



# WATER-RIGHT DOCKET

## Fort Davis National Historic Site

Docket No: 2

CHURCH CAMP

Supporting Hydro Data

00-00-0000: texas water development board: survey of ground and surface water use 1973

### TEXAS WATER DEVELOPMENT BOARD

P. O. Box 13087, Capitol Station  
AUSTIN, TEXAS 78711

SURVEY OF GROUND AND SURFACE WATER USE 1973

Please indicate any changes in  
name and address or ownership  
TWDB CODE NO. 6-5300

PLEASE TYPE  
OR PRINT ALL  
ANSWERS

PLEASE NOTE: ALL OF THE FOLLOWING QUESTIONS ARE FOR THE CALENDAR YEAR 1973

#### I. Water Sales

Please list the names of water purchasers, their locations, and the quantities of water sold to them by you during the calendar year for:

- all purchasers of 1,000,000 gallons or more, and
- all public water suppliers regardless of quantity purchased.

Please indicate treated or raw water.

| Name and Location | WATER SALES | Gallons |
|-------------------|-------------|---------|
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |

Please use additional paper if necessary.

#### II. Ground Water Use

Please answer the following questions if you used or pumped ground water.

A. Number and Location (county) of water wells owned or operated by you.

One well - Hospital Canyon

B. County(ies) in which water was used. Jeff Davis

C. Please complete the following table to show the total quantity, in gallons, of self-supplied and purchased ground water. Include any water sold to others.

| GROUND WATER USE |           |           |       |           |           |       |           |           |
|------------------|-----------|-----------|-------|-----------|-----------|-------|-----------|-----------|
| MONTH            | SELF-SUP. | PURCHASED | MONTH | SELF-SUP. | PURCHASED | MONTH | SELF-SUP. | PURCHASED |
| Jan.             | 19,840    | 33,248    | May   | 47,860    | 64,256    | Sep.  | 19,910    | 26,944    |
| Feb.             | 4,940     | 22,944    | Jun.  | 33,130    | 78,848    | Oct.  | 22,890    | 30,224    |
| Mar.             | 22,960    | 34,530    | Jul.  | 24,060    | 45,408    | Nov.  | 12,760    | 35,700    |
| Apr.             | 36,670    | 41,472    | Aug.  | 36,120    | 50,912    | Dec.  | 10,210    | 37,700    |

Yearly Totals: Self-Supplied 282,350 Purchased 501,686

Purchased from: Fl. Davis Water Supply Corp, Ft. Davis, Tx

Was purchased water raw or treated? Treated

How did you arrive at the ground water use figures which you provided above?

Meter Readings

#### III. Surface Water Use

Please answer the following questions if you used or diverted fresh surface water.

A. Source of diversion: County \_\_\_\_\_

Name of stream, river, lake, and/or reservoir \_\_\_\_\_

B. County(ies) in which water was used \_\_\_\_\_

OVER

## TEXAS WATER DEVELOPMENT BOARD

P. O. Box 13087, Capitol Station  
AUSTIN, TEXAS 78711

## SURVEY OF GROUND AND SURFACE WATER USE

PLEASE TYPE  
OR PRINT ALL  
ANSWERSPlease indicate any changes in  
name and address or ownership  
TWDB CODE NO. 37724PLEASE NOTE: ALL OF THE FOLLOWING QUESTIONS ARE FOR THE CALENDAR YEAR 1974

## I. Water Sales

Please list the names of water purchasers, their locations, and the quantities of water sold to them by you during the calendar year for:

- all purchasers of 100 million gallons or more, and
- all public water suppliers regardless of quantity purchased.

Please indicate treated or raw water.

| Name and Location | WATER SALES | Gallons |
|-------------------|-------------|---------|
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |
|                   |             |         |

Please use additional paper if necessary.

## II. Ground Water Use

Please answer the following questions if you used or pumped ground water.

- A. Number and Location (county) of water wells owned or operated by you.

1 well, Jeff Davis County, Tx.

- B. County(ies) in which water was used
- Jeff Davis

- C. Please complete the following table to show the total quantity, in gallons, of self-supplied and purchased ground water. Include any water sold to others.

| GROUND WATER USE |           |           |       |           |           |       |           |           |
|------------------|-----------|-----------|-------|-----------|-----------|-------|-----------|-----------|
| MONTH            | SELF-SUP. | PURCHASED | MONTH | SELF-SUP. | PURCHASED | MONTH | SELF-SUP. | PURCHASED |
| Jan.             | 56,170    |           | May   | 97,930    |           | Sep.  | 11,710    | 35,648    |
| Feb.             | 63,350    |           | Jun.  | 107,611   |           | Oct.  | 11,240    | 26,556    |
| Mar.             | 81,670    |           | Jul.  | 82,520    | 29,440    | Nov.  | 23,790    | 24,416    |
| Apr.             | 90,800    |           | Aug.  | 22,040    | 45,312    | Dec.  | 16,260    | 22,816    |

Yearly Totals: Self-Supplied 665,091 Purchased 184,188Purchased from: Ft. Davis Water Supply Corp., Ft. Davis, Tx.Was purchased water raw or treated? Treated

How did you arrive at the ground water use figures which you provided above?

Meter readings

## III. Surface Water Use

Please answer the following questions if you used or diverted fresh surface water.

- A. Source of diversion: County \_\_\_\_\_

Name of stream, river, lake, and/or reservoir \_\_\_\_\_

- B. County(ies) in which water was used \_\_\_\_\_

OVER

TEXAS WATER DEVELOPMENT BOARD  
P. O. BOX 13087, CAPITOL STATION  
AUSTIN, TEXAS 78711

**SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1970**

DUPLICATE - RETAIN FOR YOUR FILES

1. Counties in which  
wells are located

Jeff Davis

2. Source of water:

Water Wells X

Surface Water \_\_\_\_\_

Other \_\_\_\_\_

FORT DAVIS NHS  
FORT DAVIS, TEXAS 79734

TWDB Code No. 29530

3. Number of water wells in each county owned and operated by you Two

4. Number of water wells owned by others but supplying water to you None

Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1970 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | <u>44,590</u>                            |                                                  | July | <u>122,300</u>                           |                                                  |
| Feb  | <u>48,890</u>                            |                                                  | Aug  | <u>100,450</u>                           |                                                  |
| Mar  | <u>100,570</u>                           |                                                  | Sept | <u>84,170</u>                            |                                                  |
| Apr  | <u>111,940</u>                           |                                                  | Oct  | <u>54,250</u>                            |                                                  |
| May  | <u>158,340</u>                           |                                                  | Nov  | <u>47,800</u>                            |                                                  |
| June | <u>127,420</u>                           |                                                  | Dec  | <u>44,760</u>                            |                                                  |

Total pumpage for year 1970 1,075,480 Gallons

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1970 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

     A. Master Meter      X B. Well Meters           C. Average Pumping Rates  
     D. Power consumption           E. Storage Facilities           F. Other

(See reverse side)

E. S. WATER DEVELOPMENT BOARD  
P. O. BOX 12386, CAPITOL STATION  
AUSTIN, TEXAS 78711

**SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1969**

DUPLICATE — RETAIN FOR YOUR FILES

1. Counties in which wells are located

Jeff Davis

2. Source of water:

Water Wells X

Surface Water \_\_\_\_\_

Other \_\_\_\_\_

FORT DAVIS NHS  
FORT DAVIS, TEXAS 79734

TWDB Code No. 29530

3. Number of water wells in each county owned and operated by you Two

4. Number of water wells owned by others but supplying water to you None

Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1969 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | 61,080                                   |                                                  | July | 78,780                                   |                                                  |
| Feb  | 34,400                                   |                                                  | Aug  | 118,820                                  |                                                  |
| Mar  | 60,190                                   |                                                  | Sept | 100,570                                  |                                                  |
| Apr  | 130,870                                  |                                                  | Oct  | 108,257                                  |                                                  |
| May  | 92,330                                   |                                                  | Nov  | 59,651                                   |                                                  |
| June | 92,620                                   |                                                  | Dec  | 77,820                                   |                                                  |

Total pumpage for year 1969 1,015,388 Gallons

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1969 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

   A. Master Meter      X B. Well Meters         C. Average Pumping Rates  
   D. Power consumption         E. Storage Facilities         F. Other

(See reverse side)

G.W. \_\_\_\_\_ Account 20MP 18

Type Analysis A-1, no Fe sol'n. USGS CHEMICAL ANALYSIS Project 34

State Texas County Jeff Davis Location Church Camp

Latitude-Longitude \_\_\_\_\_ Well No. 2 Date Collected 2-23-68

Owner Nat'l. Park Service, Fort Davis, Texas Date Drilled ? Source \_\_\_\_\_ Depth (ft) 28 Diam. (in) \_\_\_\_\_

pH..... 7.3 Temp. (°C) 15 Specific Conductance, micromhos at 25°C ..... 669

Hardness as CaCO<sub>3</sub>: \_\_\_\_\_ Concentrations in milligrams per liter (mg/L)

Total, mg/L ..... 288 Silica (SiO<sub>2</sub>)..... 65 Bicarbonate (HCO<sub>3</sub>)..... 283

Noncarbonate, mg/L. 56 Calcium (Ca)..... 97 Carbonate (CO<sub>3</sub>)..... 0

Color.. 4 Sodium-adsorption ratio..... 0.7 Sulfate (SO<sub>4</sub>)..... 65

%Na.... 17 Tons per acre ft... \_\_\_\_\_ Magnesium (Mg)..... 11 Chloride (Cl)..... 28

Density, g/ml at 20°C \_\_\_\_\_ Sodium (Na)..... 28 Fluoride (F)..... 1.1

W.B.F. \_\_\_\_\_ Potassium (K)..... 3.8 Nitrate (NO<sub>3</sub>)..... 15

Producing Intervals \_\_\_\_\_ Na+K (Calculated)..... \_\_\_\_\_ Boron (B)..... 0.07

W.L. \_\_\_\_\_ Dissolved Iron (Fe).... \_\_\_\_\_ Dissolved Solids: \_\_\_\_\_

Sampled after Pumping (Time) 1 hr. Total Iron (Fe)..... 0.05 Sum of Constituents..... 453

Yield 8 GM \_\_\_\_\_ Residue on Evaporation, \_\_\_\_\_

Point of Collection \_\_\_\_\_ \_\_\_\_\_ at 180°C..... 464

Appearance \_\_\_\_\_ \_\_\_\_\_

Use \_\_\_\_\_

Collected by Pablo Bencomo

Remarks: \_\_\_\_\_

Chemist RL, BR, Checked By EFW

SWA, EP

Date Completed 3-21-68

Date Transmitted \_\_\_\_\_

Laboratory No. 63336

Provisional records, subject to revision.

TEXAS WATER DEVELOPMENT BOARD  
P. O. BOX 12386, CAPITOL STATION  
AUSTIN, TEXAS 78711

# **SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1968**

DUPLICATE - RETAIN FOR YOUR FILES

1. Counties in which  
wells are located

Jeff Davis

FORT DAVIS NHS  
FORT DAVIS, TEXAS 79734

2. Source of water:

Water Wells X

Surface Water \_\_\_\_\_

Other \_\_\_\_\_

TWDB Code No. 29530

3. Number of water wells in each county owned and operated by you Two

4. Number of water wells owned by others but supplying water to you None

Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1968 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | <u>37,250</u>                            |                                                  | July | <u>79,390</u>                            |                                                  |
| Feb  | <u>38,820</u>                            |                                                  | Aug  | <u>61,210</u>                            |                                                  |
| Mar  | <u>52,240</u>                            |                                                  | Sept | <u>49,810</u>                            |                                                  |
| Apr  | <u>93,960</u>                            |                                                  | Oct  | <u>77,440</u>                            |                                                  |
| May  | <u>95,400</u>                            |                                                  | Nov  | <u>41,480</u>                            |                                                  |
| June | <u>137,870</u>                           |                                                  | Dec  | <u>33,870</u>                            |                                                  |

Total pumpage for year 1968 798,740 Gallons

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1968 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

     A. Master Meter      X B. Well Meters           C. Average Pumping Rates  
     D. Power consumption           E. Storage Facilities           F. Other

(See reverse side)

Revised records, subject to revision.

62041

| State                                                                                                                                                                                                                                                                                                                                                                                                                                                       | County | Lat. | Long. | Seq. No. | Date | Samp. depth                             | c |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|-------|----------|------|-----------------------------------------|---|
| Remarks:<br>Source: Shallow<br>DD: 1940<br>Depth: 48'<br>WL: 37' below ground level<br>Sampled after pumping: yes<br>Yield: 6 gal. per min.<br>PC: Church camp<br>Rmks: Not chlorinated, strong odor.<br>$2O_2$ .1 .202 49.50 } 49.81<br>.2 .400 50.00 }<br>$NO_3$ .1 .839 11.92 } 11.91<br>.1 .848 11.79 }<br>$F_2$ .0125 .262 1.91 } 1.92<br>.0500 1.037 1.93 }<br>$B$ .05 .389 1.27 } 1.30<br>1.0 .772 1.30 }<br>$F$ .01 1.215<br>.02 0.942<br>.03 0.735 |        |      |       |          |      |                                         |   |
| Br _____ ml                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |      |       | 26 28    |      | Radiochemical                           |   |
| I _____ ml                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |      |       | 29 31    |      | Alpha (pc/l) 55 57                      |   |
| Alk. as $CaCO_3$                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |      |       | 32 35    |      | Beta (pc/l) 58 60                       |   |
| Free $CO_2$                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |      |       | 36 38    |      | Ra (pc/l) 61 63                         |   |
| SAR                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |      |       | 39 41    |      | U (ug/l) 64 66                          |   |
| RSC                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |      |       | 42 44    |      | Other data (67-79) <sup>e</sup>         |   |
| Organics                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |      |       |          |      |                                         |   |
| MBAS (ABS) _____ ml                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |      |       | 45 47    |      |                                         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |      |       | 48 50    |      |                                         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |      |       | 51 54    |      |                                         |   |
| a Master card A (21-34)<br>b Master card A (52-66)<br>c Type:<br>1. Pumped 4. Spigot<br>2. Bucket 5. Bailer<br>3. Forest 6. Special<br>d Source of data:<br>1. USGS 5. Industrial<br>2. UPHS 6. Private<br>3. State Health 7. Educational<br>4. State                                                                                                                                                                                                       |        |      |       |          |      | e Indicate constituent and card columns |   |
| Richard L. Lepp E. F. WILLIAMS<br>Chemist _____ Checked by _____<br>Date begun SEP 28 1967 Date transmitted _____<br>Punched by _____ Verified _____                                                                                                                                                                                                                                                                                                        |        |      |       |          |      | Card S 80 S                             |   |

Provisional records, subject to review

Texas WATER DEVELOPMENT BOARD  
P. O. BOX 12386, CAPITOL STATIO.  
AUSTIN, TEXAS 78711

## SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1967

DUPLICATE — RETAIN FOR YOUR FILES

1. Counties in which  
wells are locatedJeff Davis

2. Source of water:

Water Wells ☒Surface Water ☐Other ☐

FORT DAVIS NHS  
FORT DAVIS, TEXAS 79734

TWDB Code No. 295303. Number of water wells in each county owned and operated by you Two4. Number of water wells owned by others but supplying water to you None

Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1967 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | <u>43,710</u>                            |                                                  | July | <u>86,910</u>                            |                                                  |
| Feb  | <u>36,110</u>                            |                                                  | Aug  | <u>92,800</u>                            |                                                  |
| Mar  | <u>86,600</u>                            |                                                  | Sept | <u>58,710</u>                            |                                                  |
| Apr  | <u>83,150</u>                            |                                                  | Oct  | <u>77,490</u>                            |                                                  |
| May  | <u>89,720</u>                            |                                                  | Nov  | <u>50,420</u>                            |                                                  |
| June | <u>69,430</u>                            |                                                  | Dec  | <u>43,130</u>                            |                                                  |

Total pumpage for year 1967 818,180 (Main Well), Plus 40,000 (Supplemental Well) Gallons858,180 Gallons = Total pumpage

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1967 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

☐ A. Master Meter      ☒ B. Well Meters      ☐ C. Average Pumping Rates  
☐ D. Power consumption      ☐ E. Storage Facilities      ☐ F. Other

(See reverse side)

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
FEDERAL BUILDING  
300 EAST 8TH STREET  
AUSTIN, TEXAS 78701

September 13, 1966

MEMORANDUM

To: Mr. Manuel Morris, Office of Land & Water Rights,  
National Park Service, San Francisco, California

From: Trigg Twichell, District Chief, Water Resources  
Division, Austin, Texas

Subject: Test drilling at Alibates Flint Quarry and water  
problems at Fort Davis National Historic Site

On Aug. 3, 1966, Mr. William Fields of the Santa Fe office of the National Park Service requested the U.S. Geological Survey to furnish geological assistance during the drilling of a test hole at Alibates Flint Quarry. Mr. A. T. Long of the Austin district office went to the site on Aug. 4, 1966, and found that the drilling rig had broken down after having drilled only 3 feet.

A survey of the test site revealed that the Alibates Dolomite, which generally is a source of fresh water, cropped out only a few feet from the test hole. In fact, the well at only 3 feet probably was in the Alibates. Because of this, Mr. Long concluded that further drilling of the test hole would produce neither the quantity nor the quality of water needed by the park. Mr. Becker, the park superintendent, informed Mr. Long that the drilling rig would not be in condition to drill for at least six or seven days and that he proposed to complete the test hole in accordance with the drilling contract.

At the request of Mr. Fields, E. R. Leggat went to the Fort Davis National Historic Site on Aug. 8, 1966, to discuss with Messrs. Smith and Fields the emergency water situation at Fort Davis.

Prior to Mr. Leggat's arrival at the site, the park superintendent removed the pump, replaced a missing electrode, reset the electrodes at 63 and 69 feet, and replaced the pump to within 0.5 foot of the bottom, which was reported to be 75 feet. The well was pumped for 9 hours on Aug. 4 at a rate of 19 gpm; 48 hours after the pump was shut down, the water level had recovered to 57 feet. According to data supplied by Mr. Smith, the water level reportedly was 50 feet when the well was drilled in September 1964.

Dr. Harris - page 2

A pumping test was run by Mr. Leggat. Preliminary analysis of these data confirmed the fact that the water-supply problem was related to the pumping equipment rather than to a regional lowering of the water table. After  $4\frac{1}{2}$  hours of pumping 20 gpm, the water level was 60.8 feet, or a drawdown of 2.6 feet.

According to Mr. Smith, this well is capable of supplying the immediate water needs of the Site. However, if additional water is needed, a deeper well should be considered.

Standard Form 1081, dated Sept. 14, 1966 in the amount of \$554.00, which is the cost of the Fort Davis National Historic Site project, was submitted to your Santa Fe office on Sept. 14. The cost of the Alibates Flint Quarries test-drilling supervision was submitted in June 1966.



Charles H. Hembree

For Trigg Twichell  
District Chief

ERL:lk

TEXAS WATER DEVELOPMENT BOARD  
P. O. BOX 12386, CAPITOL STATION  
AUSTIN, TEXAS 78711

**SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1966**

DUPLICATE — RETAIN FOR YOUR FILES

1. County Jeff Davis

2. Source of Water:

Water Wells X

Surface Water \_\_\_\_\_

Other \_\_\_\_\_

FORT DAVIS NHS  
FORT DAVIS, TEXAS 79734

TWDB Code No. 29530

3. Number of water wells owned and operated by you Two

4. Number of water wells owned by others but supplying water to you None

Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1966 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | 62,500                                   |                                                  | July | 80,760                                   |                                                  |
| Feb  | 60,710                                   |                                                  | Aug  | 96,300                                   |                                                  |
| Mar  | 75,820                                   |                                                  | Sept | 78,420                                   |                                                  |
| Apr  | 119,760                                  |                                                  | Oct  | 42,184                                   |                                                  |
| May  | 100,210                                  |                                                  | Nov  | 47,850                                   |                                                  |
| June | 66,420                                   |                                                  | Dec  | 41,140                                   |                                                  |

Total pumpage for year 1966 872,074 (Main Well) Plus 50,000 (Supplemental Well) Gallons

**Total Pumpage: 922,074 Gallons**

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1966 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

     A. Master Meter   X   B. Well Meters (Pump House)   X   C. Average Pumping Rates

     D. Power consumption      E. Storage Facilities      F. Other

The increase in water usage over 1965 was due primarily to a 26% increase in visitation to the site, the completion of <sup>(See reverse side)</sup> three new employee residences and consequently increased domestic use, and three major construction projects which required considerable quantities of water.

L54

Southwest Region  
P.O. Box 728  
Santa Fe, New Mexico  
87501

NOV 4 1965

Memorandum

To: Director  
From: Assistant Regional Director, Operations  
Subject: Water Use Report, Fort Davis

We have enclosed a copy of the Water Use Report and the transmittal memorandum from the Acting Superintendent at Fort Davis. This report covers the period of water useage from September 15, 1964 to September 15, 1965.

As the transmittal memorandum explains, all the figures are estimates with the exception of the readings for the pump house where a meter was installed in November of 1964. The memorandum gives a thorough explanation of the useage throughout the year.

This report should be filed in the Water Use, Fort Davis file and by copy of this memorandum are sending it to Chief, WQDC for insertion in his file.

(SIGNED)

George W. Miller

In duplicate

Enclosures

cc:  
Chief, WQDC (2), w/encs.  
Superintendent, Fort Davis  
w/o encs.

~~DSO39~~

Fort Davis National Historic Site  
Fort Davis, Texas 79734

September 14, 1965

**NPS**

**SEP 17 1965**

**Regional Director**

**Operations**

**Administration**

**Cann.**

**Dive**

**Ranch**

**Landa & Sees**

**9/17**

**Fields**

To: Regional Director, Southwest Region  
From: Acting Superintendent, Fort Davis  
Subject: Water Use Report

Water usage at Fort Davis National Historical Site for the period from September 15, 1964 to September 15, 1965 is shown in the attached chart. The figures are, of necessity, estimates made on the same basis as those in our last year's report. A meter was installed in the pump house on November 5, 1964, and the total gallons used each month from November through September has been figured from the meter readings. However, we still lack metering into individual buildings, and the figures shown under the breakdown are estimates. Domestic use shows a decrease between December 1964 and March 1965 due to Residence HB-1 being vacant during this period. As explained in footnotes on the chart usage was up in November due to the fact that 66,000 gallons were required to fill the new storage tank and mains, and during December and January, due to the loss of approximately 30,000 gallons each month through a leak in the new system which was not discovered and repaired until late January. Diversion of runoff into the Grove was down due to a decrease in rainfall. Metering is being provided at the new Visitor Center which should make more accurate figures available for next year's report.

Bobby L. Crisman

In duplicate

~~252~~  
L 5470d

## WATER USE AT FORT DAVIS NHS - - - 9/15/64 through 9/15/65

| Date          | Watering<br>Trees<br>(gal) | Diversion of<br>Runoff into<br>Grove (acre-<br>feet) | Adobe<br>Prod. | Construction<br>(Contractor) | Domestic<br>Use | Total for<br>Month<br>(Gallons) |
|---------------|----------------------------|------------------------------------------------------|----------------|------------------------------|-----------------|---------------------------------|
| Sept. 15      | 1,500                      | 0                                                    | 8,800          | 0                            | 8,000           | 18,300                          |
| Oct.          | 2,400                      | 0                                                    | 0              | 0                            | 14,000          | 16,400                          |
| Nov.          | 2,400                      | 0                                                    | 0              | 600                          | 14,000          | 83,000 <sup>1</sup>             |
| Dec.          | 2,400                      | 0                                                    | 0              | 0                            | 8,680           | 41,080 <sup>2</sup>             |
| Jan.          | 2,400                      | 0                                                    | 0              | 0                            | 8,570           | 45,970 <sup>3</sup>             |
| Feb.          | 2,400                      | 0                                                    | 0              | 0                            | 7,290           | 9,690                           |
| March         | 2,400                      | 0                                                    | 0              | 0                            | 15,190          | 17,590                          |
| April         | 3,000                      | 0                                                    | 12,000         | 20,070                       | 20,000          | 55,070                          |
| May           | 3,000                      | (1 acre ft.)                                         | 0              | 20,120                       | 20,000          | 43,120                          |
| June          | 3,000                      | (1 acre ft.)                                         | 0              | 26,381                       | 27,000          | 56,381                          |
| July          | 3,000                      | 0                                                    | 0              | 83,109                       | 30,000          | 116,109                         |
| Aug.          | 3,000                      | 0                                                    | 4,000          | 73,620                       | 30,000          | 110,620                         |
| Sept.<br>1-15 | 1,500                      | (1 acre ft.)                                         | 0              | 7,390                        | 8,000           | 16,890                          |
| Totals        | 32,400                     | (3 acre ft.)                                         | 24,800         | 231,290                      | 210,730         | 630,220*                        |

1. 66,000 gallons used to fill 50,000-gallon storage tank and 6" mains. (Actual usage was 17,000).

2. An estimated 30,000 gallons lost thru a leak in the system which was found and repaired in late January, 1965.

3. An estimated 35,000 gallons lost through a leak in the system which was found and repaired in late January, 1965.

\* Includes 131,000 gallons in footnotes 1. 2. and 3.

TEXAS WATER DEVELOPMENT BOARD  
P. O. BOX 12386, CAPITOL STATION  
AUSTIN, TEXAS 78711

## SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1965

DUPLICATE — RETAIN FOR YOUR FILES

FORT DAVIS NHS  
FORT DAVIS, TEXAS 79734

1. County Jeff Davis

2. Source of Water:

Water Wells X

Surface Water \_\_\_\_\_

Other \_\_\_\_\_

TWDB Code No. 295303. Number of water wells owned and operated by you One4. Number of water wells owned by others but supplying water to you None

Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1965 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | 45,970*                                  |                                                  | July | 116,109**                                |                                                  |
| Feb  | 9,690                                    |                                                  | Aug  | 110,620                                  |                                                  |
| Mar  | 17,590                                   |                                                  | Sept | 39,790                                   |                                                  |
| Apr  | 55,070                                   |                                                  | Oct  | 41,760                                   |                                                  |
| May  | 43,120                                   |                                                  | Nov  | 34,930                                   |                                                  |
| June | 56,381                                   |                                                  | Dec  | 32,520                                   |                                                  |

Total pumpage for year 1965 603,550 \* A leak in system caused excessive gallonage  
\*\* Construction under way, and contractors using water.

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1965 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

     A. Master Meter      X B. Well Meters           C. Average Pumping Rates  
     D. Power consumption           E. Storage Facilities      X F. Other (Visitor Center)

(See reverse side)

581-10-20-64

W. R. Copy.

Southwest Region  
Santa Fe, New Mexico

OCT 16 1964

Memorandum

To: Director  
From: Regional Director  
Subject: Water Use Report, Fort Davis

We have enclosed a copy of the Water Use Report prepared by the Superintendent, Fort Davis for January 1st through September 15th of this year.

Although this chart is based on estimates, we think he has done an excellent job in estimating water use.

As time and money permit, we plan to install meters and measuring devices so that a more adequate report can be made.

We have started a folder for our water rights file entitled "Water Use, Fort Davis" and by copies of this memorandum are requesting that you, WODC, and the Superintendent at Fort Davis start a similar file.

(SIGNED)  
Daniel B. Beard

In duplicate ✓

Enclosures

cc: WODC (2), w/encs.  
Superintendent, Fort Davis, w/encs.



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

Fort Davis National Historic Site  
Fort Davis, Texas

IN REPLY REFER TO:

D5039

September 25, 1964

Memorandum

To: Regional Director, Southwest Region

From: Superintendent, Fort Davis

Subject: Water use report

|                               |              |
|-------------------------------|--------------|
| RECEIVED                      |              |
| NPS SOUTHWEST REGIONAL OFFICE |              |
| SEP 28 1964                   |              |
| Regional Director             | Surname Date |
| Operations                    |              |
| Administration                |              |
| Com. & Int. Aff.              |              |
| Records                       |              |
| Training                      |              |
| Public Affairs                |              |
| Security                      |              |
| Telephone Rm.                 |              |
| Director's Sec'y              |              |

*L. L. L. 101*  
*\* Fields*

When you made the well tests in February, you requested that we submit an annual report of water use. This first report will be nothing more than our estimate. After the new system is installed, we can simply break down the water pump meter reading and thereby give you a more accurate figure for water use.

You will note that the following chart is broken into different types of water uses. All water, with the obvious exception of runoff, is from the park's present well. When the present water, sewer, and electrical contract is complete, we will switch to the well which was drilled recently.

| Date        | Watering<br>Trees<br>(gal.) | Diversion<br>of Runoff<br>Into Grove<br>In Acre Ft. | Adobe<br>Product.<br>(gal.) | Well<br>Testing<br>(gal.) | Domestic<br>Use<br>(gal.) | Total<br>for<br>Month<br>(gal.) |
|-------------|-----------------------------|-----------------------------------------------------|-----------------------------|---------------------------|---------------------------|---------------------------------|
| Jan.        | 2,400                       |                                                     |                             |                           | 14,000                    | 16,400 ✓                        |
| Feb.        | 2,400                       |                                                     | 12,000                      | 50,000                    | 14,000                    | 78,400 ✓                        |
| Mar.        | 2,400                       |                                                     |                             |                           | 16,000                    | 18,400 ✓                        |
| Apr.        | 3,000                       |                                                     |                             |                           | 15,000                    | 18,000 ✓                        |
| May         | 3,000                       | 2 acre ft.                                          |                             |                           | 17,000                    | 20,000 + 2 aff                  |
| June        | 3,000                       | 2 acre ft.                                          |                             |                           | 25,000                    | 28,000 + 2 aff                  |
| July        | 3,000                       | 2 acre ft.                                          |                             |                           | 27,000                    | 30,000 + 2 aff                  |
| Aug.        | 3,000                       |                                                     |                             |                           | 29,000                    | 32,000 ✓                        |
| Sept. 15    | 1,500                       |                                                     | 8,000                       | 100,000                   | 15,000                    | 124,500<br>135,500              |
| TOTAL       | 23,700                      | 6 acre ft.                                          | 20,000                      | 150,000                   | 172,000                   | 365,700 + 6 aff<br>742,400      |
| GRAND TOTAL |                             |                                                     |                             |                           |                           | 25039 7/2                       |

An explanation of our figures may be in order:

- Item #1 (Trees)            We know how often we water these trees and how much water is used.
- Item #2 (Runoff)           This occurs only after heavy rains when the arroyo on the south end of the parade ground is diverted into the cottonwood grove. We simply figured 2 acre feet after each 2-3 inch rain.
- Item # 3 (Adobe)           We know how much water we use per hour and simply multiplied this figure by the number of hours worked.
- Item #4 (Testing)           We got this information from the person testing the well.
- Item #5 (Domestic)           (a) For residences we figured 100 gallons per day per person.
- (b) For office we figured 30 gallons per day per employee.
- (c) For visitor contact station we figured 3 gallons per day per visitor.
- (d) 100 gallons per day for maintenance purposes.

For the domestic and office figure we rounded off to the next higher thousand during the summer and the next lower thousand during the winter.

Unless you have some suggestions for change, we will use this same format for future reports.

*Michael J. Becker*

Michael J. Becker

In duplicate

181-3-18-64

WR copy  
3/18/64

Southwest Region  
Santa Fe, New Mexico

L54

MAR 13 1964

Memorandum

To: Chief, WODC, Attn: Don Marley, Project Supervisor  
From: Assistant Regional Director, Resource Planning  
Subject: Test Pumping Wells, Fort Davis

After Hydraulic Engineer Fields of this office returned from Fort Davis he called your office and relayed the test pump data to Project Supervisor Don Marley and Engineer David W. Geisinger.

For your records we are enclosing a copy of Mr. Fields trip report and by copies of this memorandum are sending this report to Chief, Branch of Water Resources in the Director's office.

(SIGNED)

Leslie P. Amberger

In duplicate

Enclosure

cc: Director (2) ✓ w/enc  
Superintendent, FODA w/enc

STANDARD FORM NO. 64

## Office Memorandum • UNITED STATES GOVERNMENT

TO : Assistant Regional Director, Resource Planning      DATE: March 12, 1964

FROM : Hydraulic Engineer

SUBJECT: Trip Report to Fort Davis for Test Pumping of Wells

I departed from Santa Fe at 6:45 A.M. on February 24th enroute to Fort Davis. The purpose of my trip was to supervise the well testing at the Headquarters well and the Church Camp well in that area.

Enroute I stopped at U.S.G.S. Ground Water office in Albuquerque and left eight (8) samples of water to be chemically analyzed.

I arrived in Fort Davis at 7:30 P.M. that evening. The following morning I went to the monument and was met by Superintendent Becker who showed me the wells. Loyd Henderson from Alpine, Texas, had been given the contract to make the pump test. He did not arrive until 11:30 A.M. at which time he made preparations to insert the test pump in the Headquarters well. After the present pump was removed we could get a heavy probe down the well, however, our electrical probe would not go beyond the 8 1/2' mark because of root and plant growth in the well. Superintendent Becker, at my request, contracted with Mr. Henderson to clean this well before testing. Then the pump (a 3/4hp submersible) was installed in the Church Camp well. At 4:21 P.M. on February 25th we started the test on the Church Camp well and pumped at varying discharges from 8 to 2 gpm until 12:00 P.M. At 12:30 P.M. I established the rate of flow at 8.0 gpm and by 4:00 A.M. I was satisfied that this was the desired yield of the well. I held the pump at 8 gpm until 6:20 P.M. that same day.

Meanwhile Mr. Henderson had cleaned out the Headquarters well and installed a one hp, submersible pump. Due to the amount of friction loss because of the distance required to pump the water the pump produced only 24 gpm at full choke. We started this pump test at 4:35 P.M. and by 1:30 A.M. the following morning the draw down was 46". I maintained this 24 gpm flow in that well until 4:30 the afternoon of February 29 with a final drawdown of 58". This was very close to the desired yield so no attempt was made to produce a greater amount of water. Meanwhile I had checked recovery in the Church Camp well and was amazed to have full recovery of the well in slightly over three (3) minutes. Recovery readings were started on the Headquarters well at the time the pump was shut off. At 12:00 A.M. on the 28th of February the well had recovered to within one (1) foot of the surface and I had enough information that I could project final recovery time.

2

On the ground observations and findings resulting from the tests are as follows:

*Note: This information relayed  
to WOC by telephone on  
March 7, 1964*

The Headquarters well is 61' deep and has 10' of water in the bore. The bore is 7"-8" in diameter and has 8 1/2' of 6" casing at the top. The entire depth of bore under the casing has a thick intrusion of roots and tubular growth. The water table reacts normally to pumping and will produce good clear water in the amount of 25 gpm for an extended period of time with 5' of drawdown. No one in the area seems to know whether or not this well bottomed in bed rock. Because it is obviously a strong aquifer it is probable that it did not and extending the depth of the hole might produce a greater volume of water. At any rate prior to use it should be reamed, cleaned and cased through the entire depth.

The Church Camp well is 48' in depth with 9.6' of water in the hole. The bore is 6" in diameter and has about 10' of 4" casing at the top. The aquifer is very porous and probably only 4'-5' in thickness with no artesian pressure. This is evidenced in the reactions of drawdown to various discharges and the fast recovery. This well will produce 8 gpm for an extended period of time and local people who were present when the well was drilled state that this well bottomed in bed rock.

I departed from Fort Davis at 1:15 P.M. staying overnight in Roswell and arriving in Santa Fe at 12:30 P.M. the 29th of February.

*William E. Fields*  
William E. Fields

cc: Regional Director  
Assistant Regional Director, Administration  
Assistant Regional Director, CIU  
Regional Chief of Lands  
Oper. & Maint. Engineer Moran

**Texas Water Commission**  
P. O. BOX 12311, CAPITOL STATION  
AUSTIN, TEXAS 78711

SURVEY OF GROUND WATER PUMPAGE IN TEXAS DURING CALENDAR YEAR 1964

DUPLICATE - RETAIN FOR YOUR FILES

Old Ft. Davis  
U. S. Dept. of Interior  
Fort Davis, Texas

FORT DAVIS NHS  
FORT DAVIS, TEXAS  
79734

1. County Jeff Davis
2. Source of Water:
- Water Wells ☒
- Surface Water ☐
- Other ☐

TWC Code No. \_\_\_\_\_

3. Number of water wells owned and operated by you Two during 1964 - one 1965
4. Number of water wells owned by others but supplying water to you None
- Names of well owners \_\_\_\_\_

5. If your records show the amount of ground water pumped by months in 1964 or if you can reasonably estimate the monthly pumpage, please fill in the following table by reporting pumpage in gallons.

| Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons | Mo.  | Total Pumpage<br>for Month in<br>Gallons | Maximum Daily Pumpage<br>for Month in<br>Gallons |
|------|------------------------------------------|--------------------------------------------------|------|------------------------------------------|--------------------------------------------------|
| Jan  | 16,400                                   |                                                  | July | 30,000                                   |                                                  |
| Feb  | 78,400                                   | 50,000 on yield tests                            | Aug  | 32,000                                   |                                                  |
| Mar  | 18,400                                   |                                                  | Sept | 124,000                                  | 100,000 on yield tests                           |
| Apr  | 18,000                                   |                                                  | Oct  | 50,000                                   |                                                  |
| May  | 20,000                                   |                                                  | Nov  | 53,000                                   | meter installed Nov. 3                           |
| June | 28,000                                   |                                                  | Dec  | 41,080                                   | 50,000 to fill new storage tank                  |

Total pumpage for year 1964 \_\_\_\_\_ Gallons

Note: If you have not been able to give the pumpage by months, please show the yearly pumpage for 1964 in the above space.

6. Please check one of the following to indicate how the figures you have provided in item 5 were obtained.

☐ A. Master Meter      ☒ B. Well Meters      ☐ C. Average Pumping Rates  
☐ D. Power consumption      ☐ E. Storage Facilities      ☒ F. Other

(See reverse side)

## CHEMICAL WATER ANALYSIS REPORT

Typewrite (Black ribbon) or Print Plainly  
(soft pencil or black ink)  
Do not use ball point pen

TEXAS STATE DEPT. OF HEALTH LABORATORIES  
1100 WEST 6TH STREET  
AUSTIN 5, TEXAS

TOWN Fort Davis COUNTY \_\_\_\_\_ DATE COLLECTED \_\_\_\_\_  
Send report to: \_\_\_\_\_

National Parks Service  
H. Davis National Historic Site  
Fort Davis Texas

OWNERSHIP OF SUPPLY: \_\_\_\_\_

USE \_\_\_\_\_ IF SURFACE WATER \_\_\_\_\_ IF FROM WELL \_\_\_\_\_ POINT OF COLLECTION \_\_\_\_\_  
Public \_\_\_\_\_ Name of Source Burch Depth \_\_\_\_\_ Raw Supply \_\_\_\_\_  
Industrial \_\_\_\_\_ Camp Well Age \_\_\_\_\_ Plant Discharge \_\_\_\_\_  
PHYSICAL APPEARANCE \_\_\_\_\_ Number \_\_\_\_\_ Storage Res. \_\_\_\_\_  
Clear \_\_\_\_\_ Distribution \_\_\_\_\_  
Turbid \_\_\_\_\_ Other \_\_\_\_\_  
Colored \_\_\_\_\_ REMARKS \_\_\_\_\_

FOR LABORATORY USE ONLY

## CHEMICAL ANALYSIS

(Values reported are for minerals in solution)

Laboratory No. 47688W OCT 17 1963 Date Requested 10-22-63

P.P.M.  
Calcium 80  
Magnesium 11  
Iron <0.02  
Manganese <0.1  
Sodium 27

P.P.M.  
Carbonate 0  
Bicarbonate 318  
Sulphate 18  
Chloride 18  
Fluoride 11  
Nitrate <0.4

Specific Conductance Micromhos/cm 630pH 7.4

Dissolved Residue (T.S.) Calculated 473  
Phenolphthalein Alkalinity as  $\text{CaCO}_3$  0  
Total Alkalinity as  $\text{CaCO}_3$  261  
Total Hardness as  $\text{CaCO}_3$  244

600 81103, Dallas  
600 81103, Dallas  
600 81103, Dallas  
600 National Park Service

Recommended limits for drinking water (P.P.M.)  
Magnesium 125 Fluoride 1.5  
Iron & Manganese 0.3 Nitrate 20  
Sulphate 250 Total Solids 1000  
Chloride 250

3229

Other Supporting Information

L54 (SWR-OM)

OCT 7 1982

FILE IN  
FORT DAVIS  
WATER RIGHT  
GENERAL CORRESPONDENCE  
FILE

Memorandum

To: Superintendent, Fort Davis  
From: Acting Associate Regional Director, Park Operations, SWR  
Subject: Water Resources Management Profile

Enclosed is an approved copy of the site's Water Resources Management Profile.  
Please appendix this report to your Resource Management Plan. This report is  
to be reviewed annually with the same due date as for the Resource Management  
Plan.

/s/ Roger J. Siglin

Enclosure

cc:  
Chief WASO/497 (each with copy of  
Chief Scientist, ONR, SWR enclosure)

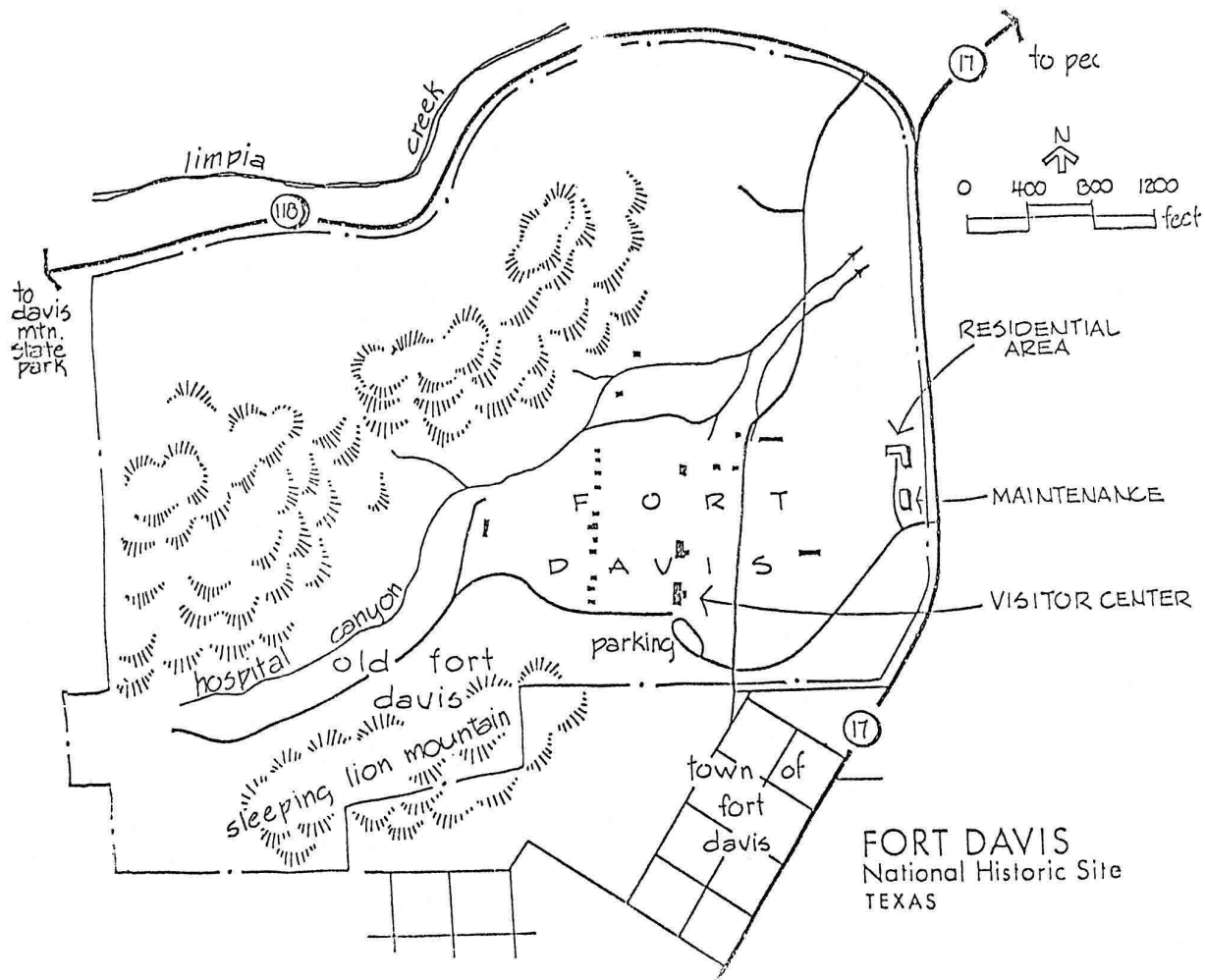
Water Resources Management Profile

for

Fort Davis National Historic Site

Recommended by: Augusta B. McChristian Sept. 30, 1982  
Superintendent, Fort Davis National Historic Site Date

Approved by: Robert J. Lee 10/8/82  
Regional Director, Southwest Region Date



I. Physical Description.

1. Physical Setting: Fort Davis National Historic site sits at the foot of the Davis Mountains of the Trans Pecos region of west Texas. The Davis Mountains were formed by dissection of a vast volcanic area, and this rock is exposed in the foothills northwest of the Historic Site.
2. Climate: Annual precipitation at Fort Davis has ranged from 6.78 inches to 27.68 inches (period of record unknown), with an average of 16.66 inches. Most of the precipitation arrives in July through September. July temperatures average 75.1°F and January average temperature is 43.8°F. The average frost-free period is from March 29 through October 26 (Jaco and Turner, 1969).
3. Soils: Most of the site occupies a flat plain where the soils consist of the Musquiz loam, a moderately well-drained, non-calcareous soil. In Hospital Canyon west of the site the soils are a mixture of Cornell and Pima silt loam, both well-drained soils. The lower slopes of the hills north of Hospital Canyon are primarily rock outcrop with very little soil; the top of the hill is made up of the Mac-Lou-Brewster Association. These soils, too, are classified as well-drained (Jaco and Turner, 1969).
4. Estimate of Water Quantity: The Historic Site has kept unusually good records of water consumption over the years. Since approximately 1970, the site has purchased water from the Fort Davis Water Supply Corporation, Fort Davis, Texas, in addition to using water from their own wells. In 1970 the annual totals were 665,091 gallons of Historic Site well water and 184,188 gallons of purchased water. In 1973 the ratio was 282,350 gallons self-supplied to 501,686 purchased. Increasing visitation is predicted to increase water use to 2.5 million gallons by 1985 and 3.1 million gallons by the year 2000.

The only well functioning at the Historic Site at present is the Headquarters Well. It serves for irrigation, fire protection and as the water source for one seldom-used bathroom. The other well that is in functional order but is not used at present is the Hospital Canyon well. Both wells are connected to a 50,000 gallon tank on the hill south of Hospital Canyon. Both wells are used to supplement the City of Fort Davis water supply in an emergency (Bowman, 1982).

In addition to the Headquarters well and Church Camp well, there are two abandoned wells near the barrack ruins, both between 45 and 75 feet deep and producing little or no water.

5. Water Quality: See Table 1 for the water quality analyses of the two principal wells at the Historic Site and the City of Fort Davis

Water Supply System. The only problem constituent is fluoride in the Headquarters Well and the city water, which poses the threat of causing mottling of the teeth in children under ten who drink the water on a regular basis. This is considered to be a cosmetic rather than a public health problem, and high fluoride content is so common in West Texas well water that the State has issued a variance to the Federal Guidelines on fluoride.

Table 1 - Chemical Analyses

| Constituent                               | Federal<br>Recommended<br>Limit          | Headquarters<br>Well | Church<br>Camp Well | Fort Davis<br>Water Supply |
|-------------------------------------------|------------------------------------------|----------------------|---------------------|----------------------------|
| pH                                        | 6-8.5                                    | 7.5                  | 7.3                 | 7.8                        |
| Total hardness<br>(as CaCO <sub>3</sub> ) | 250 ppm                                  | 218 ppm              | 288 ppm             | 157 ppm                    |
| Silica                                    | -                                        | 49 ppm               | 65 ppm              | -                          |
| Calcium                                   | 200 ppm                                  | 71 ppm               | 97 ppm              | 55 ppm                     |
| Magnesium                                 | 125 ppm                                  | 10 ppm               | 11 ppm              | 4 ppm                      |
| Sodium                                    | 250 ppm                                  | 37 ppm               | 28 ppm              | 29 ppm                     |
| Potassium                                 | 1000 ppm                                 | 4.1 ppm              | 3.8 ppm             | -                          |
| Total Iron                                | 0.3 ppm                                  | 0.02 ppm             | 0.05 ppm            | 0.02 ppm                   |
| Bicarbonate                               | 700 ppm                                  | 251 ppm              | 283 ppm             | 240 ppm                    |
| Carbonate                                 | 350 ppm                                  | 0 ppm                | 0 ppm               | 0 ppm                      |
| Sulfate                                   | 250 ppm                                  | 25 ppm               | 65 ppm              | 10 ppm                     |
| Chloride                                  | 250 ppm                                  | 33 ppm               | 28 ppm              | 9 ppm                      |
| Fluoride                                  | 1.4 - 2.4<br>depending on<br>temperature | 2.3 ppm              | 1.1 ppm             | 2.5 ppm                    |
| Nitrate                                   | 10 ppm                                   | 19 ppm               | 15 ppm              | 0.46 ppm                   |
| Boron                                     | -                                        | 0.11 ppm             | 0.07 ppm            | -                          |
| Total Dissolved<br>Solids                 | 500 ppm                                  | 374 ppm              | 453 ppm             | 230 ppm                    |
| Specific<br>Conductance<br>(at 25°C)      | 1000 micromhos                           | 586 micromhos        | 669 micromhos       | 450 micromhos              |

6. Water as it supports the purposes of the park:

Water at the Historic Site is used for drinking water and sanitation for visitors, for domestic purposes at park staff residences, for irrigation to maintain the aesthetics of the site, and for fire protection.

7. Floodplain Identification: According to the Jaco and Turner (1969) soils survey of the Historic Site, the Cornell soils at the foot of the hills in Hospital Canyon indicate a slight flood hazard, while the Pima silt loam on the terraces along the ephemeral drainage in Hospital Canyon are indicative of severe flood hazard. Other areas of the Historic Site show no indication of flooding. A system of dikes and ditches was installed by the U.S. Army during the 1880's to mitigate flood hazard, and additional small diversion dikes have been installed since that time.

II. Water Management

1. Water Rights: The United States claims riparian water rights in the following wells:

- a. Headquarters Well, latitude 30°36'49"N, longitude 103°53'39".  
The right dates from September 4, 1964. The well has a capacity of 25 gpm.
- b. Church Camp Site Well, latitude 30°35'43"N, longitude 103°54'04".  
This well has a capacity of 8 gpm.

2. Administrative Agencies: The following agencies are responsible for various aspects of water management.

Department of Water Resources  
P.O. Box 13087  
Capital Station  
Austin, Texas 78711  
(512) 475-2651

State Soil and Water Conservation Board  
Box 658  
Temple, Texas 76501  
(817) 773-2250

Texas Attorney General  
Environmental Protection Division  
Box 12548  
Austin, Texas 78711  
(512) 475-4143

Texas Department of Health  
1100 West 49th Street  
Austin, Texas 78756  
(512) 458-7497 (Division of Water Hygiene)  
(512) 458-7293 (Division of Wastewater Technology)

Texas Water Well Drillers Board  
Box 13087 Capital Station  
Austin, Texas 78711  
(512) 475-3191

U.S. Environmental Protection Agency, Regional Office  
1201 Elm  
Dallas, Texas 75270  
(214) 767-2630

The National Park Service Southwest Regional Hydraulic Engineer should be used as liaison between the park and any of the above listed agencies. The address is:

National Park Service  
Southwest Region  
P.O. Box 728  
Santa Fe, New Mexico 87501  
(505) 988-6368

III. Water Resource Problem (Actual/Potential)

1. As identified in the Resource Management Plan, the municipal fire hydrants need to be replaced by underground units to cause less of an intrusion in the historic setting.
2. The regional water table around Fort Davis is apparently declining, reducing the safe yield of the Headquarters Well from 25 gpm to 6 gpm.
3. The fluoride content of the water is a problem if there are any children under 10 among the Historic Site staff families.
4. A minimum floodplain identification study at the site is advisable in order to assess whether the existing system of diversion dikes is sufficient protection against the 100-year and 500-year flood.

IV. Recommended Strategies for Water Protection

- FODA-W-1: Deepen/Relocate Headquarters Well.  
In order to provide a better flow in the well which has been undercut by the falling regional water table, either redrill the existing well deeper into the aquifer, or if that does not appear feasible, locate a new well.

FODA-W-2: Study Neighboring Well Pumping Rates.

-to ascertain whether the drawdown in the Headquarters well is due to overpumping by neighboring landowner wells. If this proves to be the case, the information may provide the basis for legal action.

FODA-W-3: Purchase Reverse-Osmosis Demineralization Unit (Fluoride reduction)

-to provide to any park staff home with young children.

FODA-W-4: Floodplain Study

-to quantify the definition of "slight and severe flood hazards" and to define its aerial extent within the park.

References Cited:

Bowman, C. R., 1982. Report on Survey of Environmental Health Facilities,  
Fort Davis National Historic Site, Texas. Report in files of NPS, SWR.

Fort Davis National Historic Site Staff, 1981. Resources Management Plan for  
Fort Davis National Historic Site.

Jaco, H. B. and A. J. Turner, 1969. Soils Handbook: Detailed Soil Survey  
of the Fort Davis National Historical Site. USDA Soil Conservation  
Service.

Determination

It is determined that none of the actions outlined above significantly affect the natural environment nor cause controversy.

NO ENVIRONMENTAL ASSESSMENT WILL BE PREPARED.

Recommended by: Garland Mose Sept 23, 1982  
Hydraulic Engineer, Southwest Region Date

Concurred by: Douglas C. McChristian Sept. 30, 1982  
Superintendent, Fort Davis National Historic Site Date

Concurred by: /s/ Roger J. Siglin 001 - 7 1982  
~~Acting~~ Associate Regional Director, Park Operations, SWR Date

Approved by: Robert J. [Signature] 10/8/82  
Regional Director, Southwest Region Date

354 6-7-71

L54(WSC)LWW

FODA

May 27, 1971

Memorandum

To: Acting Director, Western Service Center  
Through: Chief, Office of Land Acquisition and Water Resources  
Chief, Water Resources Section

From: Hydrologist, WSC-LWW

Subject: Trip report to Fort Davis - May 17-21, 1971

1. Purpose of trip: To investigate the hydrologic situation as reflected by the well at Fort Davis, in response to the Region's request for recommendations on the effect of the apparent decline in that area's water table as to future production from the park's present well.

2. Itinerary: Left San Francisco the evening of May 17 via air to El Paso, Texas. Arrived at Fort Davis via GSA about noon on May 18. Left Fort Davis the morning of May 21, arriving in San Francisco that evening.

3. Companions: None.

4. Accomplishments: Upon arrival at Fort Davis, I received a briefing from Mr. Pablo Bencomo, Park Maintenance Foreman, on the well and its recent performance. At that time, the well was pumping on cycle. Mr. Bencomo reported he turned the pump on every morning and shut it off in the evening. The 50,000-gallon reservoir tank was not full, since average yield of the well was evidently not sufficient to keep up with the weekend demand.

In order to establish the present yield of the well during a 24-hour period, I scheduled a drawdown and recovery test starting the next day after an overnight (17-hour) shutdown of the well pump. Tuesday evening, before making the test, I drove to Alpine, Texas, and talked with Mr. Henderson, the electrician and pump man who had previously worked on this equipment for the Service. He believed the rapid cycling of the well after initial drawdown to 71 feet, was either caused by improper setting of the electrodes and/or a sump effect as the lower portion of the well casing was being filled from above, each time pumping ceased. Our subsequent drawdown measurements indicate the electrodes are placed 6 ft apart at 65 ft and 71 ft (or 63 ft and 69 ft, depending on choice of surface level datum).

A summary of the pertinent hydrological data and as-built dimensions of the well are tabulated below.

Depth: 75 ft (below ground level)  
6-inch ID blank casing: 0 to 57 ft and 72 to 74 ft  
6-inch ID perforated casing (80 X 6 in. x 1/8 in. slots): 57 ft to 72 ft  
Pump: 1-1/2 HP Rada submersible  
Cutoff electrode set at 71 ft (depth measured from the top of casing in pump house or approximately 69 ft from surface ground), on electrode at 65 ft  
Static water levels (readings taken on first of month except as indicated:

|           |      |                   |
|-----------|------|-------------------|
| September | 1964 | - 54 ft to 56 ft  |
| August    | 1966 | - 57 ft           |
| January   | 1970 | - 56 ft           |
| March     | 1970 | - 57 ft, 6 inches |
| May       | 1970 | - 57 ft           |
| June      | 1970 | - 58 ft           |
| July      | 1970 | - 59 ft           |
| September | 1970 | - 59 ft, 6 inches |
| October   | 1970 | - 59 ft           |
| November  | 1970 | - 58 ft           |
| December  | 1970 | - 57 ft, 6 inches |
| March     | 1971 | - 58 ft, 6 inches |
| April     | 1971 | - 59 ft           |
| May 19    | 1971 | - 61 ft           |

The metered pumping rate during the pumping test on May 19, averaged about 18-1/2 gpm.

The first drawdown test revealed that starting from a 61-ft static water level, it took approximately 20 minutes (26 minutes and 476 gallons on May 20) to pump 396 gallons before reaching the lower electrode and starting to cycle. On May 20, after a 17-hour recovery and a 26-minute drawdown which yielded 476 gallons, the first cycle lasted 5 minutes, 27 seconds and yielded 13 gpm or 71 gallons total. After one hour of cycling, the yield had dropped to 9.46 gpm on a 4-minute, 41-second cycle. At the end of two hours, the cycle period was 4 minutes, 37 seconds, with a yield of 8.6 gpm.

The pumping was stopped about 2 PM to allow the installation of a gate valve between the pump and meter. After this was accomplished, the pumping was resumed and allowed to cycle until about 10 PM. Although the cycle period increased to about 5 minutes, 13 seconds due to lower recharge, the yield declined to 6-1/2 gpm or 34 gallons per cycle at about 4:45 PM and to about 5.1 gpm at about 10 PM with a 30-gallon yield per cycle. From this data, the maximum daily capacity of the well is estimated to be on the order of 5,000 gpd.

5. Conclusions and recommendations: There is little doubt from the above information that a steady decline in the capacity of the well has occurred due to the lowering of the regional water table. The safe yield of the well on a continuous basis appears to be between 4 and 6 gpm, assuming the 61-ft water level remains static.

In order to protect the electric capacitors from over-use in switching the pump on and off, the flow rate was reduced with a gate valve to 6 gpm before the pump was shut off on late PM, May 20. I recommended to the maintenance foreman that if no cycling occurred, he could increase the flow to 7 or more gpm and leave the pump on continuously. Unless there is a recharge of the aquifer very soon, I think 6 gpm is about the maximum safe limit to pump the well at this time. If there is no recharge, even this rate will have to be reduced.

All the hydrological data gathered so far indicates a general decline of the water table in the Fort Davis area. A graph of the water table versus time shows that the average of the high (recharge) and low water levels since January 1, 1970, is steadily declining. This drop probably reflects the long-term weather cycle more than increased use of the water table, but it is probable both have had an adverse effect. It is likely that a new well will become necessary at some time in the future from either cause. However, in view of the accelerated decline of the water table during the last two months (-2-1/2 ft) which has reduced the present yield in gallons per minute to about 1/3 of the pumping capacity, it would seem a new well should be developed as soon as practicable.

The depth and location of the proposed well will be coordinated with the Geological Survey. It is estimated that the depth will not exceed 200 ft but 150 ft may be sufficient. Before leaving I discussed with the Park Historian Nick Bleser, the possibility of locating a well in or near the historical area. I also had some discussions with Dr. E.M.P. Lovejoy of the University of Texas, at El Paso, who is presently mapping the geology of an adjacent quadrangle for the State of Texas. Dr. Lovejoy said a well located in the northeast part of Fort Davis would take advantage of any recharge from the nearby river. He indicated this would be desirable if the drought continues.

On May 21, enroute to San Francisco, I stopped at the NPS offices in El Paso and discussed the well problem with Superintendent F. Smith. I told him that since the present low yield per minute might cause electric failure due to frequent cycling, I had suggested a gate valve be put in to throttle back the pumping rate. We discussed the possibility of writing the specifications for a new well and where the well would be best located. We also reviewed the data in the correspondence file in relation to the new data, so as to clarify any inconsistencies.

(Sgd) (

Donald C. Barrett

Cleared for Distribution:

(Sgd) Glenn O. Hendrix JUN 1 1971

Acting Director, WSC (Date)

cc:

Chief, NW-WASO

Director, Southwest Region

Superintendent, Fort Davis

L54-MW

JUN 22 1971

WR copy  
Berte  
MOSS - Please file  
in Fort Davis  
Water Cons. file

Memorandum

To: Director, Western Service Center  
Attention: Mr. Gerard Witucki  
From: Chief, Division of Water Resources

Subject: Mr. Barrett's trip report to Fort Davis

We have read with interest Mr. Barrett's trip report and he has done an excellent job in testing the well and analyzing the results. We agree with his conclusion and recommendation that another well be drilled. The present well can be used as a standby.

Our only suggestion is consideration of some method of finishing the new well other than slotted casing. Because of the remoteness of the area and probable scarcity of drillers, this may not be practicable. However, because of high entrance losses, slotted casing probably is the least efficient method of finishing a well. Gravel-walled wells with a proper sized screen have proved successful in sandstone, which we understand is the aquifer, but would be expensive. Whether the increased costs of such a method over slotted casing would be balanced out by the savings in pumping costs, and possibly maintenance, would require an economic analysis. In any case, it is worth thinking about.

Please keep us informed of any further developments.

~~Manuel~~ Manuel Morris

Manuel Morris

cc:

MW-EWReed

MW-Mr. Berte, Rm. 708, 801 Bldg.

EWReed:caw 6/17/71

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October 31, 1963

D5039

Memorandum

To: Chief Engineer, WODC  
From: Project Supervisor DWGeisinger, WODC  
Subject: Report on Proposed Development of Water Supply, Fort Davis

PURPOSE: The purpose of this report is three-fold: (1) to inform those concerned about the water supply design alternatives; (2) to offer information which will be of assistance to the Regional Office for its work in investigating the sources of water supply and (3) to invite constructive criticism and any additional useful information which should be considered in this water system development.

WATER DEMAND PREDICTION. It appears that a water supply providing a steady supply of 3 gpm or 9 gpm based on an 8 hour demand day will satisfy domestic future water demand for the next 20 years. Fire streams of 300 gpm and 50 psi hydrant pressure will satisfy Category II fire protection requirements.

EXISTING SYSTEM. The temporary Visitor Center, residence and administrative office are supplied by an existing well located approximately 300 feet west of these Officer Row buildings. Another well believed to be a good source of water is located next to the old church camp site near the head of Hospital Canyon .

Near the barracks ruins are two abandoned wells complete with base slabs, casings and a frame enclosure over one of the wells. According to local residents these two wells were among 3 or 4 wells drilled about 10 - 20 years ago on the east and southeastern portion of the property. They are said to be 45 - 75 feet deep and to have yielded little or no water. Lack of success in locating sufficient water may have been caused by the drilling rig's failure to penetrate sufficiently the solid volcanic rock underlying the surface alluvial material.

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DEVELOPMENT POSSIBILITIES. Investigation of the land has resulted in four (4) water supply development alternatives and a fifth possibility to consider for the future. Which alternative to choose to base a design on will depend upon (1) the results of two samples submitted for a chemical water quality analysis on October 9 and (2) the two well capacity tests to be conducted by the Southwest Regional Office. The various water supply alternatives are summarized as follows:

1. Utilize the existing well now serving the temporary V. C. Office and residence. A reservoir site is available on the south slope above this well at a elevation which will give 45 psi hydrant pressure for fire protection. By recessing the reservoir a few feet combined with camouflage or screen plantings, this site can be hidden from the park visitor's view. However, it is a difficult construction location. The well is 61 feet deep and had 8 feet of water in August, 1962. In October the park crew ran the reciprocal pump at its maximum rate of 7 gpm for 24 hours apparently without affecting the supply. Bacteriological tests on this water have given positive results. A sample for chemical water quality analysis was submitted in early October.

2. Utilize the former church camp well at the head of Hospital Canyon with a reservoir situated on the nearby adjacent natural bench or behind the former church camp bathhouse. Both sites are hidden from view. The well is 48 feet deep with 10 feet of water in September, 1963. It was drilled about 1948 and lined with 5 inch I.D. perforated casing. According to a Mr. Tyrone Kelly, Fort Davis resident who contracted to have the well drilled, it was drilled through bedrock to its present depth with the aid of dynamite. He stated that this well has never gone dry even though it has been used during dry summers to supply a church camp and swimming pool. The Park conducted an exploratory capacity test in September by running the existing jet pump unit at its maximum rate of 7 gpm for over 24 hours. Starting with an initial 10 feet of well water, drawdown to  $3\frac{1}{2}$  feet of water occurred in the first few hours and then maintained that level for the remainder of the test. A sample of this water was submitted for chemical water quality analysis in early October. The two above-mentioned reservoir sites are of sufficient elevation to provide domestic water pressure (30 psi and 37 psi available gravity head). A fire pump would be required to meet fire protection criteria.

3. Utilize the former church camp well with a reservoir situated south of the well near the edge of the NPS property and on the saddle at the upper end of the ravine. This reservoir site is well hidden and is of sufficient elevation to provide more than adequate domestic and fire pressures. Construction costs for this site would be high as the Contractor would be required to construct an access road to the site from the canyon floor and dress up his scar to leave a hidden NPS service road at the completion of the construction.

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4. Abandon the existing wells and drill a new well. This could prove quite costly. Based on the experience of the previous drilling here the chances of obtaining a larger quantity of water seem doubtful. The average annual rainfall is about 17 inches, occurring mostly during the summer and fall months. The subsurface material is igneous rock formed subsequent to the lower cretaceous geological period. It appears that the water in the two existing described wells comes from seepage water through the volcanic rock rather than being derived from the canyon alluvial soil deposits.

5. Another possibility to be considered in the design of this water system is that the community of Fort Davis (population 800) may develop a municipal water supply in the future. At present private wells serve individual homes. Sewage is disposed of by septic tanks and leaching fields. The community is unincorporated. A municipal water system for this town appears to be at least 10 - 20 years in the future.

CONCLUSION. Before a water system can be designed based on one of the above alternatives it is necessary that maximum yield pumping tests be conducted on the church camp well and the well presently serving the area. It is hoped that one or both wells will yield at least 40 to 50 gpm. Discussion with John Kell, Regional Office, disclosed that \$1,500 of "143 money" has been ear-marked but not programmed yet for pumping tests. The USGS will be requested to provide technical assistance.

The well capacity yield tests should be completed by early next year so that plans and specifications can be completed by spring, 1964. The water system construction considered together with the other utilities, the proposed entrance road, and the three residences would make a neat construction package project.

Signed

DWGeisinger

cc:  
Reg.Dir., Southwest  
Supt., Fort Davis  
John Kell, Chief of Lands.

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#### Docket Information

Number of Documents in Docket 42  
Documents Dated from 10/22/1963 to 10/8/1982  
Docket Compiled: 3/21/2011