## Log of Well No.

4360 Worth Street
Los Angeles, Cal.

### WELL CONTRACTORS

Log of Well No. Drilled for Bell, Collins & Associates, Ltd.

### REMARKS

Exact Location: Kawaihae, Hawaii

Started Work: May 27, 1971

Completed Work: June 14, 1971

### TOTAL DEPTH

- Size of pipe: 1 1/2 in. or gauge casing used: 4 in. left in Well

### TYPE OF PERFORATOR USED

- Type of Perforator used: NONE

### PERFORATED

- Perforated: ft to ft

<table>
<thead>
<tr>
<th>ft from</th>
<th>ft to</th>
<th>Holes per</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DIAMETER OF PERFORATION

<table>
<thead>
<tr>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### LENGTH OF PERFORATIONS

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### DEPTH AT WHICH WATER WAS FIRST FOUND

<table>
<thead>
<tr>
<th>ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### STANDING LEVEL BEFORE PERFORATING

<table>
<thead>
<tr>
<th>ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### STANDING LEVEL AFTER PERFORATING

<table>
<thead>
<tr>
<th>ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### NOTE BELOW YOUR OBSERVATION OF ANY CHANGE IN WATER LEVEL WHILE DRILLING

### WATER LEVEL WHEN FIRST STARTED

<table>
<thead>
<tr>
<th>ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### DRAW DOWN FROM STANDING LEVEL

<table>
<thead>
<tr>
<th>ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### NO. OF GALLONS PER MINUTE PUMPED WHEN TEST FIRST STARTED

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### NO. OF GALLONS PER MINUTE PUMPED WHEN TEST COMPLETED

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### DRAW DOWN AT COMPLETION OF TEST

<table>
<thead>
<tr>
<th>ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### HOURS TESTING WELL

### FORMATION: Mention size of water gravel

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 ft.</td>
</tr>
<tr>
<td>1</td>
<td>2 ft.</td>
</tr>
<tr>
<td>2</td>
<td>3 ft.</td>
</tr>
<tr>
<td>8</td>
<td>4 ft.</td>
</tr>
<tr>
<td>40</td>
<td>5 ft.</td>
</tr>
<tr>
<td>65</td>
<td>6 ft.</td>
</tr>
<tr>
<td>68</td>
<td>7 ft.</td>
</tr>
</tbody>
</table>

### Diagram

- Make diagram of perforations in square, showing dimensions.
Tom Nance Water Resource Engineering

ROY HARDY - CWRM

To: Roy Hardy

Original [ ] will [ ] will not be mailed to you.

From: Tom Nance

Subject: South Korean Water Users Group

Date: Jan. 31, 2000

Fax No.: 6

No. of Pages: 9 (including header)

Facsimile Header

(1) Copy of the signed Memorandum of Understanding (pp. 2-5)

(2) Unsigned copy of Policies and Procedures (pp. 6-9)

680 Ala Moana Boulevard, Suite 406 - Honolulu, Hawaii 96813-5411 - Phone: (808) 538-1141 - Fax: (808) 538-7757

[Handwritten note:]

Ryan - Peril this. Should put copies in relevant Blg Island well folders
MEMORANDUM OF UNDERSTANDING BETWEEN MAUNA
KEA PROPERTIES, INC., MAUNA LANI RESORT, INC.,
NANSAY HAWAII, INC. AND WAIKOLOA LAND COMPANY
ON COOPERATIVE REGIONAL WATER DEVELOPMENT

Mission Statement

To work jointly and cooperatively in developing and implementing a regional water plan which best serves the collective water needs of the parties and others within the region in a manner acceptable to relevant governmental authorities.

Objectives

The parties to this Memorandum of Understanding (collectively referred to as "South Kohala Water Study Group" or "Group") acknowledge and agree that it is in their long-term best interests to achieve the Mission set forth above in the following manner:

• Reach agreement on a regional plan for the development of sources and distribution systems for potable, non-potable water and effluent reuse;

• Form and establish, as equity participants, a private, regional water company or companies for the development, production, distribution and sale of potable, non-potable and effluent reuse resources serving the parties and others within the region;

• Reach bilateral and multilateral agreements achieving the staged implementation of the regional water plan;

• Publicly support and consider the commitment to the conditional, partial funding of the County of Hawaii Department of Water Supply's (DWS) development of its planned North Kohala Pipeline;

• Develop a Water Commitment Policy, which is incorporated herein by reference, containing guidelines and requirements for each Group Member securing a sufficient supply of water for actual use in accordance with a realistic timetable;
Coordinate the activities of the Water Study Group with all relevant State of Hawaii authorities, including but not limited to its Water Commission, in a manner which promotes and preserves the Group's ability to deal with regional water issues on a collective basis;

Communicate, where appropriate, with other interested parties within the region;

Enter into subsequent joint agreements intended to implement the objectives adopted herein.

Governance

The activities of the Group shall be governed and coordinated through an Executive Committee comprised of a designated representative of each signatory to this Memorandum of Understanding.

The Group Executive Committee shall:

- Approve all policies, agreements and expenditures made on behalf of the Group; provided, that if the representative of any Group member specifically disapproves of any such expenditure, that Group member shall be excused from its pro rata share of such expenditure;

- Approve the inclusion of additional members to and approve, except member in question, for the exclusion of existing members from the Water Study Group;

- Approve public statements and testimony regarding Water Study Group activities;

- Develop and approve an annual operating budget, project budgets and the individual party's obligations to fund the operations and the development of these planned projects;

- Be kept informed of all agreements entered into between Water Study Group members affecting the Group's Mission and Objectives;

- Coordinate all contact regarding the activities of the Water Study Group with governmental agencies;
Direct and approve the activities of all consultants retained by the Water Study Group relating to its stated Mission and Objectives.

All decisions of the Group shall be by the majority of the members of the Executive Committee except for "key decisions" which require unanimous approval. Key decision include approval of the annual operating budget and individual members obligation to fund operations or make contributions to the development of planned projects, expenditures which are outside of the approved budget in excess of $5,000 in any single case or $25,000 in the aggregate and the addition of any new member to the Executive Committee.

Dispute Resolution

It is acknowledged that from time to time, disputes and disagreements may arise between the parties to this Memorandum of Understanding regarding regional water issues and that it is in their long-term collective best interests that such disputes be resolved without resort to governmental or judicial involvement.

The parties agree that they shall use their individual and collective best efforts to resolve any and all outstanding issues covered by this Memorandum. The parties further agree that in the event negotiations fail to result in acceptable agreement or resolution, they may voluntarily submit outstanding issue(s) to binding or nonbinding arbitration pursuant to terms agreed to by the parties.

North Kohala Pipeline

The parties agree to support the concept of a North Kohala pipeline transporting potable water to South Kohala being pursued by the Department of Water Supply, County of Hawaii.

In the event that the parties are reasonably satisfied that the North Kohala pipeline will be built, but no later than the start of construction, individual signatories to this agreement shall commit, on a fair and equitable basis, to the partial funding of said pipeline under acceptable terms and conditions to be negotiated.
Termination/Withdrawal

A majority of the members of the Group may terminate the Group and joint obligations contained in this Memorandum of Understanding. Individual Group members may withdraw from the South Kohala Water Study Group upon written notice to other members; provided, that members shall remain liable for their or its pro-rata share of costs of operations per the approved budget or amendments thereto, incurred during their membership or prior to withdrawal, as the case may be.

This Memorandum of Understanding is entered into this 4th day of February, 1995.

MAUNA KEA PROPERTIES, INC.

By ____________________________

Its ______________

NANSAY HAWAII, INC.

By ____________________________

Its ______________

MAUNA LANI RESORT, INC.

By ______________

Its ______________

WAIKOLOA LAND COMPANY

By ______________

Its ______________
DRAFT
Water Commitment Policies and Procedures
of the
South Kohala Water Users' Group
Revised: [February 4, 1993]
March 9, 1993

The South Kohala Water Users Group ("Group") recognizes the need to develop a coherent set of policies and procedures for the development of groundwater to ensure maximum beneficial use of this limited resource, avoid conflicts among users, and facilitate the timely development of water tied to actual use. The parties to this document agree to abide by the policies and procedures it contains and encourage the State Commission on Water Resource Management ("Commission") to evaluate all drilling and pump installation permits received from other water users in the basin by the same criteria.

POLICIES

1. The group recognizes that all parties need assurance of the availability of water for their developments. The group further recognizes that such assurances can occur only if it is agreed to by all parties.

2. All drilling, well modification, and pump installation permits will be submitted to the Group for its approval prior to submission to the Commission. The Group's approval shall be based on the applicant's conformance with these policies, and the procedures listed below. The Group's approval shall not be unreasonably withheld if such conformance is demonstrated.

3. To minimize excessive use of groundwater, all effluent from sewage treatment plants shall be reused for irrigation unless it can be conclusively demonstrated to be physically and/or economically impractical for the developer of the irrigation supply or the ultimate user of the water.
4. All new landscaping, including golf course turfgrass, will be designed and implemented to minimize irrigation use. Efforts toward this end shall include choosing appropriate plant materials, use of proper soil types and thickness, and avoiding excessive turfgrass areas. Any new 18-hole golf course shall not use more than 0.75 MGD on year-round average nor more than 1.00 MGD over any seven-day period.

5. All new hotel, residential, commercial, and industrial development shall be designed to minimize water use and shall include appropriate water saving devices.

6. Drilling permits should be supported if consistent with the Water Resource Plan as they provide much needed information about this region's aquifer.

7. [Drilling and] Pump installation permits shall not be sought more than two years in advance of actual need [to avoid creating false shortages of supply and inappropriate positioning for the resource, potentially denying others their fair and equitable use].

8. Members of the Group agree to devise water use standards for consumption of potable and irrigation water use in order to implement these policies.

9. It is recognized that agreements between two or more parties may be necessary to facilitate respective water development. [Such agreements shall be consistent with these policies and procedures.]

PROCEDURES

1. All applications for drilling, well modification, and pump installation permits, including extensions of these permits, will be submitted for review and approval by the Group to ensure conformance with the Intent of the Group's policies and [master] water resource plan prior to submittal to the Commission.

2. To initiate the Group's review, application will be submitted with the following supporting information:

   a. Quantity [and timing] of potable and/or non-potable supply requirements, including the basis for these projections (unit counts, acreage, etc.).
b. Measures taken to avoid excessive potable and/or non-potable water use.

c. Exact location of the water uses, including land use plans, TMKs, etc.

d. Approved State land use designation; County General Plan designation; County zoning; use permit for district use; and the prospective land use approvals, including subdivision, needed to achieve the desired land use.

e. The project's site specific water master plan for potable and not potable water shall be submitted.

f. Exact location, dimensions, and pump capacity of the well (or wells) to be developed to meet these supply requirements.

g. A development schedule indicating the date of actual water use.

3. The Group's review and response to the application shall be completed within 45 days. The response shall judge the application's conformance with these policies and with the South Kohala Water [Master] Resource Plan, [the appropriateness of the timing of the application] and the [Unless there are compelling reasons otherwise, the timing of an application shall be deemed inappropriate unless all land use approvals through and including County zoning have been received and the actual use of water, based on a firm schedule, is to begin within two years.] Listed below are specific criteria of the Group's review of applications.

   a. If conformance with these policies and procedures is demonstrated [and the timing of the application is appropriate] the Group's approval shall not be unreasonably withheld.

   b. If the application fails to meet the standards for acceptability set out herein, no submittal of the application to the Commission shall be made until revisions satisfactory to the Group are made.

   c. The Group's approval for a pump installation permit shall be given only after tentative subdivision approval for the project to be served has been given.

   d. If a proven water source is a condition of County zoning or use permit approvals, the Group's approval of a well construction permit shall be given only if evidence of the actual water use within two years is provided.]
These Water Commitment Policies and Procedures are entered into this day of __________, 1993.

Mauna Kea Properties, Inc.
By: ______________________
    Its

Nansay Hawaii, Inc.
By: ______________________
    Its

Mauna Lani Resort, Inc.
By: ______________________
    Its

Waikoloa Land Company
By: ______________________
    Its
TO FILE

DATE 2/27/94  TIME

WHILE YOU WERE OUT

M Ray Seaver, Director of Engineering
of Mauna Kea Beach Resort

Phone

<table>
<thead>
<tr>
<th>TELEPHONED</th>
<th>PLEASE CALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALLED TO SEE YOU</td>
<td>WILL CALL AGAIN</td>
</tr>
<tr>
<td>WANTS TO SEE YOU</td>
<td>URGENT</td>
</tr>
</tbody>
</table>

RETURNED YOUR CALL

Message This well has been capped and reported to Port Westerfield Br.

Signatures

Operator
## NOTICE OF INTENT TO DRILL

**WELL NAME**: OULI #5 IRRIGATION  
**ISLAND**: HAWAII

### OWNER OF WELL
- **NAME**: MAUNA KEA BEACH HOTEL - O'AHU HANA CORP.  
- **MAILING ADDRESS**: KAWAHA'EA, HI.

### DRILLING COMPANY
- **NAME**: WATER RESOURCES INT'L, INC.  
- **MAILING ADDRESS**: 2828 PAA ST. HONOLULU.

### PROPOSED USE OF WELL:

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Domestic</td>
<td></td>
</tr>
<tr>
<td>(b) Irrigation</td>
<td>OF GOLF COURSE</td>
</tr>
<tr>
<td>(c) Industrial</td>
<td>TYPE</td>
</tr>
<tr>
<td>(d) Cooling</td>
<td>TYPE</td>
</tr>
<tr>
<td>(e) Disposal</td>
<td>TYPE</td>
</tr>
<tr>
<td>(f) Other</td>
<td>SPECIFY</td>
</tr>
</tbody>
</table>

### PROPOSED CONSTRUCTION AND COMPLETION DATES:
- **Proposed Construction Date**: NOV 15 - 72  
- **Proposed Completion Date**: DEC 30 - 72

### LOCATION OF WELL:
- Attach copy of USGS topographic map, plantation field map, road map, or prepared drawing showing exact location. If not available, prepare a hand-drawn sketch map (not necessarily to scale) in the space below showing sufficient landmarks, distances, and directions for location in the field.

### DRAWINGS ATTACHED:
- 2 SETS DRAWINGS ATTACHED

### Date Submitted:
- **Oct 26 - 72**

### Signature of Owner:
- W. R. Fradette

### Title (If Applicable):
- Owner

---

**FOR OFFICIAL USE**
- **Latitude**
- **Longitude**
- **Well No.**

**FOR DRILLER'S USE**
- **Job Name**: OULI #5  
- **Job No.**: 82

**INSTRUCTIONS**: Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 373, Honolulu, HI 96809.

FROM: W.R. Craddick

TO: Dan Lum
    Dept. of Land and Natural Resources
    Div. of Water & Land Development

DATE: October 27, 1972

SUBJECT: Notice of Intent to Drill
     Ouli Well #5, Our Job #82
     Mauna Kea Beach Hotel

Dan:

Enclosed please find tax map key and Notice of Intent to Drill for the above referenced Job.

Very truly yours,

W.R. Craddick,
Vice-President, Operations

WRC/sjw
NOTICE OF INTENT TO DRILL

WELL NAME: None
ISLAND: Hawaii

OWNER OF WELL: Mauna Kea Beach Hotel
Mailing Address: Kamuela, HI

DRILLING COMPANY: Water Resources Intl, Inc.
Mailing Address: 2028 Paa St, Honolulu

Proposed Construction Date: July 5-72
Proposed Completion Date: July 11-72

PROPOSED USE OF WELL:
(a) Domestic
(b) Irrigation
(c) Industrial (type)
(d) Cooling (type) Air Conditioning
(e) Disposal (type)
(f) Other (specify)

LOCATION OF WELL: (Attach copy of USGS topographic map, plantation field map, road map, or prepared drawing showing exact location. If not available, prepare a hand-drawn sketch map (not necessarily to scale) in the space below showing sufficient landmarks, distances, and directions for location in the field)

Date Submitted: July 17-72
Signature of Owner: Fredrick
Title (If Applicable): VP WRI

INSTRUCTIONS: Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 373, Honolulu, HI 96809.

### DESCRIPTION

<table>
<thead>
<tr>
<th>Date of report</th>
<th>July 5, 1972</th>
<th>Person filing report</th>
<th>Loran H. Runnels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WELL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. OWNER</td>
<td>Mauna Kea Hotel</td>
<td>NAME</td>
<td>ISLAND Hawaii</td>
</tr>
<tr>
<td>B. GENERAL LOCATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. DRILLING COMPANY</td>
<td>slope Moss Company</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. TYPE OF RIG</td>
<td>Cable Tool</td>
<td>DRILLING COMPLETED</td>
<td>6-72</td>
</tr>
<tr>
<td>E. ELEVATION, msl: Top of drilling platform</td>
<td>75 ft approx. ft.</td>
<td>Bench mark and method used to determine</td>
<td></td>
</tr>
<tr>
<td>Height of drilling platform above ground surface</td>
<td></td>
<td>ft. elevation:</td>
<td></td>
</tr>
<tr>
<td>F. HOLE SIZE:</td>
<td>22 inch dia. to 40 ft below drilling platform.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 inch dia. to 93 ft below drilling platform.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 inch dia. to 93 ft below drilling platform.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. CASING INSTALLED:</td>
<td>18 in. I.D. x 250 in. wall solid section to 40 ft below drilling platform.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 in. I.D. x 250 in. wall solid perforated section to 40 ft below drilling platform.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type of perforation</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>H. ANNULUS: Grouted</td>
<td>0 ft. to 40 ft. below drilling platform.</td>
<td>Gravel packed</td>
<td>ft. below drilling platform.</td>
</tr>
<tr>
<td>I. PERMANENT PUMP INSTALLATION:</td>
<td></td>
<td>Capacity</td>
<td>g.p.m.</td>
</tr>
<tr>
<td>- Pump type, make, serial no.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor type, H.P., voltage, r.p.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth of pump intake setting</td>
<td>ft. below</td>
<td>which elevation is</td>
<td>ft.</td>
</tr>
<tr>
<td>Depth of bottom of airline</td>
<td>ft. below</td>
<td>which elevation is</td>
<td>ft.</td>
</tr>
</tbody>
</table>

### HYDROLOGY

| Date | June 26, 1972 |
| Date | June 26, 1972 |
| Start water level | 75 ft. below R. P. |
| End water level | 93 ft. below R. P. |
| Depth of well | 93 ft. below R. P. |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.14 |
| Temp. ºF | 3.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 5.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 3.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 5.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 3.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 5.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 3.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 5.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 3.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 5.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 3.00 |
| Rate (gpm) | 125 |
| Downhole (ft) | 1.15 |
| Temp. ºF | 5.00 |

### SUBSURFACE FORMATION

<table>
<thead>
<tr>
<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
<th>Water Level</th>
<th>Depth, ft.</th>
<th>Rock Description &amp; Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 7</td>
<td>boulders &amp; brown soil</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>7 to 12</td>
<td>hard gray rock</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>12 to 18</td>
<td>red cinders</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>18 to 32</td>
<td>hard gray rock</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>32 to 45</td>
<td>red cinders</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>45 to 56</td>
<td>hard gray rock</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>56 to 70</td>
<td>red cinders</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>70 to 77</td>
<td>med. hard gray rock</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>77 to 88</td>
<td>hard gray rock</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>88 to 93</td>
<td>small loose rock</td>
<td>to</td>
<td>to</td>
<td></td>
</tr>
</tbody>
</table>

### N. REMARKS:

INSTRUCTIONS: Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 373, Honolulu, Hawaii 96809.


FOR OFFICIAL USE

Latitude: 21° 59' 21.4" N
Longitude: 155° 49' 58.4" W
Well No. 6049-64
NOTE:
CONTRACTOR SHALL PAINT ALL WELDED SURFACES AND UN-GALVANIZED MATERIALS WITH TWO COATS OF ASPHALT PAINT.
LOCATION OF ELECTRIC OUTLET CONNECTION
EXIST. SEWAGE TREATMENT PLANT
EXIST. SEWAGE TREATMENT FACILITY
LOCATION OF TEST WATER SOURCE (FIRE HYDRANT)

VICINITY MAP
SCALE: 1" = 200'

NEW EXFILTRATION WELL
SEE SHT. 3 FOR DETAIL

EXIST. 4" PVC PIPE FROM ST.P.
EXIST. AIR RELIEF VALVE
CONNECT NEW 4" PVC PIPE TO EXIST. AT A.R. VALVE.
EXIST. FENCE

PROPERTY LINE
ABANDON EXIST. 4" PVC PIPE

BENCH MARK
3/4" PIPE
ELEV. = 69.72

PLOT PLAN
SCALE: 1" = 80'

EXFILTRATION WELL
FOR
MAUNA KEA BEACH HOTEL
SOUTH KOHALA, HAWAI
OLOHANA CORPORATION

PREPARED BY: BELT, COLLINS & ASSOC., LTD.
DATE: APRIL 9, 1972
PROJECT LOCATION MAP

SEWAGE TREATMENT PLANT & SUPPORT FACILITY

KAWAIHAE HARBOUR

KAWAIHAE-WAIMEA RD.

KAWAIHAE 2nd

PROJECT LOCATION

MAUNA KEA BEACH HOTEL

GOLF COURSE

KAWAIHAE - PUUKO ROAD

OULI-LALAMIRO BDRY

LALAMIRO

GRAPHIC SCALE

TAX MAP KEY G-20
THIRD DIVISION

MAUNA KEA BEACH HOTEL
SOUTH KOKHALA
HAWAII
COLOHANA CORPORATION

MADE BY: BETT, COLLINS & ASSOC., LTD.
1-3-12, 1972
NOTICE OF INTENT TO DRILL

WELL NAME: Mauna Kea

OWNER OF WELL: Mauna Kea Beach Hotel

DRILLING COMPANY: Roscoe Moss Company

PROPOSED USE OF WELL:
(a) Domestic
(b) Irrigation
(c) Industrial (type)
(d) Cooling (type)
(e) Disposal (type)
(f) Other (specify)

LOCATION OF WELL: (Attach copy of USGS topographic map, plantation field map, road map, or prepared drawing showing exact location. If not available, prepare a hand-drawn sketch map (not necessarily to scale) in the space below showing sufficient landmarks, distances, and directions for location in the field)

Date Submitted: May 22, 1972

Signature of Owner:

Title (If Applicable):

FOR DRILLER'S USE

INSTRUCTIONS: Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 373, Honolulu, HI 96809.

TO:  Mr. Robert W. Page  

FROM: Derek Cockle  

Project 02A - Golf Course  
Irrigation Water - Salinity Tests  

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th></th>
<th>Well No. 2</th>
<th></th>
<th>Well No. 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr. 25</td>
<td>630 PPM</td>
<td></td>
<td>700 PPM</td>
<td></td>
<td>2240 PPM</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>640 &quot;</td>
<td></td>
<td>670 &quot;</td>
<td></td>
<td>2200 &quot;</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>640 &quot;</td>
<td></td>
<td>680 &quot;</td>
<td></td>
<td>2200 &quot;</td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauna (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.  
Mr. Ted Watson  
Mr. Robert Chuck  
Mr. Robert Iwamoto  
File - Salinity Tests  
File - Salinity Tests
TO: Mr. Robert W. Page
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr. 18</td>
<td>640 PPM</td>
<td></td>
<td>670 PPM</td>
<td></td>
<td>2240 PPM</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>640 &quot;</td>
<td></td>
<td>700 &quot;</td>
<td></td>
<td>2180 &quot;</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>630 &quot;</td>
<td></td>
<td>690 &quot;</td>
<td></td>
<td>2200 &quot;</td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauna (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. Robert Chuck
Mr. Robert Itamoto
Pile - Salinity Tests
ROUTE SLIP
DIVISION OF WATER AND LAND DEVELOPMENT

From: __________________ Date: 4/5/72 File in: __________________

To: Initial

Robert T. Chuck
Walter O. Watson
Takeo Fujii
James Yoshimoto
Albert Ching
Hong Fong Chang
George Morimoto
Manabu Tagomori
Dan Lum
Kazu Hayashida
Harold Sakai
Jane Sakai
Doris Hamada
Lorraine Nanbu
Jean Siarot
Elsie Yonamine

Please:

See me
Take action
Route to your branch
Review & comment
Investigate & report
Draft reply
Acknowledge Receipt
Type final
For filing
Xerox ______ copies

FOR YOUR:

Approval
Signature
Information
Initials

Remarks:

What action on this now? More fresh water involved
and it's a mile away from our existing well source.

Rated: 2
April 4, 1972

Department of Health
Environmental Health Division
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Attention: Mr. Shinji Soneda

Gentlemen:

Treated Waste Water Discharge at
Mauna Kea Beach Hotel
South Kohala, Hawaii

Enclosed are two preliminary sets of drawings and specifications for the installation of an exfiltration well at Mauna Kea Beach Hotel, disposing of the secondary treated sewage effluent. It is our understanding that the present waste water permit for the hotel, No. 664, dated August 11, 1971, will be valid to July 31, 1972. It is requested that you review the enclosed documents to determine if you have any objections to this proposed method of disposing the secondary treated effluent from the hotel. At present, the effluent is drained through a 4" PVC surface line to the ocean opposite the No. 3 green. Tests on the quality of the treated effluent have already been made and submitted to you in May, 1971, in the form of an application for permit for waste discharge, an unsigned copy of which is also enclosed.

Upon receipt of any comments you may have, we will endeavor to make the corrections and then submit these same documents to various contractors for construction proposals. When the final selection has been made, we will notify you of the successful contractor and the estimated schedule for construction.

By copy of this letter, we are submitting these same documents to the Board of Water Supply, County of Hawaii; and the Department of Land & Natural Resources, Division of Water & Land Development, State of Hawaii, for comments. Should you have any questions on the enclosures, please feel...
free to contact us at your earliest convenience in order that we may expedite the reviewing and construction work involved.

Very truly yours,

Donald H. Chung

cc:
Robert Chuck, Div. of Water & Land Rev.
Haru Fujimoto, Board of Water Supply

Encls.
April 3, 1967

TO: Mr. Robert W. Page
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
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<th>Well No. 2</th>
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<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 28</td>
<td>640</td>
<td>PPM</td>
<td>650</td>
<td>PPM</td>
<td>2300</td>
<td>PPM</td>
</tr>
<tr>
<td>30</td>
<td>630</td>
<td>*</td>
<td>660</td>
<td>*</td>
<td>2250</td>
<td>*</td>
</tr>
<tr>
<td>Apr. 2</td>
<td>650</td>
<td>*</td>
<td>670</td>
<td>*</td>
<td>2240</td>
<td>*</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck √
Mr. Robert Itamoto
File - Salinity Tests
CONTRACT SPECIFICATION AND PLANS

FOR

EXFILTRATION WELL

MAUNA KEA BEACH HOTEL

SOUTH KOHALA, HAWAII

OLOHANA CORPORATION

Prepared by

BELT, COLLINS & ASSOCIATES, LTD.
745 Fort Street, Suite 514
Honolulu, Hawaii 96813

April 3, 1972
INFORMATION AND INSTRUCTIONS TO BIDDERS

I. DRILLING THE WELL

A. General. One well shall be drilled at the location shown on the plan unless it does not exfiltrate the required amount of water in which case another well shall be drilled at a location indicated by the Engineer in the field. The well shall be drilled to a depth as ordered by the Engineer in the field but not to exceed 70' in depth.

The specific location as shown on the construction plans will be staked out by the Engineer at no expense to the contractor.

The contractor will estimate the time of completion in calendar days to be included on his bid proposal. The contractor shall begin his drilling operations immediately after the contract is signed as the date on the contract sets the starting date of the work to be done.

The Owner will obtain permission to enter and construct the well on the site. Should the construction of an access and/or the preparation of well site be required, the contractor shall be responsible for the construction of the access and/or the preparation of the site and shall include all costs of said road and/or site in the appropriate unit prices bid and no direct payment will be made therefor. Alignment of access to be approved by the Owner prior to construction.

The owner shall provide all the necessary power and water supplies that may be required for the well drilled under this contract. However, extension of these supplies to the well site shall be included in appropriate unit prices bid and no direct payment will be made therefor.

The well shall be drilled plumb and straight and shall be large enough to install and set the well casing as specified. An annular space between the wall of the hole and the exterior of the casing is required to insure solid cement grouting of the annular space as specified in these specifications.

The well shall be drilled and cased to the depths shown on the plans. The open hole below the installed casing shall have a minimum diameter equal to or not less than two inches smaller than the inside diameter of the installed casing. The extended depth of the open hole shall be as ordered by the Engineer.
The contractor shall fully coordinate and cooperate with the Hawaii County Board of Water Supply and the State Department of Health and Land & Natural Resources to include notifications of each phase of work, obtainment of permits as applicable and submission of reports, all at no additional cost to the Owner.

B. Measurements. Every opportunity should be given the Engineer to obtain samples, make observations, and to study the apparent conditions.

The contractor shall keep a continuous log of the drilling, recording the general character, thickness, type, and drilling characteristic of materials encountered, including the depth and drilling time, the color and hardness of the formations, and all other data which may be helpful in the interpretation of the geology, hydrology, and drilling conditions in the area. The log shall indicate the elevation at which water is encountered and the pertinent facts connected with its occurrence. All other information such as the location of lava tubes and cave-ins shall also be noted in the log. All work done including, but not limited to, reaming, back-filling, and concreting shall be accurately recorded. An accurate and carefully recorded log shall be kept current and available at the well site for inspection by the Engineer at any time during the work and submitted to the Engineer at the end of operations.

Rock samples or cuttings shall be submitted to the Engineer at material changes such as from cinder to basaltic rock with elevation noted.

When water is encountered in the well, the contractor shall determine the elevation of the water level in the drilled hole with reference to the datum established for the project by the Engineer. The water level data shall include the date and time at which the measurements are taken and the depth of the well at the time of measurement. When ordered and in the manner directed by the Engineer, the contractor shall obtain water samples.

C. Protection. During the progress of the work, the contractor shall provide an adequate cover over the top of the hole to prevent debris or other objects from entering the well when the crew is not at the well site. The contractor shall preserve the well in good condition until the Engineer has completed all the sampling, testing and measurement; has examined the records, and has accepted the work.

D. Abandoned Well. A well will be considered abandoned if the contractor does not complete the well to the depth indicated on the drawings or as ordered by the Engineer or if the contractor should abandon the well
due to loss of tools or for any other cause of unacceptance of the well. Such an abandoned well shall be sealed by the contractor, at no cost to the Owner, by filling the hole with approved material as directed by the Engineer. If casing has been installed, the contractor, at his own expense, may remove the casing prior to backfilling the abandoned well.

Payment will be made for any work done on an abandoned well only in the categories listed in the proposal. The cost of moving from the location of the abandoned well to the above-mentioned new well site if within a reasonable distance, will be at the contractor's expense and will not be paid for by the Owner.

Upon completion of the work, the contractor shall leave the site of the abandoned well in a neat and presentable condition free of all debris and in a state comparable to its original condition.

E. Plumbness and Alignment. The hole shall be constructed and the casing set round, plumb and true to line.

Plumbness and alignment tests which may be required by the Engineer shall be performed in the presence of and under the direction of the Engineer.

Should the well wall vary from the vertical in excess of two-thirds the smallest inside diameter of that part of the well being tested, the plumbness and alignment of the well shall be corrected by the contractor, at his own expense and should he fail to correct such faulty alignment, plumbness, or insufficient well diameter, the Owner may refuse to accept the well and deny payment.

F. Measurement. The depth of drilled cased well to be paid for shall be the actual depth in lineal feet measured vertically from the surface of the original ground to the bottom of the casing acceptably installed in the well.

The depth of open hole to be paid for shall be the actual depth in lineal feet measured vertically from the bottom of the casing acceptably installed in the well to the bottom of the hole as ordered and accepted by the Engineer.

The contractor shall not receive specific compensation for making the plumbness and alignment tests and the cost of all testing and corrections for plumbness, alignment, and well diameter shall be included in the appropriate contract unit price.
G. **Payment.** The depth of well acceptably drilled, measured, as provided above, will be paid for at the applicable contract unit price per lineal foot for:

"Drilling cased well from the original ground surface to the bottom of the casing";

"Drilling open hole from the bottom of the casing to the bottom of the well";

as the case may be, which price shall be full compensation for drilling; preparing the driller's logs; measuring and recording water levels; obtaining samples of water; protecting and maintaining the well; measuring the depth of well as required; making all tests, including the plumbness and alignment costs and necessary corrections of defects; all fishing operations; all costs of delays in work due to inclement weather, to lack of equipment, and to equipment breakdowns; and for all equipment, tools, labor and incidentals necessary to complete the work.

II. **FURNISHING AND INSTALLING THE WELL CASING**

A. **General.** The solid steel casing to be installed in the well under this contract will be furnished at the well site by the contractor.

Permanent casing shall be installed in the wells only when ordered in writing by the Engineer, and as specified herein. The Engineer will specify the total length of solid casing to be installed.

The contractor shall furnish and install all temporary casing, if required, for the drilling of this well to conform to the standards set forth in these specifications and shall remove all temporary casing when ordered by the Engineer. Temporary casing shall be of such weight and designs so as to prevent the entrance of undesirable material and later permit the installation of the permanent casing without distortion or binding. The cost of furnishing, installing and, where directed, removing and installing temporary casing, shall be part of the contract cost for construction, development, and testing of the well and shall be included in the appropriate unit bid prices, and no direct payment will be made therefor.

B. **Casing.** The casing to be furnished and installed in the well shall be of corrosion resistant steel conforming to ASTM Designation A-242, or approved equal.
The casing shall have a minimum inside diameter of 18.00
inches and a minimum wall thickness of 0.1719 (8 gage) inch and shall be
clean, straight and free from kinks.

C. Installation. The casing shall be installed in the presence of
and as directed by the Engineer. The casing shall be properly aligned and
welded by qualified welders and shall also be continuous for its entire
length. Every precaution shall be taken to prevent the casing from dropping
into the hole. Heavy driving of the casing which is likely to damage the
pipe or cause a change in the circular cross-section of the pipe will not be
permitted.

The completely installed casing shall be tested for plumbness
and alignment and any deficiencies in plumbness and alignment as required
heretofore shall be corrected.

After the completely installed casing has been tested for
plumbness and alignment and accepted by the Engineer, the contractor
shall, to the satisfaction of the Engineer, clean and surge with a surge
plunger or surge block or other equipment approved by the Engineer.

Drilling the wells below the bottom of the installed casing, if
ordered by the Engineer, shall not be started prior to 48 hours after
cement grouting the annular space.

D. Measurement. The length of casing to be paid for shall be
the number of lineal feet of casing measured to the nearest foot acceptably
installed in the well.

E. Payment. The total footage, measured as provided above,
of casing furnished and installed by the contractor, will be paid for at the
contract unit price per lineal foot for:

"Furnishing and installing 18-inch I. D. solid well
casing";

which price shall be full compensation for furnishing and hauling the casing
to the well site; for cleaning and surging the well; for unloading, handling,
cutting, aligning, welding, and setting the casing; and for all labor,
equipment, tools, materials and incidentals necessary to complete the work.

With the permission of the Engineer, the contractor may
furnish and install casing with a larger inside diameter and/or thickness
or of a higher quality than specified in the above specifications; however, he shall not be entitled to additional compensation over and above the contract unit price bid for the items listed above.

III. TESTING THE WELL

A. Description. The testing of the well shall consist of discharging water into the well to determine the level of water at various rates of flow. The equipment and methods shall be as specified below and as directed by the Engineer.

B. Pumping Test Equipment and Materials. The contractor shall furnish and install a test meter assembly capable of measuring at the minimum rate of 125 and a maximum starting rate of 375 gallons of water per minute to 750 GPM. The contractor shall also furnish and install all other equipment and material, except as specified herein, and shall extend the owner supplied water required to perform the test of the well as directed by the Engineer. All contractor furnished equipment and appurtenances shall be in good operating condition. A test shall be performed on the maximum deliverable rate obtainable from the existing fire hydrant source. If booster pumps are required, then the contractor shall provide them. Before proceeding with the delivery to the project site of the booster pump and motor, the contractor must submit in writing to the Engineer the description, pump characteristics, curves and specifications of the test pump and motor.

The rate of discharge from the well shall be measured with a flow meter to be furnished by the contractor. The contractor shall furnish any and all other equipment and materials that may be required to measure the rate of discharge and it shall be the contractor's responsibility to determine and provide the necessary and proper fittings.

Water level measurements during the pumping test shall be determined by the contractor utilizing a method satisfactory to the Engineer.

C. Pumping Test. When a pumping test is ordered in writing by the Engineer, the contractor shall clean and surge the well to the satisfaction of the Engineer. The contractor shall satisfy himself that the well is adequately prepared for proper testing. The test equipment shall be acceptably installed and tested for proper operation in the presence of the Engineer. Test shall be scheduled on a normal weekday during a time designated by the Engineer. The contractor shall notify the Engineer of his readiness to
begin the test at least 72 hours (exclusive of Saturdays and Sundays) prior to the scheduled test. The Engineer will provide the necessary personnel for directing the test. The contractor shall not begin the test until the Engineer is present at the site and the Engineer orders the test to begin.

The well will be tested at a constant pumping rate of 125 gpm for one hour and 375 gpm for three hours. If the capability of the well exceeds 375 gpm, the contractor shall determine the maximum rate possible up to 750 gpm. Test shall first be made at elevation +12' and, if satisfactory, further drilling will be stopped. If unsatisfactory to the Engineer, drilling will continue to the depth specified and retested. If deemed necessary, the Engineer may order a long term continuous test under his direction. Testing may be conducted during the night, Saturdays, Sundays, and National and State holidays as required by the Engineer. Records will be kept throughout all tests showing the rates and corresponding water levels in the well.

During the entire testing period, the contractor shall have at least one man available at the well site to operate and maintain the test and appurtenant equipment and to assist the Engineer in performing other incidental work required for the test. The contractor shall be responsible for efficient continuous operation and maintenance of the testing unit and measuring devices during all tests. The Owner will not pay for any damages to the test equipment for any cause.

D. Measurement. The installation and removal of test equipment and material to be paid for shall be considered complete when the entire unit has been satisfactorily tested and accepted by the Engineer and when the removal has been completed to the satisfaction of the Engineer.

The test time to be paid for will be the actual number of hours that the meter is operated under the direction and to the satisfaction of the Engineer measured to the nearest half-hour. The measurement of time will begin after the Engineer orders the test begun and shall end when the Engineer orders the test to be terminated. Time lost due to any failure, inability to meet specification requirements, or inefficient operation of the equipment or measuring devices will not be measured for payment.

E. Payment. Installing and removing equipment for testing the well will be paid for at the contract lump sum price for:

"Furnishing, installing and subsequent removal of flow test equipment";
which price shall be full compensation for furnishing, hauling, and installing booster pump, power unit and power supply as required, measuring devices, pipeline and materials necessary for the proper transmission of the water, and all other equipment necessary to conduct the test; for all delays necessitated by the nature of the work or as specified above; for the subsequent removal and hauling of the units listed above; and for all labor, equipment, tools, materials and incidentals necessary to test the well.

The hours measured as provided above, for the flow test, will be paid for at the contract unit price per hour for:

"Flow Tests";

which price shall be full compensation for labor required for testing the well; for keeping the records; for taking samples; for maintaining and operating all equipment and measuring devices required for the test; and for providing all labor, tools, equipment, materials, and incidentals necessary to complete the testing of the well as directed by the Engineer.

Any failure, inability to meet specifications requirements, or inefficient operation of the equipment, instruments, or measuring devices provided by the contractor for the test may necessitate repetition of part of the test or of the entire test as determined by the Engineer.

IV. FILLING THE ANNULAR SPACE

A. Description. This portion covers the cement-grouting of the annular space between the wall of the drilled hole and the casing. All work required in this portion shall be done during normal daylight working hours. The contractor shall notify the Engineer not less than 48 hours prior to cement-grouting.

B. Cement-Grouting the Annular Space. The annular space between the outside of the casing and the wall of the drilled hole from the top of the concrete plug to the top of the existing ground shall be cement-grouted in one-continuous operation in the presence of the Engineer. Cement grout shall consist of one part portland cement and two parts rock sand. (No coral sand will be used). The water-cement ratio shall not be more than seven gallons of water per sack of cement.

The grout shall be placed in the annular space in a manner satisfactory to the Engineer. It is essential that the entire annular space around the grouted section of the casing specified above be completely
filled with grout. Grout shall be placed in a manner that will avoid segregation of materials, inclusion of foreign materials and bridging of grout materials.

D. **Measurement and Payment.** Acceptable filling of the annular space which includes cement-grouting will be measured and paid for separately at the contract unit price for:

"Cement-Grouting the Annular Space";

which shall include full compensation for furnishing, mixing, placing, and curing the cement grout; and for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work as specified herein and as shown on the plans.
FOR THE CONSTRUCTION OF
EXFILTRATION WELL
MAUNA KEA BEACH HOTEL
SOUTH KOHALA, HAWAII

_________________________, 1972

Olohana Corporation
c/o Belt, Collins & Associates, Ltd.
745 Fort Street, Suite 514
Honolulu, Hawaii  96813

Gentlemen:

1. The undersigned, having carefully examined the local conditions affecting the cost of the above listed work at the place where the work is to be done and having carefully examined the plans and specifications and other contract documents, hereby proposed to furnish and pay for all materials, tools, equipment, labor and other incidental work necessary to construct, and install in place complete, the exfiltration well for the Mauna Kea Beach Hotel, including all the appurtenant and incidental work required or called for in the specifications or shown on the plans in strict conformity with the plans and specifications and other contract documents, for the total sum of ______________________ Dollars ($ ).
The prices bid herein for Item Nos. 1 to 6 inclusive, shall include drilling, casing, testing, and all incidental and appurtenant work necessary to construct the exfiltration well.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Units</th>
<th>Unit</th>
<th>Item Description</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>L. F.</td>
<td>Drilling cased well from the original ground surface to the bottom of the casing;</td>
<td>$_________</td>
<td>$______</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>L. F.</td>
<td>Drilling 16-inch I.D. open hole from the bottom of the casing to the bottom of the well;</td>
<td>$_________</td>
<td>$______</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>L. F.</td>
<td>Furnishing and installing 18-inch I.D. solid well casing;</td>
<td>$_________</td>
<td>$______</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>L. S.</td>
<td>Furnishing, installing and subsequent removal of flow test equipment;</td>
<td>$_________</td>
<td>$______</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Hrs.</td>
<td>Flow test;</td>
<td>$_________</td>
<td>$______</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>L. F.</td>
<td>Cement-grouting the annular space;</td>
<td>$_________</td>
<td>$______</td>
</tr>
</tbody>
</table>

**TOTAL ...........** $________________
2. It is understood and agreed that any quantities shown on the plans and reflected in the Proposal, if any, are approximate only.

3. It is also understood and agreed that the time of completion shall be within ____ consecutive calendar days after the signing of the contract.

4. It is understood that the Owner reserves the right to accept or reject any of the proposal and to waive any defects.

Dated ______________________, 1972

_________________________________
Firm Name

_________________________________
Official Address

_________________________________
Telephone Number

_________________________________
Authorized Representative
CONTRACT

THIS AGREEMENT, made and executed this __________ day of ____________, by and between Olohana Corporation, hereinafter called the "Owner" and ________________, hereinafter called the "Contractor".

WITNESSETH:

That for and in consideration of the payments hereinafter mentioned, the Contractor hereby covenants and agrees with the Owner to furnish and pay for all materials, tools, equipment, and labor necessary to install; and to install complete in place free and clear of liens in the most substantial and workmanlike manner, the exfiltration well for the Mauna Kea Beach Hotel, South Kohala, Hawaii, in accordance with the plans and specifications and other contract documents on file in the office of Belt, Collins & Associates, Ltd., ( ) consecutive calendar days after the execution of this contract.

For and in consideration of the covenants, undertakings, and agreements of the Contractor herein set forth, and upon the full faithful performance thereof by the Contractor, the Owner hereby agrees to pay the Contractor the sum of ______________ Dollars ($__________), subject to such additions thereto or deductions therefrom as may be mutually agreed upon during the progress of the work and subject to additions or deductions based upon the unit prices bid for the quantities of work actually performed.

The Instructions, Proposal, Technical Specifications and Drawings, together with this agreement, form the Contract and they are as fully a part of the Contract as if attached hereto.

IN WITNESS WHEREOF, the Parties hereto have executed this Contract the day and year first above written.

__________________________________________
Owner

__________________________________________

__________________________________________

__________________________________________
LOCATION OF ELECTRIC OUTLET CONNECTION
EXIST. SEWAGE TREATMENT PLANT

EXIST. SUPPORT FACILITY
LOCATION OF TEST WATER SOURCE (FIRE HYDRANT)

GREEN
PROJECT LOCATION
FAIRWAY NO. 4

NEW EXFILTRATION WELL
SEE SHT. 3 FOR DETAIL

EXIST. 4" PVC PIPE FROM S.T.P.
EXIST. AIR RELIEF VALVE
CONNECT NEW 4" PVC PIPE TO EXIST. AT A.R. VALVE.

PROPERTY LINE
ABANDON EXIST. 4" PVC PIPE

BENCH MARK 2/4" PIPE
ELEV. = 60.72

EXIST. FENCE

SCALE: 1" = 200'

SCALE: 1" = 80'

EXFILTRATION WELL FOR
MAUNA KEA BEACH HOTEL
SOUTH KOHALA HAWAII
OLOHANA CORPORATION

PREPARED BY: BELT, COLLINS & ASSOC., LTD.
DATE: APRIL 3, 1972
NOTE:
CONTRACTOR SHALL PAINT ALL WELDED SURFACES AND UN-GALVANIZED MATERIALS WITH TWO COATS OF ASPHALT PAINT.
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I. SCOPE AND DESCRIPTION OF WORK: This specification covers the construction, development, and testing of a nominal 12" diameter irrigation water supply test well, including the purchase and installation of the test well pump, prime mover and other necessary equipment as set forth in these specifications.

A. DESCRIPTION:

1. Location - The test well to be constructed will be located on the site of the proposed (Rockefeller) Mauna Kea Resort near the port of Kawaihae, County of Hawaii, Hawaii.

   The ground elevation at the well location is approximately 188 ft. above mean sea level. The location of the well on the resort property is shown on drawing TW-1, entitled Deep Well #2 (Test Well), which is a part of these specifications. Approximate coordinates of the well location as referred to on drawing TW-1 are 9133N, 4006E.

   2. Characteristics - The test well is to be constructed so as to tap the Ghyben-Herzberg fresh water lens. The well shall be drilled to accommodate a 12" O.D. steel casing. The well shall be developed by one of the methods specified herein as determined by the owners authorized representative (the Engineer), in the field, at the completion of the drilling operation.

   The well shall be tested for its yield by use of a water lubricated deep well turbine pump with a right-angle gear head drive assembly. The prime mover is to be a gasoline engine coupled to the pump gear head assembly by a Watson-Spicer type flexible shaft with flanged connections to engine and gear head shafts.

   The prime mover and pump shall be adequate to pump up to 550 gpm under an approximate total head, excluding pump losses of 205 ft.

   Pump discharge is to be measured by means of a thin plate orifice device while dissolved solids content is to be measured by the Engineer by a method to be selected by the Engineer.
II. WELL CONSTRUCTION - This section specifies the materials, installation procedures and standard of accomplishment for the construction of the 12" O.D. diameter well. The contractor shall provide as part of the contract price all necessary labor, tools, equipment, transportation, and services necessary to construct and develop the well described in these specifications.

A. MATERIALS AND EQUIPMENT:

1. Well Casings

   a. Temporary Casing - The contractor shall furnish and install all temporary casing if required for the drilling of this well to conform to the standards set forth in these specifications and shall remove all temporary casing if ordered by the Engineer. Temporary casing shall be of such weight and design so as to prevent the entrance of undesirable material and later permit the installation of the permanent casing without distortion or binding. The cost of furnishing, installing and where directed, removing the temporary casing shall be part of the contract price for construction, development and testing of the well.

   b. Permanent Solid Casing - The permanent casing installed shall be new steel pipe conforming to ASTM designation A-53, Grade B, or Electric Resistance/Welded new steel pipe conforming to ASTM Designation A-135, Grade B, or it may be electric fusion welded pipe with steel properties conforming to ASTM Designation A-283, Grade B. The casing shall be 12" O.D. with a shell thickness of not less than 0.250 inches.

       Permanent solid casing shall be installed to elevation 0 mean sea level (Approximate depth 188 ft.).

       Casing joints may be welded or made up with threaded joints. For welded joints, casing is to be provided with beveled ends for butt-welding.

   c. Permanent Perforated Casing - The perforated casing installed shall be of the same material used under the requirements of section (I) (b) above.

       Perforation openings shall be of a size, number, and pattern approved by the Engineer; provided that the maximum number of perforation does not exceed 20 per lineal ft. The casing shall be perforated prior to installation in the well.

       Permanent perforated casing shall be installed from elevation 0 m.s.l to-30 m.s.l. (mean sea level) except as otherwise directed by the Engineer in writing.

2. Grout - The grout material used for the thirty feet of annular space outside the permanent casing shall be proportioned of cement and the minimum quantity of water (not over 6 gal. per cu. ft. of cement) required to give a mixture of such consistency that it can be forced through the grout pipes. The mixture, method of mixing and consistence of grout shall be approved by the Engineer. Grout seal at 30' below surface.
3. **Packing Material** - The packing material for the annular space around the casing is to be hard, durable crushed rock 3/4 inch minus in size with not more than 10 per cent by weight passing a No. 4 square mesh screen.

**B. INSTALLATION**

1. **Drilling** - The wells shall be drilled by standard methods that will produce a well consistent with the standards of plumbness and alignment specified in the following sections.

   a. **Depth of Drilling** - The well is to be drilled to a depth of -30 feet below mean sea level as part of the lump sum price for the test well installation, development and testing contract. Drilling to greater depths may be called for at the option of the owner's authorized representative. Payment for additional drilling will be made on the basis of the section of these specifications (Section VII) entitled "Unit Price Payment for Additional Drilling and Casing."  

   b. **Drill Hole Diameter** - The well shall be drilled to a diameter that will accommodate a 12" O.D. casing meeting fully the alignment and plumbness requirements of these specifications and with a minimum of 2" annular space all around.

2. **Casing**

   a. **Method** - The casing shall be installed as shown on the plans. Heavy driving of the casing which will be likely to damage it or change its circular cross section will not be permitted.

      After installation, the casing shall be tested for alignment and plumb as provided in II-B-2c, and in the presence of an authorized representative of the owner.

   b. **Perforated Casing** - All permanent casing installed below the level 0 feet m.s.l. shall be perforated, except where the Engineer specifically directs the use of solid casing.

   c. **Plumbness and Alignment** - The well shall be drilled and all casings and liners set round, plumb and true to line as specified herein with conditions of plumbness and alignment that will permit the installation of a deep well turbine pump, of the size set forth in these specifications, without stress, binding or other interference.

   The well contractor shall furnish all labor, materials, tools and equipment to make the tests as described in the following sections and shall make the tests in the manner prescribed by, and to the satisfaction of the Engineer.

   Tests for plumbness and alignment must be made after complete construction of the well and before its acceptance. Additional tests may be made by the contractor during construction of the work. However, no extra payment will be made by the owner for these additional tests.
(1) Description of test for plumbness and alignment. - Plumbness and alignment shall be tested by lowering into the well to its bottom a section of pipe 40 feet long or a dummy of the same length. The outer diameter of the plumb shall not be more than 1/2 inch smaller than the inside diameter of that part of the casing or hole being tested. If a dummy is used, it shall conform to the description of dummy used in Section 1-6.2 American Water Works Standard for Deep Wells (A100-58).

(2) Test Requirements - Should be plumb (pipe length or dummy) fail to move freely throughout the length of the casing to the bottom or should the well vary from the vertical in excess of 19 inches, the plumbness and alignment of the well shall be corrected by the contractor at his own expense and, should he fail to correct such faulty alignment of plumbness, the Engineer may refuse to accept the well. The Engineer may waive the requirements for plumbness if, in his judgment, the utility of the completed well will not be materially affected. In no event will the provisions for alignment be waived.

3. Drilling Samples and Records - The contractor shall keep a continuous drilling log for the well and shall record the location of the top and bottom of each stratum penetrated and shall save and deliver to the Engineer a sample of material taken at 25 feet intervals above the static water level, every 5 feet below the static water level and at every change of formation.

The Contractor shall keep an accurate record as assembled of the order number, size and length of the individual pieces of casing installed.

The contractor shall maintain and submit a daily report describing the nature of the work done; the material encountered; items of work accomplished such as depth drilled, casing installed; water level at beginning and end of day or shift and such other pertinent data as the Engineer may call for.

4. Water Level Measurements - After water has been encountered in the well, the Contractor shall measure the distance between the water level in the drilled hole and a datum near the well which will be established by the Engineer. The water level measurement data shall include the time and date at which they were taken and the depth of the well at the time of measurement. Water level measurements shall be made daily before drilling operation starts each day. Additional measurements as drilling progresses shall be made when directed by the Engineer.

5. Well Grouting and Packing - The annular space between the outside of the casing and the sides of the drilled hole shall be filled with cement grout as shown on the Plans and as specified in this section. The cement grout shall completely fill the annular space extending from the top of the well at ground level to a depth of 30 feet. The contractor shall fill the annular space below the 30-feet depth with crushed rock. Grouting shall be placed by a method approved by the Engineer. The grout may be forced into the space by suitable pump or air pressure. The grout may also be placed by gravity if satisfactory results can be obtained. Grout shall be placed in a manner that will preclude segregation and bridging of grout material and the inclusion of foreign material. Seal between crushed rock and grout.
6. Well Abandonment - In the event that the contractor shall fail to sink the well to the depth specified or to such additional depth as ordered by the Engineer under the provision of the section entitled "Unit Price Payment for Additional Drilling and Casing," or should he abandon the well because of loss of tools or for any other cause, he shall, if requested, and as directed by the Engineer, fill the abandoned well with concrete and remove the casing. No payment will be made for an abandoned well but salvaged material furnished by the contractor shall remain his property.

7. Cleaning and Developing - After installing the casing, the contractor shall develop the well by the use of surge blocks or other method approved by the Engineer to remove silt, sand, drill cuttings and the like from the formation adjacent to the perforated section of the casing. The extent of development shall be as determined by the Engineer to provide a maximum of free flow of water into the well. During and immediately after development, the well shall be cleaned by bailing to remove all possible free silt and sand.

At the option of the Engineer, the development of the well may be by overpumping (with the test pump). Where the well is developed by other methods the Engineer may direct that the development be finished off by over-pumping. This operation shall not be considered part of the well test procedure for evaluating yield, drawdown and recovery.
III. DEEP WELL TURBINE PUMPS AND ACCESSORIES - This section covers the furnishing and installation of 1 - deep well turbine in the test well located as described in this section.

The pump shall be Peerless water lubricated vertical deep well turbine pump model 10 IA - 8 stage with T84323 bronze impeller; T84321 E bowl; 196 ft. of 8" standard x" discharge column assembly; 10 feet of 8" standard suction pipe; 1 - 8" cone type heavy galvanized steel strainers; 1 - size DA (1:1 ratio) Peerless Gearturbo Right Angle Drive; 1 - discharge head to fit the foregoing Gearturbo with 8" flanged discharge; 1 - Watson Spicer flexible coupling; rated not less than 50 H.P. at 1750 rpm; preliminarily tank and fittings and water level indicating equipment (220 ft. of pipe or tubing) all to fit as a working unit with the prime mover specified herein, and all meeting the requirements of this specifications or a make from the list of approved alternates given in section III-B-10 of these specifications that meets the requirements set forth herein.

A. GENERAL CONDITIONS

1. The pump to be furnished and installed shall be capable of delivering 550 gallons per minute of water under a total head* of 205 feet, not including losses within the pump.

2. The outside diameter of the well casing will be 12 inches.

3. The well will be 218 feet deep from elevation 188 above mean sea level to minus -30 feet below sea level.

4. The standing water level below the top of the well is to be taken as 188 feet (at an elevation of + 0 feet msl.)

5. The pumping level below top of well at rated capacity, is to be taken as 200 feet (at elevation - 12 feet msl.)

6. The pumping head above the top of the well is to be taken as 5 feet.

B. PUMP DRIVE HEAD:

The pump drive head is to be right-angle gear drive (Peerless Gearturbo Size DA or alternate from the selected list) and shall meet the following requirements:

1. Speed ratio 1 to 1.

2. Oil lubricated gears and bearings with oil being water cooled.

*The total pumping head does not include pump losses, which must be allowed for by supplier of the pump. The efficiency of the pumping unit shall be as high as correct design and good engineering will permit.
3. Thrust bearings with ample capacity to carry weight of all the rotating parts plus the hydraulic thrust of the pump impellers with an adequate safety factor. The safety factor to be based on an average life expectancy of five years operation at 24 hours per day.

4. Horsepower rating shall be not less than 50 H.P.

5. Housing to be adequately protected against weather and all foreign elements.

C. PUMP DISCHARGE HEAD:

The pump discharge head shall be of high grade cast iron or fabricated steel and shall provide for the mounting of the drive head. The discharge elbow of the discharge head shall provide for an above-ground flanged discharge outlet with a companion flange threaded for 8" standard weight steel pipe.

The discharge head shall include a prelubrication connection to wet down the line shaft bearings before starting the pump.

A prelubricating tank with the necessary valves and fittings to connect it to the pump, shall be provided. The size of the tank will be of sufficient capacity to allow through wetting of all the line shaft bearings before power is applied.

D. PUMP DISCHARGE COLUMNS:

The pump columns shall be furnished in interchangeable sections not over 10 feet in length and shall be connected with threaded sleeve type couplings. The ends of each section of column pipe shall be faced parallel and the threads machined to such a degree that the ends will butt, to insure proper alignment when assembled.

The pump columns shall be standard size I.D full weight steel pipe of a size which will handle the rated flow without exceeding a friction loss of 5 feet per hundred feet of discharge column.

E. COLUMN SHAFTS:

The column shafts shall be turned, ground and polished precision shafting of ample size to operate the pump without vibration or distortion. Except for the top and bottom sections, shafting shall be furnished in ten foot lengths. Intermediate lengths shall be interchangeable.

To insure accurate alignment of the shafts, they shall be straight within 0.005 inches total indicator reading for a 10 foot section; the butting faces shall be machined square to the axis of the shaft; the maximum permissible error in the axial alignment of the thread axis with the axis of the shaft shall be 0.002 inches in 6 inches.

The shafting shall be coupled with steel couplings, which shall be designed with a safety factor of 1½ times the shaft safety factor and shall have left-hand thread to tighten during pump operation.
A non-corrosive journal shall be placed on each shaft at the bearing point. This non-corrosive journal shall consist of a stainless steel or monel sleeve swaged into a shaft recess with the O. D. substantially flush with the shaft O. D. (Recess not to be deeper than diameter corresponding to the root diameter of shaft threads).

Shaft bearings shall be spaced at intervals of not more than 10 feet. Bearing retainer shall be held in position in the column couplings by means of the butted pipe ends. Each guide shall contain water lubricated cutless rubber bearings designed for vertical turbine service.

**F. PUMP BOWL ASSEMBLY:**

1. **Bowl Assemblies**

The pump bowls shall be of close grained cast iron accurately machined and bolted together. The impeller shaft shall be of stainless steel of not less than 12 per cent chrome. The impeller shaft shall be supported by water lubricated, fluted rubber bearings on both sides of each impeller. The impellers shall be of cast bronze, accurately machined and finished, and statically balanced. They shall be securely fastened to the impeller shaft, preferably with tapered compression sleeves and lock nuts.

Each bowl shall have an impeller seal ring to prevent slippage of water between bowl and impeller. The impellers shall be adjustable by means of a nut in the drive head.

**G. SUCTION PIPE AND STRAINERS:**

Suction pipes of standard full weight steel not less than ten feet long and of ample size for the required capacity shall be furnished. They shall be fitted with heavy galvanized steel strainers having net inlet opening areas of not less than four times the area of the suction pipe.

**H. WATER LEVEL INDICATORS:**

An altitude gage, reading in feet, shall be provided for the pump with fittings, air pump and sufficient galvanized iron pipe or plastic or copper tubing to extend to approximately - 20 feet msl.

**I. DESCRIPTIVE MATTER:**

The supplier of the pumps shall submit with the proposal 6 copies of complete dimensional prints and descriptive matter, performance curve showing speed, discharge, head, efficiency, and brake horsepower relationships to clearly cover the equipment to be furnished.

**J. VARIATIONS AND EXCEPTIONS:**

Variations from the above specifications will be considered providing the supplier calls attention to the variations or exceptions and explains in detail the reasons and advantages for such exceptions or variations.
The purchaser reserves the right to reject any equipment or material provided if it does not meet the provisions of these specifications even though it may be on the select list provided as part of this specifications.

K. SELECT LIST OF ACCEPTABLE MANUFACTURERS OF DEEP WELL TURBINE PUMPS:

Peerless Pump
Byron Jackson Company
Deming Company
Allis - Chalmers Company
Worthington Pump Company
Jacuzzi Bros., Inc.
Fairbanks - Morse
Layne & Bowler Company
Johnston Pump Company
Pacific Pump Company

L. INSTALLATION:

The pumps and all appurtenances shall be installed in strict accordance with the manufacturer's recommendations and good mechanical practice.
IV. PRIME MOVER (GASOLINE ENGINE) - This section covers the furnishing, set up, and operation of a gasoline engine as a prime mover to operate the deep well turbine test pump described in these specifications. The gasoline engine shall be a Continental Red Seal Model F-244, equipped as specified herein, or a made from the select list of approved alternates given in the specifications that meet the requirements set forth herein.

A. GENERAL CONDITIONS:

The prime mover shall deliver sufficient horsepower to drive, through a Watson-Spicer type flexible coupling and the right angle gear head drive, the deep well turbine test pump under the discharge and total head conditions described in these specifications (550 gpm at T.H. 205 ft.).

B. EQUIPMENT AND MATERIAL REQUIREMENTS:

1. Engine to be equipped for gasoline operation, with closed power unit, 12 Volt starter, 12 Volt generator, distributor, ignition coil, water temperature gauge, oil filter, air cleaner, gasoline carburetor and regulator, Penn safety switch (or equal), Murphy safety switch (or equal), tachometer, hourmeter, water pressure gauge, vacuum gage, radiator and fan, housing, side panels, starting crank, lifting eye, wooden mounting skid, power take off and other items necessary for the described operation.

   a. Bearings (main) to be replaceable made of steel tri-metal.
   b. Bearings (lower connecting) to be of tri-metal above.
   c. Piston Pin bushing of phosphor bronze.
   d. Water cooling system with centrifugal leak-pump water pump having ball bearing mounted impeller.
   e. Crankcase built integral with cylinder blocks and ribbed.
   f. Crankshafts to be drop forged, counter weighted and heat treated to perfect granular structure and relieve strains.
   g. Cylinder heads to be of high compression anti knock design.
   h. Fly wheels all to be dynamically balanced.
   i. Oiling system shall be full pressure to all main, connecting rod and camshaft bearings as well as tappets and timing gears. All components requiring oiling shall be adequately supplied from idle to maximum operating speed. Oil level indicators, oil gage connections, and provision for oil filter connections shall be provided.
   j. Pistons shall be made of aluminum with chrome top ring. Piston pins shall be full floating and shall be held in place by lock rings at each end.
k. Positive rotating exhaust valves shall be made of high heat resistant and corrosion-proof steel (Austenitic). Valve springs shall be Cadmium plated. Intake valve of suitable alloy steel.

1. The air cleaner shall be oil bath low speed type standard.

m. The radiator shall be - sheet metal - removable shell and grill. The radiator core shall also be removable with brass tanks, copper tubes and fins.

n. The engine shall be provided with an automatic choke.

o. Cylinders shall be en-block with crankcase and shall be made of properly normalized alloy cast iron.

p. Fuel pump shall be mechanical, diaphragm type driven off of the camshaft.

q. The fuel tank shall be at least 16 gallon capacity.

r. Safety switches shall be provided for high water temperature and low oil pressure.

s. Tappet wrenches and grease gun shall be furnished.

2. Flexible Coupling: The flexible coupling shall be a Watson-Spicer Flexible shaft type 5 ft. in length.

a. The coupling shall operate with no more than 1½ loss in power transmission at any angle from 0 to 8 degrees.

b. The coupling shall be furnished with flanges to fit the shaft of the Engine drive and the shaft of the right angle gear head drive.

c. The coupling shall be provided with a splined slip joint to accommodate end wise movement.

d. The coupling shaft shall be of sufficient rating to transmit the total horsepower rating of the right angle gear head drive specified herein.

e. The yoke flange shall bolt to the engine and gear head flanges to provide for simple uncoupling of the shaft and the universal joints shall neede bearings to absorb misalignment.

3. Descriptive Matter: The supplier shall furnish adequate descriptive literature for the prime mover and its accessories to facilitate set up, operation, and maintenance including dimensioned prints, service and operating instructions and charts or tables of performance characteristics in triplicate.

4. Variations and exceptions. (same as III-B-9)
5. **Select List of Acceptable Equipment Manufacturers of gasoline Engines.**

- Continental Red Seal
- Caterpillar Co.
- International
- Fairbanks-Morse Co.
- Wisconsin Engine Co.

C. **INSTALLATION:**

The Engine and its accessories shall be installed and set up in strict accordance with the manufacturers recommendations and good mechanical practice.
V. WELL TESTING - Testing of the well shall include pumping tests to determine yield, drawdown, recovery and chemical quality.

A. TIME OF TEST:

After the well has been completely constructed and cleaned out and the depth of the well accurately measured, the contractor shall notify the Engineer to that effect and shall make the necessary arrangements for conducting a final pumping test. Besides this final test, the Engineer may order the contractor to make such additional pumping tests during and after construction as he deems necessary. All tests shall be run with similar equipment and in a like manner to that hereinafter described.

B. TEST PUMP:

The contractor shall furnish and install the necessary pumping equipment (previously described under section III of these specifications) capable of pumping to the required point of discharge a maximum of at least 550 gallons per minute with the pumping level of -12 feet below mean sea level and with satisfactory throttling devices to reduce flow to 100 gallons per minute.

The pumping unit shall be complete with prime mover, as specified in section III-B of these specifications, of ample power, controls, and appurtenances and shall be capable of being operated without interruption during the test for a period of 72 hours.

C. AUXILIARY EQUIPMENT:

The contractor shall furnish all necessary discharge piping for the pumping unit, which shall be of sufficient length and size (8-inch diameter) to conduct the water being pumped a distance of 20 feet from the well. He shall also furnish two thin orifice plates (flanged for 8" pipe - one 4" and one 5" opening) for measuring the flow of water. To measure the elevation of the water level in the well, an air line complete with gage hand pump and check valve shall be provided as specified in section III-2g. Unless otherwise permitted, the air line shall be securely fastened to the pumping unit and shall terminate approximately at the maximum desired pumping level of approximately -20 feet m.s.l. but in no case nearer than 2 feet to the end of the suction pipe. The piping hook-up shall be as directed by the Engineer.

D. DURATION OF TEST:

Except as otherwise provided, the contractor shall furnish all labor, motive power, lubricating oil and other necessary materials, equipment, labor and supplies required and shall operate the pumping unit at such rates of discharge and for such periods of time as directed, excepting that the final test run shall be for a period of 72 hours continuous operation. This time may be shortened at the option of the Engineer.
The time stated for the duration of the final test is a minimum only and the owner's authorized representative reserves the right to require the contractor to extend such period of test as required at a rate of $70.00 per day.

E. CHEMICAL TEST EQUIPMENT:

The Engineer will provide the necessary materials and equipment for making the chemical quality tests. During the testing period, the contractor shall have at least one man available at the well site to assist the Engineer in running the test and to perform other incidental work required for the pumping and quality tests. If one man is not adequate at any time, the contractor shall provide additional men and equipment as the Engineer may require.

F. DISPOSITION OF TEST EQUIPMENT:

The following test equipment shall be retained in place after the final test and shall become the property of the owner.

1. Deep well turbine pump - including discharge column, discharge head, right angle gear drive, pump bowls, impellers, screens and all appurtenances.

2. Gasoline Engine and all its accessories.


4. Thin orifice plating.

5. Air tube gage, check valve and air pump for measuring water level.

At the conclusion of the test and prior to acceptance of the well, the gear head drive, flexible Watson-Spicer coupling and Engine will be covered with a tarpaulin in a manner satisfactory to the Engineer.
VI. **CLEAN UP** - Upon completion of the work and prior to final acceptance, the contractor shall leave the site in a neat and presentable condition free of all debris and in a state satisfactory to the Engineer.
VII. UNIT PRICE PAYMENT FOR ADDITIONAL DRILLING AND CASING - Contractor shall perform additional drilling and install casing as ordered in the field by the Owner's authorized representative. Additional work will be paid for on a Unit Price basis at the price per foot stipulated in the Contractor's proposal.
October 19

LOG OF AIR-CONDITIONING WELL DRILLED
AT MAUNA KEA BEACH HOTEL, SOUTH KOHALA, HAWAII
FOR HAWAIIAN DREDGING & CONSTRUCTION CO., LTD.

September, 1967

0' to 5' = Fine brown soil and boulders
5' to 27' = Very hard gray rock
27' to 38' = Cinders
38' to 62' = Hard gray rock
42' to 55' = Hard gray rock with few soft spots
65' to 86' = Hard gray rock with few thin soft spots

Casing in well: 76 ft. of 14" ID x 1/4" wall steel casing

Water level: 46 ft. ?

6049-02

ROSCOE MOSS COMPANY
HAWAIIAN DIVISION
600 Keeaumoku St., P. O. Box 1077
HONOLULU, HAWAII 96813
### Water Elution - Pump and Chlorine Tests

**Start Time:** 7:30 A.M. — Initial water level down 0.1 ft.

<table>
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<th>Date</th>
<th>Time</th>
<th>Q GPM</th>
<th>Water Level Draw Down</th>
<th>RPM</th>
<th>Measured Chlorine PPM Cl⁻</th>
<th>Cl⁻ PPM Cl⁻</th>
<th>Comp.</th>
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<td>7</td>
<td>P.M.</td>
<td>10:00</td>
<td>550</td>
<td>1'</td>
<td>1740</td>
<td>8.4</td>
<td>420</td>
<td>24.2</td>
</tr>
</tbody>
</table>

**VOLHARD CHECK**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Date</th>
<th>Time</th>
<th>Q GPM</th>
<th>Water Level Draw Down</th>
<th>RPM</th>
<th>Measured Chlorine PPM Cl⁻</th>
<th>Cl⁻ PPM Cl⁻</th>
<th>Comp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>4-1</td>
<td>12:00</td>
<td>550</td>
<td>1'</td>
<td>1740</td>
<td>8.4</td>
<td>420</td>
<td>24.2</td>
</tr>
<tr>
<td>10</td>
<td>4-1</td>
<td>3:00</td>
<td>550</td>
<td>1'</td>
<td>1740</td>
<td>8.9</td>
<td>415</td>
<td>25.7</td>
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<tr>
<td>11</td>
<td>4-1</td>
<td>6:00</td>
<td>550</td>
<td>1'</td>
<td>1740</td>
<td>9.1</td>
<td>455</td>
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<td>550</td>
<td>1'</td>
<td>1740</td>
<td>8.5</td>
<td>425</td>
<td>24.5</td>
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<td>13</td>
<td>4-1</td>
<td>3:15</td>
<td>550</td>
<td>1'</td>
<td>1740</td>
<td>8.6</td>
<td>430</td>
<td>25.0</td>
</tr>
<tr>
<td>14</td>
<td>4-1</td>
<td>6:00</td>
<td>540</td>
<td>1'</td>
<td>1720</td>
<td>8.6</td>
<td>430</td>
<td>25.0</td>
</tr>
<tr>
<td>15</td>
<td>P.M.</td>
<td>8:00</td>
<td>540</td>
<td>1'</td>
<td>1720</td>
<td>8.6</td>
<td>430</td>
<td>25.0</td>
</tr>
<tr>
<td>16</td>
<td>P.M.</td>
<td>9:00</td>
<td>350</td>
<td>1'</td>
<td>1450</td>
<td>9.0</td>
<td>450</td>
<td>26.2</td>
</tr>
<tr>
<td>17</td>
<td>P.M.</td>
<td>11:00</td>
<td>350</td>
<td>1'</td>
<td>1450</td>
<td>8.8</td>
<td>440</td>
<td>25.4</td>
</tr>
</tbody>
</table>

**TAKEN FOR LAB. TESTS IF NEEDED**

---

**Volhard Test (Silver Nitrate)**

Bottom of Air Line 212 ft.
April 20, 1967

TO:    Mr. Robert W. Page
FROM:  Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading
taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr. 11</td>
<td>650</td>
<td>PPM</td>
<td>690</td>
<td>PPM</td>
<td>2120</td>
<td>PPM</td>
</tr>
<tr>
<td>Apr. 13</td>
<td>620</td>
<td>&quot;</td>
<td>660</td>
<td>&quot;</td>
<td>2040</td>
<td>&quot;</td>
</tr>
<tr>
<td>Apr. 16</td>
<td>640</td>
<td>&quot;</td>
<td>670</td>
<td>&quot;</td>
<td>2260</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauna (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. Robert Ishimoto
    File - Salinity Tests
TO:     Mr. Robert W. Page
FROM:  Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr. 4</td>
<td>670</td>
<td>PPM</td>
<td>690</td>
<td>PPM</td>
<td>2200</td>
<td>PPM</td>
</tr>
<tr>
<td>6</td>
<td>670</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
<tr>
<td>9</td>
<td>690</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2080</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauna (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.
March 27, 1967

TO:    Mr. Robert W. Page
FROM:  Derek Cookle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 21</td>
<td>660</td>
<td>PPM</td>
<td>720</td>
<td>PPM</td>
<td>2300</td>
<td>PPM</td>
</tr>
<tr>
<td>23</td>
<td>650</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2250</td>
<td>&quot;</td>
</tr>
<tr>
<td>26</td>
<td>640</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2240</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
    B.H. Thompson
March 20, 1967

TO:     Mr. Robert W. Page
FROM:  Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NA CL</th>
<th>Well No. 2</th>
<th>NA CL</th>
<th>Well No. 3</th>
<th>NA CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 14</td>
<td>650</td>
<td>PPM</td>
<td>730</td>
<td>PPM</td>
<td>2120</td>
<td>PPM</td>
</tr>
<tr>
<td>16</td>
<td>650</td>
<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2200</td>
<td>&quot;</td>
</tr>
<tr>
<td>19</td>
<td>660</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2210</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
File - Salinity Tests
cc: Bill Thompson
TO:  Mr. Robert W. Page  
FROM: Derek Cockle  

Project 02A - Golf Course  
Irrigation Water - Salinity Tests  

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.  

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 7</td>
<td>690</td>
<td>PPM</td>
<td>710</td>
<td>PPM</td>
<td>2100</td>
<td>PPM</td>
</tr>
<tr>
<td>9</td>
<td>680</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2120</td>
<td>&quot;</td>
</tr>
<tr>
<td>12</td>
<td>660</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.  

cc: Mr. Robert H. Butterfield, Jr.  
Mr. Ted Watson  
Mr. L.W. Bryan  
Mr. Robert Chuck ✓  
Mr. Robert Itamoto  
File - Salinity Tests
TO: Mr. Robert W. Page  
FROM: Derek Cooke  

Project 02A - Golf Course  
Irrigation Water - Salinity Tests  

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 28</td>
<td>680</td>
<td>PPM</td>
<td>700</td>
<td>PPM</td>
<td>2220</td>
<td>PPM</td>
</tr>
<tr>
<td>Mar. 2</td>
<td>670</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2240</td>
<td>&quot;</td>
</tr>
<tr>
<td>5</td>
<td>650</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2140</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.  
    Mr. Ted Watson  
    Mr. L.W. Bryan  
    Mr. Robert Chuck  
    Mr. Robert Itamoto  
    File - Salinity Tests  
    C.Q. Thorpe
February 27, 1967

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 21</td>
<td>670</td>
<td>PPM</td>
<td>740</td>
<td>PPM</td>
<td>2160</td>
<td>PPM</td>
</tr>
<tr>
<td>23</td>
<td>670</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2200</td>
<td>&quot;</td>
</tr>
<tr>
<td>26</td>
<td>690</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2200</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
File - Salinity Tests
TO: Mr. Henry O. Beebe  
FROM: Derek Cockle  

Project 02A - Golf Course  
Irrigation Water - Salinity Tests  

February 20, 1967  

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 14</td>
<td>670</td>
<td>PPM</td>
<td>670</td>
<td>PPM</td>
<td>2020</td>
<td>PPM</td>
</tr>
<tr>
<td>16</td>
<td>670</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2040</td>
<td>&quot;</td>
</tr>
<tr>
<td>19</td>
<td>670</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.  
Mr. Ted Watson  
Mr. L.W. Bryan  
Mr. Robert Chuck  
Mr. Robert Itamoto  
File - Salinity Tests
February 13, 1967

TO:     Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 7</td>
<td>650</td>
<td>PPM</td>
<td>690</td>
<td>PPM</td>
<td>2180</td>
<td>PPM</td>
</tr>
<tr>
<td>9</td>
<td>620</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2020</td>
<td>&quot;</td>
</tr>
<tr>
<td>12</td>
<td>620</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2180</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
    P.A. Thompson
February 7, 1967

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 2</th>
<th>NACL (PPM)</th>
<th>Well No. 2</th>
<th>NACL (PPM)</th>
<th>Well No. 3</th>
<th>NACL (PPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 31</td>
<td>660</td>
<td></td>
<td>710</td>
<td></td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>Feb. 2</td>
<td>670</td>
<td></td>
<td>680</td>
<td></td>
<td>2120</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>650</td>
<td></td>
<td>690</td>
<td></td>
<td>2080</td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
January 31, 1967

TO: MR. HENRY O. BEEBE
FROM: DEREK COCKLE

Project 02A - Golf Course Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 24</td>
<td>680</td>
<td>PPM</td>
<td>700</td>
<td>PPM</td>
<td>2090</td>
<td>PPM</td>
</tr>
<tr>
<td>26</td>
<td>650</td>
<td></td>
<td>650</td>
<td></td>
<td>2120</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>680</td>
<td></td>
<td>710</td>
<td></td>
<td>2160</td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
    B. H. Thompson
January 23, 1967

TO: MR. HENRY O. BEENE
FROM: DEREK COCKS

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Neuma Kau Beach Motel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 17</td>
<td>650</td>
<td>PPM</td>
<td>710</td>
<td>PPM</td>
<td>2180</td>
<td>PPM</td>
</tr>
<tr>
<td>19</td>
<td>660</td>
<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2080</td>
<td>&quot;</td>
</tr>
<tr>
<td>22</td>
<td>670</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck
Mr. Robert Inamoto
Filo - Salinity Tests
Bill Thompson
January 17, 1967

TO: MR. HENRY C. BEEDLE
FROM: DEREK COCKLE

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Keau Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 10</td>
<td>700</td>
<td>FPM</td>
<td>700</td>
<td>FPM</td>
<td>2220</td>
<td>FPM</td>
</tr>
<tr>
<td>12</td>
<td>680</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2200</td>
<td>&quot;</td>
</tr>
<tr>
<td>15</td>
<td>680</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
    B.H. Thompson
January 12, 1967

TO: MR. HENRY O. BEEBE
FROM: DEREK COCKLE

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 3</td>
<td>650</td>
<td>PPM</td>
<td>710</td>
<td>PPM</td>
<td>2000</td>
<td>PPM</td>
</tr>
<tr>
<td>5</td>
<td>660</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2120</td>
<td>&quot;</td>
</tr>
<tr>
<td>8</td>
<td>670</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
File - Salinity Tests
January 3, 1967

TO: MR. HENRY O. BEEBE
FROM: DEREK COCKLE

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 27</td>
<td>680</td>
<td>PPM</td>
<td>660</td>
<td>PPM</td>
<td>2000</td>
<td>PPM</td>
</tr>
<tr>
<td>30</td>
<td>660</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2000</td>
<td>&quot;</td>
</tr>
<tr>
<td>Jan. 1</td>
<td>670</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2040</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
December 26, 1966

TO:  MR. JOHN W. BIEBE
FROM: DEREK COCKLE

Project 02A - Golf Course Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1 NACL</th>
<th>Well No. 2 NACL</th>
<th>Well No. 3 NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 20</td>
<td>620 PPM</td>
<td>710 PPM</td>
<td>2120 PPM</td>
</tr>
<tr>
<td>22</td>
<td>670 &quot;</td>
<td>720 &quot;</td>
<td>2100 &quot;</td>
</tr>
<tr>
<td>25</td>
<td>670 &quot;</td>
<td>690 &quot;</td>
<td>2040 &quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
File - Salinity Tests
December 19, 1966

TO:    MR. HENRY O. BEEBE
FROM:  DEREK COCKLE

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading
taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 13</td>
<td>670</td>
<td>PPM</td>
<td>620</td>
<td>PPM</td>
<td>2140</td>
<td>PPM</td>
</tr>
<tr>
<td>15</td>
<td>640</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2160</td>
<td>&quot;</td>
</tr>
<tr>
<td>18</td>
<td>620</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2060</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
December 12, 1966

TO: MR. HENRY O. BEEBE
FROM: DEREK COCKLE

Project 02A - Golf Course Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 6</td>
<td>670</td>
<td>PPM</td>
<td>710</td>
<td>PPM</td>
<td>2240</td>
<td>PPM</td>
</tr>
<tr>
<td>8</td>
<td>630</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
<tr>
<td>11</td>
<td>640</td>
<td>&quot;</td>
<td>670</td>
<td>&quot;</td>
<td>2220</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
TO: Mr. Henry O. Beebe  
FROM: Derek Cockle  

**Project 02A - Golf Course Irrigation Water - Salinity Tests**

The following is a weekly record of the sodium chloride readings taken from three wells at Nauna Ken Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 29</td>
<td>630</td>
<td>PPM</td>
<td>650</td>
<td>PPM</td>
<td>2120</td>
<td>PPM</td>
</tr>
<tr>
<td>Dec. 1</td>
<td>700</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2120</td>
<td>&quot;</td>
</tr>
<tr>
<td>4</td>
<td>610</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2060</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)

**Note:** All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.  
    Robert Trent Jones, Inc.  
    Mr. Ted Watson  
    Mr. L.W. Bryan  
    Mr. Robert Chuck /  
    Mr. Robert Itamoto  
    File - Salinity Tests
To: Mr. Henry O. Beebe

From: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 22</td>
<td>650</td>
<td>PPM</td>
<td>720</td>
<td>PPM</td>
<td>1920</td>
<td>PPM</td>
</tr>
<tr>
<td>24</td>
<td>690</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>1920</td>
<td>&quot;</td>
</tr>
<tr>
<td>27</td>
<td>650</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>1860</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Hauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

Cc: Mr. Robert E. Butterfield, Jr.
    Robert Trant Jones, Inc.
    Mr. Ted Watson
    Mr. L.W. Fryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
November 21, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cooke

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 13</td>
<td>740</td>
<td>PPM</td>
<td>770</td>
<td>PPM</td>
<td>1880</td>
<td>PPM</td>
</tr>
<tr>
<td>15</td>
<td>690</td>
<td>&quot;</td>
<td>760</td>
<td>&quot;</td>
<td>1980</td>
<td>&quot;</td>
</tr>
<tr>
<td>17</td>
<td>680</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>1920</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 8</td>
<td>720</td>
<td>PPM</td>
<td>770</td>
<td>PPM</td>
<td>1940</td>
<td>PPM</td>
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<tr>
<td>10</td>
<td>720</td>
<td>&quot;</td>
<td>760</td>
<td>&quot;</td>
<td>1900</td>
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<tr>
<td>13</td>
<td>740</td>
<td>&quot;</td>
<td>770</td>
<td>&quot;</td>
<td>1880</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
Robert Trent Jones, Inc.
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
File - Salinity Tests
Bill Thompson
November 7, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cocker

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 1</td>
<td>Pump Down</td>
<td>PPM</td>
<td>710</td>
<td>PPM</td>
<td>2140</td>
<td>PPM</td>
</tr>
<tr>
<td>3</td>
<td>670</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2020</td>
<td>&quot;</td>
</tr>
<tr>
<td>6</td>
<td>620</td>
<td>&quot;</td>
<td>660</td>
<td>&quot;</td>
<td>1940</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 = Mauka (Golf Course Irrigation)
Well #2 = 17th Fairway (Golf Course Irrigation)
Well #3 = Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
TO: Mr. Henry O. Beebe  
FROM: Derek Cockle  

**Project 02A - Golf Course**  
**Irrigation Water - Salinity Tests**

The following is a weekly record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 25</td>
<td>670 PPM</td>
<td>730 PPM</td>
<td>2060 PPM</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>27</td>
<td>720 &quot;</td>
<td>710 &quot;</td>
<td>2100 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>660 &quot;</td>
<td>700 &quot;</td>
<td>2140 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.  
Robert Trent Jones, Inc.  
Mr. Ted Watson  
Mr. L. W. Bryan  
Mr. Robert Chuck✓  
Mr. Robert Itamoto  
File - Salinity Tests
TO:        Mr. Henry O. Beebe
FROM:      Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 17</td>
<td>650</td>
<td>PPM</td>
<td>650</td>
<td>PPM</td>
<td>2080</td>
<td>PPM</td>
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<tr>
<td>18</td>
<td>650</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2120</td>
<td>&quot;</td>
</tr>
<tr>
<td>19</td>
<td>630</td>
<td>&quot;</td>
<td>650</td>
<td>&quot;</td>
<td>2160</td>
<td>&quot;</td>
</tr>
<tr>
<td>20</td>
<td>640</td>
<td>&quot;</td>
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<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
<tr>
<td>21</td>
<td>640</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2120</td>
<td>&quot;</td>
</tr>
<tr>
<td>22</td>
<td>650</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2090</td>
<td>&quot;</td>
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<tr>
<td>23</td>
<td>670</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2180</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
October 18, 1966

TO: Mr. Henry O. Buebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Nauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
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<tbody>
<tr>
<td>Oct. 10</td>
<td>640</td>
<td>PPM</td>
<td>660</td>
<td>PPM</td>
<td>2180</td>
<td>PPM</td>
</tr>
<tr>
<td>11</td>
<td>650</td>
<td>&quot;</td>
<td>670</td>
<td>&quot;</td>
<td>2190</td>
<td>&quot;</td>
</tr>
<tr>
<td>12</td>
<td>660</td>
<td>&quot;</td>
<td>670</td>
<td>&quot;</td>
<td>2150</td>
<td>&quot;</td>
</tr>
<tr>
<td>13</td>
<td>650</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2140</td>
<td>&quot;</td>
</tr>
<tr>
<td>14</td>
<td>660</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2130</td>
<td>&quot;</td>
</tr>
<tr>
<td>15</td>
<td>690</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2110</td>
<td>&quot;</td>
</tr>
<tr>
<td>16</td>
<td>720</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
    B. W. Thompson
TO:  Mr. Henry O. Beebe  
FROM:  Derek Cockle

**Project 02A - Golf Course**

**Irrigation Water - Salinity Tests**

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No.1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 3</td>
<td>630</td>
<td>PPM</td>
<td>640</td>
<td>PPM</td>
<td>2220</td>
<td>PPM</td>
</tr>
<tr>
<td>4</td>
<td>620</td>
<td>&quot;</td>
<td>630</td>
<td>&quot;</td>
<td>2200</td>
<td>&quot;</td>
</tr>
<tr>
<td>5</td>
<td>670</td>
<td>&quot;</td>
<td>670</td>
<td>&quot;</td>
<td>2060</td>
<td>&quot;</td>
</tr>
<tr>
<td>6</td>
<td>710</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
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<td>&quot;</td>
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<td>7</td>
<td>690</td>
<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2030</td>
<td>&quot;</td>
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<td>8</td>
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<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2090</td>
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<td>9</td>
<td>670</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2100</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauna (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc:  Mr. Robert H. Butterfield, Jr.  
      Robert Trent Jones, Inc.  
      Mr. Ted Watson  
      Mr. L.W. Bryans  
      Mr. Robert Chuck √  
      Mr. Robert Itamoto  
      File - Salinity Tests
RECEIVED  
DIV. OF WATER & October 11, 1966  
LAND DEVELOPMENT

TO: Mr. Henry O. Beebe  
FROM: Derek Cockle

Project O2A - Golf Course  
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
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<tbody>
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<td>640</td>
<td>PPM</td>
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Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.  
Robert Trent Jones, Inc.  
Mr. Ted Watson  
Mr. L.W. Bryan  
Mr. Robert Chuck  
Mr. Robert Itamoto  
File - Salinity Tests
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

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<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Mr. E.J. Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
...
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

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<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Dr. O. J. Noar
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Test
    Bill Thompson
TO: Mr. Henry O. Beebe
FROM: Derek Cocks

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Robert H. Butterfield, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Moer
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    File - Salinity Tests
    Bill Thompson
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

CC: Mr. Robert H. Butterfield, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck
Mr. Robert Itamoto
Mr. L.W. Bryan
C.F.

Bill Thompson
August 8, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck /
    Mr. Robert Itamoto
    C.P.
    R.H. Thompson
<table>
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<th>Code</th>
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<th>F. Location</th>
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TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACl</th>
<th>Well No. 2</th>
<th>NAcl</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Robert H. Butterfield
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    C.F.

cc: Bill Thompson
<table>
<thead>
<tr>
<th>Diet</th>
<th>Type</th>
<th>Sex</th>
<th>Test 1</th>
<th>Test 2</th>
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Note: All data points were collected under controlled conditions.
July 25, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project Q2A - Golf Course Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
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<td>2360</td>
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<td>650</td>
<td>=</td>
<td>700</td>
<td>=</td>
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</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D.C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. L.H. Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
C.F.
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

**Project O2A - Golf Course Irrigation Water - Salinity Tests**

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
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<tr>
<td>19</td>
<td>660</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2420</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

**Well #1** - Mauka (Golf Course Irrigation)
**Well #2** - 17th Fairway (Golf Course Irrigation)
**Well #3** - Hotel (Air Condition)

**Note:** All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Les Bryan
Mr. Robert Chuck
Mr. Robert Itamoto
C.F.

Bill Thompson
TO:  Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
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<tr>
<td>July 11</td>
<td>640</td>
<td>PPM</td>
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<td>PPM</td>
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<td>PPM</td>
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<td>12</td>
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<td>14</td>
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<td>17</td>
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<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2400</td>
<td>&quot;</td>
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</table>

Well #1 = Hauka (Golf Course Irrigation)
Well #2 = 17th Fairway (Golf Course Irrigation)
Well #3 = Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D.C.

cc:  Mr. Leslie R. Moore, Jr.
     Robert Trent Jones, Inc.
     Dr. O.J. Neer
     Mr. Ted Watson
     Mr. L.W. Bryan
     Mr. Robert Chuck
     Mr. Robert Itamoto
     C.F.
TO:       Mr. Henry O.  Ibb/l(j 1/ 11 AM '66
FROM:     Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
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<th>Date</th>
<th>Well No. 1</th>
<th>NACL PPM</th>
<th>Well No. 2</th>
<th>NACL PPM</th>
<th>Well No. 3</th>
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<td>7</td>
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</tr>
<tr>
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<td></td>
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<td>10</td>
<td>660</td>
<td>710</td>
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</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Mr. Ted Watson
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. L.W. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    C.F.
TO:  Mr. Henry O. Beebe  
FROM:  Derek Cook

**Project O2A - Golf Course**  
**Irrigation Water - Salinity Tests**

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
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<tbody>
<tr>
<td>June 27</td>
<td>630</td>
<td>PPM</td>
<td>720</td>
<td>PPM</td>
<td>2400</td>
<td>PPM</td>
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<tr>
<td>30</td>
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<td>&quot;</td>
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<td>2340</td>
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<tr>
<td>July 1</td>
<td>600</td>
<td>&quot;</td>
<td>710</td>
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<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2420</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)

**Note:** All readings represents parts per million of chlorides as sodium chloride.

cc:  Mr. Leslie H. Moore, Jr.  
      Robert Trent Jones, Inc.  
      Dr. O.J. Neer  
      Mr. Ted Watson  
      Mr. L.W. Bryan  
      Mr. Robert Chuck  
      Mr. Robert Itamoto  
      C.F.  
      B.L. Thompson
June 27, 1966

TO: Mr. Henry C. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th></th>
<th>Well No. 2</th>
<th></th>
<th>Well No. 3</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>ppm</td>
<td></td>
<td>ppm</td>
<td></td>
<td>ppm</td>
<td></td>
</tr>
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<td>June 20</td>
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<td>24</td>
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<td>2280</td>
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<td>25</td>
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<tr>
<td>26</td>
<td>680</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2460</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noor
    Mr. Ted Watson
    Mr. L.H. Bryan
    Mr. Robert Chuck
    Mr. Robert Itamoto
    CF
    Bill Thompson
TO: Mr. Henry O. Beebe  
FROM: Derek Cockle  

Project OZA - Golf Course  
Irrigation Water - Salinity Tests  

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
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<tbody>
<tr>
<td>June 6</td>
<td>620</td>
<td>PPM</td>
<td>700</td>
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<td>PPM</td>
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<td>7</td>
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</tr>
<tr>
<td>11</td>
<td>650</td>
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<td>650</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2560</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.  
Robert Trent Jones, Inc.  
Dr. O.J. Noer  
Mr. Ted Watson  
Mr. Robert Chuck ✓  
Mr. L.W. Bryan  
Mr. Robert Itamoto  
C.F.  
Bill Thompson
June 9, 1966

Mr. Robert T. Chuck
Manager-Engineer
Division of Water and Land Development
P. O. Box 373
Honolulu, Hawaii 96809

Thank you very much for sending us a copy of the daily record of the sodium chloride reading taken from the three wells at Mauna Kea Beach Hotel, Project 02A - Golf Course Irrigation Water - Salinity Tests. This data is very handy to us.

W. Y. Thompson
Manager-Engineer

... Water brings progress...
TO:  Mr. Henry O. Beebe  
FROM: Derek Cockle  

Project 02A - Golf Course  
Irrigation Water - Salinity Tests  

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.  

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
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<tr>
<td>May 16</td>
<td>680</td>
<td>PPM</td>
<td>640</td>
<td>PPM</td>
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<td>PPM</td>
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<tr>
<td>17</td>
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<td>18</td>
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<td>640</td>
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<tr>
<td>19</td>
<td>670</td>
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<td>&quot;</td>
<td>2720</td>
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</tr>
<tr>
<td>20</td>
<td>660</td>
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<td>&quot;</td>
<td>2440</td>
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<tr>
<td>21</td>
<td>680</td>
<td>&quot;</td>
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<td>2580</td>
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<td>22</td>
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</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.  
    Robert Trent Jones, Inc.  
    Dr. O.J. Noer  
    Mr. Ted Watson  
    Mr. Robert Chuck  
    Mr. L.W. Bryan  
    Mr. Robert Itamoto  
    C.F.
June 6, 1966

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

**Project O2A - Golf Course**
**Irrigation Water - Salinity Tests**

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NA CL</th>
<th>Well No. 2</th>
<th>NA CL</th>
<th>Well No. 3</th>
<th>NA CL</th>
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<tbody>
<tr>
<td>May 30</td>
<td>650</td>
<td>PPM</td>
<td>700</td>
<td>PPM</td>
<td>2620</td>
<td>PPM</td>
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<td>31</td>
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<td>June 1</td>
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<tr>
<td>3</td>
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<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2780</td>
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</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck
Mr. L.J. Bryan
Mr. Robert Itamoto
C.F.
May 30, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project OZA - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACl</th>
<th>Well No. 2</th>
<th>NACl</th>
<th>Well No. 3</th>
<th>NACl</th>
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<td>26</td>
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<td>ppm</td>
</tr>
<tr>
<td>28</td>
<td>680</td>
<td>ppm</td>
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<tr>
<td>29</td>
<td>680</td>
<td>ppm</td>
<td>720</td>
<td>ppm</td>
<td>2600</td>
<td>ppm</td>
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</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

S. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Moore
Mr. Ted Watson
Mr. L.W. Bryan
Mr. Robert Itamoto
C.F.

cc: Bill Thompson
May 17, 1966

TO:  Mr. Henry O. Beebe
FROM: Derek Cockle

Project OZA - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
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<td>May 9</td>
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<td>670</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2620</td>
<td>&quot;</td>
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</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck
Mr. L.W. Bryan
Mr. Robert Itamoto
C.F.
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

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<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NA CL</th>
<th>Well No. 2</th>
<th>NA CL</th>
<th>Well No. 3</th>
<th>NA CL</th>
</tr>
</thead>
<tbody>
<tr>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Moer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
    Mr. Bob Itamoto
    C.F.
<table>
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March 14, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
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<th>Well No. 3</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck ✓
Mr. L.W. Bryan
C. F.
May 3, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
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<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
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Well #1 - Mauna (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck
Mr. L.W. Bryan
Mr. Bob Itamoto
C.F.

cc: Les Wishard
April 25, 1966

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project 02A • Golf Course
Irrigation Water • Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck
Mr. L.W. Bryan
Mr. Bob Itamoto
C.F.
April 18, 1966

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
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<th>Date</th>
<th>Well No. 1</th>
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<th>Well No. 2</th>
<th>NAACL</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. C.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
    Mr. Bob Itamoto
    C.F.
April 12, 1966

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<th>Date</th>
<th>Well No. 1</th>
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Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck ✓
    Mr. L.W. Bryan
    Mr. Bob Itamoto
    C.F.
To: Mr. Henry O. Beebe  
From: Derek Cockle  

Project OZA - Golf Course  
Irrigation Water - Salinity Tests  

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<th>Well No. 2</th>
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Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)  

Note: All readings represent parts per million of chlorides as sodium chloride.

Cc: Mr. Leslie H. Moore, Jr.  
Robert Trent Jones, Inc.  
Dr. O.J. Noer  
Mr. Ted Watson  
Mr. Robert Chuck  
Mr. L.W. Bryan  
Mr. Bob Itamoto  
C.P.
March 26, 1966

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

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<th>Date</th>
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<th>Well No. 3</th>
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Well #1 - Hauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
    Mr. Bob Itamoto
    C.F.
<p>| | | | |</p>
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</table>
March 22, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
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<th>Well No. 3</th>
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<td>&quot;</td>
<td>730</td>
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<td>2550</td>
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<td>20</td>
<td>660</td>
<td>&quot;</td>
<td>740</td>
<td>&quot;</td>
<td>2600</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
    Mr. Bob Itamoto
    C. F.
March 7, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 28</td>
<td>730 FPM</td>
<td>700 FPM</td>
<td>2700 FPM</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mar. 1</td>
<td>650 &quot;</td>
<td>690 &quot;</td>
<td>2740 &quot;</td>
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</tr>
<tr>
<td>2</td>
<td>700 &quot;</td>
<td>720 &quot;</td>
<td>2700 &quot;</td>
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<tr>
<td>3</td>
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<td>690 &quot;</td>
<td>2680 &quot;</td>
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<tr>
<td>4</td>
<td>680 &quot;</td>
<td>690 &quot;</td>
<td>2690 &quot;</td>
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<td>5</td>
<td>690 &quot;</td>
<td>700 &quot;</td>
<td>2530 &quot;</td>
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<tr>
<td>6</td>
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<td>720 &quot;</td>
<td>2560 &quot;</td>
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</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D.C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O.J. Noer
Mr. Ted Watson
Mr. Robert Chuck
Mr. L.W. Bryan
<table>
<thead>
<tr>
<th>Year</th>
<th>Product</th>
<th>Quantity</th>
<th>Price</th>
<th>Total</th>
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<td>$5000</td>
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<td>2021</td>
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<td>125</td>
<td>$55</td>
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<td>Item E</td>
<td>175</td>
<td>$45</td>
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</table>

Note: The above table represents the annual sales data of various products for the past four years.
February 28, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 21</td>
<td>690</td>
<td>PPM</td>
<td>710</td>
<td>PPM</td>
<td>2260</td>
<td>PPM</td>
</tr>
<tr>
<td>22</td>
<td>680</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2400</td>
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</tr>
<tr>
<td>23</td>
<td>670</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2500</td>
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</tr>
<tr>
<td>24</td>
<td>690</td>
<td>&quot;</td>
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<td>2800</td>
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<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
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<td>&quot;</td>
</tr>
<tr>
<td>26</td>
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<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2800</td>
<td>&quot;</td>
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<td>27</td>
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<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2680</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
February 21, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 14</td>
<td>600 PPM</td>
<td></td>
<td>630 PPM</td>
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<td>2740 PPM</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>680 &quot;</td>
<td>700 &quot;</td>
<td>2610 &quot;</td>
<td></td>
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<td></td>
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<tr>
<td>16</td>
<td>690 &quot;</td>
<td>710 &quot;</td>
<td>2500 &quot;</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>17</td>
<td>710 &quot;</td>
<td>730 &quot;</td>
<td>2620 &quot;</td>
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<tr>
<td>18</td>
<td>700 &quot;</td>
<td>720 &quot;</td>
<td>2500 &quot;</td>
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<td></td>
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<tr>
<td>19</td>
<td>600 &quot;</td>
<td>710 &quot;</td>
<td>2400 &quot;</td>
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<td></td>
</tr>
<tr>
<td>20</td>
<td>610 &quot;</td>
<td>700 &quot;</td>
<td>2520 &quot;</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
<table>
<thead>
<tr>
<th>Col.</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
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</tr>
</tbody>
</table>

(continued on back)
February 14, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 7</td>
<td>670</td>
<td>PPM</td>
<td>690</td>
<td>PPM</td>
<td>2390</td>
<td>PPM</td>
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<tr>
<td>8</td>
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<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2480</td>
<td>&quot;</td>
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<td>9</td>
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<td>&quot;</td>
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<td>&quot;</td>
<td>2470</td>
<td>&quot;</td>
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<tr>
<td>11</td>
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<td>12</td>
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</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck ✓
    Mr. L.J. Bryan
February 7, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 31</td>
<td>690</td>
<td>PPM</td>
<td>700</td>
<td>PPM</td>
<td>2360</td>
<td>PPM</td>
</tr>
<tr>
<td>Feb. 1</td>
<td>670</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2320</td>
<td>&quot;</td>
</tr>
<tr>
<td>2</td>
<td>680</td>
<td>&quot;</td>
<td>660</td>
<td>&quot;</td>
<td>2220</td>
<td>&quot;</td>
</tr>
<tr>
<td>3</td>
<td>680</td>
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<td>680</td>
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<tr>
<td>4</td>
<td>670</td>
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<td>&quot;</td>
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<tr>
<td>5</td>
<td>670</td>
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<tr>
<td>6</td>
<td>680</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2380</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
January 31, 1966

TO:       Mr. Henry O. Beebe
FROM:     Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
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</thead>
<tbody>
<tr>
<td>Jan. 24</td>
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<td>720</td>
<td>PPM</td>
<td>2250</td>
<td>PPM</td>
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<td>710</td>
<td>&quot;</td>
<td>2240</td>
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<td>&quot;</td>
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<td>&quot;</td>
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<tr>
<td>28</td>
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<td>&quot;</td>
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<tr>
<td>29</td>
<td>650</td>
<td>&quot;</td>
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<td>2300</td>
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<tr>
<td>30</td>
<td>660</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2380</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D. C.

cc:   Mr. Leslie H. Moore, Jr.
      Robert Trent Jones, Inc.
      Dr. O.J. Noer
      Mr. Ted Watson
      Mr. Robert Chuck
      Mr. L.W. Bryan
January 24, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 17</td>
<td>670</td>
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<tr>
<td>23</td>
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<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2220</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones, Inc.
    Dr. O.J. Noer
    Mr. Ted Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
January 26, 1966

Mr. Leslie W. Wishard
Kamuela, Hawaii

Dear Mr. Wishard:

Attached for your information is additional data on the salinity of the Mauna Kea Beach Hotel wells for the period December 27, 1965 to January 2, 1966.

Very truly yours,

ROBERT T. CHUCK
Manager-Chief Engineer

WOW:DL:sdh
Attach.
January 11, 1966

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
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<td>Jan. 3</td>
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<td>720</td>
<td>PPM</td>
<td>2310</td>
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</tbody>
</table>

Well #1 - Hauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.
    Robert Trent Jones
    Dr. O.J. Noer
    Mr. E.J. Watson
    Mr. Robert Chuck
    Mr. L.H. Bryan
January 4, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 27</td>
<td>660</td>
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<td>700</td>
<td>PPM</td>
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<tr>
<td></td>
<td>650</td>
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<td>720</td>
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<tr>
<td></td>
<td>700</td>
<td>&quot;</td>
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<td>&quot;</td>
<td>2450</td>
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<tr>
<td></td>
<td>740</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2360</td>
<td>&quot;</td>
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<td></td>
<td>730</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2360</td>
<td>&quot;</td>
</tr>
<tr>
<td>Jan. 1</td>
<td>730</td>
<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2350</td>
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<td>2</td>
<td>710</td>
<td>&quot;</td>
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<td>&quot;</td>
<td>2320</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Hauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore
    Robert Trent Jones
    Dr. O. J. Roer
    Mr. E. J. Watson
    Mr. Robert Chuck
    Mr. L. W. Bryan
January 18, 1966

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
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<tbody>
<tr>
<td>Jan. 10</td>
<td>630</td>
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<td>700</td>
<td>PPM</td>
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<td>2340</td>
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<td>13</td>
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<td>&quot;</td>
<td>720</td>
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<tr>
<td>14</td>
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<td>&quot;</td>
<td>2240</td>
<td>&quot;</td>
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<tr>
<td>15</td>
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<td>&quot;</td>
<td>730</td>
<td>&quot;</td>
<td>2260</td>
<td>&quot;</td>
</tr>
<tr>
<td>16</td>
<td>670</td>
<td>&quot;</td>
<td>720</td>
<td>&quot;</td>
<td>2300</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

D. C.

cc: Mr. Leslie H. Moore, Jr.
Robert Trent Jones, Inc.
Dr. O. J. Noer
Mr. E. J. Watson
Mr. Robert Chuck
Mr. L. W. Bryan
**December 27, 1965**

**TO:** Mr. Henry O. Beebe  
**FROM:** Derek Cookle

**Project 02A - Golf Course**  
**Irrigation Water - Salinity Tests**

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 20</td>
<td>660</td>
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<td>700</td>
<td>PPM</td>
<td>2550</td>
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<td>23</td>
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<td>&quot;</td>
<td>2430</td>
<td>&quot;</td>
</tr>
<tr>
<td>24</td>
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<td>&quot;</td>
<td>660</td>
<td>&quot;</td>
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</tr>
<tr>
<td>25</td>
<td>670</td>
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<tr>
<td>26</td>
<td>680</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2400</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)

**Note:** All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore, Jr.  
Mr. Robert Trent Jones  
Dr. O.J. Noer  
Mr. E.J. Watson  
Mr. Robert Chuck  
Mr. L.W. Bryant
December 20, 1965

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride readings taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 13</td>
<td>700 PPM</td>
<td>670 PPM</td>
<td>2510 PPM</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>690 &quot;</td>
<td>700 &quot;</td>
<td>2420 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>680 &quot;</td>
<td>700 &quot;</td>
<td>2520 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>680 &quot;</td>
<td>710 &quot;</td>
<td>2470 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>700 &quot;</td>
<td>720 &quot;</td>
<td>2470 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>700 &quot;</td>
<td>700 &quot;</td>
<td>2470 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>710 &quot;</td>
<td>720 &quot;</td>
<td>2480 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore
    Robert Trent Jones
    Dr. O.J. Noer
    Mr. E.J. Watson
    Mr. Robert Chuck
    Mr. Leslie Bryan
December 14, 1965

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project O2A - Golf Course Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
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</thead>
<tbody>
<tr>
<td>Dec. 6</td>
<td>690 PPM</td>
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<td>2410 PPM</td>
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<tr>
<td>7</td>
<td>670 &quot;</td>
<td>&quot; 670 &quot;</td>
<td>&quot; 2390 &quot;</td>
<td></td>
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<tr>
<td>8</td>
<td>640 &quot;</td>
<td>&quot; 680 &quot;</td>
<td>&quot; 2380 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>640 &quot;</td>
<td>&quot; 680 &quot;</td>
<td>&quot; 2440 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>650 &quot;</td>
<td>&quot; 700 &quot;</td>
<td>&quot; 2620 &quot;</td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>660 &quot;</td>
<td>&quot; 710 &quot;</td>
<td>&quot; 2670 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>680 &quot;</td>
<td>&quot; 700 &quot;</td>
<td>&quot; 2680 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

cc: Mr. Leslie H. Moore
    Robert Trent Jones
    Dr. O.J. Noer
    Mr. E.J. Watson
    Mr. Robert Chuck
    Mr. L.W. Bryan
December 6, 1965

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project O2A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 29</td>
<td>680</td>
<td>PPM</td>
<td>680</td>
<td>PPM</td>
<td>2480</td>
<td>PPM</td>
</tr>
<tr>
<td>30</td>
<td>690</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2470</td>
<td>&quot;</td>
</tr>
<tr>
<td>Dec. 1</td>
<td>640</td>
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<td>&quot;</td>
<td>2410</td>
<td>&quot;</td>
</tr>
<tr>
<td>3</td>
<td>680</td>
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<td>&quot;</td>
<td>2400</td>
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</tr>
<tr>
<td>4</td>
<td>700</td>
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<td>5</td>
<td>650</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2410</td>
<td>&quot;</td>
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</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.
December 13, 1965

Mr. Leslie W. Wishard
Kamuela, Hawaii

Dear Les:

Attached for your information is a record of the chloride content of the three wells at Mauna Kea Beach Hotel. I thought you would be interested in this information.

Very truly yours,

ROBERT T. CHUCK
Manager-Chief Engineer

RTC: js
attach.
November 29, 1965

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
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<td>Nov. 22</td>
<td>680</td>
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<td>710</td>
<td>PPM</td>
<td>2470</td>
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<td>&quot;</td>
<td>2430</td>
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<td>24</td>
<td>680</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2440</td>
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</tr>
<tr>
<td>25</td>
<td>590</td>
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<td>&quot;</td>
<td>2370</td>
<td>&quot;</td>
</tr>
<tr>
<td>26</td>
<td>610</td>
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<td>&quot;</td>
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<td>&quot;</td>
</tr>
<tr>
<td>27</td>
<td>600</td>
<td>&quot;</td>
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<td>28</td>
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<td>&quot;</td>
<td>650</td>
<td>&quot;</td>
<td>2530</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

D.C.

cc: Mr. Leslie H. Moore
    Robert Trent Jones
    Dr. O.J. Noer
    Mr. E.J. Watson
    Mr. Robert Chuck
    Mr. L.M. Bryant
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
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<td>Nov. 15</td>
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<td>PPM</td>
<td>650</td>
<td>PPM</td>
<td>2300</td>
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<tr>
<td>19</td>
<td>710</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2470</td>
<td>&quot;</td>
</tr>
<tr>
<td>20</td>
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<tr>
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<td>680</td>
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</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

Derek Cockle

cc: Mr. Leslie H. Moore
    Robert Trent Jones
    Dr. O.J. Noer
    Mr. E.J. Watson
    Mr. Robert Chuck
    Mr. L.W. Bryant
TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 1</td>
<td>700</td>
<td>PPM</td>
<td>700</td>
<td>PPM</td>
<td>2350</td>
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<td>&quot;</td>
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<td>&quot;</td>
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<td>&quot;</td>
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</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.
November 15, 1965

TO: Mr. Henry O. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NACL</th>
<th>Well No. 2</th>
<th>NACL</th>
<th>Well No. 3</th>
<th>NACL</th>
</tr>
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<td>PPM</td>
<td>700</td>
<td>PPM</td>
<td>2220</td>
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<td>&quot;</td>
<td>2320</td>
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<td>10</td>
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<td>650</td>
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<td>2330</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represents parts per million of chlorides as sodium chloride.

Derek Cockle

cc: Mr. Leslie H. Moore
    Robert Trent Jones
    Dr. O.J. Noer
    Mr. E.J. Watson
    Mr. Bob Chuck
    Mr. L.N. Bryant
November 12, 1965

Mr. Derek Cockle  
Chief Engineer  
Mauna Kea Beach Hotel  
Kamuela, Hawaii  

Dear Mr. Cockle:

This is to acknowledge receipt of Daily Salinity Records on your hotel's three wells.

We are quite interested in receiving this data and maintaining an inventory of water resources data in Hawaii and we hope that you will be able to continue sending such data to us.

Thank you very much for your fine cooperation.

Very truly yours,

WALTER O. WATSON, JR.  
Acting Manager-Chief Engineer
November 4, 1965

Dear Bob:

We are taking daily Salinity readings on our three wells. I thought you may be interested in being copied.

Derek Cockle
Chief Engineer

DC:ajt
cc; Mr. Leslie H. Moore
September 3, 1965

TO: Mr. Henry O. Beebe

FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the Sodium Chloride reading taken from three wells at Mount Sea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 13</td>
<td>650</td>
<td>650</td>
<td>2430</td>
</tr>
<tr>
<td>14</td>
<td>630</td>
<td>630</td>
<td>2390</td>
</tr>
<tr>
<td>15</td>
<td>620</td>
<td>670</td>
<td>2420</td>
</tr>
<tr>
<td>16</td>
<td>670</td>
<td>670</td>
<td>2420</td>
</tr>
<tr>
<td>17</td>
<td>630</td>
<td>700</td>
<td>2450</td>
</tr>
<tr>
<td>18</td>
<td>600</td>
<td>700</td>
<td>2250</td>
</tr>
<tr>
<td>19</td>
<td>650</td>
<td>700</td>
<td>2350</td>
</tr>
<tr>
<td>20</td>
<td>650</td>
<td>700</td>
<td>2350</td>
</tr>
<tr>
<td>21</td>
<td>650</td>
<td>700</td>
<td>2350</td>
</tr>
<tr>
<td>22</td>
<td>650</td>
<td>700</td>
<td>2350</td>
</tr>
<tr>
<td>23</td>
<td>630</td>
<td>590</td>
<td>2300</td>
</tr>
</tbody>
</table>

Pump # 1 - Macka (Golf Course Irrigation)
Pump # 2 - 17th Fairway (Golf Course Irrigation)
Pump # 3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

Derek Cockle

cc: Leslie W. Moore
    Robert Trent Jones
    Dr. G. J. Roer
TO: Mr. Henry C. Beebe
FROM: Derek Cockle

Project 02A - Golf Course
Irrigation Water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Well No. 1</th>
<th>NAACL</th>
<th>Well No. 2</th>
<th>NAACL</th>
<th>Well No. 3</th>
<th>NAACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 25</td>
<td>710</td>
<td>PPM</td>
<td>720</td>
<td>PPM</td>
<td>2200</td>
<td>PPM</td>
</tr>
<tr>
<td>26</td>
<td>700</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2210</td>
<td>&quot;</td>
</tr>
<tr>
<td>27</td>
<td>720</td>
<td>&quot;</td>
<td>700</td>
<td>&quot;</td>
<td>2200</td>
<td>&quot;</td>
</tr>
<tr>
<td>28</td>
<td>720</td>
<td>&quot;</td>
<td>710</td>
<td>&quot;</td>
<td>2230</td>
<td>&quot;</td>
</tr>
<tr>
<td>29</td>
<td>730</td>
<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2240</td>
<td>&quot;</td>
</tr>
<tr>
<td>30</td>
<td>690</td>
<td>&quot;</td>
<td>690</td>
<td>&quot;</td>
<td>2280</td>
<td>&quot;</td>
</tr>
<tr>
<td>31</td>
<td>690</td>
<td>&quot;</td>
<td>680</td>
<td>&quot;</td>
<td>2290</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)
Well #2 - 17th Fairway (Golf Course Irrigation)
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

Derek Cockle

cc: Leslie H. Moore
    Robert Trent Jones
    Dr. O. J. Noer
    E. J. Watson
    Bob Chuck
TO: Mr. Henry O. Beebe  
FROM: Derek Cockle

Project O2A - Golf Course  
Irrigation water - Salinity Tests

The following is a daily record of the sodium chloride reading taken from three wells at Mauna Kea Beach Hotel.

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well No. 1</td>
</tr>
<tr>
<td>Oct. 18</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>24</td>
</tr>
</tbody>
</table>

Well #1 - Mauka (Golf Course Irrigation)  
Well #2 - 17th Fairway (Golf Course Irrigation)  
Well #3 - Hotel (Air Condition)

Note: All readings represent parts per million of chlorides as sodium chloride.

Derek Cockle

cc. Leslie H. Moore  
Robert Trent Jones  
Dr. O. J. Noer  
E. J. Watson  
Bob Chuck
August 10, 1964

To: Supervisor, Sanitary Engineering Section (Thru Official Channels)

From: Chemist, Laboratories Branch

Subject: Water, Chemical Analysis Job #120 (Exploratory Well, Layne International Inc.), Kawaihae, Board of Water Supply, County of Hawaii, received August 5, 1964

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH @ 25°C</td>
<td>8.05</td>
</tr>
<tr>
<td>Color</td>
<td>10</td>
</tr>
<tr>
<td>Odor</td>
<td>0</td>
</tr>
<tr>
<td>Turbidity</td>
<td>20</td>
</tr>
<tr>
<td>NO₂</td>
<td>less than 0.001 ppm</td>
</tr>
<tr>
<td>NO₃</td>
<td>2.32 ppm</td>
</tr>
<tr>
<td>Hydroxide Alkalinity</td>
<td>0.00 ppm as CaCO₃</td>
</tr>
<tr>
<td>Carbonate Alkalinity</td>
<td>14 ppm as CaCO₃</td>
</tr>
<tr>
<td>Bicarbonate Alkalinity</td>
<td>67 ppm as CaCO₃</td>
</tr>
<tr>
<td>Total Alkalinity</td>
<td>68 ppm as CaCO₃</td>
</tr>
<tr>
<td>Total Hardness</td>
<td>331 ppm as CaCO₃</td>
</tr>
<tr>
<td>Total solids</td>
<td>1,854 ppm</td>
</tr>
<tr>
<td>Loss on ignition</td>
<td>352 ppm</td>
</tr>
<tr>
<td>SiO₂</td>
<td>18 ppm</td>
</tr>
<tr>
<td>Fe</td>
<td>1.41 ppm</td>
</tr>
<tr>
<td>Al</td>
<td>0.2 ppm</td>
</tr>
<tr>
<td>Ca</td>
<td>43.3 ppm</td>
</tr>
<tr>
<td>Mg</td>
<td>54.2 ppm</td>
</tr>
<tr>
<td>SO₄</td>
<td>100 ppm</td>
</tr>
<tr>
<td>Na</td>
<td>463 ppm</td>
</tr>
<tr>
<td>K</td>
<td>54.2 ppm</td>
</tr>
<tr>
<td>Chlorides</td>
<td>850 ppm</td>
</tr>
<tr>
<td>As</td>
<td>less than 0.01 ppm</td>
</tr>
<tr>
<td>F</td>
<td>0.2 ppm</td>
</tr>
<tr>
<td>Mn</td>
<td>less than 0.05 ppm</td>
</tr>
<tr>
<td>Pb</td>
<td>= = 0.01 ppm</td>
</tr>
<tr>
<td>Cu</td>
<td>= = 0.1 ppm</td>
</tr>
<tr>
<td>Zn</td>
<td>= = 0.1 ppm</td>
</tr>
<tr>
<td>Se</td>
<td>= = 0.01 ppm</td>
</tr>
<tr>
<td>Phenols</td>
<td>= = 0.001 ppm</td>
</tr>
</tbody>
</table>

KINGSTON S. WILCOX, Ph.D.
Chief, Laboratories Branch

K. M. Higashi
WATER RESEARCH LABORATORY
August 12, 1964

To: Supervisor, Sanitary Engineering Section (Thru Official Channels)

From: Chemist, Laboratories Branch

Subject: WATER, CHEMICAL ANALYSIS: Well #3, Job #128, Mauna Kea Resort Area, 11:00 P.M., 7/23/64, received 8/7/64

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH @ 25°C</td>
<td>7.40</td>
</tr>
<tr>
<td>Color</td>
<td>1</td>
</tr>
<tr>
<td>Odor</td>
<td>0</td>
</tr>
<tr>
<td>Turbidity</td>
<td>5</td>
</tr>
<tr>
<td>NO₂</td>
<td>0.016 ppm</td>
</tr>
<tr>
<td>NO₃</td>
<td>1.32 ppm</td>
</tr>
<tr>
<td>Hydroxide Alkalinity</td>
<td>0.00 ppm as CaCO₃</td>
</tr>
<tr>
<td>Carbonate Alkalinity</td>
<td>0.00 ppm as CaCO₃</td>
</tr>
<tr>
<td>Bicarbonate Alkalinity</td>
<td>78 ppm as CaCO₃</td>
</tr>
<tr>
<td>Total Alkalinity</td>
<td>78 ppm as CaCO₃</td>
</tr>
<tr>
<td>Total Hardness</td>
<td>378 ppm as CaCO₃</td>
</tr>
<tr>
<td>Total solids</td>
<td>1,966 ppm</td>
</tr>
<tr>
<td>Loss on ignition</td>
<td>304 ppm</td>
</tr>
<tr>
<td>SiO₂</td>
<td>65 ppm</td>
</tr>
<tr>
<td>Fe</td>
<td>0.04 ppm</td>
</tr>
<tr>
<td>Al</td>
<td>less than 0.05 ppm</td>
</tr>
<tr>
<td>Ca</td>
<td>37.8 ppm</td>
</tr>
<tr>
<td>Mg</td>
<td>68.8 ppm</td>
</tr>
<tr>
<td>SO₄</td>
<td>107 ppm</td>
</tr>
<tr>
<td>Na</td>
<td>458 ppm</td>
</tr>
<tr>
<td>K</td>
<td>30 ppm</td>
</tr>
<tr>
<td>Chlorides</td>
<td>912 ppm</td>
</tr>
<tr>
<td>As</td>
<td>less than 0.01 ppm</td>
</tr>
<tr>
<td>F</td>
<td>0.2 ppm</td>
</tr>
<tr>
<td>Mn</td>
<td>less than 0.05 ppm</td>
</tr>
<tr>
<td>Pb</td>
<td>less than 0.1 ppm</td>
</tr>
<tr>
<td>Cu</td>
<td>less than 0.1 ppm</td>
</tr>
<tr>
<td>Zn</td>
<td>less than 0.1 ppm</td>
</tr>
<tr>
<td>Se</td>
<td>less than 0.1 ppm</td>
</tr>
<tr>
<td>Phenols</td>
<td>less than 0.001 ppm</td>
</tr>
</tbody>
</table>

FORWARDED: R. J. H. WILCOX, Ph.D.
Chief, Laboratories Branch

MASAYOSHI OGATA

RECEIVED
& CIRCULATED
8/18/64
July 10, 1963

Mr. Dan A. Davis
District Geologist
U.S. Geological Survey
Water Resources Division
1100 Water Avenue
Honolulu 14, Hawaii

Dear Dan:

Transmitted herewith for your information and files is a copy of the pump and chlorine tests for the No. 2 well at the Mauna Kea Resort Hotel.

Very truly yours,

[Signature]

ROBERT T. CHUCK
Manager-Engineer

Enc.

Transmitted in person by Wow.
July 10, 1963

Mr. Dan A. Davis  
District Geologist  
U.S. Geological Survey  
Water Resources Division  
1100 Water Avenue  
Honolulu 14, Hawaii

Dear Dan:

Transmitted herewith for your information and files is a copy of the pump and chlorine tests for the No. 2 well at the Mauna Kea Resort Hotel.

Very truly yours,

[Signature]

ROBERT T. CHUCK  
Manager-Engineer
_(Route Slip_

Division of Water and Land Development

From:  Date: 7/2/... File In: ____________

D: INITIAL

- Robert T. Chuck
- Walter O. Watson
- Takeo Fujii
- James Yoshimoto
- George Yokota
- Albert Ching
- Hong Fong Chang
- Jane Sakai
- Doris Hamada
- Tamae Shiraishi
- Jean Tanaka

PLEASE:

- See me
- Take action
- Review & Comment
- Investigate & Report
- Draft reply
- Acknowledge Receipt
- Type Draft __ copies
- Type Final
- CC to
- Mail

For your:

- Approval
- Signature
- Information

Remarks:

Many boxes on 4400 showing a map or diagram showing wells & large chloride concentrations.
Department of Land & Natural Resources
Division of Water and Land Development
State of Hawaii
Honolulu, Hawaii

Attention: Mr. Al Ching

Subject: Mauna Kea Resort Hotel -- No. 2 Well Location -- Test Results

Gentlemen:

Transmitted herewith are two copies of the test results at the No. 2 Well Location of Mauna Kea Resort Hotel, as requested.

Very truly yours,

BELT, COLLINS & ASSOC., LTD.

By

E. J. Watson

WDN;go

Encls.
July 1, 1963

Department of Land & Natural Resources  
Division of Water and Land Development  
State of Hawaii  
Honolulu, Hawaii

Attention: Mr. Al Ching  

Subject: Mauna Kea Resort Hotel -- No. 2 Well Location -- Test Results

Gentlemen:

Transmitted herewith are two copies of the test results at the No. 2 well location of Mauna Kea Resort Hotel, as requested.

Very truly yours,

BELT, COLLINS & ASSOCIATES, LTD.

By

F. J. Watson

Encls.
Division of Water and Land Development
WATER RESOURCES AND FLOOD CONTROL BRANCH
Route Slip

From: __________________________ Date: ________________ File In: ________________________

TO: INITIAL

1. ROBERT T. CHUCK
   WALTER O. WATSON
   K.Y. CHANG
   DAN LUM
   MANABU TAGOMORI
   EUGENE SOUZA
   BILL KOYANAGI
   DORIS HAMADA
   JANICE HORIMOTO
   AL CHING

2. TAKEO FUJII
   JAMES YOSHIMOTO
   TADASHI/CHICO

3. AL E.

REMARKS: WHAT was measured?
        425 - 450 PPM.
Division of Water & Land Development
Department of Land & Natural Resources
State of Hawaii
Honolulu, Hawaii

Attention: Mr. Albert Ching and Mr. Dan Lum

Re: Irrigation Well -- Rockefeller Development
Mauna Kea Beach (Kaunaoa Beach)

Gentlemen:

Attached you will find a Summary of Drilling Logs and Pump Test for Well No. 2 (Elevation 188' msl) at the subject project.

Very truly yours,

BELT, COLLINS & ASSOC., LTD.

By E. J. Watson

EJW:go

Attach.
June 27, 1963

Division of Water & Land Development
Department of Land & Natural Resources
State of Hawaii
Honolulu, Hawaii

Attention: Mr. Albert Ching and Mr. Dan Lum

Re: Irrigation Well -- Rockefeller Development
Mauna Kea Beach (Kaunaoa Beach)

Gentlemen:

Attached you will find a Summary of Drilling Logs and Pump Test for Well No. 2 (Elevation 188' msl) at the subject project.

Very truly yours,

BELT, COLLINS & ASSOC., LTD.

By E. J. Watson

EJW:go

Attach.
June 27, 1963

BELT, COLLINS & ASSOCIATES, LTD.

Division of Water & Land Development
Department of Land & Natural Resources
State of Hawaii
Honolulu, Hawaii

Attention: Mr. Albert Ching and Mr. Dan Lum

Re: Irrigation Well -- Rockefeller Development
Manna Nea Beach (Kaunaoa Beach)

Gentlemen:

Attached you will find a Summary of Drilling Logs and Pump Test for Well No. 7 (Elevation 188' msl) at the subject project.

Very truly yours,

BELT, COLLINS & ASSOC., LTD.

By

E. J. Watson

EJW:go

Attach.
July 1, 1963

Department of Land & Natural Resources
Division of Water and Land Development
State of Hawaii
Honolulu, Hawaii

Attention: Mr. Al Ching

Subject: Mauna Kea Resort Hotel -- No. 2 Well Location -- Test Results

Gentlemen:

Transmitted herewith are two copies of the test results at the No. 2 Well Location of Mauna Kea Resort Hotel, as requested.

Very truly yours,

BELT, COLLINS & ASSOC., LTD.

By E. J. Watson

Encls.
June 3, 1963

Belt Collins & Associates Ltd.
Kenrock Building
1402 Kapiolani Bldg.
Honolulu, Hawaii

Attention: Mr. Ted Watson

Gentlemen:

Mauna Kea Resort Well

We want to thank you for sending us a copy of your specification for the subject project at Kawaihae, Hawaii, and also a copy of the location map and pumping test data.

We appreciate your cooperation in providing us the information which will assist us in maintaining current and complete well records throughout the state.

Very truly yours,

WALTER O. WATSON, JR.
Acting Manager-Engineer

WOW:DL:jh
May 16, 1963

Mr. Dan A. Davis, District Geologist
U. S. Geological Survey
Water Resources Division
Ground Water Branch
1100 Ward Avenue
Honolulu 14, Hawaii

Dear Dan:

Please find enclosed a copy of the location map for the drilled well at the Rockefeller Resort in Kawaihae by Ocean View Drilling Co.

Incidentally, Sam Wong has assigned the number 17 to this well for us.

Very truly yours,

WALTER O. WATSON, JR.
Acting Manager-Engineer

Enc.
WELL 6049-01

SUMMARY OF DRILLING LOSS AND TREATMENT DATA

For

Irrigation Water Well

For

Mauna Kea Beach Hotel

As

Mauna Kea Beach (Formerly Konaonee Beach)

Island of Hawaii

May 6, 1963
Ground Horizon

188 feet = 64 ft. above MSL.

Depth and Size of Hole Drilled

Total Depth: 218 feet.
Size: 12-3/4" outside diameter
1/4" wall thickness.
Length: 218 feet. Bottom 40 ft. perforated.

Contractor

Ocean View Drilling Co., Ltd.
Box 105
Inman, South Carolina

Drilling Equipment

Bosporus into 22-1/2 cable tool drilling rig.

Date

New Brunswick

Leroy A. Ruston

Delph Ream, Jr.
Construction:

Installation and dismantilation  5 days
Drilling and installing casing  53 days
Regular shifts  50
Additional shifts  20
Total no. of shifts  82
Pump test including installation of pump and equipment  7 days

Total time  63 working days

Installation began: January 22, 1963
Drilling completed: March 30, 1963
Pump test completed: April 7, 1963
Dismantilation completed: April 9, 1963
<table>
<thead>
<tr>
<th>Date</th>
<th>Footage Per Shift</th>
<th>Depth Below Surface</th>
<th>Formation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>7</td>
<td>0</td>
<td>Hard, hard rock</td>
<td>Mobilization</td>
</tr>
<tr>
<td>24</td>
<td>11</td>
<td>7</td>
<td>Sand, dirt</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>16</td>
<td>Hard, hard rock</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>5</td>
<td>19</td>
<td>Hard, hard rock</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>20</td>
<td>Hard, hard rock</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>21</td>
<td>Very hard, gray</td>
<td>Installed waterline</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>21</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>31</td>
<td>2</td>
<td>22</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>February 1</td>
<td></td>
<td>23</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>24</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>27</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>27</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>32</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>33</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>33</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>34</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>35</td>
<td>Very hard, gray</td>
<td>Building bit constantly</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>38</td>
<td>Hard, gray rock</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>39</td>
<td>Hard, gray rock</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>40</td>
<td>Hard, gray rock</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>40</td>
<td>Hard, gray rock</td>
<td></td>
</tr>
<tr>
<td>Contents</td>
<td>215</td>
<td>217</td>
<td>219</td>
<td>221</td>
</tr>
<tr>
<td>----------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Horse</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
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Some notes:
Well 6049-01

May 6, 1963
Total Depth: 218 feet

12-3/4" outside diameter
1/2" inside diameter

Bottom 40 ft. perforated.
1. Foundation and ground floor -- 5 days
2. Framing and enclosing frames -- 95 days
3. Installation of AAC -- 70 days
4. Total no. of working days
   -- 170 days
5. As above including installation of pumps and equipment -- 170 days
6. Total time -- 170 working days

Construction begun: January 22, 1965
Building completed: March 30, 1965
Piping was completed: April 7, 1965
Chemical treatment completed: April 9, 1965
APPLICATION FOR PERMIT FOR WASTE DISCHARGE

Pursuant to Chapter 37 of the State Public Health Regulations, application for permit for waste discharge is hereby made to the Department of Health.

A. APPLICANT IDENTIFICATION

Name
Mauna Kea Beach Hotel

Mailing Address
P. O. Box 218
Kamuela Hawaii 96743

Telephone Number
882-7222

For Office Use Only
Appl. No.

Date Rec'd

Permit No.

Date Issued

Date Expires

B. OUTLET LOCATION

Mauna Kea Beach Hotel Ocean Outfall

Latitude 20° 01' "N
Longitude 155° 50' "W

Depth 0.0 feet

C. CLASSIFICATION OF WATER INTO WHICH DISCHARGE OCCURS (Check)

Fresh: Class 1 __ Class 2 __

Coastal: Class AA __ Class A __ Class B __

D. PERIOD OF DISCHARGE (Check)

Continuous __ Seasonal __ Occasional __ Emergency __

E. POLLUTION CONTROL MEASURES PRESENTLY APPLIED TO WASTE WATER PRIOR TO DISCHARGE

1. Is treatment applied to present discharge? Yes __ No __

2. If yes, state the percentage of waste water treated by your facilities. 100%

3. On a separate sheet, furnish a simplified flow diagram of the existing pollution control units in flow sequence. (See attached sheet)

F. PRESENT WASTE WATER DISCHARGE

1. Identify Type of Discharge (Check)

a. Domestic Sewage __

b. Industrial Waste __

c. Agricultural Waste __

d. Irrigation Tailwater __

e. Thermal Waste __

2. Identify Source of Discharge (for example: wash waters, boiler blowdown, cultivated fields, Kailua Community)

Sanitary, laundry and kitchen wastes from Mauna Kea Beach Hotel
3. Quantity of Discharge

Flow: Present  160,000 gallons/day
Design  150,000 gallons/day

4. Quality of Discharge

It is the objective of this part of the application to make known the quality of the present discharge so that an accurate evaluation can be made by the Department of Health to determine how the present effluent may affect the quality of the receiving body of water as established by Chapter 37-A. As a guide in obtaining acceptable data, refer to the latest edition of Standard Methods for the Examination of Water and Waste Water published by the American Public Health Association, Inc.

The findings indicated below must be obtained from a representative sample of the discharge during the most intense month in the twelve month period preceding this application.

The analyses for the various components listed below shall determine concentrations to the nearest unit or fraction thereof as indicated by the number within the parenthesis immediately following each item. For example: "Lead (0.1 mg/l)" indicates that determinations for lead shall be made to the nearest 0.1 mg/l.

Indicate "less than" if the concentration is less than the concentration shown in the parenthesis.

a. Physical Quality

Floating Debris
Oil
Scum, Foam
Color
Odor

If any of the above is Yes, describe below:

Settleable Solids (1 ml/l)  Less than 1 ml/l
Suspended Solids (1 mg/l)  69 mg/l
Total Dissolved Solids (1 mg/l)  330 mg/l
Temperature (0.5°F)  77 ° F
Turbidity (1 JTU or 1 ft)  25 USPH units

b. Chemical Quality
(If a particular determination is not applicable to your discharge, indicate N. A.)

Radioisotopes
Heavy Metals
Lead (0.1 mg/l)  NA mg/l
Mercury (0.01 mg/l)  NA mg/l
Zinc (1 mg/l)  NA mg/l
Chromium (1 mg/l)  NA mg/l
Nickel (0.1 mg/l)  NA mg/l
Silver (0.1 mg/l)  NA mg/l
Barium (0.5 mg/l)  NA mg/l
Copper (0.1 mg/l)  7.3 mg/l
Cadmium (0.1 mg/l)  NA mg/l

Toxic Chemicals
Arsenic (0.1 mg/l)  NA mg/l
Cyanides (0.1 mg/l)  NA mg/l
Phenols (0.01 mg/l)  NA mg/l
Sulfides (0.1 mg/l)  6.0 mg/l
Pesticides
Chlordane (0.1 ppb)  NA ppb
Lindane (0.1 ppb)  NA ppb
DDT (0.1 ppb)  NA ppb
Dieldrin (0.1 ppb)  NA ppb
Parathion (0.1 ppb)  NA ppb
Other - indicate generic name  ppb

Other Parameters
pH (0.1)  5.9
Biochemical Oxygen Demand (1 mg/l)  17 mg/l
Chlorine Residual (0.1 mg/l)  0.8 mg/l
Nutrients
Total Phosphorus (0.01 mg/l)  16.33 mg/l
Total Nitrogen (0.01 mg/l)  3.64 mg/l

G. SOLID WASTES
Briefly describe method for solid waste disposal- sanitary landfill (incinerator, open dump, sanitary landfill, ocean disposal, etc.)

H. IMPLEMENTATION PLAN (Check)
1. Propose New Facility
2. Increase Capacity
3. Improve Degree of Treatment
4. Eliminate Discharge
5. Relocate Effluent Disposal Location  x
6. Other - Describe

I. IMPLEMENTATION DEADLINES
Proposed deadlines by which time the Department of Health will receive pertinent data and information germane to the various stages or steps for implementation of new or additional pollution control facilities:

<table>
<thead>
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<th>Preliminary Engineering Report</th>
<th>MONTH</th>
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Signature of Authorized Person

Position

Date