



WATER-RIGHT DOCKET

Haleakala National Park

Docket No: 1

MCGEE SPRING. SILVERSWORD - HOSMER GROVE

Supporting Hydro Data

08-24-0000: table no. 1, headquarters: water use requirements for mission 66

TABLE NO. 1

8/24/66

HEADQUARTERS

Water Use Requirements for MISSION 66

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
No.	No. of Residences Planned	No. of Employees living at Park	No. of People living in Park including dependents	No. of Employees living outside of Park	Visitation to Park in 1959	Visitation staying at Headquarters	Estimated water consumption per month Column 3 x 100 Gallons x 30 or 31 Gallons	Estimated water consumption per month Column 4 x 25 Gallons x 30 or 31 Gallons	Estimated water consumption per month Column 6 x 5 Gallons	Estimated total water consumption Columns 7, 8, 9	Fire Protection Reserve
									Gallons	Gallons	Gallons
JAN	4	4	12	4	4347	4400	37,200	3100	22,000	62,300	18,000
FEB	4	4	12	4	3956	4000	36,000	3000	20,000	59,000	
MAR	4	4	12	4	4820	4800	37,200	3100	24,000	64,300	
APR	4	4	12	4	4527	4600	36,000	3000	23,000	62,000	
MAY	4	4	12	4	4500	4600	37,200	3100	23,000	63,300	
JUN	4	4	12	4	5328	5400	36,000	3000	27,000	66,000	
JUL	4	4	12	4	7503	7600	37,200	3100	38,000	78,300	
AUG	4	4	12	4	8322	8400	37,200	3100	42,000	82,300	
SEP	4	4	12	4	3960	4000	36,000	3000	20,000	59,000	
OCT	4	4	12	4	4573	4600	37,200	3100	23,000	63,300	
NOV	4	4	12	4	4234	4200	36,000	3000	21,000	60,000	
DEC	4	4	12	4	3425	3400	37,200	3100	17,000	57,300	
					59,495	60,000	440,400	36700	300,000	777,100	18,000
			Based on 3 per employee			Based on Visitation doubling over 1959 and 50% of visitors to Park stopping at Headquarters					18,000 Based on protection for 1 fire at 300 gpm for 1 hour

HEADQUARTERSWater Use Requirements for Beyond MISSION 66

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	No. of Residences Planned	No. of Employees living at Park	No. of People living in Park including dependents	No. of Employees living outside of Park	Visitation Visitors to Park in 1959	Visitors stopping at Head- quarters	Estimated water consumption per month Column 3 x 100 gallons x 30 or 31 Gallons	Estimated water consumption per month Column 4 x 25 gallons x 30 or 31 Gallons	Estimated water consumption per month Column 6 x 5 gallons	Estimated total water consumption Columns 7, 8, 9	Fire Protection Reserve
AN	8	8	24	4	4347	4400	74,400	3100	22,000	99,500	18,000
ES	8	8	24	4	3956	4000	72,000	3000	20,000	95,000	
AR	8	8	24	4	4820	4800	74,400	3100	24,000	101,500	
FR	8	8	24	4	4527	4600	72,000	3000	23,000	98,000	
AY	8	8	24	4	4500	4600	74,400	3100	23,000	100,500	
UN	8	8	24	4	5328	5400	72,000	3000	27,000	102,000	
UL	8	8	24	4	7503	7600	74,400	3100	38,000	115,500	
UG	8	8	24	4	8322	8400	74,400	3100	42,000	119,500	
EP	8	8	24	4	3960	4000	72,000	3000	20,000	95,000	
CT	8	8	24	4	4573	4600	74,400	3100	23,000	100,500	
OV	8	8	24	4	4234	4200	72,000	3000	21,000	96,000	
EC	8	8	24	4	3425	3400	74,400	3100	17,000	94,500	
					59495	60000	880,800	36700	300,000	1,217,500	18,000
	Based on MISSION 66 plus 4 additional employees for beyond MISSION 66.		Based on 3 per em- ployee		Based on Visitation doubling over 1959 and 25% of visitors to Park stopping at Headquarters						18,000 Based on protection for 1 fire at 300 gpm for 1 hour

TABLE NO. 3
SILVERSWORD INN AND HOSMER GROVE CAMPGROUND
Water Use Requirements for MISSION 66

8/24/60

No.	(1) (2) (3) (4) (5)				(6)	(7) (8)		(9)	(10)	(11)	(12) (13)		(14)	(15)	
	Number of Overnight Guests				No. of employees living at site	No. of Transients		Estimated water consumption Column 5 x 100 g	Estimated water consumption Column 6 x 100 x 30	Estimated water consumption Column 8 x 10 g	Hosmer Grove Campground		Estimated total water consumption Columns 9, 10, 11, 13	Fire Protection Reserve	
						Visitors to Park	Estimated transients at SSI				Est. pic-nickers	Estimated water consumption Column 12 x 10 g	Gallons	Gallons	
	1955	1956	1959	1960 est. 1966	1960 & 1966	1959	1966	1966	1966	1966		1966	1966		
JAN			41	27	80	2	4347	800	8000	6000	8000	200	2000	24,000	18,000
FEB			17	26	60	2	3956	800	6000	6000	8000	200	2000	22,000	
MAR			84	31	160	3	4820	1000	16000	9000	10000	200	2000	37,000	
APR		6	21		60	2	4527	1000	6000	6000	10000	200	2000	24,000	
MAY		45	38		80	2	4500	1000	8000	6000	10000	400	4000	28,000	
JUN		48	111		300	5	5328	1200	30000	15000	12000	400	4000	61,000	
JUL		173	192		600	5	7503	1600	60000	15000	16000	400	4000	95,000	
AUG		215	221		700	5	8322	1600	70000	15000	16000	400	4000	105,000	
SEP		19	265		700	5	3960	800	70000	15000	8000	200	2000	95,000	
OCT		65	32		130	3	4573	1000	13000	9000	10000	200	2000	34,000	
NOV		14	62		130	3	4234	800	13000	9000	8000	200	2000	32,000	
DEC		34	22		60	2	3425	800	6000	6000	8000	200	2000	22,000	
	750	619	1106		3060		59495	12400	306,000	117,000	124,000	3200	32,000	579,000	18,000
					12/39			Based on							Based on
					3.25			visitation							protection
					Av./mo.			doubling							for 1 fire
								over 1959							at 300
								& 10%							gpm for
								stopping							1 hour
								at the Inn							

TABLE NO. 4
SILVERSWORD INN AND HOSMER GROVE CAMPGROUND
Water Use Requirements for beyond MISSION 66

8/24/60

Mo.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Number of Overnight Guests				No. of employees living at site	No. of Transients		Estimated water consumption Column 5 x 100 g Gallons	Estimated water consumption Column 7 x 100g x 30 Gallons	Estimated water consumption Column 9 x 10 g Gallons	Hosmer Grove Campground		Estimated total water consumption Columns 10, 11, 12, 14 Gallons	Fire Protection Reserve Gallons		
						Visitors to Park	Estimated transients at SSI				Est. pic-nickers	Est. water consumption Column 13 x 10g Gallons				
	1955	1958	1959	1960	estimated beyond 1966	1960	bey. 1966	1959	beyond 1966	beyond 1966	beyond 1966	beyond 1966	beyond 1966	beyond 1966	beyond 1966	
JAN			41	27	600	2	5	4347	800	60,000	15,000	8000	400	4000	87,000	18,000
FEB			17	26	600	2	5	3956	800	60,000	15,000	8000	400	4000	87,000	
MAR			84	31	600	3	5	4820	1000	60,000	15,000	10000	400	4000	89,000	
APR		6	21		600	2	5	4527	1000	60,000	15,000	10000	400	4000	89,000	
MAY		45	38		600	2	5	4500	1000	60,000	15,000	10000	800	8000	93,000	
JUN		48	111		600	5	5	5328	1200	60,000	15,000	12000	800	8000	95,000	
JUL		173	192		1440	5	10	7503	1600	144,000	30,000	16000	800	8000	198,000	
AUG		215	221		1440	5	10	8322	1600	144,000	30,000	16000	800	8000	198,000	
SEP		19	265		1440	5	10	3960	800	144,000	30,000	8000	400	4000	186,000	
OCT		65	32		600	3	5	4573	1000	60,000	15,000	10000	400	4000	89,000	
NOV		14	62		600	3	5	4234	800	60,000	15,000	8000	400	4000	87,000	
DEC		34	22		600	2	5	3425	800	60,000	15,000	8000	400	4000	87,000	
	750	619	1106		9720	12/39	12/72	59495	12,400	972,000	225,000	124000	6400	64000	1,385,000	18,000
					Based on 16 units x 3 people x 30 days = 1440 maximum. (See file C, 3823, memo dated 5/12/60. July, Aug, Sept, full occupancy. Rest of year 2/5 occupancy.	3.25 Av/mo	6.5 Av/mo	Based on Visitation doubling over 1959 & 10% stopping at the Inn				Based on doubling Mission 66				Based on protection for 1 fire at 300 gpm for 1 hour

HALEAKALA SECTION
MISSION 66
Water Storage Estimate

	(1)	(2)	(3)	(4)	(5)	(6)
Mo.	Total Water Consumption Headquarters Table 1, Column 10 Gallons	Total Water Consumption Silversword Inn & Rosser Grove Camp-ground Table 3, Column 14 Gallons	Fire Reserve Gallons	Total Water Consumption (1) + (2) + (3) Gallons	Storage based on 17" per Annum with 3 Acres Rainshed, Table 5, Column 3 Gallons	Cumulative Excess of Storage over Consumption Column 6 + Column 5 - Column 4 using 3 Acres Rainshed Gallons
JAN	62,300	24,000	36,000	122,300	245,000	122,700
FEB	59,000	22,000		81,000	285,800	327,500
MAR	64,300	37,000		101,300	163,350	389,550
APR	62,000	24,000		86,000	81,670	385,220
MAY	63,300	28,000		91,300	81,670	375,590
JUN	66,000	61,000		127,000	40,840	289,430
JUL	78,300	95,000		173,300	89,840	205,970
AUG	82,300	105,000		187,300	24,500	43,170
SEP	59,000	95,000		154,000	16,330	-94,500
OCT	63,300	34,000		97,300	114,340	-77,460
NOV	60,000	32,000		92,000	81,670	-87,790
DEC	57,300	22,000		79,300	163,350	-3,740
	777,100	579,000	36,000	1,392,100	1,388,360 or 3740 gallons short of Column 4	389,550 Gals. 94,500 484,050 Gals. Need 500,000 gallons Storage to take care of September includ- ing 36,000 gallons for fire

TABLE NO. 7
HALEAKALA SECTION
Beyond 1966
Water Storage Estimate

	(1)	(2)	(3)	(4)	(5)	(6)
Mo.	Total Water Consumption Headquarters Table 2, Column 10 Gallons	Total Water Consumption Silversword Inn & Hosmer Grove Camp- ground Table 4, Column 15 Gallons	Fire Reserve Gallons	Total Water Consumption (1) + (2) + (3) Gallons	Storage based on 17" per Annum with 5.8 Acres Rainshed Table 5, Column 4 Gallons	Cumulative Excess of Storage over Consumption Column 6/ Column 5- Column 4 using 5.8 Acres Rainshed Gallons
JAN	99,500	87,000	36,000	222,500	473,700	251,200
FEB	95,000	87,000		182,000	552,650	621,850
MAR	101,500	89,000		190,500	315,800	747,150
APR	98,000	89,000		187,000	157,900	718,050
MAY	100,500	93,000		193,500	157,900	682,450
JUN	102,000	95,000		197,000	78,950	564,400
JUL	115,500	198,000		313,500	173,690	424,590
AUG	119,500	198,000		317,500	47,370	154,460
SEP	95,000	186,000		281,000	31,580	-94,960
OCT	100,500	89,000		189,500	221,060	-63,400
NOV	96,000	87,000		183,000	157,900	-88,500
DEC	94,500	87,000		181,500	315,800	45,800
	1,217,500	1,385,000	36,000	2,638,500	2,684,300 or 45,800 gallons excess over Column 4	747,150 Gals. 94,960 842,110 Gals. Need 850,000 gallons Storage to take care of September including 36,000 gallons for fire

Other Supporting Information

Memorandum

To: Hydrologist

From: Legal Assistant

Subject: Location of McGee Spring diversion near Hosmer Grove in
Haleakala National Park, Hawaii

Referring to the enclosed materials there seems to be some doubt as to the location of the diversion on McGee Spring near Hosmer Grove in the Northern end of the park. The record indicates that the diversion was believed to be on private lands outside of the park, and that a boundary change in 1969 incorporated the site to within the boundaries of the park. The park staff considers this source to be a State water source for these reasons.

However, there were no known boundary changes in 1969 that would have affected this water source. The major boundary changes in 1969 were in the southern and south-eastern ends of the park. There does not seem to have been in acquisitions in the north-north-western portion of the park.

Question I: Please document the location of the water source...ie is it now within the boundaries of the park or not?

Question II: Is this source still being used by the park for park purposes?

Question III: Is the park using any other source of water for its purposes? (Rain-catchment or otherwise.)

Question IV: Does the park have any documentation on the boundary change in 1969 of which they referred in their verbal correspondence with our department in August of 1975?

These questions seem significant for if the source was within the boundaries of the park from the beginning, then the source would fall within the Federal Reserve Water Right Doctrine of Winters v. U.S.. If the source was without the boundaries and is only now incorporated then the source is, as the park staff believe, a state water source.

Your assistance is appreciated in this matter.

Have a nice trip.

James Hershey
2/5/80

WATER RESOURCES/WATER RIG.

DATE: August 19, 1975

WATER RIGHT/SOURCE DOCKET INFORMATION

REGION Western AREA Haleakala National Park
 SITE Silversword - Hosmer Grove Area
 STATE Hawaii COUNTY MAKAWAOP A A NUI District DOCKET NO WR #1
 LOCATION _____
 REGIONAL BASIN _____ LOCAL BASIN _____
 ACQUIRED BY _____
 APPLICATION _____ PERMIT _____ CERTIFICATE _____
 ACTION DUE _____ PRIORITY _____ RESERVATION _____
 QUANTITY _____ USE _____
 STATUS _____ SOURCE _____

REMARKS hydrologic unit # 20020000NARRATIVE:

The water supply for the park is obtained primarily from catchments during rainfall. The Hosmer Grove campground and the Silversword Inn were supplied with water from the so-called "McGee Spring" which is also dependent on rainfall. Water from the catchments flows by gravity to the reservoirs (one 100,000 gallon concrete reservoir and approximately 26 wood stave storage tanks). According to a memo written by Mr. A. van V. Dunn on Sept. 21, 1960, McGee Spring ^{was} ~~is~~ not ^{located} ~~is~~ in the park (it also appears that it was then privately owned). On August 24, 1960, an entirely new water collection system was proposed as the old system was "so undersized and/or antiquated" that very little could be salvaged. The new system was still to be dependent on rainfall but would have a greater storage capacity to provide water during dry periods. McGee Spring was not to be included in the new system except as a standby source. This was because it was not a continuous source and required a pump to transfer the water to storage. (Also it lay outside the park boundaries and was privately owned.)

In August of 1975, verbal communication with the park provided the following information:

The new water system has not been constructed as yet. McGee Spring (which is actually not a "spring" but a diversion consisting of a small dam) is now within the boundaries of the park - this may have been the result of the boundary change of Haleakala on January 10, 1969. McGee Spring is still in use by the park but this source is considered to be a "state" water source (i.e., owned by the state). The state allows the park to take a small proportion of the flow.

Compiled by M. AckermanApproved by W. WarrellPage 1 of 1

Site HAWAII Docket 2



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WASHINGTON 25, D. C.

November 1, 1960

IN REPLY REFER TO:
154-OBL

RECEIVED	
NPS REGION FOUR OFFICE	
NOV 4 '60	
SURNAME DATE	
REG. DIR.	
ASST. R.D.	
OPERATIONS	
ADMIN.	
RECREATION	
WATER RIGHTS	
RANGER ACT	

Handwritten notes: x Spradling, 155 11/4, 11/4

Memorandum

To: Regional Director, Region Four

From: Chief of Lands

Subject: Water System, Haleakala Section, Hawaii - Water Right Docket No. 2

We have received Mr. Maier's memorandum of October 25 with Messrs. Johnson and Whitcraft's attached memoranda, and are pleased to learn that the temporary nature of our diversion from McGee Spring precludes the necessity of its acquisition, and that proper agreements are being arranged for use from this source until the proposed catchment facilities are completed.

Handwritten signature of Donald E. Lee
Donald E. Lee
Chief of Lands

Copy to: Superintendent, Hawaii
Chief, WODC (2)

L 54

October 25, 1960

Memorandum (AIR MAIL)

To: Director

From: Assistant Regional Director, Region Four

Subject: Water System, Haleakala Section, Hawaii,
Water Right Docket 2

By memorandum of September 21 Mr. Dunn called our attention to the fact that water right acquisition funds, when available, may be used to acquire spring areas essential to provide an adequate water supply.

It is our opinion that upon completion of the proposed collection system McGee Spring will not be essential to the water supply of the Haleakala Section of Hawaii National Park and the land need not be purchased for that purpose. Copies of memoranda from Superintendent Johnson (10/10/60) and Assistant Superintendent Whitcraft (10/6/60) on this subject are attached.

Assistant Regional Director

Attachments

Copy to: Supt., Hawaii
Chief, WODC (2)

W O C

OCT 27 '60

100-443886-100

SEARCHED INDEXED

SERIALIZED FILED

FBI - MEMPHIS

OCT 27 1960

COMM-FBI

MEMPHIS

100-443886-100

ACTION TAKEN - DATE

11/1/60



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

October 10, 1960

IN REPLY REFER TO:
L54

RECEIVED	
NPS REGION FOUR OFFICE	
OCT 13 '60	
SURNAME DATE	
REG. DIR.	
ASST. R.D.	
OPERATIONS	
ADMIN.	
RECREATION	
INTERP.	
RANGER ACT.	

Memorandum (AIR MAIL)

To: Regional Director, Region Four

From: Superintendent, Hawaii

Subject: Water System, Haleakala Section, Hawaii

This is in reply to Chief, Water Resources Section Dunn's memorandum of September 21, 1960 and Acting Regional Chief of Operations Whitworth's memorandum of September 29, 1960.

I concur with the comments contained in Assistant Superintendent Whitcraft's memorandum of October 6, 1960, copy attached. We are formalizing by written agreement with the owner of McGee Spring the existing verbal agreement to use the spring water for park purposes. The agreement or authority to utilize the spring for domestic water will terminate upon completion of the proposed new water collection system.

Fred T. Johnston
Fred T. Johnston
Superintendent

Attachment

Copy to: Chief, WODC (2). With attachment.
Asst. Supt., Haleakala

L54

HAWAII NATIONAL PARK
Haleakala Section -- Box 466
KAHULUI, Maui, HAWAII

Oct. 6, 1960

Memorandum (Air Mail)

To: Superintendent, Hawaii National Park
From: Assistant Superintendent, Haleakala Section
Subject: Water System, Haleakala Section, Hawaii

If water collecting rainsheds are placed in the proper locations on the slope of Haleakala at about the 7500 feet elevation, I doubt if we would ever have a water shortage problem. By placing the rainsheds in or near the abandoned concrete collection dam for the 100,000 gallon concrete tank, where rainfall in this section appears to be the heaviest, would provide sufficient catchment for MISSION 66. If beyond MISSION 66 is to be considered, moving a short distance down the slope toward McGee Spring intake, but well inside the park boundary, at approximately 7300 feet elevation and still within this rain belt, additional catchments could be installed for two, 200,000 gallon tanks.

Most of the water collected at the McGee Spring intake comes out of the park. However the character of the ground outside the park boundary and above the McGee Spring intake is made up of basins of various sizes, where water collects during rainy periods. The water then seeps slowly through the soil and is collected in the ravine in which the McGee Spring intake is located.

After having observed moisture conditions on the slopes of Haleakala for the past four and one-half years, I am convinced that we do not need the McGee Spring area to assure us of an adequate water supply. However, we should continue to use this source of supply for the Hosmer Grove Campgrounds until such time as the wooden tanks will no longer hold water.

(Sgd.) Thomas E. Whitcraft

Thomas E. Whitcraft
Assistant Superintendent



154-OBL

September 21, 1960

W O D C	
SEP 22 '60	
CHIEF	
ADM	
PERS	
P & P	
ARCH	
ENG	
L.A.	
SPEC	
CONT	
SFTV	
ACTION TAKEN - DATE	

Memorandum

To: Regional Director, Region Four
 From: Chief, Water Resources Section
 Subject: Water System, Haleakala Section, Hawaii

*This is true but
 is not mentioned
 in the report
 At the climate
 system the water
 is lost from the
 island*

The memorandum of August 24 to Chief, WODC from Mr. P. E. Smith, which was forwarded with a copy of one of September 9 to the Superintendent from Mr. Hill, is worth filing as a preliminary docket even though I do not believe that a water right is needed under the present State water laws.

I note, too, that McGee Spring is not in the Park, and I understand that there is considerable variation in the rain fall on different parts of the Park and the Island. This leads me to wonder whether a more adequate water supply for the particular developed area could be provided by acquisition of spring areas or a wetter catchment area within a reasonable distance of that part of the Park boundary. As you know, water right acquisition funds, when available, can be used for such acquisitions when such acquisitions are essential to provide an adequate water supply.

SIGNED:

A. van V. Dunn
 Chief, Water Resources Section

Copy to: Superintendent, Hawaii
 Chief, WODC (2)

28

August 24, 1960

D5029

see memo
10/3/60

Memorandum

To: Chief, WDC
From: Supervisory Engineer
Subject: Water Study - Headquarters and Silversword Inn,
Maiealahua Section - Hawaii

The present water system is inadequate to take care of future demands and is obsolete and needs replacing. Funds are programmed in FY 1962 for the rehabilitation of the system, and this report is prepared in order to set up criteria for an overall system even if programmed in increments.

Existing System:

The water supply for both the Headquarters area and Silversword Inn is obtained from catchments during rainfall. These catchments consist of pipes backed up beyond small dikes in small ravines or draws, or on roofs of water storage tanks and some houses. Even the so-called "McGee Spring" is dependent on rainfall. There is one corrugated metal 5' x 96' ruined. A concrete dam used as an intake is no longer in use due to the area in back of the dam being filled with rocks, dirt and debris. All water to storage reservoirs is by gravity, except from McGee Spring. There is a 100,000-gallon concrete reservoir which is used to supply the Silversword Inn by gravity. There are approximately 26 wood stave storage

tanks located in various locations, varying in size from 5000 to 10,000 gallons. Some of the tanks are for fire use and others for domestic use; some are interconnected. The lines to and from the storage tanks are 1", 1½", 2" and 3". All supply lines are above ground. The Lodge Area is approximately 192' (maximum) lower in elevation than the Headquarters Area. The Hooser Grove Campground is served through the Mehee Spring set-up. The water from the upper collection system is run through a 4' deep sand filter and is hand-chlorinated. The water from Mehee Spring is also hand-chlorinated.

The entire system, except for the 100,000-gallon concrete reservoir, is so undersized, and/or antiquated that very little can be salvaged into the new system.

Proposed Water Supply Development:

General:

Recognizing the need for increased use of water, the improvement of the water system is scheduled for FY 1962. The following is an analysis of the water needs under MISSION 66 and future years.

The water supply will still be dependent upon rainfall and sufficient storage capacity will be required to supply water between rainfalls.

Two studies have been made, one for MISSION 66 and one for beyond MISSION 66. Due to the increased travel and visitation

since Hawaii has become a state, and the possibility of the Halea-hala Section becoming a separate national park, the Beyond MISSION 66 study was made as "Beyond MISSION 66" could come into being during MISSION 66.

Two possible methods are considered. One is to plan the catchment and storage on an above minimum rainfall year and provide sufficient storage for a drought or minimum year by carry over from the previous year. The other method is to plan the system for a catchment area and storage capacity to take care of a minimum year within the year itself. The first method would require a smaller catchment area but greater storage capacity than the second method. From Table 5 and comparing 1958 and 1953, it seems that a safe rainfall for collecting purposes would be 25" before a minimum year of 17". On this basis a 2.5 acre watershed and 650,000 storage capacity would be required for MISSION 66 water requirements. By constructing a 3 acre watershed and 500,000 gallon storage capacity, provision could be made in case of two consecutive minimum years. While this is slightly more expensive than the first method and would require more acreage of ground by $\frac{1}{2}$ acre, the second method is recommended as a surer water supply. This would provide fresher water also. See "Rainfall and Catchment" and "Storage Facilities" for a further discussion.

The water should be filtered and chlorinated.

Larger size pipes should be used in most cases to provide fire as well as domestic water.

The storage tanks should be of steel or concrete for permanence. The existing redwood stave tanks do not last too long in this area.

The systems should be metered.

The following tabulations are used to determine the storage capacities. Tables 1 and 2 forecast the MISSION 66 and Beyond MISSION 66 water requirements for headquarters, while Tables 3 and 4 forecast the MISSION 66 and Beyond MISSION 66 water requirements for Silversword Inn and Kamehameha Grove Campground. Table 5 summarizes the rainfall by months for the last twelve years and estimates the available amount of water per month. Table 6 summarizes the storage requirements for MISSION 66 for Headquarters, Silversword Inn, and Kamehameha Grove Campground. Table 7 summarizes the storage requirements for "Beyond MISSION 66".

No provision is made for irrigation as it has been determined that this is unnecessary.

Water Use Requirements:

Table 1 gives the estimated Park Headquarters water consumption by months, based on MISSION 66 employment and visitors. Table 2 gives the estimated Park Headquarters water consumption for "Beyond MISSION 66".

Table 3 and 4 give the estimated water consumption by months for Silversword Inn as well as for Hoerner Grove Campground. Although Hoerner Grove Campground is park development it is included in the concessioner development, as it is planned to have its water system as part of the Silversword Inn system. Based on the Director's memorandum of May 12, 1960 (File C 3823), which anticipates a larger concession development, two estimates have been prepared - one to meet MISSION 66 needs and one for future needs beyond MISSION 66. In case the proposed development is accomplished under MISSION 66, but after the initial installation is made, additional rainsheds and storage tanks can be added to the system. The piping will be large enough in the initial installation to take care of enlarged use of the concession area.

Rainfall and Catchment:

It is planned to depend entirely on rainfall for the water supply. While Mohee Spring is now utilized for the Silversword Inn and Hoerner Grove Campground it is not planned to use it in the ultimate system except as a standby, as it is not a perpetual supply and use of it requires pumping to storage reservoirs. The catchment area of Mohee Spring as well as 97% of the pipeline is outside the park. Consideration can be given to using it for Hoerner Grove Campground. Table 5 gives the rainfall in inches by months, from 1948-1959. The average for this period is 52.4 inches with one year having less than 19.60", one year having 28.44", one year 30.63" and the other years

ranging from 44.45" to 90.18". However, in some years there have been downpours of from 10" to 16" in one day, and a catchment system (including piping) would not catch all this fast run-off. However, the new system should provide for a drought year such as occurred in 1953. Column 1 of Table 5 represents a safe minimum in inches of rainfall per month that can be depended upon. While these figures exceed the actual rainfall in some months, I believe this to be safe, due to actual previous months' rainfall exceeding the estimated minimum. Using these safe minimum inches by months we arrive at a safe minimum for a year as 17", which is under the lowest record by 2.6 inches. Since not all of the rainfall can be collected, due to drizzle or evaporation, we believe this 17" should take care of any drought year. It must be recognized that a water system based on this rainfall will be oversized about 80% of the time. On this basis, Columns 3 and 4 of Table 5 record the collectible rainfall by months using a 3. acre and 5.8 acre rainshed. From Table 6, Column 6 a 3 acre rainshed shows that there would be a deficiency of water during September, October, November, and December, for MISSION 66. Likewise Table 7, Column 6 shows that a 5.8 acre rainshed for "Beyond MISSION 66" would show a deficiency of water in September, October and November. These deficiencies could be eliminated by an additional 1" to 1½" rainfall from the previous year, which Table 5 shows would be a reasonable assumption.

It is proposed to have a metal rainshed or rainsheds rather than ground

collection. There could be multiple rainsheds to make them less conspicuous, but 3 acres will require an area of approximately 680' x 210'. An additional 2.8 acres would be required for 5.8 acres for "Beyond MISSION 66" requirements. The total area for 5.8 acres would be about 1800' x 210'.

It is recommended that the rainsheds be built close to the ground, which would provide no car or material space as was done at Kilauea. This is because it will be difficult to hide the rainsheds as was done at Kilauea, and the rainsheds would be quite a distance from Headquarters, making it less handy. Collection of water from building roofs is not recommended as this would require a pumping system. Collection could be from the proposed storage reservoirs. By building the rainsheds in various ravines or at the site of the abandoned concrete collection dam for the 100,000-gallon concrete tank, it is believed that sites could be found so that they would not be too objectionable. Further study would be required for their locations.

Storage Facilities:

It is suggested that the present 100,000-gallon concrete reservoir be utilized in the proposed system. The wood stave tanks can remain in use until they have used up their usefulness, at which time they should be removed and not replaced. The proposed storage capacities would not take into consideration the existing wood tanks so the old tanks could be removed without jeopardizing the water requirements.

There is a difference in elevation of approximately 800' between the Headquarters Area (El. 6960-6992) and the Silversword Inn area (El. 6800-6880), or about 85 $\frac{1}{2}$ pressure differences. For this reason multiple tanks should be used at different elevations to remove the necessity for, or reduce the number of, pressure reducing valves. This is recommended also so that storage can be maintained while individual tanks are being painted or repaired. Tanks at the existing concrete reservoir (El. 7148) can provide fire protection at 300 gpm, at 40 $\frac{1}{2}$ - 55 $\frac{1}{2}$ pressure, using 6" (or less) pipe. The storage tanks for Silversword Inn can be installed at the same elevation, using less than 6" pipe and installing pressure-reducing valves, or installing tanks at a lower elevation. This can be determined if a site can be picked that would not make the tanks too obtrusive. Multiple tanks should be used to provide raw and filtered water.

For MISSION 66, using a 3 acre rainshed, Table 6, Column 6, shows that 500,000 gallons storage (389,550 gallons excess storage in March increased by 110,450 to provide the 94,500 gallons deficiency in September) will be required. This additional 110,450 storage would have to depend on about 1 $\frac{1}{2}$ " more rainfall the previous year. Using the existing 100,000-gallon reservoir, I recommend two additional 200,000-gallon tanks, one of which would be for raw water.

For "Beyond MISSION 66", Table 7, Column 6, shows that using a 5.8 acre rainshed, storage should provide for 850,000 gallons (747,150 excess

storage in March increased by 102,850 gallons to provide for the 94,960-gallon deficiency in September). This additional 102,850 gallons storage would have to depend on less than an additional 1" of rain the previous year. In order to have uniformity in the size of tanks I recommend that 900,000 gallons storage be provided and that two 200,000-gallon reservoirs be added to the MISSION 66 storage tanks, one of which would be for raw water. It is also recommended that one-25,000 gallon sand filter tank be constructed under MISSION 66.

RECOMMENDATIONS:

1. That we depend on rainfall for water supply. Mohee Spring can be kept as a supplemental supply. Mohee Spring can be used until the tanks are beyond repair. New pipe should be laid to Rosner Grove from the new system so that switch over can be made when the Mohee System is no longer usable.
2. That water be collected by a 3-acre rainshed for MISSION 66, and by a 5.8-acre rainshed for "Beyond MISSION 66".
3. That the existing system, except for the 100,000-gallon concrete reservoir and a small amount of the collection and distribution piping, be abandoned.
4. That the water be filtered and chlorinated.
5. That the system be metered.
6. That the storage tanks be of steel and multiple, rather than a

single one, to provide better maintenance as well as raw and filtered water; the retention of the existing 100,000-gallon concrete reservoir; the addition of two 200,000-gallon steel tanks for MISSION 66, and two additional tanks of 200,000 gallons each for "Beyond MISSION 66"

7. That a 23,500 gallon steel sand filter tank be provided under MISSION 66.

8. That the system be for domestic and fire protection, with no provision for irrigation.

9. Fire protection shall consist of two streams of 50-150 gpm for each of two fires of one hour duration, at 40-55 $\frac{1}{2}$ residual pressure at the hydrant.

(Sgd.) P. E. Smith

P. E. Smith
Supervisory Engineer

Copy to: *L. H. Smith*
Superintendent, Hawaii (2)
Reg. Dir., Reg. Four
Chief, D&C
Chief, Water Resources Section

TER AREA

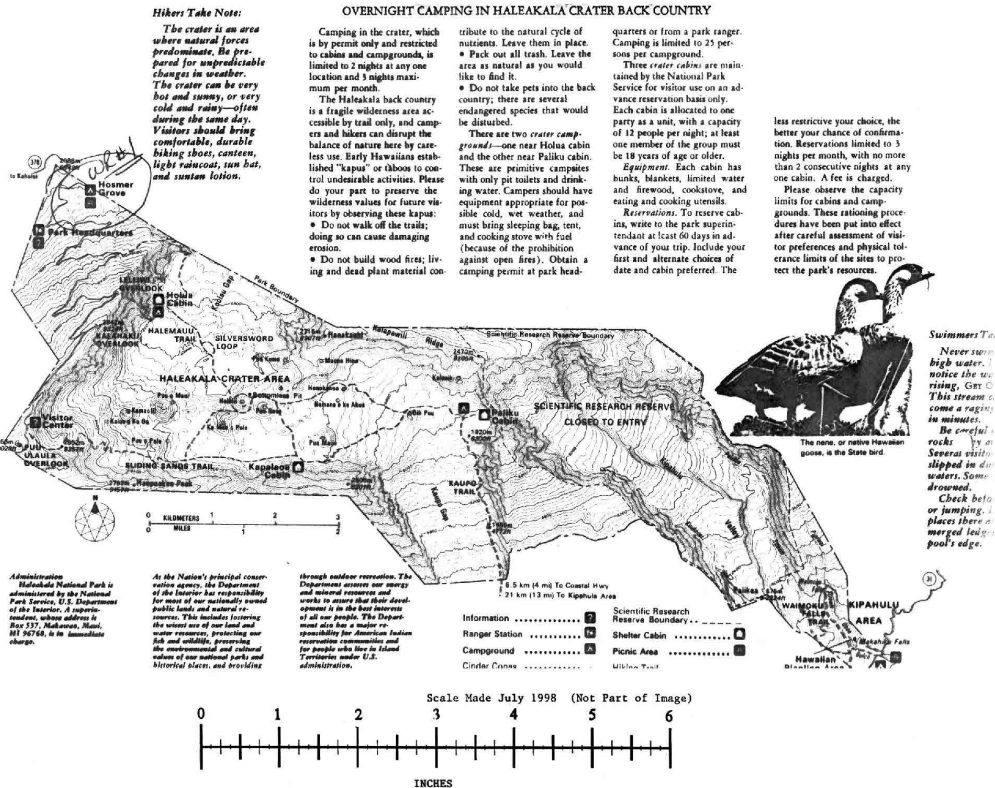
About 1.6 kilometers from the high rim, the Inner Grove is a 0.4 kilometer (1/4 mile) with the aid of a can learn of the native and animals. *Sliding Sands* did not to be return climb at this alti-

ty of 1919. A kilometer (3/4 mile) center. Hiking Campground, a cooking stove grills, and chemical here is limited (signed) groups 5 persons.

rips to use Trail to return, a 15-20 1/2 day trip. *Sands Trail* (Lahaina Trail, center 12 mile), recommended for

walks and bikes. It is a 2-hour about 3 kilometers at park current

guided crater hiking concen- cr—up a one-thatis. Write to at the address



Docket Information

Number of Documents in Docket 25

Documents Dated from 8/24/1960 to 2/5/1980

Docket Compiled: 4/11/2011