05-03-1996: notes to dockets 03, 04, 05, 06 and 43 ; may 03, 1996

NOTES TO THE FILE DEVA 03, 04, 05, 06, and 43 May 3, 1996

Dockets 03, 04, and 05 contain documentation on California State water right permits in the Furnace Creek area which were revoked.

Docket 06 contains documentation of a licensed water right from Texas Spring.

Docket 43 contains documentation of a water rights agreement between Fred Harvey and the National Park Service concerning water rights in the Furnace Creek area. Congress directed the National Park Service to work out an agreement with U.S. Borax (Fred Harvey's predecessor) concerning the water rights in the Furnace Creek area. The NPS's water rights in the Furnace Creek area are thought to be primarily Federal reserved water rights.

A folder, filed with the dockets, but not a docket, contains papers common to dockets 3, 4, 5, 6, and 43, including water use and need studies, maps, and documentation of Congress's inquiries into issues in the Furnace Creek area. Alien water right docket 42 contains documentation of Fred Harvey's water rights. The information in this folder and in the alien water right docket (in addition to that in particularly dockets 06 and 43) should be helpful if there is an adjudication of the water rights or a water rights conflict involving the NPS's water rights in the Furnace Creek area.

Alice Johns
Hydrologist
Water Rights Branch
Water Resources Division
National Park Service

This docket consists of supplimental data for the Furnace Creek - Texas Springs area (DEVA Water Right Dockets 3, 4, 5, and 6.)

**Other Supporting Information**

orig & three

Death Valley ~~Nat~~ National Monument
Furnace Creek Area
Supplemental Data, Water Right Dockets 3,4,5 & 6
CONTENTS

Part I LAND

1. Drawing NMDV 7100, Water Resources, Furnace Creek Area
2. Drawing NMDV, 2123 Revised March 14, 1958, Furnace Creek ~~Airport~~ Airport Site
3. Drawing NMDV 3115, Sheets I to ~~IV~~ VI, Topography, Furnace Creek Area, photographic reduction to scale of 1"=1000'
4. ~~Sketch Map dated July 2, 1958, Surface Water of Furnace Creek 1857~~
5. Drawing NMDV 3115, Sheets I to VI, Topography, Furnace Creek Area, ~~Photographically reduced to~~ photographic reductions to scale of 1" = 500'
6. Sketch Map dated July 2, 1958, Surface Water of Furnace Creek 1857
7. Act of July 2, 1958 (72 Stat. 295) To authorize the acquisition by exchange of certain properties within Death Valley National Monument, California, and for other purposes.

~~Map~~

Part II WATER RESOURCES

1. Test Well Report, Well No. 1, dated November 26, 1958 by Roscoe Moss Co.
2. Memorandum of November 28, 1958 ~~Spaulding~~ Spaulding to Superintendent, Report on the Furnace Creek Test Well

1 to 5

3. Data tables of spring flow, chemical analyses and test well
4. Memorandum of February 25, 1960 Kunkel to Whitworth transmitting data tables (Item II-3)
5. Memorandum of June 20, 1960, Spaulding to Acting Regional Chief of Operations, Ground-Water Analysis, Furnace Creek Area
6. Table Summary of Measurement of Water Diversion dated oct 7, 1960
7. Chart Water Diversion - Furnace Creek Area Drawing NMDV 3216 dated Oct 13, 1960
8. Memorandum of October 21, 1960 Merriam to Director discussing information requested by the director and transmitting table and chart (Items II 6 & 7)

Part III TRAVEL & WATER USE

1. Memorandum of June 20, 1956 Superintendent Binnewies to Regional Director providing data on water consumption, Texas Spring Campground
2. Table Water Demand Dated September 6, 1958
3. Memorandum of August 19, 1960, Spaulding to Regional Chief of Operations, Travel Analysis providing projections of travel to future years and with attachments
   (1) Chart Visitation Trends
   (2) Drawing NMDV 2214 Traffic Analysis
   (3) Tables I and II Tabulation of monthly vehicular travel

(4) Summary sheets of travel for the years 1954, 1955, 1956, 1957, 1958, 1959 and 1960 through May (7 sheets)

4. Memorandum of August 22, 1960, Spaulding to Acting Regional Chief of Operations. Water Use, Furnace Creek Area providing an estimate of future water needs of the National Park Serve and Hotel Company with attachments:

(1) Table I National Park Service, Irrigation, Mission 66 Development

(2) Table II National Park Service, Domestic Use Mission 66 for Peak Month of March

(3) Table III, Death Valley Hotel Company, Irrigation Use

(4) Table IV Death Valley Hotel Company - Domestic Use

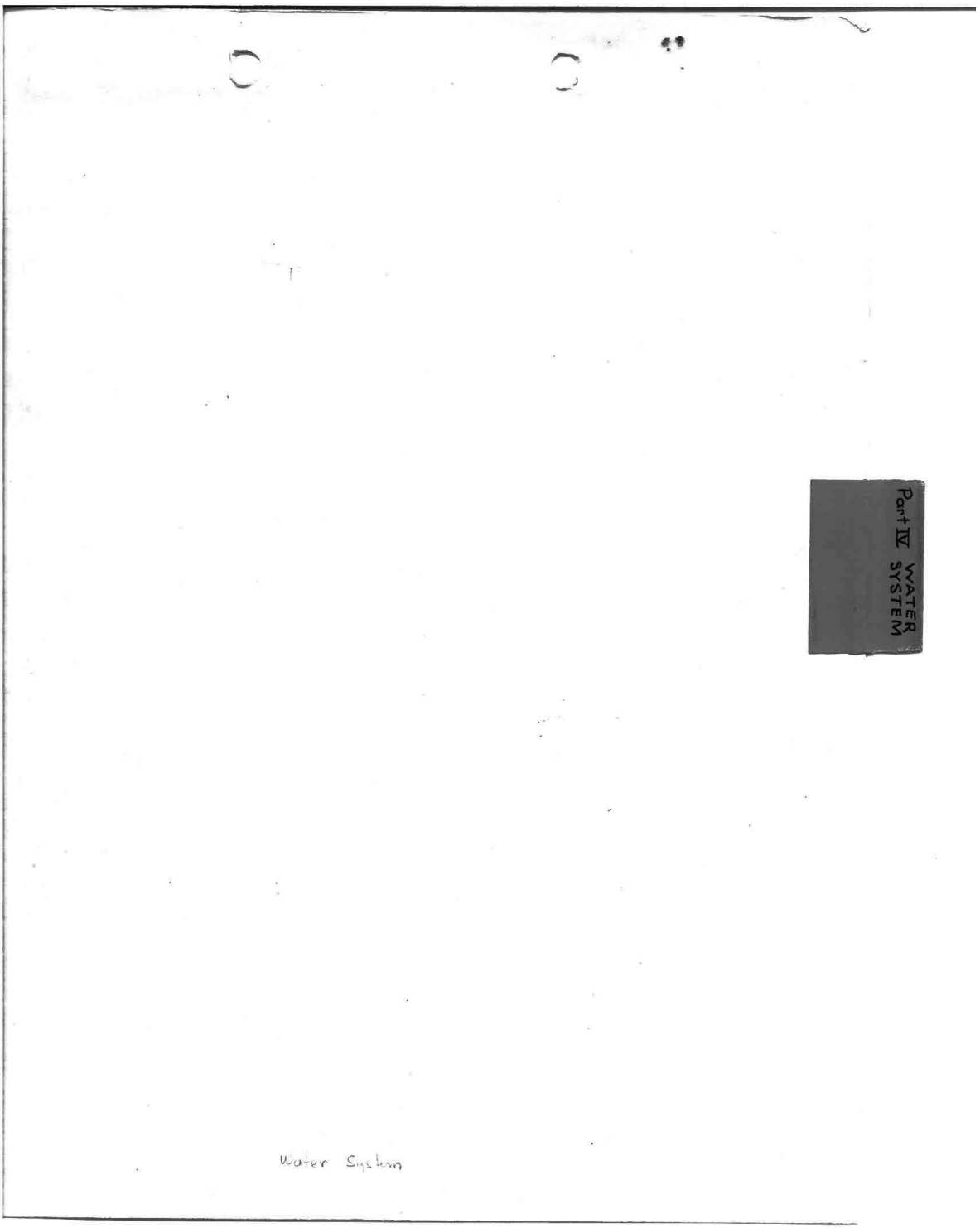
(5) Table Anticipated Water Usage dated July 29, 1960

(6) Drawing NMDV 2215 entitled Furnace Creek Visitor Center, Irrigation dated August 19, 1960.

5. Water Meter Readings, Furnace Creek Area for 5 meters and reservoir (15 pages).
6. Memorandum of December 20, 1960. Superintendent Liles to Regional Director transmitting Water Meter Readings, Item III - 5
7. Report "Water Use National Park Service Facilities in the Furnace Creek Area of Death Valley National Monument

Part III WATER SYSTEM

1. Description of Water System. Texas Spring Campground prepared April 7, 1958


Part IV WATER SYSTEM
Water System

prepared April 7, 1958

# WATER SYSTEM

## Texas Spring Campground
## Death Valley National Monument

**GENERAL**

The system serves Texas Spring Campground and the Indian Village. Prior to the establishment of Death Valley National Monument, the Pacific Coast Borax Company constructed and maintained a water system serving a tourist camp at the campground site. During the 1930s, under the CCC program, springs were improved, supply lines laid, a 20,000 gallon underground concrete reservoir constructed and distribution lines laid. In 1940, the springs serving the campground decreased in flow following improvement by the Borax Company of their existing Texas Spring tunnel. A pipeline extension was laid to connect the system with the Borax Company settling vault near the tunnel. The entire supply now comes from the Hotel Company system.

In 1955, the distribution lines within the campground were replaced, with the exception of the major portion of the main. In the same contract a new supply line was constructed from the Borax Company system to a point on the existing line 369 feet above the reservoir.

**WATER RIGHTS**

Appropriative Water Right Application 10,119, Permit 5755, was filed February 17, 1941 with the State of California. Details of the appropriation are filed in Death Valley Water Right Docket No. 8-6

**DRAWINGS**

Drawings NSV 2129A, Water System, Texas Spring Campground and NSV 6979, National Park Service Diversions at Texas Springs and Furnace Creek Wash, show the system.

**SOURCE**

The present source is a diverting tunnel owned by the Death Valley Hotel Company, Ltd., driven to intercept the main flow of Texas Springs. The National Park Service supply line connects to the Hotel Company system at a settling box 280 feet from the tunnel portal. The maximum capacity of the diversion to the National Park Service system is unknown, but is more than 35 GPM, the quantity the Borax Company agreed to deliver free of charge and the quantity for which appropriative application was made.

**SUPPLY MAINS**

Approximately 2730 feet of 2½-inch and 370 feet of 3-inch dipped and wrapped steel pipe, with a capacity when new of 71 GPM, connect the reservoir with the source. The 3-inch line was laid about 1938 and the 2½-inch in 1955. Both are in good condition.

X

STORAGE

The reservoir is government owned, is located 1600 feet east of the campground at an elevation of 126 feet above sea level, is of reinforced concrete buried flush with ground level, and has a capacity of 20,000 gallons.

TREATMENT None

DISTRIBUTION SYSTEM

A main line runs from the storage reservoir through the campground to the Indian Village. The main consists of 9460 feet of 3-inch wrapped steel pipe laid in the 1930s and about 150 feet of 2½-inch dipped and wrapped steel pipe laid in 1955. 2½-inch The capacity of the main to the center of the campground is probably about 80 GPM. Fifty 1/2-inch faucets are provided throughout the compound connected to the main by 5956 lineal feet of 3/4-inch to 2-inch laterals. Approximately 1000 lineal feet of distribution lines to outside faucets serve the Indian Village.

COST OF SYSTEM

| | | | |
|---|---|---|---|
| Portion Constructed in 1955 (construction cost) | | | |
| Supply line, 2½-inch, | 2730 feet | $4911 | |
| Distribution System, campground | | 6099 | |
| | | | $11,010 |
| Portion of old system retained (depreciated value) | | | |
| Supply line, 3-inch, | 370 feet | $ 370 | |
| Reservoir, 20,000 gal. concrete | | 2000 | |
| Distribution Main, Reservoir to Indian Village, | 9460 feet | 4780 | |
| Distribution System, Indian Village, | 1000 feet | 250 | |
| | | | 7,400 |
| Engineering costs | | | 1,000 |
| Total present value of system | | | $19,410 |

CONSUMPTION (1956-1957)

Domestic - peak, 35 GPM, by Ramsey meter
- average for 6 months, 5 GPM, estimated
Irrigation - average for 12 months, 5 GPM, estimated

L. Spaulding
April 7, 1958

Part III TRAVEL & WATER USE

Water Use and Travel

Copy No 3
Supplemental Data file
WR Dockets 3,4,5,6

National Park Service
Region Four

Report on

# WATER USE
and
# FUTURE WATER NEEDS

of

## National Park Service Facilities in the Furnace Creek Area of Death Valley National Monument

L. S. Spaulding
Hydraulic Engineer
September, 1961

11-00-1954: department of the interior header page ; november, 1954

10-23
(November 1954)

# UNITED STATES
# DEPARTMENT OF THE INTERIOR
# NATIONAL PARK SERVICE

(Area)

**FILE CODE:**

**FROM:**

**TO:**

**IMPORTANT**

This file constitutes a part of the official records of the National Park Service and should not be separated or papers withdrawn without express authority of the official in charge.

All Files should be returned promptly to the File Room.

Officials and employees will be held responsible for failure to observe these rules, which are necessary to protect the integrity of the official records.

U. S. GOVERNMENT PRINTING OFFICE 16—22371-3

09-00-1961: table of contents; september, 1961

## Contents


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Table XI 1961, 1966, 1970, 1980 Irrigation Needs

Table XII Total Water Needs

Table XIII Actual Water Use - March 1961

Table XIV Texas Spring Campground - Travel

Death Valley National Monument

Furnace Creek Area

Water Use and Future Water Needs

## CONCLUSIONS

Present consumptive water use of National Park Service facilities in the Furnace Creek Area as determined by this study varies from a monthly average of 4 gallons per minute during January to a monthly average of 24 gallons per minute during June.

Water requirements in future years have been estimated as follows:

| | Water use, gallons per minute | | |
|---|---|---|---|
| | 1966 | 1970 | 1980 |
| January (low) | 11 | 13 | 19 |
| June (peak) | 271 | 327 | 435 |

The results of this study are summarized in greater detail in Table XII, Total Water Needs.

## DEVELOPMENT

Park Service facilities for which water requirements have been calculated by this report are shown on Master Plan NMDV 3127A approved by Director Wirth, March 17, 1958. Irrigated areas are shown in greater detail on drawings NMDV 2220, Visitor Center, Water System, (8" x 10½" drawing) and NMDV 3217, Visitor Center, Site Development

Facilities and proposed irrigated areas include:

Visitor Center (4.83 acres irrigated)
Furnace Creek Campground (8.70 acres irrigated)
Texas Spring Campground (3.40 acres irrigated)

## DOMESTIC USE

Estimates of future domestic water requirements are based on per capita use for the Furnace Creek Area developed by studies of actual water consumption for a period in November 1960 and for the month of March 1961 (Table XIII). Predictions of future travel were developed in the report "Travel Analysis, Death Valley National Monument" by L. S. Spaulding, submitted August 19, 1960 (A88, DEVA).

Per capita rates for the periods studied

Visitor Center Museum - Auditorium (Table XIII)
2.4 gallons per visit.
Texas Spring Campground (Table XIV) 16.0 gallons per person per day.

For the purpose of calculating future needs the figures 2.5 gallons per visit at the Visitor Center and 20 gallons per person per day at the campgrounds have been used in this report.

Predictions of future travel are:

| | 1966 | 1970 (130% of 1966) | 1980 (180% of 1966) |
|---|---|---|---|
| Total Monument Travel, visits | 500,000 | 650,000 | 900,000 |
| Visitor Center, visits | 200,000 | 260,000 | 360,000 |
| Campgrounds, visitor-days | 150,000 | 195,000 | 260,000 |

## IRRIGATION

This report bases irrigation needs on monthly evaporation rates for the Cow Creek - Furnace Creek Area as published by the U. S. Weather Bureau. Evaporation rates for a three year period are averaged in Table VI indicating that evaporation from a standard pan is about 149 inches per year. A factor has been applied to the monthly evaporation rates to determine the monthly consumptive use of vegetation.

Table VIII shows monthly rates developed for Bermuda grass lawns, tamarisk and mesquite. Factors have been chosen so that the resulting use rates include transit losses and other losses incidental to irrigation.

Actual water consumption for irrigation of the Visitor Center patio has been calculated using meter readings for the months of January, February and March, 1961. A comparison of theoretical and actual use is as follows:

| | Water Consumption, Inches | |
|---|---|---|
| | Theoretical | Actual |
| January | 1.3 | 6.0 |
| February | 3.2 | 7.0 |
| March | 8.2 | 9.8 |

The foregoing comparison indicates that the theoretical estimates of irrigation requirements may be low, especially so in the winter months.

EXPLANATION OF TABLES

Table I-Daily Water Use

These seven sheets summarize the water meter records submitted by the Superintendent and combine certain readings to determine various purposes and locations of use. The data submitted by the Superintendent have been adjusted to make each daily reading cover a 24 hour period from 8 AM on the listed day to 8 AM on the following day.

Table II - Summary - Daily Water Use

This table summarizes on one sheet the monthly averages of Table I.

Table III - Present Domestic Water Use

This table presents average travel over the past few years taken from the travel report of August 19, 1960 (A88). Data for Texas Spring Campground Use (Column F) are from Table XIV. During March 1961 use of the presently undeveloped Furnace Creek averaged 20% of Texas Spring Campground. This ratio has been used to calculate use of the campground during other months of the year (Column H).

The right hand portion of the table shows current domestic water consumption using actual metered use where available and estimated quantities where meter records are lacking. It should be noted that Furnace Creek Campground Use (Column N) is abnormally low for campground use because water is availably only in the comfort station.

Water needed for air conditioning (Column R) is a very rough guess because meter records for the summer months were not available at the time of writing this report.

Table IV - Domestic Water Needs-1966.
Based on predicted future travel and on per capita rates of use water needs have been calculated for each month of the year 1966.

Table V - Domestic Water Needs - Present and Future.
This table combines Tables III and VI and expands these data to show domestic water needs by months for the years 1961, 1966, 1970 and 1980.

Table VI - Evaporation.
Monthly evaporation rates for Cow Creek (and Furnace Creek) published by the U. S. Weather Bureau are tabulated and averaged as a basis for irrigation consumptive use calculations.

Table VII - Temperature.
Monthly average maximum and minimum temperatures recorded at Cow Creek as published by the U. S. Weather Bureau for the years 1958, 1959 and 1960 have been tabulated and averaged as a basis for irrigation consumptive use calculations.

Table VIII - Irrigation Needs - Unit Consumptive Use.
Consumptive uses of lawn, tamarisk trees and mesquite trees have been calculated by applying factors to pan evaporation rates. Factors were selected by Spaulding guided by information that consumptive use exceeds pan evaporation during the growing season for the particular varieties, that mesquite is dormant in the winter months and that water use by tamarisk falls off when the average maximum temperature falls below 72° F.

Table IX - Theoretical 1961 Irrigation Needs.
Using actual areas planted at the Visitor Center during 1961, and using rates of consumptive use developed in Table VIII theoretical water needs have been calculated for each month of 1961.

Table I - 1966 Irrigation Needs.
Using areas proposed to be irrigated under the Master Plan and using consumptive use rates developed in Table VIII irrigation needs have been calculated for each month of 1966 for the Visitor Center and Campgrounds.

Table XI
This table summarizes irrigation data for 1961 and 1966 and expands these data to show irrigation needs for the years 1970 and 1980.

Table XII - Total Water Needs.
This table, showing the main results of this study, combines Table V and Table XI to show present and future water needs for both irrigation and domestic purposes.

Table XIII - Actual Water Use, March 1961.
This table tabulates water use and visitation at the Visitor Center to determine a per capita use rate. The rate for this month was 2.41 gallons per visit.

Table XIV - Texas Spring Campground - Travel
Actual campground use as reported in the visitor use report of August 19, 1960 has been tabulated as a basis for water use calculation of Table III.

09-00-1960: table of daily water use ; september, 1960

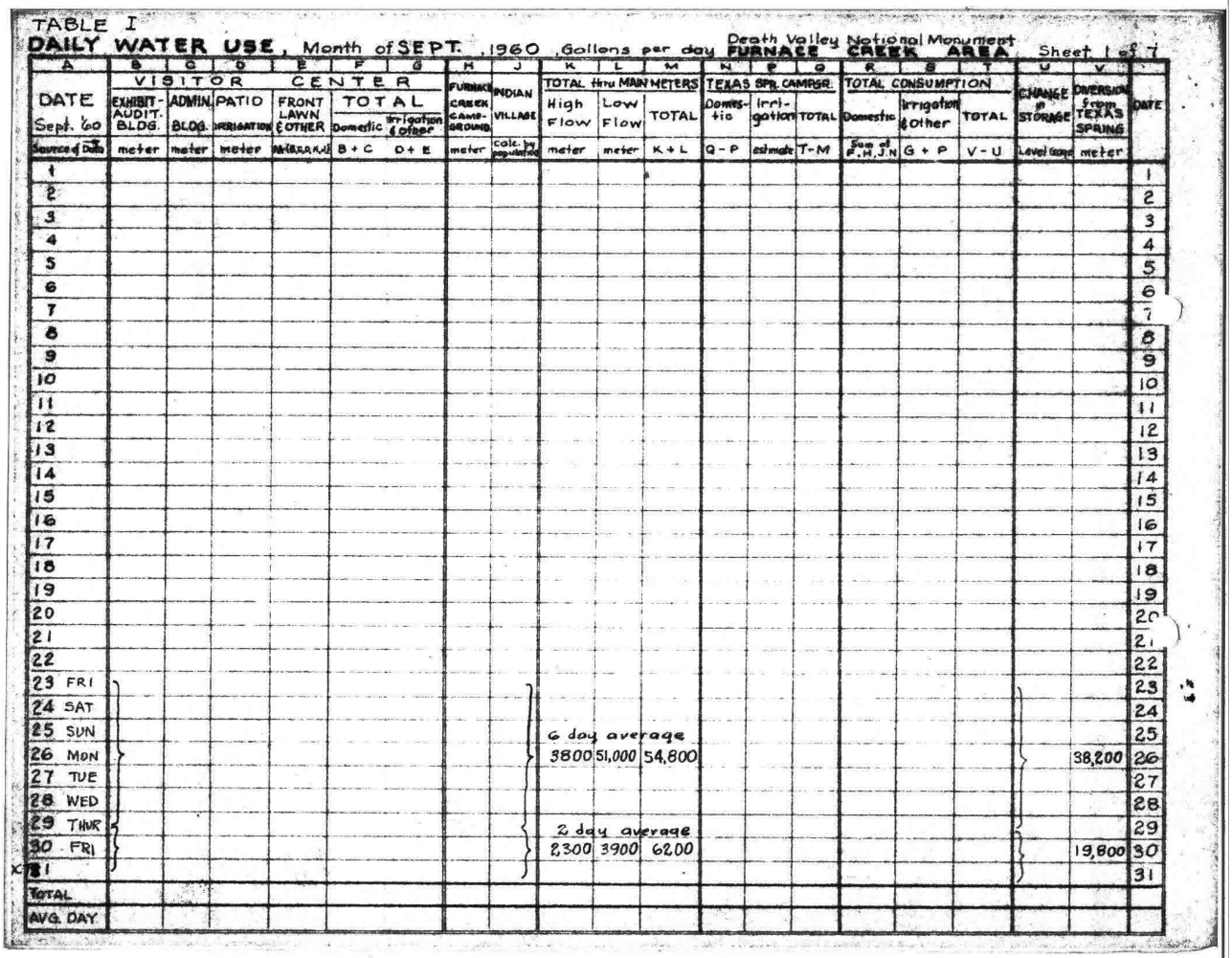


TABLE I

DAILY WATER USE, Month of SEPT. 1960, Gallons per day — Death Valley National Monument — FURNACE CREEK AREA — Sheet 1 of 7

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Sept. '60 | VISITOR CENTER | | | | TOTAL | | FURNACE CREEK CAMP-GROUND | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | Domestic | Irrigation & Other | | | High Flow | Low Flow | TOTAL | Domestic | Irrigation | TOTAL | Domestic | Irrigation & Other | TOTAL | | | |
| Source of Data → | meter | meter | meter | METERED | B + C | D + E | meter | calc. by population | meter | meter | K + L | Q - P | estimate | T - M | Sum of F, H, J, N | G + P | V - U | Level Gage | meter | |
| 1 | | | | | | | | | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | | | | | | | | | 2 |
| 3 | | | | | | | | | | | | | | | | | | | | 3 |
| 4 | | | | | | | | | | | | | | | | | | | | 4 |
| 5 | | | | | | | | | | | | | | | | | | | | 5 |
| 6 | | | | | | | | | | | | | | | | | | | | 6 |
| 7 | | | | | | | | | | | | | | | | | | | | 7 |
| 8 | | | | | | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | | | | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | | | | | | | | | | 13 |
| 14 | | | | | | | | | | | | | | | | | | | | 14 |
| 15 | | | | | | | | | | | | | | | | | | | | 15 |
| 16 | | | | | | | | | | | | | | | | | | | | 16 |
| 17 | | | | | | | | | | | | | | | | | | | | 17 |
| 18 | | | | | | | | | | | | | | | | | | | | 18 |
| 19 | | | | | | | | | | | | | | | | | | | | 19 |
| 20 | | | | | | | | | | | | | | | | | | | | 20 |
| 21 | | | | | | | | | | | | | | | | | | | | 21 |
| 22 | | | | | | | | | | | | | | | | | | | | 22 |
| 23 FRI | | | | | | | | | | | | | | | | | | | | 23 |
| 24 SAT | | | | | | | | | | | | | | | | | | | | 24 |
| 25 SUN | | | | | | | | | 6 day average | | | | | | | | | | | 25 |
| 26 MON | | | | | | | | | 3800 | 51,000 | 54,800 | | | | | | | | 38,200 | 26 |
| 27 TUE | | | | | | | | | | | | | | | | | | | | 27 |
| 28 WED | | | | | | | | | | | | | | | | | | | | 28 |
| 29 THR | | | | | | | | | 2 day average | | | | | | | | | | | 29 |
| 30 FRI | | | | | | | | | 2,300 | 3900 | 6200 | | | | | | | | 19,800 | 30 |
| X 31 | | | | | | | | | | | | | | | | | | | | 31 |
| TOTAL | | | | | | | | | | | | | | | | | | | | |
| AVG. DAY | | | | | | | | | | | | | | | | | | | | |

10-00-1960: table of daily water use ; october table of daily water , 1960

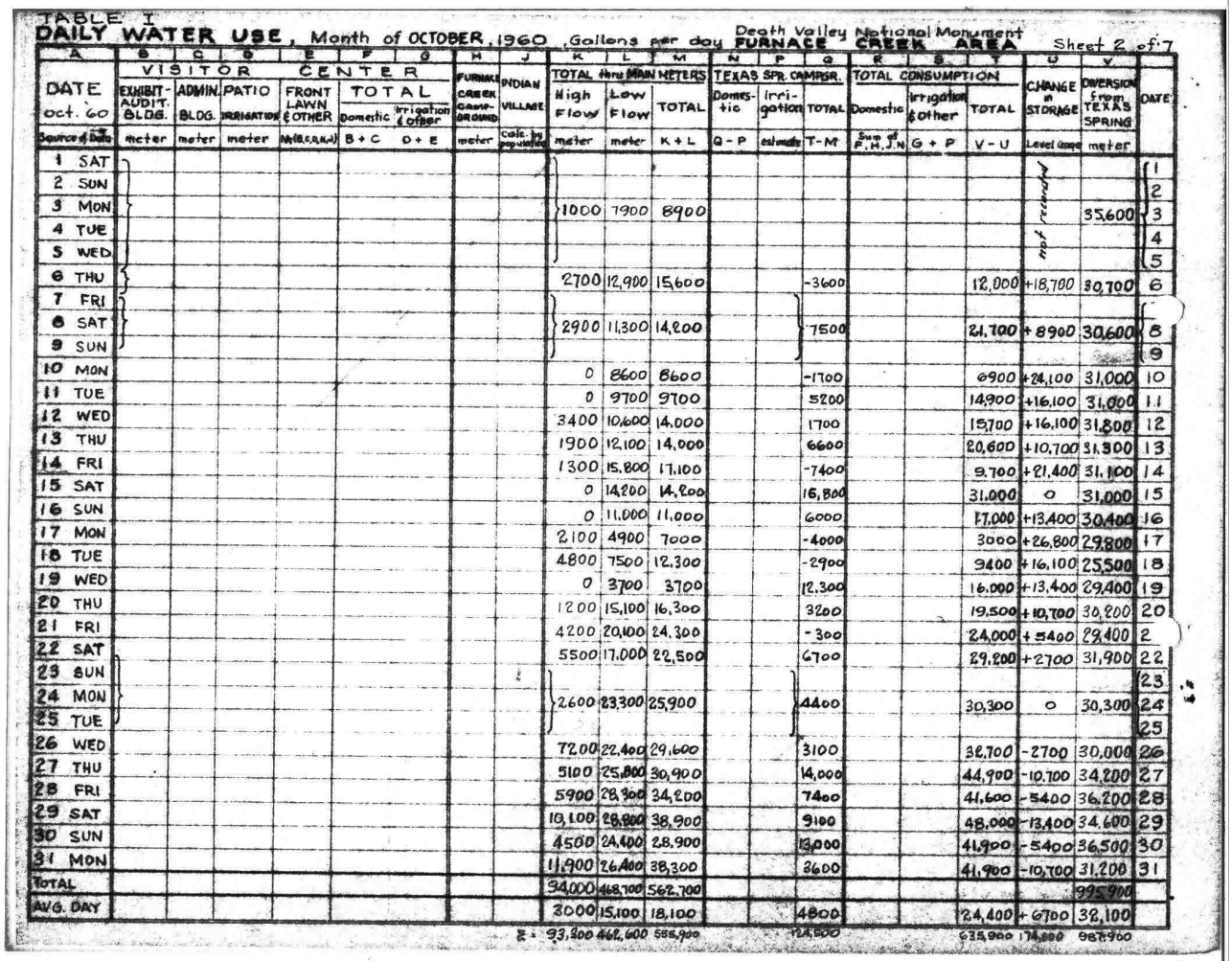


TABLE I

# DAILY WATER USE, Month of OCTOBER, 1960, Gallons per day

Death Valley National Monument — FURNACE CREEK AREA — Sheet 2 of 7

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Oct. '60 | VISITOR CENTER | | | | TOTAL | | FURNACE CREEK CAMPGROUND | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | Domestic | Irrigation & other | | | High Flow | Low Flow | TOTAL | Domestic | Irrigation estimate | TOTAL | Domestic | Irrigation & other | TOTAL | | | |
| Source of Data | meter | meter | meter | meter (A,B,C,D,E,H,J) | B + C | D + E | meter | calc. by population | meter | meter | K + L | Q - P | | T - M | Sum of F, H, J, N | G + P | V - U | Level zone | meter | |
| 1 SAT | | | | | | | | | | | | | | | | | | | | 1 |
| 2 SUN | | | | | | | | | | | | | | | | | | | | 2 |
| 3 MON | | | | | | | | | 1000 | 7900 | 8900 | | | | | | | not recorded | 35,600 | 3 |
| 4 TUE | | | | | | | | | | | | | | | | | | | | 4 |
| 5 WED | | | | | | | | | | | | | | | | | | | | 5 |
| 6 THU | | | | | | | | | 2700 | 12,900 | 15,600 | | | -3600 | | | 12,000 | +18,700 | 30,700 | 6 |
| 7 FRI | | | | | | | | | | | | | | | | | | | | 7 |
| 8 SAT | | | | | | | | | 2900 | 11,300 | 14,200 | | | 7500 | | | 21,700 | +8900 | 30,600 | 8 |
| 9 SUN | | | | | | | | | | | | | | | | | | | | 9 |
| 10 MON | | | | | | | | | 0 | 8600 | 8600 | | | -1700 | | | 6900 | +24,100 | 31,000 | 10 |
| 11 TUE | | | | | | | | | 0 | 9700 | 9700 | | | 5200 | | | 14,900 | +16,100 | 31,000 | 11 |
| 12 WED | | | | | | | | | 3400 | 10,600 | 14,000 | | | 1700 | | | 15,700 | +16,100 | 31,800 | 12 |
| 13 THU | | | | | | | | | 1900 | 12,100 | 14,000 | | | 6600 | | | 20,600 | +10,700 | 31,300 | 13 |
| 14 FRI | | | | | | | | | 1300 | 15,800 | 17,100 | | | -7400 | | | 9,700 | +21,400 | 31,100 | 14 |
| 15 SAT | | | | | | | | | 0 | 14,200 | 14,200 | | | 16,800 | | | 31,000 | 0 | 31,000 | 15 |
| 16 SUN | | | | | | | | | 0 | 11,000 | 11,000 | | | 6000 | | | 17,000 | +13,400 | 30,400 | 16 |
| 17 MON | | | | | | | | | 2100 | 4900 | 7000 | | | -4000 | | | 3000 | +26,800 | 29,800 | 17 |
| 18 TUE | | | | | | | | | 4800 | 7500 | 12,300 | | | -2900 | | | 9400 | +16,100 | 25,500 | 18 |
| 19 WED | | | | | | | | | 0 | 3700 | 3700 | | | 12,300 | | | 16,000 | +13,400 | 29,400 | 19 |
| 20 THU | | | | | | | | | 1200 | 15,100 | 16,300 | | | 3200 | | | 19,500 | +10,700 | 30,200 | 20 |
| 21 FRI | | | | | | | | | 4200 | 20,100 | 24,300 | | | -300 | | | 24,000 | +5400 | 29,400 | 21 |
| 22 SAT | | | | | | | | | 5500 | 17,000 | 22,500 | | | 6700 | | | 29,200 | +2700 | 31,900 | 22 |
| 23 SUN | | | | | | | | | | | | | | | | | | | | 23 |
| 24 MON | | | | | | | | | 2600 | 23,300 | 25,900 | | | 4400 | | | 30,300 | 0 | 30,300 | 24 |
| 25 TUE | | | | | | | | | | | | | | | | | | | | 25 |
| 26 WED | | | | | | | | | 7200 | 22,400 | 29,600 | | | 3100 | | | 32,700 | -2700 | 30,000 | 26 |
| 27 THU | | | | | | | | | 5100 | 25,800 | 30,900 | | | 14,000 | | | 44,900 | -10,700 | 34,200 | 27 |
| 28 FRI | | | | | | | | | 5900 | 28,300 | 34,200 | | | 7400 | | | 41,600 | -5400 | 36,200 | 28 |
| 29 SAT | | | | | | | | | 10,100 | 28,800 | 38,900 | | | 9100 | | | 48,000 | -13,400 | 34,600 | 29 |
| 30 SUN | | | | | | | | | 4500 | 24,400 | 28,900 | | | 13,000 | | | 41,900 | -5400 | 36,500 | 30 |
| 31 MON | | | | | | | | | 11,900 | 26,400 | 38,300 | | | 3600 | | | 41,900 | -10,700 | 31,200 | 31 |
| TOTAL | | | | | | | | | 94,000 | 468,700 | 562,700 | | | | | | | | 995,900 | |
| AVG. DAY | | | | | | | | | 3000 | 15,100 | 18,100 | | | 4800 | | | 24,400 | +6700 | 32,100 | |
| | | | | | | | | | Σ = 93,900 | 462,600 | 555,900 | | | 124,800 | | | 625,900 | 176,800 | 982,900 | |

11-00-1960: table of daily water use ; november, 1960

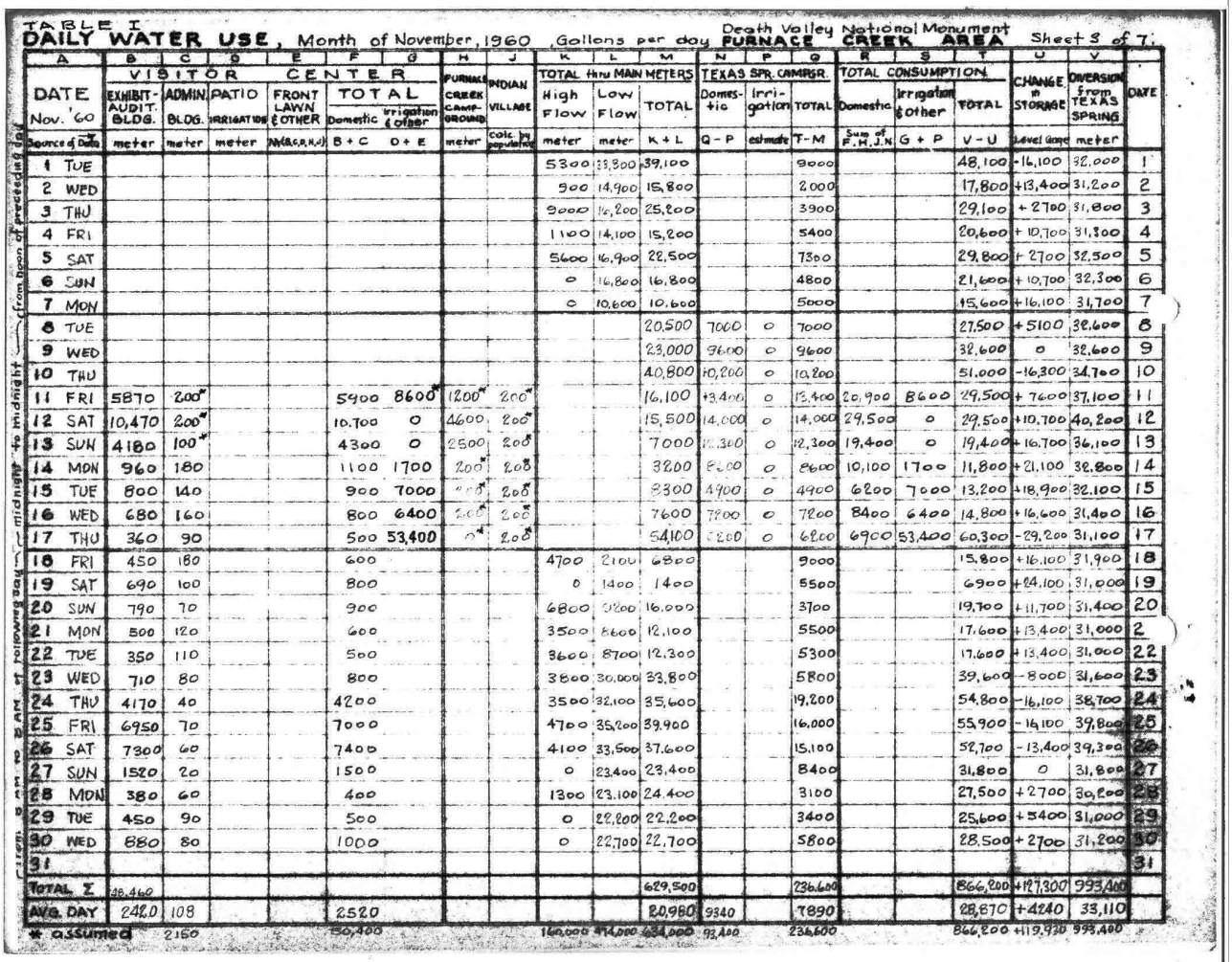


TABLE I

# DAILY WATER USE, Month of November, 1960 Gallons per day

Death Valley National Monument

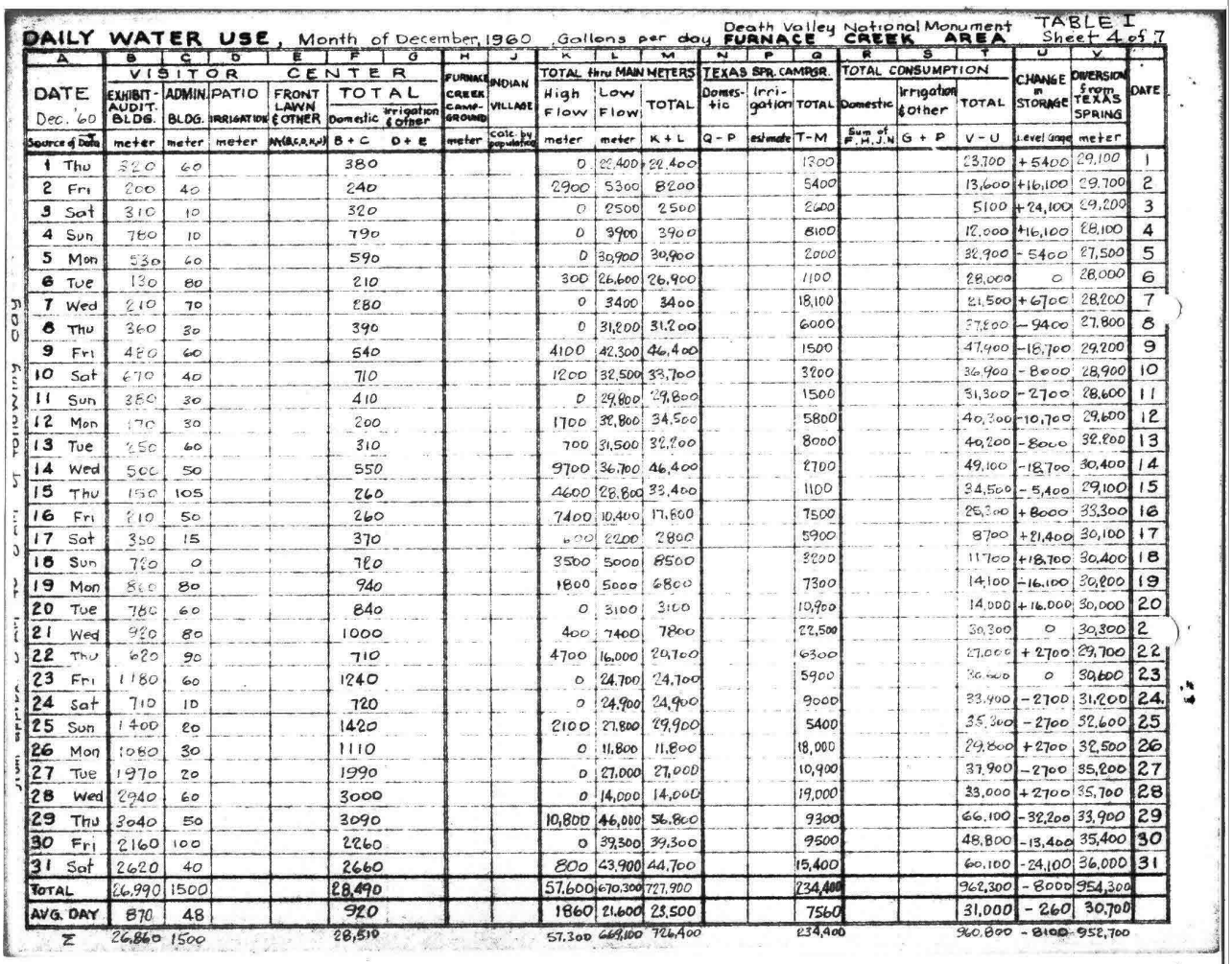
FURNACE CREEK AREA

Sheet 3 of 7

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Nov. '60 | VISITOR CENTER | | | | TOTAL | | FURNACE CREEK CAMP-GROUND | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | Domestic | Irrigation & other | | | High Flow | Low Flow | TOTAL | Domestic | Irrigation estimate | TOTAL | Domestic | Irrigation & other | TOTAL | | | |
| Source of Data | meter | meter | meter | N+(B,C,D,H,J) | B + C | D + E | meter | calc. by population | meter | meter | K + L | Q - P | | T - M | Sum of F.H.J.N | G + P | V - U | Level gage | meter | |
| 1 TUE | | | | | | | | | 5300 | 33,800 | 39,100 | | | 9000 | | | 48,100 | -14,100 | 32,000 | 1 |
| 2 WED | | | | | | | | | 900 | 14,900 | 15,800 | | | 2000 | | | 17,800 | +13,400 | 31,200 | 2 |
| 3 THU | | | | | | | | | 9000 | 16,200 | 25,200 | | | 3900 | | | 29,100 | + 2700 | 31,800 | 3 |
| 4 FRI | | | | | | | | | 1100 | 14,100 | 15,200 | | | 5400 | | | 20,600 | + 10,700 | 31,300 | 4 |
| 5 SAT | | | | | | | | | 5600 | 16,900 | 22,500 | | | 7300 | | | 29,800 | + 2700 | 32,500 | 5 |
| 6 SUN | | | | | | | | | 0 | 16,800 | 16,800 | | | 4800 | | | 21,600 | + 10,700 | 32,300 | 6 |
| 7 MON | | | | | | | | | 0 | 10,600 | 10,600 | | | 5000 | | | 15,600 | +16,100 | 31,700 | 7 |
| 8 TUE | | | | | | | | | | | 20,500 | 7000 | 0 | 7000 | | | 27,500 | + 5100 | 32,600 | 8 |
| 9 WED | | | | | | | | | | | 23,000 | 9600 | 0 | 9600 | | | 32,600 | 0 | 32,600 | 9 |
| 10 THU | | | | | | | | | | | 40,800 | 10,200 | 0 | 10,200 | | | 51,000 | -16,300 | 34,700 | 10 |
| 11 FRI | 5870 | 200* | | | 5900 | 8600* | 1200* | 200* | | | 16,100 | +3,400 | 0 | 13,400 | 20,900 | 8600 | 29,500 | + 7600 | 37,100 | 11 |
| 12 SAT | 10,470 | 200* | | | 10,700 | 0 | 4600 | 200* | | | 15,500 | 14,000 | 0 | 14,000 | 29,500 | 0 | 29,500 | +10,700 | 40,200 | 12 |
| 13 SUN | 4180 | 100* | | | 4300 | 0 | 2500 | 200* | | | 7000 | 12,300 | 0 | 12,300 | 19,400 | 0 | 19,400 | +16,700 | 36,100 | 13 |
| 14 MON | 960 | 180 | | | 1100 | 1700 | 200* | 200* | | | 3200 | 8600 | 0 | 8600 | 10,100 | 1700 | 11,800 | +21,100 | 32,800 | 14 |
| 15 TUE | 800 | 140 | | | 900 | 7000 | 200* | 200* | | | 8300 | 4900 | 0 | 4900 | 6200 | 7000 | 13,200 | +18,900 | 32,100 | 15 |
| 16 WED | 680 | 160 | | | 800 | 6400 | 200* | 200* | | | 7600 | 7800 | 0 | 7800 | 8400 | 6400 | 14,800 | +16,600 | 31,400 | 16 |
| 17 THU | 360 | 90 | | | 500 | 53,400 | 0* | 200* | | | 54,100 | 7800 | 0 | 6800 | 6900 | 53,400 | 60,300 | -29,200 | 31,100 | 17 |
| 18 FRI | 450 | 180 | | | 600 | | | | 4700 | 2100 | 6800 | | | 9000 | | | 15,800 | +16,100 | 31,900 | 18 |
| 19 SAT | 690 | 100 | | | 800 | | | | 0 | 1400 | 1400 | | | 5500 | | | 6900 | +24,100 | 31,000 | 19 |
| 20 SUN | 790 | 70 | | | 900 | | | | 6800 | 9200 | 16,000 | | | 3700 | | | 19,700 | +11,700 | 31,400 | 20 |
| 21 MON | 500 | 120 | | | 600 | | | | 3500 | 8600 | 12,100 | | | 5500 | | | 17,600 | +13,400 | 31,000 | 21 |
| 22 TUE | 350 | 110 | | | 500 | | | | 3600 | 8700 | 12,300 | | | 5300 | | | 17,600 | +13,400 | 31,000 | 22 |
| 23 WED | 710 | 80 | | | 800 | | | | 3800 | 30,000 | 33,800 | | | 5800 | | | 39,600 | -8000 | 31,600 | 23 |
| 24 THU | 4170 | 40 | | | 4200 | | | | 3500 | 32,100 | 35,600 | | | 19,200 | | | 54,800 | -16,100 | 38,700 | 24 |
| 25 FRI | 6950 | 70 | | | 7000 | | | | 4700 | 35,200 | 39,900 | | | 16,000 | | | 55,900 | -16,100 | 39,800 | 25 |
| 26 SAT | 7300 | 60 | | | 7400 | | | | 4100 | 33,500 | 37,600 | | | 15,100 | | | 52,700 | -13,400 | 39,300 | 26 |
| 27 SUN | 1520 | 20 | | | 1500 | | | | 0 | 23,400 | 23,400 | | | 8400 | | | 31,800 | 0 | 31,800 | 27 |
| 28 MON | 380 | 60 | | | 400 | | | | 1300 | 23,100 | 24,400 | | | 3100 | | | 27,500 | +2700 | 30,200 | 28 |
| 29 TUE | 450 | 90 | | | 500 | | | | 0 | 22,200 | 22,200 | | | 3400 | | | 25,600 | +5400 | 31,000 | 29 |
| 30 WED | 880 | 80 | | | 1000 | | | | 0 | 22,700 | 22,700 | | | 5800 | | | 28,500 | +2700 | 31,200 | 30 |
| 31 | | | | | | | | | | | | | | | | | | | | 31 |
| TOTAL Σ | 48,460 | | | | | | | | | | 629,500 | | | 236,600 | | | 866,200 | +127,300 | 993,400 | |
| AVG. DAY | 2420 | 108 | | | 2520 | | | | | | 20,980 | 9340 | | 7890 | | | 28,870 | +4240 | 33,110 | |
| * assumed | | 2160 | | | 50,400 | | | | 160,000 | 414,000 | 434,000 | 93,400 | | 236,600 | | | 866,200 | +119,930 | 993,400 | |

(from noon of preceding day — midnight to midnight — to noon of following day)

12-00-1960: table of daily water use ; december, 1960



DAILY WATER USE, Month of December, 1960 Gallons per day — Death Valley National Monument — FURNACE CREEK AREA — TABLE I Sheet 4 of 7

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Dec. '60 | VISITOR CENTER | | | | TOTAL | | FURNACE CREEK CAMP-GROUND | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | Domestic | Irrigation & Other | | | High Flow | Low Flow | TOTAL | Domestic | Irrigation | TOTAL | Domestic | Irrigation & Other | TOTAL | | | |
| Source of Data | meter | meter | meter | (A)(B,C,R,H,J) | B + C | D + E | meter | calc. by population | meter | meter | K + L | Q - P | estimate | T-M | Sum of F, H, J, N | G + P | V - U | Level Gage | meter | |
| 1 Thu | 320 | 60 | | | 380 | | | | 0 | 22,400 | 22,400 | | | 1300 | | | 23,700 | +5400 | 29,100 | 1 |
| 2 Fri | 200 | 40 | | | 240 | | | | 2900 | 5300 | 8200 | | | 5400 | | | 13,600 | +16,100 | 29,700 | 2 |
| 3 Sat | 310 | 10 | | | 320 | | | | 0 | 2500 | 2500 | | | 2600 | | | 5100 | +24,100 | 29,200 | 3 |
| 4 Sun | 780 | 10 | | | 790 | | | | 0 | 3900 | 3900 | | | 8100 | | | 12,000 | +16,100 | 28,100 | 4 |
| 5 Mon | 530 | 60 | | | 590 | | | | 0 | 30,900 | 30,900 | | | 2000 | | | 32,900 | -5400 | 27,500 | 5 |
| 6 Tue | 130 | 80 | | | 210 | | | | 300 | 26,600 | 26,900 | | | 1100 | | | 28,000 | 0 | 28,000 | 6 |
| 7 Wed | 210 | 70 | | | 280 | | | | 0 | 3400 | 3400 | | | 18,100 | | | 21,500 | +6700 | 28,200 | 7 |
| 8 Thu | 360 | 30 | | | 390 | | | | 0 | 31,800 | 31,200 | | | 6000 | | | 37,800 | -9400 | 27,800 | 8 |
| 9 Fri | 480 | 60 | | | 540 | | | | 4100 | 42,300 | 46,400 | | | 1500 | | | 47,900 | -18,700 | 29,200 | 9 |
| 10 Sat | 670 | 40 | | | 710 | | | | 1200 | 32,500 | 33,700 | | | 3900 | | | 36,900 | -8000 | 28,900 | 10 |
| 11 Sun | 380 | 30 | | | 410 | | | | 0 | 29,800 | 29,800 | | | 1500 | | | 31,300 | -2700 | 28,600 | 11 |
| 12 Mon | 170 | 30 | | | 200 | | | | 1700 | 32,800 | 34,500 | | | 5800 | | | 40,300 | -10,700 | 29,600 | 12 |
| 13 Tue | 250 | 60 | | | 310 | | | | 700 | 31,500 | 32,200 | | | 8000 | | | 40,200 | -8000 | 32,200 | 13 |
| 14 Wed | 500 | 50 | | | 550 | | | | 9700 | 36,700 | 46,400 | | | 2700 | | | 49,100 | -18,700 | 30,400 | 14 |
| 15 Thu | 150 | 105 | | | 260 | | | | 4600 | 28,800 | 33,400 | | | 1100 | | | 34,500 | -5,400 | 29,100 | 15 |
| 16 Fri | 210 | 50 | | | 260 | | | | 7400 | 10,400 | 17,800 | | | 7500 | | | 25,300 | +8000 | 33,300 | 16 |
| 17 Sat | 350 | 15 | | | 370 | | | | 600 | 2200 | 2800 | | | 5900 | | | 8700 | +21,400 | 30,100 | 17 |
| 18 Sun | 780 | 0 | | | 780 | | | | 3500 | 5000 | 8500 | | | 3200 | | | 11,700 | +18,700 | 30,400 | 18 |
| 19 Mon | 860 | 80 | | | 940 | | | | 1800 | 5000 | 6800 | | | 7300 | | | 14,100 | -16,100 | 30,800 | 19 |
| 20 Tue | 780 | 60 | | | 840 | | | | 0 | 3100 | 3100 | | | 10,900 | | | 14,000 | +16,000 | 30,000 | 20 |
| 21 Wed | 920 | 80 | | | 1000 | | | | 400 | 7400 | 7800 | | | 22,500 | | | 30,300 | 0 | 30,300 | 21 |
| 22 Thu | 620 | 90 | | | 710 | | | | 4700 | 16,000 | 20,700 | | | 6300 | | | 27,000 | +2700 | 29,700 | 22 |
| 23 Fri | 1180 | 60 | | | 1240 | | | | 0 | 24,700 | 24,700 | | | 5900 | | | 30,600 | 0 | 30,600 | 23 |
| 24 Sat | 710 | 10 | | | 720 | | | | 0 | 24,900 | 24,900 | | | 9000 | | | 33,900 | -2700 | 31,200 | 24 |
| 25 Sun | 1400 | 20 | | | 1420 | | | | 2100 | 27,800 | 29,900 | | | 5400 | | | 35,300 | -2700 | 32,600 | 25 |
| 26 Mon | 1080 | 30 | | | 1110 | | | | 0 | 11,800 | 11,800 | | | 18,000 | | | 29,800 | +2700 | 32,500 | 26 |
| 27 Tue | 1970 | 20 | | | 1990 | | | | 0 | 27,000 | 27,000 | | | 10,900 | | | 37,900 | -2700 | 35,200 | 27 |
| 28 Wed | 2940 | 60 | | | 3000 | | | | 0 | 14,000 | 14,000 | | | 19,000 | | | 33,000 | +2700 | 35,700 | 28 |
| 29 Thu | 3040 | 50 | | | 3090 | | | | 10,800 | 46,000 | 56,800 | | | 9300 | | | 66,100 | -32,200 | 33,900 | 29 |
| 30 Fri | 2160 | 100 | | | 2260 | | | | 0 | 39,300 | 39,300 | | | 9500 | | | 48,800 | -13,400 | 35,400 | 30 |
| 31 Sat | 2620 | 40 | | | 2660 | | | | 800 | 43,900 | 44,700 | | | 15,400 | | | 60,100 | -24,100 | 36,000 | 31 |
| TOTAL | 26,990 | 1500 | | | 28,490 | | | | 57,600 | 670,300 | 727,900 | | | 234,400 | | | 962,300 | -8000 | 954,300 | |
| AVG. DAY | 870 | 48 | | | 920 | | | | 1860 | 21,600 | 23,500 | | | 7560 | | | 31,000 | -260 | 30,700 | |
| Σ | 26,860 | 1500 | | | 28,510 | | | | 57,300 | 669,100 | 726,400 | | | 234,400 | | | 960,800 | -8100 | 952,700 | |

ROOM NUMBER 5 ON 2ND FLOOR

01-00-1961: table of daily water use ; january, 1961

# DAILY WATER USE, Month of January 1961, Gallons per day — Death Valley National Monument — FURNACE CREEK AREA — Table I, Sheet 5 of 7

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Jan. '61 | VISITOR CENTER | | | | | | FURNACE CREEK CAMP-GROUND | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | TOTAL Domestic | TOTAL Irrigation & other | | | High Flow | Low Flow | TOTAL | Domestic | Irrigation | TOTAL | Domestic | Irrigation & other | TOTAL | | | |
| Source & Date | meter | meter | meter | (A+B+C+D+E) | B+C | D+E | meter | calc. by equations | meter | meter | K+L | Q-P | estimate | T-M | Sum of F, H, J, N | G+P | V-U | Level Gage | meter | |
| 1 Sun | 2760 | 20 | | | 2780 | | | | 0 | 14,300 | 14,300 | | | 9500 | | | 23,800 | +10,800 | 34,600 | 1 |
| 2 Mon | 1150 | 0 | | | 1150 | | | | 7600 | 6200 | 13,800 | | | 2900 | | | 16,700 | +13,400 | 30,100 | 2 |
| 3 Tue | 380 | 50 | | | 430 | | | | 0 | 600 | 600 | | | 3600 | | | 4200 | +24,100 | 28,300 | 3 |
| 4 Wed | 670 | 40 | | | 710 | | | | 6700 | 2400 | 9100 | | | 2500 | | | 11600 | +16,100 | 27,700 | 4 |
| 5 Thu | 320 | 50 | | | 370 | | | | 5900 | 6500 | 12,400 | | | 11,100 | | | 23,500 | +5400 | 28,900 | 5 |
| 6 Fri | 280 | 40 | | | 320 | | | | 0 | 23,300 | 23,300 | | | 5200 | | | 28,500 | 0 | 28,500 | 6 |
| 7 Sat | 420* | 30* | | | 450 | | | | 100* | 20,500* | 20,600 | | | 7800 | | | 28,400 | 0 | 28,400 | – |
| 8 Sun | 420 | 30* | Meter Installed Jan. 17 | | 450 | | | | 100 | 20,600* | 20,700 | | | 7800 | | | 28,500 | 0 | 28,500 | 8 |
| 9 Mon | 340 | 80 | | | 420 | | | | 0 | 20,400 | 20,400 | | | 8600 | | | 29,000 | 0 | 29,000 | 9 |
| 10 Tue | 540 | 120 | | | 660 | | | | 0 | 36,000 | 36,000 | | | 300 | | | 36,300 | -8000 | 28,300 | 10 |
| 11 Wed | 580 | 120 | | | 700 | | | | 12,300 | 42,900 | 55,200 | | | 5800 | | | 61,000 | -32,200 | 28,800 | 11 |
| 12 Thu | 550 | 70 | | | 620 | | | | 0 | 10,200 | 10,200 | | | 4200 | | | 14,400 | +16,100 | 30,500 | 12 |
| 13 Fri | 150 | 60 | | | 210 | | | | 0 | 7800 | 7800 | | | 4900 | | | 12,700 | +16,100 | 28,800 | 13 |
| 14 Sat | 480 | 0 | | | 480 | | | | 5500 | 19,400 | 24,900 | | | 1500 | | | 26,400 | +2800* | 29,200 | 14 |
| 15 Sun | 630 | 20 | | | 650 | | | | 13,800 | 16,800 | 30,600 | | | 1500 | | | 32,100 | -2800* | 29,300 | 15 |
| 16 Mon | 260 | 60 | | | 320 | | | | 2100 | 15,700 | 17,800 | | | 5500 | | | 23,300 | +5400 | 28,700 | 16 |
| 17 Tue | 240 | 70 | 5400* | | 310 | | | | 12,900 | 46,000 | 58,900 | | | 6300 | | | 65,200 | -37,500 | 27,700 | 17 |
| 18 Wed | 600 | 60 | 0* | | 660 | | | | 10,700 | 32,500 | 43,200 | | | 5400 | | | 31,200 | 0 | 31,200 | 18 |
| 19 Thu | 600 | 60 | 900 | | 660 | | | | 1900 | 20,600 | 22,500 | | | 5400 | | | 45,300 | -16,100 | 29,200 | 19 |
| 20 Fri | 400 | 30 | 0 | | 430 | | | | 0 | 8900 | 8900 | | | 5100 | | | 14,000 | +16,100 | 30,100 | 20 |
| 21 Sat | 300 | 40 | 0 | | 340 | | | | 0 | 10,800 | 10,800 | | | 2000 | | | 8200 | +21,400 | 29,600 | 2 |
| 22 Sun | 1200 | 30 | 0 | | 1230 | | | | 600 | 19,600 | 20,200 | | | 2100 | | | 26,900 | +2700 | 29,600 | 22 |
| 23 Mon | 600 | 50 | 3300 | | 650 | | | | 4200 | 17,400 | 21,600 | | | 1800 | | | 23,400 | +5400 | 28,800 | 23 |
| 24 Tue | 400 | 50 | 0 | | 450 | | | | 0 | 9700 | 9700 | | | 8100 | | | 17,800 | +10,700 | 28,500 | 24 |
| 25 Wed | 400 | 50 | 0 | | 450 | | | | 2500 | 26,500 | 29,000 | | | 5800 | | | 34,800 | -5400 | 29,400 | 25 |
| 26 Thu | 500 | 80 | 7500 | | 580 | | | | 4300 | 23,600 | 27,900 | | | 5300 | | | 33,200 | -2700 | 30,500 | 26 |
| 27 Fri | 500 | 80 | 0 | | 580 | | | | 0 | 21,100 | 21,100 | | | 3700 | | | 24,800 | +5400 | 30,200 | 27 |
| 28 Sat | 700 | 10 | 0 | | 710 | | | | 0 | 20,300 | 20,300 | | | 6500 | | | 26,800 | +2700 | 29,500 | 28 |
| 29 Sun | 900* | 30* | 0 | | 930 | | | | 0 | 51,400* | 51,400 | | | 7200 | | | 58,600 | -28,500* | 30,100 | 29 |
| 30 Mon | 500 | 100 | 5700 | | 600 | | | | 5800 | 51,400 | 57,200 | | | 1600 | | | 58,800 | -28,600* | 30,200 | 30 |
| 31 Tue | 500 | 60 | 0 | | 560 | | | | 0 | 50,700 | 50,700 | | | 7900 | | | 58,600 | -28,600* | 30,000 | 31 |
| TOTAL from meter | 18,270 | 1590 | 22,800 | | 19,860 | | | | 96,900 | 674,100 | 771,000 | | | 157,200 | | | 928,200 | -16,100 | 912,100 | |
| AVG. DAY | 590 | 51 | 1520 | | 640 | | | | 3100 | 21,700 | 24,800 | | | 5100 | | | 29,900 | -500 | 29,400 | |
| *assumed ① adjusted | 18270 | 1590 | 22,800 | | 19860 | | | | 97,000 | 674,100 | 771,100 | | | 156,900 ① | | | 928,000 | | 912,000 | |

02-00-1961: table of daily water use ; feburary, 1961

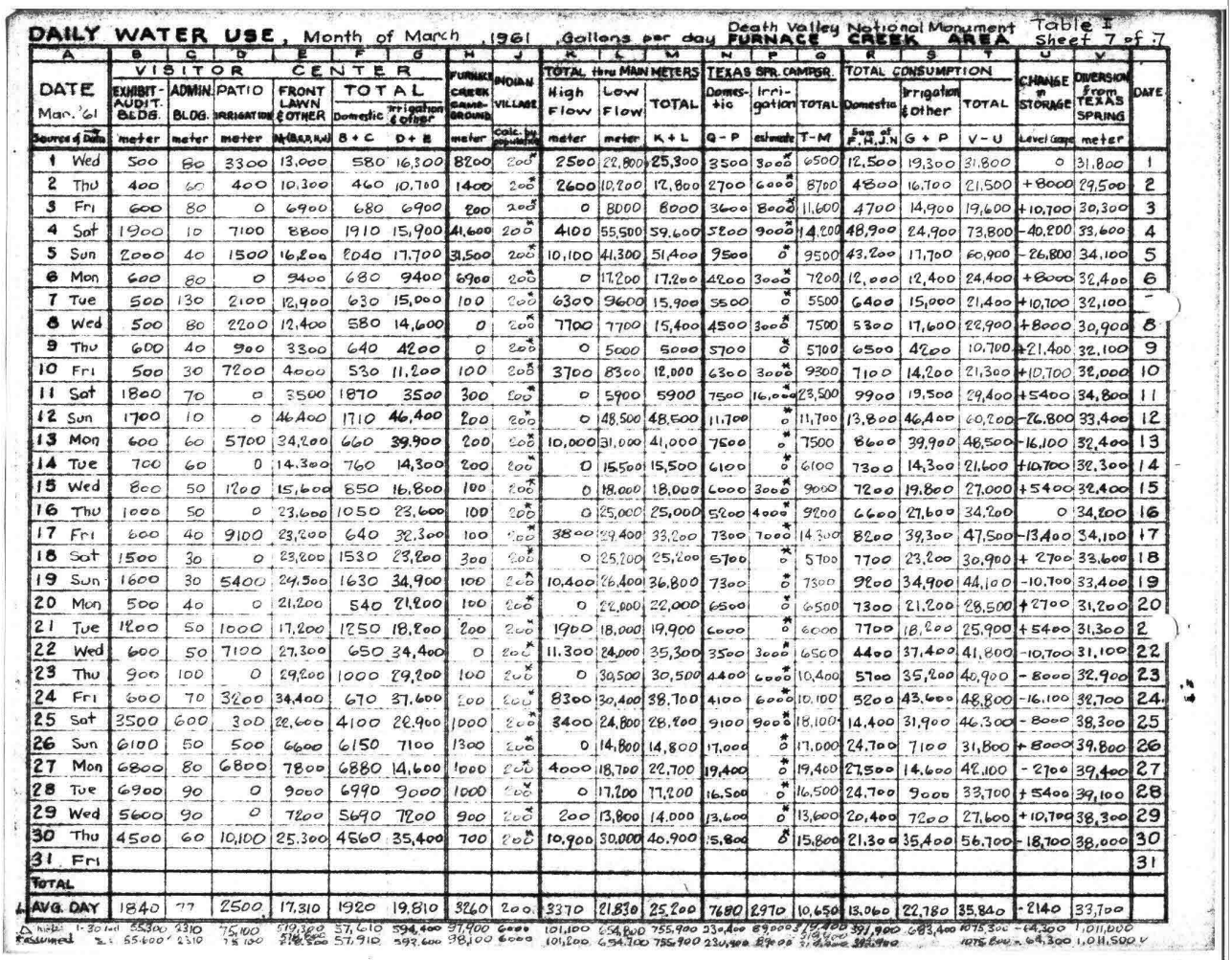
# DAILY WATER USE, Month of February, 1961, Gallons per day

Death Valley National Monument — FURNACE CREEK AREA — Table I — Sheet 6 of 7

Quantity of water from 0 AM on named date to 0 AM of following day

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Feb. '61 | VISITOR CENTER | | | | | | FURNACE CREEK CAMP-GROUND | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | TOTAL Domestic | Irrigation & other | | | High Flow | Low Flow | TOTAL | Domes-tic | Irri-gation | TOTAL | Domestic | Irrigation & other | TOTAL | | | |
| Source of Data | meter | meter | meter | Nos (B,C,D,E,H,J) | B + C | D + E | meter | calc. by population | meter | meter | K + L | Q - P | estimate | T - M | Sum of F, H, J, N | G + P | V - U | Level gage | meter | |
| 1 Wed | 300 | 100 | 0 | | 400 | | | | 0 | 2500 | 2500 | | | 700 | | | 3200 | +26,800 | 30,000 | 1 |
| 2 Thu | 500 | 130 | 0 | | 630 | | | | 0 | 2200 | 2200 | | | 3100 | | | 5300 | +24,100 | 29,400 | 2 |
| 3 Fri | 400 | 70 | 0 | | 470 | | | | 0 | 2800 | 2800 | | | 2600 | | | 4800 | +24,100 | 28,900 | 3 |
| 4 Sat | 500 | 40 | 0 | | 540 | | | | 0 | 2800 | 2800 | | | 16,500 | | | 19,300 | +10,700 | 30,000 | 4 |
| 5 Sun | 800 | 40 | 6200 | | 840 | | | | 10,200 | 40,800 | 51,000 | | | 3900 | | | 54,900 | -24,100 | 30,800 | 5 |
| 6 Mon | 700 | 80 | 800 | | 780 | | | | 5400 | 24,500 | 29,900 | | | 5200 | | | 35,100 | -5400 | 29,700 | 6 |
| 7 Tue | 500 | 310 | 0 | | 810 | | | | 5900 | 22,700 | 28,600 | | | 5200 | | | 33,800 | -2700 | 31,100 | |
| 8 Wed | 400 | 80 | 0 | | 480 | | | | 0 | 18,400 | 18,400 | | | 5300 | | | 23,700 | +8000 | 31,700 | 8 |
| 9 Thu | 700 | 80 | 13,800 | | 780 | | | | 20,200 | 25,500 | 45,700 | | | 3900 | | | 49,600 | -18,700 | 30,900 | 9 |
| 10 Fri | 400 | 60 | 0 | | 460 | | | | 0 | 17,700 | 17,700 | | | 12,600 | | | 30,300 | +2700 | 33,000 | 10 |
| 11 Sat | 1500 | 30 | 0 | | 1530 | | | | 0 | 18,600 | 18,600 | | | 6600 | | | 25,200 | +8000 | 33,200 | 11 |
| 12 Sun | 2700 | 40 | 0 | | 2740 | | | | 0 | 19,400 | 19,400 | | | 9200 | | | 28,600 | +5400 | 34,000 | 12 |
| 13 Mon | 800 | 80 | 0 | | 880 | | | | 0 | 16,400 | 16,400 | | | 6700 | | | 23,100 | +8000 | 31,100 | 13 |
| 14 Tue | 800 | 60 | 2400 | | 860 | | | | 10,400 | 20,700 | 31,100 | | | 5900 | | | 37,000 | -5400 | 31,600 | 14 |
| 15 Wed | 500 | 80 | 0 | | 580 | | | | 0 | 15,900 | 15,900 | | | 3500 | | | 19,400 | +10,700 | 30,100 | 15 |
| 16 Thu | 800 | 60 | 0 | | 860 | | | | 0 | 29,900 | 29,900 | | | 5000 | | | 45,400 | -16,100 | 29,300 | 16 |
| 17 Fri | 600 | 70 | 7100 | | 670 | | | | 5800 | 41,400 | 47,200 | | | 5100 | | | 41,800 | -10,700 | 31,100 | 17 |
| 18 Sat | 1000 | 40 | 0 | | 1040 | | | | 0 | 31,300 | 31,300 | | | 4900 | | | 36,200 | -5400 | 30,800 | 18 |
| 19 Sun | 900 | 40 | 8100 | | 940 | | | | 23,600 | 36,700 | 60,300 | | | 6300 | | | 66,600 | -34,800 | 31,800 | 19 |
| 20 Mon | 600 | 50 | 6000 | | 650 | | | | 800 | 12,300 | 13,100 | | | 4700 | | | 17,800 | +13,400 | 31,200 | 20 |
| 21 Tue | 600 | 70 | 0 | | 670 | | | | 15,500 | 19,200 | 34,700 | | | 3600 | | | 38,300 | -8000 | 30,300 | 2 |
| 22 Wed | 900 | 30 | 100 | | 930 | | | | 0 | 9800 | 9800 | | | 4800 | | | 14,600 | +16,100 | 30,700 | 22 |
| 23 Thu | 700 | 160 | 1400 | | 860 | | | | 0 | 10,400 | 10,400 | | | 3100 | | | 13,500 | +16,100 | 29,600 | 23 |
| 24 Fri | 400 | 50 | 7100 | | 450 | | | | 3700 | 11,600 | 15,300 | | | 13,700 | | | 29,000 | +2700 | 31,700 | 24 |
| 25 Sat | 1400 | 30 | 0 | | 1430 | | | | 0 | 10,100 | 10,100 | | | 4200 | | | 14,300 | +18,700 | 33,000 | 25 |
| 26 Sun | 1200 | 50 | 0 | | 1250 | | | | 0 | 8500 | 8500 | | | 1900 | | | 10,400 | +18,700 | 29,100 | 26 |
| 27 Mon | 400 | 50 | 0 | | 450 | | | | 7600 | 29,800 | 37,400 | | | 2300 | | | 39,700 | -10,700 | 29,000 | 27 |
| 28 Tue | 500 | 90 | 1600 | | 590 | | | | 600 | 25,400 | 26,000 | | | 7800 | | | 33,800 | -2700 | 31,100 | 28 |
| 29 | | | | | | | | | | | | | | | | | | | | 29 |
| 30 | | | | | | | | | | | | | | | | | | | | 30 |
| 31 | | | | | | | | | | | | | | | | | | | | 31 |
| TOTAL per meter | 21,500 | 2070 | 54,600 | | 23,570 | | | | 109,500 | 526,700 | 636,200 | | | 158,300 | | | 794,500 | +69,700 | 864,200 | |
| AVG. DAY | 770 | 74 | 1950 | | 840 | | | | 3900 | 18,800 | 22,700 | | | 5700 | | | 28,400 | +2500 | 30,900 | |
| *adjusted | 21,500 | 2070 | 54,600 | | 23,570 / 21,570 | | | | 109,700 | 526,700 | 636,400 / 636,400 | | | 158,300 / 158,300 | | | 794,700 | 69,500 | 864,200 | |

03-00-1961: table of daily water use ; march, 1961



DAILY WATER USE, Month of March 1961, Gallons per day — Death Valley National Monument — FURNACE CREEK AREA — Table I, Sheet 7 of 7

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE Mar. '61 | VISITOR CENTER | | | | TOTAL | | FURNACE CREEK GROUNDS | INDIAN VILLAGE | TOTAL thru MAIN METERS | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | DATE |
| | EXHIBIT-AUDIT. BLDG. | ADMIN. BLDG. | PATIO IRRIGATION | FRONT LAWN & OTHER | Domestic | Irrigation & Other | | | High Flow | Low Flow | TOTAL | Domestic | Irrigation* | TOTAL | Domestic | Irrigation & Other | TOTAL | | | |
| Source of Data | meter | meter | meter | | B + C | D + E | meter | Calc. by equation | meter | meter | K + L | Q - P | estimate | T - M | Sum of F, H, J, N | G + P | V - U | Level Gage | meter | |
| 1 Wed | 500 | 80 | 3300 | 13,000 | 580 | 16,300 | 8200 | 200* | 2500 | 22,800 | 25,300 | 3500 | 3000* | 6500 | 12,500 | 19,300 | 31,800 | 0 | 31,800 | 1 |
| 2 Thu | 400 | 60 | 400 | 10,300 | 460 | 10,700 | 1400 | 200* | 2600 | 10,200 | 12,800 | 2700 | 6000* | 8700 | 4800 | 16,700 | 21,500 | +8000 | 29,500 | 2 |
| 3 Fri | 600 | 80 | 0 | 6900 | 680 | 6900 | 800 | 200* | 0 | 8000 | 8000 | 3600 | 8000* | 11,600 | 4700 | 14,900 | 19,600 | +10,700 | 30,300 | 3 |
| 4 Sat | 1900 | 10 | 7100 | 8800 | 1910 | 15,900 | 41,600 | 200* | 4100 | 55,500 | 59,600 | 5800 | 9000* | 14,800 | 48,900 | 24,900 | 73,800 | -40,200 | 33,600 | 4 |
| 5 Sun | 2000 | 40 | 1500 | 16,200 | 2040 | 17,700 | 31,500 | 200* | 10,100 | 41,300 | 51,400 | 9500 | 0* | 9500 | 43,200 | 17,700 | 60,900 | -26,800 | 34,100 | 5 |
| 6 Mon | 600 | 80 | 0 | 9400 | 680 | 9400 | 6900 | 200* | 0 | 17,200 | 17,200 | 4200 | 3000* | 7200 | 12,000 | 12,400 | 24,400 | +8000 | 32,400 | 6 |
| 7 Tue | 500 | 130 | 2100 | 12,900 | 630 | 15,000 | 100 | 200* | 6300 | 9600 | 15,900 | 5500 | 0* | 5500 | 6400 | 15,000 | 21,400 | +10,700 | 32,100 | 7 |
| 8 Wed | 500 | 80 | 2200 | 12,400 | 580 | 14,600 | 0 | 200* | 7700 | 7700 | 15,400 | 4500 | 3000* | 7500 | 5300 | 17,600 | 22,900 | +8000 | 30,900 | 8 |
| 9 Thu | 600 | 40 | 900 | 3300 | 640 | 4200 | 0 | 200* | 0 | 5000 | 5000 | 5700 | 0* | 5700 | 6500 | 4200 | 10,700 | +21,400 | 32,100 | 9 |
| 10 Fri | 500 | 30 | 7200 | 4000 | 530 | 11,200 | 100 | 200* | 3700 | 8300 | 12,000 | 6300 | 3000* | 9300 | 7100 | 14,200 | 21,300 | +10,700 | 32,000 | 10 |
| 11 Sat | 1800 | 70 | 0 | 3500 | 1870 | 3500 | 300 | 200* | 0 | 5900 | 5900 | 7500 | 16,000* | 23,500 | 9900 | 19,500 | 29,400 | +5400 | 34,800 | 11 |
| 12 Sun | 1700 | 10 | 0 | 46,400 | 1710 | 46,400 | 200 | 200* | 0 | 48,500 | 48,500 | 11,700 | 0* | 11,700 | 13,800 | 46,400 | 60,200 | -26,800 | 33,400 | 12 |
| 13 Mon | 600 | 60 | 5700 | 34,200 | 660 | 39,900 | 200 | 200* | 10,000 | 31,000 | 41,000 | 7500 | 0* | 7500 | 8600 | 39,900 | 48,500 | -16,100 | 32,400 | 13 |
| 14 Tue | 700 | 60 | 0 | 14,300 | 760 | 14,300 | 200 | 200* | 0 | 15,500 | 15,500 | 6100 | 0* | 6100 | 7300 | 14,300 | 21,600 | +10,700 | 32,300 | 14 |
| 15 Wed | 800 | 50 | 1200 | 15,600 | 850 | 16,800 | 100 | 200* | 0 | 18,000 | 18,000 | 6000 | 3000* | 9000 | 7200 | 19,800 | 27,000 | +5400 | 32,400 | 15 |
| 16 Thu | 1000 | 50 | 0 | 23,600 | 1050 | 23,600 | 100 | 200* | 0 | 25,000 | 25,000 | 5200 | 4000* | 9200 | 6600 | 27,600 | 34,200 | 0 | 34,200 | 16 |
| 17 Fri | 600 | 40 | 9100 | 23,200 | 640 | 32,300 | 100 | 200* | 3800 | 29,400 | 33,200 | 7300 | 7000* | 14,300 | 8200 | 39,300 | 47,500 | -13,400 | 34,100 | 17 |
| 18 Sat | 1500 | 30 | 0 | 23,200 | 1530 | 23,200 | 300 | 200* | 0 | 25,200 | 25,200 | 5700 | 0* | 5700 | 7700 | 23,200 | 30,900 | +2700 | 33,600 | 18 |
| 19 Sun | 1600 | 30 | 5400 | 29,300 | 1630 | 34,900 | 100 | 200* | 10,400 | 26,400 | 36,800 | 7300 | 0* | 7300 | 9200 | 34,900 | 44,100 | -10,700 | 33,400 | 19 |
| 20 Mon | 500 | 40 | 0 | 21,200 | 540 | 21,800 | 100 | 200* | 0 | 22,000 | 22,000 | 6500 | 0* | 6500 | 7300 | 21,200 | 28,500 | +2700 | 31,200 | 20 |
| 21 Tue | 1200 | 50 | 1000 | 17,200 | 1250 | 18,800 | 200 | 200* | 1900 | 18,000 | 19,900 | 6000 | 0* | 6000 | 7700 | 18,200 | 25,900 | +5400 | 31,300 | 21 |
| 22 Wed | 600 | 50 | 7100 | 27,300 | 650 | 34,400 | 0 | 200* | 11,300 | 24,000 | 35,300 | 3500 | 3000* | 6500 | 4400 | 37,400 | 41,800 | -10,700 | 31,100 | 22 |
| 23 Thu | 900 | 100 | 0 | 29,200 | 1000 | 29,200 | 100 | 200* | 0 | 30,500 | 30,500 | 4400 | 6000* | 10,400 | 5700 | 35,200 | 40,900 | -8000 | 32,900 | 23 |
| 24 Fri | 600 | 70 | 3200 | 34,400 | 670 | 37,600 | 200 | 200* | 8300 | 30,400 | 38,700 | 4100 | 6000* | 10,100 | 5200 | 43,600 | 48,800 | -16,100 | 32,700 | 24 |
| 25 Sat | 3500 | 600 | 300 | 22,600 | 4100 | 22,900 | 1000 | 200* | 3400 | 24,800 | 28,200 | 9100 | 9000* | 18,100 | 14,400 | 31,900 | 46,300 | -8000 | 38,300 | 25 |
| 26 Sun | 6100 | 50 | 500 | 6600 | 6150 | 7100 | 1300 | 200* | 0 | 14,800 | 14,800 | 17,000 | 0* | 17,000 | 24,700 | 7100 | 31,800 | +8000 | 39,800 | 26 |
| 27 Mon | 6800 | 80 | 6800 | 7800 | 6880 | 14,600 | 1000 | 200* | 4000 | 18,700 | 22,700 | 19,400 | 0* | 19,400 | 27,500 | 14,600 | 42,100 | -2700 | 39,400 | 27 |
| 28 Tue | 6900 | 90 | 0 | 9000 | 6990 | 9000 | 1000 | 200* | 0 | 17,200 | 17,200 | 16,500 | 0* | 16,500 | 24,700 | 9000 | 33,700 | +5400 | 39,100 | 28 |
| 29 Wed | 5600 | 90 | 0 | 7200 | 5690 | 7200 | 900 | 200* | 200 | 13,800 | 14,000 | 13,600 | 0* | 13,600 | 20,400 | 7200 | 27,600 | +10,700 | 38,300 | 29 |
| 30 Thu | 4500 | 60 | 10,100 | 25,300 | 4560 | 35,400 | 700 | 200* | 10,900 | 30,000 | 40,900 | 15,800 | 0* | 15,800 | 21,300 | 35,400 | 56,700 | -18,700 | 38,000 | 30 |
| 31 Fri | | | | | | | | | | | | | | | | | | | | 31 |
| TOTAL | | | | | | | | | | | | | | | | | | | | |
| AVG. DAY | 1840 | 77 | 2500 | 17,310 | 1920 | 19,810 | 3260 | 200 | 3370 | 21,830 | 25,200 | 7680 | 2970 | 10,650 | 13,060 | 22,780 | 35,840 | -2140 | 33,700 | |
| Δ high: 1-30 Mar | 55,300 | 4310 | 75,100 | 519,300 | 57,610 | 594,400 | 97,900 | 6000 | 101,100 | 654,900 | 755,900 | 234,400 | 89,000 | 319,400 | 391,900 | 683,400 | 1075,300 | -64,300 | 1,011,000 | |
| Assumed 2-31 | 55,600 | 2310 | 75,100 | 516,800 | 57,910 | 592,600 | 98,100 | 6000 | 101,200 | 654,700 | 755,900 | 234,400 | 89,000 | 319,400 | 391,900 | 683,400 | 1075,300 | -64,300 | 1,011,500 | |

TABLE II

# SUMMARY AVERAGE DAILY WATER USE · Gallons per day

Death Valley National Monument
FURNACE CREEK AREA

Sheet 1 of 1
L. Spaulding
Sept. 5, 1961

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | VISITOR CENTER | | | | | | FURNACE CR. Camp-ground | INDIAN VILLAGE | TOTAL thru MAIN METER | | | TEXAS SPR. CAMPGR. | | | TOTAL CONSUMPTION | | | CHANGE in STORAGE | DIVERSION from TEXAS SPRING | MONTH |
| | EXHIBIT AUDIT. BLDG. | ADMIN. BLDG. | PATIO Irrigation | FRONT LAWN & OTHER | TOTAL Domestic B+C | TOTAL Irrigation & other | | | High Flow | Low Flow | TOTAL | Domes-tic | Irri-gation | TOTAL | Domestic | Irrigation & other | TOTAL | | | |
| Source of data | meter | meter | meter | M less the sum B,C,D,F | ~~B less the sum B,C,D~~ | D + E | meter | est. | 4" meter | 1½" meter | K + L | Q - P | estimate | T - M | Sum of F,H,J,N | G + P | V - U | level gage | meter | |
| 1960 AUG. | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | AUG |
| SEP. | * | * | * | * | * | * | * | * | * | * | 42,400 ⑤ | * | * | * | * | * | * | * | 33,600 ③ | SEP |
| OCT. | * | * | * | * | * | * | * | * | 3000 | 15,100 | 18,100 | * | * | 4800 | * | * | 24,400 | +6700 | 32,100 | OCT. |
| NOV. | 2420 ④ | 108 ④ | * | * | 2520 | 11,000 ① | 1270 ② | 200 | * | * | 21,000 | 9340 ⑤ | * | 7890 | * | * | 28,900 | +4200 | 33,100 | NOV |
| DEC. | 870 | 48 | * | * | 920 | * | * | * | 1900 | 21,600 | 23,500 | * | * | 7560 | * | * | 31,000 | - 300 | 30,700 | DEC |
| Average last Qtr. '60 | | | | | | | | | | | | | | | | | | | | |
| 1961 JAN. | 590 | 51 | 1520 | * | 640 | * | ~~3190~~ * | * | 3100 | 21,700 | 24,800 | * | * | 5100 | * | * | 29,900 | - 500 | 29,400 | JAN |
| FEB. | 770 | 74 | 1950 | * | 840 | * | * | * | 3900 | 18,800 | 22,700 | * | * | 5700 | * | * | 28,400 | +2500 | 30,900 | FEB |
| MAR | 1840 | 77 | 2500 | 17,300 | 1920 | 19,800 | 3260 | 200 | 3370 | 21,800 | 25,200 | 7680 | 2970 | 10,650 | 13,060 | 22,780 | 35,840 | -2100 | 33,700 | MAR |
| APR. | | | | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | |
| Average 1961 | | | | | | | | | | | | | | | | | | | | |

① 7 day average during '49er encampment
② 10 " " " "
③ 8 day average

* Quantity not recorded
⑤ 20 day average

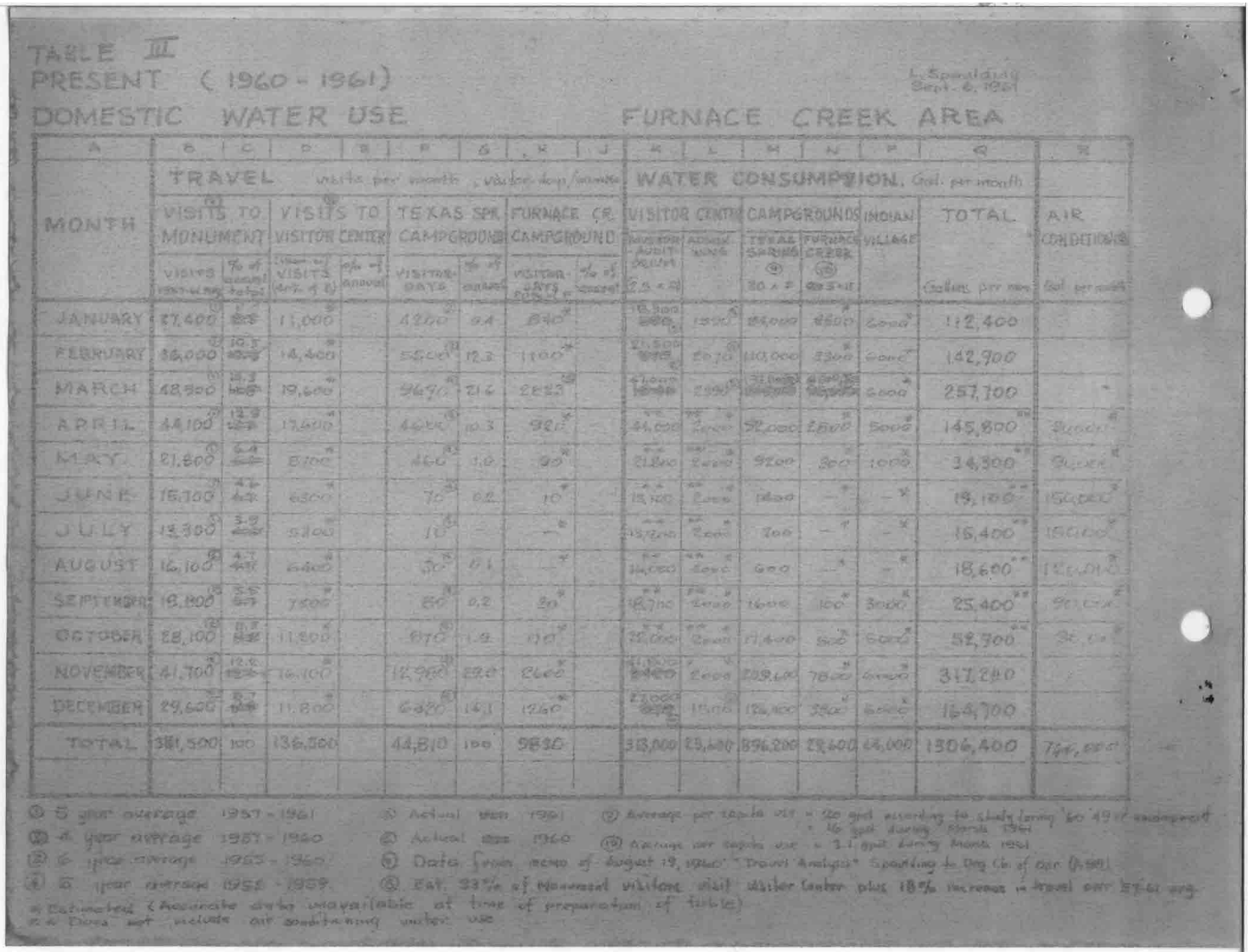


TABLE III

PRESENT (1960 - 1961)

L. Spaulding Sept. 6, 1961

DOMESTIC WATER USE FURNACE CREEK AREA

| A | B | C | D | E | F | G | K | J | K | L | M | N | P | Q | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | TRAVEL visits per month, visitor-days/month | | | | | | | | WATER CONSUMPTION, Gal. per month | | | | | | |
| | VISITS TO MONUMENT | | VISITS TO VISITOR CENTER | | TEXAS SPR. CAMPGROUND | | FURNACE CR. CAMPGROUND | | VISITOR CENTER | | CAMPGROUNDS | | INDIAN VILLAGE | TOTAL | AIR CONDITIONING |
| | VISITS | % of annual total | (Incl. in B) VISITS (incl. in B) | % of annual | VISITOR-DAYS | % of annual | VISITOR-DAYS (Incl. in F) | % of annual | WATER AUDIT (Incl. in K) | ACTUAL USE | TEXAS SPRINGS (Incl. in M) | FURNACE CREEK (Incl. in M) | | Gallons per mo. | Gal. per month |
| JANUARY | 17,400 | | 11,000 | | 4200 | 9.4 | 840 | | 18,300 | 1300 | 84,000 | 8500 | 6000 | 112,400 | |
| FEBRUARY | 16,000 | 10.5 | 14,400 | | 5500 | 12.3 | 1100 | | 21,500 | 2070 | 110,000 | 3300 | 6000 | 142,900 | |
| MARCH | 48,300 | 13.3 | 19,600 | | 9690 | 21.6 | 2823 | | 41,000 | 2390 | | | 6000 | 257,700 | |
| APRIL | 44,100 | 12.9 | 17,600 | | 4644 | 10.3 | 981 | | 44,000 | 2700 | 92,000 | 2600 | 5000 | 145,800 | 21,000 |
| MAY | 21,800 | 6.4 | 8700 | | 460 | 1.0 | 90 | | 21,800 | 2490 | 9200 | 300 | 1000 | 34,300 | 91,000 |
| JUNE | 16,700 | 4.9 | 6500 | | 70 | 0.2 | 10 | | 19,100 | 2200 | 1400 | — | — | 19,100 | 150,000 |
| JULY | 13,300 | 3.9 | 5300 | | 10 | — | — | | 13,200 | 2200 | 700 | — | — | 16,400 | 150,000 |
| AUGUST | 16,100 | 4.7 | 6400 | | 30 | 0.1 | — | | 14,000 | 2200 | 600 | — | — | 18,600 | 172,000 |
| SEPTEMBER | 18,900 | 5.5 | 7500 | | 60 | 0.2 | 30 | | 18,700 | 2200 | 1600 | 100 | 3000 | 25,400 | 90,000 |
| OCTOBER | 28,100 | 8.2 | 11,200 | | 870 | 1.9 | 110 | | 25,000 | 2200 | 11,400 | 500 | 6000 | 52,300 | 30,000 |
| NOVEMBER | 41,700 | 12.2 | 16,100 | | 12,960 | 29.0 | 2660 | | 41,500 | 2200 | 239,600 | 7800 | 6000 | 317,240 | |
| DECEMBER | 29,600 | 8.7 | 11,800 | | 6480 | 14.3 | 1240 | | 23,000 | 15,000 | 124,400 | 3200 | 6000 | 164,700 | |
| TOTAL | 341,500 | 100 | 136,500 | | 44,810 | 100 | 9830 | | 313,000 | 23,600 | 896,200 | 29,600 | 64,000 | 1306,400 | 744,000 |

① 5 year average 1957 - 1961
② 4 year average 1957 - 1960
③ 6 year average 1955 - 1960
④ 5 year average 1955 - 1959
⑤ Actual use 1961
⑥ Actual use 1960
⑦ Data from memo of August 19, 1960: "Travel Analysis" Sporting to Dec (in of our (NPS))
⑧ Est. 33⅓ of Monument visitors visit Visitor Center plus 18% increase in travel over 57-61 avg.
⑨ Average per capita use = 120 gpd according to study during '60 49% increase
⑩ Average per capita use = 3.1 gpd during March 1961

* Estimated (Accurate data not available at time of preparation of table)
** Does not include air conditioning water use

09-06-1961: present domestic water use; september 06, 1961

TABLE IV

DEATH VALLEY NATIONAL MONUMENT
FURNACE CREEK AREA

DOMESTIC WATER NEEDS
Predicted for 1966

Predicted visits to Monument, 1966 (A88, DEVA, August 19, 1960) 500,000 visits.
Predicted visits to Visitor Center, 40% of total visits to Monument.
Predicted campground use, Texas Spring and Furnace Creek Campgrounds (A88, DEVA, August 19, 1960) 150,000 visitor days.
Predicted monthly variation - same as 1957 - 1961 - average (See Table III).

| | 1966 TRAVEL | | | 1966 WATER USE, VISITOR CENTER | | | GALLONS PER MONTH | |
|---|---|---|---|---|---|---|---|---|
| Month | Monument Visits | Visitor Visits 40% of Monument | Campgrounds VisitorDays | Museum-Auditorium 2.5 gal/visit | Administration 150% of 1961 | Air Conditioning 120% of 1961 | CAMPGROUNDS 20 gallons per visitor day | TOTAL |
| Jan. | 40,000 | 16,000 | 14,000 | 40,000 | 2,400 | -- | 282,000 | 324,000 |
| Feb. | 52,500 | 21,000 | 18,400 | 52,500 | 3,100 | -- | 368,000 | 424,000 |
| Mar. | 71,500 | 28,600 | 32,400 | 71,500 | 3,600 | -- | 648,000 | 723,000 |
| Apr. | 64,500 | 25,800 | 15,500 | 64,500 | 3,000 | 36,000 | 310,000 | 414,000 |
| May | 32,000 | 12,800 | 1,500 | 32,000 | 3,000 | 108,000 | 30,000 | 173,000 |
| Jun. | 23,000 | 9,200 | 300 | 23,000 | 3,000 | 180,000 | 6,000 | 212,000 |
| Jul. | 14,500 | 5,800 | -- | 14,500 | 3,000 | 180,000 | -- | 198,000 |
| Aug. | 23,500 | 9,400 | 100 | 23,500 | 3,000 | 144,000 | 2,000 | 173,000 |
| Sept. | 27,500 | 11,000 | 300 | 27,500 | 3,000 | 108,000 | 6,000 | 145,000 |
| Oct. | 41,000 | 16,400 | 2,900 | 41,000 | 3,000 | 36,000 | 58,000 | 138,000 |
| Nov. | 61,000 | 24,400 | 43,500 | 61,000 | 3,000 | -- | 870,000 | 934,000 |
| Dec. | 43,500 | 17,400 | 21,200 | 43,500 | 2,300 | -- | 424,000 | 470,000 |
| TOTAL | 500,000 | 200,000 | 150,000 | 500,000 | 35,400 | 910,000 | 3,000,000 | 4,445,000 |

TABLE V

DEATH VALLEY NATIONAL MONUMENT
FURNACE CREEK AREA

DOMESTIC WATER NEEDS

Present and Future

Predicted 1970 water use equals 130% of 1966 use (See A88, DEVA, August 19, 1960).
Predicted 1980 water use equals 180% of 1966 use (See A88, DEVA, August 19, 1960).

PREDICTED WATER USE, Gallons per Month and Gallons per Minute

| Month | 1961 Table III Gallons per month | 1961 Table III Average gpm | 1966 Table IV Gallons per month | 1966 Table IV Average gpm | 1970 130% of 1966 Gallons per month | 1970 130% of 1966 Average gpm | 1980 180% of 1966 Gallons per month | 1980 180% of 1966 Average gpm |
|---|---|---|---|---|---|---|---|---|
| Jan. | 112,000 | 2.5 | 324,000 | 7.3 | 420,000 | 9.4 | 580,000 | 13.0 |
| Feb. | 143,000 | 3.5 | 424,000 | 10.5 | 550,000 | 13.6 | 760,000 | 18.8 |
| Mar. | 258,000 | 5.8 | 723,000 | 16.2 | 940,000 | 21.1 | 1,300,000 | 29.1 |
| Apr. | 176,000 | 4.1 | 414,000 | 9.6 | 540,000 | 12.5 | 750,000 | 17.3 |
| May | 124,000 | 2.8 | 173,000 | 3.9 | 220,000 | 4.9 | 310,000 | 6.9 |
| June | 169,000 | 3.9 | 212,000 | 4.9 | 280,000 | 6.5 | 380,000 | 8.8 |
| July | 165,000 | 3.7 | 198,000 | 4.4 | 260,000 | 5.8 | 360,000 | 8.1 |
| Aug | 139,000 | 3.1 | 173,000 | 3.9 | 220,000 | 4.9 | 310,000 | 6.9 |
| Sep. | 115,000 | 2.7 | 145,000 | 3.4 | 190,000 | 4.4 | 260,000 | 6.0 |
| Oct. | 83,000 | 1.9 | 138,000 | 3.1 | 180,000 | 4.0 | 250,000 | 5.6 |
| Nov. | 317,000 | 7.3 | 934,000 | 21.6 | 1,210,000 | 28.0 | 1,680,000 | 38.9 |
| Dec. | 165,000 | 3.7 | 470,000 | 10.5 | 610,000 | 13.7 | 850,000 | 19.0 |
| Year | 2,066,000 | 3.9 | 4,445,000 | 8.5 | 5,770,000 | 11.0 | 8,000,000 | 15.2 |

TABLE VI

EVAPORATION
Cow Creek - Furnace Creek Area

Evaporation from Standard Weather Bureau type pan of 4 foot diameter
Data from "Climatological Data, California"
published by U. S. Department of Commerce

EVAPORATION, INCHES

| Month | 1958 | 1959 | 1960 | 1961 | Average |
|---|---|---|---|---|---|
| Jan | | 4.02 | 2.72 | 2.88 | 3.2 |
| Feb | | 5.66 | 5.38 | 5.82 | 5.6 |
| Mar | Pan installed | 10.92 | 9.90 | 9.94 | 10.2 |
| Apr | April 19, 1958 | 13.79 | 14.17 | 14.31 | 14.1 |
| May | 17.98 | 17.13 | 16.65 | 22.82* | 18.6 |
| June | 21.71 | 21.03 | 21.36 | 25.17 | 22.3 |
| July | 22.44 | 21.86 | 22.71 | | 22.1 |
| Aug | 19.16 | 19.84 | 21.51 | | 18.2 |
| Sept | 17.90 | 13.48 | 14.69 | | 15.4 |
| Oct | 11.09 | 10.96 | 10.09 | | 10.7 |
| Nov | 6.70 | 4.97 | 3.72 | | 5.1 |
| Dec | 3.68 | 3.82 | 4.31 | ___ | 3.9 |
| Year | | 146.88 | 147.21 | | 149.4 |

*Pan moved to Furnace Creek from Cow Creek

09-00-1961: temperature table; september, 1961

## TABLE VII

## TEMPERATURE

### Cow Creek - Furnace Creek

(Cow Creek temperatures have been used (prior to 1961) rather than Greenland Ranch in that readings of the Cow Creek weather station probably has been done with greater care.)

average monthly maximums and minimums

| Month | 1958 | | 1959 | | 1960 | | Average | |
|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum |
| Jan | 43.5 | 68.7 | 46.3 | 69.1 | 40.0 | 61.4 | 43.3 | 66.2 |
| Feb | 51.4 | 74.7 | 48.3 | 71.3 | 46.5 | 71.2 | 48.7 | 72.4 |
| Mar | 53.4 | 75.7 | 59.3 | 86.2 | 58.9 | 86.2 | 57.1 | 82.7 |
| Apr | 62.1 | 89.1 | 69.2 | 96.9 | 66.6 | 93.8 | 65.0 | 93.3 |
| May | 75.5 | 104.8 | 73.1 | 98.1 | 72.2 | 101.4 | 73.6 | 101.4 |
| Jun | 81.1 | 109.7 | 85.7 | 113.7 | 87.7 | 115.7 | 83.8 | 113.0 |
| Jul | 87.5 | 115.2 | 92.9 | 120.2 | 91.1 | 119.5 | 90.5 | 118.3 |
| Aug | 90.0 | 117.0 | 86.6 | 113.8 | 88.2 | 116.2 | 88.3 | 115.7 |
| Sept | 81.2 | 108.5 | 76.1 | 102.7 | 79.4 | 109.9 | 78.9 | 107.0 |
| Oct | 68.4 | 96.9 | 67.6 | 95.7 | 65.0 | 92.5 | 67.0 | 95.0 |
| Nov | 49.0 | 76.0 | 50.1 | 78.8 | 50.3 | 74.4 | 49.8 | 76.4 |
| Dec | 43.1 | 69.1 | 44.1 | 66.8 | 42.0 | 66.2 | 43.1 | 67.4 |

## TABLE VIII

## IRRIGATION NEEDS
## UNIT CONSUMPTIVE USE

**Unit Consumptive Use = Factor x Pan Evaporation**

Factor depends on plant variety, growing season, temperature, density of growth. Factors have been selected by Spaulding based on data in T. W. Robinson's letter of April 6, 1955 to B. F. Manbey concerning consumptive use at Saratoga Springs, Death Valley.

| Month | CLIMATOLOGICAL DATA (Tables VI & VII) Temperature Average Minimum | Temperature Average Maximum | Pan Evaporation Inches per month | UNIT CONSUMPTIVE USE, INCHES OF WATER PER MONTH Lawn Factor | Lawn Inches | Tamarisk Factor | Tamarisk Inches | Mesquite Factor | Mesquite Inches |
|---|---|---|---|---|---|---|---|---|---|
| Jan | 43.3 | 66.2 | 3.2 | 0.4 | 1.3 | 0.2 | 0.6 | 0.0 | 0 |
| Feb | 48.7 | 72.4 | 5.6 | 0.6 | 3.4 | 0.5 | 2.8 | 0.3 | 1.7 |
| Mar | 57.7 | 82.7 | 10.2 | 0.8 | 8.2 | 0.8 | 8.2 | 0.5 | 5.1 |
| Apr | 66.0 | 93.3 | 14.1 | 1.0 | 14.1 | 1.0 | 14.1 | 0.8 | 11.3 |
| May | 73.6 | 101.4 | 18.6 | 1.1 | 20.5 | 1.2 | 23.3 | 1.0 | 18.6 |
| Jun | 83.8 | 113.0 | 22.3 | 1.2 | 26.8 | 1.2 | 26.8 | 1.0 | 22.3 |
| Jul | 90.5 | 118.3 | 22.1 | 1.1 | 24.3 | 1.2 | 26.5 | 1.0 | 22.1 |
| Aug | 88.3 | 115.7 | 18.2 | 1.1 | 20.0 | 1.2 | 21.8 | 1.0 | 18.2 |
| Sep | 78.9 | 107.0 | 15.4 | 1.0 | 15.4 | 1.2 | 18.5 | 0.8 | 12.3 |
| Oct | 67.0 | 95.0 | 10.7 | 0.8 | 8.6 | 1.0 | 10.7 | 0.6 | 6.4 |
| Nov | 49.8 | 76.4 | 5.1 | 0.6 | 3.1 | 0.8 | 4.1 | 0.2 | 1.0 |
| Dec | 43.1 | 67.4 | 3.9 | 0.4 | 1.6 | 0.2 | 0.8 | 0.0 | 0 |
| Year | | | 149.4 | | 147.3 | | 157.2 | | 119.0 |

00-00-0000: theoretical 1961 irrigation needs

## TABLE IX

## THEORETICAL 1961 IRRIGATION NEEDS

Area Irrigated (See Drawing MDV 2220, Report of 1/24/61)

| | |
|---|---|
| Patio Lawn, Trees and Pool - Total | 6,290 acre |
| Front Lawn | 0.76 |
| Trees and shrubs between parking areas | 0.14 |
| | 1.19 acres |

Consumptive use in acre feet per month = $\frac{1.19}{12}$ x Unit Use

| Month | UNIT USE (Table VIII) Inches per month (lawn factor) | CONSUMPTIVE USE Acre Feet per month | Gallons per month | Gallons per minute |
|---|---|---|---|---|
| Jan | 1.3 | 0.1 | 33,000 | 1 |
| Feb | 3.4 | 0.3 | 98,000 | 2 |
| Mar | 8.2 | 0.8 | 260,000 | 6 |
| Apr | 14.1 | 1.4 | 460,000 | 11 |
| May | 20.5 | 2.0 | 650,000 | 15 |
| Jun | 26.8 | 2.7 | 880,000 | 20 |
| Jul | 24.3 | 2.4 | 750,000 | 17 |
| Aug | 20.0 | 2.0 | 650,000 | 15 |
| Sept | 15.4 | 1.5 | 490,000 | 11 |
| Oct | 8.6 | 0.9 | 290,000 | 6 |
| Nov | 3.1 | 0.3 | 98,000 | 2 |
| Dec | 1.6 | 0.2 | 65,000 | 1 |
| Year, Total or Average | 147.3 | 14.6 | 4,750,000 | 9 |

TABLE X

1966 IRRIGATION NEEDS

Irrigated Areas based on data in Water Use Report of August 22, 1960 (154)

| Month | VISITOR CENTER 4.83 acres lawn, mesquite, tamarisk, and palm | | CAMPGROUNDS 12.10 acres mesquite and tamarisk | | TOTAL IRRIGATION NEEDS | |
|---|---|---|---|---|---|---|
| | Unit Use Table VIII Inches per Month | Acre Feet per month | Average Unit Use Table VIII Inches per Month | Acre Feet per month | Acre Feet per month | Gallons per month |
| Jan | 0.6 | 0.2 | 0.3 | 0.3 | 0.5 | 160,000 |
| Feb | 2.8 | 1.1 | 2.3 | 2.3 | 3.4 | 1,110,000 |
| Mar | 8.0 | 3.2 | 6.8 | 6.8 | 10.0 | 3,260,000 |
| Apr | 14.0 | 5.6 | 12.8 | 12.8 | 18.4 | 6,000,000 |
| May | 21.0 | 8.5 | 21.2 | 21.2 | 29.7 | 9,700,000 |
| June | 26.0 | 10.5 | 24.8 | 24.8 | 35.3 | 11,500,000 |
| July | 25.0 | 10.1 | 24.5 | 24.5 | 34.6 | 11,300,000 |
| Aug | 21.0 | 8.5 | 20.2 | 20.2 | 28.7 | 9,400,000 |
| Sept | 16.0 | 6.4 | 15.5 | 15.5 | 21.9 | 7,100,000 |
| Oct | 9.5 | 3.8 | 8.7 | 8.7 | 12.5 | 4,070,000 |
| Nov | 3.5 | 1.4 | 2.6 | 2.6 | 4.0 | 1,300,000 |
| Dec | 0.8 | 0.3 | 0.4 | 0.4 | 0.7 | 230,000 |
| Year | 148.2 | 59.6 | 138.9 | 140.1 | 199.7 | 65,130,000 |

## TABLE XI

## 1961, 1966, 1970 and 1980 IRRIGATION NEEDS

**IRRIGATION NEEDS, Gallons per Month and Average Gallons per Minute**

| Month | Theoretical 1961 Table IX | | 1966 Table X | | 1970 120% of 1966 | | 1980 160% of 1966 | |
|---|---|---|---|---|---|---|---|---|
| | Gallons per month | Average gpm | Gallons per month | Average gpm | Gallons per month | Average gpm | Gallons per month | Average gpm |
| Jan | 33,000 | 1 | 160,000 | 4 | 190,000 | 4 | 260,000 | 6 |
| Feb | 98,000 | 2 | 1,110,000 | 27 | 1,330,000 | 33 | 1,780,000 | 44 |
| Mar | 260,000 | 6 | 3,260,000 | 73 | 3,900,000 | 87 | 5,200,000 | 116 |
| Apr | 460,000 | 11 | 6,000,000 | 139 | 7,200,000 | 167 | 9,600,000 | 222 |
| May | 650,000 | 15 | 9,700,000 | 217 | 11,600,000 | 260 | 15,500,000 | 347 |
| Jun | 880,000 | 20 | 11,500,000 | 266 | 13,800,000 | 320 | 18,400,000 | 426 |
| Jul | 750,000 | 17 | 11,300,000 | 253 | 13,600,000 | 304 | 18,100,000 | 405 |
| Aug | 650,000 | 15 | 9,400,000 | 210 | 11,300,000 | 253 | 15,000,000 | 336 |
| Sept | 490,000 | 11 | 7,100,000 | 164 | 8,500,000 | 197 | 11,400,000 | 264 |
| Oct | 290,000 | 6 | 4,070,000 | 91 | 4,900,000 | 110 | 6,500,000 | 145 |
| Nov | 98,000 | 2 | 1,300,000 | 30 | 1,560,000 | 36 | 2,080,000 | 48 |
| Dec | 65,000 | 1 | 230,000 | 5 | 280,000 | 6 | 370,000 | 8 |
| Year | 4,750,000 | 9 | 65,130,000 | 124 | 78,100,000 | 149 | 104,200,000 | 198 |

TABLE XII

Death Valley National Monument
Furnace Creek Area

TOTAL WATER NEEDS

Present and Future

Summary of Tables V and XI

Average Monthly Water Needs, Gallons per Minute

| Month | 1961 | | | 1966 | | | 1970 | | | 1980 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Domestic | Irrigation | Total | Domestic | Irrigation | Total | Domestic | Irrigation | Total | Domestic | Irrigation | Total |
| Jan | 3 | 1 | 4 | 7 | 4 | 11 | 9 | 4 | 13 | 13 | 6 | 19 |
| Feb | 4 | 2 | 6 | 11 | 27 | 38 | 14 | 33 | 47 | 19 | 44 | 63 |
| Mar | 6 | 6 | 12 | 16 | 73 | 89 | 21 | 87 | 98 | 29 | 116 | 145 |
| Apr | 4 | 11 | 15 | 10 | 139 | 149 | 13 | 167 | 180 | 17 | 222 | 139 |
| May | 3 | 15 | 18 | 4 | 217 | 221 | 5 | 260 | 265 | 7 | 347 | 354 |
| Jun | 4 | 20 | 24 | 5 | 266 | 271 | 7 | 320 | 327 | 9 | 426 | 435 |
| [illegible] | 4 | 17 | 21 | 4 | 253 | 257 | 6 | 304 | 310 | 8 | 405 | 413 |
| [illegible] | 3 | 15 | 18 | 4 | 210 | 214 | 5 | 253 | 258 | 7 | 336 | 343 |
| Sept | 3 | 11 | 14 | 3 | 164 | 167 | 4 | 197 | 201 | 6 | 264 | 270 |
| Oct | 2 | 6 | 8 | 3 | 91 | 94 | 4 | 110 | 114 | 6 | 145 | 151 |
| Nov | 7 | 2 | 9 | 22 | 30 | 53 | 28 | 36 | 64 | 39 | 48 | 97 |
| Dec | 4 | 1 | 5 | 11 | 5 | 16 | 14 | 6 | 20 | 19 | 8 | 27 |
| Year | 4 | 9 | 13 | 9 | 124 | 133 | 11 | 149 | 160 | 15 | 198 | 213 |

TABLE XIII

VISITOR CENTER - MUSEUM AND AUDITORIUM
ACTUAL WATER USE

March, 1961

| Day | Water Consumption Gallons | No. of Visits | Use per visit Gallons |
|---|---|---|---|
| March 1, Wed. | 500 | 293 | 1.7 |
| 2, Thurs. | 400 | 292 | 1.4 |
| 3, Fri. | 600 | 294 | 2.0 |
| 4, Sat. | 1,900 | 819 | 2.3 |
| 5, Sun. | 2,000 | 849 | 2.4 |
| 6, Mon. | 600 | 235 | 2.6 |
| 7, Tue. | 500 | 233 | 2.1 |
| 8, Wed. | 500 | 223 | 2.2 |
| 9, Thurs. | 600 | 266 | 2.2 |
| 10, Fri. | 500 | 204 | 2.5 |
| 11, Sat. | 1,800 | 750 | 2.4 |
| 12, Sun. | 1,700 | 903 | 1.9 |
| 13, Mon. | 600 | 294 | 2.0 |
| 14, Tue. | 700 | 317 | 2.2 |
| 15, Wed. | 800 | 405 | 2.0 |
| 16, Thurs. | 1,000 | 339 | 2.9 |
| 17, Fri. | 600 | 299 | 2.0 |
| 18, Sat. | 1,500 | 839 | 1.8 |
| 19, Sun. | 1,600 | 836 | 1.9 |
| 20, Mon. | 500 | 325 | 1.5 |
| 21, Tues. | 1,200 | 514 | 2.3 |
| 22, Wed. | 600 | 235 | 2.6 |
| 23, Thurs. | 900 | 338 | 2.7 |
| 24, Fri. | 600 | 332 | 1.8 |
| 25, Sat. | 3,500 | 1,260 | 2.8 |
| 26, Sun. | 6,100 | 1,848 | 3.3 |
| 27, Mon. | 6,800 | 2,148 | 3.2 |
| 28, Tue. | 6,900 | 2,502 | 2.8 |
| 29, Wed. | 5,600 | 2,873 | 1.9 |
| 30, Thurs. | 4,500 | 2,050 | 2.2 |
| 31, Fri. | -- | -- | -- |
| Average - March 1-30 incl. | 1,840 | 767 | 2.41 |
| Weekday average | 1,600 | 674 | 2.37 |
| Sat & Sun average | 2,513 | 1,013 | 2.48 |
| Ratio of weekday to monthly average | 0.87 | 0.88 | 0.98 |
| Ratio of Sat & Sun to monthly average | 1.37 | 1.33 | 1.03 |

## TABLE XIV

**Texas Spring Campground - Travel Visitor Days**
**from August 19, 1960 report (A88)**

| | 1960 | 1959 | 1958 | 1957 | 1956 | 1955 | Average |
|---|---|---|---|---|---|---|---|
| Jan | 4,178 | 6,002 | 6,473 | 646? | 2,040 | 2,297 | 4,198 |
| Feb | 6,824 | 9,600 | 6,392 | 2,223 | 3,043 | 4,900 | 5,497 |
| Mar | | 16,974 | 8,361 | 6,464 | 12,454 | 4,185 | 9,688 |
| Apr | | 2,572 | 14,839 | 1,216 | 2,440 | 1,916 | 4,597 |
| May | | 566 | 398 | 150 | 604 | 604 | 464 |
| Jun | | 141 | 30 | 5 | 120 | 60 | 71 |
| July | | -- | 32 | 5 | 15 | 15 | 12 |
| Aug | | 10 | 20 | 60 | 30 | 14 | 27 |
| Sept | | 83 | 100 | 100 | 45 | 75 | 80 |
| Oct | | 1,089 | 1,385 | 694 | 785 | 408 | 872 |
| Nov | | 10,460 | 16,790 | 22,491 | 3,110 | 12,050 | 12,980 |
| Dec | | 6,637 | 8,234 | 8,118 | 2,355 | 6,259 | 6,321 |
| Year | | 54,134 | 63,054 | 42,172 | 26,996 | 32,783 | 44,807 |

**ACTUAL WATER CONSUMPTION - Domestic Purposes**
**March, 1961**

March 1 - 30 incl. Visitor days 14,430
March 1 - 30 incl. domestic water used 230,400 gallon

Average per capita use: 16.0 gallons per person per day

00-00-0000: department of the interior cover sheet

10-23
(November 1954)

# UNITED STATES
# DEPARTMENT OF THE INTERIOR
# NATIONAL PARK SERVICE

_____
(Area)

**FILE CODE:**

**FROM:**

**TO:**

**IMPORTANT**

This file constitutes a part of the official records of the National Park Service and should not be separated or papers withdrawn without express authority of the official in charge. All Files should be returned promptly to the File Room. Officials and employees will be held responsible for failure to observe these rules, which are necessary to protect the integrity of the official records.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Death Valley National Monument
Death Valley, California

IN REPLY REFER TO:
L54

April 27, 1961

RECEIVED
NPS REGION FOUR OFFICE
MAY 2 '61

| | SURNAME | DATE |
|---|---|---|
| REG. DIR. | | |
| ASST. R.D. | | |
| OPERATIONS | Rood | |
| ADMIN. | | |
| RECREATION | | |
| INTERP. | | |
| RANGER ACT. | | |

Spaulding 5/8
Whatworth has seen
Manbey BFM 5/8

Memorandum

To: Regional Director, Region Four

From: Acting Superintendent, Death Valley

Subject: Water Meter Readings, Furnace Creek Area - Death Valley
March 1961

Attached are copies of meter readings for the period of March 1 through March 31, 1961 for the following meters:

NPS reservoir (500,000) depth gauge readings
Four inch meter (NPS) on Visitor Center Line
One and one-half inch meter on Visitor Center Line
One and one-half inch meter - Museum and Auditorium
One inch meter - Administrative Building
Two inch meter to Visitor Center and Administrative Building Lawn
Furnace Creek Campground Comfort Station - 1½ inch meter
Two inch meter (PCB) on Texas Spring to Texas Spring Campground line

Robert A. Fleming
Acting Superintendent

In duplicate

Attachment

Copy to: WASO, w/attachment

1" = 2680 gal

## Water Level In 500,000 Gallon Reservoir - Furnace Creek

| Date | Time | Adj | Depth of Water | Δ" | ΔGal. |
|---|---|---|---|---|---|
| 3/1/61 | 8:20A | | 15' 3" | 0 | 0 |
| /2 | 8:35A | | 15' 3" | +3" | +8000 |
| /3 | 8:35A | | 15' 6" | +4 | +10,700 |
| /4 | 8:30A | | 15' 10" | -15 | -40,200 |
| /5 | 8:45A | OK | 14' 7" | -10 | -26800 |
| /6 | 9:30A | OK | 13' 9" | +3 | +8000 |
| /7 | 9:05A | OK | 14' 0" | +4 | +10,700 |
| /8 | 9:15A | OK | 14' 4" | +3 | +8000 |
| /9 | 8:45A | OK | 14' 7" | +9 | +24,100 |
| /10 | 11:10A | -2700 | 15' 4" | +3 | +8000 |
| /11 | 9:50A | +2700 | 15' 7" | +2 | +5400 |
| /12 | 9:00A | OK | 15' 9" | +10 | -26,800 |
| /13 | 8:25A | OK | 14' 11" | -6 | -16,100 |
| /14 | 8:30A | | 14' 5" | +4 | +10,700 |
| /15 | 9:00A | | 14' 9" | +2 | +5400 |

| Date | Time | | Depth of Water | ΔGal |
|---|---|---|---|---|
| 3/16 | 8:40A | OK | 14' 11" | 0 |
| /17 | 8:25A | | 14' 11" | -5 -13,400 |
| /18 | 8:45A | | 14' 6" | +1 +2700 |
| /19 | 8:40A | | 14' 7" | -4 -10,700 |
| /20 | 9:35A | | 14' 3" | +1 +2700 |
| /21 | 8:35A | | 14' 4" | +2 +5400 |
| /22 | 9:25A | | 14' 6" | -4 -10,700 |
| /23 | 9:15A | | 14' 2" | -3 -8000 |
| /24 | 8:35A | | 13' 11" | -6 -16,100 |
| /25 | 10:00A | OK | 13' 5" | -3 -8000 |
| /26 | 8:55A | OK | 13' 2" | +3 +8000 |
| /27 | 8:00A | OK | 13' 5" | -1 -2700 |
| /28 | 8:45A | | 13' 4" | +2 +5400 |
| /29 | 8:15A | | 13' 6" | +4 +10,700 |
| /30 | 9:15A | | 13' 10" | -7 -18,700 |
| /31 | 8:25A | | 13' 3" | |

Net 3/1 to 3/31 -24" =

## Four Inch Meter On Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) Gal per Day |
|---|---|---|---|---|---|---|
| 2/28 | 8:20A | | 0181070 | | | |
| | | 1435 | | 80 | 600 | 0.04 |
| 3/1 | 8:15A | | 0181150 | | | |
| | | 1415 | | 340 | 2540 | 0.18 |
| /2 | 8:25A | | 0181490 | | | |
| | | 1445 | | 350 | 2620 | 0.18 |
| /3 | 8:30A | | 0181840 | | | |
| | | 1435 | | 0 | | |
| /4 | 8:25A | | 0181840 | | | |
| | | 1455 | | 550 | 4110 | 0.28 |
| /5 | 8:40A | | 0182390 | | | |
| | | 1485 | | 1350 | 10100 | 0.68 |
| /6 | 9:25A | | 0183740 | | | |
| | | 1410 | | 0 | | |
| /7 | 8:55A | | 0183740 | | | |
| | | 1415 | | 840 | 6280 | 0.43 |
| /8 | 9:05A | | 0184580 | | | |
| | | 1410 | | 1030 | 7700 | 0.55 |
| /9 | 8:35A | | 0185610 | | | |
| | | 1520 | | 0 | | |
| /10 | 9:55A | | 0185610 | | | |
| | | 1370 | | 490 | 3670 | 0.27 |
| /11 | 8:45A | | 0186100 | | | |
| | | 1450 | | 0 | | |
| /12 | 8:55A | | 0186100 | | | |
| | | 1400 | | 0 | | |
| /13 | 8:15A | | 0186100 | | | |
| | | 1450 | | 1340 | 10020 | 0.69 |
| /14 | 8:25A | | 0187440 | | | |
| | | 1465 | | 0 | | |
| /15 | 8:50A | | 0187440 | | | |

## Four Inch Meter On Visitor Center Line (Cont'd)

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|---|
| | | 1420 | | 0 | | | |
| 3/16 | 8:30A | | 0187440 | | | | |
| | | 1425 | | 0 | | | |
| /17 | 8:15A | | 0187440 | | | | |
| | | 1455 | | 510 | 3820 | 0.26 | |
| /18 | 8:30A | | 0187950 | | | | |
| | | 1445 | | 0 | | | |
| /19 | 8:35A | | 0187950 | | | | |
| | | 1495 | | 1390 | 10400 | 0.70 | |
| /20 | 9:30A | | 0189340 | | | | |
| | | 1380 | | 0 | | | |
| /21 | 8:30A | | 0189340 | | | | |
| | | 1485 | | 250 | 1870 | 0.13 | |
| /22 | 9:15A | | 0189590 | | | | |
| | | 1455 | | 1510 | 11300 | 0.78 | |
| /23 | 9:30A | | 0191100 | | | | |
| | | 1485 | | 0 | | | |
| /24 | 8:45A | | 0191100 | | | | |
| | | 1525 | | 1170 | 8750 - 500 | 0.57 | 8300 |
| /25 | 10:10A | | 0192270 | | | | |
| | | 1385 | | 400 | 2990 + 500 | 0.22 | 3400 |
| /26 | 9:05A | | 0192670 | | | | |
| | | 1380 | | 0 | | | |
| /27 | 8:05A | | 0192670 | | | | |
| | | 1455 | | 540 | 4040 | 0.28 | |
| /28 | 8:20A | | 0193210 | | | | |
| | | 1445 | | 0 | | | |
| /29 | 8:25A | | 0193210 | | | | |
| | | 1500 | | 20 | 150 | 0.01 | |
| /30 | 9:25A | | 0193230 | | | | |
| | | 1390 | | 1450 | 10850 | 0.78 | |
| /31 | 8:35A | | 0194680 | | | | |

## One and One-half Inch Meter On Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | adj | Rate of Use (GPM) | Adjusted GPD |
|---|---|---|---|---|---|---|---|
| 2/28 | 8:20A | | 03790900 | | | | |
| | | 1435 | | 25,200 | +100 | 17.56 | 25,300 |
| 3/1 | 8:15A | | 03816300 | | | | |
| | | 1450 | | 23,000 | -200 | 15.86 | 22,800 |
| /2 | 8:25A | | 03839300 | | | | |
| | | 1435 | | 10,100 | +100 | 7.04 | 10,200 |
| /3 | 8:30A | | 03849400 | | | | |
| | | 1435 | | 8,000 | — | 5.57 | 8000 |
| /4 | 8:25A | | 03857400 | | | | |
| | | 1455 | | 55,700 | -200 | 38.28 | 55,500 |
| /5 | 8:40A | | 03913100 | | | | |
| | | 1485 | | 42,500 | -1200 | 28.62 | 41,300 |
| /6 | 9:25A | | 03955600 | | | | |
| | | 1410 | | 16,600 | -600 | 11.77 | 17,200 |
| /7 | 8:55A | | 03972200 | | | | |
| | | 1450 | | ~~26,000~~ 9800 | -200 | ~~17.93~~ | 9600 |
| /8 | 9:05A | | 03982000 | | | | |
| | | 1410 | | 7,500 | +200 | 5.32 | 7700 |
| /9 | 8:35A | | 03989500 | | | | |
| | | 1520 | | 5,300 | -300 | 3.49 | 5000 |
| /10 | 9:55A | | 03994800 | | | | |
| | | 1370 | | 7,900 | +400 | 5.77 | 8300 |
| /11 | 8:45A | | 04002700 | | | | |
| | | 1450 | | 5,900 | — | 4.07 | 5900 |
| /12 | 8:55A | | 04008600 | | | | |
| | | 1400 | | 47,300 | +1200 | 33.79 | 48,500 |
| /13 | 8:15A | | 04055900 | | | | |
| | | 1450 | | 31,200 | -2000 | 21.52 | 31,000 |
| /14 | 8:25A | | 04087100 | | | | |
| | | 1465 | | 15,800 | -300 | 10.78 | 15,500 |
| /15 | 8:50A | | 04102900 | | | | |

## One and One-half Inch Meter On Visitor Center Line (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | Adjusted GPD |
|---|---|---|---|---|---|---|
| | | 1420 | | 17,800 + 200 | 12.54 | 18,000 |
| 3/16 | 8:30A | | 04120700 | | | |
| | | 1425 | | 24,800 + 200 | 17.40 | 25,000 |
| /17 | 8:15A | | 04145500 | | | |
| | | 1455 | | 29,700 - 300 | 20.41 | 29,400 |
| /18 | 8:30A | | 04175200 | | | |
| | | 1445 | | 25,300 - 100 | 17.51 | 25,200 |
| /19 | 8:35A | | 04200500 | | | |
| | | 1495 | | 27,400 -1000 ✓ | 18.33 | 26,400 |
| /20 | 9:30A | | 04227900 | | | |
| | | 1380 | | 21,100 +900 ✓ | 15.29 | 22,000 |
| /21 | 8:30A | | 04249000 | | | |
| | | 1485 | | 18,600 -600 ✓ | 12.53 | 18,000 |
| /22 | 9:15A | | 04267600 | | | |
| | | 1455 | | 24,200 -200 | 16.63 | 24,000 |
| /23 | 9:30A | | 04291800 | | | |
| | | 1395 | | 29,600 +900 ✓ | 21.22 | 30,500 |
| /24 | 8:45A | | 04321400 | | | |
| | | 1525 | | 32,200 -1800 ✓ | 21.11 | 30,400 |
| /25 | 10:10A | | 04353600 | | | |
| | | 1375 | | 23,600 +1800 ✓ | 17.16 | 24,800 |
| /26 | 9:05A | | 04377200 | | | |
| | | 1380 | | 14,100 +700 ✓ | 10.22 | 14,800 |
| /27 | 8:05A | | 04391300 | | | |
| | | 1455 | | 18,900 -200 | 12.99 | 18,700 |
| /28 | 8:20A | | 04410200 | | | |
| | | 1445 | | 17,200 — | 11.90 | 17,200 |
| /29 | 8:25A | | 04427400 | | | |
| | | 1500 | | 14,400 -600 ✓ | 9.60 | 13,800 |
| /30 | 9:25A | | 04441800 | | | |
| | | 1385 | | 29,300 + 700 ✓ | 21.16 | 30,000 |
| 3/31 | 8:35A | | 04471100 | | | |

## One and One-half Inch Meter - Museum and Auditorium

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used | Rate of Use | No. of Visits | Use Per Visit (Gallons) |
|---|---|---|---|---|---|---|---|
| 2/28 | 7:45A | | 00029300 | | | | |
| | | 1455 | | 500 | .344 | 257 | 1.9 |
| 3/1 | 8:00A | | 00029800 | | | | |
| | | 1450 | | 500 | .345 | 293 | 1.7 |
| /2 | 8:10A | | 00030300 | | | | |
| | | 1470 | | 400 | .272 | 292 | 1.4 |
| /3 | 8:40A | | 00030700 | | | | |
| | | 1445 | | 600 | .415 | 294 | 2.0 |
| /4 | 8:45A | | 00031300 | | | | |
| | | 1390 | | 1800 +100 | 1.295 | 819 | 2.2 |
| /5 | 7:55A | | 00033100 | | | | |
| | | 1430 | | 2000 | 1.399 | 849 | 2.4 |
| /6 | 7:45A | | 00035100 | | | | |
| | | 1440 | | 600 | .417 | 235 | 2.6 |
| /7 | 7:45A | | 00035700 | | | | |
| | | 1440 | | 500 | .347 | 233 | 2.1 |
| /8 | 7:45A | | 00036200 | | | | |
| | | 1440 | | 500 | .347 | 223 | 2.2 |
| /9 | 7:45A | | 00036700 | | | | |
| | | 1550 | | 700 -100 | .452 | 266 | 2.6 |
| /10 | 9:35A | | 00037400 | | | | |
| | | 1365 | | 400 +100 | .293 | 204 | 2.0 |
| /11 | 8:20A | | 00037800 | | | | |
| | | 1425 | | 1800 | 1.263 | 750 | 2.4 |
| /12 | 8:05A | | 00039600 | | | | |
| | | 1420 | | 1700 | 1.197 | 903 | 1.9 |
| /13 | 7:45A | | 00041300 | | | | |
| | | 1450 | | 600 | .414 | 294 | 2.0 |
| /14 | 7:55A | | 00041900 | | | | |
| | | 1445 | | 700 | .484 | 317 | 2.2 |
| /15 | 8:00A | | 00042600 | | | | |

One and One-half Inch Meter - Museum and Auditorium (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used Adj | Rate of Use | No. of Visits | Use Per Visit (Gallons) |
|---|---|---|---|---|---|---|---|
| | | 1425 | | 800 | .561 | 405 | 2.0 |
| 3/16 | 7:45A | | 00043400 | | | | |
| | | 1435 | | 1000 | .697 | 339 | 2.9 |
| /17 | 7:40A | | 00044400 | | | | |
| | | 1460 | | 600 | .411 | 299 | 2.0 |
| /18 | 8:00A | | 00045000 | | | | |
| | | 1440 | | 1500 | 1.042 | 837 | 1.8 |
| /19 | 8:00A | | 00046500 | | | | |
| | | 1490 | | 1700 -100 | 1.141 | 836 | 2.0 |
| /20 | 8:50A | | 00048200 | | | | |
| | | 1385 | | 500 | .361 | 325 | 1.5 |
| /21 | 7:55A | | 00048700 | | | | |
| | | 1430 | | 1200 | .839 | 514 | 2.3 |
| /22 | 7:45A | | 00049900 | | | | |
| | | 1450 | | 600 | .414 | 235 | 2.6 |
| /23 | 7:55A | | 00050500 | | | | |
| | | 1430 | | 900 | .629 | 338 | 2.7 |
| /24 | 7:45A | | 00051400 | | | | |
| | | 1620 | | 700 -100 | .432 | 332 | 2.1 |
| /25 | 10:45A | | 00052100 | | | | |
| | | 1355 | | 3400 +100 | 2.509 | 1260 | 2.7 |
| /26 | 9:20A | | 00055500 | | | | |
| | | 1380 | | 5900 +200 | 4.275 | 1848 | 3.2 |
| /27 | 8:20A | | 00061400 | | | | |
| | | 1415 | | 6700 +100 | 4.735 | 2148 | 3.1 |
| /28 | 7:55A | | 00068100 | | | | |
| | | 1430 | | 6900 - | 4.825 | 2502 | 2.8 |
| /29 | 7:45A | | 00075000 | | | | |
| | | 1500 | | 5800 -200 | 3.867 | 2873 | 2.0 |
| /30 | 8:45A | | 00080800 | | | | |
| | | 1380 | | 4300 +200 | 3.116 | 2050 | 2.1 |
| /31 | 7:45A | | 00085100 | | | | |

## One Inch Meter - Administrative Building

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 2/28 | 7:40A | | 0006700 | | |
| | | 1455 | | 90 | .062 |
| 3/1 | 7:55A | | 0006790 | | |
| | | 1450 | | 80 | .055 |
| /2 | 8:05A | | 0006870 | | |
| | | 1420 | | 60 | .042 |
| /3 | 8:45A | | 0006930 | | |
| | | 1385 | | 80 | .058 |
| /4 | 7:50A | | 0007010 | | |
| | | 1440 | | 10 | .007 |
| /5 | 7:50A | | 0007020 | | |
| | | 1430 | | 40 | .028 |
| /6 | 7:40A | | 0007060 | | |
| | | 1440 | | 80 | .056 |
| /7 | 7:40A | | 0007140 | | |
| | | 1440 | | 130 | .090 |
| /8 | 7:40A | | 0007270 | | |
| | | 1440 | | 80 | .056 |
| /9 | 7:40A | | 0007350 | | |
| | | 1555 | | 50 - 10 | .032 |
| /10 | 9:35A | | 0007400 | | |
| | | 1365 | | 20 + 10 | .015 |
| /11 | 8:20A | | 0007420 | | |
| | | 1420 | | 70 | .049 |
| /12 | 8:00 | | 0007490 | | |
| | | 1420 | | 10 | .007 |
| /13 | 7:40A | | 0007500 | | |
| | | 1450 | | 60 | 0.41 |
| /14 | 7:50A | | 0007560 | | |
| | | 1440 | | 60 | .042 |
| /15 | 7:50A | | 0007620 | | |

One Inch Meter - Administrative Building (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| | | 1430 | | 50 | .035 |
| 3/16 | 7:40A | | 0007670 | | |
| | | 1445 | | 50 | .035 |
| /17 | 7:45A | | 0007720 | | |
| | | 1455 | | 40 | .027 |
| /18 | 8:00A | | 0007760 | | |
| | | 1435 | | 30 | .021 |
| /19 | 7:55A | | 0007790 | | |
| | | 1490 | | 30 | .020 |
| /20 | 8:45A | | 0007820 | | |
| | | 1385 | | 40 | .029 |
| /21 | 7:50A | | 0007860 | | |
| | | 1430 | | 50 | .035 |
| /22 | 7:40A | | 0007910 | | |
| | | 1450 | | 50 | .034 |
| /23 | 7:50A | | 0007960 | | |
| | | 1430 | | 100 | .070 |
| /24 | 7:40A | | 0008060 | | |
| | | 1620 | | 90 -20 | .056 |
| /25 | 10:40A | | 0008150 | | |
| | | 1355 | | 590 +10 | .435 |
| /26 | 9:15A | | 0008740 | | |
| | | 1390 | | 40 +10 | .029 |
| /27 | 8:25A | | 0008780 | | |
| | | 1410 | | 80 | .057 |
| /28 | 7:50A | | 0008860 | | |
| | | 1430 | | 90 | .063 |
| /29 | 7:40A | | 0008950 | | |
| | | 1500 | | 100 -10 | .067 |
| /30 | 8:40A | | 0009050 | | |
| | | 1380 | | 50 +10 | .036 |
| /31 | 7:40A | | 0009100 | | |

## Two Inch Meter To Visitor Center and Administration Building Lawn

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 2/28 | 7:35A | | 00075800 | | |
| | | 1425 | | 1600 | 1.12 |
| 3/1 | 7:50A | | 00077400 | | |
| | | 1450 | | 3300 | 2.28 |
| /2 | 8:00A | | 00080700 | | |
| | | 1425 | | 400 | 0.28 |
| /3 | 7:45A | | 00081100 | | |
| | | 1435 | | 0 | 0 |
| /4 | 7:40A | | 00081100 | | |
| | | 1460 | | 7100 | 4.86 |
| /5 | 8:00A | | 00088200 | | |
| | | 1415 | | 1500 | 1.06 |
| /6 | 7:35A | | 00089700 | | |
| | | 1440 | | 0 | 0 |
| /7 | 7:35A | | 00089700 | | |
| | | 1440 | | 2100 | 1.46 |
| /8 | 7:35A | | 00091800 | | |
| | | 1440 | | 2200 | 1.53 |
| /9 | 7:35A | | 00094000 | | |
| | | 1555 | | 900 | 0.58 |
| /10 | 9:30A | | 00094900 | | |
| | | 1360 | | 7200 | 5.29 |
| /11 | 8:10A | | 00102100 | | |
| | | 1420 | | 0 | 0 |
| /12 | 7:50A | | 00102100 | | |
| | | 1425 | | 0 | 0 |
| /13 | 7:35A | | 00102100 | | |
| | | 1465 | | 5700 | 3.89 |
| /14 | 8:00A | | 00107800 | | |
| | | 1420 | | 0 | 0 |
| /15 | 7:40A | | 00107800 | | |

## Two Inch Meter To Visitor Center and Administration Building Lawn (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| | | 1435 | | 1200 | 0.84 |
| 3/16 | 7:35A | | 00109000 | | |
| | | 1440 | | 0 | 0 |
| /17 | 7:35A | | 00109000 | | |
| | | 1435 | | 9100 | 6.34 |
| /18 | 7:30A | | 00118100 | | |
| | | 1455 | | 0 | 0 |
| /19 | 7:45A | | 00118100 | | |
| | | 1495 | | 5400 | 3.61 |
| /20 | 8:40A | | 00123500 | | |
| | | 1440 | | 0 | 0 |
| /21 | 8:40A | | 00123500 | | |
| | | 1375 | | 1000 | 0.73 |
| /22 | 7:35A | | 00124500 | | |
| | | 1450 | | 7100 | 4.90 |
| /23 | 7:45A | | 00131600 | | |
| | | 1430 | | 0 | 0 |
| /24 | 7:35A | | 00131600 | | |
| | | 1620 | | 3200 | 1.98 |
| /25 | 10:35A | | 00134800 | | |
| | | 1375 | | 300 | 0.22 |
| /26 | 9:25A | | 00135100 | | |
| | | 1385 | | 500 | 0.36 |
| /27 | 8:30A | | 00135600 | | |
| | | 1395 | | 6800 | 4.87 |
| /28 | 7:45A | | 00142400 | | |
| | | 1430 | | 0 | 0 |
| /29 | 7:35A | | 00142400 | | |
| | | 1500 | | 0 | 0 |
| /30 | 8:35A | | 00142400 | | |
| | | 1380 | | 10100 | 7.32 |
| /31 | 7:35A | | 00152500 | | |

Furnace Creek Campground Comfort Station - 1½" Meter

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | *No. Persons Camping | Use Per Person (Gallons) |
|---|---|---|---|---|---|---|---|
| 3/1 | 11:25A | | 00000000 | | | | |
| | | 1440 | | 8300 - 100 | 5.763 | 19 | 436.8 |
| /2 | 11:25A | | 00008300 | | | | |
| | | 1250 | | 1300 + 100 | 1.040 | 26 | 50.0 |
| /3 | 8:15A | | 00009600 | | | | |
| | | 1435 | | 200 | 0.139 | 32 | 6.3 |
| /4 | 8:10A | | 00009800 | | | | |
| | | 1435 | | 41600 | 28.990 | 122 | 341.0 |
| /5 | 8:05A | | 00051400 | | | | |
| | | 1430 | | 31500 | 22.028 | 19 | 1657.9 |
| /6 | 7:55A | | 00082900 | | | | |
| | | 1460 | | 6900 | 4.726 | 16 | 431.3 |
| /7 | 8:15A | | 00089800 | | | | |
| | | 1430 | | 100 | 0.070 | 19 | 5.3 |
| /8 | 8:05A | | 00089900 | | | | |
| | | 1440 | | 0 | 0 | 6 | 0 |
| /9 | 8:05A | | 00089900 | | | | |
| | | 1545 | | 0 | 0 | 6 | 0 |
| /10 | 9:50A | | 00089900 | | | | |
| | | 1365 | | 100 | 0.073 | 16 | 6.3 |
| /11 | 8:35A | | 00090000 | | | | |
| | | 1420 | | 300 | 0.211 | 166 | 1.8 |
| /12 | 8:15A | | 00090300 | | | | |
| | | 1425 | | 200 | 0.140 | 42 | 4.8 |
| /13 | 8:00A | | 00090500 | | | | |
| | | 1450 | | 200 | 0.138 | 22 | 9.1 |
| /14 | 8:10A | | 00090700 | | | | |
| | | 1460 | | 200 | 0.137 | 13 | 15.4 |
| /15 | 8:30A | | 00090700 | | | | |
| | | 1425 | | 100 | 0.070 | 22 | 4.5 |
| /16 | 8:15A | | 00090800 | | | | |
| | | 1430 | | 100 | 0.070 | 27 | 3.7 |

* No. persons equals tents and/or trailers multiplied by 3.2. Excessive water use on 1st, 4th, 5th, and 6th believed caused by sticking flush valve.

Furnace Creek Campground Comfort Station - 1½" Meter (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | No. Persons Camping | Use Per Person (Gallons) |
|---|---|---|---|---|---|---|---|
| 3/17 | 8:05A | | 00090900 | | | | |
| | | 1505 | | 100 | 0.066 | 16 | 6.3 |
| /18 | 9:10A | | 00091000 | | | | |
| | | 1390 | | 300 | 0.216 | 80 | 3.8 |
| /19 | 8:20A | | 00091300 | | | | |
| | | 1495 | | 100 | 0.067 | 19 | 5.3 |
| /20 | 9:15A | | 00091400 | | | | |
| | | 1420 | | 100 | 0.070 | 35 | 2.9 |
| /21 | 8:55A | | 00091500 | | | | |
| | | 1445 | | 200 | 0.138 | 29 | 6.9 |
| /22 | 9:00A | | 00091700 | | | | |
| | | 1420 | | 0 | 0 | 10 | 0 |
| /23 | 8:40A | | 0009170 | | | | |
| | | 1400 | | 100 | 0.071 | 16 | 6.3 |
| /24 | 8:00A | | 00091800 | | | | |
| | | 1610 | | 200 | 0.124 | 67 | 3.0 |
| /25 | 10:50A | | 00092000 | | | | |
| | | 1365 | | 1000 | 0.733 | 221 | 4.5 |
| /26 | 9:35A | | 00093000 | | | | |
| | | 1380 | | 1200 + 100 | 0.870 | 480 | 2.5 |
| /27 | 8:35A | | 000942000 | | | | |
| | | 1420 | | 1000 | 0.704 | 464 | 2.2 |
| /28 | 8:15A | | 00095200 | | | | |
| | | 1420 | | 1000 | 0.704 | 435 | 2.3 |
| /29 | 7:55A | | 00096200 | | | | |
| | | 1495 | | 1000 - 100 | 0.669 | 189 | 5.3 |
| /30 | 8:50A | | 00097200 | | | | |
| | | 1440 | | 700 | 0;486 | 189 | 3.7 |
| /31 | 8:50A | | 00097900 | | | | |
| | | | | | | 2823 | |

omitting use & visits
on March 1, 2, 4, 5, 6, 14

per capita use = $\frac{8100 \text{ gal}}{2608 \text{ visits}}$ = 3.1 gal per person per day

Two Inch Meter (PCB) on Line Texas Spring-To Texas Spring Campground

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used (Gallons) | Rate of Use GPM | *No. Persons Cmpg T.S.C/grd GPD |
|---|---|---|---|---|---|---|
| 2/28 | 8:30A | | 29987900 | | | |
| | | 1440 | | 31100 | 21.60 | |
| 3/1 | 8:30A | | 30019000 | | | 144 |
| | | 1450 | | 32000 - 200 | 22.07 | 31,800 |
| /2 | 8:40A | | 30051000 | | | 189 |
| | | 1440 | | 29500 — | 20.49 | 29,500 |
| /3 | 8:40A | | 30080500 | | | 214 |
| | | 1440 | | 30300 — | 21.04 | 30,300 |
| /4 | 8:40A | | 30110800 | | | 349 |
| | | 1450 | | 33800 -200 | 23.31 | 33,600 |
| /5 | 8:50A | | 30144600 | | | 698 |
| | | 1490 | | 35300 -1200 | 23.69 | 34,100 |
| /6 | 9:40A | | 30179900 | | | 234 |
| | | 1410 | | 31700 +700 | 22.48 | 32400 |
| /7 | 9:10A | | 30211600 | | | 237 |
| | | 1450 | | 32300 -200 | 22.28 | 32,100 |
| /8 | 9:20A | | 30243900 | | | 250 |
| | | 1410 | | 30300 + 600 | 21.49 | 30,900 |
| /9 | 8:50A | | 30274200 | | | 294 |
| | | 1575 | | 35100 -3000 | 22.29 | 32,100 |
| /10 | 11:05A | | 30309300 | | | 307 |
| | | 1310 | | 29100 +2900 | 22.21 | 32,000 |
| /11 | 8:55A | | 30338400 | | | 461 |
| | | 1450 | | 35000 -200 | 24.14 | 34,800 |
| /12 | 9:05A | | 30373400 | | | 797 |
| | | 1405 | | 32600 +800 +200 | 23.20 | 33,400 |
| /13 | 8:30A | | 30406000 | | | 480 |
| | | 1450 | | 32600 -200 | 22.48 | 32,400 |
| /14 | 8:40A | | 30438600 | | | 400 |
| | | 1470 | | 33000 -700 | 22.45 | 32,300 |
| /15 | 9:10A | | 30471600 | | | 314 |

Two Inch Meter (PCB) on Line Texas Spring To Texas Spring Campground (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used (Gallons) | Rate of Use GPM | *No. Persons Cmpg T.S.C/grd |
|---|---|---|---|---|---|---|
| | | 1415 | | 31800 +600 | 22.47 32,400 | |
| 3/16 | 8:45A | | 30503400 | | | 320 |
| | | 1425 | | 33900 + 300 | 23.79 34,200 | |
| /17 | 8:30A | | 30537300 | | | 400 |
| | | 1460 +20 | | 34600 -500 | 23.70 34,100 | |
| /18 | 8:50A | | 30571900 | | | 461 |
| | | 1445 +05 | | 33700 -100 | 23.32 33,600 | |
| /19 | 8:55A | | 30605600 | | | 528 |
| | | ~~1430~~ 1490 | | 34500 -1100 | 24.13 33,400 | |
| /20 | 9:45A | | 30640100 | | | 403 |
| | | 1375 | | 29800 +1400 | 21.67 31,200 | |
| /21 | 8:40A | | 30669900 | | | 310 |
| | | 1490 +50 | | 32300 -1000 | 21.68 31,300 | |
| /22 | 9:30A | | 30702200 | | | 218 |
| | | 1420 -70 | | 30700 + 400 | 21.62 31,100 | |
| /23 | 9:10A | | 30732900 | | | 250 |
| | | 1400 -40 | | 32000 +900 | 22.86 32,900 | |
| /24 | 8:30A | | 30764900 | | | 221 |
| | | 1525 +85 | | 34700 -2000 | 22.75 32,700 | |
| /25 | 9:55A | | 30799600 | | | 467 |
| | | 1375 -65 | | 36600 +1700 | 26.62 38,300 | |
| /26 | 8:50A | | 30836200 | | | 1232 |
| | | 1380 -60 | | 38200 +1600 | 27.68 39,800 | |
| /27 | 7:50A | | 30874400 | | | 1286 |
| | | 1490 +50 | | 40700 -1300 | 27.32 39,400 | |
| /28 | 8:40A | | 30915100 | | | 1152 |
| | | 1410 -30 | | 38300 + 800 | 27.16 39100 | |
| /29 | 8:10A | | 30953400 | | | 1046 |
| | | 1500 +60 | | 39900 -1600 | 26.60 38,300 | |
| /30 | 9:10A | | 30993300 | | | 768 |
| | | 1390 -50 | | 36700 +1300 | 26.40 38000 | |
| /31 | 8:20A | | 31030000 | | | 768 |
| | | | | | | 15,198 |

* Number of persons camping equals number of tent and trailers multiplied by 3.2.

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Death Valley National Monument
Death Valley, California

IN REPLY REFER TO:

L54

April 27, 1961

RECEIVED
NPS REGION FOUR OFFICE
MAY 2 '61

| | SURNAME | DATE |
|---|---|---|
| REG. DIR. | | |
| ASST. R.D. | | |
| OPERATIONS | | |
| ADMIN. | | |
| RECREATION | | |
| INTERP. | | |
| RANGER ACT | | |

5/8
LSS
Whitworth has seen
Manbey B/M 5/8

Memorandum

To: Regional Director, Region Four

From: Acting Superintendent, Death Valley

Subject: Water Meter Readings, Furnace Creek Area - Death Valley
February 1961

Attached are copies of meter readings for the period of February 1 through February 28, 1961 for the following meters:

NPS reservoir (500,000 gallons) depth gauge readings
Four inch meter (NPS) on Visitor Center Line
One and one-half inch meter on Visitor Center Line
One and one-half inch meter - Museum and Auditorium
One inch meter - Administrative Building
Two inch meter to Visitor Center and Administrative Building Lawn
Two Inch meter (PCB) on Texas Spring to Texas Spring Campground line.

Robert A. Fleming
Acting Superintendent

In duplicate

Attachment

Copy to: WASO, w/attachment

1" = 2680 gal

## Water Level In 500,000 Gallon Reservoir - Furnace Creek

| Date | Time | Depth of Water | | Gal. |
|---|---|---|---|---|
| 2/1/61 | 8:35A | 13' 1" | +10 | +26,800 |
| /2 | 8:40A | 13" 11" | +9 | +24,100 |
| /3 | 8:45A | 14' 8" | +9 | +24,100 |
| /4 | 8:30A | 15' 5" | +4 | +10,700 |
| /5 | 8:15A | 15' 9" | -9 | -24,100 |
| /6 | 8:15A | 15' 0" | -2 | -5400 |
| /7 | 8:20A | 14' 10" | -1 | -2700 |
| /8 | 8:30A | 14' 9" | +3 | +8000 |
| /9 | 8:35A | 15' 0" | -7 | -18,700 |
| /10 | 8:15A | 14' 5" | +1 | +2700 |
| /11 | 8:45A | 14' 6" | +3 | +8000 |
| /12 | 8:25A | 14' 9" | +2 | +5400 |
| /13 | 8:25A | 14' 11" | +3 | +8000 |
| /14 | 8:25A | 15' 2" | -2 | -5400 |
| /15 | 8:15A | 15' 0" | +4 | +10,700 |
| /16 | 8:20A | 15' 4" | -6 | -16,100 |
| /17 | 8:05A | 14' 10" | -4 | -10,700 |
| /18 | 8:20A | 14' 6" | -2 | -5400 |
| /19 | 8:15A | 14' 4" | -13 | -34,800 |
| /20 | 8:20A | 13' 3" | +5 | +13,400 |
| /21 | 8:35A | 13' 8" | -3 | -8000 |
| /22 | 8:35A | 13' 5" | +6 | +16,100 |
| /23 | 8:55A | 13' 11" | +6 | +16,100 |
| /24 | 8:25A | 14' 5" | +1 | +2700 |
| /25 | 8:35A | 14' 6" | +7 | +18,700 |
| /26 | 8:50A | 15' 1" | +7 | +18,700 |
| /27 | 8:20A | 15' 8" | -4 | -10,700 |
| /28 | 8:25A | 15' 4" | -1 | -2700 |
| 3/1 | | 15' 3" | | |

## Four Inch Meter On Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | GallOns Used | Rate of Use (GPM) |
|---|---|---|---|---|---|---|
| 1/31/ | 8:25A | | 0166510 | | | |
| | | 1440 | | 0 | | |
| 2/1 | 8:25A | | 0166510 | | | |
| | | 1450 | | 0 | | |
| /2 | 8:35A | | 0166510 | | | |
| | | 1445 | | 0 | | |
| /3 | 8:40A | | 0166510 | | | |
| | | 1425 | | 0 | | |
| /4 | 8:25A | | 0166510 | | | |
| | | 1425 | | 0 | | |
| /5 | 8:10A | | 0166510 | | | |
| | | 1435 | | 1360 | 10170 | 0.71 |
| /6 | 8:05A | | 0167870 | | | |
| | | 1445 | | 720 | 5390 | 0.37 |
| /7 | 8:10A | | 0168590 | | | |
| | | 1445 | | 790 | 5910 | 0.41 |
| /8 | 8:25A | | 0169380 | | | |
| | | 1445 | | 0 | | |
| /9 | 8:30A | | 0169380 | | | |
| | | 1420 | | 2700 | 20200 | 1.42 |
| /10 | 8:10A | | 0172080 | | | |
| | | 1470 | | 0 | | |
| /11 | 8:40A | | 0172080 | | | |
| | | 1415 | | 0 | | |
| /12 | 8:15A | | 0172080 | | | |
| | | 1445 | | 0 | | |
| /13 | 8:20A | | 0172080 | | | |
| | | 1435 | | 0 | | |
| /14 | 8:15A | | 0172080 | | 10400 ~~4980~~ | |
| 2/15 | | | 0173470 | 1390 | | |

## Four Inch Meter on Visitor Center Line (Cont'd)

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM |
|---|---|---|---|---|---|---|
| /15 | 8:10A | | 0173470 | | | |
| | | 1445 | | 0 | | |
| /16 | 8:15A | | 0173470 | | | |
| | | 1425 | | 0 | | |
| /17 | 8:00A | | 0173470 | | | |
| | | 1455 | | 770 | 5760 | 0.40 |
| /18 | | | 0174240 | | | |
| | | 1435 | | 0 | | |
| /19 | 8:10A | | 0174240 | | | |
| | | 1440 | | 3160 | 23640 | 1.64 |
| /20 | 8:10A | | 0177400 | | | |
| | | 1460 | | 100 | 750 | 0.05 |
| /21 | 8:30A | | 0177500 | | | |
| | | 1440 | | 2070 | 15480 | 1.08 |
| /22 | 8:30A | | 0179570 | | | |
| | | 1460 | | 0 | | |
| /23 | 8:50A | | 0179570 | | | |
| | | 1410 | | 0 | | |
| /24 | 8:20A | | 0179570 | | | |
| | | 1450 | | 490 | 3670 | 0.25 |
| /25 | 8:30A | | 0180060 | | | |
| | | 1455 | | 0 | | |
| /26 | 8:45A | | 0180060 | | | |
| | | 1410 | | 0 | | |
| /27 | 8:15A | | 0180060 | | | |
| | | 1445 | 0181070 | 1010 | 7560 | 0.52 |
| /28 | 8:20A | | ~~0191070~~ | | | |
| | | | | 80 | 600 | |
| 3/1 | | | 181150 | | | |

One and One-half Inch Meter On Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 1/31 | 8:25A | | 03238900 | | |
| | | 1440 | | 50,700 | 35.21 |
| 2/1 | 8:25A | | 03289600 | | |
| | | 1450 | | 2,500 | 1.72 |
| /2 | 8:35A | | 03292100 | | |
| | | 1435 | | 2,200 | 1.53 |
| /3 | 8:40A | | 03294300 | | |
| | | 1425 | | 2,200 | 1.54 |
| /4 | 8:25A | | 03296500 | | |
| | | 1425 | | 2,800 | 1.96 |
| /5 | 8:10A | | 03299300 | | |
| | | 1435 | | 40,800 | 28.43 |
| /6 | 8:05A | | 03340100 | | |
| | | 1445 | | 24,500 | 16.96 |
| /7 | 8:10A | | 03364600 | | |
| | | 1455 | | 22,700 | 15.60 |
| /8 | 8:25A | | 03387300 | | |
| | | 1445 | | 18,400 | 12.73 |
| /9 | 8:30A | | 03405700 | | |
| | | 1420 | | 25,500 | 17.96 |
| /10 | 8:10A | | 03431200 | | |
| | | 1470 | | 17,700 | 12.04 |
| /11 | 8:40A | | 03448900 | | |
| | | 1415 | | 18,600 | 13.14 |
| /12 | 8:15A | | 03467500 | | |
| | | 1445 | | 19,400 | 13.43 |
| /13 | 8:20A | | 03486900 | | |
| | | 1435 | | 16,400 | 11.43 |
| /14 | 8:15A | | 03503300 | | |

3524000

One and One-half Inch Meter On Visitor Center Line (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| | | 1435 | | 20,700 | 14.43 |
| 2/15 | 8:10A | | 03524000 | | |
| | | 1445 | | 15,900 | 11.00 |
| /16 | 8:15A | 1425 | 03539900 | | |
| | | 1925 X | | 29,900 | 20.98 |
| /17 | 8:00A | | 03569800 | | |
| | | 1455 | | 41,400 | 28.45 |
| /18 | 8:15A | | 03611200 | | |
| | | 1435 | | 31,300 | 21.81 |
| /19 | 8:10A | | 03642500 | | |
| | | 1440 | | 36,700 | 25.49 |
| /20 | 8:10A | | 03679200 | | |
| | | 1400 | | 12,300 | 8.42 |
| /21 | 8:30A | | 03691500 | | |
| | | 1440 | | 19,200 | 13.33 |
| /22 | 8:30A | | 03710700 | | |
| | | 1460 | | 9,800 | 6.71 |
| /23 | 8:50A | | 03720500 | | |
| | | 1410 | | ~~20,400~~ adj to 10,400 adj to 11,600 | ~~14.47~~ |
| /24 | 8:20A | | 03740900 ? say 3739090 | ~~11,600~~ 1600 | ~~8.00~~ |
| | | 1450 | | | |
| /25 | 8:30A | | 03742500 | | |
| | | 1455 | | 10,100 | 6.94 |
| /26 | 8:45A | | 03752600 | | |
| | | 1410 | | 8,500 | 6.03 |
| /27 | 8:15A | | 03761100 | | |
| | | 1445 | | 29,800 | 20.62 |
| /28 | 8:20A | | 03790900 | | |
| 3/1 | | | 3816300 | 25,~~400~~ | |

$\Sigma$ from 2/1 to 3/1 incf = 526,700

One and One-half Inch Meter - Museum and Auditorium

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used | Rate of Use | No. of Visits | Use Per Visit (Gallons) |
|---|---|---|---|---|---|---|---|
| 1/31 | 7:50A | | 00007800 | | | | |
| | | 1445 | | 500 | .346 | | |
| 2/1 | 7:55A | | 00008300 | | | | |
| | | 1440 | | 300 | .208 | 146 | 2.1 |
| /2 | 7:55A | | 00008600 | | | | |
| | | 1475 | | 500 | .339 | 171 | 2.9 |
| /3 | 8:30A | | 00009100 | | | | |
| | | 1400 | | 400 | .286 | 136 | 2.9 |
| /4 | 7:50A | | 00009500 | | | | |
| | | 1445 | | 500 | .346 | 498 | 1.0 |
| /5 | 7:55A | | 00010000 | | | | |
| | | 1430 | | 800 | .559 | 515 | 1.6 |
| /6 | 7:45A | | 00010800 | | | | |
| | | 1450 | | 700 | .483 | 162 | 4.3 |
| /7 | 7:55A | | 00011500 | | | | |
| | | 1440 | | 500 | .347 | 196 | 2.6 |
| /8 | 7:55A | | 00012000 | | | | |
| | | 1440 | | 400 | .278 | 205 | 2.0 |
| /9 | 7:55A | | 00012400 | | | | |
| | | 1430 | | 700 | .490 | 278 | 2.5 |
| /10 | 7:45A | | 00013100 | | | | |
| | | 1450 | | 400 | .276 | 234 | 1.7 |
| /11 | 7:55A | | 00013500 | | | | |
| | | 1440 | | 1500 | 1.042 | 873 | 1.7 |
| /12 | 7:55A | | 00015000 | | | | |
| | | 1435 | | 2700 | 1.882 | 923 | 2.9 |
| /13 | 7:50A | | 00017700 | | | | |
| | | 1435 | | 800 | .557 | 352 | 2.3 |
| /14 | 7:45A | | 00018500 | | | | |

One and One-half Inch Meter - Museum and Auditorium (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used | Rate of Use | No. of Visits | Use Per Visit (Gallons) |
|---|---|---|---|---|---|---|---|
| | | 1440 | | 800 | .556 | 275 | 2.9 |
| 2/15 | 7:45A | | 00019300 | | | | |
| | | 1450 | | 500 | .345 | 270 | 1.9 |
| /16 | 7:55A | | 00019800 | | | | |
| | | 1425 | | 800 | .561 | 308 | 2.6 |
| /17 | 7:40A | | 00020600 | | | | |
| | | 1440 | | 600 | .417 | 223 | 2.7 |
| /18 | 7:40A | | 00021200 | | | | |
| | | 1450 | | 1000 | .690 | 625 | 1.6 |
| /19 | 7:50A | | 00022200 | | | | |
| | | 1435 | | 900 | .627 | 558 | 1.6 |
| /20 | 7:45A | | 00023100 | | | | |
| | | 1440 | | 600 | .417 | 275 | 2.2 |
| /21 | 7:45A | | 00023700 | | | | |
| | | 1455 | | 600 | .412 | 325 | 1.8 |
| /22 | 8:00A | | 00024300 | | | | |
| | | 1475 | | 900 | .610 | 472 | 1.9 |
| /23 | 8:35A | | 00025200 | | | | |
| | | 1410 | | 700 | .496 | 266 | 2.6 |
| /24 | 8:05A | | 00025900 | | | | |
| | | 1425 | | 400 | .281 | 344 | 1.2 |
| /25 | 7:50A | | 00026300 | | | | |
| | | 1475 | | 1400 | .949 | 727 | 1.9 |
| /26 | 8:20A | | 00027700 | | | | |
| | | 1410 | | 1200 | .851 | 468 | 2.6 |
| /27 | 7:50A | | 00028900 | | | | |
| | | 1425 | | 400 | .281 | 192 | 2.1 |
| /28 | 7:45A | | 00029300 | | | | |

3/1

500

## One Inch Meter - Administrative Building

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 1/31 | 7:45A | | 0004660 | | |
| | | 1445 | | 60 | .042 |
| 2/1 | 7:50A | | 0004720 | | |
| | | 1440 | | 100 | .064 |
| /2 | 7:50A | | 0004820 | | |
| | | 1480 | | 130 | .088 |
| /3 | 8:30A | | 0004950 | | |
| | | 1405 | | 70 | .050 |
| /4 | 7:55A | | 0005020 | | |
| | | 1435 | | 40 | .028 |
| /5 | 7:50A | | 0005060 | | |
| | | 1430 | | 40 | .028 |
| /6 | 7:40A | | 0005100 | | |
| | | 1450 | | 80 | .055 |
| /7 | 7:50A | | 0005180 | | |
| | | 1440 | | 310 | .215 |
| /8 | 7:50A | | 0005490 | | |
| | | 1440 | | 80 | .056 |
| /9 | 7:50A | | 0005570 | | |
| | | 1430 | | 80 | .056 |
| /10 | 7:40A | | 0005650 | | |
| | | 1450 | | 60 | .041 |
| /11 | 7:50A | | 0005710 | | |
| | | 1440 | | 30 | .021 |
| /12 | 7:50A | | 0005740 | | |
| | | 1435 | | 40 | .028 |
| /13 | 7:45A | | 0005780 | | |
| | | 1435 | | 80 | .056 |
| /14 | 7:40A | | 0005860 | | |

## One Inch Meter - Administrative Building (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| | 1440 | 1440 | | 60 | .042 |
| 2/15 | 7:40A | | 0005920 | | |
| | | 1450 | | 80 | .055 |
| /16 | 7:50A | | 0006000 | | |
| | | 1435 | | 60 | .042 |
| /17 | 7:45A | | 0006060 | | |
| | | 1440 | | 70 | .049 |
| /18 | 7:45A | | 0006130 | | |
| | | 1435 | | 40 | .028 |
| /19 | 7:40A | | 0006170 | | |
| | | 1440 | | 40 | .028 |
| /20 | 7:40A | | 0006210 | | |
| | | 1440 | | 50 | .035 |
| /21 | 7:40A | | 0006260 | | |
| | | 1455 | | 70 | .048 |
| /22 | 7:55A | | 0006330 | | |
| | | 1475 | | 30 | .020 |
| /23 | 8:30A | | 0006360 | | |
| | | 1410 | | ~~80~~ 160 | .043 |
| /24 | 8:00A | | 0006520 | | |
| | | 1430 | | 50 | .035 |
| /25 | 7:50A | | 0006570 | | |
| | | 1455 | | 30 | .021 |
| /26 | 8:05A | | 0006600 | | |
| | | 1420 | | 50 | .035 |
| /27 | 7:45A | | 0006650 | | |
| | | 1435 | | 50 | .035 |
| /28 | 7:40A | | 0006700 | | |
| | | | | 90 | |

3/1

~~8~~ 9

## Two Inch Meter To Visitor Center and Administration Building Lawn

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 1/31 | 7:40A | | 00022800 | | |
| | | 1445 | | 0 | 0 |
| 2/1 | 7:45A | | 00022800 | | |
| | | 1440 | | 0 | 0 |
| /2 | 7:45A | | 00022800 | | |
| | | 1485 | | 0 | 0 |
| /3 | 8:30A | | 00022800 | | |
| | | 1400 | | 0 | 0 |
| /4 | 7:50A | | 00022800 | | |
| | | 1435 | | 0 | 0 |
| /5 | 7:45A | | 00022800 | | |
| | | 1430 | | 6200 | 4.34 |
| /6 | 7:35A | | 00029000 | | |
| | | 1450 | | 800 | 0.55 |
| /7 | 7:45A | | 00029800 | | |
| | | 1440 | | 0 | 0 |
| /8 | 7:45A | | 00029800 | | |
| | | 1440 | | 0 | 0 |
| /9 | 7:45A | | 00029800 | | |
| | | 1435 | | 13800 | 9;62 |
| /10 | 7:40A | | 00043600 | | |
| | | 1450 | | 0 | 0 |
| /11 | 7:50A | | 00043600 | | |
| | | 1430 | | 0 | 0 |
| /12 | 7:40A | | 00043600 | | |
| | | 1440 | | 0 | 0 |
| /13 | 7:40A | | 00043600 | | |
| | | 1435 | | 0 | 0 |
| /14 | 7:35A | | 00043600 | | |

## Two Inch Meter To Visitor Center and Administration Building Lawn (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| | | 1440 | | 2400 | 1.67 |
| 2/15 | 7:35A | | 00046000 | | |
| | | 1450 | | 0 | 0 |
| /16 | 7:45A | | 00046000 | | |
| | | 1430 | | 0 | 0 |
| /17 | 7:35A | | 00046000 | | |
| | | 1440 | | 7100 | 4.93 |
| /18 | 7:35A | | 00053100 | | |
| | | 1440 | | 0 | 0 |
| /19 | 7:35A | | 00053100 | | |
| | | 1440 | | 8100 | 5.62 |
| /20 | 7:35A | | 00061200 | | |
| | | 1440 | | 6000 | 4.17 |
| /21 | 7:35A | | 00067200 | | |
| | | 1455 | | 0 | 0 |
| /22 | 7:50A | | 00067200 | | |
| | | 1475 | | 100 | 0.07 |
| /23 | 8:25A | | 00067300 | | |
| | | 1420 | | 1400 | 0.99 |
| /24 | 8:05A | | 00068700 | | |
| | | 1420 | | 7100 | 5.00 |
| /25 | 7:45A | | 00075800 | | |
| | | 1455 | | 0 | 0 |
| /26 | 8:00A | | 00075800 | | |
| | | 1420 | | 0 | 0 |
| /27 | 7:40A | | 00075800 | | |
| | | 1435 | | 0 | 0 |
| /28 | 7:35A | | 00075800 | | |

Two Inch Meter (PCB) on Line Texas Spring To Texas Spring Campground

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used (Gallons) | Rate of USE GPM | *No. Persons Cmpg T.S.C/gd |
|---|---|---|---|---|---|---|
| 1/31 | 8:40A | | 29124800 | | | |
| | | 1440 | | 30000 | 20.83 | |
| 2/1 | 8:40A | | 29154800 | | | 163 |
| | | 1445 | | 30000 | 20.76 | |
| /2 | 8:45A | | 29184800 | | | 160 |
| | | 1445 | | 29400 | 20.35 | |
| /3 | 8:50A | | 29214200 | | | 141 |
| | | 1425 | | 28900 | 20.28 | |
| /4 | 8:35A | | 29243100 | | | 211 |
| | | 1425 | | 30000 | 21.05 | |
| /5 | 8:20A | | 29273100 | | | 301 |
| | | 1445 | | 30800 | 21.31 | |
| /6 | 8:25A | | 29303900 | | | 195 |
| | | 1440 | | 29700 | 20.62 | |
| /7 | 8:25A | | 29333600 | | | 163 |
| | | 1455 | | 31100 | 21.37 | |
| /8 | 8:40A | | 29364700 | | | 163 |
| | | 1445 | | 31700 | 21.94 | |
| /9 | 8:45A | | 29396400 | | | 224 |
| | | 1415 | | 30900 | 21.84 | |
| /10 | 8:20A | | 29427300 | | | 243 |
| | | 1470 | | 33000 | 22.45 | |
| /11 | 8:50A | | 29460300 | | | 384 |
| | | 1420 | | 33200 | 23.38 | |
| /12 | 8:30A | | 29493500 | | | 659 |
| | | 1445 | | 34000 | 23.53 | |
| /13 | 8:35A | | 29527500 | | | 269 |
| | | 1435 | | 31100 | 21.67 | |
| /14 | 8:30A | | 29558600 | | | 246 |

Two Inch Meter (PCB) on Line Texas Spring To Texas Spring Campground (Cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Amount Used (Gallons) | Rate of USe GPM | *No. Persons Cmpg T.S.C/grd |
|---|---|---|---|---|---|---|
| | | 1430 | | 31600 | 22.10 | |
| 2/15 | 8:20A | | 29590200 | | | 195 |
| | | 1445 | | 30100 | 20.83 | |
| /16 | 8:25A | | 29620300 | | | 246 |
| | | 1425 | | 29300 | 20.56 | |
| /17 | 8:10A | | 29649600 | | | 211 |
| | | 1455 | | 31100 | 21.37 | |
| /18 | 8:25A | | 29680700 | | | 294 |
| | | 1435 | | 30800 | 21.46 | |
| /19 | 8:20A | | 29711500 | | | 330 |
| | | 1445 | | 31800 | 22.01 | |
| /20 | 8:25A | | 29743300 | | | 385 |
| | | 1460 | | 31200 | 21.37 | |
| /21 | 8:45A | | 29774500 | | | 221 |
| | | 1435 | | 30300 | 21.11 | |
| /22 | 8:40A | | 29804800 | | | 224 |
| | | 1460 | | 30700 | 21.03 | |
| /23 | 9:00A | | 29835500 | | | 214 |
| | | 1410 | | 29600 | 20.99 | |
| /24 | 8:30A | | 29865100 | | | 214 |
| | | 1450 | | 31700 | 21.86 | |
| /25 | 8:40A | | 29896800 | | | 282 |
| | | 1455 | | 33,000 | 22.68 | |
| /26 | 8:55A | | 29929800 | | | 499 |
| | | 1415 | | 29100 | 20.57 | |
| /27 | 8:30A | | 29958900 | | | 176 |
| | | 1440 | | 29000 | 20.14 | |
| /28 | 8:30A | | 29987900 | | | 163 |

* Number persons camping equals number tents and trailers multiplied by 3.2.

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Death Valley National Monument
Death Valley, California

RECEIVED
NPS REGION FOUR OFFICE
FEB 8'61

| | SURNAME | DATE |
|---|---|---|
| REG. DIR. | | |
| ASST. R.D. | | |
| OPERATIONS | | |
| ADMIN. | | |
| RECREATION | | |
| INTERP. | | |
| RANGER ACT | | |

IN REPLY REFER TO:

L54

February 6, 1961

Memorandum

To: Regional Director, Region Four

From: Superintendent, Death Valley

Subject: Water Meter Readings, Furnace Creek Area - Death Valley

Attached are copies of meter readings for the period of January 1 to January 31, 1961 for the following meters:

2" meter (PCB) on Texas Spring Line

4" meter (NPS) on Visitor Center Line

1½" meter (NPS) on Visitor Center Line

NPS reservoir (500,000 gallons) depth gauge readings

1" meter Administrative Building

1½" meter Museum and Auditorium

2" meter Visitor Center Patio and lawn

Granville B. Liles
Superintendent

In duplicate

Attachment

Copy to: WASO w/attachment

## Two Inch Meter on Line Texas Spring to Texas Spring Campground

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 1/16 | 8:30A | | 28681600 | | | |
| | | 1450 | | 29,300 | 20.21 | |
| /15 | 8:20A | | 28652300 | | | |
| | | 1435 | | 29,200 | 20.35 | |
| /14 | 8:25A | | 28623100 | | | |
| | | 1445 | | 28,800 | 19.93 | |
| /13 | 8:20A | | 28594300 | | | |
| | | 1445 | | 30,500 | 21.11 | |
| /12 | 8:15A | | 28563800 | | | |
| | | 1440 | | 28,800 | 20.00 | |
| /11 | 8:15A | | 28535000 | | | |
| | | 1435 | | 28,300 | 19.72 | |
| /10 | 8:20A | | 28506700 | | | |
| | | 1450 | | 29,000 | 20.00 | |
| /9 | 8:10A | | 28477700 | | | 28,500 |
| /8 | | 2880 | | 56,900 | 19.76 | 28,400 |
| /7 | 8:10A | | 28420800 | | | |
| | | 1440 | | 28,500 | 19.79 | |
| /6 | 8:10A | | 28392300 | | | |
| | | 1435 | | 28,900 | 20.14 | |
| /5 | 8:15A | | 28363400 | | | |
| | | 1425 | | 27,700 | 19.44 | |
| /4 | 8:30A | | 28335700 | | | |
| | | 1445 | | 28300 | 19.58 | |
| /3 | 8:25A | | 28307400 | | | |
| | | 1435 | | 30,100 | 20.98 | |
| /2 | 8:30A | | 28277300 | | | |
| | | 1450 | | 34,600 | 23.86 | |
| 1/1 | 8:20A | | 28242700 | | | |
| | | 1450 | | 36,300 | 25.03 | 36,000 |
| 12/31 | 8:10A | | 28206400 | | | |

Two Inch Meter on Line Texas Spring to Texas Spring Campground (cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 1/31 | 8:40A | | 29124800 | | | 30,200 30,100 |
| /30 | | 2905 | | 60,300 | 20.76 | |
| /29 | 8:15A | 1415 | 29064500 | 29,500 | 20.85 | |
| /28 | 8:40A | 1450 | 29035000 | 30,200 | 20.83 | |
| /27 | 8:30A | 1460 | 29004800 | 30,500 | 20.89 | |
| /26 | 8:10A | 1410 | 28974300 | 29,400 | 20.85 | |
| /25 | 8:40A | 1430 | 28945900 | 28,500 | 19.93 | |
| /24 | 8:50A | 1420 | 28917400 | 28,800 | 20.28 | |
| /23 | 9:10A | 1320 | 28888600 | 27,100 | 20.53 | 29 600 |
| /22 | 11:10A | 1605 | 28861500 | 33,000 | 20.56 | 29,600 |
| /21 | 8:25A | 1450 | 28828500 | 30,100 | 20.76 | |
| /20 | 8:15A | 1425 | 28798400 | 29,200 | 20.49 | |
| /19 | 8:30A | 1435 | 28769200 | 31,200 | 21.74 | |
| /18 | 8:35A | 1435 | 28738000 | 27,700 | 19.30 | |
| /17 | 8:40A | 1450 | 28710300 | 28,700 | 19.79 | |

## Four Inch Meter on Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|---|
| | | 1445 | | 280 | 2,094.55 | 1.45 | |
| 1/16 | 8:20A | | 0160500 | | | | |
| | | 1450 | | 1,840 | 13,764.16 | 9.49 | |
| /15 | 8:10A | | 0158660 | | | | |
| | | 1435 | | 730 | 5,460.78 | 3.81 | |
| /14 | 8:15A | | 0157930 | | | | |
| | | 1445 | | 0 | 0 | 0 | |
| /13 | 8:10A | | 0157930 | | | | |
| | | 1450 | | 0 | 0 | 0 | |
| /12 | 8:00A | | 0157930 | | | | |
| | | 1440 | | 1,650 | 12,342.86 | 8.57 | |
| /11 | 8:00A | | 0156280 | | | | |
| | | 1430 | | 0 | 0 | 0 | |
| /10 | 8:10A | | 0156280 | | | | |
| | | 1455 | | 0 | 0 | 0 | |
| /9 | 7:55A | | 0156280 | | | | |
| /8 | | 2875 | | 30 | 224.42 | 0.08 | |
| /7 | 8:00A | | 0156250 | | | | |
| | | 1440 | | 0 | 0 | 0 | |
| /6 | 8:00A | | 0156250 | | | | |
| | | 1440 | | 790 | 5,909.61 | 4.10 | |
| /5 | 8:00A | | 0155460 | | | | |
| | | 1425 | | ~~900~~ 6730 | | | |
| /4 | 8:15A | | 0154560 | | | | |
| | | 1445 | | 0 | 0 | 0 | |
| /3 | 8:10A | | 0154560 | | | | |
| | | 1435 | | 1,010 | 7,555.32 | 5.27 | |
| /2 | 8:15A | | 0153550 | | | | |
| | | 1450 | | 0 | 0 | 0 | |
| 1/1 | 8:05A | | 0153550 | | | | |
| | | 1445 | | 110 | 822.86 | 0.57 | 820 |
| 12/31 | 8:00A | | 0153440 | | | | |

## Four Inch Meter on Visitor Center Line (cont'd)

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|---|
| 1/31 | 8:25A | | 0166510 | | | |
| /30 | | 2905 | | 770 | 5,760.00 | 1.98 |
| /29 | 8:00A | | 0165740 | | | |
| | | 1410 | | 0 | 0 | 0 |
| /28 | 8:30A | | 0165740 | | | |
| | | 1450 | | 0 | 0 | 0 |
| /27 | 8:20A | | 0165740 | | | |
| | | 1465 | | 570 | 4,263.90 | 2.91 |
| /26 | 7:55A | | 0165170 | | | |
| | | 1410 | | 330 | 2,468.57 | 1.75 |
| /25 | 8:25A | | 0164840 | | | |
| | | 1430 | | 0 | 0 | 0 |
| /24 | 8:35A | | 0164840 | | | |
| | | 1420 | | 560 | 4,189.09 | 2.95 |
| /23 | 8:55A | | 0164280 | | | |
| | | 1320 | | 80 | 598.44 | 0.45 |
| /22 | 10:55A | | 0164200 | | | |
| | | 160 | | 0 | 0 | 0 |
| /21 | 8:15A | | 0164200 | | | |
| | | 1450 | | 0 | 0 | 0 |
| /20 | 8:05A | | 0164200 | | | |
| | | 1430 | | 260 | 1,944.94 | 1.36 |
| /19 | 8:15A | | 0163940 | | | |
| | | 1430 | | 1,430 | 10,697.14 | 7.48 |
| /18 | 8:25A | | 0162510 | | | |
| | | 1440 | | 1,730 | 12,941.30 | 8.99 |
| 1/17 | | | 0160780 | | | |

**One and one-half inch Meter on Visitor Center Line**

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 1/16 | 8:20A | | 02863400 | | | |
| | | 1450 | | 16,800 | 11.59 | |
| /15 | 8:10A | | 02846600 | | | |
| | | 1435 | | 19,400 | 13.52 | |
| /14 | 8:15A | | 02827200 | | | |
| | | 1445 | | 7,800 | 5.40 | |
| /13 | 8:10A | | 02819400 | | | |
| | | 1450 | | 10,200 | 7.03 | |
| /12 | 8:00A | | 02809200 | | | |
| | | 1440 | | 42,900 | 29.79 | |
| /11 | 8:00A | | 02766300 | | | |
| | | 1430 | | 36,000 | 25.17 | |
| /10 | 8:10A | | 02730300 | | | |
| | | 1465 | | 20,400 | 13.92 | |
| /9 | 7:45A | | 02709900 | | | |
| /8 | | 2865 | | 41,100 | 14.35 | |
| /7 | 8:00A | | 02668800 | | | |
| | | 1440 | | 23,300 | 16.18 | |
| /6 | 8:00A | | 02645500 | | | |
| | | 1440 | | 6,500 | 4.51 | |
| /5 | 8:00A | | 02639000 | | | |
| | | 1425 | | 2,400 | 1.68 | |
| /4 | 8:15A | | 02636600 | | | |
| | | 1445 | | 600 | 0.42 | |
| /3 | 8:10A | | 02636000 | | | |
| | | 1435 | | 6,200 | 4.32 | |
| /2 | 8:15A | | 02629800 | | | |
| | | 1450 | | 14,300 | 9.86 | |
| 1/1 | 8:05A | | 02615500 | | | |
| | | 1445 | | 44,100 | 30.52 | 43,900 |
| 12/31 | 8:00A | | 02571400 | | | |

One and one-half inch Meter on Visitor Center Line (cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 1/31 | 8:25A | | 03238900 | | | |
| 1/30 | | 2905 | | 102,800 | 35.39 | |
| /29 | 8:00A | 1401 | 03136100 | 20,300 | 14.40 | |
| /28 | 8:30A | 1450 | 03115800 | 21,100 | 14.55 | |
| /27 | 8:20A | 1465 | 03094700 | 23,600 | 16.11 | |
| /26 | 7:55A | 1410 | 03071100 | 26,500 | 18.79 | |
| /25 | 8:25A | 1430 | 03044600 | 9,700 | 6.78 | |
| /24 | 8:35A | 1420 | 03034900 | 17,400 | 12.25 | |
| /23 | 8:55A | 1320 | 03017500 | 19,600 | 14.85 | 21,400 |
| /22 | 10:55A | 1600 | 02997900 | 10,800 | 6.75 | 9700 |
| /21 | 8:15A | 1450 | 02987100 | 8,900 | 6.14 | |
| /20 | 8:05A | 1430 | 02978200 | 20,600 | 14.41 | |
| /19 | 8:15A | 1430 | 02957600 | 32,500 | 22.73 | |
| /18 | 8:25A | 1440 | 02925100 | 46,000 | | |
| 1/17 | 8:25A | 1445 | 02879100 | 15,700 | 10.87 | |

2680 gal per inch

## Water Level - Visitor Center Reservoir (500,000 Gallons)

| Date | Time | Depth of Water | Change | Gal | Date | Time | Depth of Water | Change | Gal |
|---|---|---|---|---|---|---|---|---|---|
| 12/31/60 | 8:05A | 14' 4" | -9" | -24,120 gal | 1/16 | 8:25A | 15' 6" | +2" | + 5400 gal |
| 1/1 | 8:10A | 13' 7" | + 4 | +10,800 | /17 | 8:30A | 15' 8" | - 14 | - 37,500 |
| /2 | 8:22A | 13' 11" | + 5 | + 13,400 | /18 | 8:30A | 14' 6" | 0 | 0 |
| /3 | 8:17A | 14' 4" | + 9 | +24,100 | /19 | 8:25A | 14' 6" | - 6 | - 16,100 |
| /4 | 8:25A | 15' 1" | + 6 | +16,100 | /20 | 8:10A | 14' 0" | + 6 | +16,100 |
| /5 | 8:10A | 15' 7" | + 2 | +5400 | /21 | 8:20A | 14' 6" | + 8 | +21,400 |
| /6 | 8:05A | 15' 9" | 0 | 0 | /22 | 11:00A | 15' 2" | + 1 | + 2700 |
| /7 | 8:05A | 15' 9" | 0 | 0 | /23 | 8:40A | 15' 3" | + 2 | + 5400 |
| /8 | | | | | /24 | 8:40A | 15' 5" | + 4 | +10,700 |
| /9 | 8:00A | 15' 9" | 0 | 0 | /25 | 8:30A | 15' 9" | - 2 | - 5400 |
| /10 | 8:15A | 15' 9" | - 3 | -8000 | /26 | 8:00A | 15' 7" | - 1 | - 2700 |
| /11 | 8:05A | 15' 6" | - 12 | -32,200 | /27 | 8:25A | 15' 6" | + 2 | + 5400 |
| /12 | 8:05A | 14' 6" | +6 | +16,100 | /28 | 8:35A | 15' 8" | + 1 | + 2700 |
| /13 | 8:15A | 15' 0" | +6 | +16,100 | /29 | 8:05A | 15' 9" | | |
| /14 | 8:20A | 15' 6" | +6 | +16,100 | /30 | | | -32" | -85,700 |
| /15 | | | 0 | 0 | 2/1 | 8:35 A | 13' - 1" | | |
| 1/16 | | | | | | | | | |

## One Inch Meter - Administrative Building

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | (GPM) Rate of Use |
|---|---|---|---|---|---|
| 1/16 | 8:05A | | 0003860 | | |
| | | 1460 | | 20 | .0137 |
| /15 | 7:45A | | 0003840 | | |
| | | 1450 | | 0 | 0 |
| /14 | 7:35A | | 0003840 | | |
| | | 1430 | | 60 | .0420 |
| /13 | 7:45A | | 0003780 | | |
| | | 1445 | | 70 | .0484 |
| /12 | 7:40A | | 0003710 | | |
| | | 1435 | | 120 | .0836 |
| /11 | 7:45A | | 0003590 | | |
| | | 1435 | | 120 | .0836 |
| /10 | 7:50A | | 0003470 | | |
| | | 1445 | | 80 | .0554 |
| /9 | 7:45A | | 0003390 | | |
| /8 | | 2885 | | 60 | .0208 |
| /7 | 7:40A | | 0003330 | | |
| | | 1430 | | 40 | .0280 |
| /6 | 7:50A | | 0003290 | | |
| | | 1450 | | 50 | .0345 |
| /5 | 7:40A | | 0003240 | | |
| | | 1435 | | 40 | .0279 |
| /4 | 7:45A | | 0003200 | | |
| | | 1440 | | 50 | .0347 |
| /3 | 7:45A | | 0003150 | | |
| | | 1425 | | 0 | 0 |
| /2 | 8:00A | | 0003150 | | |
| | | 1455 | | 20 | .0137 |
| 1/1/61 | 7:45A | | 0003130 | | |
| | | 1440 | | 40 | .0278 40 |
| 12/21/61 | 7:45A | | 0003090 | | |

**One Inch Meter - Administrative Building (cont'd)**

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | (GPM) Rate of Use |
|---|---|---|---|---|---|
| 1/31 | 7:45A | | 0004660 | | |
| /30 | | 2880 | | 130 | .0451 |
| /29 | 7:45A | | 0004530 | | |
| /28 | 8:05A | 1420 | 0004520 | 10 | .0070 |
| /27 | 7:40A | 1465 | 0004440 | 80 | .0546 |
| /26 | 7:40A | 1440 | 0004360 | 80 | .0556 |
| /25 | 7:45A | 1435 | 0004310 | 50 | .0348 |
| /24 | 7:40A | 1445 | 0004260 | 50 | .0346 |
| /23 | 8:25A | 1390 | 0004210 | 50 | .0360 |
| /22 | 10:25A | 1320 | 0004180 | 30 | .0227 |
| /21 | 7:55A | 1590 | 0004140 | 40 | .0252 |
| /20 | 7:55A | 1440 | 0004110 | 30 | .0208 |
| /19 | 7:45A | 1450 | 0004050 | 60 | .0414 |
| /18 | 7:40A | 1445 | 0003990 | 60 | .0415 |
| 1/17 | 7:45A | 1435 | 0003920 | 70 | .0488 |
| | | 1420 | | 60 | .0423 |

## One and one-half Inch Meter - Museum and Auditorium

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 12/31/60 | 7:47 | | 2162640 | | | |
| | | 1443 | | 2,630 | 1.8226 | 2620 |
| 1/1/61 | 7:50A | | 2160010 | | | |
| | | 1455 | | 2,760 | 1.8969 | |
| /2 | 8:05A | | 2157250 | | | |
| | | 1425 | | 1,150 | .8070 | |
| /3 | 7:50A | | 2156100 | | | |
| | | 1440 | | 380 | .2639 | |
| /4 | 7:50A | | 2155720 | | | |
| | | 1435 | | 670 | .4669 | |
| /5 | 7:45A | | 2155050 | | | |
| | | 1440 | | 320 | .2222 | |
| /6 | 7:45A | | 2154730 | | | |
| | | 1440 | | 280 | .1944 | |
| /7 | 7:45A | | 2154450 | | | |
| /8 | | 2875 | | 840 | .2922 | |
| /9 | 7:40A | | 2153610 | | | |
| | | 1455 | | 340 | .2337 | |
| /10 | 7:55A | | 2153270 | | | |
| | | 1435 | | 540 | .3763 | |
| /11 | 7:50A | | 2152730 | | | |
| | | 1435 | | 580 | .4042 | |
| /12 | 7:45A | | 2152150 | | | |
| | | 1445 | | 550 | .3806 | |
| /13 | 7:50A | | 2151600 | | | |
| | | 1430 | | 150 | .1049 | |
| /14 | 7:40A | | 2151450 | | | |
| | | 1450 | | 480 | .3310 | |
| /15 | 7:50A | | 2150970 | | | |
| | | 1460 | | 630 | .1831 | |
| /16 | 8:10A | | 2150340 | | | |
| | | 1420 | | 260 | .1831 | |

## One and one-half Inch Meter - Museum and Auditorium (cont'd)

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 1/17 | 7:50A | | 2150080 | | |
| | | 1600 | | 40 | .0250 |
| Old Meter removed | 10:30A | | 2150040 | | |
| New Meter instal. | 11:30A | | 00000000 | | |
| | | 1215 | | 200 | .1646 |
| 1/18 | 7:45A | | 00000200 | | |
| | | 1445 | | 600 | .4152 |
| /19 | 7:50A | | 00000800 | | |
| | | 1440 | | 600 | .4167 |
| /20 | 7:50A | | 00001400 | | |
| | | 1450 | | 400 | .2759 |
| /21 | 8:00A | | 00001800 | | |
| | | 1590 | | 300 | .1887 |
| /22 | 10:30A | | 00002100 | | |
| | | 1320 | | 1,200 | .9091 |
| /23 | 8:30A | | 00003300 | | |
| | | 1425 | | 600 | .4211 |
| /24 | 7:45A | | 00003900 | | |
| | | 1445 | | 400 | .2768 |
| /25 | 7:50A | | 00004300 | | |
| | | 1435 | | 400 | .2787 |
| /26 | 7:45A | | 00004700 | | |
| | | 1445 | | 500 | .3460 |
| /27 | 7:50A | | 00005200 | | |
| | | 1455 | | 500 | .3436 |
| /28 | 8:05A | | 00005700 | | |
| | | 1425 | | 700 | .4912 |
| /29 | 7:50A | | 00006400 | | |
| /30 | | 2880 | | 1,400 | .4861 |

## Two Inch Meter To Visitor Center Patio and Administration Building Lawn

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 1/31 | 7:40A | | 00022800 | | |
| 1/30 | | 2880 | | 5,700 | 1.98 |
| /29 | 7:40A | | 00017100 | | |
| | | 1420 | | 0 | 0 |
| /28 | 8:00A | | 00017100 | | |
| | | 1460 | | 0 | 0 |
| /27 | 7:40A | | 00017100 | | |
| | | 1445 | | 7,500 | 5.19 |
| /26 | 7:35A | | 00009600 | | |
| | | 1435 | | 0 | 0 |
| /25 | 7:40A | | 00009600 | | |
| | | 1445 | | 0 | 0 |
| /24 | 7:35A | | 00009600 | | |
| | | 1395 | | 3,300 | 2.37 |
| /23 | 8:20A | | 00006300 | | |
| | | 1340 | | 0 | 0 |
| /22 | 10:00A | | 00006300 | | |
| | | 1565 | | 0 | 0 |
| /21 | 7:55A | | 00006300 | | |
| | | 1445 | | 0 | 0 |
| /20 | 7:50A | | 00006300 | | |
| | | 1425 | | 900 | .63 |
| /19 | 8:05A | | 00005400 | | |
| | | 1295 | | 5,400 | 4.17 |
| 1/17 | 10:30A | | 00000000 | New Meter Installed. | |

02-01-1961: water meter readings cont. ; feburary 01, 1961

Sale DEVA Docket 3,4,5,6 Suppl. Part III

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Death Valley National Monument
Death Valley, California

RECEIVED
NPS REGION FOUR OFFICE
FEB 3'61

| | SURNAME | DATE |
|---|---|---|
| REG. DIR. | | |
| ASST. R.D. | | |
| ✓ OPERATIONS | | |
| ADMIN. | | |
| RECREATION | | |
| INTERP. | | |
| RANGER ACT | | |

IN REPLY REFER TO:
L54

February 1, 1961

Memorandum

To: Regional Director, Region Four

From: Superintendent, Death Valley

Subject: Water Meter Readings, Furnace Creek Area, Death Valley

Attached are copies of meter readings for the period of December 1 to December 31 for the following meters:

2" meter (PCB) on Texas Spring Line

4" meter (NPS) on Visitor Center Line

1½" meter (NPS) on Visitor Center Line

NPS reservoir (500,000 gallons) depth gauge readings

Granville B. Liles
Superintendent

In duplicate

Attachments

Copy to: WASO w/attachments

## Two Inch Meter on Line Texas Spring to Texas Spring Campground

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| | | 1435 | | 29,000 | 20.21 | 29,100 |
| 12/15 | 8:40A | | 27695400 | | | |
| | | 1445 | | 30,900 | 21.38 | 30,400 |
| /14 | 8:35A | | 27664500 | | | |
| | | 1445 | | 32,300 | 22.35 | 32,200 |
| /13 | 8:30A | | 27632200 | | | |
| | | 1440 | | 29,600 | 20.56 | 29,600 |
| /12 | 8:30A | | 27602600 | | | |
| | | 1405 | | 27,900 | 19.86 | 28,600 |
| /11 | 9:05A | | 27574700 | | | |
| | | 1445 | | 29,000 | 20.07 | 28,400 |
| /10 | 9:00A | | 27545700 | | | |
| | | 1485 | | 30,100 | 20.27 | 29,200 |
| / 9 | 8:15A | | 27515600 | | | |
| | | 1335 | | 25,800 | 19.33 | 27,800 |
| / 8 | 10:00A | | 27489800 | | | |
| | | 1430 | | 28,000 | 19.58 | 28,200 |
| / 7 | 10:10A | | 27461800 | | | |
| | | 1550 | | 30,100 | 19.42 | 28,000 |
| / 6 | 8:20A | | 27431700 | | | |
| | | 1435 | | 27,400 | 19.09 | 27,500 |
| / 5 | 8:25A | | 27404300 | | | |
| | | 1425 | | 27,800 | 19.51 | 28,100 |
| / 4 | 8:40A | | 27376500 | | | |
| | | 1455 | | 29,500 | 20.27 | 29,200 |
| / 3 | 8:25A | | 27347000 | | | |
| | | 1425 | | 29,400 | 20.63 | 29,700 |
| / 2 | 8:40A | | 27317600 | | | |
| | | 1445 | | 29,200 | 20.21 | 29,100 |
| 12/ 1 | 8:35A | | 27288400 | | | |
| | | 1380 | | 29,900 | 21.67 | 31,200 |
| 11/30 | 9:35A | | 27258500 | | | |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 12/31 | 8:10A | | 28206400 | | | |
| | | 1440 | | 35,400 | 24.58 | 35,400 |
| /30 | 8:10A | | 28171000 | | | |
| | | 1410 | | 34,600 | 23.54 | 33,900 |
| /29 | 8:40A | | 28136400 | | | |
| | | 1445 | | 35,800 | 24.78 | 35,700 |
| /28 | 8:35A | | 28100600 | | | |
| | | 1445 | | 35,300 | 24.43 | 35,200 |
| /27 | 8:30A | | 28065300 | | | |
| | | 1415 | | 31,900 | 22.54 | 32,500 |
| /26 | 8:55A | | 28033400 | | | |
| | | 1460 | | 33,000 | 22.60 | 32,600 |
| /25 | 8:35A | | 28000400 | | | |
| | | 1415 | | 30,600 | 21.63 | 31,200 |
| /24 | 9:00A | | 27969800 | | | |
| | | 1490 | | 31,700 | 21.28 | 30,600 |
| /23 | 8:10A | | 27938100 | | | |
| | | 1415 | | 29,200 | 20.64 | 29,700 |
| /22 | 8:35A | | 27908900 | | | |
| | | 1440 | | 30,300 | 21.04 | 30,300 |
| /21 | 8:35A | | 27878600 | | | |
| | | 1410 | | 29,400 | 20.85 | 30,000 |
| /20 | 9:05A | | 27849200 | | | |
| | | 1405 | | 30,900 | 21.99 | 30,200 |
| /19 | 8:40A | | 27818300 | | | |
| | | 1450 | | 30,600 | 21.10 | 30,400 |
| /18 | 8:30A | | 27787700 | | | |
| | | 1430 | | 29,900 | 20.91 | 30,100 |
| /17 | 8:40A | | 27757800 | | | |
| | | 1445 | | 33,400 | 23.11 | 33,300 |
| 12/16 | 8:35A | | 2772l400 | | | |

## Four Inch Meter On Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|---|
| | | 1450 | | 1,000 | 7,480.52 | 5.16 | 7400 |
| 12/16 | 8:20A | | 0149260 | | | | |
| | | 1445 | | 620 | 4,637.92 | 3.21 | 4600 |
| /15 | 8:15A | | 0148640 | | | | |
| | | 1440 | | 1,300 | 9,724.68 | 6.75 | 9700 |
| /14 | 8:15A | | 0147340 | | | | |
| | | 1440 | | 100 | 748.05 | 0.52 | 700 |
| /13 | 8:15A | | 0147240 | | | | |
| | | 1440 | | 230 | 1,720.52 | 1.19 | 1700 |
| /12 | 8:15A | | 0147010 | | | | |
| | | 1415 | | 0 | | 0 | - |
| /11 | 8:40A | | 0147010 | | | | |
| | | 1435 | | 160 | 1196.88 | 0.83 | 1200 |
| /10 | 8:45A | | 0146850 | | | | |
| | | 1480 | | 570 | 4,263.90 | 2.88 | 4100 |
| / 9 | 8:05A | | 0146280 | | | | |
| | | 1340 | | 0 | | 0 | 0 |
| / 8 | 9:45A | | 0146280 | | | | |
| | | 1435 | | 0 | | 0 | 0 |
| / 7 | 9:50A | | 0146280 | | | | |
| | | 1550 | | 50 | 374.03 | 0.24 | 300 |
| / 6 | 8:00A | | 0146230 | | | | |
| | | 1445 | | 0 | | 0 | 0 |
| / 5 | 7:55A | | 0146230 | | | | |
| | | 1405 | | 0 | | 0 | 0 |
| / 4 | 8:30A | | 0146230 | | | | |
| | | 1460 | | 0 | | 0 | 0 |
| / 3 | 8:10A | | 0146230 | | | | |
| | | 1420 | | 380 | 2,842.60 | 2.00 | 2900 |
| / 2 | 8:30A | | 0145850 | | | | |
| | | 1455 | | 0 | | 0 | 0 |
| 12/ 1 | 8:15A | | 0145850 | | | | |
| | | 1435 | | 0 | | 0 | 0 |
| 11/30 | 8:20A | | 0145850 | | | | |

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|---|
| 12/31 | 8:00A | | 0153440 | | | | |
| | | 1440 | | 0 | | 0 | 0 |
| /30 | 8:00A | | 0153440 | | | | |
| | | 1420 | | 1,430 | 10,697.14 | 7.53 | 10,800 |
| /29 | 8:20A | | 0152010 | | | | |
| | | 1410 | | 0 | | 0 | 0 |
| /28 | 8:50A | | 0152010 | | | | |
| | | 1475 | | 0 | | 0 | 0 |
| /27 | 8:15A | | 0152010 | | | | |
| | | 1415 | | 0 | | 0 | 0 |
| /26 | 8:40A | | 0152010 | | | | |
| | | 1465 | | 280 | 2,094.55 | 1.43 | 2100 |
| /25 | 8:15A | | 0151730 | | | | |
| | | 1415 | | 0 | | 0 | 0 |
| /24 | 8:40A | | 0151730 | | | | |
| | | 1480 | | 0 | | 0 | 0 |
| /23 | 8:00A | | 0151730 | | | | |
| | | 1415 | | 620 | 4,637.92 | 3.28 | 4700 |
| /22 | 8:25A | | 0151110 | | | | |
| | | 1445 | | 50 | 374.03 | 0.26 | 400 |
| /21 | 8:20A | | 0151060 | | | | |
| | | 1410 | | 0 | | 0 | 0 |
| /20 | 8:50A | | 0151060 | | | | |
| | | 1470 | | 250 | 1,870.13 | 1.27 | 1800 |
| /19 | 8:20A | | 0150810 | | | | |
| | | 1445 | | 470 | 3,515.84 | 2.43 | 3500 |
| /18 | 8:15A | | 0150340 | | | 0.42 | 600 |
| | | 1425 | | 80 | 598.44 | ~~4.20~~ | ~~6000~~ |
| 12/17 | 8:30A | | 0150260 | | | | |
| | | | | 7590 | | | |

E =

**One and one-half inch Meter on Visitor Center Line**

| Date | Time | TimeInterval | Meter Reading (gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 12/16 | 8:20A | | 02306200 | | | |
| | | 1445 | | 28,900 | 20.00 | 28,800 |
| /15 | 8:15A | | 02277300 | | | |
| | | 1440 | | 36,700 | 25.49 | 36,700 |
| /14 | 8:15A | | 02240600 | | | |
| | | 1440 | | 31,500 | 21.88 | 31,500 |
| /13 | 8:15A | | 02209100 | | | |
| | | 1440 | | 32,800 | 22.78 | 32,800 |
| /12 | 8:15A | | 02176300 | | | |
| | | 1415 | | 29,200 | 20.64 | 29,800 |
| /11 | 8:40A | | 03147100 | | | |
| | | 1435 | | 32,400 | 22.58 | 32,500 |
| /10 | 8:45A | | 02114700 | | | |
| | | 1480 | | 43,500 | 29.39 | 42,300 |
| / 9 | 8:05A | | 02071200 | | | |
| | | 1340 | | 29,000 | 21.64 | 31,200 |
| / 8 | 9:45A | | 02042200 | | | |
| | | 1435 | | 3,400 | 2.37 | 3400 |
| / 7 | 9:50A | | 02038800 | | | |
| | | 1550 | | 28,600 | 18.45 | 26,600 |
| / 6 | 8:00A | | 02010200 | | | |
| | | 1440 | | 30,900 | 21.46 | 30,900 |
| / 5 | 8:00A | | 01979300 | | | |
| | | 1410 | | 3,750 | 2.66 | 3900 |
| / 4 | 8:30A | | 01975550 | | | |
| | | 1460 | | 2,550 | 1.75 | 2500 |
| / 3 | 8:10A | | 01973000 | | | |
| | | 1420 | | 5,200 | 3.66 | 5300 |
| / 2 | 8:30A | | 01967800 | | | |
| | | 1455 | | 22,600 | 15.53 | 22,400 |
| 12/ 1 | 8:15A | | 01945200 | | | 22,700 |
| | | 1435 | | 22,650 | 15.78 | |
| 11/30 | 8:20A | | 01922550 | | | |

check Month of November

12/1 8:15 AM 1945,200
10/31 1:05 PM 1436,700
508,500 ← ck →

Σ gal used = 508,500

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | (GPD) |
|---|---|---|---|---|---|---|
| 12/31 | 8:00A | | 02571400 | | | |
| | | 1440 | | 39,300 | 27.29 | 39,300 |
| /30 | 8:00A | | 02532100 | | | |
| | | 1420 | | 45,400 | 31.97 | 46,000 |
| /29 | 8:20A | | 02486700 | | | |
| | | 1410 | | 13,700 | 9.72 | 14,000 |
| /28 | 8:50A | | 02473000 | | | |
| | | 1475 | | 27,700 | 18.78 | 27,000 |
| /27 | 8:15A | | 02445300 | | | |
| | | 1415 | | 11,600 | 8.20 | 11,800 |
| /26 | 8:40A | | 02433700 | | | |
| | | 1465 | | 28,300 | 19.32 | 27,800 |
| /25 | 8:15A | | 02405400 | | | |
| | | 1415 | | 24,500 | 17.31 | 24,900 |
| /24 | 8:40A | | 02380900 | | | |
| | | 1480 | | 25,400 | 17.16 | 24,700 |
| /23 | 8:00A | | 02355500 | | | |
| | | 1415 | | 15,700 | 11.10 | 16,000 |
| /22 | 8:25A | | 02339800 | | | |
| | | 1445 | | 7,400 | 5.12 | 7400 |
| /21 | 8:20A | | 02332400 | | | |
| | | 1410 | | 3,400 | 2.41 | 3100 |
| /20 | 8:50A | | 02329000 | | | |
| | | 1470 | | 5,100 | 3.47 | 5000 |
| /19 | 8:20A | | 02323900 | | | |
| | | 1445 | | 5,000 | 3.46 | 5000 |
| /18 | 8:15A | | 02318900 | | | |
| | | 1425 | | 2,200 | 1.54 | 2200 |
| 12/17 | 8:30A | | 02316700 | | | |
| | | 1450 | | 10,500 | 7.24 | 10,400 |

## Water Level - Visitor Center Reservoir (500,000 gallons)

| Date | Time | Depth of Water | Change GPD | Date | Time | Depth of Water | Change GPD |
|---|---|---|---|---|---|---|---|
| 11/30 | 8:25A | 13' 9" | +1" +2700 | 12/16 | 8:25A | 13' 3" | -2" - 5400 |
| 12/ 1 | 8:30A | 13' 10" | +2" + 5400 | /17 | 8:35A | 13' 6" | +3" + 8000 |
| / 2 | 8:35A | 14' 0" | +6" +16,100 | /18 | 8:25A | 14' 2" | +8" + 21,400 |
| / 3 | 8:15A | 14' 6" | +9" +24,100 | /19 | 8:30A | 14' 9" | +7" +18,700 |
| / 4 | 8:35A | 15' 3" | +6" +16,100 | /20 | 8:55A | 15' 3" | +6" + 16,100 |
| / 5 | 8:10A | 15' 9" | -2" - 5400 | /21 | 8:30A | 15' 9" | +6" + 16,000 |
| / 6 | 8:07A | 15' 7" | 0 0 | /22 | 8:30A | 15' 9" | 0 0 |
| / 7 | 10:00A | 15' 7" | +2½" +6700 | /23 | 8:05A | 15' 10" | +1" +2700 |
| / 8 | 9:52A | 15' 9½" | -3½" - 9400 | /24 | 8:50A | 15' 10" | 0 0 |
| / 9 | 8:10A | 15' 6" | -7" - 18,700 | /25 | 8:25A | 15' 9" | -1" -2700 |
| /10 | 8:50A | 14' 11" | -3" - 8000 | /26 | 8:45A | 15' 8" | -1" -2700 |
| /11 | 8:50A | 14' 8" | -1" - 2700 | /27 | 8:25A | 15' 9" | +1" +2700 |
| /12 | 8:20A | 14' 7" | -4" -10,700 | /28 | 8:45A | 15' 8" | -1" - 2700 |
| /13 | 8:25A | 14' 3" | - 3" - 8000 | /29 | 8:30A | 15' 9" | +1" +2700 |
| /14 | 8:27A | 14' 0" | -7" - 18,700 | /30 | 8:05A | 14' 9" | -12" - 32,200 |
| /15 | 8:25A | 13' 5" | | /31 | 8:05A | 14' 4" | - 5" - 13,400 |

## One Inch Meter - Administrative Building

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 12/16 | 7:55A | | 0002365 | | |
| | | 1445 | | 105 | .0727 |
| /15 | 7:50A | | 0002260 | | |
| | | 1445 | | 50 | .0346 |
| /14 | 7:45A | | 0002210 | | |
| | | 1435 | | 60 | .0418 |
| /13 | 7:50A | | 0002150 | | |
| | | 1435 | | 30 | .0209 |
| /12 | 7:55A | | 0002120 | | |
| | | 1410 | | 30 | .0213 |
| /11 | 8:25A | | 0002090 | | |
| | | 1435 | | 40 | .0279 |
| /10 | 8:30A | | 0002050 | | |
| | | 1480 | | 60 | .0405 |
| / 9 | 7:50A | | 0001990 | | |
| | | 1345 | | 30 | .0223 |
| / 8 | 9:25A | | 0001960 | | |
| | | 1430 | | 70 | .0490 |
| / 7 | 9:35A | | 0001890 | | |
| | | 1555 | | 80 | .0514 |
| / 6 | 7:40A | | 0001810 | | |
| | | 1440 | | 60 | .0417 |
| / 5 | 7:40A | | 0001750 | | |
| | | 1430 | | 10 | .0070 |
| / 4 | 7:50A | | 0001740 | | |
| | | 1440 | | 10 | .0069 |
| / 3 | 7:50A | | 0001730 | | |
| | | 1415 | | 40 | .0283 |
| / 2 | 8:15A | | 0001690 | | |
| | | 1469 | | 60 | .0408 |
| 12/ 1 | 7:46A | | 0001630 | | |
| | | 1441 | | 80 | .0555 |
| 11/30 | 7:45A | | 0001550 | | |

80

## One Inch Meter - Administrative Building

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| 12/~~31~~ | 7:45A | | 0003090 | | |
| | | 1440 | | 100 | .0694 |
| /30 | 7:45A | | 0002990 | | |
| | | 1420 | | 50 | .0352 |
| /29 | 8:05A | | 0002940 | | |
| | | 1460 | | 60 | .0411 |
| /28 | 7:45A | | 0002880 | | |
| | | 1440 | | 20 | .0139 |
| /27 | 7:45A | | 0002860 | | |
| | | 1440 | | 30 | .0208 |
| /26 | 7:45A | | 0002830 | | |
| | | 1440 | | 20 | .0139 |
| /25 | 7:45A | | 0002810 | | |
| | | 1125 | | 10 | .0089 |
| /24 | 1:00P | | 0002800 | | |
| | | 1755 | | 60 | .0342 |
| /23 | 7:45A | | 0002740 | | |
| | | 1445 | | 90 | .0623 |
| /22 | 7:40A | | 0002650 | | |
| | | 1430 | | 80 | .0559 |
| /21 | 7:50A | | 0002570 | | |
| | | 1440 | | 60 | .0417 |
| /20 | 7:50a | | 0002510 | | |
| | | 1435 | | 80 | .0557 |
| /19 | 7:55A | | 0002430 | | |
| | | 1440 | | 0 | 0 |
| /18 | 7:55A | | 0002430 | | |
| | | 1440 | | 15 | .0104 |
| 12/17 | 7:55A | | 0002415 | | |
| | | 1440 | | 50 | .0347 |

## One and one-half Inch Meter - Museum and Auditorium

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 11/30/ | 7:50A | | 2187880 | | | |
| | | 1440 | | 880 | .6111 | 880 |
| 12/ 1 | 7:50A | | 2187000 | | | |
| | | 1455 | | 325 | .2234 | 320 |
| / 2 | 8:05A | | 2186675 | | | |
| | | 1429 | | 195 | .1365 | 200 |
| /3 | 7:54A | | 2186480 | | | |
| | | 1441 | | 310 | .2151 | 310 |
| / 4 | 7:55A | | 2186170 | | | |
| | | 1430 | | 780 | .5455 | 780 |
| / 5 | 7:45A | | 2185390 | | | |
| | | 1442 | | 530 | .3675 | 530 |
| / 6 | 7:47A | | 2184860 | | | |
| | | 1553 | | 140 | .0901 | 130 |
| / 7 | 9:40A | | 2184720 | | | |
| | | 1430 | | 210 | .1469 | 210 |
| / 8 | 9:30A | | 2184510 | | | |
| | | 1405 | | 350 | .2491 | 360 |
| / 9 | 8:55A | | 2184160 | | | |
| | | 1417 | | 470 | .3317 | 480 |
| /10 | 8:32A | | 2183690 | | | |
| | | 1438 | | 670 | .4659 | 670 |
| /11 | 8:30A | | 2183020 | | | |
| | | 1410 | | 370 | .2624 | 380 |
| /12 | 8:00A | | 2182650 | | | |
| | | 1435 | | 170 | .1185 | 170 |
| /13 | 7:55A | | 2182480 | | | |
| | | 1435 | | 250 | .1742 | 250 |
| /14 | 7:50A | | 2182230 | | | |
| | | 1445 | | 500 | .3460 | 500 |
| /15 | 7:55A | | 2181730 | | | |

**One and One-half Inch Meter - Museum and Auditorium**

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) |
|---|---|---|---|---|---|
| | | 1435 | | 145 | .1010 |
| 12/16 | 7:50A | | 2181585 | | |
| | | 1445 | | 215 | .1488 |
| /17 | 7:55A | | 2181370 | | |
| | | 1440 | | 350 | .2431 |
| /18 | 7:55A | | 2181020 | | |
| | | 1445 | | 720 | .4983 |
| /19 | 8:00A | | 2180300 | | |
| | | 1435 | | 860 | .5993 |
| /20 | 7:55A | | 2179440 | | |
| | | 1440 | | 780 | .5417 |
| /21 | 7:55A | | 2178660 | | |
| | | 1430 | | 920 | .6434 |
| /22 | 7:45A | | 2177740 | | |
| | | 1435 | | 620 | .4321 |
| /23 | 7:40A | | 2177120 | | |
| | | 1765 | | 1180 | .6686 |
| /24 | 1:05P | | 2175940 | | |
| | | 1125 | | 710 | .6311 |
| /25 | 7:50A | | 2175230 | | |
| | | 1440 | | 1,400 | .9722 |
| /26 | 7:50A | | 2173830 | | |
| | | 1440 | | 1,080 | .7500 |
| /27 | 7:50A | | 2172750 | | |
| | | 1440 | | 1,970 | 1.3681 |
| /28 | 7:50A | | 2170780 | | |
| | | 1460 | | 2,940 | 2.0137 |
| /29 | 8:10A | | 2167840 | | |
| | | 1410 | | 3,040 | 2.1560 |
| /30 | 7:40A | | 2164800 | | |
| | | 1443 | | 2,160 | 1.4969 |
| 12/31 | 7:47A | | 2162640 | | |

Death Valley National Monument
Death Valley, California

L54 December 20, 1960

Memorandum

To: Regional Director, Region Four

From: Superintendent, Death Valley

Subject: Water Meter Readings, Furnace Creek Area, Death Valley

Attached are copies of meter readings for the period of September 23 to November 30 for the following meters:

2" meter (PCB) on Texas Spring Line

4" meter (NPS) on Visitor Center Line

1½" meter (NPS) on Visitor Center Line

NPS reservoir (500,000 gallons) depth gauge readings

Also attached are meter readings for the period November 17 - 30 for the meters recently installed in the museum and administrative building.

/s/ Granville B. Liles
Granville B. Liles
Superintendent

In duplicate

Attachments

Copy to: WASO w/attachments

## Two Inch Meter on Line Texas Spring to Texas Spring Campground

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 10/19 | 1:12P | | 25882500 | | | |
| /18 | 4:53P | 1219 | 25857630 | 24,870 | 20.40 | 29,400 |
| /17 | 3:40P | 1513 | 25830850 | 26,780 | 17.70 | 25,500 |
| /16 | 2:13P | 1527 | 25799300 | 31,550 | 20.66 | 29,800 |
| /15 | 1:20P | 1493 | 25767800 | 31,500 | 21.10 | 30,400 |
| /14 | 1:13P | 1447 | 25736700 | 31,100 | 21.49 | 31,000 |
| /13 | 1:15P | 1438 | 25705700 | 31,000 | 21.56 | 31,100 |
| /12 | 1:15P | 1440 | 25674460 | 31,240 | 21.69 | 31,300 |
| /11 | 1:25P | 1430 | 25642900 | 31,560 | 22.07 | 31,800 |
| /10 | 1:00P | 1465 | 25611400 | 31,500 | 21.50 | 31,000 |
| / 9 | 12:28P | 1472 | 25579800 | 31,600 | 21.47 | 31,000 |
| / 7 | 1:00P | 2848 | 25519400 | 60,400 | 21.21 | 30,600 |
| / 6 | 8:38A | 1702 | 25483100 | 36,300 | 21.33 | 30,700 |
| 10/ 1 | | 7200 | 25305100 | 178,000 | 24.72 | 35,600 |
| 9/29 | | 2880 | 25265400 | 39,700 | 13.78 | 19,800 |
| /23 | | 8640 | 25036300 | 229,100 | 26.52 | 38,200 |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 11/ 6 | 2:45P | | 26461650 | | | |
| | | 1537 | | 34,450 | 22.41 | 32,300 |
| / 5 | 1:08P | | 26427200 | | | |
| | | 1413 | | 31,850 | 22.54 | 32,500 |
| / 4 | 1:35P | | 26395350 | | | |
| | | 1463 | | 31,850 | 21.77 | 31,300 |
| / 3 | 1:12P | | 26363500 | | | |
| | | 1442 | | 31,800 | 22.05 | 31,800 |
| / 2 | 1:10P | | 26331700 | | | |
| | | 1425 | | 30,900 | 21.68 | 31,200 |
| 11/ 1 | 1:25P | | 26300800 | | | |
| | | 1435 | | 31,900 | 22.23 | 32,000 |
| 10/31 | 1:30P | | 26268900 | | | |
| | | 1365 | | 30,400 | 22.27 | 32,100 |
| /30 | 2:45P | | 26238500 | | | |
| | | 1498 | | 38,000 | 25.37 | 36,500 |
| /29 | 1:47P | | 26200500 | | | |
| | | 1468 | | 35,200 | 23.98 | 34,600 |
| /28 | 1:19P | | 26165300 | | | |
| | | 1455 | | 36,600 | 25.15 | 36,200 |
| /27 | 1:04P | | 26128700 | | | |
| | | 1419 | | 33,700 | 23.75 | 34,200 |
| /26 | 1:25P | | 26095000 | | | |
| | | 1420 | | 29,550 | 20.81 | 30,000 |
| /25 | 1:45P | | 26065450 | | | |
| | | 4355 | | 91,550 | 21.02 | 30,300 |
| /22 | 1:10P | | 25973900 | | | |
| | | 1420 | | 31,450 | 22.15 | 31,900 |
| /21 | 1:30P | | 25942450 | | | |
| | | 1455 | | 29,650 | 20.38 | 29,400 |
| 10/20 | 1:15P | | 25912800 | | | |
| | | 1443 | | 30,300 | 21.00 | 30,200 |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 11/22 | 8:40A | | 26983350 | | | |
| | | 1450 | | 31,250 | 21.55 | 31,000 |
| /21 | 8:30A | | 26952100 | | | |
| | | 1435 | | 31,300 | 21.81 | 31,400 |
| /20 | 8:35A | | 26920800 | | | |
| | | 1460 | | 31,450 | 21.54 | 31,000 |
| /19 | 8:15A | | 26889350 | | | |
| | | 1430 | | 31,650 | 22.13 | 31,900 |
| /18 | 8:25A | | 26857700 | | | |
| | | 1320 | | 29,700 | 22.50 | 32,400 |
| /17 | 10:25A | | 26828000 | | | |
| | | 1280 | | 26,500 | 20.70 | 29,800 |
| /16 | 1:05P | | 26801500 | | | |
| | | 1420 | | 31,500 | 22.18 | 32,000 |
| /15 | 1:25P | | 26770000 | | | |
| | | 1452 | | 32,700 | 22.52 | 32,400 |
| /14 | 1:13P | | 26737300 | | | |
| | | 1408 | | 33,100 | 23.51 | 33,900 |
| /13 | 1:45P | | 26704200 | | | |
| | | 1480 | | 38,700 | 26.15 | 37,700 |
| /12 | 1:05P | | 26665500 | | | |
| | | 1420 | | 39,000 | 27.46 | 39,600 |
| /11 | 1:25P | | 26626500 | | | |
| | | 1420 | | 35,000 | 24.65 | 35,500 |
| /10 | 1:45P | | 26591500 | | | |
| | | 1463 | | 34,700 | 23.72 | 34,200 |
| / 9 | 1:22P | | 26556800 | | | |
| | | 1426 | | 32,300 | 22.65 | 32,600 |
| / 8 | 1:36P | | 26524500 | | | |
| | | 1456 | | 33,000 | 22.66 | 32,600 |
| 11/ 7 | 1:20P | | 26491500 | | | |
| | | 1355 | | 29,850 | 22.03 | 31,700 |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 11/30 | 9:35A | | 27258500 | | | |
| | | 1420 | | 30,550 | 21.51 | 31,000 |
| /29 | 8:55A | | 27227450 | | | |
| | | 1430 | | 30,050 | 21.01 | 30,200 |
| /28 | 9:05A | | 27197900 | | | |
| | | 1365 | | 30,100 | 22.05 | 31,800 |
| /27 | 10:20A | | 27167800 | | | |
| | | 1565 | | 42,700 | 27.28 | 39,300 |
| /26 | 8:15A | | 27125100 | | | |
| | | 1460 | | 40,300 | 27.60 | 39,800 |
| /25 | 8:35A | | 27084800 | | | |
| | | 1430 | | 38,400 | 26.85 | 38,700 |
| /24 | 8:45A | | 27046400 | | | |
| | | 1450 | | 31,750 | 21.90 | 31,600 |
| 11/23 | 8:55A | | 27014650 | | | |
| | | 1455 | | 31,300 | 21.51 | 31,000 |

## Four Inch Meter On Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|---|
| 10/19 | 1:00P | | 0115250 | | | | |
| | | 1215 | | 0 | 0 | 0 | 0 |
| /18 | 4:45P | | 0115250 | | | | 4800 |
| | | 1515 | | 680 | 5,087 | 3.36 | |
| /17 | 3:30P | | 0114570 | | | | 2100 |
| | | 1505 | | 290 | 2,169 | 1.44 | |
| /16 | 2:25P | | 0114280 | | | | — |
| | | 1520 | | 0 | 0 | 0 | |
| /15 | 1:05P | | 0114280 | | | | — |
| | | 1445 | | 0 | 0 | 0 | |
| /14 | 1:00P | | 0114280 | | | | 1300 |
| | | 1440 | | 170 | 1,272 | 0.88 | |
| /13 | 1:00P | | 0114110 | | | | 1900 |
| | | 1440 | | 260 | 1,945 | 1.35 | |
| /12 | 1:00P | | 0113850 | | | | 3400 |
| | | 1425 | | 450 | 3,366 | 2.36 | |
| /11 | 1:15P | | 0113400 | | | | — |
| | | 1470 | | 0 | 0 | 0 | |
| /10 | 12:45P | | 0113400 | | | | — |
| | | 1445 | | 0 | 0 | 0 | |
| / 9 | 12:40P | | 0113400 | | | | 2900 |
| | | 2875 | | 780 | 5,835 | 2.03 | |
| / 7 | 12:45P | | 0112620 | | | | 2700 |
| | | 1675 | | 420 | 3,142 | 1.88 | |
| / 6 | 8:50A | | 0112200 | | | | 1000 |
| | | 7200 | | 650 | 4,862 | .68 | |
| 10/ 1 | | | 0111550 | | | | 2300 |
| | | 2880 | | 620 | 4,638 | 1.61 | |
| 9/29 | | | 0110930 | | | | 3800 |
| | | 8640 | | 3,050 | 22,816 | 2.64 | |
| 9/23 | | | 0107880 | | | | |

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|---|
| 11/ 5 | 12:55P | | 0126670 | | | | |
| | | 1415 | | 730 | 5,461 | 3.86 | 5600 |
| / 4 | 1:20P | | 0125940 | | | | |
| | | 1460 | | 150 | 1,122 | 0.77 | 1100 |
| / 3 | 1:00P | | 0125790 | | | | |
| | | 1450 | | 1,220 | 9,126 | 6.29 | 9000 |
| / 2 | 12:50P | | 0124570 | | | | |
| | | 1420 | | 120 | 898 | 0.63 | 900 |
| 11/ 1 | 1:10P | | 0124450 | | | | |
| | | 1445 | | 715 | 5,349 | 3.70 | 5300 |
| 10/31 | 1:05P | | 0123735 | | | | |
| | | 1445 | | 1,600 | 11,969 | 8.28 | 11,900 |
| /30 | 1:00P | | 0122135 | | | | |
| | | 1407 | | 590 | 4,414 | 3.14 | 4500 |
| /29 | 1:33P | | 0121545 | | | | |
| | | 1468 | | 1,370 | 10,248 | 6.98 | 10,100 |
| /28 | 1:05P | | 0120175 | | | | |
| | | 1455 | | 795 | 5,947 | 4.09 | 5900 |
| /27 | 12:50P | | 0119380 | | | | |
| | | 1418 | | 670 | 5,012 | 3.53 | 5100 |
| /26 | 1:12P | | 0118710 | | | | |
| | | 1419 | | 965 | 7,219 | 5.09 | 7200 |
| /25 | 1:33P | | 0117745 | | | | |
| | | 4358 | | 1,045 | 7,817 | 1.79 | 2600 |
| /22 | 12:55P | | 0116700 | | | | |
| | | 1418 | | 720 | 5,386 | 3.80 | 5500 |
| /21 | 1:17P | | 0115980 | | | | |
| | | 1457 | | 570 | 4,264 | 2.93 | 4200 |
| 10/20 | 1:00P | | 0115410 | | | | |
| | | 1440 | | 160 | 1,197 | 0.83 | 1200 |

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|---|
| 11/21 | 8:15A | | 0142570 | | | | |
| | | 1445 | | 910 | 6,807 | 4.71 | 6800 |
| /20 | 8:10A | | 0141660 | | | | |
| | | 1445 | | 0 | 0 | 0 | 0 |
| /19 | 8:05A | | 0141660 | | | | |
| | | 1435 | | 620 | 4,638 | 3.23 | 4700 |
| /18 | 8:10A | | 0141040 | | | | |
| | | 1445 | | 8,190 | 61,265 | 42.40 | 61,100 |
| /17 | 8:05A | | 0132850 | | | | |
| | | 1160 | | 30 | 224 | 0.19 | 300 |
| /16 | 12:45P | | 0132820 | | | | |
| | | 1415 | | 500 | 3,740 | 2.64 | 3800 |
| /15 | 1:10P | | 0132320 | | | | |
| | | 1455 | | 580 | 4,339 | 2.98 | 4300 |
| /14 | 12:55P | | 0131740 | | | | |
| | | 1410 | | 120 | 898 | 0.64 | 900 |
| /13 | 1:25P | | 0131620 | | | | |
| | | 1480 | | 0 | 0 | 0 | 0 |
| /12 | 12:45P | | 0131620 | | | | |
| | | 1410 | | 0 | 0 | 0 | 0 |
| /11 | 1:15P | | 0131620 | | | | |
| | | 1420 | | 3,020 | 22,591 | 15.91 | 22,900 |
| /10 | 1:35P | | 0128600 | | | | |
| | | 1465 | | 900 | 6,732 | 4.60 | 6600 |
| / 9 | 1:10P | | 0127700 | | | | |
| | | 1425 | | 500 | 3,740 | 2.62 | 3800 |
| / 8 | 1:25P | | 0127200 | | | | |
| | | 1475 | | 530 | 3,965 | 2.69 | 3900 |
| / 7 | 12:50P | | 0126670 | | | | |
| | | 1355 | | 0 | 0 | 0 | — |
| 11/ 6 | 2:15P | | 0126670 | | | | |
| | | 1520 | | 0 | 0 | 0 | — |

| Date | Time | Time Interval | Meter Reading (Cu. Ft.) | Cu. Ft. Used | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|---|
| 11/30 | 8:20A | | 0145850 | | | | |
| | | 1430 | | 0 | 0 | 0 | — |
| /29 | 8:30A | | 0145850 | | | | |
| | | 1430 | | 170 | 1,272 | 0.89 | 1300 |
| /28 | 8:40A | | 0145680 | | | | |
| | | 1375 | | 0 | 0 | 0 | — |
| /27 | 9:45A | | 0145680 | | | | |
| | | 1540 | | 580 | 4,339 | 2.82 | 4100 |
| /26 | 8:05A | | 0145100 | | | | |
| | | 1420 | | 615 | 4,601 | 3.24 | 4700 |
| /25 | 8:25A | | 0144485 | | | | |
| | | 1435 | | 465 | 3,478 | 2.42 | 3500 |
| /24 | 8:30A | | 0144020 | | | | |
| | | 1435 | | 500 | 3,740 | 2.61 | 3800 |
| /23 | 8:35A | | 0143520 | | | | |
| | | 1455 | | 480 | 3,591 | 2.47 | 3600 |
| 11/22 | 8:20A | | 0143040 | | | | |
| | | 1445 | | 470 | 3,516 | 2.43 | 3500 |

## One and one-half inch Meter on Visitor Center Line

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 10/19 | 1:00P | | 01159300 | | | |
| | | 1215 | | 3,100 | 2.55 | 3700 |
| /18 | 4:45P | | 01156200 | | | |
| | | 1515 | | 7,850 | 5.18 | 7500 |
| /17 | 3:30P | | 01148350 | | | |
| | | 1504 | | 5,150 | 3.42 | 4900 |
| /16 | 2:26P | | 01143200 | | | |
| | | 1526 | | 11,680 | 7.65 | 11,000 |
| /15 | 1:00P | | 01131520 | | | |
| | | 1440 | | 14,220 | 9.88 | 14,200 |
| /14 | 1:00P | | 01117300 | | | |
| | | 1440 | | 15,780 | 10.96 | 15,800 |
| /13 | 1:00P | | 01101520 | | | |
| | | 1440 | | 12,120 | 8.42 | 12,100 |
| /12 | 1:00P | | 01089400 | | | |
| | | 1425 | | 10,500 | 7.37 | 10,600 |
| /11 | 1:15P | | 01078900 | | | |
| | | 1470 | | 9,900 | 6.73 | 9700 |
| /10 | 12:45P | | 01069000 | | | |
| | | 1445 | | 8,650 | 5.99 | 8600 |
| / 9 | 12:40P | | 01060350 | | | |
| | | 2875 | | 22,650 | 7.88 | 11,300 |
| / 7 | 12:45P | | 01037700 | | | |
| | | 1675 | | 15,000 | 8.96 | 12,900 |
| / 6 | 8:50A | | 01022700 | | | |
| | | 7200 | | 39,600 | 5.50 | 7900 |
| 10/ 1 | | | 00983100 | | | |
| | | 2880 | | 7,800 | 2.71 | 3900 |
| 9/29 | | | 00975300 | | | |
| | | 8640 | | 306,000 | 35.42 | 51,000 |
| 9/23 | | | 00669300 | | | |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 11/ 6 | 2:15P | | 01550400 | | | |
| | | 1520 | | 17,800 | 11.71 | 16,800 |
| / 5 | 12:55P | | 01532600 | | | |
| | | 1415 | | 16,600 | 11.73 | 16,900 |
| / 4 | 1:20P | | 01516000 | | | |
| | | 1460 | | 14,300 | 9.79 | 14,100 |
| / 3 | 1:00P | | 01501700 | | | |
| | | 1450 | | 16,350 | 11.28 | 16,200 |
| / 2 | 12:50P | | 01485350 | | | |
| | | 1420 | | 14,700 | 10.35 | 14,900 |
| 11/ 1 | 1:10P | | 01470650 | | | |
| | | 1445 | | 33,950 | 23.49 | 33,800 |
| 10/31 | 1:05P | | 01436700 | | | |
| | | 1445 | | 26,500 | 18.33 | 26,400 |
| /30 | 1:00P | | 01410200 | | | |
| | | 1406 | | 22,850 | 16.25 | 24,400 |
| /29 | 1:34P | | 01387350 | | | |
| | | 1469 | | 29,350 | 19.98 | 28,800 |
| /28 | 1:05P | | 01358000 | | | |
| | | 1455 | | 28,550 | 19.62 | 28,300 |
| /27 | 12:50P | | 01329450 | | | |
| | | 1418 | | 25,400 | 17.91 | 25,800 |
| /26 | 1:12P | | 01304050 | | | |
| | | 1418 | | 22,050 | 15.55 | 22,400 |
| /25 | 1:34P | | 01282000 | | | |
| | | 4359 | | 70,600 | 1.62 X | 23,300 |
| /22 | 12:55P | | 01211400 | | | |
| | | 1418 | | 16,750 | 11.81 | 17,000 |
| /21 | 1:17P | | 01194650 | | | |
| | | 1457 | | 20,300 | 13.93 | 20,100 |
| 10/20 | 1:00P | | 01174350 | | | |
| | | 1440 | | 15,050 | 10.45 | 15,100 |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 11/22 | 8:20A | | 01714000 | | | |
| | | 1445 | | 8,600 | 5.95 | 8600 |
| /21 | 8:15A | | 01705400 | | | |
| | | 1445 | | 9,200 | 6.37 | 9200 |
| /20 | 8:10A | | 01696200 | | | |
| | | 1445 | | 1,400 | 0.97 | 1400 |
| /19 | 8:05A | | 01694800 | | | |
| | | 1435 | | 2,050 | 1.43 | 2100 |
| /18 | 8:10A | | 01692750 | | | |
| | | 1445 | | 26,200 | 18.13 | 26,100 |
| /17 | 8:05A | | 01666550 | | | |
| | | 1160 | | 2,650 | 2.28 | 3300 |
| /16 | 12:45P | | 01663900 | | | |
| | | 1415 | | 2,800 | 1.98 | 2900 |
| /15 | 1:10P | | 01661100 | | | |
| | | 1455 | | 3,320 | 2.28 | 3300 |
| /14 | 12:55P | | 01657780 | | | |
| | | 1410 | | 3,380 | 2.40 | 3500 |
| /13 | 1:25P | | 01654400 | | | |
| | | 1480 | | 12,000 | 8.11 | 10,700 |
| /12 | 12:45P | | 01642400 | | | |
| | | 1410 | | 16,400 | 11.63 | 16,700 |
| /11 | 1:15P | | 01626000 | | | |
| | | 1420 | | 12,300 | 8.66 | 12,500 |
| /10 | 1:35P | | 01613700 | | | |
| | | 1465 | | 19,450 | 13.28 | 19,100 |
| / 9 | 1:10P | | 01594250 | | | |
| | | 1425 | | 17,200 | 12.07 | 17,400 |
| / 8 | 1:25P | | 01577050 | | | |
| | | 1475 | | 16,650 | 11.29 | 16,200 |
| 11/ 7 | 12:50P | | 01560400 | | | |
| | | 1355 | | 10,000 | 7.38 | 10,600 |

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | |
|---|---|---|---|---|---|---|
| 11/30 | 8:20A | | 01922550 | | | |
| | | 1430 | | 22,100 | 15.45 | 22,200 |
| /29 | 8:30A | | 01900450 | | | |
| | | 1430 | | 22,950 | 16.05 | 23,100 |
| /28 | 8:40A | | 01877500 | | | |
| | | 1375 | | 22,300 | 16.22 | 23,400 |
| /27 | 9:45A | | 01855200 | | | |
| | | 1540 | | 35,800 | 23.25 | 33,500 |
| /26 | 8:05A | | 01819400 | | | |
| | | 1420 | | 34,700 | 24.44 | 35,200 |
| /25 | 8:25A | | 01784700 | | | |
| | | 1435 | | 32,000 | 22.30 | 32,100 |
| /24 | 8:30A | | 01752700 | | | |
| | | 1435 | | 29,900 | 20.84 | 30,000 |
| 11/23 | 8:35A | | 01722800 | | | |
| | | 1455 | | 8,800 | 6.05 | 8700 |

Volume of 1" of rise = $\frac{\pi 27^2}{12} \times 7.28 = 2680$ gal

## Water Level - Visitor Center Reservoir (500,000 gallons)

| Date | Time | Elapsed min. | Depth of Water * | change |
|---|---|---|---|---|
| 10/6 | 8:30A | | 5' 1" | + 18,700 |
| /7 | 12:52P | | 5' 8" | + 26,800 |
| /9 | 12:20P | | 6' 6" | + 24,100 |
| /10 | 12:50P | | 7' 3" | +16,100 |
| /11 | 1:20P | | 7' 9" | +16,100 |
| /12 | 1:07P | | 8' 3" | +10,700 |
| /13 | 1:09P | | 8' 7" | +21,400 |
| /14 | 1:07P | | 9' 3" | — |
| /15 | 1:14P | | 9' 3" | +13,400 |
| /16 | 2:08P | | 9' 8" | +26,800 |
| /17 | 3:35P | | 10' 6" | +16,100 |
| /18 | 4:48P | | 11' 0" | +13,400 |
| /19 | 1:07P | | 11' 5" | +10,700 |
| /20 | 1:07P | | 11' 9" | +5400 |
| /21 | 1:25P | | 11' 11" | +2700 |
| /22 | 1:00P | | 12' 0" | — |
| /25 | 1:40P | | 12' 0" | -2700 |
| /26 | 1:19P | | 11' 11" | -10,700 |
| /27 | 1:00P | | 11'7" | -5400 |
| /28 | 1:12P | | 11' 5" | -13,400 |
| /29 | 1:40P | | 11' 0" | -5400 |
| /30 | 1:10P | | 10' 10" | -10,700 |
| 10/31 | 1:15P | | 10' 6" | -16,100 |
| 11/1 | 1:18P | | 10' 0" | +13,400 |
| /2 | 1:00P | | 10' 5" | +2700 |
| /3 | 1:05P | | 10' 6" | +10,700 |
| /4 | 1:30P | | 10' 10" | +2700 |
| /5 | 1:00P | | 10' 11" | |

| Date | Time | Depth of Water * | |
|---|---|---|---|
| 11/6 | 2:25P | 11' 3" | +10,700 |
| /7 | 1:00P | 11' 9" | +16,100 |
| /8 | 1:32P | 11' 11" | +5400 |
| /9 | 1:15P | 12' 1" | +5400 |
| /10 | 1:40P | 12' 0" | -2700 |
| /11 | 1:20P | 11' 7" | -13,400 |
| /12 | 12:50P | 11' 11" | +10,700 |
| /13 | 1:40P | 12' 3" | +10,700 |
| /14 | 1:05P | 12' 11" | +21,400 |
| /15 | 1:20P | 13' 6" | +18,700 |
| /16 | 12:50P | 14' 1" | +18,700 |
| /17 | 10:15A | 14' 4" | +8000 |
| /18 | 8:15A | 12' 9" | -50,900 |
| /19 | 8:10A | 13' 3" | +16,100 |
| /20 | 8:20A | 14' 0" | +24,100 |
| /21 | 8:25A | 14' 4" | +11,700 |
| /22 | 8:30A | 14' 9" | +13,400 |
| /23 | 8:45A | 15' 2" | +13,400 |
| /24 | 8:37A | 14' 11" | -8000 |
| /25 | 8:30A | 14' 5" | -16,100 |
| /26 | 8:10A | 13' 11" | -16,100 |
| /27 | 9:55A | 13' 6" | -13,400 |
| /28 | 9:50A | 13' 6" | -0 |
| /29 | 8:40A | 13' 7" | +2700 |
| 11/30 | 8:25A | 13' 9" | +5400 |

* Full Depth = 16'

**One Inch Meter - Administrative Building**

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 11/30 | 7:45A | | 0001550 | | | |
| | | 1425 | | 85 | .0596 | 86 |
| /29 | 8:00A | | 0001465 | | | |
| | | 1445 | | 55 | .0381 | 55 |
| /28 | 7:55A | | 0001410 | | | |
| | | 1435 | | 20 | .0139 | 20 |
| /27 | 8:00A | | 0001390 | | | |
| | | 1450 | | 60 | .0414 | 60 |
| /26 | 7:50A | | 0001330 | | | |
| | | 1415 | | 65 | .0459 | 67 |
| /25 | 8:15A | | 0001265 | | | |
| | | 1460 | | 45 | .0308 | 44 |
| /24 | 7:55A | | 0001220 | | | |
| | | 1440 | | 80 | .0556 | 80 |
| /23 | 7:55A | | 0001140 | | | |
| | | 1440 | | 105 | .0729 | 105 |
| /22 | 7:55A | | 0001035 | | | |
| | | 1440 | | 115 | .0799 | 115 |
| /21 | 7:55A | | 0000920 | | | |
| | | 1430 | | 70 | .0490 | 71 |
| /20 | 8:05A | | 0000850 | | | |
| | | 1457 | | 105 | .0721 | 104 |
| /19 | 7:48A | | 0000745 | | | |
| | | 1433 | | 175 | .1221 | 176 |
| /18 | 7:55A | | 0000570 | | | |
| | | 1345 | | 70 | .0520 | 75 |
| /17 | 9:30A | | 0000500 | | | |

## One and one-half Inch Meter - Museum and Auditorium

| Date | Time | Time Interval | Meter Reading (Gallons) | Gallons Used | Rate of Use (GPM) | GPD |
|---|---|---|---|---|---|---|
| 11/17 | 9:35A | | 2212460 | | | |
| | | 1335 | | 335 | .2509 | 362 |
| /18 | 7:50A | | 2212125 | | | |
| | | 1435 | | 445 | .3101 | 450 |
| /19 | 7:45A | | 2211680 | | | |
| | | 1445 | | 690 | .4776 | 690 |
| /20 | 7:50A | | 2210990 | | | |
| | | 1450 | | 790 | .5448 | 790 |
| /21 | 8:00A | | 2210200 | | | |
| | | 1440 | | 500 | .3472 | 500 |
| /22 | 8:00A | | 2209700 | | | |
| | | 1440 | | 350 | .2431 | 350 |
| 23 | 8:00A | | 2209350 | | | |
| | | 1440 | | 710 | .4931 | 710 |
| /24 | 8:00A | | 2208640 | | | |
| | | 1450 | | 4,190 | 2.8897 | 4170 |
| /25 | 8:10A | | 2204450 | | | |
| | | 1415 | | 6,830 | 4.8269 | 6950 |
| /26 | 7:45A | | 2197620 | | | |
| | | 1460 | | 7,400 | 5.0685 | 7300 |
| /27 | 8:05A | | 2190220 | | | |
| | | 1435 | | 1,510 | 1.0523 | 1520 |
| /28 | 8:00A | | 2188710 | | | |
| | | 1445 | | 380 | .2630 | 380 |
| /29 | 8:05A | | 2188330 | | | |
| | | 1425 | | 450 | .3158 | 450 |
| /30 | 7:50A | | 2187880 | | | |

January 24, 1961

L 54

Memorandum

To: Regional Chief of Operations, Region Four

From: Hydraulic Engineer Spaulding, Region Four

Subject: Report on Water Use, Furnace Creek Area, Death Valley National Monument

Attached is one copy of a report of water use by National Park Service facilities in the Furnace Creek Area during the '49er Encampment and dedication of the Visitor Center in November, 1960. The report is based on data taken by the writer during a trip to Death Valley and on meter readings supplied by Superintendent Liles' memorandum of December 20.

Significant results of the water use study are:

1. The quantity of water the Park Service is able to draw from Texas Spring easily met the needs during the period of peak travel.

2. Storage capacity is adequate for present uses.

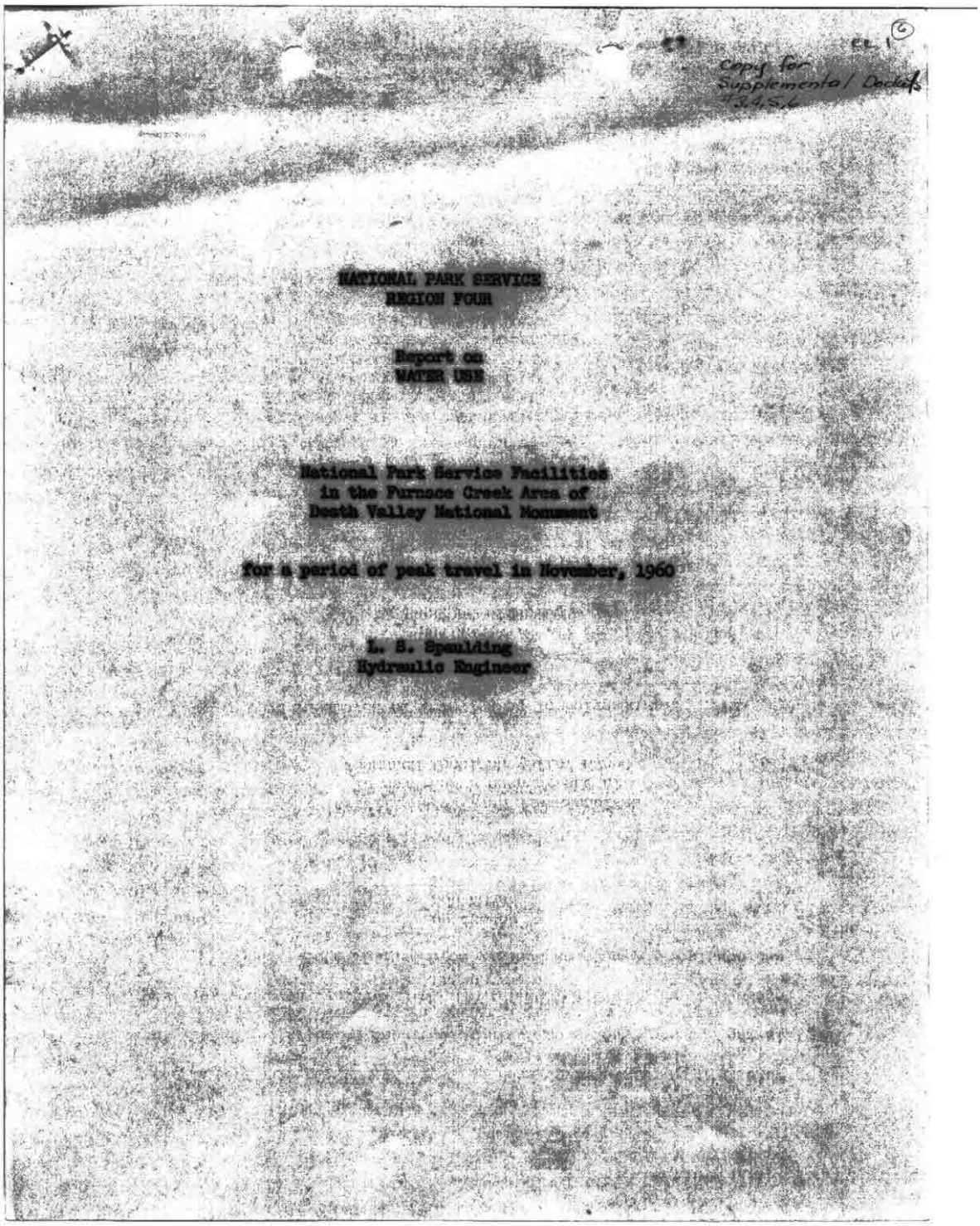
3. The quantity of water the Service is able to draw through its system is restricted to less than 35 gpm by an old, small diameter pipeline.

The report provides per capita rates of water use for predicting future needs and makes recommendations for further study and for construction to increase the capacity of the system to 35 gpm.

Linn Spaulding
Hydraulic Engineer

CLEARED FOR DISTRIBUTION:

_____
Asst Regional Director Date



Copy for Supplemental Docket

NATIONAL PARK SERVICE
REGION FOUR

Report on
WATER USE

National Park Service Facilities
in the Furnace Creek Area of
Death Valley National Monument

for a period of peak travel in November, 1960

L. S. Spaulding
Hydraulic Engineer

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Appendix B-Metered Water Use

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B-2 Storage in 500,000 gallon Reservoir

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Appendix C- Daily Water Use - Calculation Sheets

Appendix D- Maps

NRDV - 2220 Visitor Center - Water System

NRDV - 2219 Water System - Furnace Creek Area

00-00-0000: summary of water use durring 1960 '49er emcampment ; january 11, 1961

GENERAL

This is a report on water used by National Park Service facilities in the Furnace Creek area during the annual Death Valley '49er, Inc., encampment which started the evening of Thursday, November 10, 1960 and concluded at noon on Sunday, November 13, 1960. The Death Valley Visitor Center was dedicated on Saturday, November 12, an event which drew a large attendance. A special study of water use was made during this period of peak travel to determine rates of usage for domestic purposes as a basis for predicting future needs. To gather data the writer made a trip to Death Valley November 7 to 17. A summary of the data collected and results obtained are presented herein.

SUMMARY OF RESULTS

The existing Texas Spring supply was adequate to meet the needs of National Park Service facilities in the Furnace Creek Area during the Death Valley '49er Encampment and Dedication of the Visitor Center. In fact, water was added to storage during the three days of peak travel. The suspension of irrigation during the days of peak travel accounts for the surplus. Accurate data on irrigation needs were not obtained as the study did not cover a period of normal irrigation operation.

Average use during three full days of the encampment, November 11-13, was as follows:

| | Gallons Per Minute | Gallons Per Day |
|---|---|---|
| Visitor Center, Exhibit-Auditorium, domestic use | 4.8 | 6,841 |
| Visitor Center, Administrative Wing, domestic use | 0.1 | 167 |
| Visitor Center, Irrigation, Friday (suspended Saturday and Sunday) *(1/3 of rates added for total) | 6.0 * | 8,500 * |
| Furnace Creek Campground, domestic use | 1.9 | 2,603 |
| Texas Spring Campground, domestic use | 9.2 | 13,239 |
| Campgrounds, Irrigation (suspended Friday, Saturday and Sunday) | --- | --- |
| Indian Village (assumed use) | 0.1 | 200 |
| Added to Storage 500,000 gallon reservoir | 8.1 | 11,683 |
| Total Diversion from Texas Spring | 26.2 | 37,800 |

This study has determined that water was consumed at the following unit rates during the encampment:

Visitor Center, domestic use 2.6 gallons per visit
Texas Spring Campground, domestic use 20 gallons per person per day

Water consumption and population are shown in greater detail on the table and the chart which follow this page.

- Column B of the table shows daily water use delivered by the interior water system of the museum wing of the Visitor Center.

- Column C shows the daily travel to the Visitor Center, being the count of people entering the lobby during regular hours plus the attendance at the Naturalist's evening slide talk.

- Column D shows average domestic water use per visit to the Visitor Center.

- Column E shows the quantity of water assumed to have been used from the interior water system for lawn sprinkling. This use was required for watering the lawn inside the front wall of the Visitor Center pending repair of the underground sprinkler system.

- Column F shows water use of the administrative wing of the Visitor Center.

- Column G shows irrigation use for the patio and front lawns and for irrigation ditches between the parking areas.

- Column H shows water use by the one comfort station in the undeveloped Furnace Creek Campground.

- Column J shows the population camping in the vicinity of the Furnace Creek Campground comfort station.

- Column K shows the average water use of the comfort station per person camping in the vicinity.

- Column L shows the total water delivered to the Visitor Center area, comfort station at the Furnace Creek Campground and the Indian Village.

-Columns M, N & P show the water consumed in Texas Spring Campground, the camp population and the per capita use, respectively.

- Column Q shows the total water consumed through National Park Service facilities in the Furnace Creek Area.

- Column R shows the daily change in storage in the 500,000 gallon reservoir.

- Column S shows the daily National Park Service diversion from the Texas Spring source.

Death Valley National Monument - Furnace Creek Area

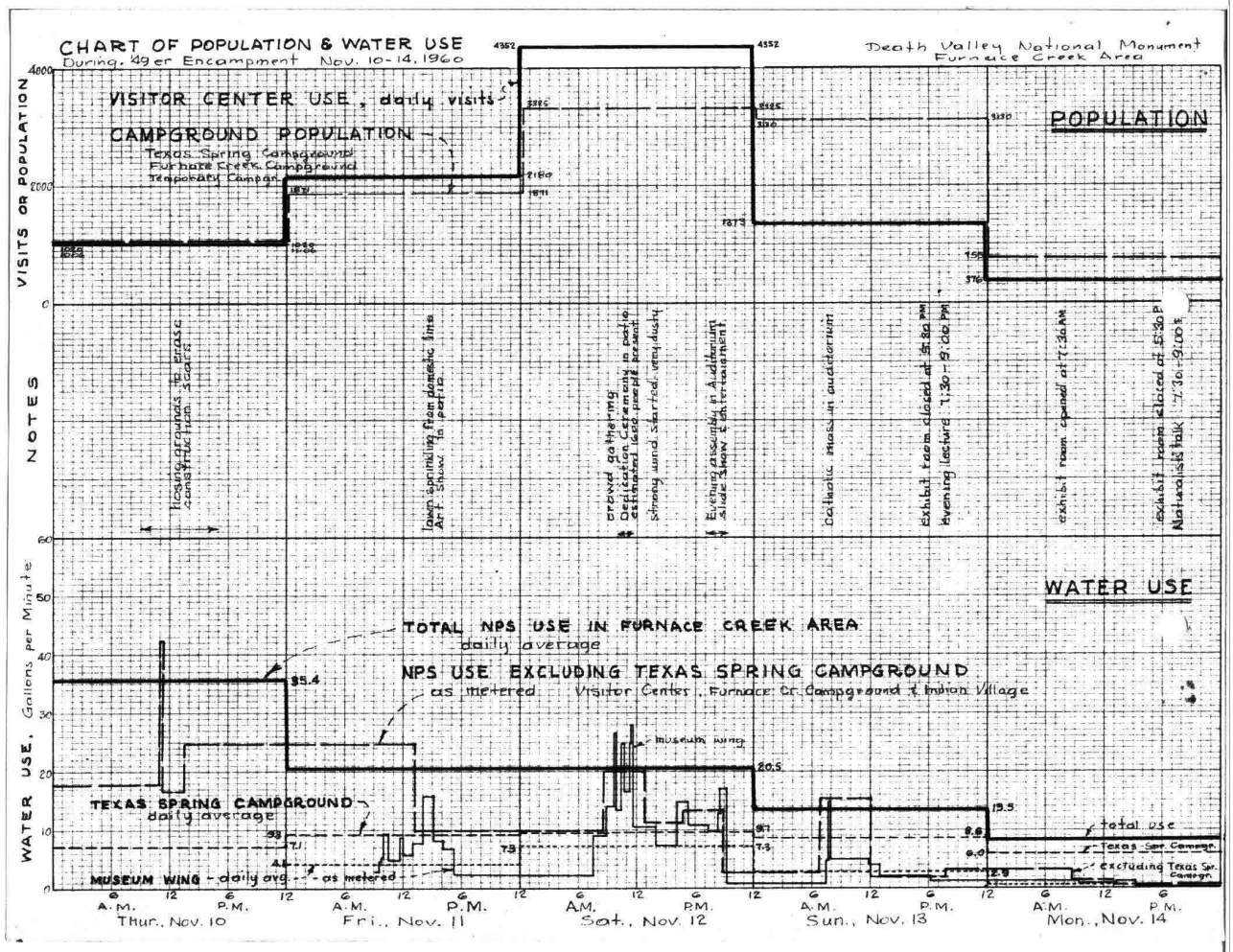
TABLE I SUMMARY OF WATER USE DURING 1960 49er ENCAMPMENT

November 1960

L. Spaulding 1-11-61

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | DAILY WATER CONSUMPTION, gallons - midnight to midnight | | | | | | | | | | | | | | CHANGE IN STORAGE 500,000 gallon Reservoir | DIVERSION from Texas Spring | COMMENTS |
| | VISITOR CENTER | | | | | | FURNACE CREEK CAMPGROUND | | | TOTAL thru main meters in vault | TEXAS SPRING CAMPGROUND | | | TOTAL CONSUMPTION | | | |
| | Museum - Auditorium (excluding irrigation) | | | Irrigat. from Museum system | Admin. Wing | Irrigation Patio & Lawns | Gallons per Day | Camp Population | Gal. per person per day | Gallons per Day | Gallons per Day | Camp Population | Gal. per person per day | Gallons | Gallons + or - | Gallons per Day | |
| 1960 | Gal. | Visits | Gal. per Visit | Gal. | Gallons | Gallons | | | | | | | | | | | |
| Tue. Nov 8 | ① | 257 | | ① | ① | ① | | ① | | 20,500 | 7000 | | | 27,500 | +5100 | 32,600 | |
| Wed. Nov 9 | ① | 656 | | ① | ① | ① | | none | | 23,000 | 9600 | 374 | 26 | 32,600 | even | 32,600 | |
| Thur. Nov 10 | ① | 1006 | | ① | ① | ① | | 99 | | 40,800 | 10,200 | 477 | 21 | 51,000 | -16,300 | 34,700 | 1st event of Encampment Thur. evening |
| Fri, Nov 11 | 5869 | 2180 | 2.7 | 300* | 200* | 8300* | 1231* | 246 | 5* | 16,100 | 13,400 | 624 | 22 | 29,500 | +7600 | 37,100 | |
| Sat. Nov 12 | 10,474 | 4352 | 2.4 | none | 800* | none | 4636③ | 864 | 5 | 15,510 | 13,980 | 752 | 19 | 29,490 | +10,740 | 40,230 | Dedication of Visitor Center |
| Sun Nov 13 | 4180 | 1373 | 3.0 | none | 100* | none | 2543③ | 746 | 3 | 7023 | 12,337 | 739 | 17 | 19,360 | +16,710 | 36,070 | last day of '49er Encampment |
| Mon Nov 14 | 960 | 376 | 2.5 | 200* | 179 | 1472④ | 200* | 32 | 6 | 3211 | 8559 | 400 | 21 | 11,770 | +21,050 | 32,820 | |
| Tue Nov 15 | 797 | 442 | 1.8 | ② | 140 | 6961③ | 200* | 29 | 7 | 8304 | 4906 | 314 | 16 | 13,210 | +18,880 | 32,090 | |
| Wed Nov 16 | 682 | 394 | 1.7 | ② | 160 | 6418③ | 150* | 19 | 8 | 7610 | 7190 | 314 | 23 | 14,800 | +16,570 | 31,370 | |
| Thur. Nov 17 | 363 | | | ② | 90 | 53,608③ | none* | none | | 54,061 | 8238 | 316 | 20 | 60,300 | -29,170 | 31,130 | irrigation lines opened to maintain use of capacity of 2-inch supply line |
| TOTAL OR AVERAGE | Nov. 11 to 16 incl. 23,962 | 9117 | 2.6 | | Average Nov 14-17 142 | | | | | average 19,612 | average 9601 | Nov 9-17 incl. 479 | 20 | average 28,953 | average +5118 | average 34,071 | |
| SOURCE OF DATA | Appendix C | Appendix A-2 | Calc. | Field Book No. 98 | Appendix B-9 corrected | Field Book No. 98 | calculated See Note No. 3 | Appendix A-1 | Col. H / Col. J | Appendix C | Col. Q - L | Appendix A-1 | Col. M / Col. N | Col. S - R | Appendix C | Appendix C | |
| NOTES | * Assumed<br>① Not recorded<br>② Lawn sprinkling from hose bibb on Museum<br>③ Not metered - Calculated by subtracting sum of known use including 800 gpd Indian Village use from Spring meter readings less Wing system - calculated<br>④ Patio lawn sprinkling before 8 AM - believed to be none on particular days - but if any is included with museum use from main metered use | | | | | | | | | | | | | | | | |

11-10-1960: water system cont. ; january 11, 1961



WATER SYSTEM

The water system is illustrated by drawings NDV 2219 and NDV 2220 attached to this report.

The source of water is the Death Valley Hotel Company's Texas Spring tunnel. The Park Service system diverts from the company system at a concrete settling box covered by a metal shed, the take out point being just upstream from the Company's measuring weir.

Water is carried from the diversion point to a 20,000 gallon buried concrete reservoir through 2,730 feet of 2-1/2 inch pipe and 370 feet of 3 inch pipe. The discharge end of the pipe is fitted with a float controlled valve which shuts off the inflow when the reservoir is filled. Midway on this line a 2 inch Neptune water meter, installed by the Death Valley Hotel Company records National Park Service diversion. The elevation of the water level in the 20,000 gallon reservoir when full is about ↓124.

From the 20,000 gallon reservoir the water is carried by a 3 inch main (laid in the 1930's) to the vicinity of the lower comfort station in Texas Spring Campground. The main then reduces to 401 feet of 2-1/2 inch pipe (laid in 1955) through the lower campground and connects to an old 2 inch main. Numerous laterals in the campground serve fifty water stations, each station having two hosebibbs and two comfort stations having a total of eleven tank type flush toilets. From the lower end of the campground water is carried 1,000 feet in the old 2 inch main to a buried concrete valve vault. A six inch main laid in 1960 runs 3,310 feet from the vault uphill to a 500,000 gallon ground level steel tank sixteen feet in height, the elevation of the bottom of the tank being ↓ 62. The 6 inch main at the tank is fitted with a Cla-Val altitude control valve which shuts inflow to the reservoir when it is filled.

Water for use at the Visitor Center, Furnace Creek Campground and the Indian Village is drawn from the supply line at the point where the 2 inch line from Texas Spring Campground joins the 6 inch line, the junction point being enclosed in a valve vault. Water passes through 4 inch and 1-1/2 inch pressure reducing valves operating in parallel. The 4 inch valve remains closed when demand is low and opens for large flows. A 4 inch Sparling meter measures the flow in the 4 inch branch and a 1-1/2 inch Neptune meter measures the flow in the 1-1/2 inch branch. Downstream from the meters and within the vault the parallel branches rejoin to supply water to the Visitor Center and Furnace Creek Campground through a 6 inch main and to the Indian Village through an old 2 inch main. (Some records show the latter line as 2-1/2 inch, other records show 3 inch.)

The above mentioned 6 inch main is 2,250 feet in length from the vault to a point near the Visitor Center at which the main branches to circle the Visitor Center. The 6 inch main continues for 1,086 feet to the vicinity of a comfort station in the undeveloped Furnace Creek Campground.

Four laterals including a 1-1/4 inch line to 778 square feet of lawn within a walled in space serve sprinkling systems watering 33,678 square feet of lawn between the exhibit-auditorium building and the parking area. Two laterals provide for irrigation flow in ditches bordering the parking areas and tees in the 6 inch main have been provided for future laterals to irrigation ditches. Visitor Center domestic use is supplied by two 2-1/2 inch laterals, one to each wing of the Center, the laterals being fitted with pressure reducing valves located in vaults near the buildings. The lateral serving the exhibit - auditorium wing provides water for restrooms containing 10 fixtures fitted with flush valves, for an inside drinking water cooler, an outside drinking fountain, janitor's service sink, three outside hose bibbs (the two hose bibbs outside the mechanical room are not metered) and for make up water for two evaporative cooling towers for the air conditioning systems. This use is measured by a 1-1/2 inch meter located in the building's mechanical room.

Domestic use of the administrative wing, measured by a 1-inch meter in the mechanical room, includes one drinking water cooler-heater, rest rooms containing three fixtures with flush valves, janitor's service sink, dark room sink, boiler make up for hot water heating of the entire Visitor Center, make up water for an evaporative cooling tower on the air conditioning system, humidifiers for the naturalist's workroom and for one outside hose bibb. (The hose bibb outside the mechanical room is not on this meter.)

Each wing of the Visitor Center contains a 2-1/2 inch fire line separate from the service lines.

A 3 inch lateral from the 6 inch main provides irrigation water for the patio, for lawn sprinkling bordering the administration wing on the west and north and makeup water for the patio pool. Vegetation receiving water from this lateral is shown on map 2220 in the appendix and totals 10,741 square feet of lawn, 4 olive trees and 5 palms. The area of the pool is 1,600 square feet. Provision has been made for installing a 2 inch meter on the 3 inch lateral.

A lateral, presently not metered separately, serves the one comfort station in Furnace Creek Campground. This facility contains six fixtures with flush valves, 4 lavatories and a service sink for public use. No other water service is provided in the presently undeveloped campground.

## TRAVEL

Details of travel provided by the Monument records are contained in Appendix A. Appendix A-1 lists daily campground population from November 9 to 17 with a breakdown between tent and trailer campers and for three areas, namely, Texas Spring Campground, temporary campground on the old airstrip between the Ranch and Texas Spring Campground and, lastly, Furnace Creek Campground.

Appendix A-2 lists daily visitor use of the Visitor Center from November 1 to 16.

Appendix A-3 lists, to the extent records were made, of hourly rates of people entering the lobby on November 10 and 11.

Traffic counters measuring travel on the main entrance roads were read by the Monument staff on Thursday, November 10 and again late on Sunday, November 13. These readings indicate that travel to the Monument during the 3 day period totaled 14,120 people. A comparison with travel to the Visitor Center from midday November 10 through November 13 totaling 8,408 visits (Appendix A-2) indicates that travel to the Visitor Center was 60 per cent of total Monument travel.

## METERED WATER USE

Appendix B provides data on water use measured by 5 meters and on water in storage as measured by the level gage on the 500,000 gal reservoir. Storage in the 20,000 gallon reservoir is presumed to be constant, the system being such that the reservoir remains full except when irrigation of Texas Spring Campground draws down the storage. The data of Appendix B have been adjusted to daily rates by calculations shown in Appendix C. In calculating visitor use of water no deduction from metered rates have been made for cooling towers, boiler makeup and other incidental uses. These other uses are considered to have been insignificant.

Some water use rates shown by the data are as follows:

1. Peak rate of diversion from Texas Spring (for a 4-1/2 hour period Saturday AM, November 12) — 31.5 gpm

2. Peak rate of use through the 6 inch main (All use at Visitor Center, F.C. Campground and Indian Village for a 58 minute period on November 17) (Irrigation lines opened as test) — 148 gpm

3. Peak rates of domestic use at Visitor Center

   a. Short periods of less than 1 minute on Saturday, November 12, following dedication — 60 gpm

   b. Seven minute period following Dedication, November 12. — 28 gpm

   c. 2-1/2 hour period of Dedication, Saturday, November 12, (1600 to 2000 people in attendance) — 17.3 gpm

   d. Peak daily rate - Saturday, November 12 — 7.3 gpm

4. Water use per person using Visitor Center restroom, Saturday, November 12 (20 people in 4 minutes using 100 gallon) — 5 gal per person

5. Texas Spring Campground - peak day domestic use, Saturday, November 12 (864 people) — 9.7 gpm

Raw data are contained in Death Valley Field Book No. 98.

## CAPACITY OF PIPELINES

A test was made of the capacity of the 2-1/2 inch and 3 inch line from Texas Spring to the 20,000 gallon reservoir and meter records have been used to determine the capacity of the pipeline varying from 3 inch to 2 inch running from the 20,000 gallon reservoir through Texas Spring Campground to the connection with the six inch main, and thence to the 500,000 gallon reservoir. Results are as follows:

| Pipeline | Capacity, gpm |
|---|---|
| Texas Spring to 20,000 gallon reservoir | 41 |
| 20,000 gallon reservoir to 500,000 gallon reservoir | 20 |

Flow in the second pipeline (joining the two reservoirs) apparently is restricted by friction through about 1,000 feet of old 2 inch steel pipe. Head loss through this section at 20 gpm is estimated to be 28 feet using a friction coefficient, C, of 80 compared to the available head between the two reservoirs of about 44 feet when the big tank is nearly full. (A flow of 35 gpm would require a head differential of 78 feet over this section.) With the present system the maximum flow which can be drawn from the 20,000 gallon reservoir is 20 gpm plus the use within Texas Spring Campground, the combined use reaching 31.5 gpm during the period of study.

A suggested improvement is to replace the 1,000 feet of 2 inch line with 2-1/2 or 3 inch pipe. It is estimated that this would increase the capacity of the system to 35 or more gallons per minute.

## RECOMMENDATIONS

This report provides detailed data on water use for a short period of peak travel. A complete determination of water needs particularly irrigation needs requires that data be collected over a longer period of time and for all seasons of the year. The following recommendations are made to provide these data. The first recommendation is for increasing the capacity of the supply system so that full use of 35 gallons per minute is possible.

1. Replace 1,000 feet of old 2 inch main from Texas Spring Campground to the valve vault on the 6 inch main with 3 inch pipe.

2. Continue reading meters weekly throughout the 1961 calendar year. Read meters early each Monday morning to provide data coincident with travel weeks.

3. Read meters daily throughout March and April of 1961 to obtain more detailed data during the months of peak travel. Read meters early each morning (before opening of Visitor Center) to obtain data coincident with travel days.

4. Record travel to Visitor Center, population of Texas Spring Campground and population of Furnace Creek Campground summarized Monday through Sunday of each week to coincide with periods of water measurement.

5. Record Visitor Center travel and Campground populations daily for the months of peak travel, March and April, 1961.

6. Install a 2 inch meter on the 3 inch line irrigating the Visitor Center patio.

7. Install a 1-1/2 inch meter on the 2 inch line serving the Furnace Creek Campground comfort station.

Appendix A-1

# FURNACE CREEK AREA

## CAMPGROUND USE DURING '49 ENCAMPMENT

November 1960

( Data from Superintendents memorandum of Nov. 28, 1960)

L. Spaulding 12-20-60

| DATE 1960 | CAMPGROUND USE, Number of People | | | | | | |
|---|---|---|---|---|---|---|---|
| | TEXAS SPRING CAMPGROUND | | TEMPORARY CAMP OLD AIRSTRIP | | FURNACE CR. CAMPGR. (Undeveloped - near Com Sta) | | TOTAL POPULATION |
| | TENTS | TRAILERS | TENTS | TRAILERS | TENTS | TRAILERS | |
| Wed. Nov. 9 | 128 | 246 | - | 99 | - | - | 473 |
| Thur. Nov. 10 | 227 | 250 | - | 444 | 99 | - | 1020 |
| Fri Nov 11 | 288 | 336 | 25 | 976 | 221 | 25 | 1871 |
| Sat Nov 12 | 368 | 384 | 32 | 1677 | 768 | 96 | 3325 |
| Sun Nov 13 | 355 | 384 | 25 | 1620 | 698 | 48 | 3130 |
| Mon Nov 14 | 160 | 240 | - | 323 | 32 | - | 755 |
| Tue Nov 15 | 77 | 237 | - | - | 29 | - | 343 |
| Wed Nov 16 | 77 | 237 | - | - | 19 | - | 333 |
| Thur Nov 17 | 73 | 243 | - | - | - | - | 316 |
| | | | | | | | |

Appendix A-2

Furnace Creek Visitor Center
Visitor Use November 1 - 16, 1960

Data from Naturalist's Log

Legend

"Visitor Center Travel" -- People entering lobby by front entrance excluding attendance at evening talk.

"Audio-Visual" -- Attendance at automatic slide show - number is included on "Visitor Center Travel."

"Evening Talk" -- Attendance at Naturalist's evening talk in Auditorium - museum normally closed. This number is not included in "Visitor Center Travel."

"Total Visitor Use" -- Sum of "Visitor Center Travel" and "Evening Talk."

| Date | Visitor Center Travel | Audio Visual | Evening Talk | Total Visitor Use | Comments |
|---|---|---|---|---|---|
| Tue., Nov 1 | 105 | 46 | 92 | 197 | Exhibit Room open 7:30 AM - 5:30 PM |
| Wed., Nov 2 | 121 | 74 | 116 | 237 | |
| Thur., Nov 3 | 122 | 67 | 114 | 236 | |
| Fri., Nov 4 | 143 | 97 | 42 | 185 | |
| Sat., Nov 5 | 231 | 152 | 109 | 340 | |
| Sun., Nov 6 | 230 | 117 | -- | 230 | |
| Mon., Nov 7 | 219 | 55 | 88 | 307 | |
| Tue., Nov 8 | 154 | 49 | 103 | 257 | |
| Wed., Nov 9 | 243 | 437 | 413 | 656 | |
| Thur., Nov 10 | 616 | 340 | 390 | 1,006 | |
| Fri., Nov 11 | 1,680 | 919 | 500 | 2,180 | |
| Sat., Nov 12 | 4,352 | 744 | (included in Visitor Center Travel) | 4,352 | Exhibit Room open 7:30 AM - 9:30 PM Evening Assembly of 49 Encampment held in Auditorium. |
| Sun., Nov 13 | 943 | 205 | 430 | 1,373 | Exhibit Room open 7:30 AM - 5:30 PM |
| Mon., Nov 14 | 211 | 113 | 165 | 376 | " " " " |
| Tue., Nov 15 | 252 | 144 | 190 | 442 | " " " " |
| Wed., Nov 16 | 236 | 83 | 158 | 394 | " " " " |

11-00-1960: hourly rate of visits to exhibit room ; november, 1960

Appendix A-3

Furnace Creek Visitor Center

Travel

Hourly Rate of Visits to Exhibit Room

during '49er Encampment

November, 1960

(from Museum Attendant's log - incomplete record)

| Date | Hours | Visits during Period | Cumulative Visits |
|---|---|---|---|
| Thursday, Nov. 10 | 7:30 - 8:30 AM | 18 | 18 |
| | 8:30 - 10:00 AM | 46 | 64 |
| | 10:00 - 11:00 AM | 99 | 163 |
| | 11:00 - 12:00 Noon | ~~86?~~ } 84 | ~~159~~ |
| | 12:00 - 1:00 PM | 88? | 247 |
| | 1:00 - 2:00 PM | 64? | 311 |
| | 2:00 - 3:00 PM | 40? | 351 |
| | 3:00 - 4:00 PM | 55 | 406 |
| | 4:00 - 4:30 | | |
| | (Total for day recorded as.....616) | | |
| Friday, Nov. 11 | 7:30 - 10:00 AM | 235 | 235 |
| | 10:00 - 11:00 AM | 256 | 491 |
| | 11:00 - 1:00 PM | 177 | 668 |
| | (Record discontinued) | | |

11-00-1960: metered water usage; november, 1960

Appendix B-1

# METERED WATER USAGE

Sheet 1 of 1

| LOCATION | | | METER | | | |
|---|---|---|---|---|---|---|
| Park | Area | Meter Location | Size 2" owned & installed by Hotel Co. | Make | Serial No. | Units |
| DEATH VALLEY | Furnace Creek | 2½" Texas Spr. Supply line | | Neptune | 12489588 | Gal. |

| DATE | TIME | READING Gallons | RATE AT READING GPM | ELLAPSED TIME | USAGE Gal. | AVERAGE RATE gpm | COMMENTS |
|---|---|---|---|---|---|---|---|
| Mon. Nov. 7 | 1:20 P | 26,491,500 | 22.0 | | | | |
| Tue. Nov. 8 | 1:36 P | 26,524,500 | 22.7 | 1456 | 33,000 | 22.7 | |
| Wed. Nov. 9 | 1:22 P | 26,556,800 | | 1426 | 32,300 | 22.6 | |
| Thur. Nov. 10 | 1:45 P | 26,591,500 | | 1463 | 34,700 | 23.7 | |
| Fri. Nov. 11 | 1:25 P | 26,626,500 | | 1420 | 35,000 | 24.6 | |
| Sat. Nov. 12 | 8:10 A | 26,656,400 | 30 | ~~1175~~ | ~~29,900~~ | 26.6 | |
| " " | 12:35 P | 26,664,750 | 30 | ~~1265~~ | ~~8,350~~ | 31.5 | |
| " " | 1:05 P | 26,665,500 | | 30 | 750 | 25.0 | |
| " " | 4:43 P | 26,671,810 | 25 | 218 | 6310 | 28.9 | |
| " " | 9:03 P | 26,679,000 | 30 | 260 | 7190 | 27.6 | |
| Sun. Nov 13 | 7:10 A | 692,500 | 30 | 607 | 13,500 | 22.3 | |
| " " | 12:15 P | 701,710 | 30 | 305 | 9210 | 30.2 | |
| " " | 12:30 P | 702,297 | | 15 | 587 | 39.2 | |
| " " | 12:37 P | 702,584 | | 7 | 287 | 41.0 | Test of capacity of line (2½") diverting from Hotel Co. system Opened float valve in 20,000 gal. reservoir wide open RESULT: Capacity = 41.0 GPM |
| " " | 1:45 P | 704,200 | | 68 | 1616 | 23.8 | |
| " " | 7:02 P | 712,360 | 25 | 317 | 8160 | 25.7 | |
| Mon. Nov. 14 | 9:00 A | 731,000 | 30 | 838 | 18,640 | 22.2 | |
| " " | 1:13 P | 737,320 | 26 | 253 | 6320 | 25.0 | |
| Tue, Nov. 15 | 8:09 A | 762,790 | 27 | 1136 | 25,470 | 22.4 | |
| " " | 1:25 P | 770,000 | | 316 | 7210 | 22.8 | |
| " " | 9:16 P | 780,530 | | 471 | 10,530 | 22.4 | |
| Wed, Nov. 16 | 8:23 A | 794,280 | 25 | 667 | 13,750 | 20.6 | |
| " " | 1:05 P | 801,500 | | 282 | 7220 | 25.6 | |
| Thur. Nov 17 | 7:49 A | 825,800 | 26 | 1124 | 24,300 | 21.6 | |
| " " | ~~11:00 A~~ | ~~829,600~~ | | 156 | 2200 | 14.2 | 2" line below campground shut off about 1 hour |
| " " | 10:25 A | 828,000 | | | | | |
| " " | 11:28 A | 829,600 | 20 | 63 | 1600 | 25.4 | |
| " " | 2:58 P | 834,280 | 26 | 210 | 4680 | 22.3 | |
| Fri Nov 18 | 8:25 A | 857,700 | | 1047 | 23,420 | 22.4 | |

11-00-1960: water in storage; november, 1960

Appendix B-2

# WATER IN STORAGE

~~METERED WATER USAGE~~

Sheet 1 of 1

| LOCATION | | | METER | | | |
|---|---|---|---|---|---|---|
| Park | Area | Meter Location | Size | Make | Serial No | Units |
| DEATH VALLEY | Furnace Creek | 500,000 gal. Reservoir | Depth Gage | (16'-0" high steel tank) | | 1" = 2600 g |

| DATE | TIME | Depth of Water READING Ft. - In. | ~~RATE AT READING~~ STORAGE gal. | ELLAPSED TIME min. | CHANGE ~~USAGE~~ + or − gal. | AVERAGE RATE gpm | COMMENTS |
|---|---|---|---|---|---|---|---|
| Mon. Nov 7 | 1:00 P | 11'-9" | | | | | Vol. recalculated 6/1/61 1" = 2680 gal for 27" Radius 3% error |
| Tue, Nov. 8 | 1:32 P | 11'-11" | | 1472 | +5200 | +3.53 | |
| Wed. Nov 9 | 1:15 P | 12'-1" | | 1423 | +5200 | +3.65 | |
| Thur. Nov 10 | 11:25 A | 11'-10" | | 1330 | -7800 | -5.87 | |
| " " | 1:40 P | 12'-0" | | 135 | +5200 | +38.5 | ← impossible rate |
| Fri., Nov 11 | 1:20 P | 11'-7" | | 1420 | -13000 | -9.15 | 1:40 P reading made by maint. crew - may have rounded off to 12' resulting in errant inflow rate - or 11:25 A reading by Spaulding may have been of a stuck slide - est. 11'2" rdg. should have been about 12'-2" |
| Sat. Nov 12 | 8:54 A | 11'-11" | | 1174 | +10,400 | +8.85 | |
| " " | 12:45 P | 11'-10.5" | | 231 | -1,300 | -5.63 | |
| " " | 4:37 P | 11'-11.2" | | 232 | +1,820 | +7.85 | |
| " " | 8:55 P | 11'-11.4" | | 258 | +520 | +2.01 | |
| Sun, Nov 13 | 7:05 A | 12'-3.6" | | 610 | +10,900 | +18.05 | |
| " " | 12:09 A | 12'-3.7" | | 304 | +260 | +0.85 | |
| " " | 6:56 P | 12'-5" | | 407 | +3,380 | +8.30 | |
| Mon. Nov 14 | 8:50 A | 12'-7.4" | | 834 | +6,240 | +7.50 | |
| " " | 1:05 P | 12'-11" | | 255 | +9,360 | +36.6 | impossible rate |
| Tue, Nov 15 | 8:04 A | 13-6.3" | | 1139 | +18,990 | +16.7 | |
| " " | 10:05 A | 13'-5" | | 121 | -3,380 | -28.1 | |
| " " | 1:20 P | 13'-6" | | 195 | +2,600 | +13.3 | |
| " " | 9:12 P | 13'-9.6" | | 472 | +9,360 | +19.8 | |
| Wed. Nov 16 | 8:18 A | 14'-1.0" | | 666 | +8,840 | +13.3 | |
| " " | 12:50 P | 14'-1" | | 272 | — | 0.0 | |
| Thur, Nov. 17 | 7:45 A | 14'-7.5" | | 1135 | +16,900 | +14.9 | |
| " " | 10:15 A | 14'-4" | | 150 | -9,100 | -60.5 | |
| " " | 11:22 A | 14'-4.0" | | 67 | — | | |
| Fri., Nov 18 | 8:15 A | 12'-9" | | 1253 | -49,400 | -39.4 | |

Appendix B-3

# METERED WATER USAGE

Sheet 1 of 1

| LOCATION | | | METER | | | |
|---|---|---|---|---|---|---|
| Park | Area | Meter Location | Size | Make | Serial No. | Units |
| DEATH VALLEY | Furnace Creek | Vault on 6" Main | 4" 1 1/2" | Sparling – Neptune – | 43843 14303358 | Sparling - CF Neptune - Gal. |

| DATE 1960 | TIME | READING SPARLING Cu. Ft. | READING NEPTUNE Gal. | ELLAPSED TIME minutes | USAGE Gal. | AVERAGE RATE GPM | COMMENTS |
|---|---|---|---|---|---|---|---|
| Mon. Nov. 7 | 12:50 P | 126,670 | 1560,400 | | | | |
| Tue. Nov. 8 | 1:25 P | 127,200 | 1577,500 | 1475 | 21,064 | 14.3 | lawn sprinkling |
| Wed. Nov. 9 | 1:10 P | 127,700 | 1594,250 | 1425 | 20,490 | 14.4 | lawn sprinkling |
| Thur. Nov. 10 | 11:00 A | 128,387 ? | 1612,380 ? | 1310 | 23,269 | 17.8 | lawn sprinkling |
| " " | 11:13 A | 128,387 ? | 1612,930 ? | 13 | 550 | 42.3 | lawn sprinkling |
| " " | 1:35 P | 128,600 ? | 1613,700 ? | 142 | 2363 | 16.7 | (one or more errors in basic data for Thur. Nov. 10) |
| Fri. Nov. 11 | 1:15 P | 131,620 | 1626,000 | 1420 | 34,840 | 24.8 | hosing grounds to erase scars |
| Sat. Nov. 12 | 8:42 A | 131,622 | 1637,540 | 1167 | 11,555 | 9.9 | |
| " " | 12:45 P | 131,620 (sic) | 1642,400 | 243 | 4875 | 20.0 | |
| " " | 4:54 P | 131,620 | 1645,170 | 249 | 2785 | 11.2 | |
| " " | 8:48 P | 131,638 | 1648,280 | 234 | 3125 | 13.3 | |
| Sun. Nov. 13 | 6:55 A | 131,630 | 1650,000 | 607 | 1735 | 2.9 | |
| " " | 12:03 P | 131,633 | 1654,700 | 308 | 4722 | 15.3 | |
| " " | 6:47 P | 131,634 | 1655,510 | 404 | 817 | 2.0 | |
| Mon. Nov. 14 | 8:40 A | 131,740 | 1657,390 | 833 | 1673 | 3.2 | patio sprinkling before 8 AM 11/14 |
| " " | 12:55 P | 131,740 | 1657,780 | 255 | 390 | 1.5 | |
| Tue. Nov. 15 | 7:58 A | 131,740 | 1658,550 | 1143 | 770 | 0.7 | |
| " " | 1:10 P | 132,320 | 1661,100 | 312 | 2885 | 22.1 | |
| " " | 9:06 P | 132,321 | 1662,070 | 476 | 977 | 2.1 | |
| Wed. Nov. 16 | 8:13 A | 132,321 | 1662,530 | 667 | 460 | 0.7 | |
| " " | 12:46 P | 132,820 | 1663,900 | 272 | 5103 | 18.8 | |
| Thur. Nov. 17 | 7:39 A | 132,849 | 1666,230 | 1134 | 2547 | 2.2 | |
| " " | 8:05 A | 132,850 | 1666,550 | 26 | 327 | 12.6 | |
| " " | 9:03 A | 133,900 | 1667,280 | 58 | 8584 | 148.0 | lawn sprinkling Thur A.M. (irrigation lines open as test) Thur. P.M. |
| Fri. Nov. 18 | 8:10 A | 141,040 | 1692,750 | 1387 | 78,877 | 56.9 | |
| Sat. Nov. 19 | 8:05 A | 141,660 | 1694,800 | 1435 | 6688 | 4.7 | |
| Sun. Nov. 20 | 8:10 A | 141,660 | 1696,200 | 1445 | 1400 | 1.0 | |
| Σ ellapsed time = 18,440 min | | 14,990 cf = 112,125 g | 135,800 | 18,440 | 247,921 | | |

Appendix B-4

# METERED WATER USAGE

Sheet 1 of 2

| LOCATION | | | METER | | | |
|---|---|---|---|---|---|---|
| Park | Area | Meter Location | Size | Make | Serial No. | Units |
| DEATH VALLEY | Furnace Cr. | Visitor Center Museum Mech. Rm. | 1"/8" | Hersey | 3448213 | gpm |

| DATE 1960 | TIME | READING gallons | RATE AT READING | ELLAPSED TIME minutes | USAGE gallons | AVERAGE RATE gpm | COMMENTS |
|---|---|---|---|---|---|---|---|
| Fri. Nov. 11 | 9:11 A | 2235128 | | | | | Meter installed (reverse rdg.) |
| | 9:32 | 35067 | | 21 | 61 | 2.9 | 1st day of 49er Encampment |
| | 9:42 | 35 020 | | 10 | 47 | 4.7 | |
| | 10:00 | 34 927 | | 18 | 93 | 5.2 | |
| | 10 30 | 34 644 | | 30 | 283 | 9.4 | Restroom use 10:00 to 10:30 81 men - 27 women 288/48 = 5.9 g. |
| | 11:35 | 34 327 | | 65 | 317 | 4.9 | audio-visual show each ½ hr. |
| | 12:00 | 34 109 | | 25 | 218 | 8.7 | |
| | 1:00 P | 33 762 | | 60 | 347 | 5.8 | Cooling tower on intermittantly during afternoon |
| | 2:00 | 33 294 | | 60 | 468 | 7.8 | |
| | 3:06 | 32 253 | | 66 | 1041 | 15.8 | irrigation of front lawn inside wall using garden hose with sprinkler |
| | 4:04 | 31 784 | | 58 | 469 | 8.1 | |
| | 5:12 P | 31 310 | | 68 | 474 | 6.9 | busy - art show in patio |
| Sat. Nov. 12 | 7:34 A | 29 332 | | 862 | 1978 | 2.3 | quiet - not many visitors |
| | 8:55 | 28600 | | 81 | 732 | 9.0 | rest rooms open overnite |
| | 9:43 | 27 930 | | 48 | 670 | 14.0 | |
| | 9:49 | 27 770 | | 6 | 160 | 26.7 | Crowd gathering |
| | 10:25 | 27 286 | | 36 | 484 | 13.4 | Dedication Ceremony start 10 A |
| | 10:46 | 26 766 | | 21 | 520 | 24.8 | Speeches & band playing estimate 1600 people in patio & audit. |
| | 11:20 | 26 200 | | 34 | 566 | 16.6 | |
| | 11:25 | 26 076 | | 5 | 124 | 24.8 | end of dedication 11:20 A |
| | 11:32 A | 25 880 | | 7 | 196 | 28.0 | Rate of use for 10 second periods varied from 16 to 60 gpm from 11:20 to 11:26 (16 & 60 gpm for 5 sec) |
| | 1:59 P | 24 320 | | 147 | 1560 | 10.6 | Restroom use 11:27 to 11:31 10 men & 10 women (16 x 24.8) ÷ 20 = 5 gal. per person |
| | 4:07 | 23 382 | | 128 | 938 | 7.3 | strong wind start about 1 PM |
| | 5:18 | 22 330 | | 71 | 1052 | 14.8 | |
| | 7:20 | 21 000 | | 122 | 1330 | 10.9 | Cooling tower on intermittently |
| | 8:19 | 20 430 | | 59 | 580 | 9.8 | Kodachrome show start at 7:20 end at 8:19 |
| | 8:31 | 20 265 | | 12 | 155 | 12.9 | Singing program in audit. to 9:05 |
| | 9:18 | 19 457 | | 47 | 808 | 17.2 | |
| | 9:25 P | | | | | | 30-50 people still in bldg. Visitor Center closed at 9:30 P rest rooms remain open |
| Sun. Nov. 13 | 7:23 A | 18,914 | | 605 | 543 | 0.9 | |
| | 7:45 | 18 807 | | 22 | 107 | 4.9 | Catholic mass in progress in audit. about 150 people in congregation |
| | 7:49 | 18 749 | | 4 | 58 | 14.5 | mass over at 7:45 |
| | 11:53 | 16 524 | | 244 | 1225 | 5.0 | crowd dispersed |
| | 12:59 P | 16 252 | | 66 | 272 | 4.1 | |
| | 6:04 P | 15 570 | | 305 | 682 | 2.2 | last day of 49er Encamp. |
| Mon, Nov 14 | 9:24 A | 14 439 | | 920 | 1131 | 1.2 | Museum closed - rest rooms open |
| | 1:13 P | 14 251 | | 229 | 188 | 0.8 | evening lecture in audit 7:30-9 |
| | 3:15 P | 14 111 | | 122 | 140 | 1.1 | Museum open 7:30 A to 5:30 P Illustrated taped lecture every hour |
| Tue, Nov 15 | 7:42 A | 13 850 | | 987 | 261 | 0.26 | Naturalist lecture 1:30 P - 9:00 P |

# METERED WATER USAGE

Sheet 2 of 2

| LOCATION | | | METER | | | |
|---|---|---|---|---|---|---|
| Park | Area | Meter Location | Size | Make | Serial No. | Units |
| | | | | | 3448213 | |

| DATE 1960 | TIME | READING gal | RATE AT READING | ELLAPSED TIME minutes | USAGE gallons | AVERAGE RATE gpm | COMMENTS |
|---|---|---|---|---|---|---|---|
| Tue, Nov 15 | 7:42A | 2 213,850 | | | | | Museum open 7:30A - 5:30P |
| | 2:80P | 13,515 | | 398 | 335 | 0.84 | |
| | 7:30 | 13,248 | | 310 | 267 | 0.86 | |
| | 8:47P | 13,177 | | 77 | 71 | 0.92 | Evening lecture 7:30P - 8:17P |
| Wed. Nov 16 | 8:00A | 13,170 | | 673 | 7 | 0.01 | 190 people at lecture<br>11 - 13 people used restroom after lecture |
| Thur Nov 17 | 7:30A | 12,488 | | 1410 | 682 | 0.48 | |
| " " | 9:35A | 12,460 | | 125 | 28 | 0.22 | |
| Fri. Nov 18 | 7:50A | 12,125 | | 1335 | 335 | 0.25 | |

Appendix B-5

# METERED WATER USAGE

Sheet 1 of 1

| LOCATION | | | METER | | | |
|---|---|---|---|---|---|---|
| Park: Death Valley | Area: Furnace Creek | Meter Location: Administration Bldg. Mechanical Room | Size: 1" | Make: Neptune | Serial No.: 14981045 | Units: gallons |

| DATE 1960 | TIME | READING gallons | RATE AT READING | ELLAPSED TIME minutes | USAGE gallons | AVERAGE RATE gpm | COMMENTS |
|---|---|---|---|---|---|---|---|
| Mon, Nov 14 | 11:00A | 0 | | | | | Meter installed at 11 AM |
| " " | 11:11 | 8 | | 11 | 8 | 0.73 | |
| " " | 11:14 | 52 | | 4 | 44 | 11.0 | test - flushed toilet 10 times in 1m 30s 42.5/1.5 = 28 gpm |
| " " | 2:05P | 95 | | 171 | 43 | 0.25 | |
| " " | 3:49P | 109 | | 104 | 14 | 0.13 | total use Nov. 14 - 17 480 - 43 = 437 gal in 2d 20h 27m = 2.86 day Average use = 153 gpd |
| Tue, Nov 15 | 7:40A | 179 | | 951 | 70 | 0.07 | |
| " " | 2:17P | 250 | | 397 | 71 | 0.18 | |
| Wed. Nov 16 | 8:03A | 337 | | 1066 | 87 | 0.08 | |
| Thur. Nov 17 | 7:27A | 480 | | 1404 | 143 | 0.10 | |
| " " | 9:30A | 500 | | 123 | 20 | 0.16 | |
| Fri. Nov 18 | 7:55A | 670 | | 1345 | 70 | 0.05 | hose bibb opened - drain water into sewer to keep stabilization pond full |
| Sat. Nov 19 | 7:48A | 745 | | 1433 | 175 | 0.12 | |

Appendix C

# DAILY WATER USE - MIDNIGHT to MIDNIGHT

## CALCULATIONS CONVERTING METERED USE TO DAILY RATES

sheet 1 of 3

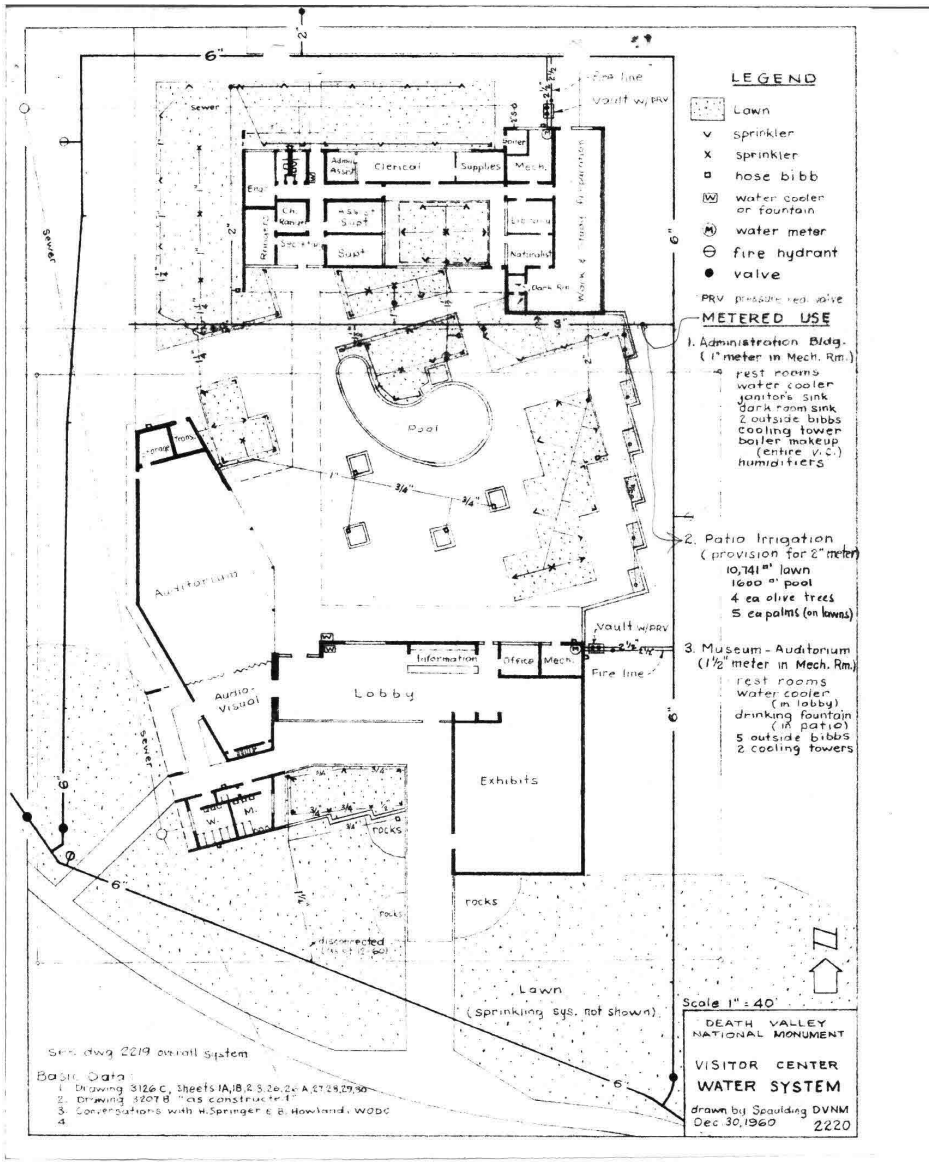
TEXAS SPRING DIVERSION - 2" Meter on 2½" line

| DATA from APPENDIX B | | | | | CONVERSION TO DAILY RATES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DATE 1960 | TIME | ELLAPSED TIME minutes | RECORDED USE gallons | AVG. RATE gpm | COMMENTS | ELLAPSED TIME minutes | EST. RATE gpm | QUANTITY for Period gal. | QUANTITY for Day gal. | DAY |
| Mon. Nov 7 | 1:20 P | | | | | | | | | |
| Tue, Nov 8 | midnight | 1456 | 33,000 | 22.7 | | 640 | 22.2 | 14,200 | | |
| " " | 1:36 P | | | | | 816 | 23 | 18,800 | 32,600 | Tue, Nov 8 |
| Wed, Nov 9 | midnight | 1426 | 32,300 | 22.6 | (32,000-18,500) | 624 | 22.1 | 13,800 | | |
| " " | 1:22 P | | | | | 802 | 23 | 18,500 | 32,600 | Wed, Nov 9 |
| Thur, Nov 10 | midnight | 1463 | 34,700 | 23.7 | (34,700-20,600) | 638 | 22.1 | 14,100 | | |
| " " | 1:45 P | | | | | 825 | 25 | 20,600 | 34,700 | Thur, Nov 10 |
| Fri, Nov 11 | midnight | 1420 | 35,000 | 24.6 | (35,000-23,900) | 615 | 23.9 | 14,100 | | |
| " " | 1:25 P | | | | | 805 | 26 | 20,900 | 37,100 | Fri, Nov 11 |
| Sat. Nov 12 | midnight | 1125 | 29,900 | 26.6 | (29,900-13,700) | 635 | 25.5 | 16,200 | | |
| " " | 8:10 A | | | | | 490 | 28 | 13,700 | | |
| " " | 9:03 P | 773 | 22,600 | | | 773 | | 22,600 | 40,230 | Sat, Nov 12 |
| Sun, Nov 13 | midnight | 607 | 13,500 | 22.3 | | 177 | 22.3 | 3930 | | |
| " " | 7:10 A | | | | | 430 | 22.3 | 9570 | | |
| " " | 7:02 P | 712 | 19,860 | | | 712 | | 19,860 | 36,070 | Sun, Nov 13 |
| Mon, Nov 14 | midnight | 838 | 18,640 | 22.3 | | 298 | 22.3 | 6640 | | |
| " " | 9:00 A | | | | | 540 | 22.3 | 12,000 | | |
| " " | 1:13 P | 253 | 6320 | 25.0 | | 253 | | 6320 | 32,820 | Mon, Nov 14 |
| Tue, Nov 15 | midnight | 1136 | 25,470 | 22.4 | | 647 | 22.4 | 14,500 | | |
| " " | 8:09 A | | | | | 489 | 22.4 | 10,970 | | |
| " " | 9:16 P | 787 | 17,740 | | | 787 | | 17,740 | 32,090 | Tue, Nov 15 |
| Wed, Nov 16 | midnight | 667 | 13,750 | 20.6 | | 164 | 20.6 | 3380 | | |
| " " | 8:28 A | | | | | 503 | 20.6 | 10,370 | 31,370 | Wed, Nov 16 |
| Thur, Nov 17 | midnight | 1406 | 31,520 | 22.4 | | 937 | 22.4 | 21,000 | | |
| " " | 7:49 A | | | | | 469 | 22.4 | 10,520 | | |
| | 2:58 P | 429 | 8480 | | | 429 | | 8480 | 31,130 | Thur, Nov 17 |
| Fri, Nov 18 | midnight | 1047 | 23,420 | 22.4 | | 542 | 22.4 | 12,130 | | |
| " " | 8:25 A | | | | | 505 | 22.4 | 11,290 | | |
| TOTAL | | 15,545 | 366,200 | 23.6 | | 15,545 | | 366,200 | 340,710 | |
| CHANGES IN RESERVOIR STORAGE | | | | | | | | | | |
| | | | Change, g. | | | | | | | |
| Mon, Nov 7 | 1:00 P | | | | | | | | | |
| Tue, Nov 8 | midnight | 1472 | + 5200 | + 3.5 | | 660 | + 3.5 | + 2400 | | |
| " " | 1:32 P | | | | | 812 | + 3.5 | + 2800 | + 5100 | Tue, Nov 8 |
| Wed Nov 9 | midnight | 1423 | + 5200 | + 3.7 | | 628 | + 3.7 | + 2300 | | |
| " " | 1:15 P | | | | | 795 | + 3.7 | + 2900 | even | Wed Nov 9 |
| Thur Nov 10 | midnight | 1330 | - 7800 | - 5.9 | (possible error) use was heavier Thur AM than Wed PM | 645 | - 4.9 | - 2900 | | |
| " " | 11:25 A | | | | | 685 | - 7.2 | - 4900 | | |
| " " | 1:40 P | 135 | + 5200 | +38.5? | impossible rate error in data | 135 | + 38.5 | + 5200 | -16,800 | Thur, Nov 10 |
| Fri, Nov 11 | midnight | 1420 | - 13,000 | - 9.2 | See Fri. A.M. heavy use (3,000-3600) | 620 | - 26.8 | -16,600 | | |

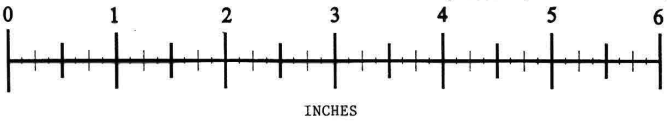
| DATA from APPENDIX B | | | | | CONVERSION TO DAILY RATES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DATE | TIME | ELLAPSED TIME minutes | RECORDED USE gallons | AVG. RATE gpm | COMMENTS | ELLAPSED TIME minutes | EST. RATE gpm | QUANTITY for Period gal. | QUANTITY for Daily gal. | DAY |
| CHANGE IN STORAGE (cont.) | | | | | | | | | | |
| Fri, Nov 11 | midnight | | | | | | | | | |
| " " | 1:20 P | | | | (est. 1 hr loss @ 150 gpm | | | | | |
| | | | | | " 740 min gain 17 | 800 | - see note | + 3600 | | |
| | | | | | net gain 12600 - 9000 | | | | +7600 | Fri. Nov 11 |
| | | | | | (10,400 - 6400) | 640 | (+6.3) | + 4000 | | |
| Sat. Nov 12 | midnight | 1174 | +10,400 | + 8.9 | (domestic use only | 534 | + 12 | + 6400 | | |
| " " | 8:54 A | | | | est 8 gpm, net gain | | | | | |
| | | 721 | +1040 | | gain to tank = 20-8 | 721 | | + 1040 | +10,740 | Sat. Nov 12 |
| " " | 8:55 P | | | | | 185 | + 17.9 | + 3300 | | |
| Sun. Nov 13 | midnight | 610 | +10,900 | + 17.9 | | 425 | + 17.9 | + 7600 | | |
| | 7:05 A | | | | | | | | | |
| | | 711 | +3640 | | | 711 | | + 3640 | +16,710 | Sun Nov 13 |
| | 6:56 P | | | | assumed rate | 304 | + 10 | + 5470 | | |
| Mon. Nov 14 | midnight | 834 | +6240 | + 7.5 | (Sprinkling before | 530 | - see | + 770 | | |
| " " | 8:50 A | | | | 8 AM (6240 - 5470) | | | | | |
| | | 255 | + 9360 | | | 255 | | + 9360 | +21,050 | Mon Nov 14 |
| " " | 1:05 P | | | | | 655 | + 16.7 | +10,920 | | |
| Tue. Nov 15 | midnight | 1139 | +18,990 | + 16.7 | | 484 | + 16.7 | + 8,070 | | |
| " " | 8:04 A | | | | | | | | | |
| | | 788 | + 8580 | | | 788 | | + 8580 | +18,880 | Tue Nov 15 |
| " " | 9:12 P | | | | | 168 | + 13.3 | + 2230 | | |
| Wed. Nov 16 | midnight | 666 | + 8830 | + 13.3 | | 498 | + 13.3 | + 6600 | | |
| " " | 8:18 A | | | | | | | | | |
| | | 272 | even | | | 272 | - | even | +16,570 | Wed Nov 16 |
| " " | 12:50 P | | | | | 670 | + 14.9 | + 9970 | | |
| Thur. Nov 17 | midnight | 1135 | +16,900 | + 14.9 | | 465 | + 14.9 | + 6930 | | |
| " " | 7:45 A | | | | | | | | | |
| | | 217 | - 9,100 | - 60.5 | | 217 | - 60.5 | - 9100 | - 29,170 | Thur Nov 17 |
| " " | 11:22 A | | | | irr. opened 2 PM | 758 | see note | -27,000 | | |
| Fri, Nov 18 | midnight | 1253 | - 49,400 | - 39.4 | Soy 6co @ 46.1 gpm | | | | | |
| " " | 8:15 A | | | | est 49,400 gal in 1095 minutes | 495 | - 45.1 | - 22,400 | | |
| | | 15,555 | +31,180 | | | 15,555 | | +31,180 | +51,180 | |
| FLOW THRU METERS IN VAULT | | | | | ON 6" Main | | 4" Sparling & 1½ Neptune | | | |
| Mon Nov 7 | 12:50 P | | | | | | | | | |
| Tue Nov 8 | midnight | 1475 | 21,064 | 14.3 | | 670 | 14.3 | 9607 | | |
| " " | 1:25 P | | | | | 805 | 14.3 | 11457 | 20,500 | Tue Nov 8 |
| Wed Nov 9 | midnight | 1425 | 20,490 | 14.4 | | 635 | 14.4 | 9043 | | |
| " " | 1:10 P | | | | | 790 | 14.4 | 11,447 | 23,000 | Wed Nov 9 |
| Thur, Nov 10 | midnight | 1310 | 23,269 | 17.8 | basic data contains | 650 | 17.8 | 11,553 | | |
| " " | 11:00 A | | | | unrecovered error | 660 | 17.8 | 11,716 | | |
| | | 155 | 2913 | 18.8 | (sum of 22 gpm | | | | | |
| " " | 1:35 P | | | | plus 5.9 from Storage ÷ 17.8) | 155 | 18.8 | 2913 | 40,800 | Thur Nov 10 |
| Fri, Nov 11 | midnight | 1420 | 34,890 | 24.8 | est 3 hrs heavy use Thur. PM (3/6 of 34,890) | 625 | (41.8) | 26,171 | | |
| " " | 1:15 P | | | | est 1 hr heavy use Fri. AM (1/6 of 34,890) | 795 | (11.0) | 8719 | 16,100 | Fri Nov 11 |
| Sat. Nov 12 | midnight | 1167 | 11,555 | 9.9 | net 11,555 - 4174 | 645 | (11.4) | 7381 | | |
| " " | 8:42 A | | | | see storage calc. | 522 | 8.0 | 4174 | | |
| | | 726 | 10,785 | 1.5 | est domestic 8 gpm | | | | | |
| " " | 8:48 P | | | | | 726 | 1.5 | 10,785 | 15,510 | Sat Nov 12 |
| Sun. Nov 13 | midnight | 607 | 1735 | 2.9 | | 192 | 2.9 | 551 | | |
| " " | 6:55 A | | | | | 415 | 2.9 | 1184 | | |
| | | 712 | 5539 | 7.8 | | 712 | 7.8 | 5539 | 7023 | Sun Nov 13 |
| " " | 6:47 P | | | | see Mon A.M. | | | | | |
| Mon Nov 14 | midnight | 833 | 2673 | 3.2 | est. domestic @ 1 gpm | 313 | 1.0 | 300 | | |

| DATA from APPENDIX B | | | | | CONVERSION TO DAILY RATES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DATE | TIME | ELLAPSED TIME minutes | RECORDED USE Gallons | AVG. RATE gpm | COMMENTS | ELLAPSED TIME minutes | EST. RATE gpm | QUANTITY for PERIOD gallons | QUANTITY for DAY gallons | DAY |
| FLOW | THRU | METERS IN | | VAULT | ON 6" MAIN (cont.) | | | | | |
| Mon. Nov 14 | midnight | See previous Sheet | | | Sprinkling before 8AM (2673 - 300) see Sun B | 520 | see (4.6) | 2373 | | |
| " " | 8:40A | 255 | 390 | 1.5 | | 255 | 1.5 | 390 | 3211 | Mon Nov 14 |
| " | 12:55P | | | | | 665 | 0.7 | 448 | | |
| Tue, Nov 15 | midnight | 1143 | 770 | 0.7 | | 478 | 0.7 | 322 | | |
| | 7:58A | 788 | 7862 | 10.0 | | 788 | 10.0 | 7862 | 8304 | Tue Nov 15 |
| | 9:06P | | | | | 174 | 0.7 | 120 | | |
| Wed. Nov 16 | midnight | 667 | 460 | 0.7 | | 493 | 0.7 | 340 | | |
| | 8:13A | 272 | 5103 | 18.8 | | 272 | 18.8 | 5103 | 7610 | Wed Nov 16 |
| | 12:45P | | | | | | | | | |
| Thur. Nov 17 | midnight | 1134 | 2547 | 2.2 | (2547 - 380) see Thur A | 675 | see note (3.2) | 2167 | | |
| | 7:39A | 84 | 8911 | 104 | assumed rate | 459 | (0.6) | 380 | | |
| | 9:03A | | | | | 84 | 104 | 8911 | 54,061 | Thur Nov 17 |
| Fri Nov 18 | midnight | 1387 | 78,877 | 56.9 | irr. times opened & est. 697 m @ 10 gpm plus 690 m @ 88.8 " | 897 | see (48.8) | 44,770 | | |
| " " | 8:10A | | | | (18,077 - 2970) in 1090 m | 490 | see (69.6) | 34,107 | | |
| | | 15,560 | 239,833 | | | 15,560 | | 239,833 | 196,119 | |
| VISITOR CENTER - EXHIBIT | | | | | - AUDITORIUM 1½" Hersey Meter Appendix B- | | | | | |
| Fri, Nov 11 | midnight | | | | est. rate | 551 | (1.5) | 827 | | |
| " " | 9:11A | 481 | 3818 | 7.9 | | 481 | 7.9 | 3818 | 6169 | Fri, Nov 11 |
| " " | 5:12P | | | | (1978 - 454) see Sat A | 408 | (3.7) | 1524 | | |
| Sat. Nov 12 | midnight | 862 | 1978 | 2.3 | est 454 m @ 1.0 | 454 | (1.0) | 454 | | |
| " " | 7:34A | 824 | 9875 | 12.0 | | 824 | 12.0 | 9875 | 10,474 | Sat Nov 12 |
| " " | 9:18P | | | | | 162 | 0.9 | 145 | | |
| Sun, Nov 13 | midnight | 605 | 543 | 0.9 | | 443 | 0.9 | 398 | | |
| " " | 7:23A | 641 | 3344 | 5.2 | | 641 | 5.2 | 3344 | 4180 | Sun Nov 13 |
| " " | 6:04P | | | | | 356 | 1.2 | 438 | | |
| Mon, Nov 14 | midnight | 920 | 1131 | 1.2 | | 564 | 1.2 | 693 | | |
| | 9:24A | 351 | 328 | 0.9 | | 351 | 0.9 | 328 | 1160 | Mon Nov 14 |
| | 3:15P | | | | | 525 | 0.26 | 139 | | |
| Tue, Nov 15 | midnight | 987 | 261 | 0.26 | | 462 | 0.26 | 122 | | |
| " " | 7:42A | 785 | 673 | 0.85 | | 785 | 0.85 | 673 | 797 | Tue Nov 15 |
| " " | 8:47P | | | | | 193 | 0.01 | 2 | | |
| Wed. Nov 16 | midnight | 673 | 7 | 0.01 | | 480 | 0.01 | 5 | | |
| " " | 8:00A | | | | | | | | 682 | Wed Nov 16 |
| Thur Nov 17 | midnight | 1410 | 682 | 0.48 | (682 - 5) | 960 | see (0.7) | 677 | | |
| " " | 7:30A | 125 | 28 | 0.22 | est 450 m @ .01 | 450 | (0.01) | 5 | | |
| " " | 9:35A | | | | | 125 | 0.22 | 28 | 363 | Thur Nov 17 |
| Fri Nov 18 | midnight | 1335 | 335 | 0.25 | (835 - 5) | 865 | see (0.38) | 330 | | |
| " " | 7:50A | | | | est. rate | 470 | (0.01) | 5 | | |
| Σ | | 9999 | 23,003 | 2.3 | | 10,550 | | 23,830 | 23,825 | |

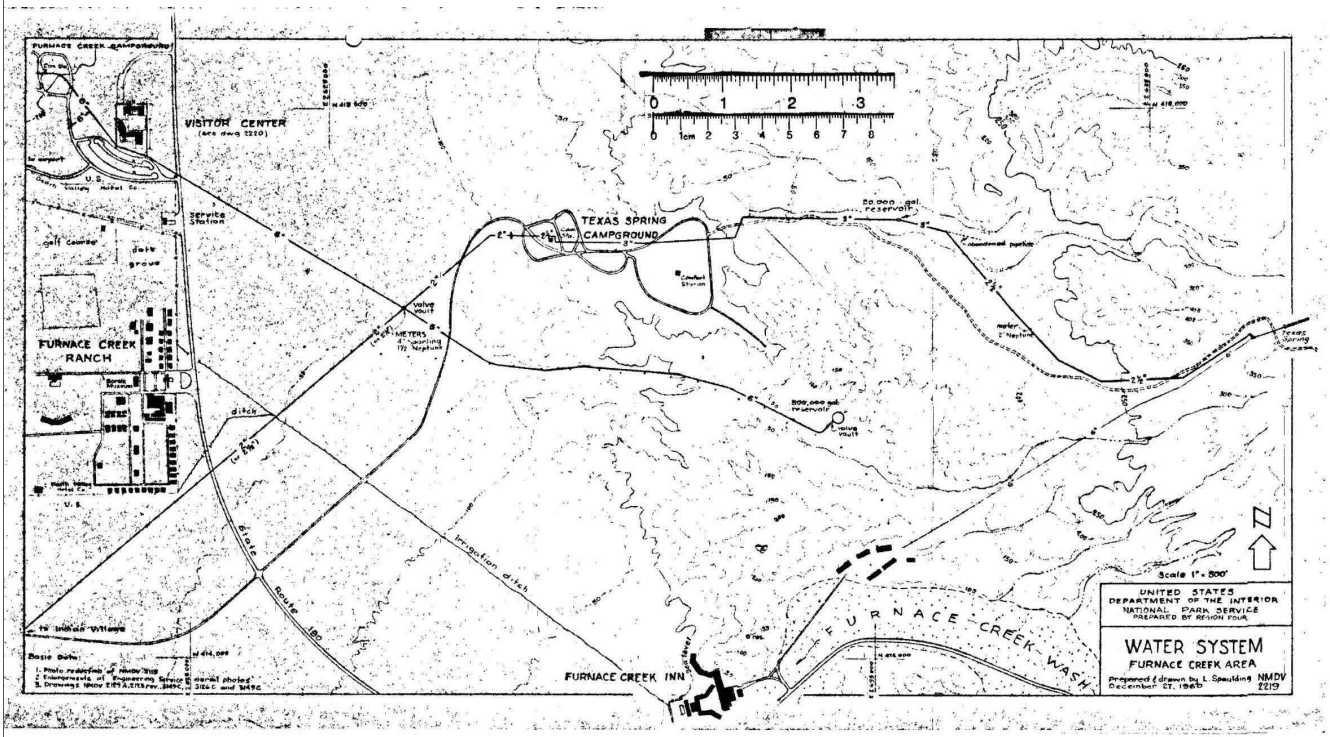
11-00-1960: map; november, 1960




Scale Made July 1998 (Not Part of Image)



00-00-0000: water system - furnace creek area



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

August 22, 1960

IN REPLY REFER TO:
L 54

Spaulding
Whitworth
BFM.
(later)

Memorandum

To: Acting Regional Chief of Operations, Region Four

From: Hydraulic Engineer Spaulding, Region Four

Subject: Water Use, Furnace Creek Area, Death Valley National Monument

Herewith is my estimate future water needs of National Park Service and Hotel Company facilities at Furnace Creek.

The needs are as follows:

FILE COPY

| | Water Consumption, Gallons per Minute | | | |
|---|---|---|---|---|
| | 1960 | 1966 | 1970 | 1980 |
| National Park Service | 41 | 230 | 285 | 383 |
| Death Valley Hotel Co. | 1640 | 2110 | 2190 | 2350 |

The above quantities are derived from Tables I, II, III and IV, which are attached. Also attached are a table of previous calculation, and a print of drawing NMDV 2215, Furnace Creek Visitor Center - - Irrigation showing vegetation included in irrigation calculations.

Water consumption for 1960 has been estimated as follows:

Irrigation - Present vegetation at Visitor Center
(3.2 acres requiring 31.6 Acre feet per year)
Summer rate will be twice annual average or

$$2X \frac{31.6}{12} = 5.27 \text{ A.F. per month} = 39.6 \text{ gpm}$$

Domestic use - Visitor Center (not complete for all of 1960)
(Office staff, air conditioning, janitorial and reduced summer visitation) = 1.4

Rate during May, June, July and August =41 gpm

Rate during rest of year will be less. Rate during peak visitation month of March, 1961 probably will be about 14 gallons per minute domestic use and about 20 gallons per minute for irrigation of present vegetation for a total of 34 gallons per minute.

Basic data for this estimate has been submitted by separate memoranda as follows:

1. Analysis of water use, Oasis Headquarters, Joshua Tree National Monument, August 18, 1960 (D 5039).

2. Memorandum of August 19, Spaulding to Regional Chief of Operations, Subject "Travel Analysis, Death Valley National Monument, (A 88).

Hydraulic Engineer

Attachments (6)

Copy to: Director (w/attachments)
Supt., Death Valley (w/attachments)
Chief, WODC (2)(w/attachments)
Chief, Water Resources Section (w/attachmets)

CLEARED FOR DISTRIBUTION:

Regional Director 8/25/60 Date

bc: Maier

LSSpaulding:lq

TABLE I

NATIONAL PARK SERVICE — IRRIGATION - MISSION 66 DEVELOPMENT

| Item | Area Sq.Ft. | Density per cent | Area Acres | Annual Rate Acre ft. per acre | Acre Ft. per year |
|---|---|---|---|---|---|
| **VISITOR CENTER** | | | | | |
| **Existing Vegetation:** | | | | | |
| Lawn | 12,600 | 100 | .289 | 12 | 2.45 |
| Mesquite | 67,080 | 100 | 1.540 | 10 | 15.40 |
| Athel | 37,600 | 100 | .863 | 10 | 8.63 |
| Date Palm | 9,680 | 100 | .222 | 10 | 2.22 |
| Other | 10,745 | 100 | .247 | 8 | 2.47 |
| Pool | 1,580 | 100 | .036 | 12 | 0.43 |
| Total Existing | | | 3,197 | | 31.60 |
| **Proposed Additional Vegetation:** | | | | | |
| Lawn | 20,000 | 100 | .460 | 12 | 5.52 |
| Trees & Shrubs | 96,000 | 50 | 1.100 | 10 | 11.00 |
| Pond | 3,200 | 100 | .073 | 12 | 0.88 |
| Total Proposed | | | 1.633 | | 17.40 |
| Visitor Center total | | | 4,830 | | 49.00 |
| **Furnace Creek Campground** | | | | | |
| Trees and Shrubs | 1,500,000 | 25 | 8.70 | 10 | 87.0 |
| **Texas Spring Campground** | | | | | |
| Trees and Shrubs | 1,500,000 | 10 | 3.40 | 10 | 34.0 |
| ~~Furnace Creek Residential~~ | ~~75,000~~ | ~~25~~ | ~~0.43~~ fss 1/24/61 | | |
| Lawns, Trees, Shrubs | 75,000 | 25 | 0.43 | 10 | 4.30 |

TABLE I (Cont'd)

Indian Village - None

School (on Hotel Company System)

SUMMARY

| Location | Irrigated Area, Acres | Annual Rate AF per yr | GPM | cfs | Peak Rate GPM | cfs |
|---|---|---|---|---|---|---|
| Visitor Center | 4.83 | 49.0 | 30 | .068 | 61 | .136 |
| Furnace Creek Campground | 8.70 | 87.0 | 54 | .120 | 108 | .240 |
| Texas Spring Campground | 3.40 | 34.0 | 21 | .047 | 42 | .094 |
| Furnace Creek Residential Area | 4.30 0.43 | 4.3 | 3 | .006 | 5 | .012 |
| Indian Village | None | None | - | -- | - | -- |
| School | None | None | - | -- | - | -- |
| | 1/24/61 21.23 17.36 | 174.3 | 108 | .241 | 216 | .482 |
| Future Demand - 1970 (120% of 1966) | | | 130 | .290 | 259 | .579 |
| Future Demand - 1980 (160% of 1966) | | | 173 | .386 | 346 | .770 |

TABLE II

NATIONAL PARK SERVICE — DOMESTIC USE - MISSION 66
(Calculated for month of Peak Visitation (March)

| Visitor Center | Gallons per month | Avg.Gals. per day | GPM | cfs |
|---|---|---|---|---|
| Visitor Use 46,000 visits @ 2.5 gpd | 115,000 | 3,700 | 2.6 | .0057 |
| Office Staff 500 man-days @ 10 gpd | 5,000 | 160 | 0.1 | .0002 |
| Janitorial - cleaning restrooms & walks 300 gpd | 9,000 | 300 | 0.2 | .0005 |
| Air conditioning, average 5 hours per day @ 8 gpm | 74,000 | 2,400 | 1.7 | .0037 |
| Dust Laying | 3,100 | 100 | 0.1 | .0002 |
| Total Visitor Center | 206,100 | 6,660 | 4.7 | .0103 |
| **Campgrounds** | | | | |
| 25,000 camper days @ 25 gpd | 625,000 | 20,200 | 14.0 | .0313 |
| **Furnace Creek Residential Area** | | | | |
| 12 residents @ 200 gpd | 74,000 | 2,400 | 1.7 | .0037 |
| **Indian Village** | | | | |
| None | | | | |
| **School** | | | | |
| On Hotel Company System | | | | |
| Total Domestic Use - March, 1966 | 905,100 | 29,260 | 20.40 | .0453 |
| Predicted Use March, 1970 (130% of 1966) | | | 26 | .059 |
| Predicted Use March, 1980 (180% of 1966) | | | 37 | .073 |
| Average Use, 1966 (1/2 of March rate) | | | 10 | .023 |
| Average Use, 1970 (130% of 1966) | | | 13 | .030 |
| Average Use, 1980 (180% of 1966) | | | 19 | .042 |

## TABLE III

### DEATH VALLEY HOTEL COMPANY, IRRIGATION USE

(Areas of Ranch and Inn under irrigation in 1957 per colored prints of drawing NMDV 7100)

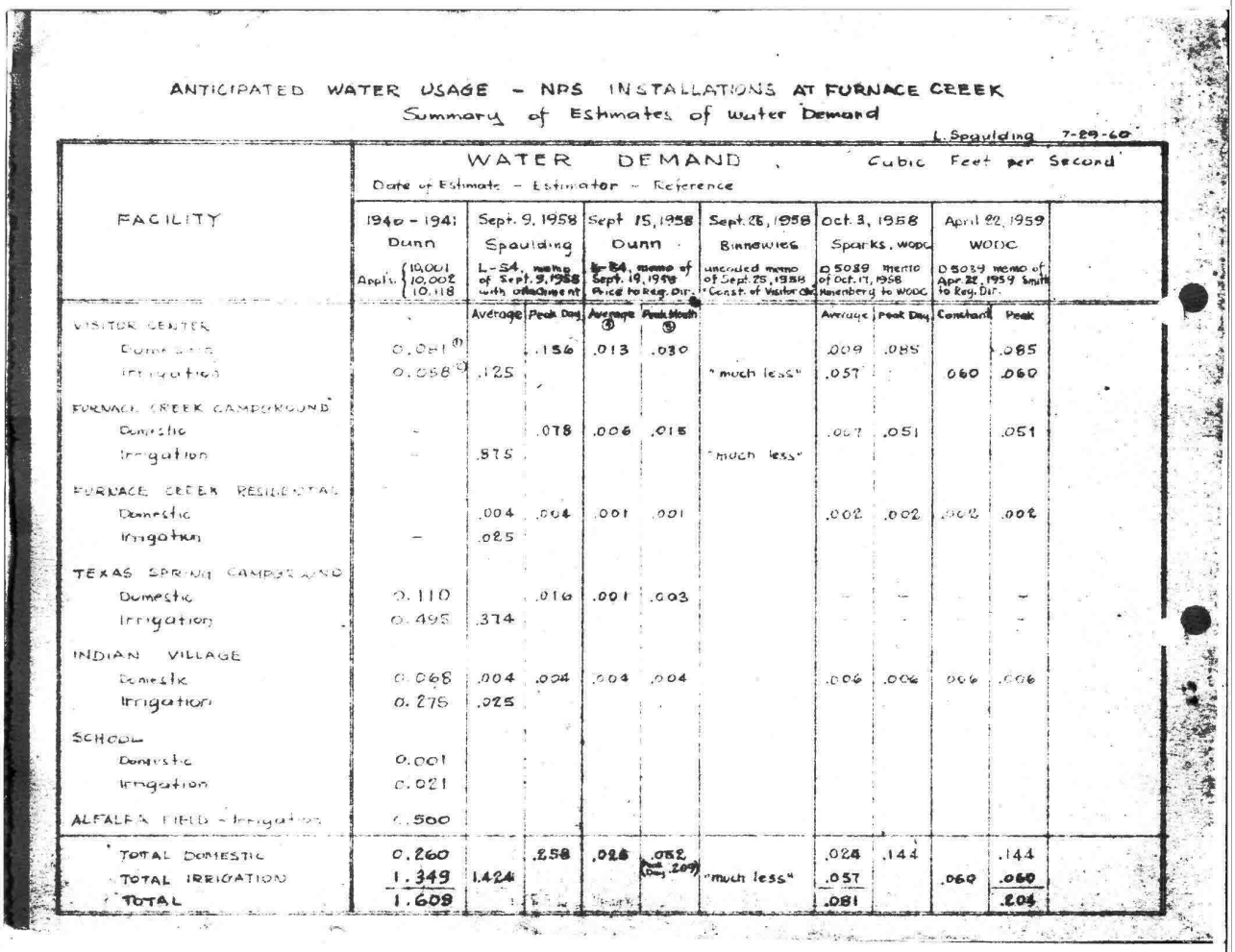
| Vegetation | Area at 100% density acres | Annual Consumption Acre Feet per acre | Annual Consumption Acre Feet per year | June Consumption (twice annual average cfs | June Consumption (twice annual average GPM |
|---|---|---|---|---|---|
| Date Palm | 28.96 | 10 | 290 | .802 | 359 |
| Bermuda Grass -Golf Course | 34.29 | 12 | 411 | 1.136 | 509 |
| Bermuda Grass - Pasture | 7.16 | 12 | 85 | .235 | 105 |
| Tamarisk - Groves | 9.68 | 10 | 97 | .268 | 119 |
| Tamarisk - Rows | 8.87 | 10 | 89 | .246 | 110 |
| Tamarisk and/or Mesquite scattered | 18.53 | 10 | 185 | .512 | 229 |
| Inn Garden, palm, oleander, grass | 1.41 | 12 | 17 | .047 | 21 |
| Field Crops, Alfalfa, corn | 4.09 | 12 | 49 | .135 | 60 |
| Ponds | 3.41 | 12 | 41 | .113 | 51 |
| | 116.40 | | 1264 | 3.494 | 1563 |
| Estimated 1960 use (105% of 1957) | | | 1328 | 3.67 | 1640 |
| Estimated 1966 use (golf course doubled in size) (135% of 1957) | | | 1710 | 4.72 | 2110 |
| Estimated 1970 use (140% of 1957) | | | 1770 | 4.89 | 2190 |
| Estimated 1980 use (150% of 1957) | | | 1900 | 5.25 | 2350 |

TABLE IV

DEATH VALLEY HOTEL COMPANY - DOMESTIC USE

| Year | Annual Occupancy Guest Days | Annual Use Gallons | Peak Month Use, March 290% of monthly average Gallons per month. | GPM | Cfs |
|---|---|---|---|---|---|
| 1960 | 70,000 @ 50 gpd | 3,500,000 | 850,000 | 19 | .043 |
| 1966 | 115,000 @ 50 gpd | 5,750,000 | 1,420,000 | 32 | .071 |
| 1970 | 127,000 @ 50 gpd | 6,350,000 | 1,560,000 | 35 | .078 |
| 1980 | 180,000 @ 50 gpd | 9,000,000 | 2,210,000 | 50 | .110 |

07-29-1960: anticipated water usage; july 29, 1960

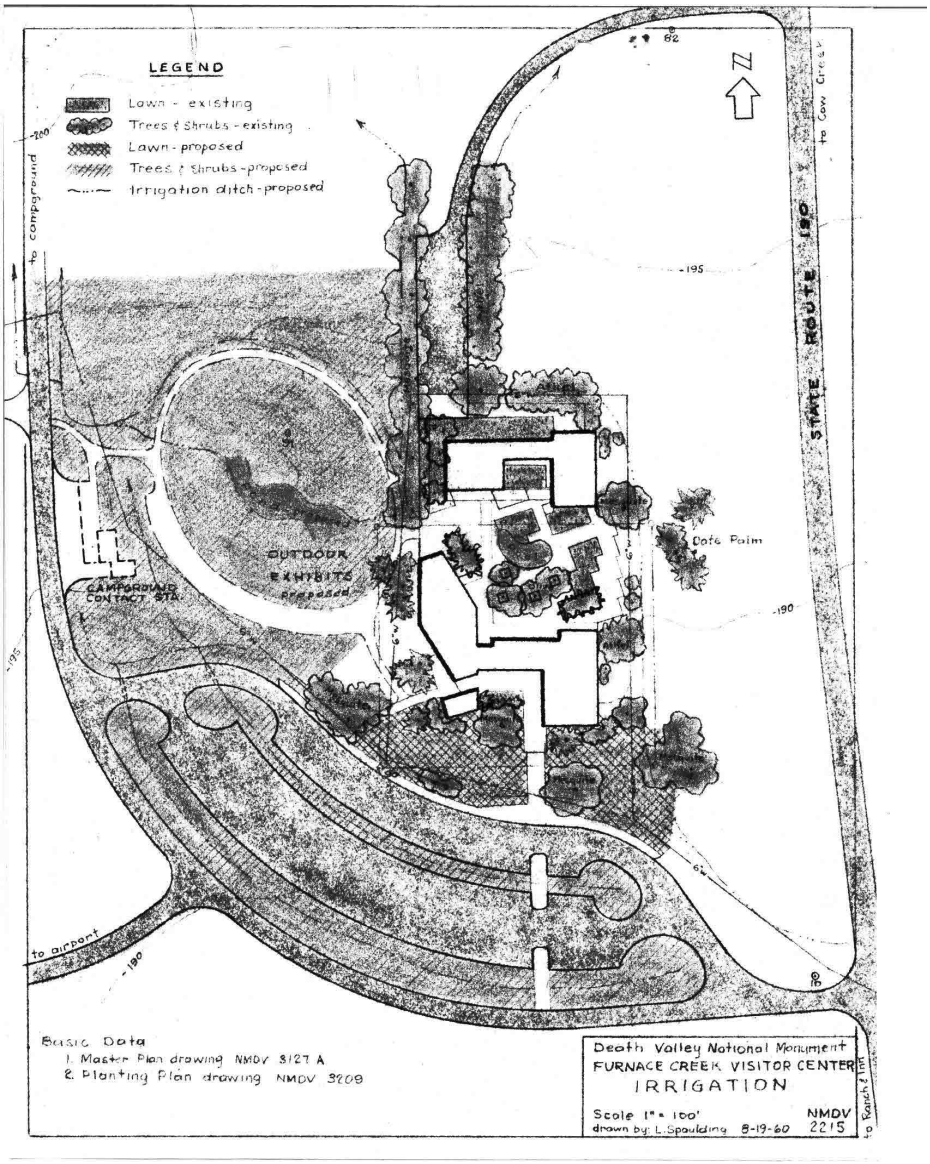


ANTICIPATED WATER USAGE - NPS INSTALLATIONS AT FURNACE CREEK
Summary of Estimates of Water Demand

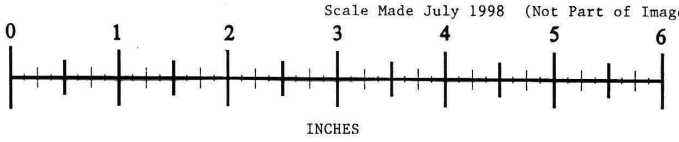
L. Spaulding 7-29-60

| FACILITY | WATER DEMAND, Cubic Feet per Second — Date of Estimate – Estimator – Reference | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1940 - 1941 Dunn Appls. {10,001 10,002 10,118 | Sept. 9, 1958 Spaulding L-54, memo of Sept. 9, 1958 with attachment | | Sept 15, 1958 Dunn L-54, memo of Sept. 19, 1958 Price to Reg. Dir. | | Sept. 25, 1958 Binnewies unsigned memo of Sept. 25, 1958 "Const. of Visitor Ctr." | Oct. 3, 1958 Sparks, WODC D 5039 Memo of Oct. 17, 1958 Hanenberg to WODC | | April 22, 1959 WODC D 5039 memo of Apr 22, 1959 Smith to Reg. Dir. | |
| | | Average | Peak Day | Average ④ | Peak Month ⑤ | | Average | Peak Day | Constant | Peak |
| VISITOR CENTER | | | | | | | | | | |
| Domestic | 0.081 ① | | .156 | .013 | .030 | | .009 | .085 | | .085 |
| Irrigation | 0.058 ② | .125 | | | | "much less" | .057 | | .060 | .060 |
| FURNACE CREEK CAMPGROUND | | | | | | | | | | |
| Domestic | - | | .078 | .006 | .015 | | .007 | .051 | | .051 |
| Irrigation | - | .875 | | | | "much less" | | | | |
| FURNACE CREEK RESIDENTIAL | | | | | | | | | | |
| Domestic | | .004 | .004 | .001 | .001 | | .002 | .002 | .002 | .002 |
| Irrigation | - | .025 | | | | | | | | |
| TEXAS SPRING CAMPGROUND | | | | | | | | | | |
| Domestic | 0.110 | | .016 | .001 | .003 | | - | - | | - |
| Irrigation | 0.495 | .374 | | | | | | | | |
| INDIAN VILLAGE | | | | | | | | | | |
| Domestic | 0.068 | .004 | .004 | .004 | .004 | | .006 | .006 | .006 | .006 |
| Irrigation | 0.275 | .025 | | | | | | | | |
| SCHOOL | | | | | | | | | | |
| Domestic | 0.001 | | | | | | | | | |
| Irrigation | 0.021 | | | | | | | | | |
| ALFALFA FIELD - Irrigation | 0.500 | | | | | | | | | |
| TOTAL DOMESTIC | 0.260 | | .258 | .026 | .052 (Peak Day .209) | | .024 | .144 | | .144 |
| TOTAL IRRIGATION | 1.349 | 1.424 | | | | "much less" | .057 | | .060 | .060 |
| TOTAL | 1.609 | | | | | | .081 | | | .204 |

08-19-1960: landscape map; august 19, 1960




Scale Made July 1998 (Not Part of Image)



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
August 19, 1960

IN REPLY REFER TO:
A88
Deva

~~Spaulding~~ LSS
~~Carpenter~~ JLC
~~Whitworth~~
~~Manbey~~ BFM
~~Wooky~~ JBW
~~Maier~~ Hen
~~Hyssong~~

Memorandum

To: Regional Chief of Operations, Region Four

From: Hydraulic Engineer Spaulding, Region Four

Subject: Travel Analysis, Death Valley National Monument

FILE COPY

Attached are tables and charts analyzing travel records of Death Valley National Monument and predicting future trends. The analysis was made to provide basic data for estimating present and future water needs at the Furnace Creek Visitor Center, but also will be useful for other purposes requiring travel data.

The attachments are:

1. Chart titled "Visitation Trends - Usage of Furnace Creek Facilities."

2. Drawing NMDV 2214, "Travel Analysis - Average Vehicular Travel, 1957-1959."

3. Tables I and II, Tabulation of monthly vehicular travel by entrances for the years 1957, 1958, and 1959.

4. Summary Sheets of travel for the years 1954, 1955, 1956, 1957, 1958, 1959, and 1960, through May (7 sheets).

Attachment 1 is a plot of Monument visitation and of usage of Furnace Creek facilities including camper day-use of Texas Spring campground, guests at Furnace Creek Ranch and Inn, visits to the Borax Company Museum, and attendance at Naturalists' talks. The curves have been projected to the year 1980, guided by a population projection of eleven Southern California counties, but modified by limiting capacities of the Visitor Center and of overnight facilities.

On the basis of the projection, the following prediction of future visitation and use may be made:

| | 1960 | 1966 | 1970 | 1980 |
|---|---|---|---|---|
| Total Monument Visitation, visitor days | 520,000 | 850,000 | 1,180,000 | 1,426,000 |
| Total Monument Visitation, visits | 345,000 | 500,000 | 675,000 | 750,000 |
| Furnace Creek Visitor Center, visits | 100,000 | 275,000 | 340,000 | 450,000 |
| Furnace Creek and Texas Spring Campgrounds, visitor days | 70,000 | 150,000 | 195,000 | 277,000 |

Attachment 2 is a map with charts showing the average daily number of vehicles travelling on six entrance roads for each month of the year.

Attachments 3 and 4 are tabulations of basic data showing monthly vehicular travel by entrances, visitor use of paid facilities, and of campgrounds and attendance at activities.

Hydraulic Engineer

Attachments

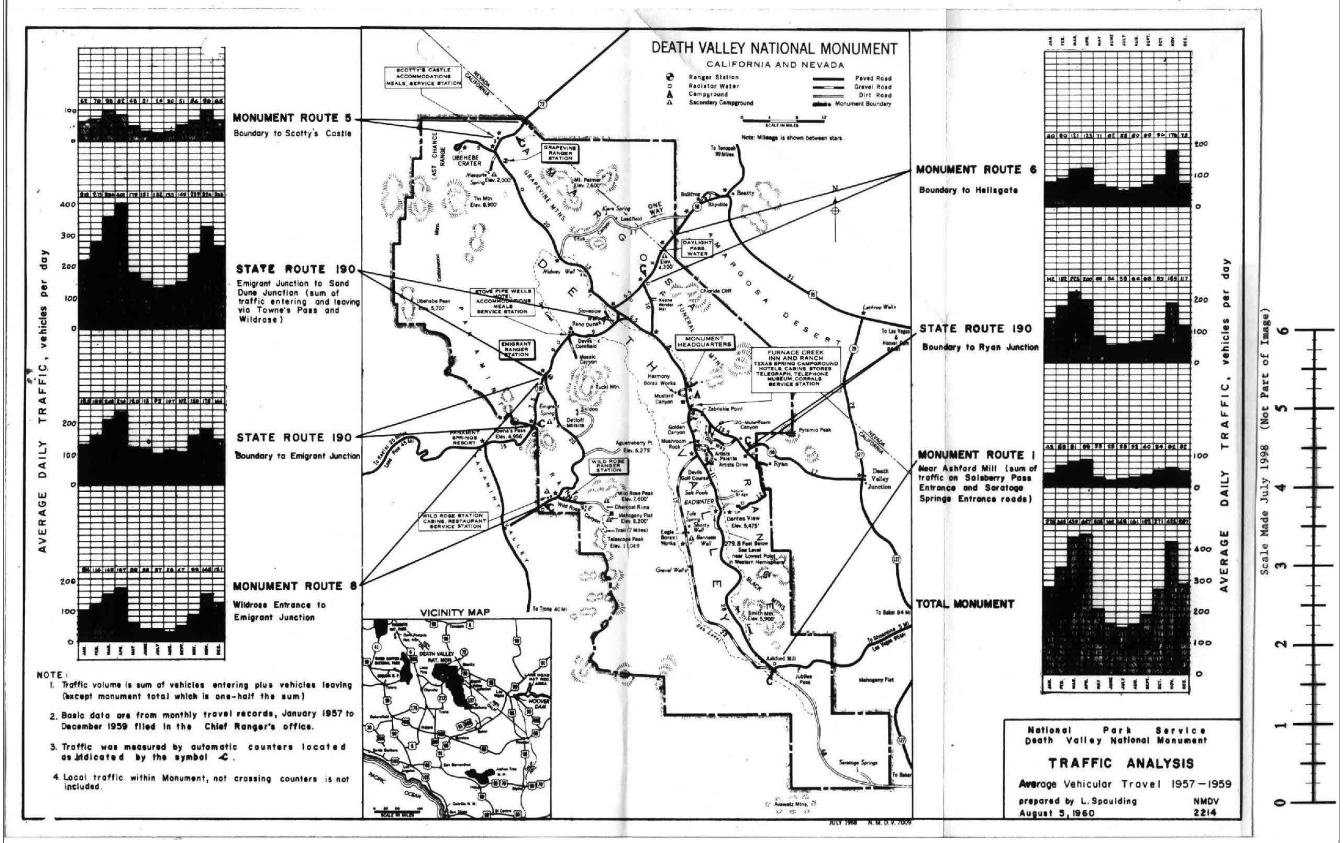
Copy to: Director, with attachments
Chief, WODO (2), with attachments
Supt., Death Valley, with attachments
Chief, Water Resources Section, WASO, with attachments

Cleared for Distribution:

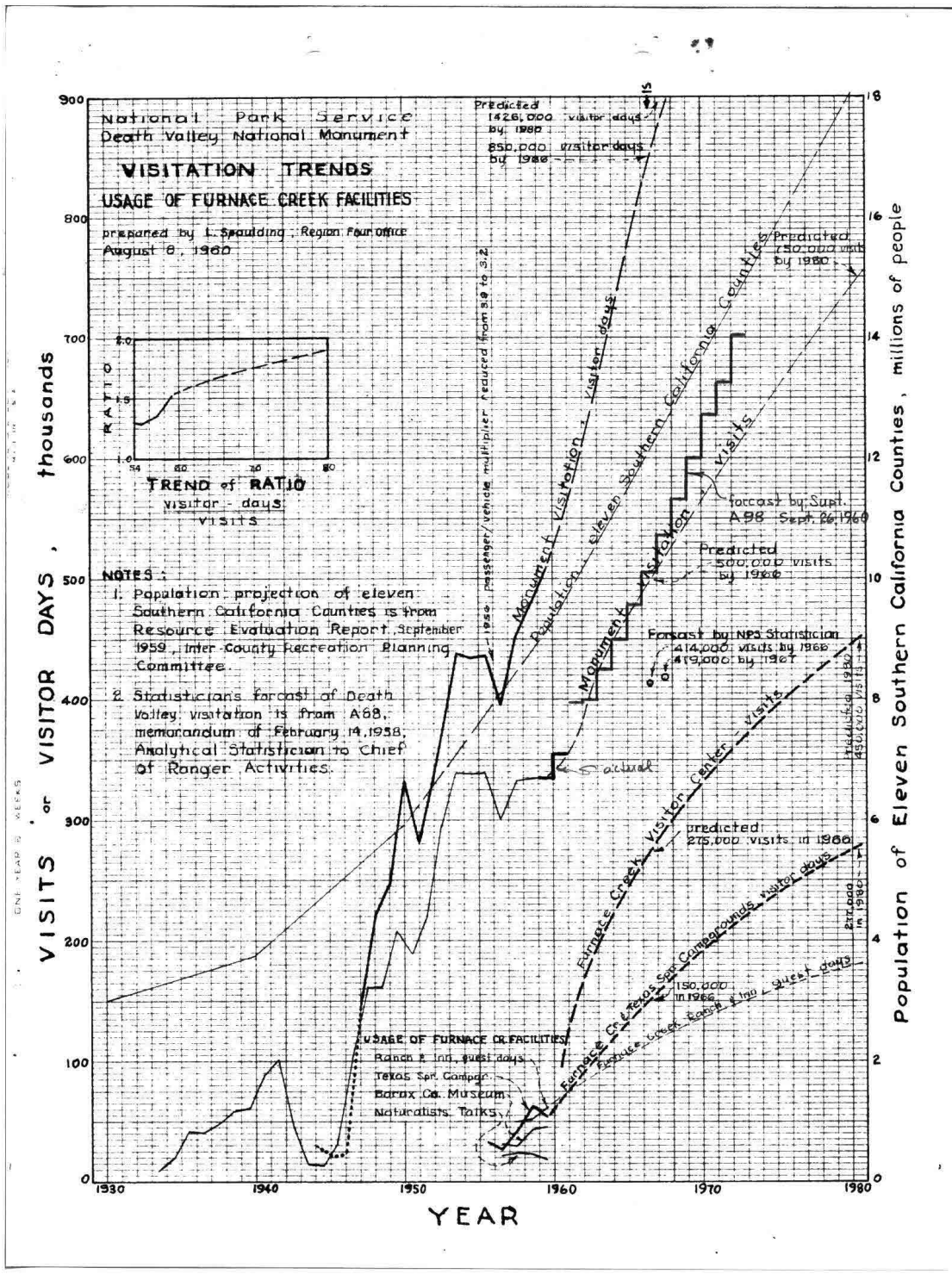
Regional Director Date 8/25/60

LSSpaulding:lq

08-05-1960: traffic analysis map; august 05, 1960



08-08-1960: visits or visitor days; august 08, 1960



## ANALYSIS OF VEHICULAR TRAVEL - Death Valley National Monument

prepared by L. Spaulding Aug. 3, 1960

TABLE I Monthly vehicular travel by entrances, average for the years 1957, 1958 & 1959

| ENTRANCE (Counter Location) | MONTHLY TRAVEL, ½ x (vehicles entering plus vehicles leaving) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR TOTAL |
| FURNACE CREEK (Ryan Jct.) | 2198 | 2549 | 3494 | 2995 | 1315 | 814 | 899 | 1016 | 1014 | 1377 | 2833 | 1813 | 22,321 |
| SALSBERRY PASS SARATOGA SPR. (Ashford Jct.) | 673 | 963 | 1252 | 1327 | 513 | 351 | 430 | 493 | 599 | 834 | 928 | 807 | 9176 |
| TOWNE'S PASS (Towne's Pass) | 1978 | 2223 | 3223 | 3510 | 1866 | 1699 | 1471 | 1657 | 1535 | 2417 | 2675 | 2227 | 26,487 |
| DAYLIGHT PASS (Hellsgate) | 1245 | 1256 | 1869 | 1840 | 1097 | 923 | 819 | 926 | 1123 | 1495 | 2642 | 1135 | 16,371 |
| WILDROSE (Wildrose Entrance) | 1457 | 1592 | 2290 | 2508 | 912 | 565 | 573 | 439 | 708 | 1283 | 2214 | 1883 | 16,424 |
| SCOTTY'S CASTLE (Scotty's Castle) | 953 | 982 | 1474 | 1232 | 745 | 466 | 405 | 462 | 761 | 986 | 1437 | 1015 | 10,916 |
| OTHER { Wingate Wash Sand Spr. Mengel Pass Saline Valley Hunter Mtn. | | | | | | | | | | | | | |
| MONUMENT TOTAL | 8503 | 9565 | 13,608 | 13,412 | 6447 | 4817 | 4595 | 4994 | 5740 | 8397 | 12,730 | 8888 | 101,698 |

TABLE II Annual vehicular travel by entrances 1954 to 1959

| ENTRANCE | ANNUAL TRAVEL, ½ x (vehicles entering plus vehicles leaving) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | YEARLY AVG. (1957-1959) |
| FURNACE CREEK (Ryan Jct. | | | | 22,780 | 20,793 | 23,390 | 22,321 |
| SALSBERRY PASS SARATOGA SPR. (Ashford Jct.) | | | | 8595 | 8575 | 10,357 | 9176 |
| TOWNE'S PASS (Towne's Pass) | 27,193 | | | 25,556 | 25,719 | 28,188 | 26,487 |
| DAYLIGHT PASS (Hellsgate) | | | | 16,897 | 17,267 | 14,949 | 16,371 |
| WILDROSE (Wildrose Entr.) | 9730 | | | 14,400 | 17,779 | 17,092 | 16,424 |
| SCOTTY'S CASTLE (Scotty's Castle | | | | 11,251 | 11,251 | 10,245 | 10,916 |
| OTHER { Wingate Wash Sand Spr. Mengel Pass Saline Valley Hunter Mtn. | | | NOT RECORDED | | | | |
| MONUMENT TOTAL | | | 93,108 | 99,478 | 101,395 | 104,221 | 101,698 |

Death Valley National Monument **1960 TRAVEL** By Months — Vehicles, Visitors or Visitor Days

| LINE NO. | TYPE OF USE | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VEHICLES by entrance | Furnace Creek | 2349 | 3435 | | | | | | | | | | | |
| 2 | | Ashford | 532 | 764 | | | | | | | | | | | |
| 3 | | Towns Pass | 1591 | 2640 | 2610 | 4550 | 1950 | 1560 | | | | | | | |
| 4 | | Daylight Pass | 1431 | 2477 | 1150 | 3670 | 1550 | 1160 | | | | | | | |
| 5 | | Wild Rose | 1634 | 2553 | | | | | | | | | | | |
| 6 | | Scotty's Castle | 960 | 1801 | | | | | | | | | | | |
| 7 | | TOTAL | 8497 | 13.670 | 13,150 | 15,960 | 7480 | 4990 | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | VISITORS from Form 10-157 | Bus | | | | | | | | | | | | | |
| 10 | | Airplane | 159 | 182 | 89 | 65 | 20 | | 1 | | 13 | 32 | | | |
| 11 | | Private Veh. | 27,904 | 43,744 | 12,985 | 15,927 | 7,057 | 4,912 | 3,207 | 5091 | 6209 | 9,000 | | | |
| 12 | | Other | | | | | | | | | | 1000 MOTOR CYCLES | | | |
| 13 | | TOTAL | 27.349 | 43,926 | 38,877 | 50,966 | 22,634 | 15,974 | 10,269 | 16,291 | 19817 | 30,630 | 44,183 | 33,140 | 355,896 |
| 14 | | | | | | | | | | | | | | | |
| 15 | PAID FACILITIES Visitor Days | Wild Rose Sta. | 171 | 109 | | | | | | | | | | | |
| 16 | | Stovepipe Wells | 1189 | 1571 | | | | | | | | | | | |
| 17 | | Furnace Cr. Inn | 2000 | 3430 | | | | | | | | | | | |
| 18 | | Furnace Cr. Ranch | 5007 | 7069 | | | | | | | | | | | |
| 19 | | Scotty's Castle | | | | | | | | | | | | | |
| 20 | | TOTAL | | | | | | | | | | | | | |
| 21 | | Form 10-157 2a+b | 8709 | 12,570 | 16,709 | 8130 | 1076 | 246 | | | | | | | |
| 22 | CAMPGROUNDS Visitor Days | Texas Spring | 4178 | 6824 | | | | | | | | | | | |
| 23 | | Emigrant Dist. | 341 | 1061 | | | | | | | | | | | |
| 24 | | Grape-vine District: Mesquite | } 294 | } 1578 | | | | | | | | | | | |
| 25 | | Midway | | | | | | | | | | | | | |
| 26 | | Daylight | | | | | | | | | | | | | |
| 27 | | Miscellaneous | 908 | 4760 | | | | | | | | | | | |
| 28 | | TOTAL | 5723 | 14,123 | 11,011 | 13,344 | 1664 | 367 | | | | | | | |
| 29 | | | | | | | | | | | | | | | |
| 30 | TOTAL VISITOR DAYS | lines 17 + 20 + 28 | | | | | | | | | | | | | |
| 31 | | from Form 10-157 | 41,779 | 70,619 | 66,597 | 72,440 | 25,374 | 16,590 | 10,676 | 17,153 | 20,568 | 39,947 | 83,739 | 54,920 | 520,410 |
| 32 | ACTIVITIES Visitors | Castle Tours | | | | | | | | | | | | | |
| 33 | | Furnace Cr. Museum | 5899 | 8386 | 6446 | 8,701 | — | — | — | | | | | | |
| 34 | | Naturalist Talks | 4206 | 7012 | 7251 | 4,512 | — | — | — | | | | | | |
| 35 | | Registration, HQ | | | | | | | | | | | | | |

| LINE NO. | TYPE OF USE | | Death Valley National Monument 1959 TRAVEL By Months — Vehicles, Visitors or Visitor Days | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
| 1 | VEHICLES by Entrance | Furnace Creek | 2492 | 2542 | 3688 | 1269 | 1298 | 740 | 1290 | 1014 | 1135 | 1649 | 3788 | 2465 | 23,390 |
| 2 | | Ashford | 1058 | 1250 | 1666 | 1016 | 582 | 526 | 674 | 661 | 661 | 786 | 966 | 649 | 10,357 |
| 3 | | Towns Pass | 2573 | 2199 | 4159 | 2338 | 1640 | 2038 | 1563 | 814 | 1931 | 2735 | 3226 | 2124 | 28,188 |
| 4 | | Daylight Pass | 1219 | 1200 | 1243 | 1280 | 1039 | 868 | 1514 | 604 | 1264 | 1849 | 2303 | 840 | 14,949 |
| 5 | | Wild Rose | 1859 | 1573 | 2988 | 1610 | 714 | 649 | 498 | 485 | 730 | 1496 | 2719 | 1705 | 17,094 |
| 6 | | Scotty's Castle | 809 | 801 | 1441 | 848 | 641 | 371 | 290 | 541 | 1645 | 1160 | 1208 | 1040 | 10,245 |
| 7 | | TOTAL | 10,010 | 9585 | 15,735 | 8402 | 5970 | 5196 | 6277 | 3519 | 6772 | 9555 | 14,092 | 8823 | 104,221 |
| 8 | | Form 10-157 L | 10,210 | 9585 | 15,735 | 8402 | | | | | | | | | |
| 9 | VISITORS from Form 10-157 | Bus | | 178 | 928 | | | | | | | | | | 1106 |
| 10 | | Airplane | 454 | 68 | 214 | 120 | 17 | 56 | 13 | | 28 | 54 | 142 | 85 | 1254 |
| 11 | | Private Veh. | 32,071 | 30,477 | 50,340 | 26,886 | 18,904 | 16,614 | 15,870 | 16,484 | 21,670 | 30,674 | 45,094 | 28,304 | 333,318 |
| 12 | | Other | | | | | | | | | | | | | |
| 13 | | TOTAL | 32,484 | 30,918 | 51,509 | 27,006 | 18,921 | 16,670 | 15,883 | 16,144 | 21,698 | 30,840 | 45,236 | 28,479 | 335,678 |
| 14 | | Form 10-157 S | | | | | 18,909 | | | | | | | | 335,666 |
| 15 | PAID FACILITIES Visitor Days | Wild Rose Sta. | 89 | 86 | 118 | 76 | 108 | 59 | 18 | 25 | 98 | 84 | 96 | 112 | 971 |
| 16 | | Stovepipe Wells | 1476 | 1930 | 2084 | 1132 | 48 | — | — | — | 110 | 745 | 1361 | 1493 | 9839 |
| 17 | | Furnace Cr. Inn | 2721 | 5078 | 3610 | 1933 | | | | — | — | — | 2169 | 1138 | 15,647 |
| 18 | | Furnace Cr. Ranch | 5766 | 7276 | 8000 | | | 1668 | — | — | 85 | 1870 | 5753 | 6000 | 46,318 |
| 19 | | Scotty's Castle | 517 | 484 | 570 | 868 | 337 | 189 | 69 | 1154 | 231 | 492 | 331 | 371 | 4723 |
| 20 | | TOTAL | 10,579 | 12,364 | 20,625 | 9318 | 493 | 366 | 87 | 1887 | 619 | 2438 | 9763 | 10,088 | 76,948 |
| 21 | | Form 10-157 | 10,604 | 12,230 | 20,646 | 9588 | 684 | 757 | 755 | 94 | 442 | 1414 | 9256 | 10,662 | 77,083 |
| 22 | CAMPGROUNDS Visitor Days | Texas Spring | 6002 | 9600 | 16,974 | 8578 | 5646 | 141 | | 110 | 33 | 1004 | 10,260 | 6837 | 54,134 |
| 23 | | Emigrant Dist | 630 | 940 | 1896 | 838 | 743 | 782 | 660 | 201 | 223 | 972 | 1408 | 1460 | 9611 |
| 24 | | Grapevine Mesquite | | | | | | | | | | | | | |
| 25 | | District Midway | 795 | 542 | 1240 | 328 | 314 | 79 | 87 | 32 | 42 | 582 | 1241 | 1671 | 6869 |
| 26 | | Daylight | | | | | | | | | | | | | |
| 27 | | Miscellaneous | 841 | 1719 | 3168 | 40 | 24 | | | | | 240 | 1581 | 2153 | 24,936 |
| 28 | | TOTAL | 8268 | 12,781 | 30,078 | 9784 | 6827 | 1002 | 806 | 343 | 318 | 2798 | 24,390 | 18,101 | 95,550 |
| 29 | | | | | | | | | | | | | | | |
| 30 | TOTAL VISITOR DAYS | lines 13+20+28 | 51,351 | 56,063 | 102,160 | 46,169 | 26,563 | 17,909 | 16,576 | 16,946 | 22,632 | 35,731 | 79,247 | 49,174 | 508,226 |
| 31 | | from Form 10-157 | 51,146 | 55,929 | 102,181 | 46,304 | 26,472 | 17,496 | 16,644 | 16,981 | 22,148 | 35,447 | 79,475 | 49,174 | 508,257 |
| 32 | ACTIVITIES Visitors | Castle Tours | 7584 | 8904 | 15,476 | 7883 | 2950 | 1164 | 511 | 1365 | 2134 | 4426 | 10,149 | 7508 | 69,892 |
| 33 | | Furnace Cr. Museum | 4672 | 4557 | 9364 | 3470 | — | — | — | — | — | — | 7660 | 11,901 | 45,574 |
| 34 | | Naturalist Talks | 2773 | 3498 | 4565 | 922 | — | — | — | 29 | — | 102 | 3580 | 4718 | 19239 |
| 35 | | Registration, HQ | | | | | | | | | | | | | |

| LINE NO. | TYPE OF USE | | Death Valley National Monument 1958 TRAVEL By Months (Vehicles, Visitors or Visitor Days) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VEHICLES by entrance | | Furnace Creek | 2050 | 2000 | 3254 | 3548 | 1145 | 754 | 631 | 675 | 950 | 1359 | 2667 | 1760 | 20,793 |
| 2 | | | Ashford | 526 | 698 | 1127 | 1430 | 582 | 67 | 295 | 192 | 490 | 888 | 1167 | 1115 | 8578 |
| 3 | | | Towns Pass | 1982 | 1865 | 2975 | 4042 | 1794 | 1345 | 1268 | 1429 | 1663 | 2318 | 2774 | 2264 | 25,719 |
| 4 | | | Daylight Pass | 1250 | 814 | 1808 | 2286 | 1030 | 835 | 1050 | 1073 | 1000 | 1378 | 3128 | 1615 | 17,267 |
| 5 | | | Wild Rose | 1535 | 1662 | 2316 | 3600 | 1065 | 565 | 779 | 458 | 697 | 1273 | 2036 | 1743 | 17,779 |
| 6 | | | Scotty's Castle | 1068 | 1057 | 1577 | 1491 | 735 | 500 | 467 | 382 | 539 | 832 | 1650 | 963 | 11,251 |
| 7 | | | TOTAL | 8,411 | 8,096 | 13,057 | 16,397 | 6,351 | 4,066 | 4,490 | 4,209 | 5,339 | 8,048 | 13,423 | 9508 | 101,395 |
| 8 | | | | | | | | | | | | | | | | |
| 9 | VISITORS from Form 10-157 | | Bus | 150 | 370 | 480 | 620 | 60 | — | — | — | — | — | 450 | 460 | 2,590 |
| 10 | | | Airplane | 123 | 95 | 154 | 520 | 20 | 14 | 2 | 10 | 32 | 38 | — | — | 1,008 |
| 11 | | | Private Veh. | 28,597 | 27,524 | 44,393 | 52,470 | 20,323 | 13,011 | 14,371 | 13,468 | 17,085 | 25,753 | 42,953 | 30,425 | 330,373 |
| 12 | | | Other | | | | | | 75 | 3 | | 34 | 48 | 91 | 78 | 329 |
| 13 | | | TOTAL | 28,870 | 27,989 | 45,027 | 53,610 | 20,403 | 13,100 | 14,376 | 13,478 | 17,151 | 25,839 | 43,494 | 30,963 | 334,300 |
| 14 | | | | | | | | | | | | | | | | |
| 15 | PAID FACILITIES Visitor Days | | Wild Rose Sta. | 63 | 41 | 75 | 120 | 40 | 53 | 127 | 26 | 20 | 17 | 61 | 67 | 710 |
| 16 | | | Stovepipe Wells | 1150 | 1362 | 2250 | 1625 | 105 | closed | | | 87 | 342 | 1269 | 1440 | 9630 |
| 17 | | | Furnace Cr. Inn | 2137 | 3048 | 3614 | 8925① | 0 | Closed for the | | | Summer | | 1655 | 1211 | 13,665 |
| 18 | | | Furnace Cr Ranch | 5795 | 5846 | 8617 | | 175 | closed | | | 30 | 1187 | 4633 | 5576 | 38,784 |
| 19 | | | Scotty's Castle | 564 | 590 | 703 | 699 | 284 | 126 | 44 | 59 | 130 | 299 | ②(300) | 342 | 4140 |
| 20 | | | TOTAL | 9,709 | 10887 | 15259 | 11,369 | 604 | 178 | 171 | 85 | 267 | 1,845 | 7918 | 8636 | 66,929 |
| 21 | | | | 9,631 | 10,887 | 15,259 | 11,369 | 604 | 178 | 171 | 85 | 267 | 1,845 | 7,917 | 8,636 | |
| 22 | CAMPGROUNDS Visitor Days | | Texas Spring | 6473 | 6392 | 8361 | 14,839 | 398 | 30 | 32 | 20 | 100 | 1385 | 16,790 | 8234 | 63,054 |
| 23 | | | Emigrant Dist. | 168 | 165 | 1224 | 958 | 484 | 115 | 134 | 185 | 266 | 220 | Hdqtrs Gp 1526 | Turnstile Gp 295 | 6490 |
| 24 | | Grape-vine District | Mesquite | 350 | 450 | 1060 | 600 | 150 | 40 | 44 | 35 | 25 | 120 | 655 | 405 | 4494 |
| 25 | | | Midway | | | | 500 | 25 | | | | 15 | 50 | | | |
| 26 | | | Daylight | | | | | | | | | 20 | 10 | | | |
| 27 | | | Miscellaneous | | | | | | | | | | | | 8600 | 3600 |
| 28 | | | TOTAL | 6991 | 7007 | 10585 | 16,897 | 1057 | 185 | 210 | 240 | 426 | 1835 | 18.971 | 13,234 | 77,638 |
| 29 | | | | | | | | | | | | | | | | |
| 30 | TOTAL VISITOR DAYS | | lines 13 + 20 + 28 | 45,570 | 45,883 | 70,871 | 81,876 | 22,064 | 13,463 | 14,757 | 13,803 | 17,844 | 29,519 | 70383 | 52833 | 478,867 |
| 31 | | | from Form 10-157 | 45,520 | 45,853 | 70,758 | 81,880 | 21,780 | 13,338 | 15,822 | 13,788 | 17,773 | 29,350 | 70,382 | 52,655 | 478,699 |
| 32 | ACTIVITIES Visitors | | Castle Tours | 7,221 | 8,150 | 13,238 | 13,211 | 2700 | 1447 | 1617 | 928 | 1240 | 3330 | ②(10,000) | 8342 | 71,224 |
| 33 | | | Furnace Cr. Museum | 4,938 | 5,323 | 7,100 | 9,228 | c | losed for the | | | Summer | | 8661 | 6309 | 42,148 |
| 34 | | | Naturalist Talks | 3,227 | 5,050 | 6,417 | 3,400 | Discontinued for the | | | | summer | | 2505 | 3322 | 23,921 |
| 35 | | | Registration, HQ | | | | | | | | | | | | | 5000 |

① Total Inn & Ranch - est 8000 at Inn
② Data not available - quantity shown estimated by Spaulding

# 1957 TRAVEL By Months Vehicles, Visitors & Visitor Days

| | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VEHICLES By Entrance | Furnace Cr. | 2052 | 3086 | 3539 | 4168 | 1502 | 947 | 775 | 1360 | 957 | 1124 | 2045 | 1225 | 22,780 |
| 2 | | Ashford | 434 | 940 | 1082 | 1535 | 376 | 459 | 318 | 607 | 645 | 888 | 651 | 660 | 8595 |
| 3 | | Towns Pass | 1379 | 2605 | 2536 | 4110 | 2163 | 1714 | 1575 | 1728 | 1011 | 2218 | 2222 | 2294 | 25,555 |
| 4 | | Daylight Pass | 1265 | 1753 | 1906 | 1953 | 1225 | 1064 | 892 | 1101 | 1106 | 1258 | 2415 | 959 | 16,897 |
| 5 | | Wild Rose | 976 | 1541 | 1565 | 2315 | 896 | 481 | 442 | 373 | 692 | 1079 | 1888 | 2152 | 14,400 |
| 6 | | Scotty's | 983 | 1088 | 1405 | 1356 | 858 | 527 | 397 | 464 | 699 | 1027 | 1454 | 993 | 11,251 |
| 7 | | | | | | | | | | | | | | | |
| 8 | | TOTAL | 7089 | 11,013 | 12,033 | 15,437 | 7020 | [illegible] | [illegible]399 | 5633 | 5110 | 7594 | 10675 | 8283 | 99,478① |
| 9 | | Form 10-187 [illegible] | 7089 | 11,013 | 12,033 | 15,437 | 7020 | [illegible] | [illegible]399 | 5633 | 5110 | 7594 | 10675 | 8283 | 109,478 |
| 10 | VISITORS (from Form 10-187) | Bus | 175 | 210 | 97 | 280 | 70 | 35 | — | 41 | 87 | 35 | 650 | 410 | 2040 |
| 11 | | Airplane | 37 | 54 | 91 | 98 | 19 | 2 | 4 | 7 | 49 | 17 | 234 | 108 | 720 |
| 12 | | Private Veh. | 22685 | 35241 | 38,506 | 52,485 | 23868 | 17653 | 14957 | 19,152 | 17,374 | 24,300① | 36,295 | 28,152 | 330,668 |
| 13 | | Other | — | — | — | — | — | — | | | | | | | |
| 14 | | TOTAL | 22,897 | 35,505 | 38,694 | 52,863 | 23957 | 17690 | 14961 | [illegible]200 | 17,460 | 24,352 | 37,179 | 28,670 | 333,428 |
| 15 | | | | | | | | | | | | | | | |
| 16 | PAID FACILITIES overnight Guests | Wild Rose Sta | 26 | 52 | 100 | 96 | 89 | 27 | 14 | 12 | 38 | 72 | 75 | 93 | 694 |
| 17 | | Stovepipe Wells | 850 | 1463 | 1997 | 1992 | 322 | Closed | | | 84 | 1030 | 1500 | 1485 | 10,723 |
| 18 | | Furnace Cr. Inn | 2165 | 2848 | 3992 | 1865 | Closed | for | the Summer | | | | 1657 | 1781 | 13,708 |
| 19 | | Furnace Cr. Ranch | 3611 | 5792 | 7208 | 6643 | Closed | for | the Summer | | | 1707 | 5859 | 5491 | 36,311 |
| 20 | | Scotty's Castle① | 424 | 470 | 755 | 580 | 446 | 119 | 97 | 130 | 222 | 596 | 512 | 514 | 4865 |
| 21 | | TOTAL ① | 7076 | 10625 | 13452 | 11,176 | 857 | 146 | 111 | 142 | 344 | 3405 | 9603 | 9364 | 66,301 |
| 22 | CAMPGROUNDS Visitor Days | Texas Spring | 648 | 2223 | 6464 | 1216 | 150 | 5 | 5 | 60 | 100 | 694 | [illegible]491 | 8118 | 42,172 |
| 23 | | Emigrant District Thorndike | ~~153~~ | ~~310~~ | ~~217~~ | ~~1552~~ | ~~211~~ | ~~50~~ | ~~60~~ | ~~68~~ | ~~266~~ | ~~472~~ | ~~1734~~ | ~~333~~ | ~~5426~~ |
| 24 | | Mahogany | | | | | | | | | | | | | |
| 25 | | Grapevine Mesquite | ~~315~~ | ~~450~~ | 260 | 669 | 75 | 75 | 20 | 25 | 50 | 75 | ~~730~~ | ~~250~~ | ~~3634~~ |
| 26 | | District Midway | | | | 500 | 25 | 25 | 5 | 30 | 30 | 25 | | | |
| 27 | | Daylight | | | | | | | | | | | | | |
| 28 | | Miscellaneous | 150 | 300 | 215 | 400 | 100 | | | | | | | | 1165 |
| 29 | | TOTAL | 1864 | 3283 | 7156 | 4337 | 561① | 155 | 90 | 185 | 446 | 1266 | 24,955 | 8701 | 52,397① |
| 30 | TOTAL VISITOR DAYS 14+29 | | 31,237 | 49,413 | 59,802 | 68,376 | 25,375 | 17,991 | 15,162 | 19,525 | 18,250 | 29,023 | 71,737 | 46,735 | 452,126① |
| 31 | ATTENDANCE | Castle Tours | 4688 | 8555 | 10,304 | 12,947 | 3080 | 1156 | 927 | 1202 | 1776 | 4549 | 8001 | 6711 | 63,916 |
| 32 | | F.C. Museum | 3262 | 4264 | 6111 | 7898 | Closed | for | the Summer | | | 1231 | 6672 | | 29,438 |
| 33 | | Naturalist Talks | 2745 | 5330 | 5399 | 5497 | 0 | — | — | — | — | 0 | 2180 | 3224 | 24,173 |
| 34 | | Registration, H.Q. | | | | | | | | | | | | | 4000 |

① Does not agree with Form 10-187

| LINE | TYPE OF USE | | Death Valley National Monument 1956 TRAVEL By Months — Vehicles, Visitors or Visitor Days | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
| 1 | VEHICLES by entrance | Furnace Creek | | | | | | | | | | | | | |
| 2 | | Ashford | | | | | | | | | | | | | |
| 3 | | Towns Pass | | | | | | | | | | | | | |
| 4 | | Daylight Pass | | | | | | | | | | | | | |
| 5 | | Wild Rose | | | | | | | | | | | | | |
| 6 | | Scotty's Castle | | | | | | | | | | | | | |
| 7 | | TOTAL | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | VISITORS from Form 10-157 | Bus | 73 | 58 | 155 | 70 | 90 | 65 | 30 | 30 | 0 | 35 | 50 | 175 | 831 |
| 10 | | Airplane | 119 | 64 | 149 | 180 | 15 | 2 | 2 | 4 | 2 | 35 | 88 | 97 | 747 |
| 11 | | Private Veh. | 30,294 | 31,843 | 47,948 | 30,538 | 17,693 | 14,671 | 14,073 | 13,184 | 12,570 | 22,656 | 32,483 | 30,582 | 298,535 |
| 12 | | Other | | 2 | | 4 | | | 1 | 12 | | | | | 19 |
| 13 | | TOTAL | 30,486 | 31,967 | 48,252 | 30,792 | 17,798 | 14,738 | 14,106 | 13,230 | 12,572 | 22,726 | 32,621 | 30,854 | 300,132 |
| 14 | | | | | | | | | | | | | | | |
| 15 | PAID FACILITIES Visitor Days | Wild Rose Sta. | | | | | | | | | | | | | |
| 16 | | Stovepipe Wells | | | | | | | | | | | | | |
| 17 | | Furnace Cr. Inn | | | | | | | | | | | | | |
| 18 | | Furnace Cr. Ranch | | | | | | | | | | | | | |
| 19 | | Scotty's Castle | | | | | | 318 | 78 | 180 | 248 | 500 | 474 | 437 | 2231 |
| 20 | | TOTAL | 8010 | 10,986 | 15,248 | 7085 | 1029 | 339 | 181 | 101 | 309 | 2202 | 8378 | 8883 | 62,746 |
| 21 | | | | | | | | | | | | | | | |
| 22 | CAMPGROUNDS Visitor Days | Texas Spring | 2040 | 3043 | 12,454 | 2440 | 604 | 120 | 15 | 30 | | 785 | 3110 | 2355 | 26,996 |
| 23 | | Emigrant Dist. | | | | | | 60 | 50 | 35 | | 25 | 250 | 390 | 760 |
| 24 | | Grape-vine District: Mesquite | 65 | 300 | 150 | 195 | 25 | 30 | 0 | | | 150 | 500 | 508 | 2398 |
| 25 | | Grape-vine District: Midway | 25 | | 275 | 150 | 5 | 15 | 0 | 5 | | | | | |
| 26 | | Grape-vine District: Daylight | | | | | | | | | | | | | |
| 27 | | Miscellaneous | 217 | 100 | 500 | 270 | 240 | | | 12 | | 10 | 300 | 300 | 1949 |
| 28 | | TOTAL | 2347 | 3443 | 13,379 | 3055 | 874 | 225 | 65 | 82 | 45 | 970 | 4160 | 3553 | 32,103 |
| 29 | | | ← | ← | ← | ← | ← | ← | ← | ← | | ← | ← | | |
| 30 | TOTAL VISITOR DAYS | lines 13 + 20 + 28 | | | | | | | | | | | | | |
| 31 | | from Form 10-157 | 40,843 | 46,396 | 76,869 | 40,932 | 19,701 | 15,302 | 14,352 | 13,413 | 12,921 | 25,898 | 45,159 | 43,290 | 395,076 |
| 32 | ACTIVITIES Visitors | Castle Tours | | | | | | 2254 | 2209 | 1491 | 1385 | 3729 | 2535 | 2462 | 26,115 |
| 33 | | Furnace Cr. Museum | 4396 | 5676 | 11,082 | Closed for the Summer | | | | | | 1121 | 3649 | 5161 | 32,085 |
| 34 | | Naturalist Talks | 3,015 | 4300 | 6,185 | 0 | — | — | — | — | — | 0 | 4362 | 3565 | 21,427 |
| 35 | | Registration HQ | | | | | | | | | | | | | |

00-00-0000: 1955 travel

Death Valley National Monument · 1955 TRAVEL By Months — Vehicles, Visitors or Visitor Days

| LINE NO. | TYPE OF USE | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VEHICLES by entrance | Furnace Creek | | | | | | | | | | | | | |
| 2 | | Ashford | | | | | | | | | | | | | |
| 3 | | Towns Pass | 1249 | 2045 | | | | | | | | | | | |
| 4 | | Daylight Pass | | | | | | | | | | | | | |
| 5 | | Wild Rose | 809 | 1740 | | | | | | | | | | | |
| 6 | | Scotty's Castle | | | | | | | | | | | | | |
| 7 | | TOTAL | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | VISITORS from Form 10-157 | Bus | | | | | | | | | | | | | |
| 10 | | Airplane | | | | | | | | | | | | | |
| 11 | | Private Veh. | | | | | | | | | | | | | |
| 12 | | Other | | | | | | | | | | | | | |
| 13 | | TOTAL | 29.311 | 31,158 | 45,549 | 54,082 | 28,272 | 16,607 | 17,404 | 12,650 | 14,038 | 21,500 | 34,610 | 30,726 | 337,907 |
| 14 | | | | | | | | | | | | | | | |
| 15 | PAID FACILITIES Visitor Days | Wild Rose Sta. | | | | | | | | | | | | | |
| 16 | | Stovepipe Wells | | | | | | | | | | | | | |
| 17 | | Furnace Cr. Inn | | | | | | | | | | | | | |
| 18 | | Furnace Cr. Ranch | | | | | | | | | | | | | |
| 19 | | Scotty's Castle | | | | | | | | | | | | | |
| 20 | | TOTAL | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | |
| 22 | CAMPGROUNDS Visitor Days | Texas Spring | 2297 | 4900 | 4185 | 1916 | 604 | 60 | 15 | 14 | 75 | 408 | 12,050 | 6259 | 32,783 |
| 23 | | Emigrant Dist | | | | | 75 | 60 | 12 | 16 | 5 | 60 | 150 | | 378 |
| 24 | | Grapevine District Mesquite | 36 | 25 | 82 | 509 | 65 | 23 | 0 | | | | | 110 | 850 |
| 25 | | Grapevine District Midway | | | | | | | | | | | | 180 | 180 |
| 26 | | Grapevine District Daylight | | | | | | | | | | | | | |
| 27 | | Miscellaneous | 149 | 268 | 75 | 579 | 260 | 36 | 31 | 42 | 6 | 30 | 677 | | 2153 |
| 28 | | TOTAL | 2482 | 5193 | 4342 | 3004 | 1004 | 179 | 58 | 78 | 86 | 498 | 12,877 | 6549 | 36,344 |
| 29 | | | | | | | | | | | | | | | |
| 30 | TOTAL VISITOR DAYS | lines 13 + 20 + 28 | | | | | | | | | | | | | |
| 31 | | from Form 10-157 | | | | | | | | | | | | | 437,166 |
| 32 | ACTIVITIES Visitors | Castle Tours | | | | | | | | | | | | | |
| 33 | | Furnace Cr. Museum | | | | | | | | | | | | | |
| 34 | | Naturalist Talks | | | | | | | | | | | | | |
| 35 | | Registration, HQ | | | | | | | | | | | | | |

Death Valley National Monument 1954 TRAVEL By Months — Vehicles, Visitors or Visitor Days

| LINE NO. | TYPE OF USE | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VEHICLES by entrance | Furnace Creek | | | | | | | | | | | | | |
| 2 | | Ashford | | | | | | | | | | | | | |
| 3 | | Towns Pass | 1840 | 2490 | 3700 | 3705 | 2100 | 1825 | 1,204 | 2,143 | 3296 | 1830 | 1745 | 1,365 | 27,193 |
| 4 | | Daylight Pass | | | | | | | | | | | | | |
| 5 | | Wild Rose | 630 | 810 | 950 | 950 | 550 | 470 | 520 | 826 | 463 | 901 | 836 | 1779 | 9730 |
| 6 | | Scotty's Castle | | | | | | | | | | | | | |
| 7 | | TOTAL | 6909 | 10,561 | 9726 | 10,454 | 6,773 | 4608 | 3513 | 5583 | 4764 | 6990 | 9222 | 7836 | 86,934 |
| 8 | | | | | | | | | | | | | | | |
| 9 | VISITORS from Form 10-157 | Bus | | | | | | | | | | | | | |
| 10 | | Airplane | | | | | | | | | | | | | |
| 11 | | Private Veh. | | | | | | | | | | | | | |
| 12 | | Other | | | | | | | | | | | | | |
| 13 | | TOTAL | 21,189 | 42,683 | 38,820 | 41,253 | 26,416 | 17,291 | 13,701 | 21,833 | 18,581 | 22,341 | 37,253 | 30,750 | 332,631 |
| 14 | | | | | | | | | | | | | | | |
| 15 | PAID FACILITIES Visitor Days | Wild Rose Sta. | | | | | | | | | | | | | |
| 16 | | Stovepipe Wells | | | | | | | | | | | | | |
| 17 | | Furnace Cr. Inn | | | | | | | | | | | | | |
| 18 | | Furnace Cr. Ranch | | | | | | | | | | | | | |
| 19 | | Scotty's Castle | | | | | | | | | | | | | |
| 20 | | TOTAL | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | |
| 22 | CAMPGROUNDS Visitor Days | Texas Spring | | | | | | | | | | | | | |
| 23 | | Emigrant Dist. | | | | | | | | | | | | | |
| 24 | | Grapevine District — Mesquite | | | | | | | | | | | | | |
| 25 | | Grapevine District — Midway | | | | | | | | | | | | | |
| 26 | | Grapevine District — Daylight | | | | | | | | | | | | | |
| 27 | | Miscellaneous | | | | | | | | | | | | | |
| 28 | | TOTAL | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | |
| 30 | TOTAL VISITOR DAYS | lines 18 + 20 + 28 | | | | | | | | | | | | | |
| 31 | | from Form 10-157 | | | | | | | | | | | | | |
| 32 | ACTIVITIES Visitors | Castle Tours | | | | | | | | | | | | | |
| 33 | | Furnace Cr. Museum | | | | | | | | | | | | | |
| 34 | | Naturalist Talks | | | | | | | | | | | | | |
| 35 | | Registration, HQ | | | | | | | | | | | | | |

# WATER DEMAND

## FURNACE CREEK - NPS DEVELOPMENT - MISSION 66

transmitted with memo of 9-9-58 (L-54). Spaulding 9-6-58

| Area | USE | POPULATION Peak Day 1966 | | IRRIGATED AREA (1966) Acres | RATE OF WATER USE | WATER DEMAND PEAK Gal. per Day | PEAK Gal. per Min. | PEAK Sec. Ft. |
|---|---|---|---|---|---|---|---|---|
| Museum - Admin. | Domestic① | 10,000 | | | 10 gal/person | 100,000 | 70 | .156 |
| | Irrigation | | | 5 | 1 SF per 40A. | 81,000 | 56 | .125 |
| | Total | | | | | 181,000 | 126 | .281 |
| Furnace Creek Campground | Domestic | 1000 | | | 50 G/Per./Day | 50,000 | 35 | .078 |
| | Irrigation | | | 35 | 1 S.F per 40 A. | 566,000 ~~265,000~~ | 393 ~~302~~ | .875 ~~.651~~ |
| | Total | | | | | 616,000 ~~315,000~~ | 428 ~~417~~ | .953 ~~.929~~ |
| Furnace Creek - Residential (3 Residences) | Domestic | 12 | | | 200 GPD/Person | 2400 | 2 | .004 |
| | Irrigation | | | 1 | 1 SF per 40 A. | 16,000 | 11 | .025 |
| | Total | | | | | 18,000 | 13 | .029 |
| Texas Spring Campground | Domestic | 200 | | | 50 GPD/Person | 10,000 | 7 | .016 |
| | Irrigation | | | 15 | ~~1~~ 1 SF/40 Ac. | 242,000 | 168 | .374 |
| | Total | | | | | 252,000 | 175 | .390 |
| Indian Village | Domestic | 50 | | | 50 GPM/Person | 2500 | ~~2500~~ 2 | .004 |
| | Irrigation | | | 1 | 1 SF/40 Ac. | 16,000 | 11 | .025 |
| | Total | | | | | 19,000 | 13 | .029 |
| Total - (this condition would never occur | | | | | | 1086,000 ~~785,000~~ | 755 ~~744~~ | 1.682 ~~1658~~ |
| Maximum Use - (Full irrigation plus 10% domestic) | | | | | | | | |
| | Domestic (10% of total domestic .258 cfs) | | | | | 17,000 | 12 | 0.026 |
| | Irrigation | | | | | 921,000 | 639 | 1.424 |
| | Total (Summer months) | | | | | 938,000 | 651 | 1.450 |

① Includes air conditioning demand (8 GPM per Ralph Thornally 9-9-58)

In reply refer to:
D5039

June 20, 1956

Memorandum

To: Regional Director, Region Four

From: Superintendent, Death Valley NM

Subject: Data concerning per capita water consumption

Regional Office memorandum No. 56-66 requested data on water consumption and sewage flow to be sent to the Public Health Service.

The following is the only reliable data on water consumption in Death Valley:

Location: Texas Spring Campground
Meter: 2" Neptune meter at NPS diversion unit to Pacific Coast Borax Company. Sand trap at Texas Spring Channel.
Date: Tuesday, March 27, to Friday, March 30, 1956 (Easter Week)

Facilities Served: 2 Comfort Stations containing:
16 water closets
1 urinal (single)
6 lavatories

90 3/4" hydrants in campground
5 (est.) hydrants in Indian Village
80 house trailers - 25% with hose connection to hydrants

Population: Campground - 300 to 500 people
Indian Village - 20 people (no interior plumbing or flush toilets)

Water Used: Tuesday, March 27, 1956, 8:00 A.M., 33 GPM
Friday, March 30, 1956 11:15 A.M., 10 GPM
3 day average - 62,830 gal. in 75 hrs. 14 GPM
Average per capita rate - 50 gal. per day

Fred W. Binnewies
Superintendent

LSS/FWB/dtm

Part II WATER RESOURCES

Water Resources

October 21, 1960

L 54

Memorandum

To: Director

From: Regional Director, Region Four

Subject: Water Rights, Furnace Creek Area, Death Valley

Your memorandum of May 31 stated that it was your feeling that any resolution of water rights needs of this Service and the Death Valley Hotel Company requires accurate information as to:

1. Total available supply of water, estimated as nearly as possible to "dry" years.

2. Present and anticipated amount that will be required by this Service and the company.

3. Whether there are waters available that have not been known to exist at the Furnace Creek Area.

The memorandum further states that until these essential facts are known, there does not appear to be a sound basis on which to go ahead with development of further water resources at Furnace Creek.

You requested us to discuss the matter of testing with Mr. Kunkel, after which we were asked to give our recommendations for further test operations. Upon receipt of our report you would decide the testing program to be undertaken and would expect this office to work out a draft of suggested understanding with the company as to special conditions to insure that the testing would not interfere with normal company operations.

At the same time it was expected that the company would submit its independent statement of water use and claims before any attempt was made to resolve as between the company and the Service an equitable division of the known water supply.

Under date of July 21 we forwarded you a copy of Mr. Kunkel's memorandum of July 15 in which he stated that the total available supply of water over a long term was estimated to be 5.6 cfs and that he considered the quantity of "waters available that have not been known to exist in the Furnace Creek Area" as probably very small. Mr. Kunkel's figure of 5.6 cfs includes Nevares Springs, several small undeveloped spring and seeps and loss by evapotranspiration. Mr. Kunkel believes that additional testing of the well and trench is unwarranted.

A report of the determination of water use was transmitted to you August 25. In this memorandum we stated that subject to possible further confirmation of relative rates of water use, we believed that data contained in the reports attached thereto could be used as a basis for estimating probable future water needs of the National Park Service, and its facilities at Furnace Creek.

We also stated that we believe the estimates for the hotel company could be used for estimating purposes. However, we do believe that the best source of current and proposed use for the hotel company would be from their figures, which can probably be obtained more readily by your office than by either the Monument or this office.

For information purposes we are enclosing a chart entitled "Water Diversion Furnace Creek Area" (drawing NMDV-2215) and a summary of measurements from which the chart was plotted. The chart shows discharges for the period from January 1956 to January 1960 of individual sources as well as the combined total as they varied with time. Mr. Kunkel's estimate of 5.5 cfs exceeds the totals shown on the chart and summary. This difference is the amount of water from Nevares Springs plus the flow of small springs and the amount lost by evapotranspiration.

We believe that with this additional information all the data requested in your memorandum of May 31 have now been sent to your office. We do not believe that further testing is required. Will you please review the data referred to in this memorandum, together with the attachments and advise us as to whether any additional steps should be taken in connection with this matter.

Regional Director

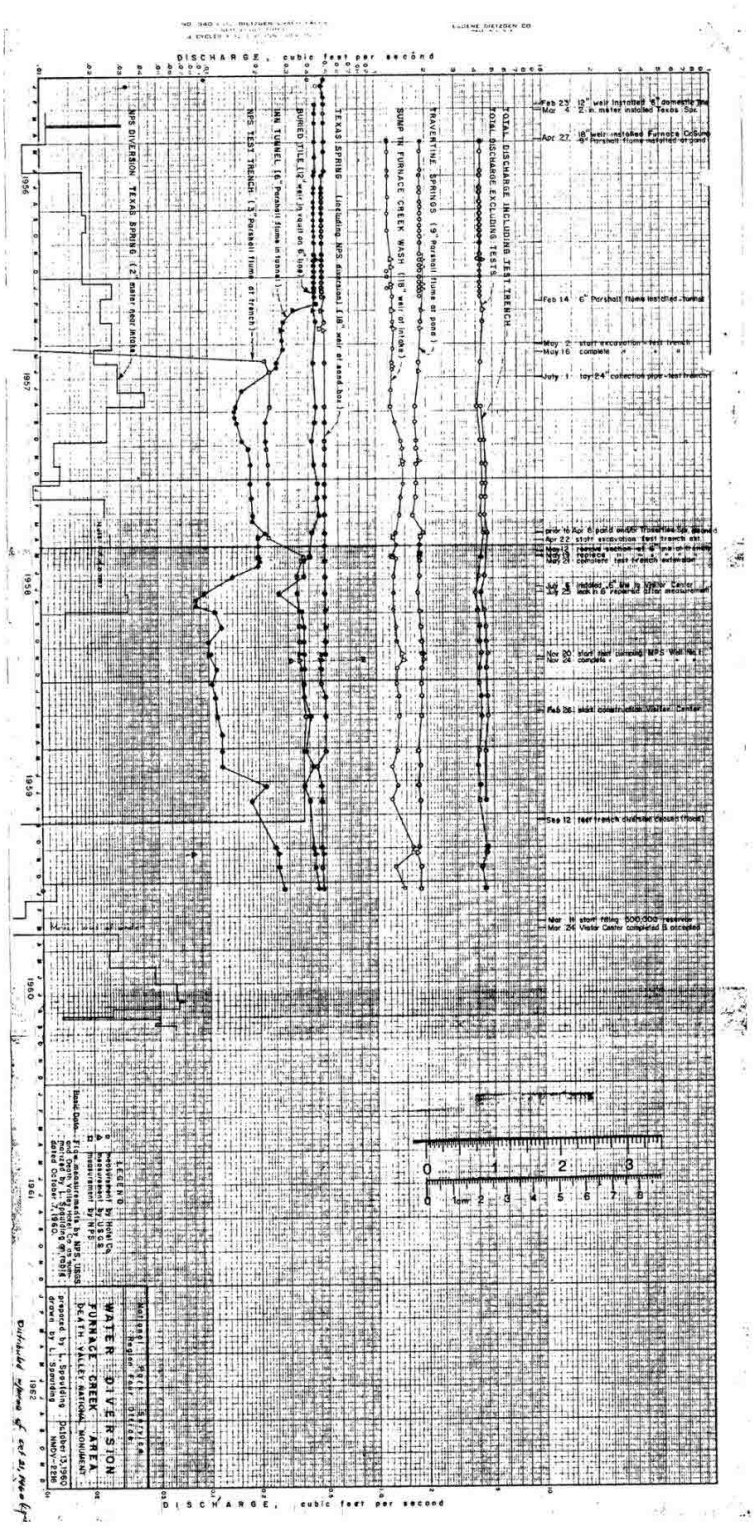
Attachments

Copy to: Supt., Death Valley
Chief, WODC (2)

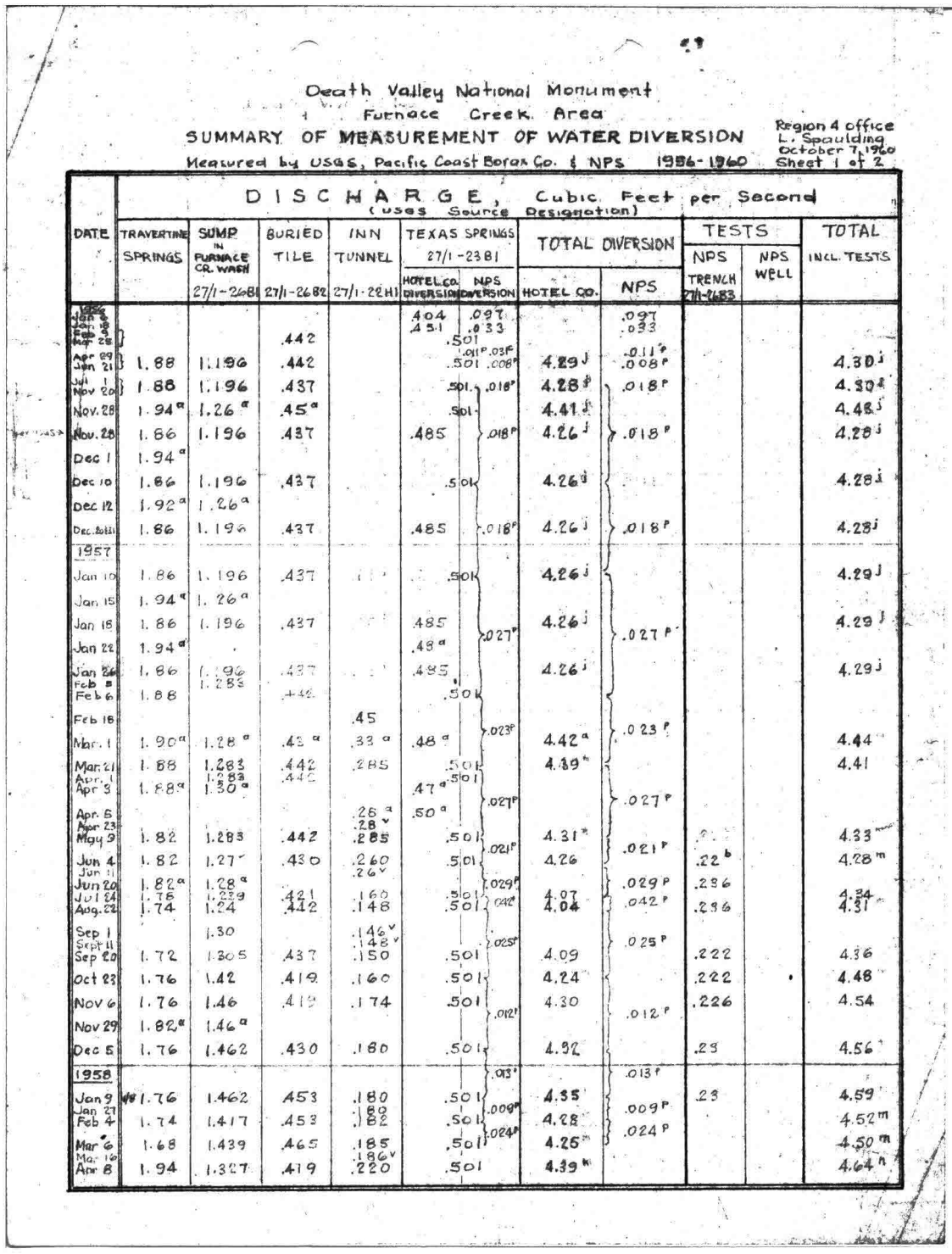
bcc: Spaulding

JWhitworth:vg:lq

00-00-0000: water discharge/ year - water diversion



00-00-0000: summary of measurement of water diverson



Death Valley National Monument
Furnace Creek Area
SUMMARY OF MEASUREMENT OF WATER DIVERSION
Measured by USGS, Pacific Coast Borax Co. & NPS 1956-1960

Region 4 office
L. Spaulding
October 7, 1960
Sheet 1 of 2

| DATE | DISCHARGE, Cubic Feet per Second (uses Source Designation) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TRAVERTINE SPRINGS | SUMP IN FURNACE CR. WASH 27/1-26B1 | BURIED TILE 27/1-26B2 | INN TUNNEL 27/1-22H1 | TEXAS SPRINGS 27/1-23B1 HOTEL CO. DIVERSION | TEXAS SPRINGS 27/1-23B1 NPS DIVERSION | TOTAL DIVERSION HOTEL CO. | TOTAL DIVERSION NPS | TESTS NPS TRENCH 27/1-26B3 | TESTS NPS WELL | TOTAL INCL. TESTS |
| 1956 | | | | | | | | | | | |
| Jan 6 | | | | | .404 | .097 | | .097 | | | |
| Jan 18 | | | | | .451 | .033 | | .033 | | | |
| Feb 3 | | | | | | .501 | | | | | |
| Mar 28 | | | .442 | | | | | | | | |
| Apr 29 | | | | | | .011[P] .031[F] | | .011[P] | | | |
| Jan 21 | 1.88 | 1.196 | .442 | | | .501 .008[P] | 4.29[j] | .008[P] | | | 4.30[j] |
| Jul 1 | | | | | | | | | | | |
| Nov 20 | 1.88 | 1.196 | .437 | | | .501 .018[P] | 4.28[j] | .018[P] | | | 4.30[j] |
| Nov. 28 | 1.94[a] | 1.26[a] | .45[a] | | | .501 | 4.41[j] | | | | 4.48[j] |
| Nov. 28 | 1.86 | 1.196 | .437 | | .485 | .018[P] | 4.26[j] | .018[P] | | | 4.28[j] |
| Dec 1 | 1.94[a] | | | | | | | | | | |
| Dec 10 | 1.86 | 1.196 | .437 | | | .501 | 4.26[j] | | | | 4.28[j] |
| Dec 12 | 1.92[a] | 1.26[a] | | | | | | | | | |
| Dec. 6-11 | 1.86 | 1.196 | .437 | | .485 | .018[P] | 4.26[j] | .018[P] | | | 4.28[j] |
| 1957 | | | | | | | | | | | |
| Jan 10 | 1.86 | 1.196 | .437 | | | .501 | 4.26[j] | | | | 4.29[j] |
| Jan 15 | 1.94[a] | 1.26[a] | | | | | | | | | |
| Jan 18 | 1.86 | 1.196 | .437 | | .485 | .027[P] | 4.26[j] | .027[P] | | | 4.29[j] |
| Jan 22 | 1.94[a] | | | | .48[a] | | | | | | |
| Jan 24 | 1.86 | 1.196 | .437 | | .485 | | 4.26[j] | | | | 4.29[j] |
| Feb 5 | | 1.283 | | | | | | | | | |
| Feb 6 | 1.88 | | .442 | | | .501 | | | | | |
| Feb 18 | | | | .45 | | | | | | | |
| Mar. 1 | 1.90[a] | 1.28[a] | .43[a] | .33[a] | .48[a] | .023[P] | 4.42[a] | .023[P] | | | 4.44 |
| Mar. 21 | 1.88 | 1.283 | .442 | .285 | | .501 | 4.39[k] | | | | 4.41 |
| Apr. 1 | | 1.283 | .442 | | | | | | | | |
| Apr 3 | 1.88[a] | 1.30[a] | | | .47[a] | .501 .027[P] | | .027[P] | | | |
| Apr. 6 | | | | .26[a] | .50[a] | | | | | | |
| Apr 23 | | | | .28[v] | | | | | | | |
| May 9 | 1.82 | 1.283 | .442 | .285 | | .501 .021[P] | 4.31[k] | .021[P] | | | 4.33[m] |
| Jun 4 | 1.82 | 1.27[v] | .430 | .260 | | .501 | 4.26 | | .22[b] | | 4.28[m] |
| Jun 11 | | | | .26[v] | | | | | | | |
| Jun 20 | 1.82[a] | 1.28[a] | | | | .029[P] | | .029[P] | .236 | | |
| Jul 24 | 1.76 | 1.259 | .421 | .160 | | .501 .042[P] | 4.07 | .042[P] | .236 | | 4.34 |
| Aug. 22 | 1.74 | 1.24 | .412 | .148 | | | 4.04 | | | | 4.31 |
| Sep 1 | | 1.30 | | .146[v] | | | | | | | |
| Sept 11 | | | | .148[v] | | .025[P] | | | | | |
| Sep 20 | 1.72 | 1.305 | .437 | .150 | | .501 | 4.09 | .025[P] | .222 | | 4.36 |
| Oct 23 | 1.76 | 1.42 | .419 | .160 | | .501 | 4.24 | | .222 | | 4.48 |
| Nov 6 | 1.76 | 1.46 | .419 | .174 | | .501 .012[P] | 4.30 | .012[P] | .226 | | 4.54 |
| Nov 29 | 1.82[a] | 1.46[a] | | | | | | | | | |
| Dec 5 | 1.76 | 1.462 | .430 | .180 | | .501 | 4.32 | | .23 | | 4.56 |
| 1958 | | | | | | .013[P] | | .013[P] | | | |
| Jan 9 | 1.76 | 1.462 | .453 | .180 | | .501 | 4.35 | | .23 | | 4.59 |
| Jan 27 | | | | .180 | | .009[P] | | .009[P] | | | |
| Feb 4 | 1.74 | 1.417 | .453 | .182 | | .501 .024[P] | 4.28 | .024[P] | | | 4.52[m] |
| Mar 6 | 1.68 | 1.439 | .465 | .185 | | .501 | 4.25[m] | | | | 4.50[m] |
| Mar 16 | | | | .186[v] | | | | | | | |
| Apr 8 | 1.94 | 1.327 | .419 | .220 | | .501 | 4.39[k] | | | | 4.64[n] |

Sheet 2 of 2

| DATE | TRAVERTINE SPRINGS | BUMP IN FURNACE CREEK WASH | BURIED TILE | INN TUNNEL | TEXAS SPRINGS | | TOTAL DIVERSION | | TESTS | | TOTAL INCL. TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HOTEL CO. | NPS | HOTEL CO. | NPS | NPS TRENCH | NPS WELL | |
| 1958 | | | | | | | | | | | |
| Apr 15 | 1.86[b] | 1.28[b] | | .20[b] | | 4/8 .502[b] | | .026[p] | .231[b] | | |
| Apr 30 | 4/29 1.82 | 5/1 1.327 | | 5/1 .200 | | .501 | | | | | |
| May 16 | 1.82[b] | | (diverted to test trench) | | | | | | .786[d] | | |
| May 20 | 1.82[b] | 1.26[b] | .407[b] | .20[b] | | | 4.17[q] | | .371[b] | | 4.56[q] |
| May 26 | | | 5/22 .373[b] | | | | | | .361[b] | | |
| May 27 | 1.82 | 1.327 | .373 | .204 | | .501 | 4.20[s] | | | | 4.58[t] |
| Jun 5 | | | | .20[v] | | | | | | | |
| Jun 25 | 1.82 | 1.283 | .373 | .140 | | .501 .032[l] | 4.09 | .032[p] | .34 | | 4.46 |
| Jul 25 | 1.78 | 1.283 | .266 | .095 | | .501 .033[p] | 3.89 | .033[p] | .34 | | 4.27 |
| Aug 6-17 | | | | .085[x] | | | | | | | |
| Aug 27 | 1.82 | 1.283 | .361 | .110 | 8/26 .501 | .014[p] | 4.05 | .014[p] | .55 | | 4.43[b] |
| Sep 25 | 1.86 | 1.327 | .373 | .120 | | .501 | 4.17 | | .85 | | 4.53 |
| Oct 21 | 1.88 | 1.327 | .373 | .100 | | .501 | 4.16[k] | | .35 | | 4.53[k] |
| Nov. 13 | 1.88 | 1.417 | .373 | .102 | | .501 | 4.26[s] | | | | 4.63[s] |
| Nov. 13 | 1.92[a] | 1.42[a] | | .10[a] | | .47[a] | | | .85[a] | | |
| Nov. 21-23 | | | | | | | | | | .84[b] | |
| Nov 24 | 1.92[a] | 1.46[a] | | | | .47[a] | | | .35[d] | .31+.84[b] | |
| Dec 9 | 1.88 | 1.327 | .373 | .113 | | .468 | 4.14[k] | | .36 | | 4.52 |
| 1959 | | | | | | | | | | | |
| Jan 6 | 1.86 | 1.327 | .373 | .105 | | .468 | 4.11[k] | | | | 4.49[u] |
| Jan 29 | 1.88 | 1.372 | .373 | 1/28 .110 | | .501 | 4.22[k] | | .50[e] | | 4.60[u] |
| Mar 4 | 1.86 | 3/5 1.372 | .407 | .113 | | .501 | 4.23[k] | | 3/5 .38 | | 4.63 |
| Apr 6 | | | | .120 | | | | | | | |
| May 6 | 1.78 | 1.33 | .38 | .12 | | .50 | 4.09[k] | | .37 | | 4.48 |
| Jun 3 | 1.82 | 1.24 | .42 | .12 | | .44 | 4.02[k] | | | | |
| Jul 9 | 1.78 | 1.33 | .37 | 7/8 .22 | 7/8 | .47 | 4.15[k] | | | | |
| Aug 6 | 1.82 | 1.24 | .40 | .18 | | .47 | 4.09[k] | | .46[e] | | 4.47[u] |
| Sep 12 | | | | | | | | | of | | |
| Oct 29 | 1.78 | 1.65 | .42 | 10/28 .25 | | .47 | 4.55[k] | | | | 4.57 |
| Nov. 9 | 1.78[ag] 1.72[ah] | 1.65[a] | .43[a] | .26[a] | | .40[a] .08[a] | 4.46[a] | .08[a] | | | 4.54[d] |
| Dec 4 | 1.82 | 1.28 | .43 | .26 | | .47 | 4.24[k] | | | | 4.26 |
| 1960 | | | | | | | | | | | |
| Jan 12 | 1.82 | 1.46 | .44 | .28 | 1/11 | .47 .012 | 4.46 | .01 | | | 4.47 |

NOTES

a. Measurement by U. S. Geological Survey.

b. Measurement by National Park Service.

c. Average flow 3 days during easter week, Tuesday - Friday, March 27-30, 1956, meter read by Spaulding.

d. Includes flow from 6" domestic line (Buried Tile).

e. Value probably too high because of growth of vegetation. Value of 0.36 substituted for arriving at total.

f. Test trench washed full of sand and gravel by flash flood on September 12, 1959. Water previously diverted from test trench into Hotel Company ditch thereafter remained in the underflow of Furnace Creek Wash.

g. Growth of tules in pool above flume, restricted flow and caused erroneous reading.

h. Growth of tules removed.

j. Total using 0.28 for Inn Tunnel.

k. Total using .02 for NPS diversion from Texas Spring.

m. Total using 0.23 for test trench diversion.

n. Total using .02 for NPS at Texas Spring and 0.23 for test trench.

p. Average between meter readings.

q. Total using 0.48 for Hotel Co. diversion at Texas Spring and .02 NPS.

s. Total using .03 for NPS diversion at Texas Spring.

t. Total using .03 for NPS diversion at Texas Spring and 0.35 at test trench.

u. Total using .02 for NPS diversion at Texas Spring and 0.36 at test trench.

v. Value from stage recorder chart.

REFERENCES - - SOURCE OF DATA

1. Pistrang and Kunkel, "A Brief Geologic and Hydrologic Reconnaissance of the Furnace Creek Wash Area, Death Valley National Monument, California," U. S. Geological Survey, Long Beach, 1958 and 1960 editions.

2. List of Borax Company measurements attached to Superintendent Binnewies' memorandum of May 15, 1959 (L54).

3. Summary of measurements by Spaulding and others attached to Regional Chief of Operations' memorandum of June 16, 1958 (L54).

4. Lists of United States Borax and Chemical Corporations' readings and photo copies of recorder charts transmitted with Superintendent Binnewies' memorandum of October 6, 1958 (Alien Water Right, Docket No. 42.)

06-20-1960: letter to acting regional chief concerning ground-water analysis ; june 20, 1960

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

June 20, 1960

Copy made for Supplemental Data File, Docket 24,56
155
~~Spaulding~~
Whitworth
~~Water~~

IN REPLY REFER TO:
L 54

Memorandum

To: Acting Regional Chief of Operations

From: Hydraulic Engineer Spaulding, Region Four

Subject: Ground-Water Analysis, Furnace Creek Area, Death Valley NM

At your request I prepared an outline of possible tests to determine the total water available in the Furnace Creek Area. The tests are presented in the body of this memorandum. A supporting analysis together with notes and drawing NMDV 2213 is attached. On the basis of my analysis I concluded that it may be possible to measure the total water passing through the area by two independent methods. One method is to measure the incoming water by an extensive pumping test on the assumption that all water first passes through the synclinal aquifer. The other method is to measure all water being discharged from the area on the assumption that nearly all the water eventually is transpired by vegetation or is evaporated from the floor of the valley. Tests No. 1 and No. 2 outlined below have been devised to determine the quantity of water by these two methods. Two other tests, No. 3 and No. 4 have been added to provide subsidiary data.

FILE COPY

Test No. 1 to determine directly the recharge to the synclinal aquifer. This test would measure the inflow by pumping from the aquifer at a rate high enough to cause lowering of the water table to the degree that all normal discharge from the aquifer ceases. Cessation would occur when the water table dropped below all outlets, some of which may have no surface indication. In effect, removal of a large percentage of water in storage in the aquifer is contemplated by this test.

Test procedure would be to start pumping at a relatively low pumping rate of, say, 1000 gallons per minute and to pump continuously at this rate until the water table stabilizes. The pumping rate would then be increased and continued at a higher rate until the water table again stabilizes. This process would be continued until a pumping rate was reached above which the water table would fail to stabilize. Recharge to the aquifer could be equated to the highest pumping rate at which stabilization could be attained. Relating recharge to climatological factors in order to determine "dry" year discharge may require additional pumping or extended observation of related spring discharge.

It is difficult to predict in advance the rate at which pumping must be done or the length of time required. However, on the assumptions suggested by the attached analysis that recharge to the synclinal aquifer is between the limits of 1 cfs and 10 cfs and that the volume in storage is 35,000 acre feet, pumping at 15 cfs. continuously for 2 to 5 years would be required to reduce aquifer storage by 50 percent (equivalent to drawing down the water table about 30 feet throughout the aquifer). The estimated cost of construction and operation facilities required for this test are:

| Construction | Estimated Cost |
|---|---|
| 16 additional wells | $ 64,000 |
| 17 pumps with 30 hp electric motors | 43,000 |
| 8,000 ft 8" to 18" diameter pipe and measuring device | 80,000 |
| Generating Plant with two 500 KW generators | 120,000 |
| Total | $307,000 |

| Operation (for 2 - 5 years) | Estimated Cost |
|---|---|
| Operation of Power Plant @ $300 per day (2-1/2 ¢ per Kwhr) | $220,000 - $550,000 |
| Operation and maintenance of pumps and care of water @ $50.00 per day | 36,000 - 90,000 |
| Total | $256,000 - $640,000 |

Total Cost of Test:

$563,000 to $947,000

This test, if successful in measuring the water, might completely disrupt all present water supplies and it appears the test could be of immense cost both in construction and in operation. On the other hand, the magnitude of the test and the effect upon other diversions would be reduced if it proves out that the synclinal aquifer is hydrologically separate or down gradient from Travertine and Texas Springs.

Test No. 2 to determine evapotranspiration from Furnace Creek Fan and Valley Floor. A field investigation would be required to determine transpiration rates of mesquite and other phreatophytes on the Furnace Creek Fan, the evaporation rate from mud flats on the valley floor bordering the Fan and the limits of the area of evapotranspiration to which water passing through the Furnace Creek area contributes. It is suggested that the U. S. Geological Survey provide a plan of investigation designed to produce the following results:

1. Provide transpiration rates for the various phreatophytes on the Furnace Creek Fan with quantitative data on variables such as density of growth, temperature, humidity and depth to water.

2. Provide evaporation rates for open water, mud flats and other areas of evaporation on the valley floor.

3. Provide areal extent of various classes of phreatophytes and surfaces of evaporation within the area supplied by water from the Furnace Creek area.

4. Provide data on the chemical quality of water appearing on the Fan and valley floor with data on the relationship of phreatophytes and water quality.

5. Provide rates of evapotranspiration of each class of vegetation and of bare ground in the developed area of Furnace Creek Ranch and the areal extent of each class.

It is estimated that the cost of such an investigation and report would be from $15,000 to $20,000.

This method, that of calculating evapotranspiration, was used in my analysis presented by the attached map, table and notes to arrive at a very rough estimate of the total water available. In this analysis the Furnace Creek area has been divided into zones according to geologic structure. Evaporation and transpiration from those zones into which all water in the area eventually discharges was calculated. These end results gave data from which water passing through each of the contributing zones could be roughly estimated. The net recharge to the entire area (and the net discharge) has been found by this rough analysis to be 8.1 cubic feet per second. Very rough calculations show a total of 224,000 acre feet of water in storage including poor quality water in the valley floor. It is estimated that the total amount of water available for use may be between 8 and 11 cubic feet per second which quantity could be increased temporarily by pumping from storage. This quantity is more than the net recharge because of the possibility of re-using return water.

Test No. 2 contemplates a refinement of the procedure used in my brief analysis.

Test No. 3 to determine ground-water discharge from Furnace Creek Wash. On the safe assumption that all ground-water leaving Furnace Creek Wash is flowing in the underground channel of the Wash, the quantity may be measured by excavating a trench to bed rock at the mouth of the Wash near Furnace Creek Inn. This would require an excavation 300 feet long and 20 to 40 feet deep. The estimated cost of such a test is $20,000 to $30,000. Trenches located up the Wash probably would be inconclusive in that no proof would be had of water entering in seams between such an upstream trench and the mouth of the Wash. I believe that the amount of water involved is not large and that the test would add only slightly to defining the total water supply.

**Test No. 4 to measure the size of aquifers.** An accurate determination of the amount of water in storage in the various ground water bodies in the Furnace Creek would require an extensive program of drilling and testing. However, such data probably is not necessary as it may be possible to determine perennial yield using only a rough determination of the quantity in storage.

In outlining the above tests cognizance was taken of the several hypotheses explaining possible sources and routes of water appearing in the Furnace Creek area. I refer to the hypothesis with four variations presented in the Pistrang-Kunkel report which considers precipitation within the tributary drainage area to be the source and to an alternate hypothesis advanced by Charles Hunt suggesting that the origin of the water may be a common source with water appearing at Ash Meadows and the Pahrump Valley.

Lynn S. Spaulding
Hydraulic Engineer

Attachments

LSSpaulding:lq

CLEARED FOR DISTRIBUTION:

T. Ferris 6/20/60
Assistant Regional Director Date

Distribution: Director
Chief, WODC
Superintendent, Death Valley

bc: Whitworth

NOTE: This analysis presents a method of determining water quantities even though results shown are not definitive.

DEATH VALLEY NATIONAL MONUMENT
FURNACE CREEK AREA
# GROUND WATER ANALYSIS
June 10, 1960 L. Spaulding

LEGEND
(5.5) Zone Refer to areas on attached dwg. NMDV 2213
① Figure in parenthesis is rough estimate
a Refers to test required for accurate quantity
Lower case letter refers to attached notes.

| A | B | C | D | E | F | G | H | J | K | L | M | N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ZONE | FORMATION | RECHARGE to ZONE | | STORAGE in ZONE | | DISCHARGE from ZONE | | | | | | AVAILABLE WATER | |
| | | Source of Recharge | Quantity cfs | Aquifer size depth Specific yield | Water Volume Acre Feet | SPRINGS TUNNELS SUMPS cfs | Evapotranspiration Vegetation Area & Rate | Q cfs | Ground-water Zone receiving discharge | Q cfs | Total Discharge cfs | perennial good quality cfs | probable limits cfs |
| I | Travertine Springs<br>Texas Springs<br>lower wash | Ground Water from Zone II<br>from Zone VIII<br>from distant source and/or F.C. watershed<br>total | (≤5.5)<br>(none)<br>(≤5.5)<br>(5.5)[a] | | negl. | 4.5[b] | | 0.5[b] | Zone III<br>Zone IV | ③ (0.3)[g]<br>(0.2)[g]<br>(0.5)[c] | (5.5) | (5.2)[d] | 5.0-5.4 |
| II | Synclinal Aquifer | Ground Water from Furnace Creek watershed<br>from distant source<br>total | ①<br>(≤6.3)[e]<br>(≤6.3)[e] | (5900) acres<br>(601) ft. deep<br>sp. yield (10%) | ④<br>(35,000) | none | | none | Zone I<br>Zone V<br>Zone VI<br>Zone VIII | (≤5.5)<br>(none)[f]<br>(≤0.8)[v]<br>(none) | (≤6.3) | (≤6.3) | (0.3)[w] | 0-0.6 |
| III | Furnace Creek Fan<br>South portion | Ground Water from zone I<br>from zones V & IX<br>from F.C. watershed<br>from distant source<br>total | (0.3)[g]<br>(1.1)[k]<br>(1.4)[k] | 3600 acres<br>(100) ft deep<br>sp. yield (10%) | ④<br>(36,000) | none | mesquite n. (46 A. @ 5 Ft/yr) (0.3)[h]<br>other phreatophytes (40 A. @ 2.5 Ft/yr) (0.1)[h]<br>③<br>total (0.4)[h] | | Zone X | (1.0) j<br>(1.0) j | (1.4) | (0.6)[m] | 0.1-1.1 |
| IV | Furnace Creek Fan<br>North portion | Ground water from Zone I<br>from Zone V<br>from F.C. drainage<br>from distant source(s)<br>Return water from Ranch & Inn<br>total | (0.2)[g]<br>(0.1)[k]<br>(3.6)[n]<br>(3.9)[k] | 2000 acres<br>(100) ft deep<br>Sp. yield (10%) | ④<br>(20,000) | none | mesquite & tamarisk (20 acres @ 6 Ft/yr) (0.2)<br>other phreatophytes (20 acres @ 2') (0.1)<br>Ranch & Inn — n<br>②<br>total (0.3)[h] | | Zone X | (3.6) j<br>(3.6) j | (3.9) | (1.8)[p] | 0-2.8 |
| V | Furnace Creek Formation North Extension | Ground water from Zone II and/or VI from other source[z] | (0.1)[r] | | negl. | none | negligible | negl. | Zone IV | (0.1)[s] | (0.1) | (none) | |
| VI | North Alluvium | Ground Water from Funeral Mts<br>from distant source<br>total | (≤0.8)<br>(≤0.8)<br>(0.≤)[k] | (4700) acres<br>(10) Ft deep<br>Sp. yield (10%) | ④<br>(5000) | .01[b] | negligible | negl. | Zone X | (0.8) j<br>(0.8) j | (0.8) | (0.2)[t] | 0-0.4 |
| VII | Nevares Springs<br>Cow Creek | Ground Water from Armagosa Mts<br>from distant source<br>Return Water NPS Hq.<br>(1.9)[k] | (1.7)[k]<br>(0.2)[n] | | negl. | 0.7[u] | growth at Nevares Spr. (30 acres @ 6') (0.2)<br>growth at NPS Hq. — n<br>② | (0.2) | Zone X | (1.2) j<br>(1.2) j | (1.9)[u] | (0.8) | 0.7-1.0 |
| VIII | Furnace Creek Wash | Ground Water Zones II & IX | negl. | | negl. | none | none | none | Zone I | (none) | (none) | none | |
| IX | Furnace Creek Formation | Rainfall | negl. | | negl. | none | none | none | Zones I, III & VIII | none | none | none | |
| X | Valley Floor | Ground water from Zone III<br>from Zone IV<br>from Zone VI<br>from Zone VII<br>from other source<br>total | (1.0)<br>(3.6)<br>(0.8)<br>(1.2)<br>(none)<br>(6.6)[x] | (6400) acres<br>(200) ft deep<br>Sp. yield (10%) | ④<br>(128,000) | none | (A) mud (1200) A @ .6 (1.0)<br>(B) (water (200) Ag 12") (3.6)<br>mud (400) A @ .6<br>(C) water (40) Ag 12" (0.8)<br>mud (100) A @ .6<br>(D) water (ac) Ag 12" (1.2)<br>mud (200) A @ .6<br>② | (6.8) | limits of Zone X selected so that there is no ground water discharge from the zone | (6.6) | none | | |
| | NET or TOTAL | (net) | (8.1)[aa] | | (224,000) | 5.2 | ② | (8.0) | (net) | none | (8.1)[x] | (8.9)[y] | 8-11 |

FURNACE CREEK AREA
GROUND WATER ANALYSIS

NOTES

a. Recharge to Zone 1

Total recharge was determined indirectly by equating to discharge (column M). Source of ground-water flowing into Zone 1 may be (1) Zone II, or (2) Furnace Creek drainage, or (3) a distant source, or (4) a combination of two or more of the first three.

b. Discharge from springs, tunnels and sumps and evapotranspiration are from the Pistrang-Kunkel report of 1958.

c. Ground water discharge from Zone 1 was determined by Spaulding's analysis of effects of NPS test trench upon Inn Tunnel diversion. Inasmuch as the removal by the test trench of 0.35 cfs from the underflow of Furnace Creek resulted in a 2/3 reduction in the Inn tunnel diversion (reduced from a flow of 0.3 cfs to a flow of 0.1 cfs), it follows that the total underflow is in the order of 150% to 200% of the original Inn tunnel diversion or about 0.5 cfs.

d. Available water in Zone 1. Total available water (5.2 cfs) as estimated roughly by Spaulding is equal to spring, tunnel and sump diversion (4.5 cfs) plus 80% of underflow of wash now leaving below the Inn tunnel (0.4 cfs) and 60% of present evapotranspiration loss (0.3 cfs.).

e. Recharge to Zone II. This quantity has been determined indirectly by equating with discharge. Measuring directly probably would require long term pumping at a high rate (Test 1).

f. Ground-water discharge from Zone II into Zone V. Spaulding assumed there is no groundwater discharge into Zone V unless it be flow in deep conduits on the basis that Zone V is an extension of the impermeable Furnace Creek formation.

g. Ground-water recharge to Zones III and IV. Values shown have been estimated on the basis that recharge from Zone 1 spreads uniformly under the fan, 60% to Zone III and 40% to Zone IV.

h. Evapotranspiration from Zones III, IV and X. Rough estimates shown were made on basis of data obtained in telephone conversation with Mr. T. W. Robinson on June 7.

j. Ground-water discharge from Zones III, IV, VI and VII. The values shown were estimated roughly by Spaulding as the quantities flowing into Zone X(A) and X(B), X(C) and X(D) and equal to the evaporation from open water and mud flats. (See Column J, Zone X). Test 2 would be required to produce an accurate figure.

k. Recharge to Zones III, IV, VI, VII and X. Values of total recharge were arrived at indirectly by equating with total discharge (Column M). Quantities from each source were equated to discharge from upgradient zone where known with balance put into recharge from zones where no direct calculation was possible.

m. Available water Zone III. Value shown was estimated as equal to 50% of remaining inflow to Zone III after deducting 0.2 cfs for water collected in Zone 1. This water may not be of quality suitable for domestic use.

n. Evapotranspiration and Returned water Zones IV and VI. To avoid duplication evapotranspiration of water on developed areas at Furnace Creek Ranch and Inn and at Cow Creek has not been included with discharge from the place of use. It was considered that this imported water was consumed before reaching ground-water. However, a portion of the water imported to developed areas was added to recharge as return water.

Consumptive use and return water has been caluclated roughly as follows:

Furnace Creek Ranch and Inn, Zone IV

| | |
|---|---|
| Total water applied (imported from Zone 1) | 4.4 cfs |
| Less water exported from Zone IV (human use) | 0.1 |
| | 4.3 |
| Less Consumptive use | |
| Domestic use - (assume equivalent amount returned to Zone) | -- |
| Evapotranspiration ranch and Inn 120 acres @ 10 ft per year = 1200 AF = | 1.7 |
| Return water | 3.6 cfs |

Cow Creek Zone VII

| | |
|---|---|
| Total water applied (imported from Nevares Springs) | 0.6 cfs |
| Less evapotranspiration from developed area 12 acres @ 10 ft per year = 120 AF = | 0.2 |
| Less evaporation of surplus water | 0.2 |
| Return water | 0.2 |

p. Available water in Zone IV. The value shown assumes that 50% of the return water from Furnace Creek Ranch could be collected and is of satisfactory quality.

[illegible] indirectly being equal to total

s. Discharge i n Zone V. Value shown was det ined indirectly being the remainder of recharge to Zone IV after other sources were allowed for.

t. Water available from Zone VI. Estimated by Spaulding to be 0 to 50% of ground-water passing through the Zone.

u. Spring discharge and total discharge from Zone VII. Spring discharges as measured by Spaulding (See L-54, attachment to Johnson's memo of January 22, 1958 to Director). Two tenths of a cubic foot per second of the spring flow is estimated to be returned to ground water below the Cow Creek development (see Note n). The net total discharge from Zone VII is the spring flow (0.7) less return water (0.2) plus evapotranspiration (0.2) plus ground water discharge (1.2) totaling 1.9 cfs.

v. Discharge from Zone II into Zone VI. Value cannot be greater than quantity of water passing through Zone VI into Zone X(C) where quantity has been roughly calculated by rate of evapotranspiration (See Zone X, Column J.).

w. Water available from Zone II. Very rough estimate by Spaulding being not more than 75% of the water estimated as discharging from Zone II into Zone VI and none of water discharging from Zone II into Zone 1. According to this analysis taking more from Zone II would deduct from Zone 1 with no net gain.

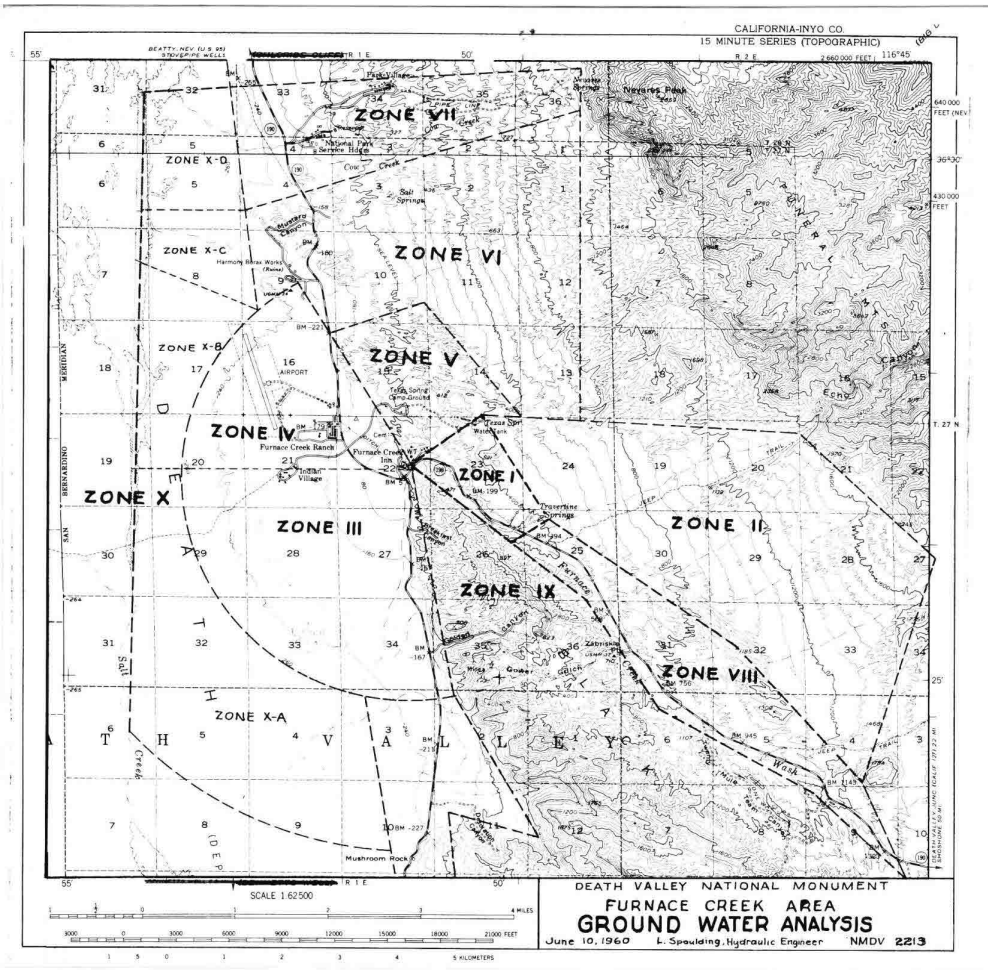
x. Total discharge from Furnace Creek Area. Amount is total of evapotranspiration (8.0 cfs) plus 0.1 cfs exported from the area through human use. This quantity is equal to the total recharge to the area (Column B).

y. Total available water in Furnace Creek Area. Sum of rough calculations shows 8.9 cfs available of which 1.6 cfs is re-used water.

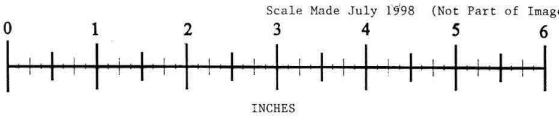
z. Recharge to Zone V. Other sources may be (1) return water from Texas Spring Campground or (2) underground conduits leading from the Furnace Creek watershed or (3) from distant sources.

aa. Total Recharge to Furnace Creek Area. Total is the sum of Recharge to Zone I (5.5) plus recharge to Zone V(0.1) plus recharge to Zone VI (0.8) plus recharge to Zone VII excluding re-use (1.7) giving a total of 8.1 cubic feet per second. This quantity is equal to the total discharge from the area (Column M).

06-10-1960: map on ground water analysis; june 10, 1960




Scale Made July 1998 (Not Part of Image)



02-25-1960: enclosed are 2 copies of data tables; february 25, 1960

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
Ground Water Branch
221 Redondo Avenue
Long Beach 3, California

IN REPLY REFER TO: 154 Denver

| | INITIAL | DATE |
|---|---|---|
| SUPT. | | |
| ASST. S.S. | | |
| OPERATIONS | | |
| ADMIN. | | |
| RECREATION | | |
| [illegible] | | |
| RANGER ACT | | |

3/7 455 Spaulding Whitworth

February 25, 1960

To: G. F. Whitworth, Acting Regional Chief of Operations
National Park Service, Region Four
San Francisco, Calif.

copy of memo made for Supplemental file - WR 24.5.6 attachments filed in Docket 24.5.6 Supplement

From: Geologist in Charge, U. S. Geological Survey
Ground Water Branch, Long Beach, Calif.

Subject: Furnace Creek Wash area, Death Valley National Monument

Through: H. D. Wilson, Jr.
District Engineer, USGS

Enclosed are two copies of data tables which include all records of spring flow, chemical analyses of water , and data for the Park Service test well. These tables contain all data collected by the Geological Survey and the U. S. Borax and Chemical Corp. through January 12, 1960. These data were collected in accordance with an agreement between the National Park Service and Geological Survey and, in part, duplicate earlier material supplied to the Park Service.

In addition to the above, we are enclosing two copies of the U. S. Geological Survey administrative report entitled "Report on Exploratory Drilling at Death Valley National Monument, Inyo County, Calif.," by Fred Kunkel, 1959. Plate 2 of this report shows the locations of the springs and test wells listed in the tables of data.

Fred Kunkel

Fred Kunkel

FK/lm
cc: H. D. Wilson, Jr., DE, USGS

Region Four
transmitted with Kuckels
memo of 2/25/60
K.54 DEVA

Table 1.--Data on points of ground-water discharge

USGS number: For description of Geological Survey numbering system see section on discharge-point numbering system.

Name: Each point of ground-water discharge inventoried by the Geological Survey is identified and is shown on figure 2.

Type of discharge: P phreatophyte area, no observed surface flow; S seep, flow too small to measure; F flow, measurable amount either from spring or artificial diversion; W well.

Altitude: Except where otherwise noted, the altitudes given are approximate, and are interpolated from Geological Survey topographic maps having an 80-foot contour interval.

Flow: The rate of flow, where measured or estimated, is given in cubic feet per second (cfs). The methods for determining the rate of flow are indicated as follows: Fm Parshall flume; Wr rectangular weir; B bucket and stopwatch; Est estimated by cross-sectional area and velocity of flow using a floating object and stopwatch.

Temperature: The temperatures given are in degress Fahrenheit, measured at the point of discharge.

Table 1.--Data on points of ground-water discharge--Continued

| USGS number [1] | Name | Type of discharge | Altitude (feet) | Date measured | Flow (cfs) | Temperature (°F) |
|---|---|---|---|---|---|---|
| T. 27 N., R. 1 E. | | | | | | |
| 27/1- 3A1 | Cow Spring (undeveloped) | F | 200 | 3- 5-57 | 0.04 Est | 81 |
| 3B1 | Undeveloped spring | P | 240 | - | - | - |
| 3K1 | Salt Spring (undeveloped) | S | 100 | - | - | - |
| 3P1 | do. | F | 0 | 12- 1-56 | .01 Est | 73 |
| 14N1 | Undeveloped spring | P | 170 | - | - | - |
| 14P1 | do. | P | 240 | - | - | - |
| 14Q1 | do. | P | 400 | - | - | - |
| 22H1 | USBCC [2] tunnel, Furnace Creek Inn | F | 50 | 3- 1-57 | .33 Fm | 91½ |
| 23B1 | Texas Spring (tunnel) | F | 380 | 1-22-57 | .50 Wr | 91 |
| 23B2 | Undeveloped spring | P | 400 | - | - | - |
| 23B3 | do. | P | 400 | - | - | - |
| 23B4 | do. | P | 400 | - | - | - |
| 23F1 | do. | F | 160 | 2-28-57 | .01 Est | 80 |
| 23G1 | do. | P | 400 | - | - | - |
| 23G2 | do. | P | 400 | - | - | - |
| 23J1 | do. | P | 410 | - | - | - |
| 23J2 | do. | P | 410 | - | - | - |
| 23K1 | do. | S | 410 | - | - | - |
| 23K2 | do. | F | 400 | - | .01 Est | - |
| 23L1 | do. | S | 160 | - | - | - |

Table 1.--Data on points of ground-water discharge--Continued

| USGS number 1/ | Name | Type of discharge | Altitude (feet) | Date measured | Flow (cfs) | Temperature (°F) |
|---|---|---|---|---|---|---|
| T. 27 N., R. 1 E.--Continued | | | | | | |
| 27/1-23L2 | Undeveloped spring | P | 160 | - | - | - |
| 23L3 | do. | S | 160 | - | - | - |
| 23P1 | NPS well dug in Furnace Creek Wash, depth of well 19.0 feet | W | 200 | Depth to water, in feet, below land surface | | |
| | | | | 11-27-56 | 15.09 | |
| | | | | 2-28-57 | 15.71 | |
| | | | | 3- 7-57 | 15.57 | |
| | | | | 6-19-57 | dry at 19 feet | |
| 23Q1 | Undeveloped spring | S | 320 | - | - | - |
| 23Q2 | do. | S | 320 | - | - | - |
| 23Q3 | do. | F | 320 | 12-17-56 | .01 Est | 72 |
| 23Q4 | do. | S | 320 | - | - | - |
| 23Q5 | do. | S | 320 | - | - | - |
| 23Q6 | do. | S | 320 | - | - | - |
| 23R1 | Travertine Spring | F | 400 | 1-19-57 | .68 Wr | 92 |
| 23R2 | Undeveloped spring | P | 410 | - | - | - |
| 23R3 | do. | P | 410 | - | - | - |
| 24N1 | do. | S | 400 | - | - | - |

Table 1.--Data on points of ground-water discharge--Continued

| USGS number 1/ | Name | Type of discharge | Altitude (feet) | Date measured | Flow (cfs) | Temperature (°F) |
|---|---|---|---|---|---|---|
| T. 27 N., R. 1 E.--Continued | | | | | | |
| 27/1-25D1 | Travertine Spring | F | 400 | | | 92 |
| 25D2 | do. | S | 400 | 1-19-57 | 0.23 Wr | - |
| 26A1 | do. | F | 330 | | | 89 |
| 26A2 | do. | F | 320 | 12-16-56 | .5 Est | 91½ |
| 26A3 | do. | F | 320 | 12-13-56 | .001 Est | 89 |
| 26A4 | do. | F | 320 | 12-13-56 | .01 Est | 94 |
| 26A5 | do. | F | 320 | 11-28-56 | | 95½ |
| 26A6 | do. | F | 330 | 11-28-56 | .6 Est | 94 |
| 26A7 | do. | F | 330 | 11-28-56 | | 85 |
| 26B1 | Sump in Furnace Creek Wash, USBCC | F | 280 | 11-28-56 | 1.26 Wr | 92 |
| 26B2 | Buried tile in Furnace Creek Wash, USBCC | F | 250 | 11-28-56 | .45 Wr | - |
| 26B3 | Park Service trench | F 3/ | 250 | 6-20-56 | .24 Fm | - |
| 26B4 | Undeveloped spring | S | 320 | - | - | - |
| 26B5 | do. | S | 320 | - | - | - |
| T. 28 N., R. 1 E. | | | | | | |
| 28/1-34M1 | Undeveloped spring | P | 0 | - | - | - |
| 34N1 | do. | S | 10 | 12- 1-56 | - | 73½ |
| 34N2 | do. | P | 80 | - | - | - |

Table 1.--Data on points of ground-water discharge--Continued

| USGS number 1/ | Name | Type of discharge | Altitude (feet) | Date measured | Flow (cfs) | Temperature (°F) |
|---|---|---|---|---|---|---|
| T. 28 N., R. 1 E.--Continued | | | | | | |
| 28/1-34P1 | Undeveloped spring | P | 100 | - | - | - |
| 35E1 | do. | P | 380 | - | - | - |
| 35G1 | do. | P | 500 | - | - | - |
| 35K1 | do. | S | 520 | 3- 4-57 | - | 76 |
| 35N1 | do. | F | 380 | 3- 5-57 | 0.01 Est | a78 |
| 36G1 | Nevares Springs area 1, north part, of Robinson (written communication) | F | b937 | 12-14-56 | .60 Fm | 104 |
| 36G2 | Nevares Springs area 1, point B, of Robinson (written communication) | F | b896 | 12-14-56 | .05 B | 102 |
| 36K1 | Nevares Springs area 2, of Robinson (written communication) | S | b920 | 12-14-56 | - | 69 |
| 36M1 | Nevares Springs area 3, point E, of Robinson (written communication) | F | b720 | 12-14-56 | .07 B | 78 |

Table 1.--Data on points of ground-water discharge--Continued

| USGS number 1/ | Name | Type of discharge | Altitude (feet) | Date measured | Flow (cfs) | Temperature (°F) |
|---|---|---|---|---|---|---|
| T. 28 N., R. 1 E.--Continued | | | | | | |
| 28/1-36M2 | Nevares Springs area 4, point D, of Robinson (written communication) | F | b745 | 12-14-56 | - | 84 |

1. For locations of discharge points see figure 2. For explanation of numbering system see section on discharge-point numbering system. For index of ground-water discharge points by areas see table 2.

2. U. S. Borax and Chemical Corp.

3. Trench destroyed by flash flood in September 1959.

a. Measurement 10 feet from source.

b. Altitude from Robinson (written communication).

Table 2.--Geological Survey numbers for ground-water discharge points by areas

| | | | |
|---|---|---|---|
| **Travertine Springs** | | | |
| **(Diverted into USBCC irrigation system)** | | | |
| 27/1-23R1 | 27/1-26A1 | 27/1-26A4 | 27/1-26A7 |
| 25D1 | 26A2 | 26A5 | |
| 25D2 | 26A3 | 26A6 | |
| **Undeveloped springs, seeps, and phreatophyte areas in area of Travertine-Texas Springs** | | | |
| 27/1-14N1 | 27/1-23G1 | 27/1-23L2 | 27/1-23Q6 |
| 14P1 | 23G2 | 23L3 | 23R2 |
| 14Q1 | 23J1 | 23Q1 | 23R3 |
| 23B2 | 23J2 | 23Q2 | 24N1 |
| 23B3 | 23K1 | 23Q3 | 26B4 |
| 23B4 | 23K2 | 23Q4 | 26B5 |
| 23F1 | 23L1 | 23Q5 | |
| **U. S. Borax and Chemical Corp. tunnel (Texas Spring)** | | | |
| 27/1-23B1 | | | |
| **Sump in Furnace Creek Wash** | | | |
| 27/1-26B1 | | | |

Table 2.--Geological Survey numbers for ground-water discharge points by areas--Continued

| | | |
|---|---|---|
| Buried tile in Furnace Creek Wash | | |
| 27/1-26B2 | | |
| Furnace Creek Inn tunnel | | |
| 27/1-22H1 | | |
| NPS well in Furnace Creek Wash | | |
| 27/1-23P1 | | |
| NPS trench in Furnace Creek Wash | | |
| 27/1-26B3 | | |
| Nevares Springs | | |
| 28/1-36G1 | 28/1-36K1 | 28/1-36M2 |
| 36G2 | 36M1 | |
| Cow Spring | | |
| (undeveloped) | | |
| 27/1-3A1 | | |

Table 2.--Geological Survey numbers for ground-water discharge points by areas--Continued

| | | |
|---|---|---|
| **Undeveloped springs, seeps, and phreatophyte areas in area of Cow Creek** | | |
| 27/1- 3B1 | 28/1-34N2 | 28/1-35G1 |
| 28/1-34M1 | 34P1 | 35K1 |
| 34N1 | 35E1 | 35N1 |
| **Salt Springs (undeveloped)** | | |
| 27/1-3K1 | | |
| 3P1 | | |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area

(Discharge in cubic feet per second. Measurements by U. S. Borax and Chemical Corp., except as indicated.)

27/1-23B1. Texas Spring tunnel. Measurement in settling box by 18-inch rectangular weir.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1926a | b0.28 | Dec. 31, 1956 | c0.48 | June 25, 1958 | 0.50 |
| Jan. 9, 1941 | a.38 | Jan. 10, 1957 | c.48 | July 25 | .50 |
| Feb. 9, 1956 | .50 | 18 | c.48 | Aug. 26 | .50 |
| 23 | .50 | 22 | c d.48 | 27 | .50 |
| Mar. 8 | .50 | 26 | c.48 | Sept. 25 | .50 |
| Apr. 29 | .50 | Feb. 5 | c.48 | Oct. 21 | .50 |
| May 17 | .50 | 6 | .50 | Nov. 13 | .47 |
| June 21 | .50 | Mar. 1 | c d.48 | 13 | d.47 |
| July 1 | c.48 | 21 | .50 | 24 | d.47 |
| 22 | c.48 | Apr. 5 | c d.47 | Dec. 9 | .47 |
| Aug. 1 | c.48 | 5 | d.50 | Jan. 6, 1959 | .47 |
| 17 | c.48 | June 4 | .50 | 29 | .50 |
| 26 | c.48 | Aug. 22 | .50 | Mar. 4 | .50 |
| Sept. 7 | c.48 | Sept. 20 | .50 | May 6 | .50 |
| 18 | c.48 | Oct. 23 | .50 | June 3 | .44 |
| 28 | c.48 | Nov. 6 | .50 | July 8 | .47 |
| Oct. 8 | c.48 | Dec. 5 | .50 | Aug. 6 | .47 |
| 18 | c.48 | Jan. 9, 1958 | .50 | Oct. 29 | .47 |
| Nov. 1 | c.48 | Feb. 4 | .50 | Nov. 9 | c d.40 |
| 20 | c.48 | Mar. 6 | .50 | 9 | d.48 |
| 30 | c.48 | Apr. 6 | .50 | Dec. 4 | .47 |
| Dec. 10 | c.48 | 30 | .50 | Jan. 11, 1960 | .47 |
| 20 | c.48 | May 27 | .50 | | |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

27/1-22H1. Furnace Creek Inn tunnel. Measurement in tunnel by 6-inch Parshall flume.

| | | | | | |
|---|---|---|---|---|---|
| Feb. 18, 1957 | 0.45 | Mar. 6, 1958 | 0.18 | Jan. 28, 1959 | 0.11 |
| Mar. 1 | d.33 | Apr. 8 | .22 | Mar. 4 | .11 |
| 1 | .33 | 30 | .20 | Apr. 6 | .12 |
| 21 | .28 | May 27 | .24 | May 6 | .12 |
| Apr. 5 | d.28 | June 25 | .14 | June 3 | .12 |
| June 4 | .26 | July 25 | .10 | July 8 | .22 |
| Aug. 22 | .15 | Aug. 26 | .11 | Aug. 6 | .18 |
| Sept.20 | .15 | Sept.25 | .12 | Oct. 28 | .25 |
| Oct. 23 | .16 | Oct. 21 | .10 | Nov. 9 | d.26 |
| Nov. 6 | .17 | Nov. 13 | .10 | Dec. 4 | .26 |
| Dec. 5 | .18 | 13 | d.10 | Jan. 12, 1960 | .28 |
| Jan. 9, 1958 | .18 | Dec. 9 | .11 | | |
| Feb. 4 | .18 | Jan. 6, 1959 | .10 | | |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

27/1-23R1, 25D1, 25D2, and 26A1-7; combined flow. Travertine Springs. Measured below pool by 9-inch Parshall flume.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Apr. 29, 1956 | 1.88 | Jan. 18, 1957 | 1.86 | May 14, 1958 | d1.86 |
| May 17 | 1.88 | 22 | d1.94 | 27 | 1.82 |
| June 21 | 1.88 | 26 | 1.86 | June 25 | 1.82 |
| July 1 | 1.86 | Feb. 5 | 1.86 | July 25 | 1.78 |
| 22 | 1.86 | Mar. 1 | d1.90 | Aug. 27 | 1.82 |
| Aug. 1 | 1.86 | 1 | 1.90 | Sept. 25 | 1.86 |
| 17 | 1.86 | 21 | 1.88 | Oct. 21 | 1.88 |
| 26 | 1.86 | Apr. 3 | d1.88 | Nov. 13 | 1.88 |
| Sept. 7 | 1.86 | June 4 | 1.82 | 13 | d1.92 |
| 18 | 1.86 | 20 | d1.82 | 24 | d1.92 |
| 28 | 1.86 | Aug. 22 | 1.74 | Dec. 9 | 1.88 |
| Oct. 8 | 1.86 | Sept. 20 | 1.72 | Jan. 6, 1959 | 1.86 |
| 18 | 1.86 | Oct. 23 | 1.76 | 29 | 1.88 |
| Nov. 1 | 1.86 | Nov. 6 | 1.76 | Mar. 3 | 1.86 |
| 20 | 1.86 | 29 | d1.76 | May 6 | 1.78 |
| 28 | d1.94 | Dec. 5 | 1.76 | June 3 | 1.82 |
| 30 | 1.86 | Jan. 8, 1958 | 1.76 | July 9 | 1.78 |
| Dec. 1 | d1.94 | Feb. 4 | 1.74 | Aug. 6 | 1.82 |
| 10 | 1.86 | Mar. 6 | 1.68 | Oct. 29 | 1.78 |
| 12 | d1.92 | Apr. 8 | e1.94 | Nov. 9 | d f1.78 |
| 20 | 1.86 | | | 9 | d g1.72 |
| 31 | 1.86 | 29 | 1.82 | Dec. 4 | 1.82 |
| Jan. 10, 1957 | 1.86 | | | Jan. 12, 1960 | 1.82 |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

27/1-26B1. Sump in Furnace Creek Wash. Measurement at outlet of settling box by 18-inch rectangular weir.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Jan. 9, 1941 | a0.97 | Jan. 15, 1957 | d1.26 | May 27, 1958 | 1.33 |
| Apr. 29, 1956 | 1.20 | 18 | 1.20 | June 25 | 1.28 |
| May 17 | 1.20 | 26 | 1.20 | July 25 | 1.28 |
| June 21 | 1.20 | Feb. 5 | 1.20 | Aug. 27 | 1.27 |
| July 1 | 1.20 | Mar. 1 | d1.28 | Sept. 25 | 1.33 |
| 22 | 1.20 | 1 | 1.28 | Oct. 21 | 1.33 |
| Aug. 17 | 1.20 | 21 | 1.30 | Nov. 13 | 1.42 |
| 26 | 1.20 | Apr. 3 | d1.30 | 13 | d1.42 |
| Sept. 7 | 1.20 | June 4 | 1.27 | 24 | d1.46 |
| 18 | 1.20 | 20 | d1.28 | Dec. 9 | 1.33 |
| 28 | 1.20 | Aug. 22 | 1.24 | Jan. 6, 1959 | 1.33 |
| Oct. 8 | 1.20 | Sept. 1 | 1.30 | 29 | 1.37 |
| 18 | 1.20 | Oct. 23 | 1.42 | Mar. 5 | 1.37 |
| Nov. 1 | 1.20 | Nov. 6 | 1.46 | May 6 | 1.33 |
| 20 | 1.20 | 29 | d1.46 | June 3 | 1.24 |
| 28 | d1.26 | Dec. 5 | 1.46 | July 9 | 1.33 |
| 30 | 1.20 | Jan. 9, 1958 | 1.46 | Aug. 6 | 1.24 |
| Dec. 10 | 1.20 | Feb. 4 | 1.42 | Oct. 29 | 1.65 |
| 12 | d1.26 | Mar. 6 | 1.44 | Nov. 9 | d1.65 |
| 20 | 1.20 | Apr. 8 | 1.33 | Dec. 4 | 1.28 |
| 31 | 1.20 | 30 | 1.33 | Jan. 12, 1960 | 1.46 |
| Jan. 10, 1957 | 1.20 | May 14 | d1.28 | | |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

27/1-26B2. Buried tile in Furnace Creek Wash. Measured at outlet of settling box by 12-inch rectangular weir.

| | | | | | |
|---|---|---|---|---|---|
| Feb. 23, 1956 | 0.44 | Nov. 30, 1956 | 0.44 | May 27, 1958 | 0.37 |
| Mar. 8 | .44 | Dec. 10 | .44 | June 25 | .37 |
| 25 | .44 | 20 | .44 | July 25 | .27 |
| Apr. 29 | .44 | 31 | .44 | Aug. 27 | .36 |
| May 17 | .44 | Jan. 10, 1957 | .44 | Sept. 25 | .37 |
| June 21 | .44 | 18 | .44 | Oct. 21 | .37 |
| July 1 | .44 | 26 | .44 | Nov. 13 | .37 |
| 22 | .44 | Feb. 5 | .44 | Dec. 9 | .37 |
| Aug. 1 | .44 | Mar. 1 | d.43 | Jan. 6, 1959 | .37 |
| 17 | .44 | 21 | .44 | 29 | .37 |
| 26 | .44 | June 4 | .43 | Mar. 5 | .41 |
| Sept. 7 | .44 | Aug. 22 | .44 | May 6 | .38 |
| 18 | .44 | Sept. 20 | .44 | June 3 | .42 |
| 28 | .44 | Oct. 23 | .42 | July 9 | .37 |
| Oct. 8 | .44 | Dec. 5 | .43 | Aug. 6 | .40 |
| 18 | .44 | Jan. 9, 1958 | .45 | Oct. 29 | .42 |
| Nov. 1 | .44 | Feb. 4 | .45 | Nov. 9 | d.43 |
| 20 | .44 | Mar. 6 | .47 | Dec. 4 | .43 |
| 28 | d.45 | Apr. 8 | .42 | Jan. 12, 1960 | .44 |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

27/1-26B3. Trench in Furnace Creek Wash. Measured by 3-inch Parshall flume. Trench destroyed by flash flood in September 1959.

| | | | | | |
|---|---|---|---|---|---|
| June 20, 1957 | d0.24 | Mar. 6, 1958 | 0.23 | Nov. 13, 1958 | d0.35 |
| Aug. 22 | .24 | Apr. 8 | .23 | 24 | d.35 |
| Sept.20 | .22 | May 1 | (h) | Dec. 9 | .36 |
| Oct. 23 | .22 | 27 | .36 | Jan. 29, 1959 | j.50 |
| Nov. 6 | .23 | June 25 | .34 | Mar. 5 | .38 |
| 29 | d.23 | July 25 | .34 | May 6 | .37 |
| Dec. 5 | .23 | Aug. 27 | .35 | Aug. 6 | j.46 |
| Jan. 9, 1958 | .23 | Sept.25 | .35 | | |
| Feb. 4 | .23 | Oct. 21 | .35 | | |

27/1-23R1. Travertine Spring

| Measurement in ditch near source by 18-inch rectangular weir | | Measurement in ditch about ¼ mile from source by 18-inch rectangular weir | |
|---|---|---|---|
| Jan. 19, 1957 | 0.68 | Jan. 19, 1957 | 0.60 |
| Feb. 26 | .60 | Feb. 26 | .59 |
| Mar. 7 | .64 | Mar. 7 | .59 |
| Apr. 3 | .60 | Apr. 3 | .57 |
| June 20 | weir destroyed | June 20 | .53 |

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

27/1-25D1 and 26A1. Travertine Springs

| Measurement in ditch above area of dense phreatophyte growth by 90° V-notch weir | | Measurement in ditch below area of dense phreatophyte growth by 90° V-notch weir | |
|---|---|---|---|
| Jan. 19, 1957 | 0.23 | Jan. 19, 1957 | 0.23 |
| Feb. 26 | .23 | Feb. 26 | .23 |
| Mar. 7 | .23 | Mar. 7 | .23 |
| Apr. 3 | .22 | Apr. 3 | .22 |
| June 20 | .23 | June 20 | .23 |

28/1-36G1. Nevares Spring

| Measurement in ditch near source by 3-inch Parshall flume | | Measurement in ditch about 0.2 mile downstream from source; point A of Robinson (written communication)[1/] | |
|---|---|---|---|
| Nov. 28, 1956 | .60 | Oct. 15, 1951 | .526 |
| 30 | .61 | 17 | .526 |
| Dec. 14 | .59 | 19 | .526 |
| Jan. 21, 1957 | .60 | Nov. 30, 1956 | .47 |
| | | Dec. 1 | .47 |
| | | 14 | .47 |

1. Measurements for 1951 by 12-inch rectangular weir by Robinson (written communication). Measurements for 1956 by 3-inch Parshall flume. Apparent change in discharge may be due to change in measuring device.

Table 3.--Periodic measurements of ground-water discharge in the Furnace Creek Wash area--Continued

a. Estimated by National Park Service.

b. Discharge from Texas Spring prior to construction of tunnel.

c. Does not include Park Service diversion to campground.

d. Measurement by Geological Survey.

e. Spring cleaned out.

f. Growth of "tules" in pool above flume.

g. Growth of "tules" removed.

h. Trench enlarged.

j. Value probably too high owing to growth of vegetation.

Table 4.--Total estimated rate of ground-water discharge in 1956-57 in the Furnace Creek Wash area

(All values from table 3, except as indicated)

| Name or general location of discharge point | Flow (cubic feet per second) |
|---|---|
| **Furnace Creek drainage area** | |
| Travertine Springs diverted to USBCC irrigation system: (27/1-23R1, 25D1, 25D2, 26A1, 26A2, 27/1-26A3, 26A4, 26A5, 26A6, 26A7) | 1.9 |
| Texas Spring tunnel 27/1-23B1 | .5 |
| Undeveloped springs, seeps, or phreatophyte areas (estimated) | .1 |
| Evapotranspiration above points of measurement (estimated) | .5 |
| Sump 27/1-26B1 in Furnace Creek Wash | 1.3 |
| Buried tile 27/1-26B2 in Furnace Creek Wash | .4 |
| Furnace Creek Inn tunnel 27/1-22H1 | .3 |
| NPS well 27/1-23P1 in Furnace Creek Wash | 0 |
| Underflow to Death Valley | Unknown |
| Total flow, Furnace Creek drainage area, excluding underflow | 5.0 |

02-25-1960: table 4--total estimated rate of ground-water discharge in 1956-57, cont. ; feburary 25, 1960

Table 4.--Total estimated rate of ground-water discharge in 1956-57 in the Furnace Creek Wash area--Continued

| Name or general location of discharge point | Flow (cubic feet per second) |
|---|---|
| **Cow Creek drainage area** | |
| Nevares Spring, 28/1-36G1 | 0.6 |
| Cow Spring and other undeveloped springs | a.1 |
| Underflow to Death Valley | Unknown |
| Total flow, Cow Creek drainage area, excluding underflow | .6 |
| Combined flow, Furnace Creek and Cow Creek drainage areas, excluding unknown underflow to Death Valley | 5.6 |

a. This is believed to be reemergent water from Nevares Spring and is not included in total.

Table 5.--Chemical analyses of spring waters in the Furnace Creek Wash area

Constituents: Constituents are in parts per million. All values are rounded to conform to the standards of the Geological Survey, Quality of Water Branch. Values preceded by the letter a were calculated by the Ground Water Branch and are approximate.

Dissolved solids: Residue on evaporation, analytically determined.

Sum of determined constituents: Arithmetic total, in parts per million, of all constituents determined, except for bicarbonate which is divided by 2.03 to obtain the carbonate equivalent.

Source of data: DPH, California Department of Public Health; DWR, California Department of Water Resources; NPS, U. S. National Park Service; USGS, U. S. Geological Survey, Quality of Water Branch.

Temperature: The temperature of the water is at the point of collection, in degrees Fahrenheit. For the temperature of the water at the point of discharge, see table 1.

Table 5.--Chemical analyses of spring waters in the Furnace Creek Wash area--Continued

| USGS number | 27/1-3A1 | 27/1-3K1 |
|---|---|---|
| Date collected | 4-8-55 | 12-1-56 |
| Silica ($SiO_2$) | - | - |
| Iron (Fe) | - | - |
| Calcium (Ca) | 45 | - |
| Magnesium (Mg) | 20 | - |
| Sodium (Na) | 146 | - |
| Potassium (K) | 10 | - |
| Lithium (Li) | - | - |
| Bicarbonate ($HCO_3$) | 345 | - |
| Carbonate ($CO_3$) | 0 | - |
| Sulfate ($SO_4$) | 178 | - |
| Chloride (Cl) | 37 | 180 |
| Fluoride (F) | 2.0 | 3.6 |
| Nitrate ($NO_3$) | 1.9 | - |
| Boron (B) | .61 | 11 |
| Dissolved solids | 603 | - |
| Sum of determined constituents | 611 | - |
| Hardness as $CaCO_3$ | a195 | 46 |
| Percent sodium (% Na) | 60 | - |
| Specific conductance (micromhos at 25°C) | 702 | 2,360 |
| pH | 8.3 | - |
| Temperature (°F) | 100 | - |
| Source of data | DWR | USGS |
| Lab./Field No. | P631-311 | 21083 |

00-00-0000: table 5--chemical anaysis of spring waters, cont.; 1956

Table 5.--Chemical analyses of spring waters in the Furnace Creek Wash area--Continued

| USGS number | 27/1-3P1 | 27/1-22H1 | 27/1-23B1 | | |
|---|---|---|---|---|---|
| Date collected | 12-1-56 | 4-5-57 | 11-27-53 | 4-11-56 | 4-5-57 |
| $SiO_2$ | - | 26 | - | - | 25 |
| Fe | - | - | - | - | - |
| Ca | - | 40 | 36 | 35 | 35 |
| Mg | - | 22 | 21 | 18 | 20 |
| Na | - | 180 | 160 | 154 | 155 |
| K | - | 13 | 11 | 12 | 12 |
| Li | - | - | - | - | - |
| $HCO_3$ | - | 378 | 310 | 342 | 348 |
| $CO_3$ | - | 0 | 17 | - | 0 |
| $SO_4$ | - | 208 | 166 | 156 | 160 |
| Cl | 22,200 | 50 | 54 | 35 | 43 |
| F | 11 | 2.5 | 4.0 | 3.7 | 2.0 |
| $NO_3$ | - | 0 | 0 | 1.9 | 0 |
| B | 327 | 1.6 | 1.0 | .88 | 1.0 |
| Dissolved solids | - | 810 | 634 | 607 | 716 |
| Sum | - | a729 | 623 | 584 | a599 |
| Hardness | 214 | a190 | a176 | a162 | a170 |
| % Na | - | a65 | a65 | 65 | a65 |
| Micromhos | 56,800 | 1,140 | 1,000 | 953 | 1,010 |
| pH | - | 7.6 | 8.5 | 7.8 | 7.9 |
| °F | 73 | 91½ | - | 87 | 91 |
| Source of data | USGS | DWR | DWR | DWR | DWR |
| Lab./Field No. | 21084 | T369-2171 | S206-3767 | R1125-3696 | T370-2122 |

00-00-0000: table 5--chemical anaysis of spring waters, cont.; 1956

Table 5.--Chemical analyses of spring waters in the Furnace Creek Wash area--Continued

| USGS number | 27/1-23R1, 25D1-2, 26A1-7 | | 27/1-25D1 | 27/1-26B1 |
|---|---|---|---|---|
| Date collected | 4-22-54 | 4-11-56 | 3-25-54 | 4-11-56 |
| $SiO_2$ | - | - | 43 | - |
| Fe | - | - | - | - |
| Ca | 38 | 36 | 26 | 40 |
| Mg | 20 | 19 | 22 | 20 |
| Na | 150 | 159 | 145 | 160 |
| K | 14 | 12 | 11 | 12 |
| Li | - | - | .13 | - |
| $HCO_3$ | 354 | 351 | 321 | 363 |
| $CO_3$ | 0 | 0 | - | 0 |
| $SO_4$ | 165 | 169 | 158 | 179 |
| Cl | 40 | 37 | 39 | 41 |
| F | 4.0 | 4.0 | 3.0 | 4.0 |
| $NO_3$ | 1.0 | 3.7 | 0 | 2.9 |
| B | .86 | .88 | 0 | 1.5 |
| Dissolved solids | 593 | 616 | - | 644 |
| Sum | 606 | 613 | 605 | 639 |
| Hardness | a177 | a168 | a155 | a182 |
| % Na | a63 | 65 | a65 | 64 |
| Micromhos | 966 | 968 | 949 | 1,020 |
| pH | 8.1 | 7.7 | 8.0 | 7.5 |
| °F | 90 | 88 | 90 | 80 |
| Source of data | DWR | DWR | USGS | DWR |
| Lab./Field No. | 4226-2718 | R1125-3697 | - | R1126-3698 |

Table 5.--Chemical analyses of spring waters in the Furnace Creek Wash area--Continued

| USGS number | 28/1-34N1 | 28/1-36G1 | | 28/1-36K1 | Test well |
|---|---|---|---|---|---|
| Date collected | 12-1-56 | 11-30-53 | 11-29-56 | 3-3-57 | 11-24-58 |
| $SiO_2$ | - | - | - | - | - |
| Fe | - | - | - | - | - |
| Ca | 52 | 38 | 42 | 30 | 32 |
| Mg | 38 | 32 | 22 | 43 | 23 |
| Na | 253 | 250 | 138 | 408 | 140 |
| K | 16 | 15 | 12 | 30 | 11 |
| Li | - | - | - | - | - |
| $HCO_3$ | 455 | 403 | 317 | 575 | 322 |
| $CO_3$ | 0 | 10 | 0 | 0 | 0 |
| $SO_4$ | a352 | 307 | 173 | a535 | a157 |
| Cl | 74 | 77 | 34 | 101 | 40 |
| F | 4.4 | 4.0 | 2.9 | 2.0 | 1.0 |
| $NO_3$ | - | 0 | 1.8 | - | - |
| B | 1.3 | 1.1 | 1.2 | 1.7 | 1.0 |
| Dissolved solids | - | 938 | 625 | - | - |
| Sum | a1,010 | 932 | 583 | a1,430 | a569 |
| Hardness | 284 | a227 | 192 | 250 | 176 |
| % Na | 64 | a69 | a59 | 75 | 62 |
| Micromhos | 1,580 | 1,420 | - | 2,120 | 955 |
| pH | 7.7 | 8.2 | 7.9 | 7.7 | 8.1 |
| °F | 74 | - | 104 | 69 | 97 |
| Source of data | USGS | DWR | DPH | USGS | USGS |
| Lab./Field No. | 21082 | S194-3764 | 4449 | 21836 | 28599 |

11-00-1958: table 5--chemical anaysis of spring waters, cont.; november, 1958

Furnace Creek test well. National Park Service. Altitude about 580 ft. Cable-tool well drilled and gravel packed by Roscoe Moss Drilling Co. in November 1958. 14-inch casing, perforated with hydraulic perforator from 100 to 240 ft. Log by U. S. Geological Survey.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene: | | |
| Alluvium: | | |
| Clay, silt, sand, and gravel. The gravel is up to 1 inch in diameter. Materials are quartzite, marble, and other metamorphic rocks derived from Funeral Range ------- | 50 | 50 |
| Same material, somewhat cemented (harder drilling) ---------- | 20 | 70 |
| Same material, finer (clay to gravel $\frac{1}{4}$ inch in diameter) much easier drilling ---------- | 45 | 115 |
| Same material, particles up to 3/4-inch diameter. Fairly easy drilling (5 ft/hr) ---------- | 10 | 125 |
| Same material, better sorted; majority of particles in 1/8-1/4 inch range. Drilling somewhat harder---------- | 30 | 155 |

Furnace Creek test well.--Continued

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene:--Continued | | |
| Alluvium:--Continued | | |
| Same material, particles up to 3/4-inch diameter | 15 | 170 |
| Same material, drilling somewhat harder | 20 | 190 |
| Fanglomerate: | | |
| Clay, silt, sand, and gravel; trace of calcite "onyx" cementing material | 20 | 210 |
| Same material, gravel somewhat finer (1/8-1/4 inch range) larger proportion of rounded particles; calcite cement | 5 | 215 |
| Gravel, as above; abundance of calcite "onyx" cementing material. Harder drilling | 15 | 230 |
| Pliocene and Pleistocene(?): | | |
| Lacustrine deposits: | | |
| Gravel, somewhat finer (1/8-1/4 inch range) larger proportion of rounded particles; less "onyx." Abundant clay (brown). Easier drilling | 15 | 245 |
| Abundant clay; gravel as above, mostly cavings | 5 | 250 |

11-20-1958: table 5--chemical anaysis of spring waters, cont.; november 20, 1958

The well was developed by surging and pumping on November 20, 1958, and the water level allowed to recover for a period of 8½ hours before test pumping was begun on November 21. Pumping was resumed at a rate of about 390 gpm (gallons per minute) with a resulting drawdown of 102 feet after a period of 72 hours. A summary of the drawdown and the subsequent recovery is given in the following table.

| Date | Time (hour) | Pumping rate[1] (gpm) | Water level[2] (feet) | Drawdown (feet) | Specific capacity[3] |
|---|---|---|---|---|---|
| 1958 | | | | | |
| Nov. 20 | 7:50 a.m. | 0 | 74.51 | - | - |
| 21 | 7:30 a.m. | 0 | 74.61 | - | - |
| 24 | 8:00 a.m. | 393 | 177 | 102 | 3.9 |
| | 8:25 | 351 | 172 | 97 | 3.6 |
| | 8:55 | 357 | 166 | 91 | 3.9 |
| | 9:10 | 320 | 142 | 67 | 4.8 |
| | 10:00 | 320 | 142 | 67 | 4.8 |
| | 10:05 | 250 | 121 | 46 | 5.4 |
| | 11:00 | 257 | 115 | 40 | 6.4 |
| | 11:15 | 205 | 101 | 26 | 7.9 |
| | 11:50 | 205 | 100 | 25 | 8.2 |
| | 12:10 p.m. | 140 | 90 | 15 | 9.3 |
| | 12:25 | 140 | 90 | 15 | 9.3 |
| | 12:34:00 | Pump off | - | - | - |
| | 12:34:30 | | 82 | | |
| | 12:34:40 | | 77 | | |
| | 12:34:40 | | 76.90 | | |
| | 12:34:50 | | 75 | | |

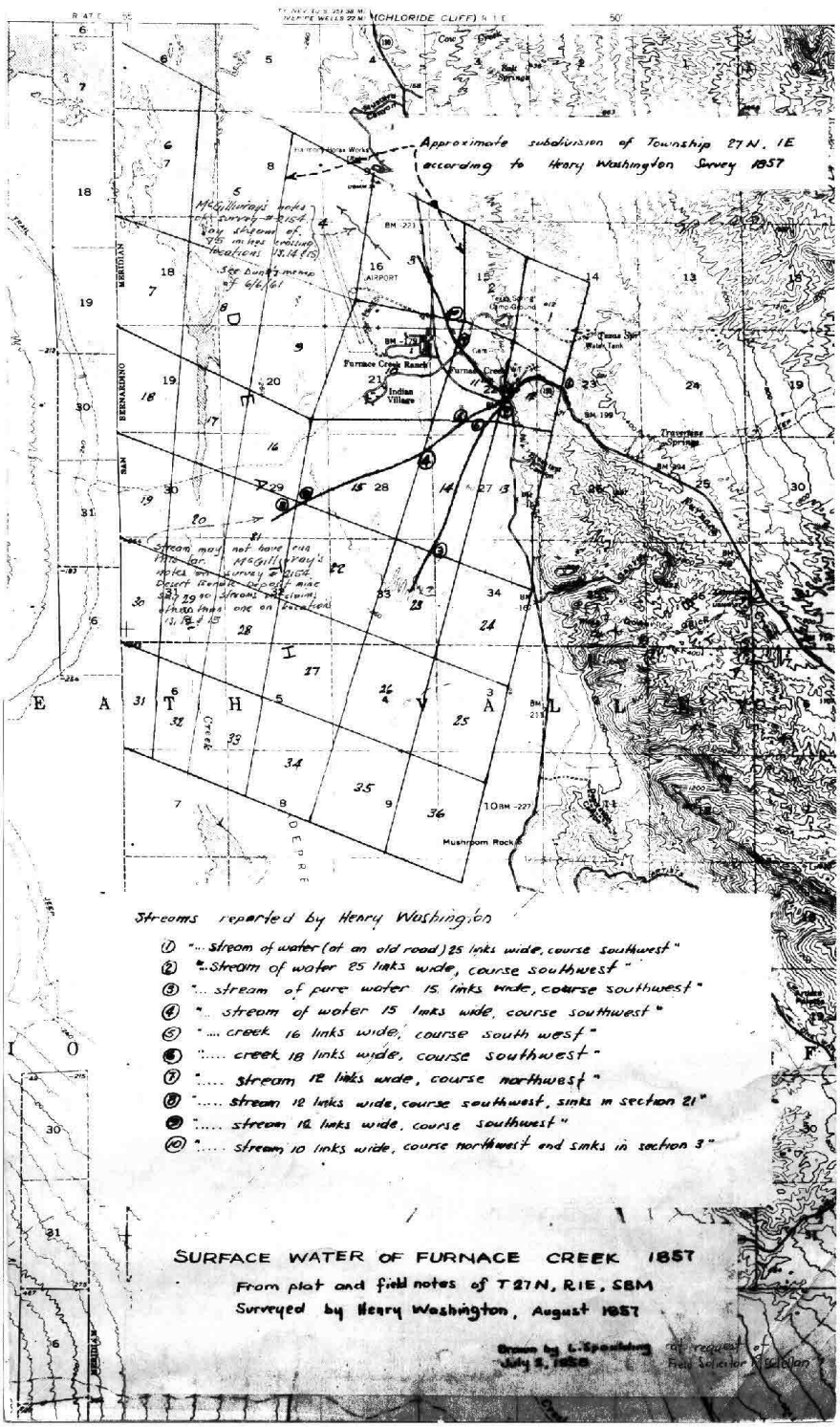
| Date | Time (hour) | Pumping rate[1] (gpm) | Water level[2] (feet) | Drawdown (feet) | Specific capacity[3] |
|---|---|---|---|---|---|
| 1958 | | | | | |
| Nov. 24 | 12:38:00 p.m. | | 75.88 | | |
| | 12:40:00 | | 75.64 | | |
| | 12:50:00 | | 75.56 | | |
| | 1:05:00 | | 75.52 | | |
| | 3:15 | | 75:38 | | |
| 25 | 9:35 a.m. | | 75.10 | | |
| 1959 | | | | | |
| Nov. 8 | | | 75.18 | | |

1. Pumping rates were measured with a pipe orifice using calibrations made by Purdue University for Layne and Bowler, Inc.

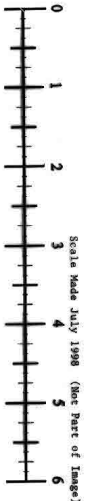
2. Water-level measurements in tenths and hundredths of a foot were made by steel tape and are below land-surface datum. Measurements in whole feet were made by air line.

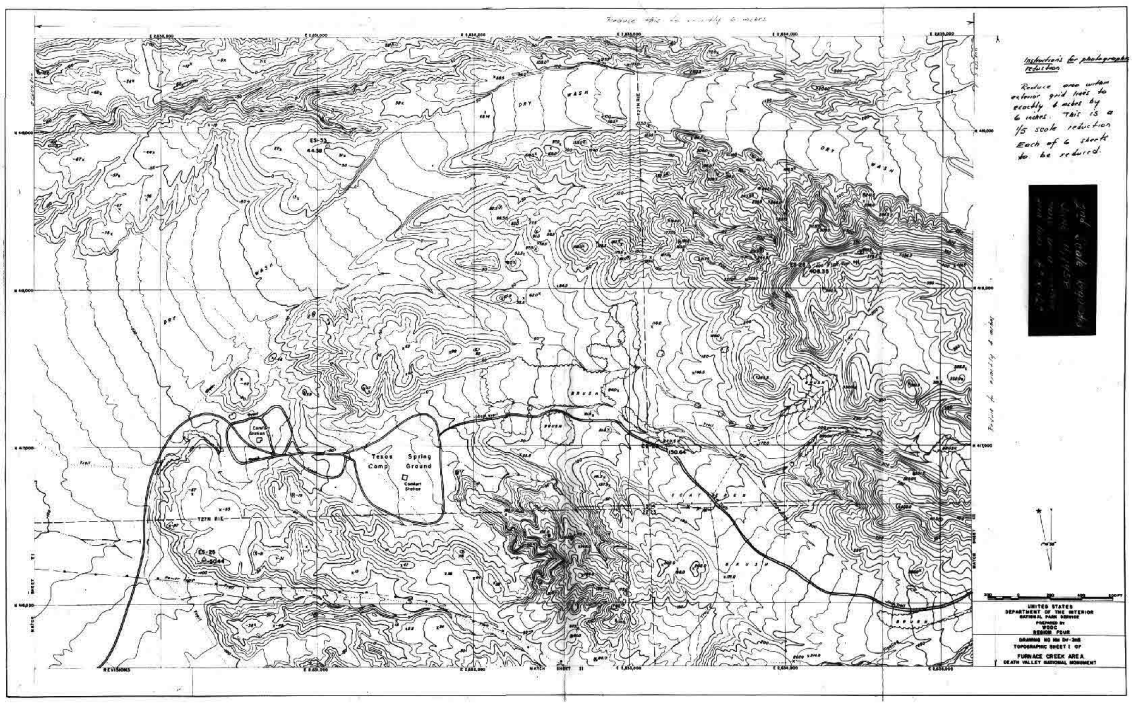
3. Specific capacity is the yield of the well in gallons per minute per foot of drawdown of water level below the static or nonpumping level.

07-02-1958: map of streams reported by henry washington; july 02, 1958

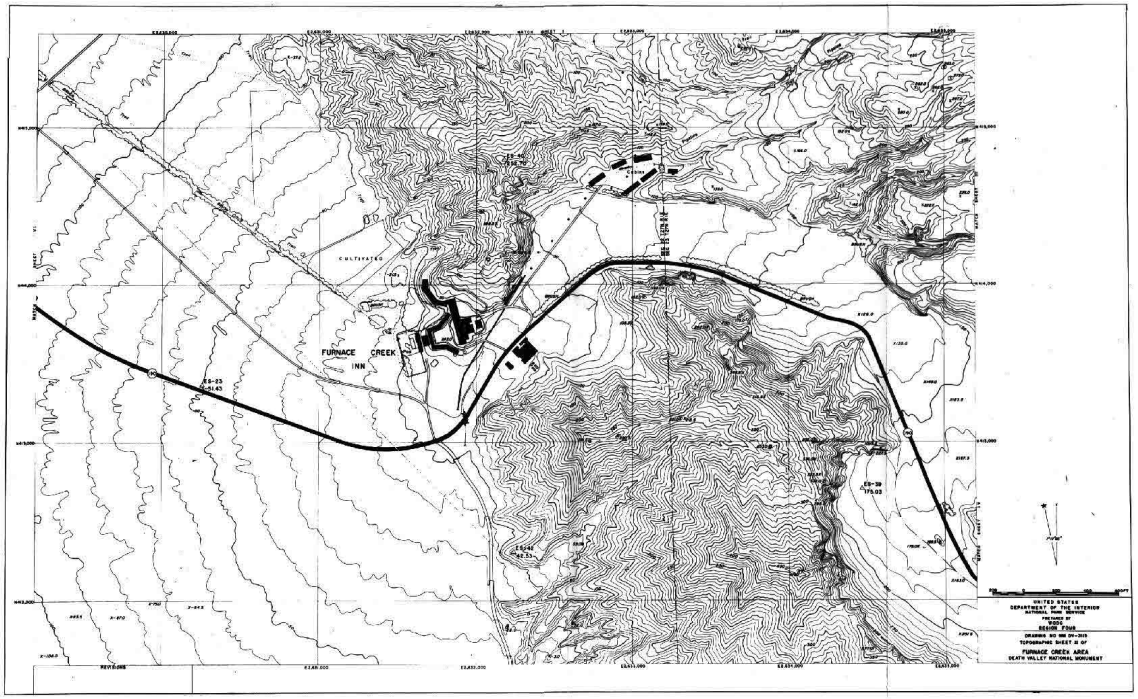


06-11-1958: topographical map; june 11, 1958

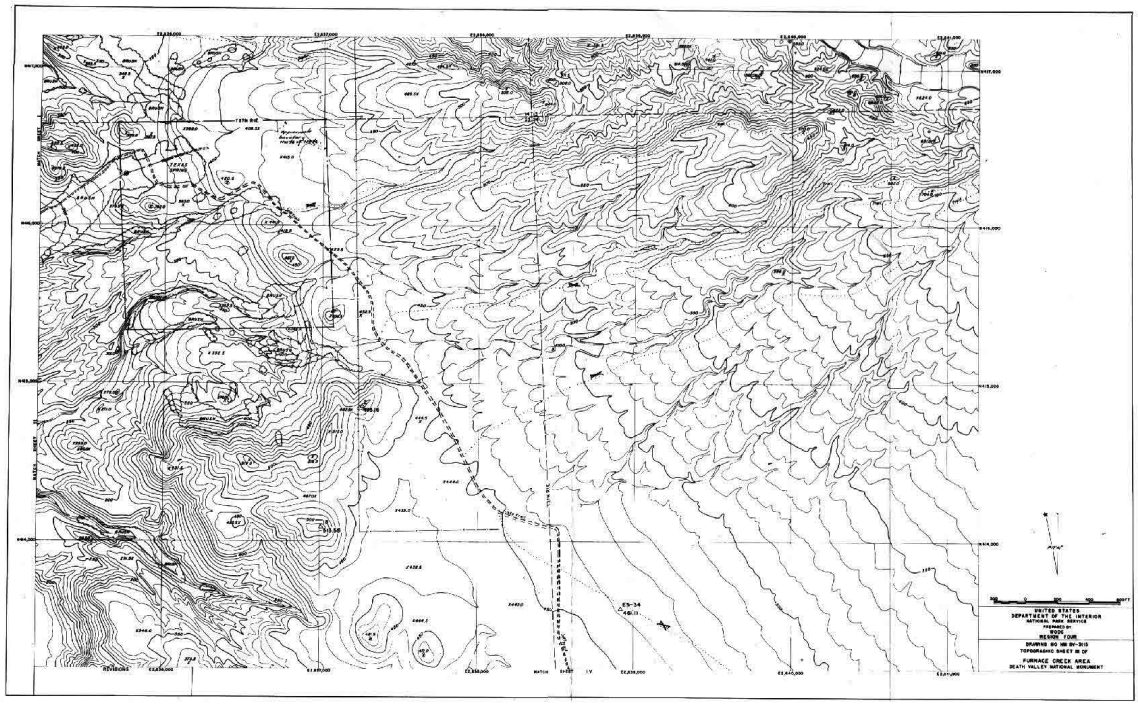


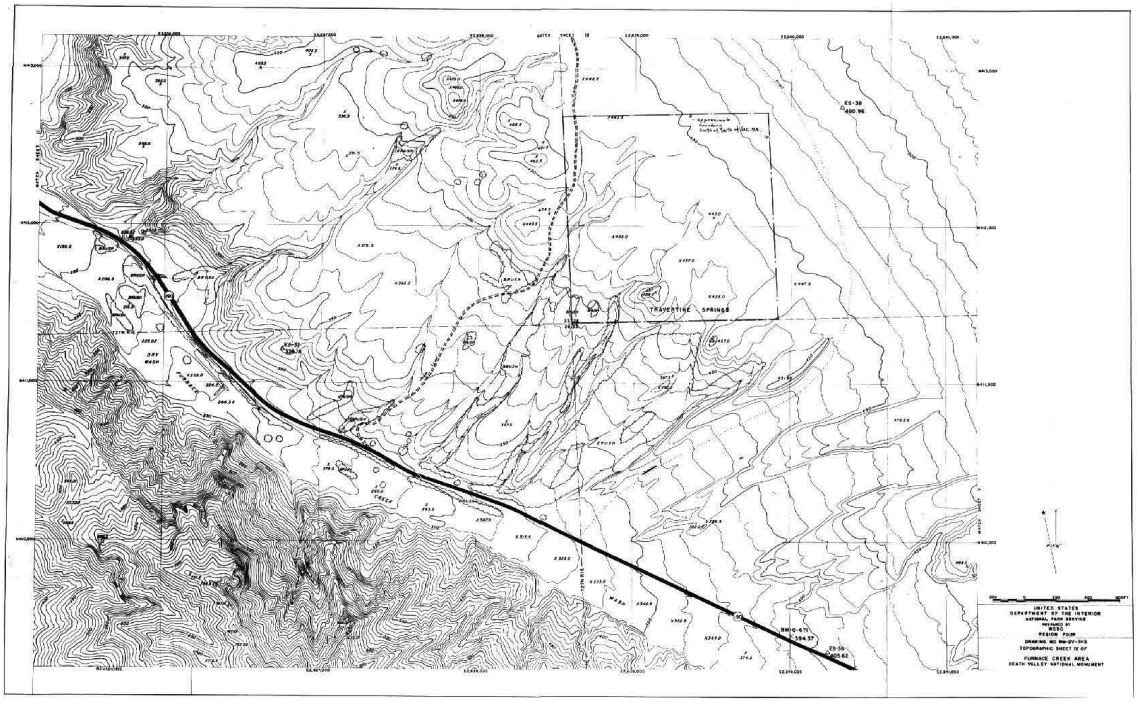
00-00-0000: topographical map



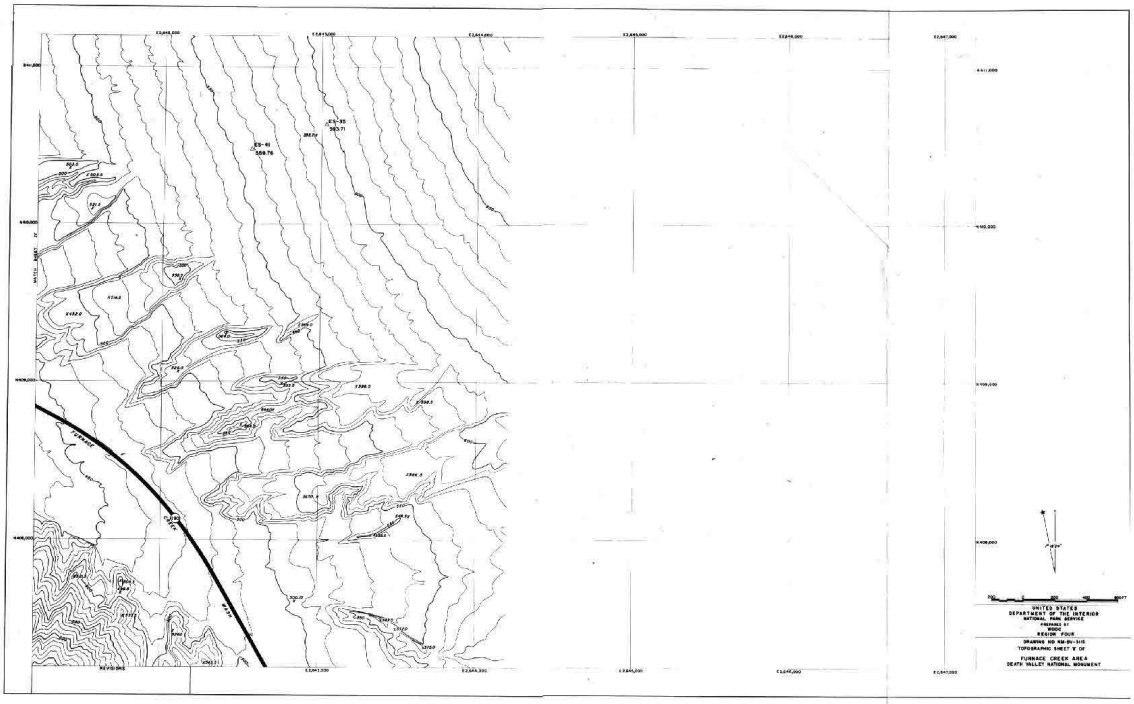
00-00-0000: topographical map



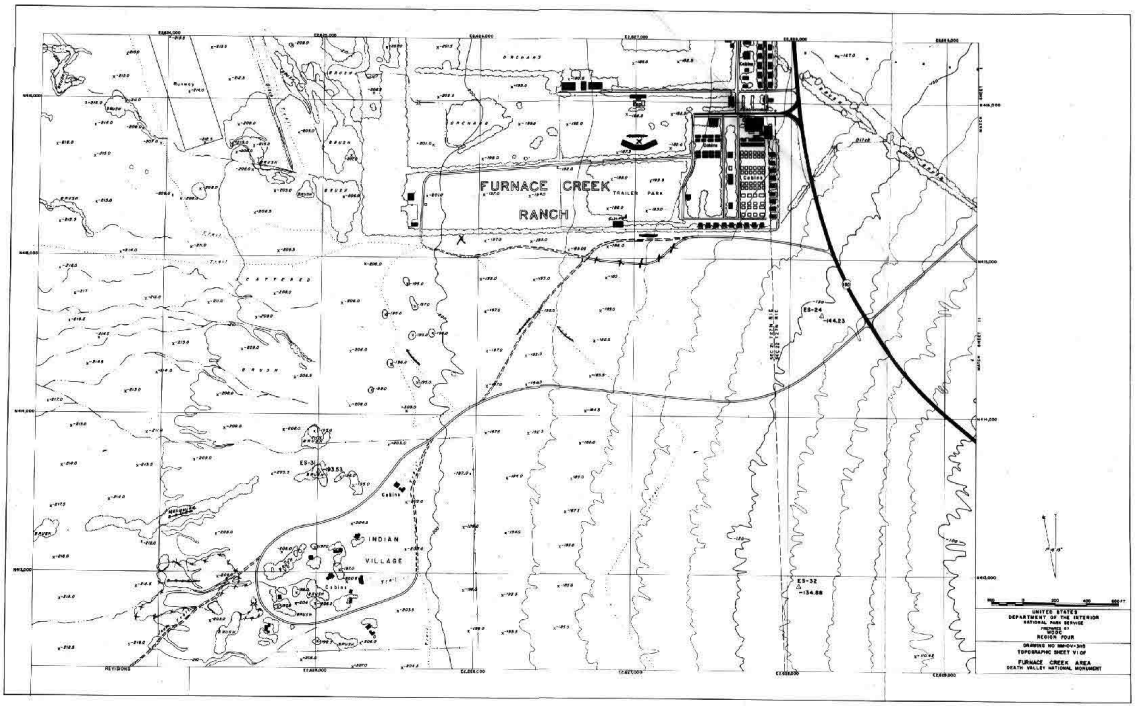
00-00-0000: topographical map



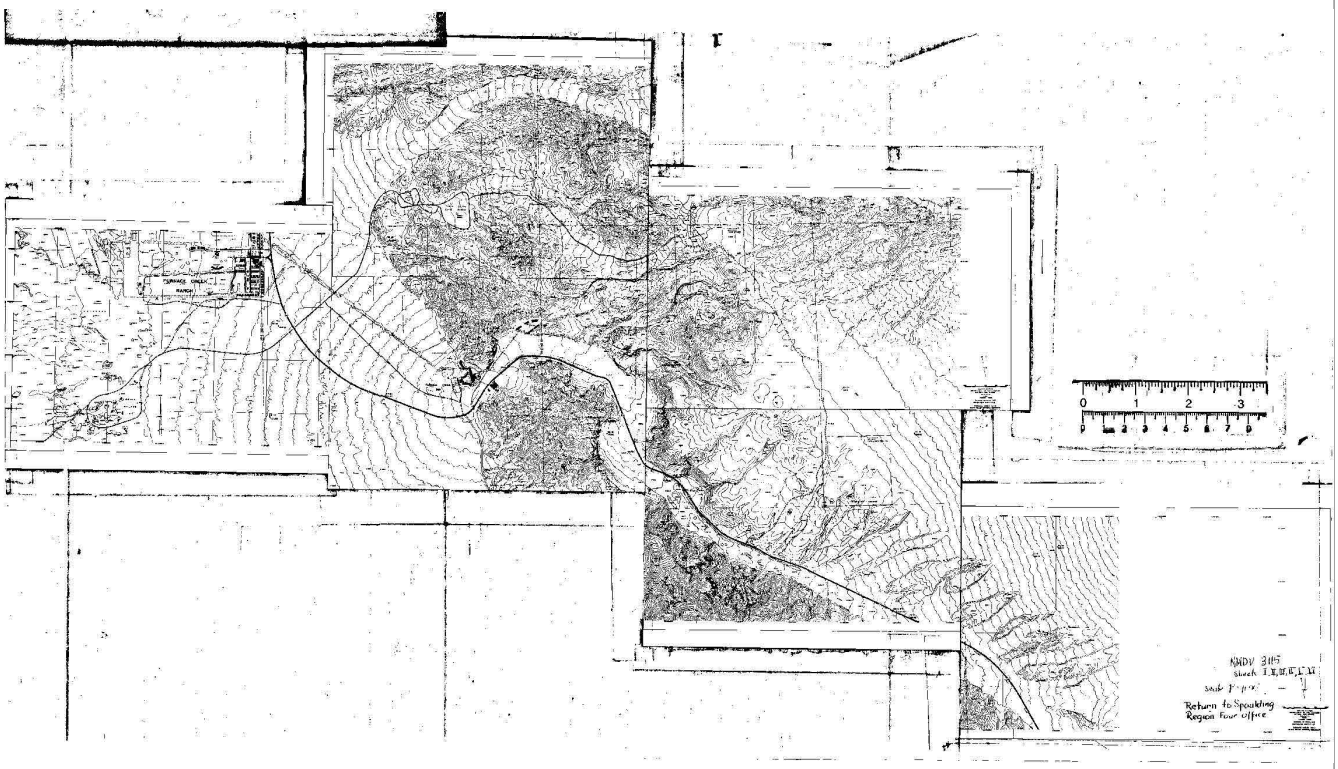
00-00-0000: topographical map



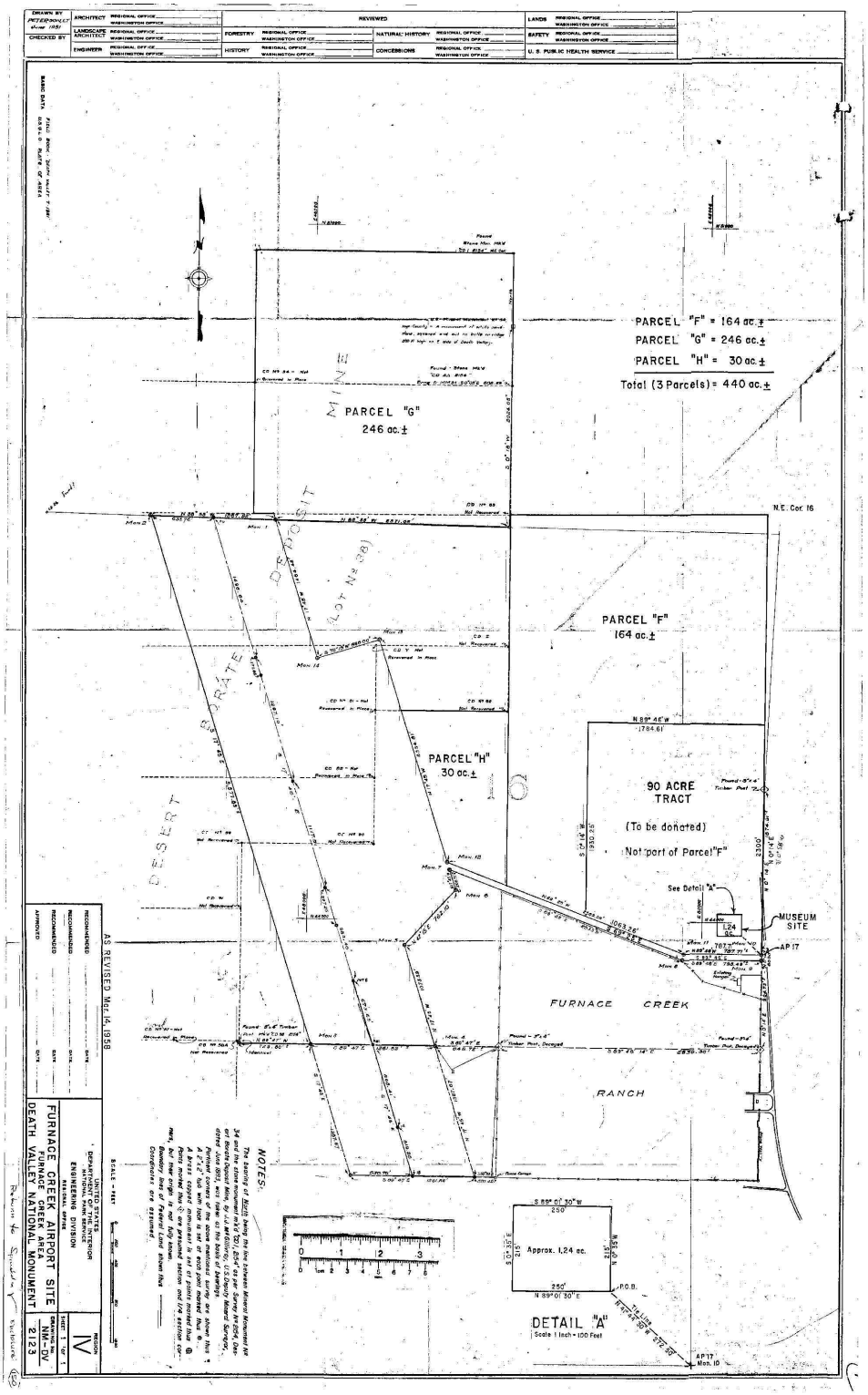
00-00-0000: topographical map with furnace creek ranch



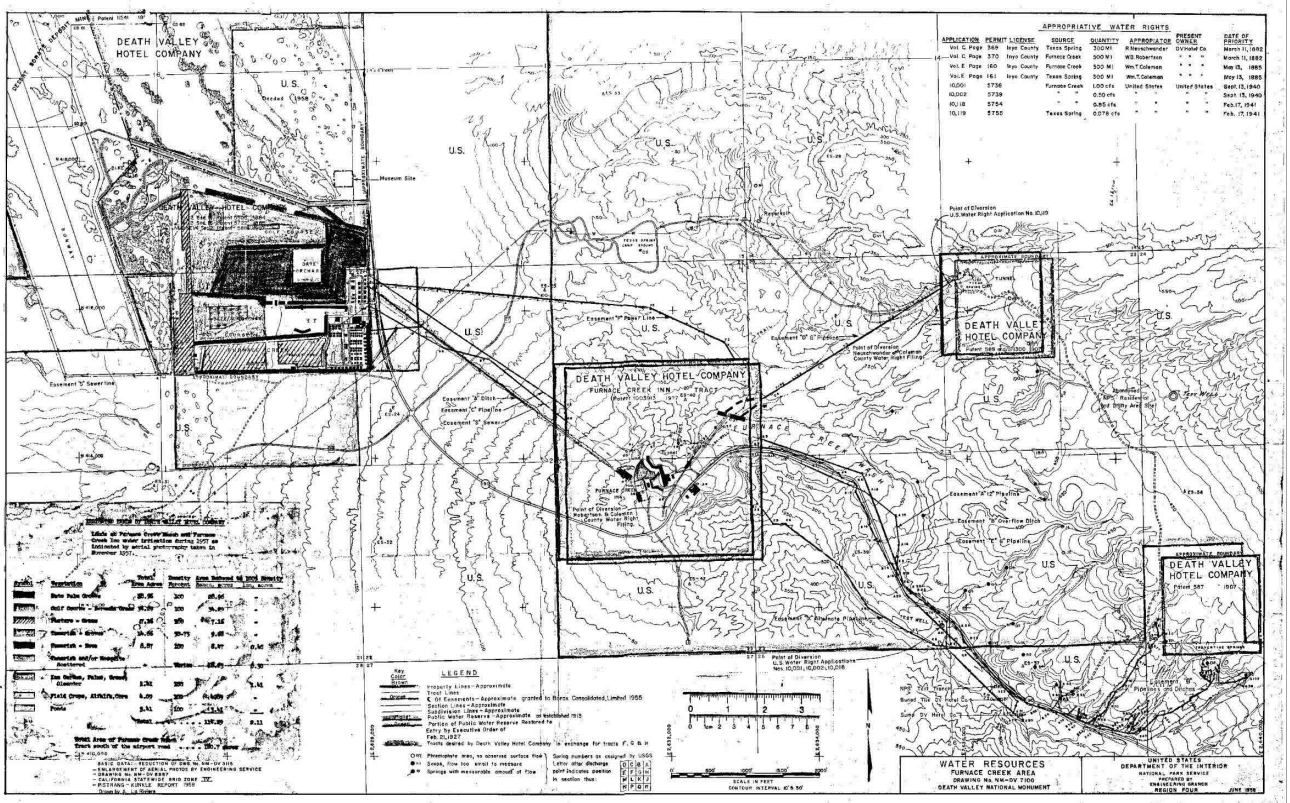
00-00-0000: topographic map - deva



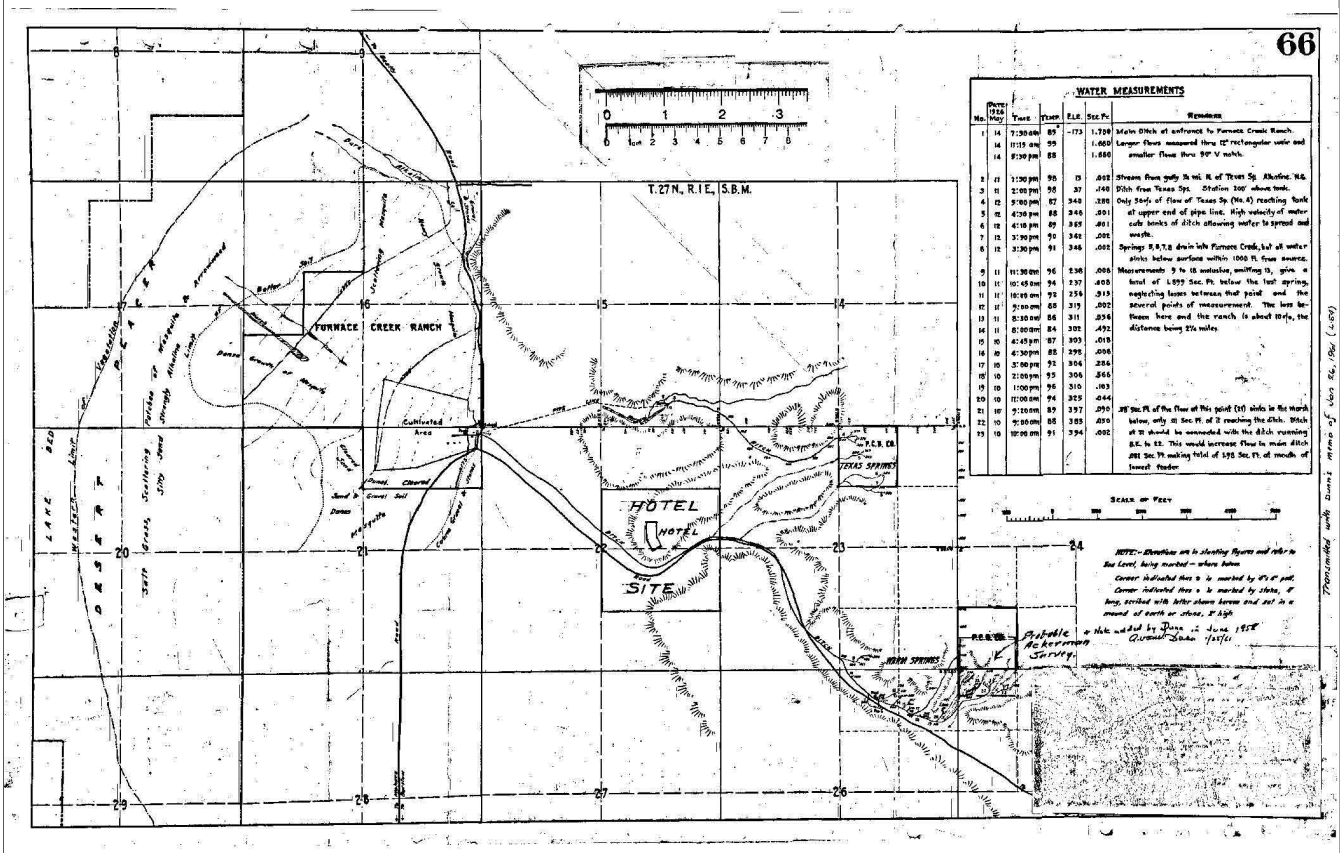
00-00-0000: diagram of furnace creek airport site



00-00-0000: water resources - furnace creek area



00-00-0000: furnace creek area - water measurements

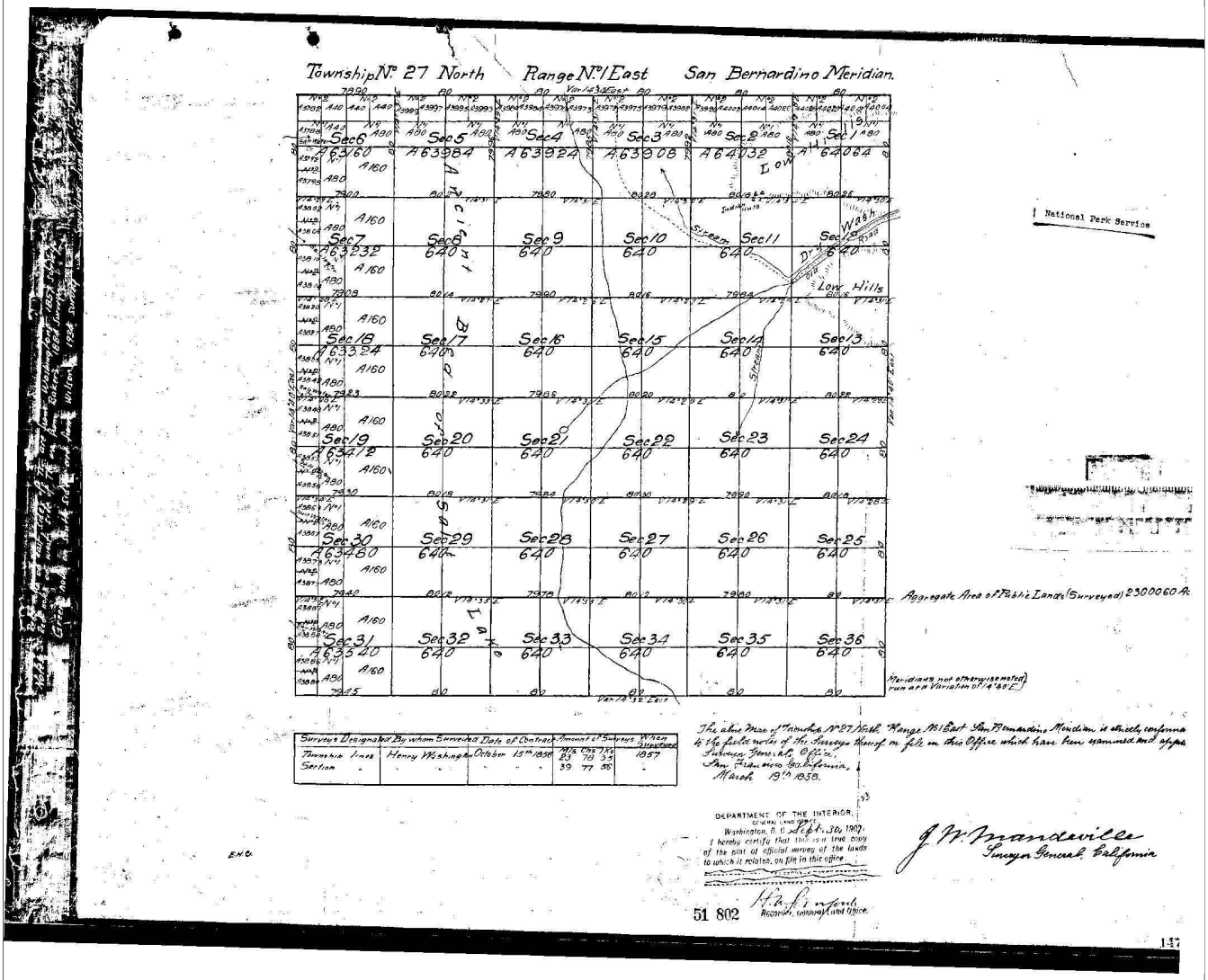



**WATER MEASUREMENTS**

| No. | Date 1936 May | Time | Temp | Elev. | Sec. Ft. | Remarks |
|---|---|---|---|---|---|---|
| 1 | 14 | 7:30 am | 89 | -173 | 1.708 | Main Ditch at entrance to Furnace Creek Ranch. |
| | 14 | 11:15 am | 99 | | 1.660 | Larger flows measured thru 12" rectangular weir and |
| | 14 | 5:30 pm | 88 | | 1.880 | smaller flows thru 90° V notch. |
| 2 | 12 | 1:00 pm | 98 | 13 | .052 | Stream flow gaged ½ mi. N. of Texas Sp. Alkaline. 96. |
| 3 | 12 | 2:00 pm | 98 | 37 | .140 | Ditch from Texas Spr. Station 200' above tank. |
| 4 | 12 | 5:00 pm | 87 | 348 | .288 | Only 5cfs of flow of Texas Sp. (No. 4) reaching tank |
| 5 | 12 | 4:30 pm | 88 | 345 | .001 | at upper end of pipe line. High velocity of water |
| 6 | 12 | 4:15 pm | 89 | 365 | .801 | cuts banks of ditch allowing water to spread and |
| 7 | 12 | 3:00 pm | 90 | 362 | .002 | waste. |
| 8 | 12 | 3:30 pm | 91 | 346 | .002 | Springs 5,6,7,8 drain into Furnace Creek, but all water |
| | | | | | | sinks below surface within 1000 ft. from source. |
| 9 | 11 | 11:30 am | 96 | 238 | .005 | Measurements 9 to 15 inclusive, omitting 13, give a |
| 10 | 11 | 10:45 am | 94 | 237 | .005 | total of 1.899 Sec. Ft. below the last spring, |
| 11 | 11 | 10:15 am | 92 | 256 | .313 | neglecting losses between that point and the |
| 12 | 11 | 9:00 am | 88 | 319 | .002 | several points of measurement. The loss be- |
| 13 | 11 | 8:30 am | 86 | 311 | .036 | tween here and the ranch is about 11%, the |
| 14 | 11 | 8:00 am | 84 | 302 | .492 | distance being 2½ miles. |
| 15 | 10 | 6:45 pm | 87 | 303 | .015 | |
| 16 | 10 | 6:30 pm | 88 | 298 | .006 | |
| 17 | 10 | 3:00 pm | 92 | 304 | .284 | |
| 18 | 10 | 2:00 pm | 93 | 306 | .566 | |
| 19 | 10 | 1:00 pm | 96 | 310 | .163 | |
| 20 | 10 | 12:00 pm | 94 | 329 | .044 | |
| 21 | 10 | 9:20 am | 89 | 327 | .050 | .35 Sec. Ft. of the flow at this point (21) sinks in the marsh |
| 22 | 10 | 9:00 am | 88 | 388 | .030 | below, only .21 Sec. Ft. of it reaching the ditch. Ditch |
| 23 | 10 | 10:00 am | 91 | 394 | .002 | at 22 should be connected with the ditch running |
| | | | | | | S.E. to 23. This would increase flow to main ditch |
| | | | | | | .281 Sec. Ft. making total of 1.98 Sec. Ft. at mouth of |
| | | | | | | lowest feeder |

NOTE - Elevations are in starting figures and refer to Sea Level, being marked - where below Corner indicated thus ⊙ is marked by 4"x 4" post. Corner indicated thus ▲ is marked by stake, 4' long, scribed with letter shown hereon and set in a mound of earth or stone, 2' high.

Note added by June 12 June 1938 Gilmore Jahn Yates




| Surveys Designated | By whom Surveyed | Date of Contract | Amount of Surveys Paid | When Surveyed |
|---|---|---|---|---|
| Township Lines | Henry Washington | October 15th 1856 | M's Chs Lks 89 70 35 | 1857 |
| Section | " | " | " 39 77 35 | " |

**NOTE TO THE FILE**

March 24, 1999
JSA

Docket DEVA-SUPP

Docket Ø, Document 0220

Re: DEVA ~~Docket No. 220~~, MapMisc Section, Map "51 802", no title (dated as approved on 3/19/1858; true and certified copy date of 10/30/1907)

The map that was scanned at WRB in 1999 had a black background with blue and red ink notations across it. Those markings identified topography/vegetation conditions at various locations. The ink notations arel not visible on the scanned copy but can be seen by retrieving the map filed in the original docket folder.

Docket Information

Number of Documents in Docket 218

Documents Dated from 11/15/1954 to 5/3/1996

Docket Compiled: 3/7/2011