSON LABS.
SUBMITTED ON
MAY 28 1997

HDS Hillary Strayer

Report#: 33916
PHASEV

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

Report
Comments
#33916

97 MAY 2 AM 11:06

97 JUN 2 AM 11:09

Group Comments

Result for TCDD analysis submitted by Quanterra Environmental Services.

ort Summary of positive esults, PR33916

97 MAY 2 All : 05 97 JUN 2 All : 09

lyzed	970429002 PUHI 5	Result	MDL	UNITS
8/97	Data Entry	05/14/97		--
6/97	Chromium, Total, ICAP/MS	6.6	5.000	UGL
01/97	Data Entry	05/02/97		--
5/97	Di-n-Butylphthalate	0.6	.500	UGL
0/97	Nitrate as NO3 by IC	0.9	.440	MGL
30/97	Nitrate-N by IC	0.2	.100	MGL
08/97	Data Entry	05/13/97		--
7/97	Data Entry	05/07/97		--
9/97	Alkalinity	70	2.000	MGL
12/97	Calcium, Total, ICAP	8.5	1.000	MGL

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)

97 MAY 2 All : 05

Laboratory
97 JUN Report
#33916: 09

Samples Received
29-apr-1997 10:50:17

Rosco Moss Hawaii, Inc.
Tracy Runnells
91-259A Olai Street
Kapolei , HI 96707

ared	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
I 5 (970429002)			Sampled on 04/28/97					
	04/29/97	61989	(ML/S2320B)	Alkalinity	70	mg/l	2.0	1
:/97	05/12/97	62283	(EPA/ML 200.7)	Calcium, Total, ICAP	8.5	mg/l	1.0	1
	05/02/97	62051	(ML/S4500CN-F)	Cyanide	ND	mg/l	0.025	1
01/97	05/08/97	62379	(ML/EPA 548.1)	Endothall	ND	ug/l	5.0	1
	05/09/97	62325	(SM 4500F)	Fluoride	ND	mg/l	0.10	1
	05/07/97	62175	(ML/EPA 547)	Glyphosate	ND	ug/l	6.0	1
01/97	05/01/97	61985	(EPA/ML 245.1)	Mercury	ND	ug/l	0.50	1
	04/30/97	61977	(ML/EPA 300.0)	Nitrite, Nitrogen by IC	ND	mg/l	0.10	1
7/97	05/08/97		(EPA 1613)	2,3,7,8 - TCDD	ND	PGL	0.59	1
			525 Semivolatiles by GC/MS					
8/97	05/15/97	62406	(ML/EPA 525.2)	2,4-Dinitrotoluene	ND	ug/l	0.10	1
8/97	05/15/97	62406	(ML/EPA 525.2)	alpha-Chlordane	ND	ug/l	0.050	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Acenaphthylene	ND	ug/l	0.10	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Alachlor	ND	ug/l	0.050	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Aldrin	ND	ug/l	0.050	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Anthracene	ND	ug/l	0.020	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Atrazine	ND	ug/l	0.050	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Benz(a)Anthracene	ND	ug/l	0.050	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Benzo(a)pyrene	ND	ug/l	0.020	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Benzo(b)Fluoranthene	ND	ug/l	0.020	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Benzo(g,h,i)Perylene	ND	ug/l	0.050	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Benzo(k)Fluoranthene	ND	ug/l	0.020	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Di(2-Ethylhexyl)phthalate	ND	ug/l	0.60	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Butylbenzylphthalate	ND	ug/l	0.50	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Bromacil	ND	ug/l	2.0	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Butachlor	ND	ug/l	0.050	1
8/08/97	05/15/97	62406	(ML/EPA 525.2)	Caffeine	ND	ug/l	0.020	1
8/08/97	05/15/97	62406	(ML/EPA 525.2)	Chrysene	ND	ug/l	0.020	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Dibenz(a,h)Anthracene	ND	ug/l	0.050	1
08/97	05/15/97	62406	(ML/EPA 525.2)	Di-(2-Ethylhexyl)adipate	ND	ug/l	0.60	1
5/08/97	05/15/97	62406	(ML/EPA 525.2)	Diethylphthalate	ND	ug/l	0.50	1
08/97	05/15/97	62406						

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...red	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
/97	05/15/97	62406	(ML/EPA 525.2)	Dieldrin	ND	ug/l	0.20	1
/97	05/15/97	62406	(ML/EPA 525.2)	Dimethylphthalate	ND	ug/l	0.50	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Dimethoate	ND	ug/l	10	1
4/97	05/15/97	62406	(ML/EPA 525.2)	Di-n-Butylphthalate	0.6	ug/l	0.50	1
/97	05/15/97	62406	(ML/EPA 525.2)	Endrin	ND	ug/l	0.10	1
6/97	05/15/97	62406	(ML/EPA 525.2)	Fluorene	ND	ug/l	0.050	1
0/97	05/15/97	62406	(ML/EPA 525.2)	gamma-Chlordane	ND	ug/l	0.050	1
/97	05/15/97	62406	(ML/EPA 525.2)	Hexachlorocyclopentadiene	ND	ug/l	0.050	1
/97	05/15/97	62406	(ML/EPA 525.2)	Heptachlor	ND	ug/l	0.040	1
0/97	05/15/97	62406	(ML/EPA 525.2)	Heptachlor Epoxide	ND	ug/l	0.020	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Indeno(1,2,3,c,d)Pyrene	ND	ug/l	0.050	1
/97	05/15/97	62406	(ML/EPA 525.2)	Isophorone	ND	ug/l	0.50	1
3/97	05/15/97	62406	(ML/EPA 525.2)	Lindane	ND	ug/l	0.020	1
0/97	05/15/97	62406	(ML/EPA 525.2)	Methoxychlor	ND	ug/l	0.050	1
3/97	05/15/97	62406	(ML/EPA 525.2)	Metribuzin	ND	ug/l	0.050	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Molinate	ND	ug/l	0.20	1
9/97	05/15/97	62406	(ML/EPA 525.2)	Metolachlor	ND	ug/l	0.050	1
3/97	05/15/97	62406	(ML/EPA 525.2)	trans-Nonachlor	ND	ug/l	0.050	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Pentachlorophenol	ND	ug/l	1.0	1
0/97	05/15/97	62406	(ML/EPA 525.2)	Phenanthrene	ND	ug/l	0.020	1
3/97	05/15/97	62406	(ML/EPA 525.2)	Prometryn	ND	ug/l	0.50	1
3/97	05/15/97	62406	(ML/EPA 525.2)	Propachlor	ND	ug/l	0.050	1
8/97	05/15/97	62406	(ML/EPA 525.2)	Pyrene	ND	ug/l	0.050	1
0/97	05/15/97	62406	(ML/EPA 525.2)	Simazine	ND	ug/l	0.050	1
5/97	05/15/97	62406	(ML/EPA 525.2)	Thiobencarb	ND	ug/l	0.20	1
0/97	05/15/97	62406	(ML/EPA 525.2)	Trifluralin	ND	ug/l	0.10	1
			(Surrogate)	Perylene-d12	93	% Rec		
			Aldicarbs					
	05/12/97	62385	(ML/EPA 531.1)	3-Hydroxycarbofuran	ND	ug/l	2.0	1
	05/12/97	62385	(ML/EPA 531.1)	Aldicarb (Temik)	ND	ug/l	0.50	1
	05/12/97	62385	(ML/EPA 531.1)	Aldicarb sulfone	ND	ug/l	0.80	1
	05/12/97	62385	(ML/EPA 531.1)	Aldicarb sulfoxide	ND	ug/l	0.50	1
	05/12/97	62385	(ML/EPA 531.1)	Baygon	ND	ug/l	2.0	1
	05/12/97	62385	(ML/EPA 531.1)	Carbofuran (Furadan)	ND	ug/l	0.90	1

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J	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
	05/12/97	62385	(ML/EPA 531.1)	Carbaryl	ND	ug/l	2.0	1
	05/12/97	62385	(ML/EPA 531.1)	Methiocarb	ND	ug/l	2.0	1
	05/12/97	62385	(ML/EPA 531.1)	Methomyl	ND	ug/l	1.0	1
	05/12/97	62385	(ML/EPA 531.1)	Oxamyl (Vydate)	ND	ug/l	2.0	1
			(Surrogate)	BDMC	101	% Rec		
			Diquat and Paraquat					
7	05/16/97	62499	(ML/EPA 549.1)	Diquat	ND	ug/l	0.40	1
7	05/16/97	62499	(EPA 549.1)	Paraquat	ND	ug/l	2.0	1
			EDB and DBCP by GC-ECD					
7	05/08/97	62310	(ML/EPA 504.1)	Dibromochloropropane (DBCP)	ND	ug/l	0.010	1
7	05/08/97	62310	(ML/EPA 504.1)	Ethylene Dibromide (EDB)	ND	ug/l	0.010	1
			(Surrogate)	1,2-dibromopropane	108	% Rec		
			Herbicides by 515.1					
/97	05/08/97	62167	(ML/EPA 515.1)	2,4,5-T	ND	ug/l	0.20	1
97	05/08/97	62167	(ML/EPA 515.1)	2,4,5-TP (Silvex)	ND	ug/l	0.20	1
97	05/08/97	62167	(ML/EPA 515.1)	2,4-D	ND	ug/l	0.10	1
/97	05/08/97	62167	(ML/EPA 515.1)	2,4-DB	ND	ug/l	2.0	1
/97	05/08/97	62167	(ML/EPA 515.1)	Dichlorprop	ND	ug/l	0.50	1
97	05/08/97	62167	(ML/EPA 515.1)	Acifluorfen (qualitative)	ND	ug/l	0.20	1
97	05/08/97	62167	(ML/EPA 515.1)	Bentazon	ND	ug/l	0.50	1
/97	05/08/97	62167	(ML/EPA 515.1)	Dalapon (qualitative)	ND	ug/l	1.0	1
97	05/08/97	62167	(ML/EPA 515.1)	3,5-Dichlorobenzoic acid	ND	ug/l	0.60	1
97	05/08/97	62167	(ML/EPA 515.1)	DCPA	ND	ug/l	0.20	1
/97	05/08/97	62167	(ML/EPA 515.1)	Dicamba	ND	ug/l	0.080	1
97	05/08/97	62167	(ML/EPA 515.1)	Dinoseb	ND	ug/l	0.20	1
97	05/08/97	62167	(ML/EPA 515.1)	Pentachlorophenol	ND	ug/l	0.040	1
97	05/08/97	62167	(ML/EPA 515.1)	Picloram	ND	ug/l	0.10	1
/97	05/08/97	62167	(ML/EPA 515.1)	4-Nitrophenol (qualitative)	ND	ug/l	5.0	1
			(Surrogate)	2,4-Dichlorophenylacetic acid	96	% Rec		
			ICPMS Metals					
97	05/06/97	62195	(EPA/ML 200.8)	Arsenic, Total, ICAP/MS	ND	ug/l	5.0	1
97	05/06/97	62195	(EPA/ML 200.8)	Barium, Total, ICAP/MS	ND	ug/l	10	1

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ed	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
/97	05/06/97	62195	(EPA/ML 200.8)	Beryllium, Total, ICAP/MS	ND	ug/l	1.0	1
97	05/06/97	62195	(EPA/ML 200.8)	Cadmium, Total, ICAP/MS	ND	ug/l	0.50	1
/97	05/06/97	62195	(EPA/MS 200.8)	Chromium, Total, ICAP/MS	6.6	ug/l	5.0	1
/97	05/06/97	62195	(EPA/ML 200.8)	Copper, Total, ICAP/MS	ND	ug/l	50	1
97	05/06/97	62195	(EPA/ML 200.8)	Nickel, Total, ICAP/MS	ND	ug/l	5.0	1
97	05/06/97	62195	(EPA/ML 200.8)	Lead, Total, ICAP/MS	ND	ug/l	5.0	1
/97	05/06/97	62195	(EPA/ML 200.8)	Antimony, Total, ICAP/MS	ND	ug/l	2.0	1
/97	05/06/97	62195	(EPA/ML 200.8)	Selenium, Total, ICAP/MS	ND	ug/l	5.0	1
97	05/06/97	62195	(EPA/ML 200.8)	Thallium, Total, ICAP/MS	ND	ug/l	1.0	1
				Nitrate by IC as NO3 & N				
	04/30/97	61973	(ML/EPA 300.0)	Nitrate-N by IC	0.2	mg/l	0.10	1
	04/30/97	61973	(ML/EPA 300.0)	Nitrate as NO3 by IC	0.9	mg/l	0.44	1
				SDWA Pesticides				
97	05/07/97	62112	(ML/EPA 508)	PCB 1016 Aroclor	ND	ug/l	0.10	1
/97	05/07/97	62112	(ML/EPA 508)	PCB 1221 Aroclor	ND	ug/l	0.10	1
/97	05/07/97	62112	(ML/EPA 508)	PCB 1232 Aroclor	ND	ug/l	0.10	1
97	05/07/97	62112	(ML/EPA 508)	PCB 1242 Aroclor	ND	ug/l	0.10	1
/97	05/07/97	62112	(ML/EPA 508)	PCB 1248 Aroclor	ND	ug/l	0.10	1
/97	05/07/97	62112	(ML/EPA 508)	PCB 1254 Aroclor	ND	ug/l	0.10	1
97	05/07/97	62112	(ML/EPA 508)	PCB 1260 Aroclor	ND	ug/l	0.10	1
/97	05/07/97	62112	(ML/EPA 508)	Alpha-BHC	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	Alachlor (Alanex)	ND	ug/l	0.050	1
/97	05/07/97	62112	(ML/EPA 508)	Aldrin	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	Beta-BHC	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	Chlordane	ND	ug/l	0.10	1
/97	05/07/97	62112	(ML/EPA 508)	Chlorthalonil (Draconil,Bravo)	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	Delta-BHC	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	p,p' DDD	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	p,p' DDE	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	p,p' DDT	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	Dieldrin	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	Endrin Aldehyde	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	Endrin	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	Endosulfan I (alpha)	ND	ug/l	0.010	1

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7	05/07/97	62112	(ML/EPA 508)	Endosulfan II (beta)	ND	ug/l	0.010	1
7	05/07/97	62112	(ML/EPA 508)	Endosulfan sulfate	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	Heptachlor	ND	ug/l	0.010	1
97	05/07/97	62112	(ML/EPA 508)	Heptachlor Epoxide	ND	ug/l	0.010	1
7	05/07/97	62112	(ML/EPA 508)	Lindane (gamma-BHC)	ND	ug/l	0.010	1
/97	05/07/97	62112	(ML/EPA 508)	Methoxychlor	ND	ug/l	0.050	1
/97	05/07/97	62112	(ML/EPA 508)	Toxaphene	ND	ug/l	0.50	1
			(Surrogate)	Dibutyl Chlorendate	92	% Rec		
			(Surrogate)	Tetrachlorometaxylene	92	% Rec		
			Volatile Organic Compounds					
	05/01/97	61988	(ML/EPA 502.2)	1,1,1,2-Tetrachloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,1,1-Trichloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,1,2,2-Tetrachloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,1,2-Trichloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,1-Dichloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,1-Dichloroethene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,1-Dichloropropene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2,3-Trichloropropane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2,3-Trichlorobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2,4-Trichlorobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2,4-Trimethylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2-Dichloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2-Dichlorobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2-Dichloropropane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,3,5-Trimethylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,3-Dichlorobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,3-Dichloropropane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,4-Dichlorobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	2,2-Dichloropropane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	2-Chlorotoluene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	4-Chlorotoluene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Bromodichloromethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Benzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Bromobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Bromochloromethane	ND	ug/l	0.50	1

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	05/01/97	61988	(ML/EPA 502.2)	Bromomethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	cis-1,2-Dichloroethene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Chlorobenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Carbon tetrachloride	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	cis-1,3-Dichloropropene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Bromoform	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Chloroform	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Chloroethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Chloromethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Dibromochloromethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2-Dibromo-3-chloropropane	ND	ug/l	1.0	1
	05/01/97	61988	(ML/EPA 502.2)	Dibromomethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Dichlorodifluoromethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	1,2-Dibromoethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Ethylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Hexachlorobutadiene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Isopropylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Methylene chloride	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	m+p-Xylenes	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Methyl tert-butyl ether	ND	ug/l	5.0	1
	05/01/97	61988	(ML/EPA 502.2)	Naphthalene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	n-Butylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	n-Propylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	o-Xylene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Tetrachloroethylene (PCE)	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	p-Isopropyltoluene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	sec-Butylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Styrene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	trans-1,2-Dichloroethene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	tert-Butylbenzene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Trichloroethylene (TCE)	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Trichlorotrifluoroethane(Freon	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	trans-1,3-Dichloropropene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Toluene	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Trichlorofluoromethane	ND	ug/l	0.50	1
	05/01/97	61988	(ML/EPA 502.2)	Vinyl chloride	ND	ug/l	0.30	1

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Laboratory Report #33916

Rosco Moss Hawaii, Inc.
(continued)

..ed	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
			(Surrogate)	Bromofluorobenzene-ELCD	93	% Rec		
			(Surrogate)	Bromofluorobenzene-PID	96	% Rec		
			(Surrogate)	Chlorofluorobenzene-ELCD	88	% Rec		
			(Surrogate)	Chlorofluorobenzene-PID	96	% Rec		