SCHOFIELD 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 - CALE
       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.

MV4-4 3004-04 PERMIT - BOTH
       AFTER THE FACT PUMP PERMIT
       PERMIT COND. - O.K

NOTE:
Chronology repeats for each of 4 monitor
wells

1
MW4-2A  3004-05  APPLIC. - BOTH

**AFTER THE FACT**  REPLACEMENT WELL FOR MW4-2
Pump Permit  2004-02.

PERMIT COND. - OK.

2-6  2902-01  APPLIC. - BOTH

PERMIT COND. - OK

2-5  2959-01  APPLIC. - BOTH

PERMIT COND. - OK

2-4  2901-02  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:**
- [ ] Well Construction
- [x] Pump Installation
- [ ] Water Use Required

**Well Name:** Schofield Monitor 4-4

**Applicant:** US Army Environmental

**Landowner:** US Army

**Consultant:** Roscoe Moss

**TMK:** 7-7-1:1

**Appl Recd:** 26 Apr 95

**Mapped/#:** 8 May 95

**Logcomp:** 5-9-95

**Logbk:** 5-9-95

**Acknowlgmt:** MAY 11 1995

**Fee Depos:** N/A

<table>
<thead>
<tr>
<th>Copies Sent for Review</th>
<th>Sent</th>
<th>Comments Recd</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoH/ Drink Water</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Wastewater</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Hist. Preserv</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Aquat Res</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>OHA</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>DHHL</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Honolulu BWS</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Maui DoW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kauai DoW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawaii DoW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCLDF</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Com:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wahiawa N.B.</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Mililani N.B.</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
<tr>
<td>Northshore N.B.</td>
<td>MAY 11 1995</td>
<td></td>
</tr>
</tbody>
</table>

**Bulletin**
- to Agenda
- Submittal
- CWRM _Appr _Deny
- Permit/Notice to Appl

**Handing Lawson**

**After**
**MONITORING WELL 4**

**GROUND ELEVATION = 828'**

5" DIA. HOLLOW STEEL PICKET FILLED WITH CEMENT

NO. 2 COARSE GRAVEL

CEMENT MOUND

WELL CAP

830'

26" DIA. STEEL WELL MONUMENT

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

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

---

**Well Completion Diagram for Well 4-4**

Schofield DA03
Schofield Barracks
Island of Oahu, Hawaii

Elevations measured with respect to mean sea level.

**Figure**

**Harding Lawson Associates**
Engineering and Environmental Services

**DATE**

3/95

**REVISED DATE**

3/95
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>3-3004-01</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 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

Northing Easting Elevation Latitude Longitude
MW 2-6 111702.132 484685.053 691.57° 21°28'27.04" 158°02'42.147"
BM#1
BM#2
BM#3

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

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
Coordinate File Name: HARDING.CO

Wednesday January 10, 1996  12:54 PM

Coordinate Manager

Lowest point #:  1  Highest point #:  6

Job #:  10

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>855.3800</td>
<td>MW 1-1</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>853.4671</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 (NAD27)
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]

MICHAEL D. WILSON  
Chairperson

Enclosures
WELL CONSTRUCTION PERM

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 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

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
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]
MICHAEI D. WILSON
Chairperson

Enclosures
AFTEfTHE-FACT PUMP INSTALLATION PERMIT

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

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
Mr. Jon Fukuda  
U.S. Army  
DPW, Attn: APVG-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, 2901-02, 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. MW4-2 (Well No. 2900-01)  
   a. As-built sectional drawing of the pump

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 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.

LN:ss
Attachment(s)

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

Contact Person: ___________________________ Phone: ___________________ 

Signed: _________________________________ Date: ___________________
TO: Honorable Lawrence Mûke, 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: Bill Wong Phone: 586-0258

Signed: Bill Wong Date: 4/1/96

APR 11 1996
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.  

RESPONSE: [ ] We have no comments  
[ ] Comments attached  
Contact Person: [ ] Lori N. Kajiwara  
Phone: 587-0218  
Signed: [ ] Lori N. Kajiwara  
Date: 4-19-96  

CE: Michael D. Wilson, Chairperson  
ROBERT G. GIRALD  
DAVID A. NOBRIGA  
LAWRENCE H. MIKE  
RICHARD H. COX  
HERBERT M. RICHARDS, JR.  
RAE M. LOUI, P.E.  
DEPUTY  

LN: [ ] We have no comments  
[ ] Comments attached  
Contact Person: [ ] Lori N. Kajiwara  
Phone: 587-0218  
Signed: [ ] Lori N. Kajiwara  
Date: 4-19-96  

RECEIVED  
P2: 27
To: Mr. Charlie Ice  
Commission on Water Resource Management  
P. O. Box 621  
Honolulu, Hawaii 96809

From: Bruce S. Wedgeworth  
Associate Geologist

Date: February 27, 1996

Subject: Schofield Barracks RI/FS; Schofield Barracks, Oahu, Hawaii

Project Number: 28339 01.01.12

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)  
   (a) WELL OWNER  
   Firm/Name: U.S. Army  
   Contact Person: Jon Fukuda  
   Address: Schofield Barracks, Garrison 
   Hawaii 96857-5000
   (b) LANDOWNER  
   Firm/Name: SAME AS WELL OWNER
   Contact Person:  
   Address:  

2. WELL LOCATION/NAME: Schofield Barracks/MW-2A  
   Island: Oahu  
   Address: Kawai St. and Lanai St., Schofield Barracks, Tax Map Key H1 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:  
   (b) WELL TYPE:  
   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
   (a) Pump Type: Deep Well Turbine, Submersible, Centrifugal
   (b) Motor: Electric, rated horsepower: 7.5
   If Pump Replacement, Existing Pump Capacity: __________ gallons per minute

5. PROPOSED USE:  
   (a) Municipal (including hotels, stores, etc.)  
   Domestic (individual, noncommercial water sys.)
   Irrigation (crop)  
   (b) Military  
   Industrial  
   Other (explain):

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

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

8. REMARKS, EXPLANATIONS:  
   Well shall be used for monitoring of groundwater quality and for collecting groundwater elevation data.

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:

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

11/5/95 WCPF Form
8. Remarks, Explanations (cont'd):

9. PROPOSED WELL SECTION

Elevation at top of casing
947 ft. msl.

Ground Elevation: 945 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.

Perforated Screen (louvered)
- Material: Stainless steel
- Length: 150 ft.
- Diameter: 6 in.
- Wall thickness: 0.25 in.
- Openings: 2.4 sq. in./ft.

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 Resources 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 1-800-486-8984 Ext 7-0225.

1. STATE WELL NO. 3004-05
2. WELL NAME MWA-2A
3. TAX MAP NO. 7-7-01
4. ISLAND Oahu
5. LOCATION: Address Kauai St. and Lanai St., Schofield
6. CONTRACTOR'S C-57 LICENSE NUMBER C-16437
7. DRILLING OR PUMP INSTALLATION CONTRACTOR Roscoe Moss Hawaii, Inc.
8. NAME OF DRILLER WHO PERFORMED WORK Elmo Shepard
9. TYPE OF RIG/CONSTRUCTION Air Rotary/Star 150K
10. DATE OF WELL DRILLING COMPLETION 12/19/94
11. TOTAL DEPTH OF WELL BELOW GROUND 815 ft.
12. HOLE SIZE: 18 inch dia. from 0 ft. to 200 ft. below ground
13. CASING INSTALLED: 6 in. I.D. x 0.28 in. wall solid section to 661 ft. below ground
14. INITIAL WATER LEVEL 671.63 ft. below ground.
15. INITIAL CHLORIDE Not analyzed ppm
16. INITIAL TEMPERATURE 70.5 °F
17. PUMPING TESTS: Reference Point (R.P.) used: 120 ft. below R.P.
18. AQUIFER PUMP TEST PROCEDURES DATA & GRAPHS ATTACHED? Yes

PUMP INSTALLATION REPORT

19. DATE OF PUMP INSTALLATION 3/20/95
20. PUMP TYPE, MAKE, SERIAL NO. Submersible, Meyers, Make: 3JR343-258
21. MOTOR TYPE, H.P., VOLTAGE, RPM Franklin Electric, 7.5 HP, 460V, 1760 RPM
22. DEPTH OF PUMP INTAKE SETTING 687 ft. below surface
23. DEPTH OF BOTTOM OF AIRLIFT N/A ft. below surface
24. CAPACITY 25 gpm
25. PUMPING HEAD - 676 ft.

For Official Use: Well No. 3004-05
Longitude 158 04 49
Latitude 21 30 35

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

DEPT (FT)  ELEVATION (FT)
200        745

622        323
638        307
617        298
661        284
676.20     270.67 (10/10/95)
691        254
711        234
724        221
815        130

*DATUM: MEAN SEA LEVEL

FIGURE

Harding Lawson Associates
Engineering and Environmental Services

Monitoring Well 4-2A
Schofield Barracks
Island of Oahu, Hawaii

DRAWN            JOB NUMBER            APPROVED           FILE            DATE             REVISED DATE
jcl               28339.09.02.12         2832984110         199511061457     9/95

Pump Section Oren
**Pump Installation Diagram for Monitoring Well 4-2A**

**Harding Lawson Associates**

Engineering and Environmental Services

Schofield Barracks

Island of Oahu, Hawaii

**Datum:** Mean Sea Level

**NOT TO SCALE**

- **647 ft:** 298 ft
- **676.20 ft:** 270.67 ft (10/10/95) (Elevation of Groundwater)
- **691 ft:** 254 ft
- **680 ft:** 265 ft
- **687 ft:** 259 ft
- **689 ft:** 256 ft
- **711 ft:** 234 ft
- **724 ft:** 221 ft
- **815 ft:** 130 ft

**DEPTH (FT) ELEVATION (FT)**

- **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**

**FILE:**

- **28339.040 199501661456**
- **DATE:** 9/95
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>
</tr>
</thead>
<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>
<td>581.99</td>
<td>270.79</td>
</tr>
<tr>
<td></td>
<td>2-1</td>
<td>10/10/95</td>
<td>1126</td>
<td>903.75</td>
<td>632.40</td>
<td>0.01</td>
<td>632.39</td>
<td>271.36</td>
</tr>
<tr>
<td></td>
<td>2-2</td>
<td>10/10/95</td>
<td>1029</td>
<td>864.34</td>
<td>593.25</td>
<td>0.05</td>
<td>593.20</td>
<td>271.14</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>10/10/95</td>
<td>1330</td>
<td>828.81</td>
<td>557.59</td>
<td>0.04</td>
<td>557.55</td>
<td>271.26</td>
</tr>
<tr>
<td></td>
<td>2-4</td>
<td>10/10/95</td>
<td>1314</td>
<td>829.70</td>
<td>558.55</td>
<td>0.09</td>
<td>558.46</td>
<td>271.24</td>
</tr>
<tr>
<td></td>
<td>2-5</td>
<td>10/10/95</td>
<td>1103</td>
<td>912.20</td>
<td>640.41</td>
<td>0.11</td>
<td>640.30</td>
<td>271.90</td>
</tr>
<tr>
<td>3004-01</td>
<td>4-1</td>
<td>10/10/95</td>
<td>0835</td>
<td>853.47</td>
<td>585.73</td>
<td>2.65</td>
<td>583.08</td>
<td>270.39</td>
</tr>
<tr>
<td>3004-02</td>
<td>4-2</td>
<td>10/10/95</td>
<td>0949</td>
<td>947.11</td>
<td>677.25</td>
<td>1.54</td>
<td>675.71</td>
<td>271.40</td>
</tr>
<tr>
<td>3004-05</td>
<td>4-2A</td>
<td>10/10/95</td>
<td>1003</td>
<td>946.87</td>
<td>676.24</td>
<td>0.04</td>
<td>676.20</td>
<td>270.67</td>
</tr>
<tr>
<td>3004-03</td>
<td>4-3</td>
<td>10/10/95</td>
<td>0855</td>
<td>884.15</td>
<td>613.27</td>
<td>0.13</td>
<td>613.14</td>
<td>271.01</td>
</tr>
<tr>
<td></td>
<td>4-4</td>
<td>10/10/95</td>
<td>0925</td>
<td>829.88</td>
<td>559.28</td>
<td>0.0</td>
<td>559.28</td>
<td>270.60</td>
</tr>
</tbody>
</table>
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 I.D. No.</th>
<th>Hawaii State Plane (ft)</th>
<th>Top of Sounding Tube Elevation (ft)</th>
<th>UTM Coordinates (meters)</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Northing</td>
<td>Easting</td>
<td>Northing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1</td>
<td>3-2901-13</td>
<td>117515.94</td>
<td>490579.06</td>
<td>852.78</td>
<td>2376770</td>
<td>600760</td>
</tr>
<tr>
<td>2-1</td>
<td>3-2900-02</td>
<td>117736.41</td>
<td>495036.81</td>
<td>903.75</td>
<td>2376800</td>
<td>602280</td>
</tr>
<tr>
<td>2-2</td>
<td>3-2900-01</td>
<td>121016.10</td>
<td>481183.95</td>
<td>864.34</td>
<td>2377760</td>
<td>597830</td>
</tr>
<tr>
<td>2-3</td>
<td>3-2900-03</td>
<td>115456.52</td>
<td>483851.56</td>
<td>828.81</td>
<td>2376100</td>
<td>598640</td>
</tr>
<tr>
<td>2-4</td>
<td>3-2901-04</td>
<td>114890.40</td>
<td>489648.08</td>
<td>829.70</td>
<td>2375930</td>
<td>600435</td>
</tr>
<tr>
<td>2-5</td>
<td>3-2901-01</td>
<td>118439.36</td>
<td>503505.78</td>
<td>912.20</td>
<td>2377050</td>
<td>604675</td>
</tr>
<tr>
<td>4-1</td>
<td>3-3004-01</td>
<td>123512.01</td>
<td>474076.13</td>
<td>853.47</td>
<td>2378530</td>
<td>595840</td>
</tr>
<tr>
<td>4-2</td>
<td>3-3004-02</td>
<td>124621.32</td>
<td>472744.17</td>
<td>947.11</td>
<td>2378880</td>
<td>595300</td>
</tr>
<tr>
<td>4-2A</td>
<td>3-3000-02</td>
<td>124606.63</td>
<td>472746.61</td>
<td>946.87</td>
<td>2378875</td>
<td>595300</td>
</tr>
<tr>
<td>4-3</td>
<td>3-3004-03</td>
<td>122896.38</td>
<td>474006.88</td>
<td>884.15</td>
<td>2378340</td>
<td>595660</td>
</tr>
<tr>
<td>4-4</td>
<td>3-3004-04</td>
<td>124474.82</td>
<td>474375.30</td>
<td>829.88</td>
<td>2378815</td>
<td>595825</td>
</tr>
</tbody>
</table>

NA = Not assigned yet by the DLNR.
<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>0-10</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10-20</td>
<td>13</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>14</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td>14</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>50-60</td>
<td>10</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

**Air Rotary/Star 150K**

**Ground Elevation**

945 ft  Date 12/19/94

**Log of Monitoring Well 4-2A** (Sheet 1 of 13)

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**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 (10YR,4/6) and strong brown (7.5YR,5/8) elastic silt.**

**RED ELASTIC SILT (MH) (10YR,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.**
**Sample Interval** (feet) | **Drilling Rate** (min./5 feet) | **Breathing Space Measurement** (ppm) | **Sample Number**
--- | --- | --- | ---
60-70 | 4 | 7
70-80 | 3 | 8
80-90 | 2 | 9
90-100 | 4 | 10
100-110 | 3 | 11
110-120 | 4 | 12

**Equipment**

**Air Rotary/Star 150K**

**Ground Elevation** 945 ft **Date** 12/19/94

---

(5YR,3/3) elastic silt.

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,5/8), 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,5/8) 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.

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

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

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.
<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>120-130</td>
<td>3</td>
<td></td>
<td>13</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>140</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>145</td>
</tr>
<tr>
<td>130-140</td>
<td>2</td>
<td></td>
<td>14</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>155</td>
</tr>
<tr>
<td>140-150</td>
<td>24</td>
<td></td>
<td>15</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>165</td>
</tr>
<tr>
<td>150-160</td>
<td>4</td>
<td></td>
<td>16</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>175</td>
</tr>
<tr>
<td>160-170</td>
<td>10</td>
<td></td>
<td>17</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>185</td>
</tr>
<tr>
<td>170-180</td>
<td>15</td>
<td></td>
<td>18</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>195</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Ground Elevation</th>
<th>Height (ft)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>945</td>
<td>12/19/94</td>
</tr>
</tbody>
</table>

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.
<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>190-200</td>
<td>5</td>
<td>18</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>200-210</td>
<td>5</td>
<td>20</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>21</td>
<td>205</td>
<td></td>
</tr>
<tr>
<td>210-220</td>
<td>5</td>
<td>22</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>23</td>
<td>215</td>
<td></td>
</tr>
<tr>
<td>220-230</td>
<td>2</td>
<td>24</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>25</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>230-240</td>
<td>3</td>
<td>26</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>240-250</td>
<td>19</td>
<td>27</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td>245</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>250</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>255</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>260</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

<table>
<thead>
<tr>
<th>Air Rotary/Star 150K</th>
</tr>
</thead>
</table>

**Ground Elevation**

945 ft

**Date**

12/19/94

---

Decreased drilling resistance from 194 to 220 feet.

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.)

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.

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.

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.

Decreased drilling resistance from 249 to 280 feet.

Olive black (5Y,2/1) and dark gray (N3), moderately hard, weak 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>4</td>
<td></td>
<td></td>
<td>260</td>
</tr>
<tr>
<td>260-270</td>
<td>7</td>
<td></td>
<td>27</td>
<td>267</td>
</tr>
<tr>
<td>270-280</td>
<td>3</td>
<td></td>
<td>28</td>
<td>273</td>
</tr>
<tr>
<td>280-290</td>
<td>10</td>
<td></td>
<td>29</td>
<td>283</td>
</tr>
<tr>
<td>290-300</td>
<td>4</td>
<td></td>
<td>30</td>
<td>295</td>
</tr>
<tr>
<td>300-310</td>
<td>12</td>
<td></td>
<td>31</td>
<td>305</td>
</tr>
<tr>
<td>310-320</td>
<td>22</td>
<td></td>
<td>32</td>
<td>325</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 (5Y, 2/1) and olive black (5Y, 2/1), hard, little to moderate weathering, slightly vesicular below 320 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./15 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>10</td>
<td>33</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td>330</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>330-340</td>
<td>10</td>
<td></td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>5</td>
<td></td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>340-350</td>
<td>5</td>
<td></td>
<td>355</td>
<td></td>
</tr>
<tr>
<td>350-360</td>
<td>12</td>
<td></td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>360</td>
<td>2</td>
<td></td>
<td>365</td>
<td></td>
</tr>
<tr>
<td>360-370</td>
<td>4</td>
<td></td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>370</td>
<td>9</td>
<td></td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>370-380</td>
<td>5</td>
<td></td>
<td>380</td>
<td></td>
</tr>
<tr>
<td>380</td>
<td>4</td>
<td></td>
<td>385</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

Air Rotary/Star 150K

**Ground Elevation**

945 ft  Date  12/19/94

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>390-400</td>
<td>7</td>
<td></td>
<td></td>
<td>395</td>
</tr>
<tr>
<td>390-400</td>
<td>8</td>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>400-410</td>
<td>6</td>
<td></td>
<td>34</td>
<td>410</td>
</tr>
<tr>
<td>410-420</td>
<td>10</td>
<td></td>
<td>35</td>
<td>420</td>
</tr>
<tr>
<td>420-430</td>
<td>3</td>
<td></td>
<td>36</td>
<td>430</td>
</tr>
<tr>
<td>430-440</td>
<td>4</td>
<td></td>
<td></td>
<td>440</td>
</tr>
<tr>
<td>440-450</td>
<td>3</td>
<td></td>
<td></td>
<td>450</td>
</tr>
</tbody>
</table>

**Equipment**

Air Rotary/Star 150K

**Elevation** 945 ft  
**Date** 12/19/94

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>
</tr>
</thead>
<tbody>
<tr>
<td>450-460</td>
<td>8</td>
<td></td>
<td>4</td>
<td>455</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td>465</td>
</tr>
<tr>
<td>460-470</td>
<td>4</td>
<td></td>
<td></td>
<td>470</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td>475</td>
</tr>
<tr>
<td>470-480</td>
<td>4</td>
<td></td>
<td></td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td>485</td>
</tr>
<tr>
<td>480-490</td>
<td>5</td>
<td></td>
<td></td>
<td>490</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td>495</td>
</tr>
<tr>
<td>490-500</td>
<td>7</td>
<td></td>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td>505</td>
</tr>
<tr>
<td>500-510</td>
<td>7</td>
<td>37</td>
<td></td>
<td>510</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td>515</td>
</tr>
</tbody>
</table>

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.

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-2A (Sheet 8 of 13)
<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>510-520</td>
<td>9</td>
<td></td>
<td>38</td>
<td>520</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td>525</td>
</tr>
<tr>
<td>520-530</td>
<td>5</td>
<td></td>
<td></td>
<td>530</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td>535</td>
</tr>
<tr>
<td>530-540</td>
<td>5</td>
<td></td>
<td></td>
<td>540</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td>545</td>
</tr>
<tr>
<td>540-550</td>
<td>4</td>
<td></td>
<td></td>
<td>550</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>555</td>
</tr>
<tr>
<td>550-560</td>
<td>4</td>
<td></td>
<td></td>
<td>560</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td>565</td>
</tr>
<tr>
<td>560-570</td>
<td>7</td>
<td></td>
<td></td>
<td>570</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td>575</td>
</tr>
<tr>
<td>570-580</td>
<td>4</td>
<td></td>
<td></td>
<td>580</td>
</tr>
</tbody>
</table>

Decreased drilling resistance from 526 to 562 feet.

(Loss of drilling foam circulation from 536 to 580 feet.)

Decreased drilling resistance from 564 to 588 feet.

Log of Monitoring Well 4-2A (Sheet 9 of 13)
<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>
<td>5</td>
<td>585</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>590</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>595</td>
<td></td>
<td></td>
</tr>
<tr>
<td>590-600</td>
<td>4</td>
<td>600</td>
<td>590</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>605</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600-610</td>
<td>7</td>
<td>610</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>615</td>
<td></td>
<td></td>
</tr>
<tr>
<td>610-620</td>
<td>4</td>
<td>620</td>
<td>610</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>620-630</td>
<td>6</td>
<td>630</td>
<td>620</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>635</td>
<td></td>
<td></td>
</tr>
<tr>
<td>630-640</td>
<td>15</td>
<td>640</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>645</td>
<td></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 grey (N3), moderately hard, weak below 610 feet.

Greenish black (5GY,2/1), greyish 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>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>640-650</td>
<td>4</td>
<td></td>
<td>44</td>
<td>650</td>
</tr>
<tr>
<td>650-655</td>
<td>3</td>
<td></td>
<td>655</td>
<td></td>
</tr>
<tr>
<td>650-660</td>
<td>5</td>
<td></td>
<td>660</td>
<td></td>
</tr>
<tr>
<td>660-665</td>
<td>4</td>
<td></td>
<td>665</td>
<td></td>
</tr>
<tr>
<td>660-670</td>
<td>5</td>
<td></td>
<td>670</td>
<td>46</td>
</tr>
<tr>
<td>670-675</td>
<td>5</td>
<td></td>
<td>675</td>
<td></td>
</tr>
<tr>
<td>670-680</td>
<td>4</td>
<td></td>
<td>680</td>
<td>47</td>
</tr>
<tr>
<td>680-685</td>
<td>5</td>
<td></td>
<td>685</td>
<td></td>
</tr>
<tr>
<td>680-690</td>
<td>5</td>
<td></td>
<td>690</td>
<td>48</td>
</tr>
<tr>
<td>690-695</td>
<td>3</td>
<td></td>
<td>695</td>
<td></td>
</tr>
<tr>
<td>690-700</td>
<td>6</td>
<td></td>
<td>700</td>
<td>49</td>
</tr>
<tr>
<td>700-705</td>
<td>4</td>
<td></td>
<td>705</td>
<td></td>
</tr>
<tr>
<td>700-710</td>
<td>5</td>
<td></td>
<td>710</td>
<td>50</td>
</tr>
</tbody>
</table>

Equipment: Air Rotary/Star 150K

(Ground) Elevation: 945 ft

Date: 12/19/94

- 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.

Log of Monitoring Well 4-2A (Sheet 11 of 13)
<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>51</td>
<td>720</td>
<td>715</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>720-730</td>
<td>5</td>
<td>52</td>
<td>730</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>730-740</td>
<td>5</td>
<td>53</td>
<td>740</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>740-750</td>
<td>7</td>
<td>54</td>
<td>750</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>750-760</td>
<td>9</td>
<td>55</td>
<td>760</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>760-770</td>
<td>5</td>
<td>770</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>775</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

<table>
<thead>
<tr>
<th>Air Rotary/Star 150K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Elevation</td>
</tr>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>

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

**Sheet 12 of 13**

**FIGURE**

- **Schofield TEPS 5**
- **Schofield Barracks**
- **Island of Oahu, Hawaii**

**APPROVED FILE**

**DATE**

**REVIS**

**DRAWN**

**JOB NUMBER**

**STEPS**

**DATE**

**REVIS**
<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</th>
</tr>
</thead>
<tbody>
<tr>
<td>770-780</td>
<td>3</td>
<td></td>
<td></td>
<td>780</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Loss of drilling foam circulation from 779 to 795 feet.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>780-790</td>
<td>4</td>
<td></td>
<td>5</td>
<td>785</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>790-800</td>
<td>7</td>
<td></td>
<td>3</td>
<td>790</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800-810</td>
<td>7</td>
<td></td>
<td></td>
<td>810</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total depth = 815 feet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water table was measured at 671.63 feet below ground surface, 12/20/94, 10:50.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Log of Monitoring Well 4-2A
Schofield Barracks
Island of Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-2A (Sheet 13 of 13)
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
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 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>
<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″</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
"+" 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

MK-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

Job #: 10

Description:

<table>
<thead>
<tr>
<th>Point</th>
<th>Northing</th>
<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.MERCATOR - HAWAII 3</td>
<td>117515.9390</td>
<td>490579.0620</td>
<td>855.3500</td>
<td>LAT/LONG MW 1-1</td>
</tr>
<tr>
<td>S.P. → 1</td>
<td>117515.9390</td>
<td>490579.0620</td>
<td>855.3500</td>
<td>LAT/LONG MW 1-1</td>
</tr>
<tr>
<td>21-29-59.344</td>
<td>158-03-19.250</td>
<td>LAT/LONG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.P. → 2</td>
<td>121016.1042</td>
<td>481183.9529</td>
<td>863.3800</td>
<td>LAT/LONG MW 2-2</td>
</tr>
<tr>
<td>S.P. → 3</td>
<td>123512.2200</td>
<td>474675.9900</td>
<td>853.4671</td>
<td>LAT/LONG MW 4-1</td>
</tr>
<tr>
<td>21-30-35.038</td>
<td>158-04-48.642</td>
<td>LAT/LONG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.P. → 4</td>
<td>124621.3160</td>
<td>472744.1700</td>
<td>947.1000</td>
<td>LAT/LONG MW 4-2</td>
</tr>
<tr>
<td>21-30-17.949</td>
<td>158-04-35.261</td>
<td>LAT/LONG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.P. → 5</td>
<td>122896.3800</td>
<td>474006.8800</td>
<td>884.1500</td>
<td>LAT/LONG MW 4-3</td>
</tr>
<tr>
<td>21-29-33.838</td>
<td>157-59-22.878</td>
<td>LAT/LONG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.P. → 6</td>
<td>118439.3594</td>
<td>503505.7809</td>
<td>912.4300</td>
<td>LAT/LONG MW 2-5</td>
</tr>
<tr>
<td>0-00-13.601</td>
<td>CONVERGENCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.9999900 SCALE FACTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.9999464 GRID FACTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S.P. → 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 4-4 (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,  

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. 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 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.

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

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

7. The permit shall not constitute a determination of correlative water rights.

8. The permittee shall not construct the well if 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.

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

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,

[Signature]
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 7-7-01, 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

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management
<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>
</tr>
</thead>
<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>
<td>581.99</td>
<td>270.79</td>
</tr>
<tr>
<td></td>
<td>2-1</td>
<td>10/10/95</td>
<td>1126</td>
<td>903.75</td>
<td>632.40</td>
<td>0.01</td>
<td>632.39</td>
<td>271.25</td>
</tr>
<tr>
<td></td>
<td>2-2</td>
<td>10/10/95</td>
<td>1029</td>
<td>864.34</td>
<td>593.25</td>
<td>0.05</td>
<td>593.20</td>
<td>271.16</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>10/10/95</td>
<td>1330</td>
<td>828.81</td>
<td>557.59</td>
<td>0.04</td>
<td>557.55</td>
<td>271.26</td>
</tr>
<tr>
<td></td>
<td>2-4</td>
<td>10/10/95</td>
<td>1314</td>
<td>829.70</td>
<td>556.55</td>
<td>0.09</td>
<td>556.46</td>
<td>271.24</td>
</tr>
<tr>
<td></td>
<td>2-5</td>
<td>10/10/95</td>
<td>1103</td>
<td>912.20</td>
<td>640.41</td>
<td>0.11</td>
<td>640.30</td>
<td>271.90</td>
</tr>
<tr>
<td>3004-01</td>
<td>4-1</td>
<td>10/10/95</td>
<td>0835</td>
<td>853.47</td>
<td>585.73</td>
<td>2.65</td>
<td>583.08</td>
<td>270.39</td>
</tr>
<tr>
<td>3004-02</td>
<td>4-2</td>
<td>10/10/95</td>
<td>0949</td>
<td>947.11</td>
<td>677.25</td>
<td>1.54</td>
<td>675.71</td>
<td>271.40</td>
</tr>
<tr>
<td></td>
<td>4-2A</td>
<td>10/10/95</td>
<td>1003</td>
<td>946.87</td>
<td>676.24</td>
<td>0.04</td>
<td>676.20</td>
<td>270.67</td>
</tr>
<tr>
<td>3004-03</td>
<td>4-3</td>
<td>10/10/95</td>
<td>0855</td>
<td>884.15</td>
<td>613.27</td>
<td>0.13</td>
<td>613.14</td>
<td>271.01</td>
</tr>
<tr>
<td>3004-04</td>
<td>4-4</td>
<td>10/10/95</td>
<td>0925</td>
<td>829.88</td>
<td>559.28</td>
<td>0.0</td>
<td>559.28</td>
<td>270.60</td>
</tr>
</tbody>
</table>
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 LD. No.</th>
<th>Hawaii State Planner (Pt)</th>
<th>Top of Sounding Tube Elevation (Pt)</th>
<th>UTM Coordinates (Meters)</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Northing</td>
<td>Easting</td>
<td>Northing</td>
<td>Easting</td>
<td>21° 29' 24.680&quot;</td>
</tr>
<tr>
<td>1-1</td>
<td>3-2901-13</td>
<td>117515.94</td>
<td>490579.06</td>
<td>852.78</td>
<td>2376770</td>
<td>600760</td>
</tr>
<tr>
<td>2-1</td>
<td>NA</td>
<td>117736.41</td>
<td>495036.81</td>
<td>903.75</td>
<td>2376800</td>
<td>602280</td>
</tr>
<tr>
<td>2-2</td>
<td>NA</td>
<td>121016.10</td>
<td>481183.95</td>
<td>864.34</td>
<td>2377780</td>
<td>597830</td>
</tr>
<tr>
<td>2-3</td>
<td>NA</td>
<td>115456.52</td>
<td>483851.56</td>
<td>828.81</td>
<td>2376100</td>
<td>598640</td>
</tr>
<tr>
<td>2-4</td>
<td>NA</td>
<td>114890.40</td>
<td>489648.08</td>
<td>829.70</td>
<td>2375930</td>
<td>600435</td>
</tr>
<tr>
<td>2-5</td>
<td>NA</td>
<td>118439.36</td>
<td>503505.78</td>
<td>912.20</td>
<td>2377050</td>
<td>604675</td>
</tr>
<tr>
<td>4-1</td>
<td>3-3004-01</td>
<td>123512.01</td>
<td>474676.13</td>
<td>853.47</td>
<td>2378530</td>
<td>595840</td>
</tr>
<tr>
<td>4-2</td>
<td>3-3004-02</td>
<td>124821.32</td>
<td>472744.17</td>
<td>947.11</td>
<td>2378880</td>
<td>595300</td>
</tr>
<tr>
<td>4-2A</td>
<td>NA</td>
<td>124606.63</td>
<td>472746.61</td>
<td>946.87</td>
<td>2378875</td>
<td>595300</td>
</tr>
<tr>
<td>4-3</td>
<td>3-3004-03</td>
<td>122896.38</td>
<td>474006.88</td>
<td>884.15</td>
<td>2378340</td>
<td>595660</td>
</tr>
<tr>
<td>4-4</td>
<td>NA</td>
<td>124474.82</td>
<td>474375.30</td>
<td>829.68</td>
<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 96810. 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 1-800-468-9694 Ext. 7-0225.

## 1. STATE WELL NO. 3004-04

### WELL NAME

M4-4

### ISLAND

Oahu

## 2. LOCATION:

- **Address:** Oahu Street, Schofield Barracks, HI
- **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 RI/CONSTRUCTION

Air Rotary/Star 150K

## 7. DATE OF WELL DRILLING COMPLETION

1/27/95

## 8. GROUND ELEVATION (msl)

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

- 30 ft. to 200 ft. below ground
- 12 ft. to 270 ft. below ground
- 8 ft. to 300 ft. below ground
- 5 ft. to 400 ft. below ground
- 3 ft. to 500 ft. below ground
- 2 ft. to 600 ft. below ground
- 1 ft. to 700 ft. below ground
- 0 ft. to below ground

## 11. HOLE SIZE:

<table>
<thead>
<tr>
<th>Size (in.)</th>
<th>Depth from</th>
<th>Below ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.312</td>
<td>0 ft. to</td>
<td>200 ft.</td>
</tr>
<tr>
<td>N/A</td>
<td>0 ft. to</td>
<td>200 ft.</td>
</tr>
<tr>
<td>N/A</td>
<td>0 ft. to</td>
<td>200 ft.</td>
</tr>
<tr>
<td>N/A</td>
<td>0 ft. to</td>
<td>200 ft.</td>
</tr>
<tr>
<td>N/A</td>
<td>0 ft. to</td>
<td>200 ft.</td>
</tr>
</tbody>
</table>

## 12. CASING INSTALLED:

Grouted from 0 ft. below ground to 200 ft. below ground

Gravel packed from N/A ft. below ground to N/A ft. below ground

## 13. ANNULUS:

- 553.5 ft. below ground
- 29 gpm Date and time of measurement: 0955 hrs., 01/28/95
- 70.5 °F Date and time of sampling: 1522 hrs., 08/01/95

## 14. INITIAL WATER LEVEL

<table>
<thead>
<tr>
<th>Depth from</th>
<th>Below ground</th>
<th>Date and time of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ft.</td>
<td>200 ft.</td>
<td>0955 hrs., 01/28/95</td>
</tr>
<tr>
<td>0 ft.</td>
<td>200 ft.</td>
<td>1643 hrs., 04/04/95</td>
</tr>
</tbody>
</table>

## 15. INITIAL CHLORIDE

<table>
<thead>
<tr>
<th>ppm</th>
<th>Date and time of sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>1522 hrs., 08/01/95</td>
</tr>
</tbody>
</table>

## 16. INITIAL TEMPERATURE

<table>
<thead>
<tr>
<th>°F</th>
<th>Date and time of sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>70.5</td>
<td>1522 hrs., 08/01/95</td>
</tr>
</tbody>
</table>

## 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. below R.P. Depth of well _____ ft. below R.P.

## 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:

- **Submersible**, Meyers, Capacity: 25 gpm
- **Motor type, H.P., Voltage, rpm** Franklin Electric, 7.5 HP, 460V, 1760 RPM
- **Depth of Pump Intake Setting** 574 ft. below surface, which elevation is 256 ft. below ground
- **Depth of bottom of airliner** N/A ft. below, which elevation is 

### Remarks:

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

**Contractor (print):** Roscoe Moss Hawaii Inc. **Title:** Manager

**Signature:**

**Date:** 2/16/96

---

**For Driller's Use:**

**Job Name:**

**For Official Use:**

**Well No:** 3004-04

**Longitude:** 158 04 31

**Latitude:** 21 30 34

---

**12/13/95 MCCE 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

Harding Lawson Associates
Engineering and Environmental Services

Typical Well-Head Flange and Landing Plate Arrangement
Schofield Barracks
Island of Oahu, Hawaii

DRAWN
jcl 28339.09.02.12

JOB NUMBER
28339.09.02.12

APPROVED

FILE
28339.09.02.12

DATE
10/95
30" DIA. STEEL WELL MONUMENT

TOP OF SOUNDING TUBE EL. = 829.88 FT.

GROUND SURFACE EL. = 828 FT.

3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

CEMENT MOUND

3.5" DIAMETER STEEL PICKET FILLED WITH CEMENT

DEPT (FT) ELEVATION (FT)

200 628

30" DIAMETER HOLE DRILLED WITH CABLE TOOL

26" DIAMETER STEEL CASING

CEMENT BENTONITE INNER SEAL

12" DIAMETER BORING DRILLED WITH AIR ROTARY

1" DIA. SCH. 80 PVC SOUNDING TUBE

559.28 270.60 (10/10/95)

(ELEVATION OF GROUNDWATER)

567 263

569 261

574 256

576 254

770 60

1.5" DIA. STEEL DISCHARGE PIPE

SUBMERSIBLE PUMP

PUMP INTAKE

*DATUM: MEAN SEA LEVEL

NOT TO SCALE

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

Harding Lawson Associates
Engineering and Environmental Services
Pump Installation Diagram for Monitoring Well 4-4
Schofield Barracks
Island of Oahu, Hawaii

DEPHT (FT)  ELEVATION (FT)
559.28  270.60 (10/10/95) \( \n\) (ELEVATION OF GROUNDWATER)
597  265
567  263
569  261
574  256
576  254
770  60

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

*DATUM: MEAN SEA LEVEL
(NOT TO SCALE)
<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>0-5</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td>-</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10-20</td>
<td>-</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>-</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>30-38</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>38-42</td>
<td>-</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td>-</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>50-55</td>
<td>-</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

<table>
<thead>
<tr>
<th>Ground Equipment</th>
<th>Air Rotary/Star 150K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>828 ft</td>
</tr>
<tr>
<td>Date</td>
<td>01/27/95</td>
</tr>
</tbody>
</table>

**Log of Monitoring Well 4-4**

- **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>Description</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.)</td>
</tr>
<tr>
<td>87-95</td>
<td>-</td>
<td>14</td>
<td>95</td>
<td>GRAYISH-BROWN SANDY ELASTIC SILT (MH), hard, moist.</td>
</tr>
<tr>
<td>95-103</td>
<td>-</td>
<td>15</td>
<td>100</td>
<td>Increased drilling resistance at 110 feet.</td>
</tr>
<tr>
<td>103-113</td>
<td>-</td>
<td>16</td>
<td>110</td>
<td>GRAYISH-BROWN AND GRAY BASALT, with elastic silt, (boulders).</td>
</tr>
<tr>
<td>113-123</td>
<td>-</td>
<td>17</td>
<td>115</td>
<td>(Added 5 sacks of cement to stabilize boulder/cobble layer).</td>
</tr>
<tr>
<td>123-128</td>
<td>-</td>
<td>18</td>
<td>120</td>
<td>Gray, deeply weathered. (Driller notes decrease in drilling resistance below 124 feet.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>125</td>
<td>GRAYISH-BROWN SANDY ELASTIC SILT (MH), hard, moist, with decomposed basalt gravel.</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>Equipment</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>128-133</td>
<td></td>
<td>18A</td>
<td>130</td>
<td>Cable Tool/ Air Rotary/Star 150K</td>
</tr>
<tr>
<td>133-138</td>
<td></td>
<td>19</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>138-141</td>
<td></td>
<td>20</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>141-145</td>
<td></td>
<td>22</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>145-150</td>
<td></td>
<td>23</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>150-155</td>
<td></td>
<td>24</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>155-160</td>
<td></td>
<td>25</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>160-165</td>
<td></td>
<td>26</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>165-170</td>
<td></td>
<td>27</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>170-175</td>
<td></td>
<td>28</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>175-180</td>
<td></td>
<td>29</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>180-185</td>
<td></td>
<td>30</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>185-190</td>
<td></td>
<td>31</td>
<td>190</td>
<td></td>
</tr>
</tbody>
</table>

GRAYISH-BROWN BASALT, low to moderate hardness, moderate to deeply weathered, below 130 feet. Increased drilling resistance.

Dark gray basalt, moderately hard, moderately strong, little weathered, below 137 feet.

Some inclusions of deeply weathered basalt and reddish-brown silt, highly vesicular. Decreased drilling resistance at 145 feet.

Dark gray and reddish-brown, low to moderate hardness, moderately strong, moderate to deeply weathered, below 150 feet. Reddish-brown below 155 feet.

Dark grey, reddish-brown and brown, moderately weathered, below 160 feet.

Gray and light brown, moderately hard to hard, below 175 feet.

Grayish-red (10R,4/2) and medium dark gray (NR), moderately hard, moderately strong to strong, below 185 feet.

Moderately hard to hard.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./15 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft) Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>190-195</td>
<td></td>
<td></td>
<td>32</td>
<td>195</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>195-203</td>
<td></td>
<td></td>
<td>33</td>
<td>205</td>
</tr>
<tr>
<td>203-205</td>
<td>34</td>
<td>0</td>
<td>34</td>
<td>210</td>
</tr>
<tr>
<td>205-210</td>
<td>34</td>
<td></td>
<td>35</td>
<td>215</td>
</tr>
<tr>
<td>210-220</td>
<td>60</td>
<td>0</td>
<td>36</td>
<td>220</td>
</tr>
<tr>
<td>220-230</td>
<td>25</td>
<td>0</td>
<td>37</td>
<td>230</td>
</tr>
<tr>
<td>230-240</td>
<td>14</td>
<td>0</td>
<td>38</td>
<td>240</td>
</tr>
<tr>
<td>240-250</td>
<td>34</td>
<td></td>
<td>39</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>255</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>260</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.

Driller switched to air rotary drilling at 200 feet.

Decreased drilling resistance from 207 to 208.5 feet.

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

Dark gray (N3) and dusty 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./ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-260</td>
<td>30</td>
<td>0</td>
<td>40</td>
<td>260</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>260-270</td>
<td>15</td>
<td>0</td>
<td>41</td>
<td>270</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>275</td>
<td></td>
</tr>
<tr>
<td>270-280</td>
<td>62</td>
<td>0</td>
<td>42</td>
<td>280</td>
<td>Dark gray (N3) and dusky red (5R,3/4), hard, below 280 feet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>285</td>
<td></td>
</tr>
<tr>
<td>280-290</td>
<td>90</td>
<td>0</td>
<td>43</td>
<td>290</td>
<td>Fresh to little weathered.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>290-300</td>
<td>90</td>
<td>0</td>
<td>44</td>
<td>300</td>
<td>Dark gray (N3), slightly vesicular, below 300 feet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>300-310</td>
<td>90</td>
<td>0</td>
<td>45</td>
<td>310</td>
<td>Dark gray (N3) and dusky red (5R,3/4).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>310-320</td>
<td>38</td>
<td>0</td>
<td>46</td>
<td>320</td>
<td>Decreased drilling resistance from 312 to 314 feet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>325</td>
<td></td>
</tr>
</tbody>
</table>

**Equipments:**
- Air Rotary/Star 150K

**Log of Monitoring Well 4-4**
- Schofield DA03
- Schofield Barracks
- Island of Oahu, Hawaii

**Harding Lawson Associates**
- Engineering and Environmental Services

**DRAWN**
- kar

**JOB NUMBER**
- 28339.05.14.12

**APPROVED**
- SDA3

**DATE**
- 01/27/95

**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>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>320-330</td>
<td>23</td>
<td>0</td>
<td>47</td>
<td>330</td>
</tr>
<tr>
<td></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>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>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>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>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></td>
<td></td>
<td></td>
<td></td>
<td>390</td>
</tr>
</tbody>
</table>

- Dark reddish brown (10R,3/4), moderately weathered, below 330 feet.
- Decreased drilling resistance from 334 to 346 feet.
- Dark reddish-brown (10R,3/4) and dark gray (N3), moderately to deeply weathered, below 340 feet.
- 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.
- Moderately hard, moderately strong, highly vesicular.
- 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.
- Brownish-gray (5YR,4/1), dusky red (5YR,3/4), and moderate brown (5YR,3/4) 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>Depth (ft)</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>380-390</td>
<td>40</td>
<td>0</td>
<td>390</td>
<td>63</td>
</tr>
<tr>
<td>390-400</td>
<td>37</td>
<td>0</td>
<td>395</td>
<td>54</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>395-390</td>
<td></td>
</tr>
<tr>
<td>400-410</td>
<td>37</td>
<td>0</td>
<td>400</td>
<td>54</td>
</tr>
<tr>
<td>405</td>
<td></td>
<td></td>
<td>400-405</td>
<td></td>
</tr>
<tr>
<td>410-420</td>
<td>10</td>
<td>0</td>
<td>410</td>
<td>55</td>
</tr>
<tr>
<td>415</td>
<td></td>
<td></td>
<td>410-415</td>
<td></td>
</tr>
<tr>
<td>420-430</td>
<td>18</td>
<td>0</td>
<td>420</td>
<td>56</td>
</tr>
<tr>
<td>425</td>
<td></td>
<td></td>
<td>420-425</td>
<td></td>
</tr>
<tr>
<td>430-440</td>
<td>14</td>
<td>0</td>
<td>430</td>
<td>57</td>
</tr>
<tr>
<td>440</td>
<td></td>
<td></td>
<td>430-440</td>
<td></td>
</tr>
<tr>
<td>445</td>
<td></td>
<td></td>
<td>440</td>
<td>58</td>
</tr>
<tr>
<td>440-450</td>
<td>46</td>
<td>-</td>
<td>450</td>
<td>59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>59</td>
</tr>
</tbody>
</table>

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

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

**Schofield Barracks Island of Oahu, Hawaii**

**Harding Lawson Associates**
Engineering and Environmental Services

**Schofield DA03**

**SDA3**
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>
</tr>
</thead>
<tbody>
<tr>
<td>450-460</td>
<td>22</td>
<td>0</td>
<td>60</td>
<td>460</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<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></td>
<td></td>
<td></td>
<td></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></td>
<td></td>
<td></td>
<td></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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></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></td>
<td></td>
<td></td>
<td></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></td>
<td></td>
<td></td>
<td></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.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./15 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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>520-530</td>
<td>58</td>
<td>-</td>
<td>67</td>
<td>525</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>530-540</td>
<td>22</td>
<td>0</td>
<td>68</td>
<td>530</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>540-550</td>
<td>34</td>
<td>0</td>
<td>69</td>
<td>540</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>550-560</td>
<td>15</td>
<td>0</td>
<td>70</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>560-570</td>
<td>37</td>
<td>0</td>
<td>71</td>
<td>560</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>570-580</td>
<td>30</td>
<td>0</td>
<td>72</td>
<td>570</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **510-520 (feet)**: Moderately hard, moderately strong.
- **520-530 (feet)**: Increased drilling resistance from 524 to 538 feet.
- **530-540 (feet)**: Hard, strong, moderately to highly vesicular.
- **540-550 (feet)**: Dark gray (N3) and dusky red (5R,3/4), fresh to little weathered, below 538 feet.
- **550-560 (feet)**: Decreased drilling resistance from 546 to 558 feet.
- **560-570 (feet)**: Moderately hard, moderately strong, little weathering.
- **570-580 (feet)**: Water table measured at 553.5 feet below ground surface, January 28, 1995, 09:55.

- Increased drilling resistance at 582 feet.
- Dark gray (N3), dark reddish brown (10R,4/6) 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./3 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>35</td>
<td>0</td>
<td>73</td>
<td>590-</td>
</tr>
<tr>
<td>590-600</td>
<td>34</td>
<td>0</td>
<td>74</td>
<td>600-</td>
</tr>
<tr>
<td>600-610</td>
<td>15</td>
<td>0</td>
<td>75</td>
<td>610-</td>
</tr>
<tr>
<td>610-620</td>
<td>20</td>
<td>0</td>
<td>76</td>
<td>620-</td>
</tr>
<tr>
<td>620-630</td>
<td>24</td>
<td>0</td>
<td>77</td>
<td>630-</td>
</tr>
<tr>
<td>630-640</td>
<td>19</td>
<td>0</td>
<td>78</td>
<td>640-</td>
</tr>
<tr>
<td>640-650</td>
<td>65</td>
<td>0</td>
<td></td>
<td>645-</td>
</tr>
</tbody>
</table>

**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.**

---

**Harding Lawson Associates**

**Log of Monitoring Well 4-4** (Sheet 10 of 12) **FIGURE**

**Schofield DA03**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**DRAWN**

kar

**JOB NUMBER**

28339.05.14.12

**APPROVED**

**FILE**

SDA3

**DATE**

4/95

**REVISED DATE**
<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>640-650</td>
<td>51</td>
<td>-</td>
<td>79</td>
<td>650</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td>655</td>
</tr>
<tr>
<td>650-660</td>
<td>20</td>
<td>0</td>
<td>80</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44</td>
<td></td>
<td>665</td>
</tr>
<tr>
<td>660-670</td>
<td>48</td>
<td>-</td>
<td>81</td>
<td>670</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31</td>
<td></td>
<td>675</td>
</tr>
<tr>
<td>670-680</td>
<td>26</td>
<td>0</td>
<td>82</td>
<td>680</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
<td></td>
<td>685</td>
</tr>
<tr>
<td>680-690</td>
<td>35</td>
<td>0</td>
<td>83</td>
<td>690</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48</td>
<td></td>
<td>695</td>
</tr>
<tr>
<td>690-700</td>
<td>24</td>
<td>0</td>
<td>84</td>
<td>700</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td></td>
<td>705</td>
</tr>
<tr>
<td>700-710</td>
<td>16</td>
<td>-</td>
<td>85</td>
<td>710</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>715</td>
</tr>
</tbody>
</table>

Increased drilling resistance from 653 to 655 feet.

Moderate red (5R.4/6), dusky red (5R.3/4) and dark grey (N3), moderately strong to strong, moderate to little weathered, below 660 feet.

Increased drilling resistance from 662 to 684 feet.

Increased drilling resistance from 666 to 669 feet.

Increased drilling resistance from 666 to 669 feet.

Dark grey (N3), dusky yellowish brown (10YR.2/2) and light brown (5YR.5/6) below 670 feet.

Decreased drilling resistance from 674 to 677 feet.

Dark grey (N3) and dusky red (5R.3/4) below 680 feet.

Decreased drilling resistance from 683 to 685 feet.

Decreased drilling resistance from 693 to 694 feet.

Decreased drilling resistance from 697 to 700 feet.

Little weathered.

Moderately hard, moderately strong, moderately to highly vesicular.
<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>Description</th>
</tr>
</thead>
<tbody>
<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 (5R,3/4) and moderate brown (5YR,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 (5YR,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>
</tbody>
</table>
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 (3004-03)

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  

Phone: 527-6183  
Date: JUN 2, 1995  

Signed:  

RAYMOND H. SATO  
Manager and Chief Engineer
Mr. Bruce Wedgewood  
Harding Lawson Associates  
Pearlridge Center Phase I  
98-1005 Moanalua Road  
Suite 235  
Aiea, HI 96701  

Dear Mr. Wedgewood:

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  

CI: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:

- [X] 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:

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 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: 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

<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,

[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: Bill Wong

Signed: Bill Wong

Phone: 586-0258

Date: 5/16/95
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>3004-0304</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.

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: 587-0225
Date: 5/11/95
APPLICATION FOR PERMIT

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 DANILO
      Address: 510/671-1573
      Address: ABERDEEN PROVING GROUND, MD 21010
   (b) LANDOWNER
      Firm/Name: US ARMY
      Contact Person: JON FUKUDA
      Address: DIRECTORATE OF PUBLIC WORKS
      Address: SCHOFIELD BARRACKS, HI 96762
   (c) CONTRACTOR
      Firm/Name: RUSK MOSS HAWAII, INC.
      Contact Person: JAMES DANIEL
      Address: 91-259A GLAI ST.
      Address: KAPOLEI, HI 96707

2. WELL LOCATION/NAME:
   Monitoring Well 4-4
   Island: OAHU
   Address: SCHOFIELD ARMY BARRACKS
   Tax Map Key: 7-7-01

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

(b) WELL TYPE:
   Drilled
   Bored
   Driven
   Grilled
   Radiel

   Is this well a part of the 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
   Motor:
   Propeller
   Reciprocating
   Rotary-Gear
   Impulse
   Electric, rated horsepower of

5. PROPOSED USE:
   Municipal (including hotels, stores, etc.)
   Domestic (individual, noncommercial water use)
   Irrigation (crop)
   State Land Use District:
   County Zoning (describe)
   Military
   Industrial
   Other (explain)

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

7. PENDING ACTIONS:
   CDUA
   OMA
   EIS
   EA
   NONE
   Other (explain)

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

---

U.S. Army Garrison, HI

Date: 7/8/1984

For Official Use Only:

Date Received:

Date Accepted:

Field Checked By:

Longitude:

Latitude:

Aquifer System Name:

State Well No.: 6/64/32 WCR

---
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. |
| Ground Elevation: | 828 ft., msl* |
| Cement Grout: | 300 ft. |
| Hole Diameter: | 24 in. |
| Total Depth: | 770 ft. |
| Rock Packing: | 162 ft. |
| Solid Casing: | |
| Material: Carbon Steel |
| Length: | 546 ft. |
| Diameter: | 20 in. |
| Wall thickness: | |
| Casing: | Perforated Screen |
| Material: Stainless Steel |
| Length: | 150 feet ft. |
| Diameter: | 20 in. |
| Wall thickness: | |
| 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. 3004-06) 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

Cl:ss  
c: 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 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,

[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: ___________________________
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 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 b-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,

[Signature]

RAE M. LOUI, P.E.
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

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: ________________
State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Commission on Water Resource Management
Honolulu, Hawaii
MAY 11 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 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 44</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.

CI:ss
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: ____________
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 application 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,

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  

<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: __________
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,

[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: _______________

Cl: ss
Enc.
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

[Box checked for 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 821, Honolulu, Hawaii 96809. Application must be accompanied by a non-refundable filing fee of $35.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 587-2225.

1. APPLICANT: (circle primary contact a, b, or c) Primary Fax: 656-1039
   (a) WELL OWNER
   FirmName: U.S. Army
   Contact Person: Jon Fukuda
   Phone: 656-2878
   Address: DPM, Attn: APVG-GNW, U.S. Army
   Schofield Barracks, Garrison
   Hawaii 96857-3000
   (c) CONTRACTOR
   FirmName: Roscoe Moss Hawaii, Inc.
   Phone: 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-Former Landfill/MW4-4Island
   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
   Modify Existing Well
   Install New Pump
   Abandon Seal
   Replace Pump
   * Be sure to complete and submit well abandonment report upon completion of work.

   (b) WELL TYPE:
   Drill
   Bored
   Driven
   Drilled
   Radial
   Is this 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
   Submersible
   Rotary-Displacement
   Reciprocating
   Impulse
   Centrifugal
   Rotary-Gear
   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)

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

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

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)

   Well Owner
   Landowner
   Contractor
   Signature
   Signature
   Signature
   Date
   Date
   Date

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

11/09/95 WCPI Form
8. Remarks, Explanations (cont'd):

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
- Wall thickness
- 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**

**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 621, Honolulu, Hawaii 96820. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 808-587-0225.

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
   - **Phone**: 808-671-1573
   - **Address**: ABERDEEN PROVING GROUND, MD 21010

   **(b) LANDOWNER**
   - **Firm/Name**: US ARMY
   - **Contact Person**: JON FUKUDA
   - **Phone**: 808-656-2878
   - **Address**: SCOFIELD BARRACKS, HI 96786

   **(c) CONTRACTOR**
   - **Firm/Name**: ROSE CO MOSS HAWAII, INC.
   - **Phone**: 808-682-5856
   - **Address**: 91-259A OLAI ST., KAPOLEI, HI 96707

2. **WELL LOCATION/NAMES**: MONITORING WELL 4-4 (300 feet) Island OAHU
   - **Address**: SCOFIELD ARMY BARRACKS
   - **TAX MAP KEY**: 7-7-01-1
   - **(Attach a USGS map, scale 1:2000, and a property tax map showing well location referenced to established property boundaries.)**

3. **(a) PROPOSED WORK**: 
   - **Drill New Well
   - **Modify Existing Well
   - **ReDrill
   - **Install New Pump
   - **Replace Pump
   - **ModiY Pump
   - **Alter Location

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

4. **PROPOSED PUMP INFORMATION**: Rated Pump Capacity: 3,000 - 4,000 gallons per minute
   - **Pump Type**: Deep Well Turbine
   - **Motor**: Diesel
   - **Rated Capacity**: 3,000 - 4,000 gallons per minute

5. **PROPOSED USE**: 
   - **Military
   - **Domestic (individual, non-commercial water use)
   - **Irrigation (crop)
   - **State Land Use District**: Urban
   - **County Zoning (describe)**
   - **Other (explain)**

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

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

8. **REMARKS, EXPLANATIONS**: ENVIRONMENTAL PROGRAM SUPPORT EXTRACTION WELL

   * Pump test

**FOR OFFICIAL USE ONLY**

**Well Owner**

**Landowner**

**Contractor**

**Date**

**Longitude**

**Aquifer System Name**

**State Well No.**

**5/24/92 WCM**
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.
MONITORING WELL 4-4

WELL CAP

28" DIA. STEEL WELL MONUMENT

GROUND ELEVATION = 828'

5" DIA. HOLLOW STEEL PICKET FILLED WITH CEMENT

NO. 2 COARSE GRAVEL

CEMENT MOUND

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

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

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

Well Completion Diagram for Well 4-4

Harding Lawson Associates
Engineering and Environmental Services

Schofield DA03
Schofield Barracks
Island of Oahu, Hawaii

DRAWN: kar
JOB NUMBER: 28339.05.14.12
APPROVED: 29339.05.14.12
FILE: 19950410.1044
DATE: 3/95
REVISED DATE: 3/95
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 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

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

2. Location/Address: Schofield Barracks
   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): 884.15 ft.
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)

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 1.0. 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
   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 (1/96 LTAT Form) attached? _ Yes _ No
18. As-built drawings attached? _ Yes _ No
19. Other remarks/comments:

Well Drilling Contractor (print) DENNIS W. BREEN C-57 Lic. No. AC 12058
Signature / Date 11/0/97

Surveyor (print) Russell; T. Langbein; Lic. No. A-129 Hawaii
Signature / Date 1-8-97

Applicant (print) COL. Donn 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 is613 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. Mcguire C-57 Lic. No. AC 12058
Signature ______________________________________________________________________ Date 4/19/97

Applicant (print) Copy Reni
Signature ______________________________________________________________________ Date 1/14/97

8. (cont'd) DRILLER'S LOG (cont'd):
   Water Level Depth (ft.) Rock Description, Remarks, Water Level Depth (ft.) Rock Description, Remarks,
   Dates (ft.) Dates (ft.) Dates (ft.) Dates (ft.)
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________
   __________ to __________ ____________________________ __________ to __________

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. 2302-01

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
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
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;</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
"+" 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

Mk1-2-3 = 828.81 feet — Black mark on top of tube
"+" cut = 827.20 feet

Mk1-2-4 = 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: HARLING.CO

Job #: 10

<table>
<thead>
<tr>
<th>Point</th>
<th>Northino</th>
<th>Eastino</th>
<th>Elev</th>
<th>Descr</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. MERCATOR - HAWAII 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.p. 1</td>
<td>117515.9390</td>
<td>490579.0620</td>
<td>LAT/LONG</td>
<td>863.3800 MW 2-2</td>
</tr>
<tr>
<td>S.p. 2</td>
<td>121016.1042</td>
<td>481163.9529</td>
<td>LAT/LONG</td>
<td></td>
</tr>
<tr>
<td>S.p. 3</td>
<td>123512.2200</td>
<td>474675.9900</td>
<td>LAT/LONG</td>
<td>853.4671 MW 4-1</td>
</tr>
<tr>
<td>S.p. 4</td>
<td>124621.3160</td>
<td>472744.1700</td>
<td>LAT/LONG</td>
<td>947.1000 MW 4-2</td>
</tr>
<tr>
<td>S.p. 5</td>
<td>122896.3800</td>
<td>474006.8800</td>
<td>LAT/LONG</td>
<td>884.1500 MW 4-3</td>
</tr>
<tr>
<td>S.p. 6</td>
<td>118439.3594</td>
<td>503505.7809</td>
<td>LAT/LONG</td>
<td>912.4300 MW 2-5</td>
</tr>
</tbody>
</table>

0-00-13.601 CONVERGENCE
0.999900 SCALE FACTOR
0.9999464 GRID FACTOR

SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD27)
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>
</tr>
</thead>
<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>
<td>581.99</td>
<td>270.79</td>
</tr>
<tr>
<td></td>
<td>2-1</td>
<td>10/10/95</td>
<td>1126</td>
<td>903.75</td>
<td>632.40</td>
<td>0.01</td>
<td>632.39</td>
<td>271.36</td>
</tr>
<tr>
<td></td>
<td>2-2</td>
<td>10/10/95</td>
<td>1029</td>
<td>864.34</td>
<td>593.25</td>
<td>0.05</td>
<td>593.20</td>
<td>271.14</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>10/10/95</td>
<td>1330</td>
<td>828.81</td>
<td>557.59</td>
<td>0.04</td>
<td>557.55</td>
<td>271.26</td>
</tr>
<tr>
<td></td>
<td>2-4</td>
<td>10/10/95</td>
<td>1314</td>
<td>829.70</td>
<td>558.55</td>
<td>0.09</td>
<td>558.46</td>
<td>271.24</td>
</tr>
<tr>
<td></td>
<td>2-5</td>
<td>10/10/95</td>
<td>1103</td>
<td>912.20</td>
<td>640.41</td>
<td>0.11</td>
<td>640.30</td>
<td>271.90</td>
</tr>
<tr>
<td>3004-01</td>
<td>4-1</td>
<td>10/10/95</td>
<td>0835</td>
<td>853.47</td>
<td>585.73</td>
<td>2.65</td>
<td>583.08</td>
<td>270.39</td>
</tr>
<tr>
<td>3004-02</td>
<td>4-2</td>
<td>10/10/95</td>
<td>0949</td>
<td>947.11</td>
<td>677.25</td>
<td>1.54</td>
<td>675.71</td>
<td>271.40</td>
</tr>
<tr>
<td></td>
<td>4-2A</td>
<td>10/10/95</td>
<td>1003</td>
<td>946.87</td>
<td>676.24</td>
<td>0.04</td>
<td>676.20</td>
<td>270.67</td>
</tr>
<tr>
<td>3004-03</td>
<td>4-3</td>
<td>10/10/95</td>
<td>0855</td>
<td>884.15</td>
<td>613.27</td>
<td>0.13</td>
<td>613.14</td>
<td>271.01</td>
</tr>
<tr>
<td></td>
<td>4-4</td>
<td>10/10/95</td>
<td>0925</td>
<td>829.88</td>
<td>559.28</td>
<td>0.0</td>
<td>559.28</td>
<td>270.60</td>
</tr>
<tr>
<td>HLA Well No.</td>
<td>Hawaii State Well J.D. No.</td>
<td>Hawaii State Planer (ft)</td>
<td>Top of Sounding Tube Elevation (ft)</td>
<td>UTM Coordinates (Meters)</td>
<td>Latitude</td>
<td>Longitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>----------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Northing</td>
<td>Easting</td>
<td>Northing</td>
<td>Easting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1</td>
<td>3-2901-13</td>
<td>117515.94</td>
<td>490579.06</td>
<td>2376770</td>
<td>600760</td>
<td>21° 29' 24.680&quot;</td>
<td>158° 01' 39.755&quot;</td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>NA</td>
<td>117736.41</td>
<td>495036.81</td>
<td>2376800</td>
<td>602280</td>
<td>21° 29' 26.871&quot;</td>
<td>158° 00' 52.554&quot;</td>
<td></td>
</tr>
<tr>
<td>2-2</td>
<td>NA</td>
<td>121016.10</td>
<td>481183.95</td>
<td>2377760</td>
<td>597830</td>
<td>21° 29' 59.344&quot;</td>
<td>158° 03' 19.250&quot;</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>NA</td>
<td>115456.52</td>
<td>483851.56</td>
<td>2376100</td>
<td>598640</td>
<td>21° 29' 04.253&quot;</td>
<td>158° 02' 50.984&quot;</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>NA</td>
<td>114890.40</td>
<td>489648.08</td>
<td>2375930</td>
<td>600435</td>
<td>21° 28' 58.657&quot;</td>
<td>158° 01' 49.608&quot;</td>
<td></td>
</tr>
<tr>
<td>2-5</td>
<td>NA</td>
<td>118439.36</td>
<td>503505.78</td>
<td>2377050</td>
<td>604675</td>
<td>21° 29' 33.838&quot;</td>
<td>157° 59' 22.878&quot;</td>
<td></td>
</tr>
<tr>
<td>4-1</td>
<td>3-3004-01</td>
<td>123512.01</td>
<td>474676.13</td>
<td>2378530</td>
<td>595840</td>
<td>21° 30' 24.055&quot;</td>
<td>158° 04' 28.178&quot;</td>
<td></td>
</tr>
<tr>
<td>4-2</td>
<td>3-3004-02</td>
<td>124621.32</td>
<td>472744.17</td>
<td>2378880</td>
<td>595300</td>
<td>21° 30' 35.038&quot;</td>
<td>158° 04' 48.642</td>
<td></td>
</tr>
<tr>
<td>4-2A</td>
<td>NA</td>
<td>124606.63</td>
<td>472746.61</td>
<td>2378875</td>
<td>595300</td>
<td>21° 30' 34.892&quot;</td>
<td>158° 04' 48.616&quot;</td>
<td></td>
</tr>
<tr>
<td>4-3</td>
<td>3-3004-03</td>
<td>122896.38</td>
<td>474006.88</td>
<td>2378340</td>
<td>595660</td>
<td>21° 30' 17.949&quot;</td>
<td>158° 04' 35.261&quot;</td>
<td></td>
</tr>
<tr>
<td>4-4</td>
<td>NA</td>
<td>124474.82</td>
<td>474375.30</td>
<td>2378815</td>
<td>595825</td>
<td>21° 30' 33.594&quot;</td>
<td>158° 04' 31.367&quot;</td>
<td></td>
</tr>
</tbody>
</table>

NA = Not assigned yet by the DLNR.
DIAMETER PICKET WITH CEMENT DEPTH (FT) 30 200 463 473 475 599

CEMENT MOUND

MOUND ELEVATION (FT).

872 683 420 410 408 284

613.14 271.01 (10/10/95)

ELEVATION OF GROUNDWATER.

649 659 712 720

DIAMETER STEEL SURFACE CASING

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

SLUGH

(C) NOT TO SCALE)

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

475  408

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

619  264

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 SREEN

10" DIA. HOLE DRILLED WITH AIR ROTARY SIEVE

SAND

SLOUGH

*DATUM: MEAN SEA LEVEL

(NOT TO SCALE)

Pump Installation Diagram for Monitoring Well 4-3
Schofield Barracks
Island of Oahu, Hawaii

Harding Lawon Associates
Engineering and Environmental Services

FIGURE

jcl  28339.09.02.12

APPROVED  FILE  DATE REVISED DATE

LD  28339042  9/95  1995.09.06.458  9/95
<table>
<thead>
<tr>
<th>Layer Description</th>
<th>Depth (ft)</th>
<th>Sample</th>
<th>Drilling Rate (min/100 ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-INCH-DIA. HOLE DRILLED WITH AUGER (Surface to 11 feet)</td>
<td>0-5</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td></td>
<td>Dark brown elastic silt (MH) (7.5YR.3/2), stiff, moist, (residual soil).</td>
</tr>
<tr>
<td></td>
<td>5-7.5</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-10</td>
<td>11</td>
<td>0</td>
<td>3</td>
<td></td>
<td>Pale yellowish brown basalt (10YR.6/2), hard, (silt and basalt intermixed) (set 16&quot; 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.</td>
</tr>
<tr>
<td></td>
<td>10-12.5</td>
<td>0</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-15</td>
<td>20</td>
<td>0</td>
<td>5</td>
<td></td>
<td>Dark brown sandy silt (ML) (7.5YR.4/4), stiff, moist, (residual soil).</td>
</tr>
<tr>
<td></td>
<td>15-20</td>
<td>10</td>
<td>0</td>
<td>6</td>
<td></td>
<td>Increased drilling resistance at 42 feet.</td>
</tr>
<tr>
<td></td>
<td>20-25</td>
<td>9</td>
<td>0</td>
<td>6</td>
<td></td>
<td>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.)</td>
</tr>
<tr>
<td></td>
<td>25-30</td>
<td>15</td>
<td>0</td>
<td>8</td>
<td></td>
<td>Low to moderately hard below 54 feet.</td>
</tr>
<tr>
<td></td>
<td>30-35</td>
<td>10</td>
<td>0</td>
<td>9</td>
<td></td>
<td>(Loss of drilling foam circulation at 60 feet.)</td>
</tr>
<tr>
<td></td>
<td>35-40</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (in/15 feet)</td>
<td>Breaking Value (pounds)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------</td>
<td>------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-65</td>
<td>6</td>
<td>0</td>
<td>14</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-70</td>
<td>11</td>
<td>0</td>
<td>15</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-75</td>
<td>53</td>
<td>03</td>
<td>16</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-80</td>
<td>39</td>
<td>0</td>
<td>17</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-85</td>
<td>53</td>
<td>0</td>
<td>18</td>
<td>85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85-90</td>
<td>25</td>
<td>0</td>
<td>19</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-95</td>
<td>0</td>
<td>20</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95-100</td>
<td>28</td>
<td>0</td>
<td>21</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-105</td>
<td>45</td>
<td>0</td>
<td>22</td>
<td>105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105-110</td>
<td>7</td>
<td>0</td>
<td>23</td>
<td>110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110-115</td>
<td>7</td>
<td>0</td>
<td>24</td>
<td>115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115-120</td>
<td>11</td>
<td>0</td>
<td>25</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120-125</td>
<td>55</td>
<td>0</td>
<td>26</td>
<td>125</td>
<td></td>
<td></td>
</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.4/11) and grayish black (N2), slightly vesicular, with some fractures filled with dark red (10R.3/6) silt, below 75 feet.
- Olive gray (5Y.4/11) 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.4/11), 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.

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

Elevation Date 12/09/93

Log of Monitoring Well 4-3 (Sheet 2 of 12)
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (in./min)</th>
<th>Breaking Space Measurement (rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-130</td>
<td>35</td>
<td>0</td>
<td>27</td>
<td>130</td>
</tr>
<tr>
<td>130-135</td>
<td>0</td>
<td>28</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>135-140</td>
<td>44</td>
<td>0</td>
<td>29</td>
<td>140</td>
</tr>
<tr>
<td>140-145</td>
<td>48</td>
<td>0</td>
<td>30</td>
<td>145</td>
</tr>
<tr>
<td>145-150</td>
<td>34</td>
<td>0</td>
<td>31</td>
<td>150</td>
</tr>
<tr>
<td>150-155</td>
<td>17</td>
<td>0</td>
<td>32</td>
<td>155</td>
</tr>
<tr>
<td>155-160</td>
<td>21</td>
<td>0</td>
<td>33</td>
<td>160</td>
</tr>
<tr>
<td>160-165</td>
<td>25</td>
<td>0</td>
<td>34</td>
<td>165</td>
</tr>
<tr>
<td>165-170</td>
<td>16</td>
<td>0</td>
<td>35</td>
<td>170</td>
</tr>
<tr>
<td>170-175</td>
<td>22</td>
<td>0</td>
<td>36</td>
<td>175</td>
</tr>
<tr>
<td>175-180</td>
<td>18</td>
<td>0</td>
<td>37</td>
<td>180</td>
</tr>
<tr>
<td>180-185</td>
<td>30</td>
<td>0</td>
<td>38</td>
<td>185</td>
</tr>
<tr>
<td>185-190</td>
<td>18</td>
<td>0</td>
<td>39</td>
<td>190</td>
</tr>
<tr>
<td>195</td>
<td></td>
<td></td>
<td></td>
<td></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 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.

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 (in ft/3 min)</th>
<th>Breathing Space Measurement (gpm)</th>
<th>Sample Number</th>
<th>Depth (m)</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>
<td></td>
</tr>
<tr>
<td>200-205</td>
<td></td>
<td>0</td>
<td>42</td>
<td>205</td>
<td></td>
</tr>
<tr>
<td>205-210</td>
<td>21</td>
<td></td>
<td>210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>210-215</td>
<td>30</td>
<td></td>
<td>215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>215-220</td>
<td>30</td>
<td>0</td>
<td>43</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>220-225</td>
<td>20</td>
<td>0</td>
<td>44</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>225-230</td>
<td>10</td>
<td>0</td>
<td>45</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>230-235</td>
<td>7</td>
<td>0</td>
<td>454</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>235-240</td>
<td>20</td>
<td>0</td>
<td>46</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>10</td>
<td>0</td>
<td>47</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>245-250</td>
<td>9</td>
<td>0</td>
<td>48</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>250-255</td>
<td>11</td>
<td>0</td>
<td>49</td>
<td>255</td>
<td></td>
</tr>
<tr>
<td>260</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Air Rotary/Downhole Hammer
- Gardner Denver 40-T

**10-INCH-DIA. HOLE DRILLED WITH DOWNHOLE HAMMER (200 to 720 feet)**

- 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.

**6-INCH-DIA. CARBON STEEL BLANK CASING**

- No sample cuttings at 215 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.
### Air Rotary/Downhole Hammer

Gardner Denver 40-T

<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (max. 5 ft.)</th>
<th>Breathing Space Measurement (rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>255-260</td>
<td>8</td>
<td>0</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>260-265</td>
<td>6</td>
<td>0</td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>265-270</td>
<td>10</td>
<td>0</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>270-275</td>
<td>3</td>
<td>0</td>
<td>275</td>
<td></td>
</tr>
<tr>
<td>275-280</td>
<td>5</td>
<td>0</td>
<td>280</td>
<td></td>
</tr>
<tr>
<td>280-285</td>
<td>6</td>
<td>0</td>
<td>285</td>
<td></td>
</tr>
<tr>
<td>285-290</td>
<td>7</td>
<td>-</td>
<td>290</td>
<td></td>
</tr>
<tr>
<td>290-295</td>
<td>7</td>
<td>0</td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>295-300</td>
<td>6</td>
<td>0</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>300-305</td>
<td>5</td>
<td>0</td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>305-310</td>
<td>7</td>
<td>0</td>
<td>310</td>
<td></td>
</tr>
<tr>
<td>310-315</td>
<td>9</td>
<td>0</td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>315-320</td>
<td>11</td>
<td>0</td>
<td>320</td>
<td></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.
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 (SY.4/2), and reddish brown (10R.3RI. 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 (SY.4/1), slightly vesicular, below 380 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (rpm, 30 ft)</th>
<th>Breathing Smoke Measurement (rpm)</th>
<th>Sample Depth (ft)</th>
<th>Sample Elevation</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>385-390</td>
<td>8</td>
<td>63</td>
<td>390</td>
<td>390</td>
<td></td>
</tr>
<tr>
<td>390-395</td>
<td>10</td>
<td>64</td>
<td>395</td>
<td></td>
<td>12/09/93</td>
</tr>
<tr>
<td>395-400</td>
<td>8</td>
<td>65</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-405</td>
<td>7</td>
<td>66</td>
<td>405</td>
<td></td>
<td></td>
</tr>
<tr>
<td>405-410</td>
<td>8</td>
<td>67</td>
<td>410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>410-415</td>
<td>9</td>
<td>68</td>
<td>415</td>
<td></td>
<td></td>
</tr>
<tr>
<td>415-420</td>
<td>6</td>
<td>69</td>
<td>420</td>
<td></td>
<td></td>
</tr>
<tr>
<td>420-425</td>
<td>7</td>
<td>70</td>
<td>425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>425-430</td>
<td>7</td>
<td>71</td>
<td>430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>430-435</td>
<td>9</td>
<td>72</td>
<td>435</td>
<td></td>
<td></td>
</tr>
<tr>
<td>435-440</td>
<td>12</td>
<td>73</td>
<td>440</td>
<td></td>
<td></td>
</tr>
<tr>
<td>440-445</td>
<td>12</td>
<td>74</td>
<td>445</td>
<td></td>
<td></td>
</tr>
<tr>
<td>445-450</td>
<td>8</td>
<td>74</td>
<td>450</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

Air Rotary/Downhole Hammer
Gardner Denver 40-T

**Elevation**

Date 12/09/93

---

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.
Air Rotary/Downhole Hammer
Gardner Denver 40-T

TOP OF CASING 882.96 ft

<table>
<thead>
<tr>
<th>Sample Depth (ft)</th>
<th>Sample Number</th>
<th>Drilling Rate (min./1000 ft)</th>
<th>Sample Elevation</th>
<th>Sample Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>17</td>
<td>0</td>
<td>455</td>
<td>12/09/93</td>
</tr>
<tr>
<td>455-460</td>
<td>13</td>
<td>0</td>
<td>460</td>
<td>12/09/93</td>
</tr>
<tr>
<td>460-465</td>
<td>9</td>
<td>0</td>
<td>465</td>
<td>12/09/93</td>
</tr>
<tr>
<td>465-470</td>
<td>8</td>
<td>0</td>
<td>470</td>
<td>12/09/93</td>
</tr>
<tr>
<td>470-475</td>
<td>11</td>
<td>0</td>
<td>475</td>
<td>12/09/93</td>
</tr>
<tr>
<td>475-480</td>
<td>16</td>
<td>0</td>
<td>480</td>
<td>12/09/93</td>
</tr>
<tr>
<td>480-485</td>
<td>9</td>
<td>0</td>
<td>485</td>
<td>12/09/93</td>
</tr>
<tr>
<td>485-490</td>
<td>17</td>
<td>0</td>
<td>490</td>
<td>12/09/93</td>
</tr>
<tr>
<td>490-495</td>
<td>10</td>
<td>0</td>
<td>495</td>
<td>12/09/93</td>
</tr>
<tr>
<td>495-500</td>
<td>10</td>
<td>0</td>
<td>500</td>
<td>12/09/93</td>
</tr>
<tr>
<td>500-505</td>
<td>10</td>
<td>0</td>
<td>505</td>
<td>12/09/93</td>
</tr>
<tr>
<td>505-510</td>
<td>10</td>
<td>0</td>
<td>510</td>
<td>12/09/93</td>
</tr>
<tr>
<td>510-515</td>
<td>7</td>
<td>8</td>
<td>515</td>
<td>12/09/93</td>
</tr>
</tbody>
</table>

BENTONITE PELLETS
(463 to 473 feet)

FINE SAND
(473.5 to 475 feet)

COLORADO SILICA SAND #6-9
FILTER PACK
(475 to 658.5 feet)

(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 495 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 (ft)</th>
<th>Drilling Rate (min, 5 ft)</th>
<th>Breaching Speed Measurement (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>515-520</td>
<td>7</td>
<td>0</td>
<td>Sample</td>
<td>520</td>
</tr>
<tr>
<td>520-525</td>
<td>10</td>
<td>0</td>
<td>Sample</td>
<td>525</td>
</tr>
<tr>
<td>525-530</td>
<td>10</td>
<td>0</td>
<td>Sample</td>
<td>530</td>
</tr>
<tr>
<td>530-535</td>
<td>8</td>
<td>0</td>
<td>Sample</td>
<td>535</td>
</tr>
<tr>
<td>535-540</td>
<td>8</td>
<td>0</td>
<td>Sample</td>
<td>540</td>
</tr>
<tr>
<td>540-545</td>
<td>9</td>
<td>0</td>
<td>Sample</td>
<td>545</td>
</tr>
<tr>
<td>545-550</td>
<td>8</td>
<td>0</td>
<td>Sample</td>
<td>550</td>
</tr>
<tr>
<td>550-555</td>
<td>9</td>
<td>0</td>
<td>Sample</td>
<td>555</td>
</tr>
<tr>
<td>555-560</td>
<td>9</td>
<td>0</td>
<td>Sample</td>
<td>560</td>
</tr>
<tr>
<td>560-565</td>
<td>9</td>
<td>0</td>
<td>Sample</td>
<td>565</td>
</tr>
<tr>
<td>565-570</td>
<td>8</td>
<td>0</td>
<td>Sample</td>
<td>570</td>
</tr>
<tr>
<td>570-575</td>
<td>9</td>
<td>0</td>
<td>Sample</td>
<td>575</td>
</tr>
<tr>
<td>575-580</td>
<td>9</td>
<td>0</td>
<td>Sample</td>
<td>580</td>
</tr>
</tbody>
</table>

**Equipment**

Air Rotary/Downhole Hammer
Gardner Denver 40-T

**Date** 12/09/93
### Log of Monitoring Well 4-3

<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (m/s or feet/minute)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>580-585</td>
<td>9</td>
<td>0</td>
<td>97</td>
<td>585</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>585-590</td>
<td>9</td>
<td>0</td>
<td>98</td>
<td>590</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>590-595</td>
<td>10</td>
<td>0</td>
<td>99</td>
<td>595</td>
</tr>
<tr>
<td>595-600</td>
<td>12</td>
<td>0</td>
<td>100</td>
<td>600</td>
</tr>
<tr>
<td>600-605</td>
<td>11</td>
<td>0</td>
<td>101</td>
<td>605</td>
</tr>
<tr>
<td>605-610</td>
<td>17</td>
<td>0</td>
<td>102</td>
<td>610</td>
</tr>
<tr>
<td>610-615</td>
<td>13</td>
<td>0</td>
<td>103</td>
<td>615</td>
</tr>
<tr>
<td>615-620</td>
<td>5</td>
<td>0</td>
<td>104</td>
<td>620</td>
</tr>
<tr>
<td>620-625</td>
<td>10</td>
<td>0</td>
<td>105</td>
<td>625</td>
</tr>
<tr>
<td>625-630</td>
<td>5</td>
<td>0</td>
<td>106</td>
<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>10</td>
<td>0</td>
<td>108</td>
<td>640</td>
</tr>
<tr>
<td>640-645</td>
<td>15</td>
<td>0</td>
<td>109</td>
<td>645</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>650</td>
</tr>
</tbody>
</table>

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

**Elevation**

**Date:** 12/09/93

---

- **Top of Casing:** 882.96 ft

**6-INCH-DIA, STAINLESS STEEL WIRE WRAP SCREEN (598.5 to 648.5 feet)**

- **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 grey (5YR,4/1) below 640 feet.**
  - Decreased drilling resistance from 642 to 644 feet.
- **Decreased drilling resistance from 648 to 650 feet.**
### Equipment
**Air Rotary/Downhole Hammer**
Gardner Denver 40-T

### Sample Interval (feet) | Drilling Rate (min./15 ft) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft) | Sample |
--- | --- | --- | --- | --- | --- |
645-650 | 15 | 0 | 110 | 650 | 650-655 | 14 | 0 | 111 | 655-660 | 15 | 0 | 112 | 660-665 | 15 | 0 | 113 | 670-675 | 15 | 0 | 114 | 675-680 | 10 | 0 | 115 | 680-685 | 20 | 0 | 116 | 685-690 | 15 | 0 | 117 | 690-695 | 10 | 0 | 118 | 695-700 | 15 | 0 | 119 | 700-705 | 15 | 0 | 120 | 705-710 | 12 | 0 | 121 |

**TOP OF CASING 882.96 ft**

**MASON SAND** (658.5 to 712 feet)

- 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) and 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.

---

**Harding Lawson Associates**

Log of Monitoring Well 4-3 (Sheet 11 of 12)

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**DRAWN**
kar

**JOB NUMBER**
26129.05.05.12

**APPROVED**
BSw

**FILE**
STEPS

**DATE**
3/94
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (max. 5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Sample Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>710-715</td>
<td>70</td>
<td>0</td>
<td>122</td>
<td>715</td>
</tr>
<tr>
<td>715-720</td>
<td>65</td>
<td>0</td>
<td>123</td>
<td>720</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

(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.: 3004-03 Well Name: MW4-3 Island: OAHU
2. Location/Address: Schofield Barracks 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): 884.15 ft.
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)

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

(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, 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: **Soil Sampling Service, Inc.**
21. Name of person performing work: **Paul Montgomery**
22. Date Pump Installation Completed: 

### 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:** 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)

### Pump Installation Contractor (print) _______ C-57 Lic. No. _______

**Signature** ____________________________ **Date** ____________________________

**Applicant (print)** ____________________________ **Date** ____________________________

**Signature** ____________________________ **Date** ____________________________

---

### DRILLER'S LOG (cont'd):

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

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

### Remarks:

```

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

Water Level Dates (ft.) Rock Description, Remarks, Water Level Dates (ft.) Rock Description, Remarks,
| to |                          |             | to |                          |             |
|    |                          |             |    |                          |             |
|    |                          |             |    |                          |             |
|    |                          |             |    |                          |             |
|    |                          |             |    |                          |             |
|    |                          |             |    |                          |             |
|    |                          |             |    |                          |             |

19. & 25. Remarks:
```

---

**Note:** The form includes various fields for detailed information about the pump installation, including pump specifications, installation details, and remarks for record-keeping purposes.
<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>0-5</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5-7.5</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>5-10</td>
<td>11</td>
<td>0</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>10-12.5</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>10-15</td>
<td>20</td>
<td>0</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>15-20</td>
<td>10</td>
<td>0</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>20-25</td>
<td>9</td>
<td>0</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>25-30</td>
<td>15</td>
<td>0</td>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>30-35</td>
<td>10</td>
<td>0</td>
<td>9</td>
<td>40</td>
</tr>
<tr>
<td>35-40</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>40-45</td>
<td>5</td>
<td>0</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>45-50</td>
<td>20</td>
<td>0</td>
<td>12</td>
<td>55</td>
</tr>
<tr>
<td>50-55</td>
<td>37</td>
<td>0</td>
<td>13</td>
<td>60</td>
</tr>
<tr>
<td>55-60</td>
<td>6</td>
<td>0</td>
<td></td>
<td>65</td>
</tr>
</tbody>
</table>

**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).**

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./24 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-65</td>
<td>6</td>
<td>0</td>
<td>14</td>
<td>65</td>
</tr>
<tr>
<td>65-70</td>
<td>11</td>
<td>0</td>
<td>15</td>
<td>70</td>
</tr>
<tr>
<td>70-75</td>
<td>53</td>
<td>03</td>
<td>16</td>
<td>75</td>
</tr>
<tr>
<td>75-80</td>
<td>39</td>
<td>0</td>
<td>17</td>
<td>80</td>
</tr>
<tr>
<td>80-85</td>
<td>53</td>
<td>0</td>
<td>18</td>
<td>85</td>
</tr>
<tr>
<td>85-90</td>
<td>25</td>
<td>0</td>
<td>19</td>
<td>90</td>
</tr>
<tr>
<td>90-95</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>95</td>
</tr>
<tr>
<td>95-100</td>
<td>28</td>
<td>0</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>100-105</td>
<td>45</td>
<td>0</td>
<td>22</td>
<td>105</td>
</tr>
<tr>
<td>105-110</td>
<td>7</td>
<td>0</td>
<td>23</td>
<td>110</td>
</tr>
<tr>
<td>110-115</td>
<td>7</td>
<td>0</td>
<td>24</td>
<td>115</td>
</tr>
<tr>
<td>115-120</td>
<td>11</td>
<td>0</td>
<td>25</td>
<td>120</td>
</tr>
<tr>
<td>120-125</td>
<td>55</td>
<td>0</td>
<td>26</td>
<td>125</td>
</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.

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-3
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

<table>
<thead>
<tr>
<th>DRAWN</th>
<th>JOB NUMBER</th>
<th>APPROVED</th>
<th>FILE</th>
<th>DATE</th>
<th>REVISED DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>kar</td>
<td>26129.05.05.12</td>
<td>STEPS</td>
<td>4/95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sample Interval (feet) | Drilling Rate (min./3 feet) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft) | Sample Elevation (Ground) | Equipment
---|---|---|---|---|---|---
125-130 | 35 | 0 | 27 | 130 | Air Rotary by Gardner Denver 40-T | SS16
130-135 | 0 | 28 | 135
135-140 | 44 | 0 | 29 | 140
140-145 | 48 | 0 | 30 | 145
145-150 | 34 | 0 | 31 | 150
150-155 | 17 | 0 | 32 | 155
155-160 | 21 | 0 | 33 | 160
160-165 | 25 | 0 | 34 | 165
165-170 | 16 | 0 | 35 | 170
170-175 | 22 | 0 | 36 | 175
175-180 | 18 | 0 | 37 | 180
180-185 | 30 | 0 | 38 | 185
185-190 | 18 | 0 | 39 | 190

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.

Moderately to highly vesicular below 170 feet.

(112.5 feet)

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.

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-3 (Sheet 3 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></th>
</tr>
</thead>
<tbody>
<tr>
<td>190-195</td>
<td>13</td>
<td>0</td>
<td>40</td>
<td>195</td>
<td></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>14</td>
<td>0</td>
<td>42</td>
<td>205</td>
<td></td>
</tr>
<tr>
<td>205-210</td>
<td>21</td>
<td>-</td>
<td>210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>210-215</td>
<td>30</td>
<td>-</td>
<td>215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>215-220</td>
<td>30</td>
<td>0</td>
<td>43</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>220-225</td>
<td>20</td>
<td>0</td>
<td>44</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>225-230</td>
<td>10</td>
<td>0</td>
<td>45</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>230-235</td>
<td>7</td>
<td>0</td>
<td>454</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>235-240</td>
<td>20</td>
<td>0</td>
<td>46</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>10</td>
<td>0</td>
<td>47</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>245-250</td>
<td>9</td>
<td>0</td>
<td>48</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>250-255</td>
<td>11</td>
<td>0</td>
<td>49</td>
<td>255</td>
<td></td>
</tr>
</tbody>
</table>

- 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.
- Decreased drilling resistance from 220 to 223 feet, reddish brown silt cuttings. Possible layer of cinders or cinder 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.
- 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 (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>255-260</td>
<td>8</td>
<td>0</td>
<td>50</td>
<td>260</td>
</tr>
<tr>
<td>260-265</td>
<td>6</td>
<td>0</td>
<td>51</td>
<td>265</td>
</tr>
<tr>
<td>265-270</td>
<td>10</td>
<td>0</td>
<td>52</td>
<td>270</td>
</tr>
<tr>
<td>270-275</td>
<td>3</td>
<td>0</td>
<td>53</td>
<td>275</td>
</tr>
<tr>
<td>275-280</td>
<td>5</td>
<td>0</td>
<td>54</td>
<td>280</td>
</tr>
<tr>
<td>280-285</td>
<td>6</td>
<td>0</td>
<td>55</td>
<td>285</td>
</tr>
<tr>
<td>285-290</td>
<td>7</td>
<td>0</td>
<td>56</td>
<td>290</td>
</tr>
<tr>
<td>290-295</td>
<td>7</td>
<td>0</td>
<td>57</td>
<td>295</td>
</tr>
<tr>
<td>295-300</td>
<td>6</td>
<td>0</td>
<td>58</td>
<td>300</td>
</tr>
<tr>
<td>300-305</td>
<td>5</td>
<td>0</td>
<td>59</td>
<td>305</td>
</tr>
<tr>
<td>305-310</td>
<td>7</td>
<td>0</td>
<td>60</td>
<td>310</td>
</tr>
<tr>
<td>310-315</td>
<td>9</td>
<td>0</td>
<td>61</td>
<td>315</td>
</tr>
<tr>
<td>315-320</td>
<td>11</td>
<td>0</td>
<td>62</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.
Log of Monitoring Well 4-3
(Sheet 6 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 Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>320-325</td>
<td>8</td>
<td>0</td>
<td>325</td>
<td>No sample cuttings from 325 to 335 feet.</td>
<td></td>
</tr>
<tr>
<td>325-330</td>
<td>3</td>
<td>0</td>
<td>330</td>
<td>Increased drilling resistance at 336 feet.</td>
<td></td>
</tr>
<tr>
<td>330-335</td>
<td>3</td>
<td>0</td>
<td>335</td>
<td>Slightly to moderately vesicular below 340 feet.</td>
<td></td>
</tr>
<tr>
<td>335-340</td>
<td>9</td>
<td>-</td>
<td>340</td>
<td>Decreased drilling resistance between 348 and 370 feet.</td>
<td></td>
</tr>
<tr>
<td>340-345</td>
<td>12</td>
<td>0</td>
<td>345</td>
<td>Low to moderately hard, (possible clinker layer), little foam return below 350 feet. (Material caving on hammer.)</td>
<td></td>
</tr>
<tr>
<td>345-350</td>
<td>7</td>
<td>0</td>
<td>350</td>
<td>(No caving below 365 feet.)</td>
<td></td>
</tr>
<tr>
<td>350-355</td>
<td>15</td>
<td>0</td>
<td>355</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>355-360</td>
<td>9</td>
<td>-</td>
<td>360</td>
<td></td>
<td></td>
</tr>
<tr>
<td>360-365</td>
<td>6</td>
<td>0</td>
<td>365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>365-370</td>
<td>9</td>
<td>0</td>
<td>370</td>
<td></td>
<td></td>
</tr>
<tr>
<td>370-375</td>
<td>8</td>
<td>0</td>
<td>375</td>
<td></td>
<td></td>
</tr>
<tr>
<td>375-380</td>
<td>9</td>
<td>0</td>
<td>380</td>
<td></td>
<td></td>
</tr>
<tr>
<td>380-385</td>
<td>13</td>
<td>0</td>
<td>385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>385-390</td>
<td>13</td>
<td>0</td>
<td>390</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></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
<td>---------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>385-390</td>
<td>8</td>
<td>0</td>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>390-395</td>
<td>10</td>
<td>0</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>395-400</td>
<td>8</td>
<td>0</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-405</td>
<td>7</td>
<td>0</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>405-410</td>
<td>8</td>
<td>0</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>410-415</td>
<td>9</td>
<td>0</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>415-420</td>
<td>6</td>
<td>0</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>420-425</td>
<td>7</td>
<td>0</td>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>425-430</td>
<td>7</td>
<td>0</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>430-435</td>
<td>9</td>
<td>0</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>435-440</td>
<td>12</td>
<td>0</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>440-445</td>
<td>12</td>
<td>0</td>
<td>73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>445-450</td>
<td>8</td>
<td>0</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**
- Air Rotary by Gardner Denver 40-T
- Air Rotary by Speedstar SS16

**Ground Elevation**
- 883 ft Date 12/09/93

*Olive gray (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 gray (5Y, 4/1), 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>Sample Elevation</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>17</td>
<td>0</td>
<td>75</td>
<td>455</td>
<td>~883 ft</td>
<td>12/09/93</td>
</tr>
<tr>
<td>455-460</td>
<td>13</td>
<td>0</td>
<td>76</td>
<td>460</td>
<td></td>
<td></td>
</tr>
<tr>
<td>460-465</td>
<td>9</td>
<td>0</td>
<td>77</td>
<td>465</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465-470</td>
<td>8</td>
<td>0</td>
<td>78</td>
<td>470</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470-475</td>
<td>11</td>
<td>0</td>
<td>-</td>
<td>475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>475-480</td>
<td>16</td>
<td>0</td>
<td>70</td>
<td>480</td>
<td>(Loss of drilling foam circulation at 474 feet.)</td>
<td></td>
</tr>
<tr>
<td>480-485</td>
<td>9</td>
<td>0</td>
<td>80</td>
<td>485</td>
<td>(Possible fractured zone at 477 feet). Olive gray (5YR,4/1), and dark reddish brown (10R,3/4), highly vesicular below 478 feet.</td>
<td></td>
</tr>
<tr>
<td>485-490</td>
<td>17</td>
<td>0</td>
<td>81</td>
<td>490</td>
<td>Slightly vesicular below 485 feet.</td>
<td></td>
</tr>
<tr>
<td>490-495</td>
<td>10</td>
<td>0</td>
<td>81</td>
<td>495</td>
<td>Moderately to highly vesicular below 495 feet. Decreased drilling resistance at 497 feet.</td>
<td></td>
</tr>
<tr>
<td>495-500</td>
<td>10</td>
<td>0</td>
<td>82</td>
<td>500</td>
<td>(Driller notes intermittent hard and soft layers between 500 and 505 feet.)</td>
<td></td>
</tr>
<tr>
<td>500-505</td>
<td>10</td>
<td>0</td>
<td>83</td>
<td>505</td>
<td></td>
<td></td>
</tr>
<tr>
<td>505-510</td>
<td>10</td>
<td>0</td>
<td>84</td>
<td>510</td>
<td>Little to moderately weathered below 505 feet.</td>
<td></td>
</tr>
<tr>
<td>510-515</td>
<td>7</td>
<td>-</td>
<td>85</td>
<td>515</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Log of Monitoring Well 4-3 (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>515-520</td>
<td>7</td>
<td>0</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>520-525</td>
<td>10</td>
<td>0</td>
<td>87</td>
<td>525</td>
</tr>
<tr>
<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>9</td>
<td>-</td>
<td>91</td>
<td>540</td>
</tr>
<tr>
<td>540-545</td>
<td>9</td>
<td>-</td>
<td>92</td>
<td>545</td>
</tr>
<tr>
<td>545-550</td>
<td>8</td>
<td>-</td>
<td>93</td>
<td>550</td>
</tr>
<tr>
<td>550-555</td>
<td>9</td>
<td>0</td>
<td>94</td>
<td>555</td>
</tr>
<tr>
<td>555-560</td>
<td>9</td>
<td>0</td>
<td>95</td>
<td>560</td>
</tr>
<tr>
<td>560-565</td>
<td>9</td>
<td>0</td>
<td>96</td>
<td>565</td>
</tr>
<tr>
<td>565-570</td>
<td>8</td>
<td>0</td>
<td>97</td>
<td>570</td>
</tr>
<tr>
<td>570-575</td>
<td>9</td>
<td>-</td>
<td>98</td>
<td>575</td>
</tr>
<tr>
<td>575-580</td>
<td>9</td>
<td>0</td>
<td>99</td>
<td>580</td>
</tr>
</tbody>
</table>

**Equipment**

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

**Log of Monitoring Well 4-3**

*Sheet 9 of 12*

Harding Lawson Associates
Engineering and Environmental Services

*Figure*
<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>580-585</td>
<td>9</td>
<td>0</td>
<td>97</td>
<td>585</td>
</tr>
<tr>
<td>585-590</td>
<td>9</td>
<td>0</td>
<td>98</td>
<td>590</td>
</tr>
<tr>
<td>590-595</td>
<td>10</td>
<td>0</td>
<td>99</td>
<td>595</td>
</tr>
<tr>
<td>595-600</td>
<td>12</td>
<td>0</td>
<td>100</td>
<td>600</td>
</tr>
<tr>
<td>600-605</td>
<td>11</td>
<td>0</td>
<td>101</td>
<td>605</td>
</tr>
<tr>
<td>605-610</td>
<td>17</td>
<td>0</td>
<td>102</td>
<td>610</td>
</tr>
<tr>
<td>610-615</td>
<td>13</td>
<td>0</td>
<td>103</td>
<td>615</td>
</tr>
<tr>
<td>615-620</td>
<td>5</td>
<td>0</td>
<td>104</td>
<td>620</td>
</tr>
<tr>
<td>620-625</td>
<td>10</td>
<td>0</td>
<td>105</td>
<td>625</td>
</tr>
<tr>
<td>625-630</td>
<td>5</td>
<td>0</td>
<td>106</td>
<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>10</td>
<td>0</td>
<td>108</td>
<td>640</td>
</tr>
<tr>
<td>640-645</td>
<td>15</td>
<td>0</td>
<td>109</td>
<td>645</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>650</td>
</tr>
</tbody>
</table>

**Equipment**
- Rotary by Gardner Denver 40-T
- Air Rotary by Speedstar SS16

**Elevation**
- 883 ft
**Date**
- 12/09/93

**Notes:**
- 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 on 2/28/94 at a depth of 610.49 feet below top of casing.
  (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./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>645-650</td>
<td>15</td>
<td>0</td>
<td>110</td>
<td>650</td>
</tr>
<tr>
<td>650-655</td>
<td>14</td>
<td>0</td>
<td>111</td>
<td>655</td>
</tr>
<tr>
<td>655-660</td>
<td>-</td>
<td>-</td>
<td></td>
<td>660</td>
</tr>
<tr>
<td>660-665</td>
<td>15</td>
<td>0</td>
<td>112</td>
<td>665</td>
</tr>
<tr>
<td>665-670</td>
<td>15</td>
<td>0</td>
<td>113</td>
<td>670</td>
</tr>
<tr>
<td>670-675</td>
<td>15</td>
<td>0</td>
<td>114</td>
<td>675</td>
</tr>
<tr>
<td>675-680</td>
<td>10</td>
<td>0</td>
<td>115</td>
<td>680</td>
</tr>
<tr>
<td>680-685</td>
<td>20</td>
<td>0</td>
<td>116</td>
<td>685</td>
</tr>
<tr>
<td>685-690</td>
<td>15</td>
<td>0</td>
<td>117</td>
<td>690</td>
</tr>
<tr>
<td>690-695</td>
<td>10</td>
<td>0</td>
<td>118</td>
<td>695</td>
</tr>
<tr>
<td>695-700</td>
<td>15</td>
<td>0</td>
<td>119</td>
<td>700</td>
</tr>
<tr>
<td>700-705</td>
<td>15</td>
<td>0</td>
<td>120</td>
<td>705</td>
</tr>
<tr>
<td>705-710</td>
<td>12</td>
<td>0</td>
<td>121</td>
<td>710</td>
</tr>
</tbody>
</table>

**Equipment**

- **Ground Elevation**: 
  - Air Rotary by Gardner Denver 40-T
  - Air Rotary by Speedstar SS16

**Log of Monitoring Well 4-3**

- **Date**: 12/09/93
- **Hawaii**
- **Appointed**: Harding Lawson Associates
- **Log**: Engineering and Environmental Services

- **Schofield TEPS 5**
- **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>
</tr>
</thead>
<tbody>
<tr>
<td>710-715</td>
<td>70</td>
<td>0</td>
<td>122</td>
</tr>
<tr>
<td>715-720</td>
<td>65</td>
<td>0</td>
<td>123</td>
</tr>
</tbody>
</table>

Total depth = 720 feet.
Water table was measured at 610.49 feet below top of casing, 2/28/94.

Log of Monitoring Well 4-3 (Sheet 12 of 12)
**DATUM: MEAN SEA LEVEL**

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

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>872</td>
</tr>
<tr>
<td>200</td>
<td>683</td>
</tr>
<tr>
<td>463</td>
<td>420</td>
</tr>
<tr>
<td>473</td>
<td>410</td>
</tr>
<tr>
<td>475</td>
<td>408</td>
</tr>
<tr>
<td>599</td>
<td>284</td>
</tr>
<tr>
<td>613.14</td>
<td>271.01 (10/10/95)</td>
</tr>
<tr>
<td>649</td>
<td>234</td>
</tr>
<tr>
<td>659</td>
<td>224</td>
</tr>
<tr>
<td>712</td>
<td>171</td>
</tr>
<tr>
<td>720</td>
<td>163</td>
</tr>
</tbody>
</table>

(NOT TO SCALE)
Pump Installation Diagram for Monitoring Well 4-3
Schofield Barracks
Island of Oahu, Hawaii

DEPT (FT) | ELEVATION (FT)
--- | ---
475 | 408
613.14 | 271.01 (10/10/95) (ELEVATION OF GROUNDWATER)
619 | 264
624 | 259
627 | 256
649 | 234
659 | 224
712 | 171
720 | 163

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

*DATUM: MEAN SEA LEVEL (NOT TO SCALE)
Monitoring Well 4-3
Well Head and Well Cover Detail
Schofield Barracks
Island of Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

FIGURE

ACCESS COVER
SOUNDING PIPE WITH THREADED CAP
ELECTRICAL CABLE TO SUBMERSIBLE PUMP
ELECTRICAL SWITCH BOX
ELECTRICAL SWITCH BOX COVER
STEEL WELL COVER
6" DIAMETER STEEL BLANK CASING
CONCRETE PAD SLOPED TO DRAIN

DISCHARGE PIPE WITH VALVE
ACCESS DOOR

COARSE SAND & PEA GRAVEL APPROXIMATELY 1-FOOT THICK
GRAVEL

GRAVEL

615.8x811.4
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
Transmittal/Memorandum

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:3093MI

Enclosures

cc:
June 7, 1993

Department of Land & Natural Resources
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

HARDING - 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***

June 7, 1993
APPLICATION FOR

X WELL CONSTRUCTION PERMIT
_ PUMP INSTALLATION 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 in the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 548-1342, 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 Olai Street
   Phone (808) 682-5856
   Contractor's License No. C-16437

4. PROPOSED WORK
   □ Drill New Well □ Deepen □ Redrill
   □ Alter □ Seal □ Abandon
   □ 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

7. PROPOSED PUMP INFORMATION
   □ Vertical Turbine □ Submersible □ Centrifugal
   □ Diesel □ Gas □ Electric: _______ Rated Horsepower _______ Rate gpm
   Rated Pump Capacity _______ gallons per minute (gpm)

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

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

For Official Use Only:
Field Checked By __________________________ Latitude ________
Date ____________________________ Hydrologic Unit ________
Longitude __________________________ State Well No. 3004-03

Mon Well 4-3
Briefly describe the proposed work:


PROPOSED SECTION OF WELL

Elevation at top of casing _____ ft., msl.

Cement Grout _____ ft.

Hole Dia. _____ in.

Total Depth _____ ft.

Rock Packing _____ ft.

Ground Elev. _____ ft., msl

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

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

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.

Harding Lawson Associates
235 Pearlridge Center, Phase 1
Aiea, Hawaii 96701
(1)808-486-6009
## WELL COMPLETION REPORT

### PART I. WELL CONSTRUCTION REPORT

<table>
<thead>
<tr>
<th>3. Drilling Company:</th>
<th>Roscoe Moss Hawaii, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Name of driller who performed work:</td>
<td></td>
</tr>
<tr>
<td>5. Type of rig/construction:</td>
<td>Air Rotary</td>
</tr>
<tr>
<td>6. Date(s) Well Construction and pump tests (if any) completed:</td>
<td>6/5/93</td>
</tr>
<tr>
<td>7. GROUND ELEVATION (referenced to mean sea level, msl):</td>
<td>945 ft.</td>
</tr>
<tr>
<td>Well Bench Mark (description/location):</td>
<td>Top of sounding tube</td>
</tr>
<tr>
<td>Elevation(msl):</td>
<td>947.11 ft.</td>
</tr>
<tr>
<td>8. DRILLER'S LOG:</td>
<td>Please attach geologic log (if available or if required by permit)</td>
</tr>
<tr>
<td>Depths (ft.)</td>
<td>Rock Description, Water Level, Dates, etc.</td>
</tr>
<tr>
<td>Depths (ft.)</td>
<td>Rock Description, Water Level, Dates, etc.</td>
</tr>
<tr>
<td>9. Total depth of well below ground:</td>
<td>781.50 ft.</td>
</tr>
<tr>
<td>10. Hole size:</td>
<td>16 inch dia. from 0 ft. to 200 ft. below ground</td>
</tr>
<tr>
<td></td>
<td>10 inch dia. from 200 ft. to 830 ft. below ground</td>
</tr>
<tr>
<td>11. Casing installed:</td>
<td>6 in. I.D. x in. wall solid section to 661 ft. below ground</td>
</tr>
<tr>
<td></td>
<td>6 in. I.D. x in. wall perforated section to 711 ft. below ground</td>
</tr>
<tr>
<td>Casing Material/Slot Size:</td>
<td>Carbon steel blank casing; stainless steel screw</td>
</tr>
<tr>
<td>12. Annulus:</td>
<td>Grouted from 0 ft. below ground to 638 ft. below ground</td>
</tr>
<tr>
<td></td>
<td>Gravel packed from 638 ft. below ground to 830 ft. below ground</td>
</tr>
<tr>
<td>13. Initial water level:</td>
<td>677.25 ft. below ground.</td>
</tr>
<tr>
<td>Date and time of measurement:</td>
<td>10/10/95</td>
</tr>
<tr>
<td>14. Initial chloride:</td>
<td>NA ppm</td>
</tr>
<tr>
<td>Date and time of sampling:</td>
<td></td>
</tr>
<tr>
<td>15. Initial temperature:</td>
<td>NA °F</td>
</tr>
<tr>
<td>Date and time of measurement:</td>
<td></td>
</tr>
<tr>
<td>16. PUMPING TESTS: Reference Point (R.P.) used:</td>
<td>NA</td>
</tr>
<tr>
<td>which elevation is</td>
<td>ft.</td>
</tr>
<tr>
<td>(1) Step-Drawdown Test Date</td>
<td></td>
</tr>
<tr>
<td>Start water level ft. below R.P.</td>
<td></td>
</tr>
<tr>
<td>End water level ft. below R.P.</td>
<td></td>
</tr>
<tr>
<td>(2) Long-term Aquifer Test Date</td>
<td></td>
</tr>
<tr>
<td>Start water level ft. below R.P.</td>
<td></td>
</tr>
<tr>
<td>End water level ft. below R.P.</td>
<td></td>
</tr>
<tr>
<td>17. Aquifer Pump Test Procedures data &amp; graphs (1/89 LTAT Form) attached?</td>
<td>Yes</td>
</tr>
<tr>
<td>18. As-built drawings attached</td>
<td>Yes</td>
</tr>
<tr>
<td>19. Other remarks/comments:</td>
<td>(On back of this form)</td>
</tr>
</tbody>
</table>

### Well Drilling Contractor (print) | Tracy Runnels |
| Signature | C-57 Lic. No. C-16437 |
| Date | 1/8/97 |

### Surveyor (print) | Russell Fogelica |
| Signature | Lic. No. 4129 - Hawaii |
| Date | 1/8/91 |

### Applicant (print) | Col. Dennis J. 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,

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:

<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>3-2901-02</td>
</tr>
<tr>
<td>2-5</td>
<td>3-2909-01</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 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>
<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;</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
"+" 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>Northing</th>
<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sp- 1</td>
<td>117515.9390</td>
<td>490579.0620</td>
<td>855.3500 MW 1-1</td>
<td></td>
</tr>
<tr>
<td>Sp- 2</td>
<td>121016.1042</td>
<td>481183.9529</td>
<td>863.3800 MW 2-2</td>
<td></td>
</tr>
<tr>
<td>Sp- 3</td>
<td>123512.2200</td>
<td>474675.9900</td>
<td>853.4671 MW 4-1</td>
<td></td>
</tr>
<tr>
<td>Sp- 4</td>
<td>124621.3160</td>
<td>472744.1700</td>
<td>947.1000 MW 4-2</td>
<td></td>
</tr>
<tr>
<td>Sp- 5</td>
<td>122896.3800</td>
<td>474006.8800</td>
<td>884.1500 MW 4-3</td>
<td></td>
</tr>
<tr>
<td>Sp- 6</td>
<td>118439.3594</td>
<td>503585.7809</td>
<td>912.4300 MW 2-5</td>
<td></td>
</tr>
</tbody>
</table>

SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD 27)
WELL COMPLETION REPORT

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

WELL COMPLETION REPORT

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

Instructions: Please print or type and submit completed report within 30 days after well completion to the Commission on Water Resource Management, P.O. Box 821, 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 (referred 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 __________  See attached
   (If more space is needed, continue on back.)
9. Total depth of well below ground: 211 1/2 ft.
10. Hole size: 18 inch dia. from 0 ft. to 200 ft. below ground
11. Casing installed: 6 in. I.D. x ______ in. wall solid section to 61 ft. below ground
12. Annulus: Grouted from 0 ft. below ground to 638 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: ________ 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 (1/96 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. ________________________________ Date ________________________________
Surveyor (print) ________________________________ Lic. No. ________________________________ Date ________________________________
Applicant (print) ________________________________ 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 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):

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


[Water Levels]
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./2 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0-5</td>
<td>23</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5-10</td>
<td>44</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>10-15</td>
<td>50</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>15-20</td>
<td>50</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>20-25</td>
<td>53</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>25-30</td>
<td>13</td>
<td>0</td>
<td>7/8</td>
</tr>
<tr>
<td>30-35</td>
<td>13</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>35-40</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>40-45</td>
<td>2</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>45-50</td>
<td>8</td>
<td>-</td>
<td>12/13</td>
</tr>
<tr>
<td>50-55</td>
<td>28</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>55-60</td>
<td>4</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>60-65</td>
<td>4</td>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>

**Air Rotary by**

**Equipment**

Gardner Denver 40-T

**Ground Elevation**

-945 ft Date 06/05/93

**Sample Injection Drilling Rill Measurement Sample Level Elevation (feet)**

- **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 at 47 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 REDESSH BROWN SILT (ML)**, hard, moist (saprolite).
Air Rotary by
Gardner Denver 40-T

Sample Interval (feet) | Drilling Rate (min./5 feet) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft)
---|---|---|---|---
65-70 | 9 | - | 17 | 66
70-80 | 11 | 0 | 18 | 70
85-90 | 12 | 0 | 19 | 85
90-95 | 15 | 0 | 20 | 90
95-100 | 11 | 0 | 21 | 95
100-105 | 14 | 0 | 22 | 100
105-110 | 13 | 0 | 23 | 105
110-115 | 48 | 0 | 24 | 110
115-120 | 8 | 0 | 25 | 115
120-125 | 29 | 0 | 26 | 120
125-130 | 7 | 0 | 27 | 125

(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./3 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>130-135</td>
<td>10</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td>135-140</td>
<td>6</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>140-145</td>
<td>12</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>145-150</td>
<td>34</td>
<td>-</td>
<td>32</td>
</tr>
<tr>
<td>150-155</td>
<td>4</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>155-160</td>
<td>5</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>160-165</td>
<td>8</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>165-170</td>
<td>15</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>170-175</td>
<td>30</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>175-180</td>
<td>37</td>
<td>0</td>
<td>38</td>
</tr>
<tr>
<td>180-185</td>
<td>45</td>
<td>0</td>
<td>39</td>
</tr>
<tr>
<td>185-190</td>
<td>38</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>190-195</td>
<td>28</td>
<td>0</td>
<td>41</td>
</tr>
</tbody>
</table>

**Depths (ft)**

- **945 ft**

**Equipment**

Air Rotary by Gardner Denver 40-T

**Log of Monitoring Well 4-2**

**Schofield Barracks Island of Oahu, Hawaii**

**Figure S**

**Approved File**

**Date Revised**

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>
</tr>
</thead>
<tbody>
<tr>
<td>195-200</td>
<td>15</td>
<td>0</td>
<td>42</td>
<td>200</td>
</tr>
<tr>
<td>200-205</td>
<td>6</td>
<td>0</td>
<td>43</td>
<td>205</td>
</tr>
<tr>
<td>205-210</td>
<td>5</td>
<td>0</td>
<td>44</td>
<td>210</td>
</tr>
<tr>
<td>210-215</td>
<td>5</td>
<td>0</td>
<td>45</td>
<td>215</td>
</tr>
<tr>
<td>215-220</td>
<td>5</td>
<td>0</td>
<td>46</td>
<td>220</td>
</tr>
<tr>
<td>220-225</td>
<td>5</td>
<td>0</td>
<td>47</td>
<td>225</td>
</tr>
<tr>
<td>225-240</td>
<td>8</td>
<td>0</td>
<td>48</td>
<td>240</td>
</tr>
<tr>
<td>240-245</td>
<td>8</td>
<td>0</td>
<td>49</td>
<td>245</td>
</tr>
<tr>
<td>245-250</td>
<td>7</td>
<td>0</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>250-255</td>
<td>7</td>
<td>0</td>
<td>51</td>
<td>255</td>
</tr>
<tr>
<td>255-260</td>
<td>10</td>
<td>0</td>
<td>52</td>
<td>260</td>
</tr>
</tbody>
</table>

Seams of silt below 195 feet.

(Seam 12-inch steel casing to 201 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.)
(Triller 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>
</tr>
</thead>
<tbody>
<tr>
<td>250-265</td>
<td>7</td>
<td>0</td>
<td>53</td>
<td>260</td>
<td>265</td>
</tr>
<tr>
<td>265-270</td>
<td>7</td>
<td>0</td>
<td>54</td>
<td>265</td>
<td>270</td>
</tr>
<tr>
<td>270-275</td>
<td>8</td>
<td>0</td>
<td>55</td>
<td>270</td>
<td>275</td>
</tr>
<tr>
<td>275-280</td>
<td>9</td>
<td>0</td>
<td>56</td>
<td>280</td>
<td>280</td>
</tr>
<tr>
<td>280-285</td>
<td>11</td>
<td>0</td>
<td>57</td>
<td>285</td>
<td>285</td>
</tr>
<tr>
<td>285-290</td>
<td>6</td>
<td>0</td>
<td>58</td>
<td>290</td>
<td>290</td>
</tr>
<tr>
<td>290-295</td>
<td>10</td>
<td>0</td>
<td>59</td>
<td>295</td>
<td>295</td>
</tr>
<tr>
<td>295-300</td>
<td>10</td>
<td>0</td>
<td>60</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>300-305</td>
<td>8</td>
<td>0</td>
<td>61</td>
<td>305</td>
<td>305</td>
</tr>
<tr>
<td>305-310</td>
<td>11</td>
<td>0</td>
<td>62</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>310-315</td>
<td>13</td>
<td>0</td>
<td>63</td>
<td>315</td>
<td>315</td>
</tr>
<tr>
<td>315-320</td>
<td>15</td>
<td>0</td>
<td>64</td>
<td>320</td>
<td>325</td>
</tr>
<tr>
<td>320-325</td>
<td>11</td>
<td>0</td>
<td>65</td>
<td>325</td>
<td>325</td>
</tr>
</tbody>
</table>

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.
<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>325-330</td>
<td>9</td>
<td>0</td>
<td>66</td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>330-335</td>
<td>15</td>
<td>0</td>
<td>67</td>
<td>335</td>
<td></td>
</tr>
<tr>
<td>335-340</td>
<td>10</td>
<td>0</td>
<td>68</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>340-345</td>
<td>6</td>
<td>0</td>
<td>69</td>
<td>345</td>
<td></td>
</tr>
<tr>
<td>345-350</td>
<td>6</td>
<td>0</td>
<td>70</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>350-355</td>
<td>6</td>
<td>0</td>
<td>71</td>
<td>355</td>
<td></td>
</tr>
<tr>
<td>355-360</td>
<td>8</td>
<td>0</td>
<td>72</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>360-365</td>
<td>7</td>
<td>0</td>
<td>73</td>
<td>365</td>
<td></td>
</tr>
<tr>
<td>365-370</td>
<td>12</td>
<td>0</td>
<td>74</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>370-375</td>
<td>8</td>
<td>0</td>
<td>75</td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>375-380</td>
<td>8</td>
<td>0</td>
<td>76</td>
<td>380</td>
<td></td>
</tr>
<tr>
<td>380-385</td>
<td>10</td>
<td>0</td>
<td>77</td>
<td>385</td>
<td></td>
</tr>
<tr>
<td>385-390</td>
<td>8</td>
<td>0</td>
<td>78</td>
<td>390</td>
<td></td>
</tr>
</tbody>
</table>

- Decreased drilling resistance from 340 to 345 feet.
- Dark gray (N3) with some moderate reddish brown (10R,4/6) below 360 feet.

Log of Monitoring Well 4-2 (Sheet 6 of 13)
### Sample Intervals and Drilling Details

<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>390-395</td>
<td>8</td>
<td>0</td>
<td>79</td>
<td>390</td>
</tr>
<tr>
<td>395-400</td>
<td>9</td>
<td>0</td>
<td>80</td>
<td>395</td>
</tr>
<tr>
<td>400-405</td>
<td>12</td>
<td>0</td>
<td>81</td>
<td>400</td>
</tr>
<tr>
<td>405-410</td>
<td>8</td>
<td>0</td>
<td>82</td>
<td>405</td>
</tr>
<tr>
<td>110-115</td>
<td>9</td>
<td>0</td>
<td>83</td>
<td>410</td>
</tr>
<tr>
<td>415-420</td>
<td>6</td>
<td>0</td>
<td>84</td>
<td>415</td>
</tr>
<tr>
<td>420-425</td>
<td>6</td>
<td>0</td>
<td>86</td>
<td>420</td>
</tr>
<tr>
<td>430-435</td>
<td>7</td>
<td>0</td>
<td>87</td>
<td>425</td>
</tr>
<tr>
<td>435-440</td>
<td>11</td>
<td>0</td>
<td>88</td>
<td>430</td>
</tr>
<tr>
<td>440-445</td>
<td>7</td>
<td>0</td>
<td>89</td>
<td>435</td>
</tr>
<tr>
<td>445-450</td>
<td>5</td>
<td>0</td>
<td>90</td>
<td>440</td>
</tr>
<tr>
<td>450-455</td>
<td>9</td>
<td>0</td>
<td>91</td>
<td>445</td>
</tr>
</tbody>
</table>

**Drilling Rates and Breathing Space Measurements:**
- 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 7 of 13)
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./15 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>455-460</td>
<td>9</td>
<td>0</td>
<td>92</td>
<td>460-</td>
</tr>
<tr>
<td>460-465</td>
<td>11</td>
<td>0</td>
<td>93</td>
<td>465-</td>
</tr>
<tr>
<td>465-470</td>
<td>5</td>
<td>0</td>
<td>94</td>
<td>470-</td>
</tr>
<tr>
<td>470-475</td>
<td>9</td>
<td>0</td>
<td>95</td>
<td>475-</td>
</tr>
<tr>
<td>475-480</td>
<td>11</td>
<td>0</td>
<td>96</td>
<td>480-</td>
</tr>
<tr>
<td>480-485</td>
<td>8</td>
<td>0</td>
<td>97</td>
<td>485-</td>
</tr>
<tr>
<td>485-490</td>
<td>10</td>
<td>0</td>
<td>98</td>
<td>490-</td>
</tr>
<tr>
<td>490-495</td>
<td>9</td>
<td>0</td>
<td>99</td>
<td>495-</td>
</tr>
<tr>
<td>495-500</td>
<td>12</td>
<td>0</td>
<td>100</td>
<td>500-</td>
</tr>
<tr>
<td>500-505</td>
<td>7</td>
<td>0</td>
<td>101</td>
<td>505-</td>
</tr>
<tr>
<td>505-510</td>
<td>6</td>
<td>0</td>
<td>102</td>
<td>510-</td>
</tr>
<tr>
<td>510-515</td>
<td>8</td>
<td>0</td>
<td>103</td>
<td>515-</td>
</tr>
<tr>
<td>515-520</td>
<td>7</td>
<td>0</td>
<td>104</td>
<td>520-</td>
</tr>
</tbody>
</table>

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), 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>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>520-525</td>
<td>9</td>
<td>0</td>
<td>105</td>
<td>525</td>
<td>Air Rotary by Gardner Denver 40-T</td>
</tr>
<tr>
<td>525-530</td>
<td>10</td>
<td>0</td>
<td>106</td>
<td>530</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>
</tr>
<tr>
<td>530-535</td>
<td>10</td>
<td>0</td>
<td>107</td>
<td>535</td>
<td>Increased drilling resistance at 572 feet.</td>
</tr>
<tr>
<td>535-540</td>
<td>7</td>
<td>0</td>
<td>108</td>
<td>540</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>
</tr>
<tr>
<td>540-545</td>
<td>8</td>
<td>0</td>
<td>109</td>
<td>545</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>
</tr>
<tr>
<td>545-550</td>
<td>8</td>
<td>0</td>
<td>110</td>
<td>550</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>
</tr>
<tr>
<td>550-555</td>
<td>7</td>
<td>0</td>
<td>111</td>
<td>555</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>
</tr>
<tr>
<td>555-560</td>
<td>10</td>
<td>0</td>
<td>112</td>
<td>560</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>
</tr>
<tr>
<td>560-565</td>
<td>10</td>
<td>0</td>
<td>113</td>
<td>565</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>
</tr>
<tr>
<td>565-570</td>
<td>19</td>
<td>0</td>
<td>570</td>
<td></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>
</tr>
<tr>
<td>570-575</td>
<td>13</td>
<td>-</td>
<td>575</td>
<td></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>
</tr>
<tr>
<td>575-580</td>
<td>11</td>
<td>-</td>
<td>580</td>
<td></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>
</tr>
<tr>
<td>580-585</td>
<td>8</td>
<td>-</td>
<td>585</td>
<td></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>
</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></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>585-590</td>
<td>8</td>
<td>-</td>
<td></td>
<td>585-590</td>
<td></td>
</tr>
<tr>
<td>590-595</td>
<td>10</td>
<td>-</td>
<td></td>
<td>590-595</td>
<td></td>
</tr>
<tr>
<td>595-600</td>
<td>9</td>
<td>-</td>
<td></td>
<td>595-600</td>
<td></td>
</tr>
<tr>
<td>600-605</td>
<td>10</td>
<td>-</td>
<td></td>
<td>600-605</td>
<td></td>
</tr>
<tr>
<td>605-610</td>
<td>7</td>
<td>0</td>
<td>114</td>
<td>605-610</td>
<td></td>
</tr>
<tr>
<td>610-615</td>
<td>7</td>
<td>0</td>
<td>115</td>
<td>610-615</td>
<td></td>
</tr>
<tr>
<td>615-620</td>
<td>10</td>
<td>0</td>
<td>116</td>
<td>615-620</td>
<td></td>
</tr>
<tr>
<td>620-625</td>
<td>15</td>
<td>0</td>
<td>117</td>
<td>620-625</td>
<td></td>
</tr>
<tr>
<td>625-630</td>
<td>-</td>
<td>0</td>
<td>118</td>
<td>625-630</td>
<td></td>
</tr>
<tr>
<td>630-635</td>
<td>4</td>
<td>0</td>
<td>119</td>
<td>630-635</td>
<td></td>
</tr>
<tr>
<td>635-640</td>
<td>6</td>
<td>0</td>
<td>120</td>
<td>635-640</td>
<td></td>
</tr>
<tr>
<td>640-645</td>
<td>7</td>
<td>0</td>
<td></td>
<td>640-645</td>
<td></td>
</tr>
<tr>
<td>645-650</td>
<td>10</td>
<td>0</td>
<td></td>
<td>645-650</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**: Air Rotary by Gardner Denver 40-T

**Ground Elevation**: ~945 ft

**Date**: 06/05/93

**Sample Number (Sample)**: 585-650

---

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 (ft)</th>
<th>Sample Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>650-655</td>
<td>8</td>
<td>0</td>
<td></td>
<td>650</td>
<td>Increased drilling resistance from 650 to 653 feet.</td>
</tr>
<tr>
<td>655-660</td>
<td>8</td>
<td>0</td>
<td></td>
<td>655</td>
<td>(Return of drilling foam circulation at 660 feet.)</td>
</tr>
<tr>
<td>660-665</td>
<td>6</td>
<td>0</td>
<td>121</td>
<td>660</td>
<td>Moderately vesicular below 660 feet.</td>
</tr>
<tr>
<td>665-670</td>
<td>7</td>
<td>-</td>
<td></td>
<td>670</td>
<td>(Loss of drilling foam circulation at 668 feet.)</td>
</tr>
<tr>
<td>670-675</td>
<td>4</td>
<td>0</td>
<td></td>
<td>675</td>
<td>Decreased drilling resistance (possible fractured zone) from 670 to 675 feet.</td>
</tr>
<tr>
<td>675-680</td>
<td>10</td>
<td>0</td>
<td></td>
<td>680</td>
<td>Water table measured on 6/8/93 at 674 feet below ground surface. Increased drilling resistance at 675 feet.</td>
</tr>
<tr>
<td>680-685</td>
<td>6</td>
<td>0</td>
<td></td>
<td>685</td>
<td>(Return of drilling foam circulation between 670 and 675 feet.)</td>
</tr>
<tr>
<td>685-690</td>
<td>7</td>
<td>-</td>
<td></td>
<td>690</td>
<td>(Loss of drilling foam circulation between 702 and 705 feet.)</td>
</tr>
<tr>
<td>690-695</td>
<td>6</td>
<td>0</td>
<td></td>
<td>695</td>
<td>Brown/black (5YR,2/1) and dark reddish brown (10R,3/4) below 700 feet.</td>
</tr>
<tr>
<td>695-700</td>
<td>6</td>
<td>0</td>
<td></td>
<td>700</td>
<td>(Return of drilling foam circulation between 700 and 702 feet.)</td>
</tr>
<tr>
<td>700-705</td>
<td>7</td>
<td>0</td>
<td>122</td>
<td>705</td>
<td>Brown/black (5YR,2/1) and dark reddish brown (10R,3/4) below 700 feet.</td>
</tr>
<tr>
<td>705-710</td>
<td>10</td>
<td>0</td>
<td>123</td>
<td>710</td>
<td>Very dusky red (10R,2/2), moderate reddish brown (10R,4/6), dark yellowish orange (10R,6/6), and brownish gray (5Y,4/1) below 710 feet.</td>
</tr>
<tr>
<td>710-715</td>
<td>7</td>
<td>0</td>
<td>124</td>
<td>715</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>Equipment (Ground Elevation)</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td>715-720</td>
<td>10</td>
<td>0</td>
<td>125</td>
<td>Air Rotary by Gardner Denver 40-T</td>
<td></td>
</tr>
<tr>
<td>720-725</td>
<td>11</td>
<td>0</td>
<td>126</td>
<td>-945 ft</td>
<td></td>
</tr>
<tr>
<td>725-730</td>
<td>11</td>
<td>0</td>
<td>127</td>
<td>Date 06/05/93</td>
<td></td>
</tr>
<tr>
<td>730-735</td>
<td>6</td>
<td>0</td>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>735-740</td>
<td>9</td>
<td>0</td>
<td>129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>740-745</td>
<td>10</td>
<td>0</td>
<td>130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>745-750</td>
<td>6</td>
<td>0</td>
<td>131</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750-755</td>
<td>10</td>
<td>0</td>
<td>132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>755-760</td>
<td>9</td>
<td>0</td>
<td>133</td>
<td></td>
<td></td>
</tr>
<tr>
<td>760-765</td>
<td>16</td>
<td>0</td>
<td>134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>765-770</td>
<td>7</td>
<td>0</td>
<td>135</td>
<td></td>
<td></td>
</tr>
<tr>
<td>770-775</td>
<td>13</td>
<td>0</td>
<td>136</td>
<td></td>
<td></td>
</tr>
<tr>
<td>775-780</td>
<td>12</td>
<td>0</td>
<td>137</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Loss 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), moderately strong to strong, moderately to highly vesicular below 725 feet.

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), strong below 735 feet.

(Viscosity of drilling foam return decreased at 741 feet.)

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.)

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), 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.
<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>780-785</td>
<td>12</td>
<td>0</td>
<td>138</td>
<td>780-785</td>
</tr>
<tr>
<td>785-790</td>
<td>11</td>
<td>0</td>
<td>139</td>
<td>785-790</td>
</tr>
<tr>
<td>790-795</td>
<td>19</td>
<td>0</td>
<td>140</td>
<td>790-795</td>
</tr>
<tr>
<td>795-800</td>
<td>11</td>
<td>0</td>
<td>141</td>
<td>795-800</td>
</tr>
<tr>
<td>800-805</td>
<td>14</td>
<td>0</td>
<td>142</td>
<td>800-805</td>
</tr>
<tr>
<td>805-810</td>
<td>15</td>
<td>0</td>
<td>143</td>
<td>805-810</td>
</tr>
<tr>
<td>810-815</td>
<td>17</td>
<td>0</td>
<td>144</td>
<td>810-815</td>
</tr>
<tr>
<td>815-820</td>
<td>16</td>
<td>0</td>
<td>145</td>
<td>815-820</td>
</tr>
<tr>
<td>820-825</td>
<td>18</td>
<td>0</td>
<td>146</td>
<td>820-825</td>
</tr>
<tr>
<td>825-830</td>
<td>19</td>
<td>0</td>
<td>147</td>
<td>825-830</td>
</tr>
</tbody>
</table>

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.
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)

(10/10/95)

691 | 254
711 | 234
724 | 221
8 5/6 | 130

(3/4"")

(Data: MEAN SEA LEVEL)

24" DIA. STEEL WELL MONUMENT

TOP OF SOUNDING TUBE EL. = 947.11 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

NOT TO SCALE
### Log of Monitoring Well 4-2

**Schofield Barracks, Island of Oahu, Hawaii**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Breathing Space Measurements (ppm)</th>
<th>Equipment</th>
<th>Sample Interval (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Downhole Hammer</td>
<td>0</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>0-5</td>
<td>2</td>
<td>0</td>
<td></td>
<td>12</td>
<td>Dark reddish brown (2.5YR,3/4) below 5 feet.</td>
</tr>
<tr>
<td>5-10</td>
<td>3</td>
<td>10</td>
<td></td>
<td>23</td>
<td>BASALT COBBLE from 13.5 to 14.5 feet.</td>
</tr>
<tr>
<td>10-15</td>
<td>4</td>
<td>15</td>
<td></td>
<td>44</td>
<td>BROWN ELASTIC SILT (MH) (5YR,4/4), stiff to very stiff, moist.</td>
</tr>
<tr>
<td>15-20</td>
<td>5</td>
<td>20</td>
<td></td>
<td>50</td>
<td>BASALT COBBLE from 17 to 18 feet.</td>
</tr>
<tr>
<td>20-25</td>
<td>6</td>
<td>25</td>
<td></td>
<td>0</td>
<td>YELLOWISH RED ELASTIC SILT (MH) (5YR,4/8), 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>7/8</td>
<td>30</td>
<td></td>
<td>13</td>
<td>Increased drilling resistance from 24 to 28 feet (probably basalt cobbles and boulders).</td>
</tr>
<tr>
<td>30-35</td>
<td>9</td>
<td>35</td>
<td></td>
<td>53</td>
<td>YELLOWISH BROWN ELASTIC SILT (MH) (5YR,5/6), stiff to very stiff, moist.</td>
</tr>
<tr>
<td>35-40</td>
<td>10</td>
<td>40</td>
<td></td>
<td>2</td>
<td>Increased drilling resistance at 47 feet.</td>
</tr>
<tr>
<td>40-45</td>
<td>11</td>
<td>45</td>
<td></td>
<td>2</td>
<td>(Drilling foam color change to grayish brown at 50 feet.)</td>
</tr>
<tr>
<td>45-50</td>
<td>12/13</td>
<td>50</td>
<td></td>
<td>8</td>
<td>VERY DARK GRAY (5YR,3/1) AND WEAK RED (2.5YR,4/8) BASALT, moderately hard, moderately strong, little to moderately weathered.</td>
</tr>
<tr>
<td>50-55</td>
<td>14</td>
<td>55</td>
<td></td>
<td>28</td>
<td>DARK REDDISH BROWN SILT (ML), hard, moist.</td>
</tr>
<tr>
<td>55-60</td>
<td>15</td>
<td>60</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>60-65</td>
<td>16</td>
<td>65</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**Drawing Information**

- **DRAWN:** Harding Lawson Associates
- **JOB NUMBER:** 26129.05.05.12
- **APPROVED:** 26129.05.05.12
- **FILE:** STEPS
- **DATE:** 06/05/93
- **REVISED DATE:** 2/94

**Figure Reference:**

- **Log of Monitoring Well 4-2**
- **Schofield TEPS 5**
- **Sheet 1 of 13**
### Log of Monitoring Well 4-2

**Top of Casing ft**

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min/100 ft)</th>
<th>Sample Number</th>
<th>Sample Depth (in)</th>
<th>Equipment</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-70</td>
<td>9</td>
<td>17</td>
<td>70</td>
<td>Downhole Hammer</td>
<td>948.8 ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Date 06/05/93</td>
</tr>
</tbody>
</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.

---

**Harding Lawson Associates**

**Engineering and Environmental Services**

**Log of Monitoring Well 4-2**

(Sheet 2 of 13) **FIGURE**

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**DRAWN**: kar  **JOB NUMBER**: 26129.05.05.12  **APPROVED**:

**FILE**: STEPS  **DATE**: 2/94  **REVISED DATE**: 
### Log of Monitoring Well 4-2

**Operation**
- **Top of Casing ft**
- **Sample Interval (ft)**
- **Drilling Rate (min./ft)**
- **Breakdown Pressure (ppm)**
- **Sample Number**
- **Depth (ft)**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Rate</th>
<th>Breakdown</th>
<th>Sample</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>130-135</td>
<td>10</td>
<td>29</td>
<td>135</td>
<td>130</td>
</tr>
<tr>
<td>135-140</td>
<td>6</td>
<td>30</td>
<td>140</td>
<td>135</td>
</tr>
<tr>
<td>140-145</td>
<td>12</td>
<td>0</td>
<td>31</td>
<td>145</td>
</tr>
<tr>
<td>145-150</td>
<td>34</td>
<td>0</td>
<td>32</td>
<td>150</td>
</tr>
<tr>
<td>150-155</td>
<td>4</td>
<td>0</td>
<td>33</td>
<td>155</td>
</tr>
<tr>
<td>155-160</td>
<td>5</td>
<td>0</td>
<td>34</td>
<td>160</td>
</tr>
<tr>
<td>160-165</td>
<td>8</td>
<td>0</td>
<td>35</td>
<td>165</td>
</tr>
<tr>
<td>165-170</td>
<td>15</td>
<td>0</td>
<td>36</td>
<td>170</td>
</tr>
<tr>
<td>170-175</td>
<td>30</td>
<td>0</td>
<td>37</td>
<td>175</td>
</tr>
<tr>
<td>175-180</td>
<td>37</td>
<td>0</td>
<td>38</td>
<td>180</td>
</tr>
<tr>
<td>180-185</td>
<td>45</td>
<td>0</td>
<td>39</td>
<td>185</td>
</tr>
<tr>
<td>185-190</td>
<td>38</td>
<td>0</td>
<td>40</td>
<td>190</td>
</tr>
<tr>
<td>190-195</td>
<td>28</td>
<td>0</td>
<td>41</td>
<td>195</td>
</tr>
</tbody>
</table>

**Downhole Hammer**

**Equipment**
- **Elevation** 948.8 ft
- **Date** 06/05/93

**Notes**
- **Light Olive Gray** (5Y.5/2), **Light Brown** (5YR.5/6) and **Moderate Brown** (5YR.4/2) Basalt, with pockets of reddish brown silt and sand, moderately hard, moderately strong, deeply weathered.
- **Dark Brown Silt with Sand** (ML), very stiff, moist.
- 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 silt pockets, moderately hard, moderately strong, moderately to deeply weathered, with some highly vesicular fragments.
- Light olive gray (5Y.3/2), grayish red (5R.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.

**Log of Monitoring Well 4-2**

- **Schofield Barracks**
- **Island of Oahu, Hawai'i**

**Drawn**
- Harding Lawson Associates
- Engineering and Environmental Services
- kar

**File**
- STEPS 2/94

**Rev. Date**
- 2/94
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (feet/minute)</th>
<th>Borehole Space Measurement (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Equipment</th>
<th>Downhole Hammer</th>
</tr>
</thead>
<tbody>
<tr>
<td>195-200</td>
<td>15</td>
<td>0</td>
<td>42</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200-205</td>
<td>6</td>
<td>0</td>
<td>43</td>
<td>205</td>
<td></td>
<td></td>
</tr>
<tr>
<td>205-210</td>
<td>5</td>
<td>0</td>
<td>44</td>
<td>210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>210-215</td>
<td>5</td>
<td>0</td>
<td>45</td>
<td>215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>215-220</td>
<td>5</td>
<td>0</td>
<td>46</td>
<td>220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>220-225</td>
<td>5</td>
<td>0</td>
<td>47</td>
<td>225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>225-240</td>
<td>0</td>
<td>48</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>8</td>
<td>0</td>
<td>49</td>
<td>245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>245-250</td>
<td>7</td>
<td>0</td>
<td>50</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250-255</td>
<td>7</td>
<td>0</td>
<td>51</td>
<td>255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>255-260</td>
<td>10</td>
<td>0</td>
<td>52</td>
<td>260</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Seams of silt below 195 feet.

(Set 12-inch steel casing to 201 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), grayish red (10R,4/2), and light olive brown (5Y,5/6) below 255 feet. Highly vesicular.
<table>
<thead>
<tr>
<th>Top of Casing (ft)</th>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min/3 ft)</th>
<th>Breakdown Space Measurement (rpm)</th>
<th>Equipment</th>
<th>Sample Number</th>
<th>Deposit ()</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>260-265</td>
<td>7</td>
<td>0 53</td>
<td>265</td>
<td>Downhole Hammer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>265-270</td>
<td>7</td>
<td>0 54</td>
<td>270</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>270-275</td>
<td>8</td>
<td>0 55</td>
<td>275</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>275-280</td>
<td>9</td>
<td>0 56</td>
<td>280</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>280-285</td>
<td>11</td>
<td>0 57</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>285-290</td>
<td>6</td>
<td>0 58</td>
<td>290</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>290-295</td>
<td>10</td>
<td>0 59</td>
<td>295</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>295-300</td>
<td>10</td>
<td>0 60</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300-305</td>
<td>8</td>
<td>0 61</td>
<td>305</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>305-310</td>
<td>11</td>
<td>0 62</td>
<td>310</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>310-315</td>
<td>13</td>
<td>0 63</td>
<td>315</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>315-320</td>
<td>15</td>
<td>0 64</td>
<td>320</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>320-325</td>
<td>11</td>
<td>0 65</td>
<td>325</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Brownish gray (5YR.4/1), light brown (5YR.5/8), 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 weathered.
### Log of Monitoring Well 4-2

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min./3 ft)</th>
<th>Breaking Space (ft)</th>
<th>Top of Casing</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Equipment</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>325-330</td>
<td>9</td>
<td>0</td>
<td>330</td>
<td>330</td>
<td>325</td>
<td>Downhole Hammer</td>
<td>06/05/93</td>
</tr>
<tr>
<td>330-335</td>
<td>15</td>
<td>0</td>
<td>335</td>
<td>335</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>335-340</td>
<td>10</td>
<td>0</td>
<td>340</td>
<td>340</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>340-345</td>
<td>6</td>
<td>0</td>
<td>345</td>
<td>345</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>345-350</td>
<td>6</td>
<td>0</td>
<td>350</td>
<td>350</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>350-355</td>
<td>6</td>
<td>0</td>
<td>355</td>
<td>355</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>355-360</td>
<td>8</td>
<td>0</td>
<td>360</td>
<td>360</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>360-365</td>
<td>7</td>
<td>0</td>
<td>365</td>
<td>365</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>365-370</td>
<td>12</td>
<td>0</td>
<td>370</td>
<td>370</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>370-375</td>
<td>8</td>
<td>0</td>
<td>375</td>
<td>375</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>375-380</td>
<td>8</td>
<td>0</td>
<td>380</td>
<td>380</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>380-385</td>
<td>10</td>
<td>0</td>
<td>385</td>
<td>385</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>385-390</td>
<td>8</td>
<td>0</td>
<td>390</td>
<td>390</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Top of Casing ft*

- **Equipment**: Downhole Hammer
- **Elevation**: 948.8 ft

**Remarks**:
- Decreased drilling resistance from 340 to 345 feet.
- Dark gray (N3) with some moderate reddish brown (10R 4/6) below 360 feet.

---

**Harding Lawson Associates**

Engineering and Environmental Services

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**Log of Monitoring Well 4-2**

**Sheet 6 of 13**

**kari**

**Job Number**

26129.05.05.12

**Approved**

STEPS

**File Date**

2/94
<table>
<thead>
<tr>
<th>Top of Casing ft</th>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min./ft)</th>
<th>Equipment</th>
<th>Downhole Hammer</th>
</tr>
</thead>
<tbody>
<tr>
<td>390-395</td>
<td>8</td>
<td>0 79</td>
<td>395-</td>
<td>Olive black (5Y,2/1) below 400 feet. Massive to slightly vesicular.</td>
</tr>
<tr>
<td>395-400</td>
<td>9</td>
<td>0 80</td>
<td>400-</td>
<td>Olive black (5Y,2/1) and brownish black (5YR,2/1) below 405 feet.</td>
</tr>
<tr>
<td>400-405</td>
<td>12</td>
<td>0 81</td>
<td>405-</td>
<td>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.</td>
</tr>
<tr>
<td>405-410</td>
<td>8</td>
<td>0 82</td>
<td>410-</td>
<td>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.</td>
</tr>
<tr>
<td>410-415</td>
<td>9</td>
<td>0 83</td>
<td>415-</td>
<td>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,4/8) below 450 feet. Moderately vesicular.</td>
</tr>
<tr>
<td>415-420</td>
<td>6</td>
<td>0 84</td>
<td>420-</td>
<td></td>
</tr>
<tr>
<td>420-425</td>
<td>6</td>
<td>0 86</td>
<td>425-</td>
<td></td>
</tr>
<tr>
<td>425-430</td>
<td>7</td>
<td>0 87</td>
<td>430-</td>
<td></td>
</tr>
<tr>
<td>430-435</td>
<td>7</td>
<td>0 88</td>
<td>435-</td>
<td></td>
</tr>
<tr>
<td>435-440</td>
<td>11</td>
<td>0 90</td>
<td>440-</td>
<td></td>
</tr>
<tr>
<td>440-445</td>
<td>7</td>
<td>0 89</td>
<td>445-</td>
<td></td>
</tr>
<tr>
<td>445-450</td>
<td>5</td>
<td>0 90</td>
<td>450-</td>
<td></td>
</tr>
<tr>
<td>450-455</td>
<td>9</td>
<td>0 91</td>
<td>455-</td>
<td></td>
</tr>
</tbody>
</table>

---

**Log of Monitoring Well 4-2**

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

**Drawn:** kar 26129.05.05.12
**Approved:** STEPS
**File:** STEPS
**Date:** 06/05/93
**Revised Date:** 2/94
<table>
<thead>
<tr>
<th>Top of Casing (ft)</th>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min. 15 feet)</th>
<th>Breaking Stress Measurement (ppm)</th>
<th>Sample Number</th>
<th>Sample Depth (ft)</th>
<th>Equipment</th>
<th>Downhole Hammer</th>
</tr>
</thead>
<tbody>
<tr>
<td>455</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>455-460</td>
<td>9</td>
<td>0</td>
<td>92</td>
<td>460</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>460-465</td>
<td>11</td>
<td>0</td>
<td>93</td>
<td>465</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>465-470</td>
<td>5</td>
<td>0</td>
<td>94</td>
<td>470</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>470-475</td>
<td>9</td>
<td>0</td>
<td>95</td>
<td>475</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>475-480</td>
<td>11</td>
<td>0</td>
<td>96</td>
<td>480</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>480-485</td>
<td>8</td>
<td>0</td>
<td>97</td>
<td>485</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>485-490</td>
<td>10</td>
<td>0</td>
<td>98</td>
<td>490</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>490-495</td>
<td>9</td>
<td>0</td>
<td>99</td>
<td>495</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>495-500</td>
<td>12</td>
<td>0</td>
<td>100</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-505</td>
<td>7</td>
<td>0</td>
<td>101</td>
<td>505</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>505-510</td>
<td>6</td>
<td>0</td>
<td>102</td>
<td>510</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>510-515</td>
<td>8</td>
<td>0</td>
<td>103</td>
<td>515</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>515-520</td>
<td>7</td>
<td>0</td>
<td>104</td>
<td>520</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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.
<table>
<thead>
<tr>
<th>Top of Casing (ft)</th>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (m/hr)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
<th>Equipment</th>
<th>Elevation</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>520</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>520</td>
<td>Downhole Hammer</td>
<td>948.8 ft</td>
<td>06/05/93</td>
</tr>
</tbody>
</table>

| 520-525           | 9                   | 0                   | 105-525                          |              |           |        |           |           |      |
| 525-530           | 10                  | 0                   | 106-530                          |              |           |        |           |           |      |
| 530-535           | 10                  | 0                   | 107-535                          |              |           |        |           |           |      |
| 535-540           | 7                   | 0                   | 108-540                          |              |           |        |           |           |      |
| 540-545           | 8                   | 0                   | 109-545                          |              |           |        |           |           |      |
| 545-550           | 8                   | 0                   | 110-550                          |              |           |        |           |           |      |
| 550-555           | 7                   | 0                   | 111-555                          |              |           |        |           |           |      |
| 555-560           | 10                  | 0                   | 112-560                          |              |           |        |           |           |      |
| 560-565           | 10                  | 0                   | 113-565                          |              |           |        |           |           |      |
| 565-570           | 19                  | 0                   | 570                               |              |           |        |           |           |      |
| 570-575           | 13                  | -                   | 575                               |              |           |        |           |           |      |
| 575-580           | 11                  | -                   | 580                               |              |           |        |           |           |      |
| 580-585           | 8                   | -                   | 585                               |              |           |        |           |           |      |

**Note:**
- Blackish red (5R,2/2) below 515 feet. Moderately weathered, very vesicular. Vesicles show iron-oxide staining.
- Blackish red (5R,2/2) and dusky red (5R,3/4) below 520 feet. Slightly vesicular.
- Dark reddish brown (10R,3/4) and very dusky red (10R,2/2) below 525 feet. Moderately vesicular.
- 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 564 to 572 feet.]
- Increased drilling resistance at 572 feet.
Top of Casing ft

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min./3 ft)</th>
<th>Breaching Spacing (intervals)</th>
<th>Sample Number</th>
<th>Depth (ft) Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>585-590</td>
<td>8</td>
<td></td>
<td></td>
<td>585</td>
</tr>
<tr>
<td>590-595</td>
<td>10</td>
<td></td>
<td></td>
<td>590</td>
</tr>
<tr>
<td>595-600</td>
<td>9</td>
<td></td>
<td></td>
<td>600</td>
</tr>
<tr>
<td>600-605</td>
<td>10</td>
<td></td>
<td></td>
<td>605</td>
</tr>
<tr>
<td>605-610</td>
<td>7</td>
<td>0</td>
<td>114</td>
<td>610</td>
</tr>
<tr>
<td>610-615</td>
<td>7</td>
<td>0</td>
<td>115</td>
<td>615</td>
</tr>
<tr>
<td>615-620</td>
<td>10</td>
<td>0</td>
<td>116</td>
<td>620</td>
</tr>
<tr>
<td>620-625</td>
<td>15</td>
<td>0</td>
<td>117</td>
<td>625</td>
</tr>
<tr>
<td>625-630</td>
<td>0</td>
<td>0</td>
<td>118</td>
<td>630</td>
</tr>
<tr>
<td>630-635</td>
<td>4</td>
<td>0</td>
<td>119</td>
<td>635</td>
</tr>
<tr>
<td>635-640</td>
<td>6</td>
<td>0</td>
<td>120</td>
<td>640</td>
</tr>
<tr>
<td>640-645</td>
<td>7</td>
<td>0</td>
<td>645</td>
<td>645</td>
</tr>
<tr>
<td>645-650</td>
<td>10</td>
<td>0</td>
<td>650</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

**Downhole Hammer**

**Elevation** 948.8 ft **Date** 06/05/93

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.)
<table>
<thead>
<tr>
<th>Top of Casing (ft)</th>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (rev./min.)</th>
<th>Breaking Strength (gpm)</th>
<th>Sample Number</th>
<th>Elevation (ft)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>948.8</td>
<td>06/05/93</td>
</tr>
<tr>
<td>650-655</td>
<td>8</td>
<td>0</td>
<td>655</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>655-660</td>
<td>8</td>
<td>0</td>
<td>660</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>660-665</td>
<td>6</td>
<td>0</td>
<td>121 665</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>665-670</td>
<td>7</td>
<td>0</td>
<td>670</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>670-675</td>
<td>4</td>
<td>0</td>
<td>675</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>675-680</td>
<td>10</td>
<td>0</td>
<td>680</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>680-685</td>
<td>6</td>
<td>0</td>
<td>685</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>685-690</td>
<td>7</td>
<td>0</td>
<td>690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>690-695</td>
<td>6</td>
<td>0</td>
<td>695</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>695-700</td>
<td>6</td>
<td>0</td>
<td>700</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>700-705</td>
<td>7</td>
<td>0</td>
<td>122 705</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>705-710</td>
<td>10</td>
<td>0</td>
<td>123 710</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>710-715</td>
<td>7</td>
<td>0</td>
<td>124 715</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Increased drilling resistance from 650 to 653 feet.
- (Return of drilling foam circulation at 650 feet.) Moderately vesicular below 660 feet.
- (Loss of drilling foam circulation at 668 feet.) Decreased drilling resistance (possible fractured zone) from 670 to 675 feet.
- Water level measured 674 feet below ground surface with Powers Well Sounder, June 8, 1993, 10:20 am. Increased drilling resistance at 675 feet.
- (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.
- Very dusky red (10R,2/2), moderate reddish brown (10R,4/8), dark yellowish orange (10R,6/8), and brownish gray (5Y,4/1) below 710 feet.

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-2
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

<table>
<thead>
<tr>
<th>DRAWN</th>
<th>JOB NUMBER</th>
<th>APPROVED</th>
<th>FILE</th>
<th>DATE</th>
<th>REVISED DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>kar</td>
<td>26129.05.05.12</td>
<td>STEPS</td>
<td></td>
<td></td>
<td>2/94</td>
</tr>
<tr>
<td>Sample Interval (ft)</td>
<td>Drilling Rate (min.:sec.)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td>Equipment</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------</td>
<td>----------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>715-720</td>
<td>10</td>
<td>0</td>
<td>125</td>
<td>720</td>
<td></td>
</tr>
<tr>
<td>720-725</td>
<td>11</td>
<td>0</td>
<td>126</td>
<td>725</td>
<td></td>
</tr>
<tr>
<td>725-730</td>
<td>11</td>
<td>0</td>
<td>127</td>
<td>730</td>
<td></td>
</tr>
<tr>
<td>730-735</td>
<td>6</td>
<td>0</td>
<td>128</td>
<td>735</td>
<td></td>
</tr>
<tr>
<td>735-740</td>
<td>9</td>
<td>0</td>
<td>129</td>
<td>740</td>
<td></td>
</tr>
<tr>
<td>740-745</td>
<td>10</td>
<td>0</td>
<td>130</td>
<td>745</td>
<td></td>
</tr>
<tr>
<td>745-750</td>
<td>6</td>
<td>0</td>
<td>131</td>
<td>750</td>
<td></td>
</tr>
<tr>
<td>750-755</td>
<td>10</td>
<td>0</td>
<td>132</td>
<td>755</td>
<td></td>
</tr>
<tr>
<td>755-760</td>
<td>9</td>
<td>0</td>
<td>133</td>
<td>760</td>
<td></td>
</tr>
<tr>
<td>760-765</td>
<td>16</td>
<td>0</td>
<td>134</td>
<td>765</td>
<td></td>
</tr>
<tr>
<td>765-770</td>
<td>7</td>
<td>0</td>
<td>135</td>
<td>770</td>
<td></td>
</tr>
<tr>
<td>770-775</td>
<td>13</td>
<td>0</td>
<td>136</td>
<td>775</td>
<td></td>
</tr>
<tr>
<td>775-780</td>
<td>12</td>
<td>0</td>
<td>137</td>
<td>780</td>
<td></td>
</tr>
</tbody>
</table>

(Loss 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.

(Decreasing 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 (max. 1/2 ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Equipment</th>
<th>Log of Monitoring Well 4-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>780-785</td>
<td>12</td>
<td>0</td>
<td>138</td>
<td>785</td>
<td>Downhole Hammer</td>
<td>Grayish brown (5YR.3/2), brownish black (5YR.2/1), and dark reddish brown (10R.3/4) below 780 feet. Moderately to highly vesicular.</td>
</tr>
<tr>
<td>785-790</td>
<td>11</td>
<td>0</td>
<td>139</td>
<td>790</td>
<td>Downhole Hammer</td>
<td>Olive black (5Y.2/1), and dark reddish brown (10R.3/4) below 790 feet. Decreased drilling resistance from 793 to 795 feet.</td>
</tr>
<tr>
<td>790-795</td>
<td>19</td>
<td>0</td>
<td>140</td>
<td>795</td>
<td>Downhole Hammer</td>
<td>Dark grey (N3) below 800 feet. Moderately vesicular.</td>
</tr>
<tr>
<td>795-800</td>
<td>11</td>
<td>0</td>
<td>141</td>
<td>800</td>
<td>Downhole Hammer</td>
<td>Dark grey (N3) and dark reddish brown (10R.3/4) below 810 feet. Slightly vesicular.</td>
</tr>
<tr>
<td>800-805</td>
<td>14</td>
<td>0</td>
<td>142</td>
<td>805</td>
<td>Downhole Hammer</td>
<td>Decreased drilling resistance (possible void) from 816 to 817 feet.</td>
</tr>
<tr>
<td>805-810</td>
<td>15</td>
<td>0</td>
<td>143</td>
<td>810</td>
<td>Downhole Hammer</td>
<td>Slightly to moderately vesicular below 825 feet.</td>
</tr>
<tr>
<td>810-815</td>
<td>17</td>
<td>0</td>
<td>144</td>
<td>815</td>
<td></td>
<td>Total depth = 830 feet. Water table was measured at 674 feet below ground surface, 6/8/93, 10:20 am.</td>
</tr>
</tbody>
</table>

Harding Lawson Associates
Engineering and Environmental Services

Log of Monitoring Well 4-2
Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

DRAWN: kar 26129.05.05.12
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 Division of Water and Land Development, P.O. Box 275, Honolulu, Hawai'i 96803. Application must be accompanied by a non-refundable filing fee of $15.00 payable to the Department of Land and Natural Resources. (Filing fee waived for government agencies.) If necessary, phone 415-1437, 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
Bldg. 300, Wheeler Army Airfield
Phone (808) 656-2878

LANDOWNER

Firm Name U.S. Army
Contact Person Col. Charles Wilson
Address Directorate of Facilities
Bldg. 300, Wheeler Army Airfield
Phone (808) 656-2878

3. PROPOSED CONTRACTOR FOR: Well Drilling Pump Installation

Name Roscoe Moss Hawaii, Inc.
Address 91-259A Olai Street
Ewa Beach, HI 96707
Phone 692-6856

Contractor's License No. C-16437

4. PROPOSED WORK

Drill New Well
Deepen
Alter
Install New Pump
Replace Pump
Redrill
Seal
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.)
Domestic (individual, noncommercial water systems)
Irrigation (specify)
Military
Industrial
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
Motor: 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

For Official Use Only:

Field Checked By

Latitude

State Well No.

Longitude

Hydrologic Unit

Date

MON WELL 4-2
Briefly describe the proposed work:

Drill and install monitoring well 50 ft into aquifer, approximate depth 1000 ft.

<table>
<thead>
<tr>
<th>Elevation at top of casing</th>
<th>935 ft., msl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Elev.</td>
<td>ft., msl*</td>
</tr>
<tr>
<td>Cement Grout</td>
<td>935 ft.</td>
</tr>
<tr>
<td>Bentonite Seal</td>
<td>5 ft.</td>
</tr>
<tr>
<td>Hole Dia.</td>
<td>10 in.</td>
</tr>
<tr>
<td>Total Depth</td>
<td>1000 ft.</td>
</tr>
<tr>
<td>Rock Packing</td>
<td>60 ft.</td>
</tr>
<tr>
<td>Solid Casing:</td>
<td>Carbon Steel</td>
</tr>
<tr>
<td>Material</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Approx 950 ft.</td>
</tr>
<tr>
<td>Diameter</td>
<td>6&quot; in.</td>
</tr>
<tr>
<td>Wall thickness</td>
<td>Schedule 40 in.</td>
</tr>
<tr>
<td>Casing:</td>
<td></td>
</tr>
<tr>
<td>/ Perforated / Screen</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Length</td>
<td>50 ft.</td>
</tr>
<tr>
<td>Diameter</td>
<td>6 in.</td>
</tr>
<tr>
<td>Wall thickness</td>
<td>Schedule 40 in.</td>
</tr>
<tr>
<td>Openings</td>
<td>0.060 in.</td>
</tr>
</tbody>
</table>

*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

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

MK-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

<table>
<thead>
<tr>
<th>Point</th>
<th>Northing</th>
<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. MERCATOR - HAWAII 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-29-24.690</td>
<td>117519.9390</td>
<td>490579.0620</td>
<td>855.3500</td>
<td>MW 1-1</td>
</tr>
<tr>
<td>Sp→</td>
<td>1</td>
<td>117519.9390</td>
<td>490579.0620</td>
<td>855.3500</td>
</tr>
<tr>
<td>Sp→</td>
<td>2</td>
<td>121016.1042</td>
<td>481183.9529</td>
<td>863.5800</td>
</tr>
<tr>
<td>Sp→</td>
<td>3</td>
<td>123512.2200</td>
<td>474675.9900</td>
<td>853.4671</td>
</tr>
<tr>
<td>Sp→</td>
<td>4</td>
<td>124621.3160</td>
<td>472744.1700</td>
<td>947.1000</td>
</tr>
<tr>
<td>Sp→</td>
<td>5</td>
<td>122896.3800</td>
<td>474006.8800</td>
<td>884.1500</td>
</tr>
<tr>
<td>Sp→</td>
<td>6</td>
<td>118439.3594</td>
<td>503505.7809</td>
<td>912.4300</td>
</tr>
</tbody>
</table>

0-00-13.601 CONVERGENCE

0.9999900 SCALE FACTOR

0.9999464 GRID FACTOR

---

**HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD 27)**
WELL COMPLETION REPORT

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

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 96813. An as-built drawing of the well and chemical analysis should also be submitted. For assistance call the Commission Regulation Branch at 587-0026.

1. STATE WELL NO. 3004-01
   WELL NAME MW4-1
   ISLAND OAHU

2. LOCATION: Address
   SCHOFIELD BARRACKS PISTOL RANGE
   Tax Map Key 3-7-701

3. DRILLING OR PUMP INSTALLATION CONTRACTOR ROSCOE MOSS HAWAII, INC.

4. CONTRACTOR'S C-67 LICENSE NUMBER C-16437

5. NAME OF DRILLER WHO PERFORMED WORK HAL FENTON

6. TYPE OF RIG/CONSTRUCTION
   AIR HAMMER & CABLE TOOL

7. DATE OF WELL DRILLING COMPLETION DECEMBER 1993
   (NOTE: Report must be submitted within 30 days after this date)

8. 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>Survey Stake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HARDING LAWSON ASSOCIATES</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BORING LOG ATTACHED</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 200 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 35 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 airline NA ft. below , which elevation is ________ ft.
   Pumping Head is 585 ft.

19. PUMPING TESTS:
   Reference Point (R.P.) used:
   Date
   Start water level ft. below R.P. ft. below R.P. ft. below R.P.
   End water level ft. below R.P. ft. below R.P. ft. below R.P.
   Depth of well ft. below R.P. ft. below R.P. ft. below R.P.
   Elapsed Time (hours) 0 0 0
   Flow (gpm) 0 0 0
   Draw down (ft) 0 0 0
   Temp. °F 10 10 10
   Elapsed Time (hours) 0 0 0
   Flow (gpm) 0 0 0
   Draw down (ft) 0 0 0
   Temp. °F 10 10 10

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

Contractor (print) ROSCOE MOSS HAWAII, INC
Signature
Date 3/14/94

For Official Use: Well No. 3004-01

Longitude 158 04 32
Latitude 21 30 22

For Driller's Use:
Job Name
Job No.
ACCESS DOOR WITH LOCK

ELECTRICAL CABLE TO SUBMERSIBLE PUMP

ACCESS WITH THREADED COVER

ELECTRICAL SWITCH BOX ATTACHED TO DOOR

DISCHARGE PIPE WITH VALVE

SOUNDING TUBE WITH THREADED CAP

STEEL SAFETY LINE ANCHORED TO SURFACE CASING

18" DIAMETER STEEL SURFACE CASING

6" DIAMETER STEEL BLANK CASING

CONCRETE PAD SLOPED TO DRAIN

NOT TO SCALE

Monitoring Well 4-1
Well Head and Well Cover Detail
Schofield Barracks
Island of Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

DRAWN: jcl  JOB NUMBER: 28339.09.02.12
APPROVED: 28339.049  DATE: 10/95
FILE: 19931112820  REVISED DATE: 10/95
Monitoring Well 4-3
Well Head and Well Cover Detail
Schofield Barracks
Island of Oahu, Hawaii

Access Cover

Sounding Pipe with Threaded Cap

Electrical Cable to Submersible Pump

Electrical Switch Box

Electrical Switch Box Cover

Steel Well Cover

6" Diameter Steel Blank Casing

Concrete Pad SLOPED TO DRAIN

Discharge Pipe with Valve

Access Door

Coarse Sand & Pea Gravel APPROXIMATELY 1-FOOT THICK

Gravel
112 COARSE CRAVEL DIAMETER STEEL PICKET FILLED WITH CEMENT

DEPTH (FT)  ELEVATION (FT)
20        831
200       651
537       314
550       301
554       297
570       281
583.08    270.39 (10/10/95) (ELEVATION OF GROUNDWATER)
590       261
620       231
645       206

*(NOT TO SCALE)*

#2 COARSE GRAVEL

24" DIA. STEEL WELL MONUMENT

TOP OF SOUNING TUBE EL. = 852.78 FT.

GROUND SURFACE EL. = 851 FT.

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

6" DIAMETER STAINLESS STEEL WIRE-WRAP SCREEN

CEMENT BENTONITE INNER SEAL

SILICA SAND FILTER PACK (#4 STANDARD SIEVE SIZE)

6" PIA. STAINLESS STEEL WIRE-WRAP SCREEN

SLOUGH

+DATUM: MEAN SEA LEVEL
**Pump Installation Diagram for Monitoring Well 4-1**

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

**Datum:** Mean Sea Level

**FIGURE**

- **DEPTH (FT) ELEVATION (FT)**
  - 554 297
  - 583.08 270.39 (10/10/95) (ELEVATION OF GROUNDWATER)
  - NA NA
  - 583 268
  - 590 261
  - 593 258
  - 590 261
  - 620 231
  - 645 206

**NOT TO SCALE**

- FINE SAND
- 1" DIA. SCH 80 PVC SOUNCING 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
- SLOUGH
Pump Installation Diagram for Monitoring Well 4-1

Harding Lawson Associates
Engineering and Environmental Services

Scholfield Barracks
Island of Oahu, Hawaii

**Figure**

**Datum:** Mean Sea Level

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>554</td>
<td>297</td>
</tr>
<tr>
<td>583.08</td>
<td>270.39 (10/10/95)</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>583</td>
<td>268</td>
</tr>
<tr>
<td>590</td>
<td>261</td>
</tr>
<tr>
<td>593</td>
<td>258</td>
</tr>
<tr>
<td>590</td>
<td>261</td>
</tr>
<tr>
<td>620</td>
<td>231</td>
</tr>
<tr>
<td>645</td>
<td>206</td>
</tr>
</tbody>
</table>

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
Slough

NOT TO SCALE
<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
<th>Breaching Space Measurement (gpm)</th>
<th>Drilling Rate (min./ft)</th>
<th>Sample Internal (gpm)</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Downhole Hammer</td>
</tr>
<tr>
<td>0.5</td>
<td>5</td>
<td>0 1/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td>10</td>
<td>0 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-15</td>
<td>15</td>
<td>0 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-20</td>
<td>20</td>
<td>0 5/6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-25</td>
<td>25</td>
<td>0 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-30</td>
<td>30</td>
<td>0 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-35</td>
<td>35</td>
<td>0 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-40</td>
<td>40</td>
<td>0 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-45</td>
<td>45</td>
<td>0 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-50</td>
<td>50</td>
<td>0 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-55</td>
<td>55</td>
<td>0 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-60</td>
<td>60</td>
<td>0 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Log of Monitoring Well 4-1**

(Sheet 1 of 10) FIGURE

**Harding Lawson Associates**

**Log of Monitoring Well 4-1**

(Sheet 1 of 10) FIGURE

**Harding Lawson Associates**

Engineering and Environmental Services

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

**DRIVEN**

**JOB NUMBER**

26129.05.05.12

**APPROVED**

**FILE**

STEPS

**DATE**

2/94

**REVISED DATE**

2004-01

VERY DUSKY RED AND DUSKY RED ELASTIC SILT (MH) (2.5YR,2.5/2 and 2.5YR,3/2), dry to 1.5 feet, then moist, soft, organic to .3 feet, approx. 5 to 10 percent fine to medium sand, (saprolite).

Becoming medium stiff below 5.5 feet.

Drilling foam added at 6 feet to prevent drill bit from clogging.

Dark red (2.5YR,3/6) below 8 feet.

Dark reddish brown (2.5YR,3/4) below 13 feet.

Red (2.5YR,4/8), becoming stiff, below 17 feet.

Dark reddish brown (2.5YR,2.5/4) below 20 feet.

Reddish 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.
Top of Casing ft

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Drilling Rate (min./60 feet)</th>
<th>Breathing Space Measurement (gpm)</th>
<th>Sample Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-65</td>
<td>3</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>65-70</td>
<td>12</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>70-75</td>
<td>12</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>75-80</td>
<td>3</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>80-85</td>
<td>4</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>85-90</td>
<td>10</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>90-95</td>
<td>10</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>95-100</td>
<td>20</td>
<td>-</td>
<td>22</td>
</tr>
<tr>
<td>100-105</td>
<td>20</td>
<td>-</td>
<td>23</td>
</tr>
<tr>
<td>105-110</td>
<td>72</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>110-115</td>
<td>73</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>115-120</td>
<td>105</td>
<td>0</td>
<td>26/27/28</td>
</tr>
<tr>
<td>120-125</td>
<td>120</td>
<td>0</td>
<td>29/30</td>
</tr>
</tbody>
</table>

Equipment: Downhole Hammer

Elevation: 853.7 ft
Date: 07/13/93

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 (5Y) 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 gray-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 Interval (feet)</th>
<th>Drilling Rate (min./foot)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-130</td>
<td>&lt;5</td>
<td>0</td>
<td>31</td>
<td>130</td>
<td>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 grey brown).</td>
</tr>
<tr>
<td>130-135</td>
<td>65</td>
<td>0</td>
<td>32</td>
<td>135</td>
<td>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,N2/1), dark brown (7.5YR,3/4) and reddish brown (2.5YR,4/4) below 145 feet. Very dark grey (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 grey (5Y,3/1), dark brown (10YR,3/2), and dark red (2.5YR,3/6), hard, strong, little weathered to fresh, below 155 feet.</td>
</tr>
<tr>
<td>135-140</td>
<td>23</td>
<td>1.4</td>
<td>33</td>
<td>140</td>
<td>Very dark grey (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.</td>
</tr>
<tr>
<td>140-145</td>
<td>23</td>
<td>0</td>
<td>34</td>
<td>145</td>
<td>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 180 to 192 feet.</td>
</tr>
<tr>
<td>145-150</td>
<td>37</td>
<td>0.4</td>
<td>35</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>150-155</td>
<td>55</td>
<td>0</td>
<td>36</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>155-160</td>
<td>35</td>
<td>0</td>
<td>37</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>160-165</td>
<td>37</td>
<td>-</td>
<td>38</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>165-170</td>
<td>27</td>
<td>-</td>
<td>39</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>170-175</td>
<td>35</td>
<td>-</td>
<td>40</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>175-180</td>
<td>10</td>
<td>0</td>
<td>41/42</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>180-185</td>
<td>38</td>
<td>0</td>
<td>43</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>185-190</td>
<td>36</td>
<td>0</td>
<td>43</td>
<td>190</td>
<td></td>
</tr>
<tr>
<td>Sample Interval (ft)</td>
<td>Drilling Rate (min./3 ft)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td>Top of Casing ft</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------</td>
<td>----------------------------------</td>
<td>----------------</td>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>190-195</td>
<td>47</td>
<td>0</td>
<td>44</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>195-210</td>
<td>137</td>
<td>0</td>
<td>45</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>200-205</td>
<td>15</td>
<td>46</td>
<td>205</td>
<td></td>
<td></td>
</tr>
<tr>
<td>205-210</td>
<td>10</td>
<td>47</td>
<td>210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>210-215</td>
<td>5</td>
<td>48</td>
<td>215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>215-220</td>
<td>5</td>
<td>49</td>
<td>220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>220-225</td>
<td></td>
<td></td>
<td>225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>225-230</td>
<td></td>
<td>50/51</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230-235</td>
<td></td>
<td></td>
<td>235</td>
<td></td>
<td></td>
</tr>
<tr>
<td>235-240</td>
<td>15</td>
<td>52</td>
<td>240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>15</td>
<td>53</td>
<td>245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>245-250</td>
<td></td>
<td>54</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250-255</td>
<td>10</td>
<td></td>
<td>255</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>853.7 ft</td>
<td>07/13/93</td>
</tr>
</tbody>
</table>

- **Equipment**: Downhole Hammer
- **Top of Casing ft**: Various
- **Elevation**: 853.7 ft
- **Date**: 07/13/93

- **190-195 ft**: 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.

- **195-210 ft**: Increased drilling resistance at 200 feet.
  - (Set 12-inch steel casing to 200 feet.)
  - Some inclusions of olive crystals at 200 feet.

- **200-215 ft**: Decreased drilling resistance at 213 feet.

- **210-220 ft**: Dark gray (10YR, 4/1), dark yellowish brown (10YR, 4/6) and dark red (2.5YR, 5/6), below 220 feet, becoming moderately vesicular.

- **220-225 ft**: Moderately to highly vesicular below 225 feet.

- **225-230 ft**: (Loss of cuttings from 230 to 240 feet.)

- **230-235 ft**: 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.

- **235-240 ft**: Dark gray (10YR, 4/1) and dark brown (2.5YR, 3/2) below 250 feet.

- **240-245 ft**: (Loss of cuttings at 255 feet. Driller reduced quantity of foam.)

- **245-250 ft**: Dark gray (10YR, 4/1) and dark brown (2.5YR, 3/2) below 250 feet.
<table>
<thead>
<tr>
<th>Top of Casing ft</th>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (m/min)</th>
<th>Breathing Space Measurement (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>260</td>
<td>Downhole Hammer</td>
</tr>
<tr>
<td>255-260</td>
<td>10</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td>Dark gray (10YR,4/1) below 260 feet.</td>
</tr>
<tr>
<td>260-265</td>
<td>10</td>
<td>56</td>
<td></td>
<td></td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>265-270</td>
<td>7</td>
<td>57</td>
<td></td>
<td></td>
<td>270</td>
<td>Slightly vesicular below 270 feet.</td>
</tr>
<tr>
<td>270-275</td>
<td>5</td>
<td>58</td>
<td></td>
<td></td>
<td>275</td>
<td>Non-vesicular below 275 feet.</td>
</tr>
<tr>
<td>275-280</td>
<td>10</td>
<td>59</td>
<td></td>
<td></td>
<td>280</td>
<td>Decreased drilling resistance between 283 and 320 feet.</td>
</tr>
<tr>
<td>280-285</td>
<td>7</td>
<td>60</td>
<td></td>
<td></td>
<td>285</td>
<td>Dark gray (2.5YR,N4) and red (10R,4/8), becoming highly to moderately vesicular, below 285 feet.</td>
</tr>
<tr>
<td>285-290</td>
<td>5</td>
<td>61</td>
<td></td>
<td></td>
<td>290</td>
<td></td>
</tr>
<tr>
<td>290-295</td>
<td>7</td>
<td>62</td>
<td></td>
<td></td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>295-300</td>
<td>5</td>
<td>63/64</td>
<td></td>
<td></td>
<td>300</td>
<td>Slightly vesicular below 305 feet.</td>
</tr>
<tr>
<td>300-305</td>
<td>6</td>
<td>65</td>
<td></td>
<td></td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>305-310</td>
<td>5</td>
<td>66</td>
<td></td>
<td></td>
<td>310</td>
<td></td>
</tr>
<tr>
<td>310-315</td>
<td>5</td>
<td>67</td>
<td></td>
<td></td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>315-320</td>
<td>12</td>
<td>68</td>
<td></td>
<td></td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>Sample Interval (feet)</td>
<td>Drilling Rate (min./ft)</td>
<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------</td>
<td>----------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>320-325</td>
<td></td>
<td></td>
<td></td>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>325-330</td>
<td>10</td>
<td></td>
<td></td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>330-335</td>
<td></td>
<td></td>
<td></td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>335-340</td>
<td>22</td>
<td></td>
<td></td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>340-345</td>
<td>25</td>
<td></td>
<td></td>
<td>73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>345-350</td>
<td>24</td>
<td></td>
<td></td>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350-355</td>
<td>13</td>
<td></td>
<td></td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>355-360</td>
<td>10</td>
<td></td>
<td></td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>360-365</td>
<td>16</td>
<td></td>
<td></td>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>365-370</td>
<td>11</td>
<td></td>
<td></td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>370-375</td>
<td>23</td>
<td></td>
<td></td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>375-380</td>
<td>10</td>
<td></td>
<td></td>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>380-385</td>
<td>10</td>
<td></td>
<td></td>
<td>82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (mils/ft)</th>
<th>Breaching Space (gpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>385-390</td>
<td>10</td>
<td>83</td>
<td></td>
<td>390</td>
<td></td>
</tr>
<tr>
<td>390-395</td>
<td>10</td>
<td>84</td>
<td>395</td>
<td></td>
<td></td>
</tr>
<tr>
<td>395-400</td>
<td>10</td>
<td>85</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-405</td>
<td>20</td>
<td>86</td>
<td>405</td>
<td></td>
<td></td>
</tr>
<tr>
<td>405-410</td>
<td>15</td>
<td>87</td>
<td>410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>410-415</td>
<td>6</td>
<td>88</td>
<td>415</td>
<td></td>
<td></td>
</tr>
<tr>
<td>415-420</td>
<td>10</td>
<td>89</td>
<td>420</td>
<td></td>
<td></td>
</tr>
<tr>
<td>420-425</td>
<td>19</td>
<td>90</td>
<td>425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>425-430</td>
<td>8</td>
<td>91</td>
<td>430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>430-435</td>
<td>4</td>
<td>92</td>
<td>435</td>
<td></td>
<td></td>
</tr>
<tr>
<td>435-440</td>
<td>15</td>
<td>93</td>
<td>440</td>
<td></td>
<td></td>
</tr>
<tr>
<td>440-445</td>
<td>16</td>
<td>94</td>
<td>445</td>
<td></td>
<td></td>
</tr>
<tr>
<td>445-450</td>
<td>12</td>
<td>95</td>
<td>450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>455</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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>Top of Casing (ft)</th>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (ft/hr)</th>
<th>Breaking Stress (gpm)</th>
<th>Sample Number</th>
<th>Sample (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>10</td>
<td>0</td>
<td>96</td>
<td></td>
<td>455</td>
</tr>
<tr>
<td>455-460</td>
<td>11</td>
<td>0</td>
<td>97</td>
<td>460</td>
<td></td>
</tr>
<tr>
<td>460-465</td>
<td>15</td>
<td>0</td>
<td>98</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td>465-470</td>
<td>10</td>
<td>0</td>
<td>99</td>
<td>470</td>
<td></td>
</tr>
<tr>
<td>470-475</td>
<td>15</td>
<td>0</td>
<td>100</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>475-480</td>
<td>11</td>
<td>0</td>
<td>101</td>
<td>480</td>
<td></td>
</tr>
<tr>
<td>480-485</td>
<td>12</td>
<td>0</td>
<td>102</td>
<td>485</td>
<td></td>
</tr>
<tr>
<td>485-490</td>
<td>11</td>
<td>0</td>
<td>103</td>
<td>490</td>
<td></td>
</tr>
<tr>
<td>490-495</td>
<td>10</td>
<td>0</td>
<td>104</td>
<td>495</td>
<td></td>
</tr>
<tr>
<td>495-500</td>
<td>12</td>
<td>0</td>
<td>105</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>500-505</td>
<td>8</td>
<td>0</td>
<td>106</td>
<td>505</td>
<td></td>
</tr>
<tr>
<td>505-510</td>
<td>8</td>
<td>0</td>
<td>107</td>
<td>510</td>
<td></td>
</tr>
<tr>
<td>510-515</td>
<td>9</td>
<td>0</td>
<td>108</td>
<td>515</td>
<td></td>
</tr>
<tr>
<td>520</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equipment**

Downhole Hammer

**Elevation**

853.7 ft

**Date**

07/13/93

---

Increased drilling resistance between 458 and 465 feet, and decreased drilling resistance from 465 to 490 feet.

Reddish gray (10YR5/1), dark gray (2.5YR4/4), and weak red (2.5YR4/2), becoming highly vesicular, below 465 feet.

Reddish gray (10YR5/1) and dusky red (2.5YR3/2) below 470 feet.

Increased drilling resistance between 490 and 531 feet.

Dark gray (2.5YR4/4) with reddish brown (2.5YR6/4), becoming moderately to slightly vesicular, below 475 feet.

Increased drilling resistance between 490 and 531 feet.

Dark gray (2.5YR4/4) with Red (2.5YR4/8), becoming moderately to highly vesicular, below 485 feet.

Moderately vesicular below 505 feet.

Slightly vesicular below 515 feet.

---

**Log of Monitoring Well 4-1**

(Sheet 8 of 10)
### Log of Monitoring Well 4-1

<table>
<thead>
<tr>
<th>Top of Casing (ft)</th>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min./20 ft)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>515-520</td>
<td>10</td>
<td>0</td>
<td>109</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>520-525</td>
<td>10</td>
<td>0</td>
<td>110</td>
<td>525</td>
<td></td>
</tr>
<tr>
<td>525-530</td>
<td>8</td>
<td>0</td>
<td>111</td>
<td>530</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased drilling resistance between 531 and 535 feet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>530-535</td>
<td>9</td>
<td>0</td>
<td>112</td>
<td>535</td>
<td></td>
</tr>
<tr>
<td>535-540</td>
<td>10</td>
<td>0</td>
<td>113</td>
<td>540</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderately vesicular below 545 feet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>540-545</td>
<td>9</td>
<td>0</td>
<td>114</td>
<td>545</td>
<td></td>
</tr>
<tr>
<td>545-550</td>
<td>9</td>
<td>0</td>
<td>115</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>550-555</td>
<td>9</td>
<td>0</td>
<td>116</td>
<td>555</td>
<td></td>
</tr>
<tr>
<td>555-560</td>
<td>11</td>
<td>0</td>
<td>117</td>
<td>560</td>
<td></td>
</tr>
<tr>
<td>560-565</td>
<td>9</td>
<td>0</td>
<td>118</td>
<td>565</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderately vesicular below 570 feet. Fractured zone between 570 and 587 feet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>565-570</td>
<td>13</td>
<td>0.6</td>
<td>119</td>
<td>570</td>
<td></td>
</tr>
<tr>
<td>570-575</td>
<td>21</td>
<td>0</td>
<td>120</td>
<td>575</td>
<td></td>
</tr>
<tr>
<td>575-580</td>
<td>45</td>
<td>0</td>
<td>121</td>
<td>580</td>
<td></td>
</tr>
<tr>
<td>585</td>
<td></td>
<td></td>
<td>Water table measured 1/7/94 at a depth of 584.74 feet.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Equipment:** Downhole Hammer  
**Elevation:** 853.7 ft  
**Date:** 07/13/93
<table>
<thead>
<tr>
<th>Top of Casing ft</th>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (feet/30 min)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Sample Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>580-585</td>
<td>17</td>
<td>0</td>
<td>122</td>
<td>585</td>
<td></td>
</tr>
<tr>
<td>585-590</td>
<td>25</td>
<td>0</td>
<td>123</td>
<td>590</td>
<td></td>
</tr>
<tr>
<td>590-595</td>
<td>10</td>
<td>0</td>
<td>124</td>
<td>595</td>
<td></td>
</tr>
<tr>
<td>595-600</td>
<td>10</td>
<td>0</td>
<td>600</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>600-605</td>
<td>11</td>
<td>0</td>
<td>605</td>
<td>605</td>
<td></td>
</tr>
<tr>
<td>605-610</td>
<td>9</td>
<td>0</td>
<td>610</td>
<td>610</td>
<td></td>
</tr>
<tr>
<td>610-615</td>
<td>13</td>
<td>0</td>
<td>125</td>
<td>615</td>
<td></td>
</tr>
<tr>
<td>615-620</td>
<td>13</td>
<td>0</td>
<td>126</td>
<td>620</td>
<td></td>
</tr>
<tr>
<td>620-625</td>
<td>14</td>
<td>0</td>
<td>126</td>
<td>625</td>
<td></td>
</tr>
<tr>
<td>625-630</td>
<td>5</td>
<td>127</td>
<td>630</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>630-635</td>
<td>5</td>
<td>127</td>
<td>635</td>
<td>635</td>
<td></td>
</tr>
<tr>
<td>635-640</td>
<td>6</td>
<td>127</td>
<td>640</td>
<td>640</td>
<td></td>
</tr>
<tr>
<td>640-645</td>
<td>18</td>
<td>0</td>
<td>128</td>
<td>645</td>
<td></td>
</tr>
</tbody>
</table>

Equipment: Cable Tool

Elevation: 853.7 ft  Date: 07/13/93

**Equipment Notes:**

- Dark gray (2.5YR.N4) and reddish brown (2.5YR.4/6), moderately to highly vesicular, below 590 feet.
- (Changed to Bucyrus Erie Cable Tool rig to drill below 600 feet.)
- Highly vesicular below 605 feet.
- Increased drilling resistance between 640 and 645 feet.
- Boring collapsed over cable tool at 645 feet.

**Log of Monitoring Well 4-1**

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

---

**Harding Lawson Associates**

**Engineering and Environmental Services**

**Log of Monitoring Well 4-1**

(Sheet 10 of 10) FIGURE

**FILE**

STEPS

**DATE**

2/94

**REVISED DATE**
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

WELL CONSTRUCTION PERMIT

for

Schofield Monitor Well
Well No. 3004-01
Wahiawa, Oahu

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 groundwater 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. Runnells Date: April 2, 1993
Printed Name: LORAN H. RUNNELLS 
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

For 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 96820. Application must be accompanied by a non-refundable filing fee of $20.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 587-0225.

1. APPLICANT: (may be a, b, or c, but all must be filled)
   (a) WELL OWNER
      Firm/Name: U.S. Army Support Command HI
      Contact Person: Col. R. Wilson
      Address: Building 300, Wheeler Army Airfield
      Schofield, HI 96758
   (b) LANDOWNER
      Firm/Name: U.S. Army Support Command Hawaii
      Contact Person: Col. R. Wilson
      Address: Building 300, Wheeler Army Airfield
      Schofield, HI 96758
   (c) CONTRACTOR
      Firm/Name: ROSSCO MOSS HAWAII, INC.
      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
   (Attach a USGS map, scale 1"=2000, and a property tax map showing well location referenced to established property boundaries.)

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

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

5. PROPOSED USE:
   [ ] Municipal (including hotels, stores, etc.)
   [ ] Domestic (individual, noncommercial water use)
   [ ] Irrigation (crop)
   [ ] Military
   [ ] Industrial
   [ ] Other (explain)
   [ ] Urban
   [ ] Agriculture
   [ ] Rural
   [ ] Conservation
   County Zoning (describe)
   (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

7. PENDING ACTIONS:
   [ ] CDUA
   [ ] 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 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 further understands that monthly water use date shall be submitted to the Commission. The applicant understands that monthly water use data shall be submitted to the Commission. The applicant further understands that approval of the proposed permits shall not constitute a determination of correlative water rights and that the applicant shall be responsible for future water rights 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: ROSSCO MOSS HAWAII, INC.
Signature: ____________________________
Date: 4-7-93
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