EXECUTIVE CHAMBERS

HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

October 29, 1979

MEMORANDUM

To: Mr. Donald Bremner, Chairman
Environmental Quality Commission

Subject: Environmental Impact Statement for Pump and Controls for Keei Well "C", South Kona Water Project, Hawaii

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the subject document as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

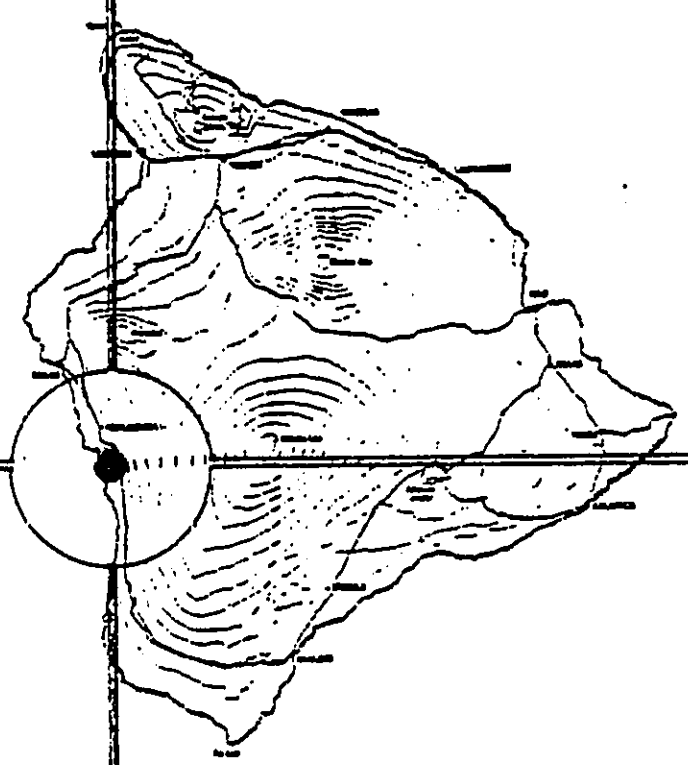
When the decision is made regarding the proposed action itself, I expect the proposing agency to weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, provide a useful analysis of alternatives to the proposed action.

George R. Ariyoshi

11/8/79

Office of Environmental Quality Control
Office of the Governor
550 Halekauwila Street
Tani Office Building, Third Floor
Honolulu, Hawaii 96813

ENVIRONMENTAL IMPACT STATEMENT (REVISED)



PUMP and CONTROLS
for KEEI WELL "C"

SOUTH KONA
WATER PROJECT

SUBMITTED BY
DEPARTMENT OF WATER SUPPLY
COUNTY OF HAWAII

H1

134

PUMP AND CONTROLS FOR
KEEI WELL "C"
SOUTH KONA WATER SYSTEM

REVISED
ENVIRONMENTAL IMPACT STATEMENT

Submitted by

Department of Water Supply
County of Hawaii

Prepared by

Division of Water and Land Development
Department of Land and Natural Resources

Revised August, 1979

AKIRA FUJIMOTO, Manager
Department of Water Supply

Table of Contents

SUMMARY

This Environmental Impact Statement describes a State funded water development project for the South Kona Water System, Hawaii County, in compliance with the EIS Regulations of the Environmental Quality Commission.

Three wells have been drilled and tested in Keei, South Kona. The first two wells are the present sources for the South Kona System. Development of the third well, Keei Well "C", is the subject of this Impact Statement. The following facilities will be installed and constructed:

500 GPM deepwell pump, controls, chlorinators, and appurtenances
Pump Control Building
50,000 gallon control tank
Booster Pump Station
1200 feet of 8-inch pipeline

The deepwell pump will lift water from the basal aquifer to the control tank with spill elevation at 899.5 feet, and the booster station will raise the control tank water to higher levels in the water system. The new 8-inch main will connect these facilities to the existing water system. The cost of improvements is estimated as $500,000.

The proposed pump in Keei Well "C" will increase the supply of domestic groundwater to the system from 0.86 to 1.58 mgd. The safe yield of the system (total source capacity minus largest pumped source) will be 0.86 mgd from two 300 gpm pumps in Wells "A" and "B".

In 1978, the average daily consumption for South Kona was about 0.54 mgd. The maximum day demand (including 10% allowance for losses) was close to 0.88 mgd. The proposed facilities will provide the system with a safe yield which just about matches the 1978 maximum day demand. Although the total system capacity will be 1.58 mgd, this output can be attained only if all three wells are pumped 24 hours per day.

The two earlier wells, Keei Wells "A" and "B" are presently producing water wtih a chloride content between 125 and 200 parts per million. The new Well "C" has water which has tested at 27 ppm. The new source is hence expected to lower the salinity level of the domestic water in South Kona.

The project site is in an agricultural area on the western slope of Mauna Loa at an elevation of 900 feet. The well site is 1000 feet from an existing country road, 900 feet from the nearest home, and adjacent to macadamia nut and coffee farms.

Construction impacts will be mitigated in part by the separation from the nearest homesites. The work will be controlled by job specifications and field inspections. Some jobs may be provided for South Kona residents, but these would be for the project duration only. Water supply will be increased to South Kona, but the safe yield, as noted previously, would just about meet the 1978 maximum day demand. As present, the impact of breakdown of a single pump is that South Kona would experience a shortage amounting to 50% of the needs on a maximum demand day. When this project is completed, even if one pump breaks down, the remaining two sources will still be able to meet present maximum day demand. As noted also, the new source is expected to lower the chloride content of the drinking water in South Kona.

This project is not expected to produce significant, adverse impacts. The physical environment and endemic biota are not threatened because of the nature of the work, the relative evenness of the terrain, and because the area is an agricultural district. The water development project, although a significant increase in supply capacity over the existing output, actually only meets the maximum day demands of 1978 with a safety feature against pump failure. This impact statement was written because of the general interest in water development projects, and to obtain public input regarding the project. More detailed information is contained in the body of this statement.

ENVIRONMENTAL IMPACT STATEMENT

Job No. 8-HW-45
Pump and Controls for Keei Well "C"
South Kona Water System

I. Project Description

The project objective is to install a 500 gpm deepwell pump, chlorinator, 50,000 gallon control tank, booster pump station and 1200 feet of 8" pipeline to connect Keei Well "C" (Figure 1) to the South Kona Water System. The facilities are being constructed in an attempt to keep pace with the burgeoning water demands of the South Kona service area. The low chloride (27 ppm) content of Keei Well "C" water will improve the quality of supply water from Keei Wells "A" and "B" which produce water with about 125 to 200 ppm chlorides.

The control tank and booster station will be located at the well site on a 0.91 acre parcel. Access from the Lower Government Main Road is by a 30-ft. wide easement (0.71 acre) for road and utility purposes.

The project is funded through appropriations from Act 226/SLH 1976, and Act 10/SS 1977. The preliminary estimate of cost is $500,000.

II. The Environmental Setting

A. Location of Project: Keei Well "C" is in West Hawaii, 3 miles southeast of Kealakekua Bay and 2.3 miles northeast of Honaunau Bay (Figure 1). Hualalai (8,251') to the north and Mauna Loa (13,679') to the east provide imposing backdrops for the communities in South Kona.

B. Physical Features at Project Site

1. General Character of Land: The project site is on the lower western slope of Mauna Loa at elevation 900'. The terrain is a gradual (11%) and even slope. Coffee trees are grown west of Keei Well C and a macadamia nut farm is to the north.

2. Soil: Kaimu extremely stony peat, a very dark brown soil about 3 inches thick underlain by fragmented Aa. Permeability is rapid; runoff is slow, and the erosion hazard is slight. The soil is generally not suited to cultivation, but

some areas are used for pasture, macadamia nuts, papaya, citrus and coffee. The natural vegetation on this well-drained, thin organic soil includes christmas berry, guava, guineagrass and lantana. (Soil Survey of the Island of Hawaii, SCS, 1973).

3. Geology: Mauna Loa rocks are made up of three different units, although all are olivine basalts. The core of the mountain was formed by the Ninole volcanic series of highly permeable rocks which carry fresh water at sea level. An erosional unconformity separates the Ninole lavas from the overlying Kahuku volcanic series which is more than 600 feet thick in places. These highly permeable rocks carry brackish water near shore, but may contain fresh water near sea level farther inland. Pahala ash 5 to 50 feet thick separates the Kahuku from the topmost Kau volcanic series. These extremely permeable kau rocks were formed during prehistoric and historic flows of lava. (Geology of the Hawaiian Islands, H. T. Stearns, 1969).

4. Hydrology: The area in the lee of Hualalai and Mauna Loa receives very little orographic trade-wind rainfall, but obtains considerable moisture from convective type showers. The South Kona rainfall, unlike other areas of the State, is greatest during the summer months. At Keei Well "C", 2.3 miles from the coast, annual rainfall is 45 inches; but only 2 more miles inland, at the Honaunau Forest Reserve, the precipitation exceeds 75 inches per year. The Hawaii Water Resources Regional Study (Surface and Ground water Resources Study Element Report) estimates groundwater flux to be about 10 mgd per mile for the wetter parts of West Hawaii.

5. Keei Well "C": Well "C" (2653-01) is 4000 feet south of Well "B" and 5000 feet south of Well "A". Ground elevation is 882 feet; depth of well is 913 feet; casing diameter is 12 inches. From August 7 to August 10, 1978 the well was pumped at rates between 750 and 780 gpm. The original static water level was 4.25 feet msl and the drawdown during the well test varied from about 1.3 feet to 1.5 feet. The chloride content of the pumped water was less than 30 ppm. Figure 2 is a plot of the well test results.

C. South Kona Water Service Area

The South Kona Water System extends along Mamalahoa Highway from Kealakekua in the north to Hookena School in the south. In between, the communities of Captain Cook, Keokea, and Kealia are served by the 11 miles-long pipeline. On the coast, Napoopoo on Kealakekua Bay and the Honaunau City of Refuge are served by this water system. The supply for this network is located in Keei between the coast and Mamalahoa Highway. Figure 3 is a schematic diagram of the South Kona Water System.

Although the facilities are physically contiguous with the North Kona water system, the South Kona system is hydraulically separated from the north by a normally closed gate valve near Kealakekua Village. The water supply, except for emergencies, must therefore originate in South Kona. The two Keei wells, each producing 300 gpm, barely meet the present needs of the extensive service area.

Information contained in the 1977-78 Annual Report of the Hawaii County Board of Water Supply indicates that the present average day consumption is about 0.54 mgd. Assuming system losses of about 10%, and a demand factor of 1.5, the maximum day demand is about 0.88 mgd. Since the two existing sources produce 0.86 mgd, if one pump breaks down, the impact on South Kona is a shortage of 50% of the water needs on a maximum demand day. Even on an average demand day, if a single pump breaks down, the remaining source will be able to meet less than 80% of the demand.

The annual water consumption of South Kona increased by a factor of nearly five from 36 million gallons in 1968 to almost 169 million gallons (Figure 4a) in 1977. This represents a growth in demand of almost 19% compounded annually. During the same period, the number of service connections almost tripled from 306 to 913, and the average consumption per household has increased from 318 to 507 gallons per day (Figure 4b). Clearly, the water consumption habits of South Kona have changed; not only has the total use increased, each household now demands much more water.

The changes in the character of South Kona as reflected in the water consumption changes of the seventies, began in the sixties. The work force, which in 1960 was composed largely of self-employed and unpaid family agricultural workers, by 1970 (as coffee production costs rose) turned into a predominant group of clerks, craftsmen, laborers and service personnel working for private wages and salaries (Kona Community Development Plan, Donald Wolbrink & Associates, Inc. 1975). The age and ethnic character of the district also changed, as the number of Caucasians increased and the number of Part-Hawaiians and Japanese decreased, while the number of elderly people increased.

Although the City of Refuge and Kealakekua Bay are important visitor sites, South Kona has no resort development, and no hotel units are definitely planned or proposed for this area (State Tourism Study, DPED, 1978).

D. Historic and Archaeological Sites

The West Hawaii coastal tract "is one of the richest areas in archaeological, historical and legendary materials. All threads of Hawaiian culture, physical remains and traditional history are found" (Recreation Program Handbook, DLNR, 1978). The Kealakekua Archaeological and Historical District was nominated to the National Register of Historic Places in 1972; and the Honaunau City of Refuge was placed on the NRHP in 1966. Numerous other archaeological remains are scattered along the coast between Kealakekua and Honaunau Bays. Historically, South Kona was the stage for Captain James Cook's landing and eventual demise in Hawaii, and the Battle of Mokuohai may have been Kamehameha's steppingstone to the conquest of the Hawaiian Islands chain. At the project site, however, no evidence of archaeological significance was uncovered during construction of the access road and drilling of Keei Well "C".

E. Biota

Endemic upland birds with ranges which could possibly extend to the project site include the Hawaiian Crow (Alala), Hawaiian short-eared owl (Pueo), and the Hawaiian Hawk (Io). The Nene is another possibility, but its present habitat is high on the sparsely vegetated slopes of Hualalai and Mauna Loa. Endemic forest birds would generally be found above 2000' elevation (Hawaii's Birds, Hawaii Audubon Society, 1975).

Endemic terrestial mammals of the Big Island include the Hawaiian (Hoary) Bat, Feral Dog, Hawaiian Rat, and Feral Pig (Recreation Program Handbook, DLNR, 1978).

The project site is covered by grasses and weeds and is located adjacent to macadamia nut and coffee farms.

III. Relationship of the Action to Land Use Plans, Policies and Controls

Detailed Land Classification is E262. The overall rating of "E" is the bottom value of a five-class productivity rating system. The number 262 referes to a land type "poorly suited for agriculture". The project is a permitted use in E262 lands under HRS 205-2.

The site is in a State Land Use Agriculture district. The proposed facility is a permitted use in the "A" district as defined in the State Land Use District Regulations.

County zoning for the project site is AG-5, and the General Plan designation is "orchards", as established by Ordinance No. 439, and shown on the Land Use Allocation Map, County of Hawaii.

IV. Probable Impacts

The portion of land on which Keei Well "C" is located was unused and weed-covered. No archaeological artifacts were discovered during construction of the access road and drilling of the well. Construction noise and dust, erosion hazards and historical sites are controlled or protected by existing laws and job specifications which will be performed project inspections. Most of the work will be performed away from public roads, although the project may generate some minor traffic inconvenience during mobilization and demobilization. The construction will be confined primarily to the well site which is 900 feet from the nearest home. Pipeline work, except for connection to the existing system, is limited to installation within the existing access road. Because of the above factors, construction is not expected to produce adverse short-term impacts.

The project may provide some jobs for South Kona residents, although most of these positions may be for the project duration only. Some project funds may filter into the local economy through payrolls and to fulfill the the ancillary needs of the contractor and workers during the life of the project.

The 500 gpm pump for this project, together with the existing 300 gpm pumps in Keei Wells "A" and "B" will provide a total source capacity of 1.58 mgd (if the pumps are operated for 24 hours). The present capacity is 0.86 mgd. In a typical system, the source is designed to meet demand on a "maximum" day (usually assumed as one-and-one-half times the average daily demand plus 10% for system losses) and storage is designed to accommodate fire flow or water demand for one day.

The average daily demand for South Kona in 1978 was 0.54 mgd. The maximum day demand was therefore about 0.88 mgd. If the growth in demand continues at the rate experienced in 1978 (extrapolated on Figure 5), the difference between the maximum day demand and the present capacity (0.86 mgd) of Keei Wells "A" and "B" will continue to increase until a new source is developed. In its 1971 "Water Master Plan" the County expected a "fully developed" (according to the existing zoning) South Kona to require

about 0.63 mgd of water, exclusive of the needs of Napoopoo which was not part of the system then. By the time this project is completed in 1980, the new 500 gpm pump will probably relieve a shortage in South Kona.

As noted earlier, if one of the two existing pumps breaks down, the remaining 300 gpm pump can only meet half of the maximum day demand, and 80% of the demand on an average day. When the new Keei Well "C" source is added to the system, even if the largest (and newest) source pump breaks down, the remaining two pumps will be able to meet present maximum day demand. This project will therefore reduce the impact of pump breakdown from a possible 50% shortfall to zero shortage on a maximum demand day.

Besides increasing the source capacity, this project will provide a supply which is less salty (27 ppm chlorides) than the water from Wells "A" and "B" (200 ppm chlorides). The new source is at least 4000 feet away from the other sources and water quality should not be affected by operation of Wells "A" and "B".

V. Unavoidable Adverse Effects

Construction noise and dust, as well as some traffic inconvenience, especially during mobilization, would be unavoidable. However, pollution control laws require the contractor to operate within specified guidelines. The major part of the project is also more than 1000 feet away from the existing roadways, and the separation should mitigate the construction impacts.

Some grading will be required for the construction of the booster station and control tank, but because of the relatively even character of the terrain, earthwork will be minimal. Most of the area was graded prior to well drilling and testing.

VI. Alternatives

Other sites could be and were considered for a well source. The use of Keei Well "C" entails the expense of pumping through a long and relatively small transmission line. The operation costs could be reduced by a well closer to Wells "A" and "B", but the chloride content of the water would probably be around 200 ppm instead of Well "C"'s 27 ppm.

Since no perennial streams nor sewage systems are available, use of surface or recycled water was not considered. Desalination of brackish or salt water at the coast would require installation of over two miles of new pipeline, booster stations, high pumping costs, and construction of a desalting plant.

Postponing this project to a later time would probably mean shortages within one or two years, if not sooner. Actually, although the present maximum yield of 0.86 mgd meets the present maximum day demand, the safe yield (total capacity minus the largest source) is only 0.43 mgd, which is less than the 1977 average day demand. In this respect, this project is already overdue, since the present system safe yield cannot meet the average day demand. The "No-Action" alternative is therefore out of the question.

One other alternative could be considered. This would involve use of water developed in North Kona and piped to South Kona. Although the pipeline is available, the 8-inch main is relatively small and includes several booster stations along Mamalahoa Highway. Also, the North Kona system presently can be regarded as an emergency standby for South Kona. If some North Kona water is committed to everyday use in South Kona, the standby capability of the North Kona system would be diminished. Because the 8-inch main would have high friction losses and require booster pumping costs, and because the South Kona system needs the North Kona system as a backup source, the Keei Well should be developed for the needs of South Kona.

VII. Short-term Uses of Environment and Long-term Productivity

About 1.6 acres of land for the site and access road will be taken out of potential agricultural use, but the site is not now actively used for agricultural production. South Kona includes thousands of acres zoned for agriculture, and land required for this project is insignificant in the overall picture.

Use of groundwater from Keei Wells "A", "B", and "C" will be monitored to assure the long-term productivity of the aquifer as a source of domestic water.

VIII. Mitigation Measures

As noted previously, job specifications, construction inspection and Hawaii statutes control construction and protect historic finds. Monitoring of well water withdrawal

and quality have also been mentioned as measures to protect the quality of the aquifer. Spacing of Keei Well "C" 4000 feet south of Well "B" is itself a measure to protect against mutual well interference and possible degradation of water quality.

IX. Irreversible Commitment of Resources

The only irreversible commitment of resources would be for labor and materials required to construct and operate the proposed facilities. A small plot of non-producing agricultural land will be committed to public utility use, but such use is not irreversible. No cultural resources are affected by this action. Groundwater is a renewable resource, continuously replenished by percolation of rainfall.

X. Parties Consulted in the Preparation of the EIS

A. Hawaii County

Planning Department
Department of Public Works

B. State

Division of State Parks, Outdoor Recreation and Hitoric Sites, DLNR
Division of Fish and Game, DLNR
Department of Health

C. Others

Bishop Estate

XI. Comments and Responses

Reproductions of comments and responses made during the consultation process are included in Appendix A.

XII. Necessary Approvals

Construction plans approvals will be obtained from the Manager-Chief Engineer of the Hawaii County Department of Water Supply and the Manager-Chief Engineer of the Division of Water and Land Development. Prior to use of Keei Well "C", approval must be obtained from the State Health Department for use of the new raw water source under Chapter 49 of the Public Health Regulations.

XIII. Figures

Figure 1: Site Map, State Land Use Districts
Figure 2: Keei Well "C" 2653-01, Pumping Test No. 1
Figure 3: Schematic Diagram, South Kona Water System
Figure 4a: South Kona Consumption and Services
4b: South Kona Consumption per Connection
Figure 5: Supply and Demand, South Kona Water System

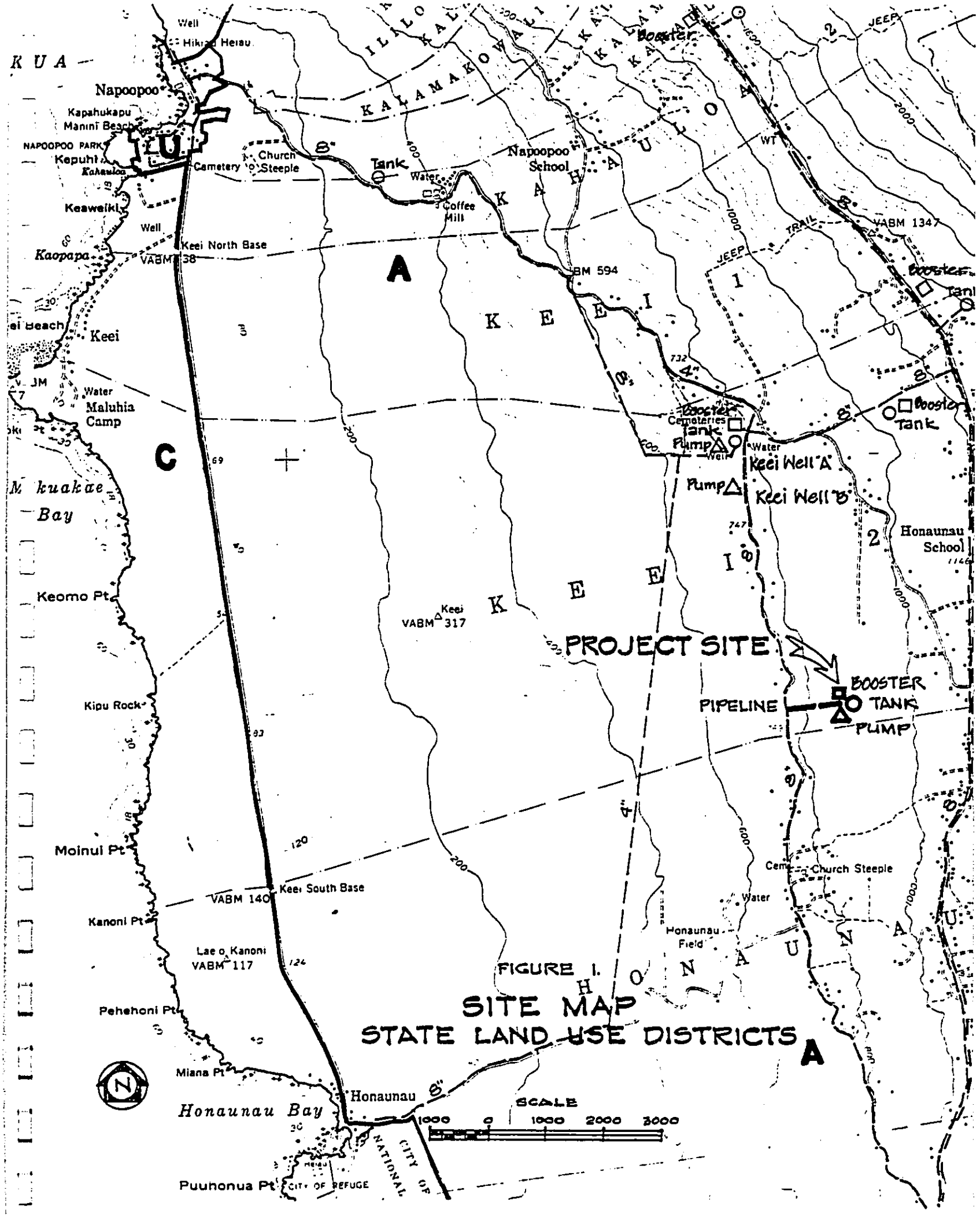
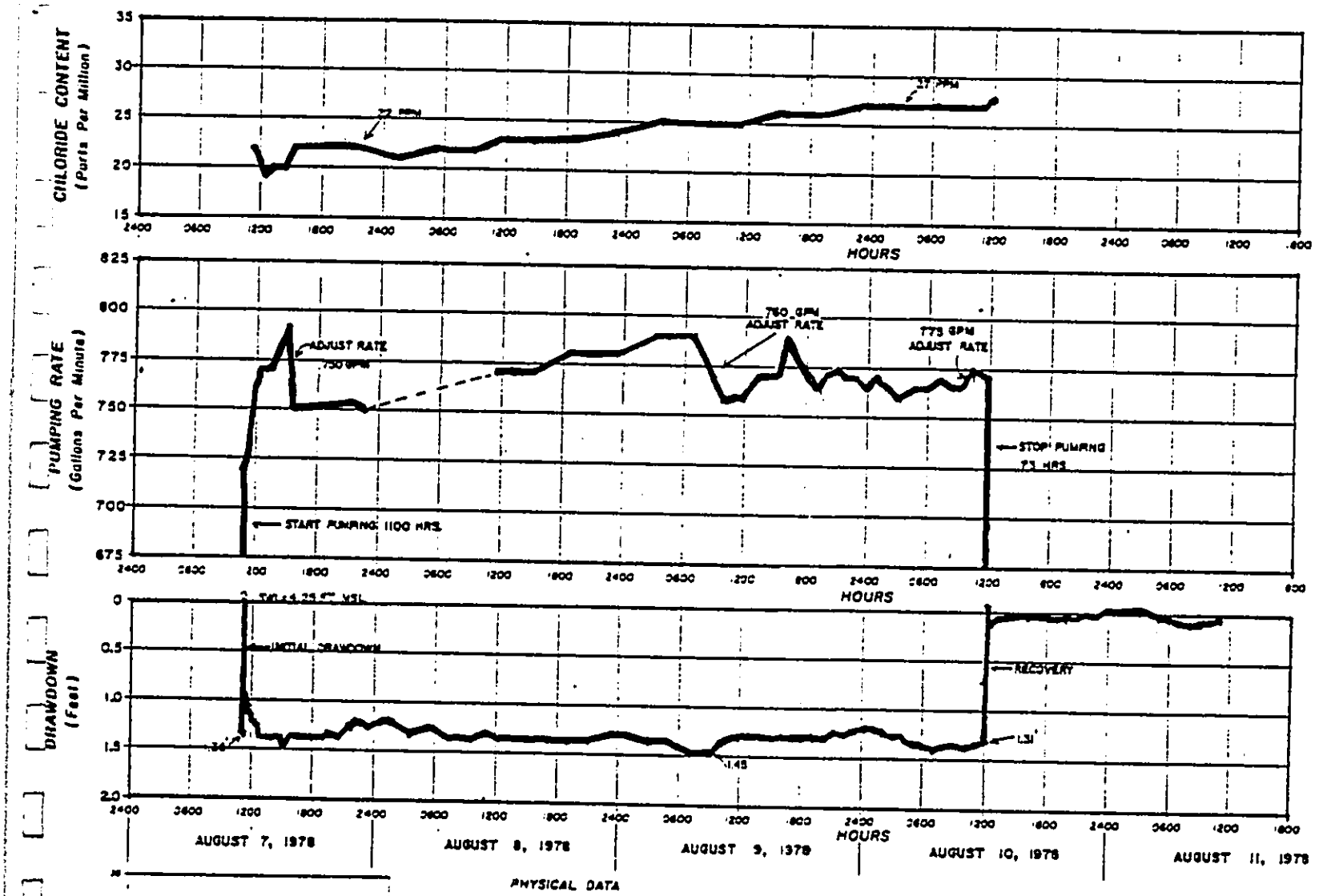


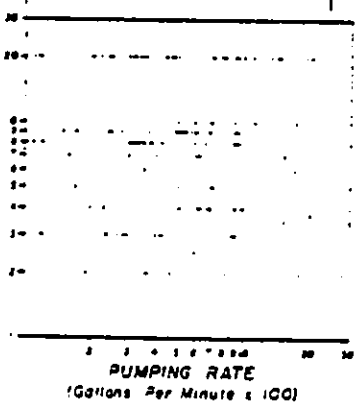
FIGURE 1.

SITE MAP

STATE LAND USE DISTRICTS

A





PHYSICAL DATA

Ground Elevation 882 FT.
Size of Casing 12 IN.
Depth of Casing (sand) 883 FT.
Depth of Casing (screened) 913 FT.
Depth of Hole 913 FT.
Water Temperature 19.5°C
Latitude 19° 26' 46"
Longitude 156° 53' 20"

*Test Conducted by ED SAKODA & MITCH OHYE

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

KEEI WELL "C" 2653-01

PUMPING TEST NO. 1

SOUTH KONA, HAWAII

FIGURE 2

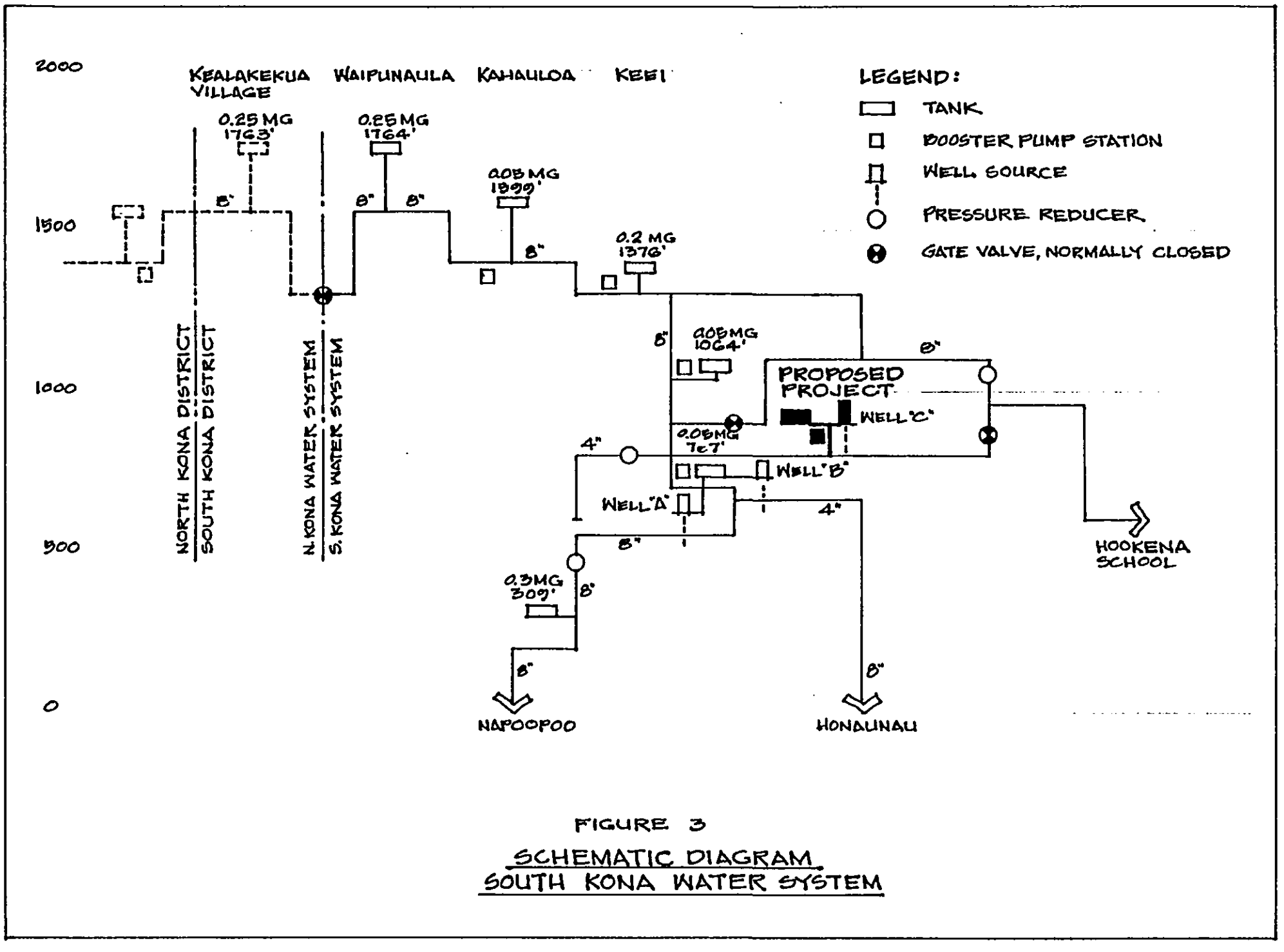


FIGURE 3

SCHEMATIC DIAGRAM
SOUTH KONA WATER SYSTEM

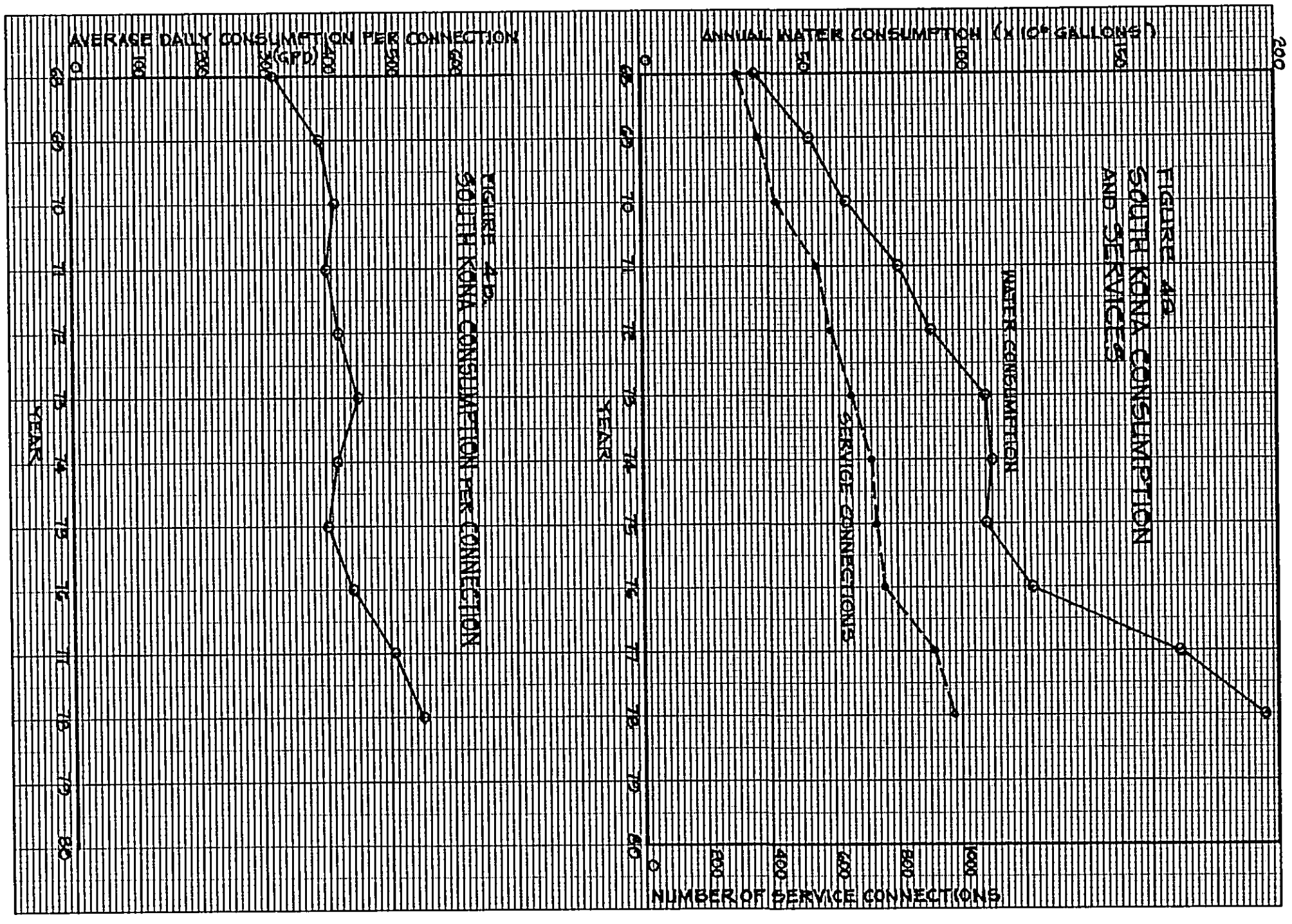
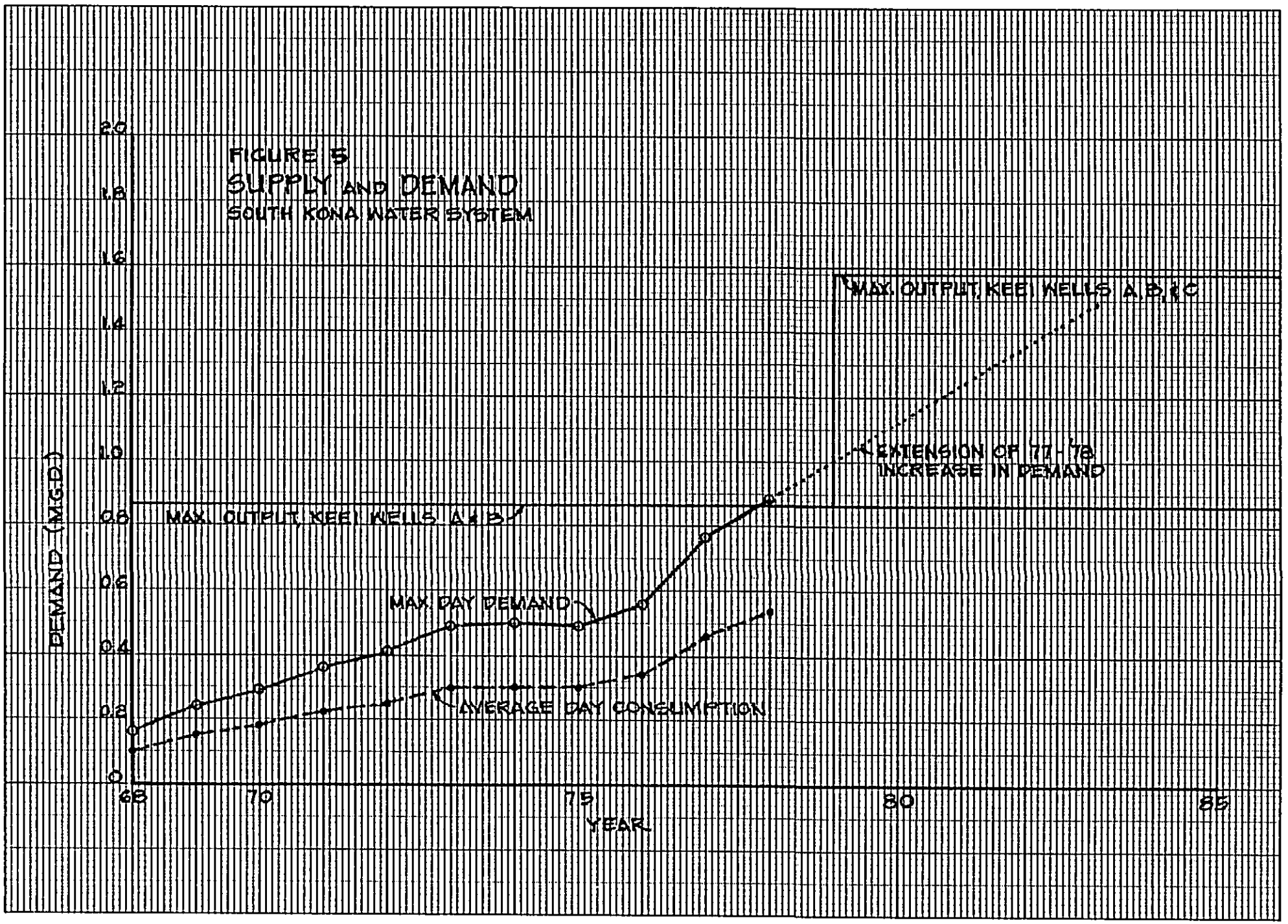


FIGURE 4D
SOUTH KONA CONSUMPTION PER CONNECTION
AND SERVICES

FIGURE 5
SUPPLY AND DEMAND
SOUTH KONA WATER SYSTEM



XIV. References

"Soil Survey of Island of Hawaii, State of Hawaii", U. S. Department of Agriculture, Dec. 1973

"Geology of the Hawaiian Islands", U. S. Geological Survey, Harold T. Stearns, District Geologist, 1967

"Surface and Ground Water Resources" (an unpublished report of the Hawaii Water Resources Regional Study), 1975

"Annual Report", Department of Water Supply, County of Hawaii, Reports from 1968 through 1978

"Kona Community Development Plan", Donald Wolbrink and Associates, Inc., prepared for the County of of Hawaii, 1975

"State Tourism Study, Physical Resources", Department of Planning and Economic Development, State of Hawaii, 1978

"Recreation Program Handbook", Department of Land and Natural Resources, State of Hawaii, 1978

"Detailed Land Classification - Island of Hawaii", Land Study Bureau, University of Hawaii, 1975

"The General Plan, County of Hawaii", Ordinance No. 439, County of Hawaii, 1971

"Water Master Plan, Island of Hawaii", Department of Water Supply, County of Hawaii, 1971

APPENDIX A

COMMENTS and RESPONSES

GEORGE R. ARIYOSHI
GOVERNOR

RICHARD L. O'CONNELL
DIRECTOR

TELEPHONE NO.
548-6915

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU HAWAII 96813

June 22, 1979

Akira Fujimoto, Director
Department of Water Supply
County of Hawaii
P.O. Box 1820
Hilo, Hawaii 96720

Dear Mr. Fujimoto,

SUBJECT: Environmental Impact Statement for Pump and Controls for Keei Well "C", South Kona, Hawaii

We have reviewed the subject document and offer the following comments for your consideration:

1. Page 3

We question some of the conclusions concerning increased water demand in the project area. In the discussion, increased demand is mainly attributed to new housing and to increased average household consumption. We suggest that a significant factor affecting the increased consumption rate may also be that many households previously served by water catchment systems are now relying on the county system. Consequently, projections for future water demand should take that phenomenon into consideration, as well as the demand generated by new housing.

2. Page 5

According to the EIS, the capacity of Keei Wells A, B, & C will be approximately 1.58 mgd. The maximum day demand is about 0.88 mgd. With the capacity increased by almost 80 percent, what is the justification for such increase? Does the increased capacity conform to the county general plan? What is the population that the proposed action will service? Because the project seems to be somewhat oversized, a discussion is warranted.

3. Alternatives

Although alternatives are considered in the EIS, there is no discussion regarding people retaining the water catchment tanks or moving the well further mauka to reduce the impact of increased chloride content in the water.

4. There should be further discussion on the water quality of the existing wells. During times when overpumping of the existing wells occur, the chloride content is increased. If the proposed wells is pumped within the same basal lens, there may be a possibility of increased chloride content. What studies or data demonstrate that well C is not within the acquifer?

5. The EIS lacks discussion on secondary impacts. Because water service is one of the key factors of growth within an area, there should be discussion on the stimulation of growth due to the proposed action. How many people will the system eventually service? What is the existing population that wells A and B service? How many existing homes still use water catchment tanks? How many homes presently having water catchment tanks will be hooking up to the water system? How does the proposed action affect the future land use patterns? What subdivisions will the proposed action service? Will Bishop Estates subdivision in Keei be included in this proposal?

6. Pages 7 & 8

The EIS mentions that water withdrawal will be monitored. Who will monitor the water quality? How often will this be done?

We trust that these comments will be helpful to you in preparing the revised EIS. An attachment sheet lists the commenting agencies and/or organizations.

We thank you for the opportunity to review the EIS. We look forward to the revised statement.

Sincerely,

for Richard L. O'Connell
Director

Attachment

LIST OF COMMENTING AGENCIES AND/OR ORGANIZATIONS

FEDERAL

* Fourteenth Naval District	May 31, 1979
* Department of the Air Force	June 5, 1979
* U.S. Fish and Wildlife Service	June 6, 1979
* Department of the Army	June 11, 1979
* Soil Conservation Service	June 19, 1979

STATE

* Department of Planning and Economic Development	May 25, 1979
Department of Accounting and General Service	May 30, 1979
Department of Defense	May 31, 1979
* Department of Land and Natural Resources (Historic Preservation Program)	June 12, 1979

COUNTY OF HAWAII

* Department of Parks and Recreation	May 25, 1979
* Planning Department	May 30, 1979
* Department of Public Works	May 31, 1979

* denotes comment forwarded by reviewer

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

P. O. BOX 1920 • HILO, HAWAII 96720 • 25 AUPUNI STREET

August 27, 1979

Mr. Richard L. O'Connell, Director
Office of Environmental Quality Control
Office of the Governor
550 Halekauwila Street, Room 301
Honolulu, HI 96813

PUMP AND CONTROLS FOR KEEI WELL "C"

We have reviewed your comments on our EIS for the subject project and respond as follows:

1. Conclusions on Increased Water Demand. For areas now serviceable by the South Kona distribution system, the number of households still relying on water catchment for everyday needs is negligible. The areas which still utilize catchment could only be served if the distribution system is extended. Our experience has been that almost all serviceable households connect as soon as the County system is available.

2. Capacity of Keei Wells "A," "B," and "C." We tried to point out in the EIS that the 1978 maximum day demand of 0.88 mgd already exceeded the present pumped capacity of 0.86 mgd in Keei. We further pointed out that if one of the existing Keei pumps breaks down, the remaining one can provide only 0.43 mgd or less than the average day demand of 0.54 mgd. While we could speculate that the proposed 0.72 mgd pump in Well "C" could theoretically support a population of about 4000 persons, the consumption statistics amply indicate that the proposed pump is long overdue because no backup is available to meet the present average day demand.

3. Alternatives. We do not feel that the retention of water catchment tanks is a socially acceptable alternative. Our experience has been that almost every serviceable household connects to the system as soon as service is available. This project will have no direct impact on those who decide not to connect to the public system, and the number of households opting for retention of water catchment is not now and will not have a significant impact on the Keei water sources.

   On the matter of well relocation, since a well (a hole in the ground) cannot be "moved," by "moving the well further mauka," we assume you mean drilling a new, deeper hole. Besides imposing an unnecessary added cost to the project, we do not see what can be gained by such an alternative since Keei Well "C" has already been drilled and the well water has been tested at 27 ppm, a chloride level lower than most well sources in the State.

4. Water Quality of Keei Wells. During a two-year period from June 1976 to July 1978, the chlorides in Keei Wells "A" and "B" ranged between 113 ppm and 225 ppm. Keei Wells "A," "B," and "C" are arranged in a north-south orientation (Figure 1.). The direction of groundwater flux is from east (mauka) to west (makai), or perpendicular to the north-south alignment of the wells. This arrangement and the separation of Well "C" (4000 feet from "B"), plus a mode of operation utilizing Well "C" with either Well "A" or "B," should provide improved quality water for South Kona, not worse as you fear, even though all three (3) wells tap the basal aquifer. Pumping test results for Wells "A" and "B" have been added to Appendix "C."

5. Stimulation of Project on Growth. We have tried to point out that even with the proposed pump in Well "C" included in the analysis, the "safe yield" of the system (total sources minus largest pump source) is only adequate to support the present resident population of slightly less than 5000 persons. We also noted that based on past use, the proposed 0.72 mgd pump could theoretically support an additional 4000 persons but only if all three (3) pumps never broke down and lasted forever. These are unrealistic suppositions for planning and operating a water system. A corollary to this is that any large subdivision or land project would require a concomitant development of a new water source. If we consider the yield of the Keei system equal to total sources minus oldest pump, on the other hand, we would have 1.15 mgd available or about 30% more than the 1978 customers required. The water supply would not be a hindrance to the present growth trends in South Kona; but if the largest pump (the proposed Keei Well "C" pump) breaks down, South Kona may have a shortfall in supply and the chloride content would probably be close to 200 ppm.

6. Monitoring Water Quality. The Department of Water Supply will maintain a continuous record of well level and pump discharge and arrange for periodic sampling for chlorides, bacteriological counts and chlorine residuals, consistent with accepted utility practices, but within our operational capabilities.

We thank you for your input and apologize for our late response. Your comments and this response will be included in the Revised EIS which we will file shortly.

Akira Fujimoto
Manager

UNIVERSITY OF HAWAII

Water Resources Research Center

June 18, 1979

Environmental Quality Commission
550 Halekauwila St., Rm. 301
Honolulu, Hawaii 96813

Dear Sir:

Subject: Comments on EIS for Pump and Controls for Keei Well "C", South Kona Water Project

Thank you for sending the subject EIS for our review and comments. We have the following points for your consideration:

1. Based on the trend of rising chlorine (Cl) during the pump testing (Cl rose from about 20-27 ppm after 3 days, Figure 2), it seems highly unrealistic to expect Cl to remain this low during long-term use (p. 6, a probable impact is producing 27 ppm Cl water from this well to mix with Keei Wells A & B). Mr. Dan Lum apparently agrees with this assessment and has stated that the Cl content could possibly rise to a range of 100 to 200 ppm (Memo of March 30, 1979 in Appendix B).

2. Bacteriological data have not been included in this EIS to justify the installation of a chlorination for the Keei Well "C". What is the bacteriological quality of the existing water supply? Is it chlorinated and, if so, what residue is maintained?

3. A comparison of the 3 wells should be given and the impact of chlorinating drinking water supplies should be considered.

Sincerely,

Yu-Si Fok, Professor
WRRC EIS Review Coordinator

YSF:jmn
cc: H. Gee
F. Peterson
Department of Water Supply, Hawaii County

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
P. O. BOX 1820 • HILO, HAWAII 96720 • 25 AUPUNI STREET

August 27, 1979

Mr. Yu-Si Fok, Professor
WRRC EIS Review Coordinator
Water Resources Research Center
University of Hawaii
2540 Dole Street
Honolulu, HI 96822

PUMP AND CONTROLS FOR KEEI WELL "C"

Thank you for your comments on the EIS for the subject project. We apologize for our late response. Our reply is as follows:

1. Chloride Levels. We did not intend to imply that the chloride level in Well "C" will forever remain at 27 ppm nor did we intend to imply that 500 gpm at 27 ppm mixed with 300 gpm (or 600 gpm if all three (3) wells are pumped) water at 200 ppm will produce 27 ppm water. You correctly quoted the memorandum on the pumping test that the "chloride content could possibly rise to a range of 100 to 200 ppm," but failed to mention that this content would be reached only with a 700 gpm pump. The memorandum also suggests "an initial production rate of 500 gpm"...at which rate..."the chloride content of the pumped water should remain below 100 ppm."

2. & 3. Chlorination. Our groundwater supplies are normally treated with continuous chlorination during pumping, maintaining a range of 0.35 to 0.5 ppm residual chlorine. We do not, at present, have an alternative operational method for disinfecting our water supply, and we would not consider using the Keei sources without disinfection as a normal practice. We stated in the EIS that Wells "A" and "B" are 5000 feet and 4000 feet, respectively, north of Well "C," and that the earlier wells could produce water with 200 ppm chlorides. We do not expect significant mutual interference between the earlier wells and Well "C" because of the physical separation coupled with the fact that the groundwater flux is perpendicular to the alignment of the wells. Pumping test results of Wells "A" and "B" have been added as Appendix C of the EIS.

Akira Fujimoto
Manager

... Water brings progress...

ORGE R. ARIYOSHI
IVERNOR OF HAWAII

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

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

June 12, 1979

Office of Environmental Quality
Control
550 Halekauwila Street
Room 301
Honolulu, Hawaii 96813

Dear Sirs:

SUBJECT: Pump and Controls for Keei Well "C"
South Kona Water Project Job No. 8-HW-45

Thank you for the opportunity to comment on the Environmental Impact Statement for the above named project.

On June 11, 1979, Pat Beggerly, an archaeologist from this office conducted a reconnaissance survey on the area of impact for Job 8-HW-45 and found that no archaeological resources are apparent on the surface.

Because the area is heavily vegetated it is possible that sites were not located during the reconnaissance it is therefore our recommendation that the applicant be informed that in the event that any unanticipated sites or cultural remains such as shell, bone or charcoal deposits; human burials; rock or coral alignments, pavings or walls are encountered during construction that work should stop and this office should be notified immediately.

Sincerely yours,

Ralston H. Nagata
Acting Director
Historic Preservation Program

cc: Dept. of Water Supply
County of Hawaii

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
P. O. BOX 1820 • HILO, HAWAII 96720 • 25 AUPUNI STREET

July 23, 1979

Mr. Ralston H. Nagata
Acting Director
Historic Preservation Program
Division of State Parks
P. O. Box 621
Honolulu, HI 96809

PUMP AND CONTROLS FOR KEEI WELL "C"

Thank you for your comments on the Environmental Impact Statement for the above project. Please rest assured that if any archaeological sites or cultural remains are encountered during construction, work will stop and your office will be notified immediately.

Akira Fujimoto
Manager

... Water brings progress ...

GEORGE R ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P O Box 3378
HONOLULU, HAWAII 96801

July 3, 1979

GEORGE A L YUEN
DIRECTOR OF HEALTH

Audrey W. Mertz, M D., M P H
Deputy Director of Health

Henry N Thompson M A
Deputy Director of Health

James S Kumagai, Ph D., P E
Deputy Director of Health

In reply, please refer to
File EPHS

MEMORANDUM

To: Department of Water Supply
County of Hawaii
P.O. Box 1820
Hilo, Hawaii 96720

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Pump and Controls for Keei Well "C", South Kona Water Project

Thank you for allowing us to review and comment on the subject EIS. We would like to reiterate our comment on the preparation notice. The proposed additions to the test facility will qualify the Keei Well "C" as a new source of potable water. As such, Section 29 of Chapter 49 requires approval of the source by the Director of Health prior to its use.

This approval is based primarily on information required to be submitted under that section.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

for JAMES S. KUMAGAI, Ph.D.

cc: Office of Environmental Quality Control

RECD JUL 6 1979

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

P. O. BOX 1820 • HILO, HAWAII 96720 • 25 AUPUNI STREET

July 23, 1979

Dr. James S. Kumagai
Deputy Director of Environmental Health
Environmental Protection and
Health Services Division
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, HI 96801

PUMP AND CONTROLS FOR KEEI WELL "C"

Thank you for your comments on the Environmental Impact Statement for the above project. We will submit an application for approval of the new source as required by Section 29, Chapter 49, of the Public Health Regulations.

Akira Fujimoto
Manager

...Water brings progress...

APZV-EHE-E

11 JUN 1979

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

The Environmental Impact Statement (EIS) for Pump and Controls for Keei Well 'C', South Kona Water Project has been reviewed and we have no comments to offer at this time. There are no Army installations or activities in the vicinity of the proposed project.

The EIS is returned in accordance with your request.

Sincerely,

1 Incl
As stated

CARL P. RODOLPH
Colonel, CE
Director of Engineering and Housing

Original signed by E.K Shimamura

Copy Furnished:
Department of Water Supply
County of Hawaii
P.O. Box 1820
Hilo, Hawaii 96720

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96853

5 JUN 1979

REPLY TO ATTN OF: DEEV (Mr Shiroma, 449-1831)

SUBJECT: Pump and Controls for Keei Well "C", South Kona Project

TO: Office of Environmental Quality Control
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

1. This office has reviewed the subject EIS and has no comment to render relative to the proposed project.

2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document.

FOR signed by

ROBERT Q. K. CHING
Chief, Engrg & Envmtl Plng Div
Directorate of Civil Engineering

Cy to: Dept of Water Supply
County of Hawaii
P. O. Box 1820
Hilo, Hawaii 96720

COPY FOR: Dept of Water Supply

REC'D JUN 7 1979

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

1 June 1979

Mr. Akira Fujimoto
Manager
Department of Water Supply
County of Hawaii
PO Box 1820
Hilo, HI 96720

Dear Mr. Fujimoto:

We have reviewed the environmental impact statement for the pump and controls project for Keei Well "C" - South Kona Water System - dated April 1979. We have no comments on the project. The project does not affect any of our planning activities or other areas of jurisdiction.

We thank you for the opportunity of participating in the review process.

Sincerely yours,

KISUK CHEUNG
Chief, Engineering Division

COPY

COUNTY OF HAWAII
DEPARTMENT OF PUBLIC WORKS
HILO, HAWAII 96720

May 31, 1979

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT
PUMP AND CONTROLS FOR KEEI WELL "C"
SOUTH KONA WATER PROJECT

Thank you for affording us an opportunity to review the subject environmental impact statement.

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

EDWARD HARADA
Chief Engineer

cc: Department of Water Supply

RECD JUN 1 1979

COPY

PLANNING DEPARTMENT
25 AUPUNI STREET

COUNTY OF HAWAII
HILO, HAWAII 96720

May 30, 1979

Office of Environmental
Quality Control
550 Halekauwila Street
Room 301
Honolulu, HI 96813

Gentlemen:

EIS-South Kona Water System,
Pump and Controls for Keei Well "C"
Job No. 8-HW-45, Keei 2nd, South Kona
(TMK: 8-3-08:portion of 41), Hawaii

Thank you for sending us the subject EIS. We have reviewed the text and have no adverse comments to offer.

Sincerely,

SIDNEY FUKE
Director

BS:wkm

cc: Dept. of Water Supply

mail

(P)1577.3

MAY 30 1979

Mr. Richard L. O'Connell
Director
Office of Environmental Quality Control
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii

Dear Mr. O'Connell:

Subject: EIS for Pump and Controls for Keei Well "C", South Kona Water Project

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

The project will not have any adverse environmental effect on any existing or planned facilities serviced by our department.

Very truly yours,

HIDEO MURAKAMI
State Comptroller

L.T:ss
cc: Dept. of Water Supply, Hawaii County

RECD JUN 1 1979

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

P. O. Box 50004, Honolulu, HI 96850

June 19, 1979

Mr. Richard L. O'Connell
Director, Office of Environmental
Quality Control
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

Dear Mr. O'Connell:

Subject: Pump and Controls for Keei Well "C" South Kona Water Project - Environmental Impact Statement

We have reviewed the subject environmental impact statement and have no comments to offer.

Thank you for the opportunity to review this document.

Sincerely,

Jack P. Kanalz
State Conservationist

Enclosure: EIS

cc:
Department of Water Supply
County of Hawaii
P. O. Box 1820
Hilo, Hawaii 96720

REC'D JUN 20 1979

psich
ue

DEPARTMENT OF [illegible]
ECONOMIC [illegible]
P. O. Box [illegible]
Honolulu, H[illegible]

May 25, 1979

Ref. No. 9117

Mr. Richard L. O'Connell, Director
Office of Environmental Quality
Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. O'Connell:

Subject: Environmental Impact Statement, Pump and Controls for Keei Well "C," South Kona Water Project

We have reviewed the subject EIS and find that it has adequately assessed the major environmental impacts which can be anticipated from the implementation of this project.

Thank you for the opportunity to review and comment upon this document.

Sincerely,

HIDETO KONO

cc: Department of Water Supply
County of Hawaii

RECD MAY 31 1979

GEORGE R. ARIYOSHI
GOVERNOR

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

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

LETTER NO. (P) 1537.9

MAY 30 1979

Mr. Richard L. O'Connell
Director
Office of Environmental Quality Control
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii

Dear Mr. O'Connell:

Subject: EIS for Pump and Controls for Keei Well "C", South Kona Water Project

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

The project will not have any adverse environmental effect on any existing or planned facilities serviced by our department.

Very truly yours,

HIDEO MURAKAMI
State Comptroller

HEADQUARTERS
FOURTEENTH NAVAL DISTRICT
BOX 110
~~FPO SAN FRANCISCO 96610~~
Pearl Harbor, HI 96860

IN REPLY REFER TO:
5902A:JJC:am
Ser 1389

31 MAY 1979

Environmental Quality Commission
Office of the Governor
State of Hawaii
[illegible] Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Pump and Controls for Keei Well 'C'
South Kona Water Project
Environmental Impact Statement

The Environmental Impact Statement for Pump and Controls for Keei Well 'C' has been reviewed and the Navy has no comments to offer. Per your request, the subject EIS is returned.

Thank you for the opportunity of reviewing the EIS.

Sincerely,

J. E. CARL
Lieutenant Commander, CEC, USN
Deputy District Civil Engineer
By direction of the Commandant

Copy to:
Dept of Water Supply
County of Hawaii
P. O. Box 1539
Hilo, HI 96720

RECD JUN 1 1979

GEORGE R ARIYOSHI
GOVERNOR

VALENTINE A SIEFERMANN
MAJOR GENERAL
ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
~~Fort Ruger, Honolulu, Hawaii 96816~~
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816

HIENG

31 MAY 1979

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Gentlemen:

Pump and Controls for Keei Well "C"
South Kona Water Project

Thank you for sending us a copy of the "Pump and Controls for Keei Well "C", South Kona Water Project, Environmental Impact Statement. We have no comments to offer at this time. The attached document is returned for your use.

Yours truly,

WAYNE R. TOMOYASU
Major, CE, HARNG
Contr & Engr Officer

Enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:

EN
Room 6307

June 6, 1979

Office of Environmental Quality
Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Re: EIS Prep and Controls
Keei Well "C"
South Kona, Hawaii

Dear Sir:

We have reviewed referenced Environmental Impact Statement and determined that the proposed project will have little if any adverse impacts on fish and wildlife resources. In view of this we have no additional comments to offer.

We appreciate this opportunity to comment.

Sincerely yours,

[illegible]
Field Supervisor
Division of Ecological
Services

cc: Dept. of Water Supply, Hilo, HI
HI
ED

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

GEORGE R. ARIYOSHI
GOVERNOR

RICHARD L. O'CONNELL
DIRECTOR

TELEPHONE NO.
548-6915

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU, HAWAII 96813

July 3, 1979

Akira Fujimoto, Director
Department of Water Supply
County of Hawaii
P. O. Box 1820

SUBJECT: Environmental Impact Statement for Pump and Controls for Keei Well "C", South Kona, Hawaii

Dear Mr. Fujimoto,

We have received a comment on the subject statement dated June 20, 1979. We are transmitting a copy of the comment for your appropriate action.

Sincerely,

Richard L. O'Connell
Director

attachment

RECD JUL 5 1979

(1)

GEORGE R. ARIYOSHI
GOVERNOR

RYOKICHI HIGASHIONNA, PH.D.
DIRECTOR

DEPUTY DIRECTORS
WALLACE AOKI
DOUGLAS S. SAKAMOTO
CHARLES O. SWANSON
James R. Carras

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

June 20, 1979

IN REPLY REFER TO:
STP 8.5488

Office of Environmental
Quality Control
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement
Pump and Controls for Keei Well "C"
South Kona Water Project

Thank you for giving us the opportunity to review and comment on the above-captioned statement. We have no substantive comments which can improve the document.

Very truly yours,

Ryokichi Higashionna

RECD JUL 5 1979

(P)1174.9

FEB 16 1979

Mr. Akira Fujimoto
Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fujimoto:

Subject: Pump and Controls for Keei Well "C"
South Kona Water System, Hawaii

We would appreciate it if our agency be consulted in the preparation of the EIS for the subject action.

Very truly yours,

RIKIO NISHIOKA
State Public Works Engineer

LT:jym
cc: DLNR, Div. of Water and Land Dev.

9410 Ls

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

RECEIVED
78 NOV 16 AM 10:02
STATE OF HAWAII

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

November 15, 1978

GEORGE A. L. YUEN
DIRECTOR OF HEALTH

Audrey W. Mertz, M.D., M.P.H.
Deputy Director of Health

Henry N. Thompson, M.A.
Deputy Director of Health

James S. Kumagai, Ph.D., P.E.
Deputy Director of Health

In reply, please refer to:
File: EPHS – SS

Mr. William Y. Thompson
Chairman of the Board
Department of Land & Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Thompson:

Subject: Request for Comments on Proposed Environmental Impact Statement (EIS) for Job No. 8-HW-45, Pump and Controls for Keei Well "C", South Kona Water System

Thank you for allowing us to review and comment on the subject proposed EIS.

It is our understanding that to date, Keei Well "C" has been used only as a test facility. The additions and intended use of the existing facility will qualify it as a new raw water source, and as such will make it subject to the terms and conditions of Part D of Public Health Regulations, Chapter 49, Potable Water Systems. The requirements of this section must be fulfilled before the public can be served by this source.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Sincerely,

Brian J-J. Choy

for JAMES S. KUMAGAI, Ph.D.
Deputy Director for
Environmental Health

cc: DHO, Hawaii

February 26, 1979

Mr. Rikio Nishioka
State Public Works Engineer
Dept. of Accounting and
General Services
State of Hawaii

Dear Mr. Nishioka:

Pump and Controls for Keei Well "C"
South Kona Water System, Hawaii

Your request to the Hawaii County Department of Water Supply to be a consulted party on the above project is acknowledged. A copy of the EIS-Preparation Notice which was filed with the EQC is enclosed for your use.

Your comments on our EIS-Preparation Notice and any information on the impacts our proposed action may have on State Public Works projects in South Kona would be appreciated.

Very truly yours,

ROBERT T. CHUCK
Manager-Chief Engineer

cp
LA:jes
Enc.

November 27, 1978

Dr. James S. Kumagai
Deputy Director for Environmental
Health
Department of Health
State of Hawaii

Dear Dr. Kumagai:

Job No. 8-HW-45, Pump and Controls
for Keei Well "C", South Kona Water System

Thank you for your comments on our draft EIS. Keei Well "C" is, as you correctly noted, only a test facility at present and will not be connected to the county public water system until this project is completed. Please rest assured that the requirements of Chapter 49 of the Public Health Regulations will be met before this new source serves the public.

Very truly yours,

W. Y. THOMPSON
Chairman of the Board

RTC:LA:jes

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

November 14, 1978

MEMORANDUM

To: Robert T. Chuck, Manager-Chief Engineer
Division of Water and Land Development

From: Kenji Ego, Director, Division of Fish and Game

Subject: Job No. 8-HW-45, Pump and Controls for Keei Well "C",
South Kona Water System

We have reviewed the draft of your EIS-Preparation Notice and have determined that the subject project will not impact significantly on fish and wildlife values.

Kenji Ego

KENJI EGO, Director
Division of Fish and Game

KE:nn

Y307

RECEIVED

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720

COUNTY OF HAWAII

HERBERT T. MATAYOSHI
(DEPT. OF MAYOR)

SIDNEY M. FUKE
Director

DUANE KANUHA
Deputy Director

STATE OF HAWAII

'78 NOV 13 A10:14

November 8, 1978

Mr. William Y. Thompson, Chairman
Board of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Thompson:

EIS Preparation Notice - Pump and Controls for
Keei Well "C", South Kona Water System
Job No. 8-HW-45

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

1. Besides the County zoning of AG-5, the project site TMK: 8-3-08:por 41 is designated as orchards by the County General Plan.

2. The project description should discuss the size of the project site and access easement.

3. The proposed action should be discussed in relation to the County Water Master Plan.

4. The adequacy of this project should be addressed not only in terms of present water needs but also in terms of expected future needs of the South Kona area.

We hope that the above comments will be of help in the drafting of the EIS for this project. Should you have any questions concerning the above, please contact us.

Thank you for the opportunity to review this project.

Sincerely,

SIDNEY FUKE
Director

BS:ak

November 15, 1978

Mr. Sidney Fuke, Director
Planning Department
County of Hawaii
25 Aupuni St.
Hilo, Hawaii 96720

Dear Mr. Fuke:

Job No. 8-HW-45, Pump and Controls
for Keei Well "C", South Kona
Water System, Hawaii

Thank you for your comments on our draft EIS-Preparation Notice. Your suggestions will help us in the preparation of our EIS.

Very truly yours,

W. Y. THOMPSON
Chairman of the Board

RTC:LA:jes

9267

HERBERT T. MATAYOSHI
Mayor
EDWARD K. HARADA
Chief Engineer
ARTHUR T. ISEMOTO
Deputy Chief Engineer

DEPARTMENT OF PUBLIC WORKS

COUNTY OF HAWAII - 25 AUPUNI STREET - HILO, HAWAII 96720 - TELEPHONE (808) 961-8321

November 6, 1978

Mr. William Y. Thompson
Chairman of the Board
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: JOB NO. 8-HW-45, PUMP AND CONTROLS
FOR KEEI WELL "C", SOUTH KONA WATER SYSTEM

In response to your October 30, 1978 letter regarding your EIS Preparation Notice for the subject project, we have reviewed the EIS Preparation Notice and have no comments to offer.

Thank you for affording us an opportunity to review the EIS Preparation Notice.

EDWARD HARADA
Chief Engineer

APPENDIX B

Pumping Test Results of
Keei Well "C"

March 30, 1979

MEMORANDUM FOR THE RECORD

FROM: Dan Lum

SUBJECT: Pumping Test Results, Keei Well "C" 2653-01, South Kona, Hawaii (Job No. 8-HW-44)

Keei Well "C", drilled June 1978, was tested for 73 hours at a continuous rate of roughly 760 gpm on August 7-10, 1978, with an apparently stabilized drawdown of 1.3 feet. A tidal fluctuation of 0.15 feet was recorded in the recovery data. The salinity of the pumped water was a low initial 20 parts per million but increased at a somewhat linear rate to a final 28 parts per million of chlorides.

Based on experience and the results of the pumping test, Keei Well "C" is capable of producing upwards of 700 gpm of fresh potable water from a thin 4-foot basal lens in highly permeable basalts.

Keei Well "C" taps a thin basal ground water lens having a static head of only 4.2 feet above mean sea level and a demonstrated chloride sensitivity under pumping conditions. Maximum production of potable water from a well tapping a thin basal lens, such as Keei, can be achieved simply by observing two basic production criteria:

(a) Withdrawal of water from the upper-most part of the basal lens, and
(b) Withdrawal of water at a rate which will not produce a highly variable and intermittent pumping pattern.

Fortunately, having penetrated highly permeable basalts, Keei Well "C" meets the first criteria with a minimal depth of 31 feet below mean sea level. Regarding the second criteria, indications from the pumping test results and from experience with similar thin basal lenses suggest an initial production rate of 500 gpm for Keei Well "C". At this pumping rate, the chloride content of the pumped water should remain below 100 ppm. However, if the water demand is sufficiently high to warrant installing a higher pumping capacity of say 700 gpm, then the chloride content could possibly rise to a range of between 100 and 200 ppm, especially during drought periods. Installation of a 700-gpm pump capacity at this time is not recommended, if the water demand is so low as to cause a highly variable and intermittent pumping pattern.

DAN LUM

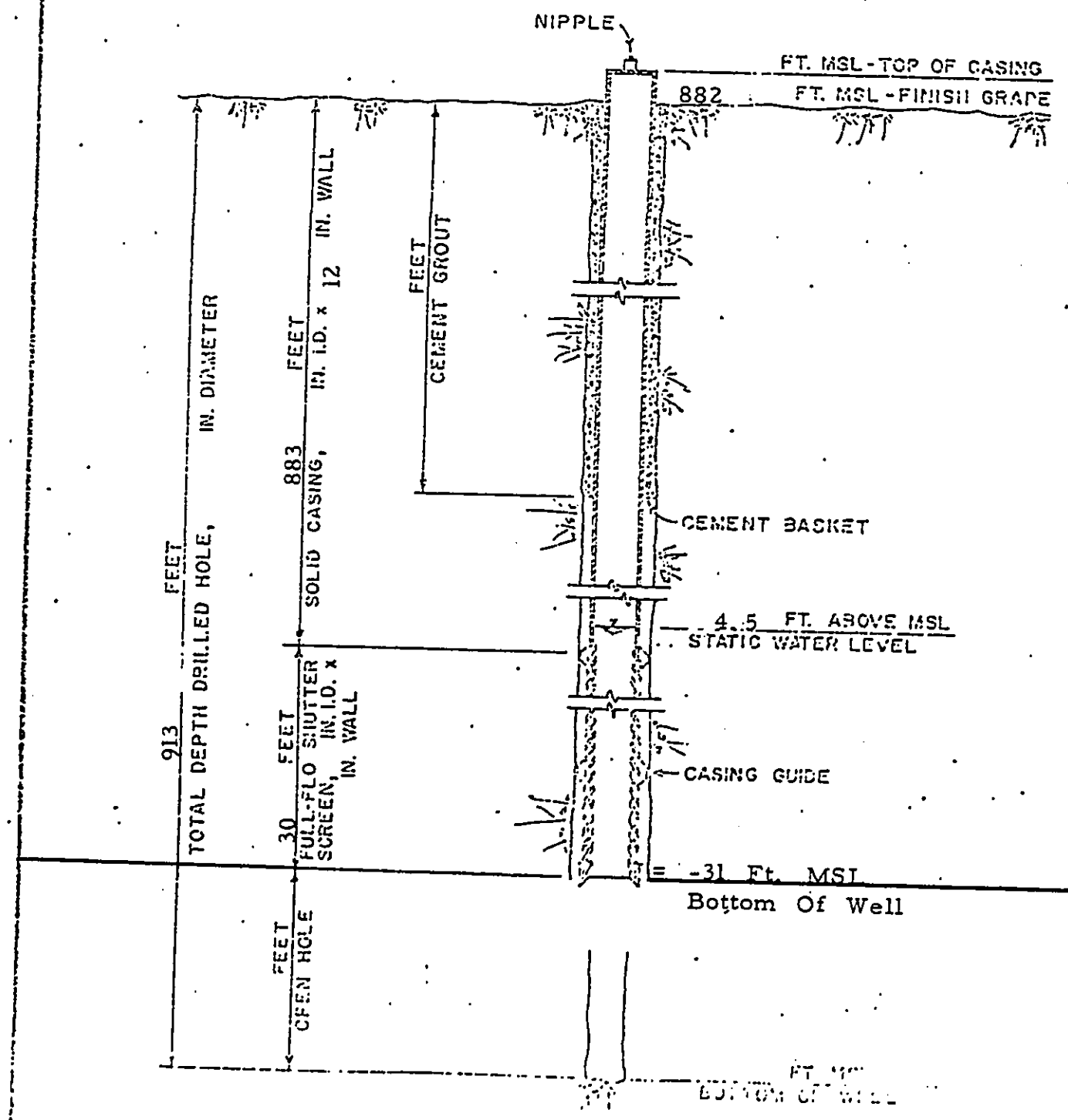
Attachment:
Location Map
Pumping Test Graph
As-Built Section
Chemical Analyses

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

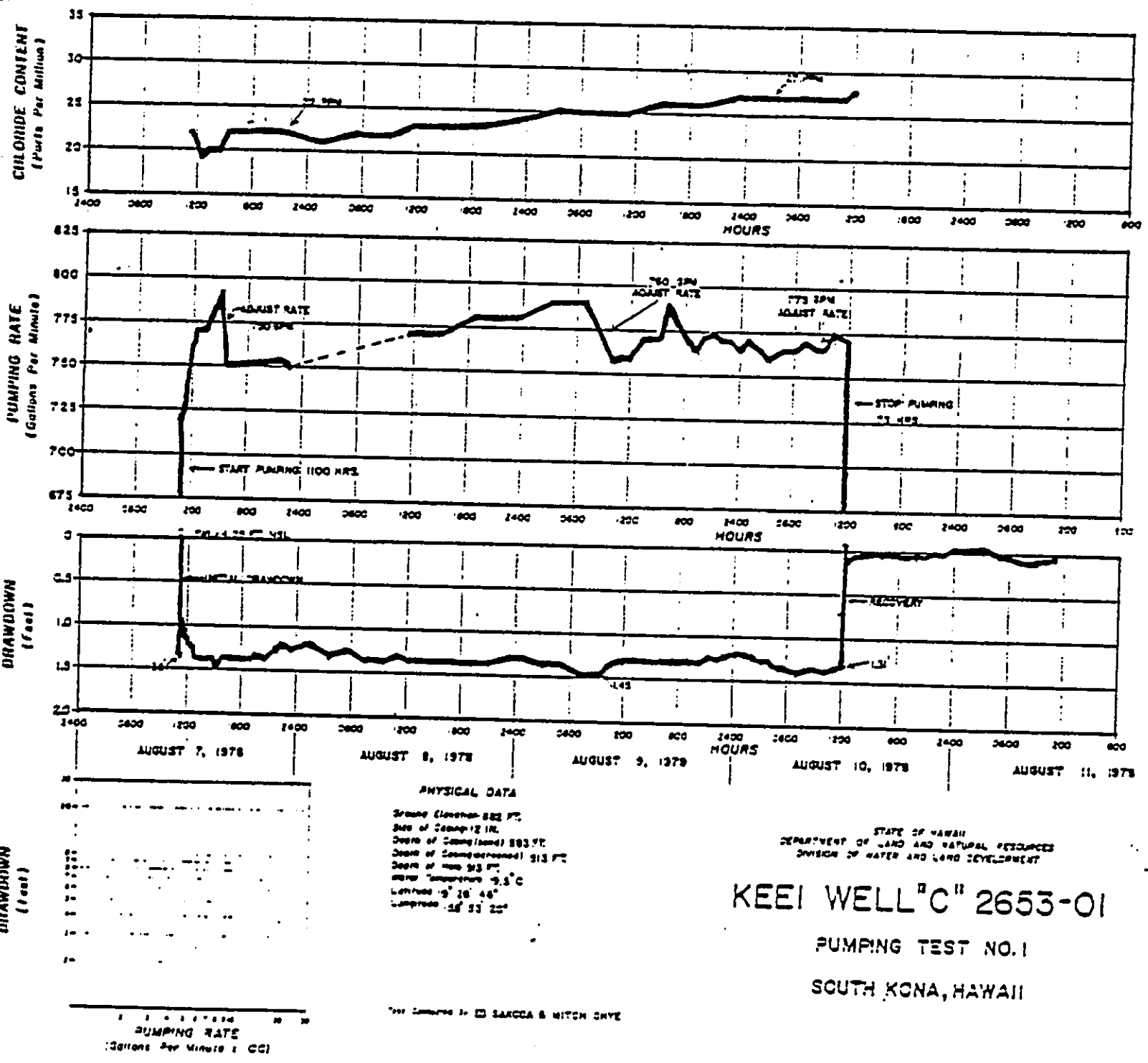
KEEI WELL "C" 2653-01 SOUTH KONA, HAWAII

AS BUILT SECTION

DRILLED: June 1978
DRILLER: Roscoe Moss Co.



8-HW-4



PHYSICAL DATA

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

KEEI WELL "C" 2653-01

PUMPING TEST NO. 1

SOUTH KONA, HAWAII

KEEI WELL C.

PROCESSING DATE: 78/10/06

STATION NUMBER: 192846155532001 LOCAL IDENTIFIER: 8-2651-01 CNTY: HONAUNAU WATER YEAR - 1978

TYPE OF STATION: WELL LATITUDE-LONGITUDE: 192844 1555120.01 STATE: 15 COUNTY: 001 DISTRICT: 15

DATE	TYPE	TIME	DIS-SOLVED CAL-CIUM (CA) (MG/L) 00915	DIS-SOLVED CHLO-RIDE (CL) (MG/L) 00940	DIS-SOLVED FLUO-RIDE (F) (MG/L) 00950	HARD-NESS (CA+MG) (MG/L) 00900	DIS-SOLVED IRON (FE) (UG/L) 01046	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) 00925	DIS-SOLVED MAN-GANESE (MN) (UG/L) 01056	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) 00935	DIS-SOLVED SILICA (SIO2) (MG/L) 00955	SODIUM AD-SORP-TION RATIO 00931
AUG. 10...	2	1200	4.0	28	0.1	16	10	5.1	0	2.5	49	1.6

DATE	DIS-SOLVED SODIUM (NA) (MG/L) 00930	PERCENT SODIUM 00932	DIS-SOLVED SULFATE (SO4) (MG/L) 00945	ALKA-LINITY AS CACO3 (MG/L) 00410	CODE FOR AGENCY ANA-LYZING SAMPLE 00028	DIS-SOL-VED PHOS-PHORUS (P) (MG/L) 00666	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) 00631
AUG. 10...	22	55	10	38	80020	0.12	1.1

APPENDIX C

Pumping Test Results of
Keei Wells "A" and "B"

KEEI WELL PUMPING TEST
WELL "A"

KONA, HAWAII, T. H.

October 2 - December 15, 1958

PUMPING TEST OF KEEI WELL A

Location: Keei, South Kona

Owner: Hawaii Water Authority

Date Started: October 2, 1958

Date Completed: December 15, 1958

Diameter: 12 inch OD casing

Depth in Feet: 780 feet

Altitude of Ground Surface (MSL): 744 ft.

Average Altitude of Water (MSL): 2.17 ft.

Average salt content (gr./gal.): 10 grains

Elevation of Top of Casing (MSL): 745.95 ft.

Elevation of R. M. #1 (Top of steel spike): 747.10 ft.

Length of Airline: 753.19 ft.

Elevation of Top of Airline (MSL): 746.24 ft.

Elevation of Bottom of Airline (MSL): -6.95 ft.

Test Pump - Byron Jackson 18L35 Submotte

Pump test conducted by Raymond R. Chun and Manabu Tagomori of the Hawaii Water Authority.

Time	Pumping Rate GPM	Water Level Above MSL	Sample	Salinity PPM-Cl.	Temperature
Wednesday, December 10, 1958					
1:00 p.m.	Hole at 756 ft.		1	200	
1:30 p.m.			2	200	
12:00 midnite	Hole at 770 ft.		3	200	
Thursday, December 11, 1958					
8:00 a.m.			4	200	
Tuesday, December 16, 1958					
8:30 a.m.	Water sample at surface		5	150	
8:35 a.m.	" " " 1/3 depth		6	150	
8:40 a.m.	" " " 2/3 "		7	150	
8:45 a.m.	" " " bottom		8	200	
Wednesday, December 17, 1958					
7:45 a.m.		2.75			
10:20 a.m.	Pump started		9	200	
10:45 a.m.	Start of Pump Test.	Rate adjusted to 25 GPM			
10:47 a.m.	28	2.29	10	200	68.5
11:00 a.m.	27	2.29	11	150	71.3
11:15 a.m.	27	2.29	12	150	72.5
11:45 a.m.	28	2.29	13	125	72.5
12:15 p.m.	28	2.29	14	125	72.5
12:45 p.m.	28	2.29	15	125	72.5
1:15 p.m.	28	2.29	16	150	72.5
1:45 p.m.	27	2.29	17	150	72.5
2:15 p.m.	27	2.29	18	125	72.5
2:45 p.m.	26	2.29	19	100	72.5
2:48 p.m.	End of 25 GPM Test.	Rate adjusted to 50 GPM			
3:05 p.m.	54	2.06	20	150	69.5
3:20 p.m.	54	1.83	21	100	69.0
3:50 p.m.	53	2.06	22	125	69.0

Time	Pumping Rate GPM	Water Level Above MSL	Sample	Salinity Cl.	Temperature
4:20 p.m.	53	2.06	23	125	69.0
4:50 p.m.	51	2.06	24	150	69.0
5:20 p.m.	50	2.06	25	150	69.0
5:50 p.m.	49	2.06	26	125	68.0
6.20 p.m.	49	2.06	27	125	68.0
6:50 p.m.	47	1.83	28	125	69.0
7:00 p.m.	End of 50 GPM Test. Rate adjusted to 75 GPM				
10:54 a.m.		2.75	Static Water Level Reading		
11:15 a.m.	Changed to USGS gage	2.29	Static Water Level Reading from USGS Gage		
11:20 a.m.	100	1.78	49	100	67.0
12:00 noon	99	1.78	50	82	67.0
12:45 p.m.	100	1.71	51	98	68.0
3:25 p.m.	Pump Stopped. Electricity shut off to check starter box.				
3:26 p.m.		2.17	Recovery Test		
3:27 p.m.		2.17	"		
3:28 p.m.		2.17	"		
3:29 p.m.		2.17	"		
3:30 p.m.	Pump Started				
3:32 p.m.	99	1.60			
3:45 p.m.	99	1.60			
4:00 p.m.	100	1.60	52	96	67.0
7:00 p.m.	100	1.48	53	100	67.0
Friday, December 19, 1958					
3:00 a.m.	100	1.48	54	100	67.0
8:00 a.m.	100	1.43	55	100	67.0
11:00 a.m.	100	1.64	56	98	67.0
7:00 p.m.	100	1.60	57	100	67.0
7:15 p.m.	75	1.71	29	125	68.0
7:30 p.m.	75	1.83	30	125	68.0
9:00 p.m.	75	1.83	31	125	68.0
8:30 p.m.	74	1.83	32	125	68.0

Time	Pumping Rate GPM	Water Level Above MSL	Sample	Salinity PPM-Cl.	Temp-erature
9:00 p.m.	73	1.83	33	125	68.0
9:30 p.m.	68	1.83	34	125	68.0
10:00 p.m.	72	1.71	35	100	68.0
10:30 p.m.	73	1.83	36	125	68.0
11:00 p.m.	73	1.83	37	125	68.0
11:03 p.m.	End of 75 GPM Test. Pump Wide Open				
11:05 p.m.	100	1.71			
11:15 p.m.	100	1.71	38	150	68.0
11:30 p.m.	100	1.71	39	100	67.0
Thursday, December 18, 1958					
12:00 midnite	100	1.71	40	125	67.0
12:30 a.m.	100	1.71	41	125	67.0
1:00 a.m.	100	1.71	42	125	67.0
1:30 a.m.	100	1.71	43	125	67.0
2:00 a.m.	100	1.71	44	125	67.0
2:30 a.m.	100	1.71	45	125	67.0
5:00 a.m.	100	1.71	46	125	67.0
7:00 a.m.	100	1.71	47	96	66.0
10:15 a.m.	100	1.83	48	100	68.0
10:52 a.m.	Pump Stopped. Starter Box Trouble				
Saturday, December 20, 1958					
3:00 a.m.	100	1.60	58	102	67.0
8:00 a.m.	100	1.60	59	102	67.0
11:00 a.m.	100	1.60	60	102	67.0
7:00 p.m.	100	1.60	61	102	67.0
Sunday, December 21, 1958					
3:00 a.m.	100	1.60	62	104	67.0
8:00 a.m.	98	1.60	63	104	67.0
End of Pumping Test					

Time	Pumping Rate GPM	Water Level Above MSL	Sample	Salinity PPM-Cl.	Temp-erature
		Recovery Test			
8:25 a.m.		1.60	Pump Stopped		
8:25:15 a.m.		2.06			
8:26 a.m.		2.06			
8:26:30		2.17			
8:27		2.17			
8:27:30		2.17			
8:28		2.17			
8:28:30		2.17			
8:29		2.17			
8:30		2.17			

Total water pumped during test - 518,070 gallons

Total power used during test - 2930 KWH

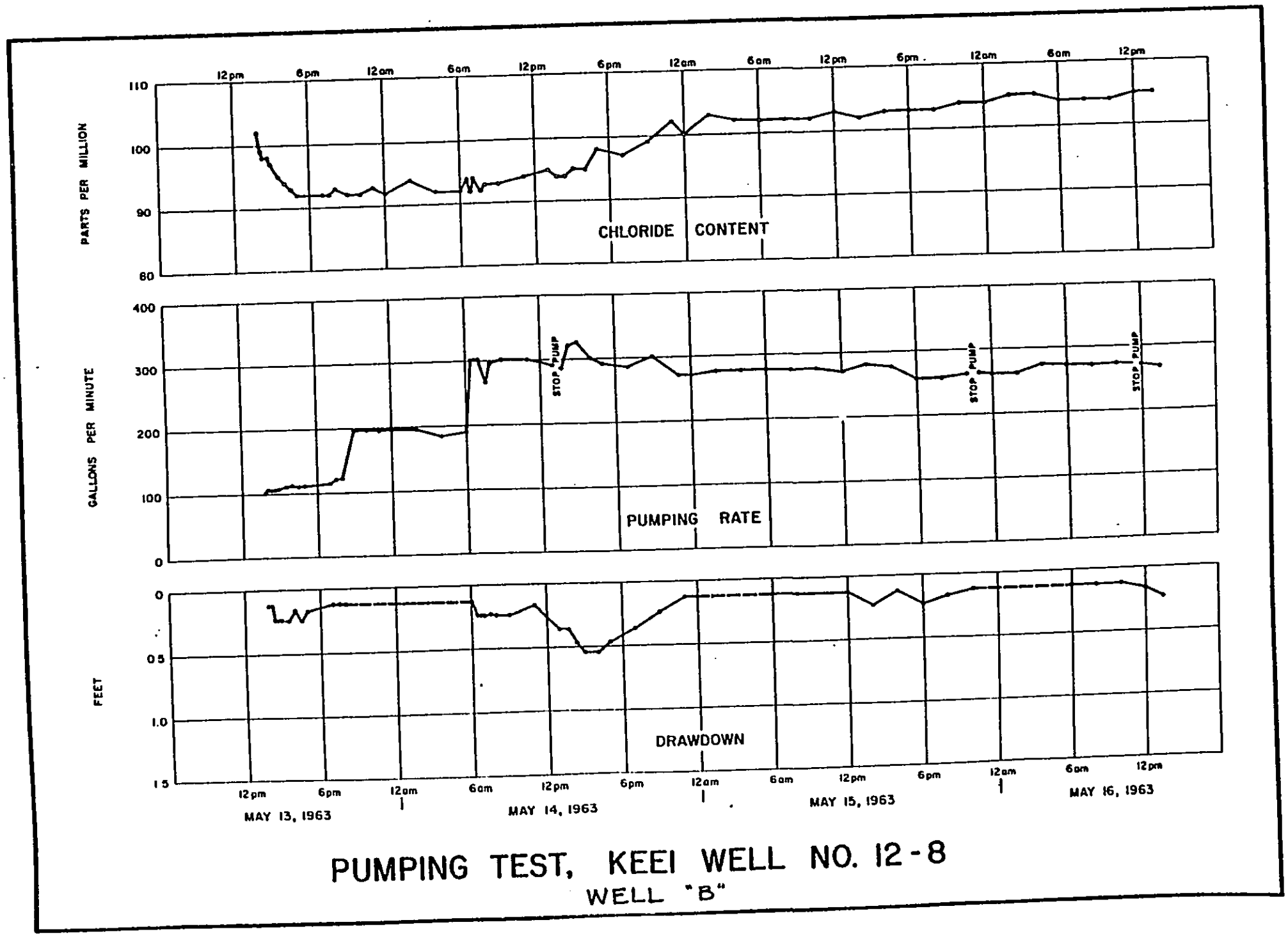
Comments:

1. Chloride content of water improved with pumping from 200 ppm to 100 ppm and steadied off at that salinity.

2. Recovery of water level after stopping pump was almost immediate.

3. Average drawdown at pumping rate of 100 GPM was 0.57 foot.

RAYMOND K. CHUN



PUMPING TEST, KEEI WELL NO. 12-8

WELL "B"

CHEMICAL ANALYSIS OF THE WATER

KEEI WELL "B"

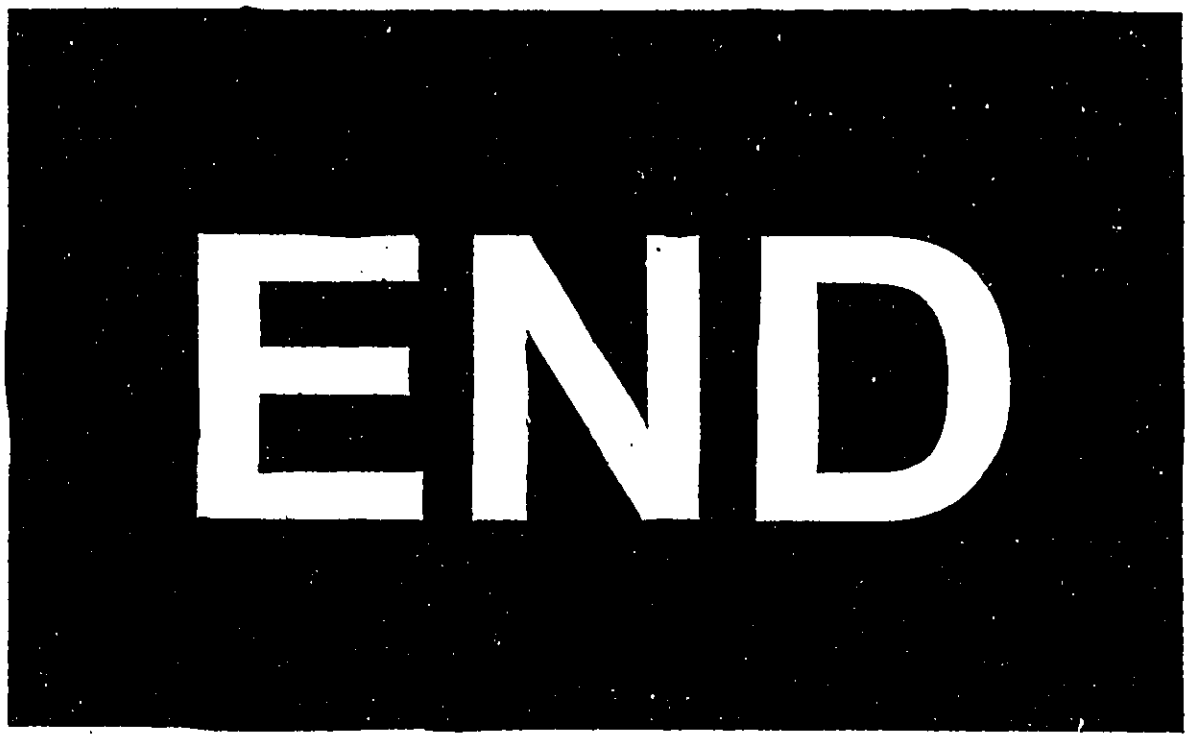
Keei Well 12-8
Keei, South Kona, Hawaii

Water Sample Taken On: 12:45 p.m., May 16, 1963

Analysis made by: Hawaii State Department of Health
May 23, 1963

pH @ 25°C		7.00	
Color		0	
Odor		Musty	
Turbidity		3	
NO_2		0.002	ppm
NO_3		1.09	ppm
Carbonate Alkalinity		0.00	ppm as $CaCO_3$
Bicarbonate Alkalinity		40	ppm as $CaCO_3$
Total Alkalinity		40	ppm as $CaCO_3$
Total Hardness		55.7	ppm as $CaCO_3$
Total Solids		320	ppm
Loss on ignition		60	ppm
SiO_2		48.8	ppm
Fe_2O_3		0.07	ppm
Al_2O_3	less than	0.05	ppm
Ca		7.6	ppm
Mg		8.92	ppm
SO_4		23.5	ppm
Na		68	ppm
K		2	ppm
Chlorides		106	ppm
As	less than	0.01	ppm
F		0.3	ppm
Mn	less than	0.05	ppm
Pb		0.012	ppm
Cu	less than	0.1	ppm
Zn	less than	0.1	ppm
Se		0.006	ppm
Phenols		0.005	ppm

Remarks: Oil film in sample.



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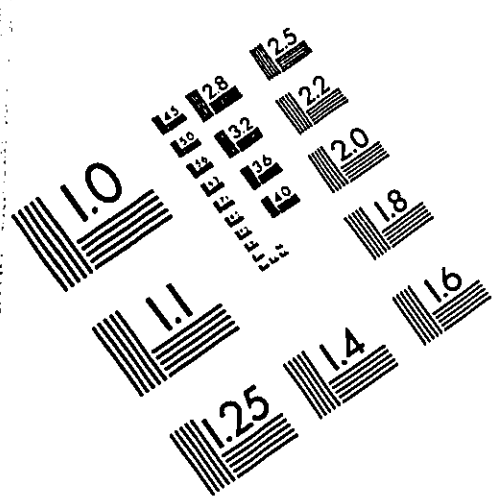


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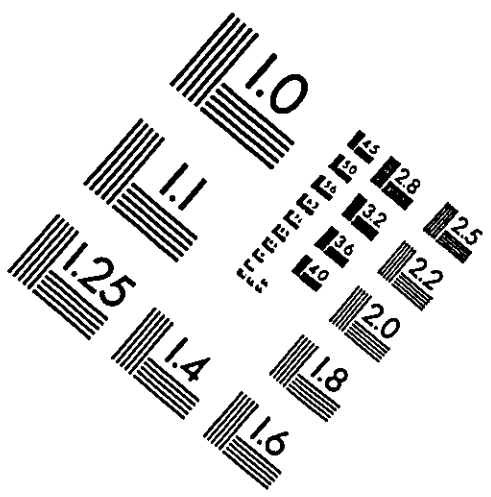
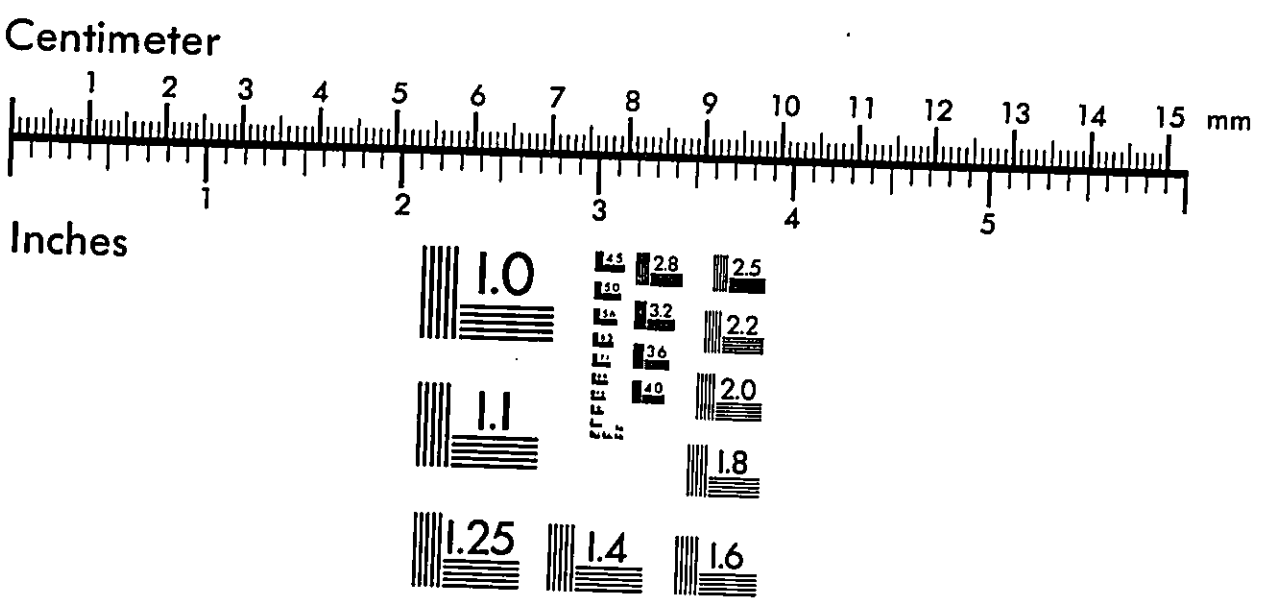

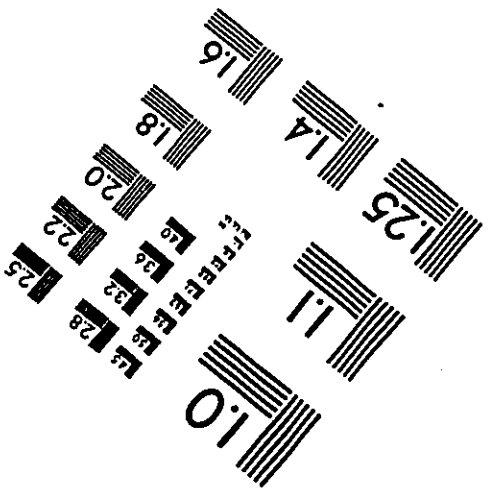
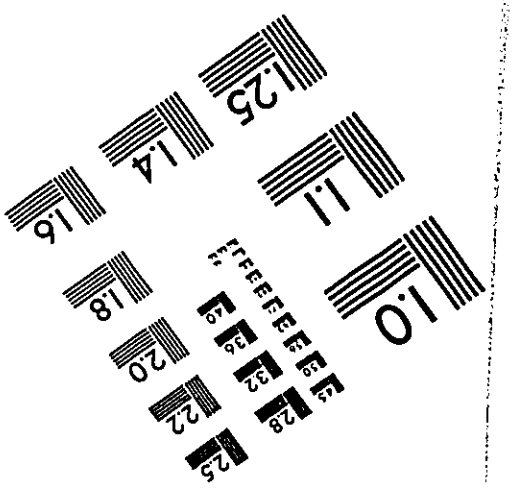

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