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

WELL COMPLETION REPORT  

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

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

| 1. State Well No.: 2901-13 | Well Name: MW1-1 | Island: Oahu |  |
| Location/Address: Schofield Barracks | Tax Map Key: 7-6-36 |  |

PART I  
WELL CONSTRUCTION REPORT  

4. Name of driller who performed work: Pete Christiansen / Mel Peterson  
5. Type of rig/construction: Bucket Auger / Air Rotary  
6. Date(s) Well Construction and pump tests (if any): 1/26/94  
7. GROUND ELEVATION (referenced to mean sea level, msl): 855.35 ft.  
   Well Bench Mark (description/location): Top of sounding tube  
   Elevation(msl): 852.78 ft.  
8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)  
   Depths (ft.)  Rock Description, Water Level, Dates, etc.  
   GROUND ELEVATION  
   Start water level to 669 ft. below ground  
   Hole size: 19 inch dia. from 0 ft. to 10 ft. below ground  
   16 inch dia. from 10 ft. to 200 ft. below ground  
   10 inch dia. from 200 ft. to 855 ft. below ground  
11. Casing installed: 6 in. I.D. x 6 in. wall solid section to 569 ft. below ground  
   Casing Material/Slot Size: Carbon steel blank casing / stainless steel wirewrap screen  
12. Annulus: Grouted from 0 ft. below ground to 559 ft. below ground  
   Gravel packed from 559 ft. below ground to 855 ft. below ground  
14. Initial chloride: NA ppm  
15. Initial temperature: NA °F  
16. PUMPING TESTS: Reference Point (R.P.) used:  
   (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) DENNIS W. MCGREEW  
C-57 Lic. No. AC 12058  
Signature  
Date 1/10/97  

Surveyor (print) RUSSELL FIGUEIREIRO  
Lic. No. 4721 - Hawaii  
Signature  
Date 1-8-99  

Applicant (print) DENNIS W. 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: 5/23/94

23. PUMP INSTALLATION:
   - Pump Type, Make, Serial No.: 3.75" dia. Grandfos pump
   - Motor type, H.P., Voltage, rpm: Electric, 7.5 hp
   - Depth of Pump Intake Setting: 597 ft. below ground, which elevation is 258 ft.
   - Depth to bottom of airline: NA ft. below, which elevation is NA ft.
   - Pumping Head is 582 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)  DEWIS W. MCGREEW  C-57 Lic. No.  AC 12058

Signature

Applicant (print)  Cop Devis J. Fontan

Signature

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

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

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

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

Dear Mr. Fukuda:

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

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

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

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

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

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

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

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

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

Sincerely,

RAE M. LOUI
Deputy Director

LN:fc

Enclosure
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. 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.
Mr. Jon Fukuda  
U.S. Army  
DPW, Attn: APVG-GVW  
U.S. Army Garrison  
Schofield Barracks, Hawaii 96857-5000

Dear Mr. Fukuda:

After-the-Fact Well Construction Permit  
MW1-1 (Well No. 2901-13)

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

**Special Conditions**

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

Please sign both enclosed permit originals and return one for our files.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214.

Aloha,

/

MICHAEL D. WILSON  
Chairperson

Enclosures
AFTER-THE-FACT WELL CONSTRUCTION PERMIT

MW1-1 Well, Well No. 2901-13

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 MW1-1 Well (Well No. 2901-13) at Schofield Barracks - East Range, Oahu, TMK 7-6-01, subject to the following conditions:

STANDARD PERMIT CONDITIONS

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

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

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

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

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

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

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

8. The well construction permit application approved by the Chairperson 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: January 24, 1997
Expiration Date: January 24, 1999

MICHAEL D. WILSON, Chairperson
Commission on Water Resource Management

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

Applicant's Signature: ___________________________ Date: ______________

Printed Name: ___________________________ Firm or Title: ___________________________

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment
  c: USGS
     Department of Health/ Safe Drinking Water & Wastewater Branches
     Honolulu Board of Water Supply
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 96809. Application must be accompanied by a non-refundable filing fee of $25.00 payable to the State of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 586-4225.

1. APPLICANT: May be a, b, or c, but all must be filled in
(a) WELL OWNER
   Firm/Name: U.S. Army
   Contact Person: Jon Fukuda Ph: 656-2878
   Address: DPM, Atten: APVG-GVM, U.S. Army
   Garrison, Schofield Barracks, Hawaii 96857-5000

(b) LANDOWNER
   Firm/Name: Same as well owner
   Contact Person
   Address

(c) CONTRACTOR
   Firm/Name: Soil Sampling Service, Inc. 682-5856
   Address: 92-1596 Olai Street, Kapolei, Hawaii 96707
   Contractor’s C-57 License No. AC-12058
   *Hawaii office of Soil Sampling Service, Inc. was recently purchased by Roscoe Moss
   Hawaii, Inc.

2. WELL LOCATION/NAME: Schofield Barracks - East Range/MW-1 Island: Oahu
   Address: East Range Road, Schofield Barracks, Hawaii 96786 Tax Map Key 7-6-31
   (Attach a USGS map, scale 1”=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
   Deepen
   * Abandon/Seal
   Install New Pump
   Replace Pump
   Modify Pump
   * Be sure to complete and submit well abandonment report upon completion of work.

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

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

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

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

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

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

8. REMARKS, EXPLANATIONS:
   (If more space is needed, continue on back)

NOTE: Signing below indicates that the applicant understands that, if the permit requested is granted by the Commission on Water Resource Management, the proposed work is to be completed within two (2) years of the approval date. In addition, the contractor shall submit to the Commission a well completion report, well abandonment report, or both, within 30 days after the completion date of the permitted work. The applicant also understands that monthly water use data shall be submitted to the Commission. The applicant further understands that approval of the proposed permit shall not constitute a determination of correlative water rights and shall not guarantee the pump capacity or future use up to the permitted pump capacity.

Well Owner: Col. D. Fontana/Director
Landowner: Col. D. Fontana/Director
Contractor: (Dennis C) McKeen

Signature: Date: November 7, 1996.
Signature: Date: November 7, 1996.
Signature: Date: 11/19/97

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

Longitude
Latitude
Aquifer System Name
State Well No. 2-901-13

6/24/92 WCR F1
Remarks, Explanations (cont'd)

9. PROPOSED WELL SECTION

Elevation at top of casing 852.78 ft., mal.

Ground Elevation 855.35 ft., mal*

Cement Grout: 559 ft.

Rock Packing: 296 ft.

Solid Casing:
- Material: Carbon steel
- Length: 569 ft.
- Diameter: 6 in.
- Wall thickness: ___________ in.

Casing: □ Perforated □ Screen
- Material: Stainless steel
- Length: 100 ft.
- Diameter: 6 in.
- Wall thickness: ___________ in.
- Openings: ___________ sq. in./L.F.

Open Hole:
- Length: 0 ft.
- Diameter: ___________ in.

*Approximate elevation at time of filing application. Ground elevation above mean sea level (mal) by a surveyor licensed by the State must be submitted at start of construction. Final elevations of well components shall be submitted in the well completion/well abandonment reports.
Mr. Jon Fukuda  
U.S. Army  
DPW, Attn: APVG-GVW  
U.S. Army Garrison  
Schofield Barracks, Hawaii 96857-5000

Dear Mr. Fukuda:

After-the-Fact Pump Installation Permit  
MW1-1 (Well No. 2901-13)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned monitor 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 both enclosed permit originals and return one for our files.

This letter is notice that we have accepted your Well Completion Report - Parts I & II as complete.

If you have any questions, please call Rae M. Loui, Deputy Director, at 587-0214.

Aloha,

MICHAEL D. WILSON  
Chairperson

Enclosures
AFTER-THE-FACT PUMP INSTALLATION PERMIT

MW1-1 Well, Well No. 2901-13

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 MW1-1 Well (Well No. 2901-13) at Schofield Barracks - East Range, Oahu, TMK 7-6-01, subject to the following conditions:

STANDARD PERMIT CONDITIONS

1. The Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work covered by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The pump installation permit shall be for installation of a 6 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 yearly basis, on forms provided by the Commission (attached).

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

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

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

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

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

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

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

Date of Approval: January 24, 1997
Expiration Date: January 24, 1999

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

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

Please sign both copies of this permit, return one to the Commission, and retain the other for your records.

Attachment c:
USGS Department of Health/ Safe Drinking Water & Wastewater Branches
Honolulu Board of Water Supply
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

APPLICATION FOR PERMIT

Select one

[ ] Well Construction
[ ] 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 96809. 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 977-0222.

1. APPLICANT: (may be a, b, or c, but all must be filled in)
   (a) WELL OWNER
      Firm/Name: U.S. Army
      Contact Person: Jim Fukuda Ph: 656-2878
      Address: DPW, Attn: APWG-6W, U.S. Army
      Garrison, Schofield Barracks, Hawaii 96857-5000
   (b) LANDOWNER
      Firm/Name: Same as well owner
      Contact Person: Ph:
      Address:
   (c) CONTRACTOR
      Firm/Name: Soil Sampling Service, Inc. Ph: 682-5856
      Contractor’s C-57 License No AC-12058
      Address: 92-159A Olai Street, Kapolei, Hawaii 96707
      *Hawaiian office of Soil Sampling Service, Inc. was recently purchased by Roscoe Moss Hawaii, Inc.

2. WELL LOCATION/NAME: Schofield Barracks - East Range/MW1-1
   Island: Oahu
   Address: East Range Road, Schofield Barracks, Hawaii 96786
   Tax Map Key: 7-6-91
   (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
      [ ] Deepen
      [ ] Abandon/Seal
      [ ] Install New Pump
      [ ] Replace Pump
      [ ] Modify Pump
      * Be sure to complete and submit well abandonment report upon completion of work.

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

4. PROPOSED PUMP INFORMATION:
   Rated Pump Capacity: 25 gallons per minute
   Pump Type:
      [ ] Deep Well Turbine
      [ ] Submersible
      [ ] Centrifugal
      [ ] Rotary
      [ ] Rotary-Displacement
      [ ] Rotary-Gear
      [ ] Impulse
      [ ] Propeller
      [ ] Reciprocating
      [ ] Gas
      [ ] Motor:
      [ ] Diesel
      [ ] Electric, rated horsepower of: 7.5

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

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

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

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

8. REMARKS, EXPLANATIONS:
   (If more space is needed, continue on back)

NOTE: Signing below indicates that the applicant understands that: If the permit requested is granted by the Commission on Water Resource Management, the proposed work is to be completed within two (2) years of the approved date. In addition, the contractor shall comply with the Commission’s well completion report, well abandonment report, or both, within 30 days after the completion date of the permitted work. The applicant also understands that monthly water use data shall be submitted to the Commission. The applicant further understands that approval of the proposed permit shall not constitute a determination of concomitant water rights and shall not guarantee the pump capacity or future use up to the permitted pump capacity.

Well Owner ___________________________ Landowner ____________________________
Signature ___________________________ Signature ____________________________
Date ________________ Date ________________

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

Longitude ___________ Latitude ___________
Aqualifer System Name __________________________
State Well No __________________________
9. PROPOSED WELL SECTION

Elevation at top of casing: 852.78 ft., mal.

Ground Elevation: 855.35 ft., mal*

Cement Grout: 559 ft.

Rock Packing: 296 ft.

Solid Casing:
- Material: Carbon steel
- Length: 569 ft.
- Diameter: 6 in.
- Wall thickness: __________ in.

Hole Diameter: 10 in.

Total Depth: 855 ft.

Open Hole:
- Length: 0 ft.
- Diameter: __________ in.

Casing: ☐ Perforated ☐ Screen
- Material: Stainless steel
- Length: 100 ft.
- Diameter: 6 in.
- Wall thickness: __________ in.
- Openings: __________ sq. in./L.F.

*Approximate elevation at time of filling application. Ground elevation above mean sea level (mal) by a surveyor licensed by the State must be submitted at start of construction. Final elevations of well components shall be submitted in the well completion/well abandonment reports.
**Log of Monitoring Well 1-1**

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**Equipment**

- **Bucket Auger (20")**
- **Air Rotary by Speedstar SS16**
- **Air Rotary by Ingersol-Rand T3W**

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<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
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**Sample Descriptions**

- **0-5 feet**: Yellowish brown (5YR,4/8) below 1 foot. Dark red (10R,3/8), yellowish brown (10R,5/4) and greyish brown (10R,5/2) below 5 feet.
- **5-10 feet**: Dark yellowish brown (10YR,4/4) and black (10YR,2/1) below 10 feet.
- **10-15 feet**: Dark red (2.5YR,3/6) below 15 feet.
- **15-20 feet**: (Set 18-inch dia. surface casing to 19.4 feet. Resume drilling 16-inch dia. with tricone bit.)
- **20-25 feet**: No sample cuttings from 25 feet.
- **25-30 feet**: No sample cuttings from 35 or 40 feet.
- **30-35 feet**: Encountered rock (boulder) between 47 and 48 feet.
- **45-50 feet**: Dark red (2.5YR,3/6), below 48 feet.
- **50-55 feet**: No sample cuttings from 55 feet.

**Driller Notes**

- Driller used 20-inch dia. core bit and barrel.
- Resumed drilling 16-inch dia. with tricone bit.
<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>Elevation</th>
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<tbody>
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<td>17</td>
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<td>19</td>
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No sample cuttings from 65 feet.

Increased drilling resistance at 87 feet.

No sample cuttings from 90 to 95 feet.

Increasing sand content below 95 feet.

Encountered rock (boulder) between 100 and 101 feet.
Reddish brown (5YR,4/3) below 100 feet.

Increased drilling resistance at 110 feet.

MODERATE BROWN BASALT (5YR,3/4), low hardness, weak, deeply weathered.
Increased drilling resistance at 113 feet.
Becoming moderately hard, moderately strong below 115 feet.
Increased drilling resistance at 118 feet.
Brownish gray (5YR,4/1) and medium gray (N4) below 120 feet.
Decreased drilling resistance from 121 to 130 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breaking Space Measurement (ppm)</th>
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<th>Depth (ft)</th>
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**Equipment**
- **Ground Elevation**: -855 ft
- **Date**: 01/26/94
- **Bucket Auger (20")**
- **Air Rotary by Speedstar SS16**
- **Air Rotary by Ingersol-Rand T3W**

**Notes**
- Increased drilling resistance at 130 feet.
- Decreased drilling resistance at 133 feet.
- Light olive gray (5Y,6/1) below 135 feet.
- Increased drilling resistance at 137.5 feet.
- Decreased drilling resistance at 139.5 feet.
- Highly vesicular below 140 feet.
- Dark reddish brown (10R,7/4), low to moderately hard below 150 feet.
- Increased drilling resistance at 159 feet.
- Medium dark gray (N3) and dark reddish brown (10R,3/4) below 160 feet.
- Decreased drilling resistance at 161 and 165 feet.
- Moderately hard to hard below 165 feet.
- Increased drilling resistance at 170 feet.
- Decreased drilling resistance at 175 feet.
- Increased drilling resistance from 186 to 187 feet and at 190 feet.
- Decreased drilling resistance at 193 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
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<tr>
<td>250-255</td>
<td>17</td>
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<td>41</td>
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</table>

- (Set 12-inch casing to 200 feet.)
- (Resume drilling at 200 feet with foam and 10-inch-dia. hammer.)
- No sample cuttings at 205 feet or 210 feet.
- (Loss of air circulation at 210 feet.) Decreased drilling resistance from 210 to 212 feet.
- Decreased drilling resistance from 215 to 217 feet.
- No sample cuttings or drilling foam circulation from 220 to 245 feet.
- Decreased drilling resistance from 233 to 235 feet.
- (Drilling foam circulation and cuttings return very low.)
- Very dark red (5R,2/6) and dusky red (10R,2/2) below 250 feet.
- Increased drilling resistance from 255 to 259 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>
<th>Comments</th>
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<tbody>
<tr>
<td>255-260</td>
<td>15</td>
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<td>42</td>
<td>260</td>
<td>Medium dark gray (N3), little weathered, and little to moderately vesicular below 260 feet.</td>
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<tr>
<td>260-265</td>
<td>9</td>
<td>0</td>
<td>43</td>
<td>265</td>
<td>Decreased drilling resistance at 269 feet. Dark reddish brown (10R.3/4) and medium dark gray (N3), moderately to deeply weathered, and highly vesicular below 270 feet.</td>
</tr>
<tr>
<td>265-270</td>
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<td>44</td>
<td>270</td>
<td>Increased drilling resistance from 278 to 279 feet.</td>
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<tr>
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<td>Increased drilling resistance at 295 feet.</td>
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<tr>
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<td>46</td>
<td>280</td>
<td>Decreased drilling resistance at 298 feet.</td>
</tr>
<tr>
<td>280-285</td>
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<td>0</td>
<td>47</td>
<td>285</td>
<td>Increased drilling resistance at 302 feet.</td>
</tr>
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<td>48</td>
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<td>Increased drilling resistance at 302 feet.</td>
</tr>
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<td>290-295</td>
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<td>49</td>
<td>295</td>
<td>Decreased drilling resistance at 298 feet.</td>
</tr>
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<td>295-300</td>
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<td>50</td>
<td>300</td>
<td>Increased drilling resistance at 302 feet.</td>
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<td>52</td>
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<td>Decreased drilling resistance at 375 feet.</td>
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<td>54</td>
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Log of Monitoring Well 1-1
(Sheet 5 of 14)

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

<table>
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<tr>
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<th>JOB NUMBER</th>
<th>APPROVED</th>
<th>FILE</th>
<th>DATE</th>
<th>REVISED DATE</th>
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<td>Breathing Space Measurement (ppm)</td>
<td>Sample Number</td>
<td>Depth (ft)</td>
<td>Sample Description</td>
</tr>
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<td>-----------------------------</td>
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<td>320-325</td>
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<td>55</td>
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<td>Dark reddish brown (10R,3/4), less vesicular below 320 feet.</td>
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<td>Increased drilling resistance at 335 feet.</td>
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<td>57</td>
<td>335</td>
<td>Dark gray (N2), hard to very hard, slightly to moderately vesicular, with little weathering below 340 feet.</td>
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<td>335-340</td>
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<td>58</td>
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<td>Decreased drilling resistance at 355 feet. Moderately to highly vesicular below 355 feet.</td>
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<td>340-345</td>
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<td>345</td>
<td>Medium hard to hard, little to moderately vesicular below 370 feet.</td>
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<td>345-350</td>
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<td>Moderately to highly vesicular below 380 feet.</td>
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<td>355</td>
<td>Deeply weathered below 385 feet. Decreased drilling resistance at 388 feet.</td>
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</tbody>
</table>
Sample Interval (feet) | Drilling Rate (min./3 feet) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft) |
<table>
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</table>

- Dark reddish brown (10R,3/4), medium dark gray (N3) and moderate brown (5YR,4/4), little to moderately weathered below 390 feet.
- Increased drilling resistance at 392 feet.
- Decreased drilling resistance at 397 feet.
- Fresh to little weathered below 400 feet.
- Increased drilling resistance at 401 feet.
- Medium dark gray (N2) below 405 feet.
- Increased drilling resistance at 408 feet.
- Decreased drilling resistance at 410 feet.
- Little to moderately weathered below 410 feet.
- Brownish black (5YR,2/1) and brownish gray (5YR,4/1), fresh to little weathered, and little to moderately vesicular below 425 feet.
- Grayish black (N2) and dusky brown (5YR,2/2) below 435 feet.
- Decreased drilling resistance at 437 feet.
- Decreased drilling resistance at 449 feet.
- Dark reddish brown (10Y,3/4), moderately reddish brown (10R,4/6), and blackish red (5R,2/2) below 450 feet.
<table>
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<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
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<td>0</td>
<td>93</td>
<td>515</td>
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</tr>
</tbody>
</table>

**Equipment**
- Bucket Auger (20°)
- Air Rotary by Speedstar SS16
- Air Rotary by Ingersol-Rand T3W

**Log of Monitoring Well 1-1**

- Harding Lawson Associates
- Schofield TEPS 5
- Schofield Barracks
- Island of Oahu, Hawaii

**FILE DATE**

- STEPS
- 4/95

**Elevation**

- ~855 ft
- Date 01/26/94
| Sample Interval (feet) | Drilling Rate (min./5 feet) | Breathing Space Measurement (ppm) | Sample Number | Depth (ft) | Elevation | Sample
|------------------------|----------------------------|----------------------------------|---------------|-----------|-----------|--------
| 515-520                | 7                          | 0                                | 94            | 520       | -855 ft   | Date 01/26/94 |
| 520-525                | 8                          | 0                                | 95            | 525       |           |        |
| 525-530                | 8                          | 0                                | 96            | 530       |           |        |
| 530-535                | 8                          | 0                                | 97            | 535       |           |        |
| 535-540                | 8                          | 0                                | 98            | 540       |           |        |
| 540-545                | 8                          | 0                                | 99            | 545       |           |        |
| 545-550                | 9                          | 0                                | 100           | 550       |           |        |
| 550-555                | 10                         | 0                                | 101           | 555       |           |        |
| 555-560                | 8                          | 0                                | 102           | 560       |           |        |
| 560-565                | 13                         | 0                                | 103           | 565       |           |        |
| 565-570                | 12                         | 0                                | 104           | 570       |           |        |
| 570-575                | 20                         | 0                                | 105           | 575       |           |        |
| 575-580                | 10                         | 0                                | 106           | 580       |           |        |

- Moderately to highly vesicular below 530 feet.
- Decreased drilling resistance at 547 feet.
- Blackish red (5R,2/2), moderate brown (5R,4/4) and olive black (5Y,2/1), below 549 feet.
- Brownish black (5YR,2/1), reddish brown (10R,3/4), dark yellowish brown (10R,4/5), moderately weathered below 550 feet.
- Increased drilling resistance at 556 feet.
- Dark gray (N2) and non-vesicular below 565 feet.
- Decreased drilling resistance at 577 feet.
- Water level measured on 3/2/94 at a depth of 582.08 feet.
- Decreased drilling resistance from 582 to 585 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>
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</thead>
<tbody>
<tr>
<td>580-585</td>
<td>14</td>
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<td>107</td>
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</tr>
<tr>
<td>585-590</td>
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<td>112</td>
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<td>610-615</td>
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<td>615</td>
</tr>
<tr>
<td>615-620</td>
<td>12</td>
<td>0</td>
<td>114</td>
<td>620</td>
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<td>620-625</td>
<td>10</td>
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<td>635</td>
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<td>635-640</td>
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<td>118</td>
<td>640</td>
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<tr>
<td>640-645</td>
<td>40</td>
<td>0</td>
<td>119</td>
<td>645</td>
</tr>
</tbody>
</table>

**Sample Number 107**: Moderately to highly vesicular below 585 feet.

**Sample Number 108**: Blackish red (5R,2/2), moderate reddish brown (10R,4/6), and dark reddish brown (10R,3/4) below 595 feet.

**Sample Number 109**: Decreased drilling resistance from 600 to 601 feet. (Possible clinker or cinder layer at 600 feet.)

**Sample Number 110**: (Borehole collapsing below 610 feet.)

**Sample Number 111**: (Driller notes rock is more solid at 632 feet.)

**Sample Number 112**: Dark gray (N2), blackish red (5R,2/2), and grayish red (10R,4/2), slightly to moderately vesicular below 640 feet.
### Table: Sample Data

<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>Sample</th>
<th>Depth (feet)</th>
</tr>
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<tbody>
<tr>
<td>645-650</td>
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<td>121</td>
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<tr>
<td>655-660</td>
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<td>122</td>
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<td>660-665</td>
<td>10</td>
<td>0</td>
<td>123</td>
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<td>665-670</td>
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<td>705-710</td>
<td>20</td>
<td>0</td>
<td>132</td>
<td>710</td>
<td></td>
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</tbody>
</table>

### Observations

- Dark gray (N2) below 650 feet.
- Moderately to highly vesicular below 655 feet.
- Dark reddish brown (10R,3/4) and dark gray (N2), moderately to deeply weathered below 660 feet.
- Decreased drilling resistance at 662 feet.
- Fresh to little weathered, non- to moderately vesicular below 670 feet.
- Dark grey (N2) and dark reddish brown (10R,3/4) below 675 feet.
- Decreased drilling resistance below 681 feet.
- Dark reddish brown (10R,3/4), moderate to deep weathering, highly vesicular below 685 feet.
- Olive gray (5Y,4/1) and dark reddish brown (10R,3/4) below 690 feet.
- Olive black (5Y,2/1) and blackish red (5R,2/2), with some calcite crystals below 705 feet.
- Decreased drilling resistance at 706 feet.
- Possible clinker layer at 707 feet.
- Increased drilling resistance from 708 to 710 feet.
- Dark reddish brown (10R,3/4), brownish black (5YR,2/1), and greyish red (5R,4/2) below 710 feet.
<table>
<thead>
<tr>
<th>Sample Interval (feet)</th>
<th>Drilling Rate (min./5 feet)</th>
<th>Breathing Space Measurement (ppm)</th>
<th>Sample Number</th>
<th>Depth Sample</th>
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<tbody>
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<td>770-775</td>
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</table>

Decreased drilling resistance, and possible clinker layer at 712 feet.
Increased drilling resistance at 713 feet.
Brownish black (5YR,2/1) and moderate brown (5YR,3/4), non- to moderately vesicular below 710 feet.
Material falling over hammer at 717 feet.
Olive black (5Y,2/1), very hard, fresh below 715 feet.
Decreased drilling resistance from 726 to 728 feet. Dark reddish brown (10R,3/4) and olive black (5Y,2/1), moderately hard to hard, fresh to moderate weathering below 720 feet.

Brownish black (5YR,2/1) and dark reddish brown (10R,3/4), moderately to highly vesicular below 735 feet.

Decreased drilling resistance at 742 feet.
Increased drilling resistance from 743 feet. Moderate reddish brown (10R,4/6), dark reddish brown (10R,3/4), and olive black (5Y,2/1), moderate to highly vesicular, moderate to deep weathering below 745 feet. Very hard drilling below 747 feet.
Olive black (5Y,2/1), slightly to moderately vesicular below 750 feet.
Increased drilling resistance at 750 feet. Olive black (5Y,2/1) with dark reddish brown (10R,3/4) below 750 feet.
Decreased drilling resistance at 753 feet. No sample cuttings and no drilling foam circulation below 756 feet.

Increased drilling resistance at 762 feet. Foam circulation returns at 763 feet.
No foam return at 765 feet.

Decreased drilling resistance at 768 feet. Foam circulation returns at 769.5 feet. Grayish black (N2) below 770 feet. Medium dark gray (N3) below 770 feet. Increased drilling resistance at 772 feet.
### Log of Monitoring Well 1-1

**Schofield Barracks Island of Oahu, Hawaii**

<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>
<th>Elevation</th>
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<tr>
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<td>780</td>
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<td>29</td>
<td>0</td>
<td>157</td>
<td>840</td>
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</tbody>
</table>

**Equipment**

- **Bucket Auger (20")**
- **Air Rotary by Speedstar SS 16**
- **Air Rotary by Ingersol-Rand T3W**

**Notable Observations**

- Decreased drilling resistance at 784 feet.
  - Dark reddish brown (10R,3/4) and dark gray (N2) below 785 feet.
  - Increased drilling resistance at 788 feet.
  - Decreased drilling resistance at 790 feet.
  - Olive black (5Y,2/1) below 790 feet.
  - Increased drilling resistance at 799 feet.
  - Non- to slightly vesicular below 800 feet.
  - Olive black (5Y,2/1) and grayish red (5R,4/2) below 820 feet.
  - Decreased drilling resistance at 821 feet.
  - Dark reddish brown (10R,3/4) with olive black (5Y,2/1), low to moderate hardness, highly vesicular, possible cinder layer below 825 feet.
  - Increased drilling resistance at 825 feet.
  - Olive black (5Y,2/1) below 825 feet.
  - Decreased drilling resistance at 828 feet.
  - Increased drilling resistance at 828.5 feet.
  - Decreased drilling resistance at 835 feet.
  - Increased drilling resistance at 843.5 feet.
### Log of Monitoring Well 1-1

#### Schofield Barracks
Island of Oahu, Hawaii

<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>
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<tr>
<td>840-845</td>
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<td>845-850</td>
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<tr>
<td>850-855</td>
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<td>160</td>
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</tbody>
</table>

**Equipment**
- Bucket Auger (20")
- Air Rotary by Speedstar SS16
- Air Rotary by Ingersol-Rand T3W

**Depth (ft)**
- 845
- 850
- 855

**Elevation**
- 855 ft

**Date**: 01/26/94

**Notes**:
- Driller says rubble zone encountered at 845 feet.
- Increased drilling resistance below 845 feet.
- Decreased drilling resistance at 848 feet.
- Very dusty red (10R,2/2), moderate brown (5YR,3/4), and blackish red (5R,2/1), with rounded gravels and cobbles below 850 feet.

**Total Depth**: 855 feet.

Water table was measured at 582.08 feet below top of casing, 3/94.
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.: 2901-13  Well Name: MW1-1  Island: Oahu
2. Location/Address: Schofield Barracks  Tax Map Key: 7-6-01

PART I. WELL CONSTRUCTION REPORT

4. Name of driller who performed work: Pete Christiansen / Mel Peterson
5. Type of rig/construction: Bucket Auger / Air Rotary
6. Date(s) Well Construction and pump tests (if any) completed: 1/26/94
7. GROUND ELEVATION (referenced to mean sea level, msl): 855.35 ft.
   Well Bench Mark (description/location): Top of sounding tube  Elevation(msl): 852.78 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.
   See attached boring log

9. Total depth of well below ground: 669 ft.
10. Hole size:
    - 19 inch dia. from 0 ft. to 10 ft. below ground
    - 16 inch dia. from 10 ft. to 200 ft. below ground
    - 10 inch dia. from 200 ft. to 855 ft. below ground

11. Casing installed:
    - 6 in. I.D. x _______ in. wall solid section to 569 ft. below ground
    - 6 in. I.D. x _______ in. wall perforated section to 669 ft. below ground
    Casing Material/Slot Size: Carbon steel blank casing / stainless steel wirewrap screen Gravel packed from 559 ft. below ground to 855 ft. below ground

12. Annulus:
    - Grouted from 0 ft. below ground to 559 ft. below ground

13. Initial water level: 581.99 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 ________  (2) Long-term Aquifer Test Date ________
   Start water level _________ ft. below R.P.  Start water level _________ ft. below R.P.
   End water level _________ ft. below R.P.  End water level _________ ft. below R.P.

17. Aquifer Pump Test Procedures data & graphs (1/97 LTAT Form) attached?  Yes  No
18. As-built drawings attached attached?  Yes  No
19. Other remarks/comments: (On back of this form)

Well Drilling Contractor (print) ____________________________ C-57 Lic. No. ____________
Signature ____________________________________________ Date ____________

Surveyor (print) ____________________________ Lic. No. ____________
Signature ____________________________________________ Date ____________

Applicant (print) ____________________________
Signature ____________________________________________ Date ____________
PART II. (PERMANENT) PUMP INSTALLATION REPORT

21. Name of person performing work: Paul Montgomery
22. Date Pump Installation Completed:

23. PUMP INSTALLATION:
   - Pump Type, Make, Serial No.: 3.75" dia. Grandfos pump
   - Motor type, H.P., Voltage, rpm: Electric, 7.5 hp
   - Depth of Pump Intake Setting: 597 ft. below ground, which elevation is 258 ft.
   - Depth to bottom of airline: NA ft. below ground, which elevation is __________ ft.
   - Pumping Head is 582 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) C-57 Lic. No.
Signature __________________________ Date __________________
Applicant (print) __________________________
Signature __________________________ Date __________________

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

<table>
<thead>
<tr>
<th>Water Level Dates (ft.)</th>
<th>Water Level Dates (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. & 25. Remarks:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
**DEPT (FT) | ELEVATION (FT)**
--- | ---
10 | 835.4
200 | 655.4
549 | 306
559 | 296
564 | 291
569 | 286
581.99 | 270.79 (10/10/95)
\( \approx \)587 | \( \approx \)276
669 | 186
674 | 181
687 | 168
855 | 0.4

*DATUM: MEAN SEA LEVEL

**CONCRETE SLAB**
EL. = 855.35 FT.

**TOP OF SOUNDING TUBE**
EL. = 852.78 FT.

**CORNER CONCRETE SLAB**
EL. = 854.97 FT.

**CEMENT SLAB**

**19" DIAMETER AUGERED HOLE**

**16" DIAMETER HOLE**
DRILLED WITH DOWNHOLE HAMMER

**12" DIAMETER STEEL CONDUCTOR CASING**

**CEMENT BENTONITE INNER SEAL**

**6" DIAMETER CARBON 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**

**FINE SAND**

**SAND**

---

*Harding Lawson Associates*
Engineering and Environmental Services

*Monitoring Well 1-1*
Schofield Barracks
Island of Oahu, Hawaii

**DRAWN**
jol 28339.09.02.12

**APPROVED**
28339045 1.0
199511061453 9/95
EXCAVATION FILLED WITH CONCRETE
SURFACE SLOPED TO DRAIN

PVC DRAIN PIPE

DISCHARGE PIPE WITH VALVE

SOUNDING PIPE WITH THREADED CAP

ELECTRICAL SWITCH BOX

LOCKING PROTECTIVE COVER

ELECTRICAL CABLE TO PUMP

WELL BOX

CRUSHED ROCK AT BASE

6" DIAMETER STEEL BLANK CASING

12" DIAMETER STEEL CONDUCTOR CASING

ACCESS DOOR

NOT TO SCALE

Monitoring Well 1-1 Detail
Schofield Barracks
Island of Oahu, Hawaii

DATE: 10/95

FIGURE REVISED 01.
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 identification numbers 3-2900-01 and 3-3004-03, respectively. The actual records, the state well identification numbers should be assigned as follow:

<table>
<thead>
<tr>
<th>Project Well Number</th>
<th>Hawaii State Well ID Number</th>
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<tbody>
<tr>
<td>1-1</td>
<td>3-2901-13</td>
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<td>2-1</td>
<td>3-2900-02</td>
</tr>
<tr>
<td>2-2</td>
<td>3-2903-01</td>
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<td>3-2902-03</td>
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<td>2-6</td>
<td>3-2802-01</td>
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<td>4-2</td>
<td>3-3004-02</td>
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<td>3-3004-03</td>
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<tr>
<td>4-4</td>
<td>3-3004-04</td>
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</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
Ms. Lenore Nakama
State of Hawaii, DLNR

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
 rejected. It is possible, perhaps, that someone such as the drill
submitted a permit application in advance. If that is the case, the
well completion reports for both Wells 4-3 and 4-4.

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

We hope that this information will help clarify the confusion in
identification systems. I will be available to discuss these well
desire. If you have any questions, please feel free to call.

Sincerely yours,

HARDING LAWSON ASSOCIATES

Bruce S. Wedgeworth
Associate Geologist

Enclosures

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

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

Attn: Mr. Bruce S. Wedgeworth

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

Northing    Easting    Elevation    Latitude     Longitude

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

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

post
  BM#1

post
  BM#2

post
  BM#3

MW 2-6

---

Engineers  Planners  Photogrammetrists  Surveyors

Construction Managers  Environmental Services
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 elevation)

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

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 MANAGER

**Coordinate File Name:** HARDING.CO  
**Job #:** 1.0  
**Description:**

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<th>Easting</th>
<th>Elev</th>
<th>Descr</th>
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**0.999990 SCALE FACTOR**  
**0.9999464 GRID FACTOR**

**SP - HAWAII STATE PLANE COORDINATE SYSTEM, ZONE 3 (NAD27)**
Mr. Jon Fukuda  
U.S. Army  
DPW, Attn: APVG-GWV, U.S. Army Garrison  
Schofield Barracks, HI 96857-5000

Dear Mr. Fukuda:

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,

[Signature]

RAE M. LOUI  
Deputy Director

LN:ss
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, 2902-01, 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: ______________________ Phone: ______________________

Signed: ______________________ Date: ______________________

LN:ss  
Attachment(s)
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 of 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 Peartridge Center, Phase 1
Aiea, Hawaii 96701
(1)-808 486 6009

0209ARP
### Table 1. Schofield Water-Level Data

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<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>Displacement (FT)</th>
<th>Corrected Depth (FT)</th>
<th>Groundwater Elevation (FT)</th>
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<td>Longitude</td>
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NA = Not assigned yet by the DLNR.
**CONCRETE SLAB**  
EL. = 855.35 FT.

**TOP OF SOUNDING TUBE**  
EL. = 852.78 FT.

**CORNER CONCRETE SLAB**  
EL. = 854.97 FT.

**CEMENT SLAB**

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<th>ELEVATION (FT)</th>
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</tr>
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<td>286</td>
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<tr>
<td>581.99</td>
<td>270.79 (10/10/95)</td>
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<td>~587</td>
<td>~276</td>
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<td>186</td>
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*DATUM: MEAN SEA LEVEL*

**FIGURE**

**MONITORING WELL 1-1**
Schofield Barracks  
Island of Oahu, Hawaii

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<th>DRAWN</th>
<th>JOB NUMBER</th>
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**DEPTH (FT)**

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- Depth (FT) Elevation (FT)
- 564 291
- 581.99 270.79 (10/10/95)
- ~587 ~276
- 593 262
- 597 258
- 600 255
- 669 186
- 674 181
- 687 168
- 855 0

**Figure:** Pump Installation Diagram for Monitoring Well 1-1

- **Datum:** Mean Sea Level
- **Scale:** Not to Scale

- **Fine Sand:**
- **1" Dia. SCH 80 PVC Sounding Tube**
- **2.0" Dia. Steel Discharge Pipe**
- **Jacketed Submersible Electrical Pump Cable**
- **Stainless Steel Safety Cable**
- **Torque Arrestor**
- **Check Valve**
- **Stainless Steel Electrical Cable Wire Guard**
- **3.75" Dia. Grandfos 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**
- **Fine Sand**
- **SAND**

---

**Harding Lawson Associates**
Engineering and Environmental Services

**Schofield Barracks**
Island of Oahu, Hawaii

**Figure:**

- **Job Number:** 28339.09.02.12
- **Approved:**
- **File:** 1995/02/1448
- **Date:** 9/95
- **Revised Date:**
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<th>Depth (ft)</th>
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<td>55-60</td>
<td>5</td>
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</tr>
</tbody>
</table>

**Equipment**
- **Rotary/Tricone Bit**
- **Downhole Hammer**
- **WATS 2000**
- **20" Bucket Auger**
- **Speedster SS16**

**Log of Monitoring Well 1-1**

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

**Top of Casing**

**Harding Lawson Associates**

**Engineering and Environmental Services**

**26129.05.05.12**

**9/94**
<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-65</td>
<td>65</td>
<td>5</td>
<td>No sample cuttings from 65 feet.</td>
</tr>
<tr>
<td>65-70</td>
<td>70</td>
<td>0 11</td>
<td>Increased drilling resistance at 87 feet.</td>
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<tr>
<td>70-75</td>
<td>75</td>
<td>0 12</td>
<td>No sample cuttings from 90 or 95 feet.</td>
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<tr>
<td>75-80</td>
<td>80</td>
<td>0 13</td>
<td>Increasing sand content below 95 feet.</td>
</tr>
<tr>
<td>80-85</td>
<td>85</td>
<td>0 14</td>
<td>Encountered rock (boulder) between 100 and 101 feet.</td>
</tr>
<tr>
<td>85-90</td>
<td>90</td>
<td>0 15</td>
<td>Reddish brown (5YR.4/3) below 100 feet.</td>
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<tr>
<td>90-95</td>
<td>95</td>
<td>0 16</td>
<td>Increased drilling resistance at 110 feet.</td>
</tr>
<tr>
<td>95-100</td>
<td>100</td>
<td>0 17</td>
<td>MODERATE BROWN BASALT (5YR.3/4), low hardness, weak, deeply weathered.</td>
</tr>
<tr>
<td>100-105</td>
<td>105</td>
<td>0 18</td>
<td>Increased drilling resistance at 113 feet.</td>
</tr>
<tr>
<td>105-110</td>
<td>110</td>
<td>0 19</td>
<td>Becoming moderately hard, moderately strong, below 115 feet.</td>
</tr>
<tr>
<td>110-115</td>
<td>115</td>
<td>0 20</td>
<td>Increased drilling resistance at 118 feet.</td>
</tr>
<tr>
<td>115-120</td>
<td>120</td>
<td>0 21</td>
<td>Brownish grey 5YR.4/1) and medium grey (N4) below 120 feet.</td>
</tr>
<tr>
<td>120-125</td>
<td>125</td>
<td>0 22</td>
<td>Decreased drilling resistance from 121 to 130 feet.</td>
</tr>
</tbody>
</table>
**Top of Casing ft**

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (ft/hr)</th>
<th>Breakdown Stress (psi)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-130</td>
<td>60</td>
<td>0</td>
<td>20</td>
<td>130</td>
<td>Increased drilling resistance at 130 feet.</td>
</tr>
<tr>
<td>130-135</td>
<td>20</td>
<td>0</td>
<td>21</td>
<td>135</td>
<td>Decreased drilling resistance at 133 feet.</td>
</tr>
<tr>
<td>135-140</td>
<td>9</td>
<td>0</td>
<td>22</td>
<td>140</td>
<td>Light olive gray (5Y.6/1) below 135 feet.</td>
</tr>
<tr>
<td>140-145</td>
<td>10</td>
<td>0</td>
<td>23</td>
<td>145</td>
<td>Increased drilling resistance at 137.5 feet.</td>
</tr>
<tr>
<td>145-150</td>
<td>7</td>
<td>0</td>
<td>24</td>
<td>150</td>
<td>Decreased drilling resistance at 139.5 feet.</td>
</tr>
<tr>
<td>150-155</td>
<td>9</td>
<td>0</td>
<td>25</td>
<td>155</td>
<td>Highly vesicular below 140 feet.</td>
</tr>
<tr>
<td>155-161</td>
<td>10</td>
<td>0</td>
<td>26</td>
<td>160</td>
<td>Dark reddish brown (10R.7/4), low to moderately hard, below 150 feet.</td>
</tr>
<tr>
<td>160-166</td>
<td>30</td>
<td>0</td>
<td>27</td>
<td>165</td>
<td>Increased drilling resistance at 159 feet.</td>
</tr>
<tr>
<td>165-170</td>
<td>11</td>
<td>0</td>
<td>28</td>
<td>170</td>
<td>Medium dark grey (N3) and dark reddish brown (10R.3/4) below 160 feet.</td>
</tr>
<tr>
<td>170-175</td>
<td>9</td>
<td>0</td>
<td>29</td>
<td>175</td>
<td>Decreased drilling resistance at 161 and 165 feet.</td>
</tr>
<tr>
<td>175-180</td>
<td>10</td>
<td>0</td>
<td>30</td>
<td>180</td>
<td>Moderately hard to hard below 165 feet.</td>
</tr>
<tr>
<td>180-185</td>
<td>20</td>
<td>0</td>
<td>31</td>
<td>185</td>
<td>Increased drilling resistance at 170 feet.</td>
</tr>
<tr>
<td>185-190</td>
<td>20</td>
<td>0</td>
<td>32</td>
<td>190</td>
<td>Decreased drilling resistance at 175 feet.</td>
</tr>
</tbody>
</table>

**Log of Monitoring Well 1-1** (Sheet 3 of 14)

*Harding Lawson Associates*
Engineering and Environmental Services

*Schrofield TEPS 5*
Schrofield Barracks
Island of Oahu, Hawaii

**Figure 1**

*Air Rotary/Tricone Bit Downhole Hammer/WATS 2000 20" Bucket Auger*

**Equipment** Speedstar SS16

**Elevation** 855.35 ft  **Date** 01/26/94

**Drawn** Job Number **Approved** File Date Revised Date
kar 26129.05.05.12 STEPS 9/94
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min./3 feet)</th>
<th>Rotating Speed (Rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>190-195</td>
<td>18</td>
<td>0</td>
<td>33</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>195-200</td>
<td>35</td>
<td>0</td>
<td>34</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>200-205</td>
<td>10</td>
<td>0</td>
<td>35</td>
<td>205</td>
<td></td>
</tr>
<tr>
<td>205-210</td>
<td>8</td>
<td>-</td>
<td></td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>210-215</td>
<td>6</td>
<td>-</td>
<td></td>
<td>215</td>
<td></td>
</tr>
<tr>
<td>215-220</td>
<td>5</td>
<td>0</td>
<td>36</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>220-225</td>
<td>5</td>
<td>-</td>
<td></td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>225-230</td>
<td>6</td>
<td>-</td>
<td></td>
<td>230</td>
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</tr>
<tr>
<td>230-235</td>
<td>11</td>
<td>0</td>
<td>37</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>235-240</td>
<td>9</td>
<td>0</td>
<td>38</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>11</td>
<td>0</td>
<td>39</td>
<td>245</td>
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</tr>
<tr>
<td>245-250</td>
<td>7</td>
<td>0</td>
<td>40</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>250-255</td>
<td>17</td>
<td>0</td>
<td>41</td>
<td>255</td>
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</tr>
</tbody>
</table>

**Air Rotary/Tricone Bit**  
**Downhole Hammer/ WATS 2000 20° Bucket Auger**  
**Speedstar SS16**

**TOP OF CASING ft**

**10-INCH-DIA. HOLE DRILLED WITH DOWNHOLE HAMMER**  
(200.4 to 855 feet)

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

**CEMENT-BENTONITE INNER SEAL**  
(Surface to 549 feet)

---

(Set 12-inch casing to 200 feet.)  
(Resume drilling at 200 feet with foam and 10-inch-dia. hammer.)

No sample cuttings at 205 feet or 210 feet.

(Loss of air circulation at 210 feet.)  
Decreased drilling resistance from 210 to 212 feet.

Decreased drilling resistance from 215 to 217 feet.

No sample cuttings and no drilling foam circulation until 245 feet.

Decreased drilling resistance from 233 to 235 feet.

(Drilling foam circulation and cuttings return very low.)

Very dark red (5R.2/6) and dusky red (10R.2/2) below 250 feet.

Increased drilling resistance from 255 to 259 feet.
### Log of Monitoring Well 1-1

**Air Rotary/Tricone Bit**
**Equipment**
- Downhole Hammer
- WATS 2000 20" Bucket Auger
- Speedstar SS16

**Elevation** 855.35 ft  
**Date** 01/26/94

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Sample Number</th>
<th>Drilling Rate (m/30 min)</th>
<th>Sample</th>
<th>Sample Number</th>
<th>Sample Number</th>
<th>Sample Number</th>
<th>Sample Number</th>
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<tbody>
<tr>
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<td>15</td>
<td>0</td>
<td>42</td>
<td>260</td>
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<td></td>
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<tr>
<td>260-265</td>
<td>9</td>
<td>0</td>
<td>43</td>
<td>265</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>265-270</td>
<td>8</td>
<td>0</td>
<td>44</td>
<td>270</td>
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<td>0</td>
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<td>47</td>
<td>285</td>
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<td>6</td>
<td>0</td>
<td>48</td>
<td>290</td>
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<td>290-295</td>
<td>8</td>
<td>0</td>
<td>49</td>
<td>295</td>
<td></td>
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<td>295-300</td>
<td>9</td>
<td>0</td>
<td>50</td>
<td>300</td>
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<td>11</td>
<td>0</td>
<td>51</td>
<td>305</td>
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</tr>
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<td>305-310</td>
<td>8</td>
<td>0</td>
<td>52</td>
<td>310</td>
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<td></td>
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<td>310-315</td>
<td>7</td>
<td>0</td>
<td>53</td>
<td>315</td>
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</tr>
<tr>
<td>315-320</td>
<td>4</td>
<td>0</td>
<td>54</td>
<td>320</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>320-325</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- **Medium dark grey (N3), little weathered, and little to moderately vesicular, below 260 feet.**
- **Decreased drilling resistance at 269 feet. Dark reddish brown (10R,3/4) and medium dark grey (N3), moderately to deeply weathered, and highly vesicular, below 270 feet.**
- **Increased drilling resistance from 278 to 279 feet.**
- **Increased drilling resistance at 295 feet.**
- **Decreased drilling resistance at 298 feet.**
- **Increased drilling resistance at 302 feet.**
- **Decreased drilling resistance at 375 feet.**
- **Increased drilling resistance at 322 feet.**
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min./ft)</th>
<th>Breaching Space Measurement (in)</th>
<th>Sample Number</th>
<th>Deposit (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>320-325</td>
<td>11</td>
<td>0</td>
<td>55</td>
<td>325</td>
<td>Dark reddish brown (10R 3/4), less vesicular, below 320 feet.</td>
</tr>
<tr>
<td>325-330</td>
<td>9</td>
<td>0</td>
<td>56</td>
<td>330</td>
<td>Increased drilling resistance at 335 feet.</td>
</tr>
<tr>
<td>330-335</td>
<td>8</td>
<td>0</td>
<td>57</td>
<td>335</td>
<td>Dark grey (N2), hard to very hard, slightly to moderately vesicular, with little weathering, below 340 feet.</td>
</tr>
<tr>
<td>335-340</td>
<td>9</td>
<td>0</td>
<td>58</td>
<td>340</td>
<td>Decreased drilling resistance at 355 feet. Moderately to highly vesicular below 355 feet.</td>
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<tr>
<td>340-345</td>
<td>17</td>
<td>0</td>
<td>59</td>
<td>345</td>
<td>Medium hard to hard, little to moderately vesicular, below 370 feet.</td>
</tr>
<tr>
<td>345-350</td>
<td>10</td>
<td>0</td>
<td>60</td>
<td>350</td>
<td>Moderately to highly vesicular below 380 feet.</td>
</tr>
<tr>
<td>350-355</td>
<td>14</td>
<td>0</td>
<td>61</td>
<td>355</td>
<td>Deeply weathered below 385 feet. Decreased drilling resistance at 388 feet.</td>
</tr>
<tr>
<td>355-360</td>
<td>15</td>
<td>0</td>
<td>62</td>
<td>360</td>
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</tr>
<tr>
<td>365-370</td>
<td>11</td>
<td>0</td>
<td>64</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>370-375</td>
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<td>0</td>
<td>65</td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>375-380</td>
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<td>0</td>
<td>66</td>
<td>380</td>
<td></td>
</tr>
<tr>
<td>380-385</td>
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<td>67</td>
<td>385</td>
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<td>385-390</td>
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<td>390</td>
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</tr>
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**Equipment**
- Air Rotary/Tricone Bit
- Downhole Hammer
- WATS 2000 20" Bucket Auger
- Speedstar SS16

**Log of Monitoring Well 1-1**
(Sheet 6 of 14)
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Breakthrough Space (in.)</th>
<th>Drilling Rate (in./hr)</th>
<th>Sample Journal (ft)</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>385-390</td>
<td>7</td>
<td>68</td>
<td>390</td>
<td>385-390</td>
<td>Dark reddish brown (10R.3/4), medium dark gray (N3) and moderate brown (5YR.4/4), little to moderately weathered, below 380 feet.</td>
</tr>
<tr>
<td>390-395</td>
<td>8</td>
<td>69</td>
<td>395</td>
<td>390-395</td>
<td>Increased drilling resistance at 392 feet.</td>
</tr>
<tr>
<td>395-400</td>
<td>8</td>
<td>70</td>
<td>400</td>
<td>395-400</td>
<td>Decreased drilling resistance at 397 feet.</td>
</tr>
<tr>
<td>400-405</td>
<td>10</td>
<td>71</td>
<td>405</td>
<td>400-405</td>
<td>Fresh to little weathered below 400 feet.</td>
</tr>
<tr>
<td>405-410</td>
<td>9</td>
<td>72</td>
<td>410</td>
<td>405-410</td>
<td>Increased drilling resistance at 401 feet.</td>
</tr>
<tr>
<td>410-415</td>
<td>8</td>
<td>73</td>
<td>415</td>
<td>410-415</td>
<td>Medium dark gray (N2) below 405 feet.</td>
</tr>
<tr>
<td>415-420</td>
<td>6</td>
<td>74</td>
<td>420</td>
<td>415-420</td>
<td>Increased drilling resistance at 408 feet.</td>
</tr>
<tr>
<td>420-425</td>
<td>10</td>
<td>75</td>
<td>425</td>
<td>420-425</td>
<td>Decreased drilling resistance at 410 feet.</td>
</tr>
<tr>
<td>425-430</td>
<td>9</td>
<td>76</td>
<td>430</td>
<td>425-430</td>
<td>Little to moderately weathered below 410 feet.</td>
</tr>
<tr>
<td>430-435</td>
<td>12</td>
<td>77</td>
<td>435</td>
<td>430-435</td>
<td>Brownish black (5YR.2/1) and brownish gray (5YR.4/1), fresh to little weathered, and little to moderately vesicular, below 425 feet.</td>
</tr>
<tr>
<td>435-440</td>
<td>18</td>
<td>78</td>
<td>440</td>
<td>435-440</td>
<td>Grayish black (N2) and dusky brown (5YR.2/2) below 435 feet.</td>
</tr>
<tr>
<td>445-450</td>
<td>12</td>
<td>80</td>
<td>450</td>
<td>445-450</td>
<td>Decreased drilling resistance at 449 feet.</td>
</tr>
<tr>
<td>455</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dark reddish brown (10Y.3/4), moderately reddish brown (10R.4/6), and blackish red (5R.2/2) below 450 feet.</td>
</tr>
</tbody>
</table>

Log of Monitoring Well 1-1 (Sheet 7 of 14)
### Log of Monitoring Well 1-1

**Schofield TEPS 5**

**Schofield Barracks**

**Island of Oahu, Hawaii**

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>450-455</td>
<td>9</td>
<td>455</td>
<td>455-460</td>
<td>11</td>
</tr>
<tr>
<td>455-460</td>
<td>11</td>
<td>460-465</td>
<td>9</td>
<td>465-470</td>
</tr>
<tr>
<td>460-465</td>
<td>9</td>
<td>470-475</td>
<td>12</td>
<td>475-480</td>
</tr>
<tr>
<td>465-470</td>
<td>5</td>
<td>480-485</td>
<td>12</td>
<td>485-490</td>
</tr>
<tr>
<td>470-475</td>
<td>12</td>
<td>490-495</td>
<td>11</td>
<td>495-500</td>
</tr>
<tr>
<td>475-480</td>
<td>22</td>
<td>500-505</td>
<td>8</td>
<td>505-510</td>
</tr>
<tr>
<td>480-485</td>
<td>12</td>
<td>510-515</td>
<td>7</td>
<td>515-520</td>
</tr>
</tbody>
</table>

- Decreased drilling resistance at 460 and at 465 feet.
- Increased drilling resistance at 468 feet.
- Brownish black (5YR 2/1), very dark red (5R 2/6) and dark reddish brown (10R 3/4), below 470 feet.
- Increased drilling resistance at 475 feet.
- Decreased drilling resistance at 480 feet.
- (Possible clinker or cinder layer from 480 to 483 feet.)
- Dark gray (N3) and dark reddish brown (10R 3/4), non-to slightly vesicular, below 480 feet.
- Decreased drilling resistance at 490 feet.
- Increased drilling resistance at 492 feet.
- Decreased drilling resistance from 495 to 497 feet.
- Decreased drilling resistance at 503 feet.
- Dark gray (N2), with trace olivine crystals, below 505 feet.
- Increased drilling resistance at 508 feet.
TOP OF CASING  ft

<table>
<thead>
<tr>
<th>Sample Interval</th>
<th>Drilling Rate (in./min)</th>
<th>Breakdown Measure (in.)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>515-520</td>
<td>7</td>
<td>0</td>
<td>94</td>
<td>520</td>
</tr>
<tr>
<td>520-525</td>
<td>8</td>
<td>0</td>
<td>95</td>
<td>525</td>
</tr>
<tr>
<td>525-530</td>
<td>8</td>
<td>0</td>
<td>96</td>
<td>530</td>
</tr>
<tr>
<td>530-535</td>
<td>8</td>
<td>0</td>
<td>97</td>
<td>535</td>
</tr>
<tr>
<td>535-540</td>
<td>8</td>
<td>0</td>
<td>98</td>
<td>540</td>
</tr>
<tr>
<td>540-545</td>
<td>8</td>
<td>0</td>
<td>99</td>
<td>545</td>
</tr>
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<td>545-550</td>
<td>9</td>
<td>0</td>
<td>100</td>
<td>550</td>
</tr>
<tr>
<td>550-555</td>
<td>10</td>
<td>0</td>
<td>101</td>
<td>555</td>
</tr>
<tr>
<td>555-560</td>
<td>8</td>
<td>0</td>
<td>102</td>
<td>560</td>
</tr>
<tr>
<td>560-565</td>
<td>13</td>
<td>0</td>
<td>103</td>
<td>565</td>
</tr>
<tr>
<td>565-570</td>
<td>12</td>
<td>0</td>
<td>104</td>
<td>570</td>
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<tr>
<td>570-575</td>
<td>20</td>
<td>0</td>
<td>105</td>
<td>575</td>
</tr>
<tr>
<td>575-580</td>
<td>10</td>
<td>0</td>
<td>106</td>
<td>580</td>
</tr>
</tbody>
</table>

- Moderately to highly vesicular below 530 feet.
- Decreased drilling resistance at 547 feet.
- Blackish red (5R,2/2), moderate brown (5R,4/4), and olive black (5Y,2/1) below 549 feet.
- Brownish black (5YR,2/1), reddish brown (10R,3/4), dark yellowish brown (10R,4/5), moderately weathered, below 550 feet.
- Increased drilling resistance at 556 feet.
- Dark gray (N2) and non-vesicular below 555 feet.
- Decreased drilling resistance at 577 feet.
- Water level measured 3/2/94 at a depth of 582.08 feet. Decreased drilling resistance from 582 to 585 feet.
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (ft/hr)</th>
<th>Breaking Speed (rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>580-585</td>
<td>14</td>
<td>0</td>
<td>107</td>
<td>585</td>
<td>Moderately to highly vesicular below 585 feet.</td>
</tr>
<tr>
<td>585-590</td>
<td>5</td>
<td>0</td>
<td>108</td>
<td>590</td>
<td>Blackish red (5R.2/2), moderate reddish brown (10R.4/8), and dark reddish brown (10R.3/4), below 585 feet.</td>
</tr>
<tr>
<td>590-595</td>
<td>4</td>
<td>0</td>
<td>109</td>
<td>595</td>
<td>Decreased drilling resistance from 600 to 601 feet. (Possible clinker or cinder layer at 600 feet.)</td>
</tr>
<tr>
<td>595-600</td>
<td>21</td>
<td>0</td>
<td>110</td>
<td>600</td>
<td>(Borehole collapsing below 610 feet.)</td>
</tr>
<tr>
<td>600-605</td>
<td>37</td>
<td>0</td>
<td>111</td>
<td>605</td>
<td>(Driller notes rock is more solid at 632 feet.)</td>
</tr>
<tr>
<td>605-610</td>
<td>10</td>
<td>0</td>
<td>112</td>
<td>610</td>
<td>Dark gray (N2), blackish red (5R.2/2), and grayish red (10R.4/2), slightly to moderately vesicular, below 640 feet.</td>
</tr>
<tr>
<td>610-615</td>
<td>18</td>
<td>0</td>
<td>113</td>
<td>615</td>
<td></td>
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<tr>
<td>615-620</td>
<td>12</td>
<td>0</td>
<td>114</td>
<td>620</td>
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</tr>
<tr>
<td>620-625</td>
<td>10</td>
<td>0</td>
<td>115</td>
<td>625</td>
<td></td>
</tr>
<tr>
<td>625-630</td>
<td>8</td>
<td>0</td>
<td>116</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>630-635</td>
<td>20</td>
<td>0</td>
<td>117</td>
<td>635</td>
<td></td>
</tr>
<tr>
<td>635-640</td>
<td>25</td>
<td>0</td>
<td>118</td>
<td>640</td>
<td></td>
</tr>
<tr>
<td>640-645</td>
<td>40</td>
<td>0</td>
<td>119</td>
<td>645</td>
<td></td>
</tr>
<tr>
<td>650</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Log of Monitoring Well 1-1

Schofield TEPS 5
Schofield Barracks
Island of Oahu, Hawaii

Harding Lawson Associates
Engineering and Environmental Services

DRAWN: kar
JOB NUMBER: 26129.05.05.12
APPROVED: STEPS
FILE: 9/94
Air Rotary/Downhole Hammer
Gardner Denver 40-T/
Equipment Speedstar SS16

Elevation 855.35 ft Date 01/26/94

Top of Casing ft

<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (min/ft)</th>
<th>Breaching Space Measurement (rpm)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>645-650</td>
<td>65</td>
<td>0</td>
<td>120</td>
<td>650</td>
<td>Dark grey (N2) below 650 feet.</td>
</tr>
<tr>
<td>650-655</td>
<td>48</td>
<td>0</td>
<td>121 655</td>
<td></td>
<td>Moderately to highly vesicular below 655 feet.</td>
</tr>
<tr>
<td>655-660</td>
<td>30</td>
<td>0</td>
<td>122 660</td>
<td></td>
<td>Dark reddish brown (10R,3/4) and dark grey (N2), moderately to deeply weathered, below 660 feet. Decreased drilling resistance at 662 feet.</td>
</tr>
<tr>
<td>660-665</td>
<td>10</td>
<td>0</td>
<td>123 665</td>
<td></td>
<td>Fresh to little weathered, non- to moderately vesicular, below 670 feet.</td>
</tr>
<tr>
<td>665-670</td>
<td>12</td>
<td>0</td>
<td>124 670</td>
<td></td>
<td>Dark grey (N2) and dark reddish brown (10R,3/4) below 675 feet.</td>
</tr>
<tr>
<td>670-675</td>
<td>60</td>
<td>0</td>
<td>125 675</td>
<td></td>
<td>Decreased drilling resistance below 681 feet.</td>
</tr>
<tr>
<td>675-680</td>
<td>40</td>
<td>0</td>
<td>126 680</td>
<td></td>
<td>Dark reddish brown (10R,3/4), moderate to deep weathering, highly vesicular below 685 feet.</td>
</tr>
<tr>
<td>680-685</td>
<td>18</td>
<td>0</td>
<td>127 685</td>
<td></td>
<td>Olive grey (5Y,4/1) and dark reddish brown (10R,3/4) below 690 feet.</td>
</tr>
<tr>
<td>685-690</td>
<td>15</td>
<td>0</td>
<td>128 690</td>
<td></td>
<td>Olive black (5Y,2/1) and blackish red (5R,2/2), with some calcite crystals, below 705 feet. Decreased drilling resistance at 706 feet. Possible clinker layer at 707 feet. Increased drilling resistance from 708 to 710 feet. Dark reddish brown (10R,3/4), brownish black (5YR,2/1), and greyish red (5R,4/2) below 710 feet.</td>
</tr>
<tr>
<td>690-695</td>
<td>18</td>
<td>0</td>
<td>129 695</td>
<td></td>
<td></td>
</tr>
<tr>
<td>695-700</td>
<td>32</td>
<td>0</td>
<td>130 700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>700-705</td>
<td>20</td>
<td>0</td>
<td>131 705</td>
<td></td>
<td></td>
</tr>
<tr>
<td>705-710</td>
<td>20</td>
<td>0</td>
<td>132 710</td>
<td></td>
<td></td>
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</tbody>
</table>

Harding Lawson Associates
Log of Monitoring Well 1-1 (Sheet 11 of 14)

Schofield EPSS 5
Schofield Barracks
Island of Oahu, Hawaii

Drawn: kar 26129.05.05.12
Job Number: APPROVED:
File: DATE: REVISED DATE: STEPS 9/94
<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Sample</th>
<th>Breathing Space (ppm)</th>
<th>Drilling Rate (ft/hr)</th>
<th>Sample Internal (ft)</th>
<th>TOP OF CASING ft</th>
</tr>
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<tbody>
<tr>
<td>710-715</td>
<td>90</td>
<td></td>
<td>0 133</td>
<td>715</td>
<td></td>
<td></td>
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<td>715-720</td>
<td>80</td>
<td></td>
<td>0 134</td>
<td>720</td>
<td></td>
<td></td>
</tr>
<tr>
<td>720-725</td>
<td>90</td>
<td></td>
<td>0 135</td>
<td>725</td>
<td></td>
<td></td>
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<tr>
<td>725-730</td>
<td>41</td>
<td></td>
<td>0 136</td>
<td>730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>730-735</td>
<td>45</td>
<td></td>
<td>0 137</td>
<td>735</td>
<td></td>
<td></td>
</tr>
<tr>
<td>735-740</td>
<td>30</td>
<td></td>
<td>0 138</td>
<td>740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>740-745</td>
<td>55</td>
<td></td>
<td>0 139</td>
<td>745</td>
<td></td>
<td></td>
</tr>
<tr>
<td>745-750</td>
<td>110</td>
<td></td>
<td>0 140</td>
<td>750</td>
<td></td>
<td></td>
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<tr>
<td>750-755</td>
<td>41</td>
<td></td>
<td>0 141</td>
<td>755</td>
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<td>755-760</td>
<td>12</td>
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<td>760</td>
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<td>760-765</td>
<td>35</td>
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<td>0 142</td>
<td>765</td>
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<td></td>
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<td>765-770</td>
<td>23</td>
<td></td>
<td>0 143</td>
<td>770</td>
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<td></td>
</tr>
<tr>
<td>770-775</td>
<td>51</td>
<td></td>
<td>0 144</td>
<td>775</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Decreased drilling resistance, and possible clinker layer at 712 feet.
- Increased drilling resistance at 713 feet.
- Brownish black (SYR,2/1) and moderate brown (SYR,3/4), non-to moderately vesicular, below 710 feet.
- Material falling over hammer at 717 feet.
- Olive black (SY,2/1), very hard, fresh, below 715 feet.

Decreased drilling resistance from 726 to 728 feet. Dark reddish brown (1OR,3/4) and olive black (SY,2/1), moderately hard to hard, fresh to moderate weathering, below 720 feet.

Brownish black (SYR,2/1) and dark reddish brown (1OR,3/4), moderately to highly vesicular, below 735 feet.

Decreased drilling resistance at 742 feet. Increased drilling resistance at 743 feet. Moderate reddish brown (1OR,4/6), dark reddish brown (1OR,3/4), and olive black (SY,2/1), moderate to highly vesicular, moderate to deep weathering, below 745 feet.

Very hard drilling below 747 feet. Olive black (SY,2/1), slightly to moderately vesicular, below 750 feet.

Increased drilling resistance at 750 feet. Olive black (SY,2/1) with dark reddish brown (1OR,3/4) below 750 feet. Decreased drilling resistance at 753 feet. No sample cuttings and no drilling foam circulation below 756 feet.

Increased drilling resistance at 762 feet. Foam circulation returns at 763 feet.

No foam return at 765 feet.

Decreased drilling resistance at 768 feet. Foam circulation returns at 769.5 feet. Grayish black (N2) below 770 feet. Medium dark gray (N3) below 770 feet. Increased drilling resistance at 772 feet.
<table>
<thead>
<tr>
<th>Sample Interval (ft)</th>
<th>Drilling Rate (m./min.)</th>
<th>Breaking Stress Measurement (psi)</th>
<th>Sample Number</th>
<th>Depth (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>775-780</td>
<td>38</td>
<td>0</td>
<td>145</td>
<td>780</td>
<td></td>
</tr>
<tr>
<td>780-785</td>
<td>139</td>
<td>0</td>
<td>148</td>
<td>785</td>
<td>Decreased drilling resistance at 784 feet.</td>
</tr>
<tr>
<td>785-790</td>
<td>19</td>
<td>0</td>
<td>147</td>
<td>790</td>
<td>Dark reddish brown (10R.3/4) and dark grey (N2) below 785 feet.</td>
</tr>
<tr>
<td>790-795</td>
<td>20</td>
<td>0</td>
<td>148</td>
<td>795</td>
<td>Decreased drilling resistance at 788 feet.</td>
</tr>
<tr>
<td>795-800</td>
<td>25</td>
<td>0</td>
<td>149</td>
<td>800</td>
<td>Decreased drilling resistance at 790 feet. Olive black (5Y.2/1) below 780 feet.</td>
</tr>
<tr>
<td>800-805</td>
<td>45</td>
<td>0</td>
<td>150</td>
<td>805</td>
<td>Increased drilling resistance at 799 feet. Non- to slightly vesicular below 800 feet.</td>
</tr>
<tr>
<td>805-810</td>
<td>78</td>
<td>0</td>
<td>151</td>
<td>810</td>
<td>Olive black (5Y.2/1) and greyish red (5R.4/2) below 820 feet. Decreased drilling resistance at 821 feet.</td>
</tr>
<tr>
<td>810-815</td>
<td>88</td>
<td>0</td>
<td>152</td>
<td>815</td>
<td>Dark reddish brown (10R.3/4) with olive black (5Y.2/1), low to moderate hardness, highly vesicular, possible cinder layer, below 825 feet. Increased drilling resistance at 825 feet. Olive black (5Y.2/1) below 825 feet.</td>
</tr>
<tr>
<td>815-820</td>
<td>160</td>
<td>0</td>
<td>153</td>
<td>820</td>
<td>Decreased drilling resistance at 828 feet. Increased drilling resistance at 828.5 feet.</td>
</tr>
<tr>
<td>820-825</td>
<td>35</td>
<td>0</td>
<td>154</td>
<td>825</td>
<td>Decreased drilling resistance at 835 feet.</td>
</tr>
<tr>
<td>825-830</td>
<td>27</td>
<td>0</td>
<td>155</td>
<td>830</td>
<td>Increased drilling resistance at 843.5 feet.</td>
</tr>
<tr>
<td>830-835</td>
<td>50</td>
<td>0</td>
<td>156</td>
<td>835</td>
<td></td>
</tr>
<tr>
<td>835-840</td>
<td>29</td>
<td>0</td>
<td>157</td>
<td>840</td>
<td></td>
</tr>
</tbody>
</table>

Rotary/Downhole Hammer
Gardner Denver 40-T/
Speedstar SS16

Elevation 855.35 ft Date 01/26/94

Log of Monitoring Well 1-1
(Sheet 13 of 14)
Air Rotary/Downhole Hammer
Gardner Denver 40-T/Speedster SS16

Elevation 855.35 ft Date 01/26/94

(Top of casing ft)
Sample Interval Drilling Rate Breaking Stress Sample Number Depth (ft)
840-845 70 0 158 845
845-850 56 0 159 850
850-855 44 0 160 855

(Driller says rubble zone encountered at 845 feet.)
Increased drilling resistance below 845 feet.
Decreased drilling resistance at 848 feet.

Very dusky red (10R.2/2), moderate brown (5YR.3/4), and blackish red (5R.2/1), with rounded gravel and cobbles, below 850 feet.

Total depth = 855 feet.
Water table was measured at 582.08 feet below top of casing, 3/94.