DEPARTMENT OF WATER

County of Kauai

"Water has no Substitute – Conserve It!"

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

October 16, 2001

Ms. Genevieve Salmonson, Director
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 Koloa Well 'F', Pump, Controls and Connecting Pipeline; TMK: 2-9-02:001, 2-9-03:001; Koloa, Kauai, Hawaii

The County of Kauai Department of Water has reviewed the comments received during the 30-day public comment period, which began on August 8, 2001. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the November 8, 2001 OEQC Environmental Notice. ✓

We have enclosed a completed OEQC Publication Form, four copies of the final EA. Please contact Mr. Michael K. Hinazumi, Project Engineer, at (808) 245-5413 if you have any questions.

Sincerely,

for Ernest Y. W. Lau
Manager & Chief Engineer

Enclosure

MH:lan
D:\docs\d&c\mike\KoloaWellF-OEQC

— 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

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2001-11-08-KA-FEA-

KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I
STATE OF HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

AND FINDING OF NO SIGNIFICANT IMPACT

Submitted Pursuant to Chapter 343, Hawai`i Revised Statutes (HRS)

Kaua`i Department of Water

October 2001

KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

AND FINDING OF NO SIGNIFICANT IMPACT

PROPOSING AGENCY:

Kaua`i Department of Water
P.O. Box 1706
Lihue, Hawai`i 96766

CONSULTANT:

Ron Terry Ph.D.
HC 2 Box 9575
Keaau, Hawai`i 96749

CLASS OF ACTION:

Use of County Funds

This document is prepared pursuant to:
the Hawai`i Environmental Protection Act,
Chapter 343, Hawai`i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai`i Department of Health Administrative Rules (HAR).

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LIST OF ABBREVIATIONS

ALISH	Agricultural Lands of Importance to the State of Hawaii
BMP	Best Management Practice
CDUP	Hawai'i State Conservation District Use Permit
DLNR	Hawai'i State Department of Land and Natural Resources
DOFAW	Hawai'i Division of Forestry and Wildlife
DOW	Kaua'i County Department of Water
DPW	Kaua'i County Department of Public Works
EA	Environmental Assessment
EIS	Environmental Impact Statement
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GP	Kaua'i County General Plan
gpm	Gallons per minute
HDOH	Hawai'i State Department of Health
HAR	Hawai'i Administrative Rules
HEPA	Hawai'i Environmental Policy Act
HRS	Hawai'i Revised Statutes
KGP	Kaua'i General Plan
KLRLTP	Kaua'i Long-Range Land Transportation Plan
MCL	Maximum Contaminant Level
mgd	Million gallons per day
OEQC	Hawai'i State Office of Environmental Quality Control
SFHA	Special Flood Hazard Area
SHPD/O	State Historic Preservation Division/Officer
SMA	Special Management Area
tgd	Thousand gallons per day
UH	University of Hawaii
USF&WS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNRCS	U.S. Natural Resources Conservation Service

SUMMARY

PROJECT DESCRIPTION AND LOCATION

The proposed project would convert an existing Kaua'i County Department of Water (DOW) exploratory well to a production well. The 1,200 gallon-per-minute production well would draw potable water from the basal aquifer. The well site would require approximately 14,000 square feet of land. Project design includes a pump, controls, control building, chlorination facilities, pipeline, paving of an existing unpaved access road, and accessory drainage structures. The project site is at the foot of a 500-foot high ridge, about a mile east of the former McBryde Sugar Mill near Koloa and about two miles from the towns of Koloa and Poipu, on the Island of Kaua'i. The purpose of this project is to develop an additional potable water source for the Koloa-Poipu Water System, which requires more water in order to meet the demands of its service area.

COST AND SCHEDULE

Estimated design and construction costs total $1.7 million. Funds for this project have been committed from DOW's Capital Improvement Program (CIP) budget. There is a possibility that other sources of funds, public or private, may be available for this project. When necessary approvals are obtained, the project would begin construction in the year 2001 and would be complete within approximately one year.

PROPOSING AGENCY

The Kaua'i Department of Water is the Proposing Agency in the context of Chapter 343, HRS.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Because the project site contains alien vegetation and is several miles distant from the shoreline and any streams, settlements, or activities other than farming, the expected environmental impacts of the project and proposed mitigation are minor. Construction will cause very localized surface clearing that will be mitigated by Best Management Practices for minimizing soil erosion, offsite sedimentation, and excessive dust. With the well in operation, it is expected that pumpage from the aquifer will remain far below its sustainable yield. It is recommended that long-term records of water salinity pumpage and water levels should be maintained at all of the Koloa wells. If chloride concentrations appear to be increasing to unacceptable levels in the Koloa well field, DOW should consider measures to reverse the increase, such as reduced pumping or aquifer recharge. Furthermore, such data will provide information to evaluate potential cumulative impacts related to the use of future wells.

1 PROJECT LOCATION, DESCRIPTION, PURPOSE AND NEED

1.1 Project Overview and Location

The proposed project would convert an existing Kaua`i County Department of Water (DOW) exploratory well to a production well and would construct associated supporting facilities (Figs. 1-1, 1-2). The project site is about a mile east of the former McBryde Sugar Mill at Koloa and about two miles from the towns of Koloa and Poipu, on the island of Kaua`i (Fig. 1-3). The well site occupies a portion of TMK 2-9-3:1, at the western edge of Mahaulepu valley, near the base of a 500-foot high ridge, at an elevation of approximately 130 feet above mean sea-level. The supporting facilities are located on this parcel and also on the adjacent parcel, TMK 2-9-2:1.

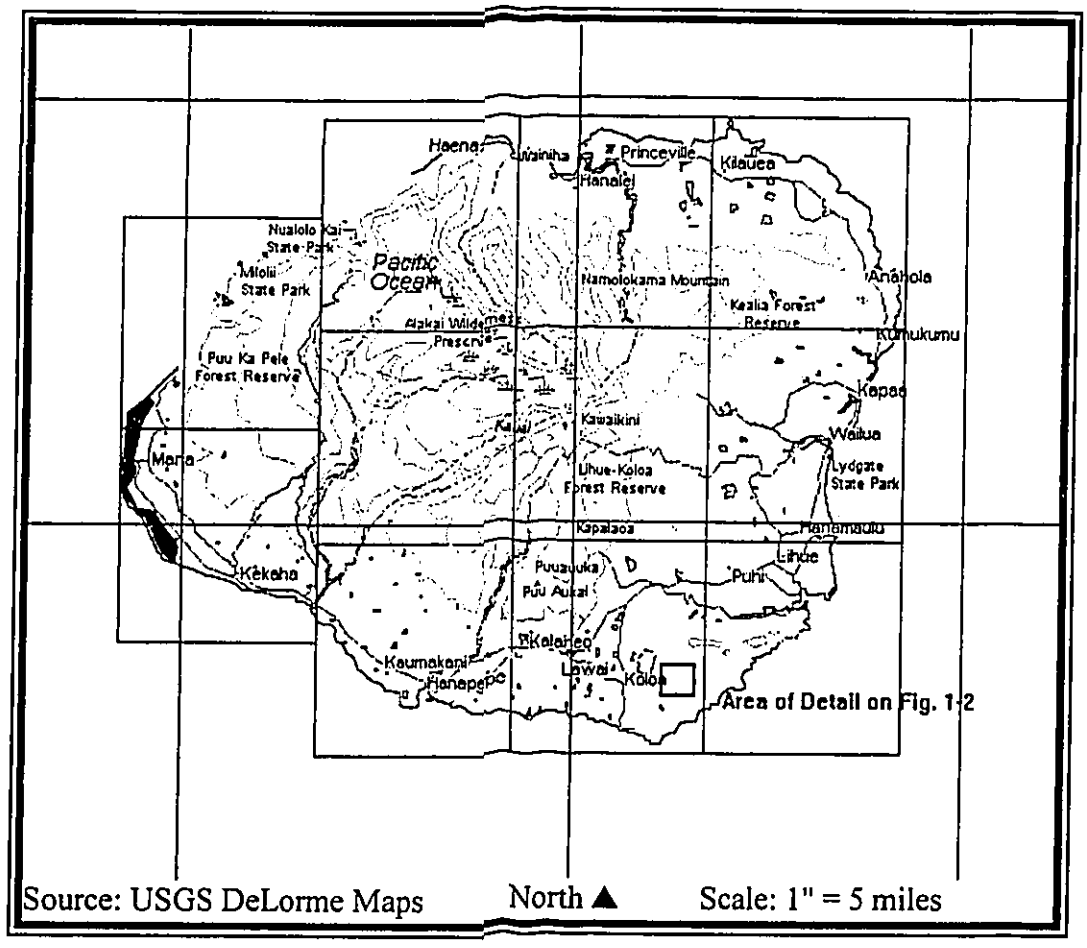


Figure 1-1
Project Location

Figure 1-2
Project Location, Detail

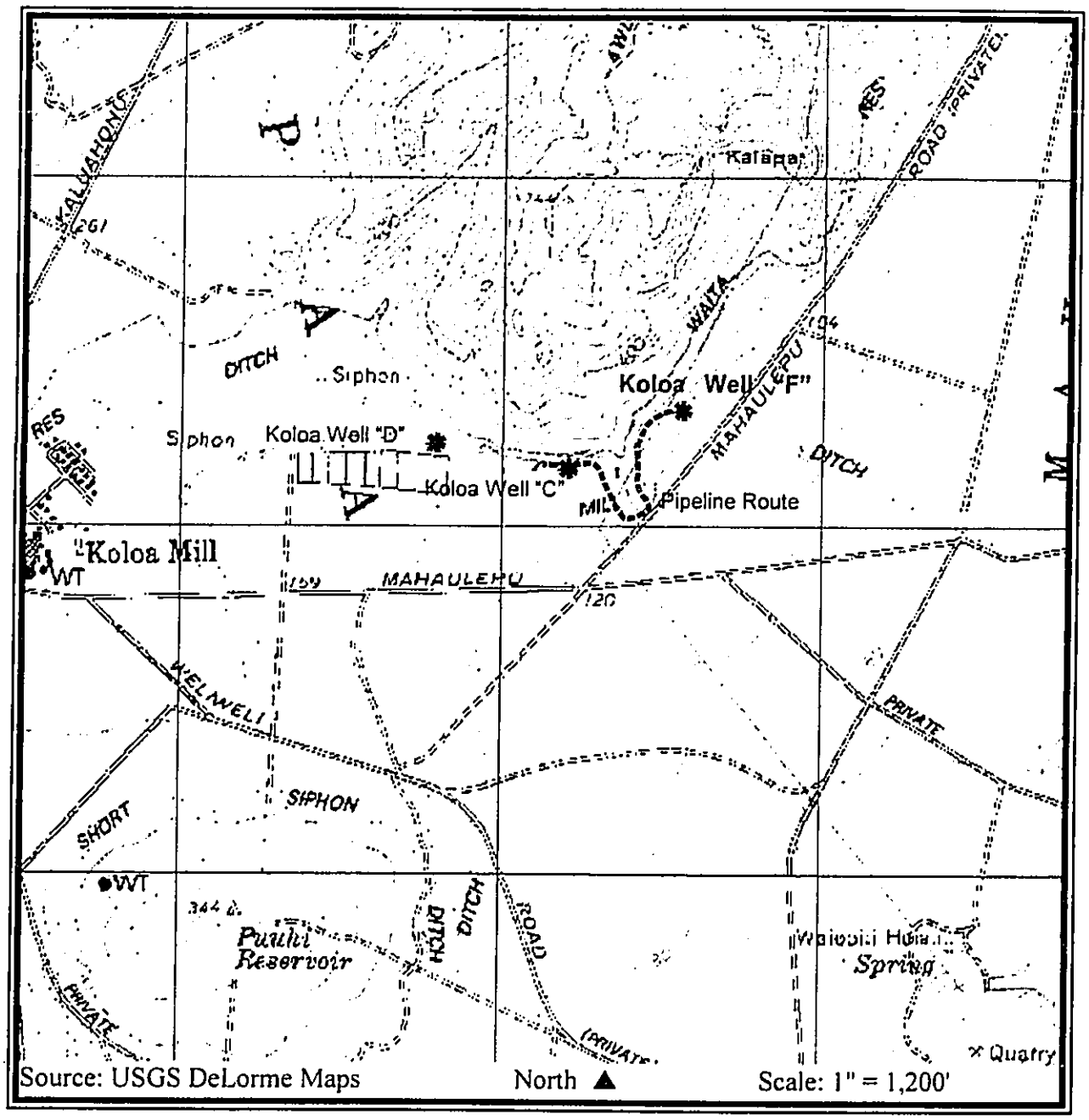
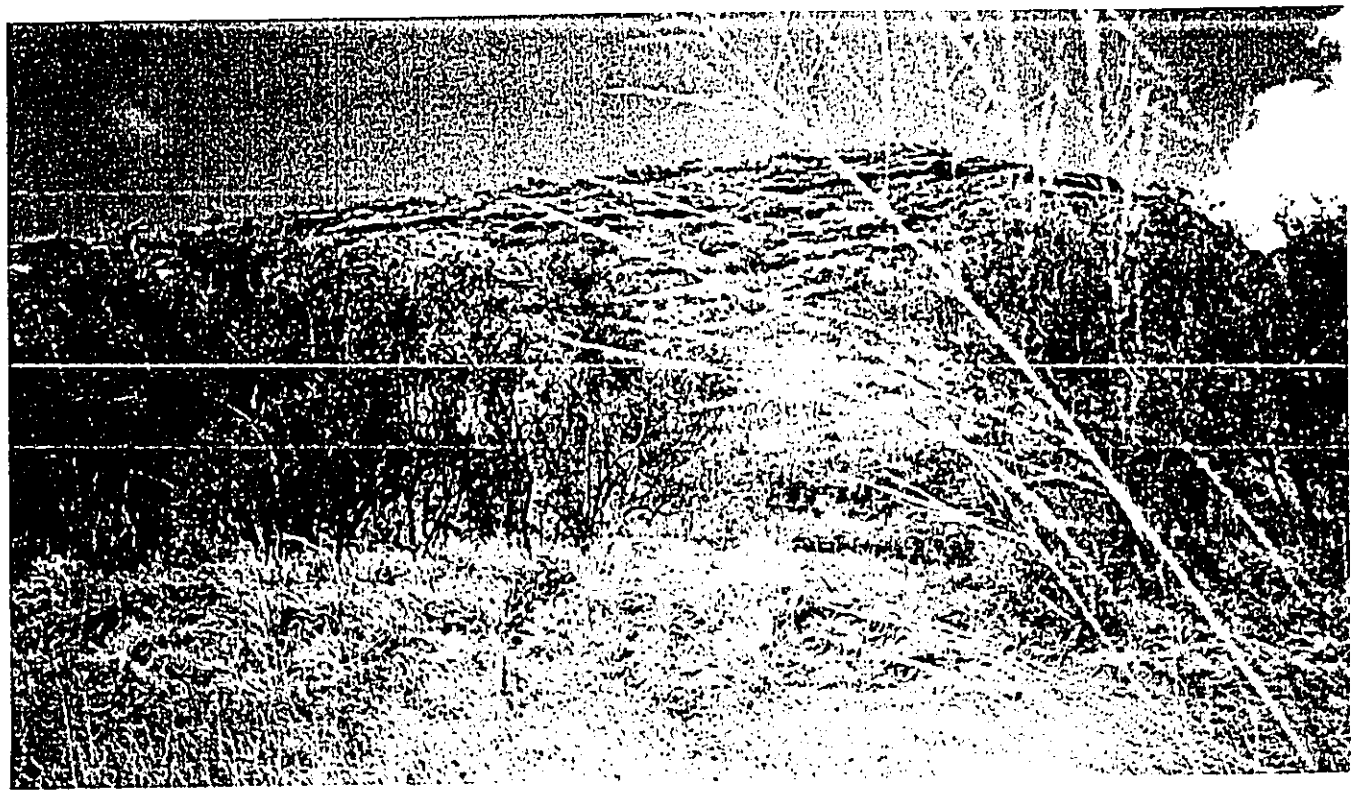


FIGURE 1-3 PROJECT SITE PHOTOGRAPHS



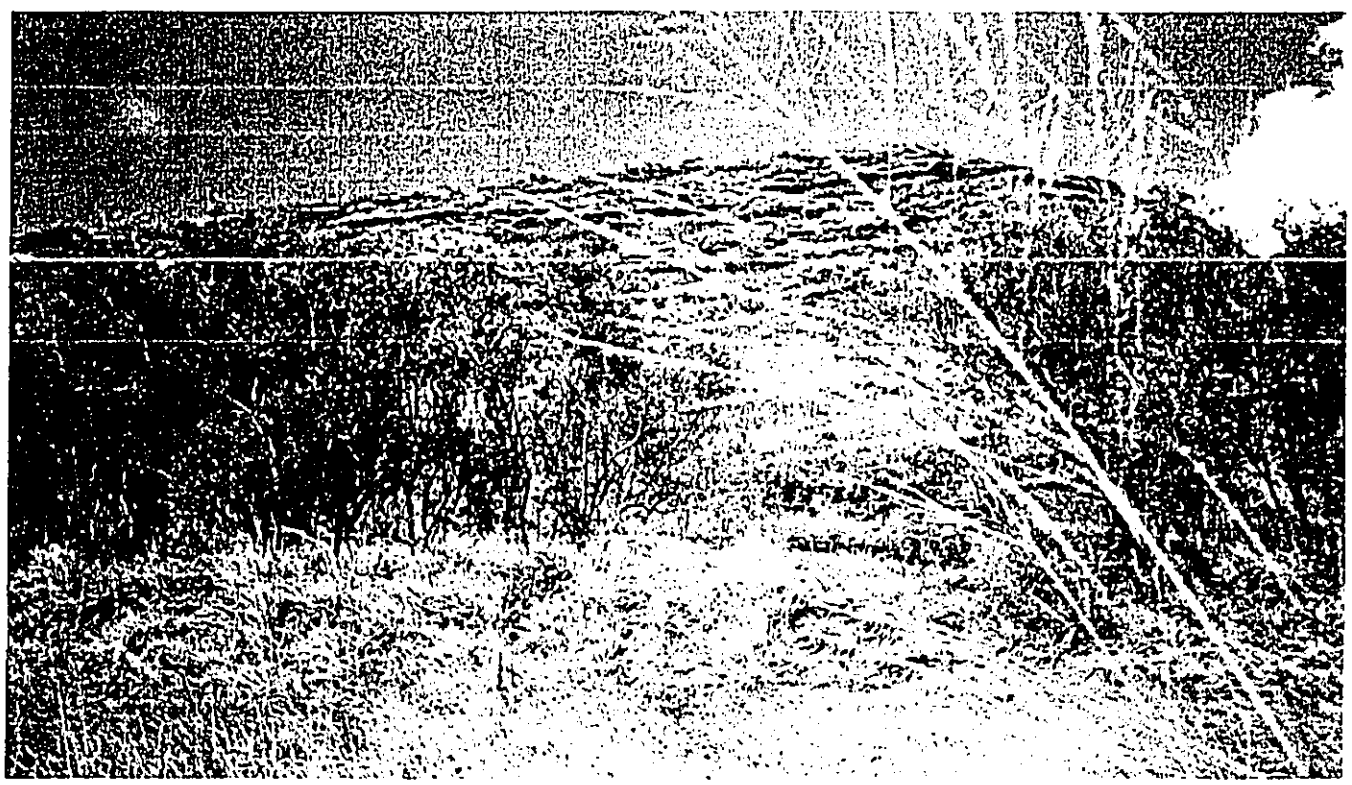
(a) View WNW from farm road looking up to well site rise, with ridge in background

(b) View towards SW, from NE corner of well site

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

FIGURE 1-3 PROJECT SITE PHOTOGRAPHS



(a) View WNW from farm road looking up to well site rise, with ridge in background

(b) View towards SW, from NE corner of well site

1.2 Purpose and Need for Project

The DOW currently serves the island of Kaua`i through thirteen partially integrated systems. Each of the separate water systems was originally built to serve a particular area or group of customers. As new areas have been developed adjacent to existing water systems, the systems have been expanded and improved to provide service to these areas. The Koloa-Poipu Water System interconnects with the adjacent, elevationally higher, Lawai-Omao Water System so that water can be brought from the latter into the former, if necessary.

The purpose of this project is to develop an additional potable water source for the Koloa-Poipu Water System, which requires more water in order to meet the demands of its service area. The Koloa-Poipu service area consists of a concentration of coastal resorts, along with residential communities clustered near the coast and around Koloa Town. Poipu is Kaua`i's fastest-growing resort destination, and the service area includes several projects yet to be built. Under existing conditions, the Koloa-Poipu service area has adequate supply when the largest source is taken out of service. Between 2000 and 2020, approximately 40 percent growth in water use is projected for Koloa-Poipu.

The need for additional sources to meet system demand must be framed in the context of overall growth in resident population and visitor numbers on the island of Kaua`i. Kaua`i experienced steady population growth between the 1968 and 1992, when Hurricane Iniki struck the island (Table 1-1). Although the devastation caused by the hurricane temporarily reversed the growth trend, resident population soon rebounded. Population has doubled since 1970, and, if current projections are correct, Kaua`i`s population will have just about tripled between 1970 and 2020.

Table 1-1
Historical and Projected Population Growth in Kaua`i and Koloa-Poipu Area

District/ Period	1970	1980	1990	1994	2000	2010	2020
Koloa-Poipu	1,834	2,142	2,766	3,160	5,404	n/a	9,800
Kaua`i County	29,761	39,082	51,177	58,280	58,463	72,000	85,940

Sources: Historical: 2000: U.S. Bureau of the Census: PL-94-171 Data Disk; 1994: Kaua`i General Plan (KGP); Others: *1990 Census of Population. General Population Characteristics*, 1990 CP-1-13; Hawai`i State DBEDT: *Hawai`i State Data Book., 1997*. Projections: 2010: KGP from DBEDT 2020 Series; 2020: KGP: . Notes: n/a: not applicable (not projected).

Kaua`i's inventory of visitor rooms and airlift capacity has grown steadily over the last three decades, and visitor numbers have steadily increased (Table 1-2).

Table 1-2
Average Daily Visitor Census, Kaua`i

Year	1984	1986	1988	1990	1992	1994	1996	1998
	10,930	14,840	14,840	18,200	13,460	13,240	14,490	17,909

Source: Hawai`i State DBEDT: *Hawai`i State Data Book, var. years.*

The growth in resident and visitor population has generated increased demand for municipal water throughout Kaua`i.

Current Demand for DOW Water

Table 1-3 shows the total water use and the number of service connections in various categories in the year 2000 for Kaua`i as a whole and the Koloa and Poipu areas. In Koloa, single-family users account for most connections; in Poipu, the multi-family/resort category has the highest use. Total water use in the Koloa-Poipu Service area is 2,626 thousand gallons per day (tgd), with most used in the Poipu section.

Table 1-3
Current Water Service Connections by Category and Water Use

District/ Water System	Single-Family (units)	Multi-Family/ Resort (units)	Commercial (Sq. Ft)	Industrial (Sq. Ft)	Government (Capita)	Water Use (thousands gallons per day)
Koloa	468	305	124,465	51,947	575	391
Poipu	489	2,115	72,507	0	14	2,235
Koloa+Poipu	957	2,420	196,972	51,947	589	2,626
Kaua`i (all)	15,811	7,076	3,876,286	2,223,994	16,942	14,407

Source: *Kaua`i Water Plan 2020*, Table 4.2 and 4.5. Note: Service connections are year 2000; Water use is 1998-1999.

Current Water System Facilities in Koloa-Poipu

Water facilities for the Koloa-Poipu Water Service Area include five well sources, all located within the service area: (Koloa Wells 16-A, 16-B, C, D, and E). These wells have a total pumping capacity of 5,785 gallons per minute (gpm). Chlorination facilities are present at each well.

Several reservoirs are located in the service area, including three tanks with a capacity of 3.25 million gallons serving the lower 245-foot elevation Poipu service area, and an additional 1.0 million gallon storage tank serving the upper 366-foot elevation Koloa service area.

Planning for Growth in Water Service in Kaua`i

DOW has developed the *Kaua`i Water Plan 2020* (Kaua`i County DOW 2001) as a long-range plan to the guide the agency in future operations and to identify the improvements and facilities required to continue to provide safe, affordable and reliable water service to the island of Kaua`i in a sustainable and financially secure manner.

Forecasts of land use, service connections and water use have been based on the *Kaua`i General Plan* (KGP) (Kauai County Department of Planning 2000). The KGP integrated a range of estimates of growth rates in various sectors of the economy in a model for developing population projections. The projections adopted by the Kaua`i Planning Department estimate for 2020 a resident population of between 65,260 and 74,320, with an average daily visitor population of between 24,000 and 28,000.

In general, the *Kaua`i Water Plan 2020* used the year 2020 island-wide totals from the *Kaua`i General Plan* (KGP) projections, allocating the island-wide population projections to each of the DOW's individual water systems.

The following conclusions concerning growth from 2000 to 2020 are noteworthy:

- The island-wide population served by DOW is projected to increase from approximately 54,798 to 68,880.
- Single-family homes are projected to increase from about 15,240 to 19,480.
- Multi-family units served by DOW are expected to increase from 1,250 to 1,620.
- Visitor units served by DOW are projected to increase from 5,830 to 8,560.

According to the KGP, the County of Kaua'i has enough land area zoned for urban development to accommodate projected visitor and resident population growth to 2020. In addition, current regulations and practice allow the subdivision of agriculturally-zoned land into parcels to be used for single-family residences at a density of about one unit per three acres without agricultural subdivisions.

In general, DOW has taken a conservative approach in defining service areas, in effect, limiting them to areas that have appropriate planning and zoning approvals in place. Water use has been forecasted to increase at basically the same rate as the user growth. Island-wide, the daily use of water is expected to increase from the 1998-99 level of 14,407 tgd to 15,335 TGD in 2005, 16,160 TGD in 2010, and to 17,793 TGD in 2020 (Ibid: Summary, p. 4).

Growing Water Demand In Koloa-Poipu

As indicated in Table 1-1, the Koloa-Poipu area is growing. Poipu is Kaua'i's fastest growing resort destination, and the service area includes several projects yet to be constructed. In particular, a major project that will be developing water supply that meets DOW standards is the master-planned project of Kukuiula. The planned Alexander and Baldwin development calls for a 200-room hotel, between 300 and 500 timeshare units, commercial space and a golf course adjacent to Kukuiula Harbor.

Table 1-4 shows the total water use and the number of service connections that are projected in the *Kaua'i Water Plan 2020* for various categories in the year 2020 for Kaua'i as a whole and the Koloa and Poipu areas, which can be compared with current values in Table 1-3.

Table 1-4
Projected Water Service Connections by Category and Water Use, Year 2020

District/ Water System	Single-Family (units)	Multi-Family/ Resort (units)	Commercial (Sq. Ft)	Industrial (Sq. Ft)	Government (Capita)	Water Use (thousands gallons per day)
Koloa	868	913	224,347	53,771	920	798
Poipu	604	3,102	86,865	0	37	2,953
Koloa+Poipu	1,472	4,105	311,212	53,771	957	3,751
Growth, 2000-2020	*65.0%*	*58.9%*	*62.3%*	*96.6%*	*61.5%*	70.0%
Kaua'i (all)	19,841	10,182	4,888,812	2,873,973	21,402	17,793

Source: *Kaua'i Water Plan 2020*, Tables 4.2 and 4.5.

As expressed in Charter of the County of Kaua'i, the Department of Waters's general plan for water sources and systems shall implement the County's General Plan, and thus needs to accommodate the growing demand for water for projects in areas with approved zoning.

1.3 Project Background

Anticipating the need for an additional well source, DOW investigated the possibility of siting a well at Mahaulepu during the early 1990s. An Environmental Assessment and Finding of No Significant Impact were prepared in 1994 for drilling of an exploratory well (see App. 2 for *OEQC' Environmental Notice Publication*, as well as other documents related to the well from this period). The 175-foot deep well, which was commenced in June and completed in November of 1998, had a 16-inch diameter steel casing in an 22-inch diameter hole. Investigations included pumping tests to determine the drawdown and recovery rates, salinity measurements, and monitoring of the adjacent Koloa Well "C" and Koloa Well "D" (see Fig. 1-1 for well locations). The well tested successfully in terms of water quality and quantity (see Section 3.1.2 for discussion of pumping tests and App. 3 for Sustainable Yield report on test well). The successful test allowed the DOW to advance the production well alternative.

1.4 Project Description

Based on the successful test and need for additional water sources, DOW now plans to convert the exploratory Koloa Well "F" (State Well No. 5425-15) to a 1,200 gallon-per-minute production well that will draw potable water from the basal aquifer. The well site will require approximately 14,000 square feet of land. Project design includes a pump, controls, control building, pipeline, and an access road to the site, with accessory drainage structures (see Fig. 1-4a and 1-4b).

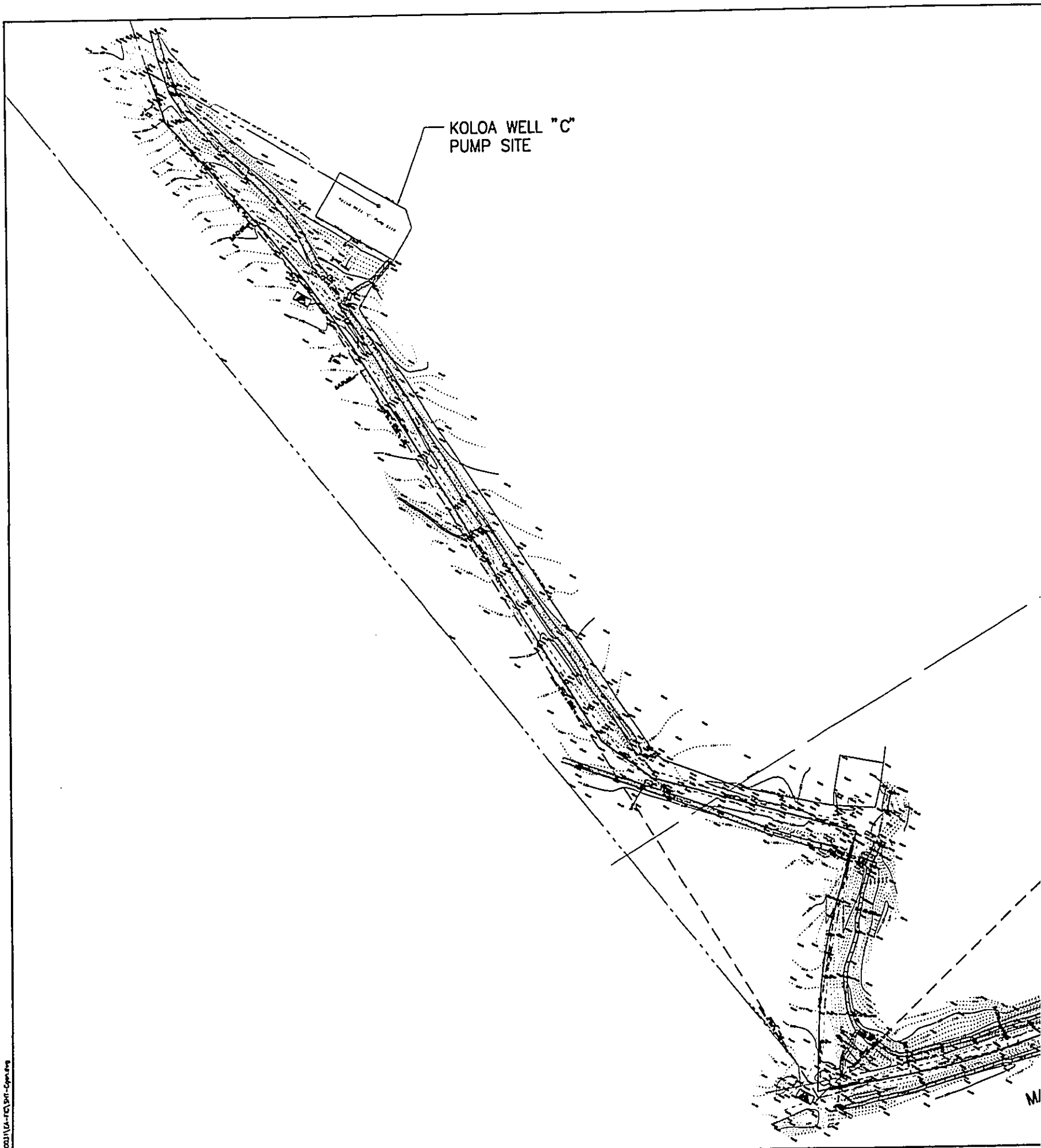
On the well site itself, equipment will consist of a vertical turbine line shaft deep well pump with a 100 hp electric motor. The 16 x 32 foot concrete control building will house the motor control center, chlorine gas disinfection equipment and attendant safety devices, and associated control panels and pumps (see Figs. 1-4b and 1-4c).

The project would also involve the installation of 3,300 linear feet of 16-inch diameter water transmission piping, along with the construction of a paved access road, electrical facilities, drain sumps, and a chain link fence and gate around the well site. Water will be pumped to the existing Mahaulepu tanks via the 16-inch ductile iron pipe that will be buried within the alignment of the well-site access road, Mahaulepu Road, and the existing access road to Well Site "C" (see Fig. 1-4a). The existing unpaved road leading to the well site, which is approximately 900 feet long, will be paved, with a 12-foot wide travel-way and shoulders that are either ten feet (on pipeline side) or two feet wide (see Fig. 1-4a). About 150 feet from the well site the access road will depart from the existing unpaved road, cross a small rise and connect to the well site.

Power to the project site will be provided by Kaua'i Electric Company via new overhead electric lines. A new radio-controlled Supervisory Control and Data Acquisition System (SCADA) located at the Mahaulepu Tanks site will communicate tank level information via radio telemetry to a similar proposed unit at Koloa Well "F".

All construction will involve implementation of Best Management Practices (BMPs) that will seek to minimize erosion and sedimentation.

Estimated design and construction costs total $1.7 million. Funds for this project have been committed from DOW's Capital Improvement Program (CIP) budget. There is a possibility that other sources of funds, public or private, may be available for this project. When necessary approvals are obtained, the project would begin construction in the year 2001 and would be complete within approximately one year. Finalization of necessary easements and property acquisition will follow final design and construction.


KOLOA WELL "C"
PUMP SITE

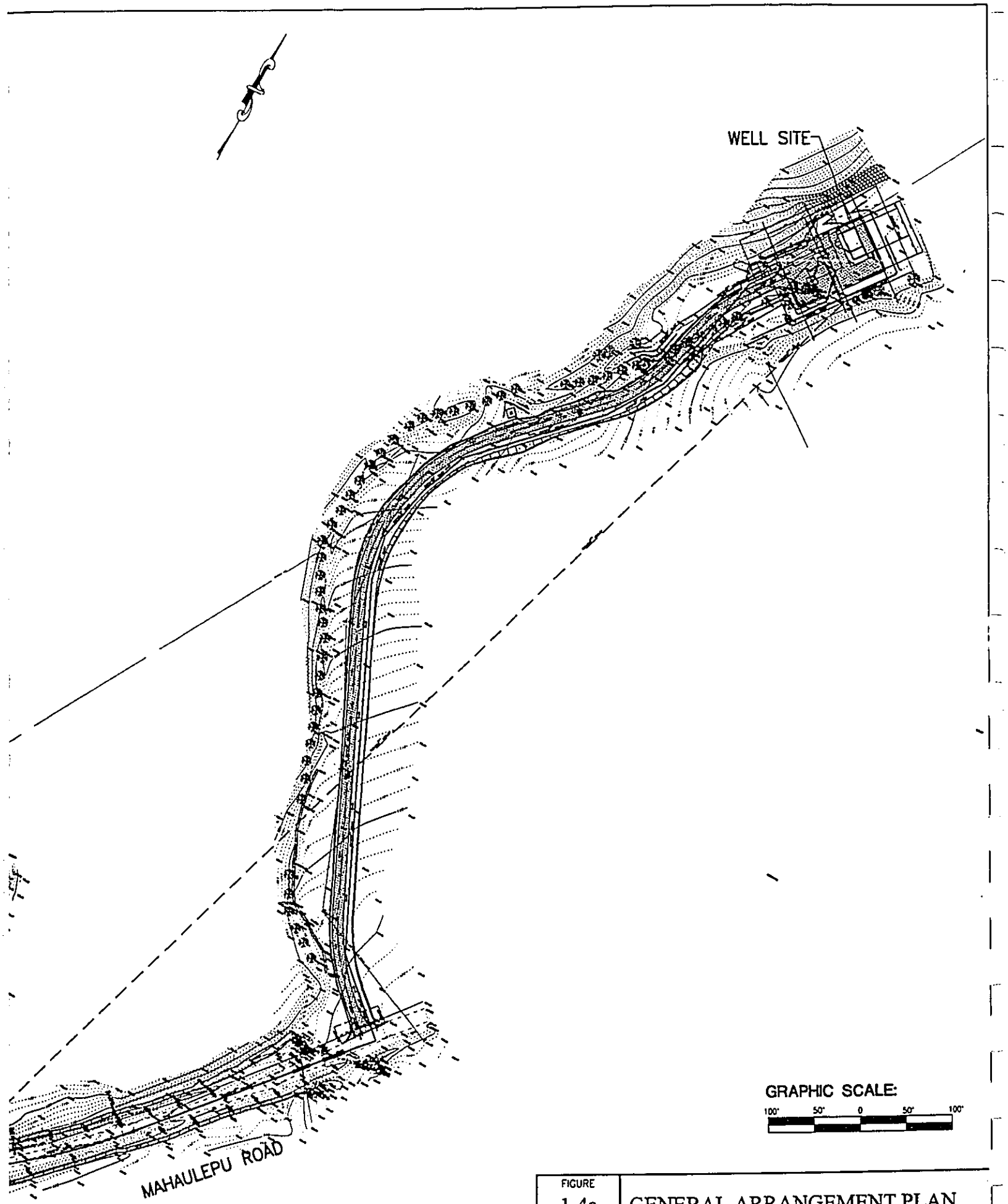
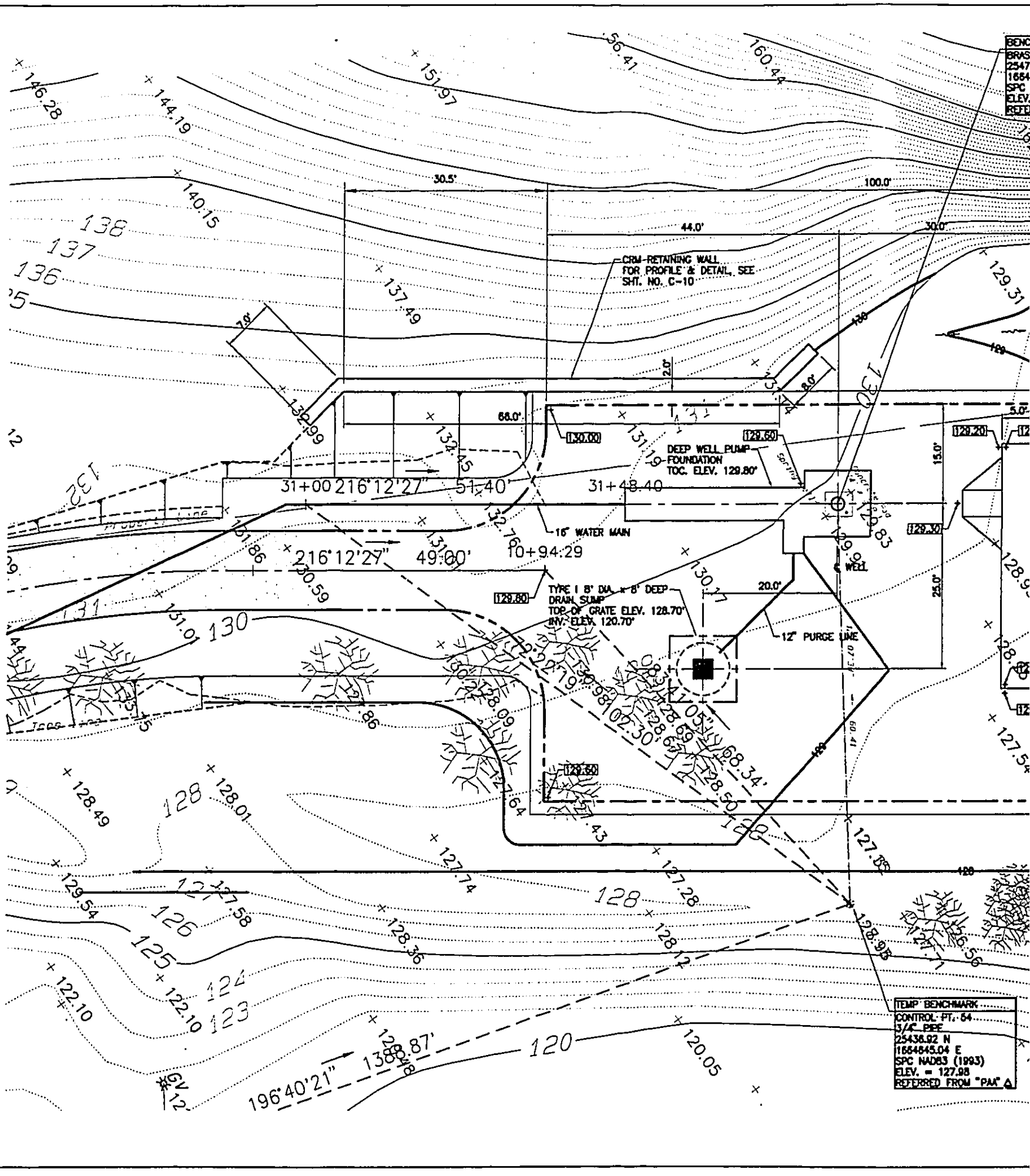


FIGURE 1-4a GENERAL ARRANGEMENT PLAN


CRM-RETAINING WALL
FOR PROFILE & DETAIL, SEE
SHT. NO. C-10
DEEP WELL PUMP
FOUNDATION
TOC. ELEV. 129.80'
16" WATER MAIN
TYPE I 8' DIA. x 8' DEEP
DRAIN SUMP
TOP OF GRATE ELEV. 128.70'
INV. ELEV. 120.70'
12" PURGE LINE
31+00 216°12'27" 51.40'
31+48.40
216°12'27" 49.00'
10+94.29
196°40'21" 138.87'
TEMP. BENCHMARK
CONTROL PT. 54
3/4" PIPE
25436.92 N
1664845.04 E
SPC NAD83 (1993)
ELEV. = 127.98
REFERRED FROM "PAA"

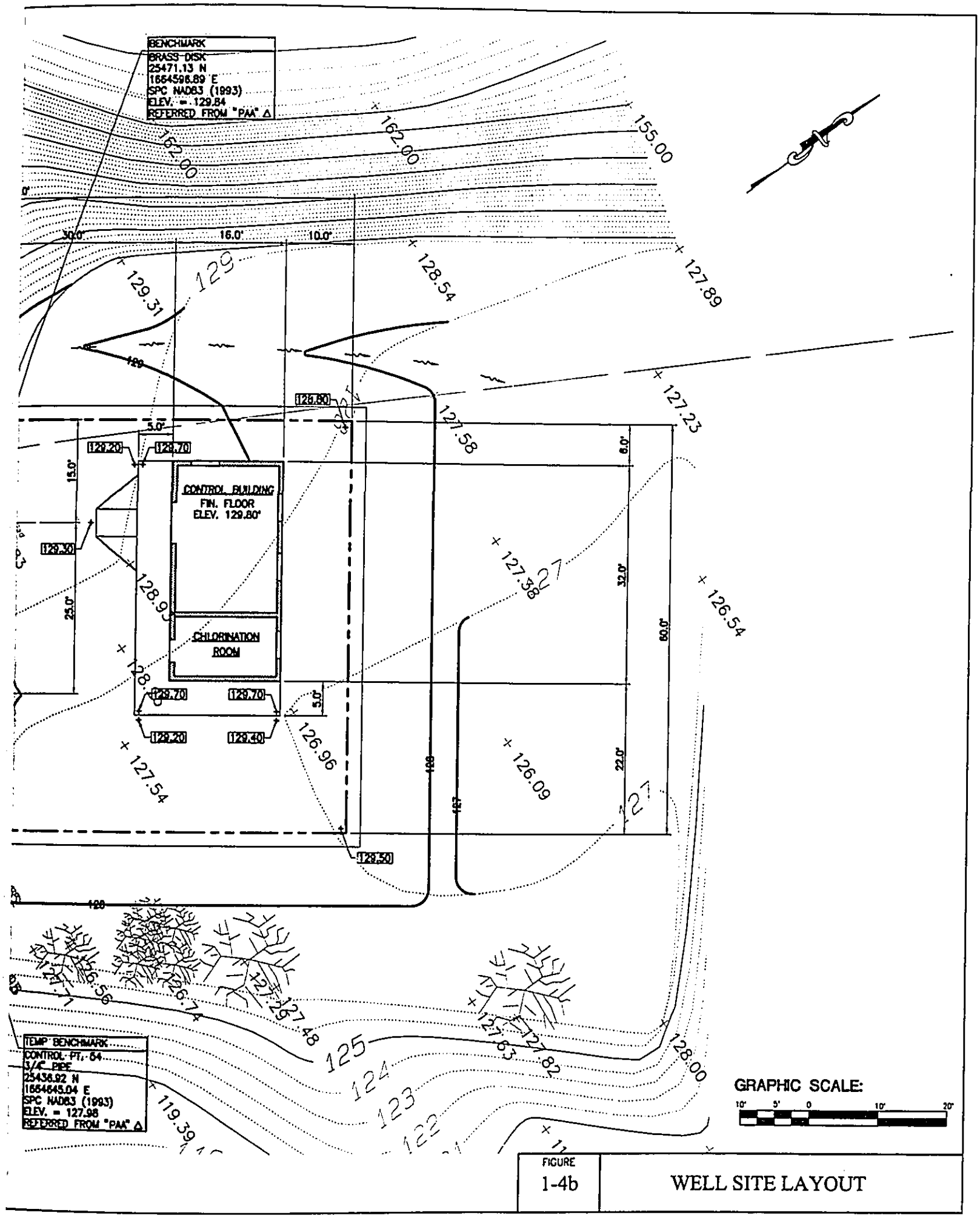
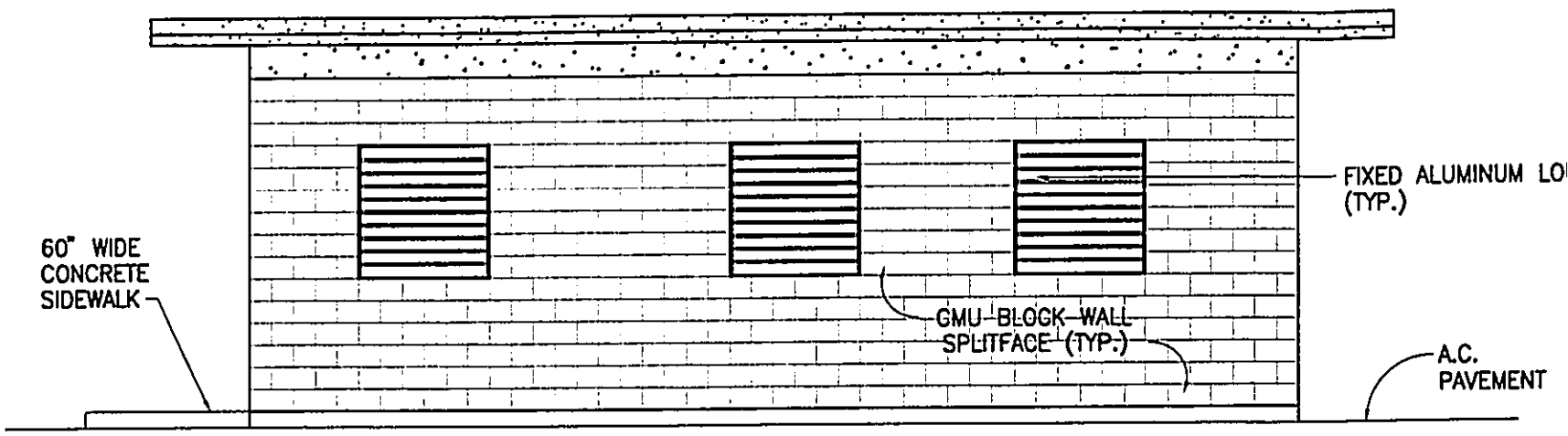
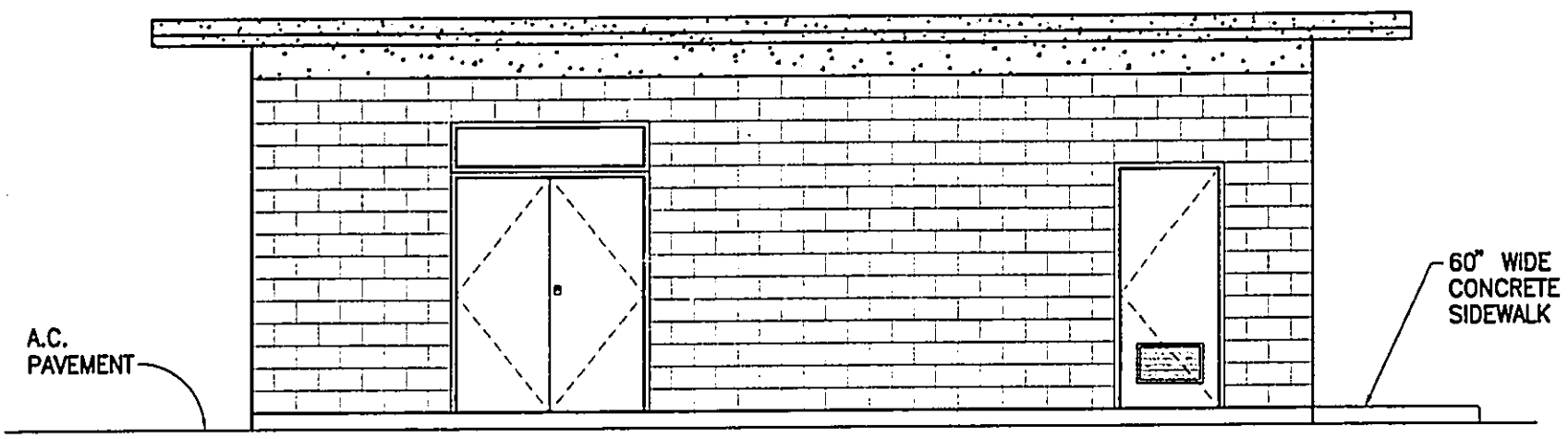


FIGURE 1-4b

WELL SITE LAYOUT



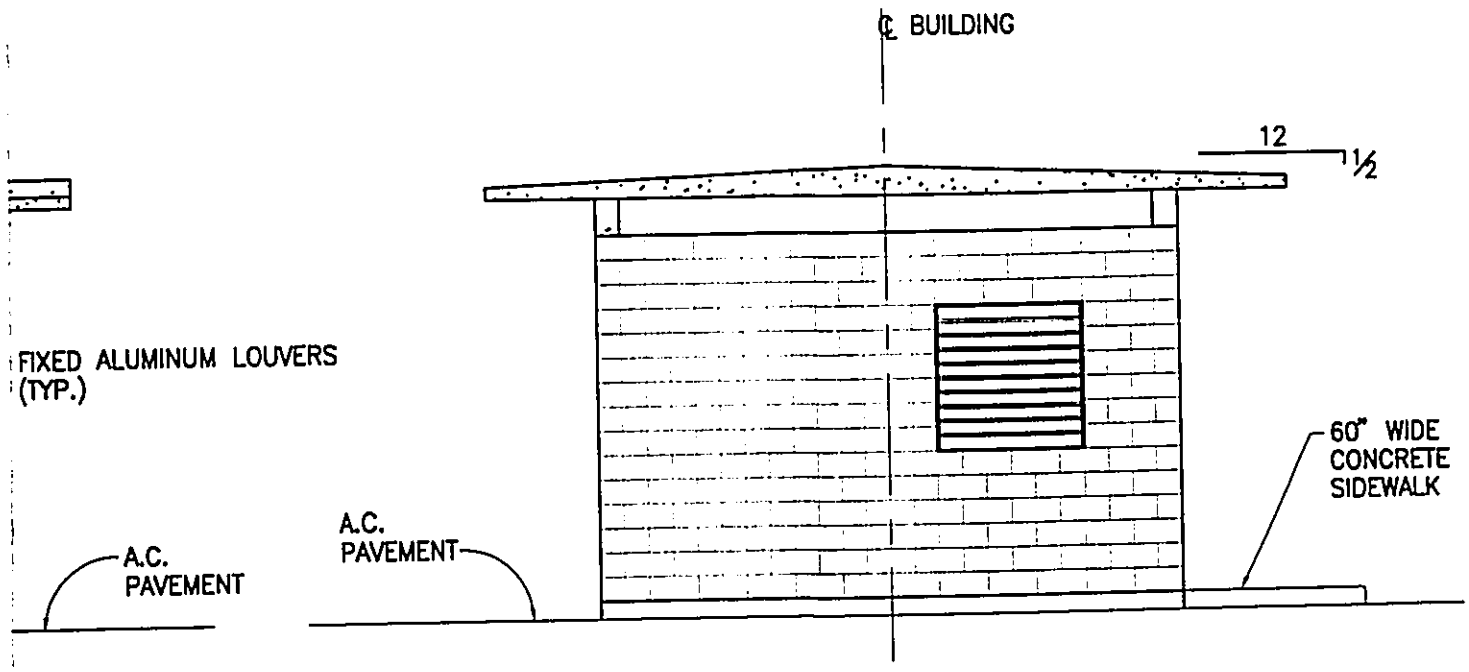
ELEVATION A



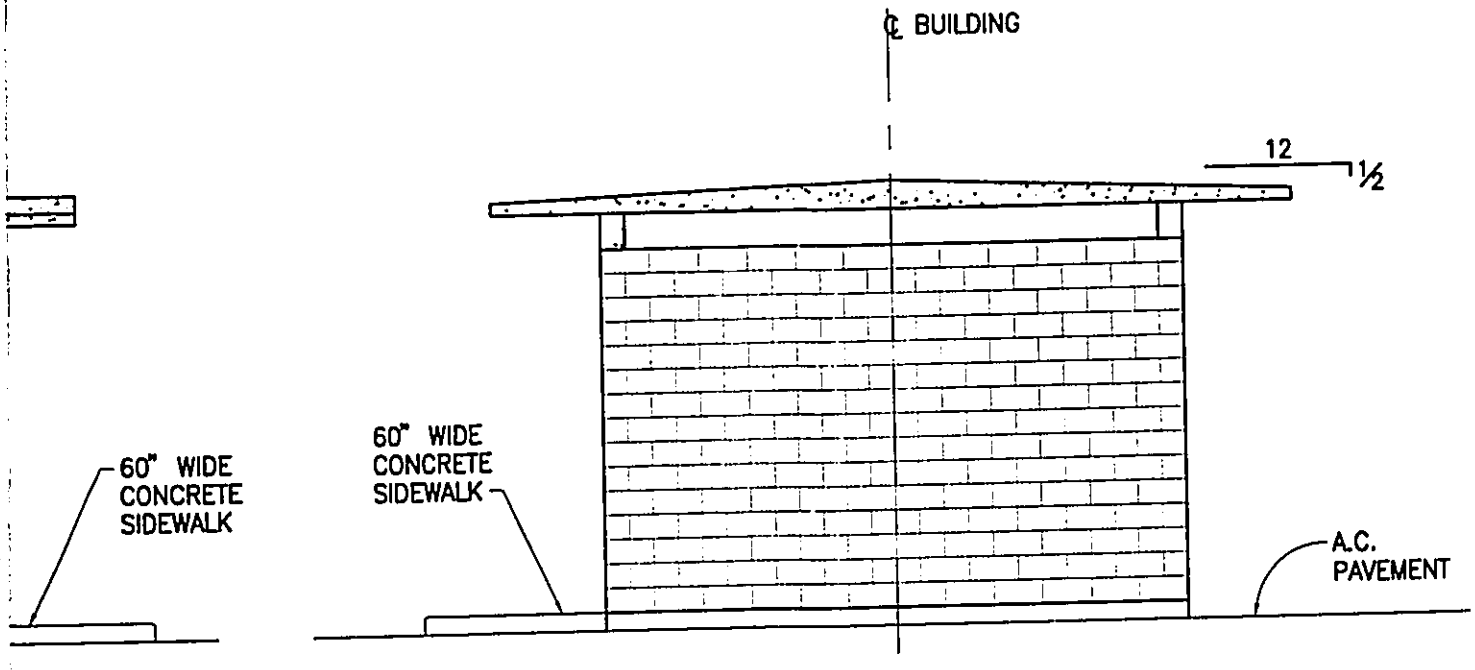
ELEVATION C

EXTERIOR E

SCALE: 1/4"



ELEVATION B



ELEVATION D

(TERIOR ELEVATIONS

SCALE: ¼"=1'-0"

GRAPHIC SCALE:

SCALE: 1/4" = 1'-0"

FIGURE	
1-4c	CONTROL BUILDING EXTERIOR ELEVATIONS

1.5 Alternatives Considered

1.5.1 Production Well Alternative

This refers to the proposed project, which is described in Section 1.4.

1.5.2 Alternative Water Wells, Catchment and Wastewater Re-Use Alternatives

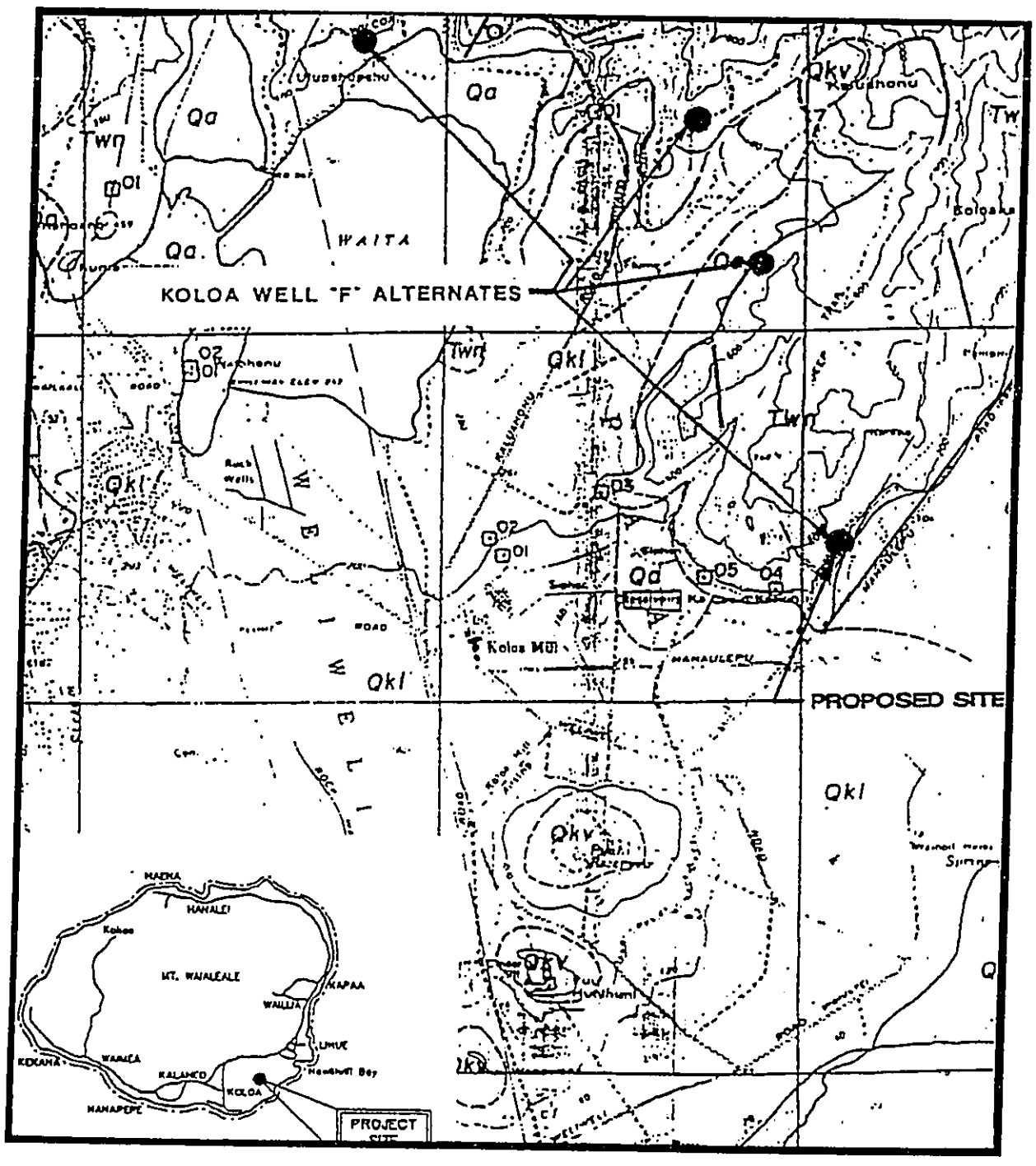
Several new alternative well sites were considered during the planning process for the exploratory well (See Fig. 1-5). The site for the proposed project was located on the basis of position in the aquifer, reduction of pumping costs, and minimization of associated infrastructure (e.g., access road and water transmission main length). More inland locations would generally put the well head at higher elevations and would thus be less efficient, resulting in higher well construction costs.

Surface water is used elsewhere in the State of Hawai'i and may be an option for certain locations in Kaua'i. However, compliance with State and federal requirements for surface water would necessitate costly water treatment plants. DOW does not presently operate any surface water treatment plants, so an additional issue would be the availability of certified water treatment plant operators.

Rainfall catchment is widely used in some parts of the State of Hawai'i. Although catchment does provide a system of last resort for drinking water, it has many drawbacks, including high maintenance costs and susceptibility to microbiological and chemical contamination. Sources of these contaminants vary from dead animals in the storage tank to roof, gutter and paint materials. The State Department of Health (DOH) recommends using catchment water for non-consumptive needs and obtaining drinking or cooking water from regulated public water systems and/or purchased bottled drinking water.

Wastewater re-use can be an important source of water, particularly for irrigation, although the treatment expenses generally elevate the cost of the water beyond the budget of agricultural users. In situations with critical water shortages, the cost of treated wastewater can be borne by municipal users, who then are able to utilize surface water or groundwater that would otherwise be used for irrigation. Such measures would appear to be unnecessary for the Koloa Aquifer. It is important to note, however, that wastewater from several resorts is being used to irrigate golf courses in various locations on Kauai (Shade 1995:15).

Figure 1-5
Alternative Well Sites Considered During Exploratory Well Planning



Scale: 1 inch = 2,000 feet. N ▲
Source: Final EA for Exploratory Drilling and Testing of Koloa Well "F", 1995.

DOW considers desalination, an energy-intensive and expensive process, to be unjustified for cost reasons on Kaua`i and unnecessary to consider when better options exist.

1.5.3 Optimize Distribution of Existing Potable/Non-Potable Supplies

There are currently no non-potable systems available for use by DOW in the Koloa-Poipu system. Delivery of non-potable water would require dual distribution systems, which would be cost-prohibitive. It should be noted that through private wells and wastewater re-use, a number of users of non-potable water already supply their own needs.

1.5.4 Conservation/Demand Side Strategies Alternative

According to the *Kaua`i Water Plan 2020*, current conservation activities at DOW include the following:

- *100 percent customer metering*. All customer accounts are metered.
- *Meter repair/replacement programs*. Testing, repair and replacement of water meters are done on a systematic basis.
- *Water analysis/reports*. The difference between metered source production and metered sales to consumers is monitored to determine whether a leak detection program is justified.
- *Leak detection programs*. DOW conducts case-by-case investigations and repair for suspected sections of leaking pipelines.
- *Tank overflow controls/alarms*. These facilities prevent system losses from unnecessary overflows.
- *Plumbing code regulations*. The County Plumbing Code was amended in 1993 to require water-efficient fixtures in all new construction, a policy which, DOW believes, will provide the greatest reliable savings in indoor water use. The Code also requires pressure reducing valves to maintain a maximum 80-pound per square inch building service pressure, which results in lower leak rates and water on plumbing fixtures and pipelines.
- *Voluntary water restriction notices*. DOW requests voluntary water conservation during dry periods and emergency water outages.
- *Public education outreach/education programs*. Exhibits in trade shows, the County fair, and public schools, among other venues, allow DOW to share information about the potable water system and water conservation.

The existing and future water conservation programs are expected to reduce future water demand. In particular, an island-wide reduction in non-metered water use is expected to be realized. The *Kaua`i Water Plan 2020* demand projections incorporate these anticipated savings.

Furthermore, DOW has prepared a water conservation plan as guidance for meeting long-range water conservation goals, based on the federal Environmental Protection Agency's (EPA) water conservation guidelines. The EPA guidelines emphasize goal-oriented planning that can help water systems improve their capacity to provide safe and reliable water service, as well as to eliminate, downsize or delay infrastructure projects. The plan integrates a number of strategies to help reduce water island-wide demand by an average of 2.2 mgd.

Rather than an alternative to developing new sources, water conservation is seen by DOW as an integral and ever-increasing part of its strategy to provide safe, affordable and reliable water service to the island of Kaua'i in a sustainable and financially secure manner.

1.5.5 Selection of Project Alternative

DOW has determined that the most rational and efficient strategy for dealing with the growth in water demand in the Koloa-Poipu area is to convert the exploratory well to production. The decision to advance this alternative was based on satisfaction of the following criteria:

- The exploratory well provides water of a quality that meets DOW requirements
- The well can produce at a sustainable yield at a pumping rate of 1,200 gpm
- No substantial adverse environmental effects would result from the use of the well
- No alternative sources (such as catchment, wastewater reuse, or desalination) would provide a practical or economical source of potable water in this service area

1.6 Consistency with Government Plans and Policies

1.6.1 Hawai'i State Plan

The Hawai'i State Plan was adopted in 1978. It was revised in 1986 and again in 1991 (Hawai'i Revised Statutes, Chapter 226, as amended). The Plan establishes a set of goals, objectives and policies that are meant to guide the State's long-run growth and development activities. The proposed project is consistent with State goals and objectives that call for increases in employment, income and job choices, and a growing, diversified economic base extending to the neighbor islands.

The sections of the Hawai'i State Plan most relevant to the proposed project are centered on the theme of facility systems. The following objectives and policies are taken from the section dealing with water development.

- Objective a): Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to

adequately accommodate domestic, agricultural, commercial, industrial, recreational and other needs within resource capacities.

- Objective b: To achieve the facility systems water objective, it shall be the policy of this State to:
  - (1) Coordinate development of land use activities with existing and potential water supply.
  - (2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.
  - (3) Reclaim and encourage the productive use of runoff water and wastewater discharges.
  - (4) Assist in improving the quality, efficiency, service and storage capabilities of water systems for domestic and agricultural use.
  - (5) Support water supply services to areas experiencing critical water problems.
  - (6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.

The proposed project supports all relevant objectives and policies of the Hawai'i State Plan.

1.6.2 Hawai'i State Water Resources Development Plan

The purpose of the *Hawai'i State Water Resources Development Plan* (Hawai'i DLNR 1980) is to set forth specific objectives, policies, programs and projects to guide State and County governments. In summary, this plan presents guidelines for development of water resources for municipal, agricultural and industrial requirements; preservation of ecological, recreational, and aesthetic values and quality; and regulation of the use of water to assure adequate supplies for the future. The proposed project would develop a municipal water source in a rational manner for planned growth and would not adversely affect ecological, recreational or aesthetic values. The project is thus consistent with the basic guidelines of the plan.

In particular, the following objectives, policies and implementing actions are noteworthy:

Objective A. Assure adequate municipal water supplies for planned urban growth.
Objective B. Support long-range municipal water supply planning by the counties.
Objective C. Promote municipal water conservation.
Objective D. Improve drinking water quality.
Objective E. Upgrade rural water systems.

Because there is no threat of exceeding sustainable levels of withdrawal from Kaua'i's aquifers, no part of Kaua'i has been declared a Groundwater Management Area by the State Commission on Water Resources Management.

1.6.3 Kaua'i General Plan

The *Kaua'i General Plan* (KGP) (Kaua'i County, Dept. of Planning: 2000) fulfills legal mandates of State law and the Charter of the County of Kaua'i. More importantly, it provides guidance for land use regulations, the location and character of new development and facilities, and planning for County and State facilities. The current plan was adopted by ordinance in 2001. In overview, the plan calls for preserving agricultural and conservation land, promoting agriculture and aquaculture, and recognizes the need to concentrate urban development into certain areas in order to minimize traffic and avoid urban sprawl. In particular, the "Kaua'i 2020 Vision Statement" component aims for a future in which "...new residential communities are centered around existing major towns and job centers in Lihue and Koloa-Poipu" (Kaua'i County Department of Planning 2001). The proposed project would fulfill this aspect of the plan by contributing to the supply of potable water available to serve growth in areas that have been designated for growth.

Section 7.4 of the plan deals with the water supply system. The plan states that although the individual systems in general have adequate source and storage capacity to support the existing maximum water demand and provide storage for fire emergencies, many systems operate at or near capacity. The plan recognizes that most of the water systems require expansion in order to accommodate planned growth. General Plan policies and actions call for DOW to plan its services and facilities in coordination with General Plan policies and guidelines, e.g., supporting compact development by giving priority to water supply improvements for existing and planned Urban Center, Residential Community, and Resort Areas, while also supporting development in already-established Agricultural Communities.

As stated above, the proposed project would contribute to the supply of potable water available to serve growth in areas that have been designated for growth, and is thus not inconsistent with the General Plan's policies and implementing actions.

2 ENVIRONMENTAL ASSESSMENT PROCESS

The project involves the use of County of Kaua`i funds, and therefore requires compliance with Chapter 343, Hawai`i Revised Statutes (HRS), the Hawai`i Environmental Policy Act (HEPA). The Kaua`i County Department of Water (DOW) is the proposing agency for this Environmental Assessment (EA).

HEPA was enacted by the Hawai`i State Legislature to require State and County agencies to consider the environmental impacts of various actions as part of the decision-making process. Agencies are required to conduct an investigation and evaluation of alternatives as part of the environmental impact analysis process, prior to making decisions that may impact the environment. The implementing regulations for HEPA are contained in Title 11, Chapter 200, Hawai`i Administrative Rules (HAR).

This Environmental Assessment (EA) process was conducted in accordance with HEPA. According to HEPA and its implementing regulations, a Draft EA is prepared to document environmental conditions and impacts, to develop mitigation measures that avoid, minimize or compensate for adverse environmental impacts, and determine whether or not an action has significant impacts upon the environment. Impacts are evaluated for significance according to thirteen specific criteria as presented in HAR 11-200-12. If no significant impacts are expected, then a Final EA with a Finding of No Significant Impact (FONSI) may be issued. When the Draft EA determines that significant impacts are present, then a Notice of Intent is prepared and the Final EA facilitates preparation of an Environmental Impact Statement (EIS).

The environmental assessment process for this project includes preconsultation with agencies and organizations, preparation of the Draft EA, circulation of the Draft EA to various parties with interest, expertise or jurisdiction, and consideration of comments to the Draft EA.

Notice of the availability of the Draft EA was published by the Hawaii State Office of Environmental Quality Control (OEQC) in the Environmental Notice of 8 August 2001. This initiated a 30-day comment period during which the public was invited to respond to the Draft EA with comments or questions. Five comment letters were received. The letters and the responses to them are included in Appendix 1B. The Final EA has been revised in various sections to incorporate revisions based on issues discussed in these letters. Areas where information has been added to Final EA are denoted by double underlines, as in this paragraph.

Based on analysis of the Draft EA and comments to it, the Kaua`i DOW has determined that no significant impacts would occur from implementation of the proposed action and has issued a Finding of No Signficant Impact (FONSI). The findings regarding the significance criteria listed in HAR 11-200-12 are presented in Section 6.

3 ENVIRONMENTAL SETTING AND IMPACTS

This section describes the existing social, economic, cultural, and environmental conditions surrounding the proposed project along with the probable impacts of the proposed action and mitigation measures designed to reduce or eliminate adverse environmental impacts. For many categories, the No Build Alternative would result in no impacts. Therefore, unless explicitly mentioned, discussion of impacts and mitigation relates to the Build Alternative only.

Basic Geographic Setting

The proposed well site is on low rise at the base of a 500 foot high ridge on the western edge of Mahaulepu valley, at an elevation of approximately 130 feet above sea level (Fig. 1-2). It is surrounded to the north, east, and south by former sugar cane fields now used for various crops (Fig. 1-3). The site is about a mile east of the former McBryde sugar mill at Koloa and over two miles from the towns of Koloa and Poipu. The surface geology of the valley floor consists of alluvium from the surrounding hills. The topography is relatively flat and the area is primarily vegetated with alien trees, shrubs and grasses. Annual rainfall averages approximately 60 inches (U.H. Hilo-Geography 1998:56).

3.1 Physical Environment

3.1.1 Surface Geology, Hazards, and Soils

Existing Environment

The island of Kaua`i is the oldest of the main islands in the Hawaiian chain, formed from a single volcanic dome near Mt. Waialeale, with another eruptive center at Haupu (UH Hilo Geog.1998).

In terms of seismic risk, the entire Island of Kaua`i is rated Zone I Seismic Probability Rating (*Uniform Building Code, 1997 Edition*). Zone I areas are at only minor risk from earthquake damage. The site is located at the base of a ridge (Fig. 1-3a). No evidence of active landslides, rockfalls, or mass wasting is present.

Soil at the well site and well site access road is classified as Pakala clay loam, 2-4 percent slopes. This well-drained soil is found on bottom lands and alluvial fans. It is used for sugar cane, pasture and truck crops. The surface layer consists of a dark reddish brown clay loam about 16 inches thick. The next layer is similar but sandier and more massive and typically 6 inches thick. A loam layer that is variable in thickness and composition underlies this. Permeability is moderate, runoff is slow, and erosion hazard is slight (U.S. Soil Conservation Service 1973). Various agricultural soils with somewhat similar characteristics are found on the areas that will be traversed by the water main or used for other accessory features.

Lava tubes are associated with pahoehoe lava flows. Some of the lava tubes are large enough and have openings for human entry, and may thus be classified as caves. Lava tube caves in Hawai'i may have value as historic sites, recreation areas, as or unique geological features, or for other reasons. Test borings and analysis conducted as part of geotechnical investigations at the project site have determined that residual and alluvial soils underlie the surface to a depth of at least 15 feet. No voids of any type were encountered, and it is unlikely that any caves are present in areas affected by project activities.

Impacts and Proposed Mitigation Measures

In general, geologic conditions impose no constraints on the construction and operation of the project. No active mass wasting hazard appears to be present. All construction will conform to the requirements of the Uniform Building Code in order to avoid seismic damage.

The soil and rock found in the substrate is generally suitable for construction of the well buildings, access road, and all other accessory features. Geotechnical investigations determined that near-surface clayey soils with high expansion potential are present at the well site. Therefore, the subgrade soils beneath the concrete slabs for the control building will be properly prepared and capped with at least two feet of aggregate sub-base, which will extend at least one foot laterally beyond the slab. This will ensure a proper foundation for the control building.

In the unlikely event that a lava tube cave is encountered during construction, all construction with the potential to impact the lava tube will immediately cease; the appropriate personnel at DOW will be contacted; these personnel will inspect the cave or through other means determine whether to contact the State Historic Preservation Division and the U.S. Geological to determine whether burials are present and whether the lava tube cave has special geological, biological or other value that merits investigation.

3.1.2 Subsurface Geology and Hydrology

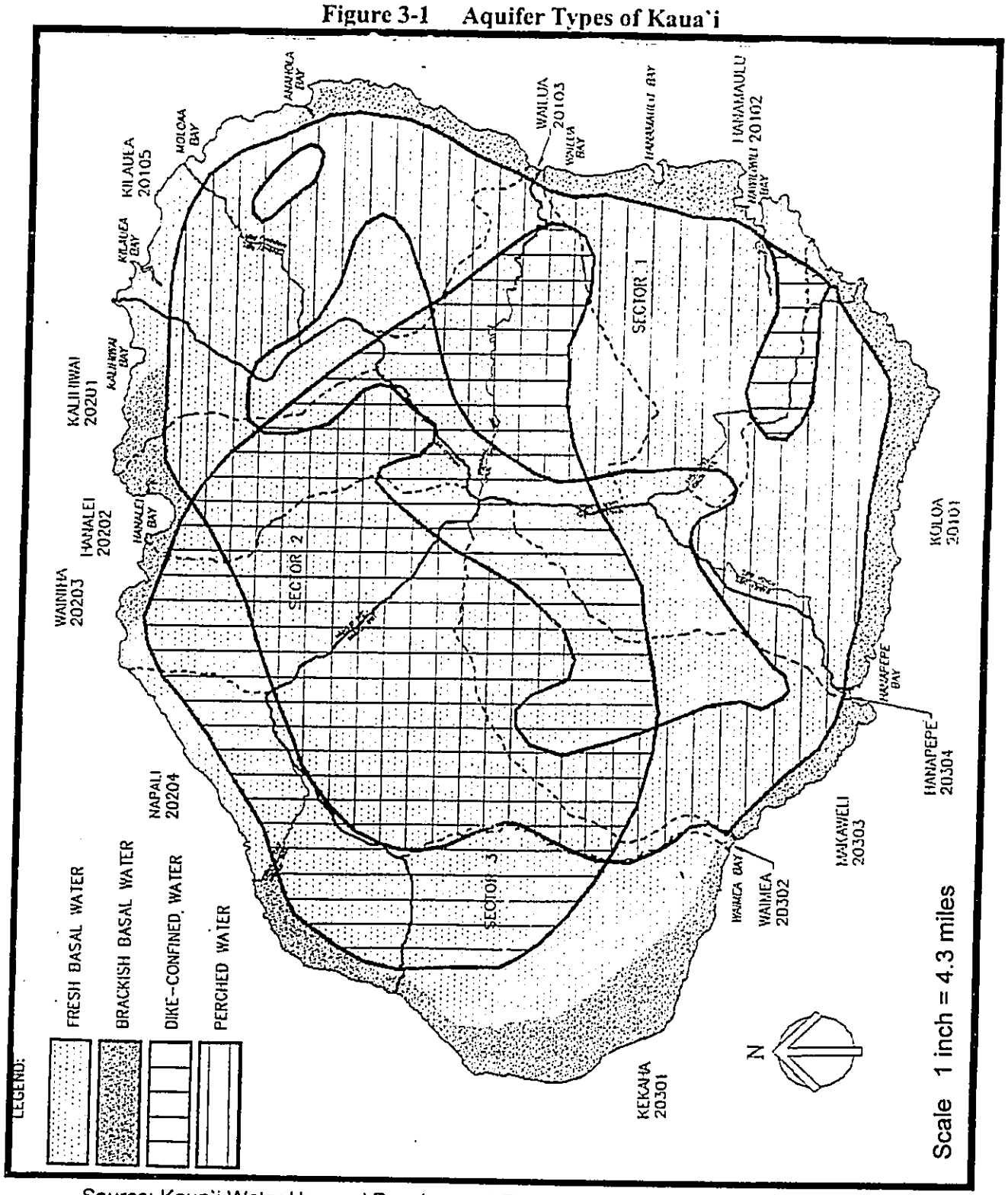
Existing Environment

Hydrogeological Setting

The island of Kaua`i consists essentially of a single volcanic dome. Lava flows dip outward in all directions from the principal volcanic center near Mt. Waialeale. The dome is slightly elongated in a northeast-southwest direction, and a slight bulge is present on the southeastern slope from a secondary eruptive center at Haupu. Kaua`i has several types of aquifers, the most extensive of which is the basal freshwater lens that floats on seawater under much of the island. It is confined in places by caprock that intermittently rings the coastline. Less widespread is groundwater confined between vertical rock structures called dikes. A third type less with far lesser volumes is groundwater held up, or "perched", on horizontal impermeable beds such as volcanic ash. The distribution of these types around Kaua`i is shown in Figure 3-1.[1]

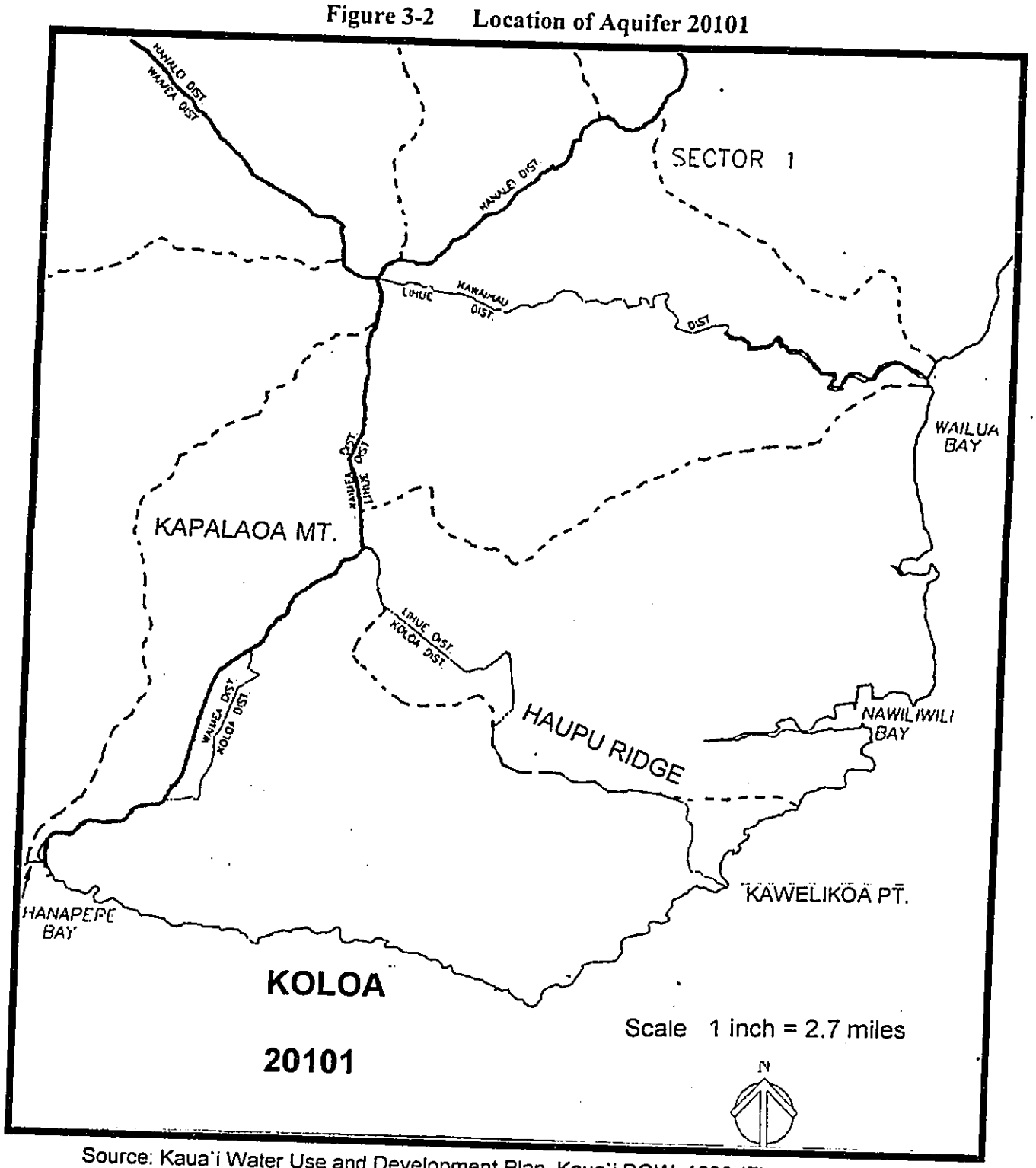
[1] Another type of groundwater has recently been identified by the U.S. Geological Survey in the Lihue Basin of Kaua`i and on Maui and may occur elsewhere. The vertically extensive fresh water body may extend from below sea level to hundreds or even thousands of feet above sea level (*USGS Water Resources Investigations Reports* 98-4142, 99-4090).

Figure 3-1 Aquifer Types of Kaua`i



Source: Kaua`i Water Use and Development Plan, Kaua`i DOW, 1990 (Fig. 1a)

Figure 3-2 Location of Aquifer 20101



Source: Kaua'i Water Use and Development Plan, Kaua'i DOW, 1990 (Fig. 2)

The State Commission on Water Resources Management (CWRM) classification of aquifers locates the Koloa area within Aquifer 20101 (Fig. 3-2). This coding refers to the Kaua`i Island (2), Aquifer Sector (01), and Aquifer System (01). The surface boundaries of the aquifer follow roughly the boundaries of the Koloa District: starting from the summit of Kapalaoa Mountain at 3,310 feet above sea level, the boundary extends southeast to and along the Haupu ridge to the coast at Kawelikoa Point; from Kapalaoa Mountain the boundary also extends southwest along a subtle ridgeline to Hanapepe Bay. The aquifer encompasses the towns and agricultural fields of Koloa, Lawai, Poipu and Kalaheo, and the drainage basins of Wahiawa and Lawai Streams. The surface drainage network has been extensively modified through a series of ditches constructed for sugar cane agriculture.

The characteristics of this aquifer are determined by the regional geology. The Koloa area was formed by lavas of the Napali formation of the Waimea volcanic series. The surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level (see App. 3). The Mahaulepu valley floor is filled with alluvium from surrounding hills that extends generally to about 60 feet under the surface, underlain by highly weathered lava. Makai of the well, the alluvium is underlain at a shallow depth by secondary eruptions of the Koloa series. A number of intrusive rocks, primarily dikes, are also in evidence within the Napali formation near the Koloa wells. The extent of dike formations in the vicinity of Koloa Well "F" is uncertain, as none are clearly in evidence. The fact that barometric responses have been repeatedly observed in all of the well levels indicates that this is a confined aquifer. Tested water levels around the aquifer vary from as high as 169 feet above sea level (at Pua Kukui) to about 25 feet above sea level at Koloa Wells "C", "D" and "F". The manner of confinement is not yet defined. The confinement may occur at the weathered face where the aquifer dips below sea level under the coastal Koloa flows, or dikes may be confining the aquifer. There is no evidence of ocean tides driving water level changes.

The recharge area for the aquifer is assumed to consist of essentially the surface area contained within the boundaries of the aquifer system. The extent of contribution from or leakage into adjacent aquifer systems is not known, but because the aquifer system is bounded by topographic ridges, this is not expected to be substantial.

Current Estimated Sustainable Yield, Installed Capacity and Water Use

The sustainable yield of the Koloa Aquifer (20101) is estimated at 30.0 mgd (Source: Hawai`i State Commission on Water Resource Management [CWRM]).

CWRM maintains a database of wells that provides information on, among other aspects, the aquifer identity, user identity, installed capacity, chloride content, and purpose of use (http://www.state.hi.us/dlnr/cwrm/data.htm). The database does not provide information on current pumpage, which instead is kept in a separate database and is derived from reports from

individual well operators. Because not all well operators report their use in a timely manner, pumpage data are often not complete or up to date.

The database has a register of 40 wells within the Koloa Aquifer. A number of these wells are no longer in use or are used for observation only. The total installed capacity (i.e., the amount of water a well is capable of withdrawing at maximum pumpage rates) of the wells listed in the database is 59.074 mgd. Another recently permitted well not yet listed in the database has an installed capacity of 2.88 mgd (CWRMS personnel, pers. comm. to author, 3/29/01), bringing the total to 61.954 mgd.

Most of the installed capacity relates to saline, brackish and/or inactive wells. Of the total installed capacity, 20.36 mgd is the total capacity of four saline water wells used for industrial cooling by Citizens Utilities. Actual pumpage is unknown, but Kaua`i Electric reports that the total amount allowed per permit is 16.20 mgd (C. Koide, Kauai Electric, pers. comm. to author, March 2001); whereas a U.S. Geological Survey paper on water use on Kauai in 1990 (Shade 1995:15) reports somewhat greater levels. Pumpage of water from these saline wells in unlikely to have any substantial effects on the aquifer.

Another 21.43 mgd in installed capacity is related to irrigation wells formerly operated by McBryde Sugar and/or Grove Farm. According to officials of Grove Farm, almost none of these wells are currently in use, as irrigation needs can now be met by the more economical gravity-fed surface water. Kaua`i Coffee uses State Wells No. 5530-02 and 5529-01, with a total listed installed capacity of 2.20 mgd; pumpage reports filed with the CWRM for 1999 and 2000 indicate that use varies seasonally but averages about 0.394 mg.

There is currently an installed well capacity of 5.99 mgd dedicated to municipal use (DOW records). Pumpage records filed with CWRM for three different three-month periods in 1998 and 1999 indicate that DOW pumpage averaged approximately 3.886 mgd for the eight wells within the Koloa Aquifer that were active during these periods.

Various estimates of the quantity of groundwater derived from the Koloa Aquifer exist. A U.S. Geological Survey report from 1990 estimated that 9.64 mgd were being withdrawn (Shade 1995:21). In 1990, the *Kaua`i Water Use and Development Plan* researched the total amount of fresh water drawn from the aquifer by all wells and estimated a higher figure of 16.25 mgd (Kaua`i DOW 1990: Fig. 5). This plan also projected forward, accounting for expanding municipal and decreasing irrigation demand, and estimated that by 2020, 10.34 mgd of irrigation water and 4.89 mgd of municipal water (for a total of 15.23 mgd) would be withdrawn from the aquifer (DOW 1990: Table 8).

Existing Water Quality

The Kaua'i DOW regularly conducts microbiological analysis and contracts for extensive chemical testing in order to comply with U.S. Environmental Protection Agency (EPA) and Hawai'i State standards. Table 3-1 depicts the contaminants tested for and the frequency of testing.

Table 3-1
Summary of Current Water Quality Monitoring Requirements

Constituent	Sample Location	Sample Frequency
Bacteriological	Distribution system	Monthly; number of samples dependent on population served
Inorganic Chemical (IOC) and Physical	Entry point to distribution	Every 36 months for groundwater sources
Asbestos	Source/distribution along AC pipe	First 3-year compliance period of 9-year cycle
Nitrate	Entry point to distribution	Annually
Lead and copper	Customer taps	Annually, number of samples dependent on population served
Sodium	Entry point to distribution	Every 36 months for groundwater sources
Trihalomethanes	Distribution (one extreme end)	Variable
Organic chemicals - Volatile (VOC) and Synthetic (SOC)	Entry point to distribution	Once each compliance period (3 yrs.) if approved by DOH
Radionuclides	Source	Every 48 months (normally)

Source: Kaua'i DOW, from National Primary Drinking Water Standards. Hawai'i Administrative Rules - Title 11, Chapter 20, Rules Relating to Potable Water Systems.

Data from the Koloa-Poipu potable water system for the period from 1994 through 1999 indicate that the system was compliant with current drinking water standards (Source: *Kaua'i Water Plan* 2020:7-38). In general, most contaminants were non-detectable. Chromium, nitrate, sodium and copper were detectable at levels less than their respective Maximum Contaminant Levels (MCLs). Occurrence of these elements probably resulted from erosion of natural deposits and, in the case of copper, corrosion of building piping. In addition, fecal coliform was found to be present in certain samples in 1997. Though the source of the contamination was not discovered, subsequent samples have revealed no contamination above MCLs, and the system remained compliant with standards.

The area near Koloa Well "F" has few apparent sources of potential contamination, other than agriculture. The nearest past or present residential, commercial or industrial operations are approximately a mile away, at the former McBryde Sugar Mill. No landfills, individual wastewater units, hazardous waste sites, dry wells or injection wells, appear to be present within one mile of the well.

Water quality data from the exploratory well on file with DOW reflect this lack of contamination. Furthermore, water quality records from the drilling report of a nearby well, Koloa Well "D", drilled in 1981, also indicate water of high quality with no contaminants above standards recorded.

Impacts and Mitigation Measures

Hydrologic Impacts

Although the installed well capacity of over 60 mgd exceeds the sustainable yield of 30 mgd, most of the installed capacity relates to inactive or little used irrigation wells and saline industrial wells. As discussed above, the actual pumpage of all fresh water wells in the Koloa Aquifer has been, and is projected to remain, well below 20 mgd, with our without Koloa Well "F".

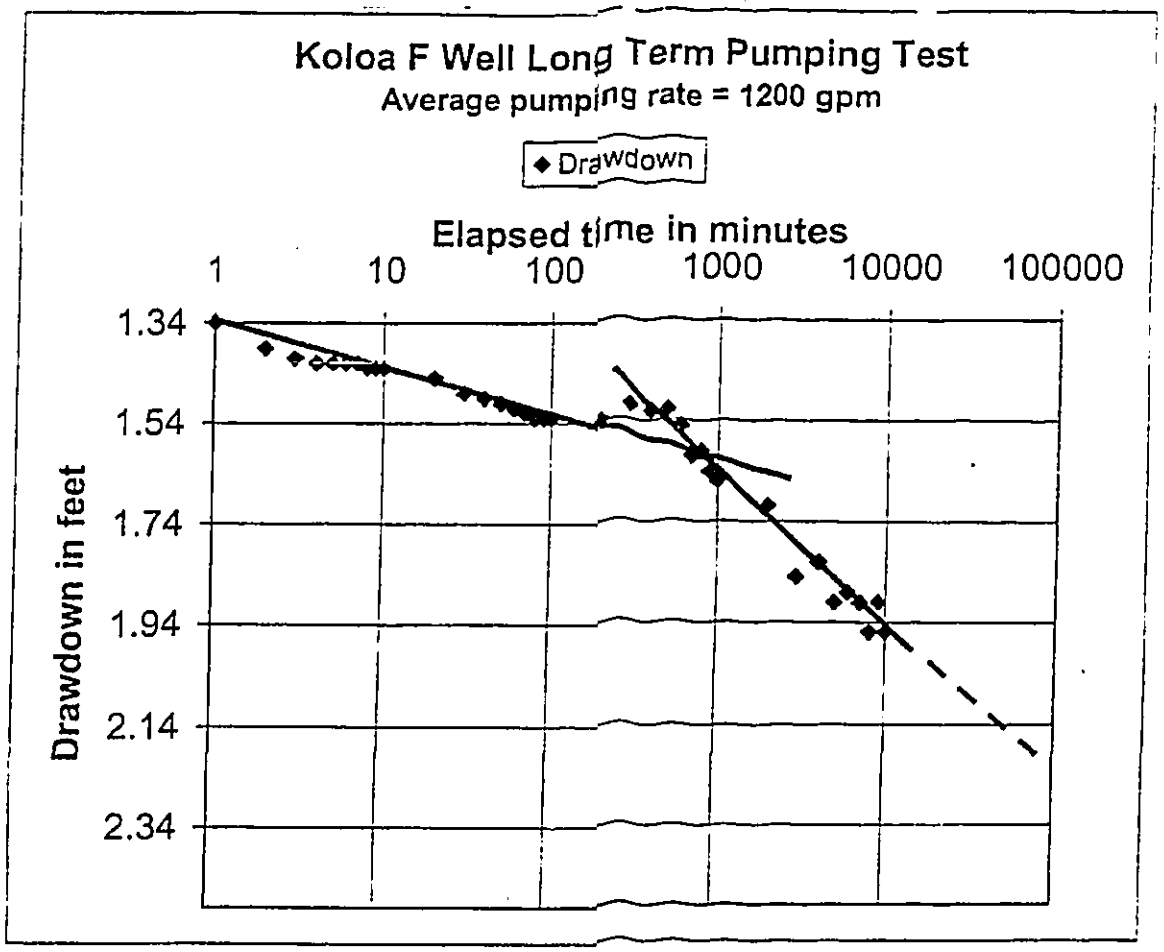
The results of a pump test are shown graphically in Figure 3-3, which illustrates the drawdown that occurred at an average pumping rate of 1,200 gpm from October 27 to November 4, 1998. The change in drawdown rates evident between 100 and 1,000 minutes is an indicator of a discharge boundary, which occurs when the cone of influence (the 3-dimensional, subsurface space where water is actively moving as a result of pumping) reaches either a zone of lower permeability or a pumping well. In this case, hydrologists determined that it was most likely the former, specifically, the weathered subsurface slope facing Mahaulepu valley or dikes.

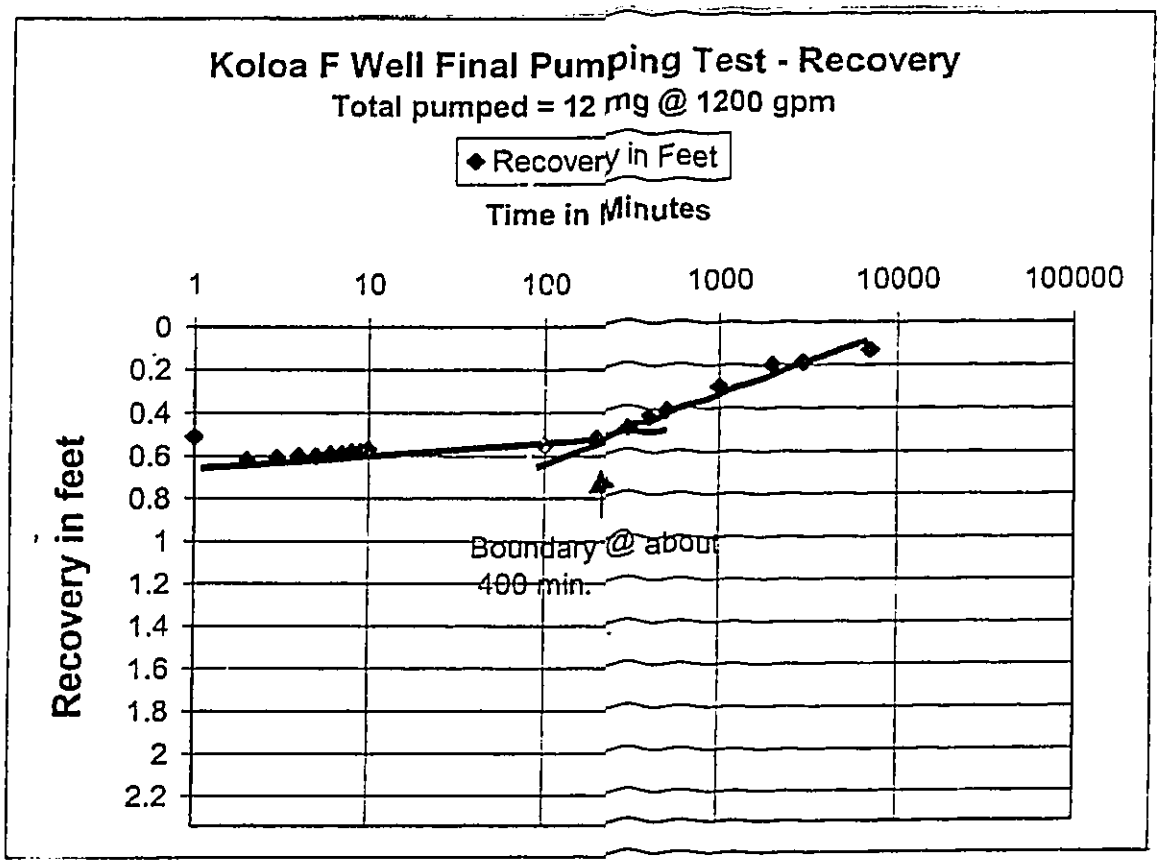
Hydrologic calculations based on the test indicate that the water level would continue to drop and reach about 2.24 feet of drawdown after 100,000 minutes.

Based on the pump tests, the consulting hydrologist made the following conclusions:

- The specific capacity of the well is at least 732 gal./ft. at 1,396 gpm (gallons per minute).
- The sustainable yield under present regional pumping conditions exceeds 1.7 million gallons per day (mgd).
- Salinity would not be of any significance at any reasonable pumping rate.
- There appears to be no impact at Koloa "F" from the pumping of Koloa Well "C" or Koloa Well "D".
- An installed pumping capacity of 1,200 gpm is reasonable.

FIGURE 3-3 PUMP TEST DRAWDOWN/RECOVERY GRAPHS





In summary, the installation of Koloa Well "F" as planned would not adversely affect the level of the aquifer or the chloride concentration of the water. It is acknowledged that a long-term increase in chloride concentration in the well-field consisting of wells "C", "D" and "F" may occur, but the likelihood of this occurrence is not known, and any hypothetical effects are not quantifiable at this time. For this reason, the following mitigation measure is recommended:

- Long term records of water salinity, pumpage and water levels should be maintained at all of the Koloa wells. If chloride concentrations appear to be increasing to unacceptable levels, DOW should consider measures to reverse the increase, such as reduced pumping, aquifer recharge, or other means.

From the perspective of cumulative impacts, Koloa Well "F, with its installed capacity of 1.7 mgd, is one of two municipal wells currently planned for the Koloa Aquifer in the Kauai Water Plan 2020. The other is LO-7, in Omao. In addition, it is likely that, over time, developers will propose to construct new municipal wells, or convert irrigation wells to potable use, to provide water for their projects. Some of these wells may be dedicated to DOW. The precise quantity of withdrawal that would occur is not possible to estimate at this point. However, considering the current scale of usage and projected population numbers, even with DOW's planned Koloa Well "F" and Omao LO-7, as well as a reasonable number of other new or converted potable wells at full capacity, it is unlikely that significant withdrawals relative to the aquifer's estimated sustainable yield of 30.00 mgd would occur. However, as each well is developed, analysis of the installed capacity, sustainable yield of the aquifer, and hydrologic impacts will be undertaken in accordance with requirements of the State Commission of Water Resources Management. The long-term records of salinity, pumpage and water levels that will be maintained by DOW will assist in protecting the long-term sustainability of the aquifer.

3.1.3 Floodplains and Surface Water Quality

Existing Environment

No known areas of flooding exist at or near the well site or pipeline route. Floodplain status for the well site and areas that will be used for supporting facilities has not been determined by the Federal Emergency Management Agency (FEMA), which has not specifically mapped the area as part of the National Flood Insurance Program's Flood Insurance Rate Maps (FIRM), according to Panel No. 15002-0192D. The area is therefore classified as Zone X, or Special Flood Hazard areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area.

Impacts and Mitigation Measures

The project will add very minimally to the area of impermeable surface and will not adversely affect drainage. In any project, uncontrolled excess sediment from soil erosion during and after excavation and construction has the potential to impact natural watercourses, water quality and flooding potential. Contaminants associated with heavy equipment and other sources during construction may also impact receiving stream, ocean and ground water.

Provisions would be made during the construction grading and earthwork to minimize the potential for soil erosion and off-site sediment transport. A Pollution Control Plan and a Stormwater Pollution Prevention Plan will be implemented to ensure that the proposed improvements do not cause drainage or water quality impacts. Best Management Practices (BMPs) such as standard soil erosion and sediment control shall be implemented. These may include measures such as the following:

- Limiting the amount of surface area graded at any given time to reduce the area subject to potential erosion;
- Utilizing soil erosion protective materials such as mulch or geotextiles on areas where soils have a high potential for erosion until permanent provisions such as lawns and grasses can be developed;
- Planting vegetation as soon as grading operations permit to minimize the amount of time soils are exposed to possible erosion; and
- Building sedimentation basins to collect sediment which enters runoff waters.

The project will be regulated through review, revision and approval by the Kaua'i County Department of Public Works (DPW) to ensure compliance with standards related to storm runoff containment and activities within designated flood zones.

3.1.4 Climate and Air Quality

Existing Environment

The climate of the Koloa-Poipu area can be described as mild and semi-moist due to its location in the lowlands near the windward/leeward boundary. Average annual rainfall is about 60 inches in Koloa, with a moderate winter maximum. Winds in the area are generally trades from the east-northeast, which are occasionally replaced by light and variable southerly "kona" winds, most often in winter (UH-Manoa, Dept. of Geography 1998).

Air quality in the project area, which is remote from urban land uses, is good, and there are no known air pollution problems. The only adverse influence is occasional dust from agricultural operations.

Impacts and Mitigation Measures

The proposed project will not produce any permanent substantial air quality impacts. Construction has the potential to produce fugitive dust emissions, which would be mitigated by the long distance to any potentially sensitive receptors. In addition, a dust control plan will be implemented for construction activities with potential to generate substantial dust. The elements of the plan may include some or all of the following:

- Watering of active work areas;
- Cleaning adjacent paved roads affected by construction;
- Covering of open-bodied trucks carrying soil or rock;
- Limiting area to be disturbed at any given time;
- Mulching or stabilizing disturbed inactive areas with geotextile; and
- Paving and landscaping of project areas as soon as practical in the construction schedule.

3.1.5 Noise and Scenic Values

Existing Environment

Noise levels on the site are very low and are derived mainly from occasional mechanized agricultural activities. No sensitive noise receptors such as homes, churches, or parks are located near any of the areas in which construction or other operations that would cause temporary or permanent noise would occur.

The well site and other areas are in or directly adjacent to agricultural fields, and they lack any special scenic value. The 500-foot ridgeline behind the well site is scenic as viewed from the shoreline and local roads.

Impacts and Mitigation Measures

Construction, particularly site work involving heavy equipment, will temporarily elevate noise levels. Water well pumps typically produce noise that is audible for several hundred feet. As no sensitive noise receptors are located with several thousand feet of the well, no temporary or permanent noise impacts would occur.

No adverse visual impacts would occur. All construction on the well site and supporting facilities will be in keeping with the agricultural nature of the surroundings. The maximum height of structures will be approximately 12.5 feet high (see Fig. 1-4c), and structures will not protrude into views of the ridgeline from the coast or nearby roads.

3.1.6 Hazardous Substances

Existing Environment

All the area involved has been used for farming sugar cane and other crops. No known hazardous substances are present.

Impacts and Mitigation Measures

Water purification will involve disinfection with chlorine gas, which will be stored in a 150-pound cylinder within the chlorination room of the control building. Chlorine is a hazardous substance that is inventoried through a Tier-2 Reporting Form, and this information is filed with State and County Civil Defense Agencies and the County Fire Department. Water system operators undergo extensive training to ensure that such chemicals are handled correctly and that neither workers nor the public are exposed to danger. Procedures to contain spills and evacuate during emergencies are part of this training. In addition, fire department personnel are also trained to respond to hazardous material situations. The single 150-lb. chlorine cylinder will be equipped with an emergency, automatic shut-off system, stopping gas flow at the cylinder in the event of leakage of chlorine gas (see App. 5 for specifications). Given the remoteness of the well site from any buildings or public activity, and the extensive safety precautions for use of the material, DOW believes there will be negligible hazard to the public or the natural environment. The Kaua'i County Civil Defense Agency, which expressed concern regarding the use of chlorine gas (see App. 1), will review the EA and suggest additional mitigation measures if warranted.

3.2 Biological Environment

Existing Flora

The site of the well and supporting facilities consists of roadways or current or abandoned agricultural fields. The vegetation at the well site is entirely alien and consists of a secondary, short-stature, scattered-canopy forest of java plum (*Syzygium cumini*) trees and koa haole (*Leucaena leucocephala*) shrubs, with a prominent understory of Guinea grass (*Panicum maximum*) and occasional passion fruit vines (*Passiflora edulis*).

No plants listed, or proposed for listing, as threatened or endangered by the U.S. Fish and Wildlife Service, were found within or near the site of the well or supporting facilities.

Existing Fauna

The alien vegetation provides habitat for alien bird species such as Japanese white-eye (*Zosterops japonica*) and cardinal (*Cardinalis cardinalis*). Feral cats (*Felis catus*), rats (*Rattus*

spp.) and mice (*Mus musculus domesticus*) may also inhabit or use the area. No endangered or otherwise rare bird species were observed or would be expected in this lowland area.

Existing Aquatic Environments

The local natural drainage network has been almost entirely converted to irrigation ditches, and no streams, wetlands or special aquatic sites, such as anchialine ponds, are present at or adjacent to the site of the well and supporting facilities. The closest stream in a near-natural condition is Waikomo Stream (about two miles west of the well site), which drains the Koloa Town area and enters the sea at Koloa Landing. Somewhat larger is Lawai Stream, about four miles west of the well site. The *Hawai'i Stream Assessment* (Hawai'i State CWRM 1990) inventoried State streams for resources, habitat, cultural and recreational value. Waikomo Stream is a small, ungaged stream noted as having a partially lined channel, irrigation function, at least some native species habitat value, a small area of wetlands (less than 0.5 sq. mi.), and historical value. Lawai Stream has been gaged and is classified as a "Small Stream," with a median flow of about 3.0 cubic feet per second. It is noted as having irrigation function, small areas of wetlands, educational value for agriculture or aquaculture, and historical value. Both Waikomo and Lawai Streams have "moderate" value for native aquatic species, with several types of 'o'opu fish and native invertebrates.

There does not appear to be any direct or substantial connection between these streams and the section of the aquifer that would be pumped by Well "F."

Impacts and Proposed Mitigation Measures

No sensitive terrestrial or aquatic species or habitat are present within the area that is likely to be affected in any way by the proposed project. Because of the long distance from the wells to any streams, use of the well is not expected to result in any appreciable alteration in any stream flow. No adverse direct or indirect impacts would be expected.

3.3 Socioeconomic

3.3.1 Social Factors and Community Identity

Existing Environment

The immediate project area is agricultural fields about 2 miles of east of Koloa Town. No residences or other buildings are present. The area served by the proposed project is the Koloa-Poipu area.

As shown previously in Table 1-1, the population of both Kaua'i and the Koloa-Poipu area has grown steadily since the 1970s as a result of the expanding visitor industry. Tourism is concentrated in several nodes in Poipu, Nawiliwili-to-Kapa'a, and Princeville-Hanalei.

Koloa, a former sugar cane town, has experienced a changing commercial structure as a result of agricultural transformation coupled with the rapid growth of tourism. However, its basic demographic structure still strongly reflects its plantation roots, and it is essentially a microcosm of Kaua'i as a whole (Table 3-2).

Poipu expanded from relatively few residents in the 1950s into a major resort area by 1990, and has the majority of its housing dedicated to vacation use. Its population reflects the influx of new residents drawn by the attractive environment and/or employment and entrepreneurial opportunities tourism brings (Table 3-2).

Table 3-2
Selected Socioeconomic Characteristics

CHARACTERISTIC	GEOGRAPHIC AREAS		
	Kaua'i County	Koloa	Poipu
Total Population	58,463	1,942	1,075
Percent Under 18 Years	26.4	26.0	16.3
Percent Over 65 Years	13.8	15.8	20.5
Median Age	36.2	35.9	48.6
Percent White	29.5	20.2	69.4
Percent Asian	36.0	43.8	16.9
Percent Hawaiian	8.4	7.3	1.5
Percent Two or More Races	23.8	26.4	10.5
Family Households	72.2	73.2	65.9
Percent of Housing for Seasonal, Vacation, or Recreational Use	15.2	1.5	75.2

Source: U.S. Bureau of the Census. May 2001. *Profiles of General Demographic Characteristics, 2000 Census of Population and Housing, Hawaii.* (U.S. Census Bureau Web Page).

Impacts and Mitigation Measures

No relocation of residences, businesses, community facilities, farms or other activities would occur because of the project. The project does not adversely affect kuleana. In the long-term, all direct impacts to the social environment may be regarded as beneficial, because it improves the quality and quantity of potable water available for residents and businesses. All water projects require consideration for the secondary effects of growth induction: this topic is covered in Section 3.4.

3.3.2 Public Services, Facilities and Utilities

Utilities

The well and supporting facilities will require electrical power. This will be supplied by Kaua'i Electric Company overhead lines that will be extended from a point on Mahaulepu Road approximately 20 feet east of the well site access road junction, and thence to the well site along the access road. The power demands of the well pump will be relatively small, and no adverse affect to the utility will occur.

Roadways

Access to all sites for construction and maintenance will be via existing roads. An approximately 1,000-foot length of an existing unpaved road will be paved. No adverse impacts to public roads will occur.

Police, Fire, Emergency Medical, Recreation, Schools, and other Public Facilities and Services

No such facilities are present, and no facilities or services would be affected in any adverse way.

3.3.3 Historic Sites/Archaeological Resources

The Kaua'i Island archaeologist for the Hawai'i State Historic Preservation Division (SHPD) was contacted regarding the potential for historic sites on the site of the well and supporting facilities. After a site visit in January 2001, the Kaua'i Island Archaeologist determined that no historic sites were present or would likely be impacted by the project (see App. 4)

3.3.4 Cultural Resources

Cultural Impact Assessment Purpose and Methodology

A Cultural Impact Assessment (CIA) prepared for the project is attached as part of Appendix 4 and is summarized below. It addresses cultural impact, and is meant to: 1) satisfy the requirement of Chapter 343, HRS, to address cultural impacts, and 2) to provide information to address the constitutional duty of agencies of the State of Hawai'i to protect the reasonable exercise of customarily and traditionally exercised rights of native Hawaiians, to the extent feasible, in connection with activities requiring State or County permits.

The CIA involved archival/background research, identification and consultation with informants, and synthesis and evaluation of information gathered from ethnographic, archaeological and historical sources. Of particular attention were Traditional Cultural Properties, which are structures, natural features, or areas that contain historic, cultural or archaeological value. Cultural value may be of a historic nature, or may be associated with ongoing practices, such as gathering, fishing, or spiritual activities.

Existing Environment

Mahaulepu is one of ten ahupua'a located in the East Kona District of Kaua'i, comprising 1,572 acres and fringed on the north by mountains culminating at Haupu. According to some scholars, the name Mahaulepu means "and falling together", referring to a battle of the 15th century involving a chief of Hawai'i Island. The flat to gently sloping and fertile valley of Mahaulepu and the productive near-shore fishing grounds were an ideal settlement location in pre-Western contact times. The valley retained some taro *lo'i* (fields) into historic times, although the stream was very small.

In the Mahele of 1848, when the lands were divided between the king, the government and the ali'i, subject to the rights of native tenants to claim kuleana on which they lived and farmed, Mahaulepu was awarded to Victoria Kamamalu, granddaughter of Kamehameha I. Thirty-one Land Commission Awards for kuleana were registered, comprising house lots and fields of taro, noni, paper mulberry, sweet potatoes, bananas, as well as salt pans, fishponds, pig pens. None were located within a mile of the well site or associated facilities.

In the late 19th century sugar cane plantations began to dominate the landscape of all Hawaiian islands, including the Koloa area of Kaua'i. Koloa Plantation began sugar cane cultivation in Mahaulepu in 1878, and soon the entire ahupua'a was sold and mostly dedicated to sugar cane. A number of wells were dug to augment the plantation's surface water supply. The area was farmed in sugar cane for over a century. In 1947, Koloa Plantation merged with Grove Farm, and subsequently, in 1974, McBryde Sugar leased the Koloa lands and mill. McBryde Sugar harvested its last sugar crop in 1996 and the Koloa Mill closed. The land is currently being used for diversified agriculture.

Interviews with five knowledgeable informants and consultation of archaeological, historical and ethnographic material revealed no Traditional Cultural Properties or any use of the area for cultural activities, such as gathering or spiritual activities.

Impacts and Mitigation Measures

As no valued natural, cultural or historical resources appear to exist on the site, and none would appear to be affected by any of the proposed activities, no cultural impacts are apparent. Review of the Draft EA and the CIA by other knowledgeable parties will assist in verifying that this conclusion is correct.

3.3.5 Agricultural Land

Existing Farming Operations and Value of Agricultural Land

Consultation of maps of important farmland from the U.S. Natural Resources Conservation Service (USNRCS) (as displayed in the Hawai'i State Geographic Information System) determined that the land traversed by the access road and pipeline includes land classified as Prime, Unique, and Other Important Lands in the *Agricultural Lands of Importance to the State of* Hawai'i (ALISH) map series. The land at the well site itself is unclassified. Farming, including seed corn, papaya, and cattle operations, is taking place in and around the area affected. An irrigation ditch flows through the fields adjacent to the site and would be crossed by the proposed access road.

Impacts and Mitigation Measures

No adverse impacts to farmland or farming would occur, because the well site is not valuable farmland, the access road already exists (but is unpaved), and the remaining facilities will be following the alignments of various roads that traverse the farmland. No impacts to the irrigation ditch will occur.

Best Management Practices will be employed during grading of the well site and access road and during construction of all improvements in order to minimize erosion or sedimentation and any adverse effects on agricultural land.

3.4 Growth-Inducing, Cumulative and Secondary Impacts

Growth-Inducing Impacts

Analysis of growth-inducing impacts examines the potential for a project to induce unplanned development, substantially accelerate planned development, encourage shifts in growth from other areas in the region, or intensify growth beyond the levels anticipated and planned for without the project. Provision of needed infrastructure such as roads, water supply, sewer facilities, etc., is

often seen as growth-inducing. Of key importance is whether infrastructure fulfills the needs of planned growth, or enables unplanned growth and in fact diverts growth away from planned areas.

The proposed increase to the water supply is in response to planned growth for approved projects within the Koloa-Poipu Service area. Water is a necessary condition for this planned growth, but it has not acted as a constraining factor. Regarding unplanned growth, it is important to note that when planning for service expansion, DOW has taken a conservative approach in defining service areas, in effect limiting them to areas that have appropriate planning and zoning approvals in place. The *Kaua`i Water Plan 2020* (Kaua`i County DOW:2001) has used the recently adopted *Kaua`i General Plan* (Kaua`i County Dept. of Planning:2000) to determine the level of need that will be required. As a result, DOW is servicing the orderly development of planned growth, and not inducing unplanned growth or accelerating planned growth.

Cumulative Impacts

Cumulative impacts result when implementation of several projects that individually have minor impacts combine to produce more severe impacts or conflicts among mitigation measures. One constant in Koloa-Poipu area is incessant construction and development, which may have a broad variety of adverse impacts.

However, nearly all adverse impacts of the current project related to most categories of effect, including traffic, native species/habitat, wetlands, water quality, erosion, historic sites, and other areas of concern, are either non-existent or extremely restricted in geographic scale, negligible, and capable of mitigation through proper enforcement of permit conditions.

Cumulative hydrological impacts are discussed on p. 3-9.

Secondary Impacts

Construction projects sometimes have the potential to induce secondary physical and social impacts that are only indirectly related to project. For example, construction of a new recreation facility can lead to changes in traffic patterns that produce impacts to noise and air quality for a previously unimpacted neighborhood. In this case, other than the issue of secondary effects of growth induction (see above), the proposed project's impacts are limited to direct impacts at the site itself, and there does not appear to be any potential for secondary impacts.

3.5 Required Permits and Approvals

Several permits and approvals would be required to implement this project. They are listed here under their granting agencies.

Hawai'i State Commission on Water Resources

a. Well Construction Permit (obtained on 3/14/95 for test well)
b. Pump Installation Permit

Hawai'i State Department of Health

a. Preliminary Engineering Report

Kaua'i Planning Commission

a. Use Permit

Kaua'i Department of Public Works

a. Grading and Grubbing Permit

Kaua'i Planning Department

a. Permit for Subdivision

4 COMMENTS AND COORDINATION

4.1 Agencies and Organizations Contacted

The following agencies received a letter inviting their participation in the preparation of the Environmental Assessment.

County of Kaua`i

- Planning Department
- Fire Department
- Police Department
- County Council
- Civil Defense Agency

State of Hawai`i

- Department of Land and Natural Resources, Office of the Chairperson
- Department of Land and Natural Resources, Historic Preservation Division
- Hawai`i State Commission on Water Resource Management
- University of Hawai`i, Water Research Center

Federal Agencies

- U.S. Geological Survey, Water Resources Division

The following organizations received a letter inviting their participation in the preparation of the Environmental Assessment:

- Sierra Club
- Kaua`i Chamber of Commerce
- Grove Farm Company

Copies of correspondence from agencies with substantive comments during the preparation of the EA are included in Appendix 1 and are cited in appropriate sections of the text of this EA.

See Section 2 for discussion of comments to Draft EA.

5 LIST OF DOCUMENT PREPARERS

This Environmental Assessment was prepared for the Kaua'i County Department of Water by Ron Terry, Ph.D., with assistance from Okahara & Associates, the engineering contractor for the well project.

EA Preparation Consultant

Ron Terry
Ph.D., Geography,
Principal Investigator and Author

Sub-Consultants

Leann McGerty, B.A., and Robert Spear, Ph.D.,
Scientific Consultant Services
Cultural Resources

6 STATE OF HAWAI'I ENVIRONMENTAL ASSESSMENT FINDINGS

Section 11-200-12 of the State Administrative Rules sets forth the criteria by which the significance of environmental impacts shall be evaluated. The following discussion paraphrases these criteria individually and evaluates the project's relation to each.

1. *The project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No natural resources will be irrevocably committed or lost. It is expected that as part of the EA process the State Historic Preservation Division will determine that no historic sites important for preservation in place will be impacted and that all adverse effects to significant historic sites will be mitigated.

2. *The project will not curtail the range of beneficial uses of the environment.* No future beneficial use of the environment will be affected in any way by the proposed project. Sufficient water will remain, well within the sustainable yield of the aquifer, to promote other beneficial uses of groundwater in the Koloa-Poipu region.

3. *The project will not conflict with the State's long-term environmental policies.* The State's long term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. A number of specific guidelines support these goals. No aspect of the proposed project conflicts with these guidelines. The project's goals of providing potable water to support orderly development of planned growth while conserving natural resources satisfies the State's environmental policies.

4. *The project will not substantially affect the economic or social welfare of the community or State.* The improvements will benefit the social and economic welfare of Kaua'i by improving the potable water supply system.

5. *The project does not substantially affect public health in any detrimental way.* No effects to public health are anticipated.

6. *The project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No adverse secondary effects are expected. The project will not enable development, but will instead serve planned growth.

7. *The project will not involve a substantial degradation of environmental quality.* The implementation of best management practices for all construction will ensure that the project will not degrade environmental quality in any substantial way.

8. *The project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* No endangered species of flora or fauna are known to exist on the project site or would be affected in any way by the project.

9. *The project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* Cumulative impacts result when implementation of several projects that individually have minor impacts combine to produce more severe impacts or conflicts among mitigation measures. All adverse impacts will either not occur or will be reduced to negligible levels through mitigation measures, and will therefore not tend to accumulate in relation to this or other projects.

10. *The project will not detrimentally affect air or water quality or ambient noise levels.* The project will have negligible effects in terms of water quality, air quality and noise.

11. *The project will not affect or will likely be damaged as a result of being located within an environmentally sensitive area such as flood plains, tsunami zones, erosion-prone areas, geologically hazardous lands, estuaries, fresh waters or coastal waters.* No floodplains, tsunami zones, geologically hazardous areas, or other such sensitive land is involved.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No protected viewplanes will be impacted by the project, which will have no adverse scenic effects.

13. *The project will not require substantial energy consumption.* Some, but not substantial, input of energy is required for the construction of the facilities and the operation of the pump.

For the reasons above, the Kaua`i County Department of Water concludes that the proposed project will not have any significant effect in the context of Chapter 343, Hawai`i Revised Statues and section 11-200-12 of the State Administrative Rules, and has issued a Finding of No Significant Impact.

REFERENCES

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KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I
STATE OF HAWAII

ENVIRONMENTAL ASSESSMENT

APPENDIX 1

AGENCY COORDINATION LETTERS

AND PUBLIC INVOLVEMENT

KOLOA WELL "F"
ENVIRONMENTAL ASSESSMENT

APPENDIX 1

PUBLIC INVOLVEMENT

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KOLOA WELL "F"
ENVIRONMENTAL ASSESSMENT

APPENDIX 1

PUBLIC INVOLVEMENT

A. Comments in Response to Pre-Consultation

Grove Farm Company
Incorporated

October 10, 2000

Mr. Ron Terry, Ph. D.
Project Environmental Consultant
Geo Metrician
HC 2 Box 9275
Keaau, HI 96749

Dear Mr. Terry:

Subject: Environmental Assessment, Koloa Well "F," Mahaulepu, Kauai

We are in receipt of your October 2, 2000 letter on the subject matter. Grove Farm Company would like to reserve comment after reviewing the Draft EA. Please forward us a copy of the Draft EA when it is completed.

Thank you.

Sincerely,

GROVE FARM COMPANY, INCORPORATED

Michael H. Furukawa
Vice President and Project Manager

C: Mr. Michael Hinazumi, Kauai Department of Water

P. O. Box 662069 Lihue, Hawaii 96766-7069
Phone: (808) 245-3678 FAX: (808) 246-9470

MARYANNE W. KUSAKA
MAYOR

WALLACE G. REZENTES, SR.
ADMINISTRATIVE ASSISTANT

CESAR C. PORTUGAL
COUNTY ENGINEER
TELEPHONE 241-6600

IAN 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, KAUA'I, HAWAI'I 96766

October 10, 2000

Geo Metrician
HC 2 Box 9575
Keaau, HI 96749

ATTENTION: MR. RON TERRY, Ph. D.

SUBJECT: ENVIRONMENTAL ASSESSMENT, KOLOA WELL "F",
MAHAULEPU, KAUAI
PW10.046

This is to acknowledge receipt of your letter dated October 2, 2000. We are concerned with traffic, flooding, and drainage impacts; we would like to receive a copy of the Draft EA. At this time, we are reserving our comments until we have had a chance to review the Draft EA.

Should you have any questions, please feel free to contact Wallace Kudo of my staff at (808) 241-6620.

Very truly yours,

CESAR C. PORTUGAL
County Engineer

wk

KAUAI CIVIL DEFENSE AGENCY
COUNTY OF KAUAI
4396 Rice Street, Room 107
Lihue, HI 96766

Bus: (808) 241-6336
FAX: (808) 241-6335
E-Mail: emops@kcda.state.hi.us

October 11, 2000

Ron Terry
HC2 Box 9575
Keaau, Hawaii 96749

Subject: EA, Koloa Well "F", Mahaulepu, Kauai

Dear Ron:

Thank you for your letter dated 10/2/00 asking for comments on the Water Department"s Well "F". I spoke with Michael Hinazumi about the type of chlorination to be used on this well. He said the county would be using dry sodiumhyporclorite not gas chlorine to purify the water. All my questions were answered.

Civil Defense concern was over the use of gas chiorine and has no other concerns with this project. We do **not** need a copy of the Draft EA when completed.

Thank you,

Sincerely,

Mark Marshall, CD Administrator

Maryanne W. Kusaka
Mayor

David K. Sproat
Fire Chief

COUNTY OF KAUAI
Fire Department
Mo'ikeha Building
4444 Rice Street, Suite 295
Lihu'e, Kaua'i, Hawaii 96766

October 18, 2000

Ron Terry, Ph.D.
Geo Metrician
HC 2 Box 9575
Keeau, Hawaii 96749

Dear Mr. Terry:

RE: Fire Department Comments
Draft Environmental Assessment
Koloa Well "F"
Mahaulepu, Kauai

The Kauai Fire Department has no issues of concern with the proposed improvements to the Koloa-Poipu Water System. We applaud every effort of our Water Department to increase and improve the storage capacity and capabilities of the system as it will have a positive effect on our ability to provide emergency fire services and response in the area.

We wish to receive a copy of the Draft EA when completed.

Sincerely,

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

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

October 19, 2000

Mr. Ron Terry
HC 2 Box 9575
Keaau, HI 96749

Dear Mr. Terry:

SUBJECT: Environmental Assessment, Koloa Well "F", Mahaulepu, Kauai

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

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

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

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

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

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

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

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

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

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

[X] OTHER:

A pump installation permit application must be made and approved by the CWRM prior to permanent pump installation.

If there are any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

LN:ss

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

November 3, 2000

LD-NAV

Ref.: KOLOAWELL.RCM

GEO METRICIAM
Ron Terry, Ph.D.
HC 2 Box 9575
Keaau, Hawaii 96749

Dear Dr. Terry:

SUBJECT: Draft Environmental Assessment for Koloa Well "F", Mahaulepu, Kauai, Hawaii

This is to acknowledge receipt of your letter regarding the County of Kauai Department of Water to develop an additional potable water well source for the Koloa-Poipu Water System in Kauai.

Please submit five copies of the Draft Environmental Assessment to the Department of Land and Natural Resources Land Division.

Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division's Support Services Branch at 808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

C: District Land Office

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

April 18, 2001

Ron Terry, Ph.D
Project Environmental Consultant
GeoMetrician
HC 2 Box 9575
Keaau, Hawaii 96749

LOG NO: 27253 ✓
DOC NO: 0104NM12

Dear Dr. Terry:

SUBJECT: **Chapter 6E-42, Historic Preservation Review --**
Koloa Well F (County of Kauai) Mahaulepu, Koloa, Kauai

On January 20, 2001, our staff archaeologist and you inspected the proposed well location. The area had been staked and somewhat cleared. No significant historic sites were found. We now believe that this project will have "no effect" on significant historic sites.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

NM:amk

KOLOA WELL "F"
ENVIRONMENTAL ASSESSMENT

APPENDIX 1

PUBLIC INVOLVEMENT

B. Comment Letters/Responses to the EA

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

September 7, 2001

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

Dear Mr. Lau:

Subject: Draft Environmental Assessment for the Koloa Well "F" Production Well, Kaua'i

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

1. Please describe the potential effects the well development may have on any nearby streams. If potential impacts exist, a monitoring program for the streams should be included.

2. Are there any caves or lava tubes near the project site. If so, what is the probability of the caves or lava tubes being impacted by the water drawdown. Describe mitigation measures to minimize any potential impact.

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

Sincerely,

Genevieve Salmonson
Director

c: Ron Terry

GEO METRICIAN
Ron Terry, Ph.D.

HC 2 Box 9575
Keaau, Hawaii 96749
(808) 982-5831

October 1, 2001

Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmonson:

Subject: **Draft Environmental Assessment, Koloa Well "F"**
Production Well, TMKs 2-9-3:01, 2-9-2:01

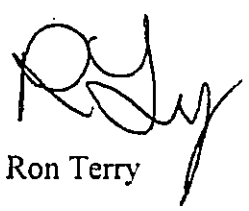
On behalf of the Kaua'i Department of Water (DOW), I am responding to your letter of September 7, 2001, to Ernest Lau, Director of DOW. Our responses to your individual comments are as follows:

1. *Impacts on Nearby Streams.* As discussed in Section 3.2 of the EA, the local natural drainage network has been almost entirely converted to irrigation ditches, and no streams, wetlands or special aquatic sites, such as anchialine ponds, are present at or adjacent to the site of the well and supporting facilities. The closest stream in a near-natural condition is Waikomo Stream (about two miles west of the well site), which drains the Koloa Town area and enters the sea at Koloa Landing. Somewhat larger is Lawai Stream, about four miles west of the well site. Waikomo Stream is a small, ungaged stream noted as having a partially lined channel, irrigation function, at least some native species habitat value, a small area of wetlands, and historical value. Lawai Stream has been gaged and is classified as a "Small Stream," with a median flow of about 3.0 cubic feet per second. It is noted as having irrigation function, small areas of wetlands, educational value for agriculture or aquaculture, and historical value. Both Waikomo and Lawai Streams have "moderate" value for native aquatic species, with several types of 'o'opu fish and native invertebrates. There does not appear to be any direct or substantial connection between these streams and the section of the aquifer that would be pumped by Well "F." Because of the distance and hydrological sources of these streams, it is highly unlikely that any effects of pumpage from the proposed well would be detectable.
2. *Caves and Lava Tubes.* Test borings and analysis conducted as part of geotechnical investigations at the project site have determined that residual and alluvial soils underlie the surface to a depth of at least 15 feet. No voids of any type were encountered, and it is unlikely that any caves are present in areas affected by project activities. However, in the unlikely event that a lava tube cave is encountered during construction, all construction with the potential to impact the lava tube will immediately cease; the appropriate personnel at DOW will be contacted; these personnel will inspect the cave or through

other means determine whether to contact the State Historic Preservation Division and the U.S. Geological Survey to determine whether burials are present, and whether the lava tube cave has special cultural, geological or other value that merits investigation. This information has been added to the Final EA.

Thank you for your review of the document.

Sincerely,



Ron Terry

MARYANNE W. KUSAKA
MAYOR

WALLACE G. REZENTES, SR.
ADMINISTRATIVE ASSISTANT

CESAR C. PORTUGAL
COUNTY ENGINEER
TELEPHONE 241-6600

IAN 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, KAUA'I, HAWAI'I 96766

August 24, 2001

Geo Metrician
HC 2 Box 9575
Keaau, HI 96749

Attention: Mr. Ron Terry, PH. D.

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR KOLOA WELL "F"
MAHAULEPU, KAUAI PW 8.025

We reviewed the subject environmental assessment and offer the following comments:

A. Environmental Assessment

1. We can exempt the grading of the well site and driveway from a grading permit. We consider the project being contained within a self contained government control area and for which the grading activity will be overseen by the Department of Water. Although a grading permit is not required, best management practices (BMP) needs to be implemented and overseen by the Department of Water.

2. Although not stated, a grading permit may be required for the site receiving the excess wasted excavated material or the borrow site.

3. Access to the well site will be from Mahaulepu Road. Mahaulepu Road is not a County roadway; access easements should to be obtained from the roadway owner.

Thank you for this opportunity to provide our comments. Should you have any questions, please feel free to contact Wallace Kudo of my staff at (808) 241-6620.

Very truly yours,

CESAR C. PORTUGAL
County Engineer

wk

GEO METRICIAN
Ron Terry, Ph.D.

HC 2 Box 9575
Keaau, Hawaii 96749
(808) 982-5831

October 1. 2001

Cesar Portugal, Chief Engineer
Kaua`i County Department of Public Works
4444 Rice St., Suite 275
Lihue, HI 96766

Dear Mr. Portugal:

Subject: **Draft Environmental Assessment, Koloa Well "F" Production Well, TMKs 2-9-3:01, 2-9-2:01**

On behalf of the Kaua`i Department of Water (DOW), I am responding to your letter of August 24, 2001. Our responses to your individual comments are as follows:

1. *Grading Permit Exemption.* The DOW will take note of this exemption for grading on the well site and driveway, and will require the grading contractor to employ appropriate Best Management Practices.
2. *Excess Excavated Material and Borrow Sites.* The contractor will be required to obtain appropriate permits, as necessary, for these activities.
3. *Access on Mahaulepu Road.* DOW and its contractors will continue to coordinate with appropriate landowners for access.

Thank you for your review of the document.

Sincerely,

Ron Terry

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

August 22, 2001

Ron Terry, Ph.D
GeoMetrician Associates
HC 2 Box 9575
Keaau, Hawaii 96749

LOG NO: 28025
DOC NO: 0108NM09

Dear Dr. Terry:

SUBJECT: **Chapter 6E-42, Historic Preservation Review --EA for Proposed Koloa Well F (County of Kauai), Mahaulepu, Koloa, Kauai**

No historic sites or traditional cultural properties are at this project area, and we have verified this with a field check. We believe that this project will have "no effect" on significant historic sites.

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

Aloha,

for DON HIBBARD, Administrator
State Historic Preservation Division

NM:amk

c. Michael Hinazaumi, Kauai Department of Water, P.O. Box 1706 Lihue, 96756
Director, OEQC, 235 South Beretania St, Suite 702, Honolulu, HI 96813

GEO METRICIAN
Ron Terry, Ph.D.

HC 2 Box 9575
Keaau, Hawaii 96749
(808) 982-5831

October 1, 2001

Don Hibbard, Administrator
State Historic Preservation Division
601 Kamokila Blvd., Rm. 555
Kapolei, Hawaii 96707

Dear Dr. Hibbard:

Subject: **Draft Environmental Assessment, Koloa Well "F" Production Well, TMKs 2-9-3:01, 2-9-2:01**

On behalf of the Kaua`i Department of Water (DOW), I am responding to your letter of August 22, 2001. Thank you for your concurrence that no traditional cultural properties or historic sites are present at the project site, and that the project will have "no effect" on significant historic sites.

Sincerely,

Ron Terry

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

September 7, 2001

LD-NAV
Ref.: KOLOWELL.RCM

Mr. Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau, Hawaii 96749

Dear Mr. Terry:

SUBJECT: Environmental Assessment for Kolo Well "F" Production Well, Koloa, Island of Kauai, Hawaii

Thank you for the opportunity to review and comment on the subject matter.

A copy of the Environmental Assessment for Kolo Well "F" Production Well was transmitted to our Division of Aquatic Resources, Historic Pervasion Division, Commission on Water Resource Management, Land Division Engineering Branch and Land Division Kauai District Land Office.

Attached herewith is a copy of our Commission on Water Resource Management, Historic Preservation Division and Land Division Engineering Branch comments.

The Department has no other comment to offer at this time.

Should you have any other questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 808-587-0438.

Very truly yours,

HARRY M. YADA
Acting Administrator

C: Kauai District Land Office
Planning and Technical Services

DLNR-LAND DIVISON
ENGINEERING BRANCH

COMMENTS

We confirm that the proposed project site according to FEMA Community Panel-Number 150003 0265 C, is located in Zone C. Zone C is an area of minimal flooding.

M:\WLD\MAKAI\DENNIS\WORD\KenolioRdResDev_SMA_com_M10.DOC

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

August 20, 2001

MEMORANDUM

LOG NO: 28035
DOC NO: 0108NM19

TO: *Harry Yada, Acting Administrator*
Land Division

FROM: *Don Hibbard, Administrator*
State Historic Preservation Division

SUBJECT: ***Historic Preservation Review --EA for Proposed Koloa Well F (County of Kauai)***
Mahaulepu, Koloa, Kauai

No historic sites or traditional cultural properties have been identified in this project area. We have also fieldchecked the area. We believe that this project will have "no effect" on significant historic sites.

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

NM:amk

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

AUG 23 2001

Ref:koloa f.dr

TO: Mr. Harry Yada, Acting Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Draft Environmental Assessment for Koloa Well F, Koloa, Kauai, Hawaii

FILE NO.: KOLOAWELL

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

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

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

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

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

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

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

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

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

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

[X] OTHER:

Our records show that a well construction permit was issued for Koloa F Well (Well No. 5425-15) on March 14, 1995 and that the well was completed on November 20, 1998. Regulatory requirements of the well construction permit were satisfied on July 28, 1999. A pump installation permit should be made and approved prior to the installation of a permanent pump. The Chapter 343 environmental review process must be completed before we may accept a pump installation permit application for processing.

If there are any questions, please contact Lenore Nakama at 587-0218.

GEO METRICIAN
Ron Terry, Ph.D.

HC 2 Box 9575
Keaau, Hawaii 96749
(808) 982-5831

October 1. 2001

Harry Yada, Acting Administrator
Land Division
Hawai`i State Department of Land and Natural Resources
P.O. Box 621
Honolulu HI 96809

Dear Mr Yada:

Subject: **Draft Environmental Assessment, Koloa Well "F" Production Well, TMKs 2-9-3:01, 2-9-2:01**

On behalf of the Kaua`i Department of Water (DOW). I am responding to your letter of September 7, 2001, in which you compiled the memos of your various divisions. Our responses to individual points brought up in the memos are as follows:

1. *DLNR Engineering Flood Zone Determination.* We concur that the project is located in an area of minimal flooding.
2. *DLNR Historic Preservation "No Effect".* This memo confirms other communications from this Division, including a separate comment letter on the Draft EA.
3. *Commission on Water Resources Management.* CWRM's checklist notes that the project should be incorporated in the County of Kauai``s Water Use and Development Plan and that a Well Construction Permit and Pump Installation Permit would be required before the ground water is developed as a source of supply. The County of Kaua`i will incorporate the project in the next revision of the *Kaua`i Water Use and Development Plan.* Under "Other" in the checklist. CWRM cites the need to complete compliance with Chapter 343 and repeats the need for a Pump Installation Permit. As noted in the Section 3.5 of the Draft EA, a Well Construction Permit and Pump Installation Permit are required for the project. The Kaua`i DOW has made a Finding of No Significant Impact determination, which will be filed with the Hawai`i State Office of Environmental Quality Control, which should complete compliance with Chapter 343.

Thank you for your Department's review of the document.

Sincerely,

Ron Terry

MARYANNE W. KUSAKA
MAYOR

PLANNING DEPARTMENT

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

September 17, 2001

Ron Terry
GeoMetrician Associates
HC 2 Box 9575
Keaau, Hawaii 96746

SUBJECT: Koloa Well "F" Production Well at Koloa, Kauai

Please pardon our delay in responding.

Our only comment is that the project will require a Use Permit because it is within the Agriculture zone. The Use Permit will involve a Public Hearing and Planning Commission action.

Should you have any questions, please feel free to contact Keith Nitta of my staff at 241-6677.

SHEILAH N. MIYAKE
Deputy Planning Director

cc: Water Department

GEO METRICIAN
Ron Terry, Ph.D.

HC 2 Box 9575
Keaau, Hawaii 96749
(808) 982-5831

October 1, 2001

Sheilah N. Miyaka, Deputy Planning Director,
Kaua'i County Planning Department
4444 Rice St., Suite 473
Lihue, HI 96766

Dear Ms. Miyake:

Subject: **Draft Environmental Assessment, Koloa Well "F" Production Well, TMKs 2-9-3:01, 2-9-2:01**

On behalf of the Kaua'i Department of Water (DOW), I am responding to your letter of September 17, 2001, in which you stated that the project would be subject to a Use Permit. DOW looks forward to coordinating with your agency in regard to this permit. Thank you for your review of the document.

Sincerely,

Ron Terry

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

GEO METRICIAN
Ron Terry, Ph.D.

HC 2 Box 9575
Keaau, Hawaii 96749
(808) 982-5831

October 1. 2001

Sheilah N. Miyaka. Deputy Planning Director.
Kaua`i County Planning Department
4444 Rice St., Suite 473
Lihue. HI 96766

Dear Ms. Miyake:

Subject: **Draft Environmental Assessment, Koloa Well "F" Production Well, TMKs 2-9-3:01, 2-9-2:01**

On behalf of the Kaua`i Department of Water (DOW). I am responding to your letter of September 17, 2001, in which you stated that the project would be subject to a Use Permit. DOW looks forward to coordinating with your agency in regard to this permit. Thank you for your review of the document.

Sincerely,

Ron Terry

KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I
STATE OF HAWAII

ENVIRONMENTAL ASSESSMENT

APPENDIX 2

DOCUMENTS RELATED TO

EXPLORATORY WELL PERMITTING

JOHN WAIHEE
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

November 30, 1994

RECEIVED
94 DEC 2 AM 8 03
STATE OF HAWAII
LAND USE COMMISSION

Mr. Tommy A. Camarillo, Vice President
GMP Associates, Inc.
841 Bishop Street, Suite 1501
Honolulu, Hawaii 96813

Dear Mr. Camarillo:

Subject: BOUNDARY INTERPRETATION No. 94-36 for Tax Map Key No.: 2-9-03: por. 1, Mahaulepu, Koloa, Kauai

Pursuant to your September 14, 1994 letter requesting a boundary interpretation for the subject parcel, please be advised that we have determined an approximate location of the State Land Use Agricultural / Conservation District boundary relative to the proposed well site.

The location of the district boundary is based on the Commission's records and official maps currently on file at our office and the representation of the well site as shown on the USGS Topographic Quadrangle that you provided.

A blueline print of your map with the approximate State Land Use Agricultural / Conservation District boundary delineated is enclosed for your reference.

If you have any questions, please call Fred Talon or Bert Saruwatari of my staff at 587-3822.

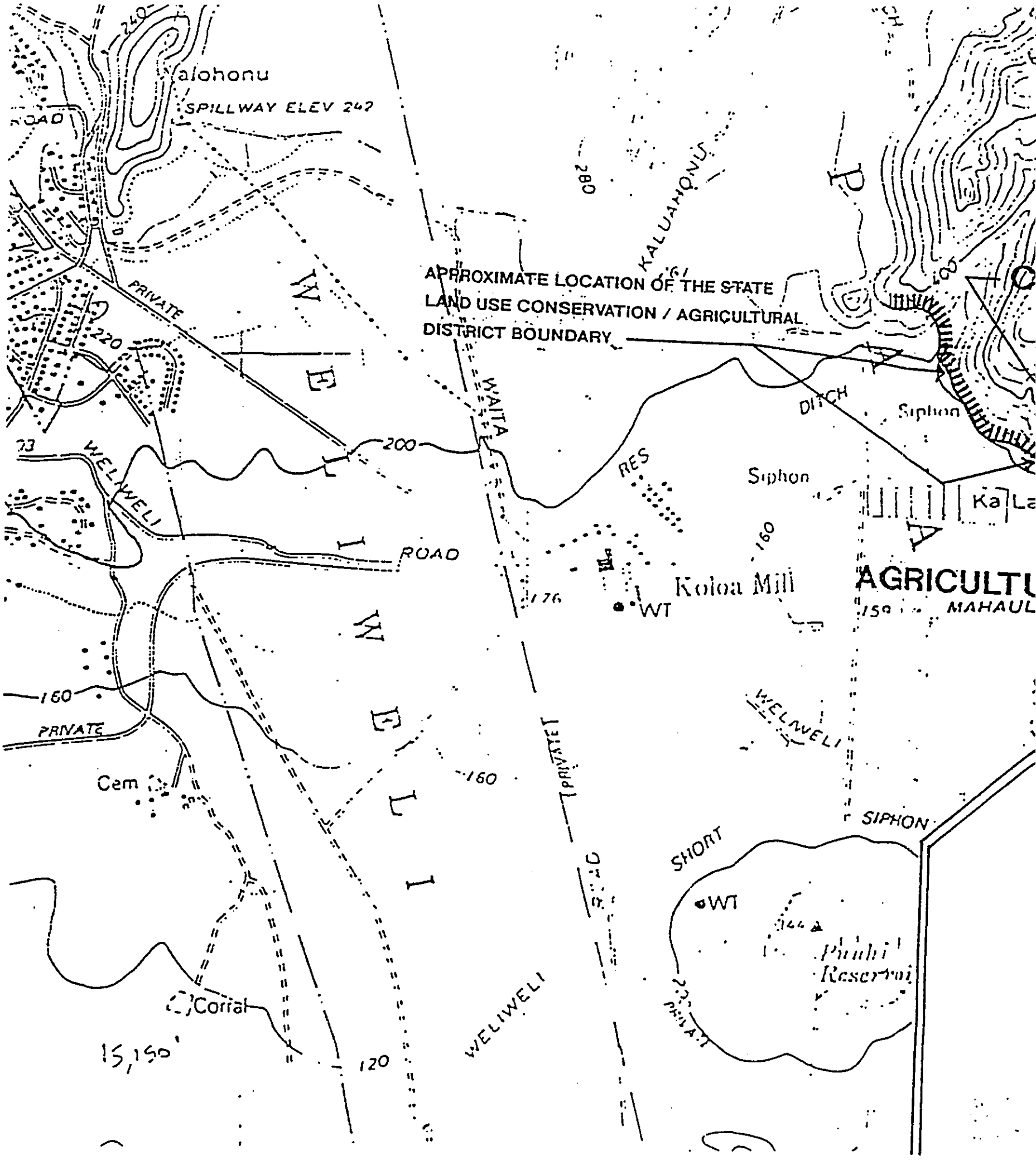
Sincerely,

ESTHER UEDA
Executive Officer

EU:fl

encl: Boundary Interpretation Map dated November 30, 1994

cc: Keith Ahue, BLNR Chairperson (w/encl.)
Attn: OCEA
Dee Crowell, Director, Kauai County Planning Dept. (w/encl.)
Glenn Y. Sato, Tax Maps & Records Supervisor (w/encl.)
C&C of Honolulu, Department of Finance


Kalohonu
SPILLWAY ELEV 242
ROAD
240
PRIVATE
220
200
WELIWELI
ROAD
160
PRIVATE
Cem
Corral
15,150'
WAITA
KALUAMONU
280
APPROXIMATE LOCATION OF THE STATE
LAND USE CONSERVATION / AGRICULTURAL
DISTRICT BOUNDARY
DITCH
Siphon
RES
Siphon
Koloa Mill
WT
176
160
AGRICULTU
MAHAUL
150
WELIWELI
PRIVATE
120
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SIPHON
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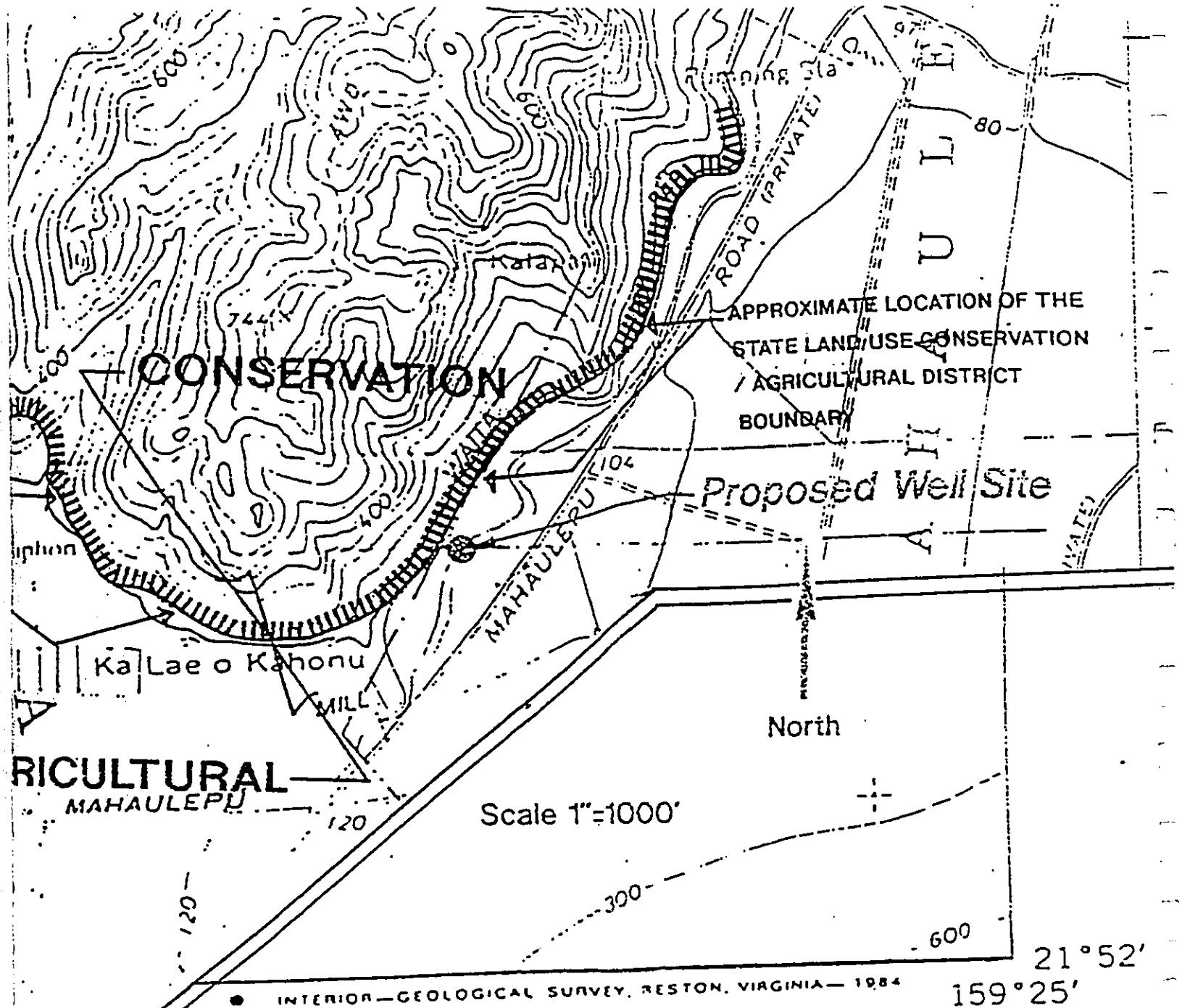


The boundary as located, named and delineated is hereby certified as the actual Land Use District Boundary adopted by the State Land Use Commission, Honolulu, Hawaii.

NOV 30 1994 by _____
Date Executive Officer

NOV 0 3 ...

Boundary
Interpretation No. 94 361

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

MAR 14 1995

WELL CONSTRUCTION PERMIT

for

Koloa Well F
(Well No. 5425-15)
Mahaulepu, Koloa, Kauai

TO: Kauai Department of Water
P.O. Box 1706
Lihue, HI 96766

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to construct and test Koloa Well F (Well No. 5425-15), is approved subject to the following conditions:

STANDARD WELL CONSTRUCTION PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, before any work covered by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. The applicant shall coordinate with the Commission and conduct a pumping test in accordance with the attached protocol. A one-inch diameter (minimum) galvanized pipe shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. No permanent pump may be installed and no water used from the well without first obtaining a pump installation permit from the Commission.

3. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to construct the well shall not constitute a determination of correlative water rights.

4. The following shall be submitted to the Commission within thirty (30) days after completion of work:

   a. Well completion report.
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other water quality data.

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

6. The well construction permit application and staff submittal approved by the Commission at its March 1, 1995 meeting are incorporated into the permit by reference.

7. The permit may be revoked if work is not started within six (6) months after the date of issuance or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

MAR 14 1995
Date of Issuance

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed.

Applicant's Signature: _____ Date: _____

Printed Name: _____

Firm or Title: _____

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

cc: USGS
Department of Health
Safe Drinking Water Branch
Ground Water Protection Program
Wastewater Branch

OEQC Bulletin

BENJAMIN J. CAYETANO
Governor

GARY GILL
Director

VOLUME XII | JANUARY 23, 1995 | NO. 02

REGISTER OF DOCUMENTS PREPARED UNDER CHAPTER 343, HAWAII REVISED STATUTES

The *OEQC Bulletin* is a semi-monthly publication. The publication dates of the *OEQC Bulletin* are the eighth and twenty-third of each month. Environmental Assessments should be submitted to the appropriate agency directly. For environmental assessments (EA) for which a Negative Declaration is anticipated, agencies should submit four copies of the Draft EA with a letter stating that a Negative Declaration is anticipated and that notice of the Draft EA should be published in the *OEQC Bulletin*. (When an agency initially determines that an EIS will be required for a project, an EIS Preparation Notice determination is made. No Draft EA is required since those projects undergo two comment periods throughout the EIS process.) After the Draft EA comment period ends, the agency will submit to OEQC, four copies of the document and a determination of a Negative Declaration or an EIS Preparation Notice for publication in the *OEQC Bulletin*. Applicants should deliver an appropriate number of Draft and Final Environmental Impact Statements (EIS) to the accepting authority before submitting copies to OEQC for publication. All documents submitted for publication in the *OEQC Bulletin* should be delivered to the Office of Environmental Quality Control, 220 South King Street, 4th Floor, Honolulu, Hawaii 96813. The deadline for all submittals is eight working days prior to the publication date. To ensure proper processing of documents, please attach the *OEQC Bulletin Publication Form* (Revised July, 1992) with all submittals. This form can be obtained by calling OEQC at 586-4185.

Please contact the approving or proposing agency to request copies of any Draft EAs, Negative Declarations, EISPNs or EISs. Any questions related to the content of these documents should be directed to the listed agency contact person.

CONTENTS

OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 South King Street, Central Pacific Plaza, Suite 400, Honolulu, HI 96813

Telephone: (808) 586-4185
Fax: (808) 586-2452

KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I
STATE OF HAWAII

ENVIRONMENTAL ASSESSMENT

APPENDIX 3

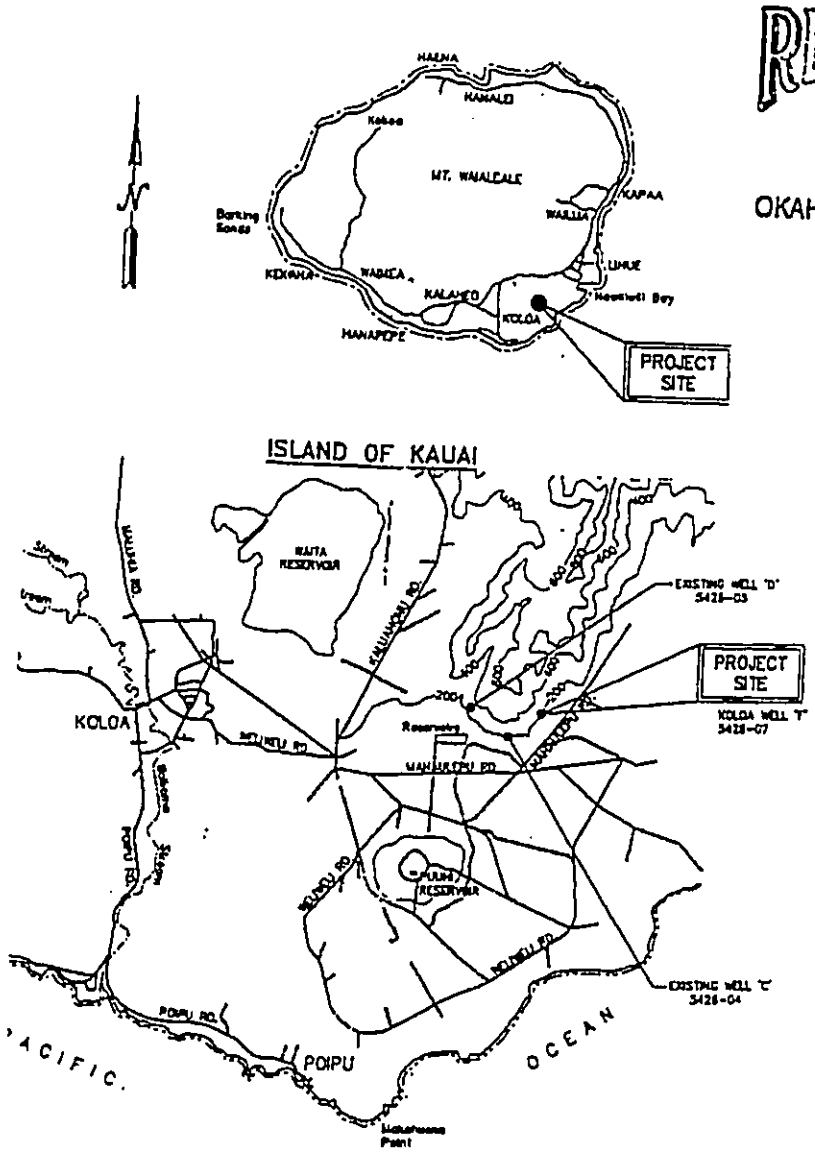
HYDROLOGICAL REPORT:

SUSTAINABLE YIELD OF KOLOA WELL "F'

Sustainable Yield of Koloa Well F (#5425-15)
June 1999
By Waimea Water Services Inc.

INTRODUCTION

Well F of the Department of Water (DOW) of the County of Kauai is located at the toe of the north slope of Mahaulepu valley in southeast Kauai.



LOCATION PLAN

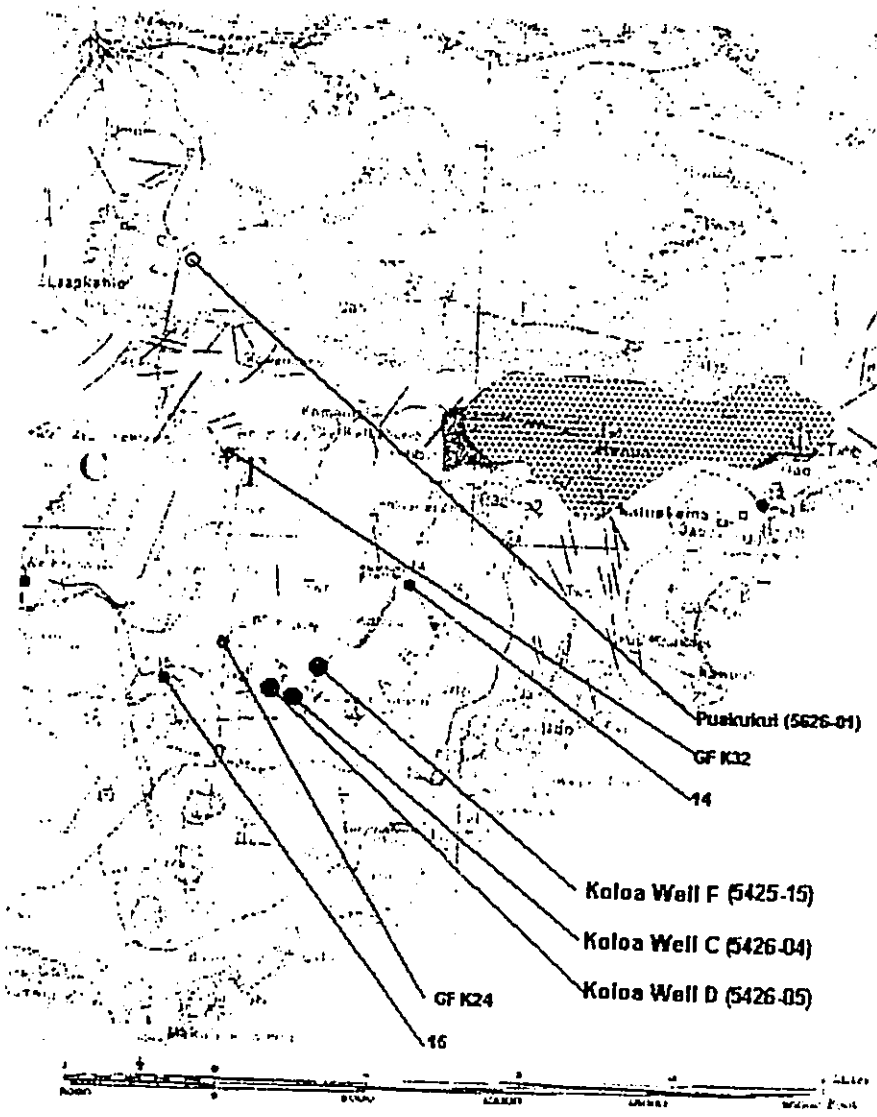
Construction of the well commenced on June 1, 1998 with site clearing and was completed in November of 1998. The complete information on construction of the well is included as an appendix to this analysis.

The well is intended to be integrated into the Poipu system of the DOW, which includes Wells C and D.

The purpose of this report is to provide analysis of the pumping test and construction information and to recommend pumping rates and settings for the permanent pump installation.

GEOLOGIC SETTING

Koloa is constructed in the lava of the Napali formation of the Waimea volcanic series noted as Twn in the geologic map. Generally, the surface lavas of the Napali formation exhibit extensive weathering as documented in the construction of Koloa C (CWRM files). Experience in various locations throughout Kauai have documented deep and extensive aerial weathering, even to 400' below sea level (personal communication-S.P. Bowles, 1999).



Geologic Map Showing DOW Wells C, D, & F
Base from Bulletin 13, Division of Hydrography, HI, 1960

During the design of Koloa F, it was anticipated that the weathering might extend deep and cause a reduction in yield as experienced in Koloa C. Based on rock and salinity samples taken during construction, it was concluded that the site of Koloa F showed minor weathering and, further, that the yield of the open bore test of the well verified that weathering was a minor influence. It was determined that the well casing could be set at a shallower depth than originally planned.

The Mahaulepu valley floor is filled with alluvium (Qa) from the surrounding hills. Drilling logs of the old well field (Wells 14A-N) indicate that the alluvium extends to a depth of about 60'. Highly weathered lava underlies the alluvium to a depth of about 250' or elevation -165'. According to the records, the wells have historically had a head of up to 30' above sea level.

The low land plains makai of the Koloa wells are underlain at a shallow depth by the secondary eruptions of the Koloa series (Qkl). At the Koloa mill site, the Well 15 tapped the aquifers of the Koloa basalt. The descriptions and well logs contained in Bulletin 13 (1960) indicated that the lava and sediments were penetrated to a depth of -150'. The lava encountered appears to be of the Koloa series. Water was reported to stand at about elevation + 119' in 1927.

As shown on the geologic map, a number of intrusive rocks, primarily dikes, are in evidence within the Napali formation near the Koloa wells. Dikes within the face off the road cut near GF K-36 to the north are highly weathered as are the surrounding lavas. The influence on groundwater flow by dikes can be very important if they are un-weathered. The extent of dike formations in the vicinity of Koloa F is uncertain as none are clearly in evidence.

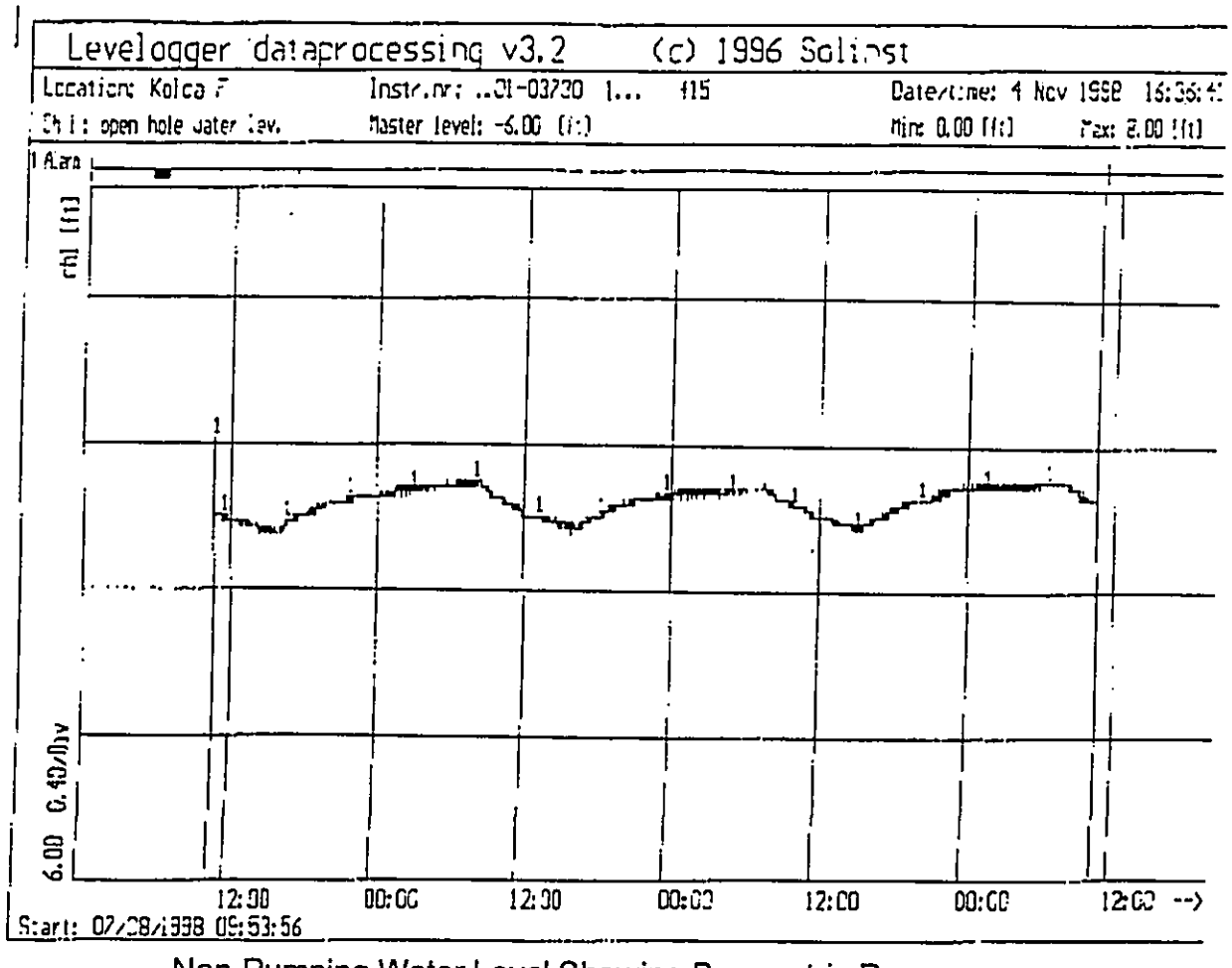
HYDROGEOLOGY

With the exception of Well 15 at Koloa mill, all of the wells in the immediate vicinity of the Koloa DOW wells produce from the Napali aquifer. The operating experience of the Grove Farm Wells GF K-32 and K-24 is extensive, although production has historically been intermittent. A controlled test of GF K-32 was conducted in 1996 as reported in a USGS memorandum to DOW dated December 10, 1996. The well was pumped at a rate of 3500 gpm with an initial drawdown of 38 ft. or a specific capacity of 92 g/ft. The initial water level stood at elevation 107'

The water level continued to drop during the continuous rate test. As documented in various memorandums by Waimea Water Services in 1996, cyclic water fluctuations recorded during the test were a response to changes in barometric pressure.

Such barometric pressure responses were also recorded by the USGS. Water level measurements of nearby Well K-24 and the USGS Puakukui test well (near the road tunnel east portal) showed no pumping influence. These measurements did show a 100% barometric response as stated in the USGS memo.

Recordings of water levels in the Koloa F during construction showed only barometric changes in non-pumping periods.



Non-Pumping Water Level Showing Barometric Pressure

It is important to note that barometric responses only occur in confined aquifers such as dike compartments or a confined system such as that under pressure in artesian conditions. In the case of the Napali aquifer, the manner of confinement is not yet defined; however, it may be the weathered face where it dips below sea level under the coastal Koloa flows or in compartments formed by the dikes.

There is no evidence of any ocean tides driving water level changes in any of the Napali wells. Numerous recordings have been made within the Koloa aquifers and tides are commonly visible in wells in proximity to the ocean.

In a January 11, 1996 memorandum from the USGS addressed to Ernest Lau, in reference to the USGS Puakukui well, it was stated that the well was situated in an "unconfined fresh-water lens." The water level stood at elevation 169'. According to a memo provided in December 10, 1996, the water level at both the GF K-26 and Puakukui wells exhibited diurnal changes corresponding to barometric pressure as recorded at Puakukui.

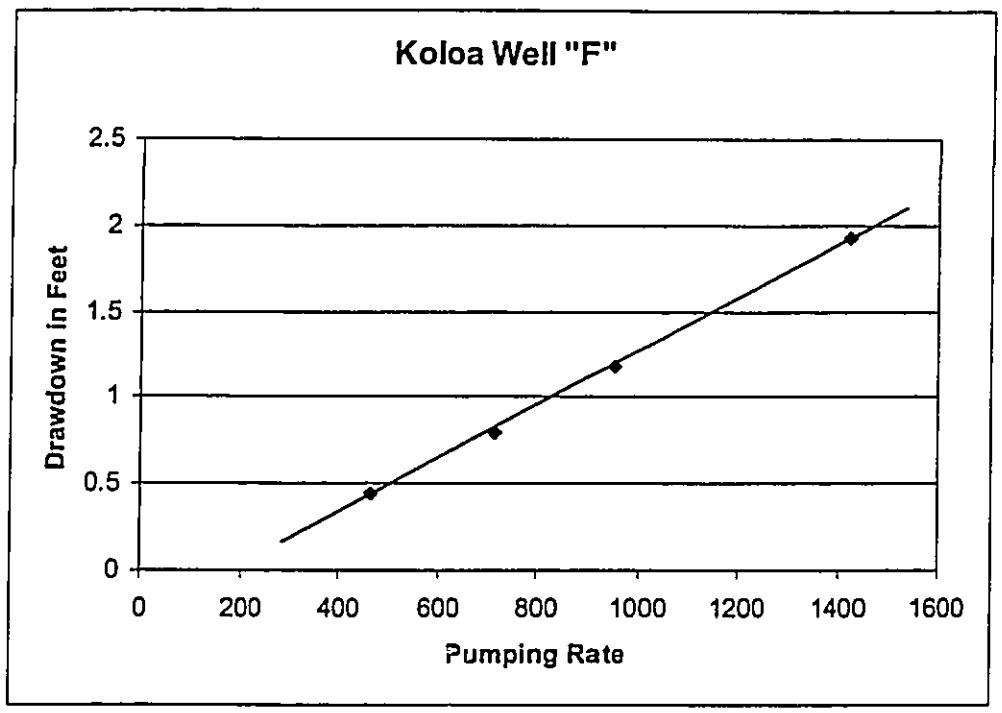
The repeated observations of barometric response lead to a conclusion that all of the Napali formation wells are situated in confined aquifers or compartments. This latter conclusion is based on the water level report, which ranges from a high 169' at Puakukui to a low of 25' at the Koloa Wells C, D and F.

During peak pumping periods, GF K-32 was pumped excessively and the water level in the well was measured below sea level (personal communication–S.P. Bowles, 1999).

Chloride measurements taken by the DOW during the long term pumping test of Koloa F showed a reduction of salinity in time (see Appendix). This would be indicative of a stagnant confined aquifer as opposed to a draft sensitive basal fresh water lens.

PUMPING TESTS – Specific Capacity

On October 21, 1998, a specific capacity test of Koloa F was conducted under the supervision of the DOW staff. The data from the test are contained in the Appendix. A graph of this data is provided below.



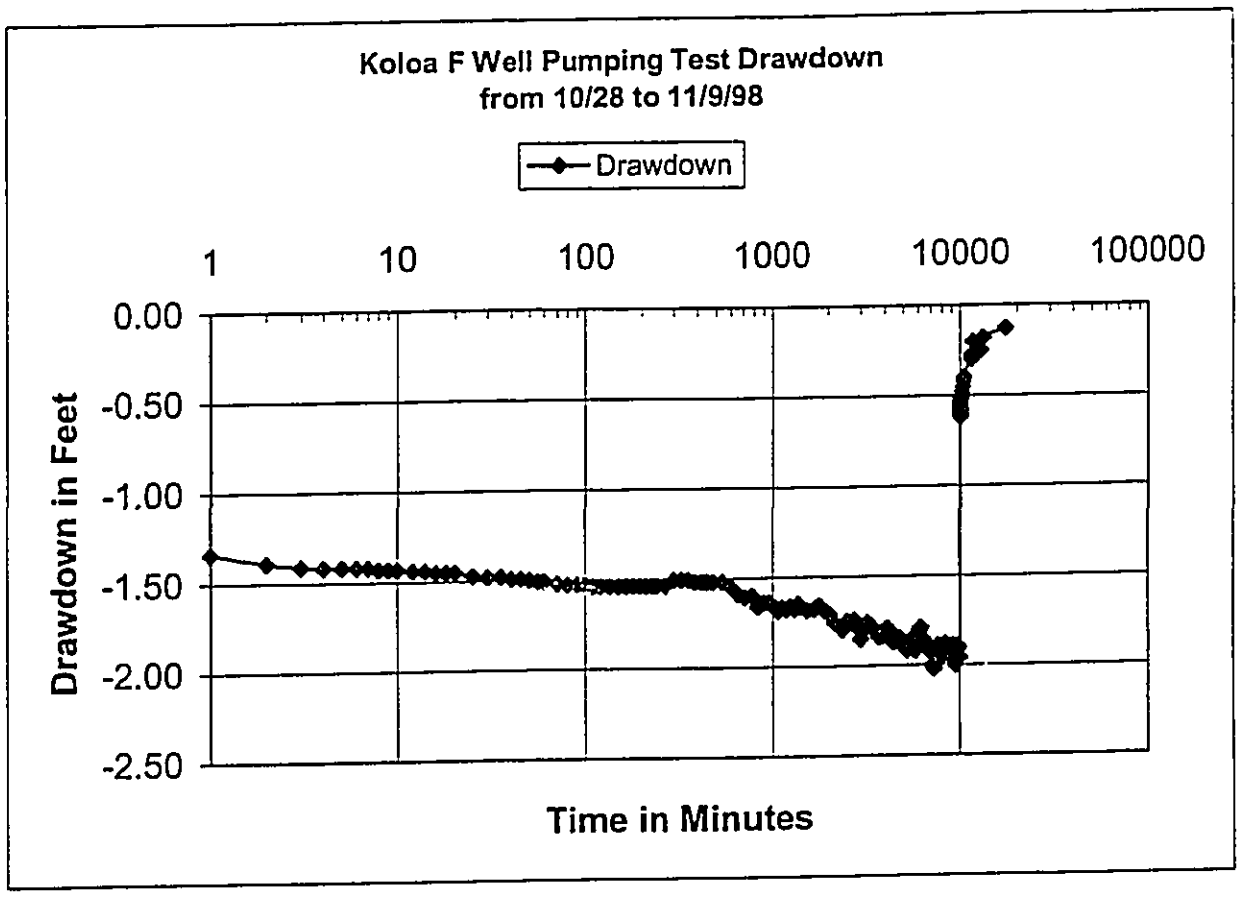
Specific Capacity Graph of Well

The specific capacity of the well at a rate of 1396 gpm is 723 gal./ft. By contrast, the high production Well GF K-32 has a specific capacity at 3500 gpm of 92 gal./ft. Entrance losses to the bore in Koloa F are exceptionally low indicating a very efficient construction. This efficiency has been most likely created by the added open hole.

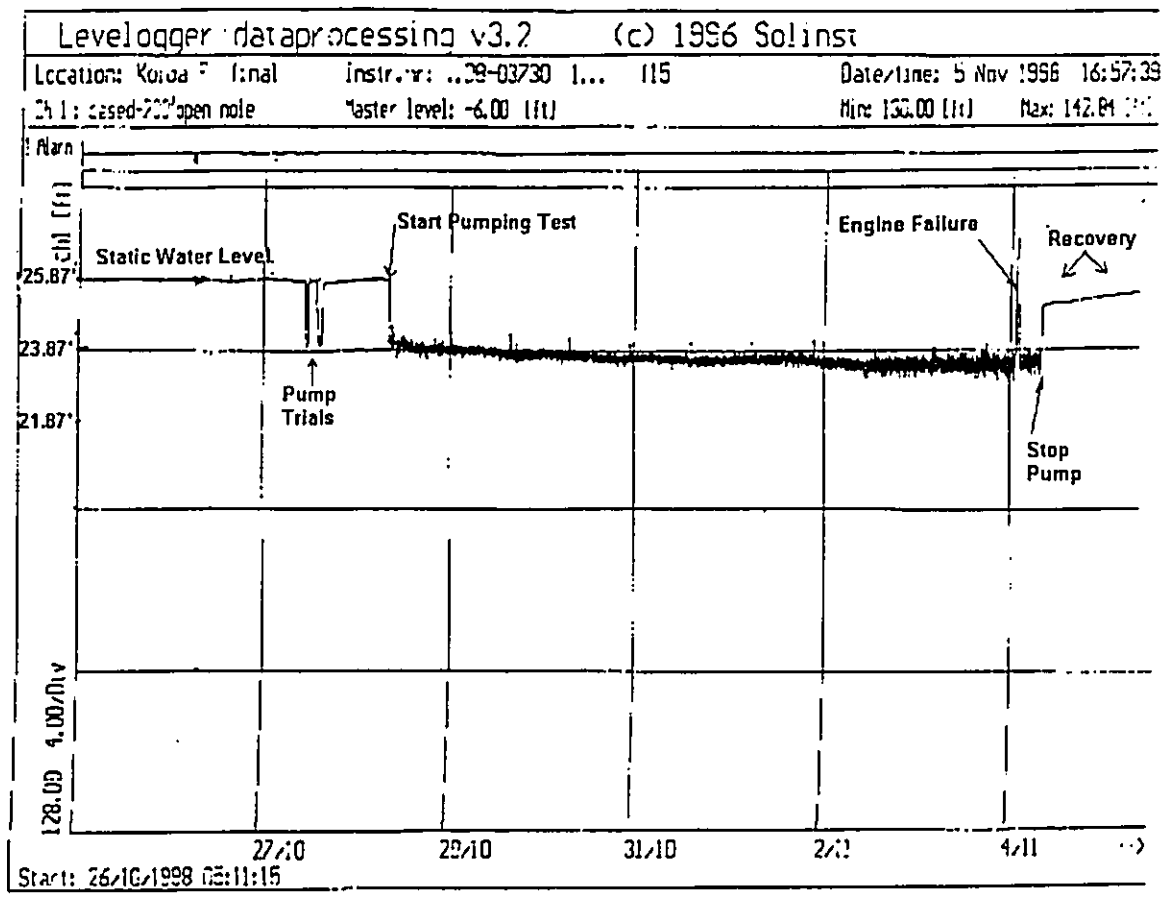
In an earlier test on July 16, 1998, with the well drilled to a depth of 160' (-31' msl), the specific capacity was 216 gal./ft. at 450 gpm.

PUMPING TESTS – Sustainable Yield

A long term pumping test at a rate of 1200 gpm was conducted beginning on October 28 and ending November 4, 1998. Measurements of the water level during the test were made using an electrical sounding probe and a downhole continuous recorder. The results are graphed and the data is included in the Appendix.

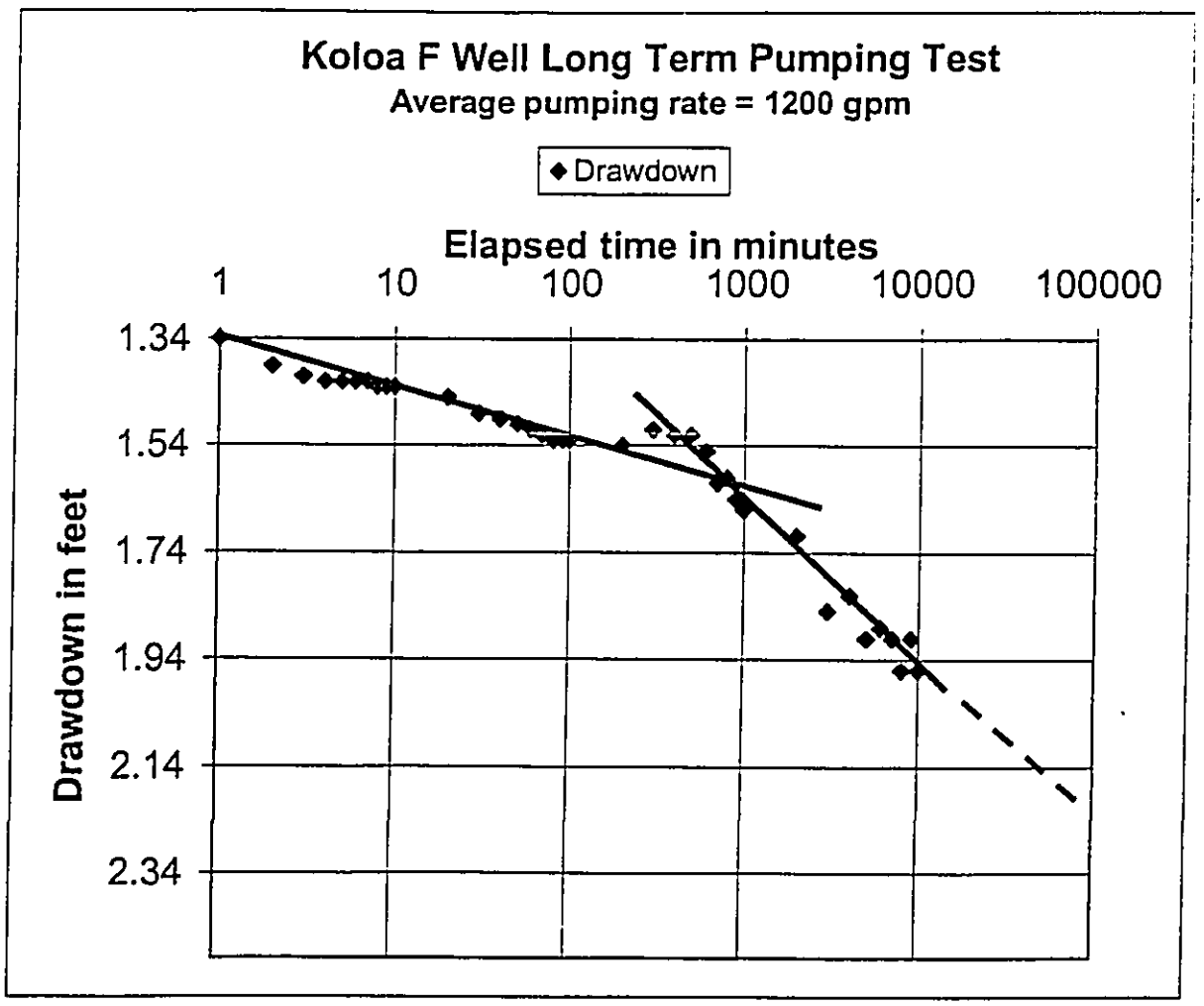


Graph showing direct measurements by DOW.



Continuous Recording of Water Level
10/27 – 11/4/98 Pumping Test at 1200 GPM

In order to estimate the sustainable yield of the well, the test data were graphed on a semi-log plot. Both the recovery and drawdown data are used for analytical purposes.



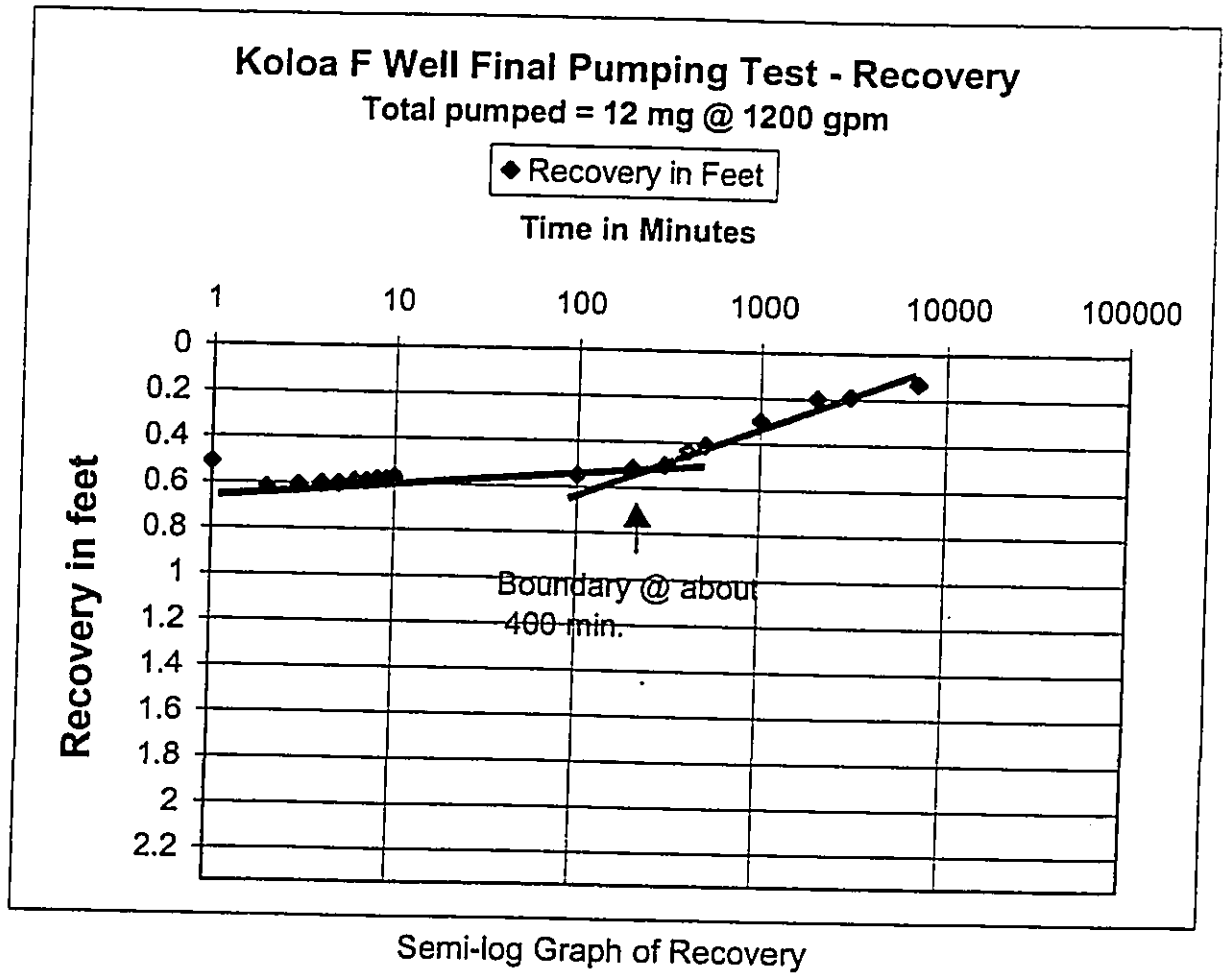
Semi-log Graph of Drawdown

As noted, there is the appearance of a discharge boundary showing on the graph. Such a boundary occurs when the cone of influence reaches either a zone of lower permeability or a pumping well. The graphic boundary may also be caused by a variation in pumping rate.

Since the Koloa Wells C and D are somewhat distant, it is unlikely that they would impact the water level so soon. The earlier discussions on geology have outlined two other possible causes: either dikes or the weathered subsurface slope facing Mahaulepu valley. Based on field observation, the latter seems most likely to be the cause.

Since the pumping period was restricted to 10,000 minutes, projecting the least squares plot following the boundary break is the most practical means of predicting the drop in water level (or loss of storage). At the sustained pumping rate of 1200 gpm, theoretically, the water level would continue to drop and reach 2.24 ft. of drawdown at 100,000 minutes or 69 days. Unless some unusual boundary condition appears, such a projection can be assumed to be reasonable.

As indicated on the recovery semi-log graph, a similar boundary appears. Theoretically, the recovery data will be more accurate to use as a basis for interpretation as it removes the influence of a pump and simply reflects the inflow or recharge rate to the well.



Semi-log Graph of Recovery

The boundary effect of recharge shows an increased recharge rate after 400 minutes of recovery and it appears that full recovery would occur at about 10,000 minutes.

From the data, it appears that the sustainable yield of the well exceeds 1200 gpm or a sustained pumping rate of 1.7 mgd.

SALINITY

As noted in the pumping data, contained in the Appendix, the salinity of the product water dropped steadily during the long-term test beginning at 84-ppm chlorides and dropping to 79 ppm.

Such a reduction in salinity is not unexpected in a high-level aquifer subject to ocean spray drift over the recharge area. The prevailing trade winds commonly carry such drift over Mahaulepu during periods of strong winds or heavy surf in Kipu Kai.

CONCLUSIONS

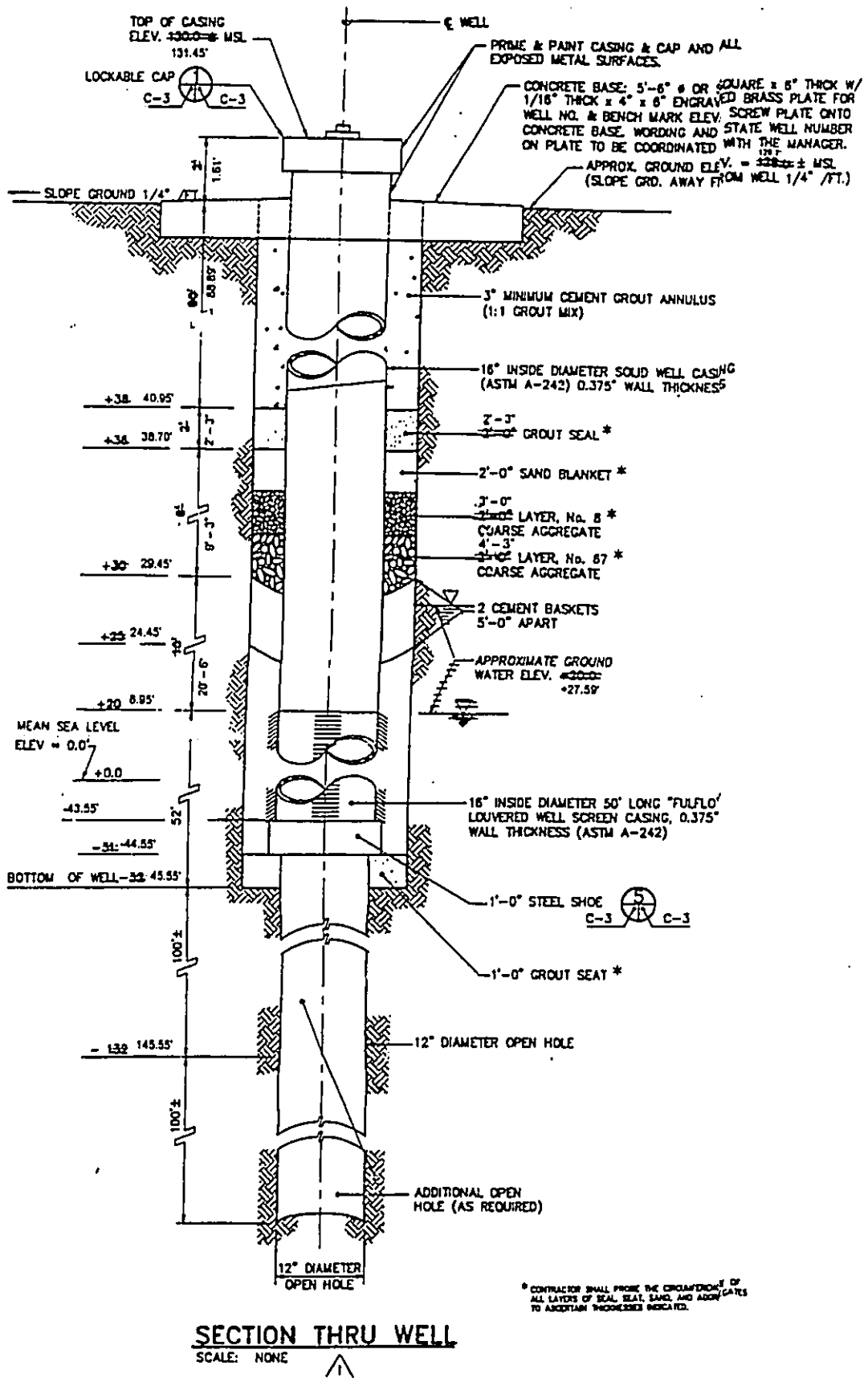
1. The specific capacity of the well is at least 732 gal./ft. at 1396 gpm.
2. The sustainable yield of the well, under the present regional pumping conditions, exceeds 1.7 mgd.
3. Salinity will not be of significance at any reasonable pumping rate.
4. There appears to be no impact on Koloa F from the pumping of Koloa C or D under the present pumping regime.

RECOMMENDATIONS

1. The well pump intake should be set at elevation – 10' or total of about 141'.
2. An installed pumping capacity of 1200 gpm is reasonable.
3. Long term records of water salinity, pumpage and water levels should be maintained at all of the Koloa wells.

APPENDIX

Koloa Well F – State Well No. 5425-15
As-Built Drawing – As per GMP Associates, Inc., June 9, 1999



SECTION THRU WELL
SCALE: NONE
1

DRILLERS REPORT

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

WELL COMPLETION REPORT

3/20/96 WCR Form

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

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

1. State Well No.: 5425-15 Well Name: Koloa Well "F" Island: Kauai
2. Location/Address: Mahaulepu, Koloa, Kauai Tax Map Key: 2-9-03:1

PART I. WELL CONSTRUCTION REPORT

3. Drilling Company: Roscoe Moss Hawaii, Inc.
4. Name of driller who performed work: Rodney Couch
5. Type of rig/construction: 36L Bucyrus Erie Cable Tool
6. Date(s) Well Construction and pump tests (if any) completed: Pump Testing 11-9-98 Construction 11-20-
7. GROUND ELEVATION (referenced to mean sea level, msl): 129.72 ft.
   Well Bench Mark (description/location): TOP OF CASING Elevation(msl): 131.45 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.
0 to 18	Red dirt & boulders	55 to 65	Gray & brown boulder
18 to 55	Weathered gray lava	65 to 72	Gray & brown lava hard

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

9. Total depth of well below ground: 377 ft.
10. Hole size: 24 inch dia. from 0 ft. to 177 ft. below ground
    12 inch dia. from 177 ft. to 377 ft. below ground
    _____ inch dia. from _____ ft. to _____ ft. below ground
11. Casing installed: 16 in. I.D. x .375 in. wall solid section to 122.5 ft. below ground
    16 in. I.D. x .312 in. wall perforated section to 175 ft. below ground
    Casing Material/Slot Size: Corten Steel
12. Annulus: Grouted from 0 ft. below ground to 107 ft. below ground
    Gravel packed from NA ft. below ground to NA ft. below ground
13. Initial water level: 103.86 ft. below ground. Date and time of measurement: 10-28-98 7:30AM
14. Initial chloride: 84 ppm Date and time of sampling: 10-28-98 10:00AM
15. Initial temperature: _____ °F Date and time of measurement: _____
16. PUMPING TESTS: Reference Point (R.P.) used: Sounding tube (top) which elevation is 129.72 ft.
    (1) Step-Drawdown Test Date 10-21-98
    Start water level _____ ft. below R.P.
    End water level _____ ft. below R.P.
    (2) Long-term Aquifer Test Date 10-28-98
    Start water level 103.86 ft. below R.P.
    End water level 105.82 ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs *(1/9/96 LTAT Form)* attached? __ Yes __ No
18. As-built drawings attached attached? __ Yes __ No
19. Other remarks/comments: *(On back of this form)*

Well Drilling Contractor (print) Roscoe Moss Hawaii Inc C-57 Lic. No. AC-16437
Signature Tracy Rummell Date 12-23-98
Surveyor (print) _____ Lic. No. _____
Signature _____ Date _____
Applicant (print) _____
Signature _____ Date _____

PUMP TEST OF JULY 16, 1998
Pumping Data Logs

PUMP TEST FIELD DATA

Pump/~~Observation~~ Well Name: KOLOA WELL 'F' State Well No.: _____
Pump well diameter: 22" open hole Dist. pump well to observ. well: _____

Reference pt. for depth to water: TOP OF CASING, elev.: _____ ft. msl
Water level measurements by: Solinst, electric sounder

pump Intake 152

Totalizer, start: 459,950 gal., end: 4,701,435 gal.

105.93'

JULY 16, 1998

7:00 — 105.30' DTW
7:59 — 105.31'

8:03 105.21' DTW

Elapsed Time (min.)	Date & Time	Gallons / Seconds	Pumping Rate (gpm)	Depth to Water (ft.)	Draw-down (ft.)	Notes
						TDS = 260 mg/l 105.93' EC = 555
0	08:26			105.31'	0.00	Pumped EC = 1/30sec 100gpm
2	08:28			104.17'	1.86	100gal / 13.23 sec
4	08:32			106.61'	0.30	
6	08:36		250	106.18'	0.87	100gal / 24.12 sec
8	08:34		240	106.18'	0.87	100gal / 24.90 sec
10	08:36		240	106.15'	0.87	100gal / 24.90 sec
12	08:41		240	106.15'	0.87	100gal / 24 sec, Cl⁻ Sample #1
14	08:46		240	106.20'	0.89	100gal / 24 sec, Cl⁻ 90 mg/l
16	08:51			106.20'	0.89	
18	08:56		240	106.21'	0.90	100gal / 25.02 sec
20	09:00			106.22'	0.91	
22	09:06			106.20'	0.89	100gal / 25.1 sec
24	09:26			106.20'	0.89	
26	09:28		550 ~	106.30'	1.49	100 gal / 16.32 sec / adjust valve
28	09:30			106.80'	1.49	100 gal / 16.46 sec
30	09:32			106.80'	1.49	
32	09:34			106.80'	1.49	
34	09:36			106.80'	1.49	100gal / 17.02 sec
36	09:41			106.80'	1.49	100 gal / 17.02 sec Cl⁻ Sample #2
38	09:46			106.80'	1.49	
40	09:51			106.79'	1.48	100gal / 17.46 sec
42	09:56			106.78'	1.47	Cl⁻ = 85 mg/l

PUMP TEST FIELD DATA (cont.)

Pump/~~Observation~~ Well Name: KOLOA WELL 'F', Static Depth to Water 105.31 ft.

Elapsed Time (min.)	Date & Time 7/16/98	Gallons / Seconds	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)	Notes
[illegible]	10:06			106.79'	1.48	100gal / 17.40 sec
[illegible]	10:16			106.79'	1.48	100gal / 17.53 sec
[illegible]	10:26			106.79'	1.48	100gal / 17.54 sec
[illegible]	10:28		450 #.	107.44'	2.13	100gal / 12.81 sec adjust valve
[illegible]	10:30			107.42'	2.11	100gal / 12.90 sec
[illegible]	10:32			107.39'	2.08	100gal / 13.20 sec
[illegible]	10:34			107.40'	2.09	100gal / 13.25 sec
[illegible]	10:36			107.40'	2.09	100gal / 13.19 sec Cl- Sample #3
[illegible]	10:41			107.40'	2.09	100gal / 13.23 sec Cl- = 90
[illegible]	10:46			107.41'	2.10	100gal / 13.30 sec
[illegible]	10:51			107.41'	2.16	100gal / 13.33 sec
[illegible]	10:56			107.41'	2.10	100gal / 13.37 sec
160	11:06			107.41'	2.10	100gal / 13.20 sec
[illegible]	11:16			107.40'	2.09	100gal / 13.30 sec Cl- = 85 mg/l
1EC	11:26			107.40'	2.09	100gal / 13:32 sec
210	11:56			107.39	2.08	100gal / 13:25
240	12:26			107.39	2.08	100 / 13.13 sec water is clear
270	12:56			107.38	2.07	100 / 13.32 T = 24.3°C
						stop pump
1				105.65	0.39	begin recovery
2				105.65	0.34	
3				105.60	0.29	totalizer = 4,701,435 gal/c
4				105.59	0.31	
5				105.58	0.27	
6				105.56	0.25	
7				105.54	0.23	
8				105.53	0.22	

PUMP TEST FIELD DATA (cont.)

Pump/~~Observation~~ Well Name: Colo4 Well "F", Static Depth to Water 105.31 ft.

Elapsed Time (min.)	Date & Time	Gallons / Seconds	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)	Notes
	7/16/98					
10			0	105.50	0.19	recovery continued
12				105.49	0.18	
14				105.47	0.16	
16				105.45	0.14	
20				105.43	0.12	
25				105.39	0.08	
30				105.38	0.07	
35				105.36	0.05	
40				105.35	0.04	
45				105.33	0.02	
50				105.31	0.00	
55				105.30	-0.01	
60				105.30	-0.01	
65	2:00 PM			105.30	-0.01	

TEST OF SPECIFIC CAPACITY
Pumping Data Logs

PUMP TEST FIELD DATA

DATE: OCTOBER 21, 1998

Pump Well Name: KOLOA WELL 'F'
Pump Well Diameter: 16" CASED, 12" OPEN HOLE
State Well No: _____
Distance of pump well to observation well: _____

Reference point for depth to water: TOP OF SOUNDING TUBE
Elevation: 129.72' ft. msl
Water level measurements by: SOLINST, ELECTRIC SOUNDER

Totalizer, start: 59761500 gallons., end: 59,973,800 gallons.

Elapsed Time (min.)	Time	Gallons / Second	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)	Notes
0	07:30	0	0	103.76	0	INITIAL WATER LEVEL READING
0	07:47	0	0	103.76	0	
0	07:58	0	0	103.76	0	Pump operating at 08:00
1	08:01			104.19	0.43	104.19
2	08:02		428 -	104.17	0.41	103.76
3	08:03			104.19	0.43	.40
4	08:04			104.16	0.40	
5	08:05			104.17	0.41	40' = 520 gal @ 08:05
6	08:06			104.16	0.40	→ 59,763,650
7	08:07			104.15	0.39	
8	08:08			104.16	0.40	
9	08:09			104.17	0.41	
10	08:10		↓	104.17	0.41	increase RPM's adjustment
12	08:12		465	104.20	0.44	704 = 940 gal @ 08:12
14	08:14			104.21	0.45	→ 59,764,650
16	08:16			104.22	0.46	water is clear
18	08:18			104.22	0.46	
20	08:20			104.23	0.47	
25	08:25			104.23	0.47	
30	08:30			104.23	0.47	
35	08:35			104.23	0.47	
40	08:40			104.23	0.47	Sample no. 1
50	08:50			104.25	0.49	1,1 = 1,175,000 @ 08:55
60	09:00		↓	104.25	0.49	increase RPM's
						→ 59,787,500

PUMP TEST FIELD DATA (CONT.)

DATE: 10/2/?

Pump Well Name: Kalae Int-11 "F"

Static Depth to Water: 103.76

Elapsed Time (min.)	Time	Gallons / Second	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)	Notes
61	09:01		691	104.52	0.76	
62	09:02			104.53	0.77	
63	09:03			104.52	0.77	
64	09:04			104.53	0.77	
65	09:05			104.52	0.77	59,794,150. @09:06
66	09:06			104.54	0.78	tot. = [illegible] @ [illegible]
67	09:07			104.54	0.78	
68	09:08			104.54	0.78	
69	09:09			104.54	0.78	
70	09:10			104.54	0.78	59,798,300
72	09:12		710	104.54	0.78	tot. = [illegible] @ 09:12
74	09:14			104.54	0.78	
76	09:16			104.55	0.79	water is clear
78	09:18			104.55	0.79	
80	09:20			104.55	0.79	
85	09:25			104.56	0.79	
90	09:30			104.55	0.79	sample no. 2
95	09:35			104.55	0.79	tot. = [illegible] @ 09:33
100	09:40		716	104.56	0.80	59,815,000
110	09:50			104.56	0.80	59,830,900
120	10:00			104.56	0.80	tot. = [illegible] @ 09:55
121	10:01		976	104.91	1.15	increase RPM's
122	10:02			104.91	1.15	104.91
123	10:03			104.91	1.15	103.76
124	10:04			104.91	1.15	
125	10:05			104.91	1.15	tot. = [illegible] @ 10:05
126	10:06			104.91	1.15	59,836,700
127	10:07			104.92	1.16	
128	10:08			104.92	1.16	

PUMP TEST FIELD DATA (CONT.)

DATE: 10/21/98

Pump Well Name: Koloa Well "F"

Static Depth to Water: 103.76

Elapsed Time (min.)	Time	Gallons / Second	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)	Notes
129	10:09		976	104.92	1.16	
130	10:10			104.92	1.16	
132	10:12			104.92	1.16	
134	10:14			104.92	1.16	
136	10:16			104.92	1.16	tot.= 54,849,400 @ 10:16
138	10:18		940	104.92	1.16	
140	10:20			104.92	1.16	water is clear
145	10:25			104.93	1.17	
150	10:30			104.93	1.17	
155	10:35			104.93	1.17	
160	10:40		952	104.94	1.18	Sample no. 3
170	10:50			104.94	1.18	tot. = 59,870,100 @ 10:40
180	11:00			104.94	1.18	tot. = 59,887,250 @ 11:58
181	11:01		1396	105.66	1.90	increase RPM's
182	11:02			105.67	1.91	
183	11:03			105.66	1.90	
184	11:04			105.66	1.90	
185	11:05			105.67	1.91	tot. = 57,896,200 @ 11:05
186	11:06			105.67	1.91	
187	11:07			105.67	1.91	
188	11:08			105.67	1.91	
189	11:09			105.67	1.91	
190	11:10			105.67	1.91	
192	11:12			105.67	1.91	
194	11:14			105.67	1.91	
196	11:16			105.68	1.92	
198	11:18			105.68	1.92	
200	11:20			105.68	1.92	
205	11:25			105.69	1.93	

PUMP TEST FIELD DATA (CONT.)

DATE: 10/21/98

Pump Well Name: Koloa Well 'F'

Static Depth to Water: 105.76

Elapsed Time (min.)	Time	Gallons / Second	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)	Notes
210	11:30		1396	105.69	1.93	sample #4
215	11:35		1427	105.69	1.93	tot. = 57,936,700 @ 11:35
220	11:40		↓	105.69	1.93	
230	11:50		↓	105.69	1.93	
240	12:00		↓	105.69	1.93	shut down pump
						tot. = 58,273,800
		RECOVERY				
241	12:01		0	104.00	0.24	Begin recovery
242	12:02			104.00	0.24	
243	12:03			103.99	0.23	
244	12:04			103.98	0.22	
245	12:05			103.97	0.21	
246	12:06			103.96	0.20	
247	12:07			103.96	0.20	
248	12:08			103.95	0.19	
249	12:09			103.95	0.19	
250	12:10			103.95	0.19	
252	12:12			103.94	0.18	
254	12:14			103.93	0.17	
256	12:16			103.92	0.16	
258	12:18			103.91	0.15	
260	12:20			103.91	0.15	
265	12:25			103.90	0.14	
270	12:30			103.89	0.12	
275	12:35			103.87	0.11	
280	12:40			103.87	0.11	
290	12:50			103.86	0.10	
300	1:00			103.86	0.10	

TEST OF LONG TERM
Data

Reference Point: Top of Sounding Tube Elevation: 129.72'

Static Depth to Water: 103.86

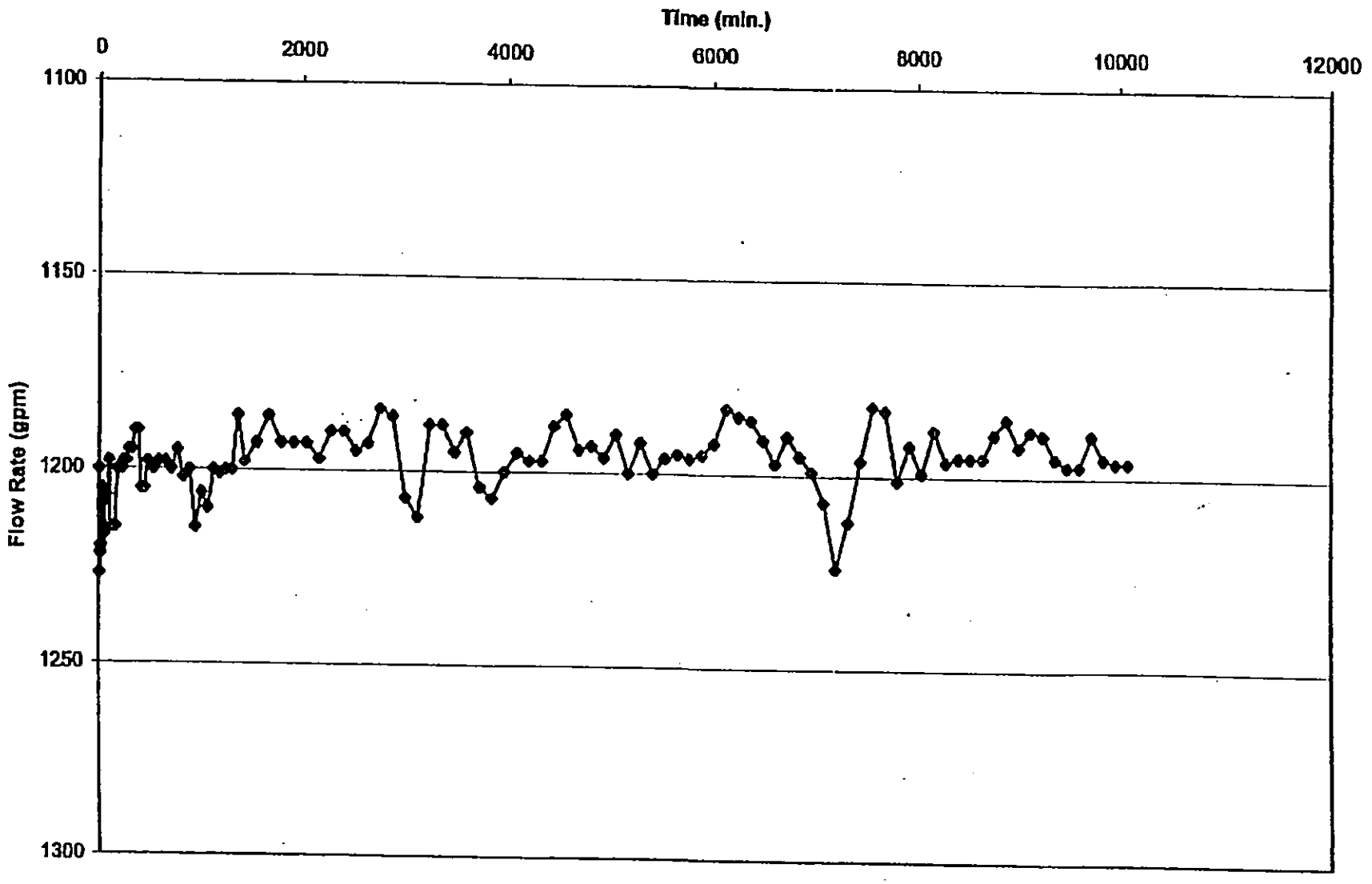
Elapsed Time (min.)	Time	Pumping Rate (gpm)	Depth to Water (ft.)	Drawdown (ft.)		Chloride Content (ppm)
0	07:30	0	103.86	0.00	10/28/98	
0	07:45	0	103.86	0.00		
0	08:00	0	103.86	0.00		
1	08:01	1200	105.20	1.34		
2	08:02	1200	105.25	1.39		
3	08:03	1200	105.27	1.41		
4	08:04	1200	105.28	1.42		
5	08:05	1200	105.28	1.42		
6	08:06	1200	105.28	1.42		
7	08:07	1200	105.28	1.42		
8	08:08	1227	105.29	1.43		
9	08:09	1227	105.29	1.43		
10	08:10	1227	105.29	1.43		
12	08:12	1222	105.30	1.44		
14	08:14	1222	105.30	1.44		
16	08:16	1222	105.31	1.45		
18	08:18	1220	105.31	1.45		
20	08:20	1220	105.31	1.45		
25	08:25	1220	105.33	1.47		
30	08:30	1220	105.34	1.48		
35	08:35	1205	105.34	1.48		
40	08:40	1209	105.35	1.49		
45	08:45	1209	105.35	1.49		
50	08:50	1209	105.36	1.50		
55	08:55	1217	105.37	1.51		
60	09:00	1217	105.37	1.51		
70	09:10	1207	105.38	1.52		
80	09:20	1207	105.39	1.53		
90	09:30	1198	105.39	1.53		
100	09:40	1198	105.39	1.53		
110	09:50	1215	105.40	1.54		
120	10:00	1215	105.40	1.54		84
135	10:15	1215	105.40	1.54		
150	10:30	1215	105.40	1.54		
165	10:45	1215	105.40	1.54		
180	11:00	1200	105.40	1.54		
195	11:15	1200	105.40	1.54		
210	11:30	1200	105.40	1.54		
225	11:45	1200	105.40	1.54		
240	12:00	1198	105.40	1.54		
270	12:30	1198	105.40	1.54		
300	13:00	1195	105.37	1.51		
330	13:30	1195	105.37	1.51		
360	14:00	1190	105.37	1.51		
390	14:30	1190	105.38	1.52		
420	15:00	1205	105.38	1.52		
450	15:30	1205	105.38	1.52		
480	16:00	1198	105.38	1.52		

5880	10:00	1195	105.78	1.92		
6000	12:00	1192	105.74	1.88		
6120	14:00	1183	105.67	1.81		
6240	16:00	1185	105.65	1.79		
6360	18:00	1188	105.71	1.85		80
6480	20:00	1191	105.72	1.86		
6600	22:00	1197	105.78	1.90		
6720	00:00	1190	105.74	1.88	11/02/98	
6840	02:00	1195	105.76	1.90		80
6960	04:00	1198	105.76	1.80		
7080	06:00	1207	105.78	1.93		
7200	08:00	1224	105.86	2.00		
7320	10:00	1212	105.88	2.02		
7440	12:00	1196	105.82	1.96		
7560	14:00	1182	105.76	1.90		
7680	16:00	1183	105.75	1.89		
7800	18:00	1201	105.77	1.91		78
7920	20:00	1192	105.79	1.93		
8040	22:00	1199	105.82	1.96		
8160	00:00	1188	105.80	1.94	11/03/98	
8280	02:00	1196	105.77	1.91		78
8400	04:00	1195	105.74	1.88		
8520	06:00	1195	105.76	1.90		
8640	08:00	1195	105.79	1.93		
8760	10:00	1189	105.80	1.94		
8880	12:00	1185	105.78	1.92		
9000	14:00	1192	105.76	1.90		
9120	16:00	1188	105.75	1.89		
9240	18:00	1189	105.78	1.92		79
9360	20:00	1195	105.83	1.97		
9480	22:00	1197	105.86	2.00		
9600	00:00	1197	105.84	1.98	11/04/98	
9720	02:00	1189	105.75	1.89		79
9840	04:00	1195	105.77	1.91		
9960	06:00	1196	105.76	1.90		
10080	08:00	1196	105.82	1.96		
10080	08:00	0	105.82	1.96		
10081	08:01	0	104.37	0.51		
10082	08:02	0	104.48	0.62		
10083	08:03	0	104.47	0.61		
10084	08:04	0	104.46	0.60		
10085	08:05	0	104.46	0.60		
10086	08:06	0	104.45	0.59		
10087	08:07	0	104.45	0.59		
10088	08:08	0	104.44	0.58		
10089	08:09	0	104.44	0.58		
10090	08:10	0	104.43	0.57		
10092	08:12	0	104.43	0.57		
10094	08:14	0	104.43	0.57		
10096	08:16	0	104.42	0.56		
10098	08:18	0	104.42	0.56		

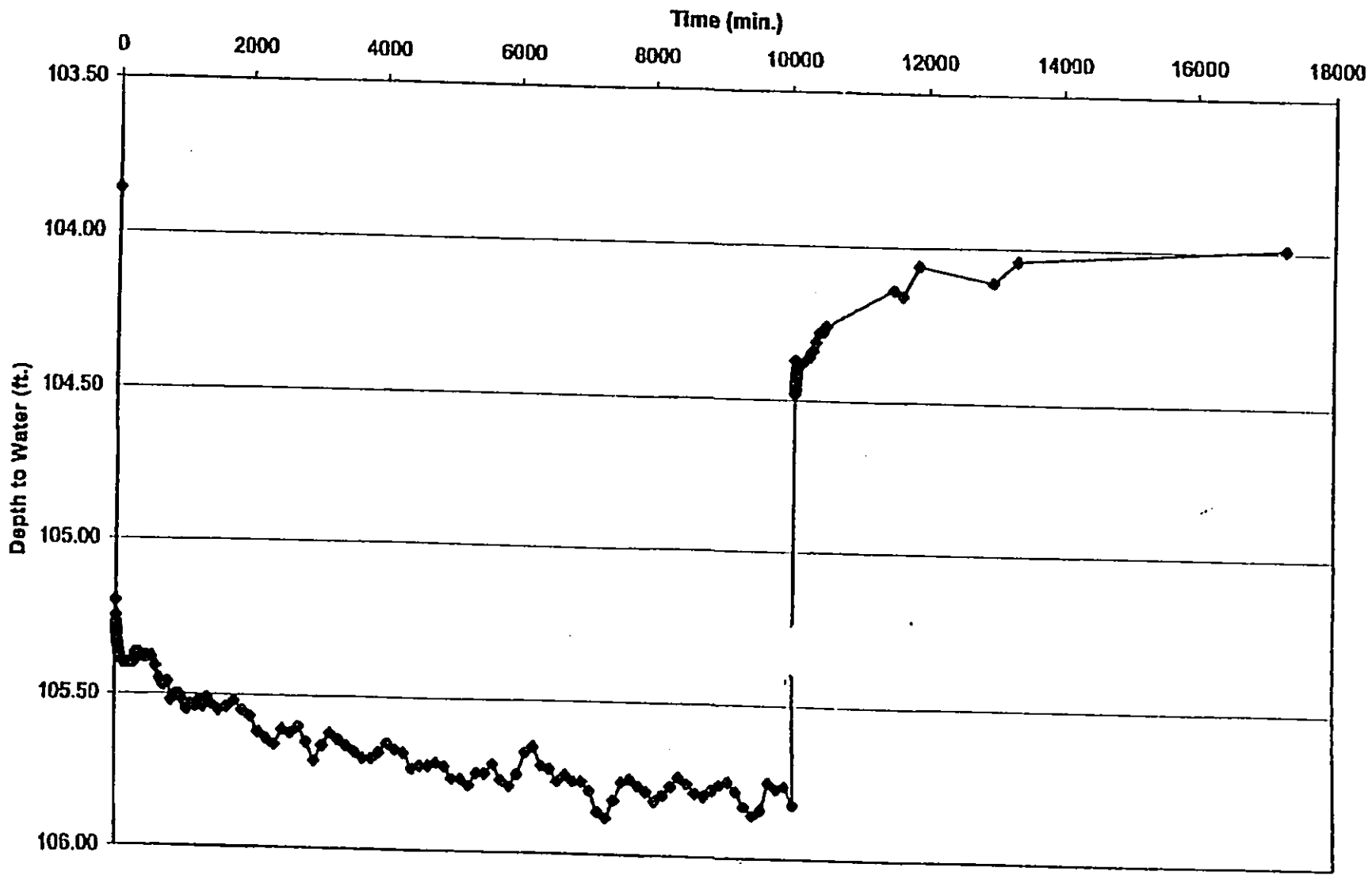
5880	10:00	1195	105.78	1.92		
6000	12:00	1192	105.74	1.88		
6120	14:00	1183	105.67	1.81		
6240	16:00	1185	105.65	1.79		
6360	18:00	1188	105.71	1.85		80
6480	20:00	1191	105.72	1.86		
6600	22:00	1197	105.78	1.90		
6720	00:00	1190	105.74	1.88	11/02/98	
6840	02:00	1195	105.76	1.90		80
6960	04:00	1199	105.76	1.90		
7080	06:00	1207	105.79	1.93		
7200	08:00	1224	105.88	2.00		
7320	10:00	1212	105.88	2.02		
7440	12:00	1196	105.82	1.96		
7560	14:00	1182	105.78	1.90		
7680	16:00	1183	105.75	1.89		
7800	18:00	1201	105.77	1.91		78
7920	20:00	1192	105.79	1.93		
8040	22:00	1199	105.82	1.96		
8160	00:00	1188	105.80	1.94	11/03/98	
8280	02:00	1196	105.77	1.91		78
8400	04:00	1195	105.74	1.88		
8520	06:00	1195	105.76	1.90		
8640	08:00	1195	105.79	1.93		
8760	10:00	1189	105.80	1.94		
8880	12:00	1185	105.78	1.92		
9000	14:00	1192	105.76	1.90		
9120	16:00	1188	105.75	1.89		
9240	18:00	1189	105.78	1.92		79
9360	20:00	1195	105.83	1.97		
9480	22:00	1197	105.86	2.00		
9600	00:00	1197	105.84	1.98	11/04/98	
9720	02:00	1189	105.75	1.89		79
8840	04:00	1195	105.77	1.91		
9960	06:00	1196	105.76	1.90		
10080	08:00	1186	105.82	1.98		
10080	08:00	0	105.82	1.86		
10081	08:01	0	104.37	0.51		
10082	08:02	0	104.48	0.62		
10083	08:03	0	104.47	0.61		
10084	08:04	0	104.46	0.60		
10085	08:05	0	104.46	0.60		
10086	08:06	0	104.45	0.59		
10087	08:07	0	104.45	0.59		
10088	08:08	0	104.44	0.58		
10089	08:09	0	104.44	0.58		
10090	08:10	0	104.43	0.57		
10092	08:12	0	104.43	0.57		
10094	08:14	0	104.43	0.57		
10096	08:16	0	104.42	0.56		
10098	08:18	0	104.42	0.56		

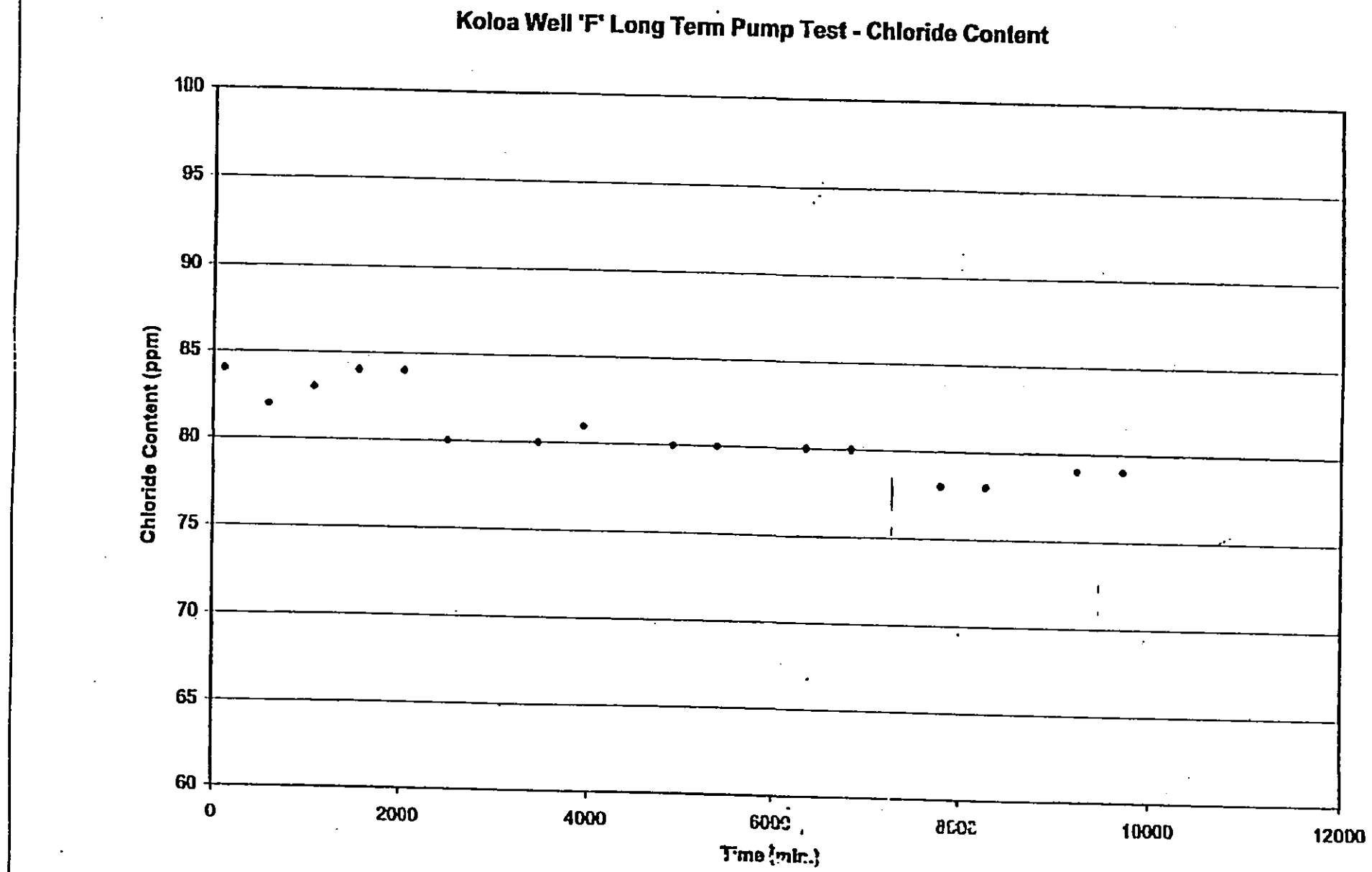
10100	08:20	0	104.41	0.55	
10105	08:25	0	104.40	0.54	
10110	08:30	0	104.40	0.54	
10115	08:35	0	104.39	0.53	
10120	08:40	0	104.39	0.53	
10125	08:45	0	104.38	0.52	
10130	08:50	0	104.38	0.52	
10135	08:55	0	104.38	0.52	
10140	09:00	0	104.38	0.52	
10150	09:10	0	104.38	0.52	
10160	09:20	0	104.38	0.52	
10170	09:30	0	104.38	0.52	
10180	09:40	0	104.38	0.52	
10280	11:20	0	104.36	0.50	
10330	12:10	0	104.34	0.48	
10380	13:00	0	104.31	0.45	
10430	13:50	0	104.28	0.42	
10480	14:40	0	104.28	0.42	
10530	15:30	0	104.26	0.40	
11520	08:00	0	104.14	0.28	11/05/98
11650	10:10	0	104.18	0.30	
11880	14:00	0	104.08	0.20	
12960	08:00	0	104.11	0.25	11/06/98
13320	14:00	0	104.04	0.18	
17280	08:00	0	103.99	0.13	11/09/98

Koloa Well 'F' - Long Term Pump Test



Koloa Well 'F' - Long Term Pump Test




Koloa Well 'F' Long Term Pump Test - Chloride Content
Chloride Content (ppm)
100
95
90
85
80
75
70
65
60
0
2000
4000
6000
8000
10000
12000
Time (min.)

KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I
STATE OF HAWAII

ENVIRONMENTAL ASSESSMENT

APPENDIX 4

HISTORIC SITES AND CULTURAL IMPACT

REPORTS AND CORRESPONDENCE

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

November 14, 2000

LOG NO: 26476 ✓
DOC NO: 0010NM22

Ron Terry, Ph.D.
Project Environmental Consultant
GeoMetrician
HC 2 Box 9575
Keaau, Hawaii 96749

Dear Dr. Terry:

SUBJECT: **Chapter 6E-42, Historic Preservation Review -- Preliminary EA**
for Koloa Well F (County of Kauai) Mahaulepu, Koloa, Kauai

A review of our records shows that no archaeological survey has taken place at these parcels. However, other significant historic sites have been found in nearby areas along the sandy shoreline (house sites, heiau, and agricultural complexes), making it quite possible that the proposed project area may contain historic sites.

We, thus, recommend that an archaeological inventory survey take place to determine if significant historic sites are present. Findings should be submitted in a report format to our office for review and approval. If historic sites are present, mitigation may be needed.

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

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

NM:amk

SCS Project Number 262-1

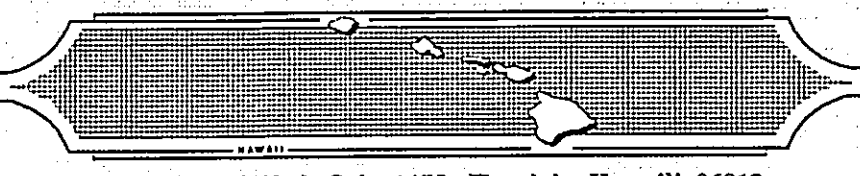
CULTURAL IMPACT ASSESSMENT (CIA) FOR A PROPOSED WELL SITE AT MĀHĀ`ULEPŪ, KŌLOA, KAUA`I, HAWAI`I [TMK:2-9-03]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.

March 2001

Prepared for:
Ron Terry
Geometrician

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 1475 Honolulu, Hawai`i 96813

ABSTRACT

At the request of Ron Terry, Scientific Consultant Services, Inc. (SCS) conducted a Cultural Impact Assessment (CIA) for a proposed well site at Māhā`ulepū, Kōloa, Kaua`i (TMK:2-9-03).

Traditional Cultural Properties are defined by the National Register Criteria for Evaluation as:

> Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in a community's history and contribute to maintaining the community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both. These properties include but are not limited to some types of archaeological sites.

This project contained several components which included appropriate archival/background research, identification and consultation with a number of informants, and a synthesis and assessment of findings from applicable archaeological work, archival/background, and ethnographic research. However, neither archaeological background research nor consultation with individuals led to the identification of any specific Traditional Cultural Properties.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

At the request of Ron Terry, Scientific Consultant Services, Inc. (SCS) conducted a Cultural Impact Assessment (CIA) for a proposed well site at Māhā`ulepū, Kōloa, Kaua`i (Figure 1). SCS provided consultation in the form of ethnographic interviews in compliance with Section 106 which simply stated, refers to the Federal review process designed to ensure that historic properties are considered during Federal project planning and execution.

Oral interviews of local residents were rreformed by SCS to determine if any Traditional Cultural Properties (TCPs) were present within the project area. If so, were there spacial relationships between the identified TCPs and the proposed site for the well in Māhā`ulepū? Is it possible to define characteristics and classify any associated cultural activities and uses of those potential properties? Of particular concern for this study was the identification of places and/or natural features or objects that may not have been physically modified by humans and were, therefore, not readily recognized as historical properties during conventional archaeological work. In addition, the identification and description of associated cultural practices were deemed of utmost importance.

The Scope-of-Work (SOW) for this project included archival/background research, identification and consultation with a limited number of informants, a synthesis and assessment of the findings from appropriate archaeological work, and ethnographic research.

DEFINITION OF TRADITIONAL CULTURAL PROPERTIES

Several publications pertaining to the process of evaluating and documenting traditional cultural properties and for assessing cultural impacts provided guidance in gathering information for this report. The National Park Service has prepared guidelines to assist in the documentation of intangible cultural resources and to encourage the identification and documentation of such resources by State and Federal agencies. National Register Bulletin No. 38 (National Park Service 1990) was developed and intended to be an aid in determining whether properties thought to have traditional cultural significance are eligible for inclusion in the National Register.

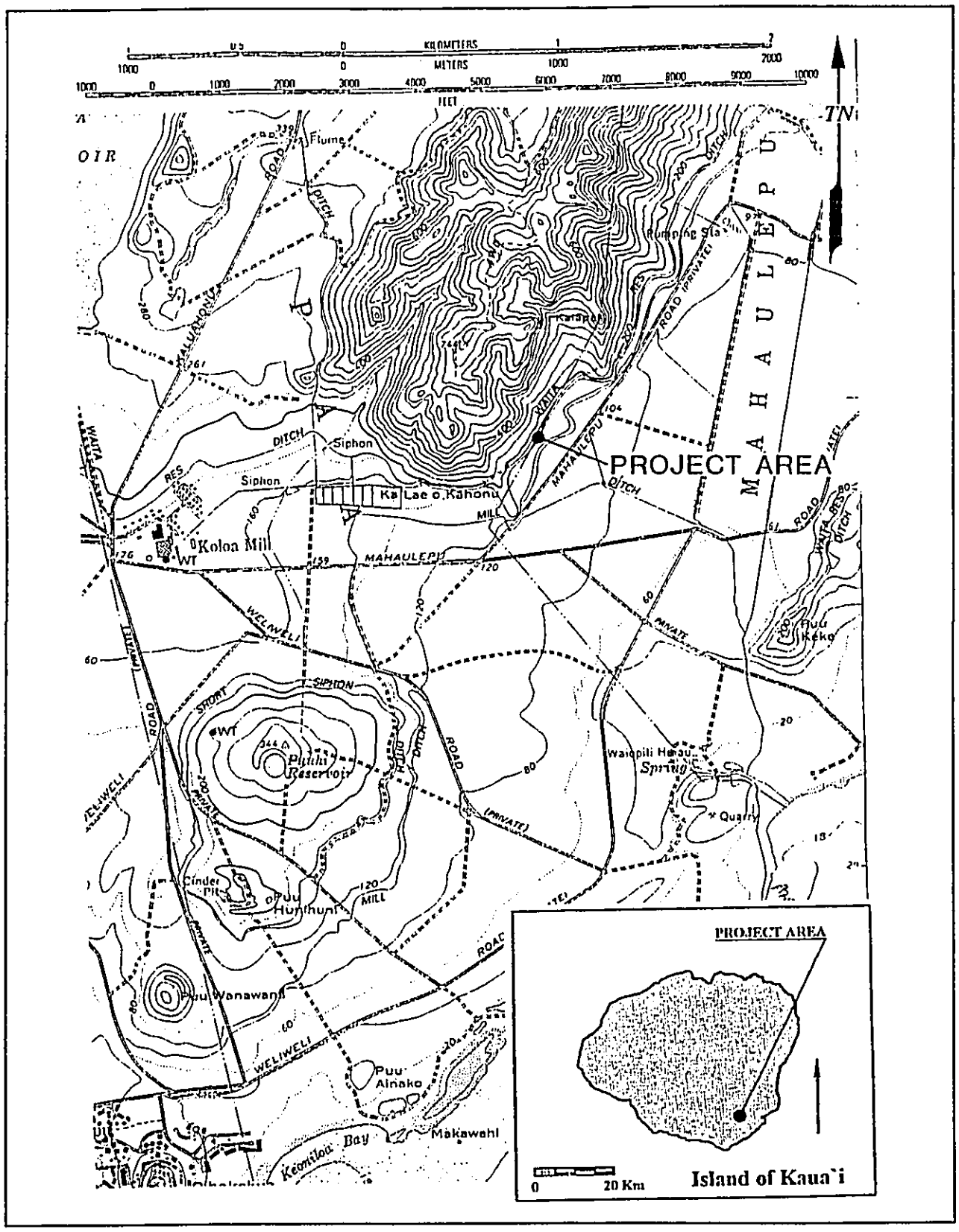


Figure 1: USGS Kōloa Quadrangle Map Showing Project Area.

According to the National Register of Historic Places, TCPs reflect

"The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting materials, workmanship, feeling, and association."

Criteria established within the National Register for evaluating a property's eligibility for listing in the National Register includes properties that:

(a) are associated with events that have made significant contribution to the broad patterns of our history; or
(b) are associated with the lives of persons significant in our past; or
(c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
(d) have yielded, or may be likely to yield information important in prehistory or history. [36 CFR, part 60.4]

It is also stated in National Register Bulletin No. 38 that an eligible site may be:

...the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value of any existing structure (National Park Service 1990).

A property could be considered a cultural site and eligible for the National Register if association with a significant event or activity can be established, even if there is no tangible evidence of the event or activity (*ibid.*).

Although the National Register does not encompass intangible resources as actual "cultural properties", it recognizes the relationship between a property and the activities and beliefs associated with it as significant in as much as it may be these activities and beliefs confer cultural importance to the property.

Guidelines adopted by the State of Hawaii's Environmental Council provide information concerning cultural practices and cultural features that may be impacted by certain activities, such as land development, and requires environmental assessment of cultural resources in determining the significance of a proposed project (OEQC 1997).

Consultation with a State Historic Preservation Division (SHPD) representative resulted in guidance provided in the "Draft Procedures For Ethnographic Inventory Surveys" (pers comm. Holly McEldowney; State Historic Preservation Office 1999, 1997a and b).

As stated in the Procedures for Ethnographic Inventory Surveys (SHPD draft 1999) a Traditional Cultural Property is defined as:

> Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in a community's history and contribute to maintaining the community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both. These properties include, but are not limited to, some types of archaeological sites.

According to the Guidelines for Assessing Cultural Impacts adopted by the State of Hawai`i (1997a):

> The types of cultural practices and beliefs subject to assessment may include subsistence, *commercial, residential, agricultural, access-related, recreational, and religious* and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

Traditional cultural properties might include presently used ancient fishing *ko`a*, coastal zones providing edible shell fish and seaweed, land areas harvested for culturally significant plants, and structures associated with ceremonies conducted for graduates of *hula halau*.

METHODOLOGY

BACKGROUND RESEARCH

Background investigation for this report included examination of the geology, soils, and vegetation within the project area. Research accessed both published and unpublished sources including surviving recorded legendary and traditional accounts, early historical journals, narratives and other written accounts describing life-styles and noted events, missionary accounts, and pre- and post-Contact land use.

Preparation for the archival-historical section also included reviewing Hawaiian Land Commission Award (LCA) records from the Māhele (Land Division) of 1848 (claims and testimonies, Royal Patent Grants, Boundary Commission records containing survey notes and maps), archival issues of the *Star Bulletin*, journal information recorded by William DeWitt Alexander (Kaua`i Historical Society 1991), William Patterson Alexander (*ibid.*:124), Hiram Bingham (*ibid.*:142), Eric Knudsen (*ibid.*:152), Arthur C. Alexander (1985), Craighill and Elizabeth Handy (1972), and Mary Kawena Puku`i (1974).

Preparation of this report included reviewing articles and documents describing archaeological data and surveys of the project area, including those by Thomas Thrum (1906-18), W. C. Bennett (1931), and more recent scholars.

INTERVIEW GUIDELINES

Informant interviews form a critical part of the assessment process. Individuals having knowledge of traditional practices and beliefs associated with a project area or knowing of historical properties within a project area are sought for interviews. Those persons whose knowledge is founded in a continuity of traditions passed down from preceding generations and the individual's personal familiarity with the project area are important. Ethnographic inventory survey, which identifies and acceptably documents historic properties within the project area, is founded upon this information.

Initial assistance was provided by a number of organizations and many individuals including the Office of Hawaiian Affairs (OHA), Kaua`i representative Lafrance Kapaka; the Historic Preservation Division Kaua`i representative, Nancy McMahon; Stella Burgess; The Hawai`i State Archives; The State Survey Office; and the Hawai`i State Library.

A total of 5 people, including Francis Frazier, Branch Harmony, Wilma Holi, Beyrl Blaich, and Stella Burgess were contacted and interviewed as to their knowledge concerning TCPs within the project area. Unless the interviewee indicated knowledge of any TCPs in the specific project area, the conversation was not taped. None of the interviewees knew of any specific TCPs in the project area. General points of interest were recorded in field notes and are summarized below.

GENERAL DESCRIPTION OF PROJECT AREA

GEOLOGY

Kaua`i, the oldest and fourth largest of the eight main Hawaiian islands (with a land area of approximately 1,432 square kilometers), was formed from one great shield volcano. At one time this vast volcano supported the largest caldera in the islands, horizontally extending 15 to 20 kilometers across. Mt. Wai`ale`ale, forming the central hub of the island, extends 1,598 meters above mean sea level (amsl). Topographically, Kaua`i is a product of heavy erosion with broad, deep valleys and large alluvial plains. The project area is located on the southeastern side of the island in the Kōloa District (Macdonald *et al.* 1970:381-392). Post-erosional activity (ca. 1.5 million years ago) created the landscape of the Kōloa area. A sequence of 40 volcanic cones (*pu`u*) were scattered over this section of Kaua`i (*ibid.*).

MĀHĀ`ULEPŪ AHUPUA`A

Māhā`ulepū is one of the ten *ahupua`a* located in the East Kona District of Kaua`i. Comprising 1,572 acres and fringed in the north/northeast by mountains culminating at Ha`upu, a peak 700 meters high (2297 feet) amsl is the location of Keolewa Heiau (Figure 2). Below the mountains, the inland section of the *ahupua`a* is generally flat to gently sloping and was described by Handy and Handy as a "broad, rich valley...once had some *lo`i*, although its stream was very small" (1972:427). Most of the permanent drainages of the valley have been modified during sugar cane cultivation of the area. A stream bed draining the valley is still present.

Limestone cliffs ranging in height from 10 to 90 feet extend along the north and south sections of the coastline. Four small bays and coral sand beaches are located along the central and northern portions of the coastline. Pu`u Keke, a basalt hill 72 meters (240 feet) high extends to the southwest of a long, aeolian sand dune in the north (Wichman 1998:46-48).

Lithified calcareous sand dunes extend below sea level along the shore and moderately to well cemented calcareous sand dunes are found along the coast from Makahu`ena Point eastward. A two mile stretch of beach extends from Punahoa Point to Hā`ula Beach and contains many pre-Contact archaeological sites, limestone hills, sinks (the largest sinkhole in Hawai`i), and caves, as well as fossil remains of extinct birds (Clark 1990:73-76). Kapunakea, a fresh water spring not far from the ocean would have been an important source of fresh water along the coast.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

GENERAL DESCRIPTION OF PROJECT AREA

GEOLOGY

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Figure 2: Māhā`ulepū Ahupua`a in Sugar Cane Showing Project Area.

Located on the lee of the Wai`ale`ale mountain, Māhā`ulepū is well protected from the direct path of the gusty north/eastern trades which secures its predominantly clear and balmy climate.

PROJECT AREA

The well site is located on the fringe of land previously cultivated with sugar cane in the Ahupua`a of Māhā`ulepū on the southeastern section of Kaua`i inland (Figure 3).

PREVIOUS ARCHAEOLOGY

In 1906, Thrum published a preliminary list of *heiau* sites on the island of Kaua`i and O`ahu (1907). He stated there was a Waipoli Heiau on the coast but said it had not been identified. The first archaeological island survey of Kaua`i was conducted in 1931 by Bennett. He recorded several sites in Māhāulepū, including house sites and Waiopili Heiau :

Site 87. Waiopili heiau, in Mahulepu section, Koloa, just northeast of Kapunakea pond.

Bennett describes a rectangular, wall enclosure built on an old lava flow with a pile of stones forming a "tower" in the southwest corner of the structure (*ibid.*:120). He stated there were many old walls, enclosures, and house sites at Māhāulepū, as well as caves utilized as shelters, and heaps of shell midden, indicating camp sites. Burials were noted in the sand dunes and two historic burials were identified in a cave (*ibid.*:121). Surveys in the early 1960s and 70s explored the coastline of the Kōloa District, listing the sites and a sinkhole containing fossil bird bones, petroglyphs and sand dune burials (Kikuchi 1963; Ching *et al.* 1974). Platforms, cave shelters, and walls were also recorded (Ching *et al.* 1974). A petroglyph site along the coast line of Māhāulepū was identified in 1980 by the Kauai Community College Anthropology Club depicting humans, animals, ageometric designs, a canoe with crab-claw sails, and historic inscriptions (State Site 50-30-11-602; Kikuchi 1983).

An archaeological inventory survey was conducted on 1,335 acres in the Lands of Pa`a and Māhāulepū during which 21 new sites were identified (Firor and Rosendahl 1991) (Figure 4). Formal types included, midden scatter, subsurface cultural deposit, wall, enclosure, overhang,

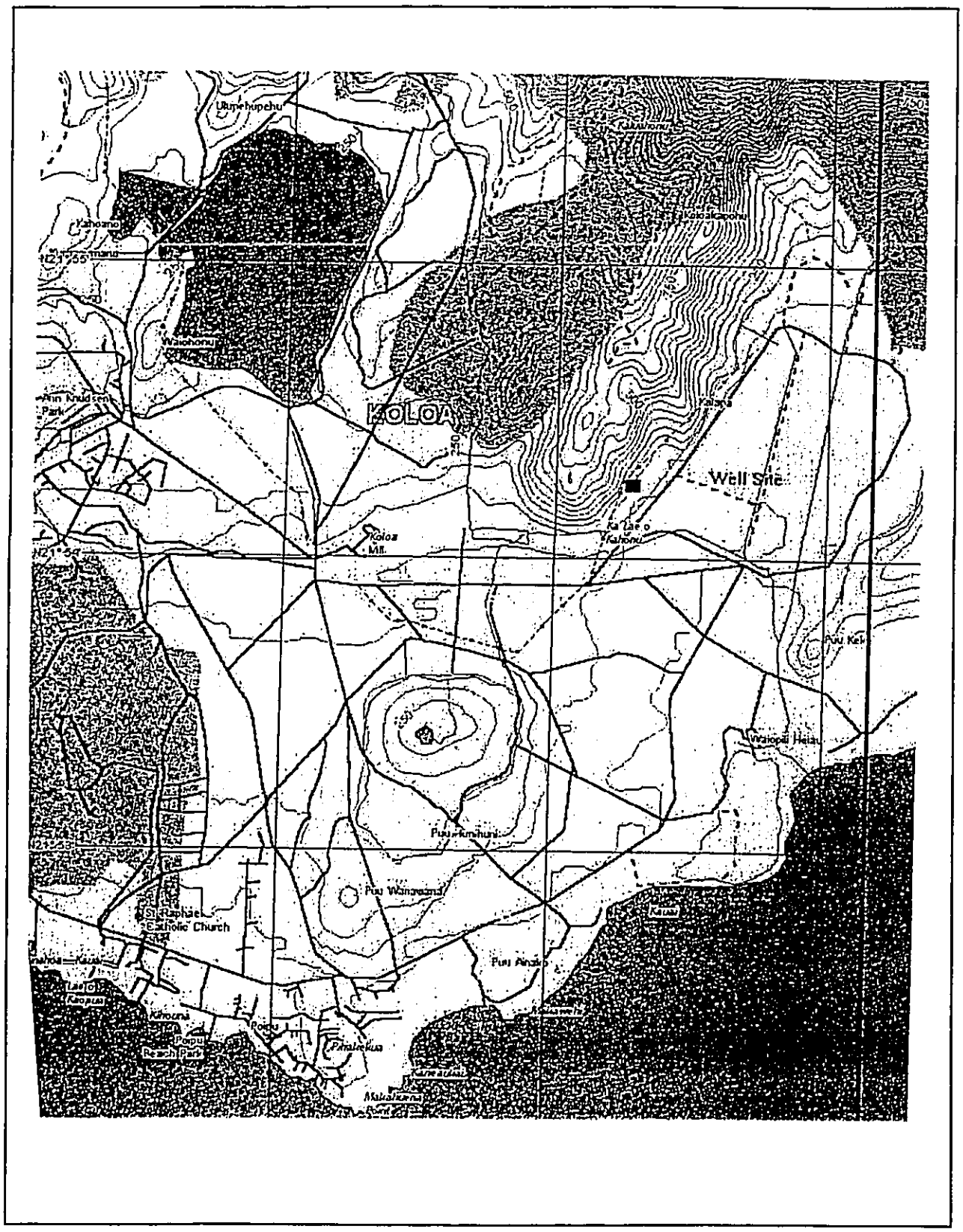

Figure 3: Project Area: Well Site.

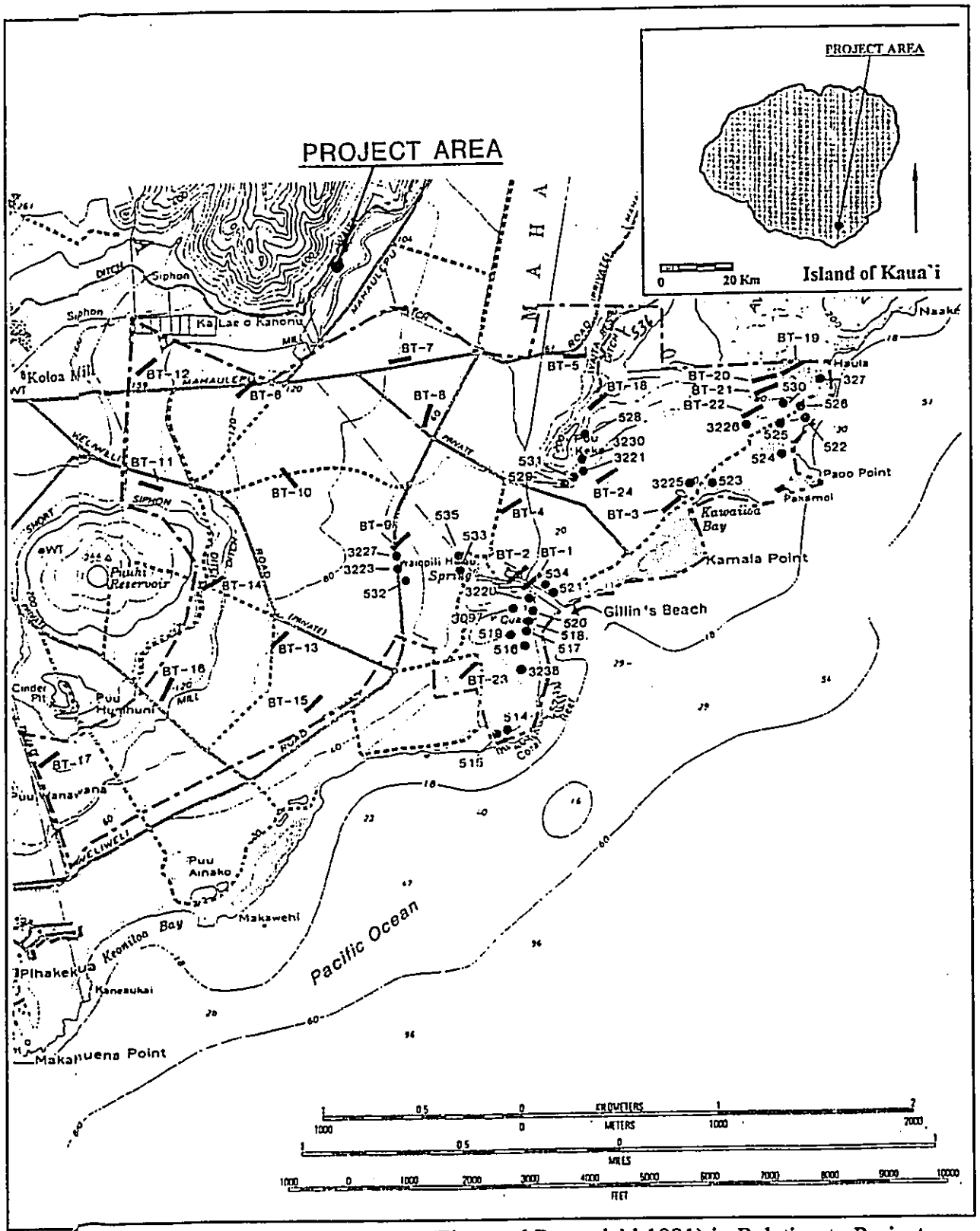

Figure 4: Area of 1991 Inventory Survey (Firor and Rosendahl 1991) in Relation to Project Area.

cave, eroding sand dune, mound, masonry pilings, and railroad bed representing boundary marker, habitation, temporary habitation, agriculture, rock art, burial, ceremonial, water diversion, and transportation. Nineteen radiocarbon samples yielded an overall date range of A.D. 660-1954, with the majority of the ranges between A.D.1170-1818. An archaeological survey was conducted on an additional 70-acres in Māhāulepū inland from Haula Bay in 1990 (Walker and Goodfellow 1991). Five new sites were identified including midden scatters representing habitation and habitation-burial functions, walls, and a ditch/flume constructed in bedrock with a tunnel. An archaeological inventory study was conducted on a 113-acre parcel in 1992 (Wigglesworth and Graves 1992). No sites other than what had previously been identified in the Walker-Goodfellow study were recorded.

A multi disciplinary study funded by the National Science Foundation entitled "Landscape-level Paleoecological Reconstructions for Kaua`i" was conducted in 1998. The archaeological work contained within the project was restricted to the Māhāulepū Sinkhole and Cave System and its vicinity near the coast. Preliminary archaeological work was carried out by Kirch *et al.* (1997) and indicated that cultural material was thinly distributed in the upper layers of the site. Subsequent work by Kikuchi (1998) detected considerable intermittent use of the site for temporary habitation. The radiocarbon dates from the Māhāulepū and Kōloa areas indicate the main activity began around A.D. 1500, although dates earlier than A.D. 1300 were found at Keoneloa Bay up the coast (*ibid.*:12).

Although not purely archaeological, a recent project was completed by the Malama Maha`ulepu Community compiling historic information for the protection of Maha`ulepu Ahupua`a (*Maha`ulepu: Kaua`i's Heritage Coast*). This study draws upon natural and cultural resources of the region supporting its position of qualifying as a heritage landscape and presents arguments for its undeveloped preservation.

Most recently (January 20, 2001), a field check of the project area was conducted by Nancy McMahon of the State Historic Preservation Division (pers. comm.) No surface archaeological sites were identified in the project area.

TRADITIONAL AND HISTORIC LAND TENURE

Traditional Hawaiian subsistence was based on agricultural production, marine exploitation, animal husbandry, and wild plant and bird collecting. Extended household groups settled in various *ahupua`a*, smaller land divisions within a district, that customarily extended inland from the ocean to the mountains. Within the *ahupua`a*, residents were able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111).

During pre-Contact Hawai`i there were primarily two types of agriculture, wetland and dryland, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo (Colocasia esculenta)* agriculture that incorporated pond fields and irrigation canals. Other cultigens such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (bananas, *Musa* sp) were also grown and where appropriate, the production of such crops as *`uala* (sweet potato, *Ipomoea batatas*) occurred. This was a typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992:5, 119; Kirch 1985).

TRADITIONAL SETTLEMENT PATTERNS

In Hawai`i, many stream gulches and river valleys were defined by cultivation occurring in lower valleys and on bends in the stream where alluvial terraces could be modified to take advantage of the stream flow (Kirch and Sahlins Vol. 2 1992:59; Earle 1978:31, 155). In *ahupua`a* with narrow gulches and adjacent tablelands or slopes such as Moloa`a and Pāpa`a on the northeastern coast, the upper regions are steep-sided and contain narrow or small stream flats where farming occurred. The majority of the farming was situated in the lower portions of the valley where there were broader alluvial flat lands. Habitation occurred on the dry colluvial areas at the base of the gulch walls or above, on fiat slopes. Dry land cultivation occurred in colluvial areas at the base of the gulch walls and on flat slopes. This pattern of cultivation was seen in similar environmental zones such as the North Kohala coast of Hawai`i Island (Tomonari-Tuggle 1988:19). Investigations on the northeastern coast of Kaua`i have suggested a model locating permanent habitations along the coastal region concentrating on marine resources but close to inland sections supporting agriculture (Earle 1978; Hammatt *et al.* 1978). Indeed, the fertile inland valley of Māhā`ulepū and the productive near-shore fishing grounds would have made an ideal settlement location.

PRE-CONTACT LAND USE

Approximately 600 years ago (from the time of Mā`ilikukahi on O`ahu and based on a 25 year per-generation count), the native population had expanded throughout the Hawaiian Islands to a point where large political districts (*moku*) were formed (Lyons 1903:29, Kamakau 1991:54, 55; Moffat and Fitzpatrick 1995:28). Kaua`i consisted of six *moku*: Kona, Puna, Ko`olau, Halele`a, Nāpali, and Waimea (Moffat and Fitzpatrick 1995:23). Further traditional land divisions within the *moku* were *ahupua`a* which ideally incorporated all the natural resources necessary for traditional subsistence strategies.

According to some scholars, the name of Māhā`ulepū means "and falling together" which refers to a battle that took place in the1400s at the invasion of Kalaunuiohua from Hawai`i Island (Puku`i *et al.* 1974:138; Joesting 1998:47). It is recorded that Kalaunuiohua, the great chief of Kona, and perhaps the entire island of Hawai`i, waged war (called Kawelweliwi), capturing the islands one by one until he arrived on the southeastern coast of Kaua`i (Malo 1951:521-254; Wichman 1998:47; Cordy 2000:188). Kūkona, the ruling chief on Kaua`i enticed the invading army across Māhā`ulepū to the plains of Wahiawa. Having disobeyed the instructions of a powerful *kaula* (prophetess) named Waahia years before, he was defeated and taken prisoner by Kūkona after a battle outside of Ka`ie`ie-waho (Kamakau 1961:194). Place names along the shore still mark the occurrence of Kalaunuiohua's assault, Kawelikoa marks the ridge under which the canoe fleet was destroyed, Nā`ākea is the cape where the canoes came ashore, and Papamō`ī, is the bay where the chiefs met (Wichman 1998:48).

Burials in the sand dunes have been suggested as the remains of Kalaunuiohia's defeated warriors. An interesting local legend suggests that a few of the canoes belonging to the *peleleu* fleet of Kamehameha I survived the storm which destroyed his invasionary army and landed on the coast where they were slaughtered and buried at Māhā`ulepū (Alexander 1891, Farley 1898), although other scholars have stated it is more likely part of a large cemetery (Stokes 1937). In fact, it was reported by Puako that lookouts were posted on the headlands in anticipation of Kamehameha's invasion and his surviving fleet was first sighted from the Kipu overlooking Māhā`ulpū (Knudsen 1914).

A spring near the coast, named Kapunakea, was the major source of fresh water in the *ahupua`a* of Māhā`ulpū. The spring fed a pool containing shrimp which were used in religious ceremonies (*ibid.*:47). Waipili Heiau was located next to the spring. Petroglyphs are to exist

from beach rock along the coast in several areas and the bones of now extinct flightless birds have been identified (Farley 1898; Clark 1990:73-76; Kikuchi 1998). According to Keahi Luahine, taro terraces were located below Pu`u Keke where taro was cultivated in semi-brackish spring water. The planting method was called *pu`epu`e*, referring to the mounds into which the cuttings were planted (Handy 1940:66).

HISTORIC PERIOD LAND USE

Much knowledge of traditional land use patterns is based on what was recorded at the time of, and shortly after, western Contact. Early records (such as journals kept by explorers, travelers, and missionaries), Hawaiian traditions that survived long enough to be written down, and archaeological investigations have assisted in understanding the past. Kaua`i was the first Hawaiian island to receive western visitors in 1778, but there are no known early pedestrian descriptions of the southeastern side of the island. It is believed that historic land records reflect a traditional pattern of land use.

The earliest description of the southern side of the island was given in1778 by Capt. James Cook followed by David Samwell, surgeon on the Discovery during Cook's third voyage. The description of the first recorded contact by Westerners most likely occurred off the coast of Māhā`ulpū:

> Monday, January 19, 1778...I stood for the East end of the nearest Island...we were in some doubt as to whether or not the land was inhabited, this doubt was soon cleared up, by seeing some canoes coming off from shore towards the ships...there were three or four men in each...I boar up for the lee side, and ranged the SE side at the distance of half a league from the shore. The land on this side of the island rises in a gentle slope from the sea shore to the foot of the Mountains that are in the middle of the island...[Beaglehold 1967]

Samwell reiterates:

> ...Drawing near the land we bore away along the South side of the Island in search of a Harbour, keeping at the Distance of about 2 miles off shore; the Ship was followed by a great number of Canoes and the whole Island seemed to be in motion, a prodigious Croud [sic] of Indians assembling from all parts & running along shore a Breast of the Ships; we passed several small Towns situated on large open plains near the sea side behind which the high Land rises covered with wood [Beaglehole 1967:1080]

Vancouver, a member of Cook's third pacific voyage, returned as captain of his own expedition in 1792. He sailed along the coast and noted many fires burning along the plains of Māhā`ulepū. Both of these early descriptions suggest a large population living along the southern coastal region (Vancouver 1984).

The Māhele

In the 1840s a drastic change in traditional land tenure resulted in a division of island lands based on western law.

While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Daws 1968:111; Kuykendall Vol. I, 1938:145 footnote 47, 152, 165-6, 170; Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45).

Among other things, foreigners demanded private ownership of land to insure their investments (Kuykendall Vol. I, 1938:138, 145, 178, 184, 202, 206, 271; Kame`eleihiwa 1992:178; Kelly 1998:4). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners) were able to claim the plots on which they had been cultivating and living, if they had been made aware of the foreign procedures (*kuleana* lands, Land Commission Awards). These claims could not include any previously cultivated or presently fallow land, *`okipu`u*, stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). This land division, or Māhele, occurred in 1848. The awarded parcels were called Land Commission Awards. If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA, issued a Royal Patent number, and could then take possession of the property (Chinen 1961:16).

Māhā`ulepū Ahupua`a was part of the lands awarded to Victoria Kamamalu, granddaughter of Kamehameha I, but were still subject to, as was all the land, the rights of native tenants and eventually became a part of the estate of Ruth Ke`elikōlani. As stated above, when native tenants proved that they had occupied a particular parcel, they would be issued a Land Commission Award (LCA) number and finally, a Royal Patent number which conveyed no title but stated that the government's interest in the land was settled (Chinen 1961).

Thirty-one LCAs were awarded in Māhā`ulepū Ahupua`a (Waihona Aina Corporation, 2000, Mahele Database, Honolulu, Hi.)(Figure 5). The Native Register recorded *lo`i*, gardens of *noni*, *wauke* (paper mulberry), *`uala* (sweet potato), *mai`a* (bananas) orange trees, salt pans, fishponds, shrimp holes, pig pens, garden plots in the mountains and house lots. Many of these land owners had originally received their land from Chief Kaumuali`i (c. 1796-1824). Several locations reflecting traditional settlement patterns for this *ahupua`a* are reflected in the land claims. The majority of the claimed house lots were located at what is called Māhā`ulepū Village on the coast. To the north, sweet potatoes were grown on the *kula* lands and along the coast were salt pans. *Wauke*, oranges, and bananas were cultivated further upland while wetland taro was cultivated along Waila`au and Wailua streams and below Pu`u Keke (a detailed parcel description and locations is found in Firor and Rosendahl 1994, Appendix B). Trails connected house sites to garden plots and rock walls enclosed house lots, as well as some gardens.

Agriculture

With the shift to private ownership of large tracts of land brought about by the Māhele, sugar cane and other agricultural ventures quickly appeared throughout the islands (Joesting 1984). By 1877 there were eight sugar plantations on Kaua`i alone: Kōloa, Līhu`e, Kīlauea, Hanalei, Grove Farm, `Ele`ele, Kapa`a, and Kawaihau (Takaki 1983:17). To service labor needs, populations were relocated from places like Anahola Valley, Moloa`a, Kalihiwai, and Waipouli in Ko`olau to centers of activity around the sugar mills and harbors in Kōloa, Keālia, Līhu`e, Niumalu, and Nāwiliwili (Joesting 1984:250).

In the early 1800s, the missionary Hiram Bingham traveled through the area and sketched several houses as part of the landscape. At least 31 houses are shown in three clusters below mount Ha`upu (Mission House Museum).

Although a small amount of sugar had been made on the island of Lāna`i by a Chinese (Wong Tze-Chun) in 1802, it wasn't until large amounts of land began to be available that its true potential was realized (Joesting 1984:130; Glick 1980:2). Apparently, the Chinese had begun a sugar venture in Māhā`ulepū before 1835 and had even constructed a small sugar mill. When Chester Lyman visited Kōloa in 1847, he reported that the mill (described as a "primitive wooden affair") was in ruins with only, "...one set of granite rollers for crushing the cane" remaining, other usable parts having been scavenged by Kōloa Plantation (Alexander 1985:1-2, 75).

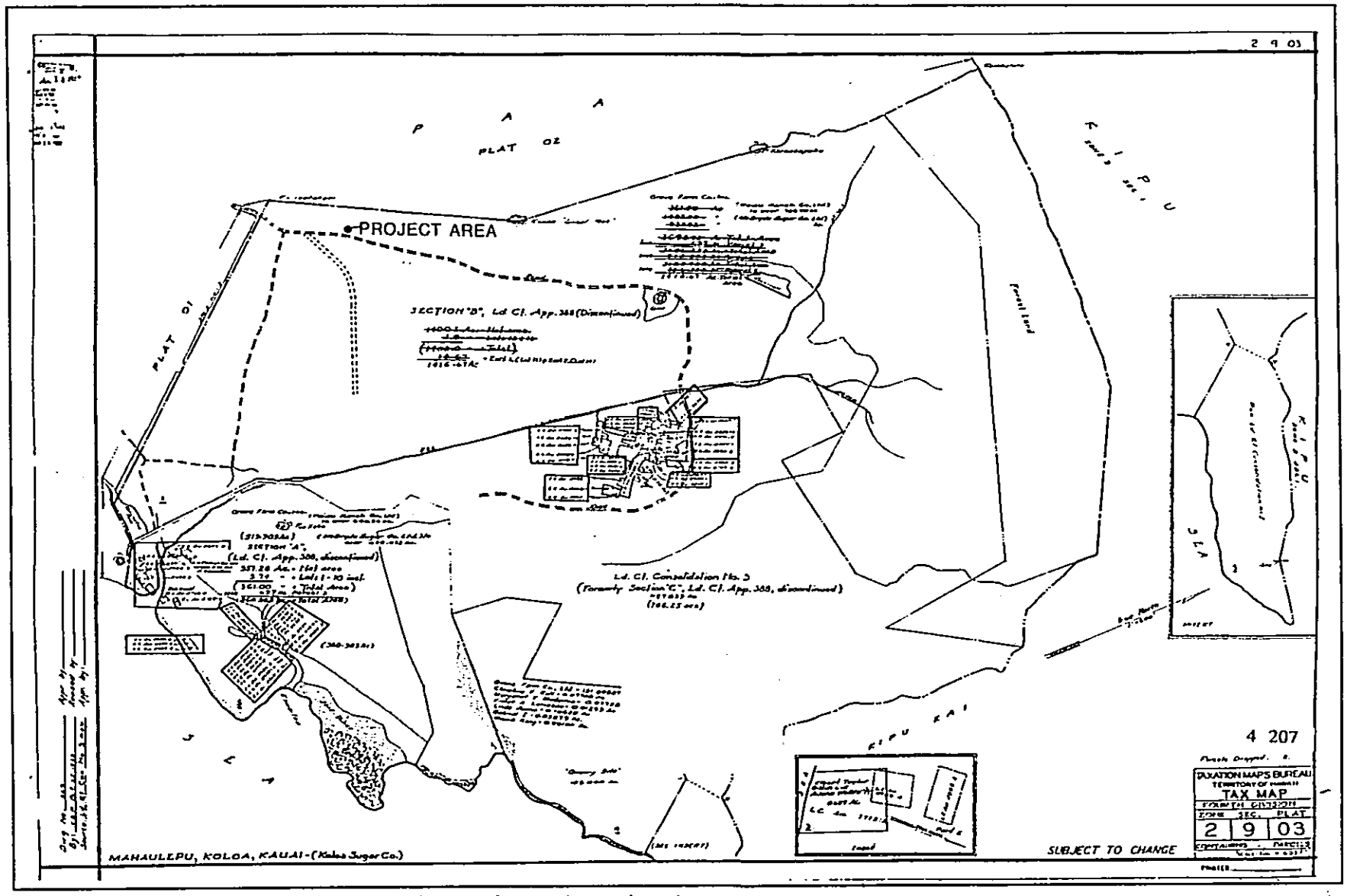

Figure 5: TMK Showing LCA Clusters in Relation to the Project Area.

The first missionaries to settle in Kōloa were Mr. and Mrs. P.J. Gulick, who moved from their station in Waimea 1835. Unhappy with the life style of the natives, they devoted much of their energy in convincing the Hawaiians, who's living conditions they considered desperate, to become farmers. Soon to follow were the Congregational Mission, also in 1835, and the Catholic church in 1843, which leased 17 acres from Kamehameha III.

In 1833, William Ladd, Peter Allan Brinsmade, and William Hooper arrived in Honolulu. As investors in the mercantile company of Ladd and Company, they planned to open a general merchandise store. Ladd and Company became involved in the development of a sugar plantation. Working with the missionaries, Ladd and Company leased approximately 1,000 acres of land in Kōloa from Kamehameha III and Governor Kaikioewa (an unprecedented arrangement at the time) for a period of 50 years for sugar cane with the goal of employing Hawaiians (*ibid.*:134). The first ten years were difficult resulting in the main creditor, Dr. Wood, becoming sole owner of the land which he named Kōloa Plantation. The plantation became the model for future plantations for the next hundred years and included a plantation store, housing and garden areas, a company dairy, and medical aid for its workers (*ibid.*:135). The land planted for sugar had been previously uncultivated and it commonly produced fifteen hundred pounds of sugar to an acre. This was fully fifty percent more productive than the average acre yield in Louisiana (*ibid.*:38).

In 1837, Ladd and Company sublet a land section to Charles Titcomb, James Jarvis, and Mr. Sherman Peck for the purpose of growing silk (Alexander 1985:34). It was called the "Mt. Pleasant Plantation", or more commonly, "Mauna Kilika" and sections adjacent to the Pa`a Marsh were cultivated with mulberries to feed the silk worms. However, this venture resulted in failure and by 1843 and the leased land became a part of Kōloa Plantation holdings.

The purchase of Pa`a Ahupua`a consisting of 3,263 acres of land, as well as the *mauka* portion of the *ahupua`a* of Weliweli in 1855, and the draining of the Kōloa Marsh (380 acres) increased the plantation's production to a great extent. The Hawaiians reported that the marsh had once been forest and, indeed, tree stumps and branches of *`ōhi`a* (*Metrosiderous polymorpha* and *loulu* palms (*Pritchardia* spp.) were found within its precincts (*ibid.*:55, 57). The marsh was a peat bog and found to be quite unsuited for sugar cane, but great quantities of timber in good preservation were removed and used by the plantation for years. Eventually, the unproductive cane land of the drained swamp was converted into a reservoir covering 425 acres (Star Bulletin 3/2/35 p.7).

In 1878, the plantation began sugar cane cultivation in Māhā`ulepū Valley consisting of 875 acres of flat land (Figures 6 and 7). Cane had not been grown there since the early efforts of the Chinese (before 1835). Although the entire ahupua`a (1,572 acres) was offered to them for sale in 1877, the Kōloa Plantation preferred to lease the land, believing it would always be available to them from the native lessee, Kaalaeahina. However, Kaalaeahina's lease was bought out by the Governor of Kaua`i, John Bush, who notified the plantation of the discontinuance of the pasturing. The owners of the plantation bought the lease from Governor Bush, as they considered the possession of Māhā`ulepū essential to the plantation. The first harvest from this area was in 1879 (Alexander 1985:76-77).

Ruth Ke`elikōlani had recieved the ahupua`a of Māhā`ulepū during the Māhele of 1848. In 1881-1882, Kōloa Plantation was approached by the agent of Ruth Ke`elikōlani to buy the ahupua`a of Māhā`ulepū. Events moved slowly, during which a *hui* of some of the children of the former tenants of the Māhā`ulepū along with other native residents gathered together and purchased the *ahupua`a* from Ruth hoping to resell it to the plantation (*ibid.*:88). Ruth Ke`elikōlani sold the land to the "Hui of Māhā`ulepū" in 1882. The 45 members of the *hui* all received shares in the land which were eagerly sought after by the Kōloa Sugar Company. By1888, the plantation had acquired 37% of the shares and by1896, 65-3/7 shares were owned, giving the plantation the majority and allowing them to bring suit in the First Circuit Court against the owners of the remaining 33% and asking that its interests in the land be partitioned out (*ibid.*:89-90). A commissioner was appointed who set off portions of the land for the Plantation "bearing such proportion to the whole as 65-3/7 does to 96" (*ibid.*).

A tract of land to the south on the seashore containing 338 acres and another tract to the west, containing 1,405.3 acres were set aside for the plantation. A third tract of land on the east side of the valley (849.1-acres) was set aside for the owners of the retained *hui* shares.

Wells were dug in Māhā`ulepū as early as 1897 to further augment the plantation's water supply (*ibid.*:97). Six wells were drilled by the McCandless Brothers to a depth of 300 feet below the surface with the water standing in the wells at about 31 feet above sea level. Four new wells were added as more water was needed. Charles Tanimoto, who lived there as a small boy, described the wells, saying:

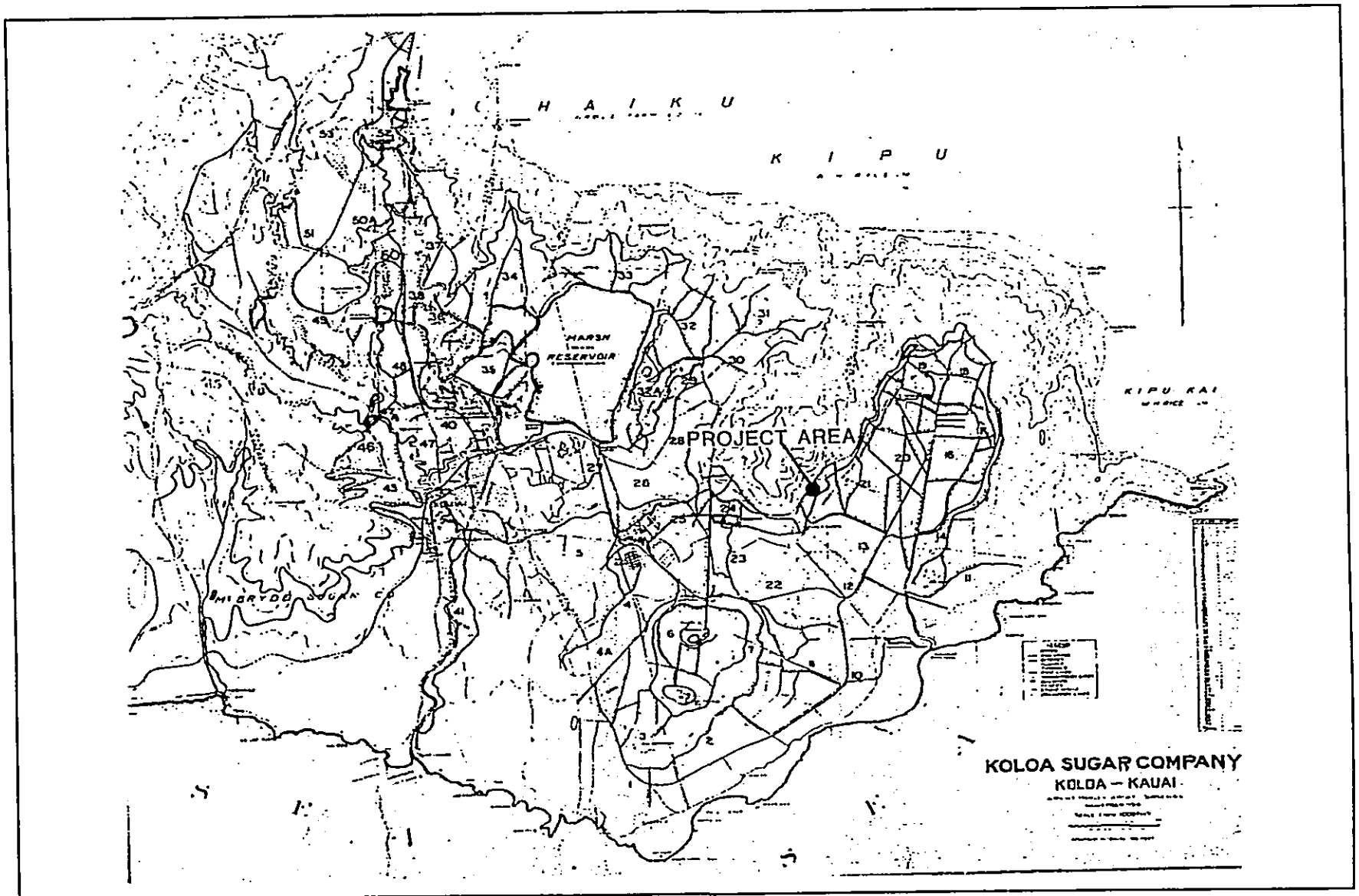

Figure 6: Kōloa Sugar Company Cane Fields and Project Area 1918 (Condé and Best 1973)

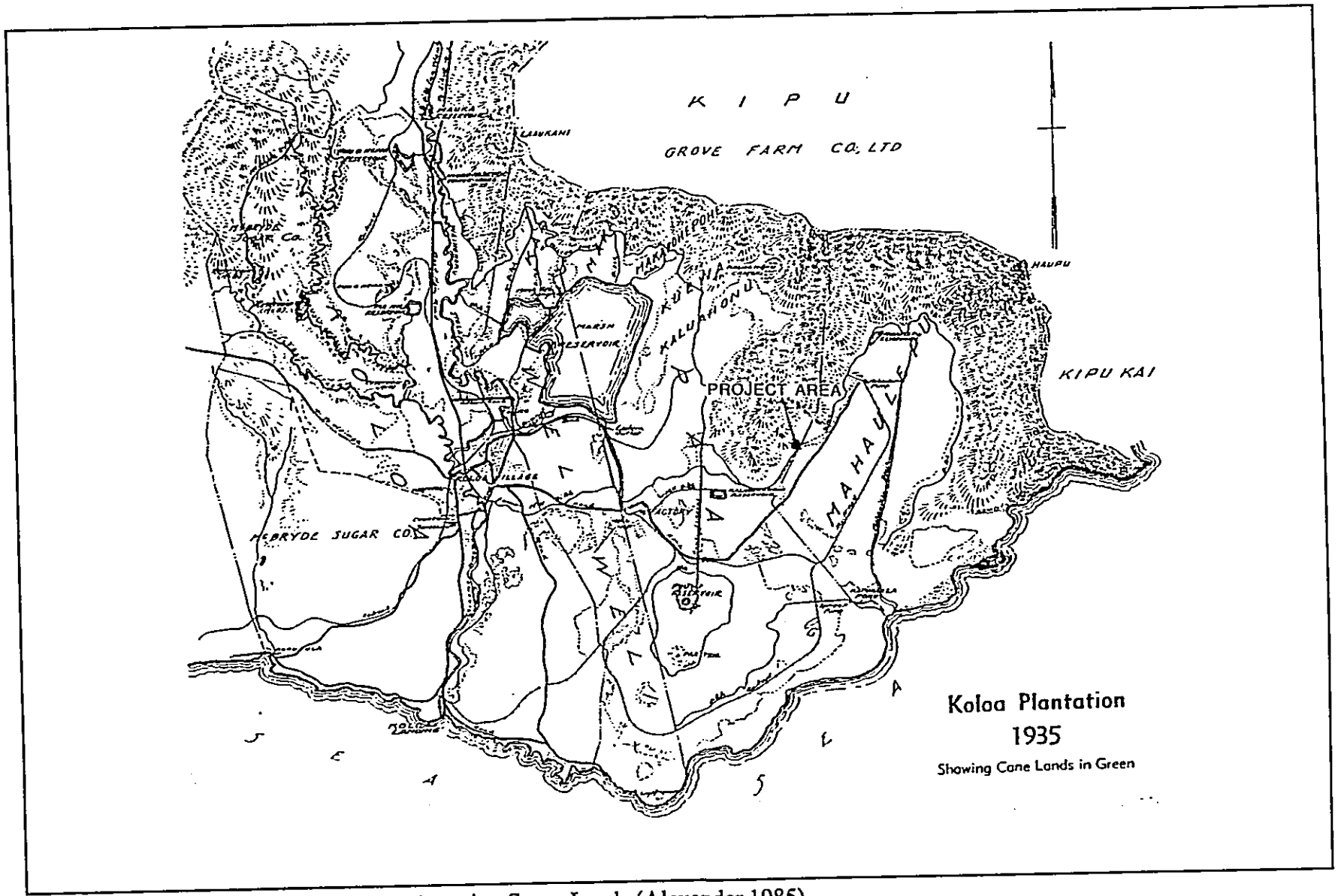

Figure 7: Project Area in 1935 Kōloa Plantation Sugar Lands (Alexander 1985).

> There is an artesian well [and] at the time of my childhood, this well was harnessed to a steam pumping station and the water was pumped into a reservoir. Owned and operated by the Koloa Sugar Company, it was considered to be an engineering marvel of the time. The boiler plant, fueled by coal, was located on the ground. Many feet below the ground level, led by a winding stairway, was a huge chamber with an awesome maze of moving machinery, enormous flywheels and steam-generated pumps. [Charles Katsume Tanimoto 1982]

An additional four wells were drilled into the Māhā`ulepū aquifer in 1927 and 1928. Kōloa Plantation merged with Grove Farm Co. in 1947 and subsequently, in 1974, McBryde Sugar leased the Kōloa lands and mill. McBryde Sugar Company harvested its last sugar in 1996 and the Kōloa Mill closed. Presently, agricultural lands are being leased for seed corn, papaya, and cattle operations that use the former sugar fields, roads and irrigation systems.

INFORMANT INTERVIEWS

Conversations with residents and people familiar with Māhā`ulepū and the project area included Stella Burgess, Lafrance Kapaka who suggested contacting Wilma Holi, Branch Harmony, and Francis Frazier, who suggested contacting Beyrl Blaich. A copy of the projects location was either mailed or faxed to each person.

Stella Burgess, a resident of Kaua`i, requested a map showing the project location, as she knows families with land associations in Māhā`ulepū Ahupua`a. This information was FAX to her and after questioning her informants, she reported to SCS the land of her friends was nearer the coast. Stella mentioned the presence of a *heiau* dedicated to *lapa`au* (healing) on the slope of a mountain. The name is unknown and the location was not readily available.

Wilma Holi, whose family is the last *kuleana* owner in Māhā`ulepū received a copy of a map containing the location of the project area. She reported that she did not know of any specific TCP on that site.

Branch Harmony's family goes back nine generations in the Māhā`ulepū area. In 1998, he requested and received gathering rights under the Public Access Shoreline Hawai`i (PASH) decision from Grove Farm. Familiar with the history of the region, Mr. Harmony stated there were several *mo`olelo* associating Hina, Kamapua`a and Pele with the Māhā`ulepū area. After viewing the project location, he was unable to identify any specific TCP.

Francis Frazier, a well known Hawaiian language translator (*Kamehameha and His Warrior Kekūhaupi`o*, Desha 2000) had no specific knowledge of the project area but suggested contact with Beyrl Blaich of the Sierra Club who had recently completed work in conjunction with the Mālama Māhā`ulepū Community in producing a publication describing the various resources of Māhā`ulepū Ahupua`a. A copy of this overview was received by SCS and contributed to the general knowledge of the region.

ASSESSMENT OF PROJECT AREA

Individuals suggested by OHA, Kaua`i representative for the State Historic Preservation Division residence, and Kaua`i residents were interviewed by SCS as to their knowledge of any Traditional Historic Properties on or in the vicinity of a well site in Māhā`ulepū Ahupua`a. These informants were recognized by other community members as knowledgeable, long-time residents of Kaua`i and the Māhā`ulepū region. Although they were all familiar with the proposed project area and well-versed in local history, conversations with these individuals did not identify any specific Traditional Cultural Properties. In addition, the proposed project area has not been used for traditional cultural purposes in the recent memory. It is reasonable to conclude, based on their testimony, that the exercise of native Hawaiian rights realted to gathering, access of other customary activities will not be affected, and there will be no adverse effect upon cultural practices or beliefs.

In addition, archival/background research and applicable archaeological work also did not identify any specific Traditional Cultural Properties within the project area as defined in the Criteria for Evaluation as:

> Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in a community's history and contribute to maintaining the community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both. These properties include, but are not limited to, some types of archaeological sites.

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KOLOA WELL "F" PRODUCTION WELL
KOLOA, KAUA`I
STATE OF HAWAII

ENVIRONMENTAL ASSESSMENT

APPENDIX 5

CHLORINE GAS EMERGENCY SHUT OFF

SYSTEM SPECIFICATIONS

HALOGEN
VALVE SYSTEMS, INC.

Automatic Valve Actuation Systems — Bulletin 901.03

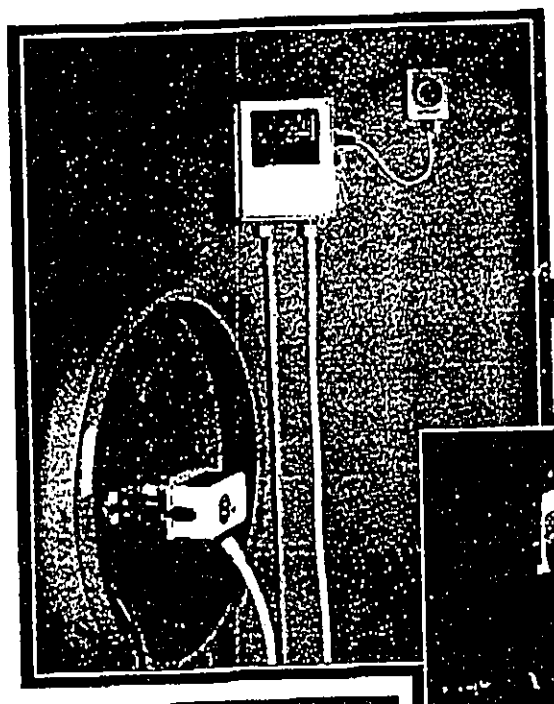
Emergency Shut Off System for Chlorine Cylinder and Ton Container Valves

Berkley Engineering
& Equipt. Co., Inc.
ph: 845-9377 fax: 845-9370
944 Akepo Lane
Honolulu, HI 96817
INDUSTRIAL AUTOMATION CONTROL HEADQUARTERS

Valve Actuators from Halogen Valve Systems define a new level of safety and dependability for chlorine gas dispensing facilities. Leaks in valves or distribution piping can be quickly shut off without exposing personnel or the surrounding community.

Unattended stations may be automatically shut-off by leak detectors, fire or seismic sensors. Shut-off may be initiated from remote command and control centers.

In the event that electrical power is interrupted, battery power insures operation. A solar powered option provides total independence from local electric power.



Halogen Valve Systems Model CC-1 Actuator installed on the liquid valve of a chlorine ton cylinder. Control panel and emergency shut-off button on wall.

Did you know that in the majority of all chlorine leak incidents, major consequences could have been avoided by simply shutting off the chlorine container valve?!

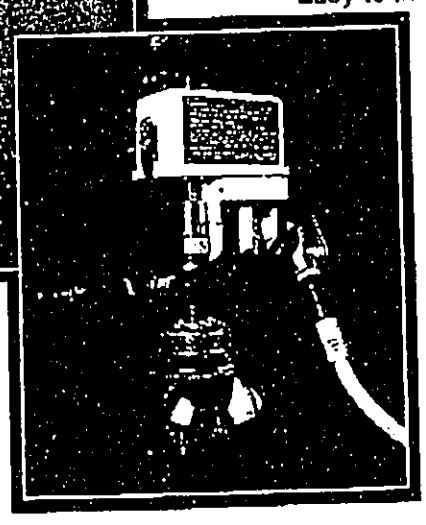
That's right, most minor problems become major incidents because of the time that it takes to shut off the chlorine valve. Traditionally, there have been two types of "Tools" used by operators and engineers to deal with actual chlorine leaks. Emergency kits, which are designed to place a temporary "patch" or "cap" on a leaking cylinder or ton container, and Scrubbers, which are devised to neutralize or absorb leaking gas. Both these devices perform their respective tasks after a leak is underway, but can do nothing to terminate a leak by shutting off the chlorine container valve. Until now, the only way of shutting off a chlorine container valve is to have an operator don a breathing apparatus (SCBA) and protective clothing , and then SEND THAT INDIVIDUAL INTO A TOXIC ATMOSPHERE to shut the valve off. This procedure is both time consuming and difficult, even for the most competent and well rehearsed technician, and must be executed under stressful conditions, that are extremely hazardous for the individuals involved.

An Emergency chlorine valve actuator: The Essential Tool!

With an emergency chlorine valve actuator from Halogen Valve Systems, it is no longer necessary to place a person in jeopardy simply to shut off a chlorine valve. This device terminates leaks quickly (1.5 seconds) and is easy to initiate by means of locally mounted "panic buttons" or leak detectors. Most importantly, personnel do not have to enter a toxic atmosphere to effect valve shut-off. Don't let the next incident or injury cause you to say "I should have specified automatic valve actuators."

OPERATION

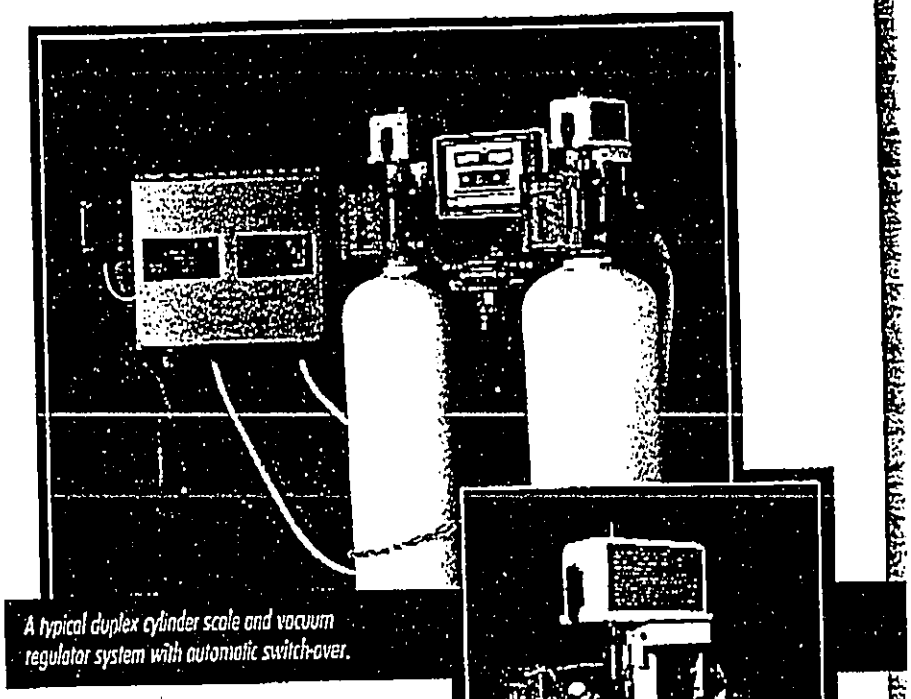
Easy to Install-No tools required



The lightweight (8 Lb.) Model CC-1 actuator is easily installed on the chlorine valve with no tools required. A hand operated mounting clamp attaches the Model CC-1 to the standard chlorine yoke assembly. The actuator is designed so that two units may be installed, one above the other, on both the liquid and gas valves of ton containers. The Model CC-1 may be integrated with valve mounted vacuum regulators. An adapter bolts directly to the vacuum regulator mounting assembly so that both the regulator and the actuator may be installed on the cylinder as a single unit.

No interference with manual operation

The actuator shaft provides a rigid mechanical connection to the valve stem which extends through the top of the actuator to accept a standard (3/8") chlorine wrench. This ingenious design enables access to the valve so that it may he manually operated while the actuator is in place! This makes it easy to reopen the valve after testing, and eliminates the apprehension of operators that they may not be able to manually access the valve in the event of an actuator failure or seizure. An additional feature designed with operator convenience in mind, is that the .. actuator and mounting clamps are offset to the rear of the valve to allow easy access to the valve packing nut and yoke for adjustment.



A typical duplex cylinder scale and vacuum regulator system with automatic switch-over.

Local, remote or automatic shut off

Local and/or remote mounted "Panic Buttons" (unlimited number) enable operators to promptly initiate an emergency shut down from inside or outside the hazardous environment. Systems may also be automatically shut down by leak detectors, fire or seismic sensors. Upon receipt of a shut down signal, the controller triggers the actuator to close the appropriate valve within one-and-one half seconds. The microprocessor detects valve closure by sensing the torque rise as the valve stem engages the valve seat. The actuator applies rapidly increasing torque for a brief moment to insure a tight shut off, and then cuts off power to the motor and generates a signal to report the shut off cycle.

Fail-safe battery operation

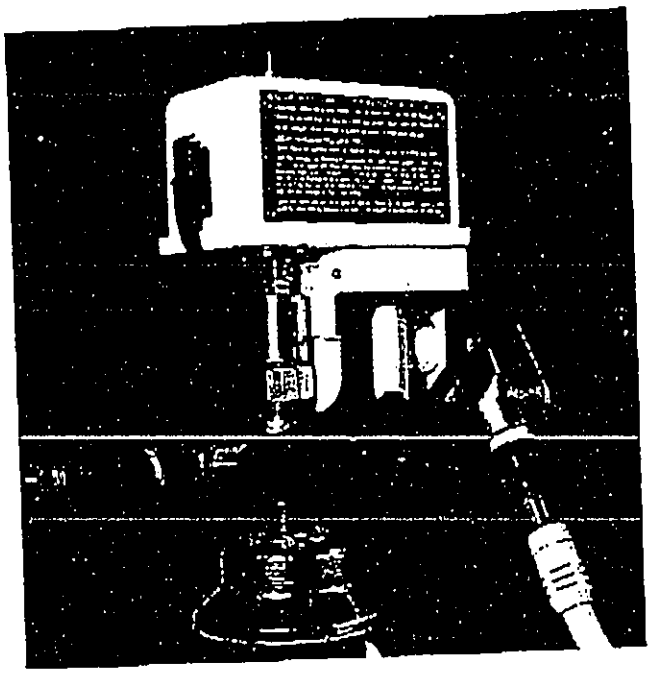
The battery is trickle charged from 120 volt AC or 12 volt DC solar power. However, in the event of a prolonged power failure, the battery will have sufficient charge for the actuator to fully close the valve for a period of 3-4 days. Should the microprocessor detect a declining battery charge, it will initiate shut off automatically, and issue an alarm signal indicating the valve closure cycle. There is no requirement to power up and switch on backup devices as in other systems in the event of power failure. The battery coupled with constant monitoring by the microprocessor is an inherently uninterruptable power supply.

Fully tested at each cylinder change

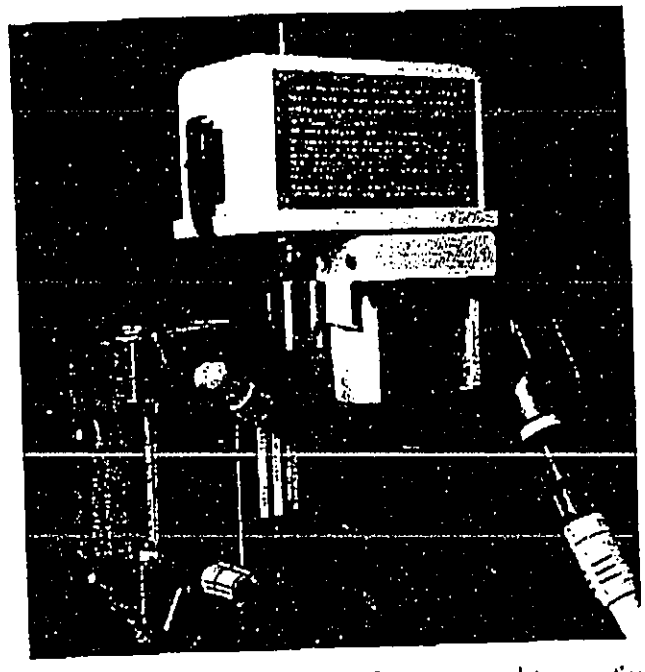
By performing the test procedure described on the control panel label, the actuator system may be fully tested under "real world" conditions at each and every cylinder change. This is an observable, tangible assurance to operating personnel of dependability and proper actuator operation. By using this test feature every time a cylinder valve is closed, operators are assured of a consistent valve closure, and gain confidence in the reliability of the Halogen Emergency Shut Off System.

ADVANTAGES

- No Interference with Manual Operation.
- Local and/or Remote "Panic Buttons".
- Easy to install, No Tools Required.
- Fits Existing Valves and Regulators.
- Fully tested at each cylinder change.
- Immediate termination of leak or emergency.
- Automatic (Sensor) Activation.
  - Powered to ***Close Only***.
  - Constant Recharge, AC or Solar.
  - Digital solid state Control.
  - Less costly than scrubbers.
  - No Hazardous Chemical Disposal.
- **May Fulfill OSHA Process Safety Management and EPA Risk Management Plan Emergency Shut Down Requirements.**



MODEL CC-1-Y with standard valve/yoke mounting



MODEL CC-1-R1 with adapter for vacuum regulator mounting

TYPICAL SPECIFICATION FOR CHLORINE VALVE EMERGENCY SHUT OFF SYSTEM US PATENT 5,588,637

An emergency shut off device shall be provided for each of the containers in the chlorine feed system. Emergency shut off system shall consist of a battery driven actuator that acts directly upon the cylinder or ton container valve stem (appended ball valves or other "plumbed apparatus" shall be unacceptable). The actuator shall mount upon the valve and yoke assembly by means of a clamping mechanism so as to be easily installed and removed with no special tools necessary.

With the actuator in place, the design shall provide an extension through and beyond the actuator such that a standard chlorine wrench may be applied to the extension to manually open or close the valve. **Under no circumstances shall the design impede manual closure of the valve while the actuator is installed on the valve.** The design shall also provide access for tightening valve packing nut and yoke assembly while the actuator is in place.

The actuator shall be constructed of chlorine compatible, corrosion resistant materials and deliver 35-40 Ft-Lb. of torque in the closing direction only. Upon cessation of any manual valve operation, the actuator shall automatically return (default) to the "armed ready" mode (to power close).

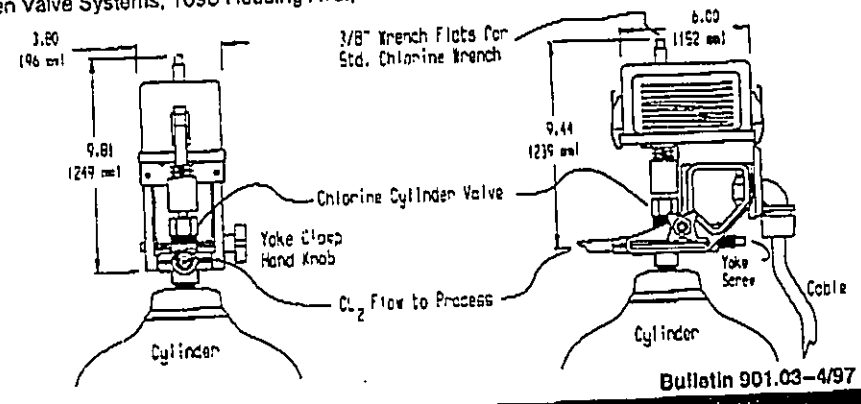
Power for the operation and control of the actuator shall be provided from an uninterruptable electric battery. Secondary or "backup" power supplies that require switching and controls shall not be acceptable. The battery power source shall have sufficient capacity for the full operation of the valve for a minimum of three days after the loss of electric power. In the event of a sustained loss of charging power, the microprocessor shall detect a declining battery charge to initiate valve closure while sufficient power remains to close the valve.

The control panel shall be contained within a NEMA 4X electrical enclosure, connected to the actuator by means of a cable 12 feet in length (standard, consult factory for other lengths). The microprocessor based controller shall accept signals from sources such as gas detectors, seismic or fire sensors, remote station alarms and manual switches to automatically close the valve. The microprocessor shall control the actuator via solid state relays with no moving parts. The control panel shall have 3 status lights to indicate that the system is "Armed/Ready", "Sufficient battery power", and "Battery Charging". Upon activation of the actuator, the control system shall provide an alarm contact (0.5 amp @ 24V dc/ac) to indicate the valve closure cycle.

A quantity of ___(1 is standard) Emergency "Panic" buttons shall be connected to the control panel and mounted ___(inside and/or outside) the chlorine room to allow for operator initiated emergency closure. These emergency buttons shall also function as a test switch to provide a full cycle test of the actuator under installed and loaded conditions for each and every cylinder change out. Installation and wiring of emergency kill button by others. Each valve actuator system shall also include a wall mounted stowage bracket and a standard chlorine cylinder valve wrench.

Chlorine emergency shut off system shall be by Halogen Valve Systems, 1098 Redding Ave., Costa Mesa, CA USA or equal.

Closing Torque	35-40 ft.-lb.
Charge @ 120 v ac	0.5 amp
Charge (solar) @ 12v dc	0.34 amp
Battery Rating	7 amp-hr.
Relay Output @ 24v AC/DC	0.5 amp
Actuator Weight (approx.)	8 lb.



HALOGEN VALVE SYSTEMS, INC.
1098 Redding Ave. Costa Mesa, Ca. 92626
Phone (714) 241-0557 Fax (714) 241-9709

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