SCHOEFIELD MONITOR WELLS

MV4-1 3004-01 PERMIT FOR CONSTR. ONLY
 BUT 25 GPM PUMP INSTALLED FOR SAMPLING.
 PERMIT CONDITIONS - O.K.

(3-31-93)

MV4-2 3004-02 PERMIT FOR CONSTR. ONLY
 BUT 25 GPM PUMP WAS INSTALLED - CABLE
 HOLDING PUMP BROKE, UNABLE TO RETRIEVE -
 LEFT IN WELL. WILL MEAS. WATER LEVELS
 ONLY. PERMIT CONDITIONS - O.K.

(6-30-93)

MV4-3 3004-03 PERMIT FOR CONSTR. ONLY
 BUT 20 GPM PUMP INSTALLED FOR
 SAMPLING. PERMIT COND. - O.K.

(6-30-93)

MV4-4 3004-04 PERMIT - BOTH

APPLIC.

AFTER THE FACT
PUMP PERMIT

PERMIT COND. - O.K.

NOTE:
Chronology repeats for each of 4 monitor wells
MW4-2A 3004-05 APPLIC. - BOTH

**AFTER THE FACT**
Pump Permit

REPLACEMENT WELL FOR MW4-2 3004-02.

PERMIT COND. - OK.

2-4 2802-01 APPLIC. - BOTH

PERMIT COND. - OK

2-5 2959-01 APPLIC. - BOTH

PERMIT COND. - OK

2-4 2801-02 APPLIC. - BOTH

PERMIT COND. - OK.
2-3 2902-03  
AFTER THE FACT  
Well/Pump Permit  
APPLIC. - BOTH  
Permit Cond. - OK.

2-2 2903-01  
AFTER THE FACT  
Well/Pump Permit  
APPLIC. - BOTH  
Permit Cond. - OK

2-1 2900-02  
AFTER THE FACT  
Well/Pump  
APPLIC. - BOTH  
Permit Cond. - OK

1-1 2901-13  
AFTER THE FACT  
Well/Pump
CHECKLIST

Type of Permit: [X] Well Construction [X] Pump Installation [ ] Water Use Required

Well Name: Schofield Monitor 4-4 No. 3004-03 Island: Oahu
Applicant: US Army Environmental Ct Landowner: US Army
Consultant: Roscoe Mats TMK: 7-7-1:1

Appl Recd: 26 Apr 95 (Dates)
Mapped/#: 8 May 95 Logcomp: 5-9-95 Logbk: 5-9-95
Acknowlgmt: MAY 11 1995
Fee Depos: N/A

Copies Sent for Review
.DoH/Drink Water
Wastewater
Hist. Preserv
Aquat Res
OHA
DHHL
Honolulu BWS
Maui DoW
Kauai DoW
Hawaii DoW
PW
SCLDF
Com: Wahiawa N.B.
Miliwai N.B.
Waiawa Northshore N.B.

Comments Recd

Bulletin to Agenda
Submittal to Appl
CWRM: [ ] Appr [ ] Deny
Permit/Notice to Appl

Handing Lawson
Attorn
MONITORING WELL 4

GROUND ELEVATION = 828'

5" DIA. HOLLOW STEEL PICKET FILLED WITH CEMENT

CEMENT MOUND

NO. 2 COARSE GRAVEL

WELL CAP

28' DIA. STEEL WELL MONUMENT

28' DIA. STEEL-CONDUCTOR CASING

CEMENT-BENTONITE INNER SEAL

30" DIA. HOLE DRILLED W/CABLE TOOL

26" DIA. STEEL-CONDUCTOR CASING

CEMENT-BENTONITE INNER SEAL

20" DIA. CARBON-STEEL BLANK CASING

24" DIA. HOLE DRILLED W/AIR-ROTARY

CEMENT-BENTONITE INNER SEAL

BENTONITE PELLETS

FINE SAND

1" STEEL SOUNDER TUBE
(Bottom 30' perforated)

SRI SUPREME SILICA SAND FILTER PACK (Size: 4/1)

20" DIA. STAINLESS-STEEL LOUVERED SCREEN (0.187-in. slot size)

FINE SAND

SLUGH

(NOT TO SCALE)

Depth (ft) Elevation (ft):
198  630
528  300
538  290
540  288
546  282
555.74  273.84, 3/15/95
576  252
696  132
700  128
770  58

*NOTE: Elevations measured with respect to mean sea level.

Well Completion Diagram for Well 4-4

Schofield DA03
Schofield Barracks
Island of Oahu, Hawaii

FIGURE
October 14, 1996

28339.06.01.12
0225AR

Ms. Lenore Nakama
State of Hawaii, Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Schofield Army Barracks RI/FS Well Information
Permit Applications and Completion Reports
Schofield Barracks, Hawaii

Dear Ms. Nakama:

As discussed during our telephone conversation on August 27, 1996, we have enclosed a copy of a USGS topographic map showing the locations of 12 monitoring wells installed for this project. The monitoring wells are identified on the map by their Army identification numbers. When we received your letter dated April 11, 1996, there seemed to be some confusion over which state well identification numbers were assigned to which of our monitoring wells. Your letter indicated that Wells 4-2 and 4-4 were assigned state well identification numbers 3-2900-01 and 3-3004-03, respectively. The actual geographic location of Well 4-2 does not correspond to well identification number 3-2900-01. Based on our records, the state well identification numbers should be assigned as follows:

<table>
<thead>
<tr>
<th>Project Well Number</th>
<th>Hawaii State Well ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>3-2901-13</td>
</tr>
<tr>
<td>2-1</td>
<td>3-2900-02</td>
</tr>
<tr>
<td>2-2</td>
<td>3-2903-01</td>
</tr>
<tr>
<td>2-3</td>
<td>3-2902-03</td>
</tr>
<tr>
<td>2-4</td>
<td>3-2801-02</td>
</tr>
<tr>
<td>2-5</td>
<td>3-2959-01</td>
</tr>
<tr>
<td>2-6</td>
<td>3-2802-01</td>
</tr>
<tr>
<td>4-2</td>
<td>3-3004-02</td>
</tr>
<tr>
<td>4-2A</td>
<td>3-3004-05</td>
</tr>
<tr>
<td>4-3</td>
<td>3-3004-03</td>
</tr>
<tr>
<td>4-4</td>
<td>3-3004-04</td>
</tr>
</tbody>
</table>

We hope this table and the map will help clear up the confusion regarding the well numbers and locations.

As requested in your April 11, 1996 letter, we have enclosed the following information:

1. Well 1-1 (State Well ID No. 3-2901-13)
   a. After-the-fact application for a well construction/pump installation permit
   b. Well completion report
October 14, 1996
28339.06.01.12
0225AR
Ms. Lenore Nakama
State of Hawaii, DLNR
Page 2

2. Well 4-2 (State Well ID No. 3-3004-02)
   a. Well completion report
   b. Well completion diagram

Although 12 monitoring wells were installed over the lifetime of the project, only 11 are functioning with submersible pumps. There were problems during the installation of Well 4-2. The cable used to pull the pump out of the well broke. After numerous unsuccessful attempts to retrieve the pump, the pump was abandoned and is not functional. Thereafter, Well 4-2 was used only to measure groundwater levels. Thus, a pump installation report and diagram were never included in the original permit application. Because Well 4-2 could not be used as a monitoring well, a new well was drilled within 15 feet of the old well. We gave the new well the name 4-2A, and this may have led to additional confusion.

Your April 11 letter also requested information on State Wells 3-2900-01 and 3-3004-03. From our records, State Well 3-3004-03 refers to Well 4-3 instead of 4-4, as listed in your letter. But we are uncertain which wells are referred to by State Wells 3-2900-01 and 3-2900-02. At one time, we did propose to install a monitoring well in a part of the East Range, but that idea was rejected. It is possible, perhaps, that someone such as the drilling company may have submitted a permit application in advance. If that is the case, that particular permit should be withdrawn, as that well was never drilled. Because of the confusion, we have enclosed copies of the well completion reports for both Wells 4-3 and 4-4.

In addition, we have enclosed survey data for all the wells, and the well completion report for Well 2-6 with supporting boring log and well completion diagram information.

We hope that this information will help clarify the confusion between the two well identification systems. I will be available to discuss these wells with you personally if you so desire. If you have any questions, please feel free to call.

Sincerely yours,

HARDING LAWSON ASSOCIATES

Bruce S. Wedgeworth
Associate Geologist

Enclosures

cc: Mr. Jon Fukuda / U.S. Army, Department of Public Works
July 16, 1996

Harding Lawson Associates
235 Pearridge Center, Phase I
98-1005 Moanalua Road
Aiea, Hawaii 96701

Attn: Mr. Bruce S. Wedgeworth

Subject: FIELD LOCATION OF MW 2-6
At Wheeler Army Airfield
Oahu, Hawaii

<table>
<thead>
<tr>
<th>Northing</th>
<th>Easting</th>
<th>Elevation</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW 2-6</td>
<td>111702.132</td>
<td>484685.053</td>
<td>691.57</td>
<td>21°28'27.04&quot; 158°02'42.147&quot;</td>
</tr>
<tr>
<td>BM#1</td>
<td></td>
<td></td>
<td>689.50</td>
<td></td>
</tr>
<tr>
<td>BM#2</td>
<td></td>
<td></td>
<td>689.55</td>
<td></td>
</tr>
<tr>
<td>BM#3</td>
<td></td>
<td></td>
<td>689.46</td>
<td></td>
</tr>
</tbody>
</table>

Coordinates referred to Hawaii State Plane Coordinate System - Zone 3
Elevation Datum = Mean Sea Level (MSL)
ELEVATION OF MONITORING WELLS AS SURVEYED
ON 7/15/95 (WITH BRUCE & MARK OF HARDING
AND LAWSON)

MW-4-2A = 946.87 feet — Black mark on top of tube
MW-4-2 = 947.11 feet — Black mark on top of tube
"t" cut near casing of MW-4-2A = 945.91 feet

MW-4-1 = 853.47 feet (as surveyed on 3/16/95)
"t" cut = 851.12 feet
Diff. = 2.35 feet (Bruce need diff. in elev. only)

MW-4-3 = 884.15 feet (as surveyed on 3/16/95)
"t" cut = 882.52 feet
Diff. = 1.63 feet (Bruce need diff. in elev. only)

MW-4-4 = 829.88 feet — Black mark

MW-2-2 = 864.34 feet — Black mark on top of tube
"t" cut = 862.90 feet

MK1-2-3 = 828.81 feet — Black mark on top of tube
"t" cut = 827.20 feet

MW-2-4 = 829.70 feet — Black mark on top of tube
"t" cut = 828.00 feet

MW-2-1 = 903.15 feet — Black mark on top of tube
### Coordinate Manager

**Coordinate File Name:** HARDING.CO

**Lowest point #:** 1  **Highest point #:** 6  
**Job #:** 1 0

**Description:**

<table>
<thead>
<tr>
<th>Point</th>
<th>Northino</th>
<th>Eastino</th>
<th>Elev</th>
<th>Descr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sp → 1</td>
<td>117515.9390</td>
<td>490579.0620</td>
<td>863.3800</td>
<td>MW 2-2</td>
</tr>
<tr>
<td>Sp → 2</td>
<td>121016.1042</td>
<td>481183.9529</td>
<td>863.3800</td>
<td>MW 2-2</td>
</tr>
<tr>
<td>Sp → 3</td>
<td>123512.2200</td>
<td>474675.9900</td>
<td>853.3671</td>
<td>MW 4-1</td>
</tr>
<tr>
<td>Sp → 4</td>
<td>124621.3160</td>
<td>472744.1700</td>
<td>947.1000</td>
<td>MW 4-2</td>
</tr>
<tr>
<td>Sp → 5</td>
<td>122896.3800</td>
<td>474006.8800</td>
<td>884.1500</td>
<td>MW 4-3</td>
</tr>
<tr>
<td>Sp → 6</td>
<td>118439.3594</td>
<td>503505.7809</td>
<td>912.4300</td>
<td>MW 2-5</td>
</tr>
</tbody>
</table>

**0-00-13,601 CONVERGENCE**

0.9999900 SCALE FACTOR  
0.9999464 GRID FACTOR

**Sp - Hawaii State Plane Coordinate System, Zone 3 (NAD 27)**
Mr. Jon Fukuda  
United States Army  
DPW, Attn: APVG-GWV, U.S. Army  
 Schofield Barracks, Hawaii 96857-5000  

Dear Mr. Fukuda:  

Well Construction Permit  
MW 4-2A (Well No. 3004-05)  

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Standard Permit Condition 11:  

Special Conditions  

1. Standard Conditions 1, 2, and 9 are waived.  

Please sign the permit copies and return one for our files. Also, copies of the aquifer pump test procedure and the well completion report form are enclosed for your use.  

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214 or 1-800-468-4644 extension 70214.  

Aloha,  

[Signature]  
MICHAEI D. WILSON  
Chairperson  

Enclosures
In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of MW 4-2A Well (Well No. 3004-05) at Schofield Barracks, Oahu, TMK 7-7-01, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management, P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. The permittee shall coordinate with the Commission and conduct a pumping test in accordance with the attached Aquifer Pump Testing Procedure (attached). The permittee shall submit to the Commission the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Commission.

3. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

4. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department's Historic Preservation Division (587-0045) immediately.

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

6. The following shall be submitted to the Commission within thirty (30) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other water quality data.

7. The permittee shall comply with all applicable laws, rules, and ordinances.

8. The well construction permit application is incorporated into the permit by reference.

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

10. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: 5/9/96
Expiration Date: 5/9/98

Michael D. Wilson, Chairperson
Commission on Water Resource Management

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

Applicant's Signature: ____________________________ Date: ____________

Printed Name: ___________________ Firm or Title: ___________________

Please sign both copies and return one copy of this permit to the Commission and retain a copy for your record.
Mr. Jon Fukuda  
United States Army  
DPW, Attn: APVG-GWV, U.S. Army Garrison  
Schofield Barracks, Hawaii 06857-5000

Dear Mr. Fukuda:

After-the-Fact Pump Installation Permit  
MW 4-2A (Well No. 3004-05)

Enclosed are two (2) copies of your approved Pump Installation Permit for the captioned well(s). As part of the Commission's approval, the following special conditions were added and are part of your permit under Standard Permit Condition 10:

Special Conditions

1. Standard Conditions 1 and 8 are waived.

2. The requirement to install a flowmeter (Standard Condition 3) is waived.

Please sign the permit copies and return one for our files.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214 or 1-800-468-4644 extension 70214.

Aloha,

[Signature]

MICHAEL D. WILSON  
Chairperson

Enclosures
AFTEFTRHE-FACT PUMP INSTALLATION ERMIT

MW 4-2A Well, Well No. 3004-05

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for MW 4-2A Well (Well No. 3004-05) at Schofield Barracks, Oahu, TMK 7-7-01, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management, P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences.

2. The pump installation permit shall be for installation of a 25 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis.

4. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The applicant shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Commission within thirty (30) days from the date of approval.

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

7. The pump installation permit application is incorporated into the permit by reference.

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

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

10. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: 5/9/96
Expiration Date: 5/9/98

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

Applicant's Signature: ___________________________ Date: ________________

Printed Name: ___________________________ Firm or Title: ___________________________

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

Attachment

cc: USGS
Department of Health: Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
Mr. Jon Fukuda
U.S. Army
DPW, Attn: APVQ-GWV, U.S. Army Garrison
Schofield Barracks, HI 96857-5000

Dear Mr. Fukuda:

Permit Applications for MW2-1 through 2-5, MW4-2A, & MW4-4
(Well Nos. 2900-02, 2903-01, 2902-03, 2801-02, 2959-01, 3004-05, & 3004-04)

We accepted your after-the-fact well construction/pump installation permit applications on February 27, 1996, and hereby acknowledge that they are complete. You can expect your applications to be processed for action within ninety (90) days from that acceptance date.

We are returning your check for $175.00 because government agencies are not subject to the payment of any fees (§13-171-12(c) HAR).

Thank you for submitting the boring logs and well completion diagrams for Wells MW1-1, MW4-1, and MW4-3. We have reviewed the record for each of the monitor wells shown on your map. Listed below are the items that should be submitted to complete the record for the following wells:

1. MW1-1 (Well No. 2901-13)
   a. After-the-fact application for a well construction/pump installation permit.
   b. Well completion report (Parts I and II, attached)

2. MW4-2 (Well No. 3004-02)
   a. Well completion report (Parts I and II, attached)
   b. As-built sectional drawing of the well
   c. As-built sectional drawing of the pump

3. MW4-3 (Well No. 2900-01)
   a. As-built sectional drawing of the well

4. MW4-4 (Well No. 3004-03)
   a. Well completion report (Parts I and II, attached)

In addition, documentation from a Hawaii-licensed surveyor should be submitted for all of your monitor wells.

If you have any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

RAE M. LOUI
Deputy Director

LN:ss
Enclosure
TO: Honorable Lawrence Miike, Director
   Department of Health
   Attention: Dennis Tulang, Wastewater Branch
   William Wong, Safe Drinking Water Branch

FROM: Michael D. Wilson, Chairperson
   Commission on Water Resources Management

SUBJECT: After-the-Fact Applications for Well Construction/Pump Installation Permits
   MW2-1 through 2-5, MW4-2A, & MW4-4 Wells
   Well Nos. 2900-02, 2903-01, 2902-03, 2801-02, 2959-01, 3004-05, & 3004-04

Transmitted for your review and comment are copies of after-the-fact applications for well
construction/pump installation permits.

We would appreciate your comments on the captioned applications for any conflicts or
inconsistencies with the programs, plans, and objectives specific to your department. Please respond
by returning this cover memo form by April 29, 1996.

Please find a map, attached, to locate the wells. If you have any questions about these
permit applications, request additional information, or request additional review time, please contact
Lenore Nakama at 587-0218.

LN: ss
Attachment(s)

RESPONSE: ( ) We have no comments
       ( ) Comments attached

Contact Person: ____________________________ Phone: ______________

Signed: ____________________________ Date: _____________________
TO: Honorable Lawrence Miiike, Director  
Department of Health  
Attention: Dennis Tulang, Wastewater Branch  
William Wong, Safe Drinking Water Branch  

FROM: Michael D. Wilson, Chairperson  
Commission on Water Resource Management  

SUBJECT: After-the-Fact Applications for Well Construction/Pump Installation Permits  
MW2-1 through 2-5, MW4-2A, & MW4-4 Wells  
Well Nos. 2900-02, 2903-01, 2902-03, 2801-02, 2959-01, 3004-05, & 3004-04  

Transmitted for your review and comment are copies of after-the-fact applications for well construction/pump installation permits.

We would appreciate your comments on the captioned applications for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by April 29, 1996.

Please find a map, attached, to locate the wells. If you have any questions about these permit applications, request additional information, or request additional review time, please contact Lenore Nakama at 587-0218.

RESPONSE: (Y) We have no comments  
( ) Comments attached

Contact Person: Bill Dong  
Phone: 5860258

Signed: Bill Dong  
Date: 4/15/96

P.O. BOX 621  
HONOLULU, HAWAII 96809  
APR 11 1996

COMMISSION ON WATER RESOURCE MANAGEMENT  

RESPONSE: We have no comments  
Comments attached

Contact Person: Bill Dong  
Phone: 5860258

Signed: Bill Dong  
Date: 4/15/96
TO: Honorable Lawrence Miike, Director  
Department of Health  
Attention: Dennis Tulang, Wastewater Branch  
William Wong, Safe Drinking Water Branch

FROM: Michael D. Wilson, Chairperson  
Commission on Water Resources Management

SUBJECT: After-the-Fact Applications for Well Construction/Pump Installation Permits  
MW2-1 through 2-5, MW4-2A, & MW4-4 Wells  
Well Nos. 2900-02, 2903-01, 2902-03, 2801-02, 2959-01, 3004-05, & 3004-04

Transmitted for your review and comment are copies of after-the-fact applications for well construction/pump installation permits.

We would appreciate your comments on the captioned applications for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by April 29, 1996.

Please find a map, attached, to locate the wells. If you have any questions about these permit applications, request additional information, or request additional review time, please contact Lenore Nakama at 587-0218.

LN:ss  
Attachment(s)

RESPONSE: ☑ We have no comments
Comments attached

Contact Person: Lori N. Kajiwara  
Phone: 587-0218

Signed: Lori N. Kajiwara  
Date: 4-11-96
Submitted for your review and approval are seven Applications for Permits and seven Well Completion Reports for monitoring wells MWs 2-1 through 2-5, MW4-2A, and MW4-4 that were installed for the Schofield Barracks Remedial Investigation/Feasibility Study (RI/FS) project. Also enclosed are boring logs and well completion diagrams for Wells MW1-1, MW4-1, and MW4-3, though they were previously permitted. We are conducting this project on behalf on the U.S. Army. Groundwater chemistry data for each of the wells are pending but will be published by the Army in the Final OU 2 RI Report. If requested, this data can be sent to you after release by the Army.

Also enclosed is a check for $175 (for seven well applications at $25 each).

If you have any questions, please contact me.

BSW/MWC/rmf

Enclosures:  Applications for Permit, Wells MW2-1 through MW2-5, MW4-2A, and MW4-4
Well Completion Reports, Wells MW2-1 through MW2-5, MW4-2A, and MW4-4
Monitoring Well Location Map, USGS Quadrangles
Tax Map Key
Table 1. Water-Level Data
Table 2. Location Coordinates of Wells Drilled at Schofield Barracks
Boring Logs and Well Completion Diagrams (also includes MWs 4-1, 4-3, and 1-1)
$175 Check Payment, Harding Lawson Associates

Harding Lawson Associates
235 Pearlridge Center, Phase 1
Aiea, Hawaii 96701
(1)-808 486 6009
APPLICATION FOR PERMIT

1. APPLICANT: (circle primary contact a, b, or c) Primary Fax: 656-1039
   (a) WELL OWNER
   Firm/Name: U.S. Army
   Contact Person: Jon Fukuda Ph: 656-2878
   Address: DPM, Attn: APVG-GW, U.S. Army Schofield Barracks, Garrison Hawaii 96857-5000
   (b) LANDOWNER
   Firm/Name: Same as Well Owner
   Contact Person: Ph:
   Address:
   (c) CONTRACTOR
   Firm/Name: Roscoe Moss Hawaii, Inc. Ph: 682-5856 Contractor’s C-57 License No. C-16437
   Contact Person: Tracy Runnels
   Address: 92-159A Olai St., Kapolei, Hawaii 96707

2. WELL LOCATION/NAME: Schofield Barracks/WW-2A  Island: Oahu
   Address: Kauai St. and Lanai St., Schofield Barracks, Tax Map Key 7-7-01
   HI 96786
   (Attach a USGS map, scale 1”=2000’, and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK: □ Drill New Well □ Deepen □ Install New Pump
   □ Modify Existing Well □ Redrill □ Modify Pump
   □ Abandon/Seal * □ Replace Pump
   * Be sure to complete and submit well abandonment report upon completion of work.
   (b) WELL TYPE:
   □ Dug □ Bored □ Driven □ Drilled □ Radial
   Is the well part of a battery of wells? □ Yes □ No
   (Briefly describe and fill in the diagram on the back of this form.)

4. PROPOSED PUMP INFORMATION: Rated Pump Capacity: 25 gallons per minute
   Pump Type:
   □ Deep Well Turbine □ Rotary □ Propeller □ Diesel
   □ Submersible □ Rotary-Displacement □ Reciprocating □ Gas
   □ Centrifugal □ Rotary-Gear □ Impulse □ Electric, rated horsepower: 7.5
   If Pump Replacement, Existing Pump Capacity: __________ gallons per minute

5. PROPOSED USE: □ Municipal (including hotels, stores, etc.) □ Military
   □ Domestic (individual, noncommercial water sys.) □ Industrial
   □ Irrigation (crop) □ Other (explain): ________________
   PERMUTATION: ___________ FOR A-Z 3004-02

6. (a) PROPOSED AMOUNT OF WITHDRAWAL: __________ gallons per (see memo) ____________
   (b) METHOD OF FLOW MEASUREMENT: □ Flow-meter □ Open-pipe

7. PENDING ACTIONS: □ CDUA □ SMA □ EIS □ EA □ NONE
   Completion Date ___________

8. REMARKS, EXPLANATIONS: ___________________________________________________________________________
   ______________________________________________________________________________________________________
   ______________________________________________________________________________________________________
   ______________________________________________________________________________________________________
   ______________________________________________________________________________________________________
   ______________________________________________________________________________________________________
   ______________________________________________________________________________________________________
   ______________________________________________________________________________________________________

I understand that approval of this application attaches the following standard conditions: 1) the proposed work is to be completed within two (2) years of the approval date; 2) the contractor shall submit to the Commission a well completion/abandonment report within 30 days after the completion date of the permitted work; 3) monthly water use data shall be submitted to the Commission; 4) such approval shall not constitute a determination of correlative water rights and shall not guarantee the pump capacity or future use up to the permitted pump capacity.

Well Owner: ___________________________ Landowner: ___________________________ Contractor: ___________________________
Signature: ___________________________ Signature: ___________________________ Signature: ___________________________
Date: ____________ Date: ____________ Date: ____________

For Official Use Only:
Date Received ________ Date Accepted ____________ Field Checked By ____________ Date ____________
Longitude ____________ Aquifer System Name ____________ State Well No. ____________
Latitude ____________

8/8/95 WCPI Form
9. PROPOSED WELL SECTION

- **Elevation at top of casing**: 947 ft. msl.
- **Cement Grout**: 622 ft.
- **Bentonite Seal**: 16 ft.
- **Rock Packing**: 177 ft.
- **Hole Diameter**: 10 in.
- **Total Depth**: 815 ft.

**Solid Casing**:
- **Material**: carbon steel
- **Length**: 661 ft.
- **Diameter**: 6 in.
- **Wall thickness**: 0.28 in.

**Casing**:
- **Perforated**: X
- **Screen (louvered)**
- **Material**: stainless steel
- **Length**: 150 ft.
- **Diameter**: 6 in.
- **Wall thickness**: 0.25 in.
- **Openings**: 2.4 sq. in./F.

**Open Hole**:
- **Length**: 0 ft.
- **Diameter**:

*Approximate elevation at time of filing application. Ground elevation above mean sea level (msl) by a surveyor licensed by the State must be submitted at start of construction. Final elevations of well components shall be submitted in the well completion/well abandonment reports.*
WELL COMPLETION REPORT

Instructions: Please print or type and submit completed report within 30 days after well completion to the Commission on Water Resource Management, P.O. Box 421, Honolulu, Hawaii 96809. An as-built drawing of the well and chemical analysis should also be submitted. For assistance call the Commission Regulation Branch at 587-0225, or 1-800-468-6954 Ext 7-0225.

1. STATE WELL NO. 3004-05
   NAME MCC-2A Barracks, Oahu
2. LOCATION: Address Kauai St. and Lanai St., Schofield Tax Map Key 7-7-01
3. DRILLING OR PUMP INSTALLATION CONTRACTOR Roscoe Moss Hawaii, Inc.
4. CONTRACTOR'S C-57 LICENSE NUMBER C-16437
5. NAME OF DRILLER WHO PERFORMED WORK Elmo Shephard
6. TYPE OF RIG/CONSTRUCTION Air Rotary/Star 150K
7. DATE OF WELL DRILLING COMPLETION 12/19/94

8. GROUND ELEVATION (msl) 945 ft.
   Top of Drilling Platform (msl) 947 ft.
   Height of Drilling Platform above Ground surface 2 ft.
   Bench Mark and Method Used to Determine Ground Elevation +866.3 ft. (differential leveling)

9. DRILLER'S LOG:

<table>
<thead>
<tr>
<th>Dates (ft.)</th>
<th>Water Level</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks,</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.25 ft.</td>
<td>7.30 ft.</td>
<td>See attached boring log</td>
<td></td>
</tr>
<tr>
<td>7.25 ft.</td>
<td>7.30 ft.</td>
<td>7.35 ft.</td>
<td></td>
</tr>
<tr>
<td>7.25 ft.</td>
<td>7.30 ft.</td>
<td>7.35 ft.</td>
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</tr>
<tr>
<td>7.25 ft.</td>
<td>7.30 ft.</td>
<td>7.35 ft.</td>
<td></td>
</tr>
</tbody>
</table>

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

10. TOTAL DEPTH OF WELL BELOW GROUND 815 ft.
11. HOLE SIZE:
   18 inch dia. from 0 ft. to 200 ft. below ground
   10 inch dia. from 200 ft. to 815 ft. below ground

12. CASING INSTALLED:
   6 in. I.D. x 0.28 in. wall solid section to 661 ft. below ground
   6 in. I.D. x 0.25 in. wall perforated section to 711 ft. below ground
   Type of Perforation Horizontal louvered openings
   Gravel packed from 638 ft. below ground to 815 ft. below ground

13. ANNULUS:
    Grouted from 0 ft. below ground to 622 ft. below ground

14. INITIAL WATER LEVEL 671.63 ft. below ground.
    Date and time of measurement 1050 hrs., 12/20/94

15. INITIAL CHLORIDE Not analyzed ppm
    Date and time of sampling 1468 hrs., 08/01/95

16. INITIAL TEMPERATURE 70.5 °F
    Date and time of sampling 1344 hrs., 08/01/95

17. PUMPING TESTS:
    Reference Point (R.P.) used: which elevation is ___ ft.
    Start water level ___ ft. below R.P.
    Start water level ___ ft. below R.P.
    End water level ___ ft. below R.P.
    End water level ___ ft. below R.P.
    Depth of well ___ ft.
    Depth of well ___ ft.

18. AQUIFER PUMP TEST PROCEDURES DATA & GRAPHS ATTACHED? Yes X No

PUMP INSTALLATION REPORT

19. DATE OF PUMP INSTALLATION 3/20/95
20. PUMP INSTALLATION:
    Pump Type, Make, Serial No. Submersible, Meyers, Make: 3JK3/343-25B
    Motor type, H.P., Voltage, rpm Franklin Electric, 7.5 HP, 460V, 1760 RPM
    Depth of Pump Intake Setting 687 ft. below Surface, which elevation is 259 ft.
    Depth of bottom of airlone N/A, ft. below Surface, which elevation is ___ ft.

Remarks:

For Doller's Use: 
Job Name 
Signature ____________________________

For Official Use: 
Well No. 3004-05
Longitude 158 04 49 49 35
Latitude

13/12/95 WCR Form
3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

CEMENT MOUND

DEPTH (FT) ELEVATION (FT)
200 745

24" DIA. STEEL WELL MONUMENT

TOP OF SOUNDING TUBE
EL. = 946.87 FT.

GROUND SURFACE
EL. = 945 FT.

18" DIAMETER HOLE DRILLED WITH AIR ROTARY

3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

12" DIAMETER STEEL SURFACE CASING

CEMENT BENTONITE INNER SEAL

6" DIAMETER CARBON STEEL BLANK CASING

10" DIAMETER HOLE DRILLED WITH AIR ROTARY

CEMENT BENTONITE INNER SEAL

BENTONITE PELLETS
FINE SAND
1" PVC SOUNDER TUBE

SILICA SAND FILTER PACK (#4 STANDARD SIEVE SIZE)

6" DIA. STAINLESS STEEL LOUVERED SCREEN (0.060" SLOT SIZE)

SAND

(ELEVATION OF GROUNDWATER)

622 323
638 307
617 298
661 284
676.20 270.67 (10/10/95)

(10/11/95)

691 254
711 234
724 221
815 130

(NOT TO SCALE)

*DATUM: MEAN SEA LEVEL
DEPTH (FT)  ELEVATION (FT)*

647       298

676.20  270.67 (10/10/95) \( \text{ELEVATION OF GROUNDWATER} \)

691       254

680       265

687       259

689       256

711       234

724       221

815       130

+DATUM: MEAN SEA LEVEL

(FOR SCALE)

FINE SAND

1" DIA. SCH 80 PVC SOUNDING TUBE

1.5" DIA. STEEL DISCHARGE PIPE

JACKETED SUBMERSIBLE ELECTRICAL PUMP CABLE

STAINLESS STEEL SAFETY CABLE

CHECK VALVE

STAINLESS STEEL ELECTRICAL CABLE WIRE GUARD

RUBBER TORQUE ARRESTOR

3.75" DIA. MYERS PUMP

PUMP INTAKE

3.75" DIA. FRANKLIN 7.5 HORSEPOWER ELECTRIC MOTOR

SILICA SAND FILTER PACK

6" DIA. STAINLESS STEEL LOUVERED SCREEN

10" DIA. HOLE DRILLED WITH AIR ROTARY

SAND

Pump Installation Diagram for Monitoring Well 4-2A

Schofield Barracks
Island of Oahu, Hawaii
<table>
<thead>
<tr>
<th>Permit Number</th>
<th>HLA Well Name</th>
<th>Date Measured</th>
<th>Time Measured</th>
<th>Top of Sounding Tube Elevation (ft)</th>
<th>Depth to Water (ft)</th>
<th>Vertical Displacement (ft)</th>
<th>Corrected Depth (ft)</th>
<th>Groundwater Elevation (ft)</th>
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<td>2901-13</td>
<td>1-1</td>
<td>10/10/95</td>
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<td>HLA Well No.</td>
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<td>Hawaii State Planar (Pt)</td>
<td>Top of Sounding Tube Elevation (Ft)</td>
<td>UTM Coordinates (Meters)</td>
<td>Latitude</td>
<td>Longitude</td>
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<tr>
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<td>Northing</td>
<td>Easting</td>
<td>Northing</td>
<td>Easting</td>
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<td>21° 29' 24.680&quot;</td>
<td>158° 01' 39.755&quot;</td>
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NA = Not assigned yet by the DLNR.
Breathing Space Measurement (ppm) Sample Number

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<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
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<td>50-60</td>
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Equipment

<table>
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<tr>
<th>Equipment</th>
<th>(Ground) Elevation</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Air Rotary/Star 150K</td>
<td>945 ft</td>
<td>12/19/94</td>
</tr>
</tbody>
</table>

CONCRETE pad, approximately 8 inches thick.
RED ELASTIC SILT (MH) (2.5YR,4/6), firm, dry to moist.

BASALT BOULDER from 15 to 23 feet.

OLIVE BLACK BASALT (5Y,2/1), hard, moderate to strong, moderately weathered, many olivine crystals, vesicular, iron-oxide staining, inclusions of red (10R,4/6) and strong brown (7.5YR,5/8) elastic silt.
RED ELASTIC SILT (MH) (10R,4/6), firm, moist, with moderate brown (5YR,4/4), highly weathered, basalt.

Red (2.5YR,4/6) and reddish brown (5YR,5/4) below 40 feet. (Some olive black (5Y,2/1) fine gravel composed of saprolite and vesicular basalt.)

BASALT BOULDER from 48 to 52 feet.

Dark reddish grey (5YR,4/2) and dark yellowish brown (10YR,4/4) below 52 feet. (Hard, vesicular, olive black (5Y,2/1) saprolite and weathered basalt gravel.)

OLIVE BLACK BASALT (5Y,2/1), low hardness to hard, weak to moderately strong, deep to moderate weathering, vesicles, trace olivine, with inclusions of dark reddish brown.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./3 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
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<tbody>
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<td>4</td>
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<td>7</td>
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<tr>
<td>70-80</td>
<td>3</td>
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<td>110-120</td>
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**Equipment**

<table>
<thead>
<tr>
<th>Air Rotary/Star 150K</th>
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<table>
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<th>Elevation (Ground)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>945 ft</td>
<td>12/19/94</td>
</tr>
</tbody>
</table>

**Sample**

- **DUSKY RED (10R,3/3) AND YELLOWISH BROWN (10YR,4/8) ELASTIC SILT (MH), firm, moist, with olive black (5Y/2/1) basalt. Basalt is hard to moderately hard, moderate weathering, vesicular, trace olivine, iron-oxide staining. (Silt is saprolite.)**

- **Weak red (10R,4/4) and yellowish brown (10YR,5/6), with hard olive black (5Y,2/1) basalt below 80 feet.**

- **Black (2.5Y,N2), dark reddish brown (2.5YR,2.5/4) and yellowish brown (10YR,5/6) below 90 feet.**

- **Black (2.5Y,N2), yellowish brown (10YR,5/4), strong brown (7.5YR,4/6) and red (2.5YR,4/8), moist, with greenish gray (5GY,6/1) basalt (low hardness, weak, deep weathering, iron-oxide staining) below 100 feet.**

- **Increased drilling resistance from 117 to 119 feet. (Possible boulders or highly fractured basalt zone).**

- **Increased drilling resistance from 117 to 119 feet. (Possible boulders or highly fractured basalt zone).**

- **Black (2.5YR,2.5), dark brown (7.5YR,4/4), and olive (5Y,5/4) below 110 feet.**

- **Dark olive gray (5Y,3/2), olive (5Y,4/4) and reddish brown (2.5YR,4/4), with dark gray (N3) basalt, hard, moderate to little weathered, vesicular) below 120 feet.**

---

**Log of Monitoring Well 4-2A**

**File**

- **Application**
- **Area**
- **Approvals**
- **Date**
- **Revised Date**
### Sample Interval

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>13</td>
</tr>
<tr>
<td>135-140</td>
<td>14</td>
</tr>
<tr>
<td>140-150</td>
<td>15</td>
</tr>
<tr>
<td>150-160</td>
<td>16</td>
</tr>
<tr>
<td>160-170</td>
<td>17</td>
</tr>
<tr>
<td>170-180</td>
<td>18</td>
</tr>
<tr>
<td>180-190</td>
<td>19</td>
</tr>
</tbody>
</table>

### Drilling Rate (ft/min)
- 120-130: 3
- 130-140: 2
- 140-150: 24
- 150-160: 4
- 160-170: 10
- 170-180: 15
- 180-190: 56

### Breathing Space Measurement (ppm)
- 130: 4
- 140: 3
- 150: 10
- 160: 4
- 170: 16
- 180: 24

### Log of Monitoring Well 4-2A

#### (Sheet 3 of 13)

- **Equipment**: Air Rotary/Star 150K
- **Ground Elevation**: 945 ft
- **Date**: 12/19/94

**Olive gray (5Y,4/2) dark gray (5Y,4/1) and brown (7.5YR,4/4), hard, saprolite, black mineralization below 130 feet.**

**Dark red (2.5YR,3/6), strong brown (7.5YR,4/6) and dark gray (7.5YR,N4) below 140 feet.**

**Increased drilling resistance from 147 to 152 feet.**

**GRAYISH BLACK (N2) AND DARK GREENISH GRAY (5GY,4/1) BASALT, low to moderate hardness, weak, deep weathering, slightly vesicular, iron-oxide staining, some black mineralization, inclusions of dusky red elastic silt (10R,3/4).**

**Grayish olive green (5GY,3/2), dark gray (N3) and dark reddish brown (10R,3/4), weak to moderately strong, moderate to deep weathering, trace olivine crystals, some black mineralization below 160 feet.**

**Increased drilling resistance from 168 to 194 feet.**

**Very dusky red (10R,2/2), grayish red (10R,4/2), brownish black (5YR,2/1) and dark greenish gray (5GY,4/1) below 170 feet. Low to moderate hardness, weak to strong, moderate to highly vesicular.**

**Olive black (5Y,2/1) and greenish black (5GY,2/1), hard to moderately hard, moderately strong, moderate weathering, some olivine crystals below 180 feet.**

**Olive black (5Y,2/1) and olive gray (5Y,4/1), hard to very hard, strong, moderate to little weathering, slightly vesicular below 190 feet.**

---

**Harding Lawson Associates**

**Engineering and Environmental Services**

**Log of Monitoring Well 4-2A**

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**DRAWN**: kar

**JOB NUMBER**: 26129.05.05.12

**APPROVED**: STEPS

**FILE**: 4/95
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>190-200</td>
<td>5</td>
<td>20</td>
<td>200</td>
<td>195</td>
<td>Decreased drilling resistance from 194 to 220 feet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>205</td>
<td></td>
<td>Medium gray (N5), olive black (5Y,2/1) and brownish black (5YR,2/1), moderately hard, moderately strong, moderate to deep weathering, slight to moderately vesicular below 200 feet. (12-inch steel casing set to 200 feet.)</td>
</tr>
<tr>
<td>200-210</td>
<td>5</td>
<td>21</td>
<td>210</td>
<td></td>
<td>Dark gray (N3), brownish black (5YR,2/1) and moderate brown (5YR,4/4), low to moderate hardness, weak to moderately strong, moderate to deep weathering, many olivine crystals below 210 feet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>215</td>
<td></td>
<td>Dark gray (N3) and moderate brown (5YR,4/4), moderately strong, black mineralization, moderately vesicular, some olivine crystals below 220 feet. Decreased drilling resistance from 224 to 245 feet.</td>
</tr>
<tr>
<td>210-220</td>
<td>5</td>
<td>22</td>
<td>220</td>
<td></td>
<td>Brownish black (5YR,2/1), dark yellowish brown (10YR,6/6) and pale reddish brown (10R,5/4), strong to weak, slightly to highly vesicular below 240 feet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>225</td>
<td></td>
<td>Decreased drilling resistance from 249 to 280 feet. Olive black (5Y,2/1) and dark gray (N3), moderately hard, weak below 250 feet.</td>
</tr>
<tr>
<td>220-230</td>
<td>2</td>
<td>23</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>235</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230-240</td>
<td>3</td>
<td>24</td>
<td>240</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>7</td>
<td>245</td>
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<tr>
<td>240-250</td>
<td>19</td>
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<td>250</td>
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<tr>
<td></td>
<td></td>
<td>4</td>
<td>255</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>6</td>
<td>260</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Some vesicles filled with silt.

Brownish black (5YR, 7/1) and olive black (5Y, 2/1), weak to moderately strong below 280 feet.
Decreased drilling resistance from 283 to 289 feet.

Decreased drilling resistance from 294 to 306 feet.

Olive black (5Y, 2/1) and dark yellowish brown (10YR, 4/2), hard to moderately hard, moderately strong below 310 feet.
Decreased drilling resistance from 311 to 316 feet.

Brownish black (5YR, 2/1) and olive black (5Y, 2/1), hard, little to moderate weathering, slightly vesicular below 320 feet.
Decreased drilling resistance from 327 to 334 feet.

(Loss of drilling foam circulation from 330 to 397 feet.)

Decreased drilling resistance from 336 to 338 feet.

Decreased drilling resistance from 340 to 352 feet.

Decreased drilling resistance from 356 to 369 feet.

Decreased drilling resistance from 373 to 392 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>380-390</td>
<td>3</td>
<td></td>
<td></td>
<td>390</td>
</tr>
<tr>
<td></td>
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<td>395</td>
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<tr>
<td>390-400</td>
<td>8</td>
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<td></td>
<td>400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18</td>
<td>405</td>
</tr>
<tr>
<td>400-410</td>
<td>6</td>
<td></td>
<td>34</td>
<td>410</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>4</td>
<td>415</td>
</tr>
<tr>
<td>410-420</td>
<td>10</td>
<td></td>
<td>35</td>
<td>420</td>
</tr>
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<td></td>
<td></td>
<td>5</td>
<td>425</td>
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<tr>
<td>420-430</td>
<td>3</td>
<td></td>
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<td>430</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>435</td>
</tr>
<tr>
<td>430-440</td>
<td>4</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>445</td>
</tr>
<tr>
<td>440-450</td>
<td>3</td>
<td></td>
<td></td>
<td>450</td>
</tr>
</tbody>
</table>

Increased drilling resistance from 402 to 406 feet.

Decreased drilling resistance from 410 to 416 feet.

Olive black (5Y,2/1), hard to moderately hard, moderately strong to weak, trace olivine crystals, vesicular below 410 feet.

Decreased drilling resistance from 422 to 459 feet.

Medium gray (N5), low hardness, weak below 430 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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</thead>
<tbody>
<tr>
<td>450-460</td>
<td>8</td>
<td></td>
<td>4</td>
<td>455</td>
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<td>460-470</td>
<td>12</td>
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<tr>
<td>460-470</td>
<td>4</td>
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<tr>
<td>470-480</td>
<td>4</td>
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<tr>
<td>480-490</td>
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<td>480</td>
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<tr>
<td>490-500</td>
<td>7</td>
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<tr>
<td>500-510</td>
<td>7</td>
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<td>37</td>
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</tr>
<tr>
<td>510-520</td>
<td>5</td>
<td></td>
<td></td>
<td>520</td>
</tr>
</tbody>
</table>

**Equipment**: Air Rotary/Star 150K
**Ground Elevation**: 945 ft
**Date**: 12/19/94

Decreased drilling resistance from 462 to 491 feet.

Increased drilling resistance from 491 to 526 feet.

Olive black (5Y 2/1) and dark reddish brown (10R 3/4), moderately hard, moderately strong, moderate to deep weathering below 510 feet.
Decreased drilling resistance from 564 to 568 feet.

Loss of drilling foam circulation from 536 to 590 feet.

Decreased drilling resistance from 526 to 562 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>580-590</td>
<td>10</td>
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<td>5</td>
<td>585</td>
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<tr>
<td>585</td>
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<tr>
<td>590-600</td>
<td>4</td>
<td>39</td>
<td>6</td>
<td>590</td>
</tr>
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<td>595</td>
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<td>600-610</td>
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<td>40</td>
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<td>610-620</td>
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<td>41</td>
<td>8</td>
<td>610</td>
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<td>615</td>
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<td>620-630</td>
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<td>42</td>
<td>9</td>
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<td>625</td>
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</tr>
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<td>630-640</td>
<td>15</td>
<td>43</td>
<td>10</td>
<td>630</td>
</tr>
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</tr>
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</tr>
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<td>650</td>
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</tr>
</tbody>
</table>

**Equipment**

*Air Rotary/Star 150K*

<table>
<thead>
<tr>
<th>Ground Elevation</th>
<th>Date</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>945 ft</td>
<td>12/19/94</td>
<td></td>
</tr>
</tbody>
</table>

- Increased drilling resistance from 588 to 612 feet.
- Olive black (5Y,2/1) and dusty yellowish brown (10YR,2/2), hard, moderately strong to strong below 600 feet.
- Dark gray (N3), moderately hard, weak below 610 feet.
- Greenish black (5GY,2/1), grayish black (N2) and dark reddish brown (10R,3/4), hard to moderately hard, moderately strong below 620 feet.
- Increased drilling resistance from 629 to 644 feet. Olive black (5Y,2/1), dark reddish brown (10R,3/4) and moderate reddish brown (10R,4/6), moderate to deep weathering below 630 feet.
- Olive black (5Y,2/1), dark reddish brown (10R,3/4), hard, moderately strong to strong below 640 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>640-650</td>
<td>4</td>
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<td>650-660</td>
<td>5</td>
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<td>660-670</td>
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<td>46</td>
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<tr>
<td>670-680</td>
<td>4</td>
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<td>47</td>
</tr>
<tr>
<td>680-690</td>
<td>5</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>690-700</td>
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<td>49</td>
</tr>
<tr>
<td>700-710</td>
<td>5</td>
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</tr>
</tbody>
</table>

**Equipment**
- **Equipment**: Air Rotary/Star 150K
- **Ground Elevation**: 945 ft
- **Date**: 12/19/94

**Log of Monitoring Well 4-2A**
(Sheet 11 of 13)

**Figure**

**Schofield Barracks**
Island of Oahu, Hawaii

**Drawn by**: Harding Lawson Associates
Engineering and Environmental Services

**Job Number**: 26129.05.05.12

**Approved by**: STEPS
**Date**: 4/95

---

Dark reddish brown (10R,3/4) and greenish black (5GY,2/1), moderately hard to hard, moderately strong below 670 feet.

Water table measured at 671.63 feet below ground surface, 12/20/94, 10:50.

Increased drilling resistance from 681 to 685 feet.

Medium dark gray (N4), dark reddish brown (10R,3/4) and moderate yellowish brown (10YR,5/4), hard below 690 feet.

Decreased drilling resistance from 702 to 724 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft) Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>710-720</td>
<td>4</td>
<td></td>
<td>51</td>
<td>720</td>
</tr>
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<td>720-730</td>
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<td></td>
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<td>735</td>
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<td>730-740</td>
<td>5</td>
<td></td>
<td>53</td>
<td>740</td>
</tr>
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<td></td>
<td>6</td>
<td></td>
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<td>745</td>
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<td>755</td>
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<td>750-760</td>
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<td>55</td>
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<tr>
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<td>3</td>
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<td>765</td>
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<td></td>
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<td></td>
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<td>775</td>
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</tbody>
</table>

**Equipment**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Air Rotary/Star 150K</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Ground)</td>
<td>(Ground)</td>
</tr>
<tr>
<td>Elevation</td>
<td>945 ft</td>
</tr>
<tr>
<td>Date</td>
<td>12/19/94</td>
</tr>
</tbody>
</table>

**Log Description**

- Decreased drilling resistance from 727 to 757 feet.
- Olive black (5Y,2/1) and moderate brown (5YR,3/4), vesicular, below 730 feet.
- Olive black (5Y,2/1), and dark reddish brown (10R,3/4), moderately strong to weak, highly vesicular below 750 feet.
- Decreased drilling resistance at 762 feet.
- (Loss of drilling foam circulation from 767 to 777 feet.)
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>770-780</td>
<td>3</td>
<td></td>
<td>780</td>
<td></td>
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<tr>
<td>780-790</td>
<td>4</td>
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</tr>
<tr>
<td>790-800</td>
<td>7</td>
<td></td>
<td>790</td>
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</tr>
<tr>
<td>800-810</td>
<td>7</td>
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<td>800</td>
<td></td>
</tr>
</tbody>
</table>

Equipment: Air Rotary/Star 150K

(Ground) Elevation 945 ft Date 12/19/94

(Loss of drilling foam circulation from 779 to 795 feet.)

Total depth = 815 feet.
Water table was measured at 671.63 feet below ground surface, 12/20/94, 10:50.
Ms. Lenore Nakama  
State of Hawaii, Department of Land and Natural Resources  
Commission on Water Resource Management  
P.O. Box 621  
Honolulu, Hawaii 96809

Schofield Army Barracks RI/FS Well Information  
Permit Applications and Completion Reports  
Schofield Barracks, Hawaii

Dear Ms. Nakama:

As discussed during our telephone conversation on August 27, 1996, we have enclosed a copy of a USGS topographic map showing the locations of 12 monitoring wells installed for this project. The monitoring wells are identified on the map by their Army identification numbers. When we received your letter dated April 11, 1996, there seemed to be some confusion over which state well identification numbers were assigned to which of our monitoring wells. Your letter indicated that Wells 4-2 and 4-4 were assigned state well identification numbers 3-2900-01 and 3-3004-03, respectively. The actual geographic location of Well 4-2 does not correspond to well identification number 3-2900-01. Based on our records, the state well identification numbers should be assigned as follows:

<table>
<thead>
<tr>
<th>Project Well Number</th>
<th>Hawaii State Well ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>3-2901-13</td>
</tr>
<tr>
<td>2-1</td>
<td>3-2900-02</td>
</tr>
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<td>2-2</td>
<td>3-2903-01</td>
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<td>2-3</td>
<td>3-2902-03</td>
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<td>3-3004-03</td>
</tr>
<tr>
<td>4-4</td>
<td>3-3004-04</td>
</tr>
</tbody>
</table>

We hope this table and the map will help clear up the confusion regarding the well numbers and locations.

As requested in your April 11, 1996 letter, we have enclosed the following information:

1. Well 1-1 (State Well ID No. 3-2901-13)  
   a. After-the-fact application for a well construction/pump installation permit  
   b. Well completion report
2. Well 4-2 (State Well ID No. 3-3004-02)
   a. Well completion report
   b. Well completion diagram

Although 12 monitoring wells were installed over the lifetime of the project, only 11 are functioning with submersible pumps. There were problems during the installation of Well 4-2. The cable used to pull the pump out of the well broke. After numerous unsuccessful attempts to retrieve the pump, the pump was abandoned and is not functional. Thereafter, Well 4-2 was used only to measure groundwater levels. Thus, a pump installation report and diagram were never included in the original permit application. Because Well 4-2 could not be used as a monitoring well, a new well was drilled within 15 feet of the old well. We gave the new well the name 4-2A, and this may have led to additional confusion.

Your April 11 letter also requested information on State Wells 3-2900-01 and 3-3004-03. From our records, State Well 3-3004-03 refers to Well 4-3 instead of 4-4, as listed in your letter. But we are uncertain which wells are referred to by State Wells 3-2900-01 and 3-2900-02. At one time, we did propose to install a monitoring well in a part of the East Range, but that idea was rejected. It is possible, perhaps, that someone such as the drilling company may have submitted a permit application in advance. If that is the case, that particular permit should be withdrawn, as that well was never drilled. Because of the confusion, we have enclosed copies of the well completion reports for both Wells 4-3 and 4-4.

In addition, we have enclosed survey data for all the wells, and the well completion report for Well 2-6 with supporting boring log and well completion diagram information.

We hope that this information will help clarify the confusion between the two well identification systems. I will be available to discuss these wells with you personally if you so desire. If you have any questions, please feel free to call.

Sincerely yours,

HARDING LAWSON ASSOCIATES

Bruce S. Wedgeworth
Associate Geologist

LKI:hkf

Enclosures

cc: Mr. Jon Fukuda / U.S. Army, Department of Public Works
July 16, 1996

Harding Lawson Associates
235 Pearridge Center, Phase I
98-1005 Moanalua Road
Aeia, Hawaii 96701

Attn: Mr. Bruce S. Wedgeworth

Subject: FIELD LOCATION OF MW 2-6
At Wheeler Army Airfield
Oahu, Hawaii

<table>
<thead>
<tr>
<th>Northing</th>
<th>Easting</th>
<th>Elevation</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
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<td>111702.132</td>
<td>484685.053</td>
<td>691.57</td>
<td>21°28'27.04&quot;</td>
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<tr>
<td>BM#1</td>
<td></td>
<td></td>
<td>689.50</td>
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</tr>
<tr>
<td>BM#2</td>
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</tr>
<tr>
<td>BM#3</td>
<td></td>
<td></td>
<td>689.46</td>
<td></td>
</tr>
</tbody>
</table>

Coordinates referred to Hawaii State Plane Coordinate System - Zone 3
Elevation Datum = Mean Sea Level (MSL)
ELEVATION OF MONITORING WELLS AS SURVEYED
ON 7/15/95 (WITH BRUCE & MARK OF HARDING
AND LAWSON)

MW-4-2A = 946.87 feet — Black mark on top of tube
MW-4-2 = 947.11 feet — Black mark on top of tube
"+" cut near casing of MW-4-2A = 945.91 feet

MW-4-1 = 853.47 feet (as surveyed on 3/16/95)
"+" cut = 851.12 feet
Diff. = 2.35 feet (Bruce need diff. in elev. only)

MW-4-3 = 884.15 feet (as surveyed on 3/16/95)
"+" cut = 882.52 feet
Diff. = 1.43 feet (Bruce need diff. in elev only)

MW-4-4 = 829.88 feet — Black mark

MW-2-2 = 864.34 feet — Black mark on top of tube
"+" cut = 862.90 feet

MKI-2-3 = 828.81 feet — Black mark on top of tube
"+" cut = 827.20 feet

MW-2-4 = 829.70 feet — Black mark on top of tube
"+" cut = 828.00 feet

MW-2-1 = 903.75 feet — Black mark on top of tube
"+" cut = 902.12 feet
Coordinate Manager

Wednesday January 10, 1996 12:34 PM

Coordinate File Name: HARDING.CO  Lowest point #: 1  Highest point #: 6
Job # : 0  Description:

<table>
<thead>
<tr>
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<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
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<td>s.p. 5</td>
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<td>474006.8800</td>
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SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD 27)

CONVERGENCE 0.9999900 SCALE FACTOR 0.9999464 GRID FACTOR
Mr. Jon Fukuda  
United States Army  
DPW, Attn: APVG-GWV, U.S. Army  
Schofield Barracks, Hawaii 96857-5000

Dear Mr. Fukuda:

Well Construction Permit  
MW 4-4 (Well No. 3004-04)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s). As part of the Chairperson’s approval, the following special conditions were added and are part of your permit under Standard Permit Condition 11:

Special Conditions

1. Standard Conditions 1, 2, and 9 are waived.

Please sign the permit copies and return one for our files. Also, copies of the aquifer pump test procedure and the well completion report form are enclosed for your use.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214 or 1-800-468-4644 extension 70214.

Aloha,

[Signature]

MICHAEL D. WILSON  
Chairperson

Enclosures
WELL CONSTRUCTION PERMIT

MW 4-4 Well, Well No. 3004-04

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of MW 4-4 Well (Well No. 3004-04) at Schofield Barracks, Oahu, TMK 7-7-01, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management, P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work by this permit commences.

2. The well construction permit shall be for construction and testing of the well only. A minimum one-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Commission, to accurately record water levels. The permittee shall coordinate with the Commission and conduct a pumping test in accordance with the attached Aquifer Pump Testing Procedure (attached). The permittee shall submit to the Commission the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Commission.

3. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

4. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and contact the Department's Historic Preservation Division (587-0045) immediately.

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

6. The following shall be submitted to the Commission within thirty (30) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other water quality data.

7. The permittee shall comply with all applicable laws, rules, and ordinances.

8. The well construction permit application is incorporated into the permit by reference.

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

10. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

11. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: 5/3/96
Expiration Date: 5/3/98

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

Applicant’s Signature: _______________________________ Date: ____________

Printed Name: _______________________________ Firm or Title: _______________________________

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

Attachment

cc: USGS
Department of Health/ Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
Mr. Jon Fukuda
United States Army
DPW, Attn: APVG-GWV, U.S. Army Garrison
Schofield Barracks, Hawaii 06857-5000

Dear Mr. Fukuda:

After-the-Fact Pump Installation Permit
MW 4-4 (Well No. 3004-04)

Enclosed are two (2) copies of your approved Pump Installation Permit for the captioned well(s). As part of the Commission's approval, the following special conditions were added and are part of your permit under Standard Permit Condition 10:

Special Conditions

1. Standard Conditions 1 and 8 are waived.

2. The requirement to install a flowmeter (Standard Condition 3) is waived.

Please sign the permit copies and return one for our files.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214 or 1-800-468-4644 extension 70214.

Aloha,

MICHAEL D. WILSON
Chairperson

Enclosures
AFTER-THE-FACT PUMP INSTALLATION PERMIT

MW 4-4 Well, Well No. 3004-04

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the pump installation for MW 4-4 Well (Well No. 3004-04) at Schofield Barracks, Oahu, TMK 7-T-01, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management, P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences.

2. The pump installation permit shall be for installation of a 25 gpm capacity, or less, pump in the well.

3. The permittee shall provide and maintain an approved meter or other appropriate means for measuring and reporting withdrawals and water levels, and appropriate devices or means for measuring chlorides and temperature. These data shall be measured monthly and reported to the Commission on a monthly basis.

4. The proposed use shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to pump water from a well shall not constitute a determination of correlative water rights. The permittee is notified and by this provision understands that the quantity of water taken from the well could be reduced by the Commission in the future. This permit is not a commitment that the pump capacity permitted here or even some lesser amount is guaranteed in the future.

5. The applicant shall complete and submit as-built drawings and Part II - (Permanent) Pump Installation Report of the Well Completion Report (attached) to the Commission within thirty (30) days from the date of approval.

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

7. The pump installation permit application is incorporated into the permit by reference.

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

9. If the well is not to be used it must be properly capped. If the well is to be abandoned then the applicant must apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

10. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: 5/9/96
Expiration Date: 5/9/98

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

Applicant's Signature: ___________________________ Date: ______________
Printed Name: ___________________________ Firm or Title: ___________________________

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

Attachment

cc: USGS
Department of Health/ Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
Table 1. Schofield Water-Level Data

<table>
<thead>
<tr>
<th>Permit Number</th>
<th>HLA Well Name</th>
<th>Date Measured</th>
<th>Time Measured</th>
<th>Top of Sounding Tube Elevation (ft)</th>
<th>Depth to Water (ft)</th>
<th>Vertical Displacement (ft)</th>
<th>Corrected Depth (ft)</th>
<th>Groundwater Elevation (ft)</th>
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<tbody>
<tr>
<td>2901-13</td>
<td>1-1</td>
<td>10/10/95</td>
<td>1143</td>
<td>852.78</td>
<td>582.21</td>
<td>0.22</td>
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<td></td>
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### Table 2. Location Coordinates of Wells Drilled at Schofield Barracks, Island of Oahu, Hawaii

<table>
<thead>
<tr>
<th>HLA Well No.</th>
<th>Hawaii State Well L.D. No.</th>
<th>Hawaii State Planer (Pt)</th>
<th>Top of Sounding Tube Elevation (Ft)</th>
<th>UTM Coordinates (Meters)</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
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<td>474006.88</td>
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<td>474375.30</td>
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<td>2378815</td>
<td>595825</td>
</tr>
</tbody>
</table>

NA = Not assigned yet by the DLNR.
## WELL COMPLETION REPORT

Instructions: Please print or type and submit completed report within 30 days after well completion to the Commission on Water Resource Management, P.O. Box 821, Honolulu, Hawaii 96820. An as-built drawing of the well and chemical analysis should also be submitted. For assistance call the Commission Regulation Branch at 587-0225, or 1-800-488-9694 Ext 7-0225.

1. **STATE WELL NO.** 3004-04  
   **WELL NAME** MWA-4  
   **ISLAND** Oahu  
   **LOCATION:** Address: Oahu Street, Schofield Barracks, HI  
   **Tax Map Key** 7-7-01  
   **DRILLING OR PUMP INSTALLATION CONTRACTOR** Roscoe Moss Hawaii, Inc.  
   **CONTRACTOR’S C-57 LICENSE NUMBER** C-16437  
   **NAME OF DRILLER WHO PERFORMED WORK** Elmo Shephard  
   **TYPE OF RIG/CONSTRUCTION** Air Rotary/Star 150K  
   **DATE OF WELL DRILLING COMPLETION** 1/27/95

8. **GROUND ELEVATION (msl)** 828 ft.  
   Top of Drilling Platform (msl) 830 ft.  
   Height of Drilling Platform above Ground surface 2 ft.  
   Bench Mark and Method Used to Determine Ground Elevation +866.38 ft. (differential leveling)

9. **DRILLER’S LOG:**

<table>
<thead>
<tr>
<th>Dates (ft.)</th>
<th>Rock Description, Remarks</th>
<th>Dates (ft.)</th>
<th>Rock Description, Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
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<tr>
<td>to</td>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
</tbody>
</table>
| (If more space is needed, continue on back.)

10. **TOTAL DEPTH OF WELL BELOW GROUND** 760 ft.

11. **HOLE SIZE:**

- 30 inch dia. from 0 ft. to 200 ft. below ground
- 12 inch dia. from 200 ft. to 270 ft. below ground

12. **CASING INSTALLED:**

- 16 in. I.D. x 0.312 in. wall solid section to 200 ft. below ground
- N/A in. I.D. x in. wall perforated section to below ground

13. **ANNULUS:**

- Grouted from 0 ft. below ground to 200 ft. below ground
- Gravel packed from N/A ft. below ground to ft. below ground

14. **INITIAL WATER LEVEL** 553.5 ft. below ground. Date and time of measurement 0955 hrs., 01/28/95

15. **INITIAL CHLORIDE** 29 ppm Date and time of sampling 1643 hrs., 04/04/95

16. **INITIAL TEMPERATURE** 70.6°F Date and time of sampling 1522 hrs., 08/01/95

17. **PUMPING TESTS:**

<table>
<thead>
<tr>
<th>Reference Point (R.P.) used:</th>
<th>Dates (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start water level ft. below R.P.</td>
<td>Start water level ft. below R.P.</td>
</tr>
<tr>
<td>End water level ft. below R.P.</td>
<td>End water level ft. below R.P.</td>
</tr>
<tr>
<td>Depth of well ft. below well</td>
<td>Depth of well ft. below well</td>
</tr>
</tbody>
</table>

18. **AQUIFER PUMP TEST PROCEDURES DATA & GRAPHS ATTACHED?** Yes X No

## PUMP INSTALLATION REPORT

19. **DATE OF PUMP INSTALLATION** 7/14/95

20. **PUMP INSTALLATION:**

<table>
<thead>
<tr>
<th>Submersible, Meyers,</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Type, Make, Serial No.</td>
<td>Make: 3/4&quot;3/4&quot;-25B</td>
</tr>
<tr>
<td>Motor type, H.P., Voltage, rpm</td>
<td>Franklin Electric, 7.5 HP, 460V, 1760 RPM</td>
</tr>
<tr>
<td>Depth of Pump Intake Setting</td>
<td>574 ft. below ground, which elevation is 256 ft.</td>
</tr>
<tr>
<td>Depth of bottom of pipe N/A ft. below surface, which elevation is 256 ft.</td>
<td></td>
</tr>
</tbody>
</table>

Pumping Head is 559 ft.

Remarks:

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

Contractor (print) Roscoe Moss Hawaii Inc
Title Manager
Signature
Date 8/30/95

For Driller's Use: Job Name
For Official Use: Well No. 3004-04  
Longide 158 04 31 Latitude 21 30 34

12/13/95 MCR Form
PLAN VIEW

BOLT HOLES

ELECTRICAL CABLE HOLE

DISCHARGE PIPE HOLE

PVC SOUNDING PIPE HOLE

STAINLESS STEEL SAFETY LINE HOLE

X-SECTION

LANDING PLATE

FLANGE

BOLTS

WELL CASING

NOT TO SCALE
**Monitoring Well 4-4**

Schofield Barracks
Island of Oahu, Hawaii

**Depth (ft) Elevation (ft)**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>559.28</td>
<td>270.60 (10/10/95)</td>
</tr>
<tr>
<td>567</td>
<td>263</td>
</tr>
<tr>
<td>569</td>
<td>261</td>
</tr>
<tr>
<td>574</td>
<td>256</td>
</tr>
<tr>
<td>576</td>
<td>254</td>
</tr>
<tr>
<td>770</td>
<td>60</td>
</tr>
</tbody>
</table>

(ELEVATION OF GROUNDWATER)

*DATUM: MEAN SEA LEVEL*
DEPTH (FT)  ELEVATION (FT)

559.28  270.60 (10/10/95) ▼
(ELEVATION OF GROUNDWATER)

597  265

567  263
569  261

574  256
576  254

770  60

*DATUM: MEAN SEA LEVEL

1" DIA. SCH 80 PVC SOUNDING TUBE
1.5" DIA. STEEL DISCHARGE PIPE
JACKETED SUBMERSIBLE ELECTRICAL PUMP CABLE
STAINLESS STEEL SAFETY CABLE
CHECK VALVE
STAINLESS STEEL ELECTRICAL CABLE WIRE GUARD
3.75" DIA. MYERS PUMP
PUMP INTAKE
3.75" DIA. FRANKLIN 7.5 HORSEPOWER ELECTRIC MOTOR
12" DIA. HOLE DRILLED WITH AIR ROTARY

Pump Installation Diagram for Monitoring Well 4-4
Schofield Barracks
Island of Oahu, Hawaii

FIGURE
Sample Interval (feet) | Drilling Rate (min./5 feet) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft) |
---|---|---|---|---|
0-5 | - | 1 | 5 |
5-10 | - | 2 | 10 |
10-20 | - | 3 | 20 |
20-30 | - | 4 | 30 |
30-38 | - | 5 | 40 |
38-42 | - | 6 | 45 |
40-50 | - | 7 | 50 |
50-55 | - | 8 | 55 |

**Equipment**
- **Cable Tool**
- **Air Rotary/Star 150K**

**Sample Data**
- (Ground) Elevation: 828 ft
- Date: 01/27/95

**Notes**
- RED-BROWN ELASTIC SILT (MH), hard, moist. (10-inch-diameter cable tool bit used to advance boring).
- Basalt boulder from approximately 4 to 5 feet.
- Increasing sand content below 20 feet.
- (Boring diameter increased to 24 inches and advanced to 36 feet. 24-inch conductor casing installed to 36 feet).
- DARK GRAY BASALT BOULDER, fresh to little weathered, from 36 to 40 feet.
- BROWN ELASTIC SILT WITH SAND (MH), hard, moist.
- Dark gray-brown with some rounded gravel below 55 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-65</td>
<td></td>
<td>9</td>
<td>65</td>
<td>Gray below 65 feet.</td>
</tr>
<tr>
<td>65-70</td>
<td></td>
<td>10</td>
<td>70</td>
<td>Brown, with some gravel and deeply weathered basalt, below 70 feet.</td>
</tr>
<tr>
<td>70-80</td>
<td></td>
<td>11</td>
<td>80</td>
<td>Grayish-brown with deeply weathered basalt gravel below 80 feet. Some basalt fragments.</td>
</tr>
<tr>
<td>80-83</td>
<td></td>
<td>12</td>
<td>85</td>
<td>GRAY BASALT, moderately hard to hard, moderately strong, little weathered, (boulders).</td>
</tr>
<tr>
<td>83-87</td>
<td></td>
<td>13</td>
<td>90</td>
<td>Decreased drilling resistance at 91 feet. (Broke through boulder layer.) GRAYISH-BROWN SANDY ELASTIC SILT (MH), hard, moist.</td>
</tr>
<tr>
<td>87-95</td>
<td></td>
<td>14</td>
<td>95</td>
<td>Increased drilling resistance at 110 feet. GRAYISH-BROWN AND GRAY BASALT, with elastic silt, (boulders).</td>
</tr>
<tr>
<td>95-103</td>
<td></td>
<td>15</td>
<td>100</td>
<td>(Added 5 sacks of cement to stabilize boulder/cobble layer).</td>
</tr>
<tr>
<td>103-113</td>
<td></td>
<td>16</td>
<td>110</td>
<td>Gray, deeply weathered. (Driller notes decrease in drilling resistance below 124 feet.) GRAYISH-BROWN SANDY ELASTIC SILT (MH), hard, moist, with decomposed basalt gravel.</td>
</tr>
<tr>
<td>113-123</td>
<td></td>
<td>17</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>123-128</td>
<td></td>
<td>18</td>
<td>130</td>
<td></td>
</tr>
</tbody>
</table>

Log of Monitoring Well 4-4 (Sheet 2 of 12)
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breaching Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>128-133</td>
<td>-</td>
<td>18A</td>
<td></td>
<td>130</td>
<td>GRAYISH-BROWN BASALT, low to moderate hardness, moderate to deeply weathered, below 130 feet. Increased drilling resistance.</td>
</tr>
<tr>
<td>133-138</td>
<td>-</td>
<td>19</td>
<td></td>
<td>135</td>
<td>Dark gray basalt, moderately hard, moderately strong, little weathered, below 137 feet.</td>
</tr>
<tr>
<td>138-141</td>
<td>-</td>
<td>20</td>
<td></td>
<td>140</td>
<td>Some inclusions of deeply weathered basalt and reddish-brown silt, highly vesicular. Decreased drilling resistance at 145 feet.</td>
</tr>
<tr>
<td>141-145</td>
<td>-</td>
<td>22</td>
<td></td>
<td>145</td>
<td>Dark gray and reddish-brown, low to moderate hardness, moderately strong, moderate to deeply weathered, below 150 feet. Reddish-brown below 155 feet.</td>
</tr>
<tr>
<td>145-150</td>
<td>-</td>
<td>23</td>
<td></td>
<td>150</td>
<td>Dark gray, reddish-brown and brown, moderately weathered, below 160 feet.</td>
</tr>
<tr>
<td>150-155</td>
<td>-</td>
<td>24</td>
<td></td>
<td>155</td>
<td>Gray and light brown, moderately hard to hard, below 175 feet.</td>
</tr>
<tr>
<td>155-160</td>
<td>-</td>
<td>25</td>
<td></td>
<td>160</td>
<td>Grayish-red (10R,4/2) and medium dark gray (NR), moderately hard, moderately strong to strong, below 185 feet. Moderately hard to hard.</td>
</tr>
<tr>
<td>160-165</td>
<td>-</td>
<td>26</td>
<td></td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>165-170</td>
<td>-</td>
<td>27</td>
<td></td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>170-175</td>
<td>-</td>
<td>28</td>
<td></td>
<td>175</td>
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<td>175-180</td>
<td>-</td>
<td>29</td>
<td></td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>180-185</td>
<td>-</td>
<td>30</td>
<td></td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>185-190</td>
<td>-</td>
<td>31</td>
<td></td>
<td>190</td>
<td></td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (min./15 feet)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------</td>
<td>-----------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>190-195</td>
<td></td>
<td>32</td>
<td>195</td>
<td></td>
<td></td>
</tr>
<tr>
<td>195-203</td>
<td></td>
<td>33</td>
<td>200</td>
<td></td>
<td></td>
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<td>203-205</td>
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<tr>
<td>205-210</td>
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<td>210-220</td>
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<td></td>
<td>46</td>
<td>0</td>
<td>225</td>
<td></td>
<td></td>
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<td>220-230</td>
<td>25</td>
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<td>230</td>
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<tr>
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<td>10</td>
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<td>235</td>
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<td></td>
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<td>230-240</td>
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<td>240</td>
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<tr>
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<td>1</td>
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<td>245</td>
<td></td>
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</tr>
<tr>
<td>240-250</td>
<td>34</td>
<td>0</td>
<td>250</td>
<td></td>
<td></td>
</tr>
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<td>34</td>
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<td>255</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>260</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dark gray (N3) and grayish red (10R,4/2), moderately hard to hard, little to moderately weathered, moderately to highly vesicular, below 195 feet. (26-inch casing set to a depth of 198.5 feet on 1/17/95, grouted on 1/19/95.)

Dark gray below 203 feet.

Decreased drilling resistance from 207 to 208.5 feet.

Some dusty red (5R,3/4) fragments below 210 feet.

Dark gray (N3) and dusky red (5R,3/4), little weathered, below 220 feet.

Decreased drilling resistance below 225 feet.

Strong, little to moderately weathered, below 230 feet.

Decreased drilling resistance at 232 feet.

Increased drilling resistance at 238 feet.

Moderately strong to strong, moderately to highly vesicular. Decreased drilling resistance from 241 to 249 feet. (Possible gravel/cinder layer.)

Dark gray (N3) and moderately reddish brown (10R,4/1), strong, little weathered, below 250 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-260</td>
<td>30</td>
<td>0</td>
<td>40</td>
<td>260</td>
</tr>
<tr>
<td></td>
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<td>265</td>
</tr>
<tr>
<td>260-270</td>
<td>15</td>
<td>0</td>
<td>41</td>
<td>270</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>275</td>
</tr>
<tr>
<td>270-280</td>
<td>62</td>
<td>0</td>
<td>42</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>285</td>
</tr>
<tr>
<td>280-290</td>
<td>90</td>
<td>0</td>
<td>43</td>
<td>290</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>295</td>
</tr>
<tr>
<td>290-300</td>
<td>90</td>
<td>0</td>
<td>44</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>305</td>
</tr>
<tr>
<td>300-310</td>
<td>90</td>
<td>0</td>
<td>45</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>315</td>
</tr>
<tr>
<td>310-320</td>
<td>38</td>
<td>0</td>
<td>46</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>325</td>
</tr>
</tbody>
</table>

**Equipment**

Cable Tool/ Air Rotary/Star 150K

**Ground Elevation**

- 828 ft
- Date: 01/27/95

**Log of Monitoring Well 4-4**

Schofield DA03

Schofield Barracks

Island of Oahu, Hawaii

**DRAWN**

kar

**JOB NUMBER**

28339.05.14.12

**APPROVED**

- SDA3
- Date: 4/95

**REVISED DATE**

- 4/95

**FIGURE**

- Schofield Barracks Island of Oahu, Hawaii

**Notes**

- Dark gray (N3), dark reddish brown (10R,3/4), grayish red (10R,4/2) and pale yellowish brown (10R,6/2), moderately strong to strong, little to deeply weathered, below 260 feet.
- Decreased drilling resistance at 264 feet.

- Dark gray (N3), dusky red (5R,3/4) and moderate brown (5YR,3/4) strong, little to moderately weathered, moderately vesicular, below 270 feet.
- Increased drilling resistance below 273 feet.

- Dark gray (N3) and dusky red (5R,3/4), hard, below 280 feet.

- Fresh to little weathered.

- Dark gray (N3), slightly vesicular, below 300 feet.

- Dark gray (N3) and dusky red (5R,3/4).

- Decreased drilling resistance from 312 to 314 feet.

- Decreased drilling resistance from 319.5 to 321 feet.
- Dusky red (5R,3/4), moderately hard, moderately strong, deep to moderately weathered, highly vesicular, below 320 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>320-330</td>
<td>23</td>
<td>0</td>
<td>47</td>
<td>325</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark reddish brown (10R,3/4), moderately weathered, below 330 feet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>330-340</td>
<td>5</td>
<td>0</td>
<td>48</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark reddish-brown (10R,3/4) and dark gray (N3), moderately to deeply weathered, below 340 feet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>340-350</td>
<td>35</td>
<td>0</td>
<td>49</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark reddish-brown (10R,3/4), dusky red (5R,3/4) and dark gray, moderately hard to hard, strong, fresh to moderately weathered, moderately to highly vesicular, below 350 feet. Decreased drilling resistance from 354 to 364 feet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>350-360</td>
<td>7</td>
<td>0</td>
<td>50</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately hard, moderately strong, highly vesicular.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>360-370</td>
<td>20</td>
<td>0</td>
<td>51</td>
<td>370</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark gray (N3), dark reddish-brown (10R,3/4) and greyish-red (10R,4/2), moderately hard to hard, little to moderately weathered, some inclusions of olivine crystals, below 370 feet. Decreased drilling resistance at 375 feet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>370-380</td>
<td>40</td>
<td>0</td>
<td>52</td>
<td>380</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brownish-gray (5YR,4/1), dusky red (5YR,3/4), and moderate brown (5YR,3/4) below 380 feet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (min./5 feet)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td>380-390</td>
<td>40</td>
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<td>63</td>
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<td></td>
<td>395</td>
</tr>
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<td>50</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>390-400</td>
<td>37</td>
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<td>54</td>
<td>400</td>
</tr>
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<td></td>
<td></td>
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<td></td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-410</td>
<td>37</td>
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<td></td>
</tr>
<tr>
<td>410-420</td>
<td>10</td>
<td>0</td>
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<td></td>
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</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>420-430</td>
<td>18</td>
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<td>57</td>
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<td></td>
<td>435</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td>430-440</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>455</td>
</tr>
</tbody>
</table>

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-4 (Sheet 7 of 12)

Schofield Barracks
Island of Oahu, Hawaii
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-460</td>
<td>22</td>
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<td>60</td>
<td>460</td>
</tr>
<tr>
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<td>20</td>
<td>0</td>
<td></td>
<td>465</td>
</tr>
<tr>
<td>460-470</td>
<td>22</td>
<td>0</td>
<td>61</td>
<td>470</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>0</td>
<td></td>
<td>475</td>
</tr>
<tr>
<td>470-480</td>
<td>26</td>
<td>0</td>
<td>62</td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>0</td>
<td></td>
<td>485</td>
</tr>
<tr>
<td>480-490</td>
<td>28</td>
<td>0</td>
<td>63</td>
<td>490</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>0</td>
<td></td>
<td>495</td>
</tr>
<tr>
<td>490-500</td>
<td>21</td>
<td>0</td>
<td>64</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>0</td>
<td></td>
<td>505</td>
</tr>
<tr>
<td>500-510</td>
<td>16</td>
<td>0</td>
<td>65</td>
<td>510</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>0</td>
<td></td>
<td>515</td>
</tr>
</tbody>
</table>

- Dark reddish brown (10YR,3/4) and greyish black (N2), moderately hard to hard, moderately strong to strong, fresh to moderately weathered, below 460 feet. Increased drilling resistance from 464 to 467 feet.
- Dark reddish brown (10R,3/4) and dark grey (N3), moderately hard, moderately strong, deeply weathered, below 470 feet. Increased drilling resistance from 473 to 478 feet.
- Dusky yellowish brown (10YR,2/2) and moderate brown (5YR,4/4), moderately hard to hard, little to deeply weathered, below 480 feet. Increased drilling resistance from 482 to 483 feet.
- Moderately hard, fresh to little weathering, moderately to highly vesicular.
- Moderately hard to hard, moderately strong to strong, little to moderately weathered, highly vesicular.
- Strong.

Log of Monitoring Well 4-4
(Sheet 8 of 12)
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>510-520</td>
<td>8</td>
<td>0</td>
<td>66</td>
<td>520</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0</td>
<td></td>
<td>525</td>
</tr>
<tr>
<td>520-530</td>
<td>58</td>
<td>-</td>
<td>67</td>
<td>530</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>0</td>
<td></td>
<td>535</td>
</tr>
<tr>
<td>530-540</td>
<td>22</td>
<td>0</td>
<td>68</td>
<td>540</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>-</td>
<td></td>
<td>545</td>
</tr>
<tr>
<td>540-550</td>
<td>34</td>
<td>0</td>
<td>69</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>-</td>
<td></td>
<td>555</td>
</tr>
<tr>
<td>550-560</td>
<td>15</td>
<td>0</td>
<td>70</td>
<td>560</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>-</td>
<td></td>
<td>565</td>
</tr>
<tr>
<td>560-570</td>
<td>37</td>
<td>0</td>
<td>71</td>
<td>570</td>
</tr>
<tr>
<td></td>
<td>66</td>
<td>-</td>
<td></td>
<td>575</td>
</tr>
<tr>
<td>570-580</td>
<td>30</td>
<td>0</td>
<td>72</td>
<td>580</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>585</td>
</tr>
</tbody>
</table>

**Equipment**
- **Cable Tool/Air Rotary/Star 150K**
- **Ground Elevation** 828 ft  **Date** 01/27/95

**Description**
- Moderately hard, moderately strong.
- Increased drilling resistance from 524 to 538 feet.
- Hard, strong, moderately to highly vesicular.
- Dark gray (N3) and dusky red (5R,3/4), fresh to little weathered, below 538 feet.
- Decreased drilling resistance from 546 to 558 feet.
- Moderately hard, moderately strong, little weathering.
- Water table measured at 553.5 feet below ground surface, January 28, 1995, 09:55.
- Dark gray (N3), dark reddish brown (10R,4/8) and dusky red (5R,4/6), moderately hard to hard, moderately strong to strong, little to moderately weathered, below 560 feet.
- Dark gray (N3) and dusky red (5R,4/6), hard, strong, little weathered, moderately to highly vesicular, below 570 feet.
- Dark gray (N3), moderately hard to hard, fresh to little weathered, below 580 feet. Increased drilling resistance at 582 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>580-590</td>
<td>35</td>
<td>0</td>
<td>73</td>
<td>590-</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>0</td>
<td></td>
<td>595-</td>
</tr>
<tr>
<td>590-600</td>
<td>34</td>
<td>0</td>
<td>74</td>
<td>600-</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td>605-</td>
</tr>
<tr>
<td>600-610</td>
<td>15</td>
<td>0</td>
<td>75</td>
<td>610-</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>0</td>
<td></td>
<td>615-</td>
</tr>
<tr>
<td>610-620</td>
<td>20</td>
<td>0</td>
<td>76</td>
<td>620-</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>0</td>
<td></td>
<td>625-</td>
</tr>
<tr>
<td>620-630</td>
<td>24</td>
<td></td>
<td>77</td>
<td>630-</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td></td>
<td></td>
<td>635-</td>
</tr>
<tr>
<td>630-640</td>
<td>19</td>
<td>0</td>
<td>78</td>
<td>640-</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td></td>
<td></td>
<td>645-</td>
</tr>
</tbody>
</table>

**Equipment:** Cable Tool/ Air Rotary/Star 150K

**Ground Elevation:** 828 ft

**Date:** 01/27/95

**Log of Monitoring Well 4-4**

Schofield DA03
Schofield Barracks
Island of Oahu, Hawaii

---

Very dusky red (10R,2/2), light brown (5YR,5/8) and dark gray (N3), hard, moderately weathered, moderately vesicular, below 590 feet.

Increased drilling resistance from 592 to 596 feet.

Increased drilling resistance from 599 to 602 feet.

Dark gray (N3) and dusky red (5R,4/6), little weathered, moderately vesicular, below 600 feet.

Moderately hard to hard, moderately strong, moderately to highly vesicular.

Dark gray (N3) and very dusky red (10R,3/6), strong, little to moderately weathered, highly vesicular, below 620 feet.

Increased drilling resistance from 610 to 627 feet.

Little weathered.

Increased drilling resistance from 647 to 649 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Log of Monitoring Well 4-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>640-650</td>
<td>51</td>
<td>-</td>
<td>79</td>
<td>650</td>
<td>Increased drilling resistance from 653 to 655 feet.</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0</td>
<td></td>
<td>655</td>
<td>Moderate red (5R.4/8), dusky red (5R.3/4) and dark grey (N3), moderately strong to strong, moderate to little weathered, below 660 feet.</td>
</tr>
<tr>
<td>650-660</td>
<td>20</td>
<td>0</td>
<td>80</td>
<td>660</td>
<td>Increased drilling resistance from 662 to 664 feet.</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>-</td>
<td></td>
<td>665</td>
<td>Increased drilling resistance from 666 to 669 feet.</td>
</tr>
<tr>
<td>660-670</td>
<td>48</td>
<td>-</td>
<td>81</td>
<td>670</td>
<td>Dark grey (N3), dusky yellowish brown (10YR.2/2) and light brown (5YR.5/6) below 670 feet.</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>0</td>
<td></td>
<td>675</td>
<td>Decreased drilling resistance from 674 to 677 feet.</td>
</tr>
<tr>
<td>670-680</td>
<td>26</td>
<td>0</td>
<td>82</td>
<td>680</td>
<td>Dark grey (N3) and dusky red (5R.3/4) below 680 feet.</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>-</td>
<td></td>
<td>685</td>
<td>Decreased drilling resistance from 683 to 685 feet.</td>
</tr>
<tr>
<td>680-690</td>
<td>35</td>
<td>0</td>
<td>83</td>
<td>690</td>
<td>Decreased drilling resistance from 693 to 694 feet.</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>0</td>
<td></td>
<td>695</td>
<td>Decreased drilling resistance from 697 to 700 feet.</td>
</tr>
<tr>
<td>690-700</td>
<td>24</td>
<td>0</td>
<td>84</td>
<td>700</td>
<td>Little weathered.</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>0</td>
<td></td>
<td>705</td>
<td>Moderately hard, moderately strong, moderately to highly vesicular.</td>
</tr>
<tr>
<td>700-710</td>
<td>16</td>
<td>-</td>
<td>85</td>
<td>710</td>
<td></td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (min./5 feet)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>710-720</td>
<td>39</td>
<td>0</td>
<td>86</td>
<td>720-</td>
<td>Decreased drilling resistance from 718 to 726 feet. Moderately hard to hard, little to moderately weathered.</td>
</tr>
<tr>
<td>720-730</td>
<td>18</td>
<td>0</td>
<td>87</td>
<td>730-</td>
<td>Dark gray (N3), dusky red (SR,3/4) and moderate brown (SYR,4/4), strong, below 730 feet.</td>
</tr>
<tr>
<td>730-740</td>
<td>24</td>
<td>0</td>
<td>88</td>
<td>740-</td>
<td>Decreased drilling resistance from 737 to 742 feet. Dark gray (N3) and moderate brown (SYR,4/4), hard, fresh to little weathered, moderately vesicular, below 740 feet.</td>
</tr>
<tr>
<td>740-750</td>
<td>67</td>
<td>-</td>
<td>89</td>
<td>750-</td>
<td>Decreased drilling resistance from 745 to 751 feet. Dark gray (N3), moderately hard to hard, moderately strong, slightly to moderately vesicular, below 750 feet.</td>
</tr>
<tr>
<td>750-760</td>
<td>36</td>
<td>0</td>
<td>90</td>
<td>760-</td>
<td>Decreased drilling resistance, hard, strong, moderately vesicular, below 758 feet.</td>
</tr>
<tr>
<td>760-770</td>
<td>35</td>
<td>0</td>
<td>91</td>
<td>770-</td>
<td>Moderately hard to hard, moderately strong, little weathered, moderately to highly vesicular. Total depth = 770 feet. 09:55.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>775-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>780-</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment:**
- **Cable Tool/ Air Rotary/Star 150K**
- **(Ground) Elevation** 828 ft **Date** 01/27/95

**Log of Monitoring Well 4-4 (Sheet 12 of 12)**

**Harding Lawson Associates**
- Engineering and Environmental Services
  - Schofield DA03
  - Schofield Barracks
  - Island of Oahu, Hawaii

**DRAWN:** kar 28339.05.14.12
**APPROVED:**
**FILE:** SDA3 4/95
**DATE:** 4/95
**REVISED DATE:**
Ms. Rae Loui, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Ms. Loui:

Subject: Your Letter of May 11, 1995 on the Army Schofield Monitor Well 4-4

Thank you for the opportunity to comment on the well application. The proposed plan for pumping is unclear. Page 1 of the application indicates a rated pump capacity of 3,000 to 4,000 gallons per minute (gpm) while page 2 indicates the well be tested at a rate of 1,000 to 1,800 gpm.

The apparent purpose of the well is to extract contaminants according to the title. We have no objections if the well will be used for the occasional pumping for samples. For extended pumping, the disposal of the pumped water should be addressed. If the treated water is used in the Army water system, less would be presumably pumped from Schofield Shaft.

We return the cover letter accordingly marked.

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

Very truly yours,

Raymond H. Sato
Manager and Chief Engineer

Attachment
Mr. Raymond Sato  
Manager and Chief Engineer  
Honolulu Board of Water Supply  
630 Beretania Street  
Honolulu, Hawaii 96843

Dear Mr. Sato:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by May 26, 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-95-09</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI
Deputy Director

Response:

( ) We have no objections
( ) Not subject to our regulatory authority and permit
( ) Comments attached (Board of Water Supply letter of June 2, 1995)
( ) Additional information requested
( ) Extended review period requested

Contact Person: Herbert H. Minakami
Signed: Raymond H. Sato
Manager and Chief Engineer

Phone: 527-6183
Date: Jun 28, 1995
Schofield Monitor Wells

Thank you for assisting our staff by phone concerning Schofield Monitor Well 4-4. In reviewing the file for the entire series of monitor wells at this location, we have additional questions for clarification.

The location of Wells 4-1 and 4-3 seem to be the same. Please forward a map that locates all wells.

Please forward well completion reports for Wells 4-2, 4-3, along with pump test results and periodic reports for all wells, as conditioned in the permits.

We note also that the application for Well 4-4 will be submitted as an after-the-fact request. Our understanding is that its large diameter means that it may be used for production purposes in the future, at which time a new pump installation application would be processed.

We appreciate your consideration. If you have any questions, please call Charley Ice at 587-0251.

Sincerely,

RAE M. LOUI
Deputy Director

Cl:ss
REF:CWRM-SS

TO: Mr. Kali Watson, Director  
    Department of Hawaiian Home Lands  
    Mr. Clayton H.W. Hee, Chairman and Trustee At Large  
    Office of Hawaiian Affairs  
FROM: Michael D. Wilson, Chairperson  
Commission on Water Resource Management  
SUBJECT: Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 26, 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-0304</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Enc.

Response:  
[ ] We have no objections  
[ ] Not subject to our regulatory authority and permit  
[ ] Comments attached  
[ ] Additional information requested  
[ ] Extended review period requested

Contact Person: LUIS A. MANRIQUE  
Signed: [Signature]

Phone: 597-1935  
Date: 05/19/95
MEMORANDUM

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

FROM: Don Hibbard, Administrator
Historic Preservation Division

SUBJECT: Application for Well Construction and Pump Installation Permit, for Monitoring Well 4-4, Schofield Army Barracks
Wahiawa, Wahiawa, O‘ahu
TMK: 7-7-01

A review of our records shows that there are no known historic sites at the project location. Aerial photographs taken in the 1970s shows that the area was cleared and graded. Because it is unlikely that historic sites remain, we believe that this project will have "no effect" on historic sites.

EJ: jk
Mr. Thomas Arizumi, Chief  
Environmental Management Division  
State Department of Health  
919 Ala Moana Blvd., 3rd Floor  
Honolulu, Hawaii 96814

Attn: Mr. Dennis Tulang

Dear Mr. Arizumi:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 12 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-03 0 4</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

[Signature]

RAE M. LOUI  
Deputy Director

Response:

( ) We have no objections  
( ) Not subject to our regulatory authority and permit  
( ) Comments attached  
( ) Additional information requested  
( ) Extended review period requested

Contact Person: Lori N. Kajiwara  
Phone: 586-4290

Signed: Lori N. Kajiwara  
Date: 5-18-95
Mr. Thomas Arizumi, Chief
Environmental Management Division
State Department of Health
919 Ala Moana Blvd., 3rd Floor
Honolulu, Hawaii 96814

Attn: Mr. William Wong

Dear Mr. Arizumi:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by May 26, 1996.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-93 04</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI
Deputy Director

Response:

☑ We have no objections
☐ Not subject to our regulatory authority and permit
☐ Comments attached
☐ Additional information requested
☐ Extended review period requested

Contact Person: Bill Wong
Signed: Bill Wong
Phone: 586-2258
Date: 5/14/95
State of Hawaii  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
Commission on Water Resource Management  
Honolulu, Hawaii  
MAY 1 1 1995

TO:  
Dr. Don Hibbard, Director  
Historic Preservation Program  
Mr. William Devick  
Division of Aquatic Resources

FROM:  
Rae M. Loui, Deputy Director  
Commission on Water Resources Management

SUBJECT: Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 26 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-0304</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resources Management staff at 587-0225.

Response:

- We have no objections
- Not subject to our regulatory authority and permit
- Comments attached
- Additional information requested
- Extended review period requested

Contact Person: Bill Devick

Signed: [Signature]

Phone: 587-0110

Date: 5/11/95
APPLICATION FOR PERMIT

[Form Instructions]

1. APPLICANT: (may be a, b, or c, but all must be filled in)
   (a) WELL OWNER
      
      [ Firm/Name: ] US ARMY ENVIRONMENTAL CENTER
      [ Contact Person: ] JAMES DANIEL
      [ Address: ] BUILDING 24480
      [ Location/Name: ] ABERDEEN PROVING GROUND, MD 21010

   (b) LANDOWNER
      
      [ Firm/Name: ] US ARMY
      [ Contact Person: ] JON FUKUDA
      [ Address: ] DIRECTORATE OF PUBLIC WORKS
      [ Location/Name: ] SCHOFIELD BARRACKS, HI 96762

   (c) CONTRACTOR
      
      [ Firm/Name: ] ROSCOE MOSS HAWAII, INC.
      [ Contact Person: ] JAMES DANIEL
      [ Address: ] 91-259A GILAI ST.
      [ Location/Name: ] KAPOLEI, HI 96707

2. WELL LOCATION/NAME: MONITORING WELL 4-4
   [ Island: ] OAHU
   [ Address: ] SCHOFIELD ARMY BARRACKS
   [ Tax Map Key: ] 7-7-01
   (Attach a USGS map, scale 1" = 2000', and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK:
   [ ] Drill New Well
   [ ] Modify Existing Well
   [ ] Install New Pump
   [ ] Replace Pump
   [ ] Be sure to complete and submit well abandonment report upon completion of work.
   [ ] Alter Location
   [ ] Redrill
   [ ] Deepen
   [ ] * Abandon/Seal

(b) WELL TYPE:
   [ ] Dug
   [ ] Bored
   [ ] Driven
   [ ] Grilled
   [ ] Radial

   [ ] Is this well a part of a battery of wells? Yes No
   (Briefly describe and fill in the diagram on the back of this form.)

4. PROPOSED PUMP INFORMATION:
   Rated Pump Capacity: 3,000* - 4,000* gallons per minute
   [ Pump Type: ] Deep Well Turbine
   [ ] Submersible
   [ ] Centrifugal
   [ ] Rotary
   [ ] Rotary-Displacement
   [ ] Rotary-Gear
   [ ] Propeller
   [ ] Reciprocating
   [ ] Gas
   [ ] Electric, rated horsepower of
   [ Motor: ] Diesel
   [ ] Gas
   [ ] Electric, rated horsepower of

5. PROPOSED USE:
   [ ] Municipal (including hotels, stores, etc.)
   [ ] Domestic (individual, noncommercial water sy.)
   [ ] Irrigation (crop)
   [ ] State Land Use District:
   [ ] Urban
   [ ] Agriculture
   [ ] Rural
   [ ] Conservation
   [ ] Other (explain)
   [ ] County Zoning (describe)
   (If more space is needed, continue below remedies, explanations.)

6. (a) PROPOSED AMOUNT OF WITHDRAWAL:
   [ ] 1,800* gal. per day
   (b) METHOD OF FLOW MEASUREMENT:
   [ ] Flow-meter
   [ ] Open-pipe
   [ ] Orifice Plate
   [ ] Well

7. PENDING ACTIONS:
   [ ] CDUA
   [ ] SMA
   [ ] EIS
   [ ] EA
   [ ] None
   [ ] Other
   (If more space is needed, continue on back)

8. REMARKS, EXPLANATIONS:
   [ ] ENVIRONMENTAL PROGRAM SUPPORT EXTRATION WELL
   [ ] Pump test
   (If more space is needed, continue on back)

NOTE: Signing below indicates that the applicant understands that if the permit requested is granted by the Commission on Water Resource Management, the proposed work is to be completed within the conditions as approved. In the event that the proposed work is not completed within the time specified, the applicant must provide evidence from a qualified engineer that the proposed work is complete. In addition, the contractor shall submit to the Commission a well completion report, well abandonment report, or both, within 30 days after completion of the permitted work. The applicant further understands that monthly water use data shall be submitted to the Commission. The applicant further understands that the applicant is responsible for the costs of the proposed work and shall not make any representations or warranties to the contrary.

[Signature]  [Signature]  [Signature]
[Date]      [Date]      [Date]

For Official Use Only:
Date Received
Date Accepted
Field Checked By
Date

[Note: This form is void if signed by anyone other than the Applicant.]

[Official Use]

[Signature]  [Signature]  [Signature]
[Date]      [Date]      [Date]

[Note: This form is void if signed by anyone other than the Applicant.]

[Official Use]

[Signature]  [Signature]  [Signature]
[Date]      [Date]      [Date]

[Note: This form is void if signed by anyone other than the Applicant.]

[Official Use]
Briefly describe the proposed work:

Drill 30" diameter hole to approximately 200 ft. and install 26" diameter conductor casing. Grout the annular space. Drill 24" diameter bore hole from 200 ft. to approximately 800 ft. Install approximately 800 ft. of 20" I.D. casing the bottom 150 ft. to be Stainless steel Full Flo Louver Casing. The annular around Perforated section will be gravel packed from approximately 800 ft. up to 650 ft. The annulus from 650 ft. to the ground surface will be cement grouted. The well will be test pumped at a rate of 1,000 G.P.M. to a rate of 1,800 G.P.M.

PROPOSED SECTION OF WELL
* SEE ATTACHED PROPOSED WELL COMPLETION DIAGRAM

Elevation at top of casing:
830 ft., msl.

Cement Grout: 300 ft.

Hole Diameter: 24 in.

Total Depth: 770 ft.

Rock Packing: 162 ft.

Ground Elevation: 828 ft., msl*

Solid Casing:

Material: Carbon Steel
Length 546 ft.
Diameter 20 in.
Wall thickness in.

Casing: ☐ Perforated ☐ Screen

Material: Stainless Steel
Length 150 feet ft.
Diameter 20 in.
Wall thickness in.
Openings 0.187 sq. in./L.F.

Open Hole:
Length 4 feet
Diameter 24 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
Mr. James Daniel  
U.S. Army Environmental Center  
Building E4480  
Aberdeen Proving Ground, MD 21010  

Dear Mr. Daniel:

We have received your application and filing fee for a permit to construct and install a pump in Schofield Monitor Well 4-4 (Well No. 3004-05) at Schofield Army Barracks, Hawaii, (TMK 7-7-01:1). We are reviewing the application for completeness.

As a government agency, you are exempt from the filing fee. We are returning the check to its originator, Harding Lawson and Associates.

Should you have any questions, please call the Commission on Water Resource Management staff at 587-0251.

Sincerely,

RAE M. LOUI  
Deputy Director

cc: Harding Lawson Associates
Mr. Thomas Arizumi, Chief  
Environmental Management Division  
State Department of Health  
919 Ala Moana Blvd., 3rd Floor  
Honolulu, Hawaii 96814

Attn: Mr. William Wong

Dear Mr. Arizumi:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 26 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-03 64</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI
Deputy Director

Response:

☐ We have no objections  
☐ Not subject to our regulatory authority and permit  
☐ Comments attached  
☐ Additional information requested  
☐ Extended review period requested

Contact Person: ________________________________ Phone: ________________

Signed: ________________________________ Date: ________________

Enc.
Mr. Thomas Arizumi, Chief
Environmental Management Division
State Department of Health
919 Ala Moana Blvd., 3rd Floor
Honolulu, Hawaii 96814

Attn: Mr. Dennis Tulang

Dear Mr. Arizumi:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by May 26, 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-06 6-4</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI
Deputy Director

Response:

- ( ) We have no objections
- ( ) Not subject to our regulatory authority and permit
- ( ) Comments attached
- ( ) Additional information requested
- ( ) Extended review period requested

Contact Person: ___________________________ Phone: ___________________
Signed: ___________________________ Date: _______________
Ms. Marjorie Ziegler  
Sierra Club Legal Defense Fund, Inc.  
223 South King Street, Suite 400  
Honolulu, Hawaii 96813  

Dear Ms. Ziegler:  

Well Construction and Pump Installation Permit Applications  

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 25, 1995.  

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-03-04</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI  
Deputy Director

Response:  

() We have no objections  
() Not subject to our regulatory authority and permit  
() Comments attached  
() Additional information requested  
() Extended review period requested

Contact Person: ____________________________ Phone: ____________
Signed: ____________________________ Date: ____________
REF: CWRM-SS

TO: 
Mr. Kali Watson, Director
Department of Hawaiian Home Lands

Mr. Clayton H.W. Hee, Chairman and Trustee At Large
Office of Hawaiian Affairs

FROM: Michael D. Wilson, Chairperson
Commission on Water Resource Management

SUBJECT: Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 26, 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-93</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Enc.

Response:

( ) We have no objections
( ) Not subject to our regulatory authority and permit
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Contact Person: ___________________________ Phone: ___________________

Signed: ___________________________ Date: ___________________
TO: Dr. Don Hibbard, Director
   Historic Preservation Program

   Mr. William Devick
   Division of Aquatic Resources

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

SUBJECT: Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by _MAY 26 1995_

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-08</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Response:

( ) We have no objections
( ) Not subject to our regulatory authority and permit
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Contact Person: ____________________________ Phone: _______________________
Signed: __________________________________ Date: ________________________
Mr. Raymond Sato  
Manager and Chief Engineer  
Honolulu Board of Water Supply  
630 Beretania Street  
Honolulu, Hawaii 96843  

Dear Mr. Sato:  

Well Construction and Pump Installation Permit Applications  

Please review the following permit applications pursuant to your area of concern and submit your comments to us by May 26, 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-03 04</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,  

[Signature]

RAE M. LOUI  
Deputy Director

Response:  

( ) We have no objections  
( ) Not subject to our regulatory authority and permit  
( ) Comments attached  
( ) Additional information requested  
( ) Extended review period requested

Contact Person: ___________________________  
Phone: ___________________________

Signed: ___________________________  
Date: ___________________________
Mr. Jack Kampfer  
Wahiawa Neighborhood Board No. 26  
P.O. Box 876  
Wahiawa, Hawaii 96782

Dear Mr. Kampfer:

**Well Construction and Pump Installation Permit Applications**

Please review the following permit applications pursuant to your area of concern and submit your comments to us by **MAY 26 1995**.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-03 04</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

[Signature]

RAE M. LOUI  
Deputy Director

---

Response:

() We have no objections.
() Not subject to our regulatory authority and permit
() Comments attached
() Additional information requested
() Extended review period requested

Contact Person: ____________________________  Phone: ____________________________

Signed: ____________________________  Date: ____________________________
Ms. Marilyn Lee
Mililani/Waipio/Melemanu Neighborhood Board No. 25
P.O. Box 3116
Mililani, Hawaii 96789

Dear Ms. Lee:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by **MAY 26 1995**.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-03 04</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

[Signature]

RAE M. LOUI
Deputy Director

Response:

() We have no objections
() Not subject to our regulatory authority and permit
() Comments attached
() Additional information requested
() Extended review period requested

Contact Person: ___________________________ Phone: ________________
Signed: ___________________________ Date: ________________
Mr. James Awai, Jr.
North Shore Neighborhood Board No. 27
P.O. Box 607
Haleiwa, Hawaii 96712

Dear Mr. Awai:

Well Construction and Pump Installation Permit Applications

Please review the following permit applications pursuant to your area of concern and submit your comments to us by MAY 26 1995.

<table>
<thead>
<tr>
<th>Island</th>
<th>Well Name</th>
<th>Well No.</th>
<th>Application Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Schofield Monitor Well 4-4</td>
<td>3004-9504</td>
<td>Well and Pump</td>
</tr>
</tbody>
</table>

Should you have any questions, please contact the Commission on Water Resource Management staff at 587-0225.

Sincerely,

RAE M. LOUI
Deputy Director

Response:

( ) We have no objections
( ) Not subject to our regulatory authority and permit
( ) Comments attached
( ) Additional information requested
( ) Extended review period requested

Contact Person: ____________________________  Phone: ____________________________

Signed: ____________________________  Date: ____________________________
PAY: TWENTY-FIVE DOLLARS

STATE OF HAWAII—Department of Land & Natural Resources
TO THE ORDER OF P.O. BOX 621
OF HONOLULU, HI 96809

[Signature]

*Note: Returned to Harding Lawson Associates*
APPLICATION FOR PERMIT

1. APPLICANT: (circle primary contact a, b, or c)
   (a) WELL OWNER
   Surname ___________ Signature ___________
   Address ___________ Phone ___________
   Contact Person ___________ Phone ___________
   Firm Name ___________ Payee ___________
   (b) LANDOWNER
   Surname ___________ Signature ___________
   Address ___________ Phone ___________
   Contact Person ___________ Phone ___________
   Firm Name ___________ Payee ___________
   (c) CONTRACTOR
   Surname ___________ Signature ___________
   Address ___________ Phone ___________
   Contact Person ___________ Phone ___________
   Firm Name ___________ Payee ___________

2. WELL LOCATION/NAME:
   Schofield Barracks-Former Landfill/MW4-4Island
   Oahu
   Address: Oahu Street, Schofield Barracks, HI 96786
   Tax Map Key: 7-7-01
   (Attach a USGS map, scale 1"=2000', and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK:
   [ ] Drill New Well
   [ ] Deep
   [ ] Install New Pump
   [ ] Modify Existing Well
   [ ] Redrill
   [ ] Modify Pump
   [ ] Abandon/Seal
   [ ] Replace Pump
   * Be sure to complete and submit well abandonment report upon completion of work.

   (b) WELL TYPE:
   [ ] Borehole
   [ ] Bored
   [ ] Drilled
   [ ] Radial
   Is this well a part of a battery of wells?
   [ ] Yes
   [ ] No
   (Briefly describe and fill in the diagram on the back of this form.)

4. PROPOSED PUMP INFORMATION:
   Rated Pump Capacity: ___ 25 ___ gallons per minute
   Pump Type:
   [ ] Deep Well Turbine
   [ ] Rotary
   [ ] Submersible
   [ ] Rotary-Displacement
   [ ] Reciprocating
   [ ] Centrifugal
   [ ] Rotary-Gear
   [ ] Impulse
   Motor:
   [ ] Electric
   [ ] Diesel
   [ ] Gas

5. PROPOSED USE:
   [ ] Municipal (including hotels, stores, etc.)
   [ ] Military
   [ ] Domestic (individual, noncommercial water sys.)
   [ ] Industrial
   [ ] Irrigation (crop)
   [ ] Other (explain)
   If Pump Replacement, Existing Pump Capacity: ___ 25 ___ gallons per minute

6. (a) PROPOSED AMOUNT OF WITHDRAWAL:
   ___ 6 ___ gallons per day

   (b) METHOD OF FLOW MEASUREMENT:
   [ ] Flow-meter
   [ ] Open-pipe
   [ ] Orifice Plate
   [ ] Weir

7. PENDING ACTIONS:
   [ ] CDUA
   [ ] SMA
   [ ] EIS
   [ ] EA
   [ ] NONE
   [ ] Other (explain)
   Completion Date:

8. REMARKS, EXPLANATIONS:
   Well shall be used for monitoring of groundwater quality and for collecting groundwater elevation data.
   (If more space is needed, continue on back)

I understand that approval of this application attaches the following standard conditions: 1) the proposed work is to be completed within two (2) years of the approval date; 2) the contractor shall submit to the Commission a well completion/abandonment report within 30 days after the completion date of the permitted work; 3) monthly water use data shall be submitted to the Commission; 4) such approval shall not constitute a determination of correlative water rights and shall not guarantee the pump capacity or future use up to the permitted pump capacity.

Well Owner

Landowner

Contractor

______________________________
Signature ______________________
Date __________-

______________________________
Signature ______________________
Date __________-

______________________________
Signature ______________________
Date __________-

For Official Use Only:

Data Received

Data Accepted

Field Checked By

Date

Longitude

Latitude

Aquifer System Name

State Well No. ___________

1999 WCPI Form
9. PROPOSED WELL SECTION

Elevation at top of casing
830 ft., msl.

Cement Grout: 200 ft.

Rock Packing: 0 ft.

Hole Diameter: 12 in.

Total Depth: 770 ft.

Ground Elevation: 828 ft., msl

Solid Casing:
- Material: steel
- Length: 200 ft.
- Diameter: 26 in.
- Wall thickness: 0.312 in.

Casing: □ Perforated □ Screen
- Material: 
- Length: 
- Diameter: in.
- Wall thickness: in.
- Openings: sq. in.A.F.

Open Hole:
- Length: 570 ft.
- Diameter: 12 in.

*Approximate elevation at time of filing application. Ground elevation above mean sea level (msl) by a surveyor licensed by the State must be submitted at start of construction. Final elevations of well components shall be submitted in the well completion/well abandonment reports.
APPLICATION FOR PERMIT

1. APPLICANT: (may be a, b, or c, but all must be filed in)
   (a) WELL OWNER
      Firm/Name: US ARMY ENVIRONMENTAL CENTER
      Contact Person: JAMES DANIEL
      Address: ABERDEEN PROVING GROUND, MD 21010
   (b) LANDOWNER
      Firm/Name: US ARMY
      Contact Person: JON FUKUDA
      Address: DIRECTORATE OF PUBLIC WORKS
      SCOFIELD BARRACKS, HI 96786
   (c) CONTRACTOR
      Firm/Name: ROSEDALE MOSS HAWAII, INC.
      Contact Person: JAMES DANIEL
      Address: 109-259A OLAI ST., KAPOLEI, HI 96707

2. WELL LOCATION/NAME: MONITORING WELL 4-4  (3004-03) Island OAHU
   Address: SCOFIELD ARMY BARRACKS
   (Attach a USGS map, scale 1:2000, and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK: Drill New Well
      - Alter Location
      - Modify Existing Well
      - Redrill
      - Install New Pump
      - Replace Pump
      - Modify Pump
      * Be sure to complete and submit well abandonment report upon completion of work.

   (b) WELL TYPE:
      - Dug
      - Bored
      - Driven
      - Drilled
      * Radial
      * Is this well a part of a battery of wells? Yes

      (Briefly describe and fill in the diagram on the back of this form.)

4. PROPOSED PUMP INFORMATION: Rated Pump Capacity: 3,000 - 4,000 gallons per minute
   Motor:
      - Electric, rated horsepower of
      - Diesel

5. PROPOSED USE:
   - Municipal (including hotels, stores, etc.)
   - Military
   - Domestic (individual, non-commercial water use)
   - Industrial
   - Irrigation (crop)
   - Other (explain)
   - State Land Use District:
      - Urban
      - Agricultural
      - Rural
      - Conservation
      - County Zoning (describe)

   (If more space is needed, continue below remarks, explanations.)

6. (a) PROPOSED AMOUNT OF WITHDRAWAL: 1,800 gallons per day
   (b) METHOD OF FLOW MEASUREMENT:
      - Flow-meter
      - Open-pipe
      - Orifice Plate

7. PENDING ACTIONS:
   - CDUA
   - SMA
   - ES
   - EA
   - NONE
   - Other (explain)

8. REMARKS, EXPLANATIONS:
   - ENVIRONMENTAL PROGRAM SUPPORT EXTRATION WELL.

* Pump test

(If more space is needed, continue on back)

U.S. Army Garrison, HI
Well Owner: Secretary of Public Works
Landowner: Secretary of Public Works
Contractor: Secretary of Public Works

For Official Use Only:
Data Received: Longitude: Aquifer System Name: State Well No.
Data Accepted: Latitude:
Field Checked By: Date: 5/24/82 WRCR Fr

Briefly describe the proposed work:

Drill 30" diameter hole to approximately 200 ft. and install 26" diameter conductor casing. Grout the annular space. Drill 24" diameter bore hole from 200 ft. to approximately 800 ft. Install approximately 800 ft. of 20" I.D. casing the bottom 150 ft. to be Stainless steel Full Flo Louver Casing. The annular around Perforated section will be gravel packed from approximately 800 ft. up to 650 ft. The annulus from 650 ft. to the ground surface will be cement grouted. The well will be test pumped at a rate of 1,000 G.P.M. to a rate of 1,800 G.P.M.

PROPOSED SECTION OF WELL
* SEE ATTACHED PROPOSED WELL COMPLETION DIAGRAM

Elevation at top of casing: 830 ft., msl.

Cement Grout: 300 ft.

Hole Diameter: 24 in.

Total Depth: 700-770 ft.

Rock Packing: 162 ft.

Ground Elevation: 828 ft., msl*

Solid Casing:
Material Carbon Steel
Length 546 ft.
Diameter 20 in.
Wall thickness in.

Casing: □ Perforated □ Screen
Material Stainless Steel
Length 150 feet ft.
Diameter 20 in.
Wall thickness in.
Openings sq. in./L.F.

Open Hole:
Length 4 feet
Diameter 24 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
MONITORING WELL 4-4

WELL CAP

28" DIA. STEEL WELL MONUMENT

NO. 2 COARSE GRAVEL

GROUND ELEVATION = 828'

5" DIA. HOLLOW STEEL PICKET FILLED WITH CEMENT

CEMENT MOUND

Depth (ft) Elevation (ft)*
198 630
528 300
538 290
540 288
546 282
(GROUNDWATER) 273.84, 3/15/95
555.74
576 252
696 132
700 128
770 58

30" DIA. HOLE DRILLED W/CABLE TOOL

26" DIA. STEEL-CONDUCTOR CASING

CEMENT-BENTONITE INNER SEAL

20" DIA. CARBON-STEEL BLANK CASING

24" DIA. HOLE DRILLED W/AIR-ROTARY

CEMENT-BENTONITE INNER SEAL

BENTONITE PELLETS

FINE SAND

1" STEEL SOUNDER TUBE (Bottom 30' perforated)

SRI SUPREME SILICA SAND FILTER PACK (Size: 4/1)

20" DIA. STAINLESS-STEEL LOUVERED SCREEN (0.187-in. slot size)

FINE SAND

SLough

(NOT TO SCALE)

*NOTE: Elevations measured with respect to mean sea level.
To: Ms. Rae Loui  
Deputy Director  
Department of Land and Natural Resources  
Commission on Water Resource Management  
P.O. Box 621  
Honolulu, Hawaii 96809

From: Bruce Wedgeworth

Date: 1/16/97

Subject: Well Completion Reports  
Schofield Army Barracks

Project Number: 33537.06.01.12

In response to your letter dated November 1, 1996, enclosed are the completed application and/or well completion reports for the following wells.

- Well No. 2901-13 (MW1-1)
- Well No. 3004-02 (MW4-2)
- Well No. 3004-03 (MW4-3)
- Well No. 2802-01 (MW2-6)

With regard to Well MW4-2, there is only one well by that name and is assigned the state Well No. 3004-02. The misunderstanding may have occurred when we filed the Well Completion Report for Well MW4-2. Initially, we had planned to drill a well in the location designated on the enclosed figure for Well MW4-2. Thus, we submitted a permit application. However, we decided to move the well location to its present location, designated by Well No. 3004-02. When we submitted the Well Completion Report for Well MW4-2, we inadvertently used the wrong state Well No. designation and did not notify you that a well was not drilled in the Well No. 2900-1 location. We also had surveying errors at the beginning of the project, thus, you may notice that the well elevations somewhat differ.

Since, there is no well at the Well No. 2900-01 location, we are not submitting a pump installation permit application.

If you have any questions, please feel free to call.

Harding Lawson Associates  
235 Pearlridge Center, Phase 1  
Aiea, Hawaii 96701  
(1)808-486-6009
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

WELL COMPLETION REPORT

(Well Construction) (Permanent) Pump Installation

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

1. State Well No.: 3004-03
2. Well Name: MW4-3
3. Island: OAHU
4. Location/Address: Schofield Barracks
5. Tax Map Key: 7-7-01

PART I.

WELL CONSTRUCTION REPORT

4. Name of driller who performed work: Pete Christiansen
5. Type of rig/construction: Air Rotary / Downhole Hammer
6. Date(s) Well Construction and pump tests (if any) completed: 12/9/93
7. GROUND ELEVATION (referenced to mean sea level, msl): 883 ft.
   Well Bench Mark (description/location): Top of sounding tube
   Elevation (msl): 384.15 ft.
8. DRILLER’S LOG: Please attach geologic log (if available or if required by permit)
   Depths (ft.) Rock Description, Water Level, Dates, etc.
   to See attached boring log to
   (If more space is needed, continue on back.)
9. Total depth of well below ground: 649 ft.
10. Hole size:
    19 inch dia. from 0 ft. to 30 ft. below ground
    16 inch dia. from 30 ft. to 200 ft. below ground
    10 inch dia. from 200 ft. to 720 ft. below ground
11. Casing installed:
    6 in. I.D. x in. wall solid section to 599 ft. below ground
    in. I.D. x in. wall perforated section to 649 ft. below ground
    Casing Material/Slot Size: Steel blank casing / stainless steel wirewrap
12. Annulus:
    Grouted from 0 ft. below ground to 473 ft. below ground
    Gravel packed from 473 ft. below ground to 720 ft. below ground
13. Initial water level: 613.14 ft. below ground.
    Date and time of measurement: 10/10/95
14. Initial chloride: NA ppm
    Date and time of sampling: 
15. Initial temperature: NA °F
    Date and time of measurement:
16. PUMPING TESTS: Reference Point (R.P.) used: NA
   (1) Step-Drawdown Test Date
   (2) Long-term Aquifer Test Date
   Start water level ft. below R.P.
   End water level ft. below R.P.
   Start water level ft. below R.P.
   End water level ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs (1/96 LTAT Form) attached? Yes No
18. As-built drawings attached? Yes No
19. Other remarks/comments: (On back of this form)

Well Drilling Contractor (print) DENNIS W. M. BREEN C-57 Lic. No. AC 12058
Signature
Date 1/6/97
Surveyor (print) Russell Figueira Lic. No. 4129 - Hawaii
Signature
Date 1-8-97
Applicant (print) COL. Douglas J. Fontana
Signature
Date 1-14-97
PART II. (PERMANENT) PUMP INSTALLATION REPORT


21. Name of person performing work: Paul Montgomery

22. Date Pump Installation Completed: 4/29/94

23. PUMP INSTALLATION:
   - Pump Type, Make, Serial No.: 3.75" Grundfos pump
   - Capacity: 20 gpm
   - Motor type, H.P., Voltage, rpm: Electric, 7.5 hp
   - Depth of Pump Intake Setting: 624 ft. below, which elevation is ______ ft.
   - Depth to bottom of airline: NA ft. below, which elevation is ______ ft.
   - Pumping Head is: 613 ft. Type of flow meter: NA which measures in ______

24. As-built drawings attached: X Yes _ No

25. Other remarks/comments: (See below)

Pump Installation Contractor (print) DENNIS W. McGRaen C-57 Lic. No. AC 12058

Signature: __________________________ Date: 4/19/94

Applicant (print) COREN & ASSOCIATES

Signature: __________________________ Date: 1-14-97

8. (cont'd) DRILLER'S LOG (cont'd):

<table>
<thead>
<tr>
<th>Water Level Dates (ft.)</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks</th>
<th>Water Level Dates (ft.)</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks</th>
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</tr>
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</table>

19. & 25. Remarks:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Mr. Jon Fukuda  
U.S. Army  
DPW, ATTN: APVG-GVW, U.S. Army Garrison  
Schofield Barracks, HI 96857-5000

Dear Mr. Fukuda:

Well Construction / Pump Installation Permit Application  
Well No. 2901-13

We have received your well construction / pump installation permit application and filing fee for the MW1-1 Well (Well No. 2901-13). However, your application is incomplete.

We are returning the original well construction/pump installation permit application to you (attached). Please complete all highlighted areas on the application and return the completed application to our office. A copy of your application has been made for our record.

Other matters which must be addressed before we accept your application as complete are as follows:

1. Please complete all highlighted areas on the original well completion reports for the following wells (originals attached; copies have been made for our record):
   a. Well No. 2901-13
   b. Well No. 3004-02
   c. Well No. 3004-03
   d. Well No. 2802-01

With regard to MW4-2, our records indicate that there are two (2) wells named MW4-2; one is assigned Well No. 2900-01 and the other is assigned Well No. 3004-02 (see attached map, permit applications, permits, and well completion reports for the two wells). Please confirm if there are two existing wells named MW4-2.
Also, note that the well completion report - Part II for Well No. 2900-01 shows a permanent pump installation. We request that you submit an after-the-fact application for the permanent pump installation in Well No. 2900-01. We have attached a blank application form for your use.

You are correct in that Well No. 3004-03 refers to MW4-3 instead of MW4-4; we apologize for this typographical error in our letter of April 11, 1996. We also confirm that Well No. 2900-02 refers to MW2-1, as indicated on the table in your letter of October 14, 1996.

Upon receipt of the above information we will accept your application as complete and you can then expect your application to be processed within ninety (90) days.

If you have any questions about your permit application, please contact Lenore Nakama of the Commission staff at 587-0218. Thank you for your continued assistance and cooperation in matters related to water resources.

Sincerely,

RAE M. LOUI
Deputy Director

LN:fc

Enclosure
October 14, 1996

Ms. Lenore Nakama  
State of Hawaii, Department of Land and Natural Resources  
Commission on Water Resource Management  
P.O. Box 621  
Honolulu, Hawaii 96809

Schofield Army Barracks RI/FS Well Information  
Permit Applications and Completion Reports  
Schofield Barracks, Hawaii

Dear Ms. Nakama:

As discussed during our telephone conversation on August 27, 1996, we have enclosed a copy of a USGS topographic map showing the locations of 12 monitoring wells installed for this project. The monitoring wells are identified on the map by their Army identification numbers. When we received your letter dated April 11, 1996, there seemed to be some confusion over which state well identification numbers were assigned to which of our monitoring wells. Your letter indicated that Wells 4-2 and 4-4 were assigned state well identification numbers 3-2900-01 and 3-3004-03, respectively. The actual geographic location of Well 4-2 does not correspond to well identification number 3-2900-01. Based on our records, the state well identification numbers should be assigned as follows:

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<th>Project Well Number</th>
<th>Hawaii State Well ID Number</th>
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<td>3-2901-13</td>
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<tr>
<td>2-1</td>
<td>3-2900-02</td>
</tr>
<tr>
<td>2-2</td>
<td>3-2903-01</td>
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<td>2-6</td>
<td>3-2802-01</td>
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<td>4-2</td>
<td>3-3004-02</td>
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<td>4-2A</td>
<td>3-3004-05</td>
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<td>3-3004-03</td>
</tr>
<tr>
<td>4-4</td>
<td>3-3004-04</td>
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</table>

We hope this table and the map will help clear up the confusion regarding the well numbers and locations.

As requested in your April 11, 1996 letter, we have enclosed the following information:

1. Well 1-1 (State Well ID No. 3-2901-13)  
   a. After-the-fact application for a well construction/pump installation permit  
   b. Well completion report
October 14, 1996
28339.06.01.12
0225AR
Ms. Lenore Nakama
State of Hawaii, DLNR
Page 2

2. Well 4-2 (State Well ID No. 3-3004-02)
   a. Well completion report
   b. Well completion diagram

Although 12 monitoring wells were installed over the lifetime of the project, only 11 are functioning with submersible pumps. There were problems during the installation of Well 4-2. The cable used to pull the pump out of the well broke. After numerous unsuccessful attempts to retrieve the pump, the pump was abandoned and is not functional. Thereafter, Well 4-2 was used only to measure groundwater levels. Thus, a pump installation report and diagram were never included in the original permit application. Because Well 4-2 could not be used as a monitoring well, a new well was drilled within 15 feet of the old well. We gave the new well the name 4-2A, and this may have led to additional confusion.

Your April 11 letter also requested information on State Wells 3-2900-01 and 3-3004-03. From our records, State Well 3-3004-03 refers to Well 4-3 instead of 4-4, as listed in your letter. But we are uncertain which wells are referred to by State Wells 3-2900-01 and 3-2900-02. At one time, we did propose to install a monitoring well in a part of the East Range, but that idea was rejected. It is possible, perhaps, that someone such as the drilling company may have submitted a permit application in advance. If that is the case, that particular permit should be withdrawn, as that well was never drilled. Because of the confusion, we have enclosed copies of the well completion reports for both Wells 4-3 and 4-4.

In addition, we have enclosed survey data for all the wells, and the well completion report for Well 2-6 with supporting boring log and well completion diagram information.

We hope that this information will help clarify the confusion between the two well identification systems. I will be available to discuss these wells with you personally if you so desire. If you have any questions, please feel free to call.

Sincerely yours,

HARDING LAWSON ASSOCIATES

Bruce S. Wedgeworth
Associate Geologist

cc: Mr. Jon Fukuda / U.S. Army, Department of Public Works
July 16, 1996

Harding Lawson Associates
235 Pearlridge Center, Phase I
98-1005 Moanalua Road
Aiea, Hawaii 96701

Attn: Mr. Bruce S. Wedgeworth

Subject: FIELD LOCATION OF MW 2-6
         At Wheeler Army Airfield
         Oahu, Hawaii

<table>
<thead>
<tr>
<th>Northing</th>
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<th>Elevation</th>
<th>Latitude</th>
<th>Longitude</th>
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<tr>
<td>BM#3</td>
<td>689.46</td>
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</tbody>
</table>

Coordinates referred to Hawaii State Plane Coordinate System - Zone 3
Elevation Datum = Mean Sea Level (MSL)

(Mw 2-6)

(Well Name: MW 2-6
Well Permit No.: 3-2802-01)
ELEVATION OF MONITORING WELLS AS SURVEYED ON 7/15/95 (WITH BRUCE & MARK OF HARDING AND LAWSON)

MW-4-2A = 946.87 feet — Black mark on top of tube
MW-4-2B = 947.11 feet — Black mark on top of tube
"+" CUT near casing of MW-4-2A = 945.91 feet

MW-4-1 = 853.47 feet (as surveyed on 3/16/95)
"+" CUT = 851.12 feet
Diff. = 2.35 feet (Bruce need diff in elev. only)

MW-4-3 = 884.15 feet (as surveyed on 3/16/95)
"+" CUT = 882.52 feet
Diff. = 1.63 feet (Bruce need diff. in elev. only)

MW-4-4 = 829.88 feet — Black mark

MW-2-2 = 864.34 feet — Black mark on top of tube
"+" CUT = 862.90 feet

M Kl-2-3 = 828.81 feet — Black mark on top of tube
"+" CUT = 827.20 feet

M Kl-2-4 = 829.70 feet — Black mark on top of tube
"+" CUT = 828.00 feet

MW-2-1 = 903.75 feet — Black mark on top of tube
Coordinate File Name: HARDING.CO

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<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
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<td>0.9999464 GRID FACTOR</td>
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SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD 27)
Table 1. Schofield Water-Level Data

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<tr>
<th>Permit Number</th>
<th>HLA Well Name</th>
<th>Date Measured</th>
<th>Time Measured</th>
<th>Top of Sounding Tube Elevation (ft)</th>
<th>Depth to Water (ft)</th>
<th>Vertical Displacement (ft)</th>
<th>Corrected Depth (ft)</th>
<th>Groundwater Elevation (ft)</th>
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<td>2901-13</td>
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Table 2. Location Coordinates of Wells Drilled at Schofield Barracks, Island of Oahu, Hawaii

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<tr>
<th>HLA Well No.</th>
<th>Hawaii State Well I.D. No.</th>
<th>Hawai'i State Plane (ft)</th>
<th>Top of Sounding Tube Elevation (ft)</th>
<th>UTM Coordinates (Meters)</th>
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</table>

NA = Not assigned yet by the DLNR.
3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

DEPTH (FT) ELEVATION (FT) *
30 872
200 683
463 420
473 410
475 408
599 284
613.14 271.01 (10/10/95) (ELEVATION OF GROUNDWATER)
649 234
659 224
712 171
720 163

*DATUM: MEAN SEA LEVEL

24" DIA. STEEL WELL MONUMENT

TOP OF SOUNDING TUBE EL. = 884.15 FT.

GROUND SURFACE EL. = 883 FT.

PEA GRAVEL

CEMENT MOUND

19" DIAMETER AUGERED HOLE 3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

18" DIAMETER STEEL SURFACE CASING

16" DIAMETER HOLE DRILLED WITH DOWNHOLE HAMMER

12" DIAMETER STEEL CONDUCTOR CASING

CEMENT BENTONITE INNER SEAL

6" DIAMETER STEEL BLANK CASING

10" DIAMETER HOLE DRILLED WITH DOWNHOLE HAMMER

CEMENT BENTONITE INNER SEAL

BENTONITE PELLETS

FINE SAND

1" PVC SOUNDING TUBE

SILICA SAND FILTER PACK (#4 STANDARD SIEVE SIZE)

6" DIA. STAINLESS STEEL WIRE-WRAP SCREEN

SAND

SLOUGH

(NOT TO SCALE)
DEPTH (FT)  ELEVATION (FT)*

475     408

613.14  271.01 (10/10/95) \( \downarrow \) (ELEVATION OF GROUNDWATER)

619     264

624     259

627     256

649     234

659     224

712     171

720     163

*DATUM: MEAN SEA LEVEL
(NOT TO SCALE)

Fine sand

1" DIA. SCH 80 PVC SOUNDING TUBE

2.0" DIA. STEEL DISCHARGE PIPE

JACKETED SUBMERSIBLE ELECTRICAL PUMP CABLE

STAINLESS STEEL SAFETY CABLE

TORQUE ARRESTOR

CHECK VALVE

STAINLESS STEEL ELECTRICAL CABLE WIRE GUARD

3.75" DIA. GRUNDFOS PUMP

PUMP INTAKE

3.75" DIA. FRANKLIN 7.5 HORSEPOWER ELECTRIC MOTOR

SILICA SAND FILTER PACK

6" DIA. STAINLESS STEEL WIRE-WRAP SCREEN

10" DIA. HOLE DRILLED WITH AIR ROTARY

SAND

SLough

Pump Installation Diagram for Monitoring Well 4-3
Harding Lawson Associates
Engineering and Environmental Services
Schofield Barracks
Island of Oahu, Hawaii
TOP OF CASING 882.96 ft

24-INCH-DIAMETER STEEL WELL MONUMENT

19-INCH-DIAM. HOLE DRILLED WITH AUGER (Surface to 11 feet)
Sample Depth (f) Sample Number
0-5 5 0 1
5-7.5 3 0 2
5-10 11 0 3
10-12.5 0 4
10-15 20 0 5

18-INCH-DIA. STEEL SURFACE CASING (Surface to 11 feet)

16-INCH-DIA. HOLE DRILLED WITH DOWNHOLE HAMMER (11 to 200 feet)
Sample Depth (f) Sample Number
15-20 10 0 6
20-25 9 0 6

12-INCH-DIA. STEEL CONDUCTOR CASING (11 to 200 feet)
Sample Depth (f) Sample Number
25-30 15 0 8
30-35 10 0 9
35-40 10 0 10
40-45 5 0 11
45-50 20 0 12
50-55 37 0 13
55-60 6

Elevation Date 12/09/93

Equipment
Air Rotary/Downhole Hammer
Gardner Denver 40-T

DARK BROWN ELASTIC SILT (MH) (7.5YR,3/2). stiff, moist, (residual soil).

Reddish brown (5YR,4/3) below 10 feet.
(Rock encountered at 11 feet. Driller unable to advance with 16-inch auger, switched to downhole hammer.)

PALE YELLOWISH BROWN BASALT (10YR,6/2),
hard, (silt and basalt intermixed) (set 16” x 11’ surface casing).
Medium light gray (N6) and medium dark gray
(N4), with silt pockets (silt and basalt intermixed).
Dark gray (N3), strong, below 15 feet.
Decreased drilling resistance from 17 to 20 feet.

Decreased drilling resistance from 25 to 30 feet.

DARK BROWN SANDY SILT (ML) (7.5YR,4/4),
stiff, moist, (residual soil).

Increased drilling resistance at 42 feet.

DARK GRAY (N3), MODERATE BROWN AND
LIGHT OLIVE GRAY (5Y,6/2) BASALT with
fractures filled with silt, moderately hard to hard, weak to moderately strong, and deeply
to moderately weathered.
(Driller notes fractured rock from 47 to 50 feet.

Low to moderately hard below 54 feet.

(Loss of drilling foam circulation at 60 feet.)
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min/ft)</th>
<th>Breaking Point Measurement (rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<tbody>
<tr>
<td>60-65</td>
<td>6</td>
<td>0</td>
<td>14</td>
<td>65</td>
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<tr>
<td>65-70</td>
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<td>70-75</td>
<td>53</td>
<td>03</td>
<td>16</td>
<td>75</td>
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<td>75-80</td>
<td>39</td>
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<td>90</td>
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<td>95-100</td>
<td>28</td>
<td>0</td>
<td>21</td>
<td>100</td>
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<tr>
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<td>115</td>
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<td>115-120</td>
<td>11</td>
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<td>25</td>
<td>120</td>
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<tr>
<td>120-125</td>
<td>55</td>
<td>0</td>
<td>26</td>
<td>125</td>
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</table>

(Driller notes increased drilling resistance at 67 feet.)
Dark brown below 65 feet.

Increased drilling resistance from 70 to 75 feet.

Olive gray (5Y.4/1) and grayish black (N2), slightly vesicular, with some fractures filled with dark red (10R,3/6) silt, below 75 feet.

Olive gray (5Y.4/1) with olivine crystals below 85 feet.

Driller notes increased drilling resistance at 97 feet.

Decreased drilling resistance at 100 feet.
(Drilling foam becomes brown, hammer firing intermittently, less foam return.)

Olive gray (5Y.4/1), dark gray (N2) and dark reddish brown (10R,3/4), fractures filled with reddish brown silt, below 105 feet.

Grayish red (10R.4/2) and light olive gray (5Y.6/1) with fractures filled with stiff silt, low hardness, deep to moderate weathering (possible clinker zone), below 120 feet.
Driller notes increased drilling resistance at 122 feet.
Brownish gray (5YR.4/1), medium dark gray (N4), moderate brown (5YR.4/4), fractures filled with silt, below 122.5 feet.

Log of Monitoring Well 4-3  (Sheet 2 of 12)  FIGURE

Harding Lawson Associates
Engineering and Environmental Services

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

DRAWN: kar  JOB NUMBER: 26129.05.05.12  APPROVED: BYU  FILE: STEPS  DATE: 3/94  REVISED DATE: 
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<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (ft/min)</th>
<th>Breaching Space Measurement (bpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<tbody>
<tr>
<td>125-130</td>
<td>35</td>
<td>130</td>
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</tr>
<tr>
<td>130-135</td>
<td>0</td>
<td>28</td>
<td>135</td>
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<td>135-140</td>
<td>44</td>
<td>0</td>
<td>29</td>
<td>140</td>
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<tr>
<td>140-145</td>
<td>48</td>
<td>0</td>
<td>30</td>
<td>145</td>
</tr>
<tr>
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<td>150-155</td>
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<td>165</td>
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<td>165-170</td>
<td>16</td>
<td>0</td>
<td>35</td>
<td>170</td>
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<td>170-175</td>
<td>22</td>
<td>0</td>
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<td>175</td>
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<td>180-185</td>
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<tr>
<td>185-190</td>
<td>18</td>
<td>0</td>
<td>39</td>
<td>190</td>
</tr>
</tbody>
</table>

Medium dark gray (N4) and dark reddish brown (10R.3/4), becoming deeply weathered, with fractured areas filled with silt, below 130 feet.

Strong, little weathered, below 145 feet.

Medium gray (N4) and dark gray (N3) below 150 feet.

Driller noted decreased drilling resistance from 153 to 158 feet. (Reddish brown silt in drilling foam.)

DARK GRAY (N3), MEDIUM GRAY (N4), AND DARK REDDISH BROWN (10R.3/4) BASALT, fractures filled with reddish brown (7.5YR.4/4) silt, low to moderate hardness, moderately strong to strong, deep to little weathering, moderately to highly vesicular. Decreased drilling resistance at 163 feet. Reddish brown (10R,3/4), dark gray (N3), and olive gray (5Y,4/1), becoming slightly vesicular, below 165 feet.

Moderately to highly vesicular below 170 feet.

(Drilled through cement grout at 173 feet using SS16 Speedstar drill rig.)

Moderate reddish brown (10R,4/6), dark reddish brown (10R,3/4), and grayish red (10R,4/2), below 175 feet.

Dark gray (5Y,4/1) and dark reddish brown (10R,3/4), with some fractures filled with
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (inch/ft)</th>
<th>Breaching Source Measurement (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>190-195</td>
<td>13</td>
<td>0</td>
<td>40</td>
<td>195</td>
<td>reddish brown silt (2.5YR.4/4), below 192 feet. Decreased drilling resistance from 190 to 198 feet.</td>
</tr>
<tr>
<td>195-200</td>
<td>14</td>
<td>0</td>
<td>41</td>
<td>200</td>
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<tr>
<td>200-205</td>
<td>0</td>
<td>42</td>
<td>205</td>
<td></td>
<td></td>
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<tr>
<td>205-210</td>
<td>21</td>
<td>-</td>
<td>210</td>
<td></td>
<td></td>
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<tr>
<td>210-215</td>
<td>30</td>
<td>-</td>
<td>215</td>
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<td>215-220</td>
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<td>0</td>
<td>43</td>
<td>220</td>
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<td>220-225</td>
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<td>44</td>
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<td>230-235</td>
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<td>46</td>
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<td>245-250</td>
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<td>0</td>
<td>48</td>
<td>250</td>
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<tr>
<td>250-255</td>
<td>11</td>
<td>0</td>
<td>49</td>
<td>255</td>
<td></td>
</tr>
</tbody>
</table>

- **10-INCH-DIA. HOLE DRILLED WITH DOWNHOLE HAMMER (200 to 720 feet)**
  - Decreased drilling resistance from 190 to 198 feet.
  - Dark gray below 205 feet. (Driller notes material from the borehole sides falling in on hammer). Increased drilling resistance at 207 feet. No sample cuttings from 206 to 210 feet.
  - No sample cuttings at 215 feet.

- **6-INCH-DIA. CARBON STEEL BLANK CASING**
  - Decreased drilling resistance from 220 to 223 feet, reddish brown silt cuttings.
  - Possible layer of cinders or clinker at 220 feet. Dark gray (5Y.6/1) and dark reddish brown (10R.3/4) below 223 feet.
  - Becoming reddish brown (2.5R.4/4), low to moderately hard, weak to moderately strong, moderately to deeply weathered, moderately to highly vesicular, some fractures filled with silt, below 223 feet.
  - Moderately hard to hard, moderately strong to strong, little to moderately weathered below 230 feet.
  - Dark gray (5Y.4/1) and dark reddish brown (10R.3/4) below 230 feet.

- **CEMENT-BENTONITE INNER SEAL (Surface to 720 feet)**
  - Less weathered and moderately vesicular below 250 feet.
  - Dark gray (5Y.4/1) below 250 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (m/min)</th>
<th>Breathing Space Measurement (rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>255-260</td>
<td>8</td>
<td>0</td>
<td>50</td>
<td>260</td>
<td>Decreased drilling resistance from 259 to 263 feet. Reddish brown silt cuttings. Dark gray (5Y.4/1) and dark reddish brown (10R.3/4), with fractures filled with silt, below 260 feet.</td>
</tr>
<tr>
<td>260-265</td>
<td>6</td>
<td>0</td>
<td>51</td>
<td>265</td>
<td>Decreased drilling resistance from 267 to 275 feet.</td>
</tr>
<tr>
<td>265-270</td>
<td>10</td>
<td>0</td>
<td>52</td>
<td>270</td>
<td>Highly vesicular below 270 feet.</td>
</tr>
<tr>
<td>270-275</td>
<td>3</td>
<td>0</td>
<td>53</td>
<td>275</td>
<td>(Driller notes void between 286 and 288.5 feet.) (Loss of drilling foam circulation.) No sample cuttings from 288.5 to 290 feet.</td>
</tr>
<tr>
<td>275-280</td>
<td>5</td>
<td>0</td>
<td>54</td>
<td>280</td>
<td>(Void is preventing drilling foam and cuttings from returning to the surface.) (Driller notes continued drilling resistance.) Increased drilling resistance from 296 to 297 feet.</td>
</tr>
<tr>
<td>280-285</td>
<td>6</td>
<td>0</td>
<td>55</td>
<td>285</td>
<td>No sample cuttings at 300 feet.</td>
</tr>
<tr>
<td>285-290</td>
<td>7</td>
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<td></td>
<td>290</td>
<td>Increased drilling resistance from 303 to 307 feet. No sample cuttings at 305 feet.</td>
</tr>
<tr>
<td>290-295</td>
<td>7</td>
<td>0</td>
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<td>295</td>
<td>Increased drilling resistance from 308 to 312 feet. No sample cuttings at 310 feet.</td>
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<tr>
<td>295-300</td>
<td>6</td>
<td>0</td>
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<td>300</td>
<td>Increased drilling resistance from 312.5 to 322 feet. No sample cuttings at 315 and 320 feet.</td>
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<tr>
<td>300-305</td>
<td>5</td>
<td>0</td>
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<td>305</td>
<td>Decreased drilling resistance between 322 and 336 feet.</td>
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<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (inch./min)</td>
<td>Breathing Space Measurement (gpm)</td>
<td>Sample Number</td>
<td>Depth (in.)</td>
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<td>320-325</td>
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<td>325</td>
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<td>325-330</td>
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<td>330-335</td>
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<td>340-345</td>
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<td></td>
<td></td>
<td></td>
<td>390</td>
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</table>

No sample cuttings from 325 to 335 feet.

Increased drilling resistance at 336 feet.

Slightly to moderately vesicular below 340 feet.

Decreased drilling resistance between 348 and 370 feet.

Low to moderately hard, (possible clinker layer), little foam return, below 350 feet. (Material caving on hammer.)

(No caving below 365 feet.)

Reddish gray (5YR.4/2), and reddish brown (10R.3/1). Moderately to highly vesicular below 356 feet. Increased drilling resistance at 370 feet. (Loss of foam circulation at 375 feet.)

Moderately hard to hard, and little to moderately weathered, below 375 feet. Decreased drilling resistance from 377 to 380 feet.

Olive gray (5Y,4/1), slightly vesicular, below 380 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (in./min)</th>
<th>Blending Speed (rpm)</th>
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<td>385-390</td>
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<td>0</td>
<td>63</td>
<td>390</td>
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<td>435-440</td>
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<td>440-445</td>
<td>12</td>
<td>0</td>
<td>74</td>
<td>445</td>
</tr>
<tr>
<td>445-450</td>
<td>8</td>
<td>0</td>
<td>75</td>
<td>450</td>
</tr>
</tbody>
</table>

**Equipment:**
Air Rotary/Downhole Hammer
Gardner Denver 40-T

**Elevation:**

**Date:** 12/09/93

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Olive grey (5Y.4/1), light reddish brown (5YR.5/4), and reddish yellow (5YR.7/6), moderately to deeply weathered, below 395 feet.
Decreased drilling resistance at 398 feet.

Dark reddish brown (10R.3/4) below 405 feet.

Olive grey (5Y.4/1), little weathered, and slightly vesicular, below 424 feet.
### Logging Data

#### Top of Casing
- **882.96 ft**

#### Equipment
- **Air Rotary/Downhole Hammer**
- **Gardner Denver 40-T**

#### Elevations and Dates
- **Elevation**
- **Date** 12/09/93

<table>
<thead>
<tr>
<th>Sample Depth (ft)</th>
<th>Drilling Rate (min./ft)</th>
<th>Sample Number</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>17</td>
<td>0 75</td>
<td>BENTONITE PELLETS</td>
</tr>
<tr>
<td>455-460</td>
<td>13</td>
<td>0 76</td>
<td>(463 to 473 feet)</td>
</tr>
<tr>
<td>460-465</td>
<td>9</td>
<td>0 77</td>
<td>FINE SAND</td>
</tr>
<tr>
<td>465-470</td>
<td>8</td>
<td>0 78</td>
<td>(473.5 to 475 feet)</td>
</tr>
<tr>
<td>470-475</td>
<td>11</td>
<td>0 79</td>
<td>COLORADO SILICA</td>
</tr>
<tr>
<td>475-480</td>
<td>16</td>
<td>0 80</td>
<td>SAND #6-9 FILTER PACK</td>
</tr>
<tr>
<td>480-485</td>
<td>9</td>
<td>0 81</td>
<td>(475 to 658.5 feet)</td>
</tr>
<tr>
<td>485-490</td>
<td>17</td>
<td>0 82</td>
<td>Little to moderately weathered below 505 feet.</td>
</tr>
<tr>
<td>490-495</td>
<td>10</td>
<td>0 83</td>
<td>Decreased drilling resistance at 497 feet.</td>
</tr>
<tr>
<td>495-500</td>
<td>10</td>
<td>0 84</td>
<td>Moderately to highly vesicular below 495 feet.</td>
</tr>
<tr>
<td>500-505</td>
<td>10</td>
<td>0 85</td>
<td>(Driller notes intermittent hard and soft layers between 500 and 505 feet.</td>
</tr>
<tr>
<td>505-510</td>
<td>10</td>
<td>0 86</td>
<td>Slightly vesicular below 485 feet.</td>
</tr>
<tr>
<td>510-515</td>
<td>7</td>
<td>0 87</td>
<td>515-520</td>
</tr>
</tbody>
</table>

---

**Harding Lawson Associates**
- **Log of Monitoring Well 4-3**
- **(Sheet 8 of 12)**
- **Schofield TEPS 5**
- **Schofield Barracks**
- **Island of Oahu, Hawaii**

**Drawn:** kar 26129.05.12  **Approved:** PWJ 3/94  **File:** STEPS  **Date:** 3/94
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min. 1/2 ft)</th>
<th>Breathing Space Measurement (gpm)</th>
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<th>Depth (ft)</th>
<th>Sample</th>
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<tr>
<td>515-520</td>
<td>7</td>
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<td></td>
<td>520</td>
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<tr>
<td>520-525</td>
<td>10</td>
<td></td>
<td></td>
<td>525</td>
<td></td>
</tr>
<tr>
<td>525-530</td>
<td>10</td>
<td></td>
<td></td>
<td>530</td>
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<td>530-535</td>
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<td>535</td>
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<tr>
<td>535-540</td>
<td>8</td>
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<td>540</td>
<td></td>
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<tr>
<td>540-545</td>
<td>9</td>
<td></td>
<td></td>
<td>545</td>
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<td>545-550</td>
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<td>550-555</td>
<td>9</td>
<td>92</td>
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<td>555-560</td>
<td>9</td>
<td>93</td>
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</tr>
<tr>
<td>560-565</td>
<td>9</td>
<td>94</td>
<td></td>
<td>565</td>
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</tr>
<tr>
<td>565-570</td>
<td>8</td>
<td>95</td>
<td></td>
<td>570</td>
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</tr>
<tr>
<td>570-575</td>
<td>9</td>
<td></td>
<td></td>
<td>575</td>
<td></td>
</tr>
<tr>
<td>575-580</td>
<td>9</td>
<td>96</td>
<td></td>
<td>580</td>
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</table>

**Equipment:** Air Rotary/Downhole Hammer
**Gardner Denver 40-T**

**Elevation**

**Date:** 12/09/93

**LOG of Monitoring Well 4-3**

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**Drawing Number:** 26129.05.05.12

**Date Approved:** 3/94
TOP OF CASING 882.96 ft

<table>
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<th>Sample Interval (feet)</th>
<th>Drilling Rate (inch/3 feet)</th>
<th>Borehole Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<td>580-585</td>
<td>9</td>
<td>0</td>
<td>97</td>
<td>585</td>
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<tr>
<td>585-590</td>
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<td>605-610</td>
<td>17</td>
<td>0</td>
<td>102</td>
<td>610</td>
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<td>610-615</td>
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<td>615-620</td>
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<td>104</td>
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<td>620-625</td>
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<td>105</td>
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<td>625-630</td>
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<td>630</td>
</tr>
<tr>
<td>630-635</td>
<td></td>
<td>0</td>
<td>107</td>
<td>635</td>
</tr>
<tr>
<td>635-640</td>
<td></td>
<td>0</td>
<td>108</td>
<td>640</td>
</tr>
<tr>
<td>640-645</td>
<td></td>
<td>0</td>
<td>109</td>
<td>645</td>
</tr>
</tbody>
</table>

- Dark red (2.5YR,3/6) and very dark gray (2.5YR,N/3) below 585 feet.
- Decreased drilling resistance between 603 and 605 feet.
- Water table measured 2/28/94 at a depth of 610.49 feet. (Possible fractured zone at 610 feet.)
- Decreased drilling resistance from 617 to 619 feet.
- Dusky red (5YR,3/4) and grayish brown (5YR,3/2) below 630 feet.
- Dark reddish brown (10R,3/4) and brownish gray (5YR,4/1) below 640 feet. Decreased drilling resistance from 642 to 644 feet.
- Decreased drilling resistance from 648 to 650 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./30 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Sample Depth (ft)</th>
<th>Equipment</th>
<th>Elevation</th>
<th>Date</th>
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<tbody>
<tr>
<td>645-650</td>
<td>15</td>
<td>0</td>
<td>650</td>
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<td></td>
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<td>665-670</td>
<td>15</td>
<td>0</td>
<td>670</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>680-685</td>
<td>20</td>
<td>0</td>
<td>685</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>690-695</td>
<td>10</td>
<td>0</td>
<td>690</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>695-700</td>
<td>15</td>
<td>0</td>
<td>700</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>700-705</td>
<td>15</td>
<td>0</td>
<td>705</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>705-710</td>
<td>12</td>
<td>0</td>
<td>710</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>715</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decreased drilling resistance at 656 feet.

Material caving on hammer. Possible clinker or fractured zone from 660 to 675 feet.

Increased drilling resistance at 675 feet.

Dark reddish brown (10R.3/4) and blackish red (5R.2/2) below 675 feet.

Dark gray (N3), dark reddish brown (10R.3/4) below 690 feet.

Decreased drilling resistance from 690 to 691.5 feet.

Decreased drilling resistance at 703 feet.

Dark gray (N3), dark reddish brown (10R.3/4), and moderate yellowish brown (10R.5/4) below 705 feet.

Increased drilling resistance at 711 feet.

Brownish black (5YR.2/1), moderately vesicular, below 713 feet.
### Log of Monitoring Well 4-3

#### (Sheet 12 of 12)

<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min/5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOUGH 710-715</td>
<td>70</td>
<td>0</td>
<td>122</td>
<td>715</td>
<td></td>
</tr>
<tr>
<td>715-720</td>
<td>65</td>
<td>0</td>
<td>123</td>
<td>720</td>
<td></td>
</tr>
</tbody>
</table>

**Total depth = 720 feet.**

Water table was measured at 610.49 feet below top of casing, 2/28/94.
**WELL COMPLETION REPORT**

**PART I. WELL CONSTRUCTION REPORT**

1. State Well No.: 3004-03  
   Well Name: MW4-3  
   Island: OAHU

2. Location/Address: Schofield Barracks  
   Tax Map Key: 7-7-01

### Drilling Company: Soil Sampling Service, Inc.

### Name of driller who performed work: Pete Christiansen

### Type of rig/construction: Air Rotary / Downhole Hammer

### Date(s) Well Construction and pump tests (if any) completed: 12/9/93

### Ground Elevation (referenced to mean sea level, msl): 883 ft.

#### Well Bench Mark (description/location): Top of sounding tube

#### Elevation (msl): 884.15 ft.

### Ground Elevation (referenced to mean sea level, msl): 12/9/93

#### Grouted from 0 ft. below ground to 473 ft. below ground

#### Gravel packed from 473 ft. below ground to 720 ft. below ground

### Initial water level: 613.14 ft. below ground

### Initial chloride: NA ppm

### Initial temperature: NA °F

### Pumping Tests: Reference Point (R.P.) used: NA

#### Which elevation is: 649 ft.

#### (1) Step-Drawdown Test Date (2) Long-term Aquifer Test Date

#### Start water level: ft. below R.P.

#### End water level: ft. below R.P.

### Aquifer Pump Test Procedures data & graphs (1/9/96 LTAT Form) attached? Yes No

### As-built drawings attached? Yes No

### Other remarks/comments: (On back of this form)

---

**Well Drilling Contractor (print) C-57 Lic. No.**

Signature  
Date

**Surveyor (print) Lic. No.**

Signature  
Date

**Applicant (print) Signature**

Signature  
Date
20. Pump Installation Company: **Soil Sampling Service, Inc.**

21. Name of person performing work: **Paul Montgomery**

22. Date Pump Installation Completed: 

23. **PUMP INSTALLATION:**
   - Pump Type, Make, Serial No.: **3.75" Grundfos pump**
   - Motor type, H.P., Voltage, rpm: **Electric, 7.5 hp**
   - Depth of Pump Intake Setting: 624 ft. below __________, which elevation is __________ ft.
   - Depth to bottom of airline: **NA** ft. below __________, which elevation is __________ ft.
   - Pumping Head is 613 ft. Type of flow meter: **NA** which measures in ________

24. As-built drawings attached attached? **X** Yes _ No

25. Other remarks/comments: (See below)

<table>
<thead>
<tr>
<th>Pump Installation Contractor (print)</th>
<th>C-57 Lic. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Applicant (print)</td>
<td></td>
</tr>
<tr>
<td>Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>

8.(cont’d) **DRILLER’S LOG (cont’d):**

<table>
<thead>
<tr>
<th>Water Level Dates (ft.)</th>
<th>Rock Description, Remarks, Water Level Dates (ft.)</th>
<th>Rock Description, Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
<td>__________</td>
</tr>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
<td>__________</td>
</tr>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
<td>__________</td>
</tr>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
<td>__________</td>
</tr>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
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</tr>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
<td>__________</td>
</tr>
<tr>
<td>__________ to __________</td>
<td>____ to</td>
<td>__________</td>
</tr>
</tbody>
</table>

19. & 25. Remarks: 

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
## Log of Monitoring Well 4-3

**Sheets:** 1 of 12

**Figure:**

**Drawn:** Harding Lawson Associates

**Job Number:** 2612.05.05.05

**Approved:** STEPS

**Date:** 4/95

### Sample Interval (feet) | Drilling Rate (min./5 feet) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft)
--- | --- | --- | --- | ---
0-5 | 5 | 0 | 1 | 0
5-7.5 | 3 | 0 | 2 | 5
5-10 | 11 | 0 | 3 | 10
10-12.5 | 0 | 0 | 4 | 15
10-15 | 20 | 0 | 5 | 20
15-20 | 10 | 0 | 6 | 25
20-25 | 9 | 0 | 6 | 30
25-30 | 15 | 0 | 8 | 35
30-35 | 10 | 0 | 9 | 40
35-40 | 10 | 0 | 10 | 45
40-45 | 5 | 0 | 11 | 50
45-50 | 20 | 0 | 12 | 55
50-55 | 37 | 0 | 13 | 60
55-60 | 6 | 0 | | 65

### Description:

- **DARK BROWN ELASTIC SILT (MH) (7.5YR,3/2), stiff, moist, (saprolite).**
  - Reddish brown (5YR,4/3) below 10 feet. (Rock encountered at 11 feet. Driller unable to advance with 16-inch auger, switched to downhole hammer.)

- **PALE YELLOWISH BROWN BASALT (10YR,6/2), hard, (boulders) (set 16" x 11" surface casing).**
  - Medium light gray (N6) and medium dark gray (N4), with silt pockets (silt and basalt intermixed).
  - Dark gray (N3), strong below 15 feet. Decreased drilling resistance from 17 to 20 feet.
  - Decreased drilling resistance from 25 to 30 feet.
  - Dark BROWN SANDY SILT (ML) (7.5YR,4/4), stiff, moist, (saprolite).

- **DARK GRAY (N3), MODERATE BROWN AND LIGHT OLIVE GRAY (5Y,6/2) BASALT,** moderately hard to hard, weak to moderately strong, and moderately to deeply weathered, with fractures filled with silt. (Driller notes fractured rock from 47 to 50 feet.)

- **Increased drilling resistance at 42 feet.**

- **DARK GRAY (N3), MODERATE BROWN AND LIGHT OLIVE GRAY (5Y,8/2) BASALT,** moderately hard to hard, weak to moderately strong, and moderately to deeply weathered, with fractures filled with silt. (Driller notes fractured rock from 47 to 50 feet.)

- **Increased drilling resistance at 42 feet.**

- **DARK GRAY (N3), MODERATE BROWN AND LIGHT OLIVE GRAY (5Y,8/2) BASALT,** moderately hard to hard, weak to moderately strong, and moderately to deeply weathered, with fractures filled with silt. (Driller notes fractured rock from 47 to 50 feet.)

- **Low to moderately hard below 54 feet.**

- **(Loss of drilling foam circulation at 60 feet.)**
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Notes</th>
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<tbody>
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<td>55</td>
<td>0</td>
<td>26</td>
<td>125</td>
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</tr>
</tbody>
</table>

(Driller notes increased drilling resistance at 67 feet.)
Dark brown below 65 feet.

Increased drilling resistance from 70 to 75 feet.

Olive gray (5Y,4/1) and grayish black (N2), slightly vesicular, with some fractures filled with dark red (10R,3/6) silt below 75 feet.

Olive gray (5Y,4/1) with olivine crystals below 85 feet.

Driller notes increased drilling resistance at 97 feet.

Decreased drilling resistance at 100 feet. (Drilling foam becomes brown, hammer firing intermittently, less foam return.)

Olive gray (5Y,4/1), dark gray (N2) and dark reddish brown (10R,3/4), fractures filled with reddish brown silt below 105 feet.

Grayish red (10R,4/2) and light olive gray (5Y,6/1) with fractures filled with stiff silt, low hardness, deep to moderate weathering (possible clinker zone) below 120 feet.
Driller notes increased drilling resistance at 122 feet.
Brownish gray (5YR,4/1), medium dark gray (N4), moderate brown (5YR,4/4), fractures filled with silt below 122.5 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./3 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
</tr>
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<tbody>
<tr>
<td>125-130</td>
<td>35</td>
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<td>145-150</td>
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<tr>
<td>185-190</td>
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</table>

Medium dark gray (N4) and dark reddish brown (10R,3/4), becoming deeply weathered, with fractured areas filled with silt below 130 feet.

Strong, little weathered, below 145 feet.

Medium gray (N4) and dark gray (N3) below 150 feet.

Driller notes decreased drilling resistance from 153 to 158 feet. (Reddish brown silt in drilling foam return.)

DARK GRAY (N3), MEDIUM GRAY (N4), AND DARK REDDISH BROWN (10R,3/4) BASALT, fractures filled with reddish brown (7.5YR,4/4) silt, low to moderate hardness, moderately strong to strong, deep to little weathering, moderately to highly vesicular. Decreased drilling resistance at 163 feet. Reddish brown (10R,3/4), dark gray (N3), and olive gray (5Y,4/1), becoming slightly vesicular below 165 feet.

Moderate to highly vesicular below 170 feet. (Drilled through cement grout at 173 feet using SS16 Speedstar drill rig.)

Moderate reddish brown (10R,4/6), dark reddish brown (10R,3/4), and grayish red (10R,4/2) below 175 feet.

Dark gray (5Y,4/1) and dark reddish brown (10R,3/4), with some fractures filled with reddish brown silt (2.5YR,4/4) below 192 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>190-195</td>
<td>13</td>
<td>0</td>
<td>40</td>
<td>195</td>
<td>Decreased drilling resistance from 190 to 198 feet.</td>
</tr>
<tr>
<td>195-200</td>
<td>14</td>
<td>0</td>
<td>41</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>200-205</td>
<td>0</td>
<td>42</td>
<td>205</td>
<td></td>
<td>Dark gray below 205 feet. (Driller notes material from the borehole sides falling in on hammer). Increased drilling resistance at 207 feet. No sample cuttings from 206 to 210 feet.</td>
</tr>
<tr>
<td>205-210</td>
<td>21</td>
<td>-</td>
<td>210</td>
<td></td>
<td>No sample cuttings at 215 feet.</td>
</tr>
<tr>
<td>210-215</td>
<td>30</td>
<td>-</td>
<td>215</td>
<td></td>
<td>Decreased drilling resistance from 220 to 223 feet, reddish brown silt cuttings. Possible layer of cinders or clinker at 220 feet. Dark gray (5Y,6/1) and dark reddish brown (10R,3/4) below 223 feet. Becoming reddish brown (2.5R,4/4), low to moderately hard, weak to moderately strong, moderately to deeply weathered, moderately to highly vesicular, some fractures filled with silt below 223 feet. Moderately hard to hard, moderately strong to strong, little to moderately weathered below 230 feet. Dark gray (5Y,4/1) and dark reddish brown (10R,3/4) below 230 feet.</td>
</tr>
<tr>
<td>215-220</td>
<td>30</td>
<td>0</td>
<td>220</td>
<td></td>
<td></td>
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<td>220-225</td>
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<td>230-235</td>
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<td>235</td>
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<td>235-240</td>
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</tr>
<tr>
<td>245-250</td>
<td>9</td>
<td>0</td>
<td>250</td>
<td></td>
<td>Less weathered and moderately vesicular below 250 feet.</td>
</tr>
<tr>
<td>250-255</td>
<td>11</td>
<td>0</td>
<td>255</td>
<td></td>
<td>Dark gray (5Y,4/1) below 250 feet.</td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (min./5 feet)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Sample Elevation (Ground)</td>
<td>Depth (ft)</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
<td>--------------</td>
<td>---------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>255-260</td>
<td>8</td>
<td>0</td>
<td>50</td>
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</tr>
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<td>260-265</td>
<td>6</td>
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<td>51</td>
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<td>265-270</td>
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<td>52</td>
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<tr>
<td>285-290</td>
<td>7</td>
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</tr>
<tr>
<td>290-295</td>
<td>7</td>
<td>0</td>
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<td>295</td>
</tr>
<tr>
<td>295-300</td>
<td>6</td>
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<td>300-305</td>
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<tr>
<td>305-310</td>
<td>7</td>
<td>-</td>
<td></td>
<td></td>
<td>310</td>
</tr>
<tr>
<td>310-315</td>
<td>9</td>
<td>0</td>
<td></td>
<td></td>
<td>315</td>
</tr>
<tr>
<td>315-320</td>
<td>11</td>
<td>0</td>
<td></td>
<td></td>
<td>320</td>
</tr>
</tbody>
</table>

- Decreased drilling resistance from 259 to 263 feet. Reddish brown silt cuttings.
- Dark gray (5Y.4/1) and dark reddish brown (10R.3/4), with fractures filled with silt below 260 feet.
- Decreased drilling resistance from 267 to 275 feet.
- Highly vesicular below 270 feet.
- (Driller notes void between 286 and 288.5 feet.) (Loss of drilling foam circulation.)
- No sample cuttings from 288.5 to 290 feet.
- (Void is preventing drilling foam and cuttings from returning to the surface.)
- (Driller notes continued drilling resistance.)
- Increased drilling resistance from 296 to 297 feet.
- No sample cuttings at 300 feet.
- Increased drilling resistance from 303 to 307 feet.
- No sample cuttings at 305 feet.
- Increased drilling resistance from 308 to 312 feet.
- No sample cuttings at 310 feet.
- Increased drilling resistance from 312.5 to 322 feet.
- No sample cuttings at 315 and 320 feet.
- Decreased drilling resistance between 322 and 336 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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</thead>
<tbody>
<tr>
<td>320-325</td>
<td>8</td>
<td>0</td>
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<td>325-330</td>
<td>3</td>
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</tr>
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<td>330-335</td>
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<td>340-345</td>
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<td>56</td>
<td>350</td>
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<td></td>
<td>360</td>
</tr>
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<td></td>
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<td>360-365</td>
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<td>0</td>
<td>59</td>
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</tr>
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<td>365-370</td>
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<td>0</td>
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<td>370-375</td>
<td>8</td>
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<td>375-380</td>
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<td>380-385</td>
<td>13</td>
<td>0</td>
<td>62</td>
<td>385</td>
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<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>385-390</td>
<td></td>
<td></td>
<td></td>
<td>390</td>
</tr>
</tbody>
</table>

No sample cuttings from 325 to 335 feet.

Increased drilling resistance at 336 feet.

Slightly to moderately vesicular below 340 feet.

Decreased drilling resistance between 348 and 370 feet.

Low to moderately hard, (possible clinker layer), little foam return below 350 feet. (Material caving on hammer.)

(No caving below 365 feet.)

Reddish gray (5YR,4/2), and reddish brown (10R,3/8). Moderately to highly vesicular below 356 feet. Increased drilling resistance at 370 feet.

(Loss of foam circulation at 375 feet.) Moderately hard to hard, and little to moderately weathered below 375 feet. Decreased drilling resistance from 377 to 380 feet.

Olive gray (5Y,4/1), slightly vesicular below 380 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./3 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>385-390</td>
<td>8</td>
<td>0</td>
<td>63</td>
<td>390</td>
</tr>
<tr>
<td>390-395</td>
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<td>395-400</td>
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<td>400-405</td>
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<td>405</td>
</tr>
<tr>
<td>405-410</td>
<td>8</td>
<td>0</td>
<td>67</td>
<td>410</td>
</tr>
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<td>410-415</td>
<td>9</td>
<td>0</td>
<td>68</td>
<td>415</td>
</tr>
<tr>
<td>415-420</td>
<td>6</td>
<td>0</td>
<td>69</td>
<td>420</td>
</tr>
<tr>
<td>420-425</td>
<td>7</td>
<td>0</td>
<td>70</td>
<td>425</td>
</tr>
<tr>
<td>425-430</td>
<td>7</td>
<td>0</td>
<td>71</td>
<td>430</td>
</tr>
<tr>
<td>430-435</td>
<td>9</td>
<td>0</td>
<td>72</td>
<td>435</td>
</tr>
<tr>
<td>435-440</td>
<td>12</td>
<td>0</td>
<td>73</td>
<td>440</td>
</tr>
<tr>
<td>440-445</td>
<td>12</td>
<td>0</td>
<td>74</td>
<td>445</td>
</tr>
<tr>
<td>445-450</td>
<td>8</td>
<td>0</td>
<td>75</td>
<td>450</td>
</tr>
</tbody>
</table>

Olive gray (5Y4/1), light reddish brown (5YR5/4), and reddish yellow (5YR7/6), moderately to deeply weathered below 395 feet. Decreased drilling resistance at 398 feet.

Dark reddish brown (10R3/4) below 405 feet.

Olive gray (5Y4/1), little weathered, and slightly vesicular below 424 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
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<td>0</td>
<td>75</td>
<td>455</td>
<td></td>
</tr>
<tr>
<td>455-460</td>
<td>13</td>
<td>0</td>
<td>76</td>
<td>460</td>
<td></td>
</tr>
<tr>
<td>460-465</td>
<td>9</td>
<td>0</td>
<td>77</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td>465-470</td>
<td>8</td>
<td>0</td>
<td>78</td>
<td>470</td>
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</tr>
<tr>
<td>470-475</td>
<td>11</td>
<td>0</td>
<td></td>
<td>475</td>
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</tr>
<tr>
<td>475-480</td>
<td>16</td>
<td>0</td>
<td>70</td>
<td>480</td>
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<td>480-485</td>
<td>9</td>
<td>0</td>
<td>80</td>
<td>485</td>
<td></td>
</tr>
<tr>
<td>485-490</td>
<td>17</td>
<td>0</td>
<td>81</td>
<td>490</td>
<td></td>
</tr>
<tr>
<td>490-495</td>
<td>10</td>
<td>0</td>
<td>81</td>
<td>495</td>
<td></td>
</tr>
<tr>
<td>495-500</td>
<td>10</td>
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</tr>
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<td>500-505</td>
<td>10</td>
<td>0</td>
<td>83</td>
<td>505</td>
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</tr>
<tr>
<td>505-510</td>
<td>10</td>
<td>0</td>
<td>84</td>
<td>510</td>
<td></td>
</tr>
<tr>
<td>510-515</td>
<td>7</td>
<td>-</td>
<td>85</td>
<td>515</td>
<td></td>
</tr>
</tbody>
</table>

(Loss of drilling foam circulation at 474 feet.)

(Possible fractured zone at 477 feet). Olive gray (5YR, 4/1), and dark reddish brown (10R, 3/4), highly vesicular below 478 feet.

Slightly vesicular below 485 feet.

Moderately to highly vesicular below 485 feet. Decreased drilling resistance at 497 feet.

(Driller notes intermittent hard and soft layers between 500 and 505 feet.)

Little to moderately weathered below 505 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<tbody>
<tr>
<td>515-520</td>
<td>7</td>
<td>0</td>
<td>86</td>
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<td>520-525</td>
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<td>525-530</td>
<td>10</td>
<td>0</td>
<td>88</td>
<td>530</td>
</tr>
<tr>
<td>530-535</td>
<td>8</td>
<td>-</td>
<td>89</td>
<td>535</td>
</tr>
<tr>
<td>535-540</td>
<td>8</td>
<td>-</td>
<td>-</td>
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<td>540-545</td>
<td>9</td>
<td>-</td>
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<td>-</td>
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</tr>
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<td>550-555</td>
<td>9</td>
<td>0</td>
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<td>570-575</td>
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<tr>
<td>575-580</td>
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Equipment:
- Air Rotary by Gardner Denver 40-T
- Equipment: Speedstar SS16

(Air Rotary by Gardner Denver 40-T)  
(Ground)  
Elevation: -883 ft  
Date: 12/09/93
<table>
<thead>
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<th>Depth (ft)</th>
<th>Elevation</th>
<th>Sample Note</th>
</tr>
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<tbody>
<tr>
<td>580-585</td>
<td>9</td>
<td>0</td>
<td>97</td>
<td>585</td>
<td></td>
<td>Dark red (2.5YR,3/6) and very dark gray (2.5YR,N/3) below 585 feet.</td>
</tr>
<tr>
<td>585-590</td>
<td>9</td>
<td>0</td>
<td>98</td>
<td>590</td>
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<td></td>
</tr>
<tr>
<td>590-595</td>
<td>10</td>
<td>0</td>
<td>99</td>
<td>595</td>
<td></td>
<td>Decreased drilling resistance between 603 and 605 feet.</td>
</tr>
<tr>
<td>595-600</td>
<td>12</td>
<td>0</td>
<td>100</td>
<td>600</td>
<td></td>
<td>Water table measured on 2/28/94 at a depth of 610.49 feet below top of casing. (Possible fractured zone at 610 feet.)</td>
</tr>
<tr>
<td>600-605</td>
<td>11</td>
<td>0</td>
<td>101</td>
<td>605</td>
<td></td>
<td>Decreased drilling resistance from 617 to 619 feet.</td>
</tr>
<tr>
<td>605-610</td>
<td>17</td>
<td>0</td>
<td>102</td>
<td>610</td>
<td></td>
<td>Dusky red (5YR,3/4) and grayish brown (5YR,3/2) below 630 feet.</td>
</tr>
<tr>
<td>610-615</td>
<td>13</td>
<td>0</td>
<td>103</td>
<td>615</td>
<td></td>
<td>Dark reddish brown (10R,3/4) and brownish gray (5YR,4/1) below 640 feet. Decreased drilling resistance from 642 to 644 feet.</td>
</tr>
<tr>
<td>615-620</td>
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<td>0</td>
<td>104</td>
<td>620</td>
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<td>Decreased drilling resistance from 648 to 650 feet.</td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (min./5 feet)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
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</table>

**Equipment**

| Air Rotary by Gardner Denver 40-T Air Rotary by Speedstar SS16 |

**Ground Elevation**

-883 ft Date 12/09/93

**Sample Interval**

645-650 15

Decreased drilling resistance at 656 feet.

650-655 14

(Material caving on hammer. Possible clinker or fractured zone from 660 to 675 feet.)

655-660 -

Increased drilling resistance at 675 feet.

660-665 15

Dark reddish brown (10R,3/4) and blackish red (5R,2/2) below 675 feet.

665-670 15

670-675 15

Dark gray (N3) and dark reddish brown (10R,3/4) below 690 feet.

675-680 10

Decreased drilling resistance from 690 to 691.5 feet.

680-685 20

685-690 15

Dark gray (N3), dark reddish brown (10R,3/4), and moderate yellowish brown (10R,5/4) below 705 feet.

690-695 10

700-705 15

Decreased drilling resistance at 703 feet.

705-710 12

Increased drilling resistance at 711 feet.

Brownish black (5YR,2/1), moderately vesicular below 713 feet.

**Log of Monitoring Well 4-3**

(Sheet 11 of 12)
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (mils./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Elevation (Ground)</th>
<th>Equipment</th>
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<td>Rotary by Ordner Denver 40-T Air Rotary by Speedstar SS16</td>
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Total depth = 720 feet.
Water table was measured at 610.49 feet below top of casing, 2/28/94.

---

Harding Lawson Associates
Engineering and Environmental Services
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

Log of Monitoring Well 4-3 (Sheet 12 of 12)

FIGURE

<table>
<thead>
<tr>
<th>DRAWN</th>
<th>JOB NUMBER</th>
<th>APPROVED</th>
<th>FILE</th>
<th>DATE</th>
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<td>26129.05.05.12</td>
<td></td>
<td>STEPS</td>
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</table>
24" DIA. STEEL MOUND WELL MONUMENT

TOP OF SOUNDING TUBE EL. = 884.15 FT.

GROUND SURFACE EL. = 883 FT.

3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT MOUND

19" DIAMETER AUGERED HOLE

3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

18" DIAMETER STEEL SURFACE CASING

16" DIAMETER HOLE DRILLED WITH DOWNHOLE HAMMER

12" DIAMETER STEEL CONDUCTOR CASING

CEMENT BENTONITE INNER SEAL

6" DIAMETER STEEL BLANK CASING

10" DIAMETER HOLE DRILLED WITH DOWNHOLE HAMMER

CEMENT BENTONITE INNER SEAL

BENTONITE PELLETS

FINE SAND

1" PVC SOUNDING TUBE

SILICA SAND FILTER PACK (#4 STANDARD SIEVE SIZE)

6" DIA. STAINLESS STEEL WIRE-WRAP SCREEN

SAND

SLough

(NOT TO SCALE)

*DATUM: MEAN SEA LEVEL

Monitoring Well 4-3
Schofield Barracks
Island of Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

DRAWN JOB NUMBER APPROVED FILE DATE REVISED DATE
jcl 28339.09.02.12

FIGURE

9/95
DEPTH (FT)  ELEVATION (FT)*

475    408

613.14  271.01 (10/10/95)\(\frac{\text{ELEVATION OF GROUNDWATER}}{\text{ELEVATION OF GROUNDWATER}}\)

619    264

1" DIA. SCH 80 PVC SOUNDING TUBE

2.0" DIA. STEEL DISCHARGE PIPE

JACKETED SUBMERSIBLE ELECTRICAL PUMP CABLE

STAINLESS STEEL SAFETY CABLE

TORQUE ARRESTOR

CHECK VALVE

STAINLESS STEEL ELECTRICAL CABLE WIRE GUARD

3.75" DIA. GRUNDFOS PUMP

PUMP INTAKE

3.75" DIA. FRANKLIN 7.5 HORSEPOWER ELECTRIC MOTOR

SILICA SAND FILTER PACK

6" DIA. STAINLESS STEEL WIRE-WRAP SCREEN

10" DIA. HOLE DRILLED WITH AIR ROTARY

SAND

SLough

*DATUM: MEAN SEA LEVEL

(NOT TO SCALE)
Monitoring Well 4-3
Well Head and Well Cover Detail
Schofield Barracks
Island of Oahu, Hawaii
WELL CONSTRUCTION PERMIT

for

Schofield Monitor Well 4-3
Well No. 3004-03
Wahiawa, Oahu

TO: U.S. Army, Directorate of Facilities Engineering
Building 300, Wheeler Army Airfield
Wahiawa, HI 96786

In accordance with Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to construct a monitor well (Well No. 3004-03) at Schofield Army Barracks, TMK: 7-7-01, is approved, subject to the following conditions:

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

2. The well shall be used for ground water quality monitoring, sampling, and testing only.

3. The following shall be submitted to the Commission within 30 days after completion of the well:
   a. Well Completion Report
   b. As-built sectional drawing of the well
   c. Plot plan and map showing the exact location of the well
   d. Periodic reports of monitoring and testing results

4. The applicant shall comply with all applicable laws, rules, and ordinances.
5. This permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.

6. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

KEITH W. AHUE, Chairperson
Commission on Water Resource Management

JUN 30 1993
Date of Issuance

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

Applicant’s Signature: ____________________________ Date: ________________

Printed Name: ________________________________

Firm or Title: ________________________________

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

Enc. (Well Completion Report form)

c: USGS
Department of Health
Safe Drinking Water Branch
Ground Water Protection Program
Solid and Hazardous Waste Branch
Honolulu Board of Water Supply
Roscoe Moss Company
To: Department of Land and Natural Resources  
P.O. Box 373  
Honolulu, Hawaii 96809  
Attention: Mr. Keith W. Ahue

From: Frank Carlos  
Date: June 7, 1993  
Subject: Well Construction Permit  
Job No.: 22504.05.05.12

Remarks:

Transmitted herewith are:

1. Application for Well Construction of Monitoring Well 4-3;
2. Map depicting the location of the well; and
3. Check Number 001885 in the amount of $25.00.

FC/kt: 3093ML

Enclosures
June 7, 1993
Department of Land & Natural Resources $25.00
Well construction permit
Project No. 22504.05.05.12

***Twenty Five and 00/100***

PAY TO THE ORDER OF
Dept. of Land & Natural Resources
P.O. Box 373
Honolulu, Hawaii 96809

HARRING - LAWSON ASSOCIATES
CONSULTING ENGINEERS
803 KAMEHAMEHA HWY., RM. 404 808-455-6551
PEARL CITY, HAWAII 96782

HARDING - LAWSON ASSOCIATES
CONSULTING ENGINEERS
803 KAMEHAMEHA HWY., RM. 404 808-455-6551
PEARL CITY, HAWAII 96782

***$25.00***
APPLICATION FOR

WELL CONSTRUCTION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Division of Water and Land Development, P.O. Box 373, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-7442, Hydrology/Geology Section for assistance.

1. WELL LOCATION

   Island Oahu   Tax Map Key 7-7-01
   Address Schofield Army Barracks

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

2. WELL OWNER

   Firm Name US Army
   Contact Person Col. Charles Wilson
   Address Engineering
       Bldg 300, Wheeler Army Airfield
       Wahiawa, Hawaii 96786
   Phone (808) 656-2878

3. PROPOSED CONTRACTOR FOR: □ Well Drilling □ Pump Installation

   Name Roscoe Moss Hawaii, Inc.
   Address 91-259A Ola'i Street
   Phone (808) 682-5856

4. PROPOSED WORK

   □ Drill New Well □ Deepen
   □ Alter □ Seal
   □ Install New Pump □ Replace Pump □ Redrill
   □ Abandon □ Modify Pump

   (Briefly describe the proposed work and fill in the diagram on the back of this form.)

5. PROPOSED USE

   □ Municipal (including hotels, stores, etc.) □ Military
   □ Domestic (individual, noncommercial water systems) □ Industrial
   □ Irrigation (specify) □ Other (specify) monitoring

6. PROPOSED AMOUNT OF WITHDRAWAL

   0 gallons per day

   Well is for monitoring use only - pumping rate of 30 gpm planned for sample pump.

7. PROPOSED PUMP INFORMATION

   Pump Type: □ Vertical Turbine □ Submersible □ Centrifugal
   Motor: □ Diesel □ Gas □ Electric: Rated Horsepower
   Rated Pump Capacity gallons per minute (gpm)

   Well Owner (print) Col. Charles Wilson
   Signature Date June 4, 1993

   Landowner (print) Col. Charles Wilson
   Signature Date June 4, 1993

   For Official Use Only:

   Field Checked By Latitude Hydrologic Unit State Well No. 3004-03
   Date Longitude Mnr Wdl 4-3
Briefly describe the proposed work:

PROPOSED SECTION OF WELL

Elevation at top of casing _____ ft., msl

Ground Elev. _____ ft., msl*

Cement Grout _____ ft.

Solid Casing:
Material
Length __________ ft.
Diameter __________ in.
Wall thickness __________ in.

Hole Dia. __________ in.

Casing: / /Perforated / /Screen
Material
Length __________ ft.
Diameter __________ in.
Wall thickness __________ in.
Openings __________ sq. in./L.F.

Total Depth _____ ft.

Rock Packing _____ ft.

Open Hole:
Length __________
Diameter __________ in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
Figure 7.6
GENERALIZED CONSTRUCTION FOR OPERABLE UNIT 1 MONITORING WELL
In response to your letter dated November 1, 1996, enclosed are the completed application and/or well completion reports for the following wells.

- Well No. 2901-13 (MW1-1)
- Well No. 3004-02 (MW4-2)
- Well No. 3004-03 (MW4-3)
- Well No. 2802-01 (MW2-6)

With regard to Well MW4-2, there is only one well by that name and is assigned the state Well No. 3004-02. The misunderstanding may have occurred when we filed the Well Completion Report for Well MW4-2. Initially, we had planned to drill a well in the location designated on the enclosed figure by Well No. 2900-01, thus we submitted a permit application. However, we decided to move the well location to its present location, designated by Well No. 3004-02. When we submitted the Well Completion Report for Well MW4-2, we inadvertently used the wrong state Well No. designation and did not notify you that a well was not drilled in the Well No. 2900-1 location. We also had surveying errors at the beginning of the project, thus, you may notice that the well elevations somewhat differ.

Since, there is no well at the Well No. 2900-01 location, we are not submitting a pump installation permit application.

If you have any questions, please feel free to call.
WELL COMPLETION REPORT
(Check Appropriate Box)  □ Well Construction □ (Permanent) Pump Installation

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

1. State Well No.: 3004-02  Well Name: MW4-2  Island: OAHU
2. Location/Address: Schofield Barracks  Tax Map Key: 7-7-01 cn

PART I. WELL CONSTRUCTION REPORT

3. Drilling Company: Roscoe Moss Hawaii, Inc.
4. Name of driller who performed work: 
5. Type of rig/construction: Air Rotary
6. Date(s) Well Construction and pump tests (if any) completed: 6/5/93
7. GROUND ELEVATION (referenced to mean sea level, msl): 945 ft.
   Well Bench Mark (description/location): Top of sounding tube  Elevation (msl): 947.11 ft.
8. DRILLER’S LOG: Please attach geologic log (if available or if required by permit)
   Depths (ft.)  Rock Description, Water Level, Dates, etc.  Depths (ft.)  Rock Description, Water Level, Dates, etc.
   to  See attached  to 
   to  See attached  to 
   (If more space is needed, continue on back)
9. Total depth of well below ground: 781 ft.
10. Hole size: 16 inch dia. from 0 ft. to 200 ft. below ground
     10 inch dia. from 200 ft. to 830 ft. below ground
    
11. Casing installed: 6 in. I.D. x in. wall solid section to 661 ft. below ground
    6 in. I.D. x in. wall perforated section to 711 ft. below ground
   Casing Material/Slot Size: Carbon steel blank casing; stainless steel screw
    
12. Annulus: Grouted from 0 ft. below ground to 638 ft. below ground
    Gravel packed from 638 ft. below ground to 830 ft. below ground

13. Initial water level: 677.25 ft. below ground.  Date and time of measurement: 10/10/95
14. Initial chloride: NA ppm  Date and time of sampling: 
15. Initial temperature: NA °F  Date and time of measurement: 
16. PUMPING TESTS: Reference Point (R.P.) used:  NA, which elevation is  ft.
    (1) Step-Drawdown Test Date  
    Start water level  ft. below R.P.  End water level  ft. below R.P.
    (2) Long-term Aquifer Test Date  
    Start water level  ft. below R.P.  End water level  ft. below R.P.
17. Aquifer Pump Test Procedures data & graphs (1/9/96 LTAT Form) attached?  Yes  No
18. As-built drawings attached?  X Yes  No
19. Other remarks/comments: (On back of this form)

Well Drilling Contractor (print)  Tracy Runnels  C-57 Lic. No. C-16437
Signature  Date  1/18/97

Surveyor (print)  Russell Figueria  Lic. No. 4729 - Hawaii
Signature  Date  1/8-91

Applicant (print)  Col Dennis T. Fontana
Signature  Date  1/14-97
Mr. Jon Fukuda  
U.S. Army  
DPW, ATTN: APVG-GVW, U.S. Army Garrison  
Schofield Barracks, HI 96857-5000

Dear Mr. Fukuda:

Well Construction / Pump Installation Permit Application  
Well No. 2901-13

We have received your well construction / pump installation permit application and filing fee for the MW1-1 Well (Well No. 2901-13). However, your application is incomplete.

We are returning the original well construction/pump installation permit application to you (attached). Please complete all highlighted areas on the application and return the completed application to our office. A copy of your application has been made for our record.

Other matters which must be addressed before we accept your application as complete are as follows:

1. Please complete all highlighted areas on the original well completion reports for the following wells (originals attached; copies have been made for our record):
   a. Well No. 2901-13
   b. Well No. 3004-02
   c. Well No. 3004-03
   d. Well No. 2802-01

With regard to MW4-2, our records indicate that there are two (2) wells named MW4-2; one is assigned Well No. 2900-01 and the other is assigned Well No. 3004-02 (see attached map, permit applications, permits, and well completion reports for the two wells). Please confirm if there are two existing wells named MW4-2.
Also, note that the well completion report - Part II for Well No. 2900-01 shows a permanent pump installation. We request that you submit an after-the-fact application for the permanent pump installation in Well No. 2900-01. We have attached a blank application form for your use.

You are correct in that Well No. 3004-03 refers to MW4-3 instead of MW4-4; we apologize for this typographical error in our letter of April 11, 1996. We also confirm that Well No. 2900-02 refers to MW2-1, as indicated on the table in your letter of October 14, 1996.

Upon receipt of the above information we will accept your application as complete and you can then expect your application to be processed within ninety (90) days.

If you have any questions about your permit application, please contact Lenore Nakama of the Commission staff at 587-0218. Thank you for your continued assistance and cooperation in matters related to water resources.

Sincerely,

[Signature]

RAE M. LOUI
Deputy Director

LN:fc

Enclosure
Ms. Lenore Nakama
State of Hawaii, Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Schofield Army Barracks RI/FS Well Information
Permit Applications and Completion Reports
Schofield Barracks, Hawaii

Dear Ms. Nakama:

As discussed during our telephone conversation on August 27, 1996, we have enclosed a copy of a USGS topographic map showing the locations of 12 monitoring wells installed for this project. The monitoring wells are identified on the map by their Army identification numbers. When we received your letter dated April 11, 1996, there seemed to be some confusion over which state well identification numbers were assigned to which of our monitoring wells. Your letter indicated that Wells 4-2 and 4-4 were assigned state well identification numbers 3-2900-01 and 3-3004-03, respectively. The actual geographic location of Well 4-2 does not correspond to well identification number 3-2900-01. Based on our records, the state well identification numbers should be assigned as follows:

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<tr>
<td>4-4</td>
<td>3-3004-04</td>
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</tbody>
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We hope this table and the map will help clear up the confusion regarding the well numbers and locations.

As requested in your April 11, 1996 letter, we have enclosed the following information:

1. Well 1-1 (State Well ID No. 3-2901-13)
   a. After-the-fact application for a well construction/pump installation permit
   b. Well completion report
October 14, 1996
28335.06.01.12
0225AR
Ms. Lenore Nakama
State of Hawaii, DLNR
Page 2

2. Well 4-2 (State Well ID No. 3-3004-02)
   a. Well completion report
   b. Well completion diagram

Although 12 monitoring wells were installed over the lifetime of the project, only 11 are functioning with submersible pumps. There were problems during the installation of Well 4-2. The cable used to pull the pump out of the well broke. After numerous unsuccessful attempts to retrieve the pump, the pump was abandoned and is not functional. Thereafter, Well 4-2 was used only to measure groundwater levels. Thus, a pump installation report and diagram were never included in the original permit application. Because Well 4-2 could not be used as a monitoring well, a new well was drilled within 15 feet of the old well. We gave the new well the name 4-2A, and this may have led to additional confusion.

Your April 11 letter also requested information on State Wells 3-2900-01 and 3-3004-03. From our records, State Well 3-3004-03 refers to Well 4-3 instead of 4-4, as listed in your letter. But we are uncertain which wells are referred to by State Wells 3-2900-01 and 3-2900-02. At one time, we did propose to install a monitoring well in a part of the East Range, but that idea was rejected. It is possible, perhaps, that someone such as the drilling company may have submitted a permit application in advance. If that is the case, that particular permit should be withdrawn, as that well was never drilled. Because of the confusion, we have enclosed copies of the well completion reports for both Wells 4-3 and 4-4.

In addition, we have enclosed survey data for all the wells, and the well completion report for Well 2-6 with supporting boring log and well completion diagram information.

We hope that this information will help clarify the confusion between the two well identification systems. I will be available to discuss these wells with you personally if you so desire. If you have any questions, please feel free to call.

Sincerely yours,

HARDING LAWSON ASSOCIATES

Bruce S. Wedgeworth
Associate Geologist

Enclosures

cc: Mr. Jon Fukuda / U.S. Army, Department of Public Works
July 16, 1996

Harding Lawson Associates
235 Pearridge Center, Phase I
98-1005 Moanalua Road
Aiea, Hawaii 96701

Attn: Mr. Bruce S. Wedgeworth

Subject: FIELD LOCATION OF MW 2-6
At Wheeler Army Airfield
Oahu, Hawaii

Northing Easting Elevation Latitude Longitude
MW 2-6 111702.132 484685.053 691.57° 21°28'27.04" 158°02'42.147" (Top of Sounding Tube)
BM#1 689.50
BM#2 689.55
BM#3 689.46

Coordinates referred to Hawaii State Plane Coordinate System - Zone 3
Elevation Datum = Mean Sea Level (MSL)
ELEVATION OF MONITORING WELLS AS SURVEYED ON 7/15/95 (WITH BRUCE & MARK OF HARDING AND LAWSON)

MW-4-2A = 946.87 feet — Black mark on top of tube
MW-4-2 = 947.11 feet — Black mark on top of tube
"+" cut near casing of MW-4-2A = 945.91 feet

MW-4-1 = 853.47 feet (as surveyed on 3/16/95)
"+" cut = 851.12 feet
Diff. = 2.35 feet (Bruce need diff. in elev. only)

MW-4-3 = 884.15 feet (as surveyed on 3/16/95)
"+" cut = 882.52 feet
Diff. = 1.63 feet (Bruce need diff. in elev. only)

MW-4-4 = 829.88 feet — Black mark

MW-2-2 = 864.34 feet — Black mark on top of tube
"+" cut = 862.90 feet

MK-2-3 = 828.81 feet — Black mark on top of tube
"+" cut = 827.20 feet

MW-2-4 = 829.70 feet — Black mark on top of tube
"+" cut = 828.00 feet

MW-2-1 = 903.75 feet — Black mark on top of tube
## COORDINATE MANAGER

Wednesday January 10, 1996 12:54 PM

Coordinate File Name: HARDING.CO

Job #: 1 0

Description:

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<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
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SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD 27)

0.9999900 SCALE FACTOR
0.9999464 GRID FACTOR
## WELL COMPLETION REPORT

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

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

1. State Well No.: 3004-02  
   Well Name: MW4-2  
   Island: OAHU

2. Location/Address: Schofield Barracks  
   Tax Map Key: 7-7-01

### PART I. WELL CONSTRUCTION REPORT

3. Drilling Company: ________________________________

4. Name of driller who performed work: ________________________________

5. Type of rig/construction: Air Rotary

6. Date(s) Well Construction and pump tests (if any) completed: 6/5/93

7. GROUND ELEVATION (referenced to mean sea level, msl): 945 ft.  
   Well Bench Mark (description/location): Top of sounding tube  
   Elevation (msl): 947.11 ft.

8. DRILLER’S LOG: Please attach geologic log (if available or if required by permit)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Rock Description, Water Level, Dates, etc.</th>
<th>Depth (ft.)</th>
<th>Rock Description, Water Level, Dates, etc.</th>
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</thead>
<tbody>
<tr>
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<td>See attached</td>
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</tr>
</tbody>
</table>

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

9. Total depth of well below ground: 720 ft.

10. Hole size:  
    - 18 inch dia. from 0 ft. to 200 ft. below ground  
    - 6 inch dia. from 200 ft. to 845 ft. below ground  
    - 6 inch dia. from 845 ft. below ground

11. Casing installed:  
    - 6 in. I.D. x in. wall solid section to 661 ft. below ground  
    - 6 in. I.D. x in. wall perforated section to 711 ft. below ground  
   Casing Material/Slot Size: Carbon steel blank casing; stainless steel screw 0.06"

12. Annulus:  
    - Grouted from 0 ft. below ground to 638 ft. below ground  
    - Gravel packed from 638 ft. below ground to 845 ft. below ground

13. Initial water level: 677.25 ft. below ground.  
   Date and time of measurement: 10/10/95

14. Initial chloride: NA ppm  
   Date and time of sampling: ________________________________

15. Initial temperature: NA °F  
   Date and time of measurement: ________________________________

16. PUMPING TESTS: Reference Point (R.P.) used: NA ft., which elevation is __________ ft.  
    (1) Step-Drawdown Test Date ________________________________  
    Start water level _________ ft. below R.P.  
    End water level _________ ft. below R.P.
    (2) Long-term Aquifer Test Date ________________________________  
    Start water level _________ ft. below R.P.  
    End water level _________ ft. below R.P.

17. Aquifer Pump Test Procedures data & graphs (1/9/96 LTAT Form) attached? Yes No

18. As-built drawings attached? Yes No

19. Other remarks/comments: ________________________________

(On back of this form)

Well Drilling Contractor (print) ________________________________  
C-57 Lic. No. ________________________________  
Signature ________________________________  
Date ________________________________

Surveyor (print) ________________________________  
Lic. No. ________________________________  
Signature ________________________________  
Date ________________________________

Applicant (print) ________________________________  
Signature ________________________________  
Date ________________________________
PART II.  (PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company: ________________________________
21. Name of person performing work: ________________________________
22. Date Pump Installation Completed: ________________________________
23. PUMP INSTALLATION:
   Pump Type, Make, Serial No.: ________________________________ Capacity: ______ gpm
   Motor type, H.P., Voltage, rpm: ________________________________
   Depth of Pump Intake Setting ______ ft. below ______, which elevation is ________ ft.
   Depth to bottom of airline ______ ft. below ______, which elevation is ________ ft.
   Pumping Head is ______ ft. Type of flow meter: _____________ which measures in ______
24. As-built drawings attached? _ Yes _ No
25. Other remarks/comments: (See below)

Pump Installation Contractor (print) ____________________________ C-57 Lic. No. ____________
Signature ____________________________ Date ____________________________
Applicant (print) ____________________________
Signature ____________________________ Date ____________________________

8.(cont'd) DRILLER'S LOG (cont'd):

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<th>Water Level Dates (ft.)</th>
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19. & 25. Remarks:

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<td>0</td>
<td>14</td>
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<td></td>
<td>15</td>
</tr>
<tr>
<td>60-65</td>
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<td>0</td>
<td>16</td>
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</table>

**Depth (ft)**

- **WEAK RED ELASTIC SILT (MH) (2.5YR,4/2),** stiff, moist, with sand, decomposed basalt gravel, and organics (residual soil).
- Dark reddish brown (2.5YR,3/4) below 5 feet.
- **BASALT COBBLE from 13.5 to 14.5 feet.**
- **BROWN ELASTIC SILT (MH) (5YR,4/4),** stiff to very stiff, moist (residual soil).
- **BASALT COBBLE from 17 to 18 feet.**
- **YELLOWISH RED ELASTIC SILT (MH) (5YR,4/6),** very stiff, moist (residual soil).
- (Driller switched to air rotary at 22 feet. Set 18" x 20' surface casing.)
- Increased drilling resistance from 24 to 28 feet.
- (Drilling foam color change to grayish brown at 50 feet.)
- **VERY DARK GRAY (5YR,3/1) AND WEAK RED (2.5YR,4/6) BASALT, moderately hard, moderately strong, little to moderately weathered.**
- **DARK REDDISH BROWN SILT (ML),** hard, moist (saprolite).
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<tbody>
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<td>125-130</td>
<td>7</td>
<td>0</td>
<td></td>
<td>130</td>
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(Loss of drilling foam circulation at 75 feet.)
Very stiff, with basalt fragments below 75 feet.
Increased drilling resistance at 78 feet.

Yellowish brown (10YR,5/4) with reddish brown and dark gray basalt fragments below 85 feet.

DARK GRAYISH BROWN (2.5Y,4/2), DARK REDDISH BROWN (5YR,3/4) AND LIGHT YELLOWISH BROWN BASALT, low hardness to moderately hard, weak, deeply weathered, moderately to highly vesicular, with inclusions of stiff silt.

YELLOWISH BROWN Silt with decomposed basalt (ML) (10YR,5/4), hard, moist (saprolite).

Increased drilling resistance at 115 feet.
LIGHT OLIVE GRAY (5Y,5/2), LIGHT BROWN (5YR,5/6) AND MODERATE BROWN (5YR,4/4) BASALT, moderately hard to hard, moderately strong to strong, moderately to deeply weathered.

Increased drilling resistance at 123 feet.
RED Silt (ML) from 125 to 130 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
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<td>-</td>
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<td>135-140</td>
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</tr>
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<td>140-145</td>
<td>12</td>
<td>0</td>
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</table>

**Equipment**

Air Rotary by Gardner Denver 40-T

**Elevation**

- 945 ft Date 06/05/93

**Log of Monitoring Well 4-2**

Schofield Barracks

Island of Oahu, Hawaii

**Harding Lawson Associates**

Engineering and Environmental Services

**Figure**

Approved File

Steps 4/95
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
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<tbody>
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<td>43</td>
<td>205</td>
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<td>45</td>
<td>215</td>
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<td>49</td>
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<td>52</td>
<td>260</td>
<td>Sample</td>
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</table>

Seams of silt below 195 feet.

Moderately hard, little to moderately weathered below 200 feet.

Grayish black (N2) and medium dark gray (N4) below 210 feet.

Decreased drilling resistance at 219 feet.

(Loss of drilling foam circulation between 222 and 225 feet. Possible cinder/gravel or highly-fractured zone.)

DARK GRAY (N3), MEDIUM GRAY (N4) AND MODERATE BROWN (5YR,3/4) BASALT, moderately hard, moderately strong, little to moderately weathered, (some cinder or gravel fragments).

(Loss of drilling foam circulation between 225 and 240 feet.)

(Driller notes some material collapsing over hammer.)

Low hardness to moderately hard below 238 feet.

(Return of drilling foam circulation at 240 feet.)

Medium gray (N5), moderate brown, and moderate reddish brown (10R,4/6) below 235 feet. Low hardness to moderately hard, weak to moderately strong, moderately to deeply weathered, with seams and pockets of silt and sand.

Olive gray (5Y,4/1) and grayish red basalt fragments below 240 feet. Highly vesicular. Increased drilling resistance at 243 feet. Moderately vesicular, with olivine crystals below 250 feet.

Increased drilling resistance at 252 feet. Olive gray (5Y,4/1), greyish red (10R,4/2), and light olive brown (5Y,5/6) below 255 feet. Highly vesicular.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./3 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample Elevation (Ground)</th>
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<tbody>
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Brownish gray (5YR,4/1), light brown (5YR,5/6), moderate yellowish brown (10YR,5/4), and medium dark gray (N4) below 270 feet. Moderately hard to hard, moderately strong to strong, and little to moderately weathered.

Decreased drilling resistance from 285 to 290 feet.

Dark gray (N4) and moderate reddish brown (10R,4/6) below 290 feet.

Decreased drilling resistance from 303 to 307 feet. (Possible fractured zone.)

Increased drilling resistance at 311 feet. Dark gray (N3), moderate reddish brown (10R,4/6), and dark yellowish brown (10YR,4/2) below 310 feet. Hard, strong, little weathered, massive to slightly vesicular. Slightly to moderately vesicular below 315 feet.

(Loss of drilling foam circulation and decreased drilling resistance between 320 and 325 feet.)

Moderately hard to hard, moderately to highly.

Harding Lawson Associates
Engineering and
Environmental Services

Log of Monitoring Well 4-2 (Sheet 5 of 13)
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
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<th>Sample</th>
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<td>380-385</td>
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<td>385-390</td>
<td>8</td>
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</tbody>
</table>

Vesicular below 320 feet.

Decreased drilling resistance from 340 to 345 feet.

Dark gray (N3) with some moderate reddish brown (10R,4/6) below 360 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>390-395</td>
<td>8</td>
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<td>79</td>
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<td>395-400</td>
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<td>400-405</td>
<td>12</td>
<td>0</td>
<td>81</td>
<td>405</td>
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<td>405-410</td>
<td>8</td>
<td>0</td>
<td>82</td>
<td>410</td>
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<td>410-415</td>
<td>9</td>
<td>0</td>
<td>83</td>
<td>415</td>
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<tr>
<td>415-420</td>
<td>6</td>
<td>0</td>
<td>84</td>
<td>420</td>
</tr>
<tr>
<td>420-425</td>
<td>6</td>
<td>0</td>
<td>86</td>
<td>425</td>
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<tr>
<td>425-430</td>
<td>7</td>
<td>0</td>
<td>87</td>
<td>430</td>
</tr>
<tr>
<td>430-435</td>
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<td>435-440</td>
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<td>440-445</td>
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<td>445-450</td>
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<td>91</td>
<td>450</td>
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<tr>
<td>450-455</td>
<td>9</td>
<td>0</td>
<td>-</td>
<td>455</td>
</tr>
</tbody>
</table>

Olive black (5Y,2/1), massive to slightly vesicular below 400 feet.

Olive black (5Y,2/1) and brownish black (5YR,2/1) below 405 feet.

Decreased drilling resistance (possibly cinders or clinker) between 415 and 420 feet.
Brownish black (5YR,2/1) and blackish red (5R,2/2) with moderate reddish brown (10R,4/1), moderately vesicular below 415 feet.
Blackish red (5R,2/2) and grayish red (5R,4/2) below 420 feet.

Dark reddish brown (10R,3/4) and blackish red (5R,2/2) below 425 feet.

Increased drilling resistance at 429 feet.
Reddish brown (10R,3/4) and very dusky red (10R,2/2) below 430 feet.

Vesicles show iron-oxide staining below 435 feet.

Blackish red (5R,2/2) and brownish black (5YR,2/1) below 440 feet.

Decreased drilling resistance from 445 to 450 feet.
Dark reddish brown (10R,3/4) and brownish black (5YR,2/1), moderately strong, slightly vesicular below 445 feet.
Brownish black (5YR,2/1) and moderate reddish brown (10R,4/6), moderately vesicular below 450 feet.
### Log of Monitoring Well 4-2 (Sheet 8 of 13)

**Equipment**
- Air Rotary by Gardner Denver 40-T

**Ground Elevation**
- ~945 ft

**Date**
- 06/05/93

<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./3 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
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<td>460-465</td>
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<td>465-470</td>
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<td>470-475</td>
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<td>475-480</td>
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<td>480-485</td>
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<td>485-490</td>
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<td>490-495</td>
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<td>495-500</td>
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<td>500-505</td>
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<td>505-510</td>
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<tr>
<td>515-520</td>
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<td>104</td>
</tr>
</tbody>
</table>

**Depths (ft)**
- 455
- 460
- 465
- 470
- 475
- 480
- 485
- 490
- 495
- 500
- 505
- 510
- 515
- 520

**Description**
- Highly vesicular below 450 feet.
- Brownish black (5YR,2/1) and dark reddish brown (10R,3/4) below 465 feet. Decreased drilling resistance from 467 to 471 feet.
- Moderately vesicular below 470 feet.
- Brownish black (5YR,2/1) and dusky red (5R,3/4) below 480 feet.
- Very dusky red (10R,2/2) and grayish black (N2) below 490 feet.
- Brownish black (5YR,2/1) and very dusky red (10R,2/2), slightly vesicular below 495 feet.
- Decreased drilling resistance from 500 to 505 feet.
- Brownish black (5YR,2/1), fresh, massive to slightly vesicular below 505 feet.
- Brownish black (5YR,2/1) and very dusky red (10R,2/2) below 510 feet.
- Decreased drilling resistance (possibly cinders or clinker) between 515 and 517 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<tbody>
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<td>540-545</td>
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<td>580-585</td>
<td>8</td>
<td>-</td>
<td>117</td>
<td>585</td>
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</table>

Blackish red (5R,2/2), moderately weathered, very vesicular below 515 feet. Vesicles show iron-oxide staining.

Blackish red (5R,2/2) and dusky red (5R,3/4), slightly vesicular below 520 feet.

Dark reddish brown (10R,3/4) and very dusky red (10R,2/2), moderately vesicular below 525 feet.

Slightly vesicular below 530 feet.

Decreased drilling resistance from 534 to 537 feet.

Loss of drilling foam circulation from 570 to 605 feet, hard drilling (possible boulders, void, or highly fractured zone) from 584 to 572 feet.

Increased drilling resistance at 572 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breaching Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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</thead>
<tbody>
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<td>590-595</td>
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<td>-</td>
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<td>590-595</td>
</tr>
<tr>
<td>595-600</td>
<td>9</td>
<td>-</td>
<td></td>
<td>595-600</td>
</tr>
<tr>
<td>600-605</td>
<td>10</td>
<td>-</td>
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<td>7</td>
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<td>605-610</td>
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<td>610-615</td>
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</table>

**Equipment**
- Air Rotary by Gardner Denver 40-T
- Drilling Rate: ~945 ft
- Date: 06/05/93

**Log of Monitoring Well 4-2**

- Sample Number: 114, 115, 116, 117, 118, 119, 120
- Breaching Space Measurement: ppm

**Notes**
- Very dusky red (10R,2/2) and moderate reddish brown (10R,4/6) below 600 feet.
- Return of drilling foam circulation at 605 feet.
- Dark gray (N3) and dark reddish brown (10R,3/4) below 615 feet.
- Increased drilling resistance at 629 feet.
- Decreased drilling resistance from 630 to 635 feet.
- Loss of drilling foam circulation from 640 to 645 feet. Fractured zone from 645 to 650 feet.
- Loss of drilling foam circulation at 649 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (f)</th>
<th>Sample Elevation (Ground)</th>
<th>Date</th>
<th>Date</th>
<th>Sample Elevation (Ground)</th>
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<tbody>
<tr>
<td>650-655</td>
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<td>650-655</td>
<td>Increased drilling resistance from 650 to 653 feet.</td>
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<tr>
<td>655-660</td>
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<td>0</td>
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<td>655-660</td>
<td>(Return of drilling foam circulation at 660 feet.)</td>
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</tr>
<tr>
<td>660-665</td>
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<td>121</td>
<td>660-665</td>
<td>Moderately vesicular below 660 feet.</td>
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<tr>
<td>665-670</td>
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<td>665-670</td>
<td>(Loss of drilling foam circulation at 668 feet.)</td>
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<td>670-675</td>
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<td>670-675</td>
<td>Decreased drilling resistance (possible fractured zone) from 670 to 675 feet.</td>
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<td>675-680</td>
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<td>675-680</td>
<td>Water table measured on 6/8/93 at 674 feet below ground surface.</td>
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<tr>
<td>680-685</td>
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<td>680-685</td>
<td>Increased drilling resistance at 675 feet.</td>
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</tr>
<tr>
<td>685-690</td>
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<td>0</td>
<td></td>
<td>685-690</td>
<td>(Return of drilling foam circulation between 700 and 702 feet.)</td>
<td></td>
<td></td>
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<tr>
<td>690-695</td>
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<td></td>
<td>690-695</td>
<td>(Loss of drilling foam circulation between 702 and 705 feet.)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>695-700</td>
<td>6</td>
<td>0</td>
<td></td>
<td>695-700</td>
<td>Brown/black (5YR,2/1) and dark reddish brown (10R,3/4) below 700 feet.</td>
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</tr>
<tr>
<td>700-705</td>
<td>7</td>
<td>0</td>
<td>122</td>
<td>700-705</td>
<td>Very dusky red (10R,2/2), moderate reddish brown (10R,4/6), dark yellowish orange (10R,6/6), and brownish grey (5Y,4/1) below 710 feet.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>705-710</td>
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<td>0</td>
<td>123</td>
<td>705-710</td>
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<td>710-715</td>
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<td>124</td>
<td>715</td>
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</table>

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-2 (Sheet 11 of 13)
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

DRAWN: kar
JOB NUMBER: 26129.05.05.12
APPROVED: STEPS
FILE: STEPS
DATE: 4/95
REVISED DATE: 4/95
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Equipment Ground Elevation</th>
<th>Date</th>
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<tbody>
<tr>
<td>715-720</td>
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<td>Air Rotary by Gardner Denver 40-T</td>
<td>-945 ft</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>06/05/93</td>
</tr>
<tr>
<td>(Loss of drilling foam circulation at 720 feet.)</td>
<td>Grayish red (10R,4/2) and moderate reddish brown below 720 feet. (Return of drilling foam circulation at 725 feet.)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>720-725</td>
<td>11</td>
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<td></td>
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<tr>
<td>(Grayish red (10R,4/2), olive black (5Y,2/1), and moderate yellowish brown (10YR,5/4), moderately strong to strong, moderately to highly vesicular below 725 feet.)</td>
<td></td>
<td></td>
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<td>725-730</td>
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<td>127</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Olive black (8Y,2/1), grayish red (10R,4/2), and dark reddish brown (10R,3/4) below 730 feet.)</td>
<td></td>
<td></td>
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<tr>
<td>730-735</td>
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<td>0</td>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Brownish black (5YR,2/1), brownish gray (5YR,4/1), moderate reddish brown (10R,4/6), and grayish red (10R,4/2), strong below 735 feet.)</td>
<td></td>
<td></td>
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<tr>
<td>735-740</td>
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<td>129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Viscosity of drilling foam return decreased at 741 feet.)</td>
<td>Brownish black (5YR,2/1), and dark reddish brown (10R,3/4), moderately vesicular below 740 feet. (Decreased drilling resistance from 745 to 750 feet.)</td>
<td></td>
<td></td>
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<tr>
<td>740-745</td>
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<td>0</td>
<td>130</td>
<td></td>
<td></td>
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<tr>
<td>Dark gray (N3), very dusky red (10R,2/2), and moderate reddish brown (10R,4/6) below 750 feet.</td>
<td></td>
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<td>745-750</td>
<td>6</td>
<td>0</td>
<td>131</td>
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<td></td>
</tr>
<tr>
<td>Increased drilling resistance at 762 feet. Grayish black (N2), olive gray (5Y,4/1), dark reddish brown (10R,3/4), and moderate yellowish brown (10YR,4/2), hard, moderately to highly vesicular below 760 feet. Decreased drilling resistance from 765 to 770 feet. Dark gray (N3), moderate yellowish brown (10YR,4/2), and dark reddish brown (10R,3/4) below 765 feet. Some calcite (?) noted in sample from below 770 feet. Highly vesicular below 775 feet.</td>
<td></td>
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Grayish brown (5YR,3/2), brownish black (5YR,2/1), and dark reddish brown (10R,3/4), moderately to highly vesicular below 780 feet.

Olive black (5Y,2/1), and dark reddish brown (10R,3/4) below 790 feet.

Decreased drilling resistance from 793 to 795 feet.

Dark gray (N3), moderately vesicular below 800 feet.

Dark gray (N3) and dark reddish brown (10R,3/4), slightly vesicular below 810 feet.

Decreased drilling resistance (possible void) from 816 to 817 feet.

Slightly to moderately vesicular below 825 feet.

Total depth = 830 feet.
Water table was measured at 674 feet below ground surface, 6/8/93, 10:20 am.
Monitoring Well 4-2

Schofield Barracks
Island of Oahu, Hawaii

3.5" Diameter Steel Picket Filled with Cement

Depth (ft) | Elevation (ft)
--- | ---
200 | 745

622 | 323
638 | 307
617 | 298
661 | 284

677.25 (Elevation of Groundwater) 271.40 (10/10/95)

691 | 254
711 | 234
724 | 221
3\frac{1}{2} | 130

18" Diameter Hole Drilled with Air Rotary

12" Diameter Steel Surface Casing

Cement Bentonite Inner Seal

6" Diameter Carbon Steel Blank Casing

10" Diameter Hole Drilled with Air Rotary

Cement Bentonite Inner Seal

Bentonite Pellets

Fine Sand

1" PVC Sounder Tube

Silica Sand Filter Pack (#4 Standard Sieve Size)

6" Dia. Stainless Steel Louvered Screen (0.060" Slot Size)

Sand

(Datum: Mean Sea Level)

(Not to Scale)
### Log of Monitoring Well 4-2

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (feet/minute)</th>
<th>Breaching Space Measurement (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<td>0</td>
<td></td>
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<tr>
<td>0-5</td>
<td>12</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>WEAK RED ELASTIC SILT (MH) (2.5YR.4/2), moist, with sand, decomposed basalt gravel, and organics. Dusky red and stiff from 0 to 5 feet.</td>
</tr>
<tr>
<td>5-10</td>
<td>23</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>Dark reddish brown (2.5YR.3/4) below 5 feet.</td>
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<tr>
<td>10-15</td>
<td>44</td>
<td>0</td>
<td>4</td>
<td>15</td>
<td>BASALT COBBLE from 13.5 to 14.5 feet.</td>
</tr>
<tr>
<td>15-20</td>
<td>50</td>
<td>-</td>
<td>5</td>
<td>20</td>
<td>BROWN ELASTIC SILT (MH) (5YR.4/4), stiff to very stiff, moist. BASALT COBBLE from 17 to 18 feet.</td>
</tr>
<tr>
<td>20-25</td>
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<td>25</td>
<td>YELLOWISH RED ELASTIC SILT (MH) (5YR.4/6), very stiff, moist. (Driller switched to air rotary at 22 feet. Set 18&quot; x 20' surface casing.)</td>
</tr>
<tr>
<td>25-30</td>
<td>13</td>
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<td>7/8</td>
<td>30</td>
<td>Increased drilling resistance from 24 to 28 feet (probably basalt cobbles and boulders).</td>
</tr>
<tr>
<td>30-35</td>
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<td>YELLOWISH BROWN ELASTIC SILT (MH) (5YR.5/6), stiff to very stiff, moist.</td>
</tr>
<tr>
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<td>Increase drilling resistance at 47 feet.</td>
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<td>11</td>
<td>45</td>
<td>(Drilling foam color change to grayish brown at 50 feet.)</td>
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<tr>
<td>45-50</td>
<td>-</td>
<td>12/13</td>
<td></td>
<td>50</td>
<td>VERY DARK GRAY (5YR.3/1) AND WEAK RED (2.5YR.4/6) BASALT, moderately hard, moderately strong, little to moderately weathered.</td>
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<td>50-55</td>
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<td>DARK REDDISH BROWN SILT (ML), hard, moist.</td>
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**Harding Lawson Associates**  
Engineering and Environmental Services

Schofield TEPS 5  
Schofield Barracks  
Island of Oahu, Hawaii

**DRAWN**  
kar  
26129.05.05.12

**APPROVED**  
STEPS 2/94  
REVISED DATE  
3-13-96
<table>
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<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min. 15 ft)</th>
<th>Breaking Strength (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Equipment</th>
<th>Elevation</th>
<th>Date</th>
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<td>0 28</td>
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<td>130-130</td>
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</table>

(Loss of drilling foam circulation at 75 feet.)
Very stiff, with basalt fragments, below 75 feet.
Increased drilling resistance at 78 feet.

Yellowish brown (10YR,5/4), below 85 feet.
With reddish brown and dark gray basalt fragments.

DARK GRAYISH BROWN (2.5Y,4/2), DARK REDDISH BROWN (5YR,3/4) AND LIGHT YELLOWISH BROWN BASALT, low hardness to moderately hard, weak, deeply weathered, moderately to highly vesicular, with inclusions of stiff silt.

YELLOWISH BROWN SILT WITH DECOMPOSED BASALT (ML) (10YR,5/4), hard, moist.

Increased drilling resistance at 115 feet.
LIGHT OLIVE GRAY (5Y,5/2), LIGHT BROWN (5YR,5/6) AND MODERATE BROWN (5YR,4/4) BASALT, moderately hard to hard, moderately strong to strong, moderately to deeply weathered.

Increased drilling resistance at 123 feet.
RED SILT (ML) from 125 to 130 feet.
<table>
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<th>Top of Casing (ft)</th>
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<th>Drilling Rate (rev./min)</th>
<th>Breaking Strength (kgf/cm²)</th>
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**Equipment:** Downhole Hammer

**Elevation:** 948.8 ft  **Date:** 06/05/93

**Log of Monitoring Well 4-2**

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<th>Sample Interval</th>
<th>Drilling Rate</th>
<th>Breaking Strength</th>
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<td>190-195</td>
<td>28</td>
<td>41</td>
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<td>195</td>
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</tbody>
</table>

**Notes:**

- Increased drilling resistance at 143 feet.
- Light olive gray (5Y,5/2), light brown (5YR,5/6), and moderate brown (5YR,4/4) basalt with silts and sand, moderately hard, moderately strong, moderately to deeply weathered, with some highly vesicular fragments.
- Light olive gray (5Y,4/2), and dark gray (N3) below 145 feet.
- Light olive gray (5Y,5/2), light brown (5YR,5/6) and moderate brown (5YR,4/4) below 150 feet.
- Dark reddish brown (10R,3/4) and dark gray (N3) below 155 feet.

**Environmental Services:**

- Brownish black (5YR,2/11) with reddish brown (10R,3/4) and grayish brown (5YR,3/2) below 170 feet. Hard, strong, fresh to little weathered, some vesicles.
- Increased drilling resistance from 171 to 175 feet.
- Grayish black (N2) with trace of reddish brown below 180 feet.

- Decreased drilling resistance at 189 feet.
- Olivine crystals below 190 feet.
<table>
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<th>Sample Interval (ft)</th>
<th>Drilling Rate (min. 15 ft)</th>
<th>Breaching Speed (m/rev)</th>
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</table>

**Equipment**  
Downhole Hammer  
Elevation 948.8 ft  Date 06/05/93

Seams of silt below 195 feet.

195-200 ft: Seams of silt below 195 feet.

200-205 ft: Seams of silt below 195 feet.

205-210 ft: Grayish black (N2) and medium dark gray (N4) below 210 feet.

210-215 ft: Decreased drilling resistance at 219 feet.

215-220 ft: Medium gray (N5), moderate brown, and moderate reddish brown (10R, 4/6) below 235 feet. Low hardness to moderately hard, weak to moderately strong, to deeply weathered, with seams and pockets of silt and sand.

220-225 ft: Olive gray (5Y, 4/1) and grayish red basalt fragments below 240 ft. Highly vesicular. Increased drilling resistance at 243 ft. Moderately vesicular, with olivine crystals below 250 feet.

225-240 ft: Olive gray (5Y, 4/1), grayish red (10R, 4/2), and light olive brown (5Y, 5/6) below 255 feet. Highly vesicular.

240-245 ft: Olive gray (5Y, 4/1), grayish red (10R, 4/2), and light olive brown (5Y, 5/6) below 255 feet. Highly vesicular.

245-250 ft: Olive gray (5Y, 4/1), grayish red (10R, 4/2), and light olive brown (5Y, 5/6) below 255 feet. Highly vesicular.


**Log of Monitoring Well 4-2**  
(Sheet 4 of 13)  
**Harding Lawson Associates**  
Engineering and Environmental Services  
Schofield TEPS 5  
Schofield Barracks  
Island of Oahu, Hawaii  
**DRAWN** kar 26129.05.05.12  
**APPROVED**  
**FILE** STEPS  
**DATE** 2/94  
**REVISED DATE**
Top of Casing ft

<table>
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**Equipment**

<table>
<thead>
<tr>
<th>Downhole Hammer</th>
</tr>
</thead>
</table>

**Elevation** 948.8 ft **Date** 06/05/93

---

Brownish gray (5YR.4/1), light brown (5YR.5/6), moderate yellowish brown (10YR.5/4), and medium dark gray (N4) below 270 feet. Moderately hard to hard, moderately strong to strong, and little to moderately weathered.

Decreased drilling resistance from 285 to 290 feet.

Dark gray (N4) and moderate reddish brown (10R.4/6) below 290 feet.

Decreased drilling resistance from 303 to 307 feet. (Possible fractured zone.)

Increased drilling resistance at 311 feet. Dark gray (N3), moderate reddish brown (10R.4/6), and dark yellowish brown (10YR.4/2) below 310 feet. Hard, strong, little weathered, massive to slightly vesicular. Slightly to moderately vesicular below 315 feet.

(Loss of drilling foam circulation and decreased drilling resistance between 320 and 325 feet.) Moderately hard to hard, moderately to highly vesicular.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Drilling Rate (min./3 ft)</th>
<th>Drilling Characteristic</th>
<th>Sample Description</th>
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- Decreased drilling resistance from 340 to 345 feet.
- Dark grey (N3) with some moderate reddish brown (10R 4/6) below 360 feet.
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<thead>
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<th>Drilling Rate (min./15 feet)</th>
<th>Breaching Space (millimeters)</th>
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**Olive black** (5Y,2/1) below 400 feet. Massive to slightly vesicular.

**Olive black** (5Y,2/1) and brownish black (5YR,2/1) below 405 feet.

Decreased drilling resistance (possibly cinders or clinker) between 415 and 420 feet. Brownish black (5YR,2/1) and blackish red (5R,2/2) with moderate reddish brown (10R,4/1) below 415 feet. Moderately vesicular. Blackish red (5R,2/2) and grayish red (5R,4/2) below 420 feet.

Dark reddish brown (10R,3/4) and blackish red (5R,2/2) below 425 feet. Increased drilling resistance at 429 feet. Reddish brown (10R,3/4) and very dusky red (10R,2/2) below 430 feet.

Vesicles show iron-oxide staining below 435 feet.

Blackish red (5R,2/2) and brownish black (5YR,2/1) below 440 feet.

Decreased drilling resistance from 445 to 450 feet. Dark reddish brown (10R,3/4) and brownish black (5YR,2/1) below 445 feet. Moderately strong, slightly vesicular. Brownish black (5YR,2/1) and moderate reddish brown (10R,4/6) below 450 feet. Moderately vesicular.
### Equipment

**Downhole Hammer**

### Top of Casing ft

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<th>Sample Interval (feet)</th>
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<th>Breaking Strength (ppm)</th>
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</table>

**Elevation**

**948.8 ft**

**Date**

**06/05/93**

**Notes:**

- Highly vesicular below 460 feet.
- Brownish black (5YR,2/1) and dark reddish brown (10R,3/4) below 465 feet. Decreased drilling resistance from 467 to 471 feet.
- Moderately vesicular below 470 feet.
- Brownish black (5YR,2/1) and dusky red (5R,3/4) below 480 feet.
- Very dusky red (10R,2/2) and grayish black (N2) below 490 feet.
- Brownish black (5YR,2/1) and very dusky red (10R,2/2) below 495 feet. Slightly vesicular.
- Decreased drilling resistance from 500 to 505 feet.
- Brownish black (5YR,2/1) below 505 feet. Fresh, massive to slightly vesicular.
- Brownish black (5YR,2/1) and very dusky red (10R,2/2) below 510 feet.
- Decreased drilling resistance (possibly cinders or clinker) between 515 and 517 feet.
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<thead>
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<th>Sample Interval (ft)</th>
<th>Drilling Rate (ft/hr)</th>
<th>Equipment</th>
<th>Elevation (ft)</th>
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<th>Blending Space Measurement (gpm)</th>
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<td>520-525</td>
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<td>Downhole Hammer</td>
<td>948.8</td>
<td>06/05/93</td>
<td>525</td>
<td>106</td>
<td>Blackish red (5R,2/2) below 515 feet. Moderately weathered, very vesicular. Vesicles show iron-oxide staining.</td>
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<td>525-530</td>
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<td>530</td>
<td>108</td>
<td>Blackish red (5R,2/2) and dusky red (5R,3/4) below 520 feet. Slightly vesicular.</td>
</tr>
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<td>530-535</td>
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<td>107</td>
<td>Dark reddish brown (10R/3/4) and very dusky red (10R,2/2) below 525 feet. Moderately vesicular.</td>
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<td>535-540</td>
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<td>540</td>
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<td>Slightly vesicular below 530 feet.</td>
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<td>Decreased drilling resistance from 534 to 537 feet.</td>
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<td>565</td>
<td>113</td>
<td>[Loss of drilling foam circulation from 570 to 605 feet, hard drilling (possible boulders, void, or highly fractured zone) from 564 to 572 feet.]</td>
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<td>Increased drilling resistance at 572 feet.</td>
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**Equipment**

**Downhole Hammer**

<table>
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<tr>
<th>Elevation</th>
<th>Date</th>
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<tbody>
<tr>
<td>948.8 ft</td>
<td>06/05/93</td>
</tr>
</tbody>
</table>

Very dusky red (10R,2/2) and moderate reddish brown (10R,4/6) below 600 feet.

(Return of drilling foam circulation at 605 feet.)

Dark grey (N3) and dark reddish brown (10R,3/4) below 615 feet.

Increased drilling resistance at 629 feet. Decreased drilling resistance from 630 to 635 feet.

(Loss of drilling foam circulation from 640 to 645 feet. Fractured zone from 645 to 650 feet.)

(Loss of drilling foam circulation at 649 feet.)
### Log of Monitoring Well 4-2

<table>
<thead>
<tr>
<th>Top of Casing ft</th>
<th>Sample Internal (feet)</th>
<th>Drilling Depth (feet)</th>
<th>Breaching Speed (gph)</th>
<th>Sample Number</th>
<th>Sample Depth (ft)</th>
<th>Equipment</th>
<th>Elevation (ft)</th>
<th>Date</th>
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<td>Downhole Hammer</td>
<td>948.8</td>
<td>06/05/93</td>
</tr>
</tbody>
</table>

- **650-655**: 8 0 655
  - Increased drilling resistance from 650 to 653 feet.

- **655-660**: 8 0 660
  - (Return of drilling foam circulation at 650 feet.)
  - Moderately vesicular below 660 feet.

- **660-665**: 6 0 121 665

- **665-670**: 7 - 670
  - (Loss of drilling foam circulation at 668 feet.)
  - Decreased drilling resistance (possible fractured zone) from 670 to 675 feet.

- **670-675**: 4 0 675
  - Water level measured 674 feet below ground surface with Powers Well Sounder, June 8, 1993, 10:20 am.
  - Increased drilling resistance at 675 feet.

- **675-680**: 10 0 680

- **680-685**: 6 0 685

- **685-690**: 7 - 690

- **690-695**: 6 0 695

- **695-700**: 6 0 700
  - (Return of drilling foam circulation between 700 and 702 feet.)
  - (Loss of drilling foam circulation between 702 and 705 feet.)
  - Brown/black (5YR,2/1) and dark reddish brown (10R,3/4) below 700 feet.

- **700-705**: 7 0 122 705
  - Very dusky red (10R,2/2), moderate reddish brown (10R,4/6), dark yellowish orange (10R,6/8), and brownish gray (5Y,4/1) below 710 feet.

- **705-710**: 10 0 123 710

- **710-715**: 7 0 124 715

---

Harding Lawson Associates
Engineering and Environmental Services

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

**DRAWN**: kar
**JOB NUMBER**: 26129.05.05.12
**APPROVED**: STEPS
**FILE**: 2/94
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<td>775-780</td>
<td>12</td>
<td>0</td>
<td>137</td>
<td>780</td>
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</table>

(King of drilling foam circulation at 720 feet.)
Grayish red (10R,4/2) and moderate reddish brown below 720 feet. (Return of drilling foam circulation at 725 feet.)

Grayish red (10R,4/2), olive black (5Y,2/1), and moderate yellowish brown (10YR,5/4) below 725 feet. Moderately strong to strong, moderately to highly vesicular.

Olive black (8Y,2/1), grayish red (10R,4/2), and dark reddish brown (10R,3/4) below 730 feet.

Brownish black (5YR,2/1), brownish gray (5YR,4/1), moderate reddish brown (10R,4/6), and grayish red (10R,4/2) below 735 feet.
Becoming strong.

(Drilling foam return becoming thin at 741 feet.)
Brownish black (5YR,2/1), and dark reddish brown (10R,3/4) below 740 feet. Moderately vesicular.
(Decreased drilling resistance from 745 to 750 feet.)

Dark gray (N3), very dusky red (10R,2/2), and moderate reddish brown (10R,4/6) below 750 feet.

Increased drilling resistance at 762 feet.
Grayish black (N2), olive gray (5Y,4/1), dark reddish brown (10R,3/4), and moderate yellowish brown (10YR,4/2) below 760 feet.
Hard, moderately to highly vesicular.
Decreased drilling resistance from 765 to 770 feet.

Dark gray (N3), moderate yellowish brown (10YR,4/2), and dark reddish brown (10R,3/4) below 765 feet.
Some calcite (7) noted in sample from below 770 feet.

Highly vesicular below 775 feet.
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (ft/min)</th>
<th>Boring Space Measurement (rpm)</th>
<th>Sample Number</th>
<th>Top of Casing (ft)</th>
<th>Downhole Hammer</th>
<th>Elevation</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>780-785</td>
<td>12</td>
<td>0</td>
<td>138</td>
<td>785</td>
<td></td>
<td>948.8</td>
<td>06/05/93</td>
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<tr>
<td>785-790</td>
<td>11</td>
<td>0</td>
<td>139</td>
<td>790</td>
<td>Olive black (SY,2/1), and dark reddish brown (10R,3/4) below 790 feet. Decreased drilling resistance from 793 to 795 feet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>790-795</td>
<td>19</td>
<td>0</td>
<td>140</td>
<td>795</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>795-800</td>
<td>11</td>
<td>0</td>
<td>141</td>
<td>800</td>
<td>Dark grey (N3) below 800 feet. Moderately vesicular.</td>
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<td></td>
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<tr>
<td>800-805</td>
<td>14</td>
<td>0</td>
<td>142</td>
<td>805</td>
<td></td>
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<td></td>
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<tr>
<td>805-810</td>
<td>15</td>
<td>0</td>
<td>143</td>
<td>810</td>
<td>Dark grey (N3) and dark reddish brown (10R,3/4) below 810 feet. Slightly vesicular.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>810-815</td>
<td>17</td>
<td>0</td>
<td>144</td>
<td>815</td>
<td>Decreased drilling resistance (possible void) from 816 to 817 feet.</td>
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<tr>
<td>815-820</td>
<td>16</td>
<td>0</td>
<td>145</td>
<td>820</td>
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<tr>
<td>820-825</td>
<td>18</td>
<td>0</td>
<td>146</td>
<td>825</td>
<td>Slightly to moderately vesicular below 825 feet.</td>
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</tr>
<tr>
<td>825-830</td>
<td>19</td>
<td>0</td>
<td>147</td>
<td>830</td>
<td>Total depth = 830 feet. Water table was measured at 674 feet below ground surface, 6/8/93, 10:20 am.</td>
<td></td>
<td></td>
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</tbody>
</table>

Total depth = 830 feet.

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-2
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

DRAWN: kar
JOB NUMBER: 26129.05.05.12
APPROVED: STEPS
FILE: STEPS
DATE: 2/94
REVISED DATE: 2/94
TO: U.S. Army, Directorate of Facilities Engineering  
Building 300, Wheeler Army Airfield  
Wahiawa, HI 96786

In accordance with Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to construct a monitor well (Well No. 3004-02) at Schofield Army Barracks, TMK: 7-7-01, is approved, subject to the following conditions:

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

2. The well shall be used for ground water quality monitoring, sampling, and testing only.

3. The following shall be submitted to the Commission within 30 days after completion of the well:
   a. Well Completion Report.
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

4. The applicant shall comply with all applicable laws, rules, and ordinances.
5. This permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.

6. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

KEITH W. AHUE, Chairperson
Commission on Water Resource Management

JUN 30 1993
Date of Issuance

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

Applicant’s Signature: __________________________ Date: ______________

Printed Name: ________________________________

Firm or Title: ________________________________

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

Enc. (Well Completion Report form)

C: USGS
Department of Health
Safe Drinking Water Branch
Ground Water Protection Program
Solid and Hazardous Waste Branch
Honolulu Board of Water Supply
Roscoe Moss Company
APPLICATION FOR
WELL CONSTRUCTION PERMIT
PUMP INSTALLATION PERMIT

INSTRUCTIONS: Please print or type and send completed application with attachments to the Department of Water and Land Development, P.O. Box 113, Honolulu, Hawaii 96801. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 442-1143, Hydrology/Geology Section for assistance.

1. WELL LOCATION

   Island OAHU Tax Map Key 7-7-01
   Address Schofield Army Barracks

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

2. WELL OWNER

   Firm Name U.S. Army
   Contact Person Col. Charles Wilson
   Address Directorate of Facilities Engineering
   Phone (808) 656-2878

   LANDOWNER

   Firm Name U.S. Army
   Contact Person Col. Charles Wilson
   Address Directorate of Facilities Engineering
   Phone (808) 656-2878

3. PROPOSED CONTRACTOR FOR: ☐ Well Drilling ☐ Pump Installation

   Name Roscoe Moss Hawaii, Inc.
   Phone 682-5856
   Address 91-259A Olai Street
   Ewa Beach, HI 96707

4. PROPOSED WORK

   ☐ Drill New Well ☐ Deepen
   ☐ Alter ☐ Seal
   ☐ Install New Pump ☐ Replace Pump ☐ Modify Pump

   (Briefly describe the proposed work and fill in the diagram on the back of this form.)

5. PROPOSED USE

   ☐ Municipal (including hotels, stores, etc.) ☐ Military
   ☐ Domestic (individual, noncommercial water systems) ☐ Industrial
   ☐ Irrigation (specify) ☐ Other (specify) Monitoring

6. PROPOSED AMOUNT OF WITHDRAWAL 0 gallons per day

   Well is for monitoring use only - pumping rate of 30gpm planned for sample pump

7. PROPOSED PUMP INFORMATION

   Pump Type: ☐ Vertical Turbine ☐ Submersible ☐ Centrifugal
   ☐ Diesel ☐ Gas ☐ Electric: ________ Rated Horsepower
   Rated Pump Capacity ________ gallons per minute (gpm)

   Well Owner (print) Col. Charles R. Wilson
   Landowner (print) Col. Charles R. Wilson
   Signature ___________________________ Signature ___________________________
   Date 5/5/92 ___________________________ Date ___________________________

For Official Use Only:

   Field Checked By ___________________________ Latitude ___________________________
   Date 5/5/92 ___________________________ Hydrologic Unit ___________________________
   State Well No. 3004-02 ___________________________ MON WELL 4-2

RECEIVED

MAY 7 1:3:04
Briefly describe the proposed work:

Drill and install monitoring well 50 ft into aquifer, approximate depth 1000 ft.

---

PROPOSED SECTION OF WELL

Elevation at top of casing 935 ft, msl.

Cement Grout 935 ft.
Bentonite Seal 5 ft.

Hole Dia. 10 in.

Total Depth 1000 ft.

Rock Packing 60 ft.

Ground Elev. ft., msl.

Solid Casing:
Material Carbon Steel
Length Approx 950 ft.
Diameter 6 in.
Wall thickness Schedule 40 in.

Casing: / Perforated / Screen
Material Stainless Steel
Length 50 ft.
Diameter 6 in.
Wall thickness Schedule 40 in.
Openings 0.060 in.

Open Hole:
Length 0
Diameter 0 in.

*Approximate elevation at time of filing application. Final elevation (msl) by a surveyor licensed by the State must be submitted at start of construction.
ELEVATION OF MONITORING WELLS AS SURVEYED
ON 7/15/95 (WITH BRUCE & MARK OF HARDING
AND LAWSON)

MW-4-2A = 946.87 feet — Black mark on top of tube
MW-4-2 = 947.11 feet — Black mark on top of tube
"+" cut near casing of MW-4-2A = 945.91 feet

MW-4-1 = 853.47 feet (as surveyed on 3/16/95)
"+" cut = 851.12 feet
Diff. = 2.35 feet (Bruce need diff. in elev. only)

MW-4-3 = 884.15 feet (as surveyed on 3/16/95)
"+" cut = 882.52 feet
Diff. = 1.63 feet (Bruce need diff. in elev. only)

MW-4-4 = 829.88 feet — Black mark

MW-2-2 = 864.34 feet — Black mark on top of tube
"+" cut = 862.90 feet

MW-2-3 = 828.81 feet — Black mark on top of tube
"+" cut = 827.20 feet

MW-2-4 = 829.70 feet — Black mark on top of tube
"+" cut = 828.00 feet

MW-2-1 = 903.75 feet — Black mark on top of tube
<table>
<thead>
<tr>
<th>Point</th>
<th>Northino</th>
<th>Eastino</th>
<th>Elev</th>
<th>Descr</th>
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<td>490579.0620</td>
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<td>481183.9529</td>
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<td>474675.9900</td>
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<td>472744.1700</td>
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<td>118439.3594</td>
<td>503505.7809</td>
<td>912.4300 MW 2-5</td>
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</table>

SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD 27)
Instructions: Please print or type and submit completed drawing within 30 days after well completion to the Commission on Water Resource Management, P.O. Box 821, Honolulu, Hawaii 96806. An as-built drawing of the well and chemical analysis should also be submitted. For assistance call the Commission Regulation Branch at 567-0225.

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

WELL COMPLETION REPORT

1. STATE WELL NO. 3004-01
   WELL NAME MK-4-1
   ISLAND OAHU

2. LOCATION: Address SCHOFIELD BARRACKS PISTOL RANGE
   Tax Map Key 7-7:01

3. DRILLING OR PUMP INSTALLATION CONTRACTOR ROSCOE MOSS HAWAII, INC.
   CONTRACTOR'S C-67 LICENSE NUMBER C-16437

4. NAME OF DRILLER WHO PERFORMED WORK HAL FENTON
   TYPE OF RIG/CONSTRUCTION AIR HAMMER & CABLE TOOL

5. DATE OF WELL DRILLING COMPLETION DECEMBER 1993
   (NOTE: Report must be submitted within 30 days after this date)

6. GROUND ELEVATION (msl) 853.7 ft.
   Top of Drilling Platform (msl) 853.7 ft.
   Height of Drilling Platform above Ground surface 853.7 ft.
   Bench Mark and Method Used to Determine Ground Elevation 853.7 ft.

9. DRILLER'S LOG:
   
<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks, Dates</th>
<th>Water Level</th>
<th>Depth (ft.)</th>
<th>Rock Description, Remarks, Dates</th>
<th>Water Level</th>
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</thead>
<tbody>
<tr>
<td>to</td>
<td>HARDING LAWSON ASSOCIATES</td>
<td></td>
<td>to</td>
<td>ROYAL LOG ATTACHED</td>
<td></td>
</tr>
<tr>
<td>to</td>
<td></td>
<td></td>
<td>to</td>
<td></td>
<td></td>
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<tr>
<td>to</td>
<td></td>
<td></td>
<td>to</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. TOTAL DEPTH OF WELL BELOW GROUND 627 ft.

11. HOLE SIZE:
    16 inch dia. from 0 ft. to 200 ft. below ground
    10 inch dia. from 200 ft. to 627 ft. below ground

12. CASING INSTALLED:
    6 in. I.D. x SCH 40 in. wall solid section to 570 ft. below ground
    6 in. I.D. x .250 in. wall perforated section to 620 ft. below ground
    Type of Perforation MILL SLOT .060 in SLOTS

13. ANNULUS:
    Grouted from 0 ft. below ground to 537 ft. below ground
    Gravel packed from 537 ft. below ground to 627 ft. below ground

14. INITIAL WATER LEVEL 584.74 ft. below ground. Date and time of measurement 1/7/94

15. INITIAL CHLORIDE ppm Date and time of sampling

16. INITIAL TEMPERATURE °F Date and time of sampling

17. DATE OF PUMP INSTALLATION DECEMBER 1993

18. PUMP INSTALLATION:
    Pump Type, Make, Serial No. SUBMERSIBLE, MYERS, J7525
    Capacity 23 gpm
    Motor type, H.P., Voltage, rpm FRANKLIN 7.5 H.P., 480 VOLT, 1800 RPM
    Depth of Pump Intake Setting 585 ft. below ground, which elevation is 853.7 ft.
    Depth of bottom of aitng NA ft. below , which elevation is ft.
    Pumping Head is 585 ft.

19. PUMPING TESTS:

<table>
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<tr>
<th>Start water level</th>
<th>End water level</th>
<th>Depth of well</th>
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</thead>
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<tr>
<td>ft. below R.P.</td>
<td>ft. below R.P.</td>
<td>ft. below R.P.</td>
</tr>
<tr>
<td>Elapsed Time (hours)</td>
<td>Flow Rate (gpm)</td>
<td>Depth (ft.)</td>
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<tr>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>Sampling Purposes Only</td>
<td>to</td>
<td>to</td>
</tr>
<tr>
<td>to</td>
<td>to</td>
<td>to</td>
</tr>
</tbody>
</table>

Remarks:

Contractor (print) ROSCOE MOSS HAWAII, INC
Title FIELD SUPERINTENDENT

Signature

Date 3/4/94

For Official Use: Well No. 3004-01

For Driller's Use: Job Name Job No.
Monitoring Well 4-1
Well Head and Well Cover Detail
Schofield Barracks
Island of Oahu, Hawaii

Access Door with Lock

Electrical Cable to Submersible Pump

Electrical Switch Box Attached to Door

Discharge Pipe with Valve

Sounding Tube with Threaded Cap

Steel Safety Line Anchored to Surface Casing

Concrete Pad SLOPED TO DRAIN

6" Diameter Steel Blank Casing

Steel Well Cover

Access with Threaded Cover

NOT TO SCALE

Harding Lawson Associates
Engineering and Environmental Services

Monitoring Well 4-1
Well Head and Well Cover Detail
Schofield Barracks
Island of Oahu, Hawaii

jcl 28339.09.02.12

28339049 10
199511132820 10/95
Depth (ft) | Elevation (ft)
---|---
554 | 297
583.08 | 270.39 (10/10/95) Y
NA | NA
583 | 268
590 | 261
593 | 258
590 | 261
620 | 231
645 | 206

*Datum: Mean Sea Level

Fine Sand

1" Dia. SCH 80 PVC Sounding Tube
(Elevation of Groundwater)

1.5" Dia. Steel Discharge Pipe

Jacketed Submersible Electrical Pump Cable

Stainless Steel Safety Cable

Check Valve

Stainless Steel Electrical Cable Wire Guard

Rubber Torque Arrester

3.75" Dia. Myers Pump

Pump Intake

3.75" Dia. Franklin 7.5 Horsepower Electric Motor

Silica Sand Filter Pack

6" Dia. Stainless Steel Louvered Screen

10" Dia. Hole Drilled With Air Rotary

Sloough

Pump Installation Diagram for Monitoring Well 4-1

Harding Lawson Associates
Engineering and Environmental Services
Schofield Barracks
Island of Oahu, Hawaii

Fig 1

Drum 28339.09.02.12

File 283390046

Date 9/95
**Top of Casing (ft)**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Breathing Space (ppm)</th>
<th>Sample Site</th>
<th>Drilling Rate (min./30 feet)</th>
<th>Elevation</th>
<th>Equipment</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>853.7 ft</td>
<td>Downhole Hammer</td>
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<td>25-30</td>
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<td>605</td>
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</tr>
</tbody>
</table>

**Reddish brown (5YR, 4/4) below 40 feet.**

**Red dr (2.5YR, 3/6) below 8 feet.**

**Red dr (2.5YR, 3/4) below 13 feet.**

**Red dr (2.5YR, 3/4) below 17 feet.**

**Red dr (2.5YR, 2.5/4) below 20 feet.**

**Redd brown (5YR, 4/4) below 40 feet.**

**Dark red (10R, 3/6) below 50 feet.**

**Dusky red (10R, 3/4) below 60 feet.**

**Increased drilling resistance at 62 feet.**

---

**Log of Monitoring Well 4-1**

*Sheet 1 of 10*
<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample Internal (ft)</th>
<th>Drilling Rate (min./20 ft)</th>
<th>Breathing Space (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
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**Equipment**
- **Downhole Hammer**

**Elevation**
- **853.7 ft**
- **Date 07/13/93**

**Log of Monitoring Well 4-1**
- **Schofield TEPS 5**
- **Schofield Barracks**
- **Island of Oahu, Hawaii**

**Harding Lawson Associates**
- **Drawing** kar 26129.05.05.12
- **Approved** BJW
- **File** STEPS
- **Date** 2/94
- **Revised Date**

**Description**
- Dark reddish grey (10R,4/1), 5 to 15 percent sand, some angular black and dark grey basalt fragments, becoming very stiff, below 65 feet.
- Weak red (2.5YR,4/2) below 70 feet.
- Increased drilling resistance at 74 feet, decomposed rock encountered.
- MOTTLED GRAYISH ORANGE PINK (5YR,7/2) AND OLIVE GRAY (5Y,6/1) BASALT, low hardness, weak, deep weathering, discoloration throughout, natural fractures appear to be coated with iron-oxide rich clays, minerals altered, 1 to 8 mm vesicles observed with black interior coating.
- Pale red (10R,6/2) and yellowish gray (5Y,7/2) below 80 feet.
  - 1 to 2 mm vesicles below 85 feet.
  - Decreased drilling resistance from 85 to 86 feet.
- Moderate red (5R,5/4) and light olive gray (5Y,6/1) below 90 feet. Increased drilling resistance.
- Pale red (10R,6/2) and greenish black (5GY,2/1) below 95 feet.
- Medium gray (NS) and light brownish gray (5YR,6/1) below 100 feet.
- Light olive gray (5Y,5/2) below 103 feet.
  - Fractures coated with gray clays.
- Greenish black (5GY,2/1) and olive gray (5Y,4/1) below 115 feet, fractures coated with grey-green clays, .5 to 2 mm vesicles.
  - Driller notes fractured zone from 115 to 120 feet.
- Olive gray and dark gray (5Y,4/1 and N3), becoming moderately hard to hard.
  - Moderately strong, moderate weathering, some local mineral alteration, some iron-oxide staining, no vesicles, below 118 feet.
- VERY DARK BROWN SANDY ELASTIC SILT (MH) (10YR,2/2), stiff to very stiff, moist.
<table>
<thead>
<tr>
<th>Sample Depth (ft)</th>
<th>Sample Number</th>
<th>Drilling Rate (min./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Top of Casing (ft)</th>
<th>Elevation</th>
<th>Equipment</th>
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Some red and black staining, some fine to medium sand.
Decreased drilling resistance at 130 feet.
Dark reddish brown (5YR,3/4), increased sand content, below 130 feet.
Some basalt fragments below 135 feet.
Fragments are deeply to little weathered.
(Driller noted increase in drilling resistance at 137 feet. Foam/cuttings color becoming light gray brown).

**VERY DARK GRAY (2.5Y, N3) REDDISH BROWN (2.5YR, 3/4) AND DARK REDDISH BROWN (2.5YR, 3/4) BASALT, moderately hard to hard, moderately strong to strong, deeply to little weathered, non-vesicular.**

Black (7.5YR,N2/4), dark brown (7.5YR,3/4) and reddish brown (2.5YR,4/4) below 145 feet.

Very dark gray (2.5YR,N3), reddish brown (2.5YR,3/4) and olive (5Y,5/4) below 150 feet.

Increased drilling resistance at 151 feet.

**DARK OLIVE GRAY (5Y,3/2), very dark gray (5Y,3/1), dark brown (10YR,3/2), and dark red (2.5YR,3/6), hard, strong, little weathered to fresh, below 155 feet.**

**Very dark gray (2.5YR,N3) and reddish brown (2.5YR,4/4), some fragments (mostly non-vesicular clinker), fragments are reddish brown with black staining, trace inclusions of silt and clay, below 165 feet.**

Decreased drilling resistance, possible fractured zone, from 175 to 181 feet.

**DARK REDDISH BROWN (2.5YR,4/4) SANDY SILT (ML), stiff, with deeply weathered basalt.**

Increased drilling resistance at 180 feet.
(Drilling foam color becomes grey.)

**VERY DARK GRAY (2.5YR,N3) AND REDDISH BROWN (2.5YR,4/4) BASALT below 181 feet, becoming hard, strong, little weathered to fresh, some iron-oxide staining, non-vesicular to slightly vesicular.**

Some olivine crystals below 190 feet.

Increased drilling resistance, possible fractured zone, from 190 to 192 feet.
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<th>Top of Casing ft</th>
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<th>Breaking Space Measurement (ppm)</th>
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<th>Downhole Hammer</th>
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</table>

**Elevation**: 853.7 ft **Date**: 07/13/93

- Very dark gray (2.5YR,N3/1), dark red (2.5YR,3/6), and reddish brown (2.5YR,4/4) below 192 feet, becoming slightly vesicular.
- Increased drilling resistance at 200 feet.
  (Set 12-inch steel casing to 200 feet.)
  Some inclusions of olive crystals at 200 feet.
- Decreased drilling resistance at 213 feet.
- Dark gray (10YR,4/1), dark yellowish brown (10YR,4/6) and dark red (2.5YR,5/6), below 220 feet, becoming moderately vesicular.
- Moderately to highly vesicular below 225 feet.
- (Loss of cuttings from 230 to 240 feet.)
- Possible fractured zone between 240 and 243 feet. Increased drilling resistance below 243 feet.
  Dark gray (10YR,4/1) and yellowish brown (10YR,4/6) below 240 feet.
  Dark gray (10YR,4/1), with some dark red fragments, below 245 feet.
  Dark gray (10YR,4/1) and dark brown (2.5YR,3/2) below 250 feet.
- (Loss of cuttings at 255 feet. Driller reduced quantity of foam.)
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<td>Slightly vesicular below 270 feet.</td>
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<td>Non-vesicular below 275 feet.</td>
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<td>Dark grey (2.5YR.N4) and red (10R.4/8), becoming highly to moderately vesicular, below 285 feet.</td>
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### Log of Monitoring Well 4-1

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

**Harding Lawson Associates**

**Engineering and Environmental Services**

**Drawn**: kar 26129.05.05.12

**Approved**: 2/94

**File**: STEPS

**Date**: 07/13/93

**Revised Date**: 2/94
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<thead>
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- **Top of Casing ft**
- **Equipment**
  - Downhole Hammer
- **Elevation**
  - 853.7 ft
  - Date: 07/13/93

- Increased drilling resistance between 330 and 340 feet.
- Possible fractured zone or clinker layer between 340 and 353 feet.
- Non-vesicular below 345 feet.
- Dark gray (2.5YR.N6) with dark reddish brown (2.5YR.2/4), becoming moderately hard, moderately strong, moderately to slightly vesicular, below 380 feet.
- Moderately to highly vesicular below 365 feet.

*Harding Lawson Associates*

Log of Monitoring Well 4-1 (Sheet 6 of 10)

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

**DRAWN**
kar 26129.05.05.12

**APPROVED**
Pt 2/94

**FILE**
STEPS

**DATE**
2/94
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Log of Monitoring Well 4-1
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

Equipment: Downhole Hammer
Elevation: 853.7 ft  Date: 07/13/93

(Loss of air circulation, possible fractured zone or clinker layer at 398 feet.)
Dark gray (2.5YR,N4), becoming slightly vesicular, with olivine crystals below 400 feet.
Possible fractured zone or clinker layer between 398 and 410 feet.

(Loss of drilling foam and cuttings at 410 feet.)
Highly to moderately vesicular below 410 feet.
Increase in drilling resistance between 410 and 414 feet. Possible fractured zone or clinker layer between 414 and 440 feet. Low to moderate hardness, moderately strong, below 414 feet. Slightly to non-vesicular below 420 feet.

Moderately vesicular below 430 feet.

Increased drilling resistance between 440 and 448 feet.
Dark gray (2.5YR,N4) with trace reddish brown (2.5YR,4/4), moderately hard to hard, strong, little weathered, moderately to slightly vesicular, below 440 feet. Moderately to highly vesicular below 445 feet. Decreased drilling resistance between 448 and 458 feet. Moderately to highly vesicular below 450 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (max. 3.3/feet)</th>
<th>Breaking Space Measurement (gpm)</th>
<th>Sample Depth (ft)</th>
<th>Sample Number</th>
<th>Top of Casing ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>10</td>
<td>96</td>
<td>455</td>
<td></td>
<td></td>
</tr>
<tr>
<td>455-460</td>
<td>11</td>
<td>97</td>
<td>460</td>
<td></td>
<td></td>
</tr>
<tr>
<td>460-465</td>
<td>15</td>
<td>98</td>
<td>465</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465-470</td>
<td>10</td>
<td>99</td>
<td>470</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470-475</td>
<td>15</td>
<td>100</td>
<td>475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>475-480</td>
<td>11</td>
<td>101</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>480-485</td>
<td>12</td>
<td>102</td>
<td>485</td>
<td></td>
<td></td>
</tr>
<tr>
<td>485-490</td>
<td>11</td>
<td>103</td>
<td>490</td>
<td></td>
<td></td>
</tr>
<tr>
<td>490-495</td>
<td>10</td>
<td>104</td>
<td>495</td>
<td></td>
<td></td>
</tr>
<tr>
<td>495-500</td>
<td>12</td>
<td>105</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-505</td>
<td>8</td>
<td>106</td>
<td>505</td>
<td></td>
<td></td>
</tr>
<tr>
<td>505-510</td>
<td>8</td>
<td>107</td>
<td>510</td>
<td></td>
<td></td>
</tr>
<tr>
<td>510-515</td>
<td>9</td>
<td>108</td>
<td>515</td>
<td></td>
<td></td>
</tr>
<tr>
<td>520</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Increased drilling resistance between 458 and 465 feet, and decreased drilling resistance from 465 to 490 feet.
Reddish gray (10YR,5/1), dark gray (2.5YR,4/4), and weak red (2.5YR,4/2), becoming highly vesicular, below 465 feet.
Reddish gray (10YR,5/1) and dusky red (2.5YR,3/2) below 470 feet.

Dark grey (2.5YR,N4) with reddish brown (2.5YR,4/4), becoming moderately to slightly vesicular, below 475 feet.

Dark gray (2.5YR,N4) with red (2.5YR,4/8), becoming moderately to highly vesicular, below 485 feet.

Increased drilling resistance between 490 and 531 feet.

Dark gray (2.5YR,N4) and reddish brown (2.5YR,6/4) below 495 feet.

Moderately vesicular below 505 feet.

Slightly vesicular below 515 feet.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Drilling Rate (min./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Top of Casing ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>520</td>
<td>10</td>
<td>0</td>
<td>109</td>
<td>515-520</td>
</tr>
<tr>
<td>525</td>
<td>10</td>
<td>0</td>
<td>110</td>
<td>520-525</td>
</tr>
<tr>
<td>530</td>
<td>8</td>
<td>0</td>
<td>111</td>
<td>525-530</td>
</tr>
<tr>
<td>535</td>
<td>9</td>
<td>0</td>
<td>112</td>
<td>530-535</td>
</tr>
<tr>
<td>540</td>
<td>10</td>
<td>0</td>
<td>113</td>
<td>535-540</td>
</tr>
<tr>
<td>545</td>
<td>9</td>
<td>0</td>
<td>114</td>
<td>540-545</td>
</tr>
<tr>
<td>550</td>
<td>9</td>
<td>0</td>
<td>115</td>
<td>545-550</td>
</tr>
<tr>
<td>555</td>
<td>9</td>
<td>0</td>
<td>116</td>
<td>550-555</td>
</tr>
<tr>
<td>560</td>
<td>11</td>
<td>0</td>
<td>117</td>
<td>555-560</td>
</tr>
<tr>
<td>565</td>
<td>9</td>
<td>0</td>
<td>118</td>
<td>560-565</td>
</tr>
<tr>
<td>570</td>
<td>13</td>
<td>0.6</td>
<td>119</td>
<td>565-570</td>
</tr>
<tr>
<td>575</td>
<td>21</td>
<td>0</td>
<td>120</td>
<td>570-575</td>
</tr>
<tr>
<td>580</td>
<td>45</td>
<td>0</td>
<td>121</td>
<td>575-580</td>
</tr>
</tbody>
</table>

- Decreased drilling resistance between 531 and 535 feet.
- Increased drilling resistance between 535 and 570 feet.
- Moderately vesicular below 545 feet.
- Moderately vesicular below 570 feet.
- Fractured zone between 570 and 587 feet.
- Coarse fragments of cinder or clinker material. Loss of drilling foam and air return at 575 feet.
- Water table measured 1/7/94 at a depth of 584.74 feet.
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (rate/10 ft)</th>
<th>Breaking Space (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Equipment</th>
<th>Cable Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Casing ft</td>
<td>580-585</td>
<td>17</td>
<td>0</td>
<td>122</td>
<td>585</td>
<td></td>
</tr>
<tr>
<td></td>
<td>585-590</td>
<td>25</td>
<td>0</td>
<td>123</td>
<td>590</td>
<td>Dark gray (2.5YR,N4) and reddish brown (2.5YR,4/6), moderately to highly vesicular, below 590 feet.</td>
</tr>
<tr>
<td></td>
<td>590-595</td>
<td>10</td>
<td>0</td>
<td>124</td>
<td>595</td>
<td></td>
</tr>
<tr>
<td></td>
<td>595-600</td>
<td>10</td>
<td>0</td>
<td>600</td>
<td></td>
<td>(Changed to Bucyrus Erie Cable Tool rig to drill below 600 feet.)</td>
</tr>
<tr>
<td></td>
<td>600-605</td>
<td>11</td>
<td>0</td>
<td>605</td>
<td></td>
<td>Highly vesicular below 605 feet.</td>
</tr>
<tr>
<td></td>
<td>605-610</td>
<td>9</td>
<td>0</td>
<td>610</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>610-615</td>
<td>13</td>
<td>0</td>
<td>125</td>
<td>615</td>
<td></td>
</tr>
<tr>
<td></td>
<td>615-620</td>
<td>13</td>
<td>0</td>
<td>126</td>
<td>620</td>
<td></td>
</tr>
<tr>
<td></td>
<td>620-625</td>
<td>14</td>
<td>0</td>
<td>126</td>
<td>625</td>
<td></td>
</tr>
<tr>
<td></td>
<td>625-630</td>
<td>5</td>
<td>-</td>
<td>127</td>
<td>630</td>
<td>Increased drilling resistance between 640 and 645 feet.</td>
</tr>
<tr>
<td></td>
<td>630-635</td>
<td>5</td>
<td>-</td>
<td>127</td>
<td>635</td>
<td></td>
</tr>
<tr>
<td></td>
<td>635-640</td>
<td>6</td>
<td>0</td>
<td>127</td>
<td>640</td>
<td>Boring collapsed over cable tool at 645 feet.</td>
</tr>
<tr>
<td></td>
<td>640-645</td>
<td>18</td>
<td>0</td>
<td>128</td>
<td>645</td>
<td>Total depth = 645 feet.</td>
</tr>
<tr>
<td></td>
<td>650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Water table was measured at 584.74 below top of casing, 1/7/94.</td>
</tr>
</tbody>
</table>

**Log of Monitoring Well 4-1**

- **Schofield TEPS 5**
- **Schofield Barracks**
- **Island of Oahu, Hawaii**

**Drawn**

- **kar**

**Job Number**

- **26129.05.05.12**

**Approved**

- **BOW**

**File**

- **STEPS**

**Date**

- **2/94**

**Revised Date**

- **2/94**
TO: U.S. Army Support Command Hawaii  
Building 300, Wheeler Army Airfield  
Wahiawa, HI 96786

In accordance with Department of Land and Natural Resources Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", your application to construct a monitor well (Well No. 3004-01) at Schofield Army Barracks, TMK: 7-7-01, is approved, subject to the following conditions:

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

2. The well shall be used for ground water quality monitoring, sampling, and testing only.

3. The following shall be submitted to the Commission within 30 days after completion of the well:
   a. Well Completion Report.
   b. As-built sectional drawing of the well.
   c. Plot plan and map showing the exact location of the well.
   d. Periodic reports of monitoring and testing results.

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

5. This permit may be revoked if work is not started within six months of the date of issuance or if work is suspended or abandoned for six months. The work shall be completed within two years of the date of issuance.
6. Upon completion of monitoring operations, the applicant shall obtain a well construction permit to seal the well with cement grout in a manner approved by the Commission.

KEITH W. AHUE, Chairperson
Commission on Water Resource Management
MAR 31 1993
Date of Issuance

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

Applicant's Signature: LORAN H. RUNNELLIS Date: April 2, 1993
Printed Name: LORAN H. RUNNELLIS Firm or Title: Roscoe Moss Company

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

Enc. (Well Completion Report form)
cc: USGS Department of Health
    Safe Drinking Water Branch
    Ground Water Protection Program
    Solid and Hazardous Waste Branch
    Honolulu Board of Water Supply
    Roscoe Moss Company
APPLICATION FOR PERMIT

Well Construction or □ Pump Installation

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 521, Honolulu, Hawaii 96826. Application must be accompanied by a non-refundable filing fee of $25.00 payable in the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 587-0225.

1. APPLICANT: (may be a, b, or c, but all must be filled in)
   (a) WELL OWNER
      Firm/Name: U.S. Army Support Command HI
      Contact Person: Col. R. Wilson
      Address: Building 300, Wheeler Army Airfield
      Waipahu, HI 96796
   (b) LANDOWNER
      Firm/Name: U.S. Army Support Command Hawaii
      Contact Person: Col. R. Wilson
      Address: Building 300, Wheeler Army Airfield
      Waipahu, HI 96796
   (c) CONTRACTOR
      Firm/Name: ROSCOE MOSS HAWAII, INC.
      Contact Person: Contractor's CST License No. C-16437
      Address: 91-259A Olai Street, Ewa Beach, Hawaii, 96707

2. WELL LOCATION/NAME: Schofield Army Barracks Island: Oahu
   Address
   Tax Map Key 7-7-01-01
   (Attach a USGS map, scale 1"=2000, and a property tax map showing well location referenced to established property boundaries.)

3. (a) PROPOSED WORK: Drill New Well
   □* Alter Location
   □ Modify Existing Well
   □ Redrill
   □ Install New Pump
   □ Replace Pump
   □ Modify Pump
   □ Be sure to complete and submit well abandonment report upon completion of work.
   (b) WELL TYPE:
   □ Dug □ Bored □ Driven □ Drilled

4. PROPOSED PUMP INFORMATION:
   Rated Pump Capacity:________________________ gallons per minute
   Pump Type:
   □ Deep Well Turbine
   □ Rotary
   □ Submersible
   □ Centrifugal
   □ Rotary-Displacement
   □ Rotoplatating
   □ Rotary-Gear
   □ Impulse
   Motor:
   □ Diesel
   □ Gas
   □ Electric, rated horsepower of________________________
   (If more space is needed, continue below under remarks, explanations.)

5. PROPOSED USE:
   □ Municipal (including hotels, stores, etc.)
   □ Domestic (individual, noncommercial water use)
   □ Irrigation (crop)
   □ State Land Use District: □ Urban □ Agriculture
   □ County Zoning (describe) □ Rural □ Conservation
   (If more space is needed, continue below under remarks, explanations.)

6. (a) PROPOSED AMOUNT OF WITHDRAWAL:________________________ gallons per day
   (b) METHOD OF FLOW MEASUREMENT: □ Flow-meter
   □ Open-pipe
   □ Office Plate
   □ Well
   (If more space is needed, continue on back)

7. PENDING ACTIONS:
   □ COUA □ SMA □ EIS □ EA □ NONE
   □ Other(explain)

8. REMARKS, EXPLANATIONS:
   Well is for monitoring only. Well will be pumped at a rate of 30 GPM.
   (If more space is needed, continue on back)

NOTE: Signing below indicates that the applicant understands that, if this permit is requested is granted by the Commission on Water Resource Management, the proposed work is to be completed within two (2) years of the approval date. In addition, the contractor shall submit to the Commission a well completion report, well abandonment report, or both, within 30 days after the completion date of the permitted work. The applicant also understands that monthly water use data shall be submitted to the Commission. The applicant further understands that approval of the proposed permit shall not constitute a determination of correlative water rights and that the Commission does not guarantee the capacity or future use up to the permitted pump capacity.

Well Owner: Col. R. Wilson/Director
   Signature:       Date: March 9, 1993

Landowner: Col. R. Wilson/Director
   Signature:       Date: March 9, 1993

Contractor: ROSCOE MOSS HAWAII, INC.
   Signature:       Date: 4-7-93

For Official Use Only:
   Date Received: 3/9/93
   Date Approved: 3/9/93
   Field Checked By: ____________________________
   Date: ____________________________

Aquifer System Name: Schofield
   State Well No.: 3-3004-01
   State Well #:
   Shallow Well
   Deep Well

City of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources
SUBJECT TO CHANGE
Figure 7.6
GENERALIZED CONSTRUCTION FOR OPERABLE UNIT 1 MONITORING WELL

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland