FILE CLOSED

SEE FOLDER FOR 3310-01, 02, 03
3410-01, 03, 05, 10

FOR WUP INFO
Sankyo Tsusho Co., Ltd., dba
Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Gentlemen:

I am pleased to inform you that the Commission on Water Resource Management approved your application for a water use permit at its meeting on December 14, 1988. Enclosed is your water use permit for the use of Mokuleia Well, State Well No. 3310-02.

If you have any questions, please contact Mr. Dan Lum

Sincerely,

[Signature]

MANABU TAGOMORI
Deputy Director

ES:dh
Enc.
WAIALUA GROUND WATER MANAGEMENT AREA
WATER USE PERMIT

Applicant: Sankyo Tsusho Co., Ltd. dba Mokuleia Land Company
Address: 68-540 Farrington Highway, Waialua, Hawaii 96791
Ground Water Management Area: Waialua Subarea: Mokuleia
Well(s) Name: Mokuleia Well Well No.(s): 3310-02
Amount of Withdrawal (Average Annual): 0.80 mgd for golf course irrigation; 0.05 mgd for domestic consumption
Reasonable-Beneficial Use: Golf course irrigation, domestic consumption
Area or Projects Served: Mokuleia Golf Course

The applicant is hereby granted a permit to withdraw and use ground water from the source identified above in accordance with Chapter 174C, HRS, State Water Code; Chapter 13-171, Hawaii Administrative Rules; and the following:

General Conditions. (1) the water use authorized by this permit must be for the reasonable-beneficial use described in this permit; (2) the use must not interfere with any existing legal use of water; and (3) the use is subject to the shortage and emergency powers of the Commission.

Additional Conditions.
(1) This Interim Water Use Permit shall be issued pending verification of the actual quantity of water to be used. A final determination of the quantity used shall be made within five years of the date of issuance of the Interim Permit and a Permanent Permit shall be issued. In issuing the Permanent Water Use Permit, the Commission may increase or reduce the amount initially granted the permittee.

(2) The applicant shall comply with the Department of Health’s Potable Water System Regulations, Chapter 20, Title 11, Administrative Rules.

(3) 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, Hawaii 96809, on a monthly basis.

(4) The development of the ground water source shall be completed within 24 months from the date of permit issuance.

The issuance of this permit was approved by the Commission on Water Resource Management at its meeting on December 14, 1988.

WILLIAM W. PATY, Chairperson
DEC 28 1988

Date of Issuance: __________________
be a critical one, determining whether or not they can develop the residential units. He mentioned he did not see an approval for an exploratory well to be necessarily a foot in the door. DOH would be reviewing any subsequent applications very carefully.

Mr. Fujimura commented that on permits accumulating, he hoped that the zoning people would not take a granting of exploratory well permits to mean anything for or against the development. The Water Code was not intended to accelerate development or hinder development; land zone is supposed to take a precedence. Mr. Fujimura moved for approval, stating he did not want anyone to think that he was approving recreational agriculture.

Mr. Cox seconded the motion and added that he had the same kind of a comment and that an exploration well is a desirable thing to learn more about our water resources.

Mr. Nakata said he would be voting against this application because when the bill was passed to permit golf courses on agricultural land, assurances were given that this was not the foot in the door for development.

Mr. Paty followed by saying that in this situation, the Commission would gain in the information available. An exploratory well is, as Mr. Fujimura said, not in any way a commitment to it. We gain information as a result of it and on that basis, we have a better understanding and can deal with it. He also added that lacking that information there would be a big gap in that whole area where we would have no basic water information, and felt this would be overall a help to us on most commissions.

Dr. Anderson added that one of the major concerns the Department of Health had with regard to the proposed golf course project was the potential for pesticides, fertilizers, etc. to leach into the ground; irregardless of whether they went ahead with the housing project. Adding to the Chairperson's position, he felt the information gained through drilling a well to further explore the hydrology of the area would help the DOH make more informed decisions on the potential for pesticides, etc. to leach. They would require that as part of the permitting process should the water resource prove to be available.

Mr. Paty called for a vote. Chairperson Paty, Messrs. Cox and Fujimura voted "Aye". Mr. Nakata voted "No". Motion died for lack of majority vote.

**ITEM 6**
SEIBU HAWAII, INC. APPLICATION FOR WELL CONSTRUCTION PERMIT, SEIBU IRRIGATION WELL #12, MAKENA, MAUI

Mr. Cox asked for a verification that this is a replacement well and why is it being replaced. Mr. Eric Maehara, representing Seibu, confirmed that this well is a replacement because the previous well was not successfully completed.

Unanimously approved (Fujimura/Cox).

**ITEM 7**
SANKYO TSUSHO CO., LTD. DBA MOKULEIA LAND COMPANY APPLICATION FOR WATER USE PERMIT, MOKULEIA WELL, MOKULEIA, OAHU

Mr. Cox asked if staff had looked into the precaution of pesticide use of the golf course. Mr. Lum replied the golf course is almost entirely on the slope wash and any leaching would migrate downward and would not reach the basalt. In answer to Mr. Nakata's question if there were any other kinds of development in the area, Mr. Lum replied he was not aware of any. How
long is the interim permit good for, asked Mr. Fujimura. Mr. Lum said it is
good for five years and they are given two years to have the golf course
built and drawing water. Dr. Anderson commented generally that the
Department of Health has concerns relating to pesticides and fertilizer
contamination of potential drinking water sources. He explained that
studies are being made to determine the risks in regards to leaching of
chemicals which could impact water quality.

Unanimously approved (Cox/Fujimura).

ITEM 8 CITY AND COUNTY OF HONOLULU APPLICATION FOR A STREAM
CHANNEL ALTERATION PERMIT, MAINTENANCE ACCESS RAMP FOR
FIVE OAHU STREAMS

Unanimously approved (Nakata/Cox).

ITEM 9 PAREN, INC.'S APPLICATION FOR A STREAM CHANNEL ALTERATION
PERMIT AND A DIVERSION WORKS CONSTRUCTION PERMIT, WAIPAHU
DRAINAGE CANAL, WAIPAHU, OAHU

Since the water being used is already covered under a groundwater use
permit, the application is for a "reuse" of water. Mr. George Matsumoto
recommended the permits be approved with the following amendments:

1) Delete Recommendation Part A(2) which reads, "The applicant shall first
seek and obtain from the Commission a waiver of the applicable interim
instream flow standard".

2) Delete Recommendation Part A(5) which reads, "the requirements for
securing a water use permit from the Commission and with".

3) Insert A(9) "The applicant obtain assurances that there will be another
source of irrigation water supply for the golf course if the water is not
available from the pump supply".

4) Delete Recommendation Part B(5) which reads, "with the requirement
for securing a water use permit from the Commission and".

Mr. Cox questioned whether this was a "stream" under the definitions of
streams in the rules, because by his understanding it did not sound like a
stream. Mr. Nakata replied that it was a well that is the source of water
for the farm. Ms. Samuels said it was her understanding that these were
once artesian sources, but they are now pumped sources. Mr. Cox replied
that this raises the question of eventually changing the permit for the use of
the groundwater from watercress farming to golf course irrigation. Mr. Cox
commented that it seems like a good project because it will utilize a poor
water source. Mr. Tagomori added that the Board of Water Supply endorses
the reuse of this water for golf course irrigation.

Unanimously approved (Cox/Nakata).

ITEM 10 RESUBMITTAL OF AKIRA ISHIDA'S APPLICATION FOR A STREAM
CHANNEL ALTERATION PERMIT, WAIHEE STREAM, OAHU

Mr. Nakata asked what the impact would be on slope portion of the
streambed on the Kaneohe side where the 20-inch main cuts across the
driveway and also on the Kahuku side. Mr. Matsumoto answered that staff
is recommending the roadway pavement be reinforced to prevent scouring
such as in the past. To prevent scouring, as well as to allow fish to move
upstream (a concern by the U.S. Fish and Wildlife Service), the downstream
portion would be reinforced with rubble masonry apron. Mr. Nakata
December 9, 1988

Sankyo Tsusho Co., Ltd.
dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Gentlemen:

The Commission on Water Resource Management will be taking action on your application for a Water Use Permit at their meeting on December 14, 1988. The meeting will be held in the Board Room 132, Kalanimoku Building, 1151 Punchbowl Street, Honolulu, Hawaii, at 2:00 p.m. Attached for your information is the submittal (Item 7) the Commission will be acting upon.

Should you desire to attend this meeting, you or your representative are invited to do so on the date noted.

Sincerely,

MANABU TAGOMORI
Deputy Director
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources
Honolulu, Hawaii
December 14, 1988

Chairperson and Members
Commission on Water Resource Management
State of Hawaii
Honolulu, Hawaii

Gentlemen:

Sankyo Tsusho Co., Ltd. dba Mokuleia Land Company
Application for Water Use Permit
Mokuleia Well, Mokuleia, Oahu

Applicant: Sankyo Tsusho Co., Ltd. dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Action Requested: Approval of a Water Use Permit to use a total of
0.850 million gallons per day (mgd) of potable water from existing
Mokuleia Well 3310-02. The well is located in the Mokuleia Subarea of
the Waialua Ground Water Management Area. Of the total amount
requested, 0.800 mgd will be to irrigate an 18-hole golf course and
0.050 mgd will be for domestic consumption at the golf course clubhouse.

Place of Use: The proposed golf course is located at Mokuleia, maukas of
Mokuleia Beach, at Tax Map Key: 6-8-03:5.

Well Location: The well is located adjacent to the proposed golf course
(see attached map).

Impact on Surrounding Wells: There are seven wells on Mokuleia Land
Company's property. Two are being used. The remaining five wells,
including Well 3310-02, are unused. One of the two wells being used,
Well 3410-01, is a domestic drinking water source and is regulated under
the Department of Health's Drinking Water Program. Because Well
3410-01 is located downgradient of the golf course, it is essential that
activities associated with golf courses should not be allowed to
contaminate ground water. Activities of concern include application of
pesticides, herbicides, and fertilizer, storage of fuel for golf carts,
maintenance facilities, and sewage disposal activities. The Department of
Health's Potable Water System Regulations, Chapter 20, Title 11,
Administrative Rules, will apply to Well 3310-02 since it will provide
potable water for the golf course clubhouse, and should adequately
address the activities of concern.

Water Availability

The status of ground water use in the Mokuleia Subarea of the
Waialua Ground Water Management Area is as follows:

| Sustainable Yield | 20.000 mgd |
| Authorized Use    | 5.153 mgd  |
| Water Available for Allocation | 14.847 mgd |

ITEM 7
Public Notice: In accordance with DLNR Administrative Rules, a Public Notice was published in the Star Bulletin on November 7 and 14, 1988 (attached). In addition, copies of the Public Notice were sent to the Department of Health, the Mayor's office, the Honolulu Board of Water Supply, and Wai'alu Sugar Company, Ltd. Written objections to the proposed permit were to be submitted, by persons with proper standing, to the Commission by November 29, 1988. No objections have been filed.

RECOMMENDATION:

That the Commission approve the issuance of an Interim Water Use Permit to Mokuleia Land Company for 0.800 mgd for golf course irrigation, and 0.050 mgd for domestic consumption at the golf course clubhouse, for a total of 0.850 mgd from Mokuleia Well 3310-02.

The approval shall be subject to the requirements of other applicable laws, rules and ordinances, and the following conditions:

(1) This Interim Water Use Permit shall be issued pending verification of the actual quantity of water to be used. A final determination of the quantity used shall be made within five years of the date of issuance of the Interim Permit and a Permanent Permit shall be issued. In issuing the Permanent Water Use Permit, the Commission may increase or reduce the amount initially granted the permittee.

(2) The applicant shall comply with the Department of Health's Potable Water System Regulations, Chapter 20, Title 11, Administrative Rules.

(3) An approved flowmeter shall be installed to measure water withdrawals.

(4) The development of the ground water source shall be completed within 24 months from the date of permit issuance.

Respectfully submitted,

MANABU TAGOMORI
Deputy Director

APPROVED FOR SUBMITTAL:

WILLIAM W. PATY, Chairperson
PUBLIC NOTICE

Application for a Water Use Permit
Waialua Ground Water Management Area, Oahu

Applicant: Sankyo Tsusho Co., Ltd.
dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Date Application Received: September 23, 1988

Source of Water Supply: Mokuleia basal aquifer, existing well 3310-02.

Location of Well: Well is located adjacent to the proposed golf course.

Quantity Applied for: 0.85 million gallons per day (mgd).

Proposed Water Use: 0.05 mgd for domestic consumption at the golf course clubhouse.
0.80 mgd to irrigate an 18-hole golf course.

Place of Water Use: Proposed golf course is located in Tax Map Key: 6-8-03:5, Mokuleia, Oahu.

Written objections or comments on the application for water use may be filed by any person who has property interest in any land within the hydrologic unit of the source of water supply or who will be directly and immediately affected by the proposed water use. Written objections shall: (1) state property or other interest in the matter; (2) set forth questions of procedure, fact, law or policy, to which objections are taken; and (3) state all grounds for objections to the proposed permit. Send written objections by November 29, 1988, to the Division of Water Resource Management, P.O. Box 373, Honolulu, Hawaii 96809.

State of Hawaii
Commission on Water Resource Management

Dated: November 2, 1988

WILLIAM W. PATY, Chairperson

Chairperson and Members
Commission on Water Resource Management
State of Hawaii
Honolulu, Hawaii

Gentlemen:

Sankyo Tsusho Co., Ltd. dba Mokuleia Land Company
Application for Water Use Permit
Mokuleia Well, Mokuleia, Oahu

Applicant: Sankyo Tsusho Co., Ltd. dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Action Requested: Approval of a Water Use Permit to use a total of 0.850 million gallons per day (mgd) of potable water from existing Mokuleia Well 3310-02. The well is located in the Mokuleia Subarea of the Waialua Ground Water Management Area. Of the total amount requested, 0.800 mgd will be to irrigate an 18-hole golf course and 0.050 mgd will be for domestic consumption at the golf course clubhouse.

Place of Use: The proposed golf course is located at Mokuleia, mauka of Mokuleia Beach, at Tax Map Key: 6-8-03:5.

Well Location: The well is located adjacent to the proposed golf course (see attached map).

Impact on Surrounding Wells: There are seven wells on Mokuleia Land Company's property. Two are being used. The remaining five wells, including Well 3310-02, are unused. One of the two wells being used, Well 3410-01, is a domestic drinking water source and is regulated under the Department of Health's Drinking Water Program. Because Well 3410-01 is located downgradient of the golf course, it is essential that activities associated with golf courses should not be allowed to contaminate ground water. Activities of concern include application of pesticides, herbicides, and fertilizer, storage of fuel for golf carts, maintenance facilities, and sewage disposal activities. The Department of Health's Potable Water System Regulations, Chapter 20, Title 11, Administrative Rules, will apply to Well 3310-02 since it will provide potable water for the golf course clubhouse, and should adequately address the activities of concern.

Water Availability

The status of ground water use in the Mokuleia Subarea of the Waialua Ground Water Management Area is as follows:

Sustainable Yield . . . . . . . . . 20.000 mgd
Authorized Use . . . . . . . . . . . . . . . 5.153 mgd
Water Available for Allocation . . . 14.847 mgd
Public Notice: In accordance with DLNR Administrative Rules, a Public Notice was published in the Star Bulletin on November 7 and 14, 1988 (attached). In addition, copies of the Public Notice were sent to the Department of Health, the Mayor's office, the Honolulu Board of Water Supply, and Waialua Sugar Company, Ltd. Written objections to the proposed permit were to be submitted, by persons with proper standing, to the Commission by November 29, 1988. No objections have been filed.

RECOMMENDATION:

That the Commission approve the issuance of an Interim Water Use Permit to Mokuleia Land Company for 0.800 mgd for golf course irrigation, and 0.050 mgd for domestic consumption at the golf course clubhouse, for a total of 0.850 mgd from Mokuleia Well 3310-02.

The approval shall be subject to the requirements of other applicable laws, rules and ordinances, and the following conditions:

(1) This Interim Water Use Permit shall be issued pending verification of the actual quantity of water to be used. A final determination of the quantity used shall be made within five years of the date of issuance of the Interim Permit and a Permanent Permit shall be issued. In issuing the Permanent Water Use Permit, the Commission may increase or reduce the amount initially granted the permittee.

(2) The applicant shall comply with the Department of Health's Potable Water System Regulations, Chapter 20, Title 11, Administrative Rules.

(3) An approved flowmeter shall be installed to measure water withdrawals.

(4) The development of the ground water source shall be completed within 24 months from the date of permit issuance.

Respectfully submitted,

MANABU TAGOMORI
Deputy Director

APPROVED FOR SUBMITTAL:

WILLIAM W. PATY, Chairperson
PUBLIC NOTICE

Application for a Water Use Permit
Waialua Ground Water Management Area, Oahu

Applicant: Sankyo Tsusho Co., Ltd.
dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Date Application Received: September 23, 1988

Source of Water Supply: Mokuleia basal aquifer, existing well 3310-02.

Location of Well: Well is located adjacent to the proposed golf course.

Quantity Applied for: 0.85 million gallons per day (mgd).

Proposed Water Use: 0.05 mgd for domestic consumption at the golf course clubhouse. 0.80 mgd to irrigate an 18-hole golf course.

Place of Water Use: Proposed golf course is located in Tax Map Key: 6-8-03:5, Mokuleia, Oahu.

Written objections or comments on the application for water use may be filed by any person who has property interest in any land within the hydrologic unit of the source of water supply or who will be directly and immediately affected by the proposed water use. Written objections shall: (1) state property or other interest in the matter; (2) set forth questions of procedure, fact, law or policy, to which objections are taken; and (3) state all grounds for objections to the proposed permit. Send written objections by November 29, 1988, to the Division of Water Resource Management, P.O. Box 373, Honolulu, Hawaii 96809.

State of Hawaii
Commission on Water Resource Management

WILLIAM W. PATY, Chairperson

Dated: November 2, 1988

?7 for Catherine Tilton
BCA 521-5361

Average of q.c. =

0.8 mgd based on?

2/4/83 Spoke w/Cathy Tilton

0.8 mgd based on "experience
w/other q.c.'s - Paul Smith?
(1/2" - 2" of rainfall/week)
- Also based on driest period.

150 acres of irrigated q.c.

* Told Cathy we will be taking
action in January instead of
December Commission meeting.
TO Ed Salkida
DATE 12/5/86 TIME 5:16

WHILE YOU WERE OUT

M Kathy Titton
of Belt Collins & Associates

Phone

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RETURNED YOUR CALL

Message

Operator

Sherri
November 9, 1988

Mr. George Fraser  
President and General Manager  
Waialua Sugar Co., Inc.  
P.O. Box 665  
Waialua, Hawaii 96791

Dear Mr. Fraser:

Enclosed for your information are two public notices which will be published in the Star Bulletin.

If you have any questions, please contact Dan Lum at [redacted].

Sincerely,

[Signature]

MANABU TAGOMORI  
Deputy Director

ES:ko  
Enc.
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:

Public Notice for Water Use Permit Applications
Pearl Harbor and Waialua
Ground Water Management Areas, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you two public notices which will be published in the Star Bulletin.

If you have any comments, please submit them to us by November 29, 1988.

Very truly yours,

WILLIAM W. PATY

MT:ES:ko
Enc.
Honorable Frank F. Fasi
Mayor, City and County of Honolulu
City Hall
Honolulu, Hawaii 96813

Dear Mayor Fasi:

Public Notice for Water Use Permit Applications
Pearl Harbor and Waialua
Ground Water Management Areas, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you two public notices which will be published in the Star Bulletin.

If you have any comments, please submit them to us by November 29, 1988.

Very truly yours,

WILLIAM W. PATY

MT:ES:ko
Enc.
Dr. John C. Lewin
Director of Health
Department of Health
State of Hawaii
1250 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Lewin:

Public Notice for Water Use Permit Applicants
Pearl Harbor and Wai'alua
Ground Water Management Areas, Oahu

In accordance with the Department of Land and Natural Resources Administrative Rules, Section 13-171-17(a), we are sending you two public notices which will be published in the Star Bulletin.

If you have any comments, please submit them to us by November 29, 1988.

Very truly yours,

WILLIAM V. PATY

MT:ES:ko
Enc.
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
P.O. Box 3350
Hon., HI 96801
Atttn: Legal Ad

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.

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<td>Application for a Water Use Permit, Pearl Harbor Ground Water Management Area, Oahu</td>
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STATE ACCOUNTING FORM C-03
JULY 1, 1983 (REVISED)
PUBLIC NOTICE

Application for a Water Use Permit
Waialua Ground Water Management Area, Oahu

Applicant: Sankyo Tsusho Co., Ltd.
dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Date Application Received: September 23, 1988

Source of Water Supply: Mokuleia basal aquifer, existing well 3310-02.

Location of Well: Well is located adjacent to the proposed golf course.

Quantity Applied for: 0.85 million gallons per day (mgd).

Proposed Water Use: 0.05 mgd for domestic consumption at the golf course clubhouse. 0.80 mgd to irrigate an 18-hole golf course.

Place of Water Use: Proposed golf course is located in Tax Map Key: 6-8-03:5, Mokuleia, Oahu.

Written objections or comments on the application for water use may be filed by any person who has property interest in any land within the hydrologic unit of the source of water supply or who will be directly and immediately affected by the proposed water use. Written objections shall: (1) state property or other interest in the matter; (2) set forth questions of procedure, fact, law or policy, to which objections are taken; and (3) state all grounds for objections to the proposed permit. Send written objections by November 29, 1988, to the Division of Water Resource Management, P.O. Box 373, Honolulu, Hawaii 96809.

State of Hawaii
Commission on Water Resource Management

WILLIAM W. PATY, Chairperson

Dated: November 2, 1988

Publish in the Honolulu Star Bulletin
issues of November 7 and 14, 1988.
October 14, 1988

Ms. Catharine Tilton
Belt Collins & Associates
680 Ala Moana Blvd., Suite 200
Honolulu, Hawaii 96813

Dear Ms. Tilton:

We are returning your $25.00 filing fee (check no. 006919) submitted on behalf of the Mokuleia Land Company for a water use permit for Well 3310-02 in Mokuleia, Oahu. We have already received a $25.00 filing fee directly from the Mokuleia Land Company.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
Enc.
Filing Fee $25.00
Mokuleia Water Use Permit
October 14, 1988

Sankyo Tsusho Co., Ltd.
dba Mokuleia Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Gentlemen:

This is to acknowledge receipt of your water use permit application for existing well 3310-02 located in the Mokuleia Subarea of the Waialua Ground Water Management Area.

Sincerely,

MANABU TAGOMORI
Deputy Director

ES:ko
cc: Belt Collins & Associates
Sankyo Tsusho Co., Ltd.
dba Mokulei Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Gentlemen:

This is to acknowledge receipt of your water use permit application for existing well 3310-02 located in the Mokuleia Subarea of the Waialua Ground Water Management Area.

We are returning your $100 filing fee check. Under our new Administrative Rules, Chapter 13-168, entitled "Water Use, Wells, and Stream Diversion Works", and Chapter 13-171, entitled "Designation and Regulation of Water Management Areas", an application for a water use permit must be accompanied by a $25.00 filing fee. Please send the $25.00 filing fee payable to the Department of Land and Natural Resources, to P.O. Box 373, Honolulu, Hawaii 96809.

My staff is reviewing your application and will notify you when upon acceptance of your application or contact you should we need more information.

If you have any questions, please contact Mr. Dan Lum at

Sincerely,

MANABU TAGOMORI
Deputy for Water Resource Management

Enc.
cc: Belt Collins & Associates

RECEIVED
SEP 30 1988
Mokulea Land Company
Do you have a long term plan to renew them? If not, hurry up.

Ed, do you have a long term plan to renew them? If not, hurry up.

File on PPS or others, you may have made? How was your meeting?
Manabu Tagomori  
Deputy for Water Resource Management  
Department of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawaii 96809  

Dear Mr. Tagomori,  

Subject: Water use permit application for existing well 3310-02 located in the Mokuleia Subarea of the Waialua Ground Water Management Area.  

As per your request, enclosed is a $25.00 filing fee check submitted on behalf of Sankyo Tsusho Co, Ltd., dba Mokuleia Land Company, to cover the filing fee for a water use permit for existing well 3310-02 located in Mokuleia Subarea of the Waialua Ground Water Management Area.

Sincerely,  

Catharine Tilton  

Check returned - send one from Sankyo Tsusho Co, Ltd  
10/12/88
September 27, 1988

Sankyo Tsusho Co., Ltd.
dba Mokulei Land Company
68-540 Farrington Highway
Waialua, Hawaii 96791

Gentlemen:

This is to acknowledge receipt of your water use permit application for existing well 3310-02 located in the Mokuleia Subarea of the Waialua Ground Water Management Area.

We are returning your $100 filing fee check. Under our new Administrative Rules, Chapter 13-168, entitled "Water Use, Wells, and Stream Diversion Works", and Chapter 13-171, entitled "Designation and Regulation of Water Management Areas", an application for a water use permit must be accompanied by a $25.00 filing fee. Please send the $25.00 filing fee payable to the Department of Land and Natural Resources, to P.O. Box 373, Honolulu, Hawaii 96809.

My staff is reviewing your application and will notify you when upon acceptance of your application or contact you should we need more information.

If you have any questions, please contact Mr. Dan Lum at ____________.

Sincerely,

[Signature]

MANABU TAGOMORI
Deputy for Water Resource Management

ES:ko
Enc.
cc: Belt Collins & Associates
**DIVISION OF WATER RESOURCE MANAGEMENT**

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Manabu Tagomori  
Deputy for Water Resource Commission  
Department of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Tagomori,

Enclosed is an application to Withdraw Water From the Waialua Ground Water Control Area for existing well 3310-02 located in the Mokuleia sub-zone. The proposed water use of 310 million gallons per year is for golf course irrigation and potable use of the clubhouse.

If you require more information or have any questions regarding this application, please do not hesitate to contact me at

Sincerely,

Catharine Tilton

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

DEPARTMENT MASTER APPLICATION FORM

(Print or Type)

I. LANDOWNER/WATER SOURCE OWNER  
(If State land, to be filled in by Government Agency in control of property)  
Sankyo Tsusho Co., Ltd.  
Name  
dba Mokuleia Land Company  
Address 68-540 Farrington Hwy  
Waialua, HI  
96791  
Telephone No. (808) [number redacted]  
SIGNATURE [signature]  
Date SEP 22, 1983  

II. APPLICANT (Water Use, omit if applicant is landowner)  
Name  
Address  
Telephone No.  
Interest in Property  

*(Indicate interest in property; submit written evidence of this interest)  
SIGNATURE [signature]  
Date  

*If for a Corporation, Partnership, Agency or Organization, must be signed by an authorized officer.

III. TYPE OF PERMIT(S) APPLYING FOR  
( ) A. State Lands  
( ) B. Conservation District Use  
( ) C. Withdraw Water From A Ground Water Control Area  
( ) D. Supply Water From A Ground Water Control Area  
( ) E. Well Drilling/Modification

IV. WELL OR LAND PARCEL LOCATION REQUESTED  
District First District  
Island Oahu  
County Honolulu  
Tax Map Key 6-8-03: por. 5  
Area of Parcel 1,261.431 Acs.  
Term (if lease)  

February 1983
DESIGNATED GROUND WATER CONTROL AREA

APPLICATION FOR: (check one)
X PERMIT TO WITHDRAW WATER FOR BENEFICIAL USE

PERMIT TO SUPPLY WATER FOR BENEFICIAL USE

Fill out, sign page 1, send application with pertinent attachments to Department of Land and Natural Resources, P. O. Box 621, Honolulu, Hawaii 96809. A non-refundable filing fee of $100 is required, excepting military, federal, state, and local government agencies.

1. REQUESTED BENEFICIAL USE OF WATER:
   X Domestic  ___ Municipal  ___ Military  ___ Agricultural  ___ Industrial
     X Other Golf course irrigation (specify)

   Appropriately describe nature and purpose of requested use: *To provide domestic water to the clubhouse and to irrigate an 18-hole golf course.

   Proposed commencement date of water use: First quarter of 1989.

2. REQUESTED AMOUNT OF WITHDRAWAL OR SUPPLY:
   Average Annual 310 mgd; Maximum Month 46.5 mgd; Maximum Day 1.5 mgd.
   Appropriately describe schedule or times of taking requested withdrawal:
   Daily golf course irrigation which will vary in amount depending on rainfall; clubhouse use on an as needed basis.

3. NATURE AND TERM OF REQUESTED PERMIT:
   ___ Temporary  X Permanent
   Requested period of permit ________________________________

4. PROPOSED SOURCE OF WATER SUPPLY:
   X Existing source  ___ Modification of existing source  ___ New Source
   Briefly describe existing or proposed source and any related facilities and submit map, plot plan, and plans or drawings of source of supply:
   A pump will be installed in existing well 3310-02. Design of the pump, tank, and pipeline is to begin in the near future; refer to Attachment 1 for further information.
   If construction work is proposed for new or modified existing source, give:
   Commencement Date January 1989  Completion Date May 1989

5. ASSESSMENT OF REQUESTED WATER USE OR SUPPLY:
   In a separate attachment to this application, applicant must provide a written assessment addressing the desirability of issuing the requested permit, including such considerations as the availability of water, the beneficial purpose of the proposed water use, and the impact if any, of the proposed water use on existing permitted uses, preserved uses, and individual household uses.
   Please see Attachment 1.

* Use additional sheets as necessary.
ATTACHMENT 1

DESIGNATED GROUND WATER CONTROL AREA

Permit to Withdraw Water for Beneficial Use

4. Proposed Source of Water Supply

Well number 3310-02 is owned by Mokuleia Land Company and lies within the Mokuleia sub-area of the Waialua Water Control Area (refer to Figure 1). According to documentation provided by the Board of Land and Natural Resources (BLNR), the Mokuleia sub-area has a sustainable yield of 20 million gallons per day (mgd) and only 5.153 mgd is currently allocated for use (refer to the enclosed tabulation).

The well was drilled in 1980 to a depth of 442 feet. The initial chloride concentration during a pump test was 32 MGL (refer to the enclosed Driller's Report). In September 1981, BLNR certified a preserved use for the well of 1.05 mgd for agricultural use and 0.20 mgd for domestic use. However, since the well was not used for more than four years, the preserved use was terminated in November of 1986.

Currently, there are seven source wells on Mokuleia Land's property (see Figure 1). Two of the seven wells are being used for agricultural and domestic purposes. The remaining five wells, including well 3310-02, have been capped and are presently not in use.

5. Assessment of Requested Water Use or Supply

The well is intended to provide an average of 800,000 gallons per day to irrigate an 18-hole golf course and up to 50,000 gallons per day for domestic consumption at the golf course clubhouse. In order to meet maximum irrigation requirements through dry summer months, a 1,050 gallons per minute (1.5 MGD) pump will be installed.

The proposed project is not anticipated to create a significant impact on the aquifer's sustainable yield. According to the Department of Water and Land Development's (DOWALD) assessment, the Mokuleia sub-area of the Waialua Water Control Area is a region with a sustainable yield of 20 mgd and only 5.153 mgd is currently reserved for use by existing wells. There is a 14.847 mgd surplus of water (refer to DOWALD'S enclosed tabulation).
**DRILLER’S REPORT**

**DESCRIPTION**

Date of report: December 8, 1980

Person filing report: Douglas O. Craddock

**A. OWNER** Makuleia Homesteads

**NAME** Makuleia Well No. 2

**ISLAND** Oahu

**B. GENERAL LOCATION** Makuleia, Oahu, Hawaii

**C. DRILLING COMPANY** Water Resources International, Inc.

**D. TYPE OF RIG** Rotary

**DRILLER COMPLETED** D. Craddock

**E. ELEVATION, msl:** Top of drilling platform 378 ft. Bench mark and method used to determine Height of drilling platform above ground surface 12 ft. elevation:

**F. HOLE SIZE:** 18 in. dia. to 42 ft. below drilling platform. 18 in. dia. to 4 ft. below drilling platform.

**G. CASING INSTALLED:** 14 in. I.D. x 3/8 in. wall solid section to 400 ft. below drilling platform.

**H. ANNULUS:** Grouted 0 ft. to 439 ft. below drilling platform.

**I. PERMANENT PUMP INSTALLATION:**

- Pump type, make, serial no.
- Capacity g.p.m.
- Motor type, H.P., voltage, r.p.m.
- Depth of pump intake setting ft. below bottom of well which elevation is ft.
- Depth of bottom of airline ft. below well which elevation is ft.

**HYDROLOGY**

**J. INITIAL WATER LEVEL**

Date of measurement: December 4, 1980

**K. INITIAL CHLORIDE**

Date of measurement: December 8, 1980

**L. PUMPING TESTS:**

Reference point (R.P.) used:

- **Date** December 8, 1980
- **Start water level** 347.9 ft. below R.P.
- **End water level** 347.9 ft. below R.P.
- **Pumping Rate**

- **Depth of well** 42.45 ft. below R.P.
- **Depth of well** 42.45 ft. below R.P.

**M. DRILLER’S LOG:**

**Subsurface Formation**

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<td>276 ... to 330</td>
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**N. REMARKS:**

**FOR OFFICIAL USE**

Latitude 21° 33’ 41’

Longitude 158° 10’ 29’

Well No. 330-02
RECEIVED

30 SEP 23  A10: 36

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PRELIMINARY
WATER AND SEWERAGE REPORT
FOR
MOKULEIA HOMESTEADS AGRICULTURAL SUBDIVISION

BY

THE RUSS SMITH CORPORATION

677 ALA MOANA, SUITE 1000, HONOLULU, HAWAII

DECEMBER 19, 1979

ENCLOSURE B
Mr. John Zapotocky, General Manager
Mokuleia Homesteads
333 Queen Street
Suite 605
Honolulu, Hawaii 96813

Dear Sir:

SUBJECT: PRELIMINARY REPORT ON WATER AND SEWERAGE
FOR MOKULEIA HOMESTEADS, Oahu

As a follow-up to our letter addressed to you on November 16, 1979 covering the subject matter, and which was returned approved by Mr. Melim on November 27, 1979, we submit this report. Briefly, our findings, as discussed in the report are:

1. Water
   a. Total daily water demands may be expected to average 2.50 million gallons per day (MGD) with maximum usage reaching 4.90 MGD.

   b. A water system to Board of Water Supply requirements is expected to cost $4,960,000, whereas a privately operated system of exactly the same capacity and capability will cost $3,930,000. The cost difference is that Board of Water Supply concrete reservoirs will cost $1,030,000 more than steel reservoirs.

   c. Water purchased from the Board of Water Supply cannot be re-metered and resold.

   d. All capital expenditures put into a Board of Water Supply water system must be recovered in the sale of land. The Board will not credit any portion of the system to the developer.

   e. Domestic water charges by the Board of Water Supply would be 64 cents per 1000 gallons while irrigation water would be 51 cents per 1000 gallons. A privately operated water system could charge 20 cents per 1000 gallons and recover operating costs. Recovery of the capital outlay would be the same as for a Board of Water Supply system but $1,030,000 less.
Because of lower water rates to the customer and lower initial costs to the developer, it is recommended that the water system remain private.

2. Sewerage

a. A sewage collection system, treatment plant and effluent disposal system is required for the Mokuleia Homestead Agricultural Subdivision and Beach Development because of Board of Water Supply and State Department of Health regulations.

b. The complete wastewater system including an "on site" irrigation disposal system can be completed for $5,600,000. This wastewater disposal system will reduce some of the peak demands on the water system.

c. The complete wastewater system with a disposal of effluent to Castle & Cooke's Kawaihapai Reservoir can be completed for $4,600,000. Although this system is $1,000,000 less than the "on site" disposal, it does not reduce water consumption and disposal control is by others.

It is recommended that the "on site" system be followed with possible site changes to meet the final subdivision layout.

Please understand that this presentation is based on a preliminary plan which is subject to change. In like manner, we must anticipate the same possible change in the cost estimates itemized in Appendix A of the report.

After you have reviewed our presentation, we would be very happy to clarify any questions that you may have and to discuss some of the pros and cons which may arise in your thoughts after reading the report.

Thank you for the opportunity to be of assistance, we look forward to being of further service.

Sincerely yours,

THE RUSS SMITH CORPORATION

RLS/aw
Preliminary
Water and Sewerage Report
For
Mokuleia Homesteads Agricultural Subdivision

Purpose

The purpose of Part I of this report is to discuss the possible demands for domestic and irrigation water on the proposed Mokuleia Homesteads Agricultural Subdivision and the adjacent lands presently being supplied water from the Dillingham private system (Crow Bar Ranch).

Part II will briefly discuss the sewerage requirements for the area and quantify the amount of sewage to be expected from the development as it is presently conceived.

Part III A will discuss the probable costs of developing and distributing the required water supply and provide the pros and cons of various system operations for the water system while Part III B will discuss sewerage costs of construction and operation.

PART I
WATER

A. Possible Water Requirements

Mauka of Farrington Highway and below the approximate 400 foot contour some 900 acres of former Dillingham land are proposed to be subdivided into agricultural lots. At present 330 lots are proposed. These lots, when 10% of the area is removed for road rights of way and drainage easements, will average approximately 2.40 acres in size. On the average, we further estimate that the .4 acre (17,000 sq. ft.) will
be used as a normal houselot while the remaining 2.0 acres will be
irrigated agricultural lands. Agricultural land under irrigation will
therefore be 660 acres (330 lots x 2.0 acres).

1. **Irrigation Water Needs**

   *Irrigation Principles and Practices Second Edition,* by
   Orson W. Israelson* published by Wiley & Sons, discusses
   water demands by various crops. Pasture lands and alfalfa
   produce best when the annual, or crop, irrigation applica-
   tion is between 30 to 36 inches. Root and truck crops
   require approximately 25 inches per growing season while
   citrus fruits need only 18 to 20 inches per season. However;
   during the major growth months these latter two crops need
   about 6 inches of water per month for best growth and
   productivity. Because Hawaii may be an area where crops
   can be grown and harvested throughout the year, we will
   ignore the seasonal fluctuation and consider the normal
   monthly demand will be the controlling quantity. Namely
   6 inches of water per month for appropriate crop growth.
   This in itself will vary with the soil types, rainfall, and actual
   acreage in production at any given time.

   In the *Water Resources of North-Central Oahu, Hawaii,*
   a Geological Survey Water-Supply Paper 1899-D, which will
   be further discussed hereinafter, the annual rainfall is

*Professor of Irrigation and Drainage, Utah State Agricultural College*
computed to be less than 30 inches over 18 square miles of the area under concern. Our approach will be conservative and recognize that all of the acreage under discussion lies within that said 18 square mile area. Therefore, if 6 inches per month is needed on all 660 acres of developable land, the total annual requirement would be 6 inches times 12 months, or 72 inches per year. By subtracting the 30 inch annual rainfall from this requirement, we find the annual need to be 42 inches on the 660 acres of land. In as much as one acre inch equals 27,200 gallons, the total annual water requirement to irrigate the 660 acres would be 27,200 gallons x 660 acres x 42 inches or 753,948,000 gallons. This reduces to 62,832,000 gallons per month, or 2,095,000 gallons per day average. **Water sales for irrigation may be close to 2,100,000 g.p.d. when full production is realized.** This quantity further equates to 3180 gallons per acre per day (as used by the Board of Water Supply 3000 gallons).

However, we must recognize that it is quite possible to have no rain within a single month's period and therefore the full 6-inch requirement may be needed. This therefore requires an availability of water equal to 27,200 gallons x 6 inches x 660 acres or 107,712,000 within the 30 day month. Assuming that this irrigation water is applied within a 25
working day month (no Sunday irrigation), the daily demand for water would be 107,712,000 gallons/25 days or 4,309,000 gallons per day. This is a maximum requirement.

Irrigation requirements are shown to average some 2.1 million gallons per day in the proposed agricultural subdivision however productivity must be 4.3 million gallons in order to satisfy a drought demand within a 25 day working month when all 660 acres are under cultivation and in full growth. This circumstance is rather unlikely within the first several years of development.

2. Domestic Water Needs

a. Agricultural Development

The .4 acre of each agricultural lot which will not be irrigated as agricultural land, will be considered as a domestic houselot. Normal demands may be considered as 100 gallons per capita per day, with an average of four persons per household, with approximately 600 gallons being used for landscape watering around the residence. Daily domestic use on the present 330 lots would therefore be 330,000 gallons per day with some 132,000 gallons being for human amenities while the remaining 168,000 gallons would be used for "domestic irrigation". The fluctuations in this usage probably
would be to a 150% daily flow during hot days of dry periods. Therefore the average \textit{domestic requirements} for water within the agricultural subdivision may be expected to be \textbf{330,000 gallons per day} but production must be capable of meeting a total demand of \textbf{495,000 gallons per day}.

\textbf{b. Existing Domestic System}

At the present time a private water system supplies domestic water to the lots along Farrington Highway from the Homestead access road westward to the Episcopal Church property adjacent to Mokuleia Airstrip. The source of the supply for this system is \textit{existing Well 288 at Crow Bar Ranch}. The pipe system is, we believe, 8 inch asbestos cement pipe some 5,000 feet in length and serves approximately 50 houselots of varying sizes. Total daily use may reach as high as 50,000 gallons per day with average daily consumption somewhat less than that as not all lots are occupied during the normal week.

\textbf{3. Fire Flows}

Fire flows in the agricultural areas may be considerably less than 1500 gpm. However, the total fire flow requirements may be 3000 gallons per minute for a two hour period if two.
fires are considered simultaneously. The total fire flow requirement would be $3000 \times 60 \times 2$ or 360,000 gallons. As this is approximately one-sixth of the volume needed to meet fluctuating irrigation demands, the controlling design is the irrigation flow, not the fire flow in this situation.

4. **Ultimate Development Water Requirements**

Based on average daily water requirements as discussed in the foregoing paragraphs, the average daily production and possible average daily sale of water may be expected to be as follows:

- a. Irrigation of 660 acre
- b. Subdivision domestic needs
- c. Existing domestic system

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<td>Irrigation of 660 acre</td>
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<td>Subdivision domestic needs</td>
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<tr>
<td>Existing domestic system</td>
<td>50,000 g.p.d.</td>
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</table>

Total Average Daily Water Needs  2,480,000 g.p.d.

Say  2,500,000 g.p.d.

However, because of the predominance of irrigation water use within the agricultural subdivision, and because it is quite probable that some months will go by with no rainfall occurring in the Mokuleia area the productivity of the system must be capable of meeting the drought condition of zero rainfall. The water system therefore must be capable of producing the following water supply at its proposed ultimate development.
a. Irrigation of 660 acres $\times 2.05 = 4,309,000$ g.p.d.
b. Subdivision domestic needs $\times 1.5 = 495,000$ g.p.d.
c. Existing domestic needs $\times 1.5 = 75,000$ g.p.d.

Total Maximum Daily Water Needs $4,879,000$ g.p.d.

Say $4,900,000$ g.p.d.

This latter figure will come about only if all agricultural lots are fully developed and no controls on water usage are administered. The charges for water may well be the controlling factor in the quantity of water used within the development.

**PART II**

**SEWERAGE**

A. **Need for a Treatment Process**

In the foregoing Part I, the discussion centered around water requirements and water development. This water source is a basal water lens which has its source in the Wahiawa-Schofield Barracks Plateau and the adjacent mountaineous terrain, which is composed of Koolau and Waianae volcanics. Records indicate that the highest level of this lens is southeast of Mokuleia with a declining head at, or near, the western edge of Dillingham Air Force Base landing strip. This basal water lens is partially confined by marine sedimentary materials (caprock) so that the lens is partially artesian in the lower plain areas.
In order to preserve the purity of this water, the Board of Water Supply has established an arbitrary line above which no cesspools or septic tank effluent may be released below ground. At Mokuleia, this arbitrary line is approximately 1200 feet mauka of Farrington Highway. Because of this ruling, no cesspools or septic tanks may be used in the upper areas of the Agricultural Subdivision.

The ocean waters immediately adjacent to Mokuleia are classed AA by the Department of Health. These waters cannot be contaminated by wastewaters, either treated or untreated.

The result is the need for at least a secondary treatment process followed by a disposal system compatible with the State Department of Health Regulation Chapter 38 as revised in July 1979.

B. **Probable Sewage Generation**

Based on the foregoing discussion of water usage, it appears that actual sewage generation in the proposed Mokuleia Agricultural Subdivision will be about 132,000 gallons per day when the area is fully developed. This quantity is figured with the average lot occupancy at four persons per lot, or residence. The individual quantity flow has been estimated at 100 gallons per person per day as records of the Wastewater Division of the City and County of Honolulu seem to verify. Although we anticipate a domestic wastewater flow of 132,000 g.p.d. (say 150,000 g.p.d.), the State Department of Health Regulation, Chapter 38 clearly states that treatment facilities
shall be designed to accommodate a wastewater flow of 200 gallons per day per bedroom. No consideration is given as to whether, or not, the bedroom is occupied by one, two, or even three persons. It therefore becomes necessary to design for the following wastewater quantity as per Section 4 of Chapter 38.

110 Lots with 2 BR homes @ 200 gpd per bedroom = 44,000 gpd
110 Lots with 3 BR homes @ 200 gpd per bedroom = 66,000 gpd
110 Lots with 4 BR homes @ 200 gpd per bedroom = 88,000 gpd
Possible 50 Lots supplied by Crow Bar Well 288 = 30,000 gpd

Design Requirements 228,000 gpd
Standard Design Size 250,000 gpd

This design size should be sufficient to handle the dry weather domestic wastewater flow and the probable infiltration of groundwater into the sewers. The standard design size for a possible 132,000 gallon per day domestic wastewater flow would be 150,000 gallons. This size would handle the daily flows to be expected, but would not conform to Chapter 38 of the State Department of Health. It is therefore recommended that the 250,000 gallon per day size be constructed as the incremental cost increase from 150,000 to 250,000 is much less than 3/5 or 1/2 of the total plant cost. If later records verify a lower flow, the overdesign may permit a future expansion without an additional expansion to the wastewater treatment plant. This would be especially true if the history of
the plant operation indicated that the effluent consistently met the Department of Health requirements.

A new requirement of Chapter 38 which must be considered also is quoted as follows:

"4.4 The design details of all wastewater effluent disposal systems shall comply with this section unless otherwise prohibited by other, federal, state, or county rules, regulations or ordinances."

"A. Subsurface disposal systems

(1) Subsurface disposal systems shall consist of a primary disposal component and a 100 percent back-up disposal component."

"B. Effluent irrigation systems

(6) The owner shall provide adequate storage systems or back-up disposal systems to prevent any overflows or discharges from the system when the irrigation is not in operation or when wastewater effluent quantities exceed irrigation requirements."

From the foregoing it can be seen that in addition to meeting all requirements of operation and maintenance necessary to produce a good quality effluent, the owner must also provide a dual disposal system. This will be considered in the design and cost estimating
aspects of the following chapter.

C. **Effluent Disposal**

Part I has indicated the possible great quantities of irrigation water needed for the agricultural subdivision. A portion of this irrigation requirement can be supplied by secondary effluent which meets the State Department of Health Standards. This is especially true in the area where papayas, avocados, bananas and other fruits or nuts are to be grown. The effluent should not be used on truck crops such as lettuce, carrots and other root crops which could come into direct contact with the effluent.

The Board of Water Supply has set an arbitrary line approximately 1200 feet mauka of Farrington Highway above which no untreated sewage may be deposited. This line has been established to protect the artesian water supply lying below the surface at, or relatively near, sea level. This artesian supply lies below a layer of dense soil, or caprock. The Board of Water Supply has figured that this caprock exists from the shoreline to about 1200 feet mauka of the highway. Underground deposition of effluent placed above the caprock will not contaminate the water supply below, it is therefore recommended that the 100 percent standby disposal system for effluent be in the sandy soils of lots 50 through 57 as a line of cesspools with leaching trenches set in an easement along the back of the said lots.
The primary disposal of the treated effluent may be to the Castle & Cooke sugar cane irrigation reservoir near Lot 200. The effluent could be acceptable as irrigation water for the sugar cane. However, this method would not reduce irrigation water demands within the agricultural development. It is therefore suggested that a specific area of about 50 or 60 lots be designated as a tree crop area and have those lots supplied with treated effluent. This area should be provided with a drip irrigation system or open ditch system rather than a high pressure spray system so that control of the effluent contact points may be easily exercised.

Pumpage of wastewater effluent can be accomplished as easily as domestic water supplies so that the effluent disposal area may be the bank of high level lots at the extreme southwesterly portion of the agricultural development or any other lower bank of lots. The economic cost of the several disposal points will be considered hereinafter in Part III.
PART III
ANALYSES AND ESTIMATED COSTS

A. Water System

1. Distribution Analysis

Subdivision water systems on Oahu whether for an agricultural or residential development, must conform to the requirements of the Honolulu Board of Water Supply. Because of the fire flow requirements imposed by the Board of Water Supply, these systems always correspond closely to the larger sized piping of the residential areas. In the case of Mokuleia Homesteads, the irrigation requirements are large enough to govern the size pipes and storage capacities.

The recommended water distribution system for Mokuleia Homesteads is virtually the same size for a private system or for a Board of Water Supply system. The preliminary layout of this system is shown on Exhibit A.

2. Sources of Supply

Two wells are proposed at or near the 450 foot level south of the homestead. This area corresponds to that recommended by the U.S. Geological Survey in the Water-Supply Paper 1899-D, The Water Resources of North - Central Oahu. The site also lies in the same water lens area in which the Singlehurst Well was drilled in 1971. That well is capable of a 2.0 - 2.5 million gallon per day production.
The capacity of a well is never known until it has been drilled and pump tested. It is anticipated that each proposed well will produce 1.5 MGD. If the pump testing indicates a 2.0 MGD capacity such sized pumps will be installed.

These wells and pumps will be to the Board of Water Supply Standard, not necessarily to match the Board of Water Supply, but to meet the source requirements of the Safe Water Act of the Environmental Protection Agency. One of these two wells will supply water to the upper level system with augmentation supply capabilities to the low level system. The other well will serve as a stand-by source.

Existing Well #291, located near the cane haul road and close to the Homestead Access Road will be the initial primary source for the low level system. This well is known to have at least a 1.5 MGD discharge capacity. The water from this well has a saline content of 95.8 parts per million chlorides at the present time. This water will meet the Safe Water Standards. However, improvements to the pumps and housing must be undertaken. This well also lies partially in the shadow of the Singlehurst Well. Large and continuous pumping from both wells may cause the chloride content of Well 291 to rise. Only time will tell.

3. Storage Requirements

With a normal daily water demand of 2.50 MGD as shown in Part I, the wells can meet the needs if the rate of usage
extends over a 24 hour day. If irrigation is carried out over a six hour period, some 2.1 million gallons will be used while the wells produce only .75 MGD. The difference of 1.35 MGD will come from storage. During a day of maximum usage when 4.90 MGD is consumed, it may be figured that 4.0 MG could be used in a twelve hour period. The wells would provide 1.5 MG during this period while the storage reservoirs would supply 2.5 MG. If less than 12 hours of heavy usage are to be considered, an additional well must be drilled, or reduced irrigation demands must be brought about. This latter is possible by using treated wastewater on a portion of the irrigated lands.

4. Board of Water Supply vs. Private

Direct discussion with the Planning Section of the Board of Water Supply provided the following information which has lead us to consider a complete private system for Mokuleia Homesteads.

a. Only concrete reservoirs will be considered appropriate for a Board of Water Supply system. This is true even though it is known that the last 1.0 MG concrete reservoir cost $750,000 and a 1.0 MG steel reservoir can be erected for $350,000.

b. Water purchased from the Board of Water Supply cannot be re-metered and re-sold. Unmetered usage by condominium owners is controllable but unmetered
usage of irrigation water on 2.0 acre parcels would be impossible to allocate without metering.

c. All capital expenditures for the water system are turned over to the Board of Water Supply. For this the Board of Water Supply operates the system at no cost to the developer. However, the developer receives no return for his capital outlay and the increased capital expenditure will be over a million dollars for a Board of Water Supply system.

d. Domestic water charges to each Board of Water Supply consumer will be 64 cents per 1000 gallons for domestic water and 51 cents per 1000 gallons for irrigation water. A private system could supply water to its consumers at a charge of 20 cents per 1000 gallons and cover all operating costs.

From the foregoing points it becomes fairly clear that the economic advantage lies in keeping the water system private. This is especially true if other portions of the development are to remain under private control and require private maintenance.

5. Water System Construction Cost

Pages A-1, A-2 and A-3 of Appendix A show a preliminary cost estimate for the water system. The cost of a private
system is figured to be $3,930,000 while the cost of the Board of Water Supply system is projected to be $4,960,000. This 25% (approximate) increase over the private system is found entirely in the cost difference between concrete and steel reservoirs. The steel reservoirs do require some maintenance costs over and above concrete, however this cost is easily recoverable in the lower water charges of the private system.

If the additional one million thirty thousand dollars of capital costs is to be returned to the developer, the sale price of each agricultural lot must be increased $3100 in order to have an equal return on the land. To increase the sale price of the lot in order to allow the owner to pay 2.5 to 3.0 times the amount for his water bill does not seem an economical approach worth considering.

The costs of operation of the private system are calculated in Appendix B hereinafter.

B. Sewerage System

1. Collection System

Exhibit B shows a preliminary collection system that will service the proposed Mokuleia Homesteads agricultural subdivision. Pumping Stations A and B have been
shown independent of each other as we have no indication at this time what is proposed in the beach area. If the beach property is developed so that Station A can pump into Station B a long force main can be eliminated. We have indicated the higher cost condition for consideration at this time.

The gravity sewers have been computed to be $2,072,800 with the two pumping stations totaling $500,200 for an overall collection system cost of $2,573,000. It is anticipated that this cost will be recovered in the sale of the land as will the water system costs.

2. Wastewater Treatment Plant
   a. Site Location

   Pumpage of raw sewage is an expensive proposition. Normal raw sewage contains solids and stringy material that require the pumps to have large openings in their impeller configuration. As a result the normal sewage pumps operate at about 60% to 65% efficiency (as compared to clear water pumps at near 80%) with relatively low discharge heads. Few sewage pumps lift to higher heads than 100 feet, and when they do, the horsepower requirement of the pump driver is unusually large.

   In order to lift raw sewage from sea level to the
400 foot level, it is probable that no less than five pump stations would be required. Also, because of the lower efficiency of the waste water pumps, the horsepower requirements would be greater for raw sewage pumping and the electrical costs would increase proportionately.

The treatment sight has been selected because of the reasonable lift requirements of the lower area sewage and the gravity flow capability of the major subdivision raw sewage portion. The high lift alternative of the treated effluent can be accomplished in one lift with a high efficiency clear water pump with less horsepower. The added costs of the odor control units for the treatment plant are offset by the omission of two pumping stations and their accompanying maintenance requirements. The general site location indicated on Exhibit B has been selected for its economic advantages.

b. Construction Cost Estimate

The estimated construction cost of the wastewater treatment plant is shown on page A-4 of Appendix A as $1,593,450 or $1,568,450. Alternative A is for disposal of the effluent to the upper area for irrigation of tree crops. Alternative B, which is a lower cost, is for disposal of the effluent on Castle and Cooke lands through the Kawaihapai Reservoir.
c. **Effluent Disposal System**

Exhibits C and D show two different schemes of effluent disposal. Exhibit D shows the irrigation disposal to the Kawaihapai Reservoir while Exhibit C shows the high level irrigation system on Mokuleia lands rather than Castle & Cooke lands. This latter is the recommended system as it reduces the need for high level irrigation water and allows the disposal control to be managed by Mokuleia Homesteads.

Both Exhibits C and D show an emergency disposal system makai of the treatment plant site. This emergency system is a requirement of Chapter 38 State of Hawaii Department of Health Regulations. It is also located as close to the treatment plant as possible and still be makai of the Board of Water Supply "No subsurface disposal line" which lies approximately 1200 feet mauka of Farrington Highway.

The cost of the Alternative A disposal system is $1,424,900 while Alternative B system is $451,000. The cost difference appears to be approximately $1,000,000 in favor of Alternative B.

d. **Pros and Cons of Alternative Irrigation System A**

The location of the treated effluent irrigation area is not fixed. It could as easily be in the area around the
plant as in the area shown. We have selected the area shown for several reasons:

(1) The wastewater irrigation system shown on Exhibit C is sloping land more conducive to orchard crops than truck crops.

(2) Effluent irrigation can be used successfully on orchard crops whereas it is not permitted on truck or root crops.

(3) The use of effluent irrigation at high level reduces the use of high level potable water. The cost differential in lifting freshwater or effluent water to the 450 ft. elevation is an "or equal" situation.

(4) Fluctuations of irrigation rates may be expected more in truck crops during droughts and peak demand periods. It is less expensive to furnish low level peak irrigation flows than high level peak flows.

(5) Use of wastewater for irrigation purposes reduces the possible need for either an additional fresh water well or a larger storage requirement to meet the future peak irrigation demands.
The extra cost of Alternative A over Alternative B is $1,000,000 at first cost, however possible reduction of at least one half million gallon reservoir ($284,000) or a third well and pump ($310,000) and some reduction in size of the domestic water lines within the wastewater irrigation area (possibly $100,000) must be considered. The cost difference remaining must be now offset be the fact that Mokuleia Homesteads controls the effluent disposal rather than an outside entity (namely Castle & Cooke).
## Construction Cost Estimate Worksheet

### Water System Summary:

**PRIVATE**

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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir: Steel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Say</td>
<td></td>
<td></td>
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</table>

**BWS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>MATERIAL COST</th>
<th>LABOR COST</th>
<th>ENGINEERING EST.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipings</td>
<td></td>
<td></td>
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<tr>
<td>Wells</td>
<td></td>
<td></td>
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<tr>
<td>Pumps</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Standby Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir: Concrete</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Say</td>
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</tbody>
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**Job No.:** 207  
**By:** HHida  
**Date:** 0-1-79  
**Makaula Homestead, Water System**
# Construction Cost Estimate Worksheet

## Items

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Material Cost</th>
<th>Labor Cost</th>
<th>Engineering Est.</th>
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<tbody>
<tr>
<td><strong>WATER LUBRICATED PUMPS:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical turbine pump / valves</td>
<td>3</td>
<td>Each</td>
<td>80,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Reduced voltage starter</td>
<td>3</td>
<td>Each</td>
<td>10,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Electric service to site</td>
<td></td>
<td></td>
<td>10,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Standby chlorinator</td>
<td>1</td>
<td>Each</td>
<td>10,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td><strong>RESERVOIR:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>320,000</td>
</tr>
<tr>
<td>Excavation/Fine Grading/Compaction</td>
<td>4</td>
<td>Site</td>
<td>80,000</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>1,000,000 gal. conc. reservoir</td>
<td>2</td>
<td>Each</td>
<td>620,000</td>
<td>1,240,000</td>
<td></td>
</tr>
<tr>
<td>500,000 gal. conc. reservoir</td>
<td>2</td>
<td>Each</td>
<td>400,000</td>
<td>800,000</td>
<td></td>
</tr>
<tr>
<td>Float controls / wiring</td>
<td>2</td>
<td>Set</td>
<td>10,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Access Road / Fencing</td>
<td>4</td>
<td>Site</td>
<td>160,000</td>
<td>320,000</td>
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</tr>
<tr>
<td>Standby generator, 200kW</td>
<td>1</td>
<td>Each</td>
<td>55,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standby generator Bldg.</td>
<td>80</td>
<td>S.F.</td>
<td>50,000</td>
<td>40,000</td>
<td></td>
</tr>
<tr>
<td>Underground FRP Fuel storage tank</td>
<td>1</td>
<td>Each</td>
<td>8,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Site work / Access road / Fence</td>
<td></td>
<td></td>
<td></td>
<td>77,000</td>
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</table>
# CONSTRUCTION COST ESTIMATE WORKSHEET

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>MATERIAL COST</th>
<th>LABOR COST</th>
<th>ENGINEERING EST.</th>
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<tbody>
<tr>
<td></td>
<td>NO.</td>
<td>UNIT</td>
<td>COST</td>
<td>COST</td>
</tr>
<tr>
<td>WATER SYSTEM:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench Excavation / Backfill</td>
<td>19,000</td>
<td>C.Y.</td>
<td>40°</td>
<td>760,000</td>
</tr>
<tr>
<td>6&quot; φ A.C. Pipe</td>
<td>6,000</td>
<td>L.F.</td>
<td>6°</td>
<td>40°</td>
</tr>
<tr>
<td>8&quot; φ A.C. Pipe</td>
<td>12,000</td>
<td>L.F.</td>
<td>3°</td>
<td>7°</td>
</tr>
<tr>
<td>12&quot; φ A.C. Pipe</td>
<td>18,000</td>
<td>L.F.</td>
<td>14°</td>
<td>7°</td>
</tr>
<tr>
<td>16&quot; φ A.C. Pipe</td>
<td>14,000</td>
<td>L.F.</td>
<td>21°</td>
<td>7°</td>
</tr>
<tr>
<td>F.H. Assembly</td>
<td>150</td>
<td>Each</td>
<td>75°</td>
<td>350°</td>
</tr>
<tr>
<td>Alt. Valve</td>
<td>3</td>
<td>Each</td>
<td>4,0°</td>
<td>200°</td>
</tr>
<tr>
<td>6&quot; Gate Valve</td>
<td>5</td>
<td>Each</td>
<td>250°</td>
<td>250°</td>
</tr>
<tr>
<td>8&quot; Gate Valve</td>
<td>20</td>
<td>Each</td>
<td>400°</td>
<td>400°</td>
</tr>
<tr>
<td>12&quot; Gate / Check Valve</td>
<td>20</td>
<td>Each</td>
<td>750°</td>
<td>750°</td>
</tr>
<tr>
<td>16&quot; Gate Valve</td>
<td>20</td>
<td>Each</td>
<td>2,500°</td>
<td>1,200°</td>
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**RESERVOIR: (STEEL)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
<th>Cost</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Grading / Compaction</td>
<td>A</td>
<td>Site</td>
<td>20,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Sand / Gravel</td>
<td>420</td>
<td>C.Y.</td>
<td>10°</td>
<td>20°</td>
<td>12,600</td>
</tr>
<tr>
<td>Foundation / Concretes, 20 sq.ft.</td>
<td>80</td>
<td>C.Y.</td>
<td>20°</td>
<td>20°</td>
<td>24,000</td>
</tr>
<tr>
<td>1,000,000 gal. Steel Tank</td>
<td>2</td>
<td>Each</td>
<td>126,000</td>
<td>432,000</td>
<td></td>
</tr>
<tr>
<td>500,000gal. Steel Tank</td>
<td>2</td>
<td>Each</td>
<td>132,000</td>
<td>264,000</td>
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</tr>
<tr>
<td>Sandblasting / Paint interior</td>
<td>39,200</td>
<td>S.F.</td>
<td>4.10</td>
<td>160,720</td>
<td></td>
</tr>
<tr>
<td>/ / exterior</td>
<td>39,200</td>
<td>S.F.</td>
<td>2.90</td>
<td>119,680</td>
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</tr>
<tr>
<td>Float Controls / Wiring</td>
<td>2</td>
<td>Set</td>
<td>10,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Access Road / Fencing</td>
<td>4</td>
<td>Site</td>
<td>40,000</td>
<td>160,000</td>
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**WELLS:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
<th>Cost</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization - Demobilization</td>
<td>L.S.</td>
<td></td>
<td>5,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12&quot; Steel Casing</td>
<td>150</td>
<td>L.F.</td>
<td>42°</td>
<td>40,000</td>
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</tr>
<tr>
<td>Bottom plug / grouting of casing</td>
<td>L.S.</td>
<td></td>
<td>10,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Drilling</td>
<td>1,000</td>
<td>L.F.</td>
<td>240°</td>
<td>240,000</td>
<td></td>
</tr>
</tbody>
</table>

*Assumed Ave. 3 ft. cover.*

---

**207**

**H. Higa**

**12-4-74**

Makaleia Homestead Water Study

A-3
# CONSTRUCTION COST ESTIMATE WORKSHEET

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>MATERIAL COST</th>
<th>LABOR COST</th>
<th>ENGINEERING EST.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summary: Sewer System:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STP w/ standby generator</td>
<td></td>
<td></td>
<td></td>
<td>Alt. A: 1,593,450</td>
</tr>
<tr>
<td>Gravity Sewer</td>
<td></td>
<td></td>
<td></td>
<td>Alt. B: 1,568,450</td>
</tr>
<tr>
<td>SPS &quot;A&quot; / Force Main</td>
<td></td>
<td></td>
<td></td>
<td>2,070,800</td>
</tr>
<tr>
<td>SPS &quot;B&quot; / Force Main</td>
<td></td>
<td></td>
<td></td>
<td>270,200</td>
</tr>
<tr>
<td>Waste Water Irrigation System:</td>
<td></td>
<td></td>
<td></td>
<td>230,000</td>
</tr>
<tr>
<td>Effluent Pump/Piping</td>
<td></td>
<td>700,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir</td>
<td></td>
<td>884,700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French Drain</td>
<td></td>
<td>340,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Waste Water Irrigation System:</strong></td>
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<td></td>
<td></td>
<td>1,424,900</td>
</tr>
<tr>
<td>Effluent Pump/Piping</td>
<td></td>
<td>110,900</td>
<td></td>
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</tr>
<tr>
<td>French Drain</td>
<td></td>
<td>840,200</td>
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<td></td>
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<tr>
<td><strong>STP Alternative A w/ A Disposal</strong></td>
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<td></td>
<td></td>
<td>Say 5,591,350</td>
</tr>
<tr>
<td><strong>STP Alternative B w/ B Disposal</strong></td>
<td></td>
<td></td>
<td></td>
<td>Say 4,592,550</td>
</tr>
</tbody>
</table>

**JOB NO.** 207  
**BY** H. Hida  
**DATE** 12-12-79  
**SUBJECT** Makuelea Homestead, Domestic Gravity Sewer.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>MATERIAL COST</th>
<th>LABOR COST</th>
<th>ENGINEERING EST.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO.</td>
<td>UNIT</td>
<td>UNIT COST</td>
<td>COST</td>
</tr>
<tr>
<td>Trench Excavation / Backfill Ave. 6'</td>
<td>23,800</td>
<td>C.Y.</td>
<td>40°</td>
<td>952,000</td>
</tr>
<tr>
<td>12&quot; Phil PVC Pipe</td>
<td>200</td>
<td>U.F.</td>
<td>28°</td>
<td>5,600</td>
</tr>
<tr>
<td>10&quot; Phil PVC Pipe</td>
<td>1,200</td>
<td>U.F.</td>
<td>22°</td>
<td>26,400</td>
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<tr>
<td>6&quot; Phil PVC Pipe</td>
<td>44,300</td>
<td>U.F.</td>
<td>16°</td>
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<tr>
<td>SMH Ave. 6'</td>
<td>180</td>
<td>Each</td>
<td>1,500</td>
<td>270,000</td>
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<tr>
<td>Houselot Lateral</td>
<td>330</td>
<td>Each</td>
<td>300</td>
<td>99,000</td>
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**SPS "A"**

<table>
<thead>
<tr>
<th>ITEM</th>
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<th>MATERIAL COST</th>
<th>LABOR COST</th>
<th>ENGINEERING EST.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO.</td>
<td>UNIT</td>
<td>UNIT COST</td>
<td>COST</td>
</tr>
<tr>
<td>Trench Excavation / Backfill</td>
<td>1,600</td>
<td>C.Y.</td>
<td>40°</td>
<td>64,000</td>
</tr>
<tr>
<td>6&quot; Phil A.C. Pipe</td>
<td>5,400</td>
<td>U.F.</td>
<td>8°</td>
<td>43,200</td>
</tr>
<tr>
<td>30 K.W. Stanley Generator, Daytank, Control</td>
<td>1</td>
<td>Each</td>
<td>18,000</td>
<td>13,000</td>
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**SPS "B"**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>MATERIAL COST</th>
<th>LABOR COST</th>
<th>ENGINEERING EST.</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>NO.</td>
<td>UNIT</td>
<td>UNIT COST</td>
<td>COST</td>
</tr>
<tr>
<td>Trench Excavation / Backfill</td>
<td>1050</td>
<td>C.Y.</td>
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<td>42,000</td>
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<tr>
<td>12&quot; Phil A.C. Pipe</td>
<td>3,500</td>
<td>U.P.</td>
<td>8°</td>
<td>26,800</td>
</tr>
<tr>
<td>17.5 K.W. Stanley Generator, Daytank, Control</td>
<td>1</td>
<td>Each</td>
<td>10,000</td>
<td>10,000</td>
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**TOTAL COST**

- SPS "A": 270,200
- SPS "B": 290,000

**TOTAL**

- 207,400
### Waste Water Irrigation System:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Material Cost</th>
<th>Labor Cost</th>
<th>Engineering Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effluent Pumps, 500 GPM @ 150 TDH</td>
<td>3</td>
<td>Each</td>
<td></td>
<td></td>
<td>60,000</td>
</tr>
<tr>
<td>Trench Excavation/Backfill</td>
<td>4,200</td>
<td>C.Y.</td>
<td></td>
<td></td>
<td>168,000</td>
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<tr>
<td>4&quot; A.C. Piping</td>
<td>200</td>
<td>L.F.</td>
<td></td>
<td></td>
<td>1,200</td>
</tr>
<tr>
<td>6&quot; A.C. Piping</td>
<td>6,200</td>
<td>L.F.</td>
<td></td>
<td></td>
<td>49,600</td>
</tr>
<tr>
<td>8&quot; A.C. Piping</td>
<td>7,600</td>
<td>L.F.</td>
<td></td>
<td></td>
<td>91,200</td>
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<tr>
<td>Water Meter (W.W. Effluent Irrigation)</td>
<td>3</td>
<td>Each</td>
<td></td>
<td></td>
<td>320,000</td>
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</table>

### W.W. Reservoir:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Material Cost</th>
<th>Labor Cost</th>
<th>Engineering Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Grading/Compaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50,000</td>
</tr>
<tr>
<td>Sand/Gravel</td>
<td>130</td>
<td>C.Y.</td>
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<td></td>
<td>3,900</td>
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<tr>
<td>50,000 gal. steel tank (AEM 242)</td>
<td>1</td>
<td>Each</td>
<td></td>
<td></td>
<td>165,000</td>
</tr>
<tr>
<td>Fleet Control/Wiring</td>
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<td></td>
<td></td>
<td></td>
<td>5,000</td>
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<tr>
<td>Access Road/Fencing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40,000</td>
</tr>
<tr>
<td>Foundation/Cement</td>
<td>20</td>
<td>C.Y.</td>
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<td></td>
<td>107,800</td>
</tr>
<tr>
<td>Sandblasting/Prin/interior/Exterior</td>
<td>15,400</td>
<td>S.F.</td>
<td></td>
<td></td>
<td>384,700</td>
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### Piping to French Drain:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Material Cost</th>
<th>Labor Cost</th>
<th>Engineering Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effluent Pump, 500 gpm @ 10 TDH</td>
<td>3</td>
<td>Each</td>
<td></td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>Trench Excavation/Backfill</td>
<td>400</td>
<td>C.Y.</td>
<td></td>
<td></td>
<td>16,000</td>
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<tr>
<td>8&quot; PVC Pipe</td>
<td>1,200</td>
<td>L.F.</td>
<td></td>
<td></td>
<td>19,200</td>
</tr>
<tr>
<td>6&quot; perforated pipe</td>
<td>2,800</td>
<td>L.F.</td>
<td></td>
<td></td>
<td>28,000</td>
</tr>
<tr>
<td>Gravel/Backfill</td>
<td>5,200</td>
<td>C.Y.</td>
<td></td>
<td></td>
<td>28,000</td>
</tr>
<tr>
<td>Cesspool</td>
<td>14</td>
<td>Each</td>
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<td></td>
<td>28,000</td>
</tr>
<tr>
<td>French Drain Excavation</td>
<td>5,200</td>
<td>C.Y.</td>
<td></td>
<td></td>
<td>28,000</td>
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</table>

### Effluent Line to Exist. Reservoir:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Material Cost</th>
<th>Labor Cost</th>
<th>Engineering Est.</th>
</tr>
</thead>
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<tr>
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APPENDIX B
OPERATING COSTS
OPERATING COSTS

A. Private Water System

1. Assumptions
   a. Cost of pumping water 25 cents/million foot gallons
      (1972, BWS = 12 cents; in 1975, BWS = 16.8 cents; in 1977, BWS = 19 cents)
   b. 1.05 MGD pumped to lower system from Well 291.
   c. 1.05 MGD pumped to high system from new well.
   d. One full time manager/operator @ $1200 per month.
   e. One full time meter reader/billing clerk @ $1000 per month.
   f. One half time maintenance man @ $500 per month.
   g. One part time typist @ $300 per month.

2. Computations
   a. 1.25 MG x 250' x $.25 = $78.13
      upper system
   b. 1.25 MG x 450' x $.25 = $140.63
      $218.75
   c. Average of 2 repairs/mo. @ $1000 = $2000/30 days = 66.67
   d. Salaries $3000/month/30 days = 100.00
   e. 2 vehicles @ $350/month = 700/30 days = 23.33
      Daily Water Costs = $408.75
3. Water Usage

Average daily usage = 2.50 million gallons

\[ \frac{408.75}{2500} \text{ thousands} = \frac{0.164}{\text{thousand gallons}} \]

Note: No capital recovery would be obtained from Board of Water Supply therefore no capital recovery computed here.

Private: Cost of Water to Consumers = 17 cents/thousand

BWS: Cost of Domestic Water = 64 cents/thousand

BWS: Cost of Irrigation Water = 51 cents/thousand

OPERATING COSTS

B. Private Treatment & Disposal System

1. Assumptions:

   a. 250,000 gallons of wastewater treated and pumped to 450' elevation for irrigation.

   b. Cost of treatment = 30 cents per 1000 gallons.

   c. Cost of pumping = 25 cents per million foot gallons.

   d. Two full time operators @ $1100 per month.

   e. One half time maintenance man @ $500 per month.

   f. One part time typist @ $300 per month.

2. Computations

   a. Treatment: \[ 250 \times 0.30 \] = $75.00/day

   b. Pumpage: \[ 0.250 \times 0.25 \times 450' \] = 28.13/day

   c. Salaries $3000/month / 30 days = $100.00/day
d. 2 vehicles @ 400/month = $800/30 = $ 26.63/day  
DAILY SEWERAGE COSTS  
229.76  
COSTS $229.76 x 30 days = $ 6,893.00/MO.

4. SEWERAGE CHARGES

a. Subdivision lots sewer charge $8.00/mo.  
330 lots x $8.00 = $ 2,640.00  
Effluent Irrigation Water @ 20/cents/thousand @ 250,000/day =  
.20 x 250 x 30 = $ 1,500.00

Wastewater Income $4,140.00
Wastewater Treatment Loss/month $3,660.00/MO.

C. RECOMMENDATION

Rather than raise sewerage charges above $8.00 per month it is suggested that water charges be established at 20 cents per 1000 gallons. With water charges about 1/3 that of the Board of Water Supply, your rates would be considered reasonable while a $10.00 or $12.00 per month sewerage charge would appear excessive.

Combined Sewer and Water Costs would be:

1. Water $408.75 x 30 = $12,262.50/MO.
2. Sewerage $229.76 x 30 = $6,893.00/MO.

$19,155.50/MO.
Combined Sewer and Water Income would be:

1. Service charges for Sewerage = $2,640.00/mo.
2. Sale of Effluent @ $.20/1000 gallons = 1,500.00/mo.
3. Sale of Water @ $.20/1000 gallons @ 2.50 MGD average for a year
   
   2500 (1000/day) x 30 days x $.20 = 15,000.00/mo.
   
   $19,140.00/mo.

At the charge rates indicated herein, the income very nearly balances the expenses. Initially the operating costs will be lower than indicated simply because less water is pumped. As the pumping costs increase and the quantity pumped increases, a small 3 to 5 cent increase in water rates may be required.
The cesspools shall be... The exact depth and diameter of Health and it shall be contact them and make the tract shall have a reinforced Plans. A manhole shall be to cover with galvanized handle. ss than 18 inches below finished equivalent will be backfilled.

antity of cesspools constructed and paid for shall be the actual s ordered and accepted by the a depth of 30 feet to be paid lineal feet acceptably constructed he ground surface to the bottom

f cesspools measured as provided contract bid price for:

urface to a depth cover."
DIVISION OF WATER RESOURCE MANAGEMENT

FROM: [Signature] DATE: \✓✓✓ FILE IN: 

TO: INITIAL: PLEASE: REMARKS:

[ ] M. TAGOMORI [ ] See Me [ ] S. Kokubun
[ ] D. Lum [ ] Take Action By [ ] D. Hamada
[ ] G. Matsumoto [ ] Route to Your Branch [ ] L. Nanbu
[ ] G. Akita [ ] Review & Comment [ ] F. Ching
[ ] L. Chang [ ] Draft Reply [ ]
[ ] Y. Shiroma [ ] Acknowledge Receipt [ ]
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[ ] E. Sakoda 12/8/88 [ ]
[ ] D. Nakano [ ]
[ ] W. Rozeboom [ ]
[ ] S. Samuels [ ]
[ ] R. Chung [ ]
[ ] A. Monden [ ]
[ ] H. Young [ ]
[ ] R. Suzuki [ ]
[ ] N. Kaneshiro [ ]

PLEASE:

SEE ME

TAKE ACTION BY

ROUTE TO YOUR BRANCH

REVIEW & COMMENT

DRAFT REPLY

ACKNOWLEDGE RECEIPT

XEROX ___ COPIES

FILE

MAIL

FOR INFORMATION

[ ] S. Kokubun
[ ] D. Hamada
[ ] L. Nanbu
[ ] F. Ching

[ ] M. TAGOMORI
[ ] D. Lum
[ ] G. Matsumoto
[ ] G. Akita
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[ ] S. Samuels
[ ] R. Chung
[ ] A. Monden
[ ] H. Young
[ ] R. Suzuki
[ ] N. Kaneshiro
Mr. William W. Paty, Chairperson
Department of Land and Natural Resources
Commission on Water Resource Management
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Public Notice on Well Permit Applications for Pearl Harbor and Waialua Groundwater Management Areas

Thank you for the public notices on these wells scheduled for publication in the Star Bulletin. Mayor Fasi sent us his copy of the public notice and called it to our attention. We subsequently received our copy on November 15, 1988. We have no comments regarding the permits.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer
State of Hawaii  
DEPARTMENT OF LAND & NATURAL RESOURCES  
DIVISION OF WATER AND LAND DEVELOPMENT  
DRILLER'S REPORT

DESCRIPTION

Date of report: December 8, 1980  
Person filing report: Douglas O. Craddock

A. OWNER Mokuleia Homesteads  
NAME: Mokuleia Well #2  
ISLAND: Oahu

B. GENERAL LOCATION: Mokuleia, Oahu, Hawaii

C. DRILLING COMPANY: Water Resources International, Inc.

D. TYPE OF RIG: Rotary  
DRILLING COMPLETED: D. Craddock

E. ELEVATION, msl: Top of drilling platform 378 ft.  
Bench mark and method used to determine

Height of drilling platform above ground surface 12 ft. elevation:

F. HOLE SIZE:  
in. dia to ft. below drilling platform. 453

in. dia to ft. below drilling platform.

G. CASING INSTALLED:  
14 in. I.D. x 3/8 in. wall solid section to 400 ft. below drilling platform.

14 in. I.D. x .312 in. wall perforated section to 440 ft. below drilling platform.

Type of perforation: Full flow louver

H. ANNULUS: Grouted 0 ft. to 435 ft. below drilling platform.

Gravel packed ft. to ft. below drilling platform.

I. PERMANENT PUMP INSTALLATION:

- Pump type, make, serial no.  
- Motor type, H.P., voltage, r.p.m.
- Depth of pump intake setting ft. below  
which elevation is ft.
- Depth of bottom of airline ft. below  
which elevation is ft.

HYDROLOGY

J. INITIAL WATER LEVEL: 357.5 ft. below drilling platform.  
Date of measurement: December 8, 1980

K. INITIAL CHLORIDE: 32 ppm, total depth of well 451 ft. below drilling platform  
Date: December 8, 1980

L. PUMPING TESTS:

Date: December 8, 1980  
Reference point (R.P.) used: casing which elevation is 357.53 ft.

Start water level 347.9 ft. below R.P.  
End water level 347.9 ft. below R.P.

Depth of well 451 ft. below R.P.

Ellapsed Time (hours)  
Rate (gpm)  
Draw-down (ft)  
Cl- (ppm)  
Temp.  
0.0 to 15  
635  
3.47  
32  
68.8  
1.0 to 15  
860  
5.51  
32  
68.8  
1.5 to 15  
1205  
8.20  
32  
68.9  
2.0 to 15  
1600  
12.82  
32  
68.9  
2.5 to 15  
1900  
15.85  
32  
68.9  
3.0 to 15  
2450  
21.85  
32  
68.9  
3.5 to 15  
3000  
27.85  
32  
68.9  
4.0 to 15  
3300  
27.85  
32  
68.9

Ellapsed Time (hours)  
Rate (gpm)  
Draw-down (ft)  
Cl- (ppm)  
Temp.  
2.5 to 16.5  
1400  
10.85  
32  
68.8  
16.5 to 17.5  
1400  
10.85  
34  
68.8  
17.5 to 18.5  
45  
34  
68.8  
18.5 to 19.5  
45  
34  
68.8  
19.5 to 20.5  
45  
34  
68.8  
20.5 to 21.5  
45  
34  
68.8

M. DRILLER'S LOG:

Depth, ft.  
Rock Description & Remarks  
Water Level, ft.  
Depth, ft.  
Rock Description & Remarks  
Water Level, ft.

0.0 to 40  
Clay and boulders  
Clay and boulders  
0.0 to 40

41.0 to 80  
Hard basalt  
0.0 to 40

81.0 to 190  
Med. weathered rock  
0.0 to 40

191.0 to 275  
Hard rock  
0.0 to 40

276.0 to 330  
Hard rock w/soft layers  
0.0 to 40

331.0 to 360  
Soft  
0.0 to 40

361.0 to 380  
Med., hard  
0.0 to 40

381.0 to 445  
Med., hard w/soft layers  
0.0 to 40

446.0 to 465  
Med., hard w/soft layers  
0.0 to 40

466.0 to 585  
Med., hard w/soft layers  
0.0 to 40

N. REMARKS:

FOR DRILLER'S USE

Mokuleia  
Job Name: Well #2  
Job No.: 243

FOR OFFICIAL USE

Latitude 21° 33' 47"  
Longitude 158° 10' 29"

Well No.: 3310-02
WELL DRILLING PERMIT
for
State Well No. 3310-02
Mokuleia, Oahu

TO: Mokuleia Homesteads
c/o Russ Smith Corporation
677 Ala Moana Blvd., Suite 1000
Honolulu, Hawaii 96813

You are hereby granted permission to drill a second well (State Well No. 3310-02) at Mokuleia Homesteads, Tax Map Key 6-8-03:5, in accordance with Department Regulation 9.

Upon completion and testing of the well, the following shall be submitted:

1. Driller's Well Completion Report within 60 days after completion.
2. Record of the pumping test data within 60 days after completion.
3. Monthly pumpage records after well is put into production.

Susumu Ono, Chairman
Board of Land Natural Resources

November 17, 1980
Date of Issuance
WELL DRILLING PERMIT
for
State Well No. 3310-02
Mokuleia, Oahu

TO: Mokuleia Homesteads
  c/o Russ Smith Corporation
  677 Ala Moana Blvd., Suite 1000
  Honolulu, Hawaii 96813

You are hereby granted permission to drill a second
well (State Well No. 3310-02) at Mokuleia Homesteads, Tax
Map Key 6-8-03:5, in accordance with Department Regulation

Upon completion and testing of the well, the following
shall be submitted:

1. Driller's Well Completion Report within 60 days
   after completion.

2. Record of the pumping test data within 60 days
   after completion.

3. Monthly pumpage records after well is put into
   production.

Susumu Ono, Chairman
Board of Land Natural Resources

November 17, 1980
Date of Issuance

cc: Honolulu BWS
Mr. Robert Chuck  
Manager and Chief Engineer  
Department of Land and Natural Resources  
Division of Water and Land Development  
P. O. Box 373  
Honolulu, Hawaii 96809

Dear Mr. Chuck:

Subject: Well Drilling Permit to Mokuleia Homesteads (a Joint Venture) at TMK: 6-8-03: 05

Attached for your information and files are copies of the well drilling application and permit issued to Mokuleia Homesteads (a Joint Venture) to drill a second well in Mokuleia, TMK: 6-8-03: 5.

Should you have any questions regarding this permit, please call Chester Lao at [redacted]

Very truly yours,

HERBERT H. MINAKAMI  
Chief, Planning and Engineering Division

Attach.
TO: Mr. T. Clifford Melim, Jr.
Mokuleia Homesteads
c/o The Russ Smith Corporation
677 Ala Moana Boulevard
Suite 1000
Honolulu, Hawaii 96813

Your application of September 9, 1980 has been approved in accordance with Chapter III of our Rules and Regulations for the Protection, Development and Conservation of Water Resources in the City and County of Honolulu.

You are hereby granted a permit to drill and test an exploratory well at TMK: 6-8-03:05 at the location shown in the plans and in accordance with the well drawing submitted with the application.

This permit is granted subject to the Rules and Regulations of the Board of Water Supply and the following conditions:

1. Please notify Chester Lao, phone [redacted] of the Board of Water Supply before any work covered by this permit commences.

2. This permit will be valid upon receipt by the Board of Water Supply of a permitee bond in the amount of $25,000.00 in accordance with Chapter III, Sec. 3-305 of these Rules and Regulations.

3. As-built drawings shall be submitted to the Board of Water Supply upon completion of the well.

4. Pump test results shall be submitted to the Board of Water Supply, including water analyses of samples taken during the test.

5. A geologic log of the formations encountered shall be submitted to the Board of Water Supply upon completion of the well.

6. This permit only covers the drilling and testing of an exploratory well. If this well is used for production purposes, the owner must apply for a Well Use Permit.

Pure Water... man's greatest need — use it wisely
7. This permit does not commit the Board of Water Supply to convey any quantity of use to this exploratory well should it prove successful.

KAZU HAYASHIDA
Manager and Chief Engineer
Board of Water Supply

SEP 24 1980
Date of Permit
Board of Water Supply  
Planning and Research Division  
City & County of Honolulu  
630 South Beretania Street  
Honolulu, Hawaii 96813

Gentlemen:

SUBJECT: APPLICATION FOR DRILLING WELL NO. 2  
Mokuleia, Oahu, Hawaii

Enclosed herewith please find a BWS Form WR 900 (Rev. 10-76), completed and signed by Mokuleia Homesteads, for drilling a well at Mokuleia, Oahu. Also enclosed is a check for $100 to cover the permit fee.

Also accompanying the signed application is the map showing the proposed site of Well No. 2 some 450 feet north of Well No. 1. It is the intent to use one well as a domestic production well while the other serves as a standby. The size and specifications for this well will be identical to Well No. 1. The drilling will be by Water Resources International, the successful bidder for Well No. 1. Should you have any questions on this project, please contact the undersigned, or David Yogi, Jr. at our office, phone

Very truly yours,

THE RUSS SMITH CORPORATION

[Signature]
Russell L. Smith, Jr.

RLS/aw

Enclosures: Application and Check  
Attachment: Map of Area
APPLICATION FOR DRILLING, MODIFYING, RECASING OR REUSING WELLS

INSTRUCTIONS: Please send 1 copy to Honolulu Board of Water Supply, who will distribute to other agencies concerned. In filling out, refer to Rules and Regulations of the Honolulu Board of Water Supply adopted on May 10, 1976 and applicable rules and regulations of the State Department of Health.

OWNER: (See BWS Rules and Regulations Chapter III, Sec. 3-305, Item 1a)

Mokuleia Homesteads (a Joint Venture)

ADDRESS: 333 Queen Street, Suite 605

Honolulu, Hawaii 96813

1. APPLICATION FOR WELL: (See Chapter III, Sec. 3-305, Item I)

Drill X Reuse ____

Modification ____ Recase ____

Change in use ____

2. WORK TO BE PERFORMED BY: (See Chapter III, Sec. 3-311)

Water Resources International, under the direction of

The Russ Smith Corporation, consulting engineers, acting for Mokuleia Homesteads.

900 (Rev. 10-76)
3. USE OF WELL: (See Chapter III, Sec. 3-305, Item 1c)

Alternate source (standby) for Agricultural Subdivision
proposed on Mokuleia Homesteads. Depending on well characteristics,
this well, or present well being completed will be primary source.

One well will be used as a standby.

4. ATTACHMENTS: (Each copy of the application shall have a complete set of attachments)

a. Location of well: Within Peacock Flats Gulch in Mokuleia

Tax Map Key: 6-8-03:5

b. Land area served: (Attach map showing exact location of well and area served. See Chapter III, Sec. 3-305, Items 1b and 1d)

See attached map showing both well sites.

c. Description of well and appurtenant details:
(See Chapter III, Sec. 3-305, Item 1e)

The proposed site lies approximately 2,000 feet from the
property boundary of Tax Map 6-8-03:5. The site drawings
are attached. The specifications and order of work will be
duplicates of the first well. This well lies approximately
450 feet north of the first well, drilled under the May 1,
1980 permit.
5. The Owner hereby agrees to install, operate, and maintain control of the well in accordance with the laws of the State of Hawaii and the Rules and Regulations of the Honolulu Board of Water Supply and the State Department of Health.

The Owner hereby understands that a fee of One Hundred Dollars ($100.00) and a permittee bond of the amount not greater than Twenty-five Thousand Dollars ($25,000.00), said amount of the bond to be set by the Engineer, are required for the drilling or excavation of each new well. The $100.00 fee per well shall be payable to the Board and shall accompany this application. The amount of the permittee bond shall be stipulated when the well owner is notified that his permit has been granted.

*(See Chapter III, Sec. 3-305, Items 2 and 2a)*

6. The Owner hereby agrees to the following special conditions for this well:

The well will be drilled, tested, cased or sealed, as the results of the test pumping indicate in compliance with the Proposal and Specifications for the Drilling and Testing of a Water Well.

If the well is successful, it will serve as a standby well to the adjacent well recently drilled and presently undergoing testing.

Mokuleia Homesteads (a Joint Venture)
Melim Limited - General Partner
by Melim Ltd.

September 10, 1980
Date Submitted

by T. Clifford Melim, Jr., President

Name of applicant if other than Owner