ITEM 4  
POAMOHO VENTURE, APPLICATION FOR WATER USE AND WELL CONSTRUCTION/PUMP INSTALLATION PERMITS, POAMOHO A WELL (WELL NO. 3205-02), WAIALUA GROUND WATER MANAGEMENT AREA, OAHU

Mr. David Taogoshi testified to the fact that the permit has taken over a year to process and requested that the Commission take action today on the water use permit.

Mr. David Penn testified for NHAC. See Commission file.

Unanimously approved. (Fujimura/Ing)

ITEM 5  
KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE, APPLICATIONS FOR WATER USE AND WELL CONSTRUCTION PERMITS, MANOA BISHOP ESTATE WELL (WELL NO. 1948-03), NUUANU GROUND WATER MANAGEMENT AREA, OAHU

Mr. Ing requested to be excused from participating in both Items 5 and 6 as his company represents Kamehameha Schools and Bishop Estate.

Topics of discussion were the pump test protocol, the impact on Manoa Stream, analysis of the pump test, and dedication of project to Board of Water Supply.

Mr. Ahue stated that he received a telephone message from Carol Holt, a private landowner who was unable to attend meeting, but is objecting to this project.

Mr. Penn presented testimony. See Commission file.

Mr. Cox made a motion to approve the staff's recommendations amending 2c and addition of 2d to read:

c. That analysis of the aquifer/pump test shall be conducted to the satisfaction of the Commission staff after consultation with other qualified hydrologists to determine potential Manoa Stream impacts, and that agreement to the analytical methodology be acknowledged by Bishop Estate prior to commencement of the pump test referred to in recommendation 2b.

d. 1-inch diameter galvanized pipe be installed outside the casing to measure water levels.

Unanimously approved with amendments and additions. (Cox/Nakata)

ITEM 6  
KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE, APPLICATIONS FOR WATER USE, WELL CONSTRUCTION & PUMP INSTALLATION PERMITS, KAMEHAMEHA SCHOOLS WELLS A & B (WELL NOS. 2051-01 & 02), KALIHI GROUND WATER MANAGEMENT AREA, OAHU

Mr. Sam Hata, Director of Support Services at Kamehameha School testified that the relocation of the well is for safety reasons, in order to relocate a high pressure line away from houses. They are not asking for any additional water allocation.

Mr. Fujimura asked why they choose to run their own system.

Mr. Hata replied that they like to be independent, but the BWS system is used as a backup.

Unanimously approved as amended to note the permit would replace the existing use permit. (Fujimura/Cox)
Chairperson and Members
Commission on Water Resource Management
State of Hawaii
Honolulu, Hawaii

Gentlemen:

Kamehameha Schools/Bernice Pauahi Bishop Estate
Applications for Water Use,
Well Construction & Pump Installation Permits
Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02)
Kalihi Ground Water Management Area, Oahu

Applicant:
Kamehameha Schools/
Bernice Pauahi Bishop Estate
Kapalama Heights
Honolulu, HI 96817

Landowner:
Same

Background

The applicant submitted well construction and pump installation permit applications to the Commission on November 12, 1992. The Commission requested that applications for water use permits be submitted and processed concurrently to facilitate and expedite processing of the well-related permit applications. Completed water use permit applications were submitted to the Commission on February 4, 1993. Specific information regarding the sources, use, notification, objections, and field investigation(s) are described in Attachment A and the attached exhibits.

Analysis & Issues

Kamehameha Schools plans to replace its existing wells, Kamehameha Schools 1 & 2 (Well Nos. 2052-07 & 11), with new wells and pumps at new locations. This change is part of an overall water system improvement program intended to increase the safety and reliability of domestic water service within the Kapalama Heights campus of Kamehameha Schools.

The proposed sources are to be located roughly one (1) mile inland from the existing sources and at higher altitudes in the watershed (see Exhibit 1). There may be intermediate-to long-range impacts to wells downgradient; however, due to the relatively small quantity of water requested and the increase in distance from other pumped wells that is afforded by the new locations, negative impacts on other wells in the Kalihi Aquifer System are not anticipated.

The proposed sources will develop 0.229 million gallons per day (mgd) of potable water from the basal portion of the Kalihi Aquifer System. Because the new wells are to replace existing wells and no increase in the existing allocation is requested, there will be no net change in the quantity of water allocated for the aquifer.

Permitted water allocations in the Kalihi Aquifer System currently exceed the estimated sustainable yield of 9 mgd by 3.217 mgd, or about 26.3 percent (see Exhibit 2).
However, on the basis of reported monthly water usage, the actual 12-month moving average withdrawals from the aquifer as of February 28, 1993 are less than the estimated sustainable yield by about 2 mgd, or 20 percent. Preliminary site investigations indicate that facilities for which water was allocated in 1981 may no longer be in existence or may be experiencing diminishing levels of production; water requirements at these sites have decreased correspondingly (see Exhibit 3). Staff is currently working in conjunction with all permitted water users in the Kalihi Aquifer System to develop a plan for re-allocation of the resource that is mutually agreeable to all parties. At this time, there are no other pending applications for water use permits in the Kalihi Aquifer System.

Staff is also in the process of evaluating trends in water levels and chlorides in relation to water withdrawals to determine the nature and extent of impacts, if any, resulting from rates of withdrawals that have, in the past, exceeded the aquifer’s estimated sustainable yield.

No specific objections to this application have been submitted to the Commission. However, a review of this application by the Historic Preservation Division indicated that historic sites exist elsewhere in the parcel; therefore, a special condition of the well construction and water use permits is that an acceptable archaeological inventory survey report be submitted to the State Historic Preservation Division.

RECOMMENDATION

That the Commission approve the issuance of an interim water use permit and well construction/pump installation permits to Kamehameha Schools/Bernice Pauahi Bishop Estate for the reasonable and beneficial use of 0.229 mgd of potable water from the Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02), subject to the standard water use permit conditions listed in Attachment B, the standard well construction/pump installation permit conditions listed in Attachment C, and the following special conditions:

1. The water use permit shall be an interim permit subject to the five year verification period afforded to existing users, and shall replace the existing water use permit for the existing Kamehameha Well Nos. 2051-01 & 02.

2. The applicant shall submit an acceptable archaeological inventory survey report to the Historic Preservation Division (HPD) of the Department of Land and Natural Resources. If significant historic sites will be adversely affected by this project, a plan to mitigate these effects must be accepted by HPD and successfully completed by the applicant.

Respectfully submitted,

RAE M. LOUI
Deputy Director

APPROVED FOR SUBMITTAL:

KEITH W. AHUE, Chairperson
WATER USE PERMIT DETAILED INFORMATION

Source Information

AQUIFER:
- Kalihi System, Honolulu Sector, Oahu
  - Sustainable Yield: 9 mgd
  - Existing Water Use Permits: 12.217 mgd
  - Available Allocation: -3.217 mgd
  - Total of other pending allocations: 0 mgd

WELL:
- Kamehameha A Well (Well No. 2051-01)
  - Location: Kapalama Heights, Hon, HI, Oahu, TMK: 1-6-22:1
  - Year Drilled: NA
  - Casing Diameter: 14 in.
  - Elevations (msl)
    - Water Level: NA ft.
    - Ground: 530 ft.
    - Bottom of Solid Casing: -50 ft.
    - Bottom of Perforated: NA ft.
    - Bottom of Open Hole: -150 ft.
  - Total Depth: 680 ft.
  - Grouted Annulus Depth: 580 ft.

- Kamehameha B Well (Well No. 2051-02)
  - Location: Kapalama Heights, Hon, HI, Oahu, TMK: 1-6-22:1
  - Year Drilled: NA
  - Casing Diameter: 14 in.
  - Elevations (msl)
    - Water Level: NA ft.
    - Ground: 830 ft.
    - Bottom of Solid Casing: -50 ft.
    - Bottom of Perforated: NA ft.
    - Bottom of Open Hole: -150 ft.
  - Total Depth: 980 ft.
  - Grouted Annulus Depth: 880 ft.

ATTACHMENT A
Chairperson and Members
Commission on Water Resource Management

July 28, 1993

Use Information

Quantity Requested: 229,000 gallons per day.
Existing Type of Water Use: Domestic service within the Kapalama Heights campus of Kamehameha Schools
Place of Water Use: Kamehameha Schools at TMK: 1-6-22:1

Reported Water Usage:

225,704 gpd
Nearby Similar Water Usage:

Kalihi Aquifer System

Current 12-Month Moving Average Withdrawal:

7,228,873 gpd (80 % of SY)

Nearby Surrounding Wells and Other Registered Ground Water Use

Excluding Kamehameha Schools existing sources, there are eight (8) other wells within a mile of the proposed wells (see Exhibit 3). None of these wells are currently being pumped. Five (5) of the wells have been sealed; two (2) are being used as observation wells; and one (1) is unused. Information from the registration program indicates there are possibly 35 existing wells in the Kalihi Aquifer System. Several of these wells have been initially field checked but many of the declarants, including the larger users, have not been completely field verified. Several are not in use or are rights claims. Of course, there are several significant users which have not been fully verified to date. However, the Oahu Water Use and Development Plan estimated that the existing withdrawals from the Kalihi Aquifer System are 9.9 mgd as of 1990.

Public Notice

In accordance with HAR §13-171-17, a public notice was published in the Star-Bulletin on May 24, 1993 and June 7, 1993 and copies of the notice were sent to the Mayor’s office and the Board of Water Supply. Additional notice copies were sent to the County Council and Department of Water Supply. Copies of the completed application were sent to the Department of Health, Department of Hawaiian Home Lands, Office of Hawaiian Affairs, Aquatic Resources & Historic Preservation Divisions of the Department of Land and Natural Resources, and other interested parties for comments. Written comments and objections to the proposed permit were to be submitted to the Commission by June 21, 1993.

Objections/Comments

The public notice specifies that an objector meet the following requirements: (1) state property or other interest in the matter; (2) set forth questions of procedure, fact, law, or policy, to which objections are taken; (3) state all grounds for objections to the proposed permits, (4) provide a copy of the objection letter(s) to the applicant, and (5) submit objections meeting the previous requirements to the Commission by June 21, 1993.

To the best of staff’s knowledge there are no objectors who have property interest within the Kalihi Aquifer System or who will be directly and immediately affected by the proposed water use. All objections and/or comments to the application are summarized as follows:

Objector/Commentor

NHAC

Objection/Comments

General process of water use permit applications. No specific objections to this application.

ATTACHMENT A
Chairperson and Members  
Commission on Water Resource Management  

July 28, 1993

Forestry and Wildlife  
No comments or objections.

Natural Area Reserve System  
No comments or objections.

DOWALD  
No objections.

Aquatic Resources  
No objections.

State Parks  
No comments.

Land Management  
No comments.

Board of Water Supply  
No objections.

Historic Preservation  
Suggest that an archaeological survey of the proposed well sites be conducted.

Briefs in Support

Responses to objections, or briefs in support, regarding the application are required to be filed with the Commission ten (10) days after an objection is filed and, presumably, copies are served to the applicant. No briefs in support were filed with the Commission.

NO BRIEFS SUBMITTED

Field Investigation

The proposed water sources and existing use were investigated on July 6, 1993. The investigation(s) verified the applicants request for a water use permit.

ATTACHMENT A
STANDARD WATER USE PERMIT CONDITIONS

1. The ground water described in the water use permit may only be taken from the location described, used for the reasonable-beneficial use described, and at the location described above and in the attachments. Reasonable-beneficial use means "the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is not wasteful and is both reasonable and consistent with the state and county land use plans and the public interest." (HAR §13-171-2).

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HAR §13-171-13 which means that it:
   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in section §13-171-2;
   c. Will not interfere with any existing legal use of water;
   d. Is consistent with the public interest;
   e. Is consistent with state and county general plans and land use designations;
   f. Is consistent with county land use plans and policies; and
   g. Will not interfere with the rights of the Department of Hawaiian Home Lands as provided in section 221 of the Hawaiian Homes Commission Act.

4. The ground water use must not interfere with surface water rights or interim instream flow standards. If it does, then:
   a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
   b. The interim or permanent instream flow standard, as applicable, must be amended.

5. The water use permit is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

6. The water use permit application and staff submittal approved by the Commission at its July 28, 1993 meeting are incorporated into the permit by reference.

7. Any modification of the permit terms, conditions, or uses can only be made with the express written consent of the Commission on Water Resource Management.

8. The water use permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
   a. Protect water sources in quantity, quality, or both;
   b. Meet other legal obligations including other correlative rights;
   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June 1987, shall be protected;
   f. Meet legal obligations to the Department of Hawaiian Homes, if applicable; or
   g. Carry out such other necessary and proper exercise of the State's and the Commissions's police powers under law as may be required.

Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

9. If the ground water source is not existing, the development of the new well shall be
completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

10. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a monthly basis in accordance with the Commission’s September 16, 1992 action on reporting requirements;

11. The water use permit shall be subject to the Commission’s periodic review of the applicable aquifer’s sustainable yield. The amount of ground water use authorized by the permit may be reduced by the Commission if the sustainable yield of the Kalihi Aquifer System, or relevant modified aquifer, is reduced;

12. The water use permit may not be transferred or the use rights granted by this permit sold or in any other way alienated. Pursuant to HAR §13-171-25 and the requirements of Chapter 174C, the Commission has the authority to allow the transfer of the permit and the use rights granted by the permit in a manner consistent with HAR §13-171-25. Any such transfer shall only occur with the Commission’s prior express written approval. Any sale, assignment, lease, alienation, or other transfer of any interest in this permit shall be void.

13. The use(s) authorized by law and by the water use permit do not constitute ownership rights.

14. The permittee shall request modification of the permit when necessary to comply with all applicable laws, rules, and ordinances which will affect the permittee’s water use.

15. The permittee shall prepare and submit a water shortage plan within 30 days of issuance of the permit to assist the Commission in fulfilling HAR §13-171-42(c). The permittee’s water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the Kalihi Ground Water Management Area.

16. The water use permit granted shall be an interim water use permit, as allowed under HAR §13-171-21. The final determination of the water use quantity shall be made within five years of the filing of the application to continue the existing use.

17. The water use permit shall be issued only after AG review.
STANDARD WELL CONSTRUCTION/PUMP INSTALLATION PERMIT CONDITIONS

1. The Commission shall be notified before work commences.

2. The well construction/pump installation permit shall be for construction, testing, and installation of a 500 gpm capacity, or less, pump in each well, as determined by the pumping test results. The applicant shall coordinate with the Commission and conduct a pumping test in accordance with the protocol established by the Commission. A means to accurately measure water levels, acceptable to the Commission, shall also be provided. The applicant shall submit to the Commission the test results and proposed permanent pump information, based on the test, for approval by the Chairperson. No permanent pump may be installed and no water used from the well without the Chairperson’s approval.

3. The proposed use 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 and pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

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

5. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission.

6. The well construction/pump installation permit may be revoked if work is not started within six (6) months of the date of issuance or if work is suspended or abandoned for six months. The work proposed in the well construction/pump installation permit application shall be completed within two years from the date of permit approval.

7. The following shall be submitted to the Commission within thirty (30) days after completion of work:
   a. Well completion report.
   b. Elevations of well (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.

8. The well construction/pump installation and water use permit application and staff submittal approved by the Commission at its July 28, 1993 meeting are incorporated into the permit by reference.

9. The permit shall be subject to review by the Attorney General.

ATTACHMENT C
Source Information

On December 30, 1992, BWS wrote to Bishop Estate that "The well cross-section ... shows an unsupported open hole in the alluvium below the perforates casing which may collapse. This well design is more typically found in a basal aquifer, and therefore, should be corrected."

The correction does not appear to have been added to this submittal.

Use Information

Nearby Similar Water Usage should reflect reported water usage from Manoa Well II.

NHAC submitted comments on the Draft Environmental Assessment for this well. Response to comments has not been received as required by law. Issuance of permits would be premature, as the environmental review process under HRS 343 has not yet been completed.

ITEM 6 KAMEHAMEHA SCHOOLS WELLS A & B

WATER USE PERMIT DETAILED INFORMATION

NHAC is disturbed that none of the wells in the Kalihi aquifer system have been field checked. In designated water management areas, field verification of declared uses and monthly reporting of use by existing allocations are top priorities.

How does use from the existing wells over the last four years compare with existing allocations?

ITEM 7 WAIKAKALUA TRIBUTARY

Has there been any alteration of the stream channel mauka of the proposed alteration?

COWRM should not permit streams to be realigned simply "to provide for more developable area for ... residential development." Realignment of natural streams and destruction of natural features violates the rights of Native Hawaiians to enjoy traditional and customary use of the stream. Note that several water use declarations covering this stream are filed with COWRM.
June 25, 1993

Ms. Rae M. Loui  
Deputy Director  
Commission on Water Resource Management  
Department of Land and Natural Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Ms. Loui:

Subject: Your Letter of June 9, 1993 Regarding Applications for Well Construction and Pump Installation Permits for Kamehameha School Wells 2051-01, 02

Thank you for the opportunity to comment on the permit applications.

The Board of Water Supply indicated that they have no objections to the issuance of the permits.

Warm personal regards.

Sincerely,

[Signature]

FFP:js
The Honorable Keith W. Ahue, Chairperson  
Commission on Water Resource Management  
Department of Land and Natural Resources  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Ahue:

O'ahu and Moloka'i WMA  
Water Use Permit Applications

Thank you for the opportunity to comment on the following applications:

**O'ahu:**  
Ewa-Kunia  
Kalihi  
Waialae  
Waimanalo

Grace Pacific, Inc.  
Kamehameha Schools/Bishop Estate  
Honolulu BWS/Kupaua  
Oceanic Institute

**Moloka'i:**  
Ualapue  
Waialua

Osborne  
Mahealani Ranch  
Matayoshi

We have no objections to any of these, as presented. The information for the Matayoshi application does not indicate potential stream impacts through the reporting of flow data; presumably, the applicant must also request a stream diversion permit, and will provide relevant information at that time.

The Grace Pacific application will presumably be acted upon after other claimants to Pearl Harbor Aquifer groundwater, including the Department of Hawaiian Home Lands, have preexisting requests determined.

Warmest aloha,

John Rowe  
Hoaliku L. Drake, Chairman  
Hawaiian Homes Commission
Ms. Rae M. Loui  
Deputy Director  
Commission on Water Resource Management  
Department of Land and Natural Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Ms. Loui:

Subject: Applications for Well Construction and Pump Installation Permits for Kamehameha School Wells 2051-01, 02

Thank you for the opportunity to comment again on these permit applications. We had previously commented in January.

As indicated, we have no objections to permits to construct and install pumps in the proposed replacement wells for Kamehameha Schools.

If you have any questions, please call Herbert Minakami at 527-6183.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer
MEMORANDUM

TO: Rae M. Loui, Deputy Director
   Commission on Water Resource Management

FROM: Don Hibbard, Administrator
   Historic Preservation Division

SUBJECT: Water Use Permit Application, Kalihi Ground Water Management Area,
   Kamehameha Schools/Bishop Estate Well Nos. 2051-01 & 02
   Kapalama, Kona, O`ahu
   TMK: 1-6-22: 1

We responded to the well construction and pump installation permit application in January of this year (Log No. 7215). Our comments for this permit application are identical. A copy is attached for your convenience.

TD:bek

Attachment
MEMORANDUM

TO: Rae M. Loui, Deputy Director
Commission on Water Resource Management

FROM: Don Hibbard, Administrator
State Historic Preservation Division

SUBJECT: Well Construction and Pump Installation Permit Application
Kamehameha Schools/B.P. Bishop Estate
Kapalama, Honolulu, O'ahu
TMK: 1-6-22: 1

Thank you for the opportunity to review this project. A review of our records shows that there are no known historic sites in the vicinity of the proposed Kamehameha School Wells "A" and "B". However, no archaeological surveys have been conducted in this portion of Kapalama, so it is uncertain if historic sites are present. Additionally, we are lacking adequate information on the land use history of the proposed well parcels and the exact location of the proposed wells in relation to the existing road (Well "A") and reservoir (Well "B").

Historic sites have been found in the lower Keanakamano Valley, adjacent to the western side of the Kamehameha Schools campus. These sites included both historic era sites (such as State site No. 80-14-2892, a Prisoner-of-War Camp associated with World War II) and probable prehistoric era sites (such as State site No. 80-14-2891, a burial cave containing the human remains of 13 individuals). Since significant historic sites exist elsewhere in this parcel, it is possible that historic sites exist in the area of the proposed wells. Therefore, we suggest that an archaeological survey, of the proposed well sites, be conducted by a qualified archaeologist to determine if any historic sites are present and, if so, to gather sufficient information to evaluate their significance. Findings should be submitted to the State Historic Preservation Division office for review.

JC:sty
IN THE MATTER OF

PUBLIC NOTICE
Application for Water Use Permits

Oceanic Institute (Well No. 1940-10)
Applicant: The Oceanic Institute
41-202 Kalanianaole Hwy.
Waimanalo, HI 96795
Date Completed Application Received: February 18, 1993
Aquifer: Waimanalo System, Windward Sector, Oahu
Well Source: Oceanic Institute Well, Well No. 1940-10, at 41-202 Kalanianaole Hwy., Oahu at Tax Map Key: 4-1-14-4
Quantity Requested: 1,872,000 gallons per day.
Existing Water Use: Aquaculture research
Place of Water Use: 41-202 Kalanianaole Hwy. at Tax Map Key: 4-1-14-4

Well A & B (Well No. 2051-01 & 02)
Applicant: Kamehameha Schools/Bishop Estate
Kapalama Heights
Honolulu, HI 96817
Date Completed Application Received: February 4, 1993
Aquifer: Kalihi System, Honolulu Sector, Oahu
Well Source: Well A & B, Well No. 2051-01, at Kapalama Heights, Hon., HI, Oahu at Tax Map Key: 1-6-22-1
Quantity Requested: 223,000 gallons per day.
Existing Water Use: Domestic Use for Kamehameha Schools
Place of Water Use: Kamehameha Schools at Tax Map Key: 1-6-22-1

Lower Makakilo (Well No. 2104-01)
Applicant: Grace Pacific, Inc.
P.O. Box 78
Honolulu, HI 96810
Date Completed Application Received: January 19, 1993
Aquifer: Ewa-Kunia System, Pearl Harbor Sector, Oahu
Well Source: Lower Makakilo Well, Well No. 2104-01, at 91-920 Farrington Hwy., Oahu at Tax Map Key: 8-1-16-4
Quantity Requested: 170,000 gallons per day.
Existing Water Use: Industrial washing and dust control
Place of Water Use: 91-920 Farrington Hwy. at Tax Map Key: 8-1-16-4

Subscribed and sworn to before me this 7th day of June
A.D. 1993

Chairperson
COMMISSION ON WATER
RESOURCES MANAGEMENT
KEITH W. AHUD
Chairperson
Dated: May 10, 1993
(SB-7615)

AFFIDAVIT OF PUBLICATION

STATE OF HAWAII
City and County of Honolulu

Hiroko Nakamura, being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of the HAWAII NEWSPAPER AGENCY LIMITED PARTNERSHIP, a partnership of GANNET PACIFIC CORPORATION, publisher of the HONOLULU ADVERTISER, and LIBERTY NEWSPAPERS LIMITED PARTNERSHIP, publisher of the HONOLULU STAR-BULLETIN, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is a true notice as was published in the aforementioned newspapers as follows:

The Honolulu Advertiser: times, on

Honolulu Star-Bulletin: times, on

Sunday edition of The Honolulu Advertiser: times, on

and that affiant is not a party to or in any way interested in the above entitled matter.

Hiroko Nakamura

Subscribed and sworn to before me this 7th day of June
A.D. 1993

Elsie A. Maruyama
Notary Public of the First Judicial Circuit,
State of Hawaii
My commission expires March 7, 1996
MEMORANDUM

TO: Aquatic Resources
    Forestry and Wildlife
    Historic Preservation
    Land Management
    Natural Area Reserve System
    Office of Conservation and Environmental Affairs
    State Parks
    Water and Land Development
    Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
         Water Use Permit Application
         Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response:

Contact person: ___________________________ Phone: ___________________________

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: _______________ Date: 5/27/93
MEMORANDUM

TO: Aquatic Resources
    Forestry and Wildlife
    Historic Preservation
    Land Management
    Natural Area Reserve System
    Office of Conservation and Environmental Affairs
    State Parks
    Water and Land Development
    Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments

Water Use Permit Application

Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. A public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko

Attachment(s)

Response:

Contact person: %8707 587 0290 Phone: 587 0290

We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: Date: 5/27/93
APPLICATION FOR WATER USE PERMIT

1. (a) APPLICANT
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Address: Kapalama Heights, Honolulu, Hawaii 96817
   Phone: 842-8603
   Contact Person: Michael Lum

2. WATER MANAGEMENT AREA:
   Water Management Area: Honolulu
   Island: Oahu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Firm/Name: Kamehameha School Well 2052-07
   Address: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key: 1-6-22:1

4. SOURCE LOCATION:
   Number and Type: Kamehameha School Well "A" 530'
   Proposed Use: Potable, Domestic (individual, noncommercial, etc.), Irrigation
   Charges:

5. SOURCE TYPE:
   Source Type: Stream

6. METHOD OF TAKING WATER:
   Method of Taking Water: Artesian Flow

7. LOCATION OF PROPOSED PRODUCTION OF WATER USE:
   Address: Kamehameha Schools, Kapalama Heights, Honolulu, HI
   Tax Map Key: 1-6-22:1

8. QUANTITY OF WATER REQUESTED:
   Quantity of Water Requested: SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT:
   Method of Measurement: Flowmeter

10. QUALITY OF WATER REQUESTED:
    Quality of Water Requested: Fresh

11. PROPOSED USE:
    Proposed Use: Municipal (including hotels, stores, etc.), Industrial

12. NUMBER AND TYPE OF UNITS TO BE SERVED:
    Number and Type of Units: SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP:
    Acres: N/A

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION:
    Proposed Time of Water Withdrawal: SEE ATTACHED DESCRIPTION

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable Yield:
    (b) Permanent or Interim
    (c) Hawaiian Home Land use affected:
    (d) Other existing legal uses affected:

16. REMARKS, EXPLANATIONS:

NOTE: Signing below indicates that the applicant understands that, if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a change in lease, property, or property management must be submitted to the Commission.
APPLICATION FOR WATER USE PERMIT

1. (a) APPLICANT
   Kamehameha Schools/B.P. Bishop Estate
   (b) LANDOWNER
   Kamehameha Schools/B.P. Bishop Estate

2. WATER MANAGEMENT AREA: Honolulu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Kamehameha School Well 2052-11
   (b) PROPOSED (NEW) SOURCE NAME:
   830' Kamehameha School Well 80

4. SOURCE LOCATION: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key 1-6-22:1

5. SOURCE TYPE (check one):
   (a) Stream (b) Dike-confined (c) Perched (d) Caprock

6. METHOD OF TAKING WATER (check one):
   (a) Artesian Flow (b) Well & Pump (c) Diverted Surface Flow (d) Other (explain)

7. LOCATION OF PROPOSED WATER USE: (if possible, show on same maps as source location. Otherwise, attach similar maps)
   (a) Address: Kapalama Heights, Honolulu, Hawaii
   (b) Land Use District (check one):
   (c) County Zoning (describe):

8. QUANTITY OF WATER REQUESTED:
   SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT:
   (a) Flowmeter (b) Open-pipe (c) Well (d) Office (e) Other (explain)

10. QUALITY OF WATER REQUESTED:
    (a) Fresh (b) Brackish (c) Salt (d) Potable (e) Non-Potable

11. PROPOSED USE:
    (a) Municipal (including hotels, stores, etc.) (b) Domestic (individual, non-commercial, etc.)
    (c) Industrial (d) Military (e) Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain):
    SEE ATTACHED DESCRIPTION

13. TOTAL ACERS PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A
    (acres) (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION:
    SEE ATTACHED DESCRIPTION
    (indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (?)
    (b) Permanent or Interim Instream Flow Standards affected (?)
    (c) Hawaiian Home Land uses affected (?)
    (d) Other existing legal uses affected (?)
    (e) Other: NONE

16. REMARKS, EXPLANATIONS:

NOTE: Signing below indicates that the applicant understands that a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, charged in sustainable yields and Interim Flow Standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted should the Commission require one.

Applicant (print)
Michael J. Chun, President
Signature
2/2/43

Landowner (print)
Michael J. Chun, President
Signature
2/2/43

For Official Use Only:
Date Received
Date Accepted
Hydrologic Unit No.
Division Works No.
State Well No.
Notice Dates:
Mail List
Bulletin
Public Hearing
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
MEMORANDUM

To: Rae M. Loui, Director
   Commission on Water Resource Management

From: Henry Sakuda, Administrator
   Division of Aquatic Resources

Subject: Comments on Water Use Permit Application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 and 02, Kalihi Ground Water Management Area

The wells are replacements for two existing wells that pump approximately 196,000 gallons of basal water per day for domestic use within the Kapalama Campus of Kamehameha Schools. The wells will increase pumpage to 229,000 gal/day within 20 years. Because there seems to be no potential for stream dewatering associated with the wells, we have no objections to the proposal.
MEMORANDUM

TO: Aquatic Resources
    Forestry and Wildlife
    Historic Preservation
    Land Management
    Natural Area Reserve System
    Office of Conservation and Environmental Affairs
    State Parks
    Water and Land Development
    Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
          Water Use Permit Application
          Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response:

Contact person: ___________________________ Phone: ___________________________

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: ___________________________ Date: ___________________________
APPLICATION FOR WATER USE PERMIT

**Ground Water** or **Surface Water**

**Instructions:** Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management. The Commission may not accept incomplete applications. For assistance, contact the Regulation Branch at...

1. **(a) APPLICANT**
   - Firm/Name: Kamehameha Schools/B.P.Bishop Estate
   - Contact Person: Michael Lum
   - Address: Honolulu, Hawaii 96817

2. **(b) LANDOWNER**
   - Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   - Contact Person: Michael Lum
   - Address: Kapalama Heights, Honolulu, Hawaii 96817

3. **(a) EXISTING SOURCE NAME AND STATE NUMBER**
   - Source: Kamehameha School Well 2052-07
   - (Well or stream diversion name/number)

4. **(b) PROPOSED (NEW) SOURCE NAME**
   - Name: 530’ Kamehameha School Well “A”

5. **SOURCE LOCATION**
   - Address: Kapalama Heights, Honolulu, Hawaii
   - Tax Map Key: 4-6-22:1
   - Attach a USGS map, scale 1"=2000", and a property tax map showing source location referenced to established property boundaries.

6. **METHOD OF TAKING WATER**
   - Method: Artesian Flow
   - Method: Well & Pump
   - Method: Diverted Surface Flow

7. **LOCATION OF PROPOSED WATER USE**
   - Address: Kamehameha Schools, Kapalama Heights, Honolulu, HI
   - Tax Map Key: 1-6-22:1
   - Land Use District:
   - County Zoning (describe)

8. **QUANTITY OF WATER REQUESTED**
   - SEE ATTACHED DESCRIPTION
   - Gallons per day

9. **METHOD OF MEASUREMENT**
   - SEE ATTACHED DESCRIPTION

10. **QUALITY OF WATER REQUESTED**
    - SEE ATTACHED DESCRIPTION

11. **PROPOSED USE**
    - Municipal (including hotels, stores, etc.)
    - Domestic (individual, noncommercial, etc.)
    - Irrigation
    - Industrial
    - Non-Potable
    - Other (explain)

12. **NUMBER AND TYPE OF UNITS TO BE SERVED (explain)**
    - SEE ATTACHED DESCRIPTION

13. **TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP**
    - N/A

14. **PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION**
    - SEE ATTACHED DESCRIPTION

15. **APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE**
    - SEE ATTACHED DESCRIPTION: NO IMPACT ANTICIPATED

16. **REMARKS, EXPLANATIONS**

**NOTE:** Signing below indicates that the applicant understands that, if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and streamflow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted should the Commission require one.

Applicant (print) Kamehameha Schools/B.P. Bishop Estate
Signature Michael Lum
Date 2/13/23

Landowner (print) Kamehameha Schools/B.P. Bishop Estate
Signature Michael Lum
Date 2/13/23

For Official Use Only:
Date Received
Date Accepted
Notice Date:
Mayor BWS Mail List Bulletin Public Hearing

6/24/92 WUPA Form
APPLICATION FOR WATER USE PERMIT

1. (a) APPLICANT
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Address: Kapalama Heights, Honolulu, Hawaii 96817

2. WATER MANAGEMENT AREA: Honolulu
   ISLAND: Oahu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Source Name: 830' Kamehameha School Well "B"
   State Number:

4. SOURCE LOCATION: Address: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key: 1-6-22:1
   (Attach a USGS map, scale 1"=2000", and a property tax map showing source location referenced to established property boundaries)

5. SOURCE TYPE (check one):
   - Stream
   - Well
   - Dike-confined
   - Perched
   - Caprock

6. METHOD OF TAKING WATER (check one):
   - Artesian Flow
   - Well & Pump
   - Diverted Surface Flow
   - Other (explain)

7. LOCATION OF PROPOSED WATER USE: (if possible, show on same maps as source location. Otherwise, attach similar maps)
   (a) Address: Kamehameha Schools, Kapalama Heights, Honolulu, Tax Map Key: 1-6-22:1
   (b) Land Use District (check one):
      - Urban
      - Agriculture
      - Conservation
      - Rural
   (c) County Zoning (describe):
      - R-5 Residential

8. QUANTITY OF WATER REQUESTED: SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT:
   - Flowmeter
   - Open-pipe
   - Weir
   - Office
   - Other (explain)

10. QUALITY OF WATER REQUESTED:
    - Fresh
    - Brackish
    - Salt
    - Potable
    - Non-Potable

11. PROPOSED USE:
    - Municipal (including hotels, stores, etc.)
    - Domestic (individual, noncommercial, etc.)
    - Irrigation
    - Industrial
    - Military
    - Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain):
    - SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A
    - (acre)
    - (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: SEE ATTACHED DESCRIPTION
    - (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (?):
    - SEE ATTACHED DESCRIPTION-NO IMPACT ANTICIPATED
    (b) Permanent or Interim
    - Instream Flow Standards affected (?): NO
      - Hawaiian Home Land uses affected (?): NO
    (c) Other existing legal uses affected (?):
      - Permanence of use:
        - Other:
          - NONE

16. REMARKS, EXPLANATIONS:

NOTE: Signing below indicates that the applicant understands that, if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted to the Commission if required. A nonrefundable filing fee of $25.00 payable to the State of Hawaii and Natural Resources. For assistance, call the Regulation Branch at 587-2225.

For Official Use Only:
Date Received: ________________________
Date Accepted: ________________________
Hydrologic Unit No.: ________________________
Diversions Works No.: ________________________
State Well No.: ________________________

Notice Dates: ________ Mayor ________ BWS ________ Mail List ________ Bulletin ________ Public Hearing ________

KIND AND WELL FORM
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
MEMORANDUM

TO: Aquatic Resources
Forestry and Wildlife
Historic Preservation
Land Management
Natural Area Reserve System
Office of Conservation and Environmental Affairs
State Parks
Water and Land Development
Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
Water Use Permit Application
Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response: Gordon Akita
Contact person: ___________________________ Phone: 70221

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: ___________________________ Date: 5/25/93

MANABU TAGOMORI
APPLICATION FOR WATER USE PERMIT

☐ Ground Water  or  ☐ Surface Water

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management at P.O. Box 821, Honolulu, Hawaii 96806. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the State of Hawaii. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 808-586-0240.

1. (a) APPLICANT

Printed Name: Kamahameha Schools/B.P. Bishop Estate
Address: Kapalama Heights, Honolulu, Hawaii 96817
Phone: 842-8603
Contact Person: Michael Lum

(b) LANDOWNER

Printed Name: Kamahameha Schools/B.P. Bishop Estate
Address: Kapalama Heights, Honolulu, Hawaii 96817
Phone: 842-8603
Contact Person: Michael Lum

2. WATER MANAGEMENT AREA:

Island: Oahu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:

Kamehameha School Well 2052-07

(b) PROPOSED (NEW) SOURCE NAME:

530' Kamehameha School Well "A"

4. SOURCE LOCATION:

Address: Kapalama Heights, Honolulu, Hawaii

5. SOURCE TYPE (check one):

☐ Stream  ☐ Dike-confined  ☐ Perched  ☐ Caprock

6. METHOD OF TAKING WATER (check one):

☐ Artesian Flow  ☐ Diverted Surface Flow  ☐ Other (explain)

7. LOCATION OF PROPOSED WATER USE: (If possible, show on same maps as source location. Otherwise, attach similar maps)

(a) Address: Kamehameha Schools, Kapalama Heights, Honolulu, HI

(b) Land Use District (check one):

☐ Urban  ☐ Agriculture  ☐ Conservation  ☐ Rural

(c) County Zoning (describe):

R-5 Residential

8. QUANTITY OF WATER REQUESTED: (See attached description) gallons per day

9. METHOD OF MEASUREMENT:

☐ Flowmeter  ☐ Open-pipe  ☐ Wait  ☐ Office  ☐ Other (explain)

10. QUALITY OF WATER REQUESTED:

☐ Fresh  ☐ Brackish  ☐ Salt  ☐ Potable  ☐ Non-Potable

11. PROPOSED USE:

☐ Municipal (including hotels, stores, etc.)  ☐ Domestic (individual, non-commercial, etc.)  ☐ Irrigation

☐ Industrial  ☐ Military  ☐ Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain): (See attached description)

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: (acres) (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: (See attached description) (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:

(a) Impact on Sustainable yield (?):

See attached description-No impact anticipated

(b) Permanent or Interim

Instream Flow Standards affected (?):

No

(c) Hawaiian Home Land uses affected (?):

No

(d) Other existing legal uses affected (?):

No

(e) Other: NONE

16. REMARKS, EXPLANATIONS:

If more space is needed, continue on back side

NOTE: Signing below indicates that the applicant understands that it is a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon-permit approval, a water shortage plan must be submitted should the Commission require one.

Applicant (print) Kamahameha Schools/B.P. Bishop Estate
Signature Michael L. Chun, President
Date 2/21/83

Landowner (print) Kamahameha Schools/B.P. Bishop Estate
Signature Michael L. Chun, President
Date 2/21/83

For official use only:
Date Received
Date Accepted
Notice Date:

Hydrologic Unit No.
Diversion Works No.
State Well No.

RIR  Mail List  Bulletin  Public Hearing
APPLICATION FOR WATER USE PERMIT

[Form]

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96808. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 858-2025.

1. (a) APPLICANT
   Kamehameha Schools/B.P. Bishop Estate
   Firm/Name
   Kamehameha Schools/B.P. Bishop Estate
   Address
   Kapalama Heights, Honolulu, Hawaii 96817
   Contact Person
   Michael Lum
   Tel. 842-8603

(b) LANDOWNER
   Kamehameha Schools/B.P. Bishop Estate
   Firm/Name
   Kamehameha Schools/B.P. Bishop Estate
   Address
   Kapalama Heights, Honolulu, Hawaii 96817
   Contact Person
   Michael Lum
   Tel. 842-8603

2. WATER MANAGEMENT AREA:
   Honolulu
   ISLAND: Oahu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Kamehameha School Well 2052-11
   Existing Source
   (well or stream diversion name/number)

(b) PROPOSED (NEW) SOURCE NAME:
   830' Kamehameha School Well "B"
   Proposed Source
   (well or stream diversion name/number)

4. SOURCE LOCATION:
   Kapalama Heights, Honolulu, Hawaii
   Tax Map Key 1-6-22:1
   (Attach a USGS map, scale 1"=2000', and a property tax map showing source location referenced to established property boundaries)

5. SOURCE TYPE (check one):
   □ Stream
   □ Well & Pump
   □ Diverted Surface Flow
   □ Other

6. METHOD OF TAKING WATER (check one):
   □ Open-Well
   □ Artesian Flow
   □ Confined Water
   □ Perched Water
   □ Caprock

7. LOCATION OF PROPOSED WATER USE:
   (if possible, show on same maps as source location. Otherwise, attach similar maps)
   (a) Address
      Kamehameha Schools, Kapalama Heights, Honolulu, Hawaii
      Tax Map Key 1-6-22:1
   (b) Land Use District (check one):
      □ Urban
      □ Agriculture
      □ Conservation
      □ Rural
   (c) County Zoning (describe):
      B-5 Residential

8. QUANTITY OF WATER REQUESTED: SEE ATTACHED DESCRIPTION
   gallons per day

9. METHOD OF MEASUREMENT:
   □ Flowmeter
   □ Water
   □ Other (explain)

10. QUALITY OF WATER REQUESTED:
    □ Fresh
    □ Brackish
    □ Salt
    □ Potable
    □ Non-Potable

11. PROPOSED USE:
    □ Municipal (including hotels, stores, etc.)
    □ Domestic (individual, noncommercial, etc.)
    □ Irrigation
    □ Industrial
    □ Military
    □ Non-Potable
    □ Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain):
    SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP:
    N/A
    (acre(s))

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION:
    SEE ATTACHED DESCRIPTION
    (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (7):
        SEE ATTACHED DESCRIPTION-NO IMPACT ANTICIPATED
    (b) Permanant or Interim
        Instream Flow Standards affected (7):
        NO
    (c) Hawaiian Home Land uses affected (7):
        NO
    (d) Other existing legal uses affected (7):
        NO
    (e) Other:
        NONE

16. REMARKS, EXPLANATIONS:

(Note: If more space is needed, continue on back side)

For Official Use Only:
Date Received
Date Accepted
Notice Date:

Applicant (print): Kamehameha Schools/B.P. Bishop Estate
Landowner (print): Kamehameha Schools/B.P. Bishop Estate

Signature:
Date: 2/3/93

Applicant (print): Michael J. Chun
Landowner (print): Michael J. Chun

Signature:
Date: 2/3/93

Hydrologic Unit No.
Diversion Works No.
State Well No.
 bureaucracynotes: 2081-02

Mail List
Bulletin
Public Hearing
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
MEMORANDUM

TO: Aquatic Resources
    Forestry and Wildlife
    Historic Preservation
    Land Management
    Natural Area Reserve System
    Office of Conservation and Environmental Affairs
    State Parks
    Water and Land Development
    Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
          Water Use Permit Application
          Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response:

Contact person: ________________________________ Phone: ______________

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: ________________________________ Date: MAY 20 1993

DOFAW HAS NO COMMENTS OR OBJECTIONS TO THE PROPOSED REQUEST.
# Application for Water Use Permit

**State of Hawaii**

**Commission on Water Resource Management**

**Department of Land and Natural Resources**

**Application for Water Use Permit**

- **Ground Water** or **Surface Water**

**Instructions:** Please print in ink or type and send completed application with attachments to the Commission on Water Use Permit P.O. Box 621, Honolulu, Hawaii 96808. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Hawaii Department of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at (808) 586-0361.

## 1. Applicant

- **Firm/Name:** Kamehameha Schools/B.P. Bishop Estate
- **Contact Person:** Michael Lum
- **Phone:** 842-8603

- **Address:** Kapalama Heights
  - Honolulu, Hawaii 96817

## 2. Water Management Area

- **Island:** Oahu
- **Location:** Honolulu

## 3. Existing Source Name and State Number

- **Source Name:** Kamehameha School Well 2052-07
- **State Number:** 5301 Kamehameha School Well "A"

## 4. Source Location

- **Address:** Kapalama Heights, Honolulu, Hawaii
- **Tax Map Key:** 1-6-22:1

## 5. Source Type

- **Check one:**
  - Stream
  - Dike-confined
  - Perched
  - Caprock

## 6. Method of Taking Water

- **Check one:**
  - Artesian Flow
  - Wall & Pump
  - Diverted Surface Flow
  - Other (explain)

## 7. Location of Proposed Water Use

- **If possible, show on same map as source location. Otherwise, attach similar maps.**
- **Address:** Kamehameha Schools, Kapalama Heights, Honolulu, HI
- **Tax Map Key:** 1-6-22:1

## 8. Quantity of Water Requested

- **See Attached Description**

- **Gallons per day**

## 9. Method of Measurement

- **Check one:**
  - Flowmeter
  - Open-pipe
  - Weir
  - Office
  - Other (explain)

## 10. Quality of Water Requested

- **Check one:**
  - Fresh
  - Brackish
  - Salt
  - Potable
  - Non-Potable
  - Other (explain)

## 11. Proposed Use

- **Check one:**
  - Municipal (Including hotels, stores, etc.)
  - Domestic (Individual, non-commercial, etc.)
  - Irrigation
  - Industrial
  - Military
  - Other (explain)

## 12. Number and Type of Units to Be Served

- **See Attached Description**

## 13. Total Acres Proposed for Irrigation and Type of Crop

- **(acres)**
- **(crop)**

## 14. Proposed Time of Water Withdrawal or Diversion

- **See Attached Description**

- **(Indicate hours of operation)**

## 15. Applicant Must Briefly Describe Following Potential Restrictions on Use

- **Impact on Sustainable Yield (?)**
- **See Attached Description—No Impact Anticipated**

- **Permanant or Interim Instream Flow Standards Affected (?)**
- **NO**

- **Hawaiian Home Land Uses Affected (?)**
- **NO**

- **Other Existing Legal Uses Affected (?)**
- **NO**

- **Other:**
- **NONE**

## 16. Remarks, Explanations

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

**NOTE:** Signing below indicates that the applicant understands that if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted should the Commission require one.

Applicant (print) Kamehameha Schools/B.P. Bishop Estate

Landowner (print) Kamehameha Schools/B.P. Bishop Estate

**Signature:** Michael J. Chun, President

**Date:** 2/1/93

**For Official Use Only:**

- **Hydrologic Unit No.**
- **Dissolution Works No.**
- **State Well No.**

**Date:**

**Notice Date:**

- **Mail List**
- **Bulletin**
- **Public Hearing**
APPLICATION FOR WATER USE PERMIT

<table>
<thead>
<tr>
<th>Ground Water</th>
<th>Surface Water</th>
</tr>
</thead>
</table>

**Instructions:** Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 1021, Honolulu, Hawaii 96801. Application must be accompanied by a non-refundable filing fee of $20.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 8662-0255.

**1. (a) APPLICANT**
Firm/Name: Kamehameha Schools/B.P. Bishop Estate
Contact Person: Michael Lum
Address: Kapalama Heights, Honolulu, Hawaii 96817

**1. (b) LANDOWNER**
Firm/Name: Kamehameha Schools/B.P. Bishop Estate
Contact Person: Michael Lum
Address: Kapalama Heights, Honolulu, Hawaii 96817

**2. WATER MANAGEMENT AREA:** Honolulu
**ISLAND:** Oahu

**3. (a) EXISTING SOURCE NAME AND STATE NUMBER:** Kamehameha School Well 2052-11

**3. (b) PROPOSED (NEW) SOURCE NAME:** 830' Kamehameha School Well "B"

**4. SOURCE LOCATION:** Address: Kapalama Heights, Honolulu, Hawaii
Tax Map Key: 1-6-22-1

**5. SOURCE TYPE (check one):**
- Stream
- Aquifer
- Dike-confined
- Perched
- Caprock

**6. METHOD OF TAKING WATER (check one):**
- Artesian Flow
- Well & Pump
- Diverted Surface Flow
- Other (explain)

**7. LOCATION OF PROPOSED WATER USE:** (If possible, show on same map as source location. Otherwise, attach similar maps)

   **(a) Address:** Kamehameha Schools, Kapalama Heights, Honolulu, Hawaii, Tax Map Key 1-6-22-1

   **(b) Land Use District (check one):**
   - Urban
   - Agriculture
   - Conservation
   - Rural

   **(c) County Zoning (describe):** R-5 Residential

**8. QUANTITY OF WATER REQUESTED:** SEE ATTACHED DESCRIPTION
   - gallons per day

**9. METHOD OF MEASUREMENT:**
- Flowmeter
- Open-pipe
- Water
- Office
- Other (explain)

**10. QUALITY OF WATER REQUESTED:**
- Fresh
- Brackish
- Salt
- Potable
- Non-Potable

**11. PROPOSED USE:**
- Municipal (including hotels, stores, etc.)
- Domestic (individual, noncommercial, etc.)
- Irrigation
- Industrial
- Military
- Other (explain)

**12. NUMBER AND TYPE OF UNITS TO BE SERVED:** SEE ATTACHED DESCRIPTION

**13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP:** N/A
   - (acres)
   - (crop)

**14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION:** SEE ATTACHED DESCRIPTION
   - (indicate hours of operation)

**15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:**

   **(a) Impact on Sustainable yield (?):** SEE ATTACHED DESCRIPTION—NO IMPACT ANTICIPATED

   **(b) Permanant or Intermediate Instream Flow Standards affected (?):** NO

   **(c) Hawaiian Home Land uses affected (?):** NO

   **(d) Other existing legal uses affected (?):** NO

   **(e) Other:** NONE

**16. REMARKS, EXPLANATIONS:**

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

---

**NOTE:** Signing below indicates that the applicant understands that if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permits, changes in sustainable yield, and changes in water use policies, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted should the Commission require one.

**Applicant (print):** Kamehameha Schools/B.P. Bishop Estate
**Signature:**

**Landowner (print):** Kamehameha Schools/B.P. Bishop Estate
**Signature:**

**Date:** 10/23/93

---

**For Official Use Only:**
**Hydrologic Unit No.**
**Diversion Works No.**
**State Well No.**

**Notice Dates:**

---

**Application Reference:**
- Public Hearing
- Bulletin
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
MEMORANDUM

TO: Aquatic Resources
    Forestry and Wildlife
    Historic Preservation
    Land Management
    Natural Area Reserve System
    Office of Conservation and Environmental Affairs
    State Parks
    Water and Land Development
    Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
          Water Use Permit Application
          Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response:

Contact person: Phone:

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

DOFAW HAS NO COMMENTS OR OBJECTIONS TO THE PROPOSED REQUEST.

Signed: ___________________ Date: 06/19/93
APPLICATION FOR WATER USE PERMIT

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, Department of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the I Regulation Branch at ...

1. (a) APPLICANT
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Ph: 842-8603

   (b) LANDOWNER
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Ph: 842-8603

   Address: Kapalama Heights
   Honolulu, Hawaii 96817

2. WATER MANAGEMENT AREA: Honolulu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER: Kamehameha School Well 2052-07

   (b) PROPOSED (NEW) SOURCE NAME: 539', Kamehameha School Well "A"

4. SOURCE LOCATION: Address: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key: 1-8-22:1

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

5. SOURCE TYPE (check one): Stream, Aquifer, Surface, Diverted Surface Flow

6. METHOD OF TAKING WATER (check one): Artesian Flow, Well & Pump, Diverted Surface Flow

7. LOCATION OF PROPOSED WATER USE: (if possible, show on same maps as source location. Otherwise, attach aerial maps)

   (a) Address: Kamehameha Schools, Kapalama Heights, Honolulu, HI
   Tax Map Key: 1-8-22:1

   (b) Land Use District (check one): Urban, Agriculture, Conservation, Rural

   (c) County Zoning (describe): R-5 Residential

8. QUANTITY OF WATER REQUESTED: SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT: Flowmeter, Open-pipe, Water, Office, Other (explain)

10. QUALITY OF WATER REQUESTED: Fresh, Brackish, Salt, Potable, Non-Potable

11. PROPOSED USE: Municipal (including hotels, stores, etc.), Domestic (individual, noncommercial, etc.), Irrigation

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain): SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: SEE ATTACHED DESCRIPTION (indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:

   (a) Impact on Sustainable yield (?): SEE ATTACHED DESCRIPTION-NO IMPACT ANTICIPATED

   (b) Permanent or Interim Instream Flow Standards affected (?): NO

   (c) Hawaiian Home Land uses affected (?): NO

   (d) Other existing legal uses affected (?): NO

   (e) Other: NONE

16. REMARKS, EXPLANATIONS:

(Note: If more space is needed, continue on back side)

Applicant (print): Kamehameha Schools/B.P. Bishop Estate

Landowner (print): Kamehameha Schools/B.P. Bishop Estate

Signature: Michael Lum, President

Date: 2/2/83

For Official Use Only:

Date Received
Date Accepted
Notice Date:

Hydrologic Unit No.

Diversion Works No.
State Well No.

Mail List
Bulletin
Public Hearing
APPLICATION FOR WATER USE PERMIT

1. (a) APPLICANT
   Kamehameha Schools/B.P. Bishop Estate
   Address: Kapalama Heights, Honolulu, Hawaii 96817
   Contact Person: Michael Lum
   Phone: 842-8603

2. LANDOWNER
   Kamehameha Schools/B.P. Bishop Estate
   Address: Kapalama Heights, Honolulu, Hawaii 96817
   Contact Person: Michael Lum
   Phone: 842-8603

3. WATER MANAGEMENT AREA:
   Honolulu
   ISLAND: Oahu

4. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Kamehameha School Well 2052-11

   (b) PROPOSED (NEW) SOURCE NAME:
   830' Kamehameha School Well "B"

5. SOURCE LOCATION:
   Kapalama Heights, Honolulu, Hawaii
   Tax Map Key: 1-6-22:1
   (Attach a USGS map, scale 1:2000, and a property tax map showing source location referenced to established property boundaries.)

6. METHOD OF TAKING WATER:
   (check one): Stream  Waterfall  Dike-confined  Perched  Caprock

7. LOCATION OF PROPOSED WATER USE: (if possible, show on same map as source location. Otherwise, attach similar maps)
   (a) Address: Kamehameha Schools, Kapalama Heights, Honolulu, Hawaii
      Tax Map Key: 1-6-22:1
   (b) Land Use District (check one): Urban  Agriculture  Conservation
   (c) County Zoning (describe): R-5 Residential

8. QUANTITY OF WATER REQUESTED: SEEN ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT:
   Flowmeter  Open-pipe  Well  Office  Other (explain)

10. QUALITY OF WATER REQUESTED:
    Fresh  Brackish  Salt  Potable  Non-Potable

11. PROPOSED USE:
    Municipal (including hotels, stores, etc.)
    Domestic (individual, noncommercial, etc.)
    Irrigation
    Industrial
    Military
    Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain): SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A
    (acre)  (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: SEE ATTACHED DESCRIPTION
    (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (7):
        SEE ATTACHED DESCRIPTION-NO IMPACT ANTICIPATED
    (b) Permanant or Interim
    Instream Flow Standards affected (7):
        NO
    (c) Hawaiian Home Land uses affected (7):
        NO
    (d) Other existing legal uses affected (7):
        NO
    (e) Other:
        NONE

16. REMARKS, EXPLANATIONS:

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

   NOTE: Signing below indicates that the applicant understands that if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permits, changeable yield and instream flow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted should the Commission require one.

   Applicant (print): Kamehameha Schools/B.P. Bishop Estate
   Landowner (print): Kamehameha Schools/B.P. Bishop Estate
   Signature: Michael J. Chun, President
   Date: 12/6/93

   Notice Date: 12/6/93

   For Official Use Only:
   Date Received
   Date Accepted
   Hydrologic Unit No.
   Diversion Works No.
   State Well No.

   Bulletin
   Public Hearing
MEMORANDUM

TO: Aquatic Resources
Forestry and Wildlife
Historic Preservation
Land Management
Natural Area Reserve System
Office of Conservation and Environmental Affairs
State Parks
Water and Land Development
Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
Water Use Permit Application
Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response:

Contact person: ___________________________ Phone: ________________

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: ___________________________ Date: ________________
Mr. Michael Lum
Kamehameha Schools/Bishop Estate
Kapalama Heights
Honolulu, HI 96817

Dear Mr. Lum:

Enclosed is a copy of the public notice for your water use permit application for Well Nos. 2051-01 & 02, which will be published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

Please be aware that there may be objections to your application. If objections are made, the objector is required to file such objections with the Commission and is also required to send you a copy of the objections.

You, or any other party, may respond to objections by filing a brief in support of your application with the Commission within ten (10) days of the filing of an objection. You, or the other party, must also send a copy of the response to the objector.

If you have any questions, please contact Roy Hardy at 587-0274.

Sincerely,

RAE M. LOUI
Deputy Director

RH:ko
Encl.
MEMORANDUM

TO: Aquatic Resources
Forestry and Wildlife
Historic Preservation
Land Management
Natural Area Reserve System
Office of Conservation and Environmental Affairs
State Parks
Water and Land Development
Other Interested Parties

FROM: Rae M. Loui, Deputy Director

SUBJECT: Request for Comments
Water Use Permit Application
Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

RH:ko
Attachment(s)

Response:

Contact person: _____________________________ Phone: __________________

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: _____________________________ Date: __________________
MEMORANDUM

TO: Mrs. Hoaliku L. Drake, Director
   Department of Hawaiian Home Lands

   Dr. John C. Lewin, M.D., Director
   Department of Health

   Mr. Clayton H. W. Hee, Chairperson
   Office of Hawaiian Affairs

   Mr. Kazu Hayashida, Manager & Chief Engineer
   Honolulu Board of Water Supply

FROM: Keith W. Ahue, Chairperson
       Commission on Water Resource Management

SUBJECT: Water Use Permit Application
         Kalihi Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02. Public notice of this application was published in the Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993.

We would appreciate your review of the attached application and please return this form by June 22, 1993.

Additionally for your information, the deadline to submit a ground water use permit application for existing uses from existing wells in Windward Oahu and the island of Molokai is July 15, 1993. We respectfully ask that you publish this information in any of your public newsletters, bulletins, etc. This additional help would be greatly appreciated.
Memorandum to:
Mrs. Hoaliku L. Drake
Dr. John C. Lewin
Mr. Clayton H.W. Hee
Mr. Kazu Hayashida

If you have any questions regarding this application, please contact Roy Hardy at 587-0274.

Attachment(s)

Response:

Contact person: ___________________________ Phone: ______________

( ) We have no comments
( ) We have no objections
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Signed: _________________________________ Date: ______________
Honorable Frank F. Fasi, Mayor  
City & County of Honolulu  
City Hall  
Honolulu, Hawaii 96813  

Attn: Mr. Jeremy Harris  

Dear Mayor Fasi:  

Notice of an Application for a Water Use Permit  
Kalihi Ground Water Management Area, Oahu  

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you a copy of the public notice for the water use permit application for the Kamehameha Schools/Bishop Estate for Well Nos. 2051-01 & 02, which was published in the Star Bulletin.  

In addition, Section 13-171-13(b) of our Administrative Rules states:  

"Within sixty days after receipt of notice of a permit application, the county shall inform the commission if the proposed use is inconsistent with the county land use plans and policies."  

We have enclosed a copy of the application for your review and would appreciate receiving your comments, within the next sixty (60) days, on whether this water use is consistent with county plans and policies.  

Very truly yours,  

KEITH W. AHUE  

Enc.
HAWAII NEWSPAPER AGENCY
LEGAL ADVERTISING DEPARTMENT
P. O. BOX 3350
HONOLULU, HAWAII 96801
PHONE: 525-7420
FAX: 525-7449 (ATTN: LEGAL AD DEPT.)

*** FAX TRANSMITTAL SHEET ***

DATE: May 13, 1993

NUMBER OF SHEETS (INCLUDING TRANSMITTAL SHEET): 2

TO:
COMPANY: DLNR - Comm. on Water Resource Mgmt.
ATTN: Faith
FAX NO.: 587-0219

FROM:
COMPANY: HAWAII NEWSPAPER AGENCY
DEPT.: LEGAL ADVERTISING - THERESA/MARGIE
PHONE NO.: (808) 525-7420
FAX NO.: (808) 525-7449 (ATTN: LEGAL AD DEPT.)

PROOF YOUR AD CAREFULLY AND CALL IN ANY CORRECTIONS OR
OKAY BY 10:00 A.M., Thurs., 5/13/93.
PUBLIC NOTICE

Applications for Water Use Permits

Applicants for the following water use permits have been received and are hereby made public in accordance with Department of Land and Natural Resources Administrative Rules 13-171, "Designation and Regulation of Water Management Areas:"

Kanaka (Well No. 8238-48)
Applicant: Kahaluu Ranch
P.O. Box 695
Kaneohe, HI 96744
Date Completed Application Received: January 30, 1983
Aquifer: Ulapa System, Southeast Sector, Molokai
Well Source: Kanaka Well, Well No. 8238-48, at Kanaka, Molokai at Tax Map Key: 5-6-756
Quantity Requested: 10,000 gallons per day
Existing Water Use: Irrigation of 5 acres of citrus fruit
Place of Water Use: Kanaka/Kapena at Tax Map Key: 5-6-756

Koaholau Shali (Well No. 9444-51)
Applicant: Ellen M. Osborne
Star Route 236-A
Kaneohe, HI 96744
Date Completed Application Received: April 7, 1983
Aquifer: Ulapa System, Southeast Sector, Molokai
Well Source: Koaholau Shali, Well No. 9444-51, at Star Route 236-A, Molokai at Tax Map Key: 5-7-878
Quantity Requested: 2,000 gallons per day
Existing Water Use: Irrigation of 0.5 acres of ginger & lemons
Place of Water Use: Star Route 236-A at Tax Map Key: 5-7-878

Makahiki T. (Well No. 9446-41)
Applicant: Thomas N. Makahiki
Star Route Box 201
Kaneohe, HI 96744
Date Completed Application Received: March 3, 1983
Aquifer: Waialua System, North Sector, Molokai
Well Source: Makahiki T. Well, Well No. 9446-41, at Star Route Box 201, Molokai at Tax Map Key: 5-7-883
Quantity Requested: 25 gallons per day
Existing Water Use: Irrigation of 1 acre of citrus fruit
Place of Water Use: Star Route Box 201 at Tax Map Key: 5-7-883

Kupuna (Well No. 1744-04)
Applicant: Honolulu Board of Water Supply
629 South Beresina St.
Honolulu, HI 96815
Date Completed Application Received: December 17, 1982
Aquifer: Waialua System, Honolulu Sector, Oahu
Well Source: Kupuna Well, Well No. 1744-04, at Kupuna Valley, Oahu at Tax Map Key: 3-7-4-41
Quantity Requested: 200,000 gallons per day
Existing Water Use: Honolulu Municipal System
Place of Water Use: Honolulu System
Oceanic Institute (Well No. 1948-10)
Applicant: The Oceanic Institute

41-305 Kalaimanoa Hwy.
Kaneohe, HI 96744
Date Completed Application Received: February 19, 1983
Aquifer: Waianae System, Windward Sector, Oahu
Well Source: Oceanic Institute Well, Well No. 1948-10, at 41-305 Kalaimanoa Hwy., Oahu at Tax Map Key: 4-4-164
Quantity Requested: 1,000,000 gallons per day
Existing Water Use: Aquaculture research
Place of Water Use: Kalaimanoa Hwy. at Tax Map Key: 4-4-164

Call 911995

Date: May 12, 1983
(Rev. 3-31: May 31, June 7, 1983)
FACSIMILE TRANSMITTAL PAGE

Please deliver the following pages to:

Name: Hawaii Newspaper Agency
Company: Honolulu Star Bulletin
From: Faith/Commission on Water Resource Management
Date: May 10, 1993

Message: Public Notice for publishing on May 24 and June 7 – see attached notice and purchase order. Please send proof prior to printing.

Total number of pages (including Transmittal Page): 5

If you do not receive all of the pages legibly, please call back: (808) 587-0210
Sending Facsimile Number: (808) 587-0219
Receiving Facsimile Number: ( ) 525-7442

TRANSMISSION REPORT

THIS DOCUMENT (REDUCED SAMPLE ABOVE) WAS SENT

** COUNT **
# 5

*** SEND ***

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XEROX TELECOPIER 7020
STATE OF HAWAII
REQUISITION & PURCHASE ORDER

DEPARTMENT OF LAND AND NATURAL RESOURCES

NOTICE TO VENDORS
Conditions of purchase are listed on the back side of this purchase order. Please read carefully. Payments may be delayed if all steps are not followed.

Hawaii Newspaper Agency
Honolulu Star Bulletin

P. O. Box 3350

Honolulu, HI 96801

DEPARTMENT OF LAND AND NATURAL RESOURCES
CWRM

DELIVERY ADDRESS
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources
1151 Punchbowl Street; Room 227
Honolulu, Hawaii 96813

BILLING ADDRESS
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. Box 3350
Honolulu, HI 96801

The State of Hawaii is an EQUAL EMPLOYMENT OPPORTUNITY and AFFIRMATIVE ACTION employer. We encourage the participation of women and minorities in all phases of employment.

QUAN. UNIT DESCRIPTION OBJECT UNIT PRICE AMOUNT

PUBLIC NOTICE - Applications for Water Use Permits - Ground Water Management Areas

Publish in Honolulu Star Bulletin issues of May 24, 1993 and June 7, 1993

$1,000.00

587-0216

REQUISITION NO. FOR DEPARTMENT USE ONLY

VENDOR NUMBER SFX

COPY #1 - VENDOR

STATE ACCOUNTING FORM C-03
Mr. Michael Lum
Kamehameha Schools/Bishop Estate
Kapalama Heights
Honolulu, Hawaii 96817

Dear Mr. Lum:

Applications for Water Use Permits
Kalihi Ground Water Management Area, Oahu

We acknowledge receipt, on February 4, 1993, of your completed water use permit applications for the Kamehameha Schools Wells A & B (Well Nos. 2052-13 & 14). You can expect your applications to be processed within ninety (90) days from the date of receipt unless there are objections to your applications.

We will be sending you a copy of the public notice for your applications and any further information regarding the status of your applications. In addition, we may need to visit and verify your proposed water source and use sites if we have not done so already under our registration program.

If you have any questions, please contact Roy Hardy at 587-0274.

Sincerely,

[Signature]
RAE M. LOUI
Deputy Director

RH:ko
<table>
<thead>
<tr>
<th>PAY TO THE ORDER OF</th>
<th>DEPARTMENT OF LAND AND NATURAL RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>EXACTLY $50.00</strong></td>
</tr>
<tr>
<td>DATE</td>
<td>February 3, 1993</td>
</tr>
<tr>
<td>AMOUNT</td>
<td><strong>$50.00</strong></td>
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</tbody>
</table>

Filing Fee for each Water Use Permit Application
Kamehameha School/Wells "A" & "B"

Mary S. D/lists
Muriel K. Wong
February 3, 1993

Ms. Rae Loui, Deputy Director  
Commission on Water Resource Management  
Department of Land & Natural Resources  
State of Hawaii  
P.O. Box 621  
Honolulu, Hawaii 96809

SUBJECT: APPLICATION FOR WATER USE PERMITS  
KAMEHAMEHA SCHOOLS WELL A & B  
TMK: 1ST DIVISION, 1-6-22:1

Dear Ms. Loui:

We herewith submit the original two copies of the subject permit applications for your review and approval.

A $50.00 check is attached as payment of the required filing fee.

The applications were prepared by Akinaka & Associates, Ltd. for Kamehameha/Schools/B.P. Bishop Estate.

If there are any questions, please call Michael Lum, Facilities Engineer, at 842-8603 or Mr. Robert Akinaka at 536-7721.

Me ke aloha pumehana,

Michael J. Chun, Ph.D.  
President  
The Kamehameha Schools

Attachments

cc: Robert Akinaka, Akinaka & Associates, Ltd.
APPLICATION FOR WATER USE PERMIT

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

APPLICATION FOR WATER USE PERMIT

Ground Water or Surface Water

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 824, Honolulu, Hawaii 96808. Application must be accompanied by a non-refundable filing fee of $250.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulations Branch at 808-587-5685.

1. (a) APPLICANT
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Phone: 808-521-5003
   Address: Kapalama Heights, Honolulu, Hawaii 96817

   (b) LANDOWNER
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Phone: 808-521-5003
   Address: Kapalama Heights, Honolulu, Hawaii 96817

2. WATER MANAGEMENT AREA: Honolulu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Kamehameha School Well 2052-07
   (well or stream diversion name/number)

   (b) PROPOSED (NEW) SOURCE NAME:
   530 Kamehameha School Well "A"

4. SOURCE LOCATION:
   Address: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key: 1-6-22:1
   (Attach a USGS map, scale 1"=2000", and a property tax map showing source location referenced to established property boundaries.)

5. SOURCE TYPE (check one):
   □ Stream □ Basin □ Ditch-confined □ Perched □ Caprock

6. METHOD OF TAKING WATER (check one):
   □ Artesian Flow □ Well & Pump □ Diverted Surface Flow □ Other (explain)

7. LOCATION OF PROPOSED WATER USE: (If possible, show on same map as source location. Otherwise, attach similar maps)
   (a) Address:
   Kamehameha Schools Kapalama Heights, Honolulu, HI
   Tax Map Key: 1-6-22:1
   (b) Land Use District (check one):
   □ Urban □ Agriculture □ Conservation □ Rural
   (c) County Zoning (describe):
   R-5 Residential

8. QUANTITY OF WATER REQUESTED:
   SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT:
   □ Flowmeter □ Open-pipe □ Well □ Orifice □ Other (explain)

10. QUALITY OF WATER REQUESTED:
    □ Fresh □ Brackish □ Salt □ Potable □ Non-Potable

11. PROPOSED USE:
    □ Municipal (including hotels, stores, etc.) □ Domestic (individual, noncommercial, etc.) □ Irrigation
    □ Industrial □ Military □ Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain):
    SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP:
    N/A

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION:
    SEE ATTACHED DESCRIPTION

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (?):
    SEE ATTACHED DESCRIPTION NO IMPACT ANTICIPATED
    (b) Permanent or Interim
    Instream Flow Standards affected (?): NO
    Hawaiian Home Land uses affected (?): NO
    (d) Other existing legal uses affected (?): NO
    (e) Other: NONE

16. REMARKS, EXPLANATIONS:

17. SIGNATURE PAGE:

   Applicant (print):
   Kamehameha Schools/B.P. Bishop Estate
   Signature: Michael Lum, President
   Date: 5/19/93

   Landowner (print):
   Kamehameha Schools/B.P. Bishop Estate
   Signature: Michael Lum, President
   Date: 5/19/93

For Official Use Only:
Date Received: ____________________ Hydrologic Unit No. ____________________
Date Accepted: ____________________ Division Works No. ____________________
State Well No. ____________________

Notice Dates:
Public ______ Mayor ______ BWS ______ Mail List ______ Bulletin ______ Public Hearing ______
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
PROPOSED 830' KAMEHAMEHA
SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA
SCHOOL WELL "A"

EXISTING KAMEHAMEHA
SCHOOL WELL 2052-11

EXISTING KAMEHAMEHA
SCHOOL WELL 2052-07

SCALE: 1:24000
CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
U.S.G.S. QUAD MAP

NOVEMBER 1992 SHEET 2 OF 3 SHEETS
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1

TAX MAP KEY

NOVEMBER 1992

SHEET 3 OF 3 SHTS
APPLYING FOR WATER USE PERMIT

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

APPLICATION FOR WATER USE PERMIT

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 821, Honolulu, Hawaii 96806. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 597-2625.

1. (a) APPLICANT
   Firm/Name: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Micahum Lum
   Address: Kapalama Heights, Honolulu, Hawaii 96817

2. WATER MANAGEMENT AREA: Honolulu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER: Kamehameha School Well 2052-07
   (well or stream diversion name/number)
   (b) PROPOSED (NEW) SOURCE NAME: 530\^1 Kamehameha School Well "A"

4. SOURCE LOCATION: Address: Kapalama Heights, Honolulu, Hawaii
   (Attach a USGS map, scale 1"=2000', and a property tax map showing source location referenced to established property boundaries.)

5. SOURCE TYPE (check one):
   □ Stream □ Shallow □ Other- confined
   □ Perched □ Caprock

6. METHOD OF TAKING WATER (check one):
   □ Artesian Flow □ Shallow & Pump □ Diverted Surface Flow □ Other (explain)

7. LOCATION OF PROPOSED WATER USE: (If possible, show on same maps as source location. Otherwise, attach to maps)
   (a) Address: Kamehameha Schools, Kapalama Heights, Honolulu, HI
   (b) Land Use District (check one): Urban □ Agriculture □ Conservation □ Rural
   (c) County Zoning (describe): B-5 Residential

8. QUANTITY OF WATER REQUESTED: SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT:
   □ Flowmeter □ Open-pipe □ Weir □ Orifice □ Other (explain)

10. QUALITY OF WATER REQUESTED:
    □ Fresh □ Brackish □ Salt □ Potable □ Non-Potable

11. PROPOSED USE:
    □ Municipal (including hotels, stores, etc.) □ Domestic (individual, noncommercial, etc.) □ Irrigation
    □ Industrial □ Military □ Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain): SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A (acres) (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: SEE ATTACHED DESCRIPTION
    (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (?):
    (b) Permanently or Interim
    Instream Flow Standards affected (?):
    (c) Hawaiian Home Land uses affected (?):
    (d) Other existing legal uses affected (?):
    (e) Other: NONE

16. REMARKS, EXPLANATIONS:

(if more space is needed, continue on back side)

NOTE: Signing below indicates that the applicant understands that, if a water use permit is granted by the Commission, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved uses as required by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted to the Commission every one year.

Applicant (print): Kamehameha Schools/B.P. Bishop Estate
Signature: Michael J. Chun, President
Date: 02/16/19

Landowner (print): Kamehameha Schools/B.P. Bishop Estate
Signature: Michael J. Chun, President
Date: 02/16/19

For Official Use Only:
Date Received ____________________________ Hydrologic Unit No. ____________________________ Diversion Works No. ____________________________
Date Accepted ____________________________ State Well No. ____________________________
Notice Dates: Mayor ____________ BWS ____________ Diversion Works No. ____________
Waters ____________ Mail List ____________ Bulletin ____________ Public Hearing ____________

8/24/82 WUPA Form
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

SCALE: 1:24000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
U.S.G.S. QUAD MAP

NOVEMBER 1992
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
TAX MAP KEY

NOVEMBER 1992

Sheet 3 of 3 Sheets
APPLICATION FOR WATER USE PERMIT

1. (a) APPLICANT: Kamehameha Schools/B.P. Bishop Estate
   Firm/Name of Person: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Address: Kapalama Heights, Honolulu 96817
   Phone: 842-8603

   (b) LANDOWNER: Kamehameha Schools/B.P. Bishop Estate
   Firm/Name of Person: Kamehameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Address: Kapalama Heights, Honolulu 96817
   Phone: 842-8603

2. WATER MANAGEMENT AREA: Honolulu
   ISLAND: Oahu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER: Kamehameha School Well 2052-11
   (b) PROPOSED (NEW) SOURCE NAME: 830' Kamehameha School Well "B"

4. SOURCE LOCATION: Address: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key: 1-6-22-1
   (Attach a USGS map, scale 1"=2000", and a property tax map showing source location referenced to established property boundaries.)

5. SOURCE TYPE (check one): □ Stream □ Irrigation □ Well □ Diverted Surface Flow □ Other (explain)

6. METHOD OF TAKING WATER (check one): □ Artesian Flow □ Well & Pump □ Diverted Surface Flow □ Other (explain)

7. LOCATION OF PROPOSED WATER USE: (If possible, show on same maps as source location. Otherwise, attach similar maps)
   (a) Address: Kamehameha Schools, Kapalama Heights, Honolulu, Hi
   (b) Land Use District (check one): □ Commercial □ Agriculture □ Conservation □ Rural
   (c) County Zoning (describe): B-5 Residential

8. QUANTITY OF WATER REQUESTED: SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT: □ Flowmeter □ Open-pipe □ Well □ Office □ Other (explain)

10. QUALITY OF WATER REQUESTED: □ Fresh □ Brackish □ Salt □ Potable □ Non-Potable

11. PROPOSED USE: □ Municipal (including hotels, stores, etc.) □ Domestic (individual, noncommercial, etc.) □ Irrigation
    □ Industrial □ Military □ Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED: SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A (acres) (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: SEE ATTACHED DESCRIPTION
    (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) impact on sustainable yield (?): SEE ATTACHED DESCRIPTION
    (b) perennial or intermittent
    (c) instream flow standards affected (?): NO
    (d) Hawaiian Home Land uses affected (?): NO
    (e) other existing legal uses affected (?): NO
    (f) other: NONE

16. REMARKS, EXPLANATIONS:

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

NOTE: Signing below indicates that the applicant understands that a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted to the appropriate basin authorities. This action is subject to the approval of the Board of Water Supply, and as required by the State and Federal laws.

Applicant (print): Kamehameha Schools/B.P. Bishop Estate
Signature: Michael J. Chun, President
Date: 6/24/92

Landowner (print): Kamehameha Schools/B.P. Bishop Estate
Signature: Michael J. Chun, President
Date: 6/24/92

For Official Use Only:
Date Received: 
Date Accepted: 
Hydrologic Unit No.: 
Division Works No.: 
State Well No.: 
Public Hearing: 

Notice Date: Mayor: BWS: Mail List: Bulletin: 
6/24/92 WUPA Form
DESCRIPTION

Kamehameha Schools plans to replace its existing wells **2052-07** and **2052-11** with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

SCALE: 1:24000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE DRILLING, CASING & TESTING TWO DEEP WELLS AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
U.S.G.S. QUAD MAP

NOVEMBER 1992 SHEET 2 OF 3 SHTS
APPLICATION FOR WATER USE PERMIT

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

APPLICATION FOR WATER USE PERMIT

1. (a) APPLICANT
Firm/Name: Kamehameha Schools/B. P. Bishop Estate
Contact Person: Michael Lum
Address: Kapalama Heights, Honolulu, Hawaii 96817

(b) LANDOWNER
Firm/Name: Kamehameha Schools/B. P. Bishop Estate
Contact Person: Michael Lum
Address: Kapalama Heights, Honolulu, Hawaii 96817

2. WATER MANAGEMENT AREA: Honolulu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER: Kamehameha School Well 268-07
(b) PROPOSED (NEW) SOURCE NAME: 5301 Kamehameha School Well "A"

4. SOURCE LOCATION: Address Kapalama Heights, Honolulu, Hawaii

5. SOURCE TYPE (check one): Stream □ Irrigated □ Dike-Confined □ Perched □ Caprock

6. METHOD OF TAKING WATER (check one): □ Artesian Flow □ Well & Pump □ Diverted Surface Flow □ Other (explain)

7. LOCATION OF PROPOSED WATER USE: (if possible, show on same maps as source location. Otherwise, attach survey maps)
(a) Address: Kamehameha Schools, Kapalama Heights, Honolulu
(b) Land Use District (check one): □ Urban □ Agriculture □ Conservation □ Rural □ Residential
(c) County Zoning (describe): M-5 Residential

8. QUANTITY OF WATER REQUESTED: SEE ATTACHED DESCRIPTION gallons per day

9. METHOD OF MEASUREMENT: □ Flowmeter □ Open-pipe □ weir □ Orifice □ Other (explain)

10. QUALITY OF WATER REQUESTED: □ Fresh □ Brackish □ Salt □ Potable □ Non-Potable

11. PROPOSED USE: □ Municipal (including hotels, stores, etc.) □ Domestic (individual, noncommercial, etc.) □ irrigation □ Industrial □ Military □ Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain): SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP: N/A (acre) (crop)

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION: SEE ATTACHED DESCRIPTION (Indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
(a) Impact on Sustainable yield (?): SEE ATTACHED DESCRIPTION
(b) Permanent or Interim Instream Flow Standards affected (?): NO
(c) Hawaiian Home Land uses affected (?): NO
(d) Other existing legal uses affected (?): NO
(e) Other: NONE

16. REMARKS, EXPLANATIONS:

NOTE: Signing below indicates the applicant understands that, if a water use permit is granted by the Commission on Water Resource Management, a permit is subject to prior existing permitted uses, changes in sustainable yields and instream flow standards, reserved usages as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applicant understands that, upon permit approval, a water shortage plan must be submitted should the Commission require one.

Applicant (print): Kamehameha Schools/B. P. Bishop Estate
Signature: Michael Chun, President
Date: 6/24/92

Landowner (print): Kamehameha Schools/B. P. Bishop Estate
Signature: Michael Lum, President
Date: 6/24/92

For Official Use Only:
Date Received
Date Accepted
Hydrologic Unit No.
Dedication Works No.
State Well No.
Public Notice:
Public Hearing:

8/24/92 WUWA Form
DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

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Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

SCALE: 1:24000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
U.S.G.S. QUAD MAP

NOVEMBER 1992
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
TAX MAP KEY

NOVEMBER 1992 SHEET 3 OF 3 SHTS
FACSIMILE TRANSMITTAL

TO: COMMISSION ON WATER RESOURCE MANAGEMENT  DATE/TIME: 1/29/93

MR ED SAKODA  FAX NO: 587-0219

TOTAL PAGES (INCLUDING THIS COVER PAGE): 3

PROJECT TITLE: KAMEHAMEHA SCHOOLS/BISHOP ESTAJA JOB NO: KSBE 91-01
   EXPLORATORY WELLS

ITEM(S) TRANSMITTED:
   COPY OF WATER USE PERMIT APPLICATION
   COPY OF DESCRIPTION TO ATTACH TO PERMIT APPLICATION

REMARKS:
   PLEASE REVIEW AND COMMENT ON ATTACHED APPLICATIONS AND INFORM ME OF ANY
   CORRECTIONS/ADDITIONS/QUESTIONS

IF THERE ARE ANY QUESTIONS, PLEASE CONTACT SAL QUIT
   a.o. Fax File
   Job File

-Ray - 1/29/93
Please review for completeness. If ok they'll get the signatures & send in.
Thanks, Ed
APPLICATION FOR WATER USE PERMIT

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

APPLICATION FOR WATER USE PERMIT

Instructions: Please print in ink or type and send completed application with submission to the Commission on Water Resource Management, P.O. Box 2121, Honolulu, Hawaii 96821. Application must be accompanied by a non-refundable filing fee of $42.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For more information, call the Permitting Branch at 808-586-0100.

1. (a) APPLICANT
   Firm/Name: Kamahameha Schools/B.P. Bishop Estate (print) Kamahameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Address: Kapalama Heights
   Honolulu, Hawaii 96817
   Phone: 842-8603

   (b) LANDOWNER
   Firm/Name: Kamahameha Schools/B.P. Bishop Estate
   Contact Person: Michael Lum
   Address: Kapalama Heights
   Honolulu, Hawaii 96817
   Phone: 842-8603

2. WATER MANAGEMENT AREA:
   Honolulu

3. (a) EXISTING SOURCE NAME AND STATE NUMBER:
   Kamahameha School Well 2052-07
   (well or stream diversion name/number)

   (b) PROPOSED (NEW) SOURCE NAME:
   8301 Kamahameha School Well "A"

4. SOURCE LOCATION:
   Address: Kapalama Heights, Honolulu, Hawaii
   Tax Map Key 1-A-22:1
   (Attach a USGS map, scale 1"=2000', and a property tax map showing source location referenced to established property boundaries.)

5. SOURCE TYPE (check one):
   [ ] Surface [ ] Underground [ ] Dewatered [ ] Perched
   [ ] Caprock

6. METHOD OF TAKING WATER (check one):
   [ ] Artesian Flow [ ] Well & Pump
   [ ] Drained Surface Flow [ ] Other (explain)

7. LOCATION OF PROPOSED WATER USE:
   (if possible, show on same map as source location. Otherwise, attach entire map)
   (a) Address:
   Kamahameha Schools, Kapalama Heights, Honolulu, Hawaii
   Tax Map Key 1-A-22:1
   (b) Land Use District/Neighborhood:
   [ ] Urban [ ] Agricultural [ ] Conservation [ ] Rural
   (c) County Zoning (description):
   [ ] R-5 Residential

8. QUANTITY OF WATER REQUESTED:
   SEE ATTACHED DESCRIPTION
   gallons per day

9. METHOD OF MEASUREMENT:
   [ ] Flowmeter [ ] Open-pipe [ ] Well [ ] Office [ ] Other (explain)

10. QUALITY OF WATER REQUESTED:
    [ ] Fresh [ ] Brackish [ ] Salt [ ] Potable [ ] Non-Potable

11. PROPOSED USE:
    [ ] Municipal (including hotels, stores, etc.)
    [ ] Commercial (individual, noncommercial, etc.)
    [ ] Irrigation
    [ ] Industrial
    [ ] Military
    [ ] Other (explain)

12. NUMBER AND TYPE OF UNITS TO BE SERVED (explain):
    SEE ATTACHED DESCRIPTION

13. TOTAL ACRES PROPOSED FOR IRRIGATION AND TYPE OF CROP:
    N/A

14. PROPOSED TIME OF WATER WITHDRAWAL OR DIVERSION:
    SEE ATTACHED DESCRIPTION
    (indicate hours of operation)

15. APPLICANT MUST BRIEFLY DESCRIBE FOLLOWING POTENTIAL RESTRICTIONS ON USE:
    (a) Impact on Sustainable yield (?):
    SEE ATTACHED DESCRIPTION-NO IMPACT ANTICIPATED
    (b) Permanent or Intermittent
    Instream Flow Standards affected (?):
    NO
    (c) Hawaiian Home Land uses affected (?):
    NO
    (d) Other existing legal uses affected (?):
    NO
    (e) Other:
    NONE

16. REMARKS, EXPLANATIONS:

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

NOTE: Signing below indicates that the applicant understands that, if a water use permit is granted by the Commission on Water Resource Management, it shall be subject to prior existing permit uses, changes in sustainable yields and streamflow standards, reserved uses as defined by the Commission, and Hawaiian Home Lands future uses. In addition, applied for by Kamehameha Schools/B.P. Bishop Estate, Kamehameha Schools/B.P. Bishop Estate (print) is hereby acknowledged.

Applicant (print): Kamehameha Schools/B.P. Bishop Estate
Signature: Michael J. Chun, President
Date:

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DESCRIPTION

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1980.
WATER USE PERMIT NO. 210

This report has been prepared in accordance with 13-171-22(b) of the Hawaii Revised Statutes requiring a 20-year review of issued water use permits to determine permit compliance. Following is a summary of permit information, site characteristics, methodology, findings, and recommendations for this State permit file.

Permit Information

- **Water User:** Bishop Estate
  - Kapalama Heights
  - Honolulu, HI 96817
- **Landowner of Source:** Bishop Estate
  - Kapalama Heights
  - Honolulu, HI 96817
- **Permitted Withdrawal Rate:** 0.229 mgd (Based upon a 12-month moving average)
- **Water Management Area:** Kalihi
- **Island:** Oahu
- **Aquifer Sector/System:** Honolulu/Kalihi
- **System Sustainable Yield:** 9 mgd
- **Water Type:** Fresh, Potable
- **Original CWRM Date:** July 18th, 1993
- **Standard Conditions:** 1-3, 5-11, 13-14, 16, 20-23
- **Special Conditions:** 46-47

Water Source

- **State Well Number(s):** 2051-01, 2051-02
- **Well Name:** Kamehameha A-B
- **Water Source TMK Number(s):** 1st Division, 1-6-022:001
- **State Land Use Classification(s):** Urban/Conservation
- **County Zoning Classification(s):** R-5/P-1
- **Geographical Coordinates:**
  - Well No. 2051-01 (Well A):
    - Latitude 21° 20' 20.6" North
    - Longitude 157° 51' 18.4" West
  - Well No. 2051-02 (Well B):
    - Latitude 21° 20' 29.5" North
    - Longitude 157° 51' 09.0" West
End Use

End Use TMK Number(s): 1st Division, 1-6-022:001
State Land Use Classification(s): Urban/Conservation
County Zoning Classification(s): R-5/P-1
Beneficial Use Explanation: Use for general school purposes including domestic, irrigation, etc.

Background Information

State Well Nos. 2051-01 and 2051-02 were originally put into use by Kamehameha Schools in 1997 to replace State Well Nos. 2052-07 and 2052-11, provide a more stable water supply to the Kapalama Heights area, and implement a more modern water system with up-to-date technology. An allocation of 0.229 mgd was given for Water Use Permit 210 to account for the projected growth of students and water use at Kamehameha Schools.

Consistent water use reporting records are available for the past three years with sporadic reporting prior to that. These records indicate that the permittee's 12-month moving average has not exceeded the permitted amount of 0.229 mgd. Reference the permit file for additional information on reporting history.

Water Use Permit 210 was approved during the July 18th, 1993 Commission on Water Resource Management meeting. This water source has been in use for approximately 14 years by Kamehameha Schools. Standard conditions 1-3, 5-11, 13-14, 16, & 20-23 and special conditions 46-47 are the governing conditions for this water use permit. A complete list of all standard and special conditions is given in the final summary report to the Legislature for this 20-year Water Use Permit Review.

Field Investigation Information

Contact: Whitney Cobb
Site Address: 1887 Makuakane St.
Honolulu, HI 96817

Brown and Caldwell conducted a field investigation on January 28th 2008 from 1:15 p.m. until 2:00 p.m. with Mr. Whitney Cobb. During this time, type of water usage was verified, GPS coordinates of well head(s) were recorded, flow meter installation and functionality were documented, and property TMK information was verified. The wellhead, its related appurtenances, and water usage area were visually inspected to assess compliance with permit conditions. Visual inspection of water loss/waste was limited to outdoor areas within the usage...
boundary. The physical location of this site is at the Kamehameha Schools campus in Kapalama Heights. Reference the TMK and GIS maps in the permit file for a visual representation of the site.

**Summary of Findings for Water Use Permit No. 210**

There are three different water source sites located on TMK parcel 1-6-022:001. The first site houses State Well No. 2051-01 (21° 20' 20.6" N, 157° 51' 18.4" W, ± 21 ft), the control system for the well, a flowmeter station, a large holding tank, and a booster pumping station. The second site houses State Well No. 2051-02 (21° 20' 29.5" N, 157° 51' 09.0" W, ±17 ft) and is nearly identical to the first. The third site simply houses a storage tank. In the event that one pump should fail, the system in place has the capability to pump water to fill all three of the storage tanks. Each tank is equipped with a float sensor to trigger the necessary well pumps. Furthermore, the system has an emergency backup generator that can power the system during an outage. From the tanks, the water is sent to the campus for domestic and agricultural needs, with each tank supplying approximately 1/3 of the grounds. Reference the Appendix for photographs of the previously described system components.

Based upon visual inspection of the system, all components appear to be in full working order. The permittee demonstrated functionality of installed flowmeters and provided access to the site grounds where no wasting of water or water loss was observed. Visual inspection also confirmed that water use was within the permitted TMK boundaries. Water use is currently being reporting on a monthly basis with no recent evidence of overpumpage violations.

However, the following are a list of standard condition(s) that the permittee is found to be in non-compliance with:

1. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a monthly basis in accordance with the Commission's September 16, 1992 action on reporting requirements.

   Since no salinity reports are being submitted to the Commission, the permittee is found to be in violation of Standard Condition (10).

**Recommendations**

- Update the Commission's electronic database with the following:
  - Create memo field entry noting field investigation on 1/28/08
- Address violation of Standard Condition (10) regarding non-reporting of salinity levels.
20-Year Water Use Permit Review
Water Use Permit No. 210

APPENDIX

Field Investigation Photographs
Figure 1 – State Well No. 2051-01

Figure 2 – State Well No. 2051-02
Figure 3 – Booster pump station for Well 2051-01

Figure 4 – Booster pump station for Well 2051-02
Figure 5 – Flowmeter station (typical of each well site)

Figure 6 – Storage tank (typical of three locations)
Figure 7 – Control system (typical of each well site)
**Water Use Permit Survey**  
(Please complete one survey form for each WUP)

**WUP Number:** 210  
**Well Number(s):** 920, 740 (2001-01-02)

**Contact Information (of the person who will be present at site visit):**

Name: Whitney Cobb  
Phone (for phone interview): (808) 842-8567  
Fax: (808) 843-3428  
Email: whcobb@ksbe.edu  
Best time to reach for phone interview: HST 8:00 a.m.

**Property Information (of the water use/well location):**

Address: 1887 Makuakane Street  
City: Honolulu  
Zip: 96817-1887  
Well Location TMK (list all if multiple wells present): 1-6-022:001  
Water Use TMK (list all if used on multiple lots):

**Water Use/Well Information:**

Is the water source currently in use?  
Yes [X] No [ ]  
If no, please explain:

What are you currently using the water for? (example: "Use for 45 acres of diversified agriculture and 3 residences"): **Educational facility**

Is a flow meter installed and working properly?  
Yes [X] No [ ]  
If no, please explain:

Do you submit monthly water use reports to the State?  
Yes [X] No [ ]  
If no, please explain:

**Field Investigations:**

A representative from Brown and Caldwell will be visiting wells in your area over the next several months between the times of 9:00 am and 5:00 pm. Each site investigation will take approximately 1-2 hours. Please indicate up to three potential days of the week and availability times for an on-site inspection of the well location and verification of water use compliance. The permit holder must provide Brown and Caldwell with at least five (5) working days notice of the need to reschedule.

| Option #1 | Date (M-F): Wed | Time: 9:00 am [X] 12:00 pm [ ] 3:00 pm [ ] |
| Option #2 | Date (M-F): Thurs | Time: 9:00 am [X] 12:00 pm [ ] 3:00 pm [ ] |
| Option #3 | Date (M-F): Fri | Time: 9:00 am [X] 12:00 pm [ ] 3:00 pm [ ] |

Once this survey is returned, a Brown and Caldwell representative will be contacting you to conduct a phone interview and finalize the exact date and time of your field investigation. Please fax/mail completed surveys by December 12th, 2007 and direct any questions related to this survey to Mr. Milo Smith of Brown and Caldwell at:

1099 Alakea Street, Suite #2400  
Honolulu, HI 96813  
Tel: (808) 203-2661  
Fax: (808) 533-0226  
mcsmith@brwnca1d.com

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Received: 12/4/07  
Information Updated: 12/5/07  
Phone Interview Complete: **✓**

Note/Comments:
Field Investigation Checklist

WUP Number: 210
Well Number(s): 2051-01-02

Water Source
Well Location TMK(s): 1-6-022:001
Well Head GPS Coordinates: Latitude: Below Longitude: Below
Well Type: Pump
Currently using water source? Yes ☒ No ☐
Notes/Comments: Since about 1993 or so.

Is there a flow meter installed? Yes ☒ No ☐
Is the flow meter operational? Yes ☒ No ☐
Notes/Comments: 2 flowmetering stations
3 tanks

Water Use
Water Use TMK(s): 1-6-022:001
What is the water being used for? Use for general school purposes (domestic, irrigation etc.)

Is the water being used within the permitted boundaries? Yes ☒ No ☐
If no, explain

Are the permit conditions being complied with? Yes ☒ No ☐
If no, explain:

Other
Photographs of: Water Source ☒ Water Meter ☒ Usage Area ☒ Pump/Motor ☒

General Notes/Comments:

01: 21°20'20.6" N, 157°51'16.4" W (± 21 ft)
02: 21°20'29.5" N, 157°51'09.0" W (± 17 ft)

Investigated By: MS. Date: 1/28/08 Time: 1:15 p.m.
**Phone Interview**

<table>
<thead>
<tr>
<th>WUP Number: 210</th>
<th>Well Number(s): 2051-01-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Name:</td>
<td>Whitney Cobb</td>
</tr>
<tr>
<td>Phone Number:</td>
<td>842-8567</td>
</tr>
<tr>
<td>Attempt #1:</td>
<td>Date/Time: 1/22/06 (11:33) Result: Left Message</td>
</tr>
<tr>
<td>Attempt #2:</td>
<td>Date/Time:                  Result:</td>
</tr>
<tr>
<td>Well Location TMK(s):</td>
<td>1-6-022:001</td>
</tr>
<tr>
<td>Water Use TMK(s):</td>
<td></td>
</tr>
<tr>
<td>Water Source Address: 1887 Makuakane St.</td>
<td></td>
</tr>
<tr>
<td>City: Honolulu</td>
<td>Zip Code: 96817-1887</td>
</tr>
<tr>
<td>Currently using water source?</td>
<td>Yes ☒, No ☐</td>
</tr>
</tbody>
</table>

**Notes/Comments:**

- How often is the water source being used? Daily ☐, Weekly ☐, Monthly ☐
- How long have you been using this water source?: 14 years
- Has there been any rezoning of the water source/water use properties? Yes ☐, No ☒, N/A ☒
- Have you reported the rezoning to the State? Yes ☐, No ☐, N/A ☒
  - If no, explain: ____________________________

**Scheduled field investigation day/time:** 1/26/06 @ 1:00

**Notes (Special directions, site conditions, potential hazards, general notes, etc.):**

- Call returned on 1/22/06 @ 2:00 p.m.
- Cell: 216-6613
  - Call first & meet at guard house at campus bottom
Comments To Make:

- Although we prefer that you do not change your scheduled field investigation time, if you require a reschedule, you must provide Brown and Caldwell with at least five (5) working days notice of the need to reschedule.

- A representative from Brown & Caldwell will be making a reminder phone call to you sometime during the week prior to your scheduled field investigation.

- It is very important that you provide access to the site at the day and time agreed upon. Due to a very tight schedule, if you fail to provide access at the agreed upon time and/or do not reschedule with at least a five (5) working day notice, a makeup date will not be allowed.

- If for some reason you don’t know where your well head is located, it would be a good idea to locate it prior to your field investigation to help make the visit go quickly and smoothly.

- Other

- Michael Lum still the correct contact?? ✓
**Standard Conditions List**

1. The water described in this water use permit may only be taken from the location described and used for the reasonable beneficial use described at the location described above. Reasonable beneficial uses means "the use of water in such a quantity as is necessary for economic and efficient utilization, which is both reasonable and consistent with State and County land use plans and the public interest." (HRS § 174C-3)

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HRS § 174C-49(a), which means that it:
   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in HRS § 174C-3;
   c. Will not interfere with any existing legal use of water;
   d. Is consistent with the public interest;
   e. Is consistent with State and County general plans and land use designations;
   f. Is consistent with County land use plans and policies; and
   g. Will not interfere with the rights of the Department of Hawaiian Home Lands as provided in Section 221 of the Hawaiian Homes Commission Act and HRS § 174C-101(a).

4. The ground-water use here must not interfere with surface or other ground-water rights or reservations.

5. The ground-water use here must not interfere with interim or permanent instream flow standards. If it does, then:
   a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
   b. The interim or permanent instream flow standard, as applicable, must be amended.

6. The water use authorized here is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

7. The water use permit application and submittal, as amended, approved by the Commission at its <Insert Date> meeting are incorporated into this permit by reference.

8. Any modification of the permit terms, conditions, or uses may only be made with the express written consent of the Commission.

Variations of Standard Condition (8) are as follows:
   i. Modification of any permit condition shall be approved by the Commission. Modification of any permit condition without notification may result in the revocation of the water use permit.
9. This permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
   a. Protect the water sources (quantity or quality);
   b. Meet other legal obligations including other correlative rights;
   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June, 1987 shall be protected;
   f. Meet legal obligations to the Department of Hawaiian Home Lands, if applicable; or
   g. Carry out such other necessary and proper exercise of the State’s and the Commission’s police powers under law as may be required.

Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

10. An approved flowmeter(s) must be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a monthly basis (attached).

Variations of Standard Condition (10) are as follows:
   i. The applicant shall keep monthly pumpage estimates to be submitted annually to the Commission.
   ii. An approved flowmeter(s) need not be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a yearly basis (attached).
   iii. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a monthly basis in accordance with the Commission’s September 16, 1992 action on reporting requirements.
   iv. Approved flowmeters must be installed to measure monthly withdrawals and a monthly record of withdrawals must be kept and reported to the Commission on Water Resource Management on a monthly basis.
   v. An approved flowmeter(s) must be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a quarterly/yearly basis (attached).
   vi. An approved flowmeter shall be installed to measure water withdrawals
   vii. An approved flowmeter(s) must be installed to measure withdrawals; and a record of the withdrawals must be kept and reported to the Department of
Land and Natural Resources, Division of Water and Land Development, P.O. Box 373, Honolulu, HI 96809, on a monthly basis.

viii. Although not stated as a condition of the permit §13-168-7 HAR requires you to keep a record of your monthly total pumpage, water level, salinity, and water temperature. This information must be submitted to the Commission on a regular monthly basis using the enclosed water use report form.

ix. An approved flowmeter shall be installed and the withdrawal from Well 1851-73 shall be recorded and reported to DLNR on a monthly basis by the owner and/or operator of the well.

x. The withdrawals from these wells shall be recorded and reported to the DLNR on a monthly basis by the BWS.

xi. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting water usage on a monthly basis.

xii. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission.

xiii. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission along with water level and salinity measurements.

11. This permit shall be subject to the Commission's periodic review of the <Aquifer> Aquifer System's sustainable yield. The amount of water authorized by this permit may be reduced by the Commission if the sustainable yield of the <Aquifer> Aquifer System, or relevant modified aquifer(s), is reduced.

12. A permit may be transferred, in whole or in part, from the permittee to another, if:
   a. The conditions of use of the permit, including, but not limited to, place, quantity, and purpose of use, remain the same; and
   b. The Commission is informed of the transfer within ninety days.

Failure to inform the department of the transfer invalidates the transfer and constitutes a ground for revocation of the permit. A transfer, which involves a change in any condition of the permit, including a change in use covered in HRS § 174C-57, is also invalid and constitutes a ground for revocation.

13. The uses(s) authorized by law and by this permit do not constitute ownership rights.

14. The permittee shall request modification of the permit as necessary to comply with all applicable laws, rules, and ordinances that will affect the permittee's water use.

15. The permittee understands that under HRS § 174C-58(4), that partial or total nonuse, for reasons other than conservations, of the water allowed by this permit for a period of four (4) continuous years or more may result in a permanent revocation as to the amount of water not in use. The Commission and the permittee may enter
into a written agreement that, for reasons satisfactory to the Commission, any period of nonuse may not apply towards the four-year period. Any period of nonuse which is caused by a declaration of water shortage pursuant to section HRS § 174C-62 shall not apply towards the four-year period or forfeiture.

16. The permittee shall prepare and submit a water shortage plan within 30 days of the issuance of this permit as required by HAR § 13-171-42(c). The permittee's water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the <Aquifer>Ground-Water Management Area.

17. The water use permit shall be subject to the Commission's establishment of instream standards and policies relating to the Stream Protection and Management (SPAM) program, as well as legislative mandates to protect stream resources.

18. The permittee understands that any willful violation of any of the above conditions or any provisions of HRS § 174C or HAR § 13-171 may result in the suspension or revocation of this permit.

19. Special conditions in the attached cover transmittal letter or attached exhibits are incorporated herein by reference.

20. If the ground-water source does not presently exist, the new well shall be completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

Variations of Standard Condition (20) are as follows:
   i. The permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work proposed in the permit application shall be completed within two years from the date of permit issuance.

21. This permit may not be transferred or the use rights granted by this permit sold or in any other way alienated. Pursuant to HRS § 174C-59 and the requirements of Chapter 174C, the Commission on Water Resource Management has the authority to allow the transfer of the permit and the use rights granted by this permit in a manner consistent with HRS § 174C-59. Any such transfer shall only occur with the Commission's prior express written approval. Any sale, assignment, lease, alienation, or other transfer of any interest in this permit shall be void.

22. The water use permit granted shall be an interim water use permit, pursuant to HRS § 174C-50. The final determination of the water use quantity shall be made within five (5) years of the filing of the application to continue the existing use.

23. The water use permit shall be issued only after agricultural review.

24. That scheduled adjustments to Oahu Sugar Co. permitted use shall be initiated upon discontinuance of agricultural uses.
25. The issuance of this permit was approved by the Commission on Water Resource Management at its meeting on <Insert Date>.

26. The permit shall be subject to the review by the Attorney General.

27. The permit holder may be required to relinquish this permit at any time or specified time after issuance to the Board of Land and Natural Resources in accordance with Chapter 166 of Title 13.

28. The applicant shall obtain the necessary land acquisition documents from the Hawaii Housing Authority.
Special Conditions List

1. Should an alternate permanent source of water be found for this use, then the Commission reserves the right to revoke this permit, after a hearing.

2. In the event that the tax map key at the location of the water use is changed, the permittee shall notify the Commission in writing of the tax map key change within thirty (30) days after the permittee receives notice of the tax map key change.

3. The applicant shall contact the Environmental Management Division, State Department of Health, at 586-4304, concerning “GUIDELINES APPLICABLE TO GOLF COURSES IN HAWAII” date <Insert Date & Version #>.

4. Standard Condition 10 is emphasized, to report consumption on a regular basis.

5. The applicant may continue this existing use of ground water within the limits approved by the Commission, and the actual issuance of the interim permit shall not be a reason to interrupt this existing use.

6. This interim water use permit shall cease to become interim and shall be subject to HRS § 174C-55 upon administrative review of the quantity within five (5) years, provided that all conditions of the use (including the review of the quantity which shall not be greater than the amount initially granted) remain the same. Enforcement of the allocation limit shall be stayed pending staff’s review and issuance of a permanent water use permit.

7. As-built drawings of the well and pump, and a complete pumping test record shall be submitted within sixty (60) days.

8. In the event the pump tests show that aquifer boundary conditions do not support the requested withdrawals, the Commission reserves the right to amend this permit, after a hearing, to a level that is supported by the pump tests.

9. The existing use may be continued within the levels approved by the Commission, and the actual issuance of the permit document shall not be a reason to interrupt the approved level of use.

10. The filing of an application by Kukui, Inc. for a new or modified water use permit for the Kualapuu Aquifer in excess of 2.0 mgd (total system withdrawal) shall be just cause for re-consideration of this interim permit by the Commission.

11. Upon completion of a new transmission line for the transport of water use by Well #17, the permit shall be modified to reduce the allocation amount by the additional 79,220 gallons per day allocated for use of the Molokai Irrigation System.

12. Within six (6) months from the date of approval of a water use permit for the well, the applicant shall conduct a feasibility study and submit a report describing
alternative sources of nonpotable water for irrigation uses at the resort area. It is suggested that the developer consider use of dual lines in the subdivisions so that effluent may be used in the existing reuse system. Another consideration is the development of brackish water wells in the Kaluakoi Aquifer system for mixing with the effluent generated at the resort.

13. Within six (6) months from the date of approval of a water use permit for the well, the application shall evaluate the filter back discharges into Kakaako Gulch to determine if excessive preventable waste is occurring and identify possible measures to eliminate or reduce such waste. The evaluation shall be conducted in cooperation with the Commission staff and staff of the Department of Health’s Safe Drinking Water Branch, which regulates the drinking water system.

14. Within six (6) months from the date of approval of a water use permit for the well, the applicant shall 1) implement a leakage control and detection system and compete repairs to prevent such leakage and 2) implement use of xeriscaping and low-flow fixtures.

15. Action on the future use portion of the water use permit application for Well #17 (Well No. 0901-01) is deferred pending the establishment of existing uses in the aquifer. Kukui Inc.’s application for uses in excess of those uses existing on July 15, 1992 will be considered “new” uses and will be taken up by the Commission as soon as other existing use applications have been decided. In the interim,

   a. The Commission shall recognize that there is disagreement between the applicant’s staff calculations of reasonable-beneficial existing use

   b. The Applicant will have the burden of proof to show within six (6) months reasonable-beneficial existing use calculations that support the applicant’s request as opposed to staff’s calculations.

   c. The Commission’s enforcement of the approved existing use allocation will be suspended for six (6) months.

16. The permittee shall submit a notice of intent and written request to continue the use at least ninety (90) days prior to the expiration of the interim five-year permit.

17. The Commission shall delegate to Maui Department of Water Supply the authority to allocate the use of water for municipal purposes, as provided in §174C-48(b).

18. Maui Department of Water Supply shall be exempt from the requirements for permit modifications, as provided in §174C-57(c).

19. The permittee must meter water use and monitor chloride concentrations on a monthly basis and submit monthly reports of water use and chloride concentrations to the Commission.

20. Standard Condition 16 is waived for saltwater wells.

21. The permit will be revoked if (1) stream monitoring shows that pumping the well reduces stream flow, or (2) the electromagnetic resistivity survey indicates that the
well was drilled into a dike compartment, unless the applicant submits a petition for an amendment to the interim instream flow standard with the well completion report. However, no use of the water may be made without a Pump Installation Permit, which cannot be issued during consideration of the amendment of the interim instream flow standard.

22. The applicant shall present the results of the electromagnetic resistivity survey, pump tests, and stream monitoring to a community meeting as well as to the Commission.

23. A final determination of water use quantity shall be made within five (5) years of the filing date of the application (<Insert Date>) to continue existing use.

24. The applicant shall implement, by December 31, 1995, a biological and hydraulic monitoring program for a minimum 2-year period that: 1) documents the existing operating procedure, 2) seeks to identify the impacts of all operating alternatives on Waikolu Stream, and 3) seeks to identify the effectiveness of weir modifications (Dam No. 1). This program shall incorporate the three new wells, Wells #4-6 (Well Nos. 0855-06, -05, &-04, respectively), which may be pumped within the approved limits, for monitoring and testing purposes only. Further, semi-annual reports summarizing data and preliminary findings shall be submitted to the Commission. It is suggested that the Department of Agriculture work with the State Division of Aquatic Resources and other affected agencies to prepare the monitoring program in light of the difficult technical questions raised by this application. A particular concern is the coordination of this monitoring program with the ongoing National Park Service study by Anne Brasher. A draft of this plan shall be submitted to the Commission staff within ninety (90) days for technical review and comment. Results of the monitoring program shall be used to make recommendations to the Commission on any additional use of the wells, and shall be made readily available to all interested parties.

25. That the Commission approves the well construction permit for the Kamiloloa-Waiola Well (Well No. 0759-01), subject to the standard well construction conditions and the special conditions for the pumping well for the aquifer tests.

26. That the Commission authorizes the Chairperson to approve and issue a pump installation permit upon acceptance of adequate pump test result, subject to the standard pump installation conditions.

27. Should the well be used for back-up domestic supply, applicant is advised to contact DOH or otherwise ensure safe drinking water quality is maintained.

28. The applicant shall follow the agreed monitoring plan.

29. If pesticides used by the applicant are found in ground or surface water and can be traced to the applicant's use, the CWRM may revoke the permit immediately upon such finding.
30. Issuance of the interim permit shall be withheld until the reservation of water for DHHL is set by rule. Applicant may continue this existing use within the approved limits.

31. The applicant shall submit well modification and pump installation permit applications for administrative approval by chairperson prior to beginning any work required to complete well.

32. Should any stream flow impacts result from use, petition to amend interim instream flow standards shall be submitted.

33. Should any dewatering result from use, pumping shall cease immediately.

34. Shall submit accurate schematic diagram of distribution system for the battery of 5 wells.

35. Shall be subject to a 6-month independent audit & monitoring.

36. Final pump capacity shall be determined from pump test results & approved administratively by signature of chair.

37. The permittee shall seek and submit to the Commission within ninety (90) days written confirmation from the Department of Land Utilization of the non-conforming use.

38. Pumping shall cease immediately if the chloride reports show that the brackish water developed in the well exceeds 1,000 mg/l of chloride, unless a variance from the chloride limit has been granted. The authority to approve future variance requests is delegated to the chairperson.

39. The duration of the interim permit shall be:
   a. To July 1, 2006, or
   b. Until treated wastewater is available and acceptable for use, or
   c. Until such time that a significant change in permitted, actual, or projected uses or water supply occurs.

40. Action on any interim permit may be initiated by the Commission or any permittee upon letter request or pursuant to §174C-57 Haw. Rev. Stat. (Modification of permit terms).

41. This permit is approved under the assumption that wastewater will become available for reuse as an alternative supply source.

42. Require adherence to the chloride sampling protocol and the submittal of weekly chloride data. The authority to approve variances from the weekly reporting requirement is delegated to the Chairperson.

43. Require adherence to the Conservation Conditions.
44. In the event a water shortage is declared by the Commission, permittees in the <Insert Aquifer System> shall comply with the <Insert Aquifer System> water shortage plan adopted by the Commission.

45. The permittee shall contact the Department of Health, Clean Water Branch and obtain the necessary discharge permit(s).

46. Permit shall be interim and replaces existing WUP for 2051-07 & 11.

47. Applicant shall submit an acceptable archaeological inventory survey report to DHP. If historic sites affected, a plan to mitigate these affects must be accepted by DHP and completed by applicant.

48. Should the well be used for back-up domestic supply, applicant is advised to contact DOH or otherwise ensure safe drinking water quality is maintained.

49. (The permittee) may report monthly pumpage on yearly basis.

50. Prior to issuance of any permits, must submit filing fee for after-the-fact pump installation permit.

51. The term of this permit shall be twenty years from the date of issuance of the permit with a five-year Board review to determine compliance with the provisions of the permit.

52. The amount of water to be withdrawn under this permit shall be 0.19 mgd, averaged annually, for irrigation use. This permitted use of 0.19 mgd when added to a preserved use of 0.27 mgd amounts to a total of 0.46 mgd, averaged annually, which may be withdrawn from well 1646-01.

53. The use authorized by the permit must not interfered substantially and materially with existing individual household uses and existing uses.

54. The use of this well shall be subject to the shortage and emergency powers of the Board of Land and Natural Resources (BLNR).

55. This permit may be suspended or revoked, in accordance with Chapter 166.

56. The permit holder may be required to relinquish this permit to BLNR, in accordance with Chapter 166.

57. The withdrawal from Well 1646-10 shall be recorded and reported to DLNR on a monthly basis by the permittee.

58. In the event that emergency water use occurs, the permittee shall notify the Commission in writing within one (1) day of pumping, to in form the Commission as to the nature of the emergency and the expected duration of the emergency. A water
use report shall also be filed pursuant to Standard Condition 10 and Administrative Rule 13-168-7.

59. Note DOH’s requirements related to non-potable water systems (attached to original permit).

60. Standard Condition 16 requiring the submittal of a water shortage plan is waived.

61. All non-potable spigots and piping shall be clearly labeled as “DO NOT DRINK, NON-POTABLE” to prevent direct human consumption.

62. Standard Condition 10 is modified. Due to the inability to take water level measurements, the requirement to measure monthly water levels is waived. In addition, as long as the U.S. Geological Survey is collecting and analyzing the chloride content of the well water, the requirement for the permittee to measure and report chlorides is also waived.

63. Well elevation components must be surveyed by a licensed surveyor and this information must be submitted to commission prior to issuance of permanent permit.

64. The permittee shall obtain approvals from the Department of Health and the U.S. Environmental Protection Agency prior to use of the water.

65. This water use permit, WUP No. <Insert #>, shall supersede WUP No. <Insert #>.

66. WUP No. <Insert #> is revoked.

67. Standard Condition 17 is waived.

68. Standard Condition 22 for interim water use permits shall not apply.

69. To supplement our records, we request that you provide a map of the Galbraith Est. lands west of Wahiawa (2100 ac+) and the associated TMK’s for use area.

70. Deferred action on portion requested for golf course irrigation pending further refinement of irrigation requirement and a feasibility study for utilization of surface water sources, including Wahiawa Reservoir.

71. Written justification be provided for any 'cushion' of 0.5 mgd.

72. The water use permit shall be an interim permit. The duration of the interim permit shall be until treated wastewater is available and acceptable for use. The permittee shall continue discussions with Honolulu Board of Water Supply regarding the use of reclaimed water.

73. The permittee is put on notice that this is a qualified approval in that this permit may be modified or revoked prior to the expiration of the interim permit if the
Commission decides that the use of additional basal ground water for dust control and landscape irrigation is not reasonable-beneficial use.

74. The permittee encouraged to use drought-tolerant landscaping to conserve water.

75. Should the applicant provide written evidence that the county DHCD approves a 201E exemption for the elderly affordable housing project then the applicant may modify a corresponding portion of their existing aquacultural use to be used by the exemption approved project within the Commission approved water use permit limits under recommendation 5.

76. The applicant shall obtain a water lease/permit from Land Division prior to actual use of the well water.

77. Require the permittee to sign a contract by May 14, 1998 with the City Department of Wastewater Management to buy and use 0.400 mgd of R-1 water for a corresponding reduction in allocation for Well Nos. 1900-02, 17 to 20, and 1901-03.

78. Standard Condition 9 is waived.

79. Standard Condition 10 is modified to exempt the permittee from monthly measurements of salinity and temperature.

80. Standard Condition 10 is waived.

81. Applicant must seek a determination from BLNR and Land Mgt Div as to whether water license required. If required, license must be obtained prior to issuance of permit. If not, permit will be issued w/out further action.

82. Commission defers action on use in excess of 452,000 gpd pending additional info from BWS and further staff analysis.

83. The permit shall be subject to the Commission’s sustainable yield review by December 1990.

84. The Commission shall delegate to the Honolulu Board of Water Supply the authority to allocate the use of water for municipal purposes, in accordance with §174C-48(b) HRS.

85. Honolulu Board of Water Supply shall be exempt from the requirements of permit modifications as provided in §174C-57.

86. BWS must participate in discussions, to be coordinated by Commission Staff, regarding a monitoring program to address impacts to Kaneohe Bay water quality, prior to any action on applications for future municipal uses.

87. A pump installation permit application must be made and approved prior to the installation of a permanent pump.
88. The water withdrawn shall be 0.7 mgd for municipal use.

89. The installed pump capacity of the well shall not be more than 700 gpm or 1.01 mgd.

90. The term of permit shall automatically expire twelve months from the date of issuance.

91. The Honolulu Board of Water Supply may continue to submit monthly water data on their own form, provided that the data are submitted in a format that is acceptable to the Commission staff.

92. Standard Condition 7 shall not apply.

93. Standard Condition 22 shall not apply.

94. Standard Condition 10 is modified to exempt the permittee from monthly measurements of salinity and temperature.

95. This permit shall be subject to conditions providing for stream restoration if the Commission determines that additional water should be returned to the streams.

96. HECO 1 mgd for industrial use

97. Campbell Estate 1 mgd for municipal use through BWS, by separate agreement with HECO

98. BWS 1 mgd for municipal use.

99. The permit shall be subject to the Commission’s sustainable yield review by <Insert Date>.

100. The applicant shall obtain the current version of the Department of Health’s Guidelines Applicable to Golf Courses in Hawaii. Where relevant and viable, items of the guidelines should be implemented and sustained appropriately. To obtain the current version, contact the Safe Drinking Water Branch, Environmental Management Division at 808-586-4258 (Honolulu).

101. The future use portion of the application shall be deferred until existing uses in the Koolauloa area are established.

102. The water to be withdrawn under this permit shall be a total of 0.03 mgd (0.02 mgd preserved plus an additional 0.01 mgd permitted use), averaged annually, for domestic and irrigation use.

103. Existing well 1851-09 shall be properly sealed by a licensed drilling contractor. A well modification permit application, enclosed, shall be submitted to the Department for approval of the well sealing. A filing fee for sealing the well will not be required.
104. The permittee is required to test the source using a certified private laboratory and submit the test results to the Commission within three (3) months. The Commission will then forward the results to the Department of Health for their review. The Department of Health recommends that the well be routinely tested for microbiological and chemical parameters thereafter.

105. The permittee is required to submit a completed Registration of Well and Declaration of Water use by <Insert Date>.

106. The permittee shall contact the Department of Health for a written determination on the status of their water system and comply with any Department of Health requirements for monitoring and testing.

107. In the event that the original spring source decontaminates, the new well authorized will be shut down.

108. That within each aquifer the total permitted use shall not exceed the sustainable yield.

109. That any water available for allocation shall be for in-district use.

110. That scheduled reductions to Oahu Sugar Co. permitted use shall be initiated upon final termination of an Osco lease or sub-lease, whichever occurs later.

111. That permits for water use issued in accordance with the proposed schedule shall be interim permits subject to review and adjustment by 1995.

112. That the permit shall be an interim permit for a new use which is afforded to existing users as specified in §13-171-20.

113. That the original allocation of 0.200 mgd shall be taken to hearing for possible revocation at a later date to complete the transfer of the water use permit entirely to Well No. 3407-02. This revocation would reduce the current allocation afforded to the Kunihiro Well (Well No. 3406-06) to zero.

114. This allocation incorporates the unspecified domestic needs of the applicant and therefore necessitates a single meter be installed at the well.

115. Should any impacts to nearby wells or streams be established by the use of this well, the applicant shall address these issues to the satisfaction of the Commission.

116. If an economically feasible nonpotable source is identified, the applicant shall convert to the alternative nonpotable source.

117. The permit shall be subject to the Chairperson's approval of a water use plan recommending possible measures to prevent or minimize saltwater contamination and establish courses of action to follow should the aquifer become too saline to use.
118. Permittee shall provide the necessary end-use information on the 10th residence to allow regulation of the use under Chapter 174C.

119. Standard Conditions 10 & 18 shall not apply.

120. Standard Condition 10 is modified to exempt the permittee from the requirement to install a flowmeter. Salt water withdrawals may instead be estimated based on pumping capacity and run time.

121. The applicant shall review the existing year long period of pumpage and streamflow data and provide analysis on ground and surface water interaction. Deadline is January 25, 1994.

122. The water use permit for Well Nos. 2301-27 to -32 for 0.75 mgd (WUP No. 419) shall be revoked upon issuance of a pump installation permit for the well.

123. The permittee shall use mulching to decrease evaporative losses and manage irrigation scheduling to minimize water demand.

124. The permittee shall submit a detailed agricultural plan to support any future water use permit application for increased agricultural use at this parcel.

125. If not already obtained, the permittee shall seek and obtain any necessary permits from the Department of Health for the proposed discharge to Malaekahana Stream.

126. Standard Condition 10 is modified to waive the requirement for installing a water meter on Well Nos. 2358-21, 22, and 29. The permittee shall install a water meter on Well No. 2358-26 to measure total monthly flow through the discharge line. This quantity should then be assumed to be the rate of natural flow from the other three wells for monthly reporting purposes.

127. The permit shall be effective upon submittal of documentation by Navy that it has met the DOH requirements for a public system.

128. This WUP shall be subject to Army's application for a WUP to reduce the permitted use of the Army's Schofield Shaft (2901-02 to 04, 10) by 0.208 mgd to a new total of 5.648 mgd. The Army's application shall be submitted within 60 days after the approval of this WUP or this WUP shall be void. Approval of the modification request shall be obtained from the CWRM prior to use of Well No. 3100-02 and issuance of this WUP.

129. Navy shall submit an after-the-fact PIPA, and approval of the permit shall be obtained prior to use of the well.

130. The well shall not be used for drinking water purposes unless it is properly tested and treated.
131. This permit is approved subject to reclaimed water becoming a practical alternative and provided that the Department of Health approves the reuse application.

132. Should any opae ula be recovered in the well water, the permittee shall notify the Division of Aquatic Resources and provide specimens to the Division of Aquatic Resources for analysis.

133. If a single meter at the well is used, the Commission shall allow an additional 1,000 gallons per day to the water use permit amount for the domestic needs of two residences, although a permit for individual domestic consumption is not required. Otherwise, the applicant must provide a meter to separately measure the irrigation consumption.

134. This permit is approved under the requirement that conversion to either: 1) treated wastewater becoming available for reuse as an alternative supply source, provided that Department of Health concerns over the use of treated effluent over the potable water aquifer have been addressed; and/or 2) other nonpotable source becoming available will occur in a timely manner.

135. These permits shall be subject to a review of actual use within four years for possible modification of the permitted amount.

136. The permit shall be reviewed in two (2) years for possible additional revocation due to nonuse.

137. The allocation is based on the projects listed in Exhibit 5 (of Item 10 of the May 20, 1998 Staff Submittal), except for the Queen's Beach GC (TMK 139-11-2,3), Lot 9 (TMK 139-17-51), and Varsity Place (TMK 128-24-35).

138. Kamehameha Schools Bishop Estate/Honolulu Board of Water Supply shall transfer the water use permit within ninety (90) days of the effective date of the transfer of the pump station to the Honolulu Board of Water Supply, pursuant to §174C-59 Hawaii Revised Statutes.

139. The permittee shall ensure that the water is recycled by either directing it into the Waiahole Ditch for use by downstream farmers (subject to the approval of the Agribusiness Development Corporation's Board) or into Waikele Farm's existing irrigation system.

140. The permittee shall file a completed application to modify WUP No. 758 to reduce the allocation by 0.100 mgd within 60 days. If a completed water use permit modification application is not received within 60 days from this submittal's date, then the subject water use permit application (WUPA No. 767) shall be deemed denied without prejudice without the need for another hearing.

141. The water withdrawn shall be for municipal use. No improvements to the existing sources are required as the existing source capacities are greater than the increase.
142. Water license must be determined through LM.

143. Proposed other uses will be considered at a later date.
Chairperson and Members  
Commission on Water Resource Management  
State of Hawaii  
Honolulu, Hawaii  

Gentlemen:

Kamehameha Schools/Bernice Pauahi Bishop Estate  
Applications for Water Use,  
Well Construction & Pump Installation Permits  
Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02)  
Kalihi Ground Water Management Area, Oahu

Applicant:  
Kamehameha Schools/  
Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, HI 96817

Landowner:  
Same

Background

The applicant submitted well construction and pump installation permit applications to the Commission on November 12, 1992. The Commission requested that applications for water use permits be submitted and processed concurrently to facilitate and expedite processing of the well-related permit applications. Completed water use permit applications were submitted to the Commission on February 4, 1993. Specific information regarding the sources, use, notification, objections, and field investigation(s) are described in Attachment A and the attached exhibits.

Analysis & Issues

Kamehameha Schools plans to replace its existing wells, Kamehameha Schools 1 & 2 (Well Nos. 2052-07 & 11), with new wells and pumps at new locations. This change is part of an overall water system improvement program intended to increase the safety and reliability of domestic water service within the Kapalama Heights campus of Kamehameha Schools.

The proposed sources are to be located roughly one (1) mile inland from the existing sources and at higher altitudes in the watershed (see Exhibit 1). There may be intermediate-to long-range impacts to wells downgradient; however, due to the relatively small quantity of water requested and the increase in distance from other pumped wells that is afforded by the new locations, negative impacts on other wells in the Kalihi Aquifer System are not anticipated.

The proposed sources will develop 0.229 million gallons per day (mgd) of potable water from the basal portion of the Kalihi Aquifer System. Because the new wells are to replace existing wells and no increase in the existing allocation is requested, there will be no net change in the quantity of water allocated for the aquifer.

Permitted water allocations in the Kalihi Aquifer System currently exceed the estimated sustainable yield of 9 mgd by 3.217 mgd, or about 26.3 percent (see Exhibit 2).
However, on the basis of reported monthly water usage, the actual 12-month moving average withdrawals from the aquifer as of February 28, 1993 are less than the estimated sustainable yield by about 2 mgd, or 20 percent. Preliminary site investigations indicate that facilities for which water was allocated in 1981 may no longer be in existence or may be experiencing diminishing levels of production; water requirements at these sites have decreased correspondingly (see Exhibit 3). Staff is currently working in conjunction with all permitted water users in the Kalihi Aquifer System to develop a plan for re-allocation of the resource that is mutually agreeable to all parties. At this time, there are no other pending applications for water use permits in the Kalihi Aquifer System.

Staff is also in the process of evaluating trends in water levels and chlorides in relation to water withdrawals to determine the nature and extent of impacts, if any, resulting from rates of withdrawals that have, in the past, exceeded the aquifer’s estimated sustainable yield.

No specific objections to this application have been submitted to the Commission. However, a review of this application by the Historic Preservation Division indicated that historic sites exist elsewhere in the parcel; therefore, a special condition of the well construction and water use permits is that an acceptable archaeological inventory survey report be submitted to the State Historic Preservation Division.

RECOMMENDATION

That the Commission approve the issuance of an interim water use permit and well construction/pump installation permits to Kamehameha Schools/Bernice Pauahi Bishop Estate for the reasonable and beneficial use of 0.229 mgd of potable water from the Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02), subject to the standard water use permit conditions listed in Attachment B, the standard well construction/pump installation permit conditions listed in Attachment C, and the following special conditions:

1. The water use permit shall be an interim permit subject to the five year verification period afforded to existing users.
2. The applicant shall submit an acceptable archaeological inventory survey report to the Historic Preservation Division (HPD) of the Department of Land and Natural Resources. If significant historic sites will be adversely affected by this project, a plan to mitigate these effects must be accepted by HPD and successfully completed by the applicant.

Respectfully submitted,

RAE M. LOUI
Deputy Director

APPROVED FOR SUBMITTAL:

KEITH W. AHUE, Chairperson
WATER USE PERMIT DETAILED INFORMATION

Source Information

AQUIFER:

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WELL:

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<th>Bottom of Perforated:</th>
<th>Bottom of Open Hole:</th>
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<th>Grouted Annulus Depth</th>
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ATTACHMENT A
Use Information

Quantity Requested: 229,000 gallons per day.
Existing Type of Water Use: Domestic service within the Kapalama Heights campus of Kamehameha Schools
Place of Water Use: Kamehameha Schools at TMK: 1-6-22:1

Reported Water Usage: 225,704 gpd
Nearby Similar Water Usage: NA gpd
Kalihi Aquifer System
Current 12-Month Moving Average Withdrawal: 7,228,873 gpd (80 % of SY)

Nearby Surrounding Wells and Other Registered Ground Water Use

Excluding Kamehameha Schools existing sources, there are eight (8) other wells within a mile of the proposed wells (see Exhibit 3). None of these wells are currently being pumped. Five (5) of the wells have been sealed; two (2) are being used as observation wells; and one (1) is unused. Information from the registration program indicates there are possibly 35 existing wells in the Kalihi Aquifer System. Several of these wells have been initially field checked but many of the declarants, including the larger users, have not been completely field verified. Several are not in use or are rights claims. Of course, there are several significant users which have not been fully verified to date. However, the Oahu Water Use and Development Plan estimated that the existing withdrawals from the Kalihi Aquifer System are 9.9 mgd as of 1990.

Public Notice

In accordance with HAR §13-171-17, a public notice was published in the Star-Bulletin on May 24, 1993 and June 7, 1993 and copies of the notice were sent to the Mayor’s office and the Board of Water Supply. Additional notice copies were sent to the County Council and Department of Water Supply. Copies of the completed application were sent to the Department of Health, Department of Hawaiian Home Lands, Office of Hawaiian Affairs, Aquatic Resources & Historic Preservation Divisions of the Department of Land and Natural Resources, and other interested parties for comments. Written comments and objections to the proposed permit were to be submitted to the Commission by June 21, 1993.

Objections/Comments

The public notice specifies that an objector meet the following requirements: (1) state property or other interest in the matter; (2) set forth questions of procedure, fact, law, or policy, to which objections are taken; (3) state all grounds for objections to the proposed permits; (4) provide a copy of the objection letter(s) to the applicant, and (5) submit objections meeting the previous requirements to the Commission by June 21, 1993.

To the best of staff’s knowledge there are no objectors who have property interest within the Kalihi Aquifer System or who will be directly and immediately affected by the proposed water use. All objections and/or comments to the application are summarized as follows:

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<th>Objector/Commentator</th>
<th>Objection/Comments</th>
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<tbody>
<tr>
<td>NHAC</td>
<td>General process of water use permit applications. No specific objections to this application.</td>
</tr>
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ATTACHMENT A
Chairperson and Members
Commission on Water Resource Management

July 28, 1993

Forestry and Wildlife No comments or objections.
Natural Area Reserve System No comments or objections.
DOWALD No objections.
Aquatic Resources No objections.
State Parks No comments.
Land Management No comments.
Board of Water Supply No objections.
Historic Preservation Suggest that an archaeological survey of the proposed well sites be conducted.

Briefs in Support

Responses to objections, or briefs in support, regarding the application are required to be filed with the Commission ten (10) days after an objection is filed and, presumably, copies are served to the applicant. No briefs in support were filed with the Commission.

NO BRIEFS SUBMITTED

Field Investigation

The proposed water sources and existing use were investigated on July 6, 1993. The investigation(s) verified the applicants request for a water use permit.
STANDARD WATER USE PERMIT CONDITIONS

1. The ground water described in the water use permit may only be taken from the location described, used for the reasonable-beneficial use described, and at the location described above and in the attachments. Reasonable-beneficial use means "the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is not wasteful and is both reasonable and consistent with the state and county land use plans and the public interest." (HAR §13-171-2).

2. The right to use ground water is a shared use right.

3. The water use must at all times meet the requirements set forth in HAR §13-171-13 which means that it:
   a. Can be accommodated with the available water source;
   b. Is a reasonable-beneficial use as defined in section §13-171-2;
   c. Will not interfere with any existing legal use of water;
   d. Is consistent with the public interest;
   e. Is consistent with state and county general plans and land use designations;
   f. Is consistent with county land use plans and policies; and
   g. Will not interfere with the rights of the Department of Hawaiian Home Lands as provided in section 221 of the Hawaiian Homes Commission Act.

4. The ground water use must not interfere with surface water rights or interim instream flow standards. If it does, then:
   a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
   b. The interim or permanent instream flow standard, as applicable, must be amended.

5. The water use permit is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.

6. The water use permit application and staff submittal approved by the Commission at its July 28, 1993 meeting are incorporated into the permit by reference.

7. Any modification of the permit terms, conditions, or uses can only be made with the express written consent of the Commission on Water Resource Management.

8. The water use permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
   a. Protect water sources in quantity, quality, or both;
   b. Meet other legal obligations including other correlative rights;
   c. Insure adequate conservation measures;
   d. Require efficiency of water uses;
   e. Reserve water for future uses, provided that all legal existing uses of water as of June 1987, shall be protected;
   f. Meet legal obligations to the Department of Hawaiian Homes, if applicable; or
   g. Carry out such other necessary and proper exercise of the State's and the Commission's police powers under law as may be required.

Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

9. If the ground water source is not existing, the development of the new well shall be

ATTACHMENT B
completed, i.e. able to withdraw water for the proposed use on a regular basis, within twenty-four (24) months from the date the water use permit is approved.

10. An approved flowmeter(s) must be installed to measure withdrawals and a monthly record of withdrawals, water-levels, salinity, and temperature must be kept and reported to the Commission on a monthly basis in accordance the Commission’s September 16, 1992 action on reporting requirements;

11. The water use permit shall be subject to the Commission’s periodic review of the applicable aquifer’s sustainable yield. The amount of ground water use authorized by the permit may be reduced by the Commission if the sustainable yield of the Kalihi Aquifer System, or relevant modified aquifer, is reduced;

12. The water use permit may not be transferred or the use rights granted by this permit sold or in any other way alienated. Pursuant to HAR §13-171-25 and the requirements of Chapter 174C, the Commission has the authority to allow the transfer of the permit and the use rights granted by the permit in a manner consistent with HAR §13-171-25. Any such transfer shall only occur with the Commission’s prior express written approval. Any sale, assignment, lease, alienation, or other transfer of any interest in this permit shall be void.

13. The use(s) authorized by law and by the water use permit do not constitute ownership rights.

14. The permittee shall request modification of the permit when necessary to comply with all applicable laws, rules, and ordinances which will affect the permittee’s water use.

15. The permittee shall prepare and submit a water shortage plan within 30 days of issuance of the permit to assist the Commission in fulfilling HAR §13-171-42(c). The permittee’s water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the Kalihi Ground Water Management Area.

16. The water use permit granted shall be an interim water use permit, as allowed under HAR §13-171-21. The final determination of the water use quantity shall be made within five years of the filing of the application to continue the existing use.

17. The water use permit shall be issued only after AG review.

ATTACHMENT B
August 5, 1997

Mr. Michael D. Wilson, Chairman
Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawaii
P.O. Box 373
Honolulu, Hawaii 96809

Attention: Ms. Rae Loui, Deputy Director

Subject: Well "B" Construction Permit Conditions

RE: Well Construction Permit
Kamehameha Schools Well B (Well No. 2051-02)

Dear Ms. Loui:

In accordance with condition no. 6 of well permit No. 2051-02, these items are submitted:

a) Well Completion Report including items 6a, 6b, 6c and 6e
b) Item 6d - Plot plan

If there are any questions, please call me at 842-8603 or Mr. Robert Akinaka at 536-7721.

Very truly yours,

Michael Lum
Facilities Engineer

ML:mo

Att.

Mr. Stephen Bowles, WWS
KAMEHAMEHA SCHOOLS
KAPALAMA WELL "B"
WELL COMPLETION REPORT

State Well No. 2051-02

JUNE 1997

Prepared by Waimea Water Services Inc.
for
Akinaka and Associates Inc.
&
KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE

Kapalama Well B; Completion Report
The Kamehameha Schools Kapalama Well "B" (State Well No. 2051-02) was permitted by the State of Hawaii, Commission on Water Resource Management on July 28, 1993. Due to construction issues with Well A the well was not started. An extension was granted on August 6, 1996 for a well completion date of October 25, 1997.

Plans and specifications by Akinaka and Associates were reviewed and approved by Mr. Mike Lum, PE, Facilities Engineer, Kamehameha Schools. The well location and basic water system site plan were agreed to prior to locating the well in the field. The location maps showing the well location and siting are included along with an overall map of the area.

The Well construction contracts were signed January 27, 1997. Site work was done by others and mobilization on the site started January 29, 1997. Drilling of the pilot hole commenced on February 11, 1997. The pilot hole was completed on February 18, 1997 to a depth of 770 feet below ground.

The bench mark at the well head was set at 717.49' elev. The water level was measured at 695.83 feet (21.66' elev).

A pilot hole was reamed in two passes to 20". Reaming of the pilot hole was completed on March 20, 1997 to 770'.

A video log of the open hole was made on March 25, 1997.
The 14" OD ASTM A-53 solid casing was started on March 26, 1997 and grouting of the annular space around the well casing was completed by April 2, 1997.

The additional 100' of 12.75" open hole drilling commenced on April 7, 1997 and was completed on April 9, 1997 to a total well depth of 870'. An As-built section drawing of the well is attached.

Plumbness and alignment tests were conducted on May 19, 1997 (see attached report). A 40 foot long dummy with three 12.75 inch diameter rings, spaced evenly along it's length, passed freely down the cased well. A cage traverse of the cased well was also performed. The results of the tests showed that the well met the specifications for each 100' and did not vary in excess of more than two-thirds the smallest inside diameter for any 100 foot interval.

PUMPING TEST - SPECIFIC CAPACITY

A specific capacity pumping test of the cased well was conducted on April 26, 1997. The well was surged and developed prior to the test. Air line measurements were made using a 30 lbs. pressure gage with 0.10 psi gradations. Direct water level measurements were made using an electric sounding tape. The non-pumping water level stood at an elevation of 23.08 feet at that time.

The following rates and measurements were recorded.

<table>
<thead>
<tr>
<th>Rate</th>
<th>Drawdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 gpm</td>
<td>0.31 ft.</td>
</tr>
<tr>
<td>750 gpm</td>
<td>0.45 ft.</td>
</tr>
<tr>
<td>800 gpm</td>
<td>0.94 ft.</td>
</tr>
<tr>
<td>850 gpm</td>
<td>1.00 ft.</td>
</tr>
</tbody>
</table>

PUMPING TEST - LONG TERM TEST

A long term test was attempted on April 24, 1997 through April 26, 1997. However, unsteady water levels and a suspected influence was detected from the drilling operations down gradient of well A, which made the test results suspect. The laboratory samples

Kapalama Well B; Completion Report
Page #2
taken were also mishandled by UPS during shipment to the mainland labs and the testing protocol was violated. A new test was scheduled.

A long term aquifer pumping test at a rate of 890 gpm commenced at 8:20 am on May 10, 1997. Water levels were recorded at the pumping well using an air line system and a direct water level was taken by electric sounding.

The pumping water level data after 48 hours (2,880 minutes) resulted in a total drawdown in the pumping well of 1.38 feet. A total of 2,563,200 gallons were pumped at an average rate of 890 gpm. Recovery was within 5 minutes.

The pumping test was stopped after 48 hours of pumping as there had been no change in drawdown or water quality, as measured by electrical conductance and temperature for 48 hours. The pumping rate was stable at an average of 890 gpm, or 390 gpm more than the design rate of 500 gpm.

State Commission of Water Resource Management (CWRM) suggested pumping test protocol calls for at least 48 hours of pumping and if the drawdown water level is stable for 24 hours, test can be stopped. The drawdown stabilized within 360 minutes of the start of the test.

**QUALITY TESTING**

Water quality samples were taken from the pumping well to the end of the pumping test (Monday, May 12, 1997; 9:00 am) by AECOS Laboratories. The current list of contaminates from the State Dept. of Health "Contaminants to be Tested in All New Sources of Potable Water"; revised January 26, 1996) was used for determining the items to be tested for (see attached list of quality results). Based on the results of the laboratory testing, the groundwater from Kamehameha School, Kapalama Well "B" meets the new source quality standards for potable water for the State of Hawaii. The laboratories used were certified by the State Department of Health and included AECOS Labs and Montgomery Laboratory.
<table>
<thead>
<tr>
<th>DATA SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-pumping Water Level</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>Draw down - Water Level</strong></td>
</tr>
<tr>
<td><strong>At 890 gpm</strong></td>
</tr>
<tr>
<td><strong>Ground Elevation</strong></td>
</tr>
<tr>
<td><strong>Pumping Rate (average)</strong></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
</tr>
<tr>
<td><strong>Electrical Conductance</strong></td>
</tr>
<tr>
<td><strong>Total pumpage as of 48 hours</strong></td>
</tr>
<tr>
<td><strong>(2,880 minutes)</strong></td>
</tr>
</tbody>
</table>
CONCLUSIONS AND RECOMMENDATIONS

Based on the data obtained from the aquifer pumping test, it appears that:

1. The Well "B" is capable of reliably producing at the design rate of 500 gpm on a long term production basis and is capable of producing the average daily requirement of 229,000.

2. The drawdown at the design rate of 500 gpm will be less than 0.3 feet.

3. The recommended pump intake setting is at elevation "0" feet, or at mean sea level. This will provide a submergence of about 21 feet. The motor diameter (submersible) should not exceed 12".

4. The water quality tests, based on results of the laboratory analyses, indicate that the groundwater is excellent in quality and meets the Safe Drinking Water Act and State Department of Health requirements.
EXIST. GROUND
WELL "B" ELEV. = 717.5'

14"O.D. STEEL CASING
(3/8" THICKNESS)
ASTM A-53
GRADE B, TYPE E
3" GROUT FILLED
ANNULUS

20" OPEN HOLE

Water Level at
22.49' +/- elev.

STEEL SHOE
BOTTOM OF CASING
ELEV. = -52.5" (WELL "B")

12.75" DIAMETER
OPEN HOLE

BOTTOM OF WELL
ELEV. = -152.5" (WELL "B")

WELL CROSS SECTION DIAGRAM
WELL PERMIT
(attached)
Mr. Mike Lum  
Kamehameha Schools/Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, Hawaii  96817

Dear Mr. Lum:

Well Construction Permit  
Kamehameha Schools Well B (Well No. 2051-02)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s). As part of the Commission's approval, the following special conditions were added and are part of your permit under Standard Permit Condition 11:

Special Conditions

1. The permittee shall use Well No. 2051-01 as an observation well during the pump test for Well No. 2051-02.  
2. The well should not be used for drinking water unless it is properly tested and treated.

Additionally, the Commission authorized the Chairperson to approve and issue a pump installation permit supported by information provided from aquifer pumping test results, required in Well Construction Standard Condition 6e, subject to the Standard Pump Installation Conditions which will be issued to you when we receive your aquifer pump test results.

Please sign the permit copies and return one for our files. Also, copies of the aquifer pump test procedure and the well completion report form are enclosed for your use.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214.

Aloha,

MICHAEL D. WILSON  
Chairperson

Enclosures
WELL CONSTRUCTION PERMIT

Kamehameha Schools Well B. Well No. 2051-02

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-158, entitled “Water Use, Wells, and Stream Diversion Works”, this document permits the construction and testing of Kamehameha Schools Well B (Well No. 2051-02) at Kapalama Heights, Oahu, TMK 1-4-22:1, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 821, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. The permittee shall coordinate with the Commission and conduct a pumping test in accordance with the attached Aquifer Pump Testing Procedure (attached). The permittee shall submit to the Commission the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Commission.

3. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

4. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department’s Historic Preservation Division (587-0045) immediately.

5. 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.

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

7. The permittee shall comply with all applicable laws, rules, and ordinances.

8. The well construction permit application and staff submitted approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

9. The permit may be revoked if work is not started within six (6) months after the date of approval 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.

10. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with 13-158-12(l) prior to any well sealing or plugging work.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: October 23, 1996
Expiration Date: October 23, 1998

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

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: ____________________________
Firm or Title: KAMEHAMEHA SCHOOLS

Printed Name: ____________________________
Firm or Title: BISHOP ESTATE

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment:

USGS
Department of Health/ Safe Drinking Water & Westwater Branches
Honolulu Board of Water Supply
WELL PUMPING TESTS
(attached)
## PUMPING TEST DATA
### STEP DRAWDOWN TEST

<table>
<thead>
<tr>
<th>Drawdown (ft)</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.31</td>
<td>700</td>
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<tr>
<td>0.45</td>
<td>750</td>
</tr>
<tr>
<td>0.94</td>
<td>800</td>
</tr>
<tr>
<td>1.00</td>
<td>850</td>
</tr>
<tr>
<td>1.38</td>
<td>890</td>
</tr>
</tbody>
</table>

### Kapalama Well B Pumping Test: Step Drawdown

![Graph of Kapalama Well B Pumping Test: Step Drawdown](image)
PLUMBNESS AND ALIGNMENT TEST
(attached)
TO: Mr. Mike Lum, PE
Facilities Engineer
FROM: John Stubbart
DATE: 21 May 97
SUBJ: Kamehameha Schools Kapalama Well B
PLUMBNESS SURVEY

The plumbness and alignment survey was run on Monday, 19 May 97. A cage was used for measuring the plumbness. The casing ID was 13.25" and the allowed deviation from vertical shall be no more than 2/3 (66%) per any 100 feet (see attached). This means that no more than 8.74" is allowed. The cage OD was 12.75".

Attached is the data and graphs of the wells for the North and West measurements. The maximum deviation noted was on the west measurements at 540 to 640 feet. This deviation was 5.1", within the tolerances allowed.

It should be noted that the well drift at the bottom was only 6.75 to the north and 6.75 to the west (Northwest) in the cased hole.

The dummy passed freely down the hole. The pump could also be turned by hand while in the hole.

cc: Akinaka and Associates
Wa'elei Drilling and Development
Manabu Tagomori
a minimum of three working days advance notice to the Engineer. The full working days shall fall within the normal Monday through Friday work week, excluding any State or National holiday. The video cassette tape record shall be delivered to the Engineer upon completion and shall become the property of the Owner.

3. **Measurement:** The depth of the well to be paid for shall be the actual depth in lineal feet measured vertically from the surface of the prepared ground to the bottom of the well as ordered by the Engineer. The Contractor shall not receive specific compensation for making the plumbness and alignment tests and video log. The cost of all testing and corrections for plumbness, alignment and well diameter shall be included in the contract price for Proposal Item Nos. 2 and 3.

4. **Well casing** shall be installed as detailed on the drawing and as specified in the Water System Standards.

5. **Grouting of annular space** shall be done as specified in the Water System Standards.

6. **Plumbness and alignment** shall conform to the requirements specified in the Water System Standards dated 1985, Part III, Section 5.6 and as modified below. The maximum deviation from the vertical shall be no more than two-thirds of the inside diameter of the casing per any 100 feet of depth. Only a cage, plummet, Totco or Shure Shot device will be accepted for measuring plumbness.

<table>
<thead>
<tr>
<th>Casing for Kapalama Well B</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.25&quot; I.D.</td>
</tr>
<tr>
<td>thus 2/3 = 66% = 8.74&quot; max. divination</td>
</tr>
</tbody>
</table>

July 1995
### KAPALAMA WELL B ALIGNMENT DATA

**Kapalama Well B**

**WELL ALIGNMENT DATA**

19 OCT 92

---

**CASING TO PULLY =** 30.30

**CASING =** 13.25 ID

**CAGE USED** 12.75 inches

---

<table>
<thead>
<tr>
<th>DEPTH FEET</th>
<th>NORTH / MAUKA</th>
<th>WEST / EWA</th>
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</thead>
<tbody>
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<td>DRIFT CHANGE NORTH DIRECTION</td>
<td>DRIFT CHANGE WEST DIRECTION</td>
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<td></td>
<td>INCHES</td>
<td>DIFF. INCHES</td>
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<td>-6.75</td>
</tr>
</tbody>
</table>

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5.10"
Kapalama Well B Plumbness Survey; West Drift; 19 May 97

Depth in Feet

DRIFT DIFF. INCHES

Alignment in Inches

EAST

WEST

Page 1
WATER QUALITY DATA
(attached)
## REPORT OF ANALYTICAL RESULTS

**CLIENT:** Waimea Water Services  
P.O. Box 326  
Kamuela, HI 96743

**ATTENTION:** Shirleen

**FILE No.:** 457  
**REPORT DATE:** 06/06/97  
**PAGE:** 1 of 4

### SAMPLE TYPE:
Potable water

### DATE SAMPLED:
4/24/97, 5/12/97

### AECOS LOG No.:
10535, 10576  
**DATE RECEIVED:** 4/24/97, 5/12/97

<table>
<thead>
<tr>
<th>ANALYTE</th>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Analysis Date/ ID</th>
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<tbody>
<tr>
<td>Total Coliform</td>
<td>P/A</td>
<td>Absence</td>
<td>SM 9221 B</td>
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<td>Present</td>
<td>---</td>
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<tr>
<td>Fecal Coliform</td>
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<td>Absence</td>
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<td>0.1</td>
<td>0.5/l</td>
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<td>0.18</td>
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<td>4/25/97 me</td>
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<tr>
<td>pH</td>
<td>---</td>
<td>6.5-8.5</td>
<td>EPA 150.2</td>
<td>8.15</td>
<td>---</td>
<td>4/24/97 me</td>
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<tr>
<td>Conductivity</td>
<td>µmhos/cm</td>
<td>1</td>
<td>---</td>
<td>EPA 120.1</td>
<td>282</td>
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<td>4/25/97 me</td>
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<tr>
<td>Temperature</td>
<td>°C</td>
<td>---</td>
<td>---</td>
<td>EPA 170.1</td>
<td>22.0</td>
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<td>4/24/97 me</td>
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<tr>
<td>Fluoride</td>
<td>mg/L</td>
<td>0.10</td>
<td>4</td>
<td>SM4500F</td>
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<td>&lt;0.10</td>
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<td>Nitrates</td>
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<td>0.001</td>
<td>10</td>
<td>EPA 353.2</td>
<td>0.610</td>
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<td>4/25/97 am</td>
</tr>
<tr>
<td>Nitrites</td>
<td>mg N/L</td>
<td>0.001</td>
<td>1</td>
<td>EPA 353.2</td>
<td>0.002</td>
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<td>4/25/97 am</td>
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<tr>
<td>Cyanide</td>
<td>mg/L</td>
<td>0.025</td>
<td>200</td>
<td>SM 4500 CN-F</td>
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<td>&lt;0.025</td>
<td>5/21/97 ML</td>
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<td>Alkalinity</td>
<td>mg/L</td>
<td>4</td>
<td>250</td>
<td>EPA 310.1</td>
<td>70</td>
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<td>5/25/97 me</td>
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<tr>
<td>Calcium</td>
<td>mg/L</td>
<td>1.0</td>
<td>---</td>
<td>EPA 200.7</td>
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<td>12</td>
<td>5/21/97 ML</td>
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<td>Antimony</td>
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<td>0.006</td>
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<td>Arsenic</td>
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<td>0.001</td>
<td>0.05</td>
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<td>&lt;0.001</td>
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<tr>
<td>Barium</td>
<td>mg/L</td>
<td>0.002</td>
<td>2</td>
<td>EPA 200.8</td>
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<td>0.0048</td>
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MCL = Maximum Contaminant Level

J. Mello, Laboratory Director
<table>
<thead>
<tr>
<th>ANALYTE</th>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Analysis Date/ID</th>
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<tbody>
<tr>
<td>Beryllium</td>
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<td>0.004</td>
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<td>5/30/97</td>
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<td>Cadmium</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.005</td>
<td>EPA 200.8</td>
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<tr>
<td>Chromium</td>
<td>mg/L</td>
<td>0.002</td>
<td>0.1</td>
<td>EPA 200.8</td>
<td>---</td>
<td>0.0039</td>
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<tr>
<td>Copper</td>
<td>mg/L</td>
<td>0.002</td>
<td>1.3 *</td>
<td>EPA 200.8</td>
<td>---</td>
<td>&lt;0.002</td>
<td>5/30/97</td>
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<tr>
<td>Lead</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.015 *</td>
<td>EPA 200.8</td>
<td>---</td>
<td>&lt;0.0005</td>
<td>5/30/97</td>
</tr>
<tr>
<td>Mercury</td>
<td>mg/L</td>
<td>0.0002</td>
<td>0.002</td>
<td>EPA 245.1</td>
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<td>&lt;0.0002</td>
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<tr>
<td>Nickel</td>
<td>mg/L</td>
<td>0.005</td>
<td>0.100</td>
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<td>Selenium</td>
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<td>0.005</td>
<td>0.05</td>
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<td>Thallium</td>
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<td>0.002</td>
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<td>&lt;0.001</td>
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**EPA Method 504**

<table>
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<tr>
<th>Analyte</th>
<th>Units</th>
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<th>MCL</th>
<th>Method</th>
<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Analysis Date/ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBCP (Dibromo-chloropropane)</td>
<td>mg/L</td>
<td>0.00001</td>
<td>0.00004</td>
<td>EPA 504.1</td>
<td>---</td>
<td>&lt;0.00001</td>
<td>5/16/97</td>
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<tr>
<td>EDB (Ethylene Dibromide)</td>
<td>mg/L</td>
<td>0.00001</td>
<td>0.00004</td>
<td>EPA 504.1</td>
<td>---</td>
<td>&lt;0.00001</td>
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**EPA Method 508**

<table>
<thead>
<tr>
<th>Analyte</th>
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<th>MCL</th>
<th>Method</th>
<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Analysis Date/ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alachlor</td>
<td>mg/L</td>
<td>0.00005</td>
<td>0.002</td>
<td>EPA 508</td>
<td>---</td>
<td>&lt;0.00005</td>
<td>5/15/97</td>
</tr>
<tr>
<td>Chlordane</td>
<td>mg/L</td>
<td>0.0001</td>
<td>0.002</td>
<td>EPA 508</td>
<td>---</td>
<td>&lt;0.0001</td>
<td>5/15/97</td>
</tr>
<tr>
<td>Endrin</td>
<td>mg/L</td>
<td>0.00001</td>
<td>0.0002</td>
<td>EPA 508</td>
<td>---</td>
<td>&lt;0.00001</td>
<td>5/15/97</td>
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<tr>
<td>Heptachlor</td>
<td>mg/L</td>
<td>0.00001</td>
<td>0.0004</td>
<td>EPA 508</td>
<td>---</td>
<td>&lt;0.00001</td>
<td>5/15/97</td>
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<td>Heptachlor Epoxide</td>
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<td>0.00001</td>
<td>0.0002</td>
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<td>Lindane</td>
<td>mg/L</td>
<td>0.00001</td>
<td>0.0002</td>
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<td>5/15/97</td>
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<tr>
<td>Methoxychlor</td>
<td>mg/L</td>
<td>0.00005</td>
<td>0.04</td>
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<td>&lt;0.00005</td>
<td>5/15/97</td>
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<td>PCB's</td>
<td>mg/L</td>
<td>0.0001</td>
<td>0.0005</td>
<td>EPA 508</td>
<td>---</td>
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<tr>
<td>Toxaphene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.003</td>
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**EPA Method 515.1**

<table>
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<th>MCL</th>
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<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Analysis Date/ID</th>
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<tbody>
<tr>
<td>2,4-D</td>
<td>mg/L</td>
<td>0.0001</td>
<td>0.07</td>
<td>EPA 515.1</td>
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<td>&lt;0.0001</td>
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* = Action Level  
MCL = Maximum Contaminant Level
### Table: Analyte Results

<table>
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<th>Units</th>
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<th>MCL</th>
<th>Method</th>
<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Anal. Date/ID</th>
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<tbody>
<tr>
<td>Pentachlorophenol</td>
<td>mg/L</td>
<td>0.00004</td>
<td>0.001</td>
<td>EPA 515.1</td>
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<td>&lt;0.00004</td>
<td>5/20/97</td>
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<tr>
<td>2,4,5-TP</td>
<td>mg/L</td>
<td>0.0002</td>
<td>0.05</td>
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<td>&lt;0.0002</td>
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<tr>
<td>Dalapon</td>
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<td>0.2</td>
<td>EPA 515.1</td>
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<td>Dinoseb</td>
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<td>0.007</td>
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<td>Picloram</td>
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<td>0.5</td>
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**EPA Method 524.2**

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<th>MCL</th>
<th>Method</th>
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<th>Well B 5/12/97</th>
<th>Anal. Date/ID</th>
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<td>Benzene</td>
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<td>0.0005</td>
<td>0.005</td>
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<td>Carbon</td>
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<td>Tetrachloride</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.075</td>
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<td>5/22/97</td>
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<td>Chlorobenzene</td>
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<td>0.0005</td>
<td>0.1</td>
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<td>5/22/97</td>
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<tr>
<td>ortho-Dichlorobenzene</td>
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<td>0.6</td>
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<td>5/22/97</td>
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<tr>
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<td>0.075</td>
<td>EPA 524.2</td>
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<td>1,1-Dichloroethylene</td>
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<td>mg/L</td>
<td>0.0005</td>
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<td>5/22/97</td>
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<td>Dichlororomethane</td>
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<td>0.0005</td>
<td>0.1</td>
<td>EPA 524.2</td>
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<td>EPA 524.2</td>
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<td>5/22/97</td>
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<td>Ethylbenzene</td>
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<td>0.0005</td>
<td>0.7</td>
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<td>&lt;0.0005</td>
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<td>Styrene</td>
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<td>0.1</td>
<td>EPA 524.2</td>
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<tr>
<td>Tetrachloroethylene</td>
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<td>0.0005</td>
<td>0.005</td>
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<td>---</td>
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<td>5/22/97</td>
</tr>
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<td>Toluene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>1</td>
<td>EPA 524.2</td>
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<td>&lt;0.0005</td>
<td>5/22/97</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.2</td>
<td>EPA 524.2</td>
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<td>&lt;0.0005</td>
<td>5/22/97</td>
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<tr>
<td>1,1,2-Trichloroethane</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.2</td>
<td>EPA 524.2</td>
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<td>&lt;0.0005</td>
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<tr>
<td>1,2,4-Trichlorobenzene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.2</td>
<td>EPA 524.2</td>
<td>---</td>
<td>&lt;0.0005</td>
<td>5/22/97</td>
</tr>
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</table>

**MCL = Maximum Contaminant Level**

---

CLIENT: Waimea Water Services
P.O. Box 326
Kamuela, HI 96743

ATTENTION: Shirleen

FILE No.: 457
REPORT DATE: 06/06/97
PAGE: 3 of 4
LOG No.: 10535, 10576
### ANALYTE Overview

<table>
<thead>
<tr>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Well B 4/24/97</th>
<th>Well B 5/12/97</th>
<th>Analysis Date/ ID</th>
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<tbody>
<tr>
<td>Trichloroethylene</td>
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<td>0.005</td>
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<td>0.0008</td>
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<td>&lt;0.0005</td>
<td>5/22/97 ML</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
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<td>0.002</td>
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<td>5/22/97 ML</td>
</tr>
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<td>Xylenes (Total)</td>
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<td>5/22/97 ML</td>
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<tr>
<td>Atrazine</td>
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<td>&lt;0.00005</td>
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<tr>
<td>Benzo (A) Pyrene</td>
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<td>0.07</td>
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<td>5/21/97 ML</td>
</tr>
<tr>
<td>Di(ethylhexyl)- Adipate</td>
<td>mg/L</td>
<td>0.0006</td>
<td>0.4</td>
<td>EPA 525.2</td>
<td>&lt;0.00006</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Di(ethylhexyl)- Phthalate</td>
<td>mg/L</td>
<td>0.0006</td>
<td>0.05</td>
<td>EPA 525.2</td>
<td>&lt;0.00006</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Hexachloro- benzene</td>
<td>mg/L</td>
<td>0.000005</td>
<td>0.001</td>
<td>EPA 525.2</td>
<td>&lt;0.000005</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Hexachloro- cyclopentadiene</td>
<td>mg/L</td>
<td>0.000005</td>
<td>0.05</td>
<td>EPA 525.2</td>
<td>&lt;0.000005</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Simazine</td>
<td>mg/L</td>
<td>0.000005</td>
<td>0.004</td>
<td>EPA 525.2</td>
<td>&lt;0.000005</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td><strong>EPA Method 531.1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aldicarb</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.003</td>
<td>EPA 531.1</td>
<td>&lt;0.00005</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Aldicarb Sulfone</td>
<td>mg/L</td>
<td>0.0008</td>
<td>0.002</td>
<td>EPA 531.1</td>
<td>&lt;0.00008</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Aldicarb Sulfoxide</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.004</td>
<td>EPA 531.1</td>
<td>&lt;0.00005</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Carbofuran</td>
<td>mg/L</td>
<td>0.0009</td>
<td>0.04</td>
<td>EPA 531.1</td>
<td>&lt;0.00009</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td>Oxamyl</td>
<td>mg/L</td>
<td>0.002</td>
<td>0.2</td>
<td>EPA 531.1</td>
<td>&lt;0.002</td>
<td>5/21/97 ML</td>
</tr>
<tr>
<td><strong>EPA Method 547</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glyphosate</td>
<td>mg/L</td>
<td>0.006</td>
<td>0.7</td>
<td>EPA 547</td>
<td>&lt;0.006</td>
<td>5/22/97 ML</td>
</tr>
<tr>
<td><strong>EPA Method 548.1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endothall</td>
<td>mg/L</td>
<td>0.005</td>
<td>0.1</td>
<td>EPA 548.1</td>
<td>&lt;0.005</td>
<td>5/19/97 ML</td>
</tr>
<tr>
<td><strong>EPA Method 549.1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diquat</td>
<td>mg/L</td>
<td>0.0004</td>
<td>0.02</td>
<td>EPA 549.1</td>
<td>&lt;0.0004</td>
<td>5/16/97 ML</td>
</tr>
<tr>
<td><strong>EPA Method 1613</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dioxin</td>
<td>pg/L</td>
<td>1.2</td>
<td>30</td>
<td>EPA 1613</td>
<td>&lt;1.2</td>
<td>5/22/97 ML</td>
</tr>
</tbody>
</table>

MCL = Maximum Contaminant Level
Laboratory Report

for

AECOS
970 Kalaheo Ave. C311
Kailua, HI 96734
Attention: Snookie De Mello
ACKNOWLEDGMENT OF SAMPLES RECEIVED

AECOS
970 Kalaheo Ave. C311
Kailua, HI 96734
Attn: Snookie De Mello

Customer Code: AECOS
Group#: 34231
Project#: DRINKING
Proj Mgr: Hillary Strayer
Phone: (808) 254-5884

The following samples were received from you on 05/14/97. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Montgomery Watson Laboratories.

<table>
<thead>
<tr>
<th>Sample#</th>
<th>Sample Id</th>
<th>Tests Scheduled</th>
<th>Matrix</th>
<th>Sample Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>970514064</td>
<td>WELL B</td>
<td>@DIQUAT @EDB-DBC @MET-HI @ML525 @ML531 @NPS3 @PESTSDW @VOASDWA GLYPHOS ENDOthal TCDD-</td>
<td>Water</td>
<td>05/12/97</td>
</tr>
<tr>
<td>70514065</td>
<td>TRIP BLANK-HOLD</td>
<td>@VOASDWA</td>
<td>Water</td>
<td>05/12/97</td>
</tr>
</tbody>
</table>

Test Acronym Description

- @DIQUAT: Diquat and Paraquat
- @EDB-DBC: EDB and DBCP by GC-ECD
- @MET-HI: ICPMS Metals
- @ML525: 525 Semivolatiles by GC/MS
- @ML531: Aldicarbs
- @NPS3: Herbicides by 515.1
- @PESTSDW: SDWA Pesticides
- @VOASDWA: Regulated VOCs plus lists 1&3
- CA: Calcium, Total, ICAP
- CNDW: Cyanide
- ENDOthal: Endothall
- F: Fluoride
- GLYPHOS: Glyphosate
- HG: Mercury
- TCDD-DW: 2,3,7,8 - TCDD
# Chain of Custody Form

**AECOS, Inc.**  
970 N. Kalaheo Ave., Suite C311  
Kailua, Oahu, Hawaii 96734  
Tel: (808) 254-5884 Fax: 254-3029

## Sample Information

**CLIENT:** Warman Water  
**ADDRESS:**

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5/12/97</td>
<td>9:16</td>
<td>potable water</td>
<td>2 40 ml vials</td>
<td>EPA 504 (EDB/DBCP)</td>
<td>4 drops HCl</td>
</tr>
<tr>
<td>2</td>
<td>09:06</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 508 (PESTSDWA)</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>09:26</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 515.1 (NPS3)</td>
<td>HCl</td>
</tr>
<tr>
<td>4</td>
<td>09:01</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 525.2 (ML525)</td>
<td>1 ml MCAA</td>
</tr>
<tr>
<td>5</td>
<td>08:53</td>
<td></td>
<td>potable water</td>
<td>2 40 ml vials</td>
<td>EPA 531.1 (ML531)</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>08:19</td>
<td></td>
<td>potable water</td>
<td>1 125 ml glass</td>
<td>EPA 547 (GLYPHOS)</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>09:59</td>
<td></td>
<td>potable water</td>
<td>1 250 ml glass</td>
<td>EPA 548 (ENDOTHAL)</td>
<td>None</td>
</tr>
<tr>
<td>8</td>
<td>09:03</td>
<td></td>
<td>potable water</td>
<td>1 liter poly</td>
<td>EPA 549 (DIQUAT)</td>
<td>None</td>
</tr>
<tr>
<td>9</td>
<td>09:43</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 1613 (TCDD-DW)</td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>09:12</td>
<td></td>
<td>potable water</td>
<td>3 40 ml vials</td>
<td>EPA 524.2 (VOA SDWA)</td>
<td>drop HCl</td>
</tr>
</tbody>
</table>

**PRECAUTIONS:** DISPOSAL: RETURN SAMPLE TO CLINENT □

**SIGNATURES:**

- **RECEIVED BY:** Joann Fisher  
  **SIGNATURE:**  
  **DATE:** 5/12/97  
  **TIME:** 9:16

- **RECEIVED FOR LABORATORY:**  
  **SIGNATURE OR INITIALS:**  
  **DATE:** 5/14/97  
  **TIME:** 11:52

- **RELIENQUISHED:**  
  **SIGNATURE OR INITIALS:**  
  **DATE:** 5/12/97  
  **TIME:** 11:52

**COMMENTS:**
## Chain of Custody Form

**CLIENT:** Waimea Water Services  
**ADDRESS:**

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>5/12/97</td>
<td>09:01</td>
<td>potable water</td>
<td>2</td>
<td>500 ml poly</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>5/12/97</td>
<td>09:10</td>
<td>potable water</td>
<td>1</td>
<td>125 ml poly</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>5/12/97</td>
<td>09:02</td>
<td>potable water</td>
<td>2</td>
<td>liter poly</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>laboratory water</td>
<td>3</td>
<td>40 ml vials</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>5/12/97</td>
<td>09:09</td>
<td>potable water</td>
<td>1</td>
<td>fluoride, alkalinity</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>cyanide</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>metals (Ag, Ba, Be, Ca, Cd, Cr, Cu, Hg, Ni, Pb, Sr, Sn, Ti)</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EPA 524.2 (VOA SDWA)</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mercury</td>
<td></td>
</tr>
</tbody>
</table>

Clients providing samples to the laboratory should complete, in black ink, as much of the above form as possible. Note: name and dated signature of person collecting the sample must be entered below. Information requested in shaded boxes will be provided by the laboratory.

**SAMPLED BY:**  
**DATE:** 5/12/97  
**PRINT NAME:** Jennie Fisher  
**SIGNATURE:**

**RECEIVED BY:**  
**DATE:** 5/12/97  
**SIGNATURE:** Jennie Fisher  
**TIME:** 09:52  
**RECEIVED FOR LABORATORY:**  
**DATE:** 1997  
**SIGNATURE:**  
**TIME:** 09:52  
**RELINQUISHED:**  
**DATE:** 5/13/97  
**SIGNATURE OR INITIALS:** Jennie Fisher  
**TIME:** 09:52  
**RELINQUISHED:**  
**DATE:** 1997  
**SIGNATURE OR INITIALS:**  
**TIME:** 09:52  
**DISPOSAL:**

**RETURN SAMPLE TO CLIENT:**
Subcontractor: Montgomery
Requested By: Snookie Melia
Date: 5/13/97

Results Requested By: normal turn around

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Qty</th>
<th>Sample Type</th>
<th>Analysis Requested</th>
<th>Collection Information</th>
<th>Sample Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10578</td>
<td>2</td>
<td>new source well</td>
<td>EPA 504</td>
<td>5/13/97</td>
<td>HCL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>potable well</td>
<td>EPA 508</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>EPA 515.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>EPA 525.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>EPA 531.1</td>
<td></td>
<td></td>
<td>McAA</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>EPA 547 (Glyphos)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>EPA 548 (Endothal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>EPA 549 (Diquat)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>EPA 1613</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>EPA 524.2</td>
<td></td>
<td></td>
<td>HCL</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>EPA 524.2 TRIP BLANK</td>
<td></td>
<td></td>
<td>HCL</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Fluoride</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Cyanide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes/Special Instructions:
- Metals (See Chain of Custody)
- Mercury

Please analyze for new source well contaminants:
- ONE Sample (Well B). Montgomery provided bottles were used if available so preservatives may have been in the bottles.
Group Validation Comments

Result for TCDD analysis submitted by Quanterra Environmental Services.
Report Summary of positive results, PR34231

<table>
<thead>
<tr>
<th>Analyzed</th>
<th>970514064 WELL B</th>
<th>Result</th>
<th>MDL</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/16/97</td>
<td>Data Entry</td>
<td>05/20/97</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>05/30/97</td>
<td>Barium, Total, ICAP/MS</td>
<td>4.8</td>
<td>2.000</td>
<td>UGL</td>
</tr>
<tr>
<td>05/30/97</td>
<td>Chromium, Total, ICAP/MS</td>
<td>3.9</td>
<td>2.000</td>
<td>UGL</td>
</tr>
<tr>
<td>05/27/97</td>
<td>Di-n-Butylphthalate</td>
<td>0.8B</td>
<td>.500</td>
<td>UGL</td>
</tr>
<tr>
<td>05/28/97</td>
<td>Data Entry</td>
<td>05/29/97</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>05/23/97</td>
<td>Data Entry</td>
<td>05/28/97</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>05/22/97</td>
<td>Calcium, Total, ICAP</td>
<td>12</td>
<td>1.000</td>
<td>MGL</td>
</tr>
</tbody>
</table>

Analyzed 970514065 TRIP BLANK-HOLD
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Result</th>
<th>Conc.</th>
<th>%Rec</th>
<th>Dilution</th>
<th>Det.Limit</th>
<th>Prepared</th>
<th>By</th>
<th>Analyzed</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium, TOTAL, ICAP</td>
<td>(EPA/ML 200.4) mg/l</td>
<td>14</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>21-may-1997</td>
<td>jpa</td>
<td>22-may-1997</td>
<td>jpa</td>
</tr>
<tr>
<td>Cyanide</td>
<td>(ML/S4500CN-F) mg/l</td>
<td>ND</td>
<td>0.025</td>
<td></td>
<td></td>
<td></td>
<td>21-may-1997</td>
<td>vrg</td>
<td>21-may-1997</td>
<td>vrg</td>
</tr>
<tr>
<td>Endotoxin</td>
<td>(NL/EPA 944.1) ug/l</td>
<td>ND</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>12-may-1997</td>
<td>wpt</td>
<td>19-may-1997</td>
<td>crw</td>
</tr>
<tr>
<td>Fluoride</td>
<td>(SM 4500F) mg/l</td>
<td>ND</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
<td>15-may-1997</td>
<td>vrg</td>
<td>15-may-1997</td>
<td>vrg</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>(ML/EPA 54) ug/l</td>
<td>ND</td>
<td>ND</td>
<td></td>
<td></td>
<td></td>
<td>22-may-1997</td>
<td>crw</td>
<td>22-may-1997</td>
<td>crw</td>
</tr>
<tr>
<td>Mercury</td>
<td>(EPA/ML 243.1) ug/l</td>
<td>ND</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td>23-may-1997</td>
<td>gne</td>
<td>23-may-1997</td>
<td>gne</td>
</tr>
<tr>
<td>1,3,5,7,8-PeDDT</td>
<td>(EPA 1612) pg/g/L</td>
<td>ND</td>
<td>1.7</td>
<td></td>
<td></td>
<td></td>
<td>21-may-1997</td>
<td>sub</td>
<td>21-may-1997</td>
<td>sub</td>
</tr>
</tbody>
</table>

Report #: 34231
Laboratory Report

Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-may-1997  Received 14-may-1997  Reported 03-jun-1997

Single Determination Analytes
Quality Control

<table>
<thead>
<tr>
<th>Control</th>
<th>Parameter</th>
<th>Units</th>
<th>Actual</th>
<th>Found</th>
<th>%Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCS1</td>
<td>Calcium, Total, ICAP</td>
<td>mg/l</td>
<td>50</td>
<td>52.8</td>
<td>106</td>
</tr>
<tr>
<td>LCS2</td>
<td>Calcium, Total, ICAP</td>
<td>mg/l</td>
<td>50</td>
<td>51.8</td>
<td>104</td>
</tr>
<tr>
<td>MS</td>
<td>Calcium, Total, ICAP</td>
<td>mg/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>MSD</td>
<td>Calcium, Total, ICAP</td>
<td>mg/l</td>
<td>50</td>
<td>53.9</td>
<td>108</td>
</tr>
<tr>
<td>LCS1</td>
<td>Cyanide</td>
<td>mg/l</td>
<td>0.10</td>
<td>0.10</td>
<td>100</td>
</tr>
<tr>
<td>MS</td>
<td>Cyanide</td>
<td>mg/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>MSD</td>
<td>Cyanide</td>
<td>mg/l</td>
<td>0.10</td>
<td>0.095</td>
<td>95</td>
</tr>
<tr>
<td>LCS1</td>
<td>Endothall</td>
<td>ug/l</td>
<td>25</td>
<td>25.3</td>
<td>101</td>
</tr>
<tr>
<td>MS</td>
<td>Endothall</td>
<td>ug/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>MSD</td>
<td>Endothall</td>
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Report #: 34231
Sample Type: Water  | Sampled: 12-May-1997 | Received: 14-May-1997 | Reported: 03-Jun-1997

**Diquat and Paraquat**  
(ML/EPA 549.1)

<table>
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<tr>
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<th>Conc.</th>
<th>%Rec</th>
<th>Dilution</th>
<th>Det. Limit</th>
<th>Prepared By</th>
<th>Analyzed By</th>
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Report #: 34231
Laboratory Report

AECOS
970 Kalaheo Ave. C311
Kailua, HI 96734
ATTN: Snookie De Mello

Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-may-1997  Received 14-may-1997  Reported 03-jun-1997

Diquat and Paraquat Quality Control (ML/EPA 549.1)

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<th>Found</th>
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Report #: 34231
**Sample ID**: 270314054  
**Sample Type**: Water  
**Sampled** 12-May-1997  
**Received** 14-May-1997  
**Reported** 03-Jun-1997  

### EDB and DBCP by GC-ECD  
*(ML/EPA 504.1)*

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<th>Det. Limit</th>
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<th>Analyzed By</th>
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**Report #: 34231**
## Laboratory Report

Sample #: 970514064  Sample ID: WELL B  Project: DRINKING
Sample Type: Water  Sampled: 12-May-1997  Received: 14-May-1997  Reported: 03-Jun-1997

### EDB and DBCP by GC-ECD (ML/EPA 504.1)

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Report #: 34231
Sample # 970514064  Sample ID WELL B  Project DRINKING

Sample Type Water  Sampled 22-may-1997  Received 14-may-1997  Reported 03-jun-1997

EDB and DBCP by GC-ECD  (ML/EPA 504.1 )  

Quality Control

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<th>Found</th>
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Report #: 34231
### Sample Information

- **Sample ID:** WELL E
- **Sample Type:** Water
- **Sampled:** 12-May-1997
- **Received:** 14-May-1997
- **Reported:** 03-Jun-1997

### ICPMS Metals (ML 200.8)

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<th>Conc.</th>
<th>%Rec</th>
<th>Dilution</th>
<th>Det. Limit</th>
<th>Prepared</th>
<th>By</th>
<th>Analyzed</th>
<th>By</th>
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Report #: 34231

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**Laboratory Report**

ARCOS
970 Kalaeo Ave. C311
Kailua, HI 96734
ATTN: Snookie De Mello
<table>
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<tr>
<th>Control</th>
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Report #: 34231
Laboratory Report

Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-may-1997  Received 14-may-1997  Reported 03-Jun-1997

525 Semivolatiles by GC/MS  (ML/EPA 525.2 )
Surrogate Summary

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Report #: 34231
Laboratory Report

AECOS
970 Kalaeo Ave. C111
Kailua, HI 96734
ATTN: Snookie De Mello

Sample #: 970514064    Sample ID WELL B    Project: DRINKING
Sample Type: Water    Sampled: 12-may-1997    Received: 14-may-1997    Reported: 03-jun-1997

525 Semivolatile by GC/MS (ML/EPA 525.2)
Quality Control

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Laboratory Report

Sample # 970514064    Sample ID WELL B          Project DRINKING
Sample Type Water      Sampled 12-May-1997 Received 14-May-1997 Reported 03-Jun-1997

525 Semivolatiles by GC/MS (ML/EPA 525.2)
Quality Control

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Report #: 34231
## Laboratory Report

**Sample #**: 970514064  
**Sample ID**: WELL-B  
**Sample Type**: Water  
**Sampled**: 12-May-1997  
**Received**: 14-May-1997  
**Reported**: 03-Jun-1997  
**Project**: DRINKING

### 525 Semivolatiles by GC/MS  
*(ML/EPA 525.2)*

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<th>Found</th>
<th>%Recv</th>
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**Report #:** 34231
### Laboratory Report

**Sample ID WELL B**

**Sample Type Water**

**Sample 12-may-1997**

**Received 14-may-1997**

**Reported 03-jun-1997**

### Aldicarb Sulfoxide (ML/EPA 531.1)

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Sample # 970514064   Sample ID WELL B       Project DRINKING
Sample Type Water    Sampled 12-may-1997 Received 14-may-1997 Reported 03-jun-1997

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Report #: 34231
**Sample # 970514064  Sample ID WELL B**

Sample Type: Water  Sampled: 12-may-1997  Received: 14-may-1997  Reported: 03-jun-1997

### Aldicarbs

**Quality Control (ML/EPA 531.1)**

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Report #: 34231
Sample # 970514006, Sample ID WELL B, Project DRINKING
Sample Type Water, Sampled 12-May-1997, Received 14-May-1997, Reported 01-Jun-1997

Herbicides by 515.1 (ML/EPA 515.1)

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<th>% Rec</th>
<th>Dilution</th>
<th>Det. Limit</th>
<th>Prepared By</th>
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Report #: 34231
### Sample Information

Sample #: 970514064  
Sample ID: WELL B  
Sample Type: Water  
Sampled: 12-May-1997  
Received: 14-May-1997  
Reported: 03-Jun-1997

### Herbicides by 515.1 (ML/EPA 515.1)

**Surrogate Summary**

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Report #: 34231
Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-May-1997  Received 14-May-1997  Reported 03-Jun-1997

Herbicides by 515.1 (ML/EPA 515.1)

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Report #: 34231
Sample #: 970514064  Sample ID: WELL B  Project: DRINKING
Sample Type: Water  Sampled: 12-May-1997  Received: 14-May-1997  Reported: 03-Jun-1997

Herbicides by 515.1
Quality Control
(ML/EPA 515.1)

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Report #: 34231
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Laboratory Report

Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-May-1997  Received 14-May-1997  Reported 03-Jun-1997

SDWA Pesticides (ML/EPA 508 )

Surrogate Summary

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Report #: 34231
## Laboratory Report

**Sample # 970514064**  
Sample ID: WELL B  
Sample Type: Water  
Sampled: 12-may-1997  
Received: 14-may-1997  
Reported: 03-jun-1997

### SDWA Pesticides (ML/EPA 508)

**Quality Control**

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Report #: 34231
## Laboratory Report

**Sample #** 270514664 | **Sample ID** WELL B | **Project** DRINKING
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**Sample Type** Water | **Sampled** 12-May-1997 | **Received** 14-May-1997 | **Reported** 03-Jun-1997

### SDWA Pesticides

#### Quality Control

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Regulated VOCs plus Lists 1 & 3 (EPA 524.2)

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Report #: 34231
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Report #: 34231
Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-May-1997  Received 14-May-1997  Reported 01-Jun-1997

Regulated VOCs plus Lists 1&3 (EPA 524.2)

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<th>Result</th>
<th>Conc. %Rec</th>
<th>Dilution</th>
<th>Det. Limit</th>
<th>Prepared</th>
<th>By</th>
<th>Analyzed</th>
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Report #: 34231
Sample #: 970514064    Sample ID: WELL B    Project: DRINKING
Sample Type: Water    Sampled: 12-May-1997    Received: 14-May-1997    Reported: 03-Jun-1997

Regulated VOCs plus Lists 1&3 (EPA 524.2)

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Report #: 34231
### Regulated VOCs plus Lists 1 & 3 (EPA 524.2)

#### Quality Control

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<th>Found</th>
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Report #: 34231
Regulated VOCs plus Lists 1&3 (EPA 524.2)

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Laboratory Report

MONTGOMERY WATSON LABORATORIES
555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6226;
1 800 566 LABS (1 800 566 5227)

Sample # 970514064  Sample ID WELL B  Project DRINKING
Sample Type Water  Sampled 12-may-1997  Received 14-may-1997  Reported 03-jun-1997

Regulated VOCs plus Lists 1&3 (EPA 524.2 )
Quality Control

<table>
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<tr>
<th>Control Parameter</th>
<th>Units</th>
<th>Actual</th>
<th>Found</th>
<th>%Recv</th>
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Report #: 34231
Sample #: 970514266       Sample ID: WELL B       Project: DRINKING
Sample Type: Water       Sampled: 12-may-1997  Received: 14-may-1997  Reported: 03-jun-1997

Regulated VOCs plus Lists 1&3 (EPA 524.2 )
Quality Control

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Report #: 34231
**Regulated VOCs plus Lists 1 & 3 (EPA 524.2)**

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<td>p-Isopropyltoluene</td>
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## Laboratory Report

**Sample #** 970514065  
**Sample ID** TRIP BLANK-HOLD  
**Sample Type** Water  
**Sampled** 12-may-1997  
**Received** 14-may-1997  
**Reported** 03-jun-1997  
**Project** DRINKING

**Regulated VOCs plus Lists 1&3 (EPA 524.2)**

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<thead>
<tr>
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<th>Result</th>
<th>Conc.</th>
<th>%Rec</th>
<th>Dilution</th>
<th>Det.Limit</th>
<th>Prepared</th>
<th>By</th>
<th>Analyzed</th>
<th>By</th>
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Report #: 34231

38
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Regulated VOCs plus Lists 1&3 (EPA 524.2 )

Surrogate Summary

Report #: 34231
Regulated VOCs plus Lists 1&3 (EPA 524.2)

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<td>Benzene</td>
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<td>Chlorodibromomethane</td>
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Report #: 34231
Sample #: 970514065  Sample ID: TRIP BLANK-HOLD
Sample Type: Water  Sampled: 12-May-1997  Received: 14-May-1997  Reported: 03-Jun-1997

Regulated VOCs plus Lists 1&3 (EPA 524.2 )
Quality Control

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<th>%Recv</th>
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Report #: 34231
## Laboratory Report

**Regulated VOCs plus Lists 1&3 (EPA 524.2) Quality Control**

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<th>%Recv</th>
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<tr>
<td>MBLK</td>
<td>trans-1,2-Dichloroethylene</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
</tr>
<tr>
<td>MBLK</td>
<td>tert-Butylbenzene</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
</tr>
<tr>
<td>MBLK</td>
<td>Trichloroethylene (TCE)</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
</tr>
<tr>
<td>MBLK</td>
<td>Trichlorotrifluoroethane (Freon)</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
</tr>
<tr>
<td>MBLK</td>
<td>trans-1,3-Dichloropropene</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
</tr>
<tr>
<td>MBLK</td>
<td>Toluene</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
</tr>
</tbody>
</table>

Report #: 34231

---

Sample #: 970514055  Sample ID TRIP BLANK-HOLD  Project DRINKING
Sample Type: Water  Sampled: 12-May-1997  Received: 14-May-1997  Reported: 03-Jun-1997

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

AECOS
970 Kalaeo Ave. C11
Kailua, HI 96734
ATTN: Snookie De Mello
Sample # 270514065  Sample ID TRIP BLANK-HOLD  Project DRINKING
Sample Type Water  Sampled 12-may-1997  Received 14-may-1997  Reported 03-jun-1997

Regulated VOCs plus Lists 1&3 (EPA 524.2 )
Quality Control

<table>
<thead>
<tr>
<th>Control</th>
<th>Parameter</th>
<th>Units</th>
<th>Actual</th>
<th>Found</th>
<th>% Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>4MBLX</td>
<td>Vinyl chloride (VC)</td>
<td>ug/l</td>
<td>ND</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Report #: 34231
### Chain of Custody Form

**AECOS, Inc.**

970 N. Kalaheo Ave., Suite C311
Kailua, Oahu, Hawaii  96734
Tel: (808) 254-5884  Fax: 254-3029

---

**CLIENT:** Waimea Water Services  
**ADDRESS:**

**PROJECT FILE No.**  
**LOG NUMBER**

---

**SAMPLES**

<table>
<thead>
<tr>
<th>No.</th>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Well B</td>
<td>5/12/97</td>
<td>05:01</td>
<td>potable water</td>
<td>2</td>
<td>Fluoride, Alkalinity</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>09:10</td>
<td>potable water</td>
<td>1</td>
<td>Cyanide</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td>09:02</td>
<td>potable water</td>
<td>2</td>
<td>Metals (As, Ba, Be, Ca, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Ti)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Trip blank</td>
<td></td>
<td>09:16</td>
<td>laboratory water</td>
<td>3</td>
<td>EPA 524.2 (VOA SDWA)</td>
<td>Mercury</td>
</tr>
</tbody>
</table>

---

**Clients providing samples to the laboratory should complete, in black ink, as much of the above form as possible. Note: Name and dated signature of person collecting the sample must be entered below. Information requested in shaded boxes will be provided by the laboratory.**

---

**Sampled By:**

**Date:** 5/12/97  
**Signature:**

**Relinquished:**

**Date:** 5/13/97  
**Signature:**

**Comments:**

---

**Received By:**

**Date:** 5/12/97  
**Signature:**

**Relinquished:**

**Date:** 5/13/97  
**Signature:**

**Precautions:**

---

**Received for Laboratory:**

**Date:** 1997  
**Signature:**

**Relinquished:**

**Date:** 1997  
**Signature:**

**Disposal:**

**Return Sample to Client:**
**CHAIN OF CUSTODY FORM**

**PROJECT FILE No.**

**LOG NUMBER** 1105351

---

**CLIENT:** Waihe'e Ho Services  
**ADDRESS:**

**CONTACT:**  
**PHONE No.:**

**Purchase Order No.:**

---

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PREPARATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4/04/17</td>
<td>1545</td>
<td>potable water</td>
<td>whirlpaks</td>
<td>Total &amp; Fecal Coliforms, Temp Control</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>potable water</td>
<td>1 Liter</td>
<td>pH, Conductivity, Turbidity, Temperature</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>potable water</td>
<td>2 125 ml</td>
<td>Nuts &quot;A&quot; (Nitrate), Nuts &quot;B&quot; (Nitrite)</td>
<td></td>
</tr>
</tbody>
</table>

---

**SPECIAL INSTRUCTIONS**

Clients providing samples to the laboratory should complete, in black ink, as much of the above form as possible. Note: Name and dated signature of person collecting the sample must be entered below. Information requested in shaded boxes above to be filled in by the laboratory.

---

**SAMPLED BY:** Mapuana Cunningham  
**DATE:** 4/24/17  
**TIME:** 1545  
**SIGNATURE OR INITIALS:**  
**COMMENTS:**

---

**RECEIVED BY:**  
**DATE:** 109-  
**TIME:** 1545  
**SIGNATURE OR INITIALS:**  
**PRECAUTIONS:**

---

**RECEIVED FOR LABORATORY:**  
**DATE:** 4/24  
**TIME:** 1545  
**SIGNATURE OR INITIALS:**  
**DISPOSAL:**

---

**RELINQUISHED:**  
**DATE:** 4/24/17  
**TIME:** 1545  
**SIGNATURE:**  
**COMMENTS:**

---

**RELINQUISHED:**  
**DATE:** 109-  
**TIME:** 1545  
**SIGNATURE OR INITIALS:**  
**DISPOSAL:**

---

**RELINQUISHED:**  
**DATE:** 109-  
**TIME:** 1545  
**SIGNATURE OR INITIALS:**  
**DISPOSAL:**

---

**RETURN SAMPLE TO CLIENT**
**CLIENT:** Waimea H₂O Services  
**ADDRESS:**

**PROJECT FILE No.**  
**LOG NUMBER:**

**RUSH**  
**SEE REVERSE**

### SAMPLED

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4/24/94</td>
<td>1543</td>
<td>potable water</td>
<td>40 ml vials</td>
<td>EPA 504 (EDB/DBCP)</td>
<td>4 drops HCl (26%)</td>
</tr>
<tr>
<td>2</td>
<td>1530</td>
<td></td>
<td>potable water</td>
<td>liter glass</td>
<td>EPA 508 (PESTSDWA)</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>1533</td>
<td></td>
<td>potable water</td>
<td>liter glass</td>
<td>EPA 515.1 (NPS3)</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>1539</td>
<td></td>
<td>potable water</td>
<td>liter glass</td>
<td>EPA 525.2 (ML525)</td>
<td>1 ml MCAA</td>
</tr>
<tr>
<td>5</td>
<td>1543</td>
<td></td>
<td>potable water</td>
<td>40 ml vials</td>
<td>EPA 531.1 (ML531)</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>1545</td>
<td></td>
<td>potable water</td>
<td>126 ml glass</td>
<td>EPA 547 (GLYPHOS)</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>1536</td>
<td></td>
<td>potable water</td>
<td>250 ml glass</td>
<td>EPA 548 (ENDOTIIAL)</td>
<td>None</td>
</tr>
<tr>
<td>8</td>
<td>1530</td>
<td></td>
<td>potable water</td>
<td>liter poly</td>
<td>EPA 549 (DIQUAT)</td>
<td>None</td>
</tr>
<tr>
<td>9</td>
<td>1524</td>
<td></td>
<td>potable water</td>
<td>liter glass</td>
<td>EPA 1613 (TCDD-DW)</td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>1544</td>
<td></td>
<td>potable water</td>
<td>40 ml vials</td>
<td>EPA 524.2 (VOA SDWA)</td>
<td>drop HCl,</td>
</tr>
</tbody>
</table>

Clients providing samples to the laboratory should complete, in black ink, as much of the above form as possible. Note: Name and dated signature of person collecting the sample must be entered below. Information requested in shaded boxes will be provided by the laboratory.

**SAMPLED BY:**  
**DATE:** 4/24  
**SIGNATURE:**

**RECEIVED BY:**  
**DATE:** 4/24  
**SIGNATURE:**

**RECEIVED FOR LABORATORY:**  
**DATE:**

**SIGNATURE OR INITIALS:**

**DISPOSAL:**

**RETURN SAMPLE TO CLIENT**
## Sample Log

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>4/24</td>
<td>1535</td>
<td>potable water</td>
<td>2</td>
<td>300 ml poly, 125 ml poly</td>
<td>Fluoride, Alkalinities</td>
</tr>
<tr>
<td>12</td>
<td>4/24</td>
<td>1527</td>
<td>potable water</td>
<td>1</td>
<td>125 ml poly</td>
<td>Cyanide</td>
</tr>
<tr>
<td>13</td>
<td>4/24</td>
<td>1535</td>
<td>potable water</td>
<td>3</td>
<td>liter-only 500 ml</td>
<td>Metals (As, Ba, Be, Ca, Cd, Cr, Co, Cu, Hg, Ni, Pb, Sb, Sc, Ti)</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>laboratory water</td>
<td>3</td>
<td>40 ml vials</td>
<td>EPA 524.2 (VOA SDWA)</td>
</tr>
</tbody>
</table>

**Clients providing samples to the laboratory should complete, in black ink, as much of the above form as possible. Note: Name and dated signature of person collecting the sample must be entered below. Information requested in shaded boxes will be provided by the laboratory.**

---

**Sampled by:** Maquana Cunningham  
**Date:** 4/24  
**Print Name:**  
**Relinquished:**  
**Date:** 4/24  
**Signature:**  
**Time:** 1543

---

**Received by:**  
**Date:** 4/24  
**Signature:**  
**Time:** 1635

---

**Received for Laboratory:**  
**Date:**  
**Signature:**  
**Time:**  
**Reelinquished:**  
**Date:**  
**Signature or Initials:**  
**Time:**  
**Disposal:**

---

**Comments:**

**Precautions:**

---

**Return Sample to Client:**
Subcontractor: Montgomery  
Requested By: Snookie Mello  
Date: 5/2/97  
Results Requested By: normal turnaround

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Key</th>
<th>Sample Type</th>
<th>Analysis Requested</th>
<th>Collection Information</th>
<th>Sample Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10576</td>
<td>2</td>
<td>new source well</td>
<td>EPA 504</td>
<td>5/10/97</td>
<td>HCL</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>portable test</td>
<td>EPA 508</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>EPA 515.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>EPA 525.2</td>
<td></td>
<td>HCL</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>vials</td>
<td>EPA 531.1</td>
<td></td>
<td>MCAA</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>EPA 547 (Glyphos)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>EPA 548 (Endothal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>EPA 549 (Diquat)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>EPA 1613</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>EPA 524.2</td>
<td></td>
<td>HCL</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>vials</td>
<td>EPA 524.2 Blank</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Fluoride</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Cyanide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes/Special Instructions:  
Mercury

Please analyze for new source well contaminants:  
ONE sample (well B). Montgomery provided bottles  
were used if any. So preservatives may have been in the  
bottles.
**CLIENT:** Waimea Water  
**ADDRESS:**

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5/12/97</td>
<td>0916</td>
<td>potable water</td>
<td>20 ml vials</td>
<td>EPA 504 (EDB/DBCP)</td>
<td>4 drops HCl</td>
</tr>
<tr>
<td>2</td>
<td>0926</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 508 (PESTSDWA)</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>0927</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 515.1 (NPS3)</td>
<td>HCl</td>
</tr>
<tr>
<td>4</td>
<td>0928</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 525.2 (ML525)</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>0913</td>
<td></td>
<td>potable water</td>
<td>40 ml vials</td>
<td>EPA 531.1 (ML531)</td>
<td>1 ml MCAA</td>
</tr>
<tr>
<td>6</td>
<td>0911</td>
<td></td>
<td>potable water</td>
<td>125 ml glass</td>
<td>EPA 547 (GLYPHOS)</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>0919</td>
<td></td>
<td>potable water</td>
<td>250 ml glass</td>
<td>EPA 548 (ENDOTHAL)</td>
<td>None</td>
</tr>
<tr>
<td>8</td>
<td>0908</td>
<td></td>
<td>potable water</td>
<td>1 liter poly</td>
<td>EPA 549 (DIQUAT)</td>
<td>None</td>
</tr>
<tr>
<td>9</td>
<td>0907</td>
<td></td>
<td>potable water</td>
<td>2 liter glass</td>
<td>EPA 1613 (TCDD-DW)</td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>0912</td>
<td></td>
<td>potable water</td>
<td>40 ml vials</td>
<td>EPA 524.2 (VOA SDWA)</td>
<td>drop HCl</td>
</tr>
</tbody>
</table>

**SPECIAL INSTRUCTIONS**

**CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE, IN BLACK INK, AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW. INFORMATION REQUESTED IN SHADED BOXES WILL BE PROVIDED BY THE LABORATORY.**

**SAMPLED BY:** Joann Fisher  
**RECEIVED BY:** Joann Fisher  
**RELINQUISHED:** Joann Fisher  
**PRECAUTIONS:**
### SAMPLED

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLE TYPE</th>
<th>CONTAINER(S)</th>
<th>REQUESTED ANALYSES</th>
<th>PRESERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>5/12/97</td>
<td>0900</td>
<td>potable water</td>
<td>500 ml poly</td>
<td>Fluoride, Alkalinity</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>5/12/97</td>
<td>0900</td>
<td>potable water</td>
<td>125 ml poly</td>
<td>Cyanide</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>05/07</td>
<td>0916</td>
<td>potable water</td>
<td>1 liter poly</td>
<td>Metals (As, Be, Ba, Ca, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Ti)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>05/07</td>
<td>0916</td>
<td>laboratory water</td>
<td>40 ml vials</td>
<td>EPA 524.2 (VOA SDWA)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0909</td>
<td>0909</td>
<td>potable water</td>
<td>1 vial</td>
<td>Fluoride</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>0909</td>
<td>0909</td>
<td></td>
<td></td>
<td>Mercury</td>
<td></td>
</tr>
</tbody>
</table>

**CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE, IN BLACK INK, AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW. INFORMATION REQUESTED IN SHADED BOXES WILL BE PROVIDED BY THE LABORATORY.**

**SAMPLED BY:**
- **PRINT NAME:**
- **DATE:** 5/12/97

**RECEIVED BY:**
- **DATE:** 5/12/1997

**RECEIVED FOR LABORATORY:**
- **DATE:** 5/12/1997

**SIGNATURE:**
- **TIME:** 1152

**RELINQUISHED:**
- **DATE:** 5/13/1997

**SIGNATURE OR INITIALS:**
- **TIME:** 1152

**PRECAUTIONS:**
- **TIME:** 1152

**DISPOSAL:**
- **TIME:** 1152

**RETURN SAMPLE TO CLIENT**
WELL DRILLING CONTRACTORS
COMPLETION REPORT
(attached)
WELL COMPLETION REPORT

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

WELL COMPLETION REPORT

3/20/98 WCR Form

(Check Appropriate Box)  ♦ Well Construction  ♦ (Permanent) Pump installation

1. State Well No.: 201-02  Well Name: Kaplama Well "A"  Island: OAHU
2. Location/Address: Kaplama Stree, KAPLAMA HEIGHTS  Tax Map Key: 1-62-22

PART I

WELL CONSTRUCTION REPORT

3. Drilling Company: WAI'ELI DRILLING & DEVELOPMENT
4. Name of driller who performed work: TOM HELFRIECH
5. Type of rig/constructor: ROTARY
6. Date(s) Well Construction and pump tests (if any) completed: 5/20/97
7. GROUND ELEVATION (referenced to mean sea level, feet): 717.5
   Well Bench Mark (description/location): at well head
   Elevation (feet): 717.49
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)
   Depth (ft)  Rock Description, Water Level, Dates, etc.
   0 to 665  hard/medium layers
   666 to 670  hard
   (If more space is needed, continue on back.)

9. Total depth of well below ground: 870  ft.
10. Hole size:
    20  inch dia. from  0  ft. to  770  ft. below ground
    12  3/4 in. dia. from 770  ft. to  870  ft. below ground
    11  1/2 in. dia. from 870  ft. to  1000  ft. below ground

11. Casing installed:
    14  in. O.D. x 37  ft. in wall solid section to 770  ft. below ground
    14  in. I.D. x 37  ft. in wall perforated section to  770  ft. below ground
    Casing Material/ID Size: none

12. Annulus:
    gravel packed from  0  ft. below ground to  770  ft. below ground

13. Initial water level: 695  ft. below ground
14. Initial chloride: 60  ppm
15. Initial temperature: 20.3  °F
16. PUMPING TESTS: Reference Point (R.P.) used:
    ground level, which elevation is 717.5  ft.
    (1) Step-Drawdown Test Date: 4/26/97
        Start water level: 696.61  ft. below R.P.
        End water level: 695.6  ft. below R.P.
    (2) Long-term Aquifer Test Date: 4/26/97
        Start water level: 695.0  ft. below R.P.
        End water level: 696.48  ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs (10/88 LTAT Form) attached?  x Yes  No
18. As-built drawings attached?  x Yes  No
19. Other remarks/comments: (Print back of this form)

Well Drilling Contractor
WAI'ELI DRILLING  Licence No.: C-57 Licence No.: C-16543

Signature:  Date: May 27, 1997

Surveyor (print):  Coulter/Neidic Surveying  Licence No.: 6105

Signature:  Date: 6/9/97

Applicant (print):  Kamalahele School District  Bishop Estate

Signature:  Date: 6/26/97

P 02
<table>
<thead>
<tr>
<th>FROM:</th>
<th>DATE: 8/1</th>
<th>SUSPENSE DATE:</th>
</tr>
</thead>
</table>

**TO:**
- BAUER, G.
- CHING, F.
- FUJII, N.
- HARDY, R.
- HIGA, D.
- HIRANO, E.
- ICE, C.
- IMATA, R.
- JINNAI, R.
- KUNIMURA, I.

**INIT:**

**TO:**
- LOUI, R.
- NAKAMA, L.
- NAKANO, D.
- OHYE, M.
- SAKADA, E.
- SUBIA, S.
- SWANSON, S.
- UWANE, J.
- YODA, K.

**INIT:**

**FOR:**
- Approval
- Signature
- Information

**PLEASE:**
- See Me
- Review & Comment
- Take Action
- Type Draft
- Type Final
- File
- Xerox ___ copies

---

*my updates to file - consistent?*
The Honorable Michael D. Wilson  
Chairman of the Board  
ATTN: Rae Loui, Deputy Director  
Department of Land and Natural Resources  
1151 Punchbowl Street  
Honolulu, Hawaii  96813

Dear Mr. Wilson:

SUBJECT:  PROPOSED SOURCE OF POTABLE WATER

Enclosed for your review and comments is a copy of the engineering report for the following source:

Kamehameha Schools Well "B"  
State Well No. 3-2051-02  
Honolulu, Oahu

This report has been prepared pursuant to Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, section 11-20-29.

The Department of Health will use your comments in determining the potential impacts which may result by the proposed project.

Please submit your comments to the Safe Drinking Water Branch within 30 days from the date of this letter. You may also return the engineering report to this office if you do not need it for future reference.

If you should have any questions, please call the Safe Drinking Water Branch, Engineering Section, at 586-4258.

Sincerely,

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

Enclosure
PRELIMINARY ENGINEERING REPORT FOR NEW POTABLE WATER SOURCES

KAMEHAMEHA SCHOOLS WELL "B" (STATE WELL 2051-02) HONOLULU, HAWAII, 96817 TMK: 1ST DIV; 1-6-22:01

PREPARED FOR:
KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE KAPALAMA HEIGHTS HONOLULU, HAWAII 96817

PREPARED BY:
AKINAKA & ASSOCIATES, LTD. 250 NO. BERETANIA ST., SUITE 300 HONOLULU, HAWAII 96817-4716

AUGUST 1997
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VI. SOURCES OF WATER SUPPLY
VII. PROPOSED TREATMENT WORK
VIII. PUMPING FACILITIES
IX. FINISHED WATER STORAGE
X. WATER DISTRIBUTION SYSTEMS
XI. FINANCING

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B. WELL DRILLING AND PUMP TEST REPORT

AUGUST 1997
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3. LOCATION MAP
4. SITE PLAN
5. RAINFALL MAP
6. HONOLULU QUADRANGLE MAP
7. STATE LAND USE PLAN
8. COUNTY ZONING MAP
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10. WELL SECTION
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AUGUST 1997
I. INTRODUCTION

This report is prepared pursuant to Chapter 20 of Title 11, "Potable Water Systems," of the Public Health Regulations, which requires submittal of preliminary drawings and supporting data to the State Department of Health when a new source of water supply is developed.

The new source of water supply, Kamehameha Schools Well "B" (State Well No. 2051-02) is located on the southern slopes of the Koolau Range along the east ridge of Kalihi Valley (Kapalama) on the Island of Oahu. It will serve the Kamehameha Schools campus located as shown on EXHIBIT 1: ISLAND MAP.

This report follows the format of "Guidelines for Preparation of Preliminary Engineering Reports for New Potable Water Sources", Drinking Water Program, State Department of Health. The information it contains has been gathered from various project reports and documents as listed below. As appropriate in this report, sections will be referenced by the listed letter designation of the "Guidelines."

REFERENCES FOR KAMEHAMEHA SCHOOLS WELL "B"

A. Water Master Plan for the Kamehameha Schools; by Clifford S. Jamile, P.E., December 1990 w/addendums

B. Kamehameha Schools Well "B", Well Completion Report; by Waimea Water Services, Inc.; June 1997

C. Subsurface Investigation Report - Proposed 740' 0.50 M.G. Reservoir, Kamehameha Schools Water System Improvements; by Fewell Geotechnical Engineering, Ltd; July 7, 1994

D. Water supply for Expansion of Kamehameha Schools; by Mink & Yuen, March 31, 1992


I-1

INTRODUCTION
AUGUST 1997
II. GENERAL INFORMATION

A. PROJECT DESCRIPTION AND LOCATION

1. The Project proposes to replace a portion of the existing Kamehameha Schools/B.P. Bishop Estate water supply source (Wells 2052-07 & 2052-11). The Project is part of a water system improvement program intended to increase the safety and reliability of domestic water service within the Kapalama Heights campus of Kamehameha Schools.

The total system improvements include:

a. 565' Reservoir Site
   1 - Deepwell and 500 gpm pump station (WELL 2051-01)
   1 - 0.25 MG reinforced concrete reservoir
   1 - Booster Pump Station with two 500 gpm booster pumps
   1 - Pump Control Building and Sitework
   Transmission Mains

b. 740' Reservoir Site
   1 - Deepwell and 500 gpm pump station (WELL 2051-02)
   1 - 0.5 MG reinforced concrete reservoir
   1 - Booster Pump Station with two 500 gpm booster pumps
   1 - Pump Control Building and Sitework

   Transmission mains

c. 920' Reservoir Site
   1 - 0.25 MG reinforced concrete reservoir
   1 - Instrument House and Sitework
   Transmission mains

2. The Project is located in Kapalama, a neighborhood of Kalihi, in Honolulu, Oahu. EXHIBIT 2: VICINITY MAP shows the Project area adjacent to developed suburban areas on the hillsides above Honolulu.

3. Well "B" (SEE EXHIBIT 3: LOCATION MAP) is located within the school site owned by Kamehameha Schools/B.P. Bishop Estate. The well location was selected to be efficiently integrated into the master planned water supply system.

4. Well "B" will serve as standby for Well 2051-01 which was recently completed. Simultaneous pumping of both wells is not contemplated.
B. OWNER AND OPERATOR OF THE PROJECT

Kamehameha Schools/B.P. Bishop Estate will develop and own the well. Kamehameha Schools will operate and maintain the well. The improvements will be similar to municipal water standards including treatment and metering.

C. SITE PLAN

EXHIBIT 4: SITE PLAN is provided to show the proposed improvements. As shown, the site includes an all-weather road, reservoir, control/chlorinator building, and well pump facility. Details of the Project such as well characteristics, pump piping and treatment are discussed in later sections.
III. PHYSICAL AND HYDROLOGICAL CHARACTERISTIC OF THE AREA

A. LOCATION

The Project area is located in the Kalihi area of the City of Honolulu, approximately 2.3 miles northerly of the State Capital. The well site is along an existing paved road which serves as the secondary access into the upper campus area.

B. CLIMATE

The climate of Honolulu is comfortably uniform and is characterized by the northeast tradewinds generated by regions of high pressure to the north. These winds keep the average month temperatures near sea level within the range of 70° in February to 79° in August. The mean temperature decreases about 3° for every 1,000 foot increase in elevation.

The consistent approach of the tradewinds from the Northeast distinguishes the island into windward and leeward sides. Windward Oahu receives larger amounts of rainfall as the result of the condensation of water vapor as it is forced up into the atmosphere by the mountain mass. Median annual rainfall at the project area is about 40 inches.

EXHIBIT 5: RAINFALL MAP.

C. TOPOGRAPHY

The project site is located within the Kapalama Heights campus of the Kamehameha Schools. Topographic information is available on the Honolulu - Quadrangle Map published by the U.S. Geological Survey (SEE EXHIBIT 6: HONOLULU QUADRANGLE MAP).

The site has been graded to accommodate the well and 0.50 mg reservoir. The original ground sloped southerly at approximately 20 percent. At approximately 120 feet east of the site the ground slopes into a gully.

D. GEOLOGY

General subsurface information was obtained from "Subsurface Investigation Report - Proposed - 740 - foot 0.50 MG Reservoir" by Fewell Geotechnical Engineering, Ltd., dated July 7, 1994. The site is...
underlain by 8 to 16 feet of residual soils over weathered basalt. Basalt extends to below 30 feet of the existing ground surface. The upper basalt is moderately weathered and exhibits hard strengths. The deeper basalts are highly to moderately weathered and exhibits medium hard to hard strengths.

E. GROUNDWATER CONDITIONS

Static ground water level is at 22.5 feet elevation, which is 695.0 feet depth to water. A long term aquifer pumping test was commenced on April 24, 1997. A total of 2,563,200 gallons were pumped during 48 hours at an average rate of 890 gpm. The total drawdown in the pumping well was 1.38 feet and recovery was within 5 minutes.

F. FLOOD HAZARD

Flood hazard data was not obtained for the well site. As the site is on higher grounds and as adjacent land slopes preclude ponding, flooding is not expected. The adjacent gully will transport all flood flows away from the well site.

G. LAND USE PLANNING AND ZONING REGULATIONS

1. State Land Use Plans

The State Land Use Commission designates properties in four categories: Agriculture, Rural, Urban, and Conservation. The proposed project lies within land designated as Urban. See EXHIBIT 7: STATE LAND USE PLAN

2. City & County of Honolulu Zoning

The Zoning Map for the Island of Oahu, by the Department of Land Utilization dated March 1995, provides information on the surrounding communities and land use designations. The project site is within lands designated Residential (R-5) in zoning map. See EXHIBIT 8: COUNTY ZONING MAP

H. DISCUSSION OF WATER RIGHTS AND FUTURE USES BY OTHERS

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water

III-2

PHYSICAL AND HYDROLOGICAL CHARACTERISTIC OF THE AREA
AUGUST 1997
Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new well is to replace an existing well, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
IV. EXTENT OF THE WATERWORKS SYSTEM

A. DESCRIPTION OF THE NATURE AND EXTENT OF THE EXISTING AREA AND FUTURE AREA TO BE SERVED

Kamehameha Schools Kapalama Heights campus resides within TMK: 1-6-22:01 which consists of 426.4 acres. At present, approximately 50 acres are developed entirely for school purposes. Expansion of facilities to support the increase in student population will be within the developed area.

B. POPULATION SERVED BY WATER WORKS SYSTEM

The present student population at the Kapalama Heights campus is 3,000 students. The projected population (year 2015) is 3,300 students. Administrators, teachers, and support staff are approximately 800 people. The population served by the water system will be approximately 4,100 persons.

C. APPRAISAL OF FUTURE REQUIREMENTS FOR SERVICE

Per Reference D, the Kamehameha Schools water allocation is underutilized by 11.4 percent. Increasing the average pumping rate to the allowed average draft will satisfy the anticipated increase in demand for a number of years.

D. PROVISIONS FOR EXTENDING WATERWORKS SYSTEM

The water master plan (Reference A) does not anticipate a need for extending the water system beyond the present developed area. This project will not include provisions to extend the water system.

E. FIRE PROTECTION AND PRESSURE REQUIREMENTS

The water system's design follows the Honolulu Board of Water Supply standards for storage, transmission and distribution. All applicable fire flow and pressure requirements will be met.

F. ALTERNATE SOLUTION CONSIDERED AND SUPPORTING DATA FOR RECOMMENDED PLAN

Other ways to meet the projected water demand are to develop a substantial rainfall catchment system or to collect and treat surface water.
Both of these alternatives are not economically comparable to the proposed well and would involve other environmental impacts as well. Water from existing Board of Water Supply wells cannot meet the school's demand.

G. ENVIRONMENTAL AND ECONOMIC IMPACT

1. Short Term Impacts

Short term impacts of the proposed project will be minimal. Daily traffic of the construction crew through the school and the noise of the equipment will be the extent of the off-site construction impacts. The residences within a mile of the project site experience similar traffic noises from the school and other traffic.

The work will be restricted to daylight hours and the noise should blend in with the normal activities. Exhaust emissions will not impact any populated area.

Dust and erosion from the construction efforts will be insignificant considering the site area and grading requirements. Conformance to the Grading Ordinance should mitigate any adverse effects. Water discharged from the well during the testing period will be directed to the existing gulley.

2. Long Term Impacts

The land necessary for the development of the well site is part of the existing school area. The major long term impact resulting from the proposed project will be the development of a potable well facility and the improved reliability of the Kamehameha School's water system. The well will not influence rezoning of lands to higher uses in consideration that all production will be used only by the school. The improved water system may be a factor in encouraging further development of the school, however the extent of future development has been established by other actions, such as zoning and master planning.
V. POTENTIAL SOURCES OF CONTAMINATION

A. DESCRIPTION OF WELL SITE

1. Coordinates for Kamehameha School's Well B (State Plane Coordinates)
   
   64707.74 N  
   549250.00 E

2. Elevation of pump base plate = 719.75. The well pad site will be graded to approximately 2% with 1-1/2:1 cut slopes used to achieve a level area. EXHIBIT 9: GRADING PLAN shows the final site conditions.

3. Size and Topography of Catchment Area

   The well site will provide virtually no surface catchment of water so drainage will not be a problem. The precise areal size of the catchment area is not known.

4. General Summary of Soil and Substrata:

   The fill is underlain by 8 to 16 feet residual soils over weathered basalt. Basalt extends to below 30 feet of the existing ground surface.

5. Well depth, depth to ground water and design well draft.

   a. STATE WELL NO. 2051-02 (EXHIBIT 8: WELL SECTION KAMEHAMEHA SCHOOLS WELL 'B')

      Ground El. = 718.6 Ft.  
      Q = 500 GPM  
      Hp = 125 Hp (Submersible motor)  
      Static Head = 696 Ft.  
      TDH = 760 Ft.  
      Casing = 14 Inches (inside diameter)  
      W.S. El. = 22.5 Ft.

      TDH = Total Dynamic Head

V-1 POTENTIAL SOURCES OF CONTAMINATION
AUGUST 1997
B. WATER QUALITY

Water quality samples were taken from the pumping well to the end of the pumping test by AECOS Laboratories. The list of contaminants from the Department of Health "Contaminants to be Tested in All New Sources of Potable Water", revised January 26, 1996 was used to determine the test items. Based on the results of the laboratory testing, the groundwater from Kamehameha School, Well "B" meets the new source quality standards for potable water. The laboratories used were certified by the State Department of Health and included AECOS Labs and Montgomery Laboratory. Method details are found in the AECOS laboratory SOPs. A summary of methods and quality control is included in Appendix A.

C. LAND USE CLASSIFICATION OF SURROUNDING AREA

The well site is within lands designated as Urban per State Land Use District Regulations (SEE EXHIBIT 7). City & County zoning of the well site and surrounding area is Residential per the General Plan (SEE EXHIBIT 8).

D. POTENTIAL SOURCES OF CONTAMINATION IN THE RECHARGE AREA

The well is located within a controlled area, there are no developments above the school site. The well has a solid casing for the upper 770 feet with concrete grouting preventing direct access into the well. Chlorination will be provided to ensure that bacterial contamination is not a problem (See EXHIBIT 11).

E. APPROXIMATE GROUNDWATER CONTOURS

The water level in Well 'B' was measured at 22.5' elevation. Information for the well which will be replaced by Well 'B' (approximately one mile makai) and other wells in the Kalihi Subarea is shown on the table below:

V-2 POTENTIAL SOURCES OF CONTAMINATION
AUGUST 1997
### Kalihi Subarea
Honolulu Water Management Area

<table>
<thead>
<tr>
<th>Aquifer/Source</th>
<th>State Well No.</th>
<th>Year Drilled</th>
<th>Ground Elev. (ft.)</th>
<th>Well Depth (ft.)</th>
<th>Static Head (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jonathan Spr. Well (BWS)</td>
<td>2052-12</td>
<td>1981</td>
<td>31</td>
<td>151</td>
<td>21.9</td>
</tr>
<tr>
<td>Kalihi Station (BWS)</td>
<td>1952-06</td>
<td>1900</td>
<td>21</td>
<td>460</td>
<td>27.2</td>
</tr>
<tr>
<td></td>
<td>1952-07</td>
<td>1900</td>
<td>20</td>
<td>475</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>1952-08</td>
<td>1900</td>
<td>21</td>
<td>490</td>
<td>25.8</td>
</tr>
<tr>
<td></td>
<td>1952-16</td>
<td>1926</td>
<td>21</td>
<td>430</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1952-17</td>
<td>1926</td>
<td>19</td>
<td>401</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>1952-18</td>
<td>1926</td>
<td>24</td>
<td>442</td>
<td>26.0</td>
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<td>1952-19</td>
<td>1926</td>
<td>23</td>
<td>414</td>
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<td></td>
<td>1952-22</td>
<td>1926</td>
<td>24</td>
<td>360</td>
<td>26.0</td>
</tr>
<tr>
<td>Castle &amp; Cooke</td>
<td>1952-11</td>
<td>1913</td>
<td>5</td>
<td>513</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>1952-13</td>
<td>1923</td>
<td>4</td>
<td>650</td>
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<td>1952-20</td>
<td>1927</td>
<td>5</td>
<td>540</td>
<td>26.4</td>
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<tr>
<td></td>
<td>1952-21</td>
<td>1927</td>
<td>4</td>
<td>612</td>
<td>26.3</td>
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<tr>
<td>Del Monte</td>
<td>1952-12</td>
<td>1920</td>
<td>6</td>
<td>599</td>
<td>18.4</td>
</tr>
<tr>
<td>Hon. Gas Co.</td>
<td>1952-14</td>
<td>1923</td>
<td>4</td>
<td>682</td>
<td>25.8</td>
</tr>
<tr>
<td>Kamehameha Sch.</td>
<td>2052-07</td>
<td>1927</td>
<td>80</td>
<td>321</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td>2052-11</td>
<td>1977</td>
<td>90</td>
<td>334</td>
<td>26.0</td>
</tr>
<tr>
<td>Palama Settlement</td>
<td>1952-15</td>
<td>1924</td>
<td>27</td>
<td>335</td>
<td>25.8</td>
</tr>
</tbody>
</table>

(From: Assessment of Water Supply and Sustainable Yield on Kamehameha Schools/Bernice Pauahi Bishop Estates' Oahu Lands Moanalua - Kaimuki Subarea; April 1991)
VI. SOURCES OF WATER SUPPLY

A. NATURE OF SOIL AND STRATUM WITHIN AND OVERLAYING THE WATER SOURCE

The native soil at the site is classified as Manana silty clay per Reference E. Runoff is medium to rapid and the erosion hazard is moderate to severe. The driller's log describes the rock at water level as "hard".

B. THE PROBABILITY AND EFFECT OF SURFACE DRAINAGE OR CONTAMINATED UNDERGROUND WATER ENTERING THE SUBJECT WATER SOURCE

1. Contamination from surface drainage will be prevented by designing the facilities to control local rainfall runoff.

2. Probability that contaminated underground water will enter the water source is decreased by grouting the upper 770' of the well.

C. DEPTH TO WATER TABLE, LOCATION AND LAY OF WELLS IN VICINITY IN USE AND/OR ABANDONED

1. Depth to water table for the well is approximately:

   Land surface elevation = 718.6
   Water surface elevation = 22.5
   Depth to water table = 696.1

2. The following wells exists in the vicinity of Kamehameha Schools' Well No. B and shown on EXHIBIT 12: ADJACENT WELLS.

<table>
<thead>
<tr>
<th>WELL NAME</th>
<th>STATE NO.</th>
<th>DIST FROM WELL 'A'</th>
<th>DRAW (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JONATHAN SPR. WELL</td>
<td>2052-12</td>
<td>6,500' SW</td>
<td>1.0</td>
</tr>
<tr>
<td>KALIHI STA. WELLS (8)</td>
<td>1952-07/ETC</td>
<td>8,500' SW</td>
<td>6.22 (TOT)</td>
</tr>
<tr>
<td>PALAMAJA SETTLEMENT</td>
<td>1952-16</td>
<td>8,000' S</td>
<td>0.024</td>
</tr>
<tr>
<td>KAMEHAMEHA SCHOOLS (2)*</td>
<td>2052-07/11</td>
<td>6,000' SW</td>
<td>0.229 (TOT)</td>
</tr>
<tr>
<td>KAMEHAMEHA SCHOOLS</td>
<td>2051-01</td>
<td>1,500' SW</td>
<td>0.229</td>
</tr>
</tbody>
</table>

* To be abandoned
D. SLOPE OF WATER TABLE

The water table slope at the site differs from that of the other well sites. Per Reference D, the basal aquifer is artesian where it is confined beneath the caprock sediments which constitute the coastal plain, but above a ground elevation of about 25 feet the water table is unconfined.

E. FLOODING AND/OR EARTHQUAKE RISK

No flooding problems are anticipated. Potential seismic activity will be mitigated in the design of all structures.

F. QUALITY AND QUANTITY OF SOURCE WATERS

Water quality data for Well 'B' is tabulated in APPENDIX A. Samples were obtained on May 12, 1997 by AECOS during the pump test.

A 48-hour aquifer test started May 10, 1997. The pumping test was stopped after 48 hours of pumping as there had been no change in drawdown or water quality. The pumping rate was stable at an average of 890 gpm or 390 gpm more than the design rate of 500 gpm.

G. SIGNIFICANT FACTORS HAVING POTENTIAL FOR CONTAMINATING THE WATER SOURCE

1. Urban development - limited risk
2. Sugar cane cultivation - none
3. Pasture lands - none
4. Sanitary landfills - none
5. Subsurface disposal units - none

H. CONTROL MEASURES

The site will be graded to direct storm flows away from the well.

The well water quality will be monitored using chemical and biological analysis in conformance with State Safe Drinking Water quality requirements to assure maintenance of high quality water. Output from the wells will be chlorinated.
I. SUMMARY

The quality of water from Kamehameha Schools Well 'B' is within the limits for potable waters and the State Department of Health, Safe Drinking Water Program regulates compliance with the standards of the Safe Drinking Water Act and other State Department of Health Regulations. The water quality will be monitored on a regular basis.
VII. PROPOSED TREATMENTS WORKS

The water drawn from the wells will be treated by an on-site chlorine generation system. A modular equipment package will provide chlorine without the danger of storing or handling hazardous materials. The equipment will replace cylinders of chlorine gas and commercial sodium hypochlorite. The process consists of combining salt, water (w/electricity) to produce the sodium hypochlorite solution and hydrogen which is vented to the atmosphere. A metering pump delivers the solution to an injection point in the water piping. The treated water will be pumped into the 740' reservoir to be distributed to the consumers or directed to the 920' reservoir by the booster pump.

Other required information referring to treatment plant facilities does not apply to well source.
VIII. PUMPING FACILITIES

A. PURPOSE OF SERVICE

The well pumps and booster pumps will serve the Kamehameha Schools Water System consisting of the educational and residential (dormitories) facilities.

B. PUMPING LAYOUT AND SIZING OF CONNECTION MAIN

Well pump station piping, valves and controllers are shown on EXHIBIT 13: WELL PUMP PIPING. The well station is designed as an outdoor facility. To prevent backflow into the wells, a check valve will be installed upstream to the pump. Instruments and electrical controls will be housed in a CMU building.

Connecting mains will be ductile iron pipe with push-on or mechanical joints. Flanged end pipe and fittings will be used for above ground piping. Pipeline size between well and reservoir at spillway elevation 740 will be 8 inches.

C. DESIGN FLOW REQUIREMENTS

Flows from Well 'B' will be pumped directly into the adjacent 740' spillway 0.50 MG reservoir. This reservoir services users between elevations 465' to 640'. A booster pump at the reservoir will boost water to the 920' spillway 0.25 MG reservoir. This reservoir services users between elevation 640' and 820'.

D. LIQUID CHARACTERISTIC

The water characteristic are shown in APPENDIX A
E. ELECTRIC POWER

Electric power will be provided by the Hawaiian Electric Company by underground lines from an existing electric handhole adjacent to the 565' Reservoir site (See Exhibit 3) then along existing Waonahele Road and existing mauka Access Road to the Well B site.

F. PUMPING ARRANGEMENT

The pumping system is a typical potable water pump station as shown in EXHIBIT 13. A submersible turbine pump and motor will be controlled by telemetered signals based on water levels in the 0.50 million gallon concrete reservoir at spillway elevation 740'.

G. PUMP SELECTION

The well pump will be a multi-stage turbine submersible pump similar to the Byron Jackson 10" MQ-"L" (20 stages). It should have a rated capacity of 500 gpm at 760 ft. head. See EXHIBIT 10: WELL SECTION Specifications of the pump include:

1. Minimum capacity 500 gpm
2. Proposed setting of pump intake 0.00 feet (msl)
3. Maximum size pump (nominal) 10 inches
4. Maximum discharge column size (nominal) 6 inches
5. Maximum pump speed 1770 rpm
6. Minimum overall efficiency 68 percent

H. PUMP PERFORMANCE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Capacity (USGPM)</th>
<th>Head (Ft)</th>
<th>Bowl Efficiency (%)</th>
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<tbody>
<tr>
<td>0</td>
<td>1200</td>
<td>—</td>
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<tr>
<td>200</td>
<td>1040</td>
<td>56</td>
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<tr>
<td>300</td>
<td>940</td>
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<td>400</td>
<td>860</td>
<td>78</td>
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<tr>
<td>500</td>
<td>760</td>
<td>81</td>
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VIII-2

PUMPING FACILITIES
AUGUST 1997
I. BUILDINGS AND OTHER STRUCTURAL IMPROVEMENTS

The well pumping station includes a 13'X35X10'H CMU building to house the electrical cabinets, instrumentation and chlorination equipment.

J. WATER HAMMER CONSIDERATION

Water hammer is controlled during pump start-up and shut-down by the correct sequencing of the pump, the pump control valve and the check valve.

K. ESSENTIAL FEATURES OF CONSTRUCTION AND OPERATION

The well pump will be automatically controlled by reservoir mounted floats. Pump and motor protection will be provided by pressure and flow switches.

L. ELECTRICAL SYSTEM PROVISIONS FOR POWER FAILURE

The 125 hp pump motor requires a 460 volts, 3 phase, 60 hertz power source which will be supplied by Hawaiian Electric Company. Stand by power will not be provided.
IX. FINISHED WATER STORAGE

Water from the well will be stored at the 740' tank site which includes a 0.50 MG concrete tank. A Smart system at the tank site will provide signals to operate the pump. Provisions for future supervisory controls are included in the project.

The 740' water system will be connected to the 920' system through a booster pump at the 740' tank site.
X. WATER DISTRIBUTION SYSTEM

A. GENERAL LAYOUT

The Kamehameha Schools Water System service area is limited to the facilities within the Kapalama Heights campus. EXHIBIT 14: WATER MASTER PLAN provides a general layout of the system. Water improvements shown are only those related to Kamehameha Schools/B.P. Bishop Estate.

Pipe sizes are subject for review during the design process. In general, the off-site pipelines fall in the following categories:

1. Source to storage (wells to reservoirs)
2. Storage to storage (reservoir to reservoir)
3. Storage to user (reservoir to school facilities)

Source to storage pipelines are pressurized by the well pumps. Service laterals will not be connected to these pipelines.

Storage to storage pipelines are pressurized by booster pumps at the lower reservoir. Design pressures will be less than 150 psi. Gate valves will be included to isolate selected sections of the pipelines. Service laterals will not be connected to these pipelines.

Storage to user pipelines are located in each service level. System pressures are based on the relative reservoir elevation and will be designed below 125 psi.

A schematic profile (EXHIBIT 15) shows the service and approximate system pressures.

B. WATER SYSTEM MATERIALS

The system will follow the City & County of Honolulu, Board of Water Supply standards for construction materials for pipelines, valves, fittings and miscellaneous appurtenances.

C. PROXIMITY TO OTHER UTILITIES

There are no other utilities except for the underground power lines serving the pump station and reservoir.
XI. FINANCING

Construction of Kamehameha Schools Well 'B' is estimated to cost $1,700,000. Financing of the well construction will be by Kamehameha Schools/B. P. Bishop Estate.

Kamehameha Schools will operate and maintain the well. Funding for operations/maintenance will be obtained from Kamehameha Schools/B. P. Bishop Estate Capital improvements budget.
KAMEHAMEHA SCHOOLS WELL "B"
(State Well No. 2051-02)

920' 0.25 MG RESERVOIR
(FUTURE)

EXIST. 850' 0.5 MG RESERVOIR

740' 0.5 MG RESERVOIR

KAMEHAMEHA SCHOOLS
WELL "A"
WAONAHELE 565'
0.25 MG RESERVOIR

LOCATION MAP

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "B"
(State Well No. 2051-02)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
MEDIAN ANNUAL RAINFALL - OAHU, HAWAII

NOTE: Isohyets in mm.


PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "B"
(State Well No. 2051-02)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
HONOLULU QUADRANGLE MAP

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL “B”
(State Well No. 2051-02)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "B"
(State Well No. 2051-02)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
**EQUIPMENT DESCRIPTION**

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<tr>
<th>KEY</th>
<th>Description</th>
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<td>01</td>
<td>ELECTRICAL CONTROL PANEL</td>
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<tr>
<td>02</td>
<td>FLOW CONTROL PANEL</td>
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<td>03</td>
<td>POWER SUPPLY NO. 1</td>
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<td>04</td>
<td>BRINE TANK</td>
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<td>05</td>
<td>HYPO TANK</td>
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<td>06</td>
<td>125 GALLON NALGENE TANK WITH LEGS</td>
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<tr>
<td>07</td>
<td>INJECTION PUMP WITH 18&quot; x 18&quot; x 12&quot; STAND</td>
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**CHLORINATION SYSTEM SCHEMATIC**

**PRELIMINARY ENGINEERING REPORT**

KAMEHAMEHA SCHOOLS WELL "B"

(State Well No. 2051-02)

Honolulu, Oahu, Hawaii

TMK: 1-6-22:1 (Div. 1)
APPENDIX A

WATER QUALITY DATA
# REPORT OF ANALYTICAL RESULTS

**SAMPLE TYPE:** potable water  
**DATE SAMPPLED:** 4/24/97, 5/12/97  
**AECOS LOG No.:** 10535,10576  
**DATE RECEIVED:** 4/24/97,5/12/97

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<th>MCL</th>
<th>Method</th>
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<th>Well B 5/12/97</th>
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<td>P/A</td>
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<td>SM 9221</td>
<td>B</td>
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<td>E</td>
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<td>0.5/1</td>
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<td>8.15</td>
<td>4/25/97 me</td>
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<td>pH</td>
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<td>Conductivity</td>
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<td>---</td>
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<td>Temperature</td>
<td>°C</td>
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<td>---</td>
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<td>4</td>
<td>SM4500F</td>
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<td>5/30/97 ML</td>
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MCL = Maximum Contaminant Level

__J. Mello, Laboratory Director__
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<tr>
<th>ANALYTE</th>
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<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
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<th>Well B 5/12/97</th>
<th>Analysis Date/ ID</th>
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<td>chloropropane)</td>
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<td>Alachlor</td>
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<td>0.00005</td>
<td>0.002</td>
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<td>0.0004</td>
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<td>2,4-D</td>
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* = Action Level  
MCL = Maximum Contaminant Level
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<th>ANALYTE</th>
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<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
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<th>Well B 5/12/97</th>
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<td>&lt;0.0005</td>
<td>5/22/97</td>
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</tr>
<tr>
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MCL = Maximum Contaminant Level
### Waimea Water Services
P.O. Box 326
Kamuela, HI 96743

### ATTENTION: Shirleen

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<th>ANALYTE</th>
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**MCL = Maximum Contaminant Level**

FILE No.: 457
REPORT DATE: 06/06/97
PAGE: 4 of 4

LOG No.: 10535, 10576
APPENDIX B

WELL DRILLING AND PUMP TEST REPORT

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "B"
(State Well No. 2051-02)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
KAMEHAMEHA SCHOOLS
KAPALAMA WELL "B"
WELL COMPLETION REPORT

State Well No. 2051-02

JUNE 1997

Prepared by Waimea Water Services Inc.
for
Akinaka and Associates Inc.
&
KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE

Kapalama Well B; Completion Report
KAMEHAMEHA SCHOOLS
KAPALAMA WELL "B"
WELL COMPLETION REPORT

State Well No. 2051-02

WELL CONSTRUCTION, CWRM PERMIT

The Kamehameha Schools Kapalama Well "B" (State Well No. 2051-02) was permitted by the State of Hawaii, Commission on Water Resource Management on July 28, 1993. Due to construction issues with Well A the well was not started. An extension was granted on August 6, 1996 for a well completion date of October 25, 1997.

WELL CONSTRUCTION, PLANS

Plans and specifications by Akinaka and Associates were reviewed and approved by Mr. Mike Lum, PE, Facilities Engineer, Kamehameha Schools. The well location and basic water system site plan were agreed to prior to locating the well in the field. The location maps showing the well location and siting are included along with an overall map of the area.

WELL CONSTRUCTION, SUMMARY

The Well construction contracts were signed January 27, 1997. Site work was done by others and mobilization on the site started January 29, 1997. Drilling of the pilot hole commenced on February 11, 1997. The pilot hole was completed on February 18, 1997 to a depth of 770 feet below ground.

The bench mark at the well head was set at 717.49' elev. The water level was measured at 625.33 feet (21.66' elev).

A pilot hole was reamed in two passes to 20'. Reaming of the pilot hole was completed on March 20, 1997 to 770'.

A video log of the open hole was made on March 25, 1997.
The 14" OD ASTM A-53 solid casing was started on March 26, 1997 and grouting of the annular space around the well casing was completed by April 2, 1997.

The additional 100' of 12.75" open hole drilling commenced on April 7, 1997 and was completed on April 9, 1997 to a total well depth of 870'. An As-built section drawing of the well is attached.

Plumbness and alignment tests were conducted on May 19, 1997 (see attached report). A 40 foot long dummy with three 12.75 inch diameter rings, spaced evenly along its length, passed freely down the cased well. A cage traverse of the cased well was also performed. The results of the tests showed that the well met the specifications for each 100' and did not vary in excess of more than two-thirds the smallest inside diameter for any 100 foot interval.

PUMPING TEST - SPECIFIC CAPACITY

A specific capacity pumping test of the cased well was conducted on April 26, 1997. The well was surged and developed prior to the test. Air line measurements were made using a 30 lbs. pressure gage with 0.10 psi gradations. Direct water level measurements were made using an electric sounding tape. The non-pumping water level stood at an elevation of 23.08 feet at that time.

The following rates and measurements were recorded.

<table>
<thead>
<tr>
<th>Rate (gpm)</th>
<th>Drawdown (ft)</th>
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<tr>
<td>700</td>
<td>0.31</td>
</tr>
<tr>
<td>750</td>
<td>0.45</td>
</tr>
<tr>
<td>800</td>
<td>0.94</td>
</tr>
<tr>
<td>850</td>
<td>1.00</td>
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PUMPING TEST - LONG TERM TEST

A long term test was attempted on April 24, 1997 through April 26, 1997. However, unsteady water levels and a suspected influence was detected from the drilling operations down gradient of well A, which made the test results suspect. The laboratory samples
taken were also mishandled by UPS during shipment to the mainland labs and the testing protocol was violated. A new test was scheduled.

A long term aquifer pumping test at a rate of 890 gpm commenced at 8:20 am on May 10, 1997. Water levels were recorded at the pumping well using an air line system and a direct water level was taken by electric sounding.

The pumping water level data after 48 hours (2,880 minutes) resulted in a total drawdown in the pumping well of 1.38 feet. A total of 2,563,200 gallons were pumped at an average rate of 890 gpm. Recovery was within 5 minutes.

The pumping test was stopped after 48 hours of pumping as there had been no change in drawdown or water quality, as measured by electrical conductance and temperature for 48 hours. The pumping rate was stable at an average of 890 gpm, or 390 gpm more than the design rate of 500 gpm.

State Commission of Water Resource Management (CWRM) suggested pumping test protocol calls for at least 48 hours of pumping and if the drawdown water level is stable for 24 hours, test can be stopped. The drawdown stabilized within 360 minutes of the start of the test.

**QUALITY TESTING**

Water quality samples were taken from the pumping well to the end of the pumping test (Monday, May 12, 1997; 9:00 am) by AECOS Laboratories. The current list of contaminants from the State Dept. of Health "Contaminants to be Tested in All New Sources of Potable Water"; revised January 26, 1996) was used for determining the items to be tested for (see attached list of quality results). Based on the results of the laboratory testing, the groundwater from Kamehameha School, Kapalama Well "B" meets the new source quality standards for potable water for the State of Hawaii. The laboratories used were certified by the State Department of Health and included AECOS Labs and Montgomery Laboratory.
### DATA SUMMARY

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<th>Parameter</th>
<th>Value(s)</th>
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<td></td>
<td>695'</td>
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<td>Elevation</td>
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<td>Depth to water</td>
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</tr>
<tr>
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<tr>
<td>At 890 gpm</td>
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<td>Draw down elevation.</td>
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<td>Ground Elevation</td>
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<tr>
<td>Pumping Rate (average)</td>
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<td>Temperature</td>
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<tr>
<td>Electrical Conductance</td>
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<td>Total pumpage as of 48 hours</td>
<td>2,563,200 gallons</td>
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<tr>
<td>(2,880 minutes)</td>
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</table>
CONCLUSIONS AND RECOMMENDATIONS

Based on the data obtained from the aquifer pumping test, it appears that:

1. The Well "B" is capable of reliably producing at the design rate of 500 gpm on a long term production basis and is capable of producing the average daily requirement of 229,000.

2. The drawdown at the design rate of 500 gpm will be less than 0.3 feet.

3. The recommended pump intake setting is at elevation "0" feet, or at mean sea level. This will provide a submergence of about 21 feet. The motor diameter (submersible) should not exceed 12".

4. The water quality tests, based on results of the laboratory analyses, indicate that the groundwater is excellent in quality and meets the Safe Drinking Water Act and State Department of Health requirements.
WELL CROSS SECTION DIAGRAM
KAMEHAMEHA SCHOOLS WELL "A"
WELL COMPLETION REPORT

State Well No. 2051-01

September, 1995

Prepared by Waimea Water Services Inc.
for

KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE
KAMEHAMEHA WELL "A"
WELL COMPLETION REPORT

State Well No. 2051-01

WELL CONSTRUCTION, CWRM PERMIT

The Kamehameha Well "A" (State Well No. 2051-01) was permitted by the State of Hawaii, Commission on Water Resource Management in 25 Oct. 93.

WELL CONSTRUCTION, PLANS

Plans and specifications by Akinaka and Associates were reviewed and approved by Mr. Mike Lum, PE, Facilities Engineer, Kamehameha Schools. The well location and basic water system site plan were agreed to prior to locating the well in the field. The location maps showing the well location and siting are included along with an overall map of the area.

WELL CONSTRUCTION, SUMMARY

The Well construction contracts were signed 20 January 95. Site work was done by others and mobilization on the site started 6 April 95. Drilling of the pilot hole commenced on 17 April 95. The pilot hole was completed on 2 May 95 to a depth of 603 feet (-53' elev.).

The bench mark at the well head was set at 546.36' elev. The water level was measured at 22.36' elev.

A pilot hole was reamed in two passes to 20". Reaming of the pilot hole was completed on 18 May 95 to 604' (-54.64' elev.).

A video log of the open hole was made on 23 May 95.

The 14" OD ASTM A-53 solid casing was started on 24 May 95 and grouting of the annulus space around the well casing was completed by 1 June 95.
The additional 100' of 12.75" open hole drilling commenced on 5 June 1995 and was completed on 8 June 95 to a total well depth of 705.8' (-156.44' elev.). An As-built section drawing of the well is attached.

The water level was recorded at 527.75' depth or 21.61' elev. on 13 June 95.

Plumbness and alignment tests were conducted on 13 June 95 (see attached report). A 40 foot long dummy with three 12.75 inch diameter rings, spaced evenly along it's length, passed freely down the cased well. A cage traverse of the cased well was also performed. The results of the two tests showed that the well met the specifications for each 100' and did not vary in excess of more than two-thirds the smallest inside diameter for any 100 foot interval.

**PUMPING TEST - SPECIFIC CAPACITY**

A specific capacity pumping test of the cased well was conducted on 23 June 95. The well was surged and developed prior to the test. Air line measurements were made using a 60 lbs. pressure gage with 0.10 psi gradations. The non-pumping water level stood at an elevation of 21.61 feet.

The contractor had trouble stabilizing the water level on a 700 gpm rate as a bypass was not functioning as planned. Only one rate was used; 850 gpm.

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<th>Rate</th>
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<tr>
<td>850 gpm</td>
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**PUMPING TEST - LONG TERM TEST**

A long term aquifer pumping test at a rate of 800 gpm commenced at 10:46 am on 26 June 95. Water levels were recorded at the pumping well using an air line system.

The pumping water level data after 48 hours (2,880 minutes) resulted in a total drawdown in the pumping well of 1.73 feet. A total of 2,268,830 gallons were pumped at an average rate of 787.79 gpm. Recovery was within 5 minutes.

The pumping test was stopped after 48 hours of pumping as there had been no change in drawdown or water quality, as measured by electrical conductance for 48 hours. The pumping rate was stable at an average of 787.79 gpm, or 287 gpm more...
than the design rate of 500 gpm. The permitted daily average is 0.229 MGD, or about 239 gpm for a 16 hour service day. The 500 gpm would be expected to be pumping for a daily total of about 8 hours.

State Commission of Water Resource Management (CWRM) suggested pumping test protocol calls for at least 48 hours of pumping and if the drawdown water level is stable for 24 hours, test can be stopped. The drawdown stabilized within 100 minutes of the start of the test.

QUALITY TESTING

Water quality samples were taken from the pumping well to the end of the pumping test (Wednesday, 28 June 95) by AECOS Laboratories. The current list of contaminates from the State Dept. of Health "Contaminants to be Tested in All New Sources of Potable Water"; effective December 15, 1994, (revised June 23, 1995) was used for determining the items to be tested for (see attached list of quality results). Based on the results of the laboratory testing, the groundwater from Kamehameha Well "A" meets the new source quality standards for potable water for the State of Hawaii. The laboratories used were certified by the State Department of Health and included AECOS Labs and Pace Laboratory.
## DATA SUMMARY

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<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
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<td>Elevation</td>
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<td></td>
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<td>Draw down elevation.</td>
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<td>Pumping Rate (average)</td>
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<td>Electrical Conductance</td>
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<td>microsiemens (field)</td>
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<td>Total pumpage as of 48 hours</td>
<td>2,268,830</td>
<td>gallons</td>
</tr>
<tr>
<td>(2,880 minutes)</td>
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CONCLUSIONS

Based on the data obtained from the aquifer pumping test, it appears that:

1. The aquifer system is capable of producing and sustaining the water requirements of 229,000 gallons per day (average day).

2. The Well "A" is capable of reliably producing at the design rate of 500 gpm on a long term production basis.

3. The recommended pump intake setting is at elevation "0" feet, or at mean sea level. This will provide a submergence of about 21 feet. The motor diameter (submersible) should not exceed 12".

4. The water quality tests, based on results of the laboratory analyses, indicate that the groundwater is excellent in quality and meets with the SDWA and State DOH requirements.
KAMEHAMEHA SCHOOL / BISHOP ESTATE

WELL A

ELEVATION

DEPTH

GROUND ELEV. 549.36'

603' SOLID CASING AND GROUTED ANNULUS

21.61' ELEV.

527.75' DEPTH

WATER LEVEL 21.61' ELEV. 13 JUNE 95

14" OD ASTM A-53 GRADE B, TYPE E SOLID CASING

12.75" DIAMETER OPEN HOLE

705.8' ELEV.

100' OPEN HOLE

-156.44' ELEV.

-54.64' ELEV.

604' ELEV.
LOCATION MAPS
WELL PERMITS
WELL CONSTRUCTION/PUMP INSTALLATION PERMIT

for

Kamehameha Schools Wells A & B
Well Nos. 2051-01 & 02
Kalihi Ground Water Management Area, Oahu

TO: Kamehameha Schools/Bernice Pauahi Bishop Estate
Kapalama Heights
Honolulu, HI 96817

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, test, and install a pump in Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02), for exploratory purposes only, is approved subject to the following 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, testing, and installation of a 500 gpm capacity, or less, pump in each well, as determined by the pumping test results. The applicant shall coordinate with the Commission and conduct a pumping test in accordance with the protocol established by the Commission. A means to accurately measure water levels, acceptable to the Commission, shall also be provided. The applicant shall submit to the Commission the test results and proposed permanent pump information, based on the test, for approval by the Chairperson. No permanent pump may be installed and no water used from the well without the Chairperson's approval.

3. The proposed use 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 and pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

4. The applicant shall comply with all applicable laws, rules, and ordinances.
5. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission.

6. The well construction/pump installation permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work proposed in the permit application shall be completed within two years from the date of permit approval.

7. The following shall be submitted to the Commission within 30 days after completion of the work:
   a. Well Completion Report.
   b. Elevation (referenced to mean sea level) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test record; including time, pumping rate, drawdown, chloride content, and water quality data.

8. The well construction/pump installation permit application and staff submittal approved by the Commission at its meeting on July 28, 1993 shall be incorporated herein by reference.

9. The permit shall be subject to review by the Attorney General.

10. Special conditions:
   a. The water use permit shall be an interim permit subject to the five year verification period afforded to existing users.
   b. The applicant shall submit an acceptable archaeological inventory survey report to the Historic Preservation Division (HPD) of the Department of Land and Natural Resources. If significant historic sites will be adversely affected by this project, a plan to mitigate these effects must be accepted by HPD and successfully completed by the applicant.

KEITH W. AHUE, Chairperson
Commission on Water Resource Management

Date of Issuance

OCT 25 1993
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: Samuel Hata Date: 1-12-94

Printed Name: Samuel Hata

Firm or Title: Director of Support Services

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
    Wastewater Branch
    Ground Water Protection Program
    Honolulu Board of Water Supply
GRAPHS OF DATA
Kamehameha Well "A" Pumping Test
Long Term Test 26 June 95

Water Level above MSL – in FEET

Time in Minutes

static water level elevation

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Drawdown W.L.  Recovery
DATA OF LONG TERM PUMPING TESTS
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PLUMBNESS AND ALIGNMENT TEST
To: Mike Lum  
Fr: John Stubbart  
Re: Kamehameha Well A  
Plumbness and Alignment Test  
Date: June 13, 1995

An open hole plumbness and alignment test was run on 13 Jun 95 at the Kamehameha Well A cased well (14" OD/13.25" ID) to 600 feet. The data shows that the well meets the contract specifications for plumbness for each 100' (see attached Figures).

On this same day a dummy was run down the hole and it passed freely the entire length of the cased well. The dummy was 40 feet long with 3 rings 12.75 inches in diameter and 1 foot long each, spaced evenly along the dummy.

The attached data and graphs are as listed below:

1. Original Data from field.

2. Tabulated data of Drift and Pump Center Line and the deflection in inches. This data is used for plumbness and alignment graphs/charts.

3A and B. Graphic representation of computer data showing well alignment and most effective pump center line.

4A and B. Plumbness Chart showing the drift per 100' and the tally per 100 feet.

cc: Akinaka and Associates
**Figure 1**

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**Note:** The data represents measurements taken at various depths. The measurements are in inches, with the depth in feet. The data is used for a specific application, possibly related to drilling or well construction.
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KAMEHAMEHA WELL A (550')
Alignment Survey 13 JUNE 95

Accumulative Drift in Inches

Depth of Well in Feet

— NORT/SOUTH DRIFT — Pump Line

FIGURE 3A
KAMEHAMEHA WELL A (550')
Alignment Survey 13 JUNE 95

FIGURE 3B
## KAMEHAMEHA WELL A
### PLUMBNESS
13 JUN 95

<table>
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8.9* equals allowed variation, but does not exceed.

For 14" OD Casing with 13.25" ID
2/3 of 13.25" ID for each 100'= 8.9" allowed.

This well meets the specification for plumbness.
WATER QUALITY DATA
REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: potable water
DATE SAMPLED: 06/28/95

<table>
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<tr>
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<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Kam. School</th>
<th>Anal. Date/Analyst ID</th>
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<td>0.1</td>
<td>EPA 180.1</td>
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The sample was collected and analyzed prior to DOH mailing the revised (June 23, 1995 edition) new source well contaminants list.

MCL = Maximum Contaminant Level
ND = Not Detected at or above detection limit.

J. Mello, Laboratory Director
<table>
<thead>
<tr>
<th>ANALYTE - O</th>
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<th>MCL</th>
<th>Method</th>
<th>Kam. School</th>
<th>Anal. Date/Analyst ID</th>
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* = Action Level  
MCL = Maximum Contaminant Level  
ND = Not Detected at or above detection limit
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MCL = Maximum Contaminant Level
ND = Not Detected at or above detection limit.
**CLIENT:** Waimea Water Services  
P.O. Box 326  
Kamuela, HI 96743  
**ATTENTION:** Steve/John  

**FILE No.:** 457  
**REPORT DATE:** 09/21/95  
**PAGE:** 4 of 4  

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<thead>
<tr>
<th>ANALYTE</th>
<th>Units</th>
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<th>MCL</th>
<th>Method</th>
<th>Kam. School</th>
<th>Anal. Date/Analyst ID</th>
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<tbody>
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**NOTE:** Analytes on pages 1-3 are from the new source well list. Any additional analytes found in these methods may be found on the attached lists.  
MCL = Maximum Contaminant Level  
ND = Not Detected at or above detection limit.
WELL DRILLING CONTRACTORS
COMPLETION REPORT
To: Mr. Michael D. Wilson, Chairman  
Commission on Water Resource Management  
Department of Land & Natural Resources  
State of Hawaii  
P.O. Box 621  
Honolulu, Hawaii 96809

Attention: Ms. Rae M. Loui, Deputy Director

Project: KAMEHAMEHA SCHOOLS WELL “A”  
WELL COMPLETION REPORT  
TMK: 1-6-22: 1  
A&A JOB NO: KSBE 91-01

Subject: Well Completion Report

We are sending you herewith:

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For:  
× Information/Files  
□ Review/Comments  
□ Review/Approval  
□ Approval/Signature  

□ ACTION  
□ Revise/Re-Submit  
□ Reply Requested  

Remarks:

The attached is submitted for your information and approval as required by the Well Construction/Pump Installation Permit.

The Dept. of Health have completed their preliminary review of the Preliminary Engineering Report for new potable water source. We are in the process of revising the report based on their concerns.

We request your approval to install the permanent pump.
If there are any questions, please call the undersigned.

Very truly yours,

By: [Signature]

Robert Y. Akinaka
President

cc: Michael Lum, KSBE
    Steve Bowles, WWS
    SMQ\RYA:cyk
    DLNR288.DOC

Transmittal Form
COMMISSION ON WATER RESOURCE MANAGEMENT

FROM: [Initials]  DATE:                   SUSPENSE DATE: 

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[Handwritten notes: 157 51 22]
The Honorable Michael D. Wilson  
Chairman of the Board  
Department of Land and Natural Resources  
1151 Punchbowl Street  
Honolulu, HI 96813

Attn: Rae Loui, Deputy Director for Water Resource Management  

Dear Mr. Wilson:

SUBJECT: PROPOSED SOURCE OF POTABLE WATER

Enclosed for your review and comments is a copy of the engineering report for the following source:

Kamehameha Schools Well "A"  
State Well No. 3-2051-01  
Honolulu, Oahu  
TMK: 1st Div; 1-6-22:01

This report has been prepared pursuant to Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, section 11-20-29.

The Department of Health will use your comments in determining the potential impacts which may result by the proposed project.

Please submit your comments to the Safe Drinking Water Branch within 30 days from the date of this letter. You may also return the engineering report to this office if you do not need it for future reference.

If you should have any questions, please call the Safe Drinking Water Branch, Engineering Section, at 586-4258.

Sincerely,

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

Enclosure
PRELIMINARY ENGINEERING REPORT FOR NEW POTABLE WATER SOURCES

KAMEHAMEHA SCHOOLS WELL "A" (STATE WELL 2051-01) HONOLULU, HAWAII, 96817 TMK: 1ST DIV; 1-6-22:01

PREPARED FOR:
KAMEHAMEHA SCHOOLS/BERNICE PAUAHI BISHOP ESTATE KAPALAMA HEIGHTS HONOLULU, HAWAII 96817

PREPARED BY:
AKINAKA & ASSOCIATES, LTD. 250 NO. BERETANIA ST., SUITE 300 HONOLULU, HAWAII 96817-4716

JANUARY 1996
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X. WATER DISTRIBUTION SYSTEMS
XI. FINANCING

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B. WELL DRILLING AND PUMP TEST REPORT

JANUARY 1996
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2. VICINITY MAP
3. LOCATION MAP
4. SITE PLAN
5. RAINFALL MAP
6. HONOLULU QUADRANGLE MAP
7. STATE LAND USE PLAN
8. COUNTY ZONING MAP
9. GRADING PLAN
10. WELL SECTION KAMEHAMEHA SCHOOLS WELL NO. A
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14. WATER MASTER PLAN
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JANUARY 1996
I. INTRODUCTION

This report is prepared pursuant to Chapter 20 of Title 11, "Potable Water Systems," of the Public Health Regulations, which requires submittal of preliminary drawings and supporting data to the State Department of Health when a new source of water supply is developed.

The new source of water supply, Kamehameha Schools Well "A" (State Well No. 2051-01) is located on the southern slopes of the Koolau Range along the east ridge of Kalihi Valley (Kapalama) on the Island of Oahu. It will serve the Kamehameha Schools campus located as shown on EXHIBIT 1: ISLAND MAP.

This report follows the format of "Guidelines for Preparation of Preliminary Engineering Reports for New Potable Water Sources", Drinking Water Program, State Department of Health. The information it contains has been gathered from various project reports and documents as listed below. As appropriate in this report, sections will be referenced by the listed letter designation of the "Guidelines."

REFERENCES FOR KAMEHAMEHA SCHOOLS WELL "A"

A. Water Master Plan for the Kamehameha Schools; by Clifford S. Jamile, P.E., December 1990 w/addendums

B. Kamehameha Schools Well "A", Well Completion Report; by Waimea Water Services, Inc.; September 1995

C. Subsurface Investigation Report - Proposed 565' 0.25 M.G. Reservoir, Kamehameha Schools Water System Improvements; by Fewell Geotechnical Engineering, Ltd; June 30, 1994

D. Water supply for Expansion of Kamehameha Schools; by Mink & Yuen, March 31, 1992

II. GENERAL INFORMATION

A. PROJECT DESCRIPTION AND LOCATION

1. The Project proposes to replace the existing Kamehameha Schools/B.P. Bishop Estate water supply source. The Project is part of a water system improvement program intended to increase the safety and reliability of domestic water service within the Kapalama Heights campus of Kamehameha Schools.

The total system improvements include:

a. 550' Elevation Site
   1 - deepwell pump station (WELL 'A')
   1 - booster pump station
   1 - pump control building
   1 - 0.25 M.G. reinforced concrete reservoir water transmission lines, sitework

b. 725' Elevation Site
   1 - deepwell pump station
   1 - booster pump station
   1 - pump control building
   1 - 0.50 M.G. reinforced concrete reservoir water transmission lines, sitework

2. The Project is located in Kapalama, a neighborhood of Kalihi, in Honolulu, Oahu. EXHIBIT 2: VICINITY MAP shows the Project area adjacent to developed suburban areas on the hillsides above Honolulu.

3. Well "A" (SEE EXHIBIT 3: LOCATION MAP) is located within the school site owned by Kamehameha Schools/B.P. Bishop Estate. The well location was selected to be efficiently integrated into the master planned water supply system.
B. OWNER AND OPERATOR OF THE PROJECT

Kamehameha Schools/B.P. Bishop Estate will develop and own the well. Kamehameha Schools will operate and maintain the well. The improvements will be similar to municipal water standards including treatment and metering.

C. SITE PLAN

EXHIBIT 4: SITE PLAN is provided to show the proposed improvements. As shown, the site includes an all-weather road, reservoir, control/chlorinator building, and well pump facility. Details of the Project such as well characteristics, pump piping and treatment are discussed in later sections.
III. PHYSICAL AND HYDROLOGICAL CHARACTERISTIC OF THE AREA

A. LOCATION

The Project area is located in the Kalihi area of the City of Honolulu, approximately 2.3 miles northerly of the State Capital. The well site is along an existing paved road which serves as the secondary access into the campus.

B. CLIMATE

The climate of Honolulu is comfortably uniform and is characterized by the northeast tradewinds generated by regions of high pressure to the north. These winds keep the average month temperatures near sea level within the range of 70° in February to 79° in August. The mean temperature decreases about 3° for every 1,000 foot increase in elevation.

The consistent approach of the tradewinds from the Northeast distinguishes the island into windward and leeward sides. Windward Oahu receives larger amounts of rainfall as the result of the condensation of water vapor as it is forced up into the atmosphere by the mountain mass. Median annual rainfall at the project area is about 40 inches.

EXHIBIT 5: RAINFALL MAP.

C. TOPOGRAPHY

The project site is located within the Kapalama Heights campus of the Kamehameha Schools. Topographic information is available on the Honolulu - Quadrangle Map published by the U.S. Geological Survey (SEE EXHIBIT 6: HONOLULU QUADRANGLE MAP).

The site has been graded to accommodate the future well and reservoir. The original ground sloped toward the south at approximately 20 percent. At approximately 150 feet east of the site the ground slopes into a gully.

D. GEOLOGY

General subsurface information was obtained from "Subsurface Investigation Report - Proposed 565' 0.25 MG Reservoir" by Fewell Geotechnical Engineering, Ltd., dated June 30, 1994. The site is underlain by 12 feet of fill. The fill is underlain by 3 to 6 feet of alluvial...
soils over saprolite and weathered basalt. Basalt extends to below 40 feet of the existing ground surface. The basalt is highly to completely weathered immediately below the alluvial clays, grading to moderately to slightly weathered with increasing depth.

E. GROUNDWATER CONDITIONS

Static ground water level is at 21.6 feet elevation, which is 527.8 feet depth to water. A long term aquifer pumping test was commenced on June 26, 1995. A total of 2,268,830 gallons were pumped during 48 hours at an average rate of 787.8 gpm. The total drawdown in the pumping well was 1.73 feet and recovery was within 5 minutes.

F. FLOOD HAZARD

Flood hazard data was not obtained for the well site. As the site is on higher grounds and as adjacent land slopes preclude ponding, flooding is not expected. The adjacent gully will transport all flood flows away from the well site.

G. LAND USE PLANNING AND ZONING REGULATIONS

1. State Land Use Plans

The State Land Use Commission designates properties in four categories: Agriculture, Rural, Urban, and Conservation. The proposed project lies within land designated as Urban. See EXHIBIT 7: STATE LAND USE PLAN

2. City & County of Honolulu Zoning

The Zoning Map for the Island of Oahu, by the Department of Land Utilization dated March 1995, provides information on the surrounding communities and land use designations. The project site is within lands designated Residential (R-5) in zoning map. See EXHIBIT 8: COUNTY ZONING MAP

H. DISCUSSION OF WATER RIGHTS AND FUTURE USES BY OTHERS

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage
growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new well is to replace an existing well, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
IV. EXTENT OF THE WATERWORKS SYSTEM

A. DESCRIPTION OF THE NATURE AND EXTENT OF THE EXISTING AREA AND FUTURE AREA TO BE SERVED

Kamehameha Schools Kapalama Heights campus resides within TMK: 1-6-22:01 which consists of 426.4 acres. At present, approximately 50 acres are developed entirely for school purposes. Expansion of facilities to support the increase in student population will be within the developed area.

B. POPULATION SERVED BY WATER WORKS SYSTEM

The present student population at the Kapalama Heights campus is 3,000 students. The projected population (year 2015) is 3,300 students. Administrators, teachers, and support staff are approximately 800 people. The population served by the water system will be approximately 4,100 persons.

C. APPRAISAL OF FUTURE REQUIREMENTS FOR SERVICE

Per Reference D, the Kamehameha Schools water allocation is underutilized by 11.4 percent. Increasing the average pumping rate to the allowed average draft will satisfy the anticipated increase in demand for a number of years.

D. PROVISIONS FOR EXTENDING WATERWORKS SYSTEM

The water master plan (Reference A) does not anticipate a need for extending the water system beyond the present developed area. This project will not include provisions to extend the water system.

E. FIRE PROTECTION AND PRESSURE REQUIREMENTS

The water system's design follows the Honolulu Board of Water Supply standards for storage, transmission and distribution. All applicable fire flow and pressure requirements will be met.

F. ALTERNATE SOLUTION CONSIDERED AND SUPPORTING DATA FOR RECOMMENDED PLAN

Other ways to meet the projected water demand are to develop a substantial rainfall catchment system or to collect and treat surface water.
Both of these alternatives are not economically comparable to the proposed wells and would involve other environmental impacts as well. Water from existing Department of Water Supply wells cannot meet the school's demand.

G. ENVIRONMENTAL AND ECONOMIC IMPACT

1. Short Term Impacts

Short term impacts of the proposed project will be minimal. Daily traffic of the construction crew through the school and the noise of the equipment will be the extent of the off-site construction impacts. The residences within a mile of the project site experience similar traffic noises from the school and other traffic.

The work will be restricted to daylight hours and the noise should blend in with the normal activities. Exhaust emissions will not impact any populated area.

Dust and erosion from the construction efforts will be insignificant considering the site area and grading requirements. Conformance to the Grading Ordinance should mitigate any adverse effects. Water discharged from the well during the testing period will be directed to the existing gulley.

2. Long Term Impacts

The land necessary for the development of the well site is part of the existing school area. The major long term impact resulting from the proposed project will be the development of a potable well facility and the improved reliability of the Kamehameha School's water system. The well will not influence rezoning of lands to higher uses in consideration that all production will be used only by the school. The improved water system may be a factor in encouraging further development of the school, however the extent of future development has been established by other actions, such as zoning and master planning.
V. POTENTIAL SOURCES OF CONTAMINATION

A. DESCRIPTION OF WELL SITE

1. Coordinates for Kamehameha School's Well A (State Plane Coordinates)
   
   63754.5N
   548398.3E

2. Elevation of pump pad = 549.0. The site will be graded to approximately 2%. EXHIBIT 9: GRADING PLAN shows the final site conditions.

3. Size and Topography of Catchment Area

   The well site will provide virtually no surface catchment of water so drainage will not be a problem. The precise areal size of the catchment area is not known.

4. General Summary of Soil and Substrata:

   The site is underlain by 12 feet of fill. The fill is underlain by 3 to 6 feet alluvial soils over saprolite and weathered basalt. Basalt extends to below 40 feet of the existing ground surface.

5. Well depth, depth to ground water and design well draft.

   a. STATE WELL NO. 2051-01 (EXHIBIT 8: WELL SECTION KAMEHAMEHA SCHOOLS WELL 'A')

      Ground El. = 549.4 Ft.
      Q = 500 GPM
      Hp = 125 Hp
      Static Head = 527.8 Ft.
      TDH = 565 Ft.
      Casing = 14 Inches (inside diameter)
      W.S. El. = 21.6 Ft.

      TDH = Total Dynamic Head
B. WATER QUALITY

Samples were analyzed by AECOS Laboratory of Hawaii and Laboratory with results shown in APPENDIX A. AECOS, Inc. adheres to published EPA methods as much as possible; however there are deviations. Standard Methods (APHA, 1992) may be followed in some cases. Method details are found in the AECOS laboratory SOPs. A summary of methods and quality control is included in Appendix A.

C. LAND USE CLASSIFICATION OF SURROUNDING AREA

The well site is within lands designated as Urban per State Land Use District Regulations (SEE EXHIBIT 7). City & County zoning of the well site and surrounding area is Residential per the General Plan (SEE EXHIBIT 8).

D. POTENTIAL SOURCES OF CONTAMINATION IN THE RECHARGE AREA

The well is located within a controlled area, there are no developments above the school site. The well has a solid casing for the upper 600 feet with concrete grouting preventing direct access into the well. Chlorination will be provided to ensure that bacterial contamination is not a problem (See EXHIBIT 11).

E. APPROXIMATE GROUNDWATER CONTOURS

The water level in Well 'A' was measured at 22.36' elevation. Information for the well which will be replaced by Well 'A' (approximately one mile makai) and other wells in the Kalihi Subarea is shown on the table below:
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<td>90</td>
<td>334</td>
<td>26.0</td>
</tr>
<tr>
<td>Palama Settlement</td>
<td>1952-15</td>
<td>1924</td>
<td>27</td>
<td>335</td>
<td>25.8</td>
</tr>
</tbody>
</table>

(From: Assessment of Water Supply and Sustainable Yield on Kamehameha Schools/Bernice Pauahi Bishop Estates' Oahu Lands Moanalua - Kaimuki Subarea; April 1991)
VI. SOURCES OF WATER SUPPLY

A. NATURE OF SOIL AND STRATUM WITHIN AND OVERLAYING THE WATER SOURCE

The native soil at the site is classified as Manana silty clay per Reference E. Runoff is medium to rapid and the erosion hazard is moderate to severe. The driller's log describes the rock at water level as "hard".

B. THE PROBABILITY AND EFFECT OF SURFACE DRAINAGE OR CONTAMINATED UNDERGROUND WATER ENTERING THE SUBJECT WATER SOURCE

1. Contamination from surface drainage will be prevented by designing the facilities to control local rainfall runoff.

2. Probability that contaminated underground water will enter the water source is decreased by grouting the upper 600' of the well.

C. DEPTH TO WATER TABLE, LOCATION AND LAY OF WELLS IN VICINITY IN USE AND/OR ABANDONED

1. Depth to water table for the well is approximately:

   Land surface elevation = 549.4'
   Water surface elevation = 22.4'
   Depth to water table = 527.0'

2. The following wells exists in the vicinity of Kamehameha Schools' Well No. A and shown on EXHIBIT 12: ADJACENT WELLS.

<table>
<thead>
<tr>
<th>WELL NAME</th>
<th>STATE NO.</th>
<th>DIST FROM WELL 'A'</th>
<th>DRAW (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JONATHAN SPR. WELL</td>
<td>2052-12</td>
<td>5,000' SW</td>
<td>1,000</td>
</tr>
<tr>
<td>KALIHI STA. WELLS (8)</td>
<td>1952-07/ETC</td>
<td>7,000' SW</td>
<td>6,220 (TOT)</td>
</tr>
<tr>
<td>PALAMA SETTLEMENT</td>
<td>1952-16</td>
<td>7,000' S</td>
<td>0.024</td>
</tr>
<tr>
<td>KAMEHAMEHA SCHOOLS (2)</td>
<td>2052-07/11</td>
<td>4,500' SW</td>
<td>0.229 (TOT)</td>
</tr>
</tbody>
</table>
D. SLOPE OF WATER TABLE

The water table slope at the site differs from that of the other well sites. Per Reference D, the basal aquifer is artesian where it is confined beneath the caprock sediments which constitute the coastal plain, but above a ground elevation of about 25 feet the water table is unconfined.

E. FLOODING AND/OR EARTHQUAKE RISK

No flooding problems are anticipated. Potential seismic activity will be mitigated in the design of all structures.

F. QUALITY AND QUANTITY OF SOURCE WATERS

Water quality data for Well 'A' is tabulated in APPENDIX A. Samples were obtained on June 28, 1995 by AECOS during the pump test.

A 48-hour aquifer test started June 26, 1995. The pumping test was stopped after 48 hours of pumping as there had been no change in drawdown or water quality. The pumping rate was stable at an average of 787 gpm or 287 gpm more than the design rate of 500 gpm.

G. SIGNIFICANT FACTORS HAVING POTENTIAL FOR CONTAMINATING THE WATER SOURCE

1. Urban development - limited risk
2. Sugar cane cultivation - none
3. Pasture lands - none
4. Sanitary landfills - none
5. Subsurface disposal units - none

H. CONTROL MEASURES

The site will be graded to direct storm flows away from the well.

The well water quality will be monitored using chemical and biological analysis in conformance with State Safe Drinking Water quality requirements to assure maintenance of high quality water. Output from the wells will be chlorinated.
I. SUMMARY

The quality of water from Kamehameha Schools Well 'A' is within the limits for potable waters and the State Department of Health, Safe Drinking Water Program regulates compliance with the standards of the Safe Drinking Water Act and other State Department of Health Regulations. The water quality will be monitored on a regular basis.
VII. PROPOSED TREATMENTS WORKS

The water drawn from the wells will be treated by an on-site chlorine generation system. A modular equipment package will provide chlorine without the danger of storing or handling hazardous materials. The equipment will replace cylinders of chlorine gas and commercial sodium hypochlorite. The process consists of combining salt, water (w/electricity) to produce the sodium hypochlorite solution and hydrogen which is vented to the atmosphere. A metering pump delivers the solution to an injection point in the water piping. The treated water will be pumped into the 565' reservoir to be distributed to the consumers or directed to the 850' reservoir by the booster pump.

Other required information referring to treatment plant facilities does not apply to well source.
VIII. PUMPING FACILITIES

A. PURPOSE OF SERVICE

The well pumps and booster pumps will serve the Kamehameha Schools Water System consisting of the educational and residential (dormitories) facilities.

B. PUMPING LAYOUT AND SIZING OF CONNECTION MAIN

Well pump station piping, valves and controllers are shown on EXHIBIT 13: WELL PUMP PIPING. The well station is designed as an outdoor facility. To prevent backflow into the wells, a check valve will be installed upstream to the pump. Instruments and electrical controls will be housed in a CMU building.

Connecting mains will be ductile iron pipe with push-on or mechanical joints. Flanged end pipe and fittings will be used for above ground piping. Pipeline size between well and reservoir at spillway elevation 565 will be 8 inches.

C. DESIGN FLOW REQUIREMENTS

Flows from Well ‘A’ will be pumped directly into the adjacent 565’ spillway 0.25 MG reservoir. This reservoir services users between elevations 325’ to 465’. A booster pump at the reservoir will boost water to the 850’ spillway 0.50 MG reservoir. This reservoir services users between elevation 465’ and 800’. Approximately one-half of the campus will be served by flows from Well ‘A’.

D. LIQUID CHARACTERISTIC

The water characteristic are shown in APPENDIX A
E. ELECTRIC POWER

Electric power will be provided by the Hawaiian Electric Company by underground lines from an existing electric handhole adjacent to Akahi Bldg (See Exhibit 3) then along existing Waoahele Road to the Well 'A' site.

F. PUMPING ARRANGEMENT

The pumping system is a typical potable water pump station as shown in EXHIBIT 13. A vertical turbine pump and motor will be controlled by telemetered signals based on water levels in the 0.25 million gallon concrete reservoir at spillway elevation 565'.

G. PUMP SELECTION

The well pump will be a vertical turbine pump similar to the Byron Jackson 10" MQ-'L' (15 stages). It should have a rated capacity of 500 gpm at 565 ft. head. See EXHIBIT 10: WELL SECTION Specifications of the pump include:

1. Minimum capacity 500 gpm
2. Proposed setting of pump intake 0.00 feet (msl)
3. Maximum size pump (nominal) 10 inches
4. Maximum discharge column size (nominal) 6 inches
5. Maximum pump speed 1760 rpm
6. Minimum overall efficiency 70 percent

H. PUMP PERFORMANCE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Capacity (USGPM)</th>
<th>Head (Ft)</th>
<th>Efficiency (%)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>749</td>
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<tr>
<td>300</td>
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<td>400</td>
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<td>565</td>
<td>76</td>
</tr>
<tr>
<td>600</td>
<td>516</td>
<td>75</td>
</tr>
</tbody>
</table>

I. BUILDINGS AND OTHER STRUCTURAL IMPROVEMENTS

The well pumping station includes a 13'X35X10'H CMU building to house the electrical cabinets, instrumentation and chlorination equipment.
J. WATER HAMMER CONSIDERATION

Water hammer is controlled during pump start-up and shut-down by the correct sequencing of the pump, the pump control valve and the check valve.

K. ESSENTIAL FEATURES OF CONSTRUCTION AND OPERATION

The well pump will be automatically controlled by reservoir mounted floats. Pump and motor protection will be provided by pressure and flow switches.

L. ELECTRICAL SYSTEM PROVISIONS FOR POWER FAILURE

The 125 hp pump motor requires a 460 volts, 3 phase, 60 hertz power source which will be supplied by Hawaiian Electric Company. Stand by power will not be provided.
IX. FINISHED WATER STORAGE

Water from the well will be stored at the 565’ tank site which includes a 0.25 MG concrete tank. A Smart system at the tank site will provide signals to operate the pump. Provisions for future supervisory controls are included in the project.

The 565’ water system will be connected to the 850’ system through a booster pump at the 565’ tank site.
X. WATER DISTRIBUTION SYSTEM

A. GENERAL LAYOUT

The Kamehameha Schools Water System service area is limited to the facilities within the Kapalama Heights campus. EXHIBIT 14: WATER MASTER PLAN provides a general layout of the system. Water improvements shown are only those related to Kamehameha Schools/B.P. Bishop Estate.

Pipe sizes are subject for review during the design process. In general, the off-site pipelines fall in the following categories:

1. Source to storage (wells to reservoirs)
2. Storage to storage (reservoir to reservoir)
3. Storage to user (reservoir to subdivision)

Source to storage lines are pressurized by the well pumps. Service laterals will not be connected to these lines.

Storage to storage lines are pressurized by booster pumps at the lower reservoir. Design pressures will be less than 150 psi. Gate valves will be included to isolate selected sections of the pipelines. Service laterals will not be connected to these lines.

Storage to user lines are located in each service level. System pressures are based on the relative reservoir elevation and will be designed below 125 psi with use of pressure reducing valves.

A schematic profile (EXHIBIT 15) shows the service and approximate system pressures.

B. WATER SYSTEM MATERIALS

The system will follow the City & County of Honolulu, Board of Water Supply standards for construction materials for pipelines, valves, fittings and miscellaneous appurtenances.

C. PROXIMITY TO OTHER UTILITIES

There are no other utilities except for the underground power lines serving the pump station and reservoir.
XI. **FINANCING**

Construction of Kamehameha Schools Well ‘A’ is estimated to cost $1,200,000. Financing of the well construction will be by Kamehameha Schools/B. P. Bishop Estate.

Kamehameha Schools will operate and maintain the well. Funding for operations/maintenance will be obtained from Kamehameha Schools/B. P. Bishop Estate Capital improvements budget.
Preliminary Engineering Report
Kamehameha Schools Well "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22 (Div. 1)
MEDIAN ANNUAL RAINFALL - OAHU, HAWAII

NOTE: Isohyets in mm.


PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22-1 (Div. 1)
HONOLULU QUADRANGLE MAP

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2081-01)
Honolulu, Oahu, Hawaii
TMC: 1-6-22:1 (Div. 1)
### Equipment Description

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<thead>
<tr>
<th>Key</th>
<th>Equipment Description</th>
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<tbody>
<tr>
<td>01</td>
<td>Electrical Control Panel</td>
</tr>
<tr>
<td>02</td>
<td>Flow Control Panel</td>
</tr>
<tr>
<td>03</td>
<td>Power Supply No. 1</td>
</tr>
<tr>
<td>04</td>
<td>Brine Tank</td>
</tr>
<tr>
<td>05</td>
<td>Hypo Tank</td>
</tr>
<tr>
<td>06</td>
<td>125 Gallon Nalgene Tank with Legs</td>
</tr>
<tr>
<td>07</td>
<td>Injection Pump with 18&quot; x 18&quot; x 12&quot; Stand</td>
</tr>
</tbody>
</table>

**Chlorination System Schematic**

**Preliminary Engineering Report**

Kamehameha Schools Well "A"

(State Well No. 2051-01)

Honolulu, Oahu, Hawaii

TMK: 1-6-22:1 (Div. 1)
PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
**SECTION B**

**WELL PUMP PIPING**

**NOT TO SCALE**

**PRELIMINARY ENGINEERING REPORT**

**KAMEHAMEHA SCHOOLS WELL "A"**

(State Well No. 2051-01)

Honolulu, Oahu, Hawai'i

**Twk: 1-6--22:1 (Div. 1)**
APPENDIX A

WATER QUALITY DATA

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
## REPORT OF ANALYTICAL RESULTS

**SAMPLE TYPE:** potable water  
**DATE SAMPLED:** 06/28/95  
**AECOS LOG No.:** 8637  
**DATE RECEIVED:** 06/28/95

<table>
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<tr>
<th>ANALYTE</th>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Kam. School</th>
<th>Anal. Date/Analyst ID</th>
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</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td>col/100 ml</td>
<td>Absence</td>
<td>SM 9222 A,B</td>
<td>ca</td>
<td>06/28/95</td>
<td></td>
</tr>
<tr>
<td>Fecal Coliform</td>
<td>col/100 ml</td>
<td>Absence</td>
<td>SM 9222 A,B</td>
<td>ca,me</td>
<td>06/28/95</td>
<td></td>
</tr>
<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>0.10</td>
<td>EPA 180.1</td>
<td>0.28</td>
<td>06/28/95</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>---</td>
<td>0.01</td>
<td>EPA 150.2</td>
<td>8.26</td>
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<tr>
<td>Conductivity</td>
<td>μmhos/cm</td>
<td>---</td>
<td>EPA 120.1</td>
<td>308</td>
<td>06/28/95</td>
<td></td>
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<tr>
<td>Temperature</td>
<td>°C</td>
<td>1</td>
<td>EPA 170.1</td>
<td>22</td>
<td>06/28/95</td>
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<tr>
<td>Fluoride</td>
<td>mg/L</td>
<td>0.20</td>
<td>EPA 340.2</td>
<td>&lt; 0.20</td>
<td>07/24/95</td>
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<tr>
<td>Nitrate</td>
<td>mg N/L</td>
<td>0.001</td>
<td>EPA 353.2</td>
<td>0.606</td>
<td>06/28/95</td>
<td></td>
</tr>
<tr>
<td>Nitrite</td>
<td>mg N/L</td>
<td>0.001</td>
<td>EPA 353.2</td>
<td>&lt; 0.001</td>
<td>06/28/95</td>
<td></td>
</tr>
<tr>
<td>Alkalinity</td>
<td>mg/L</td>
<td>4</td>
<td>EPA 310.1</td>
<td>70</td>
<td>06/28/95</td>
<td></td>
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<tr>
<td>Calcium</td>
<td>mg/L</td>
<td>0.15</td>
<td>EPA 215</td>
<td>12.0</td>
<td>07/19/95</td>
<td></td>
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<tr>
<td>Arsenic</td>
<td>mg/L</td>
<td>0.003</td>
<td>EPA 200.9</td>
<td>&lt; 0.003</td>
<td>07/11/95</td>
<td></td>
</tr>
<tr>
<td>Barium</td>
<td>mg/L</td>
<td>0.002</td>
<td>EPA 200.9</td>
<td>0.003</td>
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<tr>
<td>Cadmium</td>
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<td>0.0001</td>
<td>EPA 200.9</td>
<td>&lt; 0.0001</td>
<td>06/29/95</td>
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</tr>
<tr>
<td>Chromium</td>
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<td>0.0005</td>
<td>EPA 200.9</td>
<td>0.002</td>
<td>07/13/95</td>
<td></td>
</tr>
</tbody>
</table>

The sample was collected and analyzed prior to DOH mailing the revised (June 23, 1995 edition) new source well contaminants list.

MCL = Maximum Contaminant Level  
ND = Not Detected at or above detection limit.

J. Mello, Laboratory Director
<table>
<thead>
<tr>
<th>ANALYTE &amp; Analyte Code</th>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Kam. School</th>
<th>Anal. Date/ Analyst ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>mg/L</td>
<td>0.001</td>
<td>1.3 *</td>
<td>EPA 200.9</td>
<td>&lt; 0.001</td>
<td>07/12/95 jh</td>
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<tr>
<td>Lead</td>
<td>mg/L</td>
<td>0.001</td>
<td>0.015 *</td>
<td>EPA 200.9</td>
<td>&lt; 0.001</td>
<td>06/29/95 jh</td>
</tr>
<tr>
<td>Mercury</td>
<td>mg/L</td>
<td>0.0002</td>
<td>0.002</td>
<td>EPA 200.9</td>
<td>&lt; 0.0002</td>
<td>07/24/95 dh</td>
</tr>
<tr>
<td>Selenium</td>
<td>mg/L</td>
<td>0.002</td>
<td>0.05</td>
<td>EPA 200.9</td>
<td>&lt; 0.002</td>
<td>07/10/95 jh</td>
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<tr>
<td>DBCP (Dibromo- chloropropane)</td>
<td>mg/L</td>
<td>0.00001</td>
<td>0.00004</td>
<td>EPA 504</td>
<td>ND</td>
<td>07/07/95 PACE</td>
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<tr>
<td>EDB (Ethylene Dibromide)</td>
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<td>0.00002</td>
<td>0.00004</td>
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<tr>
<td>Atrazine</td>
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<td>0.003</td>
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<tr>
<td>Alachlor</td>
<td>mg/L</td>
<td>0.00055</td>
<td>0.002</td>
<td>EPA 508</td>
<td>ND</td>
<td>07/05/95 ML</td>
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<tr>
<td>Chlordane</td>
<td>mg/L</td>
<td>0.00011</td>
<td>0.002</td>
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<tr>
<td>Endrin</td>
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<td>0.000011</td>
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<td>07/05/95 ML</td>
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<tr>
<td>Heptachlor</td>
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<td>Heptachlor Epoxide</td>
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<td>PCB's</td>
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<td>Toxaphene</td>
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<td>0.003</td>
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<tr>
<td>2,4-D</td>
<td>mg/L</td>
<td>0.01</td>
<td>0.07</td>
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<td>07/11/95 PACE</td>
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<tr>
<td>Pentachlorophenol</td>
<td>mg/L</td>
<td>0.0002</td>
<td>0.001</td>
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<td>07/11/95 PACE</td>
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<td>2,4,5-TP</td>
<td>mg/L</td>
<td>0.002</td>
<td>0.05</td>
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<td>ND</td>
<td>07/11/95 PACE</td>
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<tr>
<td>2,4,5-TP</td>
<td>mg/L</td>
<td>0.002</td>
<td>0.05</td>
<td>EPA 515.1</td>
<td>ND</td>
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</tr>
<tr>
<td>Benzene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.005</td>
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<tr>
<td>Carbon Tetrachloride</td>
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<td>0.005</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
</tbody>
</table>

* = Action Level  
MCL = Maximum Contaminant Level  
ND = Not Detected at or above detection limit.
<table>
<thead>
<tr>
<th>ANALYTE</th>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
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<th>Anal. Date/Analyst ID</th>
</tr>
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<tbody>
<tr>
<td>Chlorobenzene</td>
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<tr>
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<td>0.075</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>1,2-Dichloroethane</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.005</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>1,1-Dichloroethylene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.007</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethylene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.07</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethylene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.1</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>DCP (1,2-Dichloropropane)</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.005</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.7</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Styrene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.1</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Tetrachloroethylene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.005</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Toluene</td>
<td>mg/L</td>
<td>0.0005</td>
<td>1</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.2</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>mg/L</td>
<td>0.005</td>
<td>0.005</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>TCP (1,2,3-Trichloropropane)</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.0008</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.002</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Xylenes (Total)</td>
<td>mg/L</td>
<td>0.0005</td>
<td>10</td>
<td>EPA 524.2</td>
<td>ND</td>
<td>07/07/95 PACE</td>
</tr>
<tr>
<td>Carbofuran</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.04</td>
<td>EPA 531.1</td>
<td>ND</td>
<td>07/18/95 PACE</td>
</tr>
<tr>
<td>Calcium Hardness</td>
<td>mg/L</td>
<td>1</td>
<td>n/a</td>
<td>SM2340B</td>
<td>30.0</td>
<td>08/24/95 dh</td>
</tr>
<tr>
<td>Total Hardness</td>
<td>mg/L</td>
<td>1</td>
<td>250</td>
<td>SM2340B</td>
<td>55.9</td>
<td>08/24/95 dh</td>
</tr>
</tbody>
</table>

MCL = Maximum Contaminant Level
ND = Not Detected at or above detection limit.
<table>
<thead>
<tr>
<th>ANALYTE &amp;</th>
<th>Units</th>
<th>Det. Limit</th>
<th>MCL</th>
<th>Method</th>
<th>Kam. School</th>
<th>Anal. Date/ Analyst ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium</td>
<td>mg/L</td>
<td>0.005</td>
<td>n/a</td>
<td>200.9</td>
<td>6.3</td>
<td>07/18/95</td>
</tr>
<tr>
<td>Manganese</td>
<td>mg/L</td>
<td>0.0002</td>
<td>50</td>
<td>200.9</td>
<td>0.0003</td>
<td>06/30/95</td>
</tr>
<tr>
<td>Iron</td>
<td>mg/L</td>
<td>0.001</td>
<td>300</td>
<td>200.9</td>
<td>0.009</td>
<td>07/11/95</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>mg/L</td>
<td>1.0</td>
<td>500</td>
<td>160.1</td>
<td>180</td>
<td>06/29/95</td>
</tr>
<tr>
<td>Chloride</td>
<td>mg/L</td>
<td>1.0</td>
<td>250</td>
<td>325.3</td>
<td>44.0</td>
<td>06/28/95</td>
</tr>
<tr>
<td>Sulfate</td>
<td>mg/L</td>
<td>1.0</td>
<td>250</td>
<td>375.4</td>
<td>7.58</td>
<td>07/24/95</td>
</tr>
<tr>
<td>Color</td>
<td>mg/L</td>
<td>5</td>
<td>15</td>
<td>110.2</td>
<td>&lt; 5</td>
<td>06/28/95</td>
</tr>
<tr>
<td>Cyanide</td>
<td>mg/L</td>
<td>0.02</td>
<td>200</td>
<td>335.2</td>
<td>ND</td>
<td>07/10/95</td>
</tr>
<tr>
<td>Corrosivity</td>
<td>mg/L</td>
<td>N/A</td>
<td>non-corrosive</td>
<td>Langlier Index</td>
<td>-0.25</td>
<td>08/24/95</td>
</tr>
<tr>
<td>Antimony</td>
<td>mg/L</td>
<td>0.005</td>
<td>0.006</td>
<td>200.9</td>
<td>&lt;0.005</td>
<td>09/18/95</td>
</tr>
<tr>
<td>Beryllium</td>
<td>mg/L</td>
<td>0.001</td>
<td>0.004</td>
<td>200.9</td>
<td>&lt;0.001</td>
<td>09/18/95</td>
</tr>
<tr>
<td>Nickel</td>
<td>mg/L</td>
<td>0.10</td>
<td>0.100</td>
<td>200.9</td>
<td>&lt;0.10</td>
<td>09/18/95</td>
</tr>
<tr>
<td>Thallium</td>
<td>mg/L</td>
<td>0.001</td>
<td>0.002</td>
<td>200.9</td>
<td>&lt;0.001</td>
<td>09/18/95</td>
</tr>
<tr>
<td>Simazine</td>
<td>mg/L</td>
<td>0.001</td>
<td>0.004</td>
<td>507</td>
<td>&lt;0.001</td>
<td>07/05/95</td>
</tr>
<tr>
<td>Dalapon</td>
<td>mg/L</td>
<td>0.010</td>
<td>0.2</td>
<td>508</td>
<td>&lt;0.010</td>
<td>07/16/95</td>
</tr>
<tr>
<td>Dinoseb</td>
<td>mg/L</td>
<td>0.002</td>
<td>0.007</td>
<td>508</td>
<td>&lt;0.002</td>
<td>07/16/95</td>
</tr>
<tr>
<td>Picloram</td>
<td>mg/L</td>
<td>0.001</td>
<td>0.5</td>
<td>508</td>
<td>&lt;0.001</td>
<td>07/16/95</td>
</tr>
<tr>
<td>Aldicarb</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.003</td>
<td>531.1</td>
<td>&lt;0.0005</td>
<td>07/18/95</td>
</tr>
<tr>
<td>Aldicarb Sulfone</td>
<td>mg/L</td>
<td>0.0006</td>
<td>0.002</td>
<td>531.1</td>
<td>&lt;0.0006</td>
<td>07/18/95</td>
</tr>
<tr>
<td>Aldicarb Sulfoxide</td>
<td>mg/L</td>
<td>0.0005</td>
<td>0.004</td>
<td>531.1</td>
<td>&lt;0.0005</td>
<td>07/18/95</td>
</tr>
<tr>
<td>Oxamyl</td>
<td>mg/L</td>
<td>0.0006</td>
<td>0.2</td>
<td>531.1</td>
<td>&lt;0.0006</td>
<td>07/18/95</td>
</tr>
</tbody>
</table>

NOTE: Analytes on pages 1-3 are from the new source well list. Any additional analytes found in these methods may be found on the attached lists.

MCL = Maximum Contaminant Level
ND = Not Detected at or above detection limit.
The following pages reflect formalized portions of an Analytical Laboratory Quality Assurance Program at AECOS, Inc. These pages are expanded and updated by management as time permits. However, AECOS laboratory SOPs dictate the quality control measures to be incorporated in the analytical methods used by the chemists and technicians. The documentation of these protocols and additional quality control data may be found elsewhere, such as the laboratory SOPs and individual job files.
The Analytical Laboratory Quality Assurance Program at AECOS, Inc. is an evolving program, and the QA manual reflects the changing nature of this program. Various pages of this document are reviewed and rewritten to reflect improvements in quality assurance or to add material not previously included in the QA manual. QC results are regularly added as these accumulate on the laboratory QA sheets, and PE (performance evaluations) results are reported as these become available from third-party evaluators (U.S. Environmental Protection Agency or State of Hawaii, Department of Health). The document, as provided here, may not include all parts of the working manual, or may not contain the most recent versions of some pages. Other than the general sections, pages are dated to reflect when changes were last made. Clients wishing to see additional parts of the manual, or in receiving updated pages, should inquire of the laboratory manager.

OUTLINE OF THE QA MANUAL SECTIONS

INTRODUCTION
Analytical and Sampling Capabilities

QUALITY ASSURANCE PROGRAM - SOP

QUALITY CONTROL DATA - Meters and Probes
Conductivity
Salinity
pH
Turbidity

QUALITY CONTROL DATA - NUTRIENTS by AutoAnalyzer
Nitrate + Nitrite
Ammonia Nitrogen
Total Nitrogen
Orthophosphate
Total Phosphorus

QUALITY CONTROL DATA - Miscellaneous Analytical Procedures
Biochemical Oxygen Demand

QUALITY CONTROL DATA - Atomic Absorption Spectrophotometer
Metals by flame and/or graphite furnace

QUALITY ASSURANCE PROGRAM - FORMS

[Text portions of this document will be found in Word for Windows™ files QCINTRO.DOC and QCREPORT1.DOC, QCREPORT2.DOC, & QCREPORT3.DOC]
QUALIFICATIONS AND EXPERIENCE

_AECOS_ Inc. has conducted environmental studies and provided laboratory analyses of chemical constituents for government, industrial and individual clients in Hawaii and the Pacific area since 1971. We offer a wide variety of environmental services, with special emphasis in the aquatic and marine sciences. Consulting services include full capabilities in field sampling, chemical and biological analyses, toxicity bioassays, statistical analysis of environmental data, and preparation of interpretive reports, environmental assessments and impact statements. This expertise has provided technical support related to obtaining permits for ocean disposal (Section 301h), discharge of effluents (NPDES), providing safe drinking water (SDWA) and proper disposal of hazardous wastes (RCRA).

_AECOS_ Inc. personnel are OSHA certified to handle hazardous waste and are certified to conduct drinking water analyses by the State of Hawaii. The _AECOS_ laboratory participates in EPA controlled performance evaluations for the SDWA, NPDES and water pollution programs to validate the laboratory determinations and ensure the reliability of reported results. _AECOS_ biologists have extensive knowledge of the ecology of marine and aquatic organisms and conduct field studies using established techniques for on site sampling, organism collection and identification and measurement of environmental parameters. The broad and interrelated expertise of our personnel provides a multi-disciplinary capability for addressing the diverse variety of environmental issues and problems of our clients. Our dedication to excellence has produced a reputation for quality and integrity.
ANALYTICAL AND SAMPLING CAPABILITIES

Chromatography

Gas chromatographic analyses are performed on one of two Hewlett Packard 5890 gas chromatographs equipped with an autosampler and 100-unit sample tray controlled by MSDOS workstations. A wide range of chromatographic columns, both packed and capillary, are available for on-line determination and confirmation. Detection systems include flame ionization (FID), electron capture (ECD), electrolytic conductivity (ECLD), and photo-ionization (PID). Gas chromatograms are collected and stored on MSDOS workstations through a direct computer-GC interface using AECOS software. The raw data are then analyzed using GRAMS/386™ software and archived on both magnetic media and paper copy.

Typical GC investigations include, but are not limited to: chlorinated hydrocarbon pesticides/herbicides, polychlorinated biphenyls (PCB), and petroleum hydrocarbons (PNA).

Atomic Absorption Analysis

Trace metal concentrations are determined using a Thermo-Jarrell Ash Model 8000 spectrophotometer and a Model 188 furnace atomizer. In addition to the flame and furnace atomizers an atomic vapor accessory is used for mercury determination. Background correction modes include deuterium and Smith-Hieftje methods. The two units are computer controlled by Thermo-Spec software. The system includes an autosampler that is capable of performing automatic dilutions, standard preparations and Method of Standard Additions under computer control.

Spectrophotometer

Other spectrophotometric analyses are performed on Coleman fixed wavelength UV/VIS or Perkin Elmer Infrared spectrophotometers with 1, 5 and 10 cm quartz cells. Analyses performed on these instruments include cyanide, chlorophyll, phenols, formaldehyde, petroleum hydrocarbons and oil and grease.

Fluorometry

Fluorometric determinations are made with a Turner Model 111 Fluorometer. Over 20 primary and secondary filters are available for determination of organic and inorganic compounds of interest.

Inorganic and Organic Nutrients

Automated analysis of samples for total phosphorus and total nitrogen as well as trace orthophosphate, nitrate, and ammonia are routinely done using the Technicon AutoAnalyzer II. Automated analyses provides better quality control, reproducibility, and efficiency in projects involving many samples. Three separate chemistry modules and three separate filter photometers provide the ability to custom design analyses.
Inorganic Analysis

Ion specific analyses are performed using Orion Model 701 and 401 (portable) ion analyzers. Dissolved oxygen concentrations are determined using a YSI dissolved oxygen meter or by Winkler titration. Conductivity can be measured using the YSI conductivity bridge with 1 and 10 cm cells.

Special Field Sampling

Water samplers available include Van Dorn type water sampler and a well water sampler. Where unattended sampling or sample compositing are required, water samples are retrieved automatically using Manning and ISCO autosamplers. Core samples in soil and sediment can be taken to a depth of four feet. Hazardous liquids, sludges and powders are collected with Coliwassas, thieves and other EPA approved samplers.

Data Analysis and Presentation

AECOS maintains an extensive library of environmental reports and texts and reference collections of marine and aquatic flora and fauna. A Novell network (NetWare ver. 3.11) computers running on MS-DOS and a variety of analytic and word processing software enable rapid analysis of data and timely submission of reports. Reports are prepared using Microsoft® Word for Windows™. Data tables can be provided in either Word or Microsoft® Excel formats, and on 3.5 or 5.25, DD or HD diskettes. A dedicated modem link is available for direct transfer of computer files to outside systems.
QUALITY CONTROL / QUALITY ASSURANCE

AECOS, Inc.

Quality control (QC) and quality assurance are essential for reporting accurate and reliable results. Quality control is an internal process that checks the performance of the laboratory. Quality assurance outlines and documents the capabilities of the laboratory and the laboratory personnel.

CHAIN OF CUSTODY

The Chain of Custody form is required to document the handling of a sample. This form records the identity of the sample, sample container(s), time and date collected, the sampler, and lists the analyses desired. The sampler and subsequent handlers must sign and date this form which stays with the sample. Chain of Custody forms are available to be filled out by each client when delivering samples to the laboratory or, whenever possible, are provided prior to sampling for use in the field. The latter practice is strongly encouraged. An example of our customized Chain of Custody form is provided herein.

SAMPLE CONTAINER PREPARATION

Samples are collected in carefully washed bottles to assure that there is no contamination from the laboratory or previous samples. Glass and plastic containers are washed in warm water with a phosphate-free laboratory detergent, rinsed with warm tap water, then rinsed with deionized distilled water at least three times. The containers are then allowed to air dry. Some analyses require further container preparation such as acid or acetone rinsing. Bottles used for nutrient determination are acid soaked in 10% hydrochloric for a minimum of four hours (usually overnight) and then rinsed with deionized water. For most organics analyses, precleaned glass jars and bottles are used as received from the supplier. AECOS encourages clients to always use laboratory prepared containers by providing these at no cost.

SAMPLE HANDLING

When AECOS, Inc. field personnel are utilized, they record all field measurements, weather observations, and any other pertinent information (i.e. unrelated construction, activity in the area, earlier storm or sea conditions) that may have an influence on the quality of the water being sampled. These notes, along with the date, time, and observer/sampler initials are recorded in waterproof field books. Ongoing projects have one field book assigned. Upon return to the laboratory the information is entered in the computer and/or placed in work files as part of the permanent record, and as field books are filled they are also kept as part of the permanent record.

All samples received by the laboratory for analysis are given a Sample Log Number. This unique, sequential number appears on all sample bottles and on all analysis work sheets pertaining to the sample(s). This number may incorporate client field sample numbers.

Samples are sorted and either run immediately or preserved for later analysis according to EPA guidelines. Each batch of samples is run with laboratory prepared or certified standards and QC samples. The analysis work sheets for completed tests are reviewed by the performing analyst,
followed by a peer review of the same data. Reviewed data are submitted to the office for final typing. The typed report is checked for errors by a reviewer. The original typed report is sent to the client and a copy of the final report is retained in company files. The entire package consisting of chain of custody form, raw data, instrument print-outs, and any loose work sheets is bound together and retained for at least five years.

After all work has been completed, the samples are placed in a sample storage area and held for two weeks (or longer at a clients' request), sample preservation permitting. Hazardous materials, oils, and solvents are returned to the client after the two week holding period.

DATA VALIDATION

Reliability monitoring includes:

1. Preservation and storage of samples according to the appropriate methods.

2. Analyses on samples completed within the time specified by the appropriate method.

3. Analysis of a method blank in each batch of samples. The method blank is prepared and analyzed in the same manner as the samples. The purpose of the method blank is to monitor the possible occurrence of contamination during sample preparation or analysis. Field blanks are included if specifically called for by EPA protocol or requested by client.

4. Analysis of one sample in each batch in replicate to determine precision. In a replicate analysis two identical aliquots of a single sample are prepared and analyzed. Analysis of replicates evaluates the ability of the laboratory to obtain reproducible results (precision).

5. Analysis of one spiked method blank in each batch (AA and GC methods). A spike is the addition of a known amount analyte. The spike is added to a method blank prior to analysis to evaluate the accuracy of the analytical method.

INTERLABORATORY QUALITY ASSURANCE

AECOS, Inc. utilizes EPA Certified QC samples and/or Water Pollution Quality Control and Water Supply Quality Control samples to monitor the effectiveness of the internal quality control program. AECOS regularly participates in EPA performance evaluations for both the NPDES (Water Pollution) and drinking water (Water Supply) programs. Results of the laboratory performance in these testing studies are reported in the tables of quality control data provided (by analyte/method) to clients upon request.

External performance testing results can be identified in the QC data tables of the QA Program manual by the EPA study number given in italics in the "QC Log No./ Lot No." column: WP0xx for Water Pollution studies, WS0xx for Water Supply (drinking water) studies. NPDES performance testing may be identified as either WP0xx or DMR-QA0xx. The acceptance limits for Water Pollution studies are set by EPA at the 99% confidence interval. However, the AECOS quality assurance program attempts to maintain performance at the more stringent 95% confidence interval. Therefore, these limits (the so-called "Warning Limits") are given in the far right columns labeled "95% Confidence Interval". However, if the laboratory's performance for a particular performance test is outside the Warning Limits (95% C.I.), the EPA Acceptance Limits (99% C.I.)
are given instead in *italics*. A value which falls outside the warning limits but inside the acceptance limits is technically acceptable, but may indicate a marginal problem.

SUMMARY OF METHODS AND QUALITY CONTROL

AECOS, Inc. adheres to published EPA methods as much as possible; however, there are deviations. Standard Methods (APHA, 1992) may be followed in some cases. Method details are found in the AECOS laboratory SOPs.

AMMONIA NITROGEN - The Solarzano (1969) alkaline phenol method as modified for the AutoAnalyzer by Patton and Whittlede (1977) is used for ammonia determinations. This method is similar to EPA Method 350.1. Samples are run in triplicate from a single sample. Standards of 5.0, 10.0, and 25.0 µg-at/l per liter are routinely included in each batch. However, if sample concentrations are under 5.0 µg-at/l, 2.5, 1.25 or 1.0 µg-at/l standards are included. No fewer than three standard concentrations are used in each run. Samples believed to be high in ammonia are diluted with distilled deionized water (which is also checked for ammonia content) to fall within the standard curve. Additional quality control procedures, QC data and control charts, and results of performance testing for ammonia measurements are given in the Quality Control Data - Nutrients by AutoAnalyzer section of the quality assurance manual.

BIOCHEMICAL OXYGEN DEMAND - Biochemical Oxygen Demand (or BOD₅) is measured by the 5-day test as described in EPA Method 405.1. A glucose/glutamic acid check is prepared with each run to test that the dilution water, seed, and analytical technique will yield a BOD₅ within an expected range. Samples with no need for dilution (low BOD, natural waters) are run in triplicate. Diluted samples (usually effluents) are run in at least three dilutions and each dilution is prepared in duplicate. Blanks, seeded blanks, and the glucose/glutamic acid check sample are all prepared in triplicate. Additional quality control procedures, QC data and control charts, and results of performance testing for Biochemical Oxygen Demand measurements are given in the Quality Control Data - Miscellaneous Analytical Procedures section of the quality assurance manual.

CHLORIDE - EPA Method 325.3 is used for determination of chlorides. A duplicate is run for every ten samples. A QC check sample is run with every batch of samples.

CHLOROPHYLL α - Chlorophyll samples are analyzed by Method 10200 H in Standard Methods (APHA, 1992). Samples containing low levels of chlorophyll α are analyzed using a Turner fluorometer. Samples containing higher levels may be analyzed on a Perkin-Elmer UV-Vis spectrophotometer. The fluorometer is calibrated biannually using EPA calibration standards. An EPA Quality Control sample is also analyzed at this time to verify the calibration. EPA Quality control samples are also analyzed on the spectrophotometer biannually.

Samples are collected in dark brown polyethylene bottles, placed on ice, and transported to the laboratory where they are processed immediately. A sample is filtered onto a 1.2 µm glass-fiber filter, extracted with 90% acetone, and stored in the freezer until ready for analysis (at least 24 hours later). Results are reported in micrograms per liter (µg/L) which is equivalent to milligrams per cubic meter (mg/m³). The detection limit is 0.01 µg/L. The limits of detection can change depending on the volume of water filtered.

CONDUCTIVITY - Conductivity is measured following EPA Method 120.1. Reported values are the average of measurements made in duplicate. The duplicate measurements also provide a means of establishing instrument precision and quality control. Additional quality control procedures, QC data and control charts, and results of performance testing for Conductivity
measurements are given in the Quality Control Data - Meters and Probes section of the quality assurance manual.

MICROBIOLOGY - Quality control/quality assurance procedures for microbiology are detailed in the AECOS Standard Operating Procedures for Microbiological Sampling and Analyses. Membrane filtration and multiple tube fermentation methods from EPA publication 600/8-78/017 are used for the determination of total and fecal coliforms. Positive and negative culture controls are analyzed along with each batch of samples. Dilution water and media blanks are also run with each batch of samples.

The membrane filtration method for enterococcus is taken from EPA publication 600/4-85/076. The multiple tube fermentation method for enterococcus is taken from the 18th edition of Standard Methods, Method 9230B. Positive and negative culture controls are analyzed along with the samples. Dilution water and media blanks are also run with each batch of samples.

NITRATE / NITRATE + NITRITE - EPA Method 353.2 is used for the determination of nitrate and nitrite in drinking water, seawater, and waste water. This method utilizes the Technicon AutoAnalyzer II. Drinking water samples are collected in duplicate and each analyzed in triplicate. Seawater samples are analyzed in duplicate from a single sample. An EPA Certified Quality Control sample is analyzed with each set of drinking water samples, and at least every other run of non-drinking water samples. Nitrate nitrogen is calculated by analyzing the sample for both nitrate + nitrite and nitrite according to EPA Method 353.2. The nitrite value is subtracted from the nitrate + nitrite value to get the final nitrate value.

Nitrate standards included in each run are 5.0, 10.0 and 25.0 µg-at per liter. However, if sample concentrations are under 5.0 µg-at/l, 2.5, 1.25 or 1.0 µg-at/l standards are included. No fewer than three standard concentrations are used in each run. A 5 µg-at per liter nitrite standard is also analyzed to assess the efficiency of the cadmium reduction column. The detection limit of the method is 0.001 mg/L. Results are reported in milligrams nitrate + nitrite nitrogen per liter. Additional quality control procedures, QC data and control charts, and results of performance testing for nitrate, nitrate+nitrite, and nitrite measurements are given in the Quality Control Data - Nutrients by AutoAnalyzer section of the quality assurance manual.

NITRITE NITROGEN - EPA Method 353.2 is used for the determination of nitrite, the same method used for nitrate + nitrite analyses, except the cadmium reduction column is not used. Samples are run in duplicate or triplicate, with standards of 5.0, 10.0, and 25.0 µg-at per liter. However, if sample concentrations are under 5.0 µg-at/l, 2.5, 1.25 or 1.0 µg-at/l standards are included. The detection limit of the method is 0.001 milligrams per liter.

OIL & GREASE - Oil and Grease is analyzed by either EPA Method 413.1 or EPA Method 413.2. Method 413.1 is gravimetric and has a method detection limit of 10 mg/L. Method 413.2 is an IR (Infrared Spectrophotometer) method with a detection limit of about 0.6 mg/L. Samples are collected in precleaned, freon-rinsed glass bottles and placed on ice in coolers in the field. Samples are preserved within a few hours of sampling by adding hydrochloric acid to pH < 2.

ORTHOPHOSPHATE - Determinations of orthophosphate (dissolved inorganic phosphorus) are made by EPA Method 365.1 on the Technicon AutoAnalyzer. Samples are analyzed in triplicate. Calibration involves standards at 5.0, 10.0, and 25.0 µg-at/l. However, if sample concentrations are under 5.0 µg-at/l, 2.5, 1.25 or 1.0 µg-at/l standards are included. No fewer than three standard concentrations are used in each run. Samples that are high in orthophosphate are diluted to fall within the standard curve.
An EPA Quality Control sample is included in each run. The detection limit of the method is 0.001 mg P/L. Results are reported as mg P/L. Additional quality control procedures, QC data and control charts, and results of performance testing for orthophosphate measurements are given in the Quality Control Data - Nutrients by AutoAnalyzer section of the quality assurance manual.

**OXYGEN, DISSOLVED** - YSI Model 57 and Model 58 dissolved oxygen (DO) meters are used in the field to measure dissolved oxygen by EPA method 360.1. The probe and its membrane are checked prior to starting calibration procedures. The batteries are checked using the meter red line according to manufacturer's instructions. The meter is zeroed, the temperature read, and then the instrument is "air calibrated" with the probe inserted in a partially water-filled BOD bottle. A calibration table relating oxygen saturation at sea level and ambient temperature is used to calibrate. The salinity of the water to be sampled is checked with a hand held refractometer, and the proper setting dialed in on the meter. The meter is switched to red line or zero between readings and recalibrated every time the location of the meter changes.

Results are reported in milligrams per liter (mg/L). The limits of detection are 0.01 mg /L for values from 0.00 to 5.00 mg/L; 0.1 mg /L for values from 5.0 to 10.0; and 1 mg/L for values >10.

**pH** - Ideally pH measurements are made in the field. As this is not always possible, the samples are collected, placed on ice, and sent to the laboratory for immediate analysis. An Orion SA/250 pH meter with a combination electrode is used to measure the pH of the samples in the laboratory. The meter is calibrated using a two point calibration that brackets the sample. Commercially prepared buffers of pH 4.01, 7.00, and 10.00 are used. If the resulting slope does not fall within 92% to 102%, the probe is checked and the meter is recalibrated. When sea water samples are involved, the probe is conditioned in sea water for 15 minutes prior to analysis. After analysis is complete the probe is returned to the 7.00 pH buffer or a QC buffer sample, and the value recorded. The sample pH, the buffers used to calibrate, and the slope are recorded in a bound pH log book.

Results are in pH units. The limit of detection is 0.01 pH units. Additional quality control procedures, QC data and control charts, and results of performance testing for pH measurements are given in the Quality Control Data - Meters and Probes section of the quality assurance manual.

**SALINITY (RI)** - The measurement of salinity by refractive index utilizes a hand held, temperature compensating, refractometer. The refractometer is zeroed with distilled water, and periodically checked against samples of known salinity. Results are reported in parts per thousand (ppt or 0/oo). The limit of detection is 1 ppt.

**SALINITY (SALINOMETER)** - Precise measurement of salinity is accomplished by an AGE Model 2100 salinometer. This instrument provides salinity readings with an accuracy of ±0.003 ppt by electrical conductivity comparison with (IAPSO) certified sea water standards. At least one duplicate is run in each batch of samples.

**SILICA, REACTIVE** - Reactive silica is analyzed on a Technicon AutoAnalyzer II at the AECOS of Hawaii laboratory at Honokohau (Kailua-Kona) by EPA Method 370.1. Samples are collected in plastic bottles and shipped by air to the laboratory where a dedicated silica channel is maintained on the AutoAnalyzer. Standards of 5, 10, and 20 µg-at per liter are used to calibrate each instrument run. All samples are run in duplicate. Samples high in silica are diluted to fall within the standard curve.

The detection limit is 0.001 mg Si/L. Results are reported as mg Si/L (ppm).
TEMPERATURE - Temperature is measured in the field using either a mercury thermometer in protective case or the temperature probe on the dissolved oxygen meter. Both are calibrated against an NBS traceable thermometer semi-annually. Results are reported in degrees Celsius (°C). The limit of detection is 0.1 °C.

TOTAL DISSOLVED SOLIDS - EPA Method 160.1 is used for the determination of total dissolved solids. At least one blank is carried throughout the procedure. Duplicates and quality control check samples are run three to four times a year.

TOTAL NITROGEN - AECOS utilizes a Total Persulfate Nitrogen (TPN) method for measurement of organic plus inorganic nitrogen in all but high ammonia waste water samples. The Total Kjeldahl (TKN) method is used for samples high in ammonia. Samples are digested using a total persulfate nitrogen digestion in a laboratory autoclave. Samples believed to be high in total nitrogen are digested at several different dilutions. All samples (including dilutions) are digested in triplicate. Five to six reagent blanks, three quality control (QC) samples, and three distilled water blanks are included in each batch during the digestion process.

The digested samples are run on the Technicon AutoAnalyzer II for nitrate plus nitrite concentration (EPA Method 353.2). Standards of 5.0, 10.0, and 25.0 μg-at per liter are used in each run. The detection limit of the method, based on three times the standard deviation of the variation between n blanks, is 0.01 mg/liter. The detection limit is higher when the quantity of sample initially digested is reduced. Additional quality control procedures, QC data and control charts, and results of performance testing for total nitrogen measurements are given in the Quality Control Data - Nutrients by AutoAnalyzer section of the quality assurance manual.

TOTAL PHOSPHORUS - AECOS utilizes a Total Persulfate Phosphorus (TPP) method to measure inorganic plus organic phosphorus in all samples. The samples are digested using a persulfate digestion. Samples that are believed to be high in phosphorus are digested at different dilutions. All samples (including dilutions) are run in duplicate.

After digestion the samples are run on a Technicon Autoanalyzer II following EPA Method 365.1. Standards of 5.0, 10.0, and 25.0 μg-at per liter are used in the run. The detection limit of the method based on three times the standard deviation of the variation between n blanks is 0.005 mg/liter. The detection limit is higher when dilutions must be made. Additional quality control procedures, QC data and control charts, and results of performance testing for total phosphorus measurements are given in the Quality Control Data - Nutrients by AutoAnalyzer section of the quality assurance manual.

TOTAL SUSPENDED SOLIDS (TSS or Non-filterable residue, NFR) - TSS is analyzed using Whatman GF/C (or equivalent) filters following EPA Method 160.2. The filters are glass fibre with a pore size of 1.2 μm. At least one blank is carried throughout the analysis. Results are reported in milligrams per liter (mg/L). The detection limit is 0.1 mg/L based on 1 liter filtered volume.

TRACE METALS BY ATOMIC ABSORPTION SPECTROPHOTOMETER - At AECOS, most metals analyses will be accomplished on the Thermo-Jarrell-Ash atomic absorption spectrophotometer (AAS) by either direct aspiration (FLAME) or graphite furnace (GFAA). Detection limits by GFAA are lower (the method is more sensitive), but the analysis is more difficult and therefore more expensive. The following table provides method numbers (from EPA, 1979) and instrument detection limits. These detection limits are usually achieved in relatively clean water samples. Detection limits for solids (i.e., soils and sediments), digests, and water samples containing complex or difficult mixtures (e.g., undiluted waste effluents) or salts requiring dilution will be higher.
Metals in clean water samples may be analyzed without predigestion. However, if total metals is required in a solid or a liquid with particulates, a sample preparation (acid digestion) is called for. Analysis for dissolved metals requires filtration of the sample soon after it is collected to remove the particulates. These sample preparation costs are listed below. One sample preparation will usually serve for all metals analyses required from a sample, unless both total and dissolved metals content are required. A separate preparation charge is not assessed for each element. Mercury is an exception, and the price list reflects the cost of the separate digestion required for this heavy metal. Full QA/QC data including duplicates, matrix spikes, and check standards using certified reference materials are performed routinely without additional cost; these data are available upon request. QC data and the results of performance testing for trace metal measurements are given in the Quality Control Data - Atomic Absorption Spectrophotometer section of the quality assurance manual.

TURBIDITY - Either a Turner nephelometer or a Hach Turbidimeter is used to measure the turbidity of water samples following EPA Method 180.1. The meters and commercially prepared sealed standards are calibrated quarterly with freshly prepared formazin standards. The sealed standards (0.5, 5.0, and 20.0 NTU) are used to calibrate the meter with each use. The meter is set with a one point calibration standard near the sample range. Results are reported in...
nephelometric turbidity units (NTU). The limit of detection is 0.1 NTU for samples from 0.0 to 10.0 and 1 NTU for samples above 10 NTU.

**CONTROL CHARTS**

Control charts are used at AECOS as basic tools for quality assurance, providing a graphical means of demonstrating statistical control. While the use of QC samples within analytical runs may give the analyst and the customer assurance that a particular set of results is reasonably close to true values, only a process which combines QC results accumulated over time can provide the statistical expressions to bridge individual analytical runs and performance evaluations into an ongoing quality assurance program. Control charts monitor the measurement process, document measurement uncertainty, and aid the process of improving performance (Taylor, 1987).

For analyses of nutrients performed on the Technicon AutoAnalyzer, a property or X chart is utilized. QC results from accepted runs are entered into the "current" control chart data set, contributing to the calculation of a mean and standard deviation for the data set. Data points are plotted on the X chart along with a line representing the data mean (-----), the data mean plus and minus two standard deviations ("Warning Limits" or WL) (-----), the data mean plus and minus three standard deviations ("control limits" or CL) (-----), and the 95% confidence intervals (+ and -; -------) for the QC derived from EPA Performance Evaluation Studies. The previous figure demonstrates how these elements are combined into a single chart. The Y-axis represents the sequence of the QC measurements (i.e., the analytical run dates).
A Range Control Chart is utilized for those methods which generate large numbers of duplicate readings such as conductivity and pH. The difference between two measurements of the same sample, quality control sample, or standard constitutes a range value.

**SIGNIFICANT FIGURES**

There is a tendency for analysts and others involved in calculations from analytical measurements to report numbers without particular regard to the significance of the number of places that are valid. Significant figures are those digits that are accurate (Simpson, Roe, & Lewontin, 1960). Consideration of significant figures is applied to the reporting of data. In all intermediate operations, rounding off should be done only after all calculations are made and, if possible, at least one more digit than the number of significant figures should be carried through for values used in calculations. To avoid rounding errors, laboratory and field personnel are encouraged to record one more place than might be significant in subsequent calculations and reporting. The number of significant figures is based ultimately on the capabilities and calibrations of the measuring device. The following discussion provides some general rules utilized at AECOS in final reporting of results.

Zeros may be significant or may just be place holders. Zeros are considered significant if they are 1) between two other digits (1.09 & 109 = 3 significant figures) or 2) to the right of digits following a decimal (2.0400 = five significant figures, assuming that the analyst can actually read to the place indicated on the meter, balance, pipette, etc.). Zeros are not significant if they are to the left of digits after a decimal with no preceding digits (0.099 = two significant figures). Zeros may be considered significant in numbers such as 10, 400, or 5,000. However, caution must be applied, since one significant figure may be intended, or two (10), three (400) or four (5,000) significant figures may be acceptable. If a zero is ambiguous it is advisable to accompany the number with an estimate of its uncertainty (i.e., 440 ± 20).

It may be helpful to change a number to scientific notation to determine the significant figures. Thus, 0.099 becomes $9.9 \times 10^{-2}$ showing two significant figures. However, as standard practice, results are not to be reported out in scientific notation. Sometimes changing the units to get rid of zeros will make reporting less confusing. For example, 0.099 mg/L could be changed to 99 µg/L to show that the result has only two significant figures.

If a result must be multiplied to account for a dilution, the factor with the least number of significant figures will determine the number of significant figures in the answer. That is, for the result 0.099 x 5, the proper answer is 0.5; for 99 x 5 your answer would be 500 (the zeros are not significant figures). However, in determining significant figures where dilutions are involved, it may be important to consider the actual dilution measurement that was made. In other words, a 5 times dilution might actually represent measurements (presuming use of Class A graduated cylinders) of 100 ml and 20 ml (zeros representing significant figures), giving $99 \times 100/20 = 0.50$ (two significant figures). If a pipette and/or balance were used to make dilutions, the number of significant figures may be increased further; for example $0.103 \times 5.00/1.00 = 0.515$ (three significant figures).

If calculations involve adding or subtracting numbers, the numbers that have the fewest decimal places, not necessarily the fewest significant figures, provide the limit on the number of places that justifiably may be carried in the sum or difference. That is, for the sum of 10.2, 10.0, and 9.51, the answer would be 29.7.
REFERENCES CITED


APPENDIX B

WELL DRILLING AND PUMP TEST REPORT

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1–6–22:1 (Div. 1)
WELL CROSS SECTION DIAGRAM
KAMEHAMEHA SCHOOL / BISHOP ESTATE

WELL A

WWS AS OF 13 JUNE 95

ELEVATION  DEPTH  GROUND ELEV. 549.36'

603'
Solid Casing and
grouted annulus

21.61'  527.75'
ELEV.

14" OD ASTM A-53
Grade B, Type E
SOLID CASING

20" DIAMETER HOLE

100' OPEN
HOLE

Casing Shoe

- 54.64'  604'
ELEV.

GRouted ANNULUS

12.75" DIAMETER OPEN HOLE

- 156.44'  705.8'
ELEV.

WATER LEVEL  21.61' ELEV.
13 JUNE 95
APPENDIX B

PUMP TEST REPORT

PRELIMINARY ENGINEERING REPORT
KAMEHAMEHA SCHOOLS WELL "A"
(State Well No. 2051-01)
Honolulu, Oahu, Hawaii
TMK: 1-6-22:1 (Div. 1)
KAMEHAMEHA WELL "A"
WELL COMPLETION REPORT

State Well No. 2051-01

WELL CONSTRUCTION, CWRM PERMIT

The Kamehameha Well "A" (State Well No. 2051-01) was permitted by the State of Hawaii, Commission on Water Resource Management in 25 Oct. 93.

WELL CONSTRUCTION, PLANS

Plans and specifications by Akinaka and Associates were reviewed and approved by Mr. Mike Lum, PE, Facilities Engineer, Kamehameha Schools. The well location and basic water system site plan were agreed to prior to locating the well in the field. The location maps showing the well location and siting are included along with an overall map of the area.

WELL CONSTRUCTION, SUMMARY

The Well construction contracts were signed 20 January 95. Site work was done by others and mobilization on the site started 6 April 95. Drilling of the pilot hole commenced on 17 April 95. The pilot hole was completed on 2 May 95 to a depth of 603 feet (-53' elev.).

The bench mark at the well head was set at 546.36' elev. The water level was measured at 22.36' elev.

A pilot hole was reamed in two passes to 20'. Reaming of the pilot hole was completed on 18 May 95 to 604' (-54.64' elev.).

A video log of the open hole was made on 23 May 95.

The 14" OD ASTM A-53 solid casing was started on 24 May 95 and grouting of the annulus space around the well casing was completed by 1 June 95.
The additional 100' of 12.75" open hole drilling commenced on 5 June 1995 and was completed on 8 June 95 to a total well depth of 705.8' (-156.44' elev.). An As-built section drawing of the well is attached.

The water level was recorded at 527.75' depth or 21.61' elev. on 13 June 95.

Plumbness and alignment tests were conducted on 13 June 95 (see attached report). A 40 foot long dummy with three 12.75 inch diameter rings, spaced evenly along it's length, passed freely down the cased well. A cage traverse of the cased well was also performed. The results of the two tests showed that the well met the specifications for each 100' and did not vary in excess of more than two-thirds the smallest inside diameter for any 100 foot interval.

PUMPING TEST - SPECIFIC CAPACITY

A specific capacity pumping test of the cased well was conducted on 23 June 95. The well was surged and developed prior to the test. Air line measurements were made using a 60 lbs. pressure gage with 0.10 psi gradations. The non-pumping water level stood at an elevation of 21.61 feet.

The contractor had trouble stabilizing the water level on a 700 gpm rate as a bypass was not functioning as planned. Only one rate was used; 850 gpm.

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<tr>
<th>Rate</th>
<th>Drawdown</th>
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<td>850 gpm</td>
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PUMPING TEST - LONG TERM TEST

A long term aquifer pumping test at a rate of 800 gpm commenced at 10:46 am on 26 June 95. Water levels were recorded at the pumping well using an air line system.

The pumping water level data after 48 hours (2,880 minutes) resulted in a total drawdown in the pumping well of 1.73 feet. A total of 2,268,830 gallons were pumped at an average rate of 787.79 gpm. Recovery was within 5 minutes.

The pumping test was stopped after 48 hours of pumping as there had been no change in drawdown or water quality, as measured by electrical conductance for 48 hours. The pumping rate was stable at an average of 787.79 gpm, or 287 gpm more
than the design rate of 500 gpm. The permitted daily average is 0.229 MGD, or about 239 gpm for a 16 hour service day. The 500 gpm would be expected to be pumping for a daily total of about 8 hours.

State Commission of Water Resource Management (CWRM) suggested pumping test protocol calls for at least 48 hours of pumping and if the drawdown water level is stable for 24 hours, test can be stopped. The drawdown stabilized within 100 minutes of the start of the test.

QUALITY TESTING

Water quality samples were taken from the pumping well to the end of the pumping test (Wednesday, 28 June 95) by AECOS Laboratories. The current list of contaminates from the State Dept. of Health "Contaminants to be Tested in All New Sources of Potable Water"; effective December 15, 1994, (revised June 23, 1995) was used for determining the items to be tested for (see attached list of quality results). Based on the results of the laboratory testing, the groundwater from Kamehameha Well "A" meets the new source quality standards for potable water for the State of Hawaii. The laboratories used were certified by the State Department of Health and included AECOS Labs and Pace Laboratory.
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<th>Data Summary</th>
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<td>Ground Elevation</td>
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<td>Pumping Rate (average)</td>
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<td>Temperature</td>
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<td>Total pumpage as of 48 hours (2,880 minutes)</td>
<td>2,268,830</td>
<td>gallons</td>
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CONCLUSIONS

Based on the data obtained from the aquifer pumping test, it appears that:

1. The aquifer system is capable of producing and sustaining the water requirements of 229,000 gallons per day (average day).

2. The Well "A" is capable of reliably producing at the design rate of 500 gpm on a long term production basis.

3. The recommended pump intake setting is at elevation "0" feet, or at mean sea level. This will provide a submergence of about 21 feet. The motor diameter (submersible) should not exceed 12".

4. The water quality tests, based on results of the laboratory analyses, indicate that the groundwater is excellent in quality and meets with the SDWA and State DOH requirements.
### WELL GRAPHS

**KAM #A**  
**PUMP SUMMARY**  
**26 JUNE 95**

**STATIC WATER LEVEL - 21.61’**  
**PUMP INLET - 592’**  
**H = 7.6 PSI**  
**GROUND ELEV. = 549.36’ ELEV.**  
**AIRLINE = 545.50’**

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### DATA OF LONG TERM PUMPING TESTS
Kamehameha Well "A" Pumping Test
Long Term Test 26 June 95

Water Level above MSL – in FEET

Time in Minutes

* Drawdown W.L.  □  Recovery

static water level elevation
CONCLUSIONS

Based on the data obtained from the aquifer pumping test, it appears that:

1. The **aquifer system** is capable of producing and sustaining the water requirements of 229,000 gallons per day (average day).

2. The **Well "A"** is capable of reliably producing at the design rate of 500 gpm on a long term production basis.

3. The recommended pump intake setting is at elevation "0" feet, or at mean sea level. This will provide a submergence of about 21 feet. The motor diameter (submersible) should not exceed 12".

4. The water quality tests, based on results of the laboratory analyses, indicate that the groundwater is excellent in quality and meets with the SDWA and State DOH requirements.
**WELL GRAPHS**

**STATIC WATER LEVEL - 21.61'**

**PUMP INLET - 592**

**0 = 7.6 PSI**

**GROUND ELEV. = 549.36'ELEV.**

**AIRLINE = 545.50'**

**PUMP SUMMARY**

26 JUNE 95

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**DATA OF LONG TERM PUMPING TESTS**
Kamehameha Well "A" Pumping Test
Long Term Test 26 June 95

Graph showing water level above MSL in FEET over time in minutes.

- *Drawdown W.L.*
- Recovery

Static water level elevation
Mr. Michael Lum  
Kamehameha Schools/Bernice  
Pauahi Bishop Estate  
P.O. Box 3466  
Honolulu, HI 96801  

Dear Mr. Lum:  

Well Completion Report for Well No. 2051-01  

We have received your Well Completion Report Part II for the Kamehameha Schools Well A (Well No. 2051-01) and acknowledge that it is complete.  

If you have any questions, please contact Lenore Nakama of the Commission staff at 587-0218.  

Sincerely,  

LINNEL T. NISHIOKA  
Deputy Director  

LN:ss
PART II. (PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company: Roscoe Moss Hawaii, Inc.
21. Name of person performing work: Clayton Igarashi
22. Date Pump Installation Completed: November 24, 1998
23. PUMP INSTALLATION:
   Pump Type, Make, Serial No.: Submersible/BJ/96-WR-2819
   Capacity: 500 gpm
   Motor type, H.P., Voltage, rpm: Submersible/125HP/460V/175RPM
   Depth of Pump Intake Setting: 550 ft below Grade, which elevation is 549' - 3" ft
   Depth to bottom of airline: 549 ft below Grade, which elevation is 549' - 3" ft
   Pumping Head: 875 ft. Type of flow meter: which measures in
24. As-built drawings attached: Yes No
25. Other remarks/comments: (See below)

Pump Installation Contractor (print) Roscoe Moss HI, Inc. C-57 Lic. No. AC-16437
Signature William C. Moore Date November 25, 1998
Applicant (print) MICHAEL YUM
Signature Date 4/12/00

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

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1. Rock Description, Remarks, Dates
2. Water Level, Depth (ft.)
3. Rock Description, Remarks, Dates
4. Water Level, Depth (ft.)
5. Rock Description, Remarks, Dates
6. Water Level, Depth (ft.)
7. Rock Description, Remarks, Dates
**SUBMERSIBLE OUTLINE**

**STANDARD WELL SEAL – JUNCTION BOX CONSTRUCTION**

**DATE:** 11-25-98

**NAME OF CUSTOMER:** Bernice Parker

**Bishop Estate - Kamalanaula Schools**

**PROPOSITION NO.:** 55.96

**ORDER NO.:**

**PURCHASE ORDER NO.:**

**NO. OF UNITS:** ONE (1)

**SURFACE PLATE:** 25" O.D. 1/2" TH'K

**8-3/8" FOUNDATION HOLES. STR. 6" ON 12" L.I. PLT. COLUMN**

**COLUMN:** 5 3/4" K

**CABLE & PIPE COUPLING:** 1/4" OFFSET

**DISCHARGE ELBOW:** 10" 250#

**OPTIMAL WELL CASING FLANGE**

**CABLE CLAMP & COLUMN:** 7 1/4" SCH. 40 GALV.

**BOWLS & CABLE:** 11 1/4" BOTTOM OF AIRLINE 54X.22 FT (2.0 PLT. ML)

**BOWLS:** 10 3/4"

**PUMP:** 16-244"

**INTAKE:** 990'

**WELL I.D.:** 13.25"

**WELL NO.:**

**MOTOR:** 9 3/4"

**CABLE SIZE:** 4/0

**VOLTAGE:** 1100

**LENGTH:** 550 ft

**125 H.P. 1751 RPM**

**B.J. SUBM. MOTOR TYPE M**

**12" SIZE:** 3 PH. 60 CYCLE 460 VOLT

**500 GPM. ∆ 585 TDH**

**CABLE SIZE:** 4/0

**VOLTAGE:** 1000

**LENGTH:** 550 ft

**REMARKS:** *PERMANENT PUMP* (*TEMPORARY PUMP WAS 2 STAGES*)

**DESIGNED TO**

**WAINA'IHELE**

**WELL NO.:**

**DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED**

**JOB NO.**

**PROP. NO.**

**CERTIFIED**

**CORRECT.**

**DATE**

**TOTAL:** P.04
TO Akinaka & Associates, Ltd.
250 N. Beretania St., Ste. 300
Honolulu, HI 96817-6716

WE ARE SENDING YOU Attached Under separate cover the following items:

- Shop drawings
- Prints
- Plans
- Samples
- Specifications
- Copy of letter
- Change order

COPIES DATE: NO. DESCRIPTION
1 11-25-98 COPY OF WELL COMPLETION REPORT (PREVIOUSLY SUBMITTED)
1 11-25-98 COPY OF AS BUILT DRAWING (PREVIOUSLY SUBMITTED)

THese are transmitted as checked below:

- For approval
- Approved as submitted
- Resubmit copies for approval
- For your use
- Approved as noted
- Submit copies for distribution
- As requested
- Returned for corrections
- Return corrected prints
- For review and comment
- Prints returned after loan to us

REMARKS Todd: Please note the original documents were mailed to Clifford Jamile on December 8, 1998.

Post-it Fax Note 7671
To: Loree Nakama
From: Sheldon
Co./Dept: CWRM
Co.: A+A
Phone #: 534-7721
Fax #: 587-6219

SIGNED: Glen R. Davis

If enclosures are not as noted, kindly notify us at once.
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

WELL COMPLETION REPORT

(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.: 2054-01    Well Name: Kamehameh Schools "A"    Island: Oahu
2. Location/Address: Honolulu, Hawaii    Tax Map Key: 1-6-022, 001

PART I
WELL CONSTRUCTION REPORT

3. Drilling Company: ________________________________
4. Name of driller who performed work: ________________________________
5. Type of rig/construction: ________________________________
6. Date(s) Well Construction and pump tests (if any) completed: ________________________________
7. GROUND ELEVATION (referenced to mean sea level, msl): ______________________ ft.
   Well Bench Mark (description/location): ______________________ ft.
   Elevation(msl): ______________________ 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.

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9. Total depth of well below ground: ______________________ ft.
10. Hole size: ______________________ inch dia. from ______________________ ft. to ______________________ ft. below ground
     ______________________ inch dia. from ______________________ ft. to ______________________ ft. below ground
     ______________________ inch dia. from ______________________ ft. to ______________________ ft. below ground
11. Casing installed: ______________________ in. I.D. x ______________________ in. wall solid section to ______________________ ft. below ground
     ______________________ in. I.D. x ______________________ in. wall perforated section to ______________________ ft. below ground
     Casing Material/Slot Size: ________________________________
12. Annulus: Grouted from ______________________ ft. below ground to ______________________ ft. below ground
     Gravel packed from ______________________ ft. below ground to ______________________ ft. below ground
13. Initial water level: ______________________ ft. below ground. Date and time of measurement: ________________________________
14. Initial chloride: ______________________ ppm Date and time of sampling: ________________________________
15. Initial temperature: ______________________ °F Date and time of measurement: ________________________________
16. PUMPING TESTS: Reference Point (R.P.) used: ______________________, which elevation is ______________________ ft.
    (1) Step-Down Drawdown Test Date ________________________________
        Start water level ______________________ ft. below R.P.
        End water level ______________________ ft. below R.P.
    (2) Long-term Aquifer Test Date ________________________________
        Start water level ______________________ ft. below R.P.
        End water level ______________________ ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs (1/8/86 ITAT 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) ________________________________ C-57 Lic. No. ________________________________
Signature ________________________________ Date ________________________________
Surveyor (print) ________________________________ Lic. No. ________________________________
Signature ________________________________ Date ________________________________
Applicant (print) ________________________________
Mr. Michael Lum  
Kamehameha Schools  
Bernice Pauahi Bishop Estate  
P.O. Box 3466  
Honolulu, HI 96801

Dear Mr. Lum:

Well Completion Report for Well No. 2051-02

We have received your Well Completion Report Part II for the Kamehameha Schools Well B (Well No. 2051-02) and acknowledge that it is complete.

If you have any questions, please contact Lenore Nakama of the Commission staff at 587-0218.

Sincerely,

[Signature]

TIMOTHY E. JOHNS  
Deputy Director

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</table>
### WELL COMPLETION REPORT

**State of Hawaii**

**COMMISSION ON WATER RESOURCE MANAGEMENT**

**Department of Land and Natural Resources**

**WELL COMPLETION REPORT**

(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, Water Conservation and Environmental Protection Division, 640 Kapiolani Boulevard, 10th Floor, Honolulu, HI 96813-5750. An additional copy of the well and chemical analysis should also be submitted. For questions call the Commission Regulatory Branch at 808-586-0236, or 1-800-652-3444 Extension 7046.

1. State Well No.: 271-02  
   Well Name: Ramona St-17  
   Island: OAHU

2. Location/Address:  
   Kamehameha Schools Bishop Estate  
   Tax Map Key: 1-15-22-2

### PART I: WELL CONSTRUCTION REPORT

3. Drilling Company: HAI'ELI DRILLING & DEVELOPMENT

4. Name of driller who performed work: TOM HELFRICH

5. Type of rig/constructor: ROTARY

6. Date(s) of Well Construction and pump tests (if any) completed: 5/20/97

7. GROUND ELEVATION (referenced to mean sea level, msl): 717.5 ft.

   Well Bench Mark (description/location): at well head  
   Elevations (msl): 717.49 ft.

8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Rock Description, Water Level, Dates, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 619.0</td>
<td>hard/medium layers 619 to 770 soft w/hard layers</td>
</tr>
<tr>
<td>619.0 to 660.0</td>
<td>hard</td>
</tr>
</tbody>
</table>

   (If more space is needed, continue on back)

9. Total depth of well below ground: 870 ft.

10. Hole size:  
    - 20 inch dia. from 0 ft. to 770 ft. below ground  
    - 12 3/4 inch dia. from 770 ft. to 870 ft. below ground

11. Casing installed:  
    - 14 in. I.D. x 375 ft. well section to 770 ft. below ground  
    - 10 in. I.D. x 230 ft. back section to 770 ft. below ground

   Casing Material/Size/Spec: none

12. Annulus:  
    - Grouted from 0 ft. below ground to 770 ft. below ground  
    - Gravel packed from 770 ft. below ground to 870 ft. below ground

13. Initial water level: 695 ft. below ground  
   Date and time of measurement: 5/26/97 10am

14. Initial chlorine: 60 ppm  
   Date and time of sampling: 5/26/97 10am

15. Initial temperature: 20.3 °F  
   Date and time of measurement: 5/26/97 10am

16. PUMPING TESTS: Reference Point (R.P.) used: ground level, which elevation is 717.5 ft.

   (1) Step-Drawdown Test Data: 5/26/97  
      - Start water level: 695.41 ft. below R.P.  
      - End water level: 695.31 ft. below R.P.

   (2) Long-term Aquifer Test Data: 5/26/97  
      - Start water level: 695.0 ft. below R.P.  
      - End water level: 695.88 ft. below R.P.

17. Aquifer Pump Test Procedures data & graphs (10/98 LAT Form) attached? X Yes _ No

18. As-built drawings attached? X Yes _ No

19. Other remarks/comments: (20 pages of this form)

**Well Drilling Contractor:** HAI'ELI DRILLING  
**C-37 Lic. No.:** C-16544

**Signature:**  
**Date:** May 27, 1997

**Surveyor (print):**  
**Signature:**  
**Date:** 6/9/97

**Applicant (print):** Kamakeha Schools Bishop Estate  
**Signature:**  
**Date:** 6/26/97
FACSIMILE TRANSMITTAL MEMO 8/06/97

TO: SALVADOR QUITORIANO
AKINAKA

FROM: ED YEH

740 RESERVOIR
TRR #: X0000.035
TAX MAP KEYS: XX
JOB NO. 94142-1 7/30/97

FAX # 521-2153
FAX # 532-6020
TEL # 545-2945

Control Point
To: Mr. Michael D. Wilson, Chairman  
Commission on Water Resource Management  
Department of Land & Natural Resources  
State of Hawaii  
Honolulu, Hawaii 96809  
Attention: Mr. Timothy Johns, Deputy Director  
Project: KSBE Water System Improvements  

A&A Job No. KSBE96-02  

Subject: Kamehameha Schools Well "B"  
Well No. 2051-02  
Kalihi Ground Water Management Area  
Reference: Pump Installation Permit dated August 14, 1996  

We are sending you herewith:

<table>
<thead>
<tr>
<th>No. of Copies</th>
<th>Description</th>
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</thead>
</table>

For:  
- [x] Information / Files  
- [ ] Review / Comments  
- [ ] Review / Approval  
- [ ] Approval / Signature  
- [ ] ACTION  
- [ ] Revise / Re-Submittal  

Remarks:  
Pursuant to Condition no. 5 of reference pump installation permit, on behalf of Kamehameha Schools, we herewith submit the completed pump installation report and as-built drawing of Well "B".  

If there are any questions, please contact the undersigned at 536-7721.  

Very truly yours,  
Akinaka & Associates, Ltd.  

By: Sheldon T. Yamasato  

cc: Michael Lum, KSBE  
with Attachments  

Transmittal Form
**PART II. (PERMANENT) PUMP INSTALLATION REPORT**

20. Pump Installation Company: Roscoe Moss Hawaii, Inc.

21. Name of person performing work: Clayton Igarashi

22. Date Pump Installation Completed: 9-21-98

23. PUMP INSTALLATION:

   - Pump Type, Make, Serial No.: Submersible/BI/97-WR-0048
   - Capacity: 500 gpm
   - Motor type, H.P., Voltage, rpm: Submersible/125/460/1760
   - Depth of Pump Intake Setting 717.5 ft. below Grade, which elevation is 719.75 ft.
   - Depth to bottom of airline 714.75 ft. below Grade, which elevation is 719.75 ft.
   - Pumping Head is 760 ft. Type of flow meter: Flow Tube which measures in GPM

24. As-built drawings attached? Yes No

25. Other remarks/comments: (See below)

<table>
<thead>
<tr>
<th>Pump Installation Contractor (print)</th>
<th>Roscoe Moss HI Inc.</th>
<th>C-57 Lic. No.</th>
<th>AC-16437</th>
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</thead>
<tbody>
<tr>
<td>Signature</td>
<td>William C. Moore</td>
<td>Date</td>
<td>9-25-98</td>
</tr>
<tr>
<td>Applicant (print)</td>
<td>Michael Linn</td>
<td>Date</td>
<td>10-7-98</td>
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8.(cont'd) DRILLER'S LOG (cont'd):

<table>
<thead>
<tr>
<th>Water Level Dates (ft.)</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks,</th>
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# WELL COMPLETION REPORT

**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.

## Part I. Well Construction & Part II. Permanent Pump Installation

1. **State Well No.:** 2051-02  
   **Well Name:** Kamehameha Schools Well B  
   **Island:** Oahu

2. **Location/Address:** Kapalama Heights, Oahu  
   **Tax Map Key:** 1-6-22:1

### PART I. WELL CONSTRUCTION REPORT

3. **Drilling Company:**

4. **Name of driller who performed work:**

5. **Type of rig/construction:**

6. **Date(s) Well Construction and pump tests (if any) completed:**
   - **ft.**

7. **GROUND ELEVATION** (referenced to mean sea level, msl):
   - **Elevation (msl):**

8. **DRILLER’S LOG:** Please attach geologic log (if available or if required by permit)
   - Depth (ft.)
   - Rock Description, Water Level, Dates, etc.
   - Depth (ft.)
   - Rock Description, Water Level, Dates, etc.

9. **Total depth of well below ground:**
   - **ft.**

10. **Hole size:**
   - **inch dia. from**
   - **ft. to**
   - **ft. below ground**
   - **inch dia. from**
   - **ft. to**
   - **ft. below ground**
   - **inch dia. from**
   - **ft. to**
   - **ft. below ground**

11. **Casing installed:**
   - **in. I.D. x in. wall solid section to**
   - **ft. below ground**
   - **in. I.D. x in. wall perforated section to**
   - **ft. below ground**

   **Casing Material/Slot Size:**

12. **Annulus:**
   - Grouted from **ft. below ground to**
   - **ft. below ground**
   - Gravel packed from **ft. below ground to**
   - **ft. below ground**

13. **Initial water level:**
   - **ft. below ground**
   - **Date and time of measurement:**

14. **Initial chloride:**
   - **ppm**
   - **Date and time of sampling:**

15. **Initial temperature:**
   - **°F**
   - **Date and time of measurement:**

16. **PUMPING TESTS:** Reference Point (R.P.) used:
   - **which elevation is**
   - **ft.**
   - (1) Step-Drawdown Test Date
   - Start water level **ft. below R.P.**
   - End water level **ft. below R.P.**
   - (2) Long-term Aquifer Test Date
   - Start water level **ft. below R.P.**
   - End water level **ft. below R.P.**

17. **Aquifer Pump Test Procedures data & graphs** (1/9/96 LTAT Form) attached? _Yes_ _No

18. **As-built drawings attached**
   - _Yes_ _No

19. **Other remarks/comments:**

---

Well Drilling Contractor (print) ____________  
C-57 Lic. No. ____________

Signature ____________________________  
Date ____________

Surveyor (print) ______________________  
Lic. No. ____________

Signature ____________________________  
Date ____________

Applicant (print) _____________________  
Lic. No. ____________

Signature ____________________________  
Date ____________
SUBMERSIBLE OUTLINE

STANDARD WELL SEAL — JUNCTION BOX CONSTRUCTION

DEEPWELL SUBMERSIBLE AT 740 FT. SITE

DATE _____________________

NAME OF CUSTOMER: Bishop Estate / A. A. Kobayashi

4-2051-02 Kamaka Blk. B

PROPOSITION NO. 097-027

ORDER NO. 34-97P

PURCHASE ORDER NO. ______________________

NO. OF UNITS: ONE (1)

SURFACE PLATE 25.00" O.D. 1.500" TH'K

8-7/8" FOUNDATION HOLES. STR. ø ON 23" B.C

6" - 8 T.P.I. ¾" TAPER T&C ST'D. COLUMN

300# WITH NPT LINE COUPLINGS

6" - 3# F.F. (STEEL) DISCHARGE FLANGE

BOWL ASSEMBLY: 10 MGD / 20 STGS.

125 H.P. 1760 RPM B.J. SUBM. MOTOR TYPE M

12" SIZE 3 PH. 60 CYCLE 460 VOLT

500 GPM 760 TDH

CABLE SIZE: 300MM VOLTAGE: 460 LENGTH: 720 FT

REMARKS: Lakewood Check Valve Located

8 ft. Above Pump Bowl Discharge

REV. A Changed Column and Overall Length

AS BUILT

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

JOB NO. KSBE 96-02 PROP. NO. 34-97P

CERTIFIED CORRECT: __________________________ DATE: 9-31-98
Dr. Michael Chun  
Kamehameha Schools/Bishop Estate  
1887 Makuakane Street  
Honolulu, Hawaii 96817

Dear Dr. Chun:

SUBJECT: PUBLIC WATER SYSTEM NO. 319, KAMEHAMEHA SCHOOLS  
KAMEHAMEHA SCHOOLS WELL "B"  
STATE WELL NO. 3-2051-02

We have reviewed the engineering report and the supplemental information submitted for the Kamehameha Schools Well "B," State Well No. 3-2051-02, prepared by Akinaka & Associates, Ltd. The Department of Health hereby grants conditional approval for the use of the Kamehameha Schools Well "B" as a drinking water source for a public water system. In addition, the use of this well as a drinking water source shall be subject to the following conditions:

1. The Kamehameha Schools Well "B," State Well No. 3-2051-02, shall deliver potable water of the quality in compliance with Hawaii Administrative Rules, Title 11, Chapter 20, Potable Water Systems. The water quality shall be subject to verification by the Department of Health.

2. The Kamehameha Schools/Bishop Estate, in its operation of the Kamehameha Schools Well "B," State Well No. 3-2051-02, shall comply with all other relevant provisions of Hawaii Administrative Rules, Title 11, Chapter 20, Potable Water Systems.

3. The Kamehameha Schools/Bishop Estate shall notify the Department of Health of any condition that may arise or be revealed which may contaminate the source and pose a threat to human health.

4. The Kamehameha Schools/Bishop Estate shall notify the Safe Drinking Water Branch of the planned well activation date(s), at least thirty (30) days in advance. This will help the Department incorporate the well into its monitoring schedules.

5. Immediately prior to or upon startup, the Kamehameha Schools/Bishop Estate shall resample the Kamehameha Schools Well "B" to retest for total and fecal coliform and to confirm the presence of barium, chromium, nitrate and nitrite. The analyses must be performed by a
laboratory approved by the Hawaii Department of Health, State Laboratories Division, using EPA approved drinking water methods. At a minimum, the chain of custody and laboratory reports for the microbiological analysis need to be submitted. In the event that the presence of barium, chromium, nitrite and nitrate in the Kamehameha Wells "B" is confirmed, the Kamehameha Schools/Bishop Estate will issue a press release.

6. The Kamehameha Schools Well "B" shall be properly disinfected prior to entry into the distribution system.

7. The Kamehameha Schools/Bishop Estate must sample and analyze the Kamehameha Schools Well "B" for all required contaminants that are not analyzed by the Department of Health, State Laboratories Division.

Presently, the Department of Health cannot analyze the following EPA regulated contaminants:

Cyanide
Benzo(A)Pyrene
Dalapon
Di(ethylhexyl)-Adipate
Di(ethylhexyl)-Phthalate
Dinoseb
2,3,7,8-TCDD (Dioxin)
Diquat
Endothall
Pentachlorophenol
Picloram
PCB
Toxaphene
2,4,5-TP(Silvex)
2,4-D

Please note that the drinking water regulations are frequently revised and the preceding list may be subject to change.

8. The Kamehameha Schools Well "B" must be tested for chlordane and dieldrin once every three months (calendar quarter), using EPA approved drinking water method(s), with minimum detection limits of 0.1 microgram per liter (ug/l) and 0.01 microgram per liter (ug/l), respectively. The quarterly laboratory reports shall be submitted to the Safe Drinking Water Branch no later than ten days after the end of each quarter. Upon review of the analytical results for the first four consecutive quarters, the Department of Health will determine the future sampling requirements.

The Department of Health reserves the right to suspend or revoke this conditional approval upon either a finding of violation on any of the above conditions or a determination of a threat to public health from factors which may arise in the future.
Thank you for your attention and concern to these matters. If you should have any questions, please contact Ms. Queenie Komori of the Safe Drinking Water Branch, Engineering Section, at 586-4258.

Sincerely,

WILLIAM WONG, P.E., Chief
Safe Drinking Water Branch
Environmental Management Division

QK:1a

c:  SDWB Monitoring Section
    SDWB Enforcement Section
    Akinaka & Associates, Ltd.
    250 N. Beretania St., #300
    Honolulu, HI 96817

Charley Ice, DLNR
To: Mr. Michael D. Wilson, Chairman
Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Attention: Ms. Rae Loui

Project: KSBE OFF-SITE WATER SYSTEM IMPROVEMENTS
TAX MAP KEY: 1-6-22:1
A&A JOB NO: KSBE 96-02

Subject: Pump Installation Permit

Reference: Kamehameha Schools Well B, Well No. 2051-02

We are sending you herewith:

<table>
<thead>
<tr>
<th>No. of copies</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Pump Installation Permit – Kamehameha Schools Well &quot;B&quot;, Well No. 2051-02</td>
</tr>
</tbody>
</table>

For:  
☑ Information/Files ☐ Review/Comments ☐ Review/Approval ☐ Approval/Signature
☐ ACTION ☐ Revise/Re-Submittal ☐ Reply Requested  

Remarks:

As directed by Kamehameha Schools, we herewith transmit executed pump installation permit for your files.

If there are any questions, please call the undersigned or Sal Quitoriano.

Very truly yours,

By: Robert Y. Akinaka
President

cc: Michael Lum, KSBE w/attach
SMQRYA:cyk
DLNR289.DOC
PUMP INSTALLATION PERMIT

Kamehameha Schools Well B, Well No. 2051-02

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for Kamehameha Schools Well B (Well No. 2051-02) at Kapalama Heights, Oahu, TMK 1-6-22:1, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

1. The Chairperson to the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to observe all activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 600 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Chairperson (attached).

4. The proposed use 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 pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The permittee shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Chairperson within sixty (60) days after completion of work.

6. The permittee shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

7. The pump installation permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97).

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation 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 Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement 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.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

10. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: August 14, 1997
Expiration Date: August 14, 1999

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. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day.

Permittee’s Signature: Michael J. Lum
Printed Name: Michael J. Lum
Firm or Title: Kamehameha Schools

Installer’s Signature: William C. Moore
Printed Name: William C. Moore
License #: C164937 Date: 01/26/97
Firm or Title: Pres.

Please sign both copies of this permit, return one to the Chairperson, and retain the other for your records.

Attachments
USGS Department of Health/ Safe Drinking Water & Wastewater Branches Honolulu Board of Water Supply
Mr. Michael Lum  
Kamehameha Schools  
Bernice Pauahi Bishop Estate  
P.O. Box 3466  
Honolulu, Hawaii 96801

Dear Mr. Lum:

Pump Installation Permit  
Kamehameha Schools Well B (Well No. 2051-02)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned well(s) which authorizes permanent pump installation work for your well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 10:

Special Conditions

1. (NONE)

The well owner is responsible for all conditions of the permit. This includes ensuring that the pump installation contractor, or other party who installs the pump, submits a completed Part II of the Well Completion Report form (enclosed) within sixty (60) days after the pump installation work is completed. Be advised that you may be subject to fines of up to $1000 per day for any violations of your permit conditions.

To validate your pump installation permit, please sign and have the contractor sign both permit originals and return one for our files.

A copy of the Well Completion Report (Part II) and a copy of your water use report form are enclosed for your use. Except for the monthly water use report form, please provide copies of all the information in this packet to your pump installation contractor.

Finally, this letter is notice that we have accepted your Well Completion Report - Part I as complete.

If you have any questions, please call the Commission staff at 587-0218.

Aloha,

MICHAEL D. WILSON  
Chairperson

Enclosures
PUMP INSTALLATION PERMIT

Kamehameha Schools Well B, Well No. 2051-02

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for Kamehameha Schools Well B (Well No. 2051-02) at Kapalama Heights, Oahu, TMK 1-6-22-1, subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97) which include but are not limited to the following conditions:

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2. The pump installation permit shall be for installation of a 500 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Chairperson (attached).

4. The proposed use 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 pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The permittee shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Chairperson within sixty (60) days after completion of work.

6. The permittee shall comply with all applicable laws, rules, and ordinances, and non-compliance may be grounds for revocation of this permit.

7. The pump installation permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (1/23/97).

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation 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 Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement 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.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

10. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: August 14, 1997
Expiration Date: August 14, 1999

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. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $1000 per day.

Permittee's Signature: ____________________________  Date: ________________

Printed Name: ________________________________  Firm or Title: ________________________________

Installer's Signature: ____________________________  License #: __________  Date: ________________

Printed Name: ________________________________  Firm or Title: ________________________________

Please sign both copies of this permit, return one to the Chairperson, and retain the other for your records.

Attachments
C: USGS
   Department of Health/ Safe Drinking Water & Wastewater Branches
   Honolulu Board of Water Supply
Mr. Mike Lum  
Kamehameha Schools/Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, Hawaii 96817

Dear Mr. Lum:

Well Construction Permit  
Kamehameha Schools Well B (Well No. 2051-02)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s). As part of the Commission’s approval, the following special conditions were added and are part of your permit under Standard Permit Condition 11:

Special Conditions

1. The permittee shall use Well No. 2051-01 as an observation well during the pump test for Well No. 2051-02.
2. The well shall not be used for drinking water unless it is properly tested and treated.

Additionally, the Commission authorized the Chairperson to approve and issue a pump installation permit supported by information provided from aquifer pumping test results, required in Well Construction Standard Condition 6e, subject to the Standard Pump Installation Conditions which will be issued to you when we receive your aquifer pump test results.

Please sign the permit copies and return one for our files. Also, copies of the aquifer pump test procedure and the well completion report form are enclosed for your use.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214.

Aloha,

Enclosures
WELL CONSTRUCTION PERMIT

Kamehameha Schools Well B, Well No. 2051-02

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-188, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of Kamehameha Schools Well B (Well No. 2051-02) at Kapalama Heights, Oahu, TMK 1-6-22:1, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. The permittee shall coordinate with the Commission and conduct a pumping test in accordance with the attached Aquifer Pump Testing Procedure (attached). The permittee shall submit to the Commission the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Commission.

3. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

4. In the event that subsurface cultural remains such as artifacts, burial sites or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department's Historic Preservation Division (587-0045) immediately.

5. 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.

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

7. The permittee shall comply with all applicable laws, rules, and ordinances.

8. The well construction permit application and staff submittal approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

9. The permit may be revoked if work is not started within six (6) months after the date of approval 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.

10. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-188-12(f) prior to any well sealing or plugging work.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: October 23, 1996
Expiration Date: October 23, 1998

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

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: MICHAEL J. LUM

Printed Name: MICHAEL J. LUM
Firm or Title: KAMEHAMEHA SCHOOLS

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment to:
USGS
Department of Health/ Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
LETTER OF TRANSMITTAL

TO: Ms. Rae M. Loui, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

FROM: Mike Lum
Facilities Engineer

DATE: July 21, 1997

RE: Pump Installation Permits
Kamehameha Schools

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<td>Well Construction Permit for Well B (Well No. 2051-02)</td>
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The above is/are transmitted herewith: [x] for your files

ML:mo

Att.

cc: Sal Quitoriano (Akinaka & Associates) - w/att.
Mr. Mike Lum
Kamehameha Schools/Bernice Pauahi Bishop Estate
Kapalama Heights
Honolulu, Hawaii 96817

Dear Mr. Lum:

Pump Installation Permit
Kamehameha Schools Well A (Well No. 2051-01)

Enclosed are two (2) copies of your approved Pump Installation Permit for the captioned well(s). As part of the Commission's approval, the following special conditions were added and are part of your permit under Standard Permit Condition 10:

Special Conditions

(NONE)

Additionally, please let this letter serve as notice of our acceptance of your Well Completion Report - Part 1 as complete.

Please sign the permit copies and return one for our files. Also, copies of the well completion report and your water use report forms are enclosed for your use.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214 or 1-800-468-4644 extension 70214.

Aloha,

MICHAEL D. WILSON
Chairperson

Enclosures
PUMP INSTALLATION PERMIT

Kamehameha Schools Well A, Well No. 2051-01

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-188, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for Kamehameha Schools Well A (Well No. 2051-01) at Kapalama Heights, Oahu, TMK 1-6-22:1, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with 13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 500 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Commission (attached).

4. The proposed use 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 pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The applicant shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Commission within thirty (30) days after completion of work.

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

7. The pump installation permit application and staff submittal approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation 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 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.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with 13-168-12(f) prior to any well sealing or plugging work.

10. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: October 23, 1996
Expiration Date: October 23, 1998

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: Michael J. Lum
Date: July 24, 1997

Printed Name: Michael J. Lum
Firm or Title: KAMEHAMEHA SCHOOLS BISHOP ESTATES

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment:

USGS
Department of Health/ Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
Mr. Mike Lum  
Kamehameha Schools/Bernice  
Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, HI 96817  

Dear Mr. Lum:  

Per your telephone request on July 15, 1997, we are sending you two (2) copies of the original well construction permit for Well No. 2051-02 and pump installation permit for Well No. 2051-01 for your review and signature. Please return one copy of the fully executed permits to our office and retain the second copy for your record.  

If you have any questions, please contact Lenore Nakama at 587-0218.  

Sincerely,  

RAE M. LOUI  
Deputy Director  

LN:ss  
Attachments
TO: Mr. Mike Lum, PE
Facilities Engineer
FROM: John Stubbart
DATE: 12 May 97
SUBJ: Kamehameha Schools Kapalama Well B
Status Report
Revised

The second pumping test was completed at 9:20 am, Monday, 12 May 97. The test was started 48 hours before on Saturday, 10 May 97, at about 8:20 am. AECOS took water samples from 9:00 am to 9:20 am on Monday.

I spoke to Bob Stender of the Kamehameha School physical plant operations to notify him that the test was completed and he can operate Well A again.

The test data was clean and the results showed a 1.38 foot drawdown at 890 gpm flow rate. The drawdown was at a constant level from 3 minutes into the pumping test and the recovery was within 3 minutes.

cc: Akinaka and Associates
Wa‘ele Drilling and Development
CWRM
TO: Mr. Mike Lum, PE
Facilities Engineer
FROM: John Stubbart
DATE: 23 April 97
SUBJ: Kamehameha Schools Well B
Status Report

The pumping test is to start on Thursday, 24 April 97, around 7:30 am.

Aecos Laboratory will be on site to take the samples at 3:00 pm. We confirmed DOH list for Contaminates to be Tested in all New Sources of Potable Water, published on 26 Jan 96 as the current list of contaminates.

cc: Akinaka and Associates
    Wai'elei Drilling and Development
    CWRM
TO: Mr. Mike Lum, PE
Facilities Engineer

FROM: John Stubbart

DATE: 23 April 97

SUBJ: Kamehameha Schools Well B
Status Report

The pumping test is delayed as the pump will not start. The contractor was just about complete with the installation on Monday, 21 April 97, and completed the job on Tuesday. However the pump and motor would not start. WWS has set up the recording equipment.

Thus the step drawdown test and long term test could not be started as scheduled. We will monitor the progress today and will send out a revised schedule as soon as we hear. We will also delay the laboratory testing as this must be done on Monday through Thursday. The start of the long term test will need to coincide so that near the end of the test the samples can be taken.

cc: Akinaka and Associates
Wa'ili Drilling and Development
CWRM
TO: Mr. Mike Lum, PE
Facilities Engineer
FROM: John Stubbart
DATE: 18 April 97
SUBJ: Kamehameha Schools Well B
Status Report

The pumping test equipment was being installed. The contractor will complete the installation on Monday, 21 April 97, connect the power and test the pump. If all goes well the step drawdown test will be conducted that day. Steve Bowles will be on site from the mid-morning to the end of the day.

A 1.25" pvc pipe was installed along with two air lines for water level measurements.

The long term pumping test will start on Tuesday or Wednesday morning, depending on the start of the step drawdown test.

cc: Akinaka and Associates, Wai'eli Drilling and Development, CWRM
The well casing has been placed and 4 yards of cement were placed as the plug at the bottom of the well. This will cure over the holiday weekend and additional grouting of the annulus will commence next week.

The depth to the water level on Tuesday was is 696.5 feet. The mauka benchmark is 717.49 feet. This is about ground level. The water level elevation is about 21 feet.

Contractor has not received any payments yet on Invoice #1 and #2.

cc: Akinaka and Associates
     Wailei Drilling and Development
     CWRM
TO: Mr. Mike Lum, PE  
Facilities Engineer  
FROM: John Stubbart  
DATE: 24 March 97  
SUBJ: Kamehameha Schools Well B (2051-02) Status Report  

As of 24 March 97, the well has been reamed to 773 feet with a 20" diameter bit. The casing will be set to 770'. They drilled 3 extra feet from 770.28' to about 773 feet to allow for cuttings before setting casing and grout plug.

No foaming has been reported or seen entering the stream.

The video of the well bore is planned for tomorrow.

Casing is on island and is planned to be set starting Thursday. The pumping test is scheduled to start in about 2.5 to 3 weeks. We will review the pumping test protocol and test data criteria with the Wai'eli Drilling.

The depth to the water level is 695.83 feet. The mauka benchmark is 717.49 feet. This is about ground level. The water level elevation is about 21.66 feet.

cc: Akinaka and Associates  
Wai'eli Drilling and Development  
CWRM
Mr. Mike Lum  
Kamehameha Schools/Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, Hawaii 96817

Dear Mr. Lum:

Pump Installation Permit  
Kamehameha Schools Well A (Well No. 2051-01)

Enclosed are two (2) copies of your approved Pump Installation Permit for the captioned well(s). As part of the Commission’s approval, the following special conditions were added and are part of your permit under Standard Permit Condition 10:

Special Conditions

(NONE)

Additionally, please let this letter serve as notice of our acceptance of your Well Completion Report - Part 1 as complete.

Please sign the permit copies and return one for our files. Also, copies of the well completion report and your water use report forms are enclosed for your use.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214 or 1-800-468-4644 extension 70214.

Aloha,

Michael D. Wilson  
Chairperson

Enclosures
PUMP INSTALLATION PERMIT

Kamehameha Schools Well A, Well No. 2051-01

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for Kamehameha Schools Well A (Well No. 2051-01) at Kapalama Heights, Oahu, TMK 1-6-22:1, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with 13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 500 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Commission (attached).

4. The proposed use 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 pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The applicant shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Commission within thirty (30) days after completion of work.

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

7. The pump installation permit application and staff submittal approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation 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.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with 13-168-12(f) prior to any well sealing or plugging work.

10. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: October 23, 1996
Expiration Date: October 23, 1998

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment:
USGS
Department of Health/Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
Mr. Mike Lum  
Kamehameha Schools/Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, Hawaii 96817

Dear Mr. Lum:

Well Construction Permit  
Kamehameha Schools Well B (Well No. 2051-02)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s). As part of the Commission’s approval, the following special conditions were added and are part of your permit under Standard Permit Condition 11:

**Special Conditions**

1. The permittee shall use Well No. 2051-01 as an observation well during the pump test for Well No. 2051-02.
2. The well should not be used for drinking water unless it is properly tested and treated.

Additionally, the Commission authorized the Chairperson to approve and issue a pump installation permit supported by information provided from aquifer pumping test results, required in Well Construction Standard Condition 6e, subject to the Standard Pump Installation Conditions which will be issued to you when we receive your aquifer pump test results.

Please sign the permit copies and return one for our files. Also, copies of the aquifer pump test procedure and the well completion report form are enclosed for your use.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214.

Aloha,

Chairperson

Enclosures
Kamehameha Schools Well B, Well No. 2051-02

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-168, entitled “Water Use, Wells, and Stream Diversions Works”, this document permits the construction and testing of Kamehameha Schools Well B (Well No. 2051-02) at Kapalama Heights, Oahu, TMK 1-8-22:1, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. The permittee shall coordinate with the Commission and conduct a pumping test in accordance with the attached Aquifer Pump Testing Procedure (attached). The permittee shall submit to the Commission the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Commission.

3. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

4. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department’s Historic Preservation Division (587-0045) immediately.

5. 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.

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

7. The permittee shall comply with all applicable laws, rules, and ordinances.

8. The well construction permit application and staff submittal approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

9. The permit may be revoked if work is not started within six (6) months after the date of approval 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.

10. If the well is not to be used, it must be properly capped. If the well is to be abandoned, then the applicant must apply for a well abandonment permit in accordance with 113-168-12(f) prior to any well sealing or plugging work.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: October 23, 1996
Expiration Date: October 23, 1998

Michael D. Wilson, Chairperson
Commission on Water Resource Management

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 both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment

USGS
Department of Health/ Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
MOTION: (NOBRIGA/MIIKE)

To approve staff's recommendation.

UNANIMOUSLY APPROVED.

11. KAMEHAMEHA SCHOOLS/BERNICE PUAHII BISHOP ESTATE REQUEST FOR EXTENSION OF WELL PERMIT. KAMEHAMEHA SCHOOLS WELL B (WELL NO. 2051-02), WELL CONSTRUCTION: 14-INCH CASING DIAMETER, 980-FOOT DEEP WELL, PUMP INSTALLATION: 500 GPM FOR DOMESTIC USE, TMK 1-6-22:1, KAPALAMA HEIGHTS, OAHU

STAFF PRESENTATION: Ms. Lenore Nakama

STAFF RECOMMENDATION:

The staff recommends that the Commission:

A. Approve the issuance of a well construction permit for Well B (Well No. 2051-02), subject to the standard conditions in Exhibit 3, and the following special conditions:

1. The applicant shall use Well No. 2051-01 as an observation well during the pump test for Well No. 2051-02.
2. The well should not be used for drinking water unless it is properly tested and treated.

B. Authorize the Chairperson to approve and issue a pump installation permit for Well No. 2051-02 supported by information provided from aquifer pumping test results, required in Well Construction Standard Condition 6e (Exhibit 3), subject to the Standard Pump Installation Conditions in Exhibit 4.

C. Approve the issuance of a pump installation permit for Well A (Well No. 2051-01), subject to the standard conditions in Exhibit 4.

TESTIMONY BY APPLICANT:

Mr. Michael Lum, Facilities Engineer for KSBE, was available for questions. He stated that the two years would be adequate time to complete the well.

MOTION: (NOBRIGA/GIRALD)

To approve staff's recommendation.

UNANIMOUSLY APPROVED.
12. MOKULEIA AQUAFARM, APPLICATION FOR WELL PERMITS, MAF 1 (WELL NO. 3409-24), TMK 6-8-13:44, WELL CONSTRUCTION: 4-INCH DIAMETER, 60-FOOT DEEP WELL, PUMP INSTALLATION: 250-300 GPM CAPACITY PUMP, APPLICATION FOR WATER USE PERMIT, MAF 1 (WELL NO. 3409-24), TMK 6-8-13:44, OAHU

STAFF PRESENTATION: Lenore Nakama

STAFF RECOMMENDATION:

The recommendation was amended as follows:

1. Approve the issuance of an interim water use permit to Mokuleia Aquafarm for the reasonable and beneficial use of 250,000 gallons per day of fresh nonpotable water for aquaculture use (for two (2) acres fish and taro) for MAF 1 Well (Well No. 3409-24), subject to the standard water use permit conditions listed in Attachment B and the following special condition:
   a. Should an alternate permanent source of water be found for this use, then the Commission reserves the right to revoke this permit, after a hearing.

2. Approve the issuance of a well construction permit for MAF 1 Well (Well No. 3409-24), subject to the standard conditions in Exhibit 4 and the following special conditions:
   a. The long-term continuous test shall run at least a minimum of 72 hours.
   b. The well should not be used for drinking water unless it is properly tested and treated.
   c. Cement grout shall be a minimum of 70% of the vertical distance between the ground surface and the top of the aquifer.

3. Authorize the Chairperson to approve and issue a pump installation permit supported by information provided from aquifer pumping test results, required in Well Construction Standard Condition 6e (Exhibit 4), subject to the Standard Pump Installation Conditions in Exhibit 5.

MOTION: (NOBRIGAIMIIE)

To approve staff's recommendation as amended.

UNANIMOUSLY APPROVED AS AMENDED.
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 821
HONOLULU, HAWAI'I 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

October 23, 1996
Honolulu, Oahu

Kamehameha Schools/Bernice Pauahi Bishop Estate
REQUEST FOR EXTENSION OF WELL PERMIT
Kamehameha Schools Well B (Well No. 2051-02)
Well Construction: 14-inch Casing Diameter, 980-foot Deep Well
Pump Installation: 500 GPM for Domestic use
TMK 1-6-22:1, Kapalama Heights, Oahu

APPLICANT:
Kamehameha Schools/
Bernice Pauahi Bishop Estate
Kapalama Heights
Honolulu, HI 96817

LANDOWNER:
Same

DESCRIPTION:
Location: (See Exhibit 1)
Dimensions: (See Exhibit 2)

BACKGROUND:
On September 11, 1981, the Board of Land and Natural Resources approved a water use permit for Kamehameha Schools/Bernice Pauahi Bishop Estate (KSBE) for 0.229 mgd for domestic use at the Kamehameha Schools Kapalama campus for existing Well Nos. 2052-07 & 11.

On July 28, 1993, the Commission on Water Resource Management (Commission) approved a combined well construction/pump installation permit for KSBE for two (2) new replacement wells, Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02) and the "transfer" of the water use permit from the existing wells to the new wells. The new wells will replace two (2) existing wells located roughly one (1) mile makai and at lower altitude in the watershed. This change is part of an overall water system improvement program intended to increase the safety and reliability of domestic water service within the Kapalama Heights campus of Kamehameha Schools. A representative for KSBE testified at the July 28, 1996 meeting that the construction of the new wells is for safety reasons, in order to relocate a high pressure line away from houses. The old wells will be sealed and abandoned when the new wells are put into operation. No increase in the allocation is requested. KSBE runs their own independent water system for the campus. The Honolulu Board of Water Supply system is used as a backup.

Item 11
On July 14, 1995, KSBE's engineering consultants submitted a well completion report for the construction of Well A.

On February 22, 1996, the Environmental Management Division, Department of Health, submitted a Preliminary Engineering Report for new potable water sources for Well A. The cover letter requested approval to install a permanent pump; however, the permit had already expired at the time of the request. A permanent pump has not yet been installed in the well.

Because of the logistical problems associated with combined well construction/pump installation permits, such combined permits are no longer recommended by staff. The new procedure recommends Commission action for the well construction permit first and then delegation to the Chairperson the authority to approve a pump installation permit upon acceptance of pump test results that support the proposed pump capacity. This allows the permittees sufficient time to complete both the drilling and pump installation work (in four years as opposed to two) and also allows the pump installation work to proceed in light of drilling and testing results. As such, the staff is recommending that the Commission approve the issuance of a new pump installation permit for Well A.

On July 24, 1996, KSBE submitted a request for an extension of time until October 25, 1997 to complete Well B. Construction delays in providing access to the second well site have prevented KSBE from completing the drilling and testing. KSBE indicates that an extension to October 25, 1997 should be sufficient to complete the drilling of Well B and pump installation for the two wells.

On August 6, 1996, the Commission acknowledged the July 24, 1996 extension request and responded that an elevation survey (pursuant to Condition 7.b.) should be submitted for Well A.

On August 19, 1996, KSBE submitted the required elevation survey.

WATER AVAILABILITY:
Kalihi Aquifer System of the Honolulu Sector
Estimated Sustainable Yield: 15 mgd
Current Aquifer System Pumpage (12-MAV as of 12/95): 16.384 mgd
Existing Use: 0.229 mgd., domestic use

ISSUES/ANALYSIS:
There is no new information regarding the proposed well construction and/or water use (which is covered by WUP No. 210). The staff is not aware of any new issues associated with this request for a permit extension, which were covered by previous Commission action. Additional information is contained in the staff's submittal of July 28, 1993, which is incorporated herein by reference.

As stated earlier, combined well construction/pump installation permits are no longer recommended. As such, the staff is recommending that the Commission issue new permits in accordance with the permitting procedure described above.
RECOMMENDATION:

The staff recommends that the Commission:

A. Approve the issuance of a well construction permit for Well B (Well No. 2051-02), subject to the standard conditions in Exhibit 3, and the following special conditions:

1. The applicant shall use Well No. 2051-01 as an observation well during the pump test for Well No. 2051-02.
2. The well should not be used for drinking water unless it is properly tested and treated.

B. Authorize the Chairperson to approve and issue a pump installation permit for Well No. 2051-02 supported by information provided from aquifer pumping test results, required in Well Construction Standard Condition 6e (Exhibit 3), subject to the Standard Pump Installation Conditions in Exhibit 4.

C. Approve the issuance of a pump installation permit for Well A (Well No. 2051-01), subject to the standard conditions in Exhibit 4.

Respectfully submitted,

RAE M. LOUI
Deputy Director

Exhibit(s):
1 (Location Map)
2 (Proposed Well Section)
3 (Standard Well Construction Permit Conditions)
4 (Standard Pump Installation Permit Conditions)
5 (Well Completion Report Form)
6 (Pump Test Procedures)
7 (Water Use Report Form)

APPROVED FOR SUBMITTAL:

MICHAEL D. WILSON, Chairperson
### PROPOSED WELL SECTION

- **Elevation at top of casing**: 831 ft., mal.
- **Ground Elevation**: 830 ft., mal.
- **Cement Grout**: 880 ft.
- **Rock Packing**: N/A ft.
- **Hole Diameter**: 20 in.
- **Total Depth**: 980 ft.

#### Solid Casing:
- **Material**: Steel
- **Length**: 881 ft.
- **Diameter**: 14 in.
- **Wall thickness**: 0.375 in.

#### Casing:
- **Material**: N/A
- **Length**: N/A
- **Diameter**: N/A
- **Wall thickness**: N/A
- **Openings**: N/A sq. in./L.F.

#### Open Hole:
- **Length**: 100 ft.
- **Diameter**: 13.75 in.

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

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**EXHIBIT 2**
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, at least two (2) weeks before any work by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. The permittee shall coordinate with the Commission and conduct a pumping test in accordance with the attached Aquifer Pump Testing Procedure (attached). The permittee shall submit to the Commission the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Commission.

3. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

4. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department’s Historic Preservation Division (587-0045) immediately.

5. 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.

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

7. The permittee shall comply with all applicable laws, rules, and ordinances.

8. The well construction permit application and staff submittal approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

9. The permit may be revoked if work is not started within six (6) months after the date of approval 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.

10. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

EXHIBIT 3
STANDARD PUMP INSTALLATION PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 500 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis, on forms provided by the Commission (attached).

4. The proposed use 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 pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The applicant shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Commission within thirty (30) days after completion of work.

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

7. The pump installation permit application and staff submittal approved by the Commission at its October 23, 1996 meeting are incorporated into the permit by reference.

8. The permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the pump installation 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.

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.
WELL COMPLETION REPORT

PART I. WELL CONSTRUCTION REPORT

1. State Well No.: ___________  Well Name: ___________________________  Island: ___________
2. Location/Address: ___________________________  Tax Map Key: ___________

3. Drilling Company: ___________________________
4. Name of driller who performed work: ___________________________
5. Type of rig/construction: ___________________________
6. Date(s) Well Construction and pump tests (if any) completed: ___________________________
7. GROUND ELEVATION (referenced to mean sea level, msl): ___________ ft.  
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit) 
   Depths (ft.)  Rock Description, Water Level, Dates, etc.  Depths (ft.)  Rock Description, Water Level, Dates, etc.
   ___________ to ___________  ___________ to ___________
   ___________ to ___________  ___________ to ___________
   (If more space is needed, continue on back.)
9. Total depth of well below ground: ___________ ft.
10. Hole size: ___________ inch dia. from ___________ ft. to ___________ ft. below ground
    ___________ inch dia. from ___________ ft. to ___________ ft. below ground
    ___________ inch dia. from ___________ ft. to ___________ ft. below ground
11. Casing installed: ___________ in. I.D. x ___________ in. wall solid section to ___________ ft. below ground
    ___________ in. I.D. x ___________ in. wall perforated section to ___________ ft. below ground
    Casing Material/Slot Size: ___________________________
12. Annulus: Grouted from ___________ ft. below ground to ___________ ft. below ground
    Gravel packed from ___________ ft. below ground to ___________ ft. below ground
13. Initial water level: ___________ ft. below ground.  Date and time of measurement: ___________ 
14. Initial chloride: ___________ ppm  Date and time of sampling: ___________ 
15. Initial temperature: ___________ °F  Date and time of measurement: ___________ 
16. PUMPING TESTS: Reference Point (R.P.) used: ___________  which elevation is ___________ ft.  
    (1) Step-Drawdown Test Date ___________  (2) Long-term Aquifer Test Date ___________.
    Start water level ___________ ft. below R.P.  Start water level ___________ ft. below R.P.
    End water level ___________ ft. below R.P.  End water level ___________ 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) ___________________________  C-57 Lic. No. ___________
Signature ___________________________  Date ___________
Surveyor (print) ___________________________  Lic. No. ___________
Signature ___________________________  Date ___________
Applicant (print) ___________________________  Date ___________
Signature ___________________________  Date ___________

EXHIBIT 5
PART II.  (PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company:

21. Name of person performing work:

22. Date Pump Installation Completed:

23. PUMP INSTALLATION:
   Pump Type, Make, Serial No.: ___________________________ Capacity: _______ gpm
   Motor type, H.P., Voltage, rpm: ___________________________ Depth of Pump Intake Setting _______ ft. below _______ which elevation is _______ ft.
   Depth to bottom of airline _______ ft. below _______ which elevation is _______ ft.
   Pumping Head is _______ ft. Type of flow meter: _______ which measures in _______.

24. As-built drawings attached attached?  _____ Yes  _____ No

25. Other remarks/comments: (See below)

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<th>Pump Installation Contractor (print)</th>
<th>C-57 Lic. No.</th>
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| Applicant (print)                    |              |
| Signature                            | Date         |

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

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<th>Water Level</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks</th>
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19. & 25. Remarks:

EXHIBIT 5
AQUIFER (PUMP) TEST PROCEDURES

The pump test procedure for new wells shall consist of a step-drawdown test followed by a long-term continuous aquifer test. Testing the well and aquifer in the prescribed manner should result in the hydrologic information needed to determine: 1) the well's performance with regard to yield and water quality (chloride concentration), and 2) the nearby hydraulic properties of the aquifer.

**General Recording Requirements**

The records required for analysis and the tolerance in measurement acceptable for the step-drawdown and long-term continuous aquifer test are as follows:

1. Discharge from the well shall not fluctuate beyond ± 10 percent.
2. Depth to water measurements in the pumped well shall be accurate to 0.01 feet.
3. Time shall be accurate within ± 1 percent.
4. Water discharged from the well during the step-drawdown and long-term test shall be carried away from the well to a distance sufficient to preclude circulation of the discharge water downward to the ground-water table.
5. Recording of data should be on a form similar to Table 1. All information shown in Table 1 shall be provided. In addition, data shall be plotted on Graph 1 and provided.

**Step-Drawdown Test**

The purpose of the step-drawdown test is to establish the efficiency of the well and to provide preliminary information on the yield of the well, both from a quantity and quality standpoint.

1. Measurement of water level in the pumped well shall be made every 12 hours for a period of no less than two days prior to the initiation of the step-drawdown test in order to obtain the pretest trend in water levels.
2. The step-drawdown test will consist of continuously pumping the well for four hours at four different rates.
   a. The change from one pumping rate to the next must be sufficient to induce an observable change in water level in the well from the previous pumpage rate.
   b. If desired, the four different rates should represent the full range of pump capacity (if the yield can sustain this), but this is not necessary.
AQUIFER (PUMP) TEST PROCEDURES

3. Each pumping rate should be continued for one hour, after which the new rate should be instituted as rapidly as possible.
4. Pumping should begin at the lowest rate and conclude with the highest rate.
5. Pumping should be continuous through the entire step-drawdown test.
6. Measurement of chloride concentration and temperature of the discharge water shall be measured at least five times:
   a. at the end of each pumping rate during the step-drawdown test, and
   b. at the very beginning of the test.
7. A sufficient number of water level measurements shall be made in the pumped well following the termination of the step-drawdown test to establish that the water level fully recovers from each test to pretest levels.

Long-Term Continuous Test

The purpose of the long-term continuous test is to determine the hydraulic properties of the aquifer to explore for and identify nearby aquifer boundaries such as streams or dikes, and to observe the trend in chloride concentration of the discharge water.

1. The long-term test should not commence until the water level in the pumped well has fully recovered from the step-drawdown test. Generally, the time required for this recovery will be slightly greater than four hours. The water level in the pumped well should be measured immediately before initiation of the long-term test.
2. The pump rate for the long-term test should be sufficient to create an observable drawdown.
3. The test should be run 24 hours per day for at least seven days. If during the test, the water level remains the same for a period of 24 hours, the test can be terminated.
4. Measurement of chloride concentration and temperature of the discharge water during the long-term test shall be made at the beginning of the test and every six hours thereafter.
5. Depth to water in all wells shall be measured with sufficient frequency that each logarithmic cycle in time on the data plots (Graph 1) contains at least 10 data points spread through the cycle. Thus, depth to water should be made at t=0 (immediately prior to start of the test), and as close as possible at t=1, 1.5, 2, 2.5, 3, 4, 5, 6, 7, and 8 minutes for the first ten minutes and at all succeeding decimal multiples of these numbers to the end of the test (t=10, 15, 20, 25, 30, 40, 50, 60, 70, and 80 minutes for the log cycle 10 to 100 minutes, etc.)
6. A sufficient number of water level measurements shall be made in the pumped well following termination of the long-term continuous test to establish that the water level fully recovers from each test to pretest levels.
# Table 1: Long-Term Aquifer Test Data

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<th>Suggested elapsed time (min)</th>
<th>Actual elapsed time (min)</th>
<th>Depth to water (nearest 0.01 ft)</th>
<th>Drawdown (unadjusted to nearest 0.01 ft)</th>
<th>Pumping rate Q (gpm)</th>
<th>EC (microsiemens)</th>
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Data in this table is for:  
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Begin recovery data next page:
Flow meter reading at end of pumped period: _____________ gals.
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END TEST  Date: ____________ Hour of day: ____________

ADDITIONAL REMARKS:

Person in charge of pump test (print): __________________________

Signature: __________________________

The signature above indicates that the data reported on this form is accurate and true to the best of the person's knowledge who operated this aquifer test.

EXHIBIT 6
STATE OF HAWAI'I
COMMISSION ON WATER RESOURCE MANAGEMENT
DEPARTMENT OF LAND AND NATURAL RESOURCES

MONTHLY GROUND WATER USE REPORT

Month of ___ 19_

INSTRUCTIONS: Please type or print clearly. Complete this form to report monthly water use, chloride and water level. Mail to: Commission on Water Resource Management, P.O. Box 621, Honolulu, HI 96809. For assistance, please call (808) 587-0254.

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<th>State Well No.</th>
<th>Well Name</th>
<th>Period Begin Date (mm/dd/yy)</th>
<th>Period End Date (mm/dd/yy)</th>
<th>Quantity Pumped (gallons)</th>
<th>Method of Measurement*</th>
<th>Chloride (mg/l)</th>
<th>Non-pumping Water Level** (ft. above msl)</th>
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* e.g. - flow meter; electrical consumption; weir or flume; not metered (estimated)
** measurement should be taken while pump is not running; if measurement is taken while pump is running, please indicate so

Submitted by (print) ___________________________ Title ___________________________
Signature ___________________________ Date ___________________________

Form mwur12.frm
Mr. Mike Lum
Kamehameha Schools/Bernice
Pauahi Bishop Estate
Kapalama Heights
Honolulu, HI 96817

Dear Mr. Lum:

Request for Extension of Well Construction/Pump Installation Permit for
Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02)
Kalihi Ground Water Management Area, Oahu

Thank you for submitting the elevation survey for Well A (Well No. 2051-01) in compliance with Standard Condition 7.b. of your well construction permit.

We understand that, due to construction delays in providing access to the second well site, the drilling and testing of Well B (Well No. 2051-02) has been prevented, and you are requesting an extension of the permit to October 25, 1997 to complete Well B. Although the permit expired on October 25, 1995, we understand that there is no new information regarding the proposed well construction and/or water use (which is covered by WUP No. 210). As such, we are planning to schedule your request for an extension of the well construction permit for the next Commission meeting on Oahu, tentatively September 11, 1996.

In the past, the Commission has approved permit extensions if the applicant has made some effort toward constructing the well as exhibited by equipment purchase, site preparation, plan preparation, or rezoning processing. If you would like to offer any additional information to support your request for an extension of the well permit, please provide the information as soon as possible before the Commission meeting on September 11, 1996.

If you have any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

RAE M. LOUI
Deputy Director

LN:ss
August 15, 1996

Mr. Michael D. Wilson, Chairman
Commission on Water Resource Management
Department of land & Natural Resources
State of Hawaii
P. O. Box 373
Honolulu, Hawaii 96809

ATTENTION: Ms. Rae Loui, Deputy Director

Subject: Elevation Survey for Well "A" (Well No. 2051-01)

Well Construction/Pump Installation Permit for
Kamehameha Schools Wells A & B
Well Nos. 2051-01 & 02
Kalihi Ground Water Management Area, Oahu

Dear Ms. Loui:

In accordance with your 8/6/96 letter request, enclosed is the elevation survey for Well "A" pursuant to Condition 7.b of our reference permit.

We understand that upon receipt of this survey, our request for extension of our well permit will be submitted for Commission action.

Please contact me at 842-8603 or Mr. Robert Akinaka if there are any questions.

Sincerely,

Michael Lum
Facilities Engineer

Enclosure

cc: Robert Akinaka, Akinaka & Associates, Ltd.
    Stephen Bowles, Waimea Water Service
Mr. Mike Lum  
Kamehameha Schools/Bernice  
Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, HI 96817

Dear Mr. Lum:

Request for Extension of Well Construction/Pump Installation Permit for  
Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02)  
Kalihi Ground Water Management Area, Oahu

We acknowledge receipt, on July 24, 1996, of your request for a two-year extension of time until October 25, 1997 for the captioned well permit.

Please submit an elevation survey (by a Hawaii-licensed surveyor) for Well A pursuant to Condition 7.b. of your permit. Upon receipt of the elevation survey, we will schedule your request for Commission action.

Thank you for informing us that the existing wells (Well Nos. 2052-07 & 11) will be abandoned and sealed once the new wells are put into operation. We have enclosed an application for well construction permit to abandon/seal the two wells for your future use.

If you have any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

RAE M. LOUI  
Deputy Director

LN:ss  
Enclosure
Mr. Mike Lum  
Kamehameha Schools/Bernice  
Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, HI 96817

Dear Mr. Lum:

Request for Extension of Well Construction/Pump Installation Permit for  
Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02)  
Kalihi Ground Water Management Area, Oahu

We acknowledge receipt, on July 24, 1996, of your request for a two-year extension of time until October 25, 1997 for the captioned well permit.

Please submit an elevation survey (by a Hawaii-licensed surveyor) for Well A pursuant to Condition 7.b. of your permit. Upon receipt of the elevation survey, we will schedule your request for Commission action.

Thank you for informing us that the existing wells (Well Nos. 2052-07 & 11) will be abandoned and sealed once the new wells are put into operation. We have enclosed an application for well construction permit to abandon/seal the two wells for your future use.

If you have any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

[Signature]

RAE M. LOUI  
Deputy Director

LN:ss  
Enclosure
I.

COMMISSION ON WATER RESOURCE MANAGEMENT

FROM: [Name]
DATE: 7/24
SUSPENSE DATE: 

TO: [Name]
INIT: [Name]
TO: [Name]
INIT: [Name]
FOR: Approval
PLEASE: See Me

BAUER, G. LOUI, R.
CHING, F. NAKAMA, L.
FUJII, N. NAKANO, D.
HARDY, R. OHYE, M.
HIGA, D. SAKODA, E.
HIRANO, E. SUBIA, S.
ICE, C. SWANSON, S.
JINNAI, R. UWaine, J.
KUNIMURA, I. YODA, K.

Xerox ___ copies

EW, survey

1. Need a copy of old report for our file. 
2. Are we missing any info from Well A? (Pump Test?)
3. Any details on access problem points, spaces, etc? no
4. If no problems (violations) then we have to take to court. Otherwise, we need to respond/seek more info before we accept extension request.
July 19, 1996

Mr. Michael D. Wilson, Chairman
Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawaii
P.O. Box 373
Honolulu, Hawaii 96809

Attention: Ms. Rae Loui, Deputy Director

Dear Ms. Loui:

Subject: Request for Extension of Well Construction/Pump Installation Permit for
Kamehameha Schools Wells A & B, Well Nos. 2051-01 & 02
Kalihi Ground Water Management Area, Oahu

Kamehameha Schools Bishop Estate requests a two year extension of time until October 25, 1997 for the above referenced well permit that was issued on October 25, 1993.

Well A (well no. 2051-01) was completed in June 1995. The well completion report was finalized in September 1995. The Preliminary Engineering Report was submitted to the Dept. of Health in January 1996. A letter requesting approval of the proposed pump was submitted to the Commission in February 1996.

Construction delays in providing access to the second well site have prevented us from completing drilling and testing of Well B. The two year extension should be sufficient to complete drilling of Well B and pump installation for the two wells. These two new wells will replace the existing wells that will be sealed and abandoned once the two new wells are put into operation.

Grading the site for Well B is expected to begin in September. Drilling for Well B is expected to start within four months.

If there are any questions, please call the undersigned at 842-8603 or Mr. Robert Akinaka at 536-7721.

Sincerely,

Michael Lum
Facilities Engineer

Mr. Stephen Bowles, WWS
Mr. Mike Lum
Kamehameha Schools/Bernice
Pauahi Bishop Estate
Kapalama Heights
Honolulu, HI 96817

Dear Mr. Lum:

Kamehameha Schools Well "A" (Well No. 2051-01)
Well Completion Report

Thank you for submitting the Well Completion Report for the construction of Well No. 2051-01.

Pursuant to condition 7.b. of your Well Construction/Pump Installation Permit for Well Nos. 2051-01 & 02, documentation from a Hawaii-licensed surveyor should also be submitted.

In addition, please indicate your plans, if any, for Well Nos. 2052-07 & 11. We have enclosed the section from our proposed Well & Pump Installation Standards that discusses Well Abandonment/Sealing.

Sincerely,

RAE M. LOUI
Deputy Director

Enclosure
Mr. Mike Lum  
Kamehameha Schools  
Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, HI 96817  

Dear Mr. Lum:  

Thank you for your attention to the concerns of the Historic Preservation Division (HPD) regarding the archaeological inventory survey of the reservoir and well sites at the Kamehameha Schools. Pursuant to the memorandum dated January 9, 1995 from HPD to the Commission on Water Resource Management, grading and construction activities for the well construction may proceed.  

If you have any questions, please contact Lenore Nakama at 587-0218.  

Sincerely,  

RAE M. LOUI  
Deputy Director  

LN:ss
This message is intended only for the use of the individual or entity to which it is addressed and may contain information that is privileged, confidential, and exempt from disclosure under applicable law.

If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited.

If you have received this communication in error, please notify us immediately by telephone and return the original message to us at the above address by the United States Postal Service. Thank you.

DATE: 1/13/95
TO: LENORE NAKAMA

FAX NO. 587-6219
FROM: MIKE LUM

Number of Pages of transmission, including this coversheet: 2

Special comments or instructions:

Our telefax number is (808) 842-8485 If you encounter any difficulty in this transmission, please call (808) 842-8211.
MEMORANDUM

TO: Rae M. Loui, Deputy Director
Commission on Water Resource Management

FROM: Don Hibbard, Administrator
Historic Preservation Division

SUBJECT: Historic Preservation Field Inspection of Well Construction and Pump Installation Site
Kamehameha Schools Parcel
Kapalama, Kona, O'ahu

My staff conducted a site inspection of the archaeological site area reported in the draft archaeological inventory survey of the Proposed Reservoir and Well Sites at the Kamehameha Schools. Based on the field assessment we believe that grading and construction activities for the well construction may proceed.

EJ: jk

cc: R. Spear, Scientific Consultant Services Inc.
47-269D Hui Iwa Street, Kaneohe, HI 96744
MEMORANDUM

TO: Rae M. Loui, Deputy Director
Commission on Water Resource Management

FROM: Don Hibbard, Administrator
Historic Preservation Division

SUBJECT: Historic Preservation Field Inspection of Well
Construction and Pump Installation Site
Kamehameha Schools Parcel
Kapalama, Kona, O'ahu
TMK: 1-1-6:22

January 9, 1995

My staff conducted a site inspection of the archaeological site area reported in the draft archaeological inventory survey of the Proposed Reservoir and Well Sites at the Kamehameha Schools. Based on the field assessment we believe that grading and construction activities for the well construction may proceed.

EJ:jk

cc: R. Spear, Scientific Consultant Services Inc.
47-269D Hui Iwa Street, Kaneohe, HI 96744
SCS FAX TRANSMISSION

THIS FAX IS DIRECTED TO: Lenore Nakama
COMPANY: Commission on Water Resources Management
DEPARTMENT: ________________________________
BUSINESS PHONE: 587-0218
FAX PHONE: 587-0219

Number of Pages Including This One: 3

THIS FAX HAS BEEN SENT BY: Bob Spear Chaffee

COMMENTS:

Lenore:
I wanted you to have a copy of this letter. It is regard to the well construction and pump installation project occuring at Kanesamena Schools.
Don Hibbard, Administrator  
Historic Preservation Division  
33 South King Street, 6th Floor  
Honolulu, HI. 96813

12/30/94

Dear Dr. Hibbard:

My company has been conducting archaeological investigations for Kamehameha Schools as part of their well construction and pump installation project.

On December 8, 1994 your office contacted the Commission on Water Resource Management asking that all grading and construction activities be stopped until questions concerning the archaeological findings could be addressed (DOC NO: 9411EV19). The specific questions concerning the findings were provided my company in a letter from your office dated November 18, 1994 (DOC NO:9411TD11).

In response to the November 18 letter we submitted a revised draft report to your office during the week of December 12, 1994 which addressed all of the questions asked by your office.

In my opinion, while your office is reviewing our revised draft, there is no need to halt the construction and grading activities in the vicinity of the archaeological site. These activities, which have been on-going for some time now, do not endanger the identified site area. Because the site is not in danger from the construction activities I hope that you will resend your request to the Commission on Water Resource Management to halt all grading and construction activities in the vicinity of the site area.
Should your office have any further questions please feel free to contact me at 239-4630.

Sincerely,

Robert L. Spear, Ph.D.
President
Scientific Consultant Services, Inc.
Mr. Mike Lum  
Kamehameha Schools/  
Bernice Pauahi Bishop Estate  
Kapalama Heights  
Honolulu, HI 96817

Dear Mr. Lum:

Historic Preservation Review of  
Draft Inventory Survey Report for  
Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02)  
Well Construction and Pump Installation

The water use and well construction/pump installation permits that were awarded on July 28, 1993 for Kamehameha Schools Wells A and B (Well Nos. 2051-01 & 02) were conditioned on the preparation and submittal of an acceptable archaeological survey inventory report to the Historic Preservation Division (HPD).

Pursuant to the review comments from HPD on your draft inventory survey report (attached), the Commission hereby requests that all construction and grading activities in the vicinity of possible site areas be stopped immediately and HPD be contacted to address their concerns. Please be advised that failure to comply with Special Condition b. may result in revocation of the well construction/pump installation permit.

If you have any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

[Signature]

for: RAE M. LOUI  
Deputy Director

LN:ss  
Attach.

c: Don Hibbard, HPD
MEMORANDUM

TO: Rae M. Loui, Deputy Director
Commission on Water Resource Management

FROM: Don Hibbard, Administrator
Historic Preservation Division

SUBJECT: Historic Preservation Review of Draft Inventory Survey Report for Well Construction and Pump Installation
Kamehameha Schools Parcel
Kapalama, Kona, O'ahu
TMK: 1-1-6:22

Our office received a draft report of an archaeological inventory survey of Proposed Reservoir and Well Sites at the Kamehameha Schools. The survey reports the finding of an archaeological site containing four features possibly associated with traditional agricultural activities. Also observed near this site are two possible upright stones, which are interpreted to have possible religious significance. Additional information on the site and the possible shrine stones and their significance needs to be incorporated into the report in order for us to evaluate the sites and their proper treatment.

Because there is uncertainty over whether the sites are significant, we request that the Commission on Water Resource Management ask that all grading and construction activities in the vicinity of these possible site areas be stopped until an acceptable report on the archaeological inventory survey is submitted to our office, so we can better evaluate the situation and advise the Commission.

EJ:jk
COMMISSION ON WATER RESOURCE MANAGEMENT

FROM: Lenore
TO: ""
INIT: ""
FOR: ""
PLEASE: ""

DATE: 9/9/94
FILE IN: 2051-01-02

REGULATION BRANCH

R. LOUI
S. KOKUBUN
F. CHING
S. SUBIA
K. YODA
K. OSHIRO

APPROVAL

E. SAOKDA
R. HARDY
L. NAKAMA
D. HIGA

SIGNATURE

PLANNING BRANCH

E. HIRANO
G. BAUER
N. FUJII
S. EDUMNDS 9/3/94 called
L. MIZUNO Mapped FF. DP.

ED: a condition of the WPP was that an acceptable archaeological survey report be submitted to DHP.

Ed: received report last week; has not been reviewed; will send a copy of review.

- Called Mike Lunn 9/9. He said archaeological report not completed, but he doesn't think any sites were found. They're starting construction work any.

- I asked if DHP was aware work was starting. 8/94. Mike said he thinks so. Asked for copy of report when complete.

Field Services & Technical Support

Y. SHIROMA
R. JINNAI
M. OHYE
I. KUNIMURA
S. SWANSON

Is this OK, or should we follow-up?
August 29, 1994

Mr. Keith Ahue, Chairman
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, HI 96809

ATTENTION: Ms. Rae Loui, Deputy Director

Subject: Kamehameha Schools Wells A and B
Wells No. 2051-01 & 2051-02
Kalihi Ground Water Management Area, Oahu

In accordance with condition #1 of the Well Construction/Pump Installation Permit issued by the Water Commission, this letter is notification that site work has been underway under the executed grading contract with Haitsuka Brothers dated 5/10/94.

The well drilling work will be bid while the grading work is still underway. Mr. Stephen Bowles of Waimea Water Services, Inc. will be monitoring the drilling program along with Mr. Robert Akinaka of Akinaka & Associates, Ltd.

If there are any questions, please call me at 842-8603 or Mr. Robert Akinaka at 536-7721.

Sincerely,

Michael Lum
Facilities Engineer

Cc: Mr. Robert Akinaka, Akinaka & Associates, Inc.
Mr. Stephen P. Bowles, Waimea Water Resources, Inc.
WELL COMPLETION REPORT

STATE WELL NO. 2051-01
WELL NAME Kamehameha Well A
ISLAND Oahu
LOCATION: Address Kapalama Heights
Tax Map Key 1-6-22-1
DRILLING OR PUMP INSTALLATION CONTRACTOR: Wailei Drilling & Development
CONTRACTOR'S C-57 LICENSE NUMBER: C-16543
NAME OF DRILLER WHO PERFORMED WORK: Thomas Helfrich
TYPE OF RIG/CONSTRUCTION: Rotary
DATE OF WELL DRILLING COMPLETION: July 5, 1995

(Note: Report must be submitted within 30 days after the order)

GROUND ELEVATION (msl) 549.36 ft.
Top of Drilling Platform (msl) 555.36 ft.
Height of Drilling Platform above Ground surface 6 ft.

DRILLER'S LOG:

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<th>Depth (ft)</th>
<th>Rock Description, Remarks, Dates</th>
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<tr>
<td>0 to 324</td>
<td>ratty</td>
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<td>325 to 447</td>
<td>hard/soft zones</td>
</tr>
<tr>
<td>448 to 666</td>
<td>hard</td>
</tr>
<tr>
<td>605 to 705</td>
<td>hard/soft layers</td>
</tr>
</tbody>
</table>

If more space is needed, continue on back.

TOTAL DEPTH OF WELL BELOW GROUND: 705 ft.
HOLE SIZE: 14 in. I.D. x 3/8 in. wall solid section to 603 ft. below ground
Casing Installed: none

ANNULUS: Grouted from 0 ft. below ground to 603 ft. below ground
Gravel packed from none ft. below ground to 603 ft. below ground

INITIAL WATER LEVEL: 527 ft. below ground. Date and time of measurement 5/2/95 11:30 am
INITIAL CHLORIDE: 60 ppm Date and time of sampling
INITIAL TEMPERATURE: 71.6 °F Date and time of sampling

DATE OF PUMP INSTALLATION: N/A

PUMP INSTALLATION:

Pump Type, Make, Serial No. ____________ Capacity ____________ gpm
Motor type, H.P., Voltage, rpm ____________ ____________ ____________
Depth of Pump Intake Setting ____________ ft. below ground, which elevation is ____________ ft.
Depth of bottom of airline ____________ ft. below ground, which elevation is ____________ ft.
Pumping Head is ____________ ft.

PUMPING TESTS:

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<tr>
<th>Date</th>
<th>Start water level</th>
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<th>End water level</th>
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<th>Depth of well</th>
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<tr>
<td>6/26/95</td>
<td>527.75 ft. below R.P.</td>
<td>ft. below R.P.</td>
<td>529.48 ft. below R.P.</td>
<td>Depth of well 705 ft. below R.P.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Elapsed Time (hours)</th>
<th>Rate (gpm)</th>
<th>Drawn down (ft.)</th>
<th>Ch. (ppm)</th>
<th>Temp. °F</th>
<th>Elapsed Time (hours)</th>
<th>Rate (gpm)</th>
<th>Drawn down (ft.)</th>
<th>Ch. (ppm)</th>
<th>Temp. °F</th>
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</thead>
<tbody>
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<td>800</td>
<td>1.72</td>
<td>60</td>
<td>71.6</td>
<td>0 to 48</td>
<td>800</td>
<td>1.72</td>
<td>60</td>
<td>71.6</td>
</tr>
</tbody>
</table>

Remarks:

Contractor (print): O'HALL STROMQUIST
Title: PARTNER
Signature: [Signature]
Date: JULY 14, 1995
KAMEHAMEHA SCHOOL / BISHOP ESTATE
WELL A 2051-01 UWS AS OF 13 JUNE 95

ELEVATION DEPTH GROUND ELEV. 549.36'

603' Solid Casing and Grouted Annulus

21.61' 527.75' Water Level

- 54.64' 604' 13 JUNE 95

Casing Shoe

100' Open Hole

- 156.44' 785.8' 21.61' ELEV.
WELL CONSTRUCTION/PUMP INSTALLATION PERMIT

for

Kamehameha Schools Wells A & B
Well Nos. 2051-01 & 02
Kalihi Ground Water Management Area, Oahu

TO: Kamehameha Schools/Bernice Pauahi Bishop Estate
    Kapalama Heights
    Honolulu, HI 96817

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, test, and install a pump in Kamehameha Schools Wells A & B (Well Nos. 2051-01 & 02), for exploratory purposes only, is approved subject to the following 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, testing, and installation of a 500 gpm capacity, or less, pump in each well, as determined by the pumping test results. The applicant shall coordinate with the Commission and conduct a pumping test in accordance with the protocol established by the Commission. A means to accurately measure water levels, acceptable to the Commission, shall also be provided. The applicant shall submit to the Commission the test results and proposed permanent pump information, based on the test, for approval by the Chairperson. No permanent pump may be installed and no water used from the well without the Chairperson's approval.

3. The proposed use 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 and pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

4. The applicant shall comply with all applicable laws, rules, and ordinances.
5. The applicant shall provide and maintain an approved meter or other appropriate device or means for measuring and reporting total water usage. Water usage shall be measured on a monthly basis and reported to the Commission.

6. The well construction/pump installation permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work proposed in the permit application shall be completed within two years from the date of permit approval.

7. The following shall be submitted to the Commission within 30 days after completion of the work:
   
   a. Well Completion Report.
   
   b. Elevation (referenced to mean sea level) survey by a Hawaii-licensed surveyor.
   
   c. As-built sectional drawing of the well.
   
   d. Plot plan and map showing the exact location of the well.
   
   e. Complete pumping test record; including time, pumping rate, drawdown, chloride content, and water quality data.

8. The well construction/pump installation permit application and staff submittal approved by the Commission at its meeting on July 28, 1993 shall be incorporated herein by reference.

9. The permit shall be subject to review by the Attorney General.

10. Special conditions:
   
   a. The water use permit shall be an interim permit subject to the five year verification period afforded to existing users.
   
   b. The applicant shall submit an acceptable archaeological inventory survey report to the Historic Preservation Division (HPD) of the Department of Land and Natural Resources. If significant historic sites will be adversely affected by this project, a plan to mitigate these effects must be accepted by HPD and successfully completed by the applicant.

______________________________
KEITH W. AHUE, Chairperson
Commission on Water Resource Management

OCT 25 1993
Date of Issuance
WELL CONSTRUCTION/PUMP INSTALLATION PERMIT

Well Nos. 2051-01 & 02

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
        Wastewater Branch
        Ground Water Protection Program
    Honolulu Board of Water Supply
TO: Ms. Rae M. Loui, Deputy Director  
Commission on Water Resource Management  
Department of Land & Natural Resources  
State of Hawaii  
P.O. Box 621  
Honolulu, Hawaii 96809

ATTENTION: Ms. Lenore Nakama

SUBJECT: APPLICATION FOR WELL CONSTRUCTION/PUMP INSTALLATION PERMITS  
KAMEHAMEHA SCHOOLS WELL "A"  
TMK: 1ST DIVISION-16-22:1  
A&A JOB NO: KSBE 91-01

We are sending you attached herewith:

<table>
<thead>
<tr>
<th>No. of Copies</th>
<th>Description or Remarks</th>
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</thead>
<tbody>
<tr>
<td>1 Each</td>
<td>Well &quot;A&quot; Permit Application</td>
</tr>
</tbody>
</table>

General Remarks:

As requested, we herewith transmit a copy of the above well permit application.

If there are any questions, please call the undersigned.

Very truly yours,  
AKINAKA & ASSOCIATES, LTD.

By Robert Y. Akinaka  
President

cc: Michael Lum, KSBE  
SMQ\RYA:cyk

Transmittal Form
November 10, 1992

Mr. William Paty, Chairman
Commission on Water Resource Management
Department of Land & Natural Resources
Division of Water Resources Management
State of Hawaii
P.O. Box 373
Honolulu, Hawaii 96809

ATTENTION: Ms. Rae Loui, Deputy Director

Dear Mr. Paty:

SUBJECT: APPLICATION FOR WELL CONSTRUCTION/PUMP INSTALLATION PERMITS KAMEHAMEHA SCHOOLS WELL A & B TMK: 1st DIVISION, 1-6-22:1

We herewith submit the original and two copies of the subject permit applications for your review and approval.

A $50.00 check is attached as payment of the required filing fee.

If there are any questions, please call Michael Lum, Facilities Engineer, at 842-8603.

Me ke aloha pumehana,

Michael J. Chun, Ph.D.
President
The Kamehameha Schools

Attachments

cc: Robert Akinaka, Akinaka & Associates, Ltd.
APPLICATION FOR PERMIT

1. APPLICANT: (may be a, b, or c, but all must be filled in)
   (a) WELL OWNER
      Firm/Name: Kamehameha Schools/B.P. Bishop Estate
      Contact Person: Michael Lum
      Address: Kapalama Heights, Honolulu, Hawaii 96817
   (b) LANDOWNER
      Firm/Name: Kamehameha Schools/B.P. Bishop Estate
      Contact Person: Michael Lum
      Address: Kapalama Heights, Honolulu, Hawaii 96817
   (c) CONTRACTOR
      Firm/Name: To Be Determined After Bid
      Address: ____________________________________________________________________

2. WELL LOCATION/NAME: KAMEHAMEHA SCHOOLS WELL A - ELEV. 530' Island Oahu
   Address: Kapalama Heights, Honolulu, Hawaii 96817
   (Attach a USGS map, scale 1" = 2000', and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK:
   - Drill New Well
   - Modify Existing Well
   - Redrill
   - Install New Pump
   - Replace Pump
   - Modify Pump
   * Be sure to complete and submit well abandonment report upon completion of work.
   (b) WELL TYPE:
   - Dug
   - Bored
   - Driven
   - Drilled
   - Radial
   Is this well a part of a battery of wells? Yes
   No
   (Briefly describe and fill in the diagram on the back of this form.)

4. PROPOSED PUMP INFORMATION:
   - Rated Pump Capacity: 500 gallons per minute
   - Pump Type:
     - Deep Well Turbine
     - Submersible
     - Centrifugal
   - Motor:
     - Propeller
     - Reciprocating
     - Impulse
   - Electric, rated horse power: 175 hp

5. PROPOSED USE:
   - Municipal (including hotels, stores, etc.)
   - Domestic (individual, non-commercial water use)
   - Irrigation (crop)
   - State Land Use District: R-5 RESIDENTIAL
   - County Zoning (describe)___
   - Urban
   - Agriculture
   - Rural
   - Conservation
   (If more space is needed, continue below under remarks, explanations.)
   DESCRIPTION

6. (a) PROPOSED AMOUNT OF WITHDRAWAL:
   SEE ATTACHED__
   gallons per day
   (b) METHOD OF FLOW MEASUREMENT:
   - Flow-meter
   - Open-pipe
   - Orifice Plate
   - War

7. PENDING ACTIONS:
   - CDUA
   - SMA
   - EIS
   - EA
   - NONE
   - Other (explain)

8. REMARKS, EXPLANATIONS:
   SEE ATTACHED DESCRIPTION

NOTE: Signing below indicates that the applicant understands that, if this permit is granted by the Commission on Water Resource Management, the proposed work is to be completed within two (2) years of the approval date. In addition, the contractor shall submit to the Commission a well completion report, well abandonment report, or both, within 30 days of completion date of the permitted work. The applicant also understands that monthly water use data shall be submitted to the Commission. The applicant further understands that the proposed permit shall not constitute a determination of cumulative water rights and shall not guarantee the permit holder any additional rights to the permitted water supply.

Well Owner
__________________________
Michael J. Chun, President

Landowner
__________________________
Michael J. Chun, President

Contractor
__________________________
Michael J. Chun, President

Signature
__________________________
Date November 10, 1992

Date November 10, 1992

For Official Use Only:
Date Received ___________________________
Date Accepted ___________________________
Field Checked By _________________________
Date ___________________________

Latitude ___________________________
Longitude ___________________________
Aqurifer System Name ___________________
State Well No. _________________________
4-24-92

Kamehameha Schools/B.P. Bishop Estate
Kamehameha Schools/B.P. Bishop Estate
Kamehameha Schools/B.P. Bishop Estate
Kamehameha Schools/B.P. Bishop Estate
Kamehameha Schools/B.P. Bishop Estate
9. PROPOSED WELL SECTION

Elevation at top of casing: 531 ft., msl

Ground Elevation: 530 ft., msl

Cement Grout: 580 ft.

Rock Packing: N/A ft.

Solid Casing:
- Material: Steel
- Length: 581 ft.
- Diameter: 14 in.
- Wall thickness: 0.375 in.

Hole Diameter: 20 in.

Total Depth: ___ ft.

Casing:
- Perforated: N/A
- Screen: N/A

Open Hole:
- Length: 100 ft.
- Diameter: 13.75 in.

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

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD.

It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division - 1-6-22:1
U.S.G.S. QUAD MAP
NOVEMBER 1992

SCALE: 1:24000
CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

FILE: D:\DRAFTING\PERM\MAP
BEGIN: 11/03/92
PM: SMQ
OPERATOR: SMQ
REVISED:

PROPOSED 830' KAMEHAMEHA
SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA
SCHOOL WELL "A"

EXISTING KAMEHAMEHA
SCHOOL WELL 2052-11

EXISTING KAMEHAMEHA
SCHOOL WELL 2052-07

SCALE: 1:24000
CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division - 1-6-22:1
U.S.G.S. QUAD MAP
NOVEMBER 1992 SHEET 2 OF 3 SHTS
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

AKINAKA & ASSOCIATES, LTD.
WAIKEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE DRILLING, CASING & TESTING TWO DEEP WELLS AND TWO DEEP WELL PUMP INSTALLATIONS Kapalama Heights, Honolulu, Oahu, Hawaii

Tax Map Key: 1st Division - 1-6-22:1

NOVEMBER 1992

TAX MAP KEY SHEET 3 OF 3 SHTS
March 25, 1993

Ms Rae Loui, Deputy Director
Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

ATTENTION: Mr. Ed Sakoda

SUBJECT: ARCHAEOLOGICAL INVESTIGATION FOR WELL CONSTRUCTION PUMP INSTALLATION PERMIT APPLICATION FOR KAMEHAMEHA SCHOOLS WELLS "A" & "B" TMK: 1-6-22:1

Dear Ms. Loui:

We are proceeding with the archaeological investigation recommended by the State Historic Preservation Division in their January 20, 1993 memorandum to the Commission on Water Resource Management regarding the subject application.

Archaeologist Francis Ching has begun survey of the sites. It is expected that excavation, analysis and formulation of his report will extend over the next six weeks.

We will submit the report to your office as soon as Mr. Ching has finalized his report.

Me ke aloha pumehana,

Michael J. Chun, Ph.D
President
The Kamehameha Schools

cc: Robert Akinaka, Akinaka & Associates, Ltd.
Honorable William M. Paty, Chair  
Board of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawaii 96809

RE: Application for Water Use Permit  
Applicant: Kamehameha Schools/B.P. Bishop Estate  
Request: Drill new well and install new pump  
TMK: 1-6-22:1  
Location: Kapalama Heights, Honolulu, Hawaii

Dear Mr. Paty:

We have received a copy of the above-referenced Water Use Permit Application. Thank you for the opportunity to review this application. At this time, we have no comments or concerns on this matter.

If you have any questions, please contact Lynn J. Lee in our Land and Natural Resources Division at 586-3777.

Sincerely,

Richard K. Paglinawan  
Administrator

cc: Clayton Hee  
Chair, Board of Trustees
Thank you for the opportunity to review this project. A review of our records shows that there are no known historic sites in the vicinity of the proposed Kamehameha School Wells "A" and "B". However, no archaeological surveys have been conducted in this portion of Kapalama, so it is uncertain if historic sites are present. Additionally, we are lacking adequate information on the land use history of the proposed well parcels and the exact location of the proposed wells in relation to the existing road (Well "A") and reservoir (Well "B").

Historic sites have been found in the lower Keanakamano Valley, adjacent to the western side of the Kamehameha Schools campus. These sites included both historic era sites (such as State site No. 80-14-2892, a Prisoner-of-War Camp associated with World War II) and probable prehistoric era sites (such as State site No. 80-14-2891, a burial cave containing the human remains of 13 individuals). Since significant historic sites exist elsewhere in this parcel, it is possible that historic sites exist in the area of the proposed wells. Therefore, we suggest that an archaeological survey, of the proposed well sites, be conducted by a qualified archaeologist to determine if any historic sites are present and, if so, to gather sufficient information to evaluate their significance. Findings should be submitted to the State Historic Preservation Division office for review.

JC:sty
MEMORANDUM

TO: Rao M. Loui, Deputy Director
    Commission on Water Resource Management

FROM: Don Hibbard, Administrator
    State Historic Preservation Division

SUBJECT: Well Construction and Pump Installation Permit Application
          Kamehameha Schools/B.P. Bishop Estate
          Kapalama, Honolulu, O'ahu

January 20, 1993

Thank you for the opportunity to review this project. A review of our records shows that there are no known historic sites in the vicinity of the proposed Kamehameha School Wells "A" and "B". However, no archaeological surveys have been conducted in this portion of Kapalama, so it is uncertain if historic sites are present. Additionally, we are lacking adequate information on the land use history of the proposed well parcels and the exact location of the proposed wells in relation to the existing road (Well "A") and reservoir (Well "B").

Historic sites have been found in the lower Ko'olau Valley, adjacent to the western side of the Kamehameha Schools campus. These sites included both historic era sites (such as State site No. 80-14-2892, a Prisoner-of-War Camp associated with World War II) and probable prehistoric era sites (such as State site No. 80-14-2891, a burial cave containing the human remains of 13 individuals). Since significant historic sites exist elsewhere in this parcel, it is possible that historic sites exist in the area of the proposed wells. Therefore, we suggest that an archaeological survey, of the proposed well sites, be conducted by a qualified archaeologist to determine if any historic sites are present and, if so, to gather sufficient information to evaluate their significance. Findings should be submitted to the State Historic Preservation Division office for review.

J.C. sty

TRANSMISSION REPORT

THIS DOCUMENT (REDUCED SAMPLE ABOVE) WAS SENT

** COUNT **
# 1

*** SEND ***

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TOTAL 0:00'55" 1 XEROX TELECOPIER 7020
Ms. Rae M. Loui  
Deputy Director  
Commission on Water Resource Management  
Department of Land and Natural Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Ms. Loui:

Subject: Your Letter of January 6, 1993 Regarding Applications for Well Construction and Pump Installation Permits for Kamehameha School Wells 2051-01, 02

Thank you for the opportunity to comment on these permit applications.

We have no objections to the issuance of the permits to construct and to install pumps in the proposed wells for Kamehameha Schools. We understand that the school is relocating their water source because the pipeline from the existing source to the school is old and difficult to maintain.

If you have any questions, please call Herbert H. Minakami at 527-6183.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer
Mr. Kazu Hayashida  
Manager and Chief Engineer  
Board of Water Supply  
City and County of Honolulu  
630 South Beretania Street  
Honolulu, Hawaii 96843

Dear Mr. Hayashida:

Well Construction and Pump Installation Permit Application

Transmitted for your review and comment is a copy of the following permit applications:

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
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<tr>
<td>Oahu</td>
<td>Kamehameha Schools A&amp;B</td>
<td>2051-01 &amp; 02</td>
<td>Wells and Pumps</td>
</tr>
</tbody>
</table>

Please review the application pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI  
Deputy Director

JZ:ky  
Enc.
Mr. Thomas Arizumi, Chief  
Environmental Management Division  
State Department of Health  
Five Waterfront Plaza  
500 Ala Moana Blvd., Suite 250  
Honolulu, Hawaii 96813

Attn: Mr. William Wong

Dear Mr. Arizumi:

Well Construction and Pump Installation Permit Applications

Transmitted for your review and comment are copies of the following permit applications:

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
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<tbody>
<tr>
<td>Hawaii</td>
<td>Kainaliu Test</td>
<td>3255-02</td>
<td>Well Construction</td>
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<td>3181-01</td>
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<td>Keawanui-Clark</td>
<td>0350-06</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI  
Deputy Director

JZ:ky
Enc.
MEMORANDUM

TO: Don Hibbard, Director
   Historic Preservation Program

FROM: Rae M. Loui, Deputy Director
       Commission on Water Resource Management

SUBJECT: Well Construction and Pump Installation Permit Applications

Transmitted for your review and comment are copies of the following permit applications:

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Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this memo.

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

JZ:ky
Enc.
Ms. Marjorie Ziegler  
Sierra Club Legal Defense Fund, Inc.  
212 Merchant Street, Room 202  
Honolulu, Hawaii 96813

Dear Ms. Ziegler:

**Well Construction and Pump Installation Permit Applications**

Transmitted for your information are copies of recent well permit applications:

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Should you have questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

[Signature]

RAE M. LOUI  
Deputy Director

JZ:ky  
Enc.
REF: WRM-KY

Mr. Clayton H. W. Hee  
Chairman & Trustee At Large  
Office of Hawaiian Affairs  
711 Kapiolani Blvd., Suite 500  
Honolulu, Hawaii 96813-5249

Attn: Ms. Linda Delaney, Land & Natural Resources Division

Dear Mr. Hee:

Well Construction and Pump Installation Permit Applications

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Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact Rae M. Loui, Deputy Director at 587-0214.

Very truly yours,

WILLIAM W. PATY

Enc.
Honorable Hoaliku L. Drake
Director
Department of Hawaiian Home Lands
State of Hawaii
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Mrs. Drake:

Well Construction and Pump Installation Permit Applications

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Please review the applications pursuant to your area of concern and submit your comments to us, orally or in writing, ten (10) working days from date of this letter.

Should you have any questions, please contact Rae M. Loui, Deputy Director at 587-0214.

Very truly yours,

WILLIAM W. PATY

Enc.
Mr. Michael Lum
Kamehameha Schools/B.P. Bishop Estates
Kapalama Heights
Honolulu, Hawaii 96817

Dear Mr. Lum:

We have received your application and filing fee for a permit to construct and install pumps in wells (Well Nos. 2051-01 & 02) at Honolulu, Oahu, (TMK 1-6-22:01). We are reviewing the application for completeness and will process it concurrently with your water use permit application.

Should you have questions, please call the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI
Deputy Director

JZ:ky
November 10, 1992

Mr. William Paty, Chairman
Commission on Water Resource Management
Department of Land & Natural Resources
Division of Water Resources Management
State of Hawaii
P.O. Box 373
Honolulu, Hawaii 96809

ATTENTION: Ms. Rae Loui, Deputy Director

Dear Mr. Paty:

SUBJECT: APPLICATION FOR WELL CONSTRUCTION/PUMP INSTALLATION PERMITS KAMEHAMEHA SCHOOLS WELL A & B TMK: 1st DIVISION, 1-6-22:1

We herewith submit the original and two copies of the subject permit applications for your review and approval.

A $50.00 check is attached as payment of the required filing fee.

If there are any questions, please call Michael Lum, Facilities Engineer, at 842-8603.

Me ke aloha pumehana,

Michael J. Chun, Ph.D.
President
The Kamehameha Schools

Attachments

cc: Robert Akinaka, Akinaka & Associates, Ltd.
APPLICATION FOR PERMIT

1. APPLICANT: (may be a, b, or c, but all must be filled in)
   (a) WELL OWNER
      Name: Kamehameha Schools/B.P. Bishop Estate
      Address: Kapalama Heights, Honolulu, Hawaii 96817
      Contact Person: Michael Lum
      Phone: 842-8603
   (b) LANDOWNER
      Name: Kamehameha Schools/B.P. Bishop Estate
      Address: Kapalama Heights, Honolulu, Hawaii 96817
      Contact Person: Michael Lum
      Phone: 842-8603
   (c) CONTRACTOR
      Name: To Be Determined After Bid
      Address: ____________
      Contractor's C-87 License No: ____________

2. WELL LOCATION/NAME:
   KAMEHAMEHA SCHOOLS WELL B - Elev.-830'
   Address: Kapalama Heights, Honolulu, Hawaii 96817
   Tax Map Key: 1-6-222-1
   (Attach a USGS map, scale 1" = 2000', and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK:
   - Drill New Well
   - Modify Existing Well
   - Redrill
   - Install New Pump
   - Replace Pump
   - Modify Pump
   - Be sure to complete and submit well abandonment report upon completion of work.
   * After Location
   - Deepen
   - * Abandon/Seal

   (b) WELL TYPE:
   - Dug
   - Bored
   - Driven
   - Drilled
   - Radial
   Is this well a part of a battery of wells? Yes
   - No
   (Briefly describe and fill in the diagram on the back of this form.)

4. PROPOSED PUMP INFORMATION:
   - Rated Pump Capacity: 500 gallons per minute
   - Pump Type:
     - Deep Well Turbine
     - Submersible
     - Centrifugal
     - Rotary
     - Propeller
     - Reciprocating
     - Rotary-Geer
     - Impulse
   - Motor:
     - Gas
     - Electric, rated horsepower of 175 Hp

5. PROPOSED USE:
   - Military
   - Industrial
   - Other (explain)
   - Irrigation (crop)
   - Urban
   - Agriculture
   - R-5 Residential
   (If more space is needed, continue below under remarks, explanations.)
   (If more space is needed, continue on back)

6. (a) PROPOSED AMOUNT OF WITHDRAWAL:
   - ____________ gallons per day
   (b) METHOD OF FLOW MEASUREMENT:
     - Flow-meter
     - Open-pipe
     - Orifice Plate
     - Weir

7. PENDING ACTIONS:
   - CDA
   - SMA
   - EIS
   - EA
   - NONE
   - Other (explain)

8. REMARKS, EXPLANATIONS:
   SEE ATTACHED DESCRIPTION

NOTE: Signing below indicates that the applicant understands that, if the permit requested is granted by the Commission on Water Resource Management, the proposed work is to be commenced two (2) years of the approved date. In addition, the contractor shall submit to the Commission a well completion report, well abandonment report, or both, within 30 days of completion date of the permitted work. The applicant also understands that monthly water use data shall be submitted to the Commission. The applicant further understands that as part of the proposed work, shall not constitute a determination of permitted water rights and shall not guarantee the pump capacity or future use up to the permitted pump capacity.

Well Owner: Michael J. Chun, President
Landowner: Michael J. Chun, President
Contractor: Michael J. Chun, President

Signature: ____________ Date: November 10, 1992
Signature: ____________ Date: November 10, 1992
Signature: ____________ Date: ____________
9. PROPOSED WELL SECTION

**Ground Elevation:** 830 ft. mal

**Elevation at top of casing:** 831 ft. mal

**Cement Group:** 880 ft

**Rock Packing:** N/A ft

**Hole Diameter:** 20 in.

**Total Depth:** 980 ft

**Solid Casing:**
- Material: Steel
- Length: 881 ft
- Diameter: 14 in.
- Wall thickness: 0.375 in.

**Casing:**
- Perforated: 
- Screen: N/A
- Material
- Length
- Diameter
- Wall thickness
- Openings sq. in./L.F.

**Open Hole:**
- Length: 100 ft
- Diameter: 13.75 in.

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

Kamehameha Schools plans to replace its existing wells 2052-07 and 2052-11 with new wells and pumps, Kamehameha Schools Well A and Kamehameha Schools Well B.

This change is part of an overall water system improvement program intended to increase the safety and reliability of service within the Kapalama Heights campus of Kamehameha Schools.

The Kamehameha Schools wells develop water from the Kalihi Aquifer system which is "designated" by the State Commission on Water Resource Management. Kamehameha Schools pumpage between 1981 and 1990 averaged 0.196 MGD. The commission authorized pumpage for the Kamehameha Schools is 0.229 MGD. It is expected that normal growth of student population over the next 10 to 20 years will consume the differential between the authorized and actual pumpage.

Because the new wells are to replace existing wells, no changes or adverse effects on the Kalihi Aquifer system are anticipated. Pumpage from the Kamehameha Schools wells averaged 2.2 percent of the total aquifer pumpage of 9.9 MGD in 1990.
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

EXISTING KAMEHAMEHA SCHOOL WELL 2052-07

SCALE: 1:24000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

AKINAKA & ASSOCIATES, LTD.
WAIMEA WATER SERVICES, INC.

KAMEHAMEHA SCHOOLS/BISHOP ESTATE
DRILLING, CASING & TESTING TWO DEEP WELLS
AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
U.S.G.S. QUAD MAP

NOVEMBER 1992 SHEET 2 OF 3 SHTS
PROPOSED 830' KAMEHAMEHA SCHOOL WELL "B"

PROPOSED 530' KAMEHAMEHA SCHOOL WELL "A"

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EXISTING KAMEHAMEHA SCHOOL WELL 2052-11

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AKINAKA & ASSOCIATES, LTD.
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DRILLING, CASING & TESTING TWO DEEP WELLS AND TWO DEEP WELL PUMP INSTALLATIONS
Kapalama Heights, Honolulu, Oahu, Hawaii
Tax Map Key: 1st Division – 1-6-22:1
TAX MAP KEY

NOVEMBER 1992 SHEET 3 OF 3 SHTS
PAY

TO THE ORDER OF

EXACTLY $50.00 AND 00 CTS

DEPARTMENT OF LAND AND NATURAL RESOURCES

DATE

AMOUNT

November 12, 1992

$50.00**

Well Permits
CSBE 91-01

Signature

Marilyn Y. Kwan