Hawaiian Volcano Observatory Record Book 1920

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Hawaiian volcano observatory.

Daily Journal.

1920

U.S. GEOLOGICAL SURVEY
94012
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JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Date

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ABBREVIATIONS

Anas.	Anastigmat
cam.	camera
C	Century
dist.	distance
elev.	elevation
ex.	exposure
f	F. system of stops
Hal.	Halemaumau
h.i.	height of instrument (5 feet if not specified)
H. S.	"Hut Stone" -- stone monument at Halemaumau hut.
hor.	horizontal angle
H.V.O.	Hawaiian Volcano Observatory
I.P.J.	I. P. Jaggar
Kil.	Kilauea
K 2	Wratten K 2 screen
K 3	Wratten K 3 screen
lev.	level reading
no.	number
P	Premo
pan.	panorama
pl.	plate
pt.	point photographed or located
R.H.F.	R H Finch
scr.	screen
sta.	station
t	time
T.A.J.	T. A. Jaggar
W.P.	Wratten panchromatic
vert.	vertical angle

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date January 1,1920
Friday " 2, "

January 1.
11:30 a.m. Lava has continued subsidence but at a moderate rate. Large spatter accululations against outer wall of pit, especially at the NW, give evidence of stationary liquid much of the time. Outer slope of island has broken down making outlying slabs and fragments in the ring lake. Two of these are flat upright slabs on the N side of the N crag with channels about 4 feet wide between them and the crag. Another islet formed by breakdown half fills the SE channel. NW channel has greatly narrowed. Boiling is mostly in the W, E and S. Streaming to the N on both E and W sides of the pit, meeting point of currents NE. S and SW channels appear dividing up into pockets, the fountaining there showing not much streaming. Central lagoon as before. Heavy smoke rising from N crag. The slope of terraced spatter lines under N shelf changes to vertical below. The transition from these spatter lines above to the heavy border accumulations below marks the change from rapid to slow sinking. Dense smoke from SW slag heap. Much Pele's hair from pit.

January 2. Fume increasing from Halemaumau pit. Glow very bright and excessively dense fume rising in three or more places along crack in SW slag heap.

Explored desert by trail across 1868 flow from Kapapala Ranch gate in forenoon. Crossed '68 flow and the aa next beyond, then climbed up the mountain towards the distant Puu Kouele. Front of flow seen to be in that vicinity two or three miles away from highest point reached after six miles walking from road. We followed up old pahoehoe along western edge of 1823 aa over a series of eminences. 1823 aa seen to be passing into forking slats of pahoehoe above. Edge of 1823 aa much like present flow about 6 feet high. Puu Kouele a teepee shaped cone and the yellow cone shown on Kapapala map is another alightly smaller one farther down the mountain.

From a high point secured a general view of country which indicated that the presemt flow if continued should follow a forested valley or sag bewteen the ridge of old pahoehoe where we were and the ridge on the W side of the 1868 depression. Along two or three miles of this sag there was a very smooth evenly graded pahoehoe flow which would be the natural floor for the new flow to follow. This would carry the flow down toward the sea along the eastern side of the 1868 flow.

Returned to Kapapala bull-pen and went to sand dune at upper end of lower slag heap. Top of slag heap smoking but not fountaining and sluggish pahoehoe flows still moving from E side of it. Climbed on top of slag heap, now the highest eminence in this country (excepting Kamakaia), a great flat-topped gray hill visible from the road. From here could see whole flow and this appeared as bright and

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

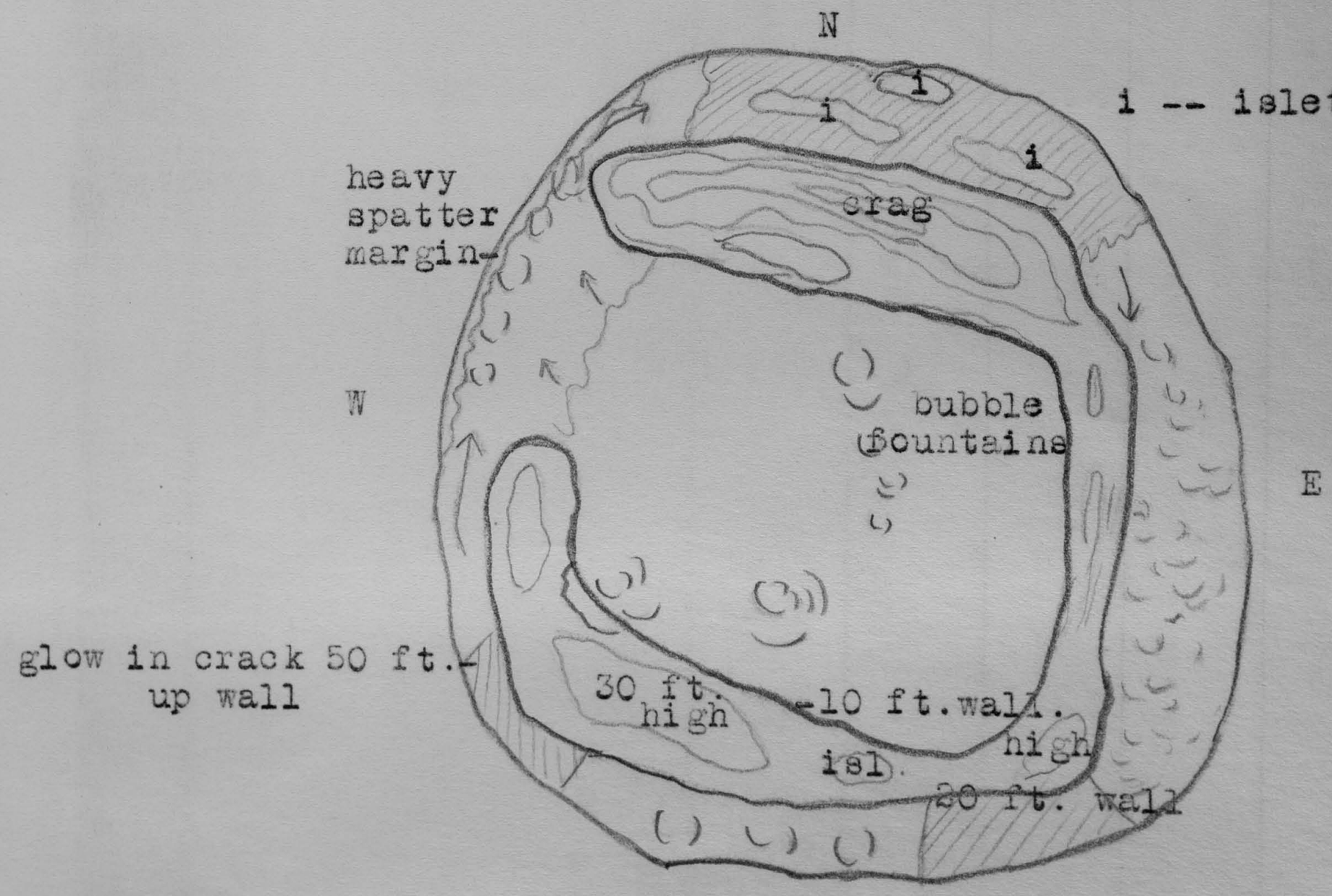
Day Friday Date January 2, 1920, cont'd
Saturday " 3, "

vigorous as ever, following same course as before and showing no forks or spreadings out in its upper part. A party which visited the source reported another small flow making out from source heap towards the W.

Near front of main flow glowing lava in motion I could see in the distance and front seen to be somewhere near Puu Kouele and perhaps not more than one mile below the front occupied December 31. There was occasional smoke of burning wood at the front.

January 3.
10:25 a.m.

Lake at ring pool beginning to leave bottom exposed at N, SE and SW. E side still fountaining strongly. Island very high above lake both inside and outside. Continuous fountaining N side of lagoon as though shutting off portions of the ring pool augments gas pressure inside. Dense fume from SW heap. N pool all crusted, three islets. Whirlwinds outside of pit NE and S. Great quantities of Pele's hair rising.



T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Thursday Date January 1, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11:30a	Edge bear NNE	NE monument	0					
	N mon.	" "	0					
		Elevation N monument --	3709	feet				
		" NNE edge	3714	"				
Edge near NNE		Crag summit	71 34	-25 48		0	393	-191
"		Lake edge N base of crag	76 44	-35 24		0	325	-231
"		Lake margin under W niche	85 56					
N		same	76 15	ca				
NNE		Lake margin E	9 23					
N		same	11 00					
NNE		Lake at SW grotto	60 16	-11 57		-02	1130	-239
N		same	53 40	-11 34		00	1171	-240

T A J

PHOTOGRAPH RECORD

4 U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date January 1, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
11:30a	NNE	W side of pit	1	Seed L Ortho	8x	f/16	1	4x5
	"	E " " "	2	"	"	"	"	"
		Panorama						

T A J

6 U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Saturday Date January 3, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10:25a	Edge near NNE	Crag summit		-27 53		393	218	
	"	SW grotto (lake)		-13 00		1130	260	

T A J

JOURNAL

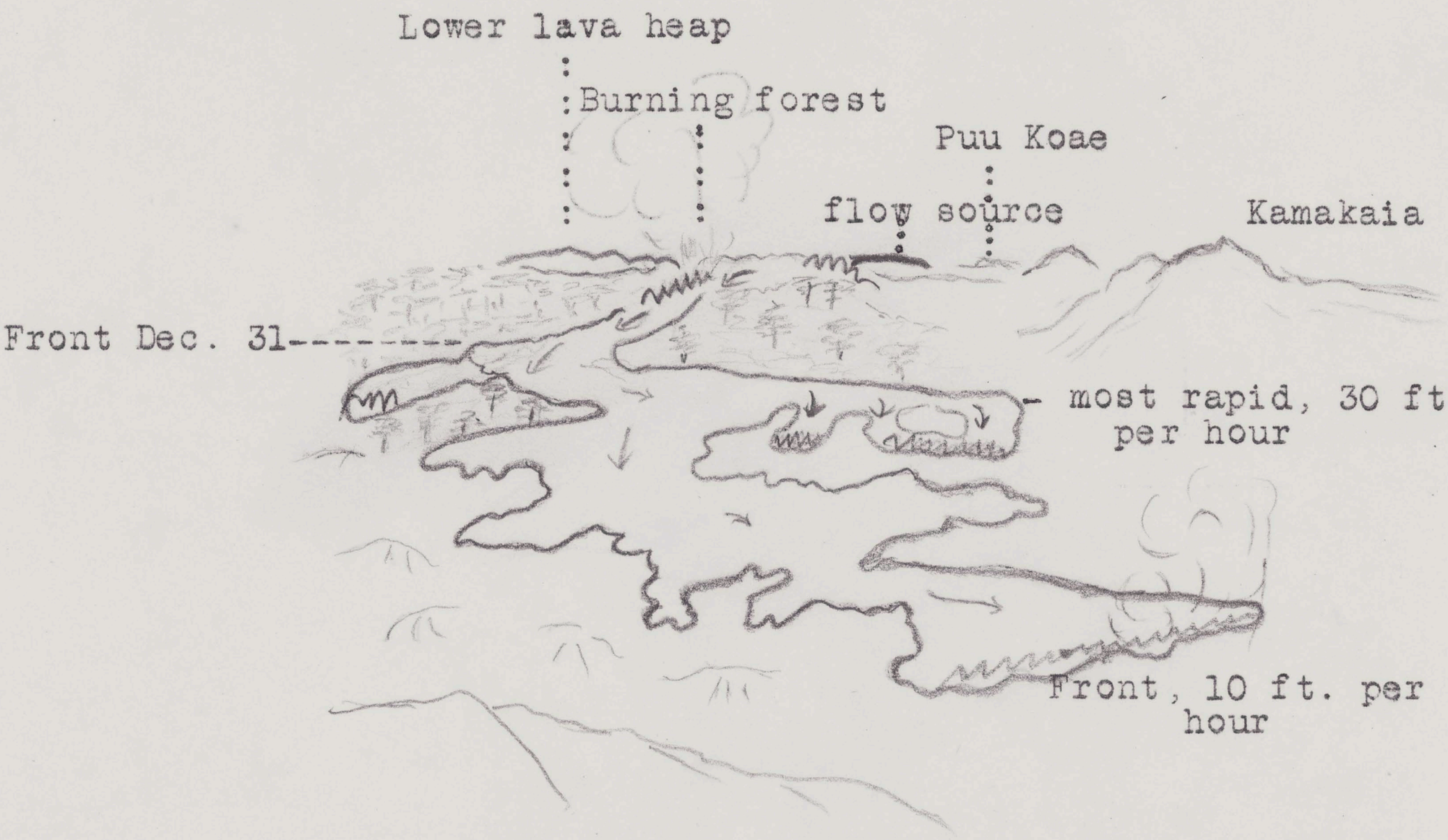
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date January 4, 1920

9:07 a.m. Hear deep rumble at Kapapala bull-pen (SW wind); probably thunder. Immense cumulus over Halemaumau.

Approach desert from bull-pen.
Jottings:-
Aa flow W from source heap not alive.
Live pahoehoe flows NW from source heap.
Note: There was noted on Dec. 31 last the down curved festoons in aa and the transverse white stains.
Breach W side S lava heap.
Front 1000 feet wide advancing 1/5 mile per day at base of Puu Kouele on its E side. Other more lively branches farther back and farther E tending to join this one.
Forest burning strongly, SE of S slag heap, at border of flow.
Channel at source 40 feet wide, 6 miles per hour. Floor built up at source amphitheatre.
Ground steaming S of Puu Kouele, 300 yards in front of flow.

2:30 p.m. Sketch of front of flow from Puu Kouele:
(Front as a whole advancing 10 feet per hour.)

~~~~ alive




T A J
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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date January 4, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
a.m.	pan.	Kau Desert. Dome hill to source flow	1	Seed L Ortho	8x	f/22.5	1	4x5 Century
		Dome hill to Puu Koae	2	"	"	"	"	"
		" " " Kamakaia (steaming rift and flow)	3	"	"	"	"	"
		From hill foot of upper slag heap to new aa flows (same hill as Dec. 24 and later)	4	"	"	"	"	"
		From N dune to lower lava heap	5	"	"	"	"	"
		Explosion hole from coal gas, W of N dune (smell of coal gas strong)	6	"	"	"	"	"
		From W dune to aa breach in lower slag heap W side	7	"	"	"	"	"

T A J

1920, Jan. 4

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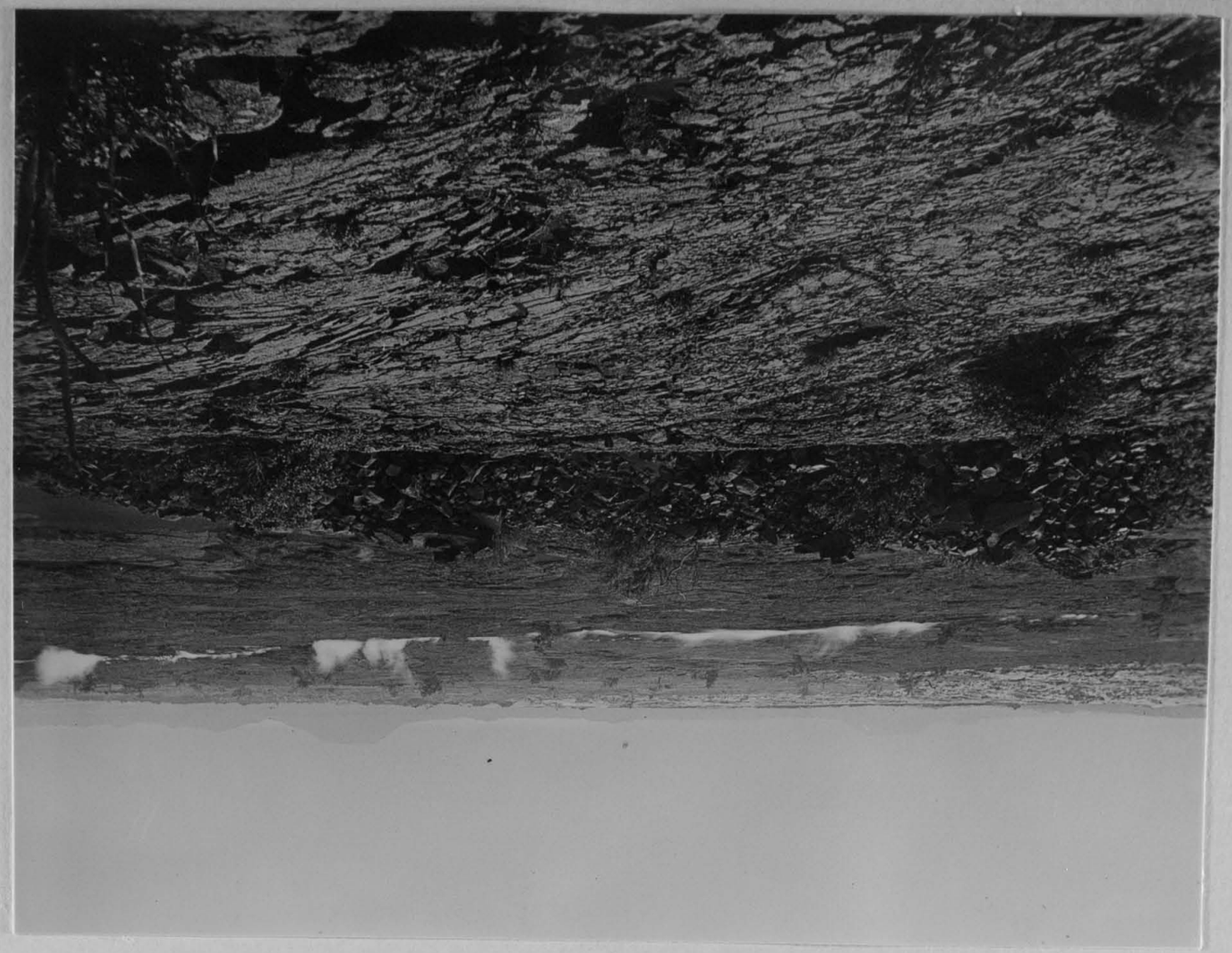

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Jog

1920, Jan 4

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date January 5, 1920

8:00 a.m. Slide and talus SW crack.
Glowing cavity 80 feet above in crack.
SW grotto dome gone, fountain continues.
Three center fountaining areas; two near W border of lagoon.
Fountaining pot N base N crag.
SW ring pool completely choked.
Dense fume from N crag mass.
Violent fountaining against wall W and NE.
E and S pools boiling.
Floor remnants of N pool slumped.
Wall crack chasm N inside of shell crags at base of N crag.
Streaming from lagoon W.
Puff heard once, not located.
N central fountaining continuous and noisy.
Island stands high all around.
Some deep rumbling.
Noise most against W wall, much heard in still weather recently even at Observatory.
Black ledge has shelled off W and NW.
Streaming along wall to N and against it E and W.
At NW corner the streaming amounts to a cascade downward into a crack behind a spatter rampart extension of N crag mass.
At NE corner intense rush to wall.
General fume from pit increased, SW heap fume less.

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Monday Date January 5, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
8 a.m.	Edge NNE	SW grotto lagoon		-13 42		1130	274	
	"	Crag summit		-29 42		393	225	

T AJ

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date January 6, 1920.

Morning. Entered desert at bull-pen 9:30 a.m., travelled S to front of flow. Found upper 1868 outflows in pahoehoe as mapped by Baldwin closely resembling upper outflows of 1919 W of Puu Koae. One driblet spire about 8 feet high with both aa and pahoehoe in its spatter heap and renewed movement in the source crack cracking it. One field of lava several hundred feet across. Lava a coarse pahoehoe and cracks one to three feet wide. No broad faulted chasm here.

12:30 p.m. Found front of flow E of Puu Kouele as before and advancing faster, moving three feet in nine minutes. Entire front flowing with numerous small lobes showing definite viscous motion. Tendency appears to be toward sag around S side of Puu Kouele, trending W Flow has advanced not more than a quarter mile in two days. Energy still being dissipated in spurting out of lobes E and W. One lobe seen burning timber E side opposite middle Kamakaia cone.

Went up mountain beside flow on W. Surface of flow much higher, has been deepening and pooling in area W of Kamakaia. New lobe penetrating forest for several hundred feet SE of lower slag heap. From high ground see upper part of flow, an active stream as before. Air dead like CO_2 to leeward of flow.

Climbed E side of lower slag heap to summit. Find sink oval depression with vertical walls in summit plateau at head of the western breakdown. Walls of sink vertical 15 to 20 feet high, floor more or less flat made of broken plateau crust. At N edge of plateau find 3-foot hole over rift line glowing inside and showing a slope downward of glowing aa. The sink resembles Kilauea crater in miniature and opens to a sector of downbreak on the W not unlike the desert sector of Kilauea. The slag heap as a whole is dead, no flowing anywhere. Sink 100 by 300 feet,

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Wednesday Date January 7, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
5 p.m.	NNE edge	Crag		-30 55	00			
	"	SW grotto		-14 31	00			
								T A J

15

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Wednesday Date January 7, 1920
Thursday " 8, "

January 7.
5:00 p.m. Heat at edge of pit no longer excessive. Lowest point of lake appears to be approaching, or crag is sinking faster, as streaming is inward to lagoon from W boiling area.

SW grotto now a standing fountain, large, of artesian character close to bank. Two central fountaining areas, large dome fountains. Rocks falling in chasms N crag.

Liquid lower in N pot and NW sink-hole small and separated off from ring pool.

E and S pools smaller; fountaining. Central streaming toward SW. Lagoon has piled and folded skins. Smoke from crags less. Window glowing in SW wall at the upright crack is larger. SW and SE fills of wall crack smoky with some splashing pots.

Streaming along W wall both northward and inward.

Inner wall of island around lagoon 18 feet high. Outer wall at E pool appears still higher. New slab crags in SW fill higher than island ridge.

SW crack window 100 feet above lake.

Golden epaulette pattern at W side lagoon where inflow is in progress.

SW heap smoke holes large tumbled depressions with glow between blocks, probably flaming, dense fumes yellow-white and bluish.

January 8.
10:15 a.m. Conditions same. Island sinking more than lake. Multiple dome fountains in E pool. Smoke less from N crag fractures. Five or six fountains at N central part lagoon in a group. Abundant multiple fountaining S pool.

T A J

SURVEY RECORD

16

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date January 8, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10:15a	NNE edge	N crag		-31 28	00	393	-241	
	"	SW grotto		-14 41	00	1130	-296	
								T A J

PHOTOGRAPH RECORD

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date January 8, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
10:15a		Keanakekoi flats to Halemaumau	1	Seed L Ortho	Seed	f/28	2	4x5
		Looking W at SW heap	2	"	"	f/22.5	1	"
		Driblet cascade column Lee's pit	3	"	"	"	"	"

T A J

1920, Jan. 8

JOURNAL

19

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date January 9, 1920
Sunday " 11, "

January 9. Flow source of Kau Desert quite unchanged; steady stream; channel 30 to 40 feet wide; rate of flow 5 miles per hour. Some cascades A cone at source vent and opposite it the amphitheatre an oval with flat floor and surrounding cliffs 10 to 12 feet high, similar to the sink on top of southern lava heap.

Finch finds foot of flow has advanced 2 miles SSE from Puu Kouele and is making out at present more to the SW with steaming ground in front of flow. All on top of 1823 flow.

T A J

January 11.
9:30-10 p.m. Three fountains playing continuously in central pond of Halemaumau. Three fountaining places in wall crack ponds with deeply crusted intervening spaces. The fountain place to the E exhibited the continuous bubbling type with occasional large fountains. The other fountain places were at the S and at the W sides.

R H F

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date January 9, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Summit plateau of source heap to Puu Koae Century lens.	1	Seed L Ortho	Seed	f/22	1	4x5 T A J
12:10P		Lava river just above bend shown in #2 looking upstream with rapids to left (Puu Koae in background).....	1f	film	3x	US 16	½	Kodak
		Bend in lava river below upper slag heap looking down stream..,	2f	"	"	"	"	"
		Lower end of flow arm below Puu Kouele, taken from middle old lava river with aa on each side looking toward new aa	3f	"	"	"	"	"
		Looking across low slag heap from SE, about same position as the one of Dec. 25 ...	4f	"		"	1/25	" R H F
		(1f and 2f panorama)						

1920, Jan. 9

Taf

1f

2f

3f

4f

RHF

22

1920, Jan. 9

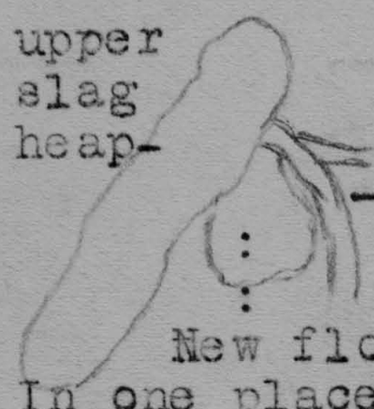
JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date January 12, 1920
Wednesday " 14, "

January 12.
Forenoon.

Lava flows at several places on top of upper slag heap in Kau Desert. The lava river is crusted over for some distance from the apparent source. A small break has formed in the side of the river just below where river leaves slag heap proper and is flowing off to the E. There is another break on the other side of river from the first which is going down the mountain parallel to the crack system. This latter flow is a 15-foot wall of aa with cascade of pahoehoe pouring over it in several places.



New flow with pahoehoe cascading over aa front. In one place the cascade was over 20 feet wide.

R H F

4:00 p.m.

Halemaumau. Pit very smoky. Same general conditions. E pool boiling hard and is large. Apparently the subsidence rehearsing same series of stages as the previous rise.

From SW rim see glow window in projection of rift crack on NE wall of Halemaumau similar to the window of SW wall only lower down.

Streaming is slow inward from the W. Bubble fountaining in center.

T A J

January 14.
Forenoon.

Desert flow approached from Halfway House. N part of source heap greatly extended W and SW. Source cone at slightly tumbled area and river for 200 yards below heavily crusted. Below this liquid appears from bright-line edge flowing 2 miles per hour. Below this on NE side dome hill remnant a large cascade in river 100 feet wide with constriction below and second cascade and rapid pool beneath. Flow down stream joins old flow line E of dunes. Forest burning farther S. Many fresh small flows and dome hill half buried N and W. No evident diminution of volume of flow.

T A J

5 to 6 p.m.

Halemaumau. Rain vapor very dense. Crag mass fuming. W wall crack streaming into lagoon with much golden flocculent pattern. Lava boiling up at SW grotto and streaming out into lagoon. Fountains in center boiling continuously with apparently sink-hole action. Island wall around lagoon very high. E pool boiling hard, S pool also. Window in rift crack continues to glow SW wall Halemaumau.

Note. Occasionally lately some movement in S pressure ridge.

T A J

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date January 14, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Desert Flow.						
11a.m.		General view flow at source	1	Seed L Ortho	Seed	f/22	1	4x5 C
		Source cone	2	"	"	"	"	"
		Looking down source stream crusted	3	"	"	"	"	"
Pan.		Source amphitheatre looking E	4	"	"	"	"	"
		Same looking SE	5	"	"	"	"	"
		Same looking S	6	"	"	"	"	"
		Cascade near dome hill	7	"	"	"	"	"
		Dome hill to Puu Koae	8	"	"	"	"	"

T A J

25

1920, Jan. 14

1920, Jan.

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

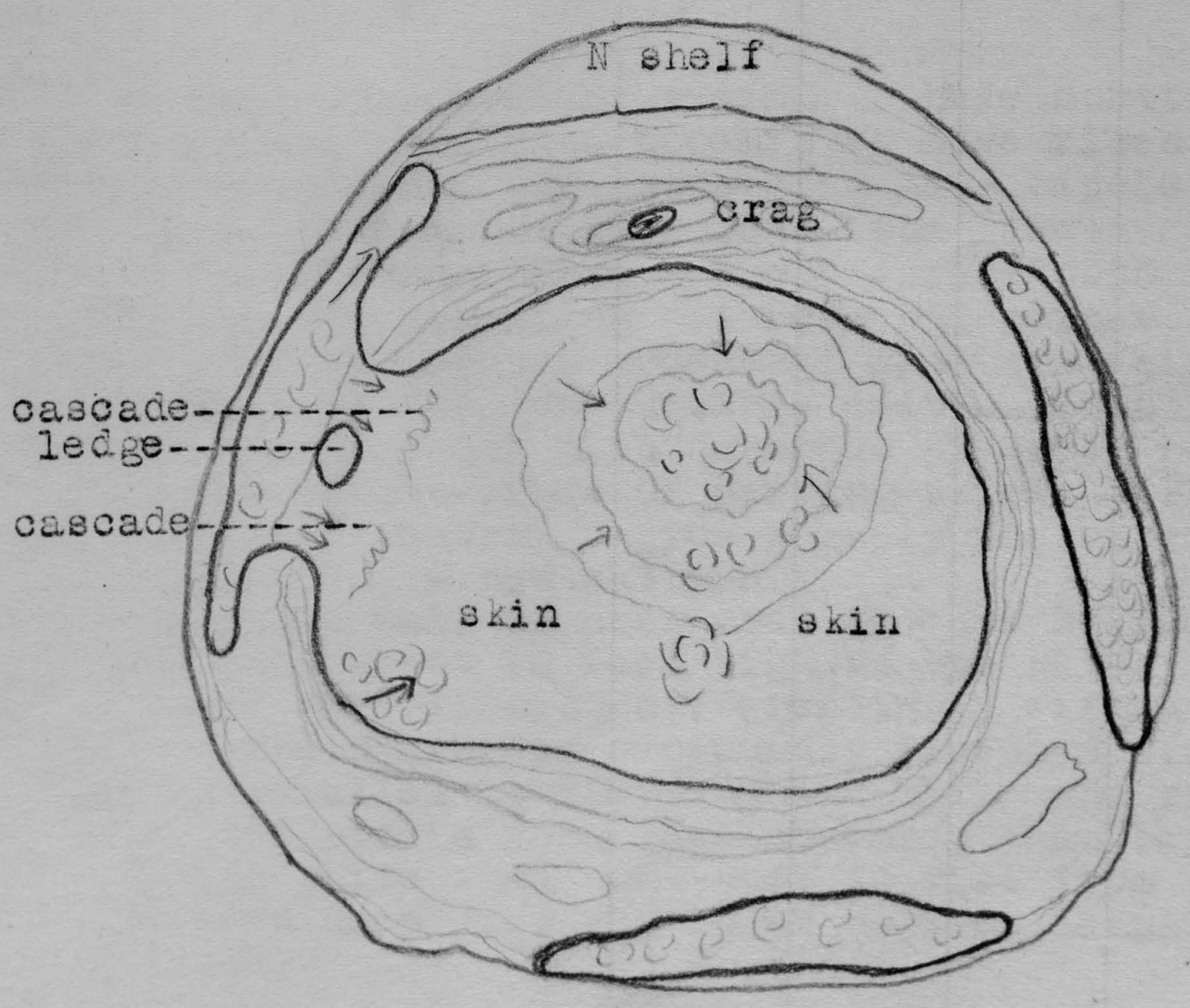
JOURNAL

Day Thursday Date January 15, 1920.

10:30 a.m. The W wall crack pond again separated off from lagoon by a ledge which marks the rim of the bench magma column. This ledge divides a wide cascade pouring from wall crack towards lagoon. The center fountaining of lagoon on N side of center now a turbulent mass of bubble fountains, with centripetal streaming and concentric circles of breaking skins. The SW grotto with fountain boiling up and streaming out from grotto, as though it also came from wall crack. E pool boiling hard, S pool smaller, W pool still pouring into NW crack. Great quantity of smoke from crag-mass. N crag now a high series of steps from the wall towards the center. Lagoon surrounded by wall 40 feet or more high of island remnant, the lagoon going down most and the margins being clogged by the funnelling pit.

Dense smoke from SW heap and line of jets from 1868 cracks beyond. Glow in desert at night.

11:00 a.m. Sketch map of Halemaumau:



T A J

Alex reports abundant pahoehoe flowing in the desert.

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date January 15, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10:30a		SE platform (Sta. 1) to NE height	0					
		NNE edge (Sta. 2) to NE monument	0					
		SE -- 13 ft. below NE monument, below 3727. Therefore el 3714'						
		NNE - " " " " " " " " "						
	1	Crag summit	L 49 03	-17 07	+02	831	-256	
	2	same	R 71 33	-33 26	+02	376	-249	
	1	SW grotto	L 104 10	-22 22	00	802	-330	
	2	same	R 60 44	-16 21	+02	1121	-330	
								T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Friday Date January 16, 1920.
Sunday " 18, "

January 16.
2:15 p.m.

Pit extremely full of smoke and vapor; and column of dense yellowish white vapor rising from the northern pit of the SW heap. The southern pit has merely thin blue fume as before. Glow can still be seen in these pits.

In Halemaumau central fountains make larger patch than before with inward streaming from all sides to the center. The western lip of the bench magma basin is still more lifted so that the cascade pouring from the W wall-crack into the lake is narrower and the rill divided off from the main cascade by the lifted ledge is very narrow on the S side of the ledge. The broader cascade on the N side is narrower (see yesterday's sketch map). The W wall-crack pond continues its bubble fountaining with northward streaming into the wall pot as well as the cascading into the lake. E and S wall pools boiling as before. Many fume cracks in the crag mass. Seeing is becoming difficult on account of the smoke.

January 18.
11:25 a.m.

NE wind again; clear seeing. Lake continues to rise slightly and crag mass appears to have risen on W side. Low rampart ridge now makes crag mass circle complete, shutting off W wall-crack pond from lake. This pond now fountaining moderately. E wall-crack pond fountaining violently and streaming out from NNE corner. S wall-crack pond as before. Central lake streaming from WNW and from ESE, the two currents meeting in a line of continuous fountaining with hundreds of small bubble fountains and bright-lines of parting skins. The bubble fountains of central region greatly increased in area and distinctly a new pattern.

The inner wall of crag mass appears 20 feet high on the SW and only about 10 feet high on the NE as though the crag mass were lifting differentially with maximum at W side. The N crag is profoundly fissured transversely as well as parallel to the ring and while the rising fume is dense, the pit is much less obscured than before. Dense yellowish white fume continues to rise from the SW heap.

Noticed deep fissures in SW wall of Keanakakoi; possibly fresh.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Fri. & Sun Date January 16 & 18,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
January 16.								
2:15 p	NNE edge	SW grotto		-16 07	00	1121	324	
	"	N crag		-33 17	00	376	247	
January 18.								
11:25a		Brunton.						
	NNE edge	SW grotto		-15 55		1121	320	
	"	N crag		-33 15		376	247	

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date January 17, 1920.

Kau Desert Flow.

Exploration of Kau Desert flow in pouring rain of southwesterly storm. Abundant brooks of running water coursing across pahoehoe of desert.

Crossed flow from region of lower slag heap eastward climbing first over aa then pahoehoe and crossing four distinct river channels. These were progressively warmer towards the E and N but none of them hot and all were dead. The lower aa fields did not even steam under heavy rain. Followed up E side, coming to fresher pahoehoe fronts making dense clouds of steam but none of them alive on E side. From below had observed glowing lava at the flow source amphitheatre but nowhere else. Passed around N side of upper end of flow-source heap which was steaming densely and obscured by its own fog.

Coming down W side of this heap found the heap fountaining on top and overflowing in two broad pahoehoe streams towards the W. These cascaded down the slopes of the slag heap and fountains on the summit of the heap could be seen in both the third and fourth terraces of the long ridge. As nearly as could be made out through the heavy steam clouds, the new activity was a revival of the terraced pool next below the source amphitheatre of the main previous flow. The longer and southernmost of the two flows pouring W appeared to have an aa front trending SW a few hundred feet from the summit pool. Another large fountain could be seen in the summit of the ridge farther S.

It is evident that a change of outlet is taking place in the heap, but there appeared to be ample volume in these flows.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date January 20, 1920
Wednesday " 21, "

January 20.
6:00 p.m.

Halemaumau seen from W; SW wind. Strongly acid sulphurous fume from SW crack near rim of pit. Central and southwestern bubble fountaining in lagoon increased in area with bright-line pattern, skins drawing apart rapidly, streaming from E and W meets in lines of fountaining across middle. Pattern recalls 1912 and 1913. High rampart separates off W pool from central lake. W pool fountaining, S pool fountaining, E pool fountaining hard. Cannot positively detect glow in rift crack ENE wall. Crag mass appears high, with glow in cracks high above lake over grottoes N and SE.

Pit evenly bright at night.

January 21.
Forenoon.

Kau Desert Flow. Visit source heap from Halfway House. Find upper three terraces of lava ridge all active with pahoehoe flows on W side. Upper one has two cones on top, the larger one an open pot with a continuous standing dome fountain 6 feet high feeding a flow which is banked against the old Keamoku aa flow to the west and is burning vegetation there and making many explosions. No explosions where fresh pahoehoe pours over recent cavernous pahoehoe, showing that coal gas from burnt vegetable matter makes the explosions. The top of second terrace was climbed and found to be a hot pool heavily crusted with a fountaining flat pot. Down the slope W of the second terrace a collapsed roof over a flowing lava stream found. The upper or first terrace making cascades below the summit fountain on W slope and sending a second flow, in addition to the one against the Keamoku aa, across the Kapapala stone wall into sparce timber below the foot of the Keamoku flow. The third terrace shows an escarpment on top, and fountains down W slope just below summit, and flows. All of these flows are short and of smooth or broken pahoehoe; fountains can be seen in profile of ridge and ridge is greatly built up, 100 feet more or less above surrounding country.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

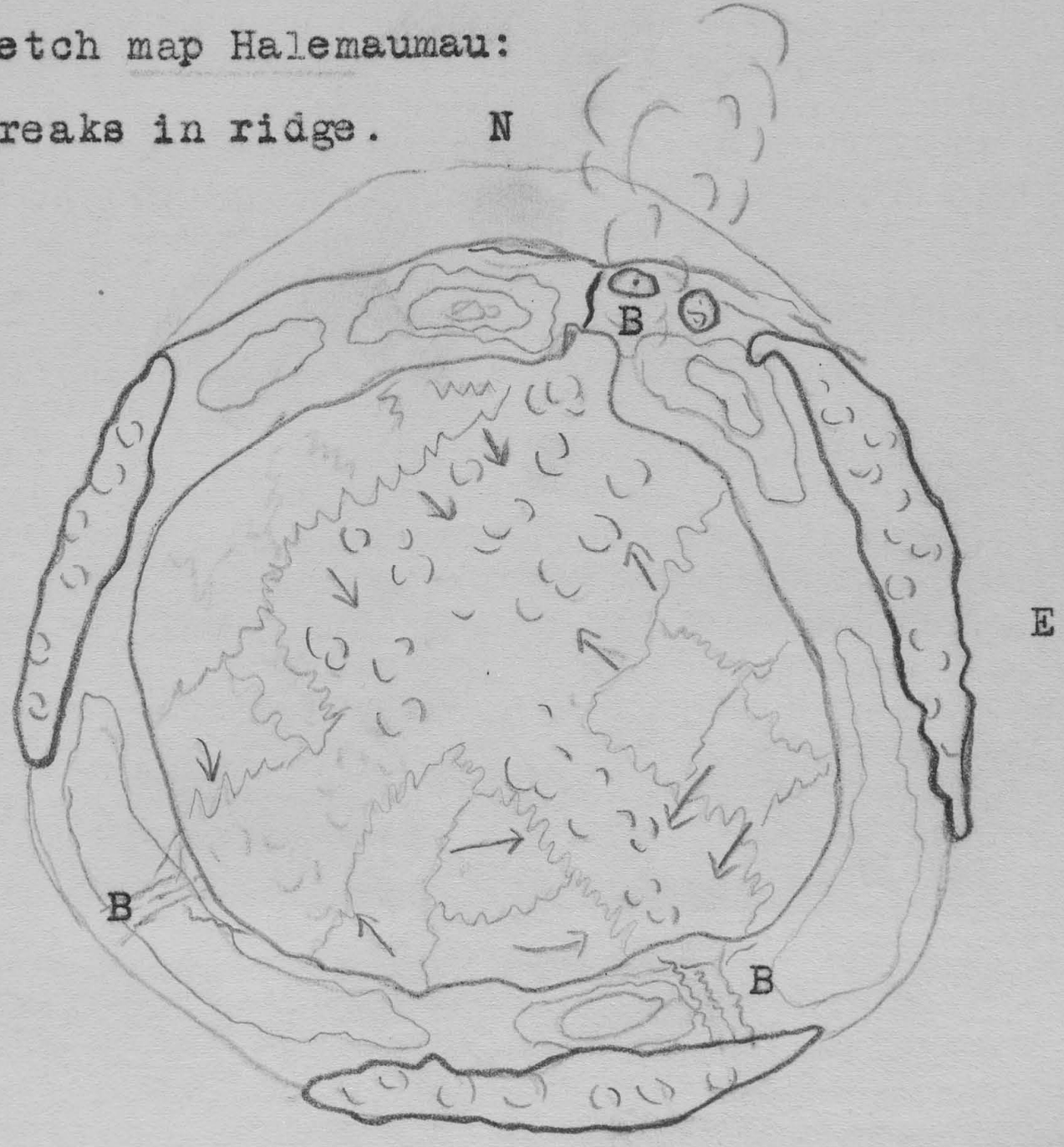
Day Friday Date January 23, 1920

9:30 a.m. After storm.

Lake and crag mass rising. New pots open extending E pool on N side of N crag. Crag mass broken transversely to ridge in the three places where grotto fountains are, SE, SW and NNE. Increase of bubble fountaining in lagoon with streamings meeting in lines of fountaining along these three axes. S, W and E pools with multiple fountaining as before. Much fume from pit and SW heap. S pit of SW heap not fuming. Light from Halemaumau at night very bright and even. Dense vapor from smoke hole near Hal. SW.

Sketch map Halemaumau:

B-- breaks in ridge.



Visited Cone Peak and crevasses along SW edge Kilauea crater. Much washing of cracks by recent rains. No new movement. Transverse cracks common, one of them right across the Cone Peak ridge, and others freshly broken extending NW from the S end of the Uwekahuna wall. The western crack of the rift pair goes right through Cone Peak ridge, the eastern one 100 yards E; these diverge down the mountain to wider separation. Maximum yawning of crevasses, with much vapor, is about 300 yards S of edge of Kilauea; crossed all of them easily at actual Kilauea edge. No fresh breaks on rift line across SW heap.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Friday Date January 23, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
9:30a	SE platform.	N crag		-16 50		831	252	
	NNE edge	same		-32 45		376	242	
	SE plat.	SW grotto		-20 25		802	300	
	NNE edge	same		-14 40		1121	292	

T A J

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date January 24, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Lower slag heap from upper end, nearly the same position as the one of Dec. 26,1919,		film		US 16	1/25	Kodak R H F

1920, Jan. 24

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Saturday Date January 24, 1920.
Sunday " 25, "

January 24. Entered Kau Desert flow region from a point about half mile below Halfway House.

No sign of flowing near the place where the stone wall was pushed over. The slag heap was crossed on the second terrace and no sign of flowing found. Several collapsed flats, indicating lack of live lava, observed. Smoke was issuing from several vents but nothing more than glowing cracks found. No live lava at the lower end of the upper slag heap. Some smoke was seen issuing from the edge of the aa flow on a line between Puu Kouele and the lower slag heap, but in volume no greater than at several places in the middle of the aa. Crack in the lower slag heap showed red 10 feet down.

New cracks that cross the old crack in the sand filled aa, at a very small angle, were found just below where the stone wall was pushed down, between the wall and the heap.

January 25, Went in from Halfway House and turned to the left after passing the head of the stone fench.

The upper part of the sand filled aa is about covered with pahoehoe flowing from the upper part of the slag heap. A small stream was found to be issuing from a broken cone on top of the slag heap. Pele's hair (red, white and brown in color) was found in abundance on and near this cone. In places the lava stream was so narrow that one could step across it. A large pool was formed on the side of the slag heap a little way down from the summit, with small sluggish flows pouring out from its sides in several places. The narrow stream connecting the cone source with the pool was moving about 12 or 14 miles an hour.

No flowing other than that above described was discernible.

R H F

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date January 25, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Cone near upper end breakdown site that caused large aa flow W side upper slag heap (shown in background of #2)	1	film		US 16	1/25	Kodak
		Small flow from a cone near head of breakdown in upper slag heap from which came the aa flow that joined the Keamoku aa	2	"		"	"	"
		Looking away from cone shown in 1 and 2 on upper slag heap near head of breakdown site	3	"		"	"	"
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date January 27, 1920.

5:30 p.m. General condition of Halemaumau unchanged. Streaming from E and W meeting in line of fountains in the middle. Crags on either side of SW grotto stand higher than before. Small coves have been eaten out at the transverse crevasses through the crag mass N and SW. The three fountaining grottoes N, SW and SE all show streaming towards the grotto and away from the lagoon and the three outer pools in the wall-crack appear lower than the lagoon, these facts appearing to indicate that the lava is sinking. The SW rift window glows brightly and appears about 100 feet above the lake as before. The bright lines formed by the outward streaming from a quiet crust at the W make a symmetrical pattern which incessantly creates an island of skin in the W central region from which streaming radiates, and which itself slowly migrates out to the fountaining belt leaving a new patch of skin to form behind it. This nodal patch of skin is not created by a breaking away of the western crust area, but by the solidification of a crust where one of the bright-line bands widens and slowly darkens. The same radiation cooling which causes the dark crust against the western shore, appears to assert itself for a second time in creating the floating islet of crust, and it may well be that these quiet crusts at places of uprising gas bubbles are to be accounted for by expansion cooling where bubble increment and bubble distention are at a maximum.

The general fume from the pit is abundant and the fume from the crag mass voluminous. A heavy fume column rises from the SW heap.

The Kau Desert flow is reported to continue at the upper end of the slag heap with the construction of a small cone.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date January 27,1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
5:30p	NNE edge	SW grotto		-16 30	ca	1121	332	
	"	crag		-32 40	ca	376	241	
								T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date January 29, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
5:40p	NNE edge	SW grotto		15 45		1121	316	
								T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Thursday Date January 29, 1920
Friday " 30, "

January 29.
5:40 p.m. Noise from Halemaumau less at a distance.

General appearance quite unchanged. E, W and S marginal pools boiling. Vapor and fume dense from crag mass. Streaming in central lake out from dark patches WNW, SSW and ENE to meet in three radial lines of fountaining which end in border grottoes SW, SE and NNE. Inward streaming at these grottoes towards the wall valley, and at SW grotto there are two coves, the larger one with a broad stream into a cavern, the smaller one adjacent to it on the S and a cascade pouring from the lake into a pot. Most active streaming from the W making nodal centers of skin, Window of SW rift continues to glow.

January 30. Kau Desert Flow. Visited N end of the long tabular source ridge. This ridge in five distinct summit terraces, but the slag heap aspect of the outer slopes not so marked as before. The steep even outer slopes are now replaced by more irregular spurs due to many small flows and the upper two terraces are roundish hills in plan, with flat tops and extensive frozen floods of pahoehoe extending out both E and W to the 1823 ridge on the E and the Keamoku flow on the W. The western flows across the stone wall and against the aa have changed but little since last visit and are now hard and not very hot. The pahoehoe is banked up against the Keamoku aa more than half the height of the latter. The northernmost summit was easily climbed from the W. The only activity seen in the lower four terraces was slightly smoking places in the upper two. The top of the northern terrace seems 80 to 100 feet above the surrounding country and is a flat pool of glowing lava, crusted, showing one small oven cone and pahoehoe welling up cracks very sluggishly. The organic odor which has been likened to the smell of a slaughter house is present on this heap, but there may be more or less vegatation distilling below A sluggish flow is moving down the E slope and recent flows on that side have bent southward and become aa at their extremities. They are small. One heavy elongate mass of aa breaks out of the flank and trends SE about 200 feet, appearing to be a small breakdown revealing the inside substance of the heap. On top of the heap, S of the active pool, there is the usual flat plateau of heavy crusted pahoehoe and one or two driblet heaps with smoky pahoehoe on their slopes; these probably over the rift line. Close by is a small flat stained yellow with sulphur and fuming.

Distant view of the southern heap in the sand dunes revealed no heat vibration or smoke.

General situation appears to be a solidification of the rift system from below upward with a last dribbling activity at the upper end.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date January 30,1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Desert Flow. (Cloudy)						
3:20p		Flow against old Keamoku aa (looking W)	1	W P	8x	f/14	1	Gaumont stereo
		Stone wall overwhelmed	2	"	"	"	"	"

T A J

45

1920, Jan. 30.

1

2

Jag

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date February 1, 1920.

11:15 a.m. Considerable changes beginning to appear. The three cross fissures in ring crag-mass have developed through to wall crack, wholly so on SW side, partly on SE and NNE. SE is a fountaining cove without marked streaming. SW is streaming through to the wall of Halemaumau, into a wall-crack pot which appears to be the focus of cascading from all sides. The W wall-crack pond cascades into it; the lake cascades through the rampart in a tunnel into the W pond; the hole next to the SW fissure channel on the S is cascading under a crust into the same pot as before, and probably connects through with the wall crack. The wall crack void receiving all these cascades is slightly N of the Kau rift crack, about under the old W station and S of there, and blur fume puffed up from it. The N crevasse channel receives an inrushing stream from the lake and above this stream at the inner end there is a puffing gas cone. There is another gas-cone hissing in the smoky S pond region and the S pond appears to be largely crusted.

Both sides of these transverse fissures appear in each case to have lifted, tending to form crags like the NE crags of August 1916, on each side of the cove formed by the crevasse. The N crag mass is high, smoky and tumbled and is getting to be a confused and chaotic body, with dense smoke coming up the cracks. There are terraced crags on each side of the SW cross-channel.

The alignment of fountains in the lake is definitely in three radial zones leading to the three coves with turbulent travelling fountains. The streaming out from the NW patch is compensated by a streaming in from the center to the W rampart where the above mentioned cascade pours through a submerged tunnel through the rampart to the W pool. Out of the SW wall-crack pot blue fume shoots up in puffs; evidently there is a hot boiling inside. There is one central continuous fountaining patch at the meeting of the three radial lines.

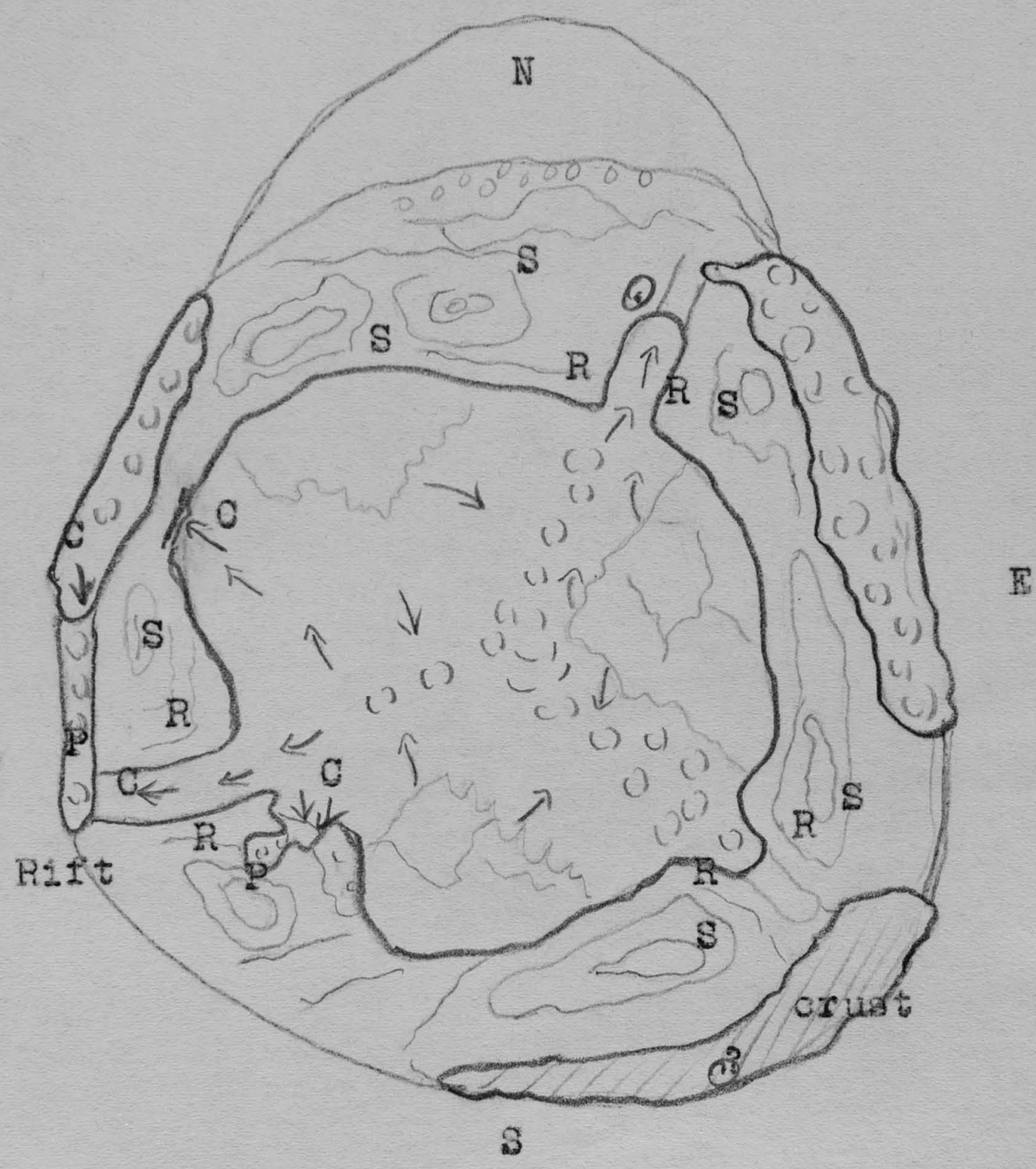
The E wall-crack pool appears to be boiling hard but lower. The wall-crack pools are clearly lower than the lake, but the border crags rather seem to be lifting. Perhaps this is only a breaking and tilting.

Sketch map of Halemaumau on following page.

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date February 1, 1930.

P -- pot
C -- cascade
S -- smoke
R -- raised



T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date February 1,1920

t	sta	pt		hor	vert	lev	dist	elev	h. i.
		Transit.							
11:15a	NE edge	NNE monument		0					
	NNE edge	NE "		0					
	NE	Crag summit	L	36 58	-32 12	00	585	-239	
	MNE	same	R	73 49	-31 20	00	376	-239	
	NE	N crack cove	L	46 17					
	NNE	same		57 35					
	NE	SE crack cove	L	115 18					
	NNE	same		32 06					
	NE	SW crack cove	L	81 19					
	NNE	same		67 02					
	NE	SW grotto	L	89 27	-18 11	+3	981	324	
	NNE	same	R	61 13	-15 14	00	1145	313	
	NE	Middle E pool		105 07					
	NNE	same		15 31					
	NE	Middle W pool		56 40					
	NNE	same		86 51					
	NE	Middle S pool		115 06					
	NNE	same		37 05					
	NE	Central fountain, lagoon (meeting place of radial lines of fountaining)		78 42					
	NNE	same		53 34					
	NE	Summit SW crag		75 56	-14 09	00			
	NNE	same		73 27	-13 12	00			
	NNE	SW rift window (vertical under SW rim)		69 03	2 46	00			

T A J

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date February 1, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
11:15	a.m.							
	N rim	SW chasm	1		8x	f/14	1	Gaumont stereo
	"	N crag	2		"	"	"	"
	"	SE chasm	3		"	"	"	"
	"	W rim	4		"	"	3	"
								T A J

2

3

4

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date February 3, 1920.

10:30 a.m. Trip to Halemaumau, Cone Crater, Puu Koae and desert flow.

Halemaumau. Examination from E and NNE shows little that is new. The N crag appears lifted and all the matter of former N pool is now part of the cracked and elevated crag mass. Streaming out from lake into NNE, SW and SE crevasse coves, E side of crust appears heaviest as though it might lift high and dry before long. The SSW grotto continues to receive a cascade pouring from the lake under a crust. Three radial lines of fountains as before.

Examination from W niche shows a round pot in the wall crack WSW and the cascade from lake through a tunnel in W rampart is plainly visible, pouring into W pool. W pool probably cascading under a crust into the round pot, which is churning and boiling within.

The fume recently has hung far to the SW obscuring view and seems to be very dense. The pattern of nodal crusts W of center is not so marked as before.

Rift. Explored rift N of Cone Peak and find the wide part, 15 to 20 feet open, much like the Grabd Canyon in its buttresses. Crevasse getting choked below with debris. Large blocks making arches across. Followed a fresh rift crack a half mile SE.

Puu Koae and Cone Craters. Exploration of Puu Koae and Cone Craters reveals nothing new. One rather fresh vertical break in E side of lower hill of Puu Koae. Large flat of sand S of Puu Koae. N end of source heap smoking and glistening all over with fresh lava.

Desert Flow. Arrived at source heap and found it flowing pahoehoe all over N part; flows E, N and W, and flat pool on top.

Passing around to W side, find that the W terrace or hill of the long source ridge has broken out into aa on its W side and this forms a coarse serrate profile. Blocks 15 to 25 feet in diameter showing the old pshoehoe surfaces and turned on end in a jumble. This flow started February 1. The heap has burst open just as the S slag heap did, and its internal lava has oozed out as aa paste, breaking to pieces and carrying forward the carapace of pahoehoe. This flow 100 yards wide and half a mile long, going out to the toe of the Keamoku flow and piling over that flow slightly. The new front extends across the stone wall and buries up the earlier pahoehoe there. This is the second largest aa flow of the whole series, and its outbreak directly from the side of the pahoehoe heap seems to imply that the lava of the pool inside the heap reaches a density which bursts the heap after most of the volcanic gas of the pool has gone off. This heavy fluid, free from volcanic gas, when it flows, freezes as aa. When a long flow, at first pahoehoe, turns to aa, apparently the loss of gas and its replacement by air determines the aa type of consolidation.

T A J

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date February 3, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
10:30a	NNE	Lake	1			f/7.7	1/50	Stereo Kodak
		Smoke hole SW heap looking SW	2			"	"	"
		Cracks newly opened SW cliff Kilauea (right hand one steaming)	3			"	"	"
		Looking down cracks top of bluff SW	4			"	"	"
		Looking down main chasm	5			"	"	"
		Looking up main chasm and net of cracks	6			"	"	"
		Distant view live heap in desert looking SW	7			"	"	"
		Rift crack going under upper side live heap	8			"	"	"
		New aa breach W side looking up to ENE	9			"	"	"
								T A J
11:30a		Looking down into deep crack facing S near edge of crater	1f	film		US 16	1/25	Kodak
		New cracks through sand fill near rim of Kil.	2f	"		"	"	"
3:30 p		Aa flow that moved from western side of slag heap and joined Keamoku flow	3f	"		"	"	"
								R H F

1920, Feb. 3

1

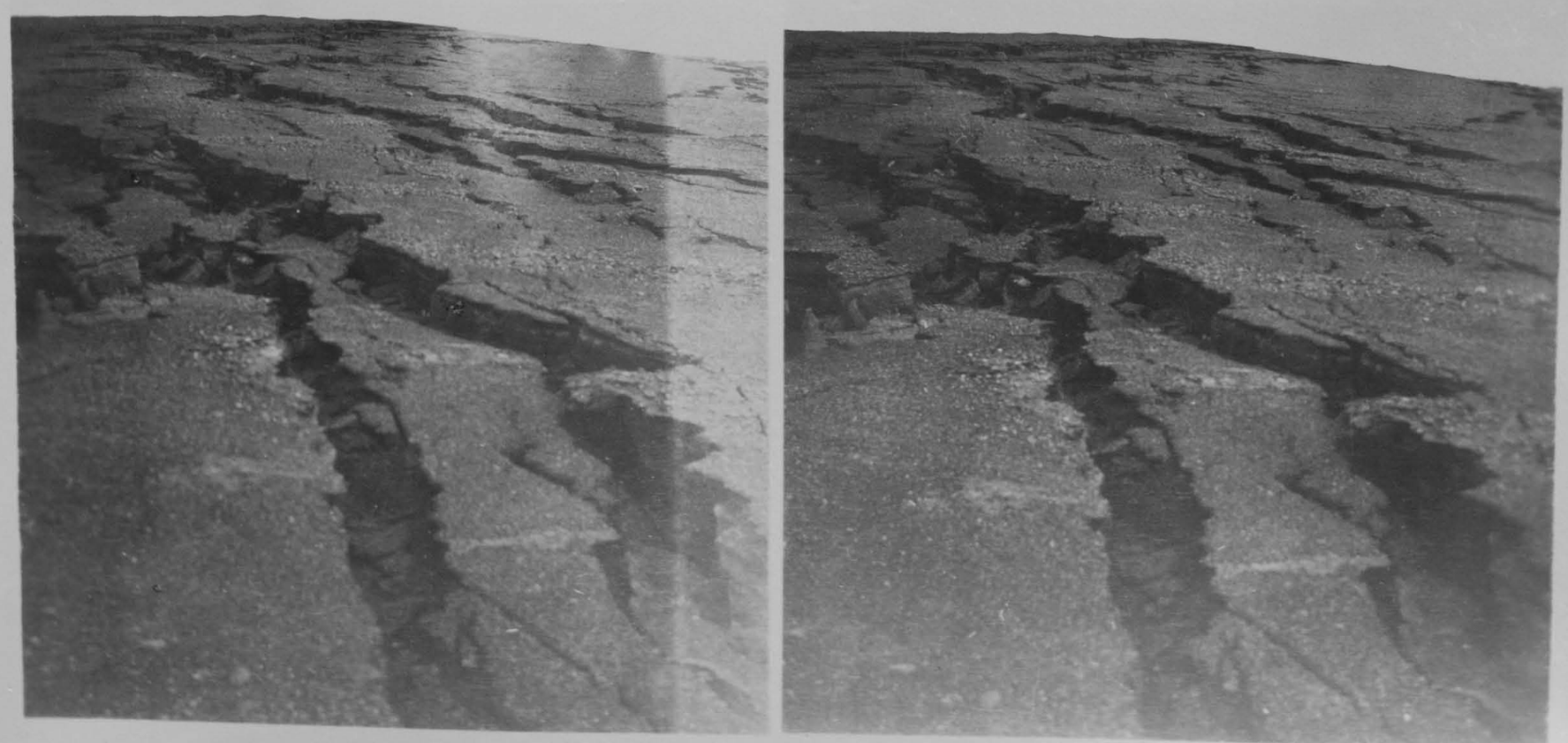
2

3

1920, Feb. 3

4

5



6

1920, Feb. 3.

7

8

9

1920, Feb. 3

1f

2f

3f

RHF

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Thursday Date February 5, 1920

10:45 a.m. Wind SE. Halemaumau very smoky. Distinct new note in the sounds, heavy roar of fountains and sharp puff from a cone NW Cone over NNE arm glowing. Turbulent vortex of fountaining E of center. Large talus from outer wall across crag mass at its low part S; some sliding heard there. The three coves as before, fountaining E and W pools.

The puffing sounds like a rising pool.

Fume from SW heap much less. In afternoon fume from pit less.

Explored 200 feet of Postal Rift tunnel. Alum and gypsum(?) stalactites. Four openings.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date February 5, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
10:45a	NNE edge	Crag N		-30 05		376	218	
	"	SW grotto		-14 50		1145	302	
								T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

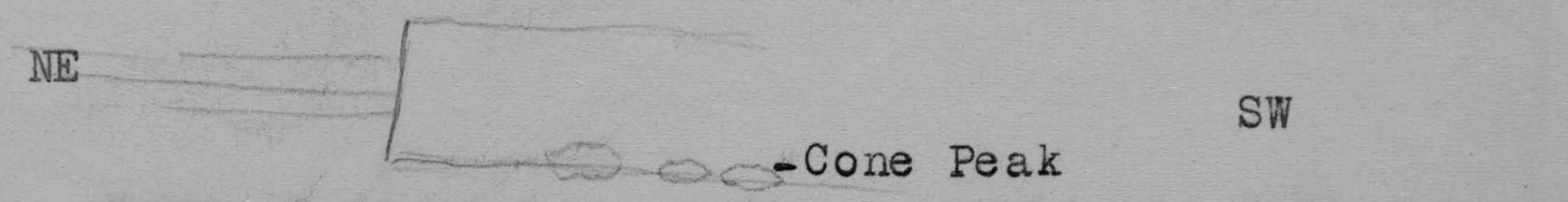
JOURNAL

Day Friday Date February 6, 1920.

Walked from Uwekahuna to source heap in Kau Desert by way of rift.

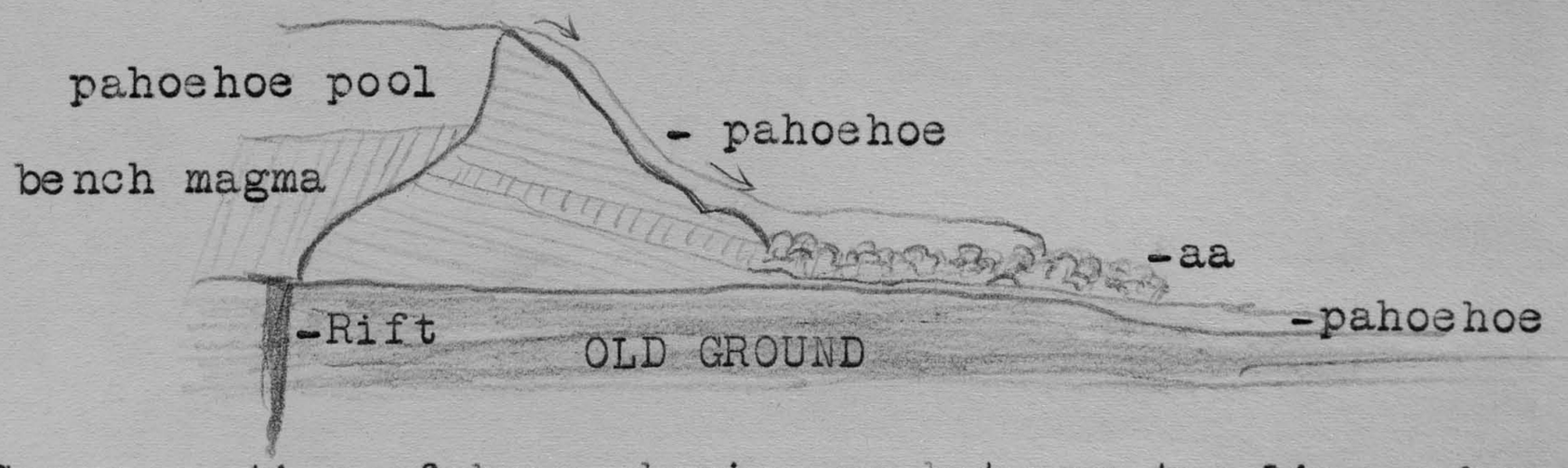
No new movement positively identified in cracks parallel to SW edge of Kilauea.

Found a locality just N of Cone Peak where the separation of the two cracks of the live rift takes place by way of a cross crack nearly at right angles, thus:-



The place of first lava outbreak which was visited December 22 was found nearly cold, just as last seen, and wholly inactive. Little vapor along this region.

The source heap was flowing down its N slope, both pahoehoe and aa being present. The aa was flowing out of a low fracture near base of heap. The pahoehoe was flowing in cascades from the summit pool. Pahoehoe nearly drowned the aa while we were there and was burning bushes and making border explosions in old pahoehoe caverns. It was interesting to see both flows at same locality, both alive, and wholly unconnected in origin apparently.



Cross-section of heap showing aa between two live pahoehoe flows.

The aa pushed over a flowing pahoehoe tongue and was itself overridden by another. Another fresh aa flow found farther S on W side.

T A J

JOURNAL

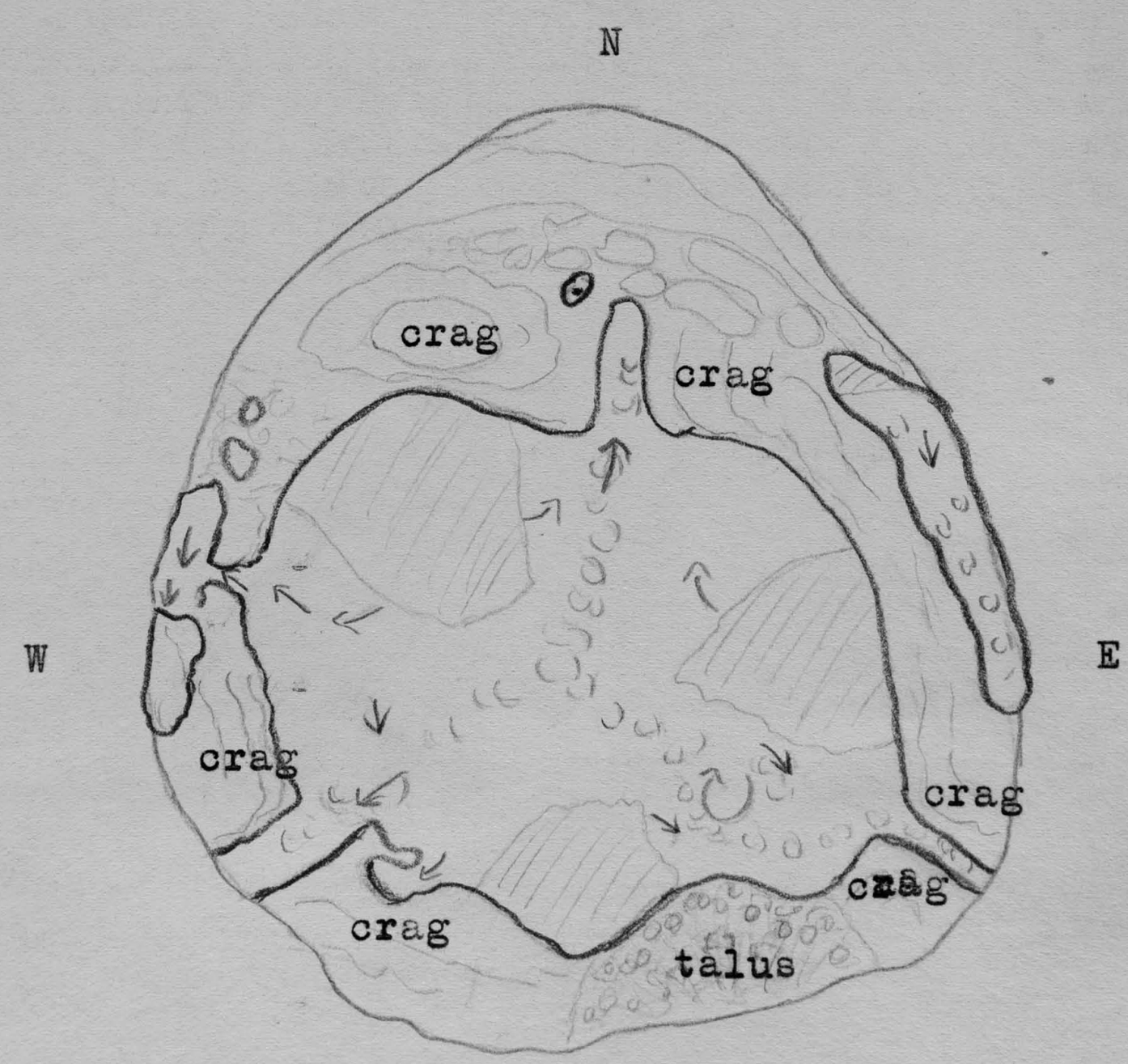
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date February 7, 1920

4:15 p.m. Summit rock of N crag has fallen. Lake very hot. Three radial lines of bubble fountains, vortex in middle of SE line. Cascades out from lake W and SSW. Big cascade from W pool into SW wall pot. N end of W pool arched over, windows in roof. Strong streams out from lake through N and SW chasm gulches. SE gulch through to the wall, a narrow creek, less rapid outward (centrifugal) streaming. Big talus to edge of lake S, its E flank smoking. Large flaming chimney over SSW pot.

Crags high both sides SW chasm and very high both sides of N chasm. Flaming cone over inner end N chasm. Black ledges have spalled away lower part of SW rift. N crag upper surfaces are tilted toward center.

Quiet patches with outward streaming E, S and NW.

All of the black ledge veneer S and much of the wall behind it, including parts of the S pressure ridge, have fallen to make the new talus.



T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sat. & Mon. Date February 7 & 9, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
February 7. 4:15 p	NE edge	SW grotto		-16 50		981	298	4'
	"	N crag		-20 45		585	221	4'
February 9. 10a.m.	NE edge	Crag N		-20 40		585	220	
	NNE edge	Crag N		-28 55		376	208	
	"	SW grotto		-14 00		1145	284	
	"	Crag SW		-12 30				

T A J

(92)

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Monday Date February 9,1920.

10:00 a.m. When first seen lake appeared very high and continuous across W rampart to W wall pool. N end of W pool a row of pots and cones. Later a cascade developed from lake across channel in W rampart pouring into W pool. Latter churning and evidently cascading beneath a crust into SW wall pot.

Fountaining in lake less and fume thinning, all implying rising. Crags continue to rise. In E pool streaming toward center of pit away from crust along outer wall; fountaining there less intense than of late. Streaming into N, SE and SW arms and flaming pot SSW.

Evening. Cascade W as before and bright-line pattern.

Flow in desert continues.

T A J

63

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

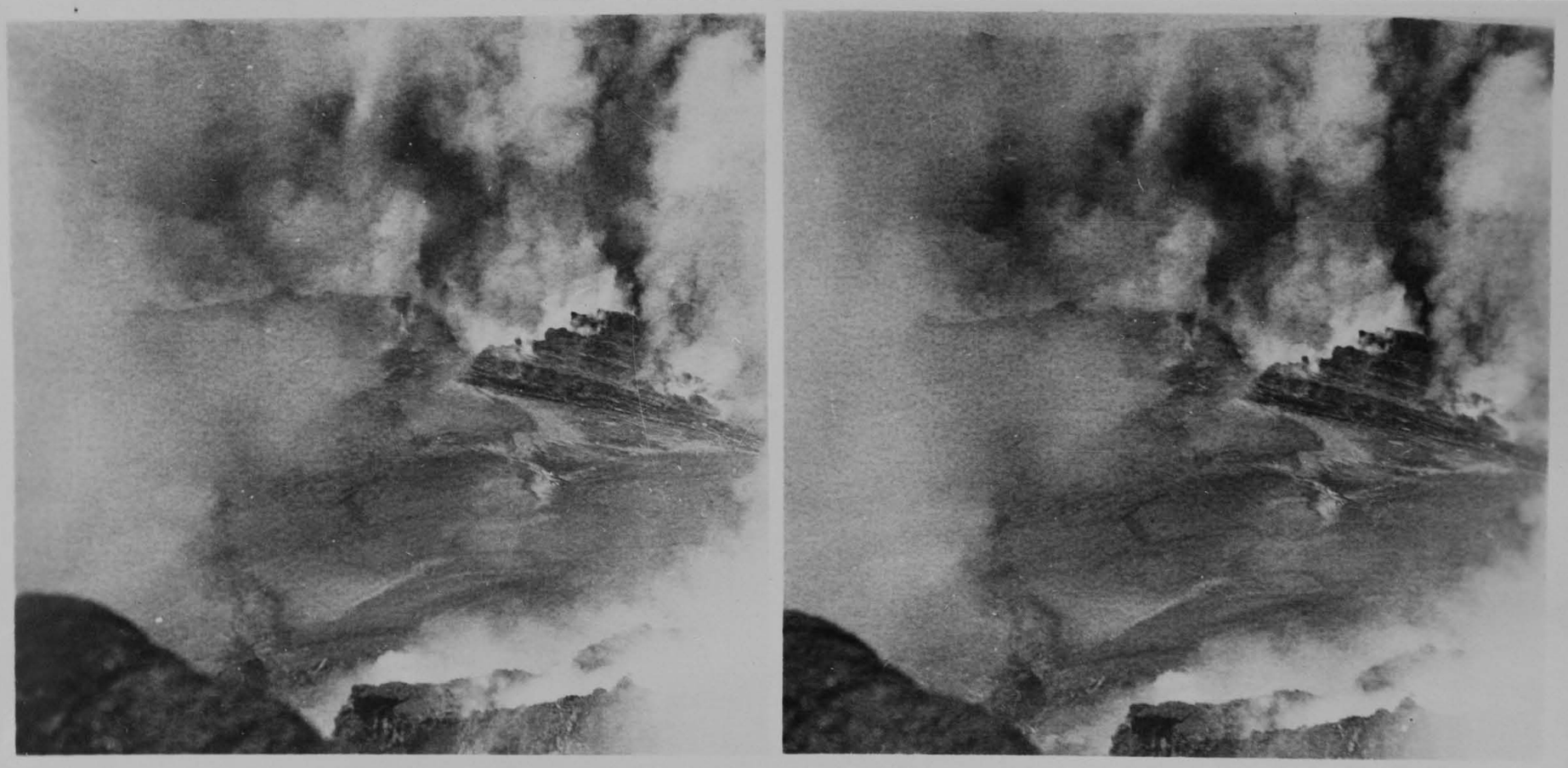
PHOTOGRAPH RECORD

Day Monday Date February 9,1920

t	sta	subject	no	pl	scr	stop	ex	cam
10a.m.	NNE	N crag gulch	1			f/11	1/35	Stereo Kodak (hand)
	"	SW gulch	2			"	"	"
	NE platform	W cascade	3			"	"	"
								T A J

1920, Feb. 9

1



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3

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Wednesday Date February 11, 1920.

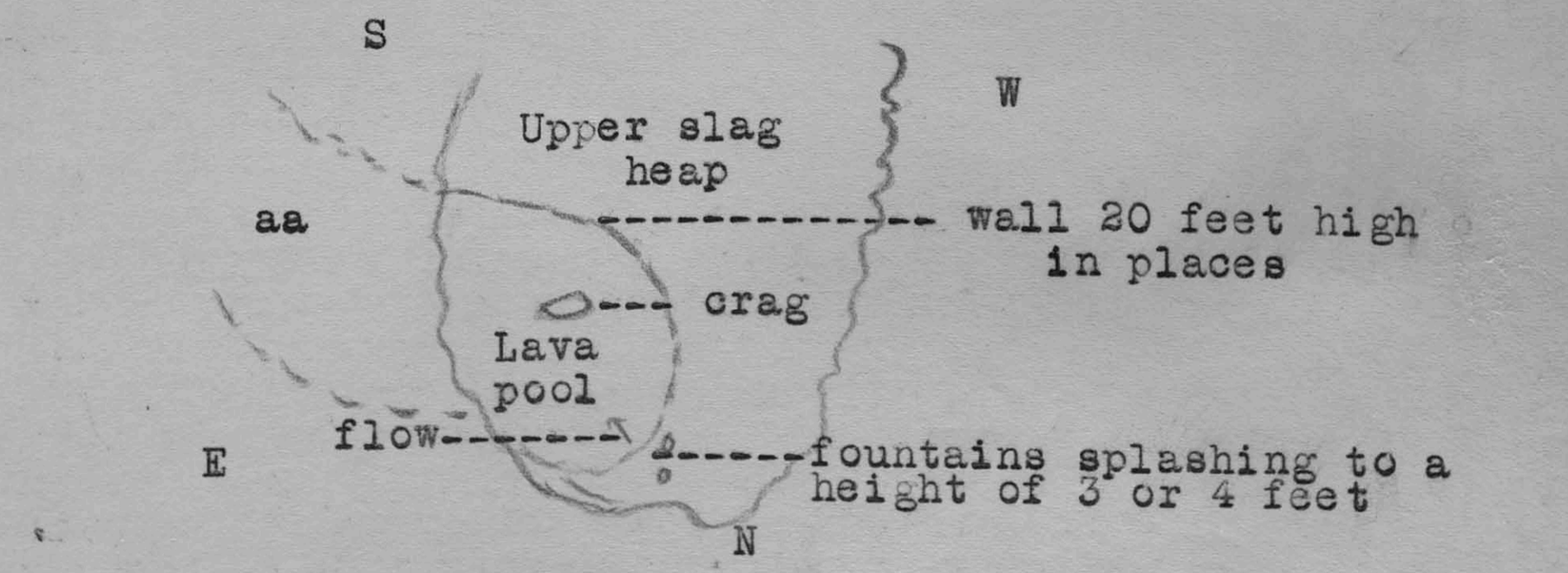
6:30 p.m. Lake continues bright with increased fountaining and bright-line pattern; main line of fountains N and S. Arms SW and SE larger. Heavy cascade in to pot SSW and boiling in pot about 5 feet down. Moderate streaming into arms SW, SE and N and into W pool from lake. High stack built NW, flinging umbrella gushes with noise like explosion engine. Avalanche from wall NNE. Fume much thinner and very high cumulus over crater in afternoon, boiling up rapidly. Glow described as brilliant even as seen from Hilo last night. Flings of melt from back of crag mass in S wall-crack. E pool narrow and partly crusted. New grotto with inrush on NE side of lake as though breaking through to E pool. Whole lake covered with bright-line pattern and fountains more scattered. Lake enlarging at expense of crag mass. Black ledge veneer scaling off in many places.

At dusk, a mushroom cloud seen over flow in desert, but no glow could be distinguished after dark.

Much rain vapor on Kilauea floor and fresh snow on mountains. Thunder for two days.

T A J

Kau Desert Flow. Went in by Halfway House. No flowing detected around the upper edge of the slag heap. Though there were some indications of a crack appearing in the new flow in a line with about the easternmost of the new cracks. Upon the dome in line, roughly, with the above mentioned cracks, a flow was pouring forth into a large breakdown site several acres in extent. The flow at orifice was 15 feet across and moving 10 to 12 miles an hour.



A short way from the beginning the flow broadened out to 35 or 40 feet wide and decreased in speed to two or three miles per hour. When last observed about 1:30 p.m. the flow apparently had not got out of the breakdown site.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Friday Date February 13,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
3:30p	NE edge	SW grotto		-16 43		981	294	
	"	N crag		-19 10		585	203	
								T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date February 13, 1920.
Saturday " 14, "

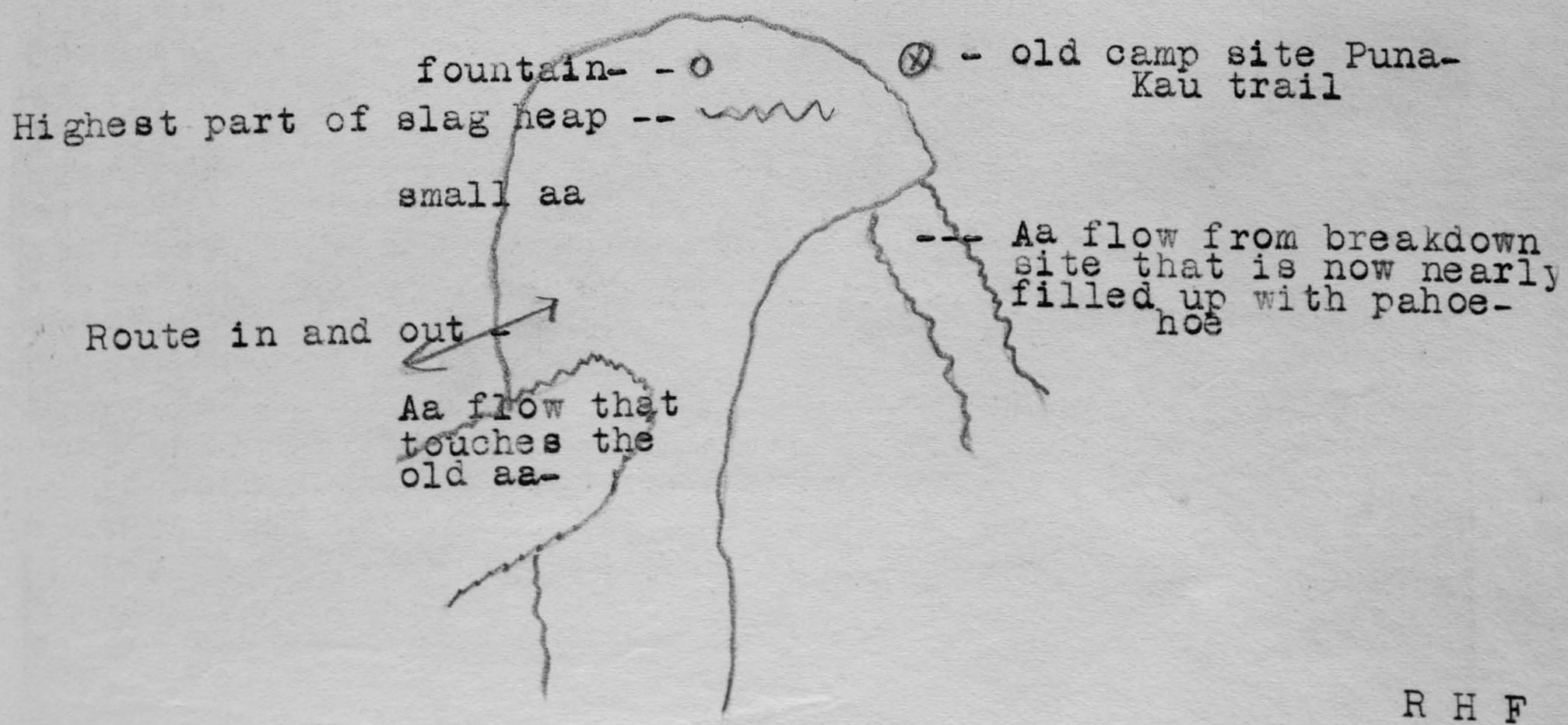
February 13.
3:30 p.m. Circuit pit by E and N. Crag continues rising. SW crag adjacent to SW arm shows wedge terraces of tilting uplift and same effect seen on E side of SE arm. New coves developing NE and NW of lake. Liquid lava of W pool and SW wall pot up level with lake and even higher, streaming into lake rapidly through the western cascade narrows, thus reversing the cascade. Slow centrifugal flow N and SW arms, SE arm stagnant. Fountaining more irregular, but very hot and numerous fountains and lines of travelling fountains. One large fountain bursting more or less regularly N of center. N arm wider. E pool continues brightly fountaining and two new hissing cones N of it in the debris of N crag mass. Streaming in lake from W to S and to N, and from NE side toward the S. Fume thinner and whole new talus under S wall visible, smoking strongly on its E side. Top of N crag has changed its shape, several pinnacles formed. Fume at SW heap thin and blue, much sulphur stain at rift crack near Halemaumau and some gas.

At locality of stack NW there is now a cove of lake. Crag-mass breaking up?

T A J

February 14.
10:30 a.m. to 12:30 p.m. Kau Desert Flow. Entered by Halfway House.

Moveing lava was found over most of the upper end of the slag heap except the W slope. One fountain was observed on top in a line with a crack to the W of middle of crack zone. The flow has buried most of the old camping site on the Puna-Kau trail, at the NE of slag heap. The aa flow that went to the S from the eastern side of the upper slag heap apparently reached the neighborhood of the big river source. Its source was the breakdown site where the lava was seen on Feb. 11. The upper part of slag heap is fully 30 feet higher than the rest and still building.



R H F

68

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

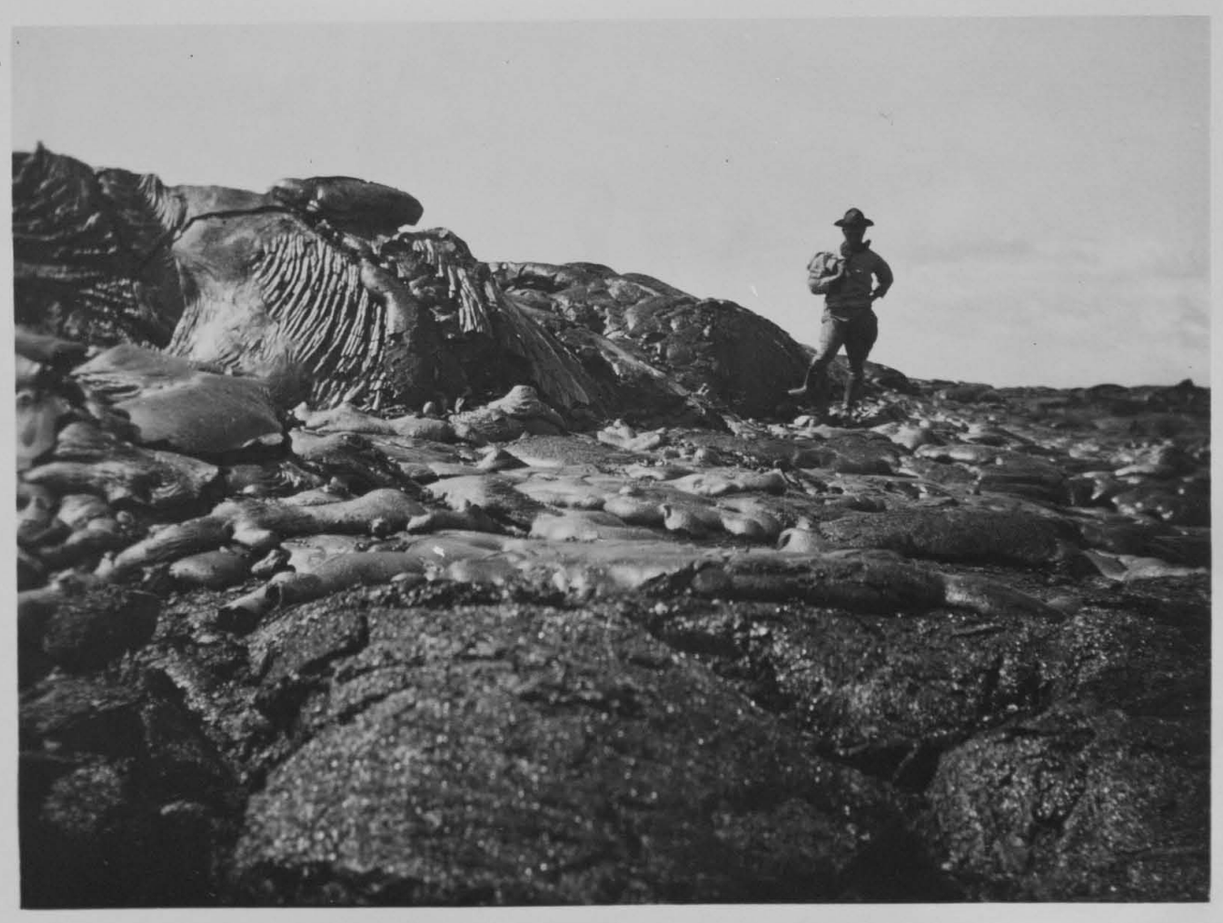
Hawaiian Volcano Observatory

Day Saturday Date February 14, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Lava cascading into old breakdown site eastern arm of upper slag heap, forming a pool	1	film		US 16	1/25	Kodak
		Heavy blue sharkskin lava that exuded from a small dome of light pahoehoe on side of upper slag heap	2	"	3x	"	1/4	"

R H F

1920, Feb. 14



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RHF

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date February 15, 1920.
Monday " 16, "

February 15.

4 to 4:30 p.m. Kau Desert Flow. Allen reports the flow as much the same as on February 14. A fountain was in the same place as on Saturday. Moving lava was observed over a large part of the upper end of the slag heap, but no big flow was to be seen anywhere.

8:00 p.m. Island shaped like a walrus in center of lake with sloping back towards the NE. This is the tip of a NE

Sketch of new island from NNE.

sector of the bottom which has recently been dark and appeared as though an island might form. Much like the N islands of August 1916. Rush of insuck and fountaining at the rounded head of the island, where the central fountaining was before. The rise of the island is probably facilitated by the heaping up of crusts on bottom of lake where centripetal currents have been rushing.

Crags higher. SSW cascade pouring into a boiling pot, W pool flooded from lake, streaming into SW arm. Blowing cones noisy all along NW base of wall of pit, spouting, flaming and lifting lids. These extend into hollow N of N crag where there is much live lava. N arm large, with streaming into it from lake. E pool still boiling in patches with blowing cones N of it. Fume thinner. Streaming rather irregular, out from W side, lines of fountains continue.

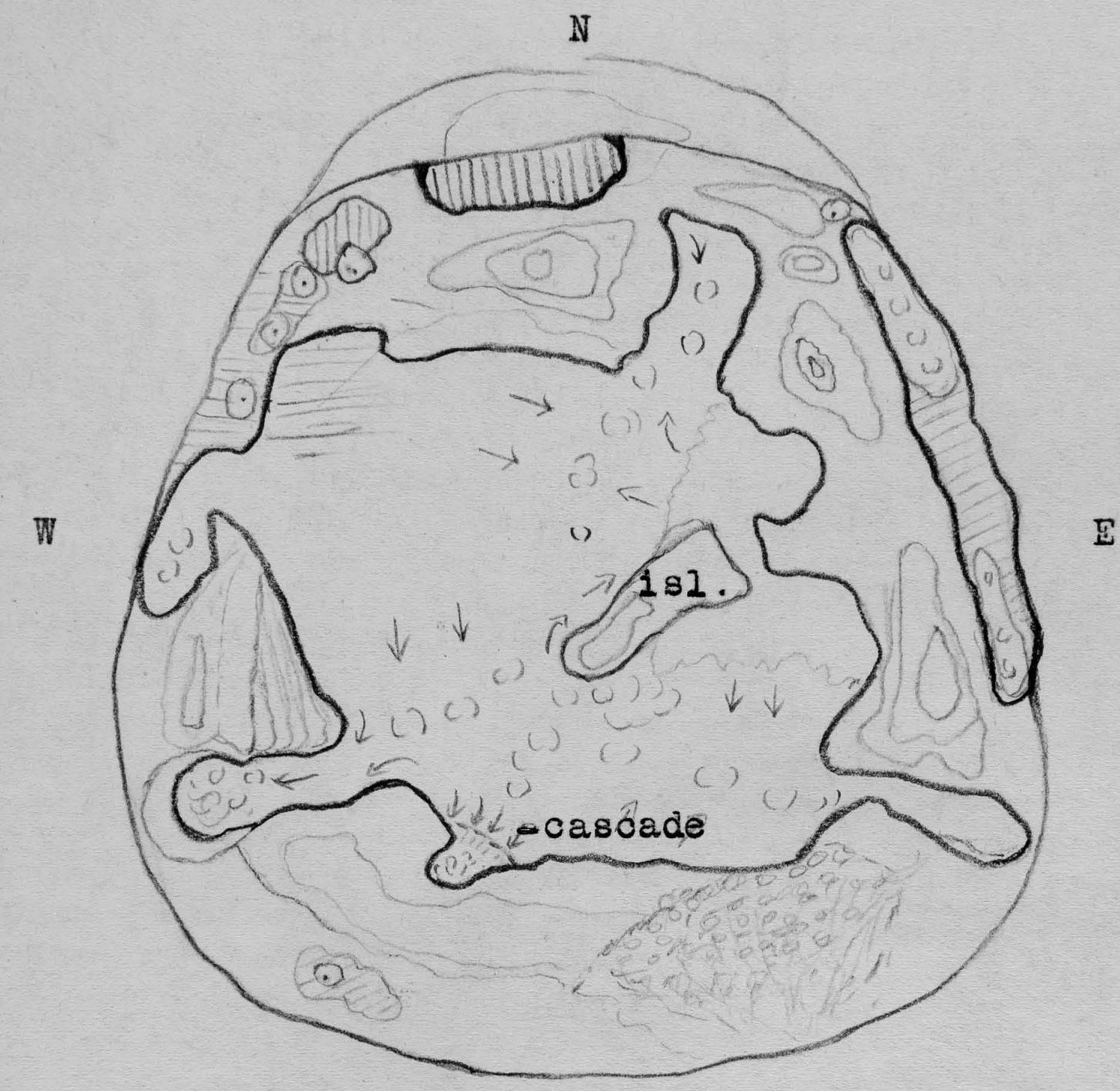
February 16. Herbert White, in yacht "Ajax" 190 miles ESE, saw glow in Hawaii direction at night.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date February 17,1920

Noon. Sketch of Halemaumau:-



Changing developments in bench magma. Island 10 feet high at its SW end, sloping to NE; 200 feet, more or less, long. New point and cove developed back of island on E side of lake. W pool region flooded by lake. Rampart built around basin at far end of SW arm. Widened cascade with curved ledge under fall at SSW pot. New crusted pools N of N crag. High crag E of N arm as well as W. SW crag shows numerous tilted shore lines. Blowing cones NW. Much fume SE side of pit.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date February 17,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
Noon		Transit.						
	NNE edge (Sta.1) N stone	NE monument	0					
	(Sta. 2)	NNE "	0					4'
	1	N crag summit	R 78 42	-24 16	+01	377	170	
	2	same	R 55 08					
	1	SW grotto (cascade edge)	60 05	-13 03	00	1097	254	
	2	same	80 10					
	1	SW part of new island, lake level	54 05	-19 00	00	734	253	
	2	same	65 13					
	1	Summit SW crag	76 10	-11 39	00	1014	210	
	2	same	93 54					
Location of NW stone:								
N mon.		NNE monument	0	-0 51	00			5'
"		N stone	R 104 29	-2 58	00			5'

N monument, measured distance to N stone -- 53 feet
(Nstone appears about 2 feet higher ground than N monument)

N monument -- 3714 ' elevation
N stone -- 3716 ' "

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Tuesday Date February 17, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
Noon	NNE	SW crag ∞ focus	1	W P		f/9	1/50	Gaumont Stereo
	"	N shelf " "	2	"		"	1/35	"
	"	Island 15 m. focus	3	"		"	1/40	"
	"	W side " "	4	"		"	"	"
	"	NW corner 10 m. focus	5	"		"	"	"
	"	SW crag " " " (brilliant)	6	"		"	"	"
	"	N crag 7 m. focus	7	"		"	"	"
	"	Central island 7 m. focus	8	"		"	"	"

T A J

1920, Feb. 17

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1920, Feb. 17.

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8

Jag

JOURNAL

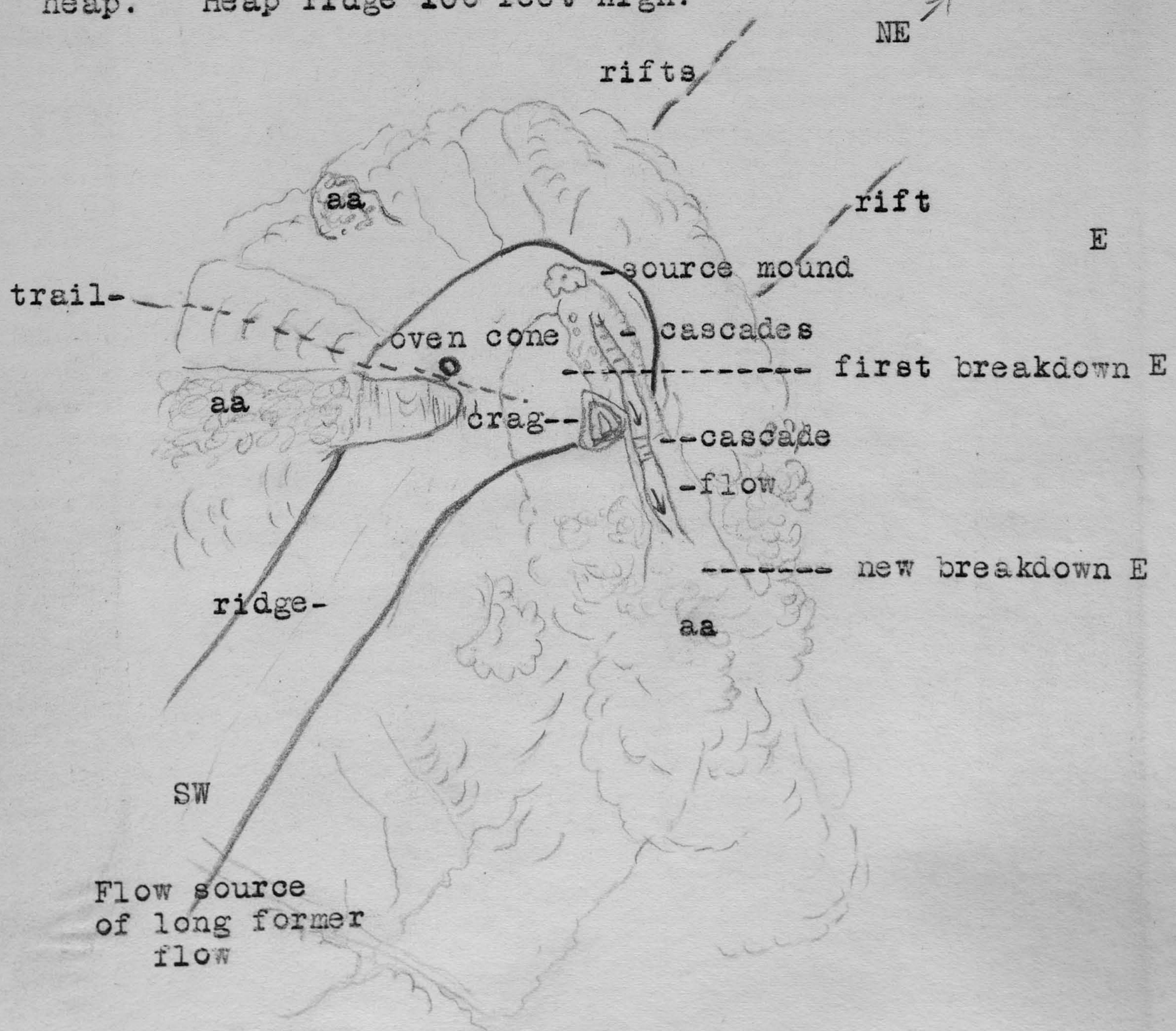
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Wednesday Date February 18,1920.

3 to 5 p.m. Kau Desert Flow. Entered desert from Halfway House and crossed foot of Keamoku flow. Climbed W side of heap above aa and found head of aa large slumped oval, cliffs 10 to 15 feet high, broken and crevassed interior like the seracs of a glacier. Note transition in cliff section from pahoehoe layers to aa paste below. Slumped blocks at head with paste up cracks. High crags in profile of flow W. No pahoehoe on top of this as a flow.

Large down-slump area with aa out from beneath on E of center. Find oven cone, 8 feet in diameter with well inside, over rift; now cold. Large crag E side of the ridge. River of pahoehoe cascading down to E past this crag. This river in a new northern depressed area of aa, and aa to the E. The crag a block of bench magma of heap which has slipped E and tilted up. River flowing four to ten miles per hour; 20 feet wide; cascades above and below; 300 yards seen. Aa valley occupied by the river 150 feet wide. Above, the river is found emerging from under a crust, and this in turn leads to a flat pahoehoe mound of heavy crust over the source fountain which jars the mound with incessant quakes. Mound 4 feet high and 20 feet across; glow in cracks; smooth and solid. Driblet cone flaming from small sponge on top of mound.

This whole valley in an eastern extension of head of heap. Heap ridge 100 feet high.



Sketch of upper end flow ridge.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date February 18,1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Desert.						
3 to 5 p.m.		General of aa W from above	1			f/8	1/40	Kodak Stereo
		Detail of paste in crack head of aa	2			"	"	"
		Wall of amphitheatre head of aa	3			"	"	"
		Flow E of N end summit looking NW	4			"	"	"
		Same looking SE	5			"	"	"
		Flow from under source crust and distant Halemaumau	6			"	"	"
								T A J

1920, Feb. 18

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1920, Feb. 18

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Jap

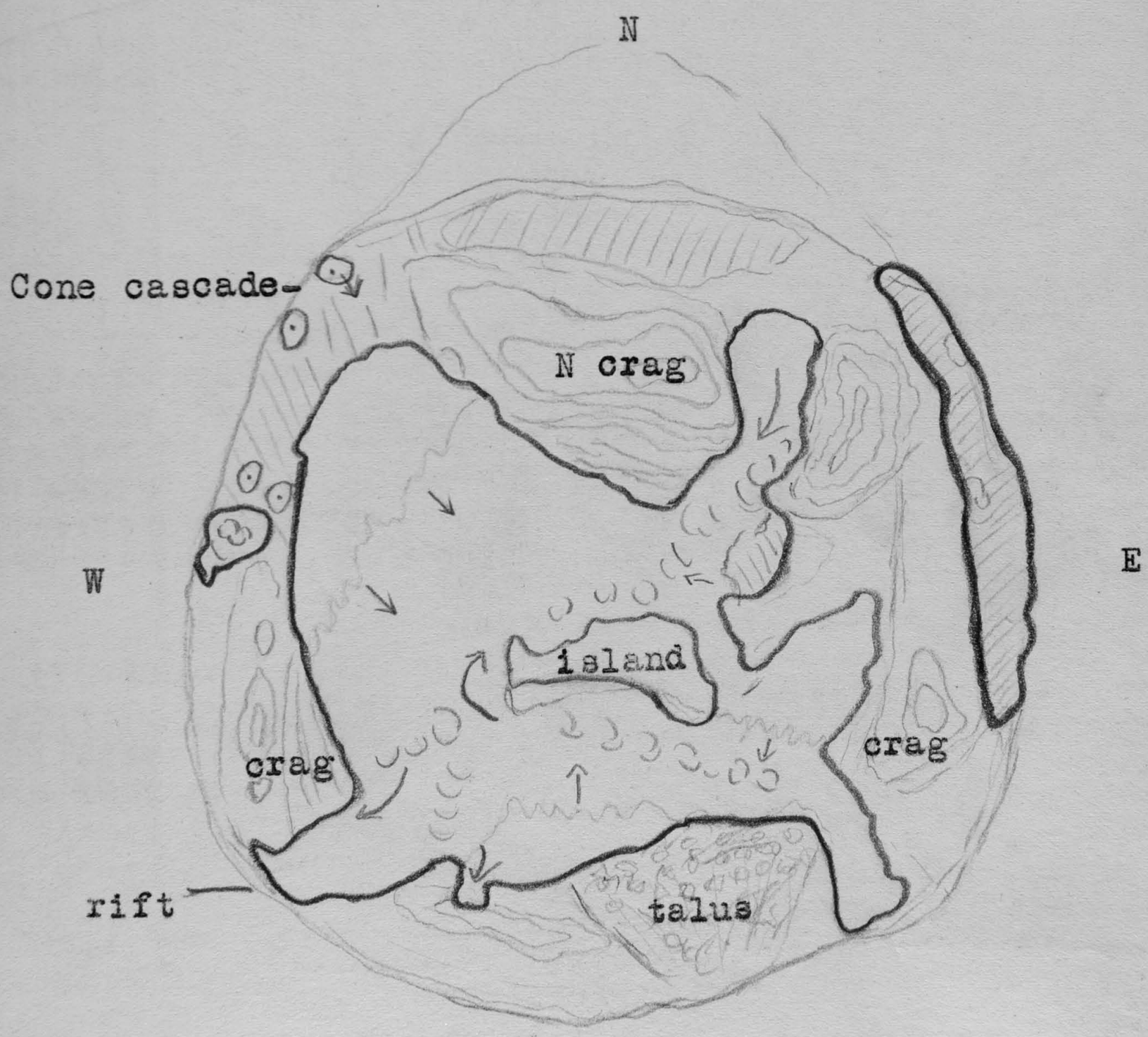
JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date February 19, 1920.

12 to 1 p.m. Rising continues. Island separated by narrow channel from peninsula NE. Crags continue to lift. Pool N wall-crack crusted and blistered, increasing in size. Fountaining pot against wall NW 10 feet above lake level cascading down to fields below. Other cones spurting along W wall. Active W pool small and triangular at extreme S end of former long pool, stream from lake into it through crust.

Island higher. Streaming out from N arm. Three radial fountain lines from center. SW arm greatly enlarged. Wall rift SW appears more broken and open. Streaming into SSW pot. Crag N side SE arm greatly tilted eastward closing E pool. Latter narrow and crusted. Fume diminished, some very clear seeing. Large quiet crusts on lake W and NE. Streaming from them to fountain lines.



T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Thursday Date February 19,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Transit.						
12tol p.m.	NNE	SW grotto		-12 55	+02	1097	252	
	edge "	Lake, SW corner of island		-18 36	+02	734	248	
	"	Summit N crag		-23 50	+02	377	167	
	"	" SW " (smoky)		-11 23		1014	206	
								T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date February 19, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
12 to 1 p.m.	NNE	Center	1	Seed L Ortho	15x	f/22.5	1	4x5
	"	SW crag	2	"	"	"	"	"
	"	N arm	3	"	"	"	"	"
	"	NW corner	4	"	"	"	"	"
								T A J

83

1920, Feb. 19

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Jog

1920, Feb. 19.

3

4

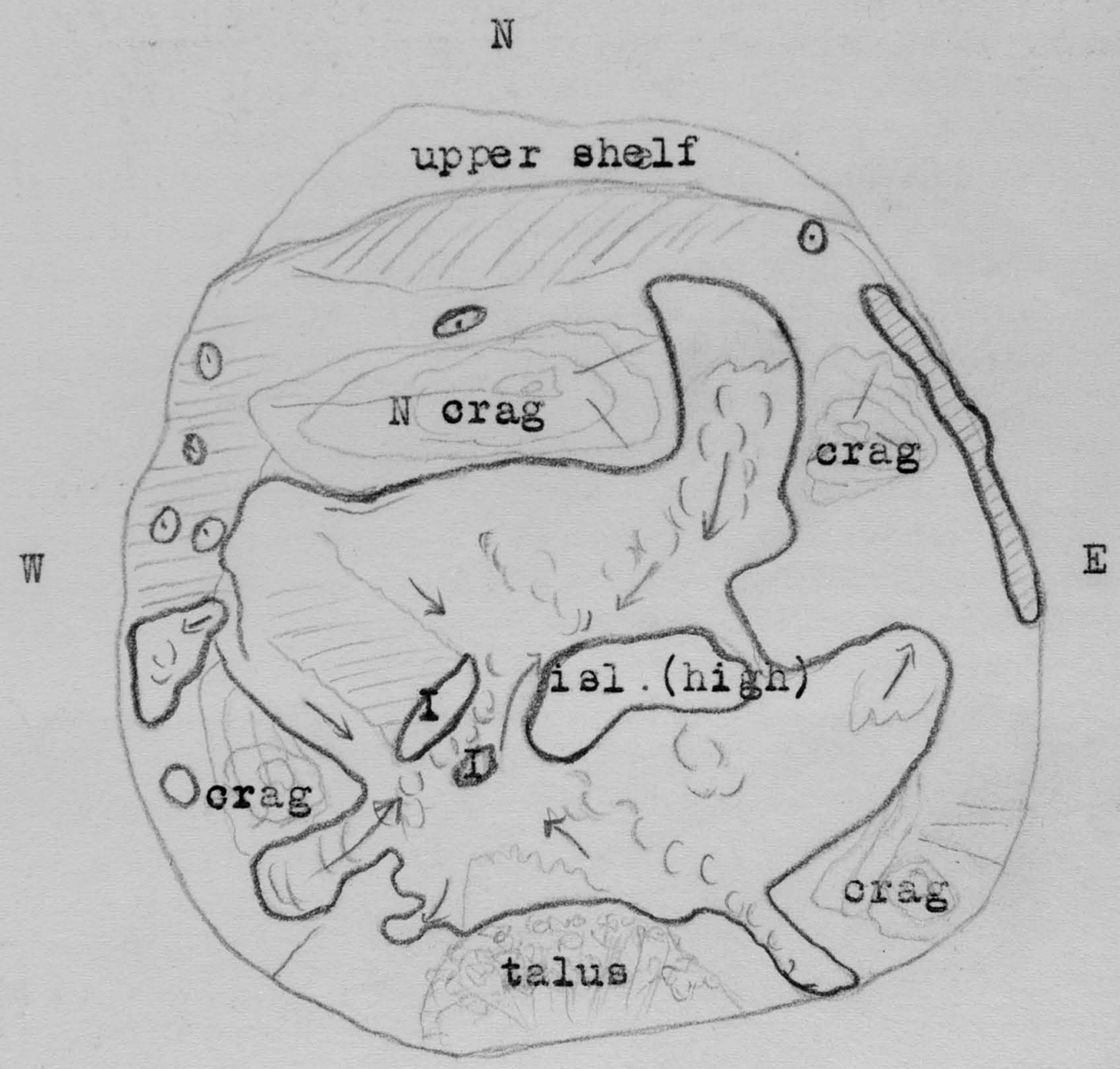
Jag

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Friday Date February 20,1920.

5 to 7 p.m. Wind N. Seeing from NW; E side smoky.
Torrent through rampart from lake into W pool. Streaming SE from W side lake on each side of a dark patch that ends in a new island shoal. Another smaller shoal on opposite side of channel of fountains which trends to SW arm. SW arm wider and more irregular. Wall pot SW. Fountaining and flaming cones W and NW and back of (N of) N crag. Streaming out from N arm, out from SW arm, into SSW pot, around large island to N, meeting of currents W of large island. Puffing cone NE. Crags very high.



T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Sunday Date February 22, 1920.

3:30 to 5:30 p.m. Islands and crags continue to rise. Three radial lines of fountains occupying channels between the islands. Blowing cones of NE wall crack now replaced by a high fountaining pool there. Large crusted area over W side of lake which was seen to break up with cracking and foundering. Other features much as before.

T A J

9:30 to 11:30 a.m. No evidence of any new cracking on Byron's Ledge where the flow of 1832 came out. Between the outbreak site and Halemaumau near where the trail from the Prison Camp goes down on to Byron's Ledge there has been some recent movement that looks very much like a small landslide in talus. This was observed on December 8, 1919, and apparently there has been no change since that date.

A freshly broken crack that is roughly in line with the one just mentioned and a point a little to the SE of Halemaumau was observed in the talus of the Kilauean cliff near the spot that is continually steaming S of the Observatory below Prison Camp site. The crack was also observed where there was no talus at the junction of the cliff with the floor of Kilauea. The crack gets higher and higher above the floor of Kilauea as Byron's Ledge is approached.

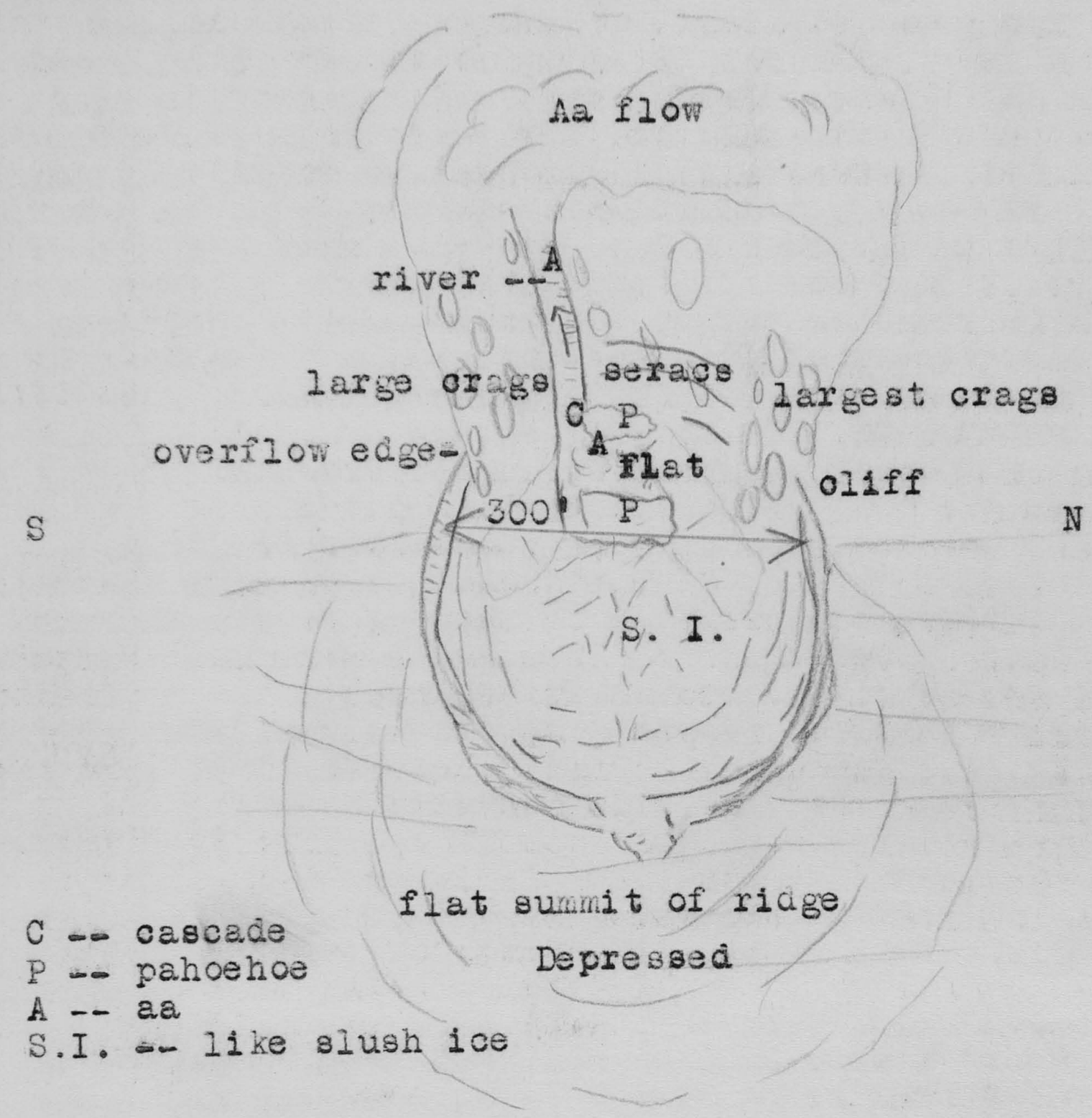
R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date February 23,1920.

Kau Desert.

Diagram of W aa breakdown from the head of cirque:



Leaving Halfway House went E one half mile, then turned N into a wooded corner of Keamoku flow. Found a broad built trail leading across the flow in NE direction to the pahoehoe on the other side. Here went E around the upper end of the live lava ridge. A short distance S on the E side of the ridge found extensive aa breakdown with large field of aa partly alive extending from here southward for a half mile nearly to the L of the long earlier flow. The summit of the lava ridge at its northern end had now built up again into a flat-topped plateau of pahoehoe all alive and overflowing both northward and southward on each side of an eastward extension or angle piece in the main ridge which extends from the angle off to the SW. From this eastern spur of the ridge, the pahoehoe was cascading down the flanks and healing the former breakdown and largely burying the former crags. From the end of the spur the flowing lava on top changed to aa which was flowing at a front on the E side at the usual sluggish pasty rate.

Followed down the eastern side of the whole field of aa, came around its foot and returned across the ridge by way of the amphitheatre or sink at the head of the western aa.

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

 Day Monday Date February 23, 1920

Crossed this sink exploring the crags and tumbled debris as shown in plan.

The breakdown consists of: (1) A flowing out of aa from a fracture in the lower slope of the heap. (2) In the collapse of an elliptical area on top of the heap. (3) In the definition of an elliptical sink in this area where the broken up shell of pahoehoe collapses and subsides. (4) In the subsidence of this area by step-faults right and left, a breakup into floes like slush ice and in the riding forward towards the opening of the horseshoe of a tract of flat plateau material with exposed surfaces of the aa paste adjacent to these flat rafted floating shells. (5) In the overflow of the marginal regions right and left by the sludge thus moving down hill and fanning out at the entrance or narrows of the sink. Here the highest crags are piled up right and left of the entrance at the region of transition, from the sinking within the sink, to the rising or overflow over the edges of the broken area just below the sink. This region corresponds to the narrows at the top of a mountain talus where a fan cone below matches a cup-shaped hollow above. (6) In the breaking down of the whole mass of material in a series of crosswise crevasses just below the narrows, strongly suggesting the seracs of a glacier. Across this in one or more places a definite stream of aa appears as a channel between coarser flocks of other aa with some longitudinal stream lines. Farther down the course of the flow the whole mass widens out into a big field of aa with occasional craggy bowlders and some surfaces among the debris which indicate that there are fragments of pahoehoe present.

In the moving live aa of the east side, found fragment of pahoehoe three feet long rolled into a "snow ball"with rough pasty lava on its outside three inches thick. The whole thing was egg-shaped. This snow-ball action was evident in many of the fragments up to six feet in diameter. Saw two fragments at the front spread apart under the push from behind leaving a gaping mass of paste in a cavern between them three feet wide and five feet deep. This paste which solidified as aa was at orange heat with drawn out vesicles, no bubbling whatever, no tendency to skin over, and the paste which dripped from the roof pf the cavity did so after the fashion of a porous porridge, slowly freezing through shades of cherry red to purple. The whole front was moving perhaps 20 miles per hour.

Explored the pahoehoe ridge of old lava which lies to the E of the present live ridge, trends parallel with it, and appears by Baldwin's map of the Kapapala lands to be 1823 material. This ridge is about 50 feet high and a mile or more long in the NE-SW azimuth. Along the top of the ridge there is a succession of pits which have broken down at the places where formerly there were crusted plateau pools similar to those of the present live ridge. These pits are from 20 to 100 feet across and from 20 to 40 feet deep with downbent bedding of the lava beds revealed in cross-section on the walls and with arched caverns at their ends apparently connecting pit with pit along the general rift line. Went

down into one of these caverns, found stalactites and stalagmites of the wormy type coated with gypsum crystals, fine green mosses and horizontal spatter lines marking lake levels on the sides. Apparently the interior of a ridge is a series of wells with ponds above connected by tunnels through partitions separating the distinct ponds. Each pond thus forms a pit when the lava recedes. There was no sign in this ridge of the breakdown making aa flows, and the lava was lighter and more frothy. There were a number of driblet cones on the upper surface of the ridge including a high one near its base over the rift line at its northern end. If this was 1823 apparently the lava rose here first, built the ridge to only moderate height and then was drawn away to flow out below at Puu Kouele.

Went farther E to the northern low pumice cone of the Kamakaia hills. Found this to be older than the 1823 pahoehoe of the lava ridge just described. The cone consisted of an open ring ridge with even outside slopes about 80 feet high consisting of pumiceous fragments and an irregular inside depression consisting of numerous tumbled spatter ridges extending southward to other similar ridges on either side of a rift which led through a southern opening in the otherwise nearly complete ring of this cone. The inner spatter ridges were built up of large blobs of pumiceous pahoehoe.

On returning W from here passed a high driblet cone with two differently shaped heaps side by side, the higher one being a spire fully 15 feet high and only three to four feet thick.

On the E side of the aforementioned 1823 lava ridge there is a rift crack open which is later than the ridge and has some peculiar mounds of a woody looking lava along its course with snaky trickles down the flanks of the mounds.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date February 23,1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Desert.						
10:30a		Distant lava heap of 1920, looking E. Old trail Keamoku aa in foreground.	1			f/18	1/5	Gaumont Stereo
								T A J
		Spire in Kau Desert from ancient flow	1f	film		US 16	¼	Kodak
		Cavern in red hot flowing aa	2f	"		US-32	½	"
		Breakdown site on W side upper slag heap showing terrace caused by sinking	3f	"		US 8	1/25	"
		Near upper end upper slag heap from E. Part of edge of a breakdown site shown to left.	4f	"		"	"	"
		Upper end of upper heap from E (Pan. with 4f)	5f	"		"	"	"
								R H F

1920, Feb. 23.

Jag

1f

2f

Rkf

1920, Feb. 23

5f

3f

4f

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date February 24, 1920.
Thursday " 26, "

February 24.
11 a.m to 12 m. Streaming out from N cove. The eastern, southern and western quiet areas of lake becoming pronounced sectors, while the fountaining is confined to very definite lines radial from center of pit as channels between the islands. The islands are all higher and the channel dividing the large central island from the NE peninsula is now closed, so that the island is continuous with the peninsula. W wall pond area all flooded by the lake with fountaining pots through the crust. E wall pond now entirely crusted with two fountaining pots NE and a tumble of fresh avalanche debris from wall of pit beside them. Streaming of E arm of lake northeastward to a grotto at the bank. Crags continue to rise and tilt, fume is thinner and an avalanche fall was heard toward the SE. Glowing cones against wall NW and W and a fountaining pot in the top of a cone at the northern base of the N crag. The crusted pool between the N crag and the N wall of the pit has increased in size.

February 26.
10:00 p.m. Kau Desert.

Night view of flows. Approach by old volcano trail across Keamoku aa, from Halfway House. Reach N end of flow heap. Large pahoehoe flow pouring down N flank of heap and burning trees, extending to NW. Rapid stream down slope and a second such river was pouring NE.

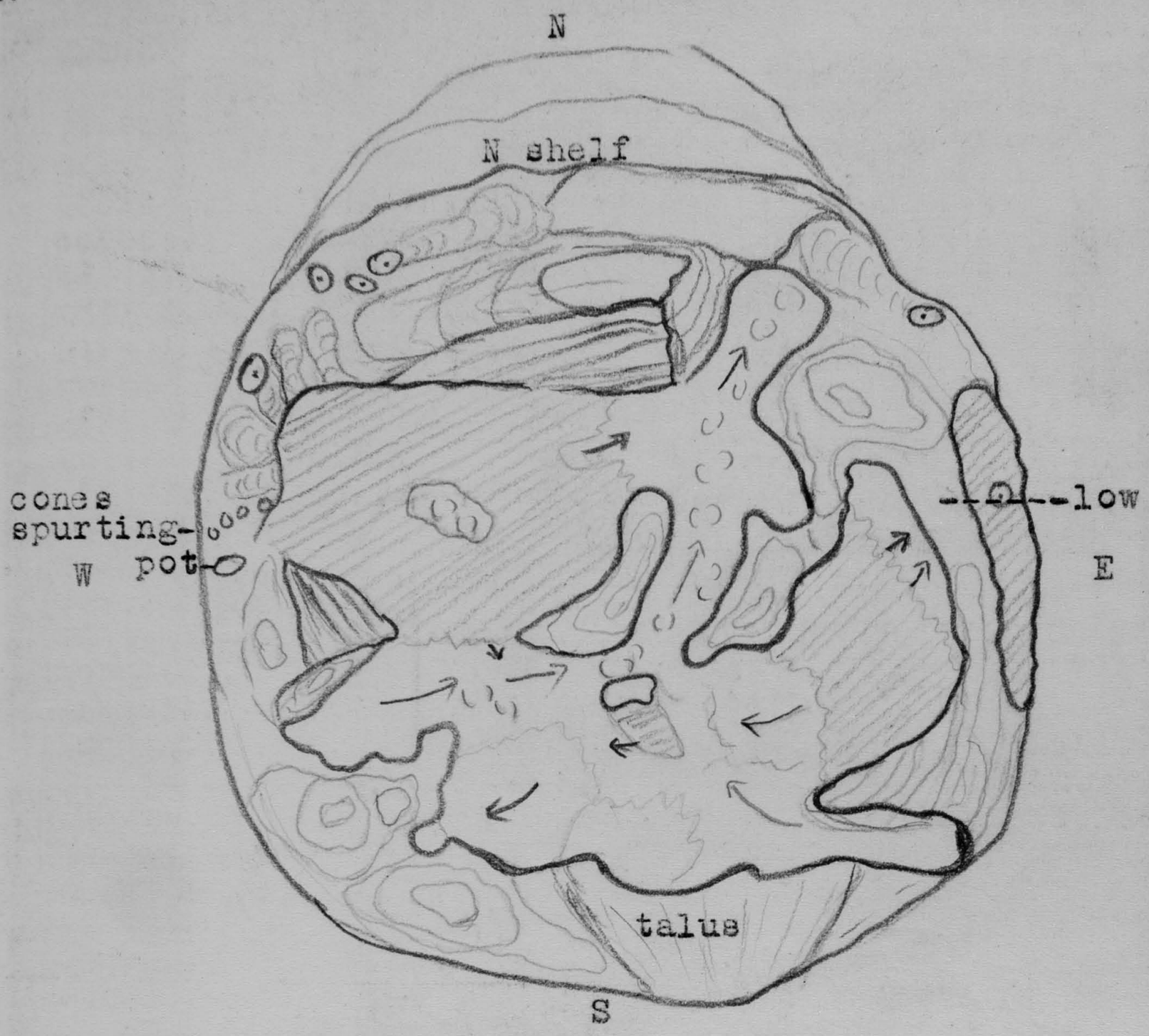
T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Saturday Date February 28,1920.

10:15 a.m. Sketch of Halemaumau from S:-



Small island 5 feet high, larger island 15 feet high, peninsula top 20 feet high.

Lake overflowing its banks W and fountains growing markedly less. Blowing and spurting cones replace W pond, the cones in a line leading from lake towards SW wall pot. Splashing pot open W of SW crag in the wall crack. Two active wall-crack cones against wall of pit NW. Cones, feeding flows which pour down from high ground, N of N crag and NE of NE crag. These flows lead to N valley pool of crusted lava. The absence of fountains in this pool very different from the December condition there. Evidently the mechanism of intense wall-crack activity of that time has been replaced by a radial cracking of the central lagoon bottom of that time, shifting the gas escape to the center, and starting central tumescence. Opening of the three radial cracks has produced the three radial lines of fountains from the center, in contrast to the ring of fountains in the wall-crack pool. The tumescence now lifts the middle and forces the crags against the wall, revealing as islands and peninsulas the lifted sectors of bottom lava

Streaming to grottoes E and SSW, streaming out from SW and SE arms, streaming into N arm. Crusts E and W, bright lines S. One fountain breaks middle of W crust occasionally.

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

 Day Saturday Date February 28, 1920

Island NW of center growing larger. NE island now a peninsula.

SW heap not fuming at all. Cracks of rift near Halemaumau greatly stained with sulphur and both S and SO_2 gas perceived.

N crag has been breaking away much on its N face.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date February 28,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton						
10:15	a.m.							
	NNE edge	Summit SW crag (SW crag has crumbled)		-10 10		1014	184	
	"	Summit N crag		-21 00		377	145	
	"	SW grotto(SW grotto is identical with edge SSW cascade)		-11 55		1097	232	
	"	Lake SW point central island		-17 10		734	227	
	"	Summit central island		-13 20				

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Saturday Date February 28,1920

t	sta	subject	no	pl	scr	stop	ex	cam
		For detail, with stiff tripod.						
10:15a	NNE	Center	1		8x	f/28	2	Gaumont Stereo
	"	SE	2		"	"	"	"
	"	NW corner small flow	3		"	"	"	"
	"	N arm, looking down	4		"	"	"	"
	N stone	SW arm	5		"	"	"	"
	"	down to NE wall crack	6		"	"	"	"
	W niche	Cove in NE peninsula	7		"	"	"	"

T A J

1920, Feb. 28.

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5

Jog

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date February 29,1920.

2 p.m. No marked change. New hole broken open but not glowing in rift crack on inner wall Halemaumau SW, 50 feet above lake. Cascade into SSW pot renewed. Hissing and flaming cones. Lava welling up all around edge of crust of N pool. Fresh floods from lake across W floor where W pond was before. Glowing cones against W and NW wall base. Crag remnant very low E. Central peninsula 35 feet high. Dark crusts back of islands suggest shoals.

Visited summit crater of SW heap. Find the two slumped cone remnants in the depression and hot air rising but no noise or fume. Depression an oval 150 by 75 feet, in character like the breakdown cirques of the lava heap in the desert with aa below, the paste showing in places and the transition in the walls from bedding above to paste below.

Visited the rift N of Cone Peak. Noted an E wall of older crack on the E which stands above its mate, and some W walls similarly offset in the live rifts, as though a graben belt lay between. Distant view of flow heap in desert showed it very wide with an amphitheatre glowing open northward, apparently new breakdown. Fume W side of heap.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date March 1, 1920.
Tuesday " 2, "

March 1. Kau Desert Flow. Aa reported again in action at N end of flow heap.

Halemaumau. Fume thinner. Clinging fringe of white vapor along cracks NW and NNW edge of Halemaumau. Imitates in miniature the cracks vaporing along N rim of Kilauea. Why this vapor in cracks on actual edges of cliffs, and none below? And little back from the edge. Does the face ventilate and chill the rain vapor?

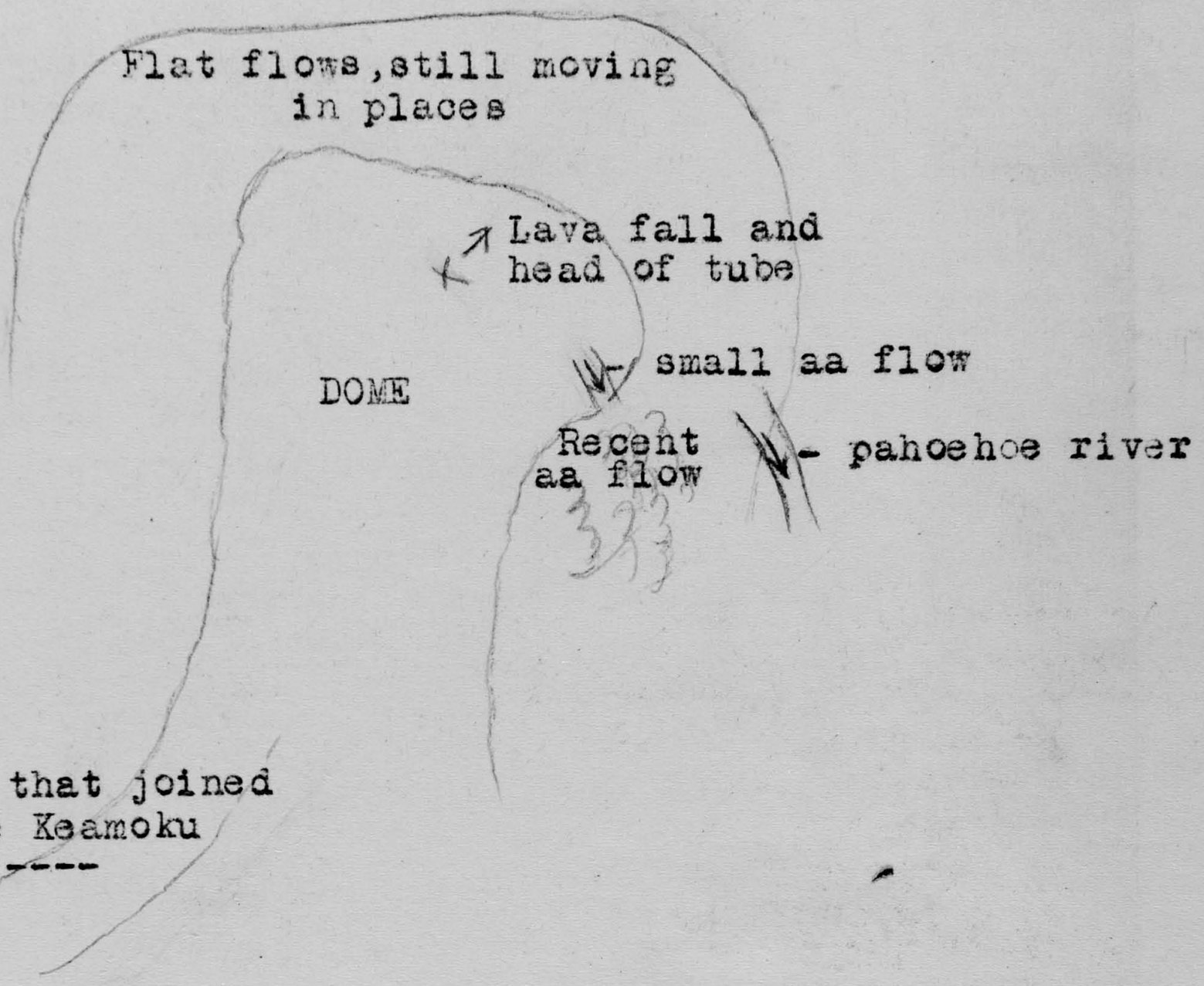
March 2.
6 p.m. Halemaumau. Islands much higher, W island 30 feet, NE peninsula at tip 45 feet high, S island 20 feet high. Channels and pools growing complicated. N pond shows glow lines. Twelve or fifteen blowing cones W, NW, N, NE and E (perhaps S?); about twenty-five fountains. Dark areas of crust between NE peninsula and E bank and between W island and SW crag appear as though connections with shores would grow there. W pool mostly crusted, only outlet is between W island and N crag. Streaming W from SE arm, SW from crust over E part of lake, W on both sides of S island, W into cascade pot SSW, stagnant in SW arm, SE from crust between W island and SW crag, N through narrows NW of S island, N through narrows NE of S island, conflict and fountains in main channel between NE peninsula and W island, E from W pool through space N of W island, S from N cove, currents into cove E of N channel, currents against bank NE. Large spouting cone-pot E wall-crack, noisy blowing cone NE back of NE crag, occasional gushes from two cones NW wall-crack, flames from all the cones, filagree cone between SW crag and W wall of pit. S side of lake very brilliant with bright lines, fountains in the three channel lines, but less intense, turbulent fountaining in the center and NE corner of lake, bubble fountains and conflict fountains in N channel and SW arm.
Flow glow in distance SW is bright over Kau Desert.

T A J

7-9 p.m. Kau Desert. Glowing cracks could be seen at numerous places from the aa flow that joins the Keamoku flow to a considerable distance to the N of dome proper, white about a half mile away from the flow. Small toes were pushing out at numerous points to the N, E and W from the flat flows that surround upper end of dome. A lava fall 12 to 15 feet wide and 8 or 10 feet high at the head of a tube observed on top of the dome a little to the E of western crack line. A lava river emerged from a flat crust a little to the E of upper aa on the E side with apparently about a third of the volume that was pouring into the tube mentioned above. A small aa flow that increased in volume while it was observed was creeping from the eastern side of the dome at the edge of an old breakdown site.
The glow from the lava fall mentioned above was very brilliant. Pele's hair formed there was quickly carried up to

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date March 2, 1920.

a height of several hundred feet.



R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Tuesday Date March 2, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
8 p.m.		Kau Flow. Lava fall into a tube looking nearly up stream		film			2 min	Kodak R H F

1920, Mar. 2

JR H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Thuraday Date March 4, 1920
Friday " 5, "

March 4.
6 p.m. Halemaumau.

General description covered by the account of next day, March 5. Islands continue to rise. There appears to be a S outlet for W bay from the rapid streaming S from a cruat between SW crag and W island. General streaming S in S part of lake, rush into SSW pot continues, though not seen to be definitely a cascade. Numerous splashing and spurting wall-crack cones and some fountaining middle of W pool.

March 5. With H. F. Osborn to Uwekahuna and to Halemaumau in evening.

Little change. Blowing cones NE wall-crack. Whole lake has bright lines, crusts most sluggish in W pool of main lake. Numerous flaming cones W, NW and N. Wall pool large and crusted. Streaming out from W bay N and SW sides of W island. Streaming in a curved river from E bay around S side of NE peninsula. Streaming otherwise mostly centripetal. Fountaining moderate. Crags high. Fume abundant. Strong streaming to NE corner of E bay.

T A J

JOURNAL

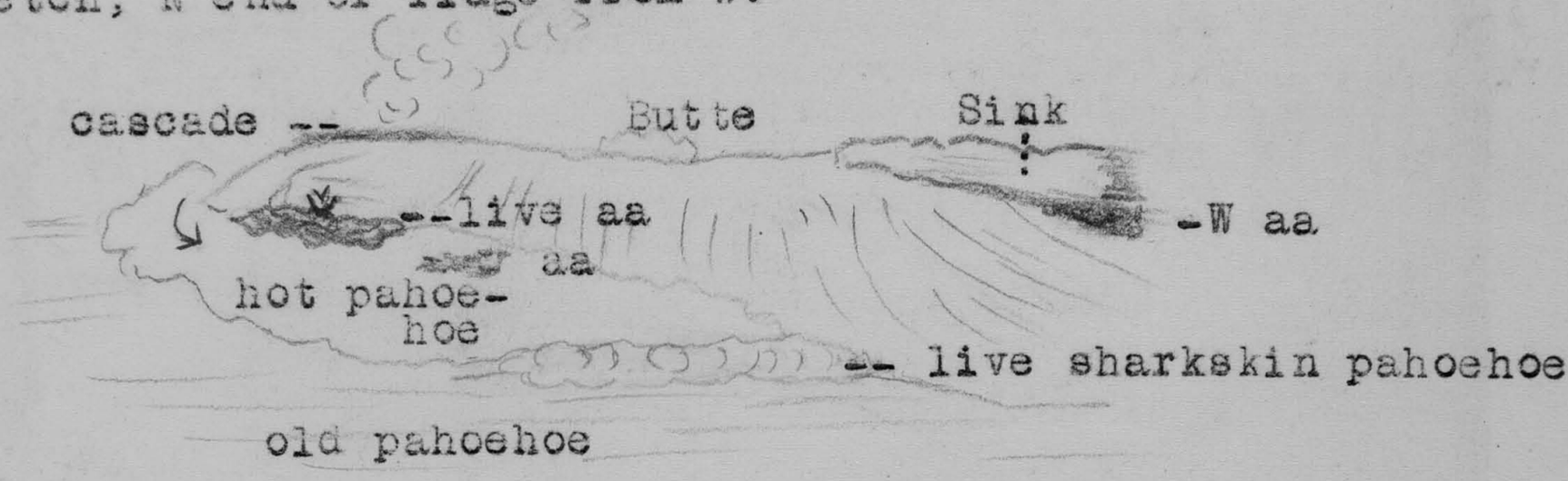
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Saturday Date March 6, 1920

Morning. Kau Desert Flow with H. F. Osborn.

Flows sluggish W of head of heap with sharkskin glassy type in front of the pahoehoe and two fresh areas of aa in the steep part of W side of heap above the pahoehoe flats. Upper one flowing. New high butte seen over top of ridge, part of E spur. The sharkskin pahoehoe is at the front of flows which originate in cascade N side of E lobe of ridge and flow clear around NW base of ridge. (See Finch notes)

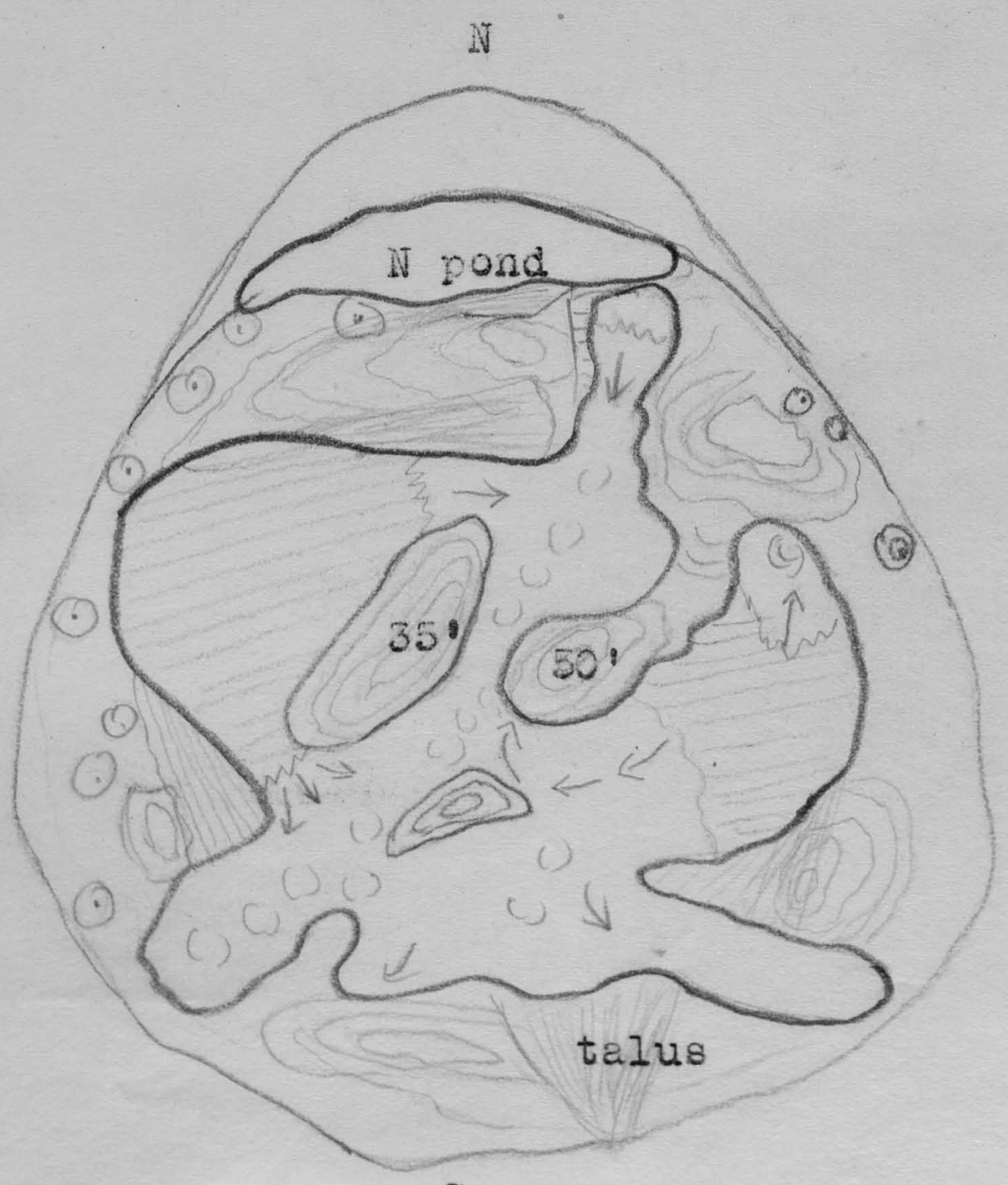
Sketch, N end of ridge from W:



5:30-6:30 p.m. Halemaumau and "Algae Crack" with H. F. Osborn.

Crags increasingly high and steep. Main flow into lake of streaming from E and W. Dark heavy crusts E and W. S crag against wall rising high. Fountaining not so strong. Blowing cones numerous, and spurting and flaming vigorous. Streaming into a central grotto at end of NE peninsula. Fume abundant.

Desert flow glow not seen in distance; flow dull.



T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
- 2 - Day Saturday Date March 6, 1920.

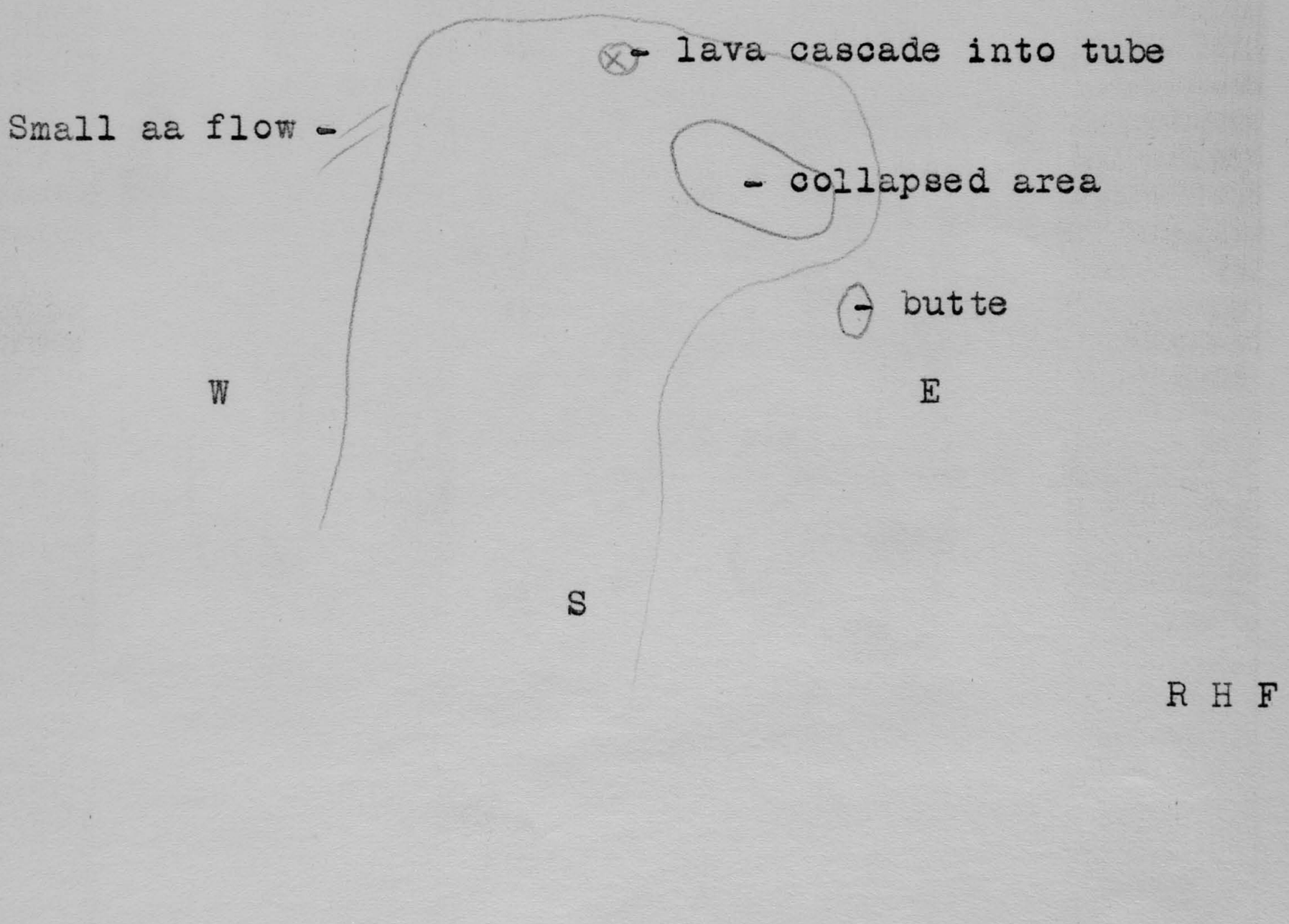
10-11 a.m. Kau Desert Flow.

Small pahoehoe flows observed in the flat to the W of the upper end of the upper slag heap A small aa flow was observed moving slowly on the W side of the slag heap.. Considerable cracking was noticed around the very small breakdown source of this aa flow.

A lava cascade was pouring into a tube on top of the slag heap in much the same manner as observed on March 2.

An extension collapse has taken place on the top of the eastern arm of the slag heap. This collapse place has no outlet but is an elliptical shaped depression with vertical walls 15 feet high in places. A little to the SE of the rim of this collapsed site, separated by a shallow depression, there is a large block whode top is about as high as the major portion of the dome. No rapid flowing lava could be seen to the E of the slag heap.

Upper end of dome:



R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

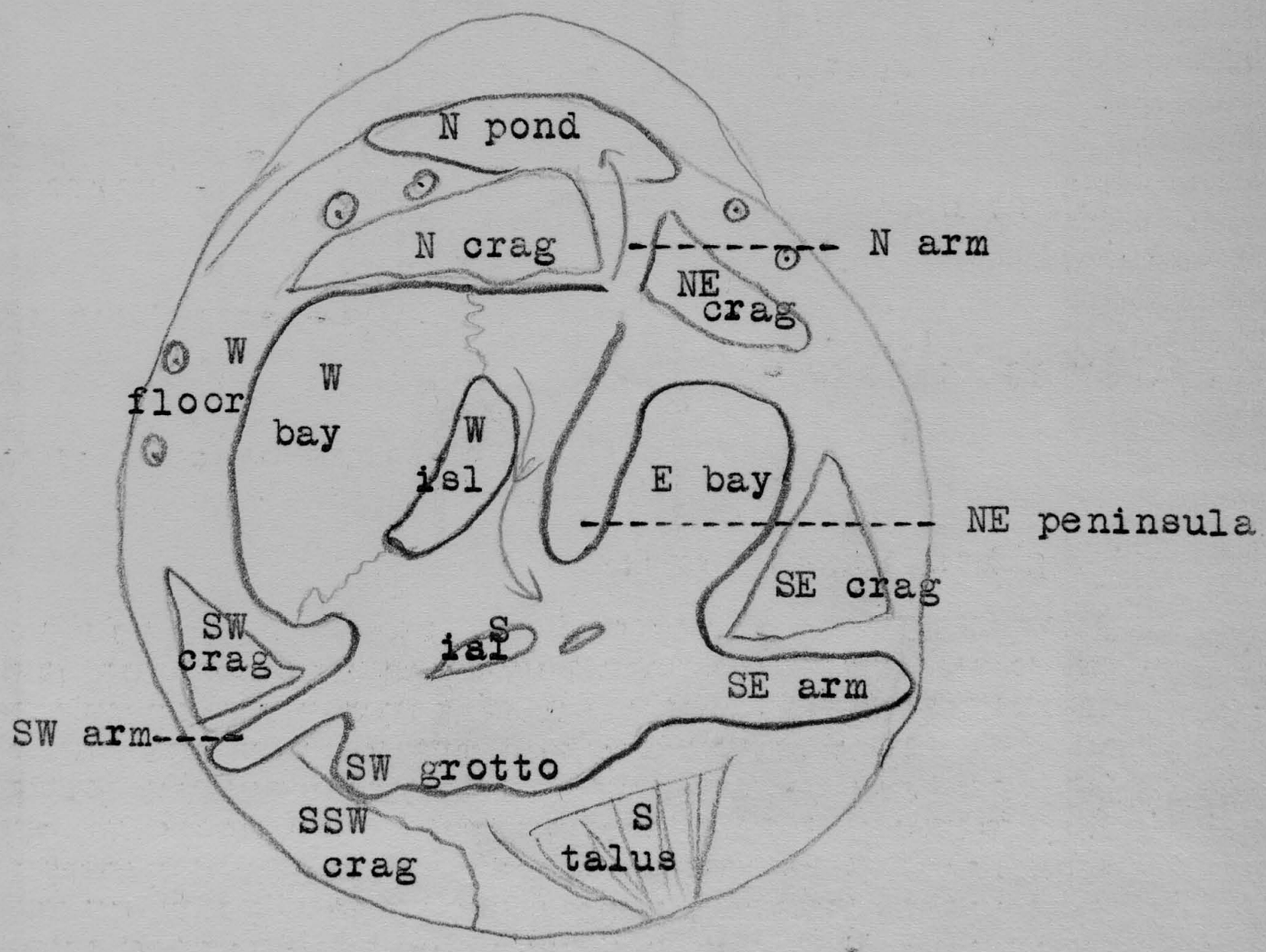
JOURNAL

Day Sunday Date March 7, 1920.

4 to 6 p.m. Lava lake has been overflowing W bench at base of wall drowning the blowing cones there. Latter fountaining trhough lava crusts. Crags high and showing signs of breaking. NE crag avalanching into N arm. Vertical crack trending SW across NW end of SW crag. Vertical crack trending E-W across high part of NE peninsula near center of pit. Vertical crack across floor of N pond trending E-W; and N pond appears uplifted and solid. New high stack against SW wall of pit back of SSW crag throwing up umbrella flings of melt. Streaming and fountaining about the same. E and W bays crusted. Glowing cones at N base of N crag and in NE wall-crack.

Crags smoking; perhaps the reason why crags smoke is that the dead sponge of vesicles in raised epimagma acts as condensing chamber and also absorbs moisture.

Sketch giving names:



T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Monday Date March 8, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11a.m.	From	stones 100 ft. SW of N station (3714') to						
		Summit N crag		-14 00	00	392	98	
		Top left hand penin.		-11 50	00			
		Lake at point of left hand peninsula		-15 10	00	791	216	
		Top SW crag		- 7 11	-01	857	108	
		SW grotto		-10 05	-01	1072	192?	
		Mean for lake 204 feet.						

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date March 8, 1920
Tuesday " 9, "

March 8.
11 a.m. to 12 noon. A rapid flow of lava through the N arm into the N pond commenced at 11:15 a.m. One fountain in center of W bay continuous. Three cones emittimg lava at edge of W bay. A slow current pours forth from W bay and flows S past NE peninsula thence to the SE. Fountaining continuous in the narrows by NE peninsula and in SW arm . Very smoky in E and S sides.

R H F

March 9.
Morning.

Kau Desert Flow.

Same locality as last Saturday, W side flow-heap, shows heavy torrents of pahoehoe pouring down W slope from summit pool on both sides of the small aa patch that was then seen in motion. Climbed up to summit and found pool a circular well 40 feet in diameter, crusted, with the stream pouring out from under the edge of the crust amd immediately cascading down hill in a turbulent river. Near the top numerous fountains from released gas break through the torrent as it flows and flinging up jets of melt which resemble leaping fishes. The stream below passes over a terrace and forms another pool and cascade at a lower level before it forks around the spur above the aa.

Top of hill shows collapse and no active streams were seen on E side. N of the live pool a collapsed tunnel showed lava pouring downward irregularly through fissures 10 or 15 feet beneath the surface. The flows of the northern slope are hot but were not observed moving.

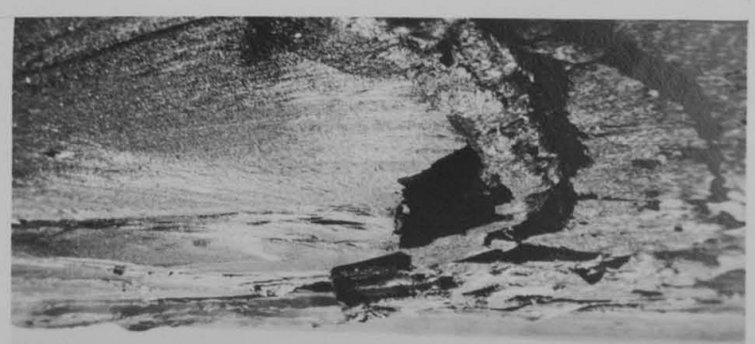
T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date March 9, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Mauna Iki Flows						
a.m.		Edge of summit lake looking S	1				snap	Brownie
		Raymonds at lake	2				"	"
		Lava stream looking downhill W	3				"	"
		Raymonds and same	4				"	"
		Edge summit lake looking N (people)	5				"	"
		Edge summit lake looking N	6				"	"
		Lava pouring from under edge heavy crust	7				"	"
		Standing waves in same	8				"	"

T A J



JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date March 10, 1920

7:15 to 7:45 p.m. Halemaumau.

Vapor very heavy, fume thin. The lakes gave the general appearance of having risen more than the crags since Monday. A sluggish flow was pouring out of the N arm into the W bay and a flow from the SE was moving into the SW arm and W bay. The island at the mouth of the W bay has risen since Monday. A cone in or near the NE crag was hissing loudly. Dozens of fountains were playing in each lava pool.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date March 11, 1920.

11 a.m. to 1 p.m. Light southerly wind and thunderstorm. Many steam spouts including one extending downward from thunder cloud to flow in desert as a long horn.

Climbed S pressure ridge, view into SSW wall-crack shows merely tumble of talus covered with a mass of Pele's hair. The spalling off of S wall of pit has left the pressure ridge a narrow wall only three feet thick in places and 10 to 12 feet high, a remarkable structure with knife-edge summit which appears instable.

View of pit standing on rim at SW rift line remarkably different from N view. The three fountaining channels appear as a Y with the two arms leading to SE and N arms of lake and the stem leading to the SW arm at the rift crack. The E bay is seen beyond, crusted, with slight streaming into its NE corner. The W and S bays appear symmetrical on each side of the Y and the islands are all very high, apparently 50 to 75 feet above the lake.

W island now connected across by an isthmus with the SW crag and is an immense mass with rather flat shoreline levels, shutting off the W bay. The S island has joined completely with the islet SE of it and promises to join itself to a point jutting out from the S side of the lake which has an oven grotto in its end. The streaming is strongly towards the center from the N and SE arms and bends into the W and S bays. The S arm is rather stagnant and fountaining. The streaming in the S bay is irregular. The current from the N arm rushes through the channel between the N crag and the W island and sets the entire W bay in motion as a whirlpool slowly revolving counter-clockwise about a center fountain. On the W side there is again a defined bench and into a tunnel under it a broad torrent is pouring down from the lake at about the same place as the former W cascades. It is,pouring into a void in the wall-crack which is again perhaps being drained on that side by the desert flows.

A remarkable feature noticed along the S margin of the liquid lake is a slightly raised shoreline bench tilted away from the lake as though the doming tendency which had lifted the middle into islands had also tilted centrifugally the outer segments of the sectors.

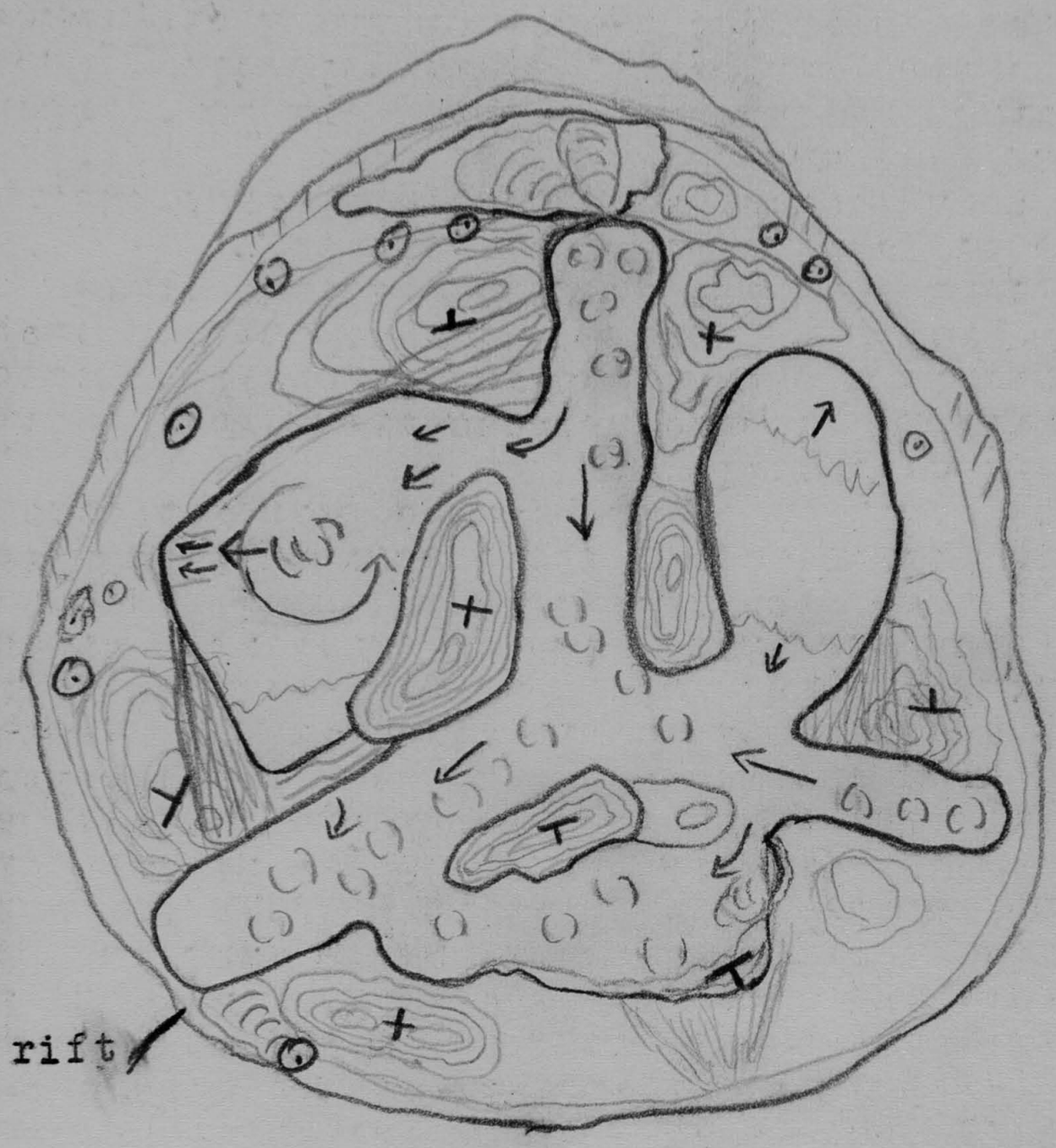
The blowing cones are numerous against the wall W and NW and in the N and NE wall valleys. The lake has again been overflowing the end of the N arm so that the N pond crust appears again nearly at lake level. One small avalanche was seen at the N face of the N crag showing that the tilting back of the sectors continues. There is much continuous hissing and some spurting from the blowing cones.

(Sketch on next page)

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date March 11, 1920

Sketch as seen from SW:



T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date March 11,1920

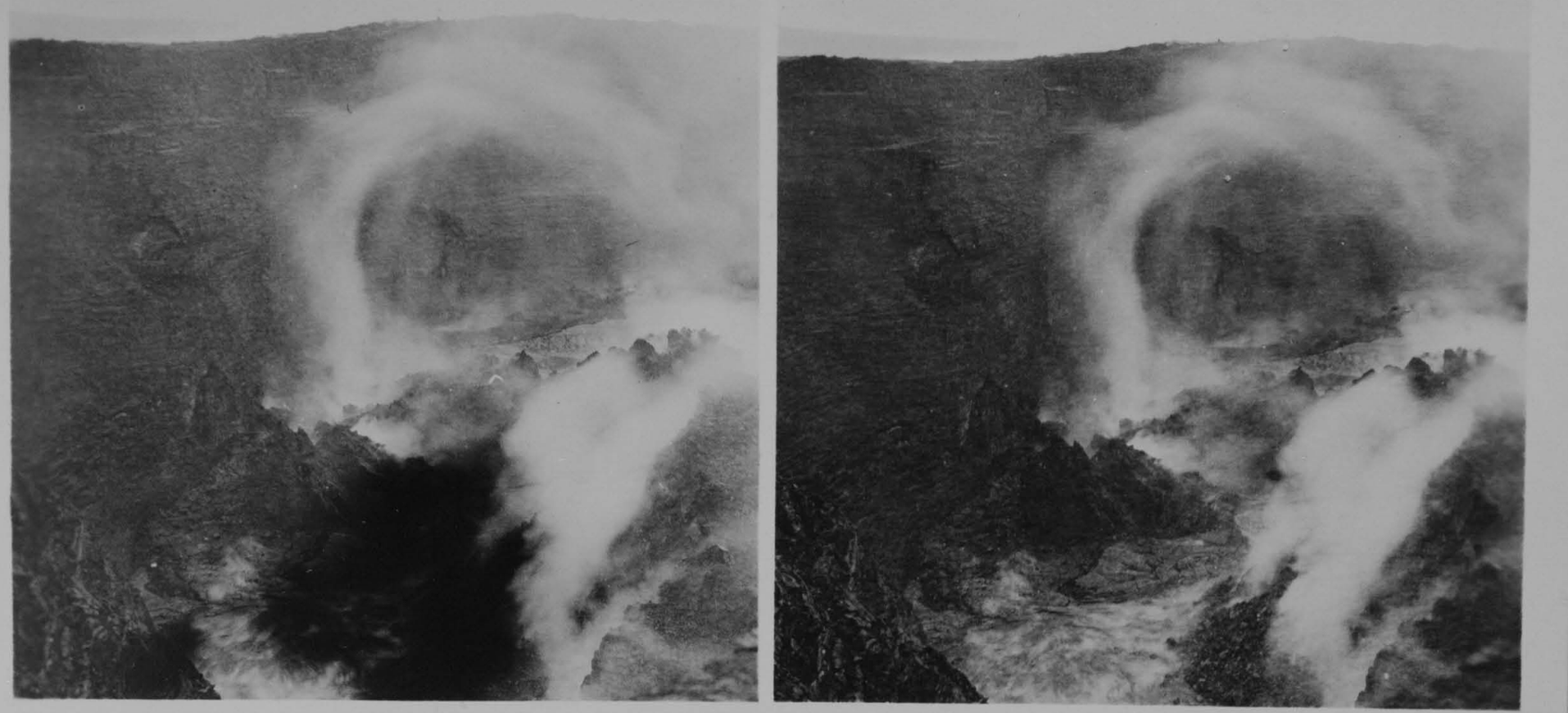
t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Transit.						
1 p.m.	N							
	stone	SW grotto		-10 07	00	1097	196	
	"	N crag		-12 59	00	405	94	
	"	Lake at base NE peninsula (center of pit)		-14 36	00	813	212	
		Mean for lake 304 feet.						
		(Finch's stone was 50 feet SW from here on Monday)						
								T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date March 11, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
1 p.m.	SW rim	Lake	1		8x	f/11	1	Stereo Kodak
	NW rim	NE	2		"	f/16	"	"
	"	Center	3		"	"	"	"
	"	SW	4		"	"	"	"
	"	N crag	5		"	"	"	"
	"	N shelf	6		"	"	"	"
								T A J

1920, Mar. 11.



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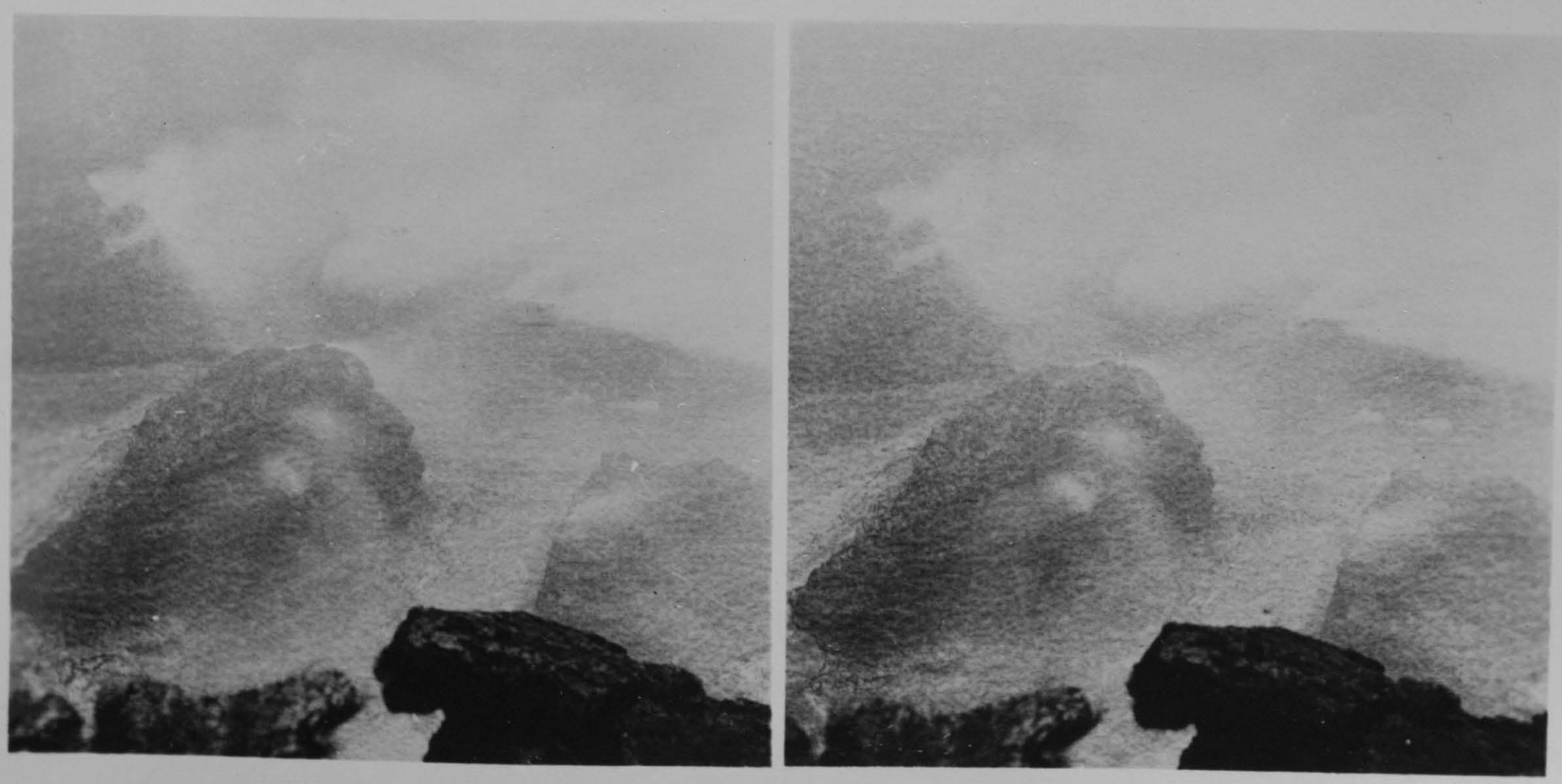


Jan 9

1920, Mar. 11

4

5

6

Fog

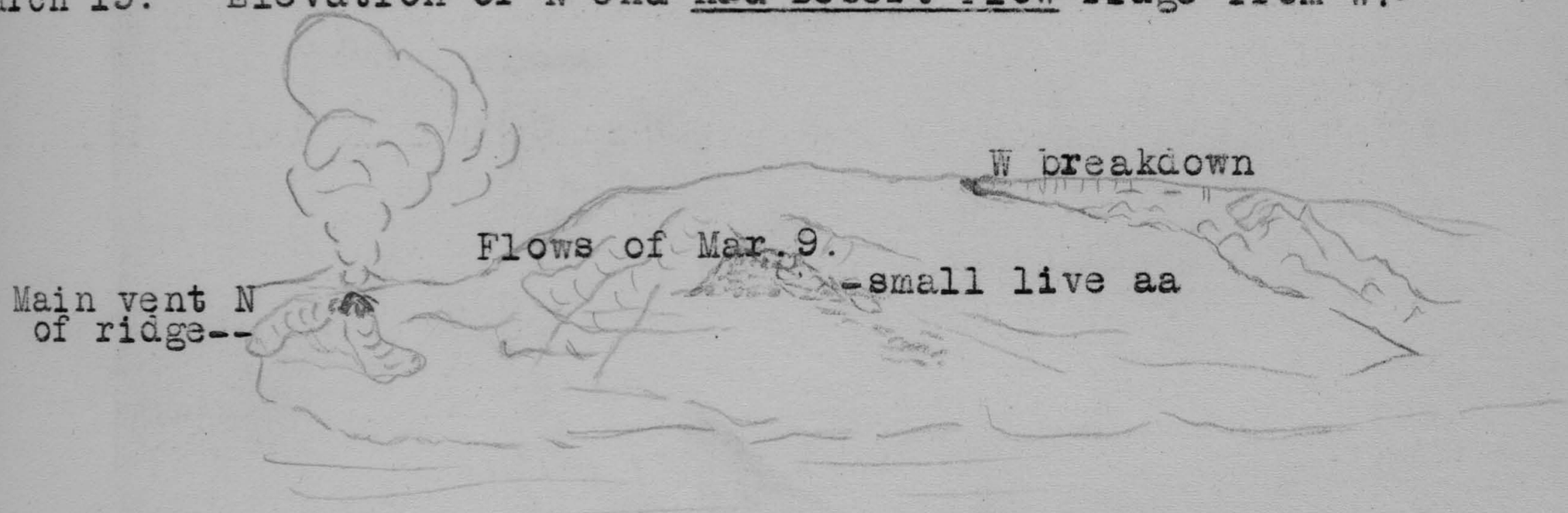
JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date March 14, 1920
Monday " 15, "

March 14.
4 to 6 p.m. Lake flooding W bench and N pool. These covered with glowing crust. Many flaming cones E, N and W. Streaming into W bay which occasionally circles in whirlpool. Falls of rock from NE crag and changes in grotto, cove E of N arm. Crags appear no higher Occasional inflow to oven grotto W. Blowing cones, one lifting lid, NE. Five flaming vents N base of N crag. Spurting stack SSW sending flow along wall northwestward to head of SW arm. Cracks across E bench and filagree cone there extending from former E pool to lake. Fume thinner and pit brighter. Streaming NE and SW from dark skin across E bay. Mottled pattern in N arm and SW arm. S island not yet connected with bank. W island wholly connected with SW crag. Rock seen rolling down N face of N crag.

March 15. Elevation of N end <u>Kau Desert Flow</u> ridge from W:-



Aa patch from spur W of ridge trickling sluggishly. Crusted summit pool above slightly collapsing. Summit hot and glowing but not flowing. Flow center a small hissing cone middle of flats N of ridge with pahoehoe making out in all directions over an area several yards wide burning trees and bushes in places. Pahoehoe very smooth making remarkable elongate toes of elephant type with smaller toes as snaky branches making out from the larger toes. Some live pahoehoe of sharkskin type. A large schollen-dome with fresh snaky driblets down its flanks.

Found main rift above ridge with lava in rift solidified which had risen from below extending for 100 feet or more from the fresh lava fields and showing by the flat-topped filling that it came up. Another rift farther W was likewise occupied by fresh lava but this showed by the festoons that it had cascaded into the rift from the lava fields to the S, the chasm being a wholly dead one with vegetation growing in it with no sign of recent expansion. The other rift showed abundant sign of expansion and fresh disturbance of dirt. There were numerous freshly broken cracks in the old ground in a zone eastward from the live rift above mentioned.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

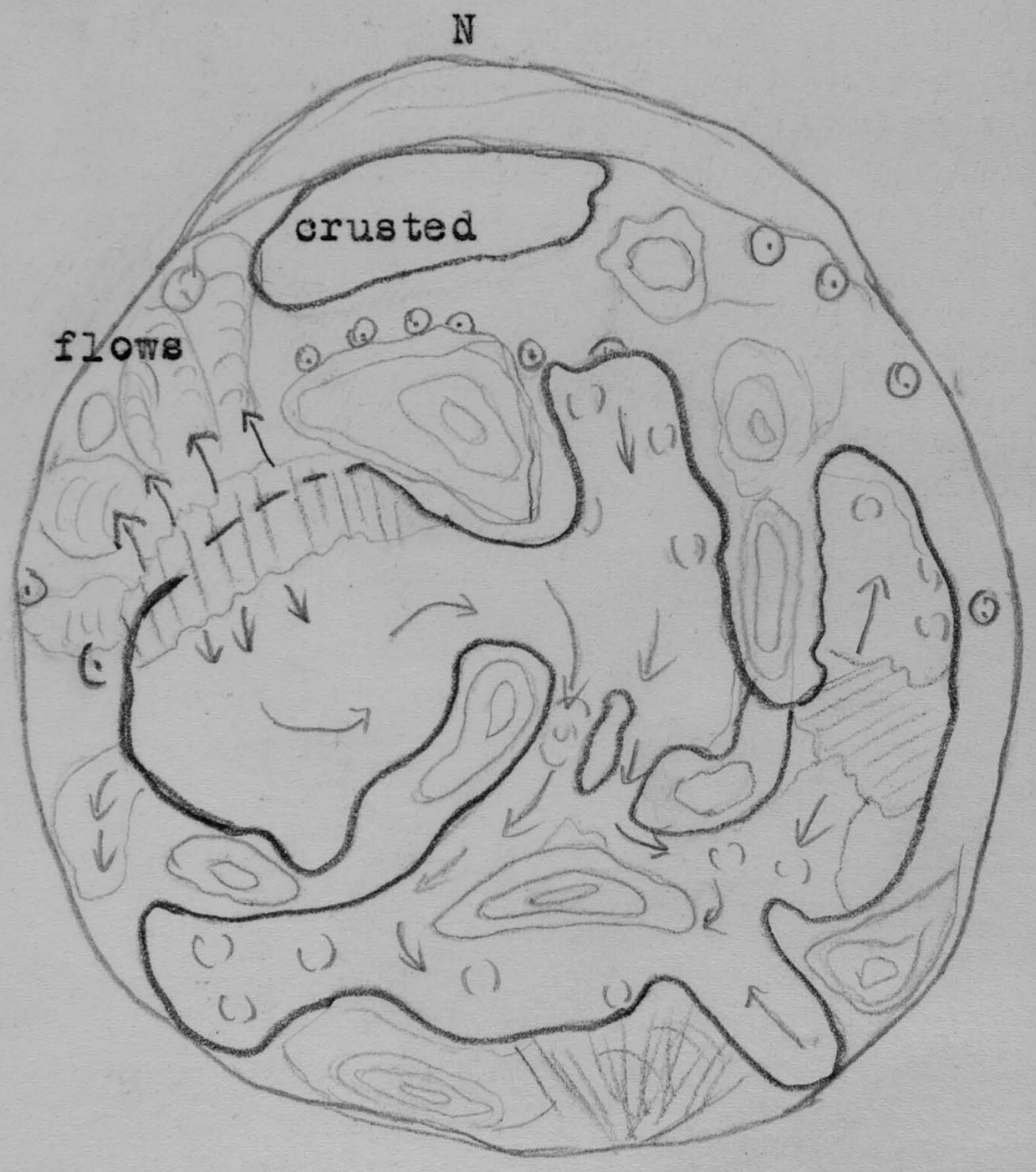
JOURNAL

Day Tuesday Date March 16, 1920
Wednesday " 17, "

March 16.
5:30 p.m.

Crags appear no higher and relief lower relative to lake. New islet in central channel. Lake flooding W bench, and both E and W, open pots splashing instead of blowing cones. Blowing cones puffing continuously and coughing all along N. Streaming all pours southward. NE crag appears to have broken and NE peninsula has broken down at its tip. Fountaining abundant, fume moderate, everything shows high blowing pressure in the liquid lava.

Pattern and islet strongly recalls the slight rise of March 1913.



T A J

March 17.
5:30 p.m.

Fume thick on S and E sides. One border fountain and one center fountains in W bay playing continuously. Numerous fountains in all channels and arms with bubble fountains in SW arm. Streaming out of N arm very slowly. N crag seemed to have maintained its height above the liquid while the other crags appear to be much lower. (Lake higher. - T.A.J.)

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Thursday Date March 18, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	Top left hand penin. (Doubtful, top broken up)		-12 03	+01			
		Top of N crag		-13 21	00	377	90	
		SSW pot smoky						
		Lake at point NE peninsula		-14 41		734	192	
		Top SW crag		- 7 46	+02	1014	140	
		Distance readings of Feb. 28.						

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Thursday Date March 18, 1920
Friday " 19, "
Saturday " 20, "

March 18.
10:10 a.m. Fountain continuous in center W bay. Current out of N arm into W bay and SW arm. Little islet in center. There have been land slides base NE peninsula. At 10:40 a.m. fountain in center of W bay died. Evidence of small avalanche from the N crag on to the N pond. Lakes generally crusted.

March 19.
10:30 a.m. to 12:30 p.m. Kau Desert Flow.

Small sluggish flows at the N end of the slag heap have spread a considerable distance to the E, and are still moving to the N and E.

There has been a further collapse on the N side of the sink on the W side of the slag heap. A small flow from the arm of the inverted L (⌐) of the upper slag heap cascaded into this sink. A flow around the western base of N end of the slag heap has buried a large part of the large aa flow on the W side and also covered up several feet of the toe of the Keamoku aa.

R H F

March 20.
11:30 a.m. Sketch of Halemaumau:

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Saturday Date March 20, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
		Brunton.						
11:30a	NNE	Top peninsula		-12 00				
		N crag		-11 45				
		Lake peninsula		-14 50				
		Top SW crag		- 7 20				
		SW grotto		-13 45		1097	270	
		Depression N crag below rim of pit 78 feet						
		" SW " " " " " 130 "						
								T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Monday Date March 22, 1920.
Tuesday " 23, "

March 22.
10 to 11 a.m. Current to the N in E arm. Current out of N arm and SW arm into SE. Avalanches frequent from N crag. Current to W in W bay. All lakes and arms several feet below rampart (5 to 8 feet). All crags except one to the SW appear considerably higher. Channel from center into SE much narrower. Peak near head of N arm scarred on all sides and has sharp peak with nearly vertical walls.

R H F

Kau Desert Flow.

Flow heap much higher in N side of ridge. Toes making out mostly sharkskin type. Center a pool, hot, but heavily crusted. No distinct flows seen N or W.

T A J

March 23.
9:15 to 10:30 a.m. Current to the N in E arm and to the S in N arm. Height of lakes and crags appear to be about the same. Fountains in W bay and in center channel. Grottoes and border fountains on all islands. The islet in the center appears to be the same as for past several days. A whirlpool appeared at times in the SSW pot. Lake ramparts appear to be 5 to 8 feet high. Several vertical cracks show plainly in the SW crag.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Monday Date March 22, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10:15a	N							
(50	ft.W)	Summit N crag		-10 58	00	448	87	
		Lava base of NE peninsula		-12 34		816	182	
		SSW pot (left hand)		9 06		1113?	178	
		Summit SW crag		8 28		904	135	
		Distance of Feb. 28, 1920.						

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Wednesday Date March 24, 1920
Thursday " 25, "
Saturday " 27, "

March 24.
8 to 8:30 a.m. Ramparts in W bay 3 to 5 feet above liquid. From general appearances crags and lakes appear to be about the same height as on 23rd, or perhaps a trifle higher. One vigorous fountain in entrance to W bay, and several (seven or eight) in center channel. E arm rather quiet with one fountain in center. SE pool near wall active with three fountains. Very rapid streaming out of N arm past center islet, with a sluggish branch from this flow into W bay. Current to the W past S island.

March 25.
1:15 to 2 p.m. Fume moderately thick. One large fountain in E arm. Rapid streaming to S past center islet out of N arm. Fountains 15 feet high at times to W of islet, Lakes about 3 to 5 feet below rampart. Center islet wider but not higher. Current to the E in SW pond. Crack in bench along wall near base NE crag. Current from SE. W bay fell 2 p.m. and a current started in from center channel

March 27.
1 to 2 p.m. Fume moderately thick. From general appearances the crags and lakes have risen slightly. The smoke from the crack to the SW of Halemaumau is more voluminous than common. Rapid streaming into W bay. SE and E arms quiet. Considerable landslides from N crag which is considerable cracked at the peak

9:40 to 10:40 a.m. Kau Flow.
Very slow moving small toes on W side of N end of ridge. Main activity to the NE of N end of ridge, from a terrace some lower than highest part. Three rivers are flowing out from under a flat crust on top of this terrace, and with their numerous branches flow in every direction except NW.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date March 25, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1:20p	NNE	Summit N crag		-11 27	00	377	76+?	
	"	" SW "		- 7 10		1014	127	
	N (+ 50 ft)	Lake base NE penin.		-13 18		816	178	
	"	SSW pot (doubtful, smoky)		- 9 42				
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date March 28, 1920
Monday " 29, "
Tuesday " 30, "
Wednesday " 31, "

March 28.
1 to 2 p.m. and 6:30 to 7:30 p.m.
Fume moderate. A vertical crack in the SSW wall some distance from the big crack leading to the flow was observed, (near the southern end of pressure ridge). A vigorous broad current poured continuously into a grotto on the S crag. Another current poured into a tube near the base of the SW crag from the W bay. N crag has cracked open more. SE arm full of fountains, E arm quiet. Numerous blowing cones along E and NE walls; one, very narrow spire, fully 10 feet high built up at base of NE peninsula.

March 29,
7:30 to 8 p.m. Fume moderate, though a thunderstorm was in progress and vapor dense. Lakes and crags appeared as high or higher than common. Slight current to the N from under thick crust over S part of E arm. Slight current out of N arm and a feeble current into grotto in S crag that was locus of swift current on 28th. A cone was blowing loudly near S wall. New island near SSW wall.

March 30.
3:50 to 4:30 p.m. Current to N in E arm. Small island to SSW first seen Sunday. Current out of W bay to grotto in narrows leading to central channel. Current out of N arm; current to grotto and tunnel W side of W bay. Small avalanche N crag. Lake rampart W bay 3 to 5 feet high. Some slipping of plaster on walls under N ledge. Vigorous current into grotto S crag (see Sunday) and a narrow current cascading into a hole S side of S island down sharp decline.

March 31.
10 a.m. Center islet nearly gone. Current in many directions to vigorous fountains. One usually in W bay, in narrows by islet, SW arm. Large and vigorous but none continuous. Avalanches from N crag.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Wednesday Date March 31, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	N (near)		0					
		NNE	55 45	-10 08			77	
		Top N crag	100 40	-15 16			180	
	NNE (near)							
		Top N crag		-10 31			74	
		Grotto W bay		-11 51			176	
								R H F

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Hawaiian Volcano Observatory

JOURNAL

Day Thursday Date April 1,1920.
Friday " 2, "
Saturday " 3, "

April 1.
1 to 2 p.m. Current to N n eastern arm which is covered with a very thin broken crust. Little pond in E wall crack below high point of rim. S island peninsula (since Sunday). Tendency for lakes to become separated. Many border fountains and grottoes active in all lakes. Avalanches N crag. Much Pele's hair being formed.

April 2.
10-11 a.m. Kau Flow. Several sluggish moving toes to the W and NE of the northern end of the lava ridge and a few on top of the highest portion of the ridge. The center of activity has moved to the top of the ridge, but no vigorous flowing was in evidence. A ridge some distance out from the main ridge to the N and E is almost as high as the latter, between there is a valley.

3:30-5 p.m. Halemaumau. Rapid current through narrows into E arm which was lower than central channels so that the current was a rapids. A line of fountains across the E arm starting with a border fountain at a crack in the bench magma (below NE monument). Lava rising rapidly at 4:30 p.m. the lake began to overflow its ramparts and covered the old N pond and all benches around the wall with liquid lava. A cascade was still pouring into a tunnel under the S island.

April 3.
1-2:30 p.m. Cascade into E arm from both ends at 1 p.m. (The one from N end had stopped at 2:30, though the one from the S continued as yesterday). Overflow in crack along wall at E side. Overflow on to bench at NNW, current into W bay. Crags and lava appear higher. Cones along wall spouting and hissing.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Thursday Date April 1, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1:30p	NNE	N	0					
		Stadia to N 441 feet.						
	"	Old N station	7 40					
		NW niche	31 34					
		W station	50 38					
		Center W grotto W bay	49 45	-11 36		930	-191	
		Top N crag	63 13	-10 06		425	- 75	
		SW crag	60 49	- 6 33		1035	-119	
		NE monument (near)	135 55					
	N	NNE	0					
		Old N station	63 22					
		NE monument (near)	25 24					
		NW niche monument	118 18					
		W station	106 24					
		Top N crag	55 57	- 9 41				
		W grotto W bay	100 52	-15 02				
		SW crag	93 27	- 7 42				
		E point S island	59 22	-10 40		1050	-198	
	NE mon.	NNE	0					
		Top N crag	40 42					
		NW niche	43 25					
		W station	64 50					
		SE platform	144 54					
		Depression N crag		- 8 10				
		Grotto W bay	58 48	-10 40				
		E point S island	95 11	-18 57				

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date April 4, 1920
Monday " 5, "
Tuesday " 6, "

April 4.
11 a.m. to 12 noon. Current N in N arm. Numerous border fountains. Lake flooding contimues. Cones along N and NE walls coughing and some flowing. E arm has extended northward. (Islands yesterday) Cone flow into N pool.

5 to 7 p.m. Cone very high in S talus. Lakes lower. Cascade into E arm from N. Avalanches from NE, N and center crags.

April 5.
2 to 3 p.m. Lakes higher than at 7 p.m. on 4th. Center island brokenn up somewhat on S side. Avalanches from N crag at times. Currents to grottoes. One large fountain continuous in E arm. Cones along N wall spouting lava, cones in N crag hissing loudly

Kau Flow. Numerous slow moving toes on all sides of upper end of the lava heap. One narrow lava river flowing N over the new fill and on to new ground in places near western large new crack. A small aa flow moved for about 10 feet from a large schollendome on the W side.

April 6.
2 to 3 p.m. Lakes higher than yesterday. Cascade still going through grotto in W bay. S part of central island has cracked off. SSW crags broken up. Rim crags are being encroached upon by lakes. Some bubble fountaining in N part of E arm. Only grotto action elsewhare. The large grotto near S talus still has some current pouring into it. Glowing crust around all walls except E and S. New island SSW higher.

11 a.m. to 12 noon. Kau Flow. Allen reports:
Toeing out around the N end of the new fill. Some small breakdowns on the eastern part of highest portion of ridge. Aa flowing on small upper aa place on W side.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Sunday Date April 4, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
			0					
11a.m.	N	NNE	56 19	- 8 27		440	65	
		N crag	59 25	- 9 46		998	172	
		Point S island	91 19	- 6 50		885	106	
		SW crag	100 43	-14 00		685	171	
		W grotto W bay						R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Wednesday Date April 7, 1920
Thursday " 8, "
Friday " 9, "

April 7.
1:15 p.m.

E arm has a definite lake basin being separated from central channel by a crust three or four feet higher than the lava. Overflow of bench NW. N and NE still glowing. Avalanches continue to fall from N crag and central island. The latter has developed several new cracks lengthwise. Flooding N pool from one of the wall cones N at 2 p.m. E lake 4 or 5 feet lower than lava in central channel. The crust between the E lake and central channel is increasing in thickness by solidifying overflow from central channel. The rim crags and island are being drowned by lava. The center islet has entirely disappeared. The SE arm has increased considerably in width by the breaking down of the confining crags.

Kau Flow. Alex reports that there is a small breakdown on new terrace to E of highest portion of new ridge. Pahoehoe flowing out of breakdown. No aa seen, but was probably buried.

April 8.
1 to 2 p.m.

E arm smaller and lower than rest of lakes. Current from cone near N wall into W bay. Current from W in SW arm going SE and N. S crag and others appear higher except one small crag to NNE which is almost drowned.

April 9.
1 p.m.

Most of the bench around S wall covered with new flow. S crag and S talus partly buried. SE crag also. E wall crack filled with new lava. Flow pouring out of cone N into W bay. Crag base NE peninsula nearly buried. Crack in SW crag large. Two high cones near SSW wall have caused flows over S bench and are still spouting lava.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Wed. & Thurs Date April 7 & 8, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
April 7.								
	N ledge	Section of NE crag nearly drowned.		film				Kodak
April 8.								
	W of N	Looking toward S pressure ridge, N crag in foreground	1	"				"
	N ledge	Section of NE crag nearly drowned	2	"				"
	"	W bay	3	"				"
								R H F

April 7.

1, April 8.

2, April 8.

3, April 8.

RHT

1920, Apr. 7 & 8

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Thursday Date April 8, 1920

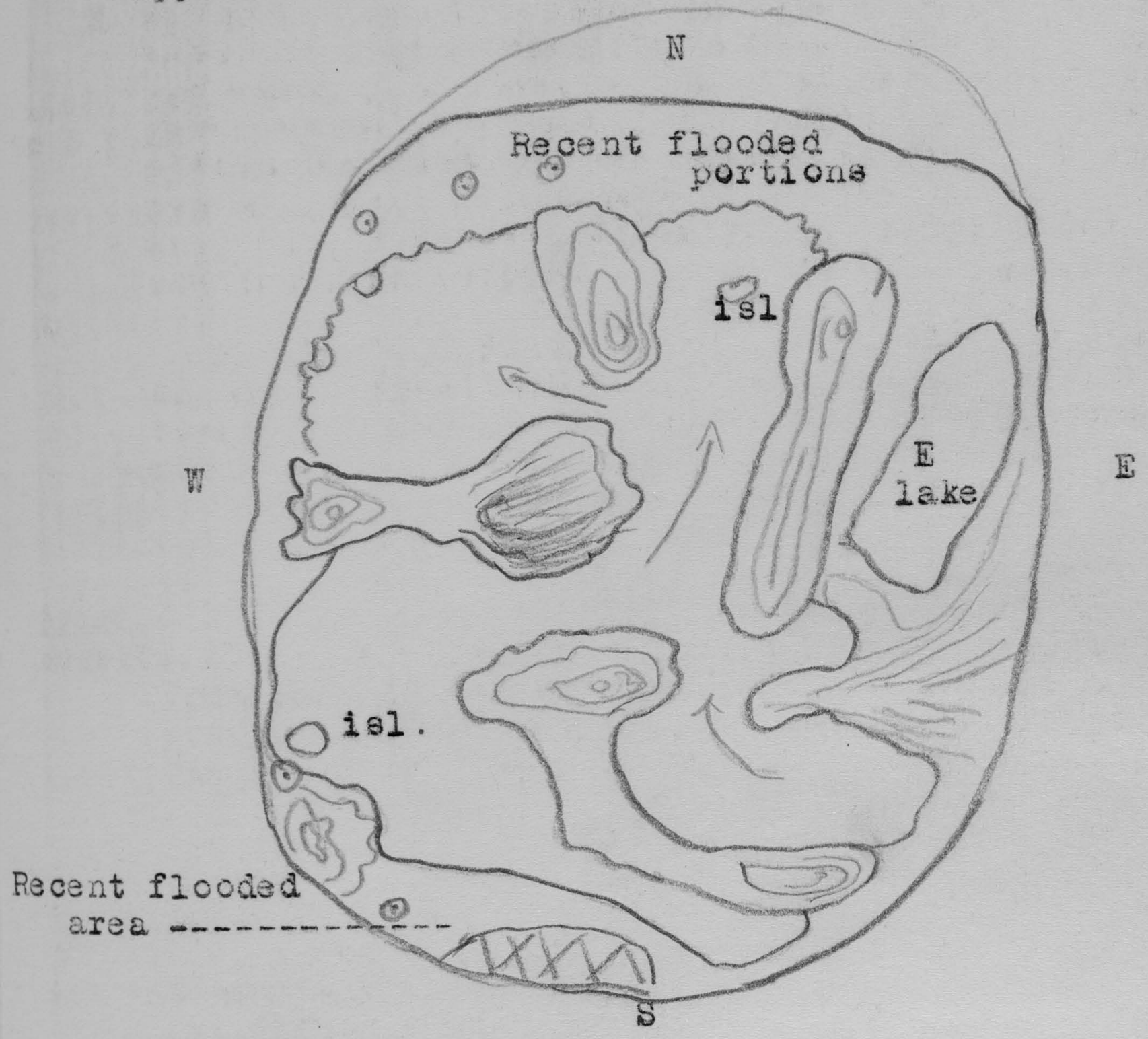
t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	N	W grotto W bay		-12 42		685	154	
		SW crag		- 5 03		885	78	
		N crag		- 6 52		436	53	
		E point S island		- 8 38		998	151?	
	NNE	W grotto		- 9 40		880	150	
		N crag		- 7 00		415	51	
								R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Saturday Date April 10, 1920
Sunday " 11, "

April 10.
10 to 11 a.m. Center island (SW peninsula) tilting to N and very tall. E lake still lower than rest but not so much as yesterday. NE crag breaking up; small avalanches; a large one at 9:30. All of the crags are islands now except the one to the ESE and one to SSW. Avalanches from SW crag. Center island appeared into view from Observatory about 4 p.m.



April 11.
5:30 p.m. Very rapid streaming out of W bay (not directed to grottoes or fountains). Lakes and crags much higher. N crag tilting N. Lava spire base N crag 5 feet high, hissing loudly. Three boiling pots N pool and three NE. Fountains splashing very high and no continuous fountains.

2-3 p.m. Kau Flow. Small flows pouring over recent flows on terrace to N and E of N end of new ridge. Cones hissing and emitting much smoke top of high terrace to the NE.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Saturday Date April 10, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	Lake W grotto	49 46	- 8 42		880	135	
		SW crag	61 30±	- 3 36		1010	64	
		Peak center island	69 25	- 2 21		800	33	
		N crag	60 06	- 6 58		408	49	
		Lake NE islet	82 15	-16 39		463	138	
	N	Top N crag	56 37	- 6 04		426	45	
		Center island peak	78 07	- 2 37		770	35	
		SW crag	92 00±	- 4 19		885	67	
		W grotto	±101 15	-11 19		685	137	
		Lake NE islet	50 00	-16 12		595	139	

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

140 Hawaiian Volcano Observatory

Day Monday Date April 12,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	NNE	Peak center island	68 30	-0 40		785	9	
		NE islet (lake)	83 10	-14 42		463	131	
		N crag	58 40	- 4 25		408	32	
		W grotto	48 05	- 7 39		906	121	
	N	NE islet lake	49 40	-11 34		595	122-	
		N crag	56 46	- 4 44		426	35	
		Center island	-78 50	- 0 56		742	12	
		W grotto W bay	103 35	-10 08		696	124	
		SW crag		- 3 00		885	46	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

Day Monday Date April 12, 1920
Tuesday " 13, "
Wednesday " 14, "
Thursday " 15, "

April 12.
1 p.m. Very rapid current out of W bay , slow current out of SW arm. NE crag broken up near center of pit making separate small island. S side of center island broken more forming separate small islands near center of pit. Many live pools along N. Talus S wall all buried.

April 13.
1 to 2 p.m. Rapid current out of W bay, also streaming out of SE arm. (Alex reports that during the forenoon there was a current into the W bay and lakes presented a general appearance of falling. At 3 p.m. the center island crag was nearly a foot lower than at 9 a.m. The current reversed and commenced flowing out of W bay about 1:30 p.m.)

Many wide mouthed cones around the walls SSW and N spouting lava. The S side of center island is entirely engulfed.

April 14.
1:30 p.m. Current out of W bay and out of N arm. Many fountains N end of E lake which extends to wall by NNE monument. Flowing out of SE arm source from under ledge near wall and SE platform. Avalanches from N, NE and SE crags. Cascade into grotto in SSW crag.

April 15.
10:30 to 11:30 a.m. Conditions much the same as on the 14th. Current out of W bay and SW arm. Three fountains in W bay, six in SE arm and six in SW arm.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Friday Date April 16, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
9:40 a	NNE	NE islet	83 30	-12 51		463	106	
		Center island	68 09	0 0		785	0	
		N crag	58 00	4 46		415	33	
		W grotto	48 36	- 6 32		906	104	
	N	NE islet	48 43	-10 07		595	106	
		N crag	57 13	- 4 02		425	30	
		Center island	79 00	- 0 04		742	1	
		W grotto	101 41	- 8 41		696	106	
								R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Friday Date April 16, 1920
Saturday " 17, "
Sunday " 18, "
Monday " 19, "
Tuesday " 20, "

April 16.
10-11 a.m. Current out of W bay. Hissing cone 4 feet high near the wall under SE platform. Lakes lower; E lake 4 or 5 feet below rampart and others 2 or 3 feet. Fountaining brisk in all arms.

The eastern branch of the beginning of the lava tube which heretofore has been quite cool is now very hot, the western branch has cooled off rapidly since Tuesday, April 13.

April 17.
1-1:45 p.m. Lakes appeared a trifle lower, no positive streaming in any direction. Two large lava stacks spouting SSW. One immense cone base N crag flaming vent in top and three cones base SW crag rumbling deeply and one spouting lava. W bay larger by taking in wall pool under N station.

April 18.
1 p.m. Current out of SE arm. New cone along E wall. Sunken place, site of an old cone N pool, still has cone that is surrounded by aa blown out. A cascade was pouring into the SW lake, the source being a cone near SSW wall. E lake level with its ramparts.

April 19.
10-11 a.m. Lakes lower, all having a well defined rampart from 3 to 5 feet high. Fountaining vigorous in central channel.

April 20.
9:30 to 10:30 a.m. E lake lower than rest. Sluggish current out of N arm and SW arm. N arm and W bay have each increased in size and show a tendency to unite along the N wall N of N crag. Sluggish current out of W bay. Cascading from a cone between E lake and N arm into E lake. Pronounced whirlpool in central channel near point NE crag.

R H F

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date April 19, 1920

t	sta	subject	no	pl	scr	stop	ex	cam	
10 a		Flashlight picture inside big lava tube in Kilauea floor. Long white stalactite to the right.		film				Kodak	

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date April 20, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
9:30a	NNE	W grotto	49 18	- 6 56		906	110.4	
		Center island	68 14	- 0 02		785	1	
		N crag	58 00	- 3 48		405	27	
		NE islet	83 06	-13 30		463	111	
	N	W grotto	101 49	- 9 08		696	113	
		Center island	79 00	- 0 14		742	3	
		N crag	57 08	- 4 05		425	31	
		NE islet	49 00	-10 33		595	111	
		SW crag	93 12	- 2 20				

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Wednesday Date April 21, 1920
Thursday " 22, "
Friday " 23, "
Saturday " 24, "
Sunday " 25, "

April 21.
1 p.m. S crag breaking in two. Lakes lower but crags appear to be about same height as yesterday (compared with rim). Strong current out of W bay. N arm and W pond nearly joined. Small new island between S crag and center island. Slight current out of SW arm; this current and the one from W bay stop at head of NE crag. Also slight current out of SE arm starting from wall.

April 22.
1 p.m. Lakes about same height or a little lower. Current out of W bay. W bay and N arm joined.

8 p.m. Alex reports that as seen from NE station the lake under that station was about 10 feet below its banks. At 8:10 p.m. there was a large slide from the point of the center crag which caused boiling up of the liquid.

April 23.
3 p.m. Current out of SE arm and out of W bay into SW arm. Fountaining vigorous in all arms. Ramparts 8 to 10 feet high surround all lakes. Point of center island badly broken up.

Morning. Kau Flow. Small flows toeing out at upper (N) end of slag heap. A lava river was found in a tube on the high terrace to the NE; site of hissing vents of April 11.

April 24.
1 p.m. Slight current into W bay. Fountaining vigorous, some flinging the melt in umbrella shaped pattern fully 15 feet high. The general appearance of the lakes and crags is about the same as on the 23rd. Fume thick.

April 25.
1:30 p.m. Lakes lower than yesterday. Rapid flowing out of SW arm and streaming out of SE arm. NE islet not so high as during the past several days. Fume thick.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date April 23, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
3 p.m.	NNE	NE islet	83 55	-14 28		463	119	
		Summit N crag	±58 05	- 3 46		405	26.6	
		W grotto	±49 06	- 7 25		906	118	
		Center island		- 0 30?			7	
								R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date April 26, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	NNE	W grotto lake	47 30	- 7 55		906	126	
		N crag	58 00	- 3 52		405	27	
		NE islet	82 19	-17 09		463	142	
		Center island	68 48	- 2 00		785	27	
	N	N crag	49 08	- 4 14			25	
		NE islet	92 00	-10 35	value uncertain			
		Center island	68 00	- 2 10		742	28	
								R HF

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date April 26, 1920
Wednesday " 28, "

April 26.
1 p.m. Lakes and crags appear much the same as yesterday. The peak of the center island has broken down somewhat. No currents observed except a few intermittent ones to grottoes. Fountaining vigorous in all arms. Fume thick.

April 28.
3 p.m. Cone along ESE wall now an open pot. Rapid current out of W bay. Bench between E lake and N arm broken. Center crag island broken more at peak. N crag has tilted more to the NNW. Fume thick.

10:30 to 11:30 a.m. Kau Flow.

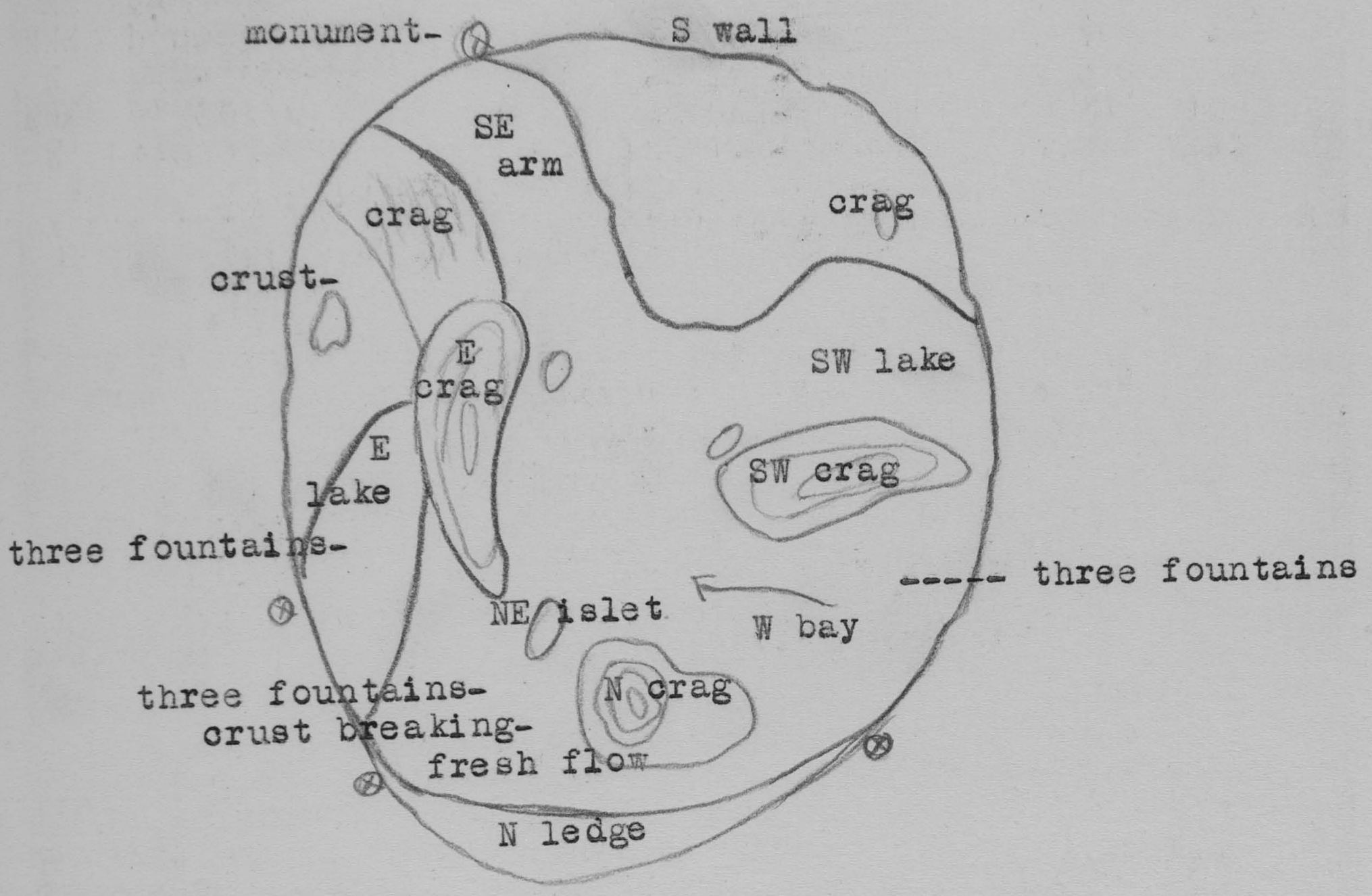
Small sluggish towing out around N end of fill. A lava river , 12 feet wide, cascaded into a tunnel with a 10-foot fall on the summit of the high terrace to the NE. The volume was greater than that observed flowing through the same tunnel on April 23. A small cone shaped fill has been built up on top of the highest portion of the main ridge. A lava pool inside the cone fluctuates between overflowing and seven feet down inside. At times large fountains break out.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date April 29, 1920.
Friday " 30, "

April 29, Sketch Halemaumau by R. H. F. for observations taken by Allen at 2:30 p.m.



Fume thick.

April 30.
8:30-9:30 a.m. Lakes about the same height as yesterday. Vigorous fountaining in all arms except one to the SW. A cascade 40 feet wide was pouring into a depression on the E side of SW arm -- W side of S crag. The lava below the left side of the cascade turned to the left and flowed under, apparently, the center part of the S crag. The lava on the right hand side of the cascade poured into a pool about 4 or 5 feet lower. Another cascade was pouring into a hole on the center side of the same crag just opposite the wide one above mentioned.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date April 30, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
8:30a	N	N crag	57 08	- 4 22		425	33	
		W grotto	103 30	-11 17		696	139	
		Peak center island	78 09	- 2 30		742	32	
	NNE	same	69 00	- 2 18		785	32	
		NE islet	81 50	17 51		463	134	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Saturday Date May 1, 1920
Sunday " 2, "
Monday " 3, "
Tuesday " 4, "
Wednesday " 5, "

May 1.
11 a.m. Cascade in E brabch of SW arm still continues; first observed on April 29. Lakes lower fume;very thick.

May 2.
1:30 p.m. Cascade in SW arm continues. The drop, however, is not so high as on the 1st. Pool below cascade on left hand side but a little lower than SW arm. The old floor around SSW cone site has sunken farther.

May 3.
10-11 a.m. Kau Flow. Usual small slow moving toes around the edges of N end of new fill The high cone on top of the highest portion of the N end of the ridge has further increased in height and has a small flow issuing. The river on the high terrace to the NE is still in action. Cracking and rumbling in the lava surrounding the portion of the river before it enters the tube indicates the beginning of a breakdown. The fill from this river which has been flowing so long has built up a long hook to the S on the E side of the lava ridge.

May 4.
1 p.m. Cascade in SW arm still vigorous. Strong individual fountains in all lakes going very high and making much noise. Appearance of lakes and crags much the same, but little difference in depression.

May 5.
11:30 a.m. to 12 noon.
Lakes much the same as yesterday -- currents to grottoes. Cascade in SW lake is confined to left hand side but very vigorous. Windows in the tube below the cascade are incandescent. The current below the cascade is reveaked by said windows and can be seen flowing to the SW.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Tuesday Date May 4, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	N	W grotto	102 30	-11 41		696	143	
		Summit N crag	57 00	- 4 26		425	-33	
	NNE	NE islet	82 35	-18 43		463		
		W grotto	49 00	- 8 57		906	143	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

Day Thursday Date May 6, 1920
Friday " 7, "
Saturday " 8, "
Sunday " 9, "

May 6,
1 p.m. Cascade in SW arm stopped. The narrow peninsula that separated (nearly) the E portion of this arm from the W has disappeared. A cone near the SSW wall is rumbling and spouting lava. Indications of a rising column. Rapid current out of W bay. Streaming out of SW and SE arm all to central channel.

May 7.
5;30 p.m. Lakes higher. Old N pool flooded again. A narrow and low isthmus separates W bay from central channel. Flow from cone SSW over S floor.

R H F

11 a.m. Kau Flow. Cone not active, but cracks showed hot. Most active part of flow stands on left side of cone. Big fountains shown.

Allen

May 8.
1 p.m. Large crack has developed in NE crag. Lakes higher and fume thinner. Rapid streaming out of W bay. Cascade from floor near SSW into SW arm.

May 9.
1:30 p.m. Lakes appear to be a trifle higher than on 8th. Rapid current out of W bay. A narrow cascade from a cone near the SSW wall pours off the flat into the E part of the SW arm.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date May 8, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	NNE	NE islet	82 28	-14 20		415	107	
	N	same	47 05	-10 50		565	107	
	NNE	Summit central island	67 27	- 0 40		756	9	
	N	same	78 00	0 54		715	11	
	NNE	N crag	56 30	- 1 48		397	13	
	N	same	58 12	- 2 12		403	15	
	NNE	W grotto	49 28	- 6 43		915	108	
	N	same	102 13	- 8 15		715	111	

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Sat. & Wed. Date May 8 & 12, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
May 8.								
1 p.m.	SE	platform to Halemaumau	1	film				Kodak
	NNE	Through the center	2	"				"
May 12.								
3:30p.		Cascade in eastern part SW lake		film				Kodak
								R H F

1, May 8

2, May 8 RHF

May 12. RHF.

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1929, May 8
" 12

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Tuesday Date May 11, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	NE islet	83 00±	-15 46		415	117	
		N crag	56 16	- 1 43		397	11	
		Central island	67 30	- 0 41		756	9	
		Grotto W bay	?49 12	- 7 26		915	119	
								R H F

160 U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Tuesday Date May 11, 1920
Wednesday " 12, "
Thursday " 13, "

May 11.
10 a.m. Entrance to SW arm from central channel very narrow. Lakes appear to have risen less than the crags or perhaps have fallen slightly. Current out of SE arm and sluggish one out of W bay. Cone along S wall hissing. Rapid current cascades into a grotto E part of W arm, same place as of April 29.

3-4 p.m. Kau Flow. The high cone on top of the main lava ridge quiet but smoking. Spatter from this cone was thrown over 200 feet to the E. Broken blocks of lava several feet from the cone furnish evidence of the small explosions. Some of the blocks weigh 10 to 15 pounds. The lava river in the tube on the high NE fill is still very active. This NE fill is very high. The flow from the tube reaches considerable distance to the E. Two small aa flows pushed out of the S side of the NE fill.

May 12.
3-4 p.m. Fume thicker, lakes lower. Walls around lakes 10 to 15 feet or more high. Cascade in E end of E arm of SW lake has increased in vigor, whole lake flows into cascade with a velocity of at least five miles per hour. Crags appear unchanged.

May 13.
1 p.m. Cascade SW arm continues. Current out of W part of SW arm unites with current from W bay and both go down near center point of N crag. NE islet has joined the NE crag. New island in center, more numerous and higher.
channel

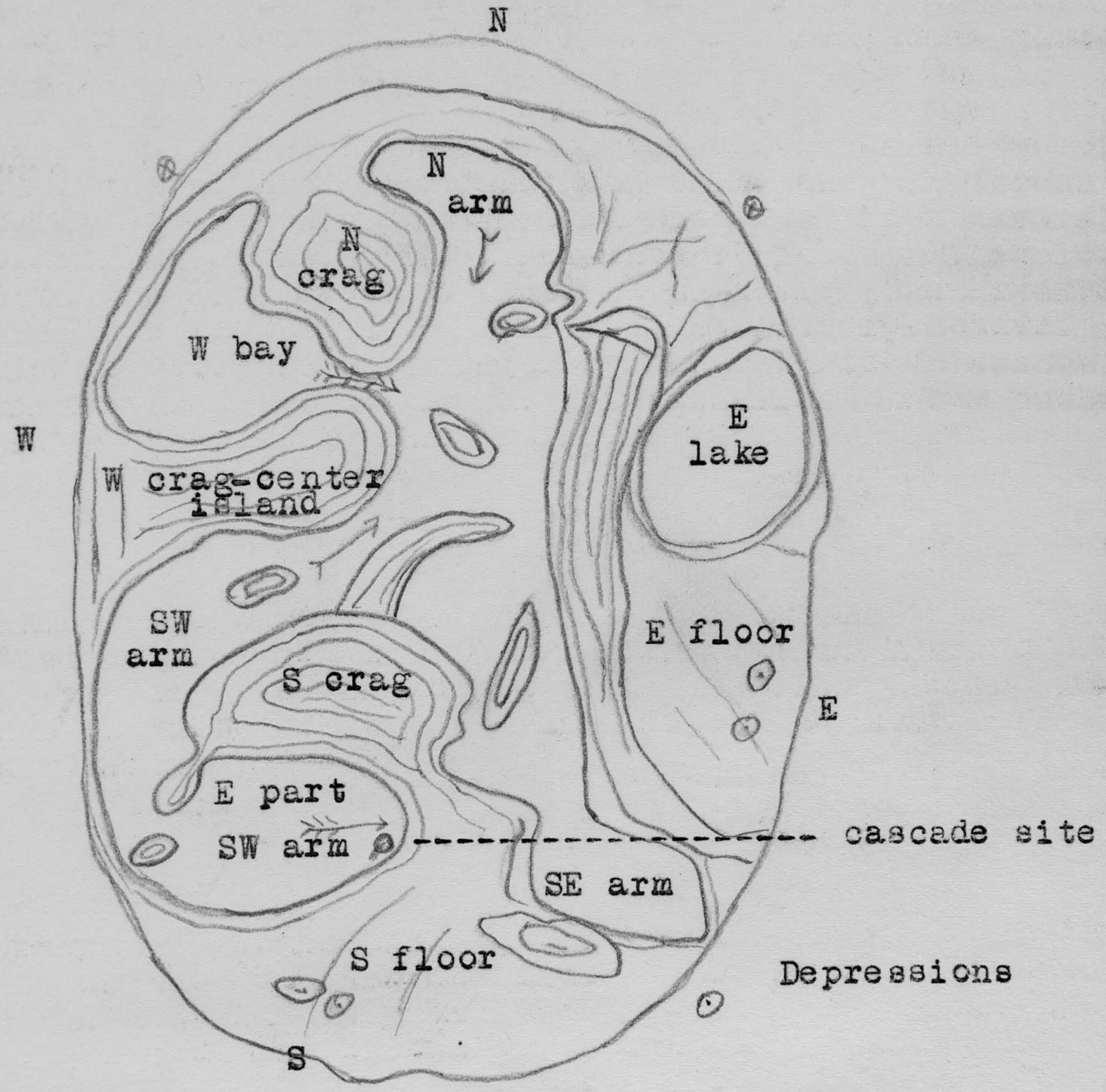
R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day: Friday — Date: May 14, 1920
Saturday — " 15, "

May 14.
10 a.m. Lakes lower, fume thicker. Cascade in SW arm very vigorous, also streaming out of SW arm to center channel. Extremely rapid rush of lava through the very narrow strait between center island and N crag. A few intermittent fountains in each arm.



May 15.
9 a.m. to 12 noon. Kau Flow. All activity confined to eastern side of lava ridge. The fill to the NE is as high as the northern part of the main ridge. The old tube location on the NE fill is broken down in several places, the bottom of the breakdown sites being crusted with hot lava but no flowing lava visible, except at one window part way down the southern slope of the fill. The flow to the S extends on the eastern side of the 1823 flow nearly to the northernmost of the Kamakaia cones. Other branches of the flow that went down the mountain to the Kamakaia cone region alongside the Dec. 30-Jan. 10 river course crossed over the 1823 ridge at several places. One or two small arms cascaded into the tube in the 1823 ridge.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date May 14, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10 a.	N	W grotto	102 23	-10 33		715	132	
	"	Peak central island	78 18	- 1 24		715	17	
	NNE	same	67 24	- 1 16			17	
	N	N crag	58 30	- 2 50		403	20	
	NNE	same	57 30	- 2 26			17	
	"	NE islet	83 19	-17 10			128	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date May 16, 1920
Tuesday " 18, "
Wednesday " 19, "
Thursday " 20, "
Friday " 21, "
Saturday " 22, "

May 16.
1 to 2 p.m. Cascade in SW arm very vigorous. Slow streaming out of W bay. Lakes lower than on the 14th. Fume moderately thick.

May 18.
1 p.m. Current out of SW arm and sluggish out of W bay and N arm. Lakes possibly a little higher than on 16th.

May 19.
4 p.m. Current to grotto (cascade site) SW arm. Cone hissing near SSW wall. Lakes about same as on 18th. Hissing cone indicates rising tendency. Fume thick. Avalanches fell from several of the crags during the day.

May 20.
1 p.m. Entire S floor has sunk a little. Very slight streaming to grotto E part SW arm. Streaming out of N arm. N crag broken up more by avalanches falling to the NNE. Peak of center island also broken down.

May 21.
9:30 a.m. Very sluggish streaming to E part of SW arm. Streaming rapidly out of SW arm. An apparent sink near center point of center island. Several glowing places show in many of the crags several feet above liquid. Fountaining vigorous in all lakes. Small avalanche from NE crag. W bay separated from central channel by a narrow isthmus.

May 22.
1-2 p.m. The S and E floors have both sunk considerably. The center island is further broken down on the S side. The N crag is still breaking up -- a pit has been formed between the outer northern edge and the main part of the crag. A current from the SW arm to the central channel seems to sink between the center island and S crag. Very large fountains were active in the central channel. No apparent current in E branch SW arm.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Friday Date May 21, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	NE islet	82 40	-19 21		415	147	
		Peak N crag	59 55	- 5 16		397	36	
		" central island	69 25	- 3 05		756	38	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date May 23, 1920
Monday " 24, "
Tuesday " 25, "
Wednesday " 26, "
Thursday " 27, "

May 23.
2-3 p.m. Pit fumy. Rapid streaming out of SW arm to strait between center island and S crag. Current out of SE arm. NE crag has sunk more than the old N floor.

May 24.
11 a.m. to 2 p.m. Kau Flow. Entered from bull-pen and crossed to middle cone of Kamakaia. Flow is below the lower Kamakaia to the E of the aa from the big river of Dec. 30-Jan. 10 and within a few hundred feet of cones. Mostly heavy pahoehoe. Slow moving toes numerous over considerable area from below Kamakaia to about 1 mile above. The river in the tube near the northern end of the lava fill is much the same as when last observed -- a very small window surrounded by shelly lava.

May 25.
2 p.m. Current out of SW arm; flow from central channel into W bay. Lava lower. Pit very fumy. Avalanches from crags. Three large fountains central channel.

May 26.
3-4 p.m. Pit very fumy and lava lower. Currents to grottoes. Avalanches frequent from N crag and others. A narrow ring of the old floor around the wall stands 10 or 15 feet above the new inner floor.

May 27.
3-4 p.m, Pit very fumy and apparently falling slowly. Current out of SW arm but not very vigorous. Current other places fortuitous often reversing within 5 minutes,

Kau Flow. A flow was pouring from a small cone near the high cone on the northern end of the main lava ridge down the western side of the lava fill. The main arm went along the small upper aa outbreak and reached the edge of the new lava fill. (From Allen).

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Friday Date May 28, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
8a.m.	N	N crag	58 30	- 1 30		450	59	
		Center island	78 02	- 5 51		715	73	
		Base NE peninsula	42 20	-13 46		590		
		W grotto W bay	102 00	-14 06±		715 ?	179	
	NNE	NE islet	82 52	-22 08		415	168	
		Base NE crag	89 33	-23 39		395	174	
		N crag	61 45	- 7 25		433	56	
		Center island	68 19	- 5 30		756	72	
		Pit fumy.						R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date May 28, 1930
Saturday " 29, "
Sunday " 30, "
Monday " 31, "

May 28.
7:30 a.m. Current to E in SW arm which is separated from central channel by a low isthmus. The floor around the N crag has gone down several feet and a large hole has developed between part of N floor of N crag. Avalanches from N crag.

May 29. Pit very fumy and about of the same height as on the 28th.

May 30.
10-11 a.m. Pit not quite so fumy as during the past several days. The SE arm is becoming narrower. The crack in the crater floor under which the Kau Desert flow pours is wider in places and emitting much fume and heat. The crack line is well marked by sulphur stain. Sluggish current to SE arm.

May 31. Kau Flow. Great volumes of smoke were being emitted from three breakdowns in the lava tube on the NE fill. Lava was flowing in the tube but could scarcely be seen both because of the smoke and a heavy crust over it. Some movement was going on in the mass of the NE fill as was evidenced by occasional shocks that shook the entire NE fill. Occasional heavy booming was heard that resembled the gas explosions that take place where the lava invades wooded country (pahoehoe covered).

5-6 p.m. Pit less fumy and apparently 2 to 3 feet higher than on the 30th. Current to E in SW arm and to northward in central channel to the N arm. A few fountains in all the arms.

R H F

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date May 31, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Flow. High cone on N end of main lava ridge, showing spatter and explosion blocks		film				Kodak R H F

1920, May 31

RHJ

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Tuesday Date June 1, 1920
Wednesday " 2, "
Thuraday " 3, "
Friday " 4, "
Saturday " 5, "
Sunday " 6, "

June 1.
4-5 p.m. Lakes higher and pit less fumy. Avalanche from central island. SW arm appeared 2 or 3 feet higher than the rest. Streaming to the N in central channel and N arm.

June 2.
9-10 a.m. Rapid streaming from SW arm under a bridge into the central channel, where the stream divides one branch to SE arm and main branch to the N arm. Lakes 3 or 4 feet lower than on the 1st. Lakes rose rapidly at 11 a.m. Several avalanches during day from center island.

June 3.
9-10 a.m. Current to central channel under bridge from SW arm. Streaming in central channel goes to isthmus between N crag and central island. Hissing cone by NE islet. Lakes appear a little lower than during the afternoon of June 2. A few small fountains in each of the lakes. Sluggish streaming into SE arm.

June 4.
10-11 a.m. Streaming out of SW arm under bridge into central channel. W bay very quiet. Pit more fumy than yesterday and about the same height.

June 5.
7:15 to 7:45 a.m. Pit moderately fumy. Lakes rather quiet. Three fountains in central channel, only border fountains in other lakes. Current toward W bay in central channel.

June 6.
1 p.m. Current out of SW arm and streaming in central channel toward W bay. Large fountains in central channel and border fountains elsewhere. Pit about same height as on 5th.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Tuesday Date June 1, 1920

t	sta	subject	no	pl	scr	stop	ex	cam	
5 p.m.	Bet. NE & NNE	Halemaumau		film				Kodak R H F	

1926, June 1

RHJ

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

Day Friday Date June 4, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11a.m.	NNE	Grotto W bay	49 06	- 9 30		910	156	
		Peak center island	67 38	3 45		756	48	
		Peak N crag	60 09	- 5 39		433	43	
		Lake NE island	82 38	-19 16		425	149	
	N	Grotto W bay	102 36	-13 16		708	154	
		Peak center island	78 13	- 4 09		715	52	
		Peak N crag	58 48	- 5 50		450	46	
		Lake NE island	47 57	-14 56		574	153	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day		Date			
	Monday		June	7,	1920
	Tuesday		"	8,	"
	Wednesday		"	9,	"
	Thursday		"	10,	"
	Friday		"	11,	"
	Saturday		"	12,	"

June 7,
1 p.m.

Pit moderately fumy. Streaming out of N arm and southward in central channel. Vigorous fountaining in central channel.

June 8.
1 p.m.

Pit moderately thick with fumes. N crag broken down so that it is now about two-thirds as high as on Monday. Peak fell toward the SE or toward the center of the pit. Streaming to the N in central channel, one branch toward W bay and the other to N arm which is much smaller by being filled up from avalanches of N crag. SW arm again connected to center channel by a narrow gorge through which there is rapid streaming.

June 9.
1-2 p.m.

Pit fumy. The peak of the SW crag has broken off. Streaming to the N in central channel.

June 10.
10-11 a.m.

Kau Flow.

High cone on N end of main ridge smoking more than common. Immense quantities of smoke being emitted from old window in what used to be a lava tube on NE fill. A lava river 20 to 25 feet below the crust was observed through a window on the S side of NE fill. Practically all of the activity is confined to E side of lava fill and to the S toward Kamakaia. (Increasing depth of river in tubes.)

June 11.
10-11 a.m.

Pit very fumy. Lakes quiet; border fountains in W bay and SE arm. A few small fountains in central channel.

June 12.
5-6 p.m.

Pit fumy. Hydrogen sulphide odor very pronounced. Flowing out of SW arm through a tunnel into central channel. Large border fountains and grottoes vigorous in all arms of the lake.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Friday Date June 11, 1930

t	sta	pt	hor	vert	lev	dist	elev	h. i.
9 a.m.	N	W grotto	103 00	-14 51		708	179	
		Peak center island	77 28	- 5 36		715	70	
								R H F

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JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day	Date
Sunday	June 13, ,1920
Monday	" 14, "
Tuesday	" 15, "
Wednesday	" 16, "
Thursday	" 17, "

June 13.
10-11 a.m. Pit very fumy. Current out of SW arm into central channel. Lake level about the same.

June 14.
3-4 p.m. Pit very fumy and about the same height as on the 13th. Streaming to a large grotto in SE arm and out of SW arm through a tunnel into central channel. A few central fountains in central channel, border fountains and grottoes in other lakes.

June 15.
4-5 p.m. Pit fumy, lakes rather quiet with but little streaming except to grottoes.

June 16.
9-11 a.m. Kau Flow. Much smoke from cone on N end of main lava ridge and from breakdown sites on NE fill. The lava river below the large window on S slope of the NE fill has sealed over. Another smaller window a few feet to the S is open with the wall incandescent to within a few inches of the top. A flow from the N emd of the main lava ridge (which has further increased in height so that the tall cone which used to stand at least 30 feet above the lava at its base is now only about 15 feet above) cascaded into the old breakdown amphitheatre mentioned on February 1 and 3.

Halemaumau. Lakes about 10 feet below lower inner rampart at 8:30 a.m. or about 4 feet lower than on the 15th. At 2 p.m. the lakes were about 5 feet below ramparts. Current to the N in central channel into N arm where it was directed toward a border fountain on E side. Pit less fumy than on June 15.

R H F

June 17. Kau Flow. A collapse occurred near the SE base of the high cone on N end of main lava ridge and revealed a fountaining lake some 30 feet across each way. (Information from Alex Lancaster)

1-2 p.m. Halemaumau very fumy, so that but little could be seen. Fountaining was very vigorous in all arms judging from the noisy conditions. At about 9 p.m. the lakes fell rapidly when a cascade in the N end of the E lake commenced.

R H F

'17

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Friday Date June 18, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
8:30p	NNE	NE islet	84 30	-23 40		435±	186	
		Peal central island	68 38	- 6 15		756	83	
		Grotto W bay	48 40	-11 30		910	185	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date June 18, 1920
Saturday " 19, "
Sunday " 20, "
Monday " 21, "

June 18.
8-9 p.m. Rapid current out of SW arm continuous. Vigorous current to grottoes at times in SE arm. Slow streaming to the N in central channel. Numerous border fountains in all of the lakes. Large fountains in the central channel at all times.

June 19.
4-5 p.m. Pit less fumy than common. A vigorous current was flowing out of the SE arm, one branch going to a grotto at entrance of arm and the other into central channel. Rapid current northward in central channel. Avalanche fell from S crag. Four or five fountains playing at all times in central channel.

June 20.
4-5 p.m. Pit moderately fumy. Northward streaming in central channel and into N arm.

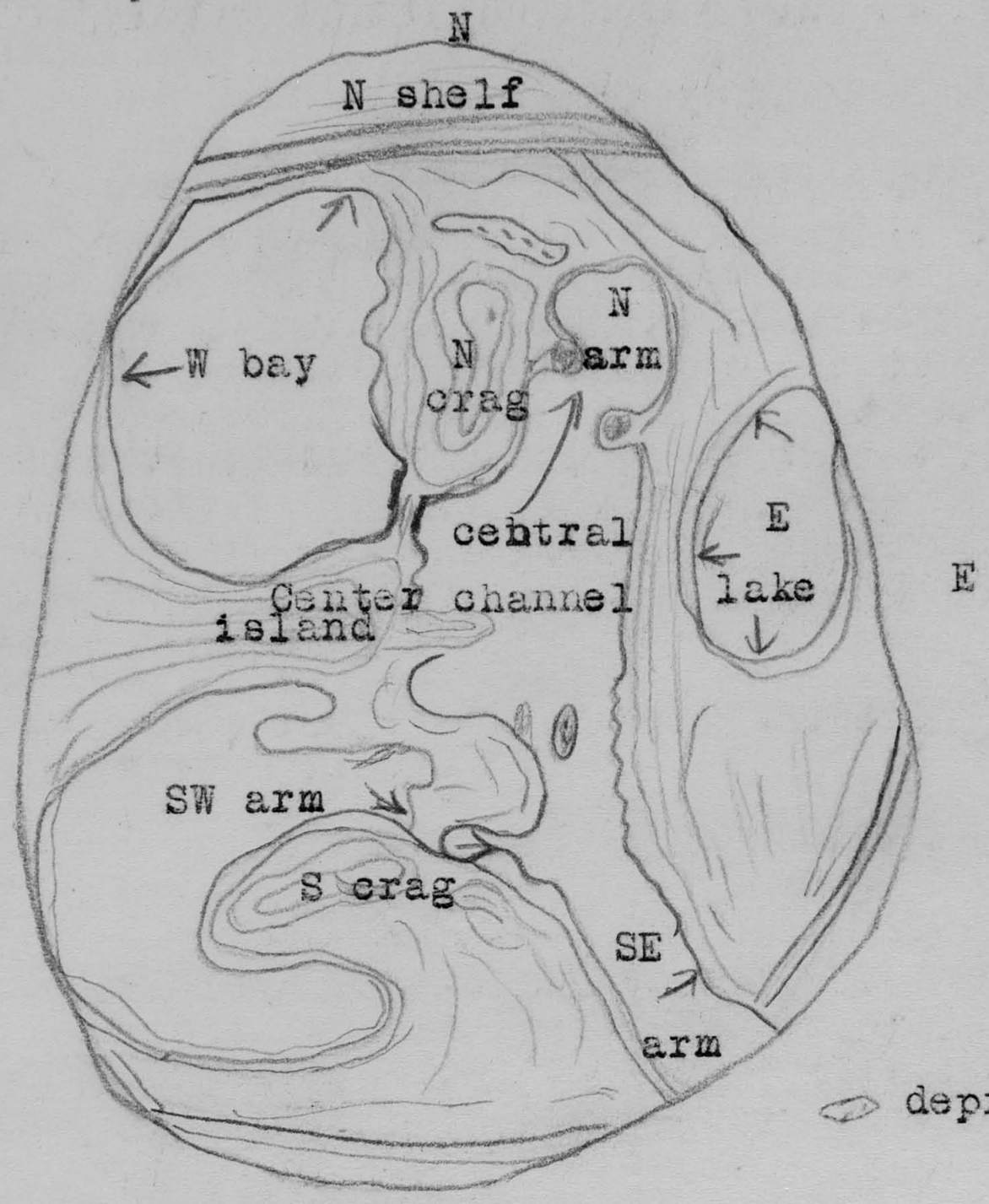
June 21.
1-2 p.m. Smoke from Kau flow plainly visible from volcano road.
Hissing vent near entrance to SE arm making much noise. (This is the first hissing cone or vent heard in nearly two weeks). E lake fountaining more vigorously than usual. Sluggish current out of SW arm through tunnel into central channel; very lattle streaming in any of the arms. Pit about as fumy as on the 20th.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date June 22, 1920
Wednesday " 23, "

June 22.
1 p.m. Slow streaming out of SW arm. Rapid streaming into N arm. Avalanches on N crag. Pit less fumy than on 21st. Lakes about same height apparently. More fume than common from crack over Kau Desert flow in floor of Kilauea near rim of pit.



June 23.
10:30 to 11:15 a.m. Pit moderately fumy. Lakes appear to be a little lower than on 22nd. N arm deeply crusted. Lakes rather quiet save for border fountains in each arm. A large sector of the "plaster" on SSW wall has fallen off.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date June 25, 1920

10 a.m. to 3 p.m. Kau Flow.

With Finch entered Kau Desert at Halfway House, crossed northern end of Mauna Loa Iki, walked down E side of the new flows along the 1823 ridge and found pahoehoe flows actively pushing into bushes and trees about a mile S of the southern Kamakaia hill and on the E side of the aa flow of January.

The upper end of Mauna Iki is greatly widened eastward and the whole area between the ridge of March and the 1823 ridge is filled with new lava. On the summit there is a small circular pond about 30 feet across with a heaving heavy crust inside, said to explode violently and to develop fountaining at intervals. Evidence of the explosions is shown by two-foot blocks which have fallen 50 or 60 feet away from the pool. Tunnels lead southward from this pool and may be traced by breakdowns here and there, the whole mechanism carrying lava about five miles before it appears on the surface. Where the new flows are banked up against the 1823 ridge they have poured across the lower saddles of the ridge and flooded the country for a mile to the E, wholly pahoehoe. One of the 1823 pits is completely filled with new lava and another shows a frozen cascade into it.

On going S along the new flow belt the lava gets hotter until in the frontal region about a mile N of Puu Kouele there are numerous surface streams of heavy pahoehoe partly of the sharkskin type and along the edges of the flow there is burning timber and many explosions in old caverns were heard. The newer pahoehoe has overridden and buried the January aa W of it in many places. An arm of the fresh lava was found newly poured through a forested belt with many trees on its surface and many fresh glowing tree-molds with the wood still burning inside. The lava feeding this front is all coming through tubes from away up at the head of Mauna Iki and the mechanism is closely analogous to the Postal Rift flow of October-November 1919.

Returning by the lower lava heap in the sand dunes, found the rift crack along the E side of the foot of the heap with renewed steaming and quite hot. No sign of any fresh activity in the heap.

T A J

The lava pool on top of ridge at old cone site was crusted over. (Broke out with fountains later, Alex reports). A hissing vent at edge of this pool was active time to time. The first window in the lava tube on NE fill still emitting great volumes of smoke. The window on the S slope of the NE fill and the newer one a few feet away where flowing lava has been visible for over two months reveal no flowing lava. Flowing lava was found below the lower Kamakaia cone over an area of several acres. It extended all the way from the Kamakaia cones to the western branch of the aa river course of January. A considerable aa of the eastern branch of this river has been buried by heavy pahoehoe. The flowing lava was burning trees in places and has made several moderately sized tree molds. Cracks below lower ridge steaming.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date June 25, 1920.

Evening. Halemaumau .

Pit smoky and over 200 feet deep with four big crags in the bottom and four lakes, respectively W, SW and E, and the main lake a channel depression extending from the SE arm across the center to the N arm. The streaming was in general northward. Some avalanches were heard in the northern crags, the old N crag is broken into fragments and the larger crags rise from 60 to 100 feet above the lakes. A tunnel on the W side of the SE arm shows lava streaming eastward from the SW lake region. In general the lakes appear low, smoky and complicated.

T A J

8-9 p.m. Pit moderately fumy. Lakes apparently have changed height but little since the 23rd. A slow current was pouring through the tunnel leading from the SW arm to central channel. There was slight northward streaming in the central channel. A current moved northward from under a crust in the bay of the central channel between N crag and central island. A large part of this northward streaming went into the narrow N arm. Avalanche from S crag.

R H F

PHOTOGRAPH RECORD

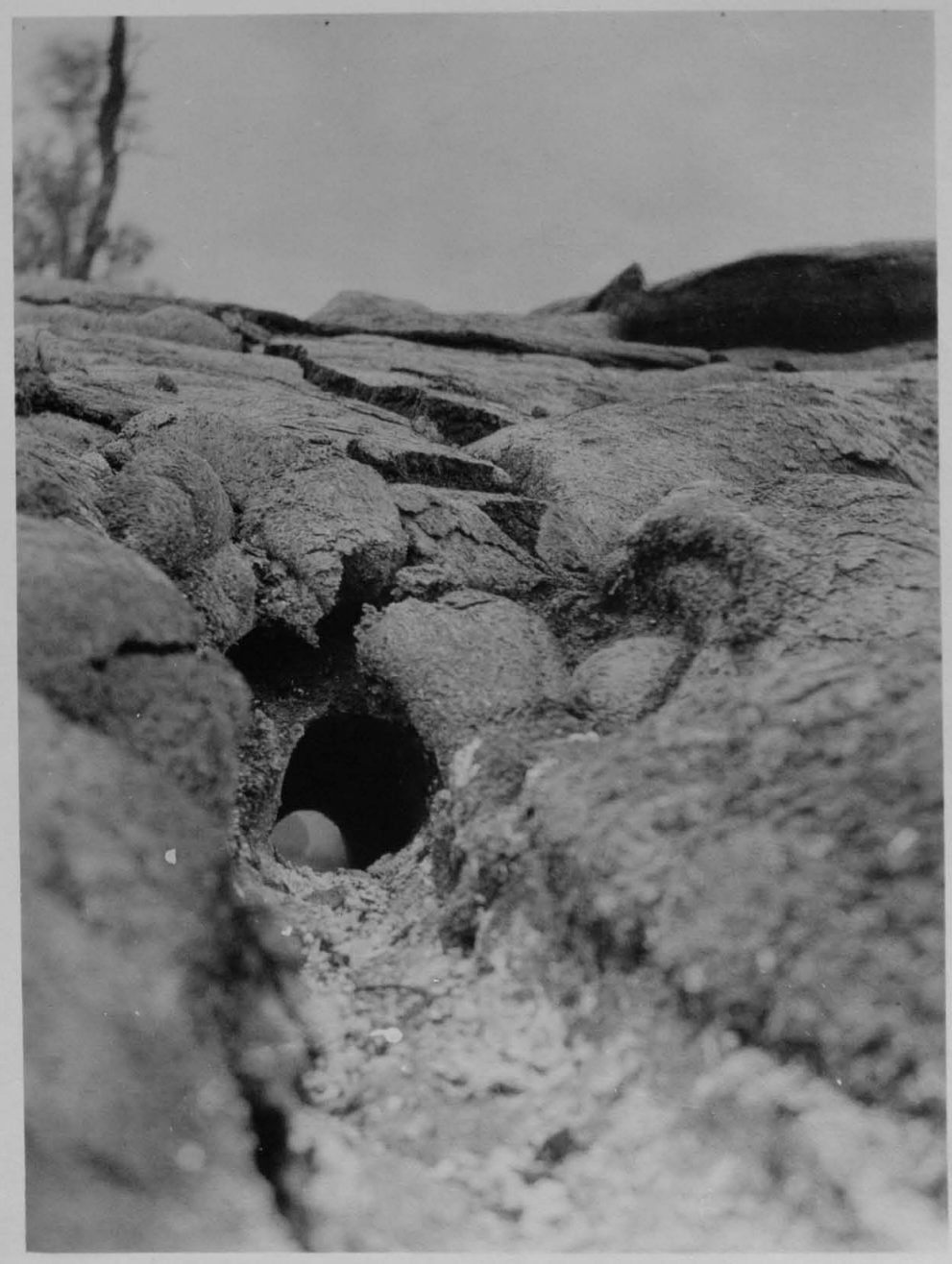
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date June 25, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Flow.						
		Cave in 1823 lava ridge smoke from new flow in background	1f	film				Kodak
		Cascade in breakdown site 1823 ridge, near #1	2f	"				"
		Horizontal tree mold; incandescent in back. Near Kamakaia cones.	3f	"				"
								R H F
		Swollen dome N end Mauna Iki	1		8x	f/32	3	Stereo Kodak
		Margin summit pond	2		"	"	"	"
		Collapse in tube and N smoke crack	3		"	"	"	"
		Collapse in tube farther S	4		"	"	"	"
		Looking W across Mauna Iki	5		"	"	"	"
		Stalactite cavern summit 1823 ridge	6		"	"	"	"
		Stalactite sheets summit 1823 ridge	7		"	"	"	"
		Looking SE, below Kamakaia pahoehoe tongues	8		"	"	"	"
		Below Kamakaia, flowing pahoehoe	9		"	f/11	½	"
								T A J

1920, June 25

1f

2f



3f

RHJ

1

2

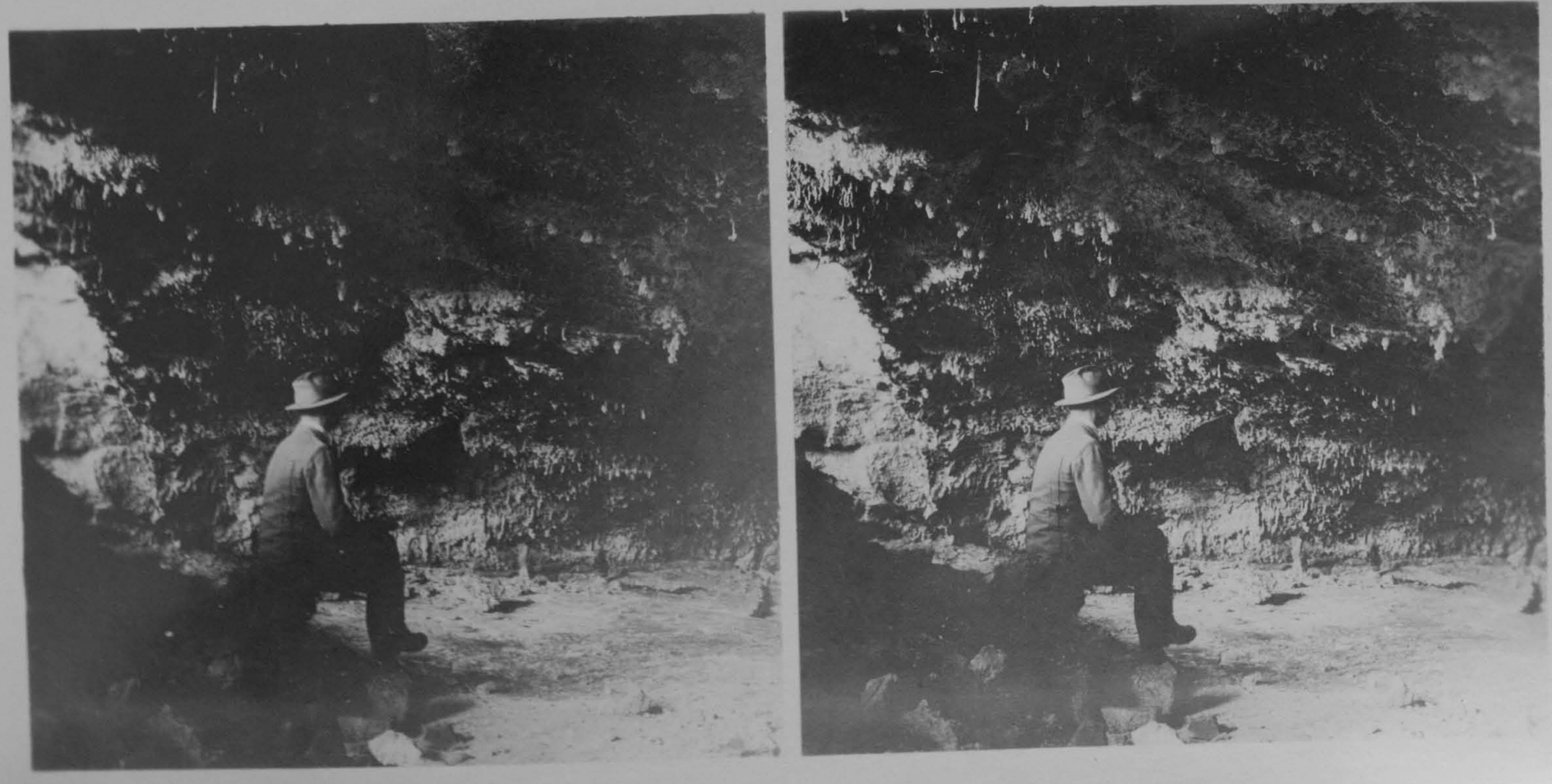
3

185

1920, June 25

4

5



6

Jag

1920, June 25

7

8

9

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Saturday Date June 28, 1930.

3 p.m. Little noticeable change. Some rock falls heard. A rhythmic central fountain observed. The SW peak of the central crag mass appears higher than the NE peak and is smoking strongly through chasms.

T A J

Pit moderately fumy. Slight current through tunnel from SW arm into central channel.
Avalanches along NW wall, on N crag and center island. Streaming into N arm. Intermittent fountains in central channel, one in center of W bay and border fountains in all arms.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Saturday Date June 26, 1920

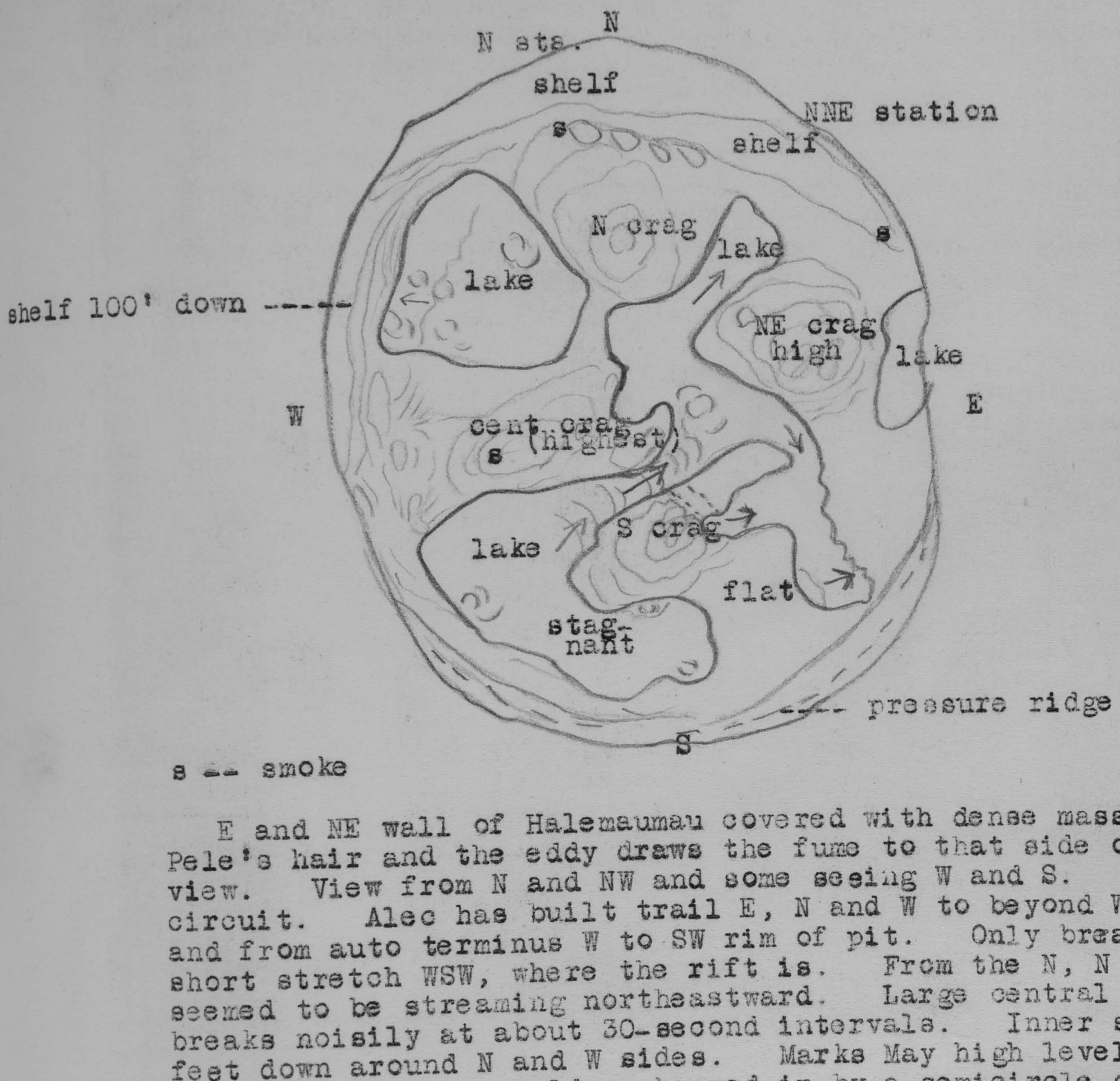
t	sta	pt	hor	vert	lev	dist	elev	h. i.
			0					
2 p.m.	NNE	N						
	"	W grotto W bay	L 49 14	-13 19	-03	922	217	
	N	same	R 102 51	-17 17	-03	715	222	
	NNE	Peak center island	L 58 09	- 9 21	-03	776	137	
	N	same	R 78 11	-10 03	-01	740	131	
	NNE	Lake base of NE islet	L 84 14	-27 59	-02	420	223	
	N	same	R 46 26	-21 09	-01	578	223	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date June 27, 1920

4 p.m.



s -- smoke

E and NE wall of Halemaumau covered with dense masses of Pele's hair and the eddy draws the fume to that side obscuring view. View from N and NW and some seeing W and S. Made circuit. Alec has built trail E, N and W to beyond W niche, and from auto terminus W to SW rim of pit. Only break is a short stretch WSW, where the rift is. From the N, N arm seemed to be streaming northeastward. Large central fountain breaks noisily at about 30-second intervals. Inner shelf 100 feet down around N and W sides. Marks May high level. W lake a remarkable cauldron hemmed in by a semicircle of uplifted crag matter, the N crag NE of it and the central crag S of it. Fountaining in this pool various with streaming to a persistent grotto on W side.

From the SW the SW lake seemed to be an arm of the main lake with a torrent pouring from it northeastward through a narrow canyon into the central pool where the big fountain is. SW pool stagnant with some border fountains. The SE arm streams mostly southeastward and there is a broad upheaved flat separating it from the E lake and another separating it from the SW pool. There is a high crag mass NE separating N arm and E lake, and the S crag is relatively low. The remnants of the former marginal crags W and SW have largely tumbled to confused talus heaps. The N crag still shows a serrate row of upturned spatter lines on its crest but everything below is horizontal from the May-June subsidence marks. The smoke is specially dense from the highest southwestern

knob of the central crag and from crevasses N and NE.

Dense fume is rising from the SW rift leading to the Kau Desert flow where the rift crosses the floor of Kilauea crater near the northeastern base of the SW slag heap of last December. There was no special difficulty in breathing the fume from the pit on its SW side. Blue fume and higher temperature is conspicuous at cracks concentric with the pit NE of the NE station near the instrument hut. This solfataric patch lies 100 feet or more inside of the old Postal Rift circle and about on the trend of the flow rift.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date June 28, 1920
Tuesday " 29, "
Wednesday " 30, "

June 28.
6 p.m.

Fresh NNE wind. Pit full of fume. From N station very little change; central pool appears wider; central fountain continues its periodic explosions and very narrow torrent pours northward from SW pool. Some small rock falls heard at base of S wall of pit. Lakes a little more crusted.

T A J

June 29.
2-3 p.m.

Wind strong and fume dense, so seeing difficult.

From N station: W pond covered with smooth crust except at W end where bright streaming edges were seen with occasional fountains. Blowing noise and noise of fountains could be heard from the center of the pit amidst the fume.

From SE, faint glimpses of SE arm and center of main lake were had. SE arm crusted and central channel appeared much wider and lava higher.

At 2:40 p.m. a fall of rock S was heard.

Alex says that a small island in central channel is covered with lava, though some of it must be still above the surface as a column of smoke could be seen rising.

I P J

June 30.
2-3 p.m.

Fume continues dense, wind strong. Seeing from N station a little better. W pond crusted and showing a one-foot margin. Streaming in narrow channel main lake from SW arm toward N with travelling fountains. SW arm and N arm not visible. Much noise of fountain activity could be heard but was seen only in bay on E side central crag and in channel leading from SW arm as mentioned above.

From SE, glimpses of SE arm showed it a foot or two lower than yesterday when no banks could be noted.

Several rock falls heard from S, a heavy one at 2:20 p.m.

I P J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Saturday Date July 3, 1920.

1 p.m. Pit fumy. Current out of SW arm through narrow channel into center. (Later lower). Numerous border fountains in all lakes. Two center fountains in central channel. The rumbling of the many border fountains very pronounced. Northern part of central channel deeply crusted.

R H F

9:30 p.m. From N station. All lakes with banks about 5 feet high. Most of the fountaining activity confined to center where there were a good many fountains. Two avalanches fell on SE side of pit.

11 p.m. From E station. Liquid lava has risen three feet since 9:30 p.m. and is still rising.

Alex.

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Saturday Date July 3, 1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	NNE	Lake NE islet	±88 00	-30 20	-01	420	246	
		Lake grotto W bay	52 43	-15 00		932	245	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date July 4, 1920.

3 to 5 p.m. Fume thick E and S, some seeing from NW. At 3 p.m. lakes about 3 feet below their marginal shelves. Narrow rivulet pouring from SW pond to center. Rhythmic fountain in center. Some sliding heard S and E.

About 4 p.m. the lakes had begun to rise rapidly and at 5 p.m. the liquid was about 20 feet higher than when first seen. The border shelves were all drowned under new floods, and pronounced blowing noises were strongly in evidence. The SW lake was now connected with the center by a broad channel and a second channel had flooded across an eastern chasm in the S crag mass so as to make that crag into an island. Overflows were pouring southward from the southeast arm across the floor leading to the SW lake. A cone in the middle of the SW pond was being rapidly drowned by the rising lava. All the banks of the central rivulet were flooded across extinguishing the peninsula which had separated that rivulet from the SE arm. The avalanching noises ceased.

Exploration of the Postal Rift tunnel revealed an immense chamber inclined downward from the source cone towards the S in the direction of Halemaumau and three feeding wells were found narrowing to irregular inclined fissures a few feet across. These fissures dipped in the direction of the pit and trended the one toward the SE and the other toward the SW. The general arrangement showed an increase in size of the vent upward as though the melt under pressure below opened a larger way for itself above. The same arrangement was found in exploring the second tunnel leading from the forks a few feet away and this also ended after going down an incline in a rift trending SW and dipping toward the pit where daylight could be seen through two orifices 20 or 30 feet below. Possibly these windows led through the wall of Halemaumau above the N shelf.

On following the tube to the places where magnesium sulphate stalactites were collected in January last these coatings were found to have become dried and powdery and great quantities of the dry sulphate lay on the floor of the cavern. Following the cavern farther a quarter mile from the source it became intolerably hot, and here the sulphate stalactites were fresh.

T A J

Kau Flow.

1-2 p.m. Lava pond on top of N end of main lava ridge breaks out with fountains occasionally and the level of the lava fluctuates at least 6 or 7 feet. A flow in a tube to the E of the above pond in the NE fill could barely be seen through a small window.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

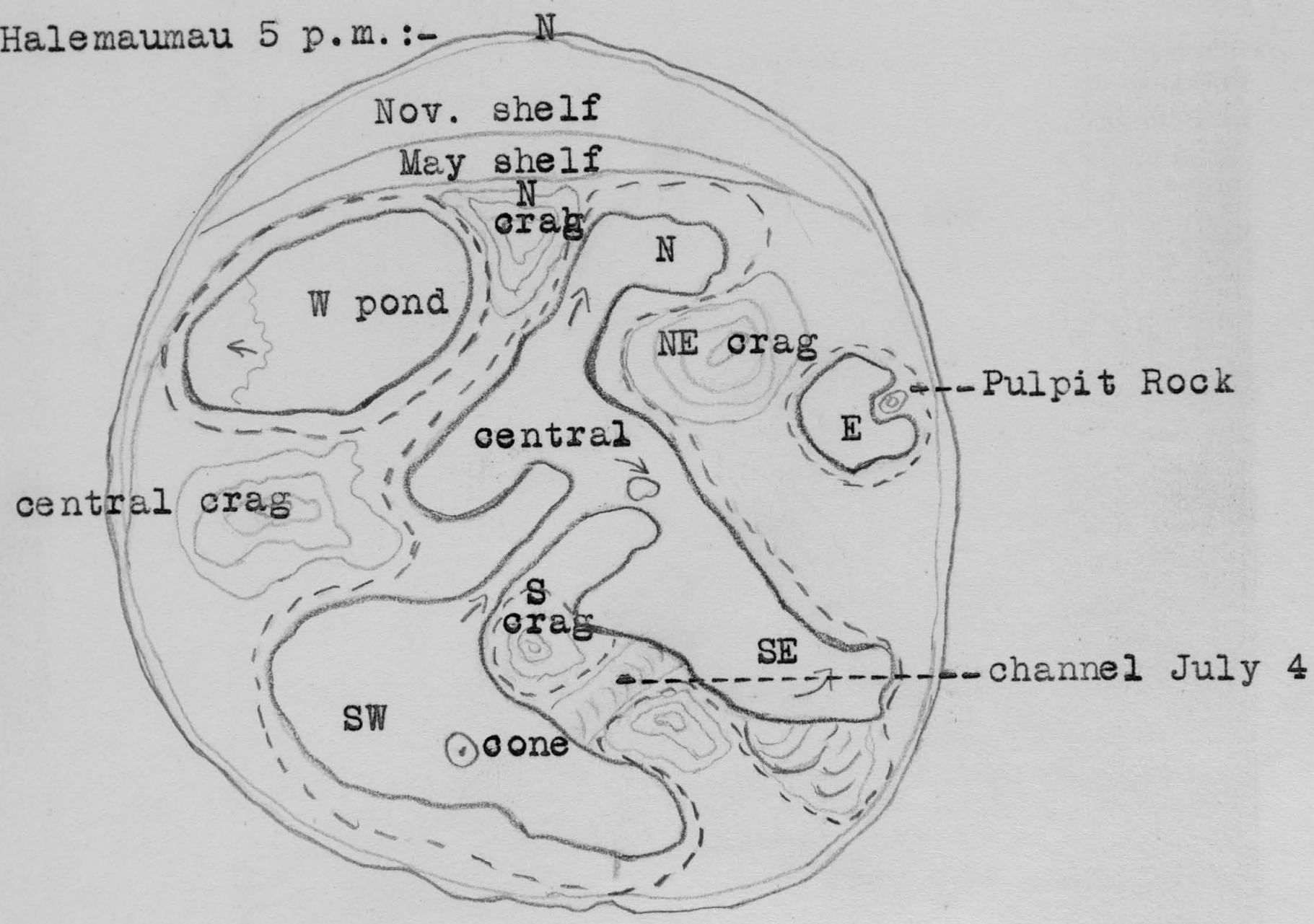
JOURNAL

Day Monday Date July 5, 1920.
Tuesday " 6, "

July 5.

4:30 to 6 p.m. Pit more smoky and the lakes down again relative to crags. Sluggish fountaining in ten or twelve border grottoes. Central rhythmic fountain in large dome bursts. Stream from SW lake a rivulet between banks flowing rapidly and arched over in two places with crusts. One strong avalanche heard. Pulpit rock 15 feet, more or less, high on E side of E lake. Dense fume puffing up from hole under lower N shelf, and also from summit central crag W of rivulet. Two fuming holes along SW rift in Kilauea floor. Banks of fresh yesterday's lava 8 to 15 feet above lakes.

Halemaumau 5 p.m.:-



Dotted outline -- rise of July 4.

T A J

July 6.
5-6 p.m. Pit less fumy than on the 5th and lakes higher. One blowing cone on the bench by old central island and two by S crag made very loud noise at times. One fountain in central channel. Avalanches from walls and crags. Streaming slight, for a few minutes a current went into SW arm from central channel. N arm crusted over.

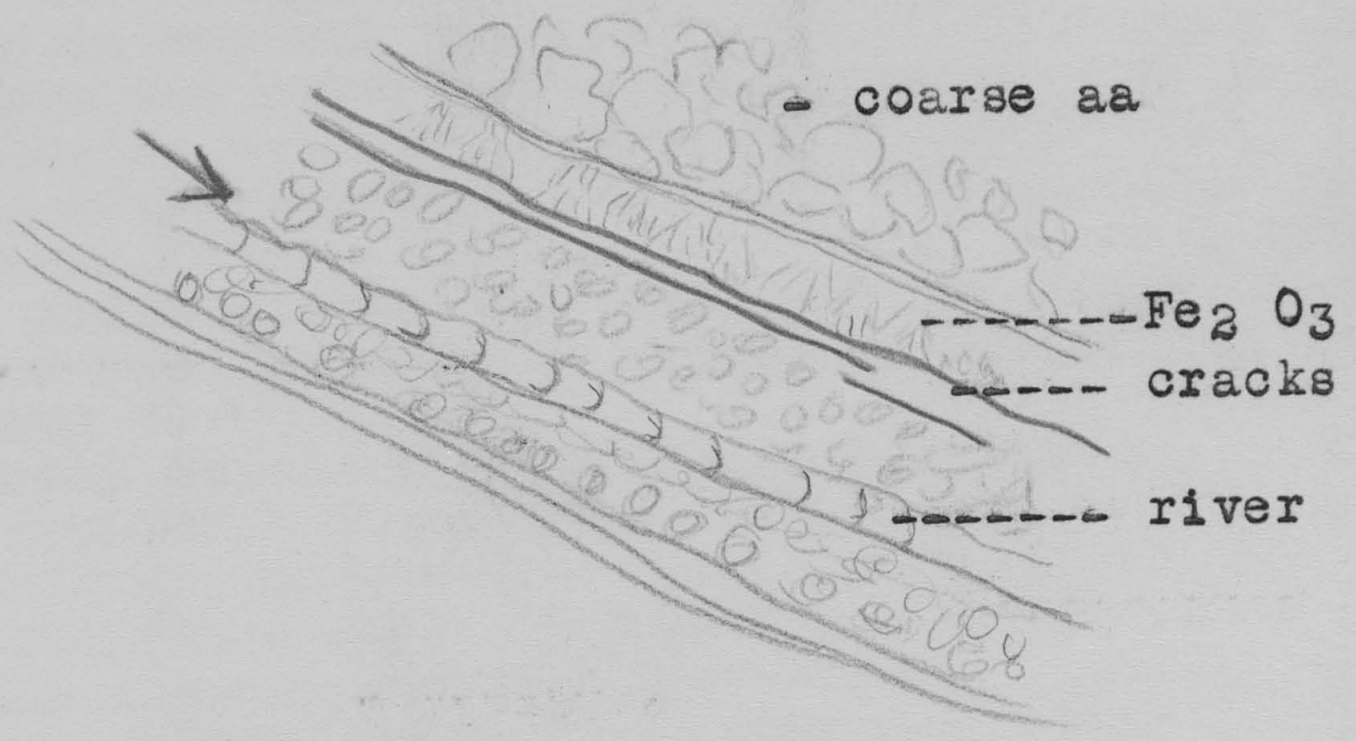
R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date July 7, 1920.

Kau Flow.

All day trip with A. L. Dean to foot of Kau Desert flow. Entered Desert from Bull Pen. Found foot of live pahoehoe flows all over region from Puu Kouele to Kamakaia, very hot lava field riding over the January aa but flowing very sluggishly. Pushing toes on surface of the flow here and there, partly of sharkskin type, much of the flow glistening smooth pahoehoe, and crust only a few inches thick. Some bushes burning at margins. Found in January aa remarkable arborescent red $Fe_2 O_3$ on edge of a river forming a zone where burning gas may have played out from the shear crack between the banked lava and the moving stream:



T A J

Halemaumau.

8-9 p.m. Rapid current out of SW arm through a short tunnel into a pool and through a second tunnel into central channel. Lakes about the same height as on the 6th though glowing crust showed that the S floor between the SE arm and SW arm has just been flooded. The flat between the S crag and center island as well as the side of the S crag for some distance up was full of glowing holes some of which had flames issuing. The curremt from the SW arm at times went to the N and at times to the S. One continuous fountain in central channel close to the location of "Old Faithful".

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Thursday Date July 8, 1920.
Friday " 9, "

July 8.
4:20 p.m. SE arm six fountains; 10-foot banks; strong southeastward streaming.

N arm four fountains; streaming to grottoes; sliding N talus.

W arm two fountains, more or less; stagnant; 10-foot banks.

W pond oval; inner bench 10 feet N end, 5 feet S end; slides on talus SW; upper inner bench around W pond also tilted from N to S , 5 feet above lower bench N end, 2 feet S end. Wall crack behind talus open SW. Suggestion is that entire crag-mass around W pond is lowering most S end.

Smoke all around walls and from central crag. Bedding or terracing in central crag horizontal; in N crag horizontal below, upturned above; in S crag dips S. NE crag has a large scar of broken wall on NE side of central pool.

W pond crusted except W grotto. Polyhedral skin patches over central pool. Streaming through central rivulet from SW lake, under arches, in canyon of new bench 10 feet deep.

SW lake has fountain in middle occasionally; heavy stalactite grotto S.

Principal noises fountaining and rumbling, rather puffing type of rumble at S grotto. Travelling fountains in SE arm. Clinging crag remnants 100 feet high against SSW wall. Cracks athwart central crag. W pond looks higher than central pool. Fuming and glowing patches in S crag. Avalanches common. Stalactite grottoes numerous. Center looks low.

Stromg avalanche S wall at 4:55 p.m.

T A J

July 9.
4-5 p.m. Pit fumy, lakes lower. Avalanches from walls of pit but none noticed from the crags. Current out of SW arm. Some of the floor between the S crag and center island on the SW arm side has collapsed. Lakes considerably crusted over with the exception of fountaining in vicinity of "Old Faithful". Only border fountains were observed.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Friday Date July 9, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
4 p.m.	N	Peak central island	85 45	-14 10		777	196	
	NNE	Lake NE island	85 05	-34 30		420	288	
		Peak central island	63 20	12 30		864	192	
		Grotto W bay	48 51	?17 24		922	?289	

200

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

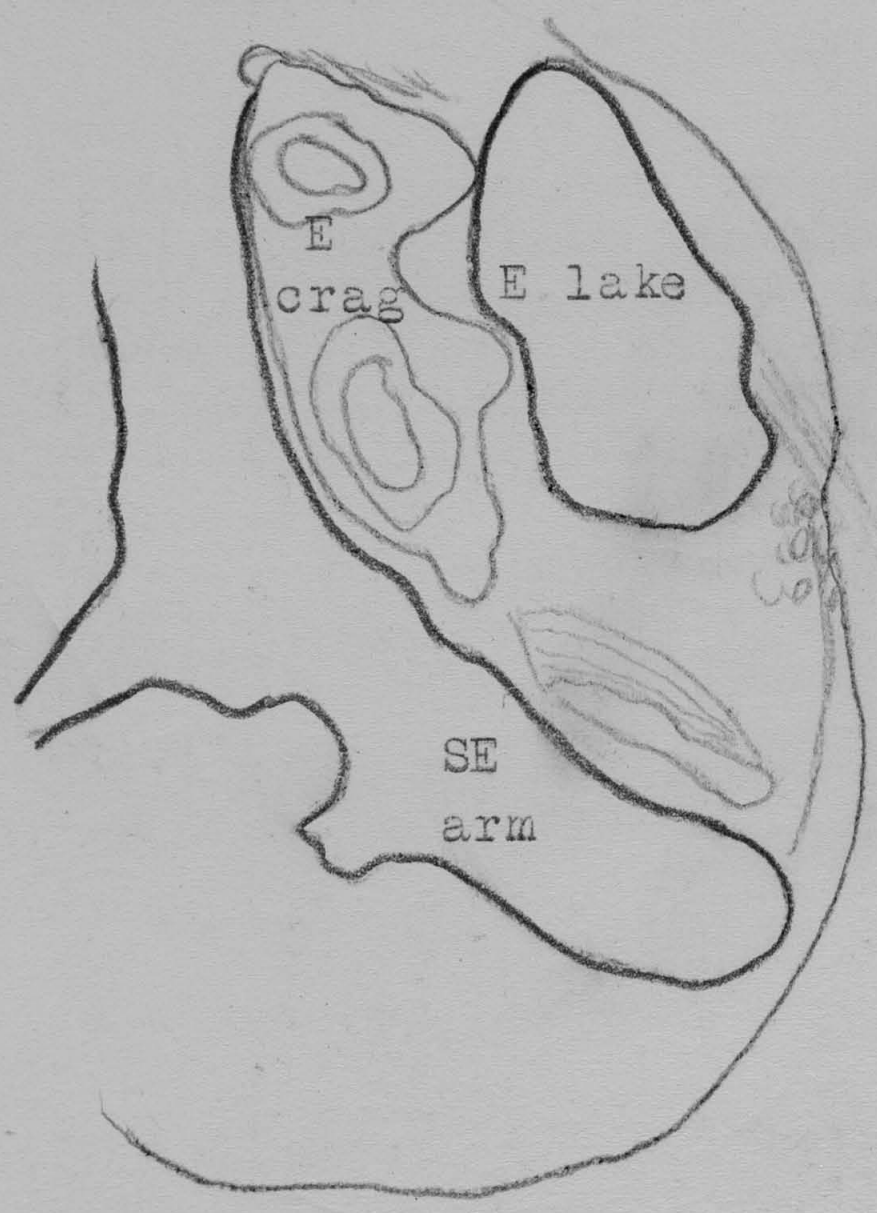
Hawaiian Volcano Observatory

Day Saturday Date July 10, 1920
Sunday " 11, "

July 10.
11 a.m. to 1 p.m. General seeing poor, some thinning of fumes. Avalanches continue. Lakes high relative to crags. S crag appears to be sinking and the lake overflow floors to be increasing around it. W pond has also been high. About twelve fountains, occasional central fountain. Rivulet from SW lake to center arched over in middle. Two smoke holes and much sulphur on rift SW Kilauea floor.

Kau flow source pond enlarging and fountaining.

12 noon. Sketch of E lake and SE arm:-



July 11.
11 a.m. With G. Grosvenor.
No marked change. Some rock slides. W pond is directly against wall of pit on W side; so is E pond on E side, and SW lake on SW side. Streaming somewhat toward center from N, W and SW. Elsewhere stagnant. Channel arch broken and SW rivulet continuous.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Tuesday Date July 13, 1920
Wednesday " 14, "
Friday " 16, "
Saturday " 17, "

July 13.
11 a.m. Wind slight SW, seing NE. Pit fumy, no change. E pond boiling on N side. Idle marginal fountaining. Cavern in central crusts, across rivulet from SW pond. Rock slides N and S. Some harsh puffs from central grottoes. Dense fume SW rift Kilauea.

Note. The 100-foot May shelf goes around E and SE sides of pit.

Kau Flow. Alex reports Mauna Iki lake 5 feet down from edge, larger and fountaining.

July 14.
6:15 p.m. Pit smoky, general appearance from SE as usual. From NW crags look lower, W pond barely visible over edge of May bench. N, W, central and SW regions crusted with tendency to form pot-hole fountains in crust. Eight fountains visible. On platform W side central channel violent gas blowing in filagree heap, and lifting lid. Central channel not flowing but a series of crusted pools. Streaming in central pool from W to SE and SE arm shows bright lines and skins. No avalanches heard, except a few stones.

E pond fountaining against its NE bank.

Kau Flow. Alex reports continued activity in lake on Mauna Iki and no changes there.

T A J

July 16.
4 p.m. Pit very fumy, lakes a little lower. Liquid lava 6 or 8 feet below lower inner walls. A small lake in the low floor between central island and S crag. No currents noticed. Avalanche from wall of pit.

July 17.
7-8 p.m. Pit fumy. Sluggish current into SW arm from central channel. W bay deeply crusted. Large grotto in SW arm persistently active. Old N arm crusted over.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Saturday Date July 17, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
8 p.m.	NNE	Grotto SW arm	78 16	14 15		1185	301	
	N	same	80 20	14 26		1178	304	
								R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Sunday Date July 18. 1920

t	sta	subject	no	pl	scr	stop	ex	cam
		Kau Flow source.						
10a.m. to 12 noon		New pit live lava	1		8x	f/32	3	Stereo Kodak
		Near view interior ditto	2		"	"	"	"
		N half of main lake crusted on flow heap (Mauna Iki)	3		"	"	"	"
								T A J
		Green and yellow crystals in hot crack near new pit		film				Kodak
								R H F

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1920, July 18

RHJ

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Sunday Date July 18, 1920
Tuesday " 20, "

July 18.
10 a.m. to 12 noon. Kau Flow.

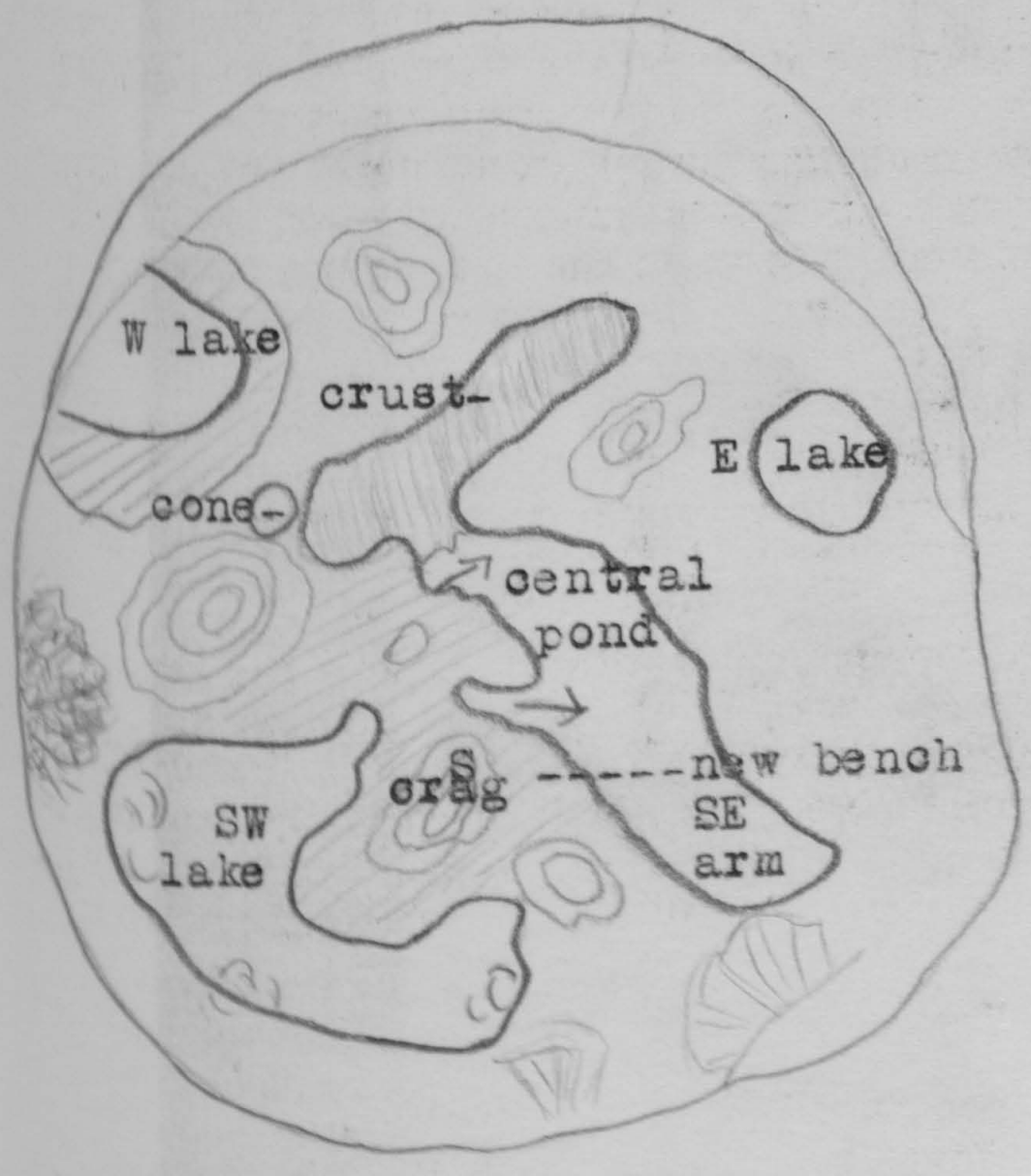
Enter desert from Halfway House. Mauna Iki not changed. Lake on top crusted for four hours and no change. Parties report that it occasionally breaks up. Lake 75 feet long east-west, 50 feet wide north-south. Crust about 10 feet down. Glow at edges. Crust swollen. Occasional gas hiss.

Another pit farther N at former smoke locality with live lava inside. Pit 30 feet deep, 50 feet across with tumble on one side. Ground cracked and slumped from here eastward; glow down cracks, at hottest one 500° C, more or less; crystals in hot edge bright yellow, green and blue, crystals soft and break down when block detached. Blue feathery recrystallization like azurite in color. Taste salty. Yellow crystals platy, appear too hot for prismatic sulphur.

Visited pits along tube E. One very hot and 15 feet to floor, no glow seen. Fume and stain along tube line toward Kamakaia. Nothing new. Smoke much less from head of Mauna Iki. A little seen along rift NE.

Halemaumau very densely smoky.

July 20.
11 a.m. Seeing from NW at intervals. New bench of overflow of lakes about 8 feet above them, making an extensive platform around the S crag on the SW pond side as well as on the center of pit. S crag accordingly more submerged. Central rivulet covered, but the streaming out from its tunnel visible in central pool. W of central pool, in corner of its W arm, and at N base of the central crag, is a flaming cone with a glowing orifice in summit 1 foot in diameter. W pond has a new flood bench lapping into talus. SE arm alive and fountaining, and several grottoes seen in SW pond. Avalanches numerous. Smoke closes in much of the time. The crags appear lower and the lake bench possibly stationary.



T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

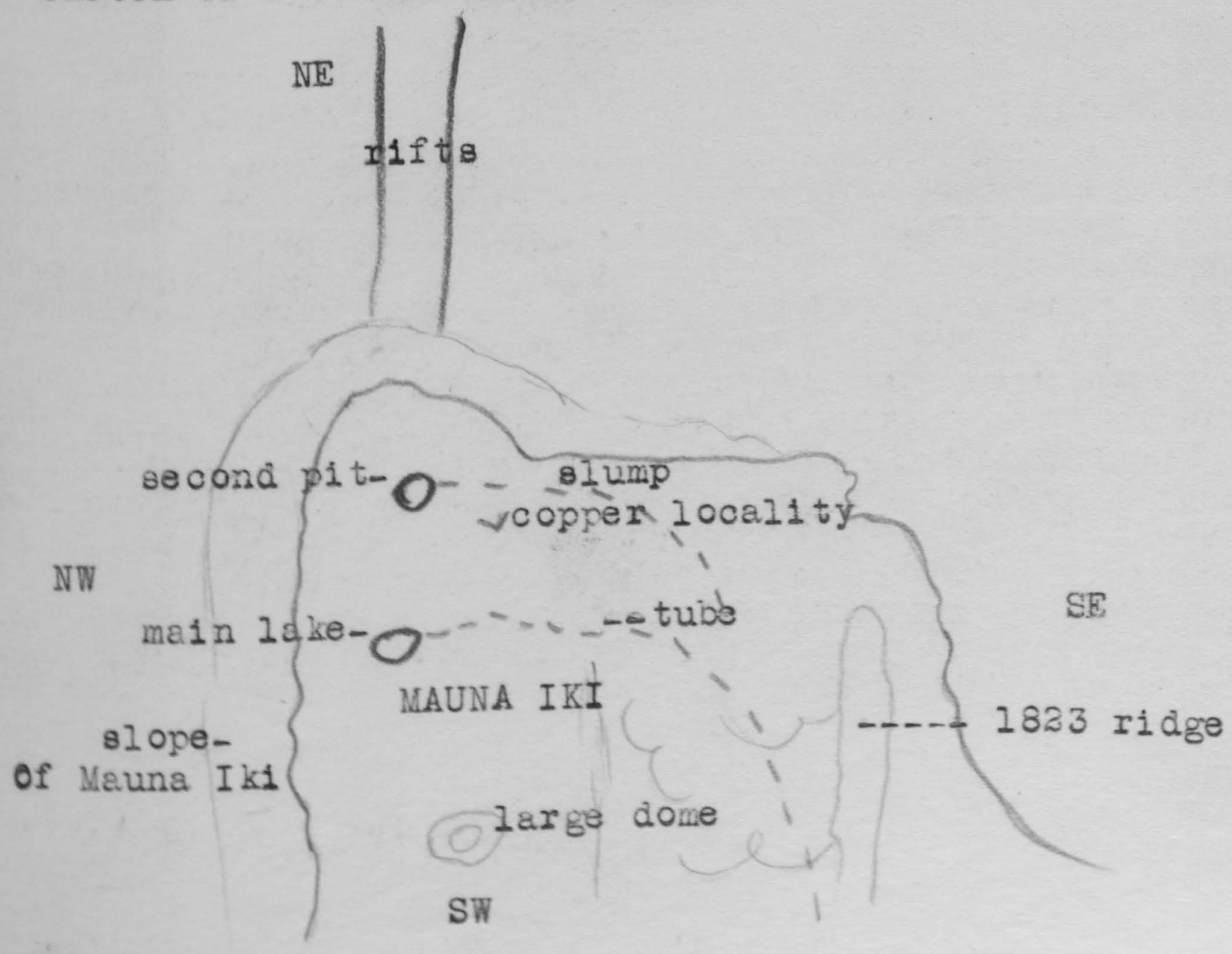
Day Wednesday Date July 21, 1920

6-7:45 a.m. Pit fumy. No currents detected in any portions of the pit that were observed in a few seconds they were visible. Large grotto on the wall side of the SW arm active. Considerable noise from the old N arm site. No avalanches heard.

R H F

3 p.m. With A. L. Dean to source lake of Kau Flow.
The lake 25 feet down from edge, surface appears recently soft, cracking and foundering going on in the edges of crust under deeply overhanging banks. Evidently the pit overhangs as one of the wells along a cavern way in Mauna Iki, like the line of pits in the 1823 ridge. No special swelling of present crust. Some fountains seen by earlier parties this day.
Examined the northern live pit and found it more broken and little lava showing. The copper salts over red hot crack collected with sticks, and latter burned in the air one foot over the crack, which was bright orange heat inside. The salts yellow in the incandescent region, green intermediate, and blue on edges where cooler. Also blue when cold. Appears to be copper sulphate. When hot the mass is waxy when pushed with stick. Large stalactite of perhaps the same substance seen far down crack and incandescent. Test in laboratory shows salt to be soluble and with ammonia turns deep blue. (cu)
Copper salt area about 20 feet long along two cracks which are 6 inches and 12 inches open, and salts go down indefinitely. Deposit from vapor. This all is on the edge (W) of a slumped line of caverns leading E and S from the second live pit.

Sketch of N end of Mauna Iki:-



T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date July 22, 1920
Friday " 23, "
Saturday " 24, "

July 22.
11 a.m. Halemaumau very smoky. No marked change. No avalanches heard. Bench W side central pool seen to fall in. Bench 10 feet high. Smoke from central crag and from marginal talus as usual. Fountaining noise moderate.

July 23. Fume a little thinner morning and evening.

T A J

July 24,
1:30 to 3 p.m. Pit less fumy than common. Indications of rising. Sluggish current through tunnel out of SW arm into central channel. One blowing cone in flat by old central island. NE islet broken down. "Old Faithful" fountain in central channel and a few border fountains in the other arms. Crust in W bay foundering. Avalanches heard. Lakes about 5 feet below platform in center.

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Saturday Date July 24, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1 p.m.	NNE	Peak center island	63 06	14 56	0	890	237	
		W point W bay	49 00	18 33	0	920?	307	
		Grotto SW arm	80 30	14 40?	0	1185?	310	
		NW bay of central channel	68 40	25 10	0	655	305	
	N	NW bay of central channel	70 47	25 30	0	653	310	
		Peak center island	87 25	16 45	0	795	239	

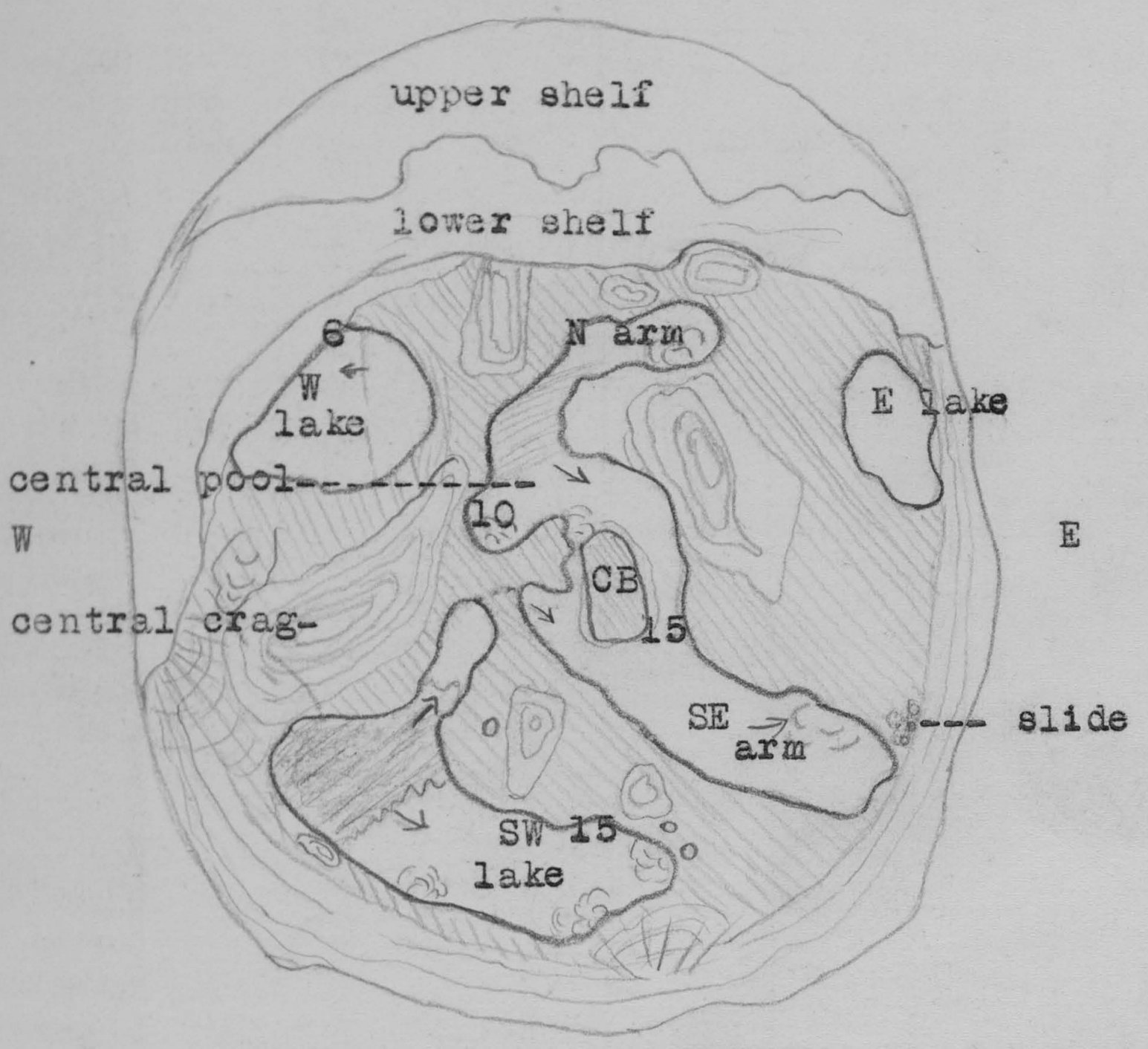
N station is higher than NNE about 2 or 3 feet.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date July 26, 1920

10 a.m.



CB -- central bench lifting into a crag 15 feet high tipped W.

Made circuit of pit. Clearing spells with fair seeing. SW lake appears at least 50 feet lower than W lake. Central platform 10 to 15 feet high and appears breaking up as though the side of S crag were subsiding and the side of central crag stayed up. Some sliding and occasional blasts from grottoes. Latter numerous, nine to ten fountains. W pool seen cracking and foundering from E to W about 6 feet below its bench. This bench a fresh one of overflow, which lapped the talus to the S and apparehtly if it had been a little higher it would have gone through the gap W of central crag and cascaded down the longer talus leading to SW lake. Latter crusted W, open E, cracking and foundering, and fountaining at E end. At this E end two open glow pots on bench and another on W side of S crag.

The central peninsula now an island tipped westward and becoming a crag. General streaming is eastward.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date July 26, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
9:45 a	NW	Central crag	1		8x	f/16	2	Stereo Kodak
	"	same	2		"	"	"	"
	"	same	3		"	"	"	"
	"	Lower bench N	4		"	"	"	"
		Looking into Postal Rift flow cavern	5		"	f/32	3	"
		4 and 5 fogged						

T A J

1920, July 26

2

3

Fog

1920, July 26

4

5

Jaj

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Wednesday Date July 28, 1920
Friday " 30, "

July 28.
2:30 to 3:30 p.m. Pit fumy. Lakes appear to be same height as on Saturday 24th. Two large grottoes in SW arm. Very little streaming observed. Plaster off from W wall. (This probably accounts for the avalanching reported during evening of July 27.)

R H F

Lower end Kau Desert Flow with F. Atherton.
Entered from Bull Pen. No flowing detected in middle part of flow from slag-heap sand dunes. Toe of flow in three or more tongues just E of Puu Kouele. These tongues dead. Live lava opposite lower Kamakaia but not flowing visibly. All pahoehoe. Found white crystals taste acetic acid where the ohia trees were burnt by flow farther W. Much iron sulphate and white stains. Many small tree molds.

T A J

July 30.
8-9 p.m. Fume moderately thick. SE arm deeply crusted over. Slight currents out of the SW arm through two separate tunnels. One fountain in central channel surrounded by heavy crust. Two glowing vents in the floor above the SW arm. Crust in all arms foundered once in a while.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Sunday Date August 1, 1920
Monday " 2, "
Tuesday " 3, "
Wednesday " 4, "
Thursday " 5, "

August 1.
10-11 a.m. Pit moderately fumy. All lakes crusted over except the SW which was fountaining vigorously. "Old Faithful" fountain in central channel nearly continuous. Avalanches fell from W wall. Lakes rising apparently, liquid about 2 feet below inner confining bench.

August 2.
4:30-5 p.m. Pit less fumy than common. SE arm nearly separated from central channel. Fountaining and crusts breaking up in all arms. Part of second benoh along N has scaled off.

August 3.
10:30-11:30 a.m. Kau Desert Flow. Both pits at the upper end of the flow ridge dead, but smoke issuing in considerable quantities. The walls of the one to the W have fallen in and enlarged the size of pit. Many hot cracks close to NE pit but no red could be seen.

Fume at Halemaumau moderately thin.

August 4.
1-2 p.m. Fume very thin. The entire pit could be plainly seen from any position. Lakes higher than on 2nd. Most of the floor surrounding the lakes was recently flooded. A new small lake has appeared between SE arm and E lake at the point of E crag. E lake is 3 or 4 feet lower than the others. A cone near S edge of SW lake was hissing loudly. All lakes crusted over, very few fountains.

August 5.
10 a.m. Pit clear. Good seeing from all points on rim. Streaming out of SW arm into central channel. Small new lake by SE arm out of action and crust several feet lower than surrounding bench. Lakes down 3 or 4 feet from what they were a few hours previous as shown by overflow. Border fountains in all lakes.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day ~~Sunday~~ Friday Date August 1, ~~"~~ 6, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
August 1.								
10a.m.	N	Bay center island	70 26	-25 17		653	308	
		Peak center island	86 30	-17 06		795	245	
August 6.								
9:30a	NNE	Peak center island	62 00	-13 30	-02	860	206	
		Recess by center platform	69 26	-23 06	-02	652	278	
		E grotto SW arm	85 40	-13 40	-02	1147	279	
	N	E grotto SW arm	72 41	-13 23	-02	1198	285	
		Peak center island	87 14	-15 24		762	210	
		Recess by central platform	70 54	-23 32	-02	649	282	
								R H F

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JOURNAL

Hawaiian Volcano Observatory

Day Date

Friday August 6, 1920
Saturday " 7, "

August 6.
9-10 a.m. Pit clear. Lakes higher. A flow was pouring over the surface from the SE arm into the E lake. All individual crags were islands by flooding around their bases except the old center island, - SW crag system which was a peninsula. Current out of SW arm into central channel. Two grottoes in SW arm active. "Old Faithful" in central pool active. Lakes crusted. A flow had poured from the N arm of the central channel around the E crag into the N end of the E lake.

August 7,
3-4 p.m. Open channel between SW arm and central channel, through which a rapid current is flowing eastward. Three small islands tilted to W in central pool which is much larger. One boiling pot in old N arm. Lakes 4 or 5 feet below inner bench and rising. Moderately thick crusts.

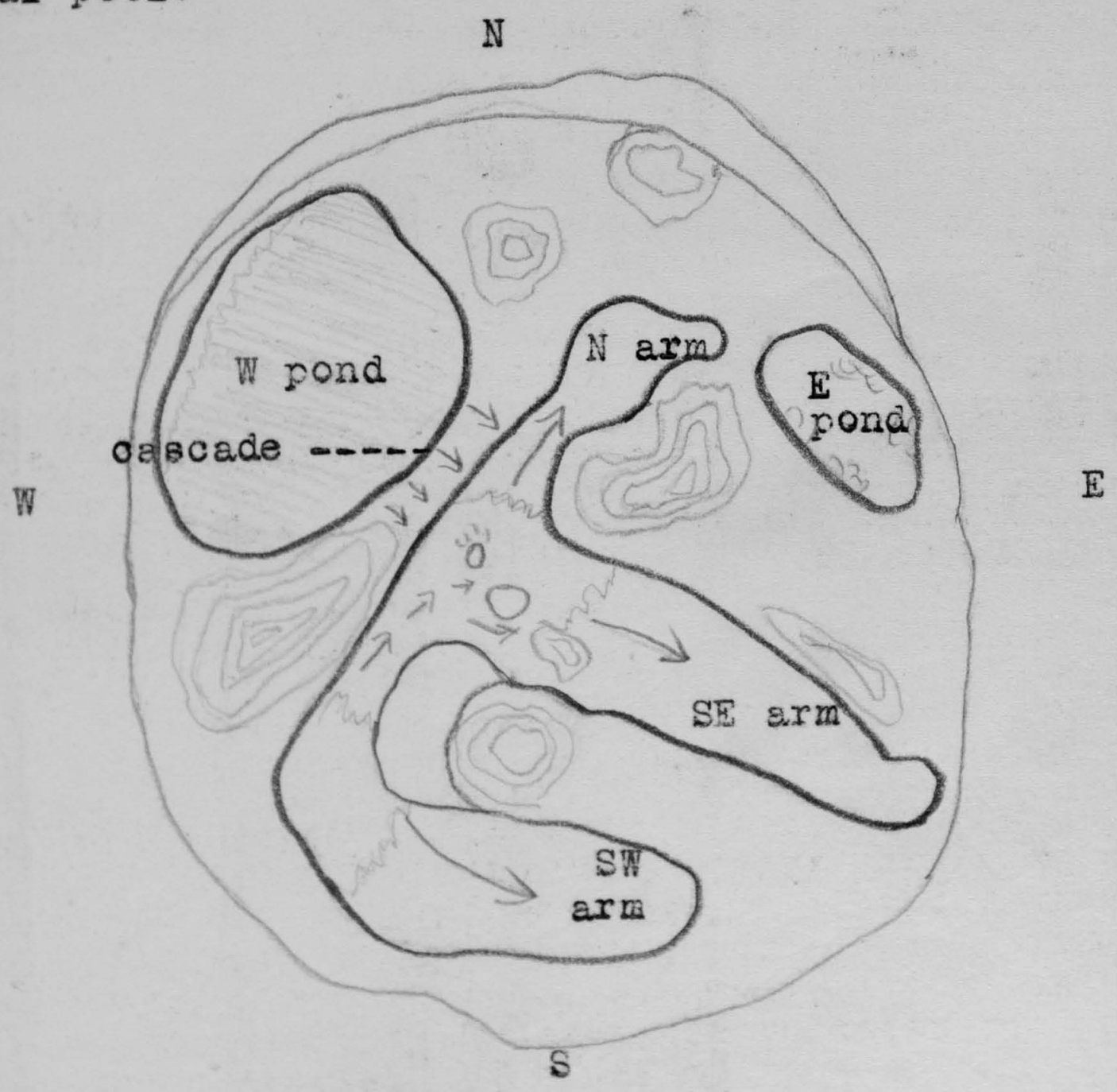
R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date August 8, 1920

8 p.m. With Pan-Pacific Scientific Congress.
Lakes very high. Fresh glowing flows on all benches. Rapid stream, estimated 5 miles per hour, pouring from SW arm to center. Occasional continuous fountaining in center. Arrangement of streaming and of slope of bottom now definitely from W pond to the SE. This produces two fountaining grottoes at southern end of SW arm, some at SE and of SE arm, several around E pond and some in N arm. The W pond tending to remain crusted except for occasional breakings up. Such a breaking up was revealed at beginning of visit and there appeared a cascade 30 feet wide and 8 feet high from W pond under a crust into central pool. The crust broke up and general cracking and foundering progressed across W pond making a fine display. Fume in pit greatly thinned so that seeing was good even at E side. Flames from filagree patch N of N arm and others observed. A strongly spraying grotto in SE arm and other grottoes. Collapse of spatter bank S side of E pond. E lake appears a few feet lower than central pool.



Lakes approximately 290 feet down.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date August 9, 1920
Tuesday " 10, "

August 9.
10 a.m to 12 noon. With Pan-Pacific Scientific Conference.

Lakes high but no more cascading or break up from W pool. Smoke from summit central crag much thinner than ten days ago. Central platform adjacent to S crag both yesterday and today seen to be divided into three islets of which the southeasternmost is the highest. Western islet connected with base of central crag by a crust which appears to have a tunnel under it. Other two islets with streaming channels past them leading from torrent which comes from SW arm. Lake about 4 feet below bench at SW and N, bench growing lower thence to E lake and to SE arm. W pond crusted. Usual grottoes. No trace of cascade from W pond, the whole of that bench being covered with crust.

Marked rise about noon revealing itself in overflow of benches around E pond and SE arm, the rise taking effect by flooding at the lowest portions of the lake system.

Explored Postal Rift cavern. Found it hot in source well and still hotter in terminal tube of fourth entrance. Found some salts greenish and stained, appears to be iron sulphate.

T A J

August 10.
Forenoon. Kau Desert Flow.

The western or larger of the two source ponds has increased in activity since last observed. A new pool of crusted lava has covered the talus of rocks with which the pit was filled when last observed. No signs of renewed activity in the northern pit.

R H F

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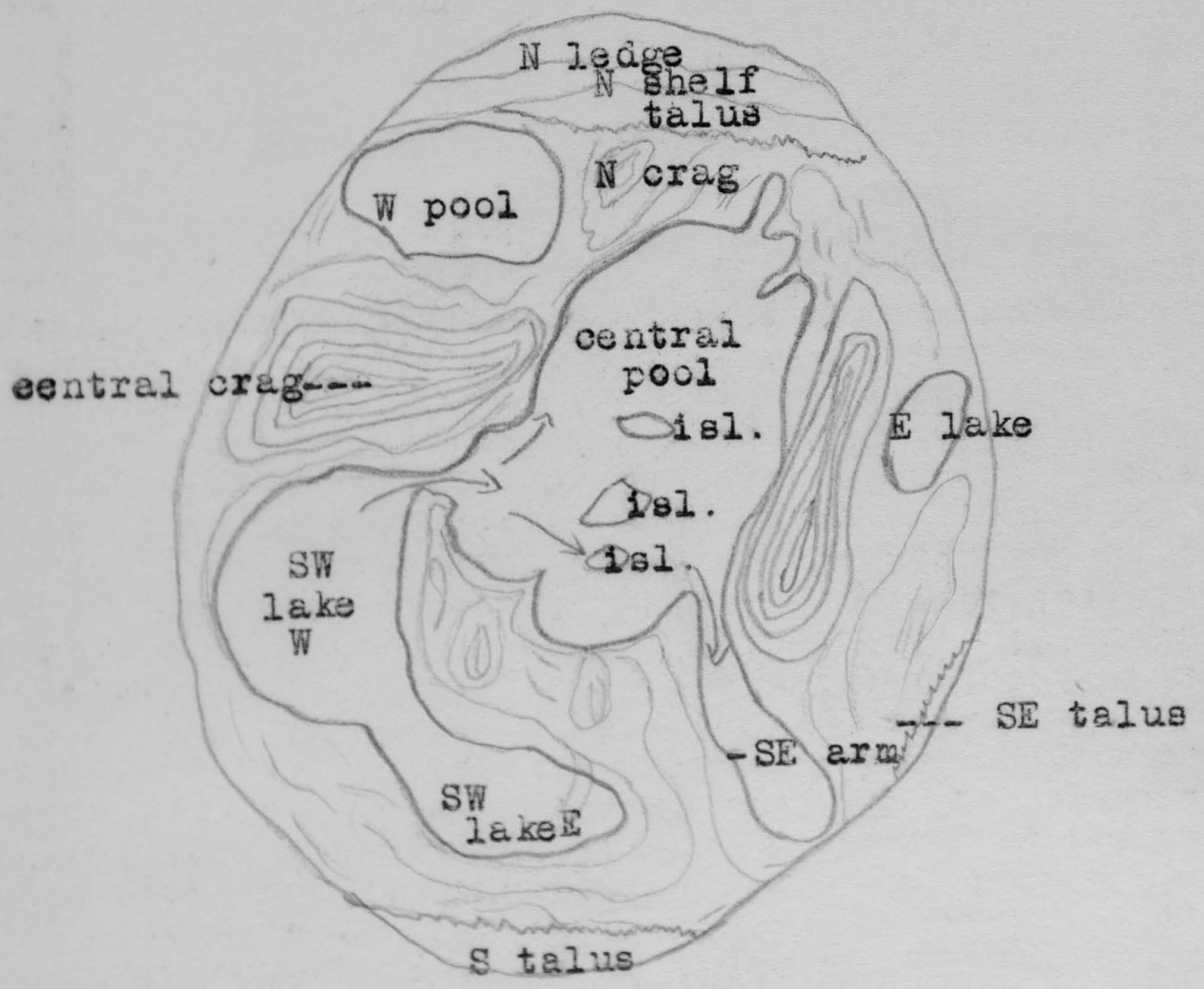
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Wednesday Date August 11, 1920
Thursday " 12, "

August 11.
10-11 a.m. Fume very thin. Lakes crusted and rising. Very rapid streaming out of SW arm to central channel, one branch going to N and other to SE arm. One border fountain in SW arm, one in W pool two in central pool and one in SE arm. "Old Faithful" active. A glowing hole was observed in SW wall near the beginning of the Kau Desert rift crack, some 10 feet above lake level.

August 12.
10-11 a.m. Fume light. Rapid current out of SW arm to central pool Three central islets higher above liquid than before, 4 or 5 feet (average). Glowing window in SW wall shows plainly. W pool was crusted over and 4 or 5 feet higher than central pool until the crust foundered and the level decreased 3 or 4 feet,



R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Wednesday Date August 11, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	Peak center island	61 02	-12 18	-04	849	184	
		Lake at N point of middle central islet	80 15	-20 05	-01	664	244	
		Lake at grotto SW arm	85 42	-12 15	-02	1155	250	
	N	Peak center island	87 52	-14 06	-03	743	186	
		Lake at N point middle of three central islets	63 23	-18 33	0	732	246	
		Lake at SW grotto	73 07	-11 55	-02	1203	253	
								R H F

222 U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Wednesday Date August 11, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
10a.m.		From middle N ledge	1	film				Kodak
		W pool from N ledge	2	"				"
	N	Halemaumau	3	"				"
								R H F

1920, Aug. 11

1f

2f

3f

RH f

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Friday Date August 13, 1920
Saturday " 14, "
Sunday " 15, "
Monday " 16, "

August 13.
10-11 a.m. Lava about same height, referred to confining ramparts as on the 12th (5 or 6 feet). Current from the SW arm varied in speed from very sluggish to rapid. W pool higher than central pool. E lake has decreased in area. The small, narrow N arm was deeply crusted.

August 14.
10-11 a.m. Pit more fumy than yesterday. Lakes appear to be 3 or 4 feet lower than on the 13th. W pool 4 or 5 feet below its banks. Rapid streaming out of SW arm. E lake has further decreased in size.

August 15.
7:30-8:30 a.m. Kau Flow.
Much smoke being emitted from the western or larger source pit of the Kau Flow. The floor of this pit has again collapsed after emitting a small amount of lava around the hissing vent observed on August 10. No activity discernible at upper end of source region.

4-5 p.m. Halemaumau.
Pit a little less fumy than in the morning. All lakes about 7 or 8 feet higher than on 14th. Rapid streaming out of SW arm.

R H F

August 16.
5 p.m. All benches being overflowed from lakes and cascade pouring out of hole in SW wall Halemaumau where glow has been seen a few feet above lake benches the last few days.
8:15 p.m. Earthquake felt, accompanied by rock falls N side.
Other slight falls from sides of pit noticed during evening, some rocks breaking through crust of flows.

Earthquake felt at H.V.O. at 8:15± .

I P J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day Saturday Date August 14, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	Top of center crag	60 46	11 38	-02	854	175	
		Lake N islet	76 50	21 15	-02	631	245	
	N	Top of center crag	88 14	13 26	-02	745	177	
		Lake N islet	64 19	19 58	-04	681	246	
								Allen

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date August 14, 1920

t	sta	subject	no	pl	scr	stop	ex	cam	
10 a	N	Halemaumau		film				Kodak R H F	

1920, Aug. 14

RHF

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Tuesday Date August 17, 1920
Day Wednesday Date " 18, "

August 17.
11 a.m. to 1 p.m. Fume thin. Liquid lava low in banks, average depth to surface of main lake 10 feet. E lake banks fully 12 or 14 feet high. Most of area of benches covered with fresh lava. Small round island and middle island covered with new lava of last night's high level. Frozen cascade down Halemaumau wall SW with pile of pahoehoe on bench at its foot. No glowing hole to be seen above it. Big crack across S end of crag between E lake and central pool.

Streaming as usual. Inspected Kilauea floor crack SW -- hot and fuming, with much red and yellow deposit in patches.

12:30 p.m. Lakes almost brimming. Two smaller islands nearly submerged. At 1 p.m. a slight subsidence in progress.

August 18.
11 a.m. to 12 noon. Seeing very clear. Liquid lava in W pond about 5 feet below bank; in E pond 10 feet; in main lake average 10 feet. SW arm and SE arm main lake crusted, as was W pond. Fountains at border and in center of central pool. Constant fountaining N end middle island where a large spatter grotto with stalactites had been built since yesterday. This island much enlarged -- effect of high level of yesterday. The small round island W of it gone. Some time since visit of yesterday overflows from W pond and main lake had taken place, that from W pond going on both sides of crag NE of it and reaching nearly to E pond. SE arm overflowed in direction of E pond and SW arm flooded its surrounding bench. Fresh talus and pink dust from E wall of pit on floor between E pond and SE arm. One large grotto SW arm, otherwise dark. No streaming visible in this arm. Current through channel going on both sides of both islands.

Corner of bench between N and SE arms elevated. (Tilted up by bench flows?)

Filagree cone on S bank SE arm.

No glow in SW rift crack seen.

11:40 a.m. Sinking spell in main lake and E pond, not affecting W pond.

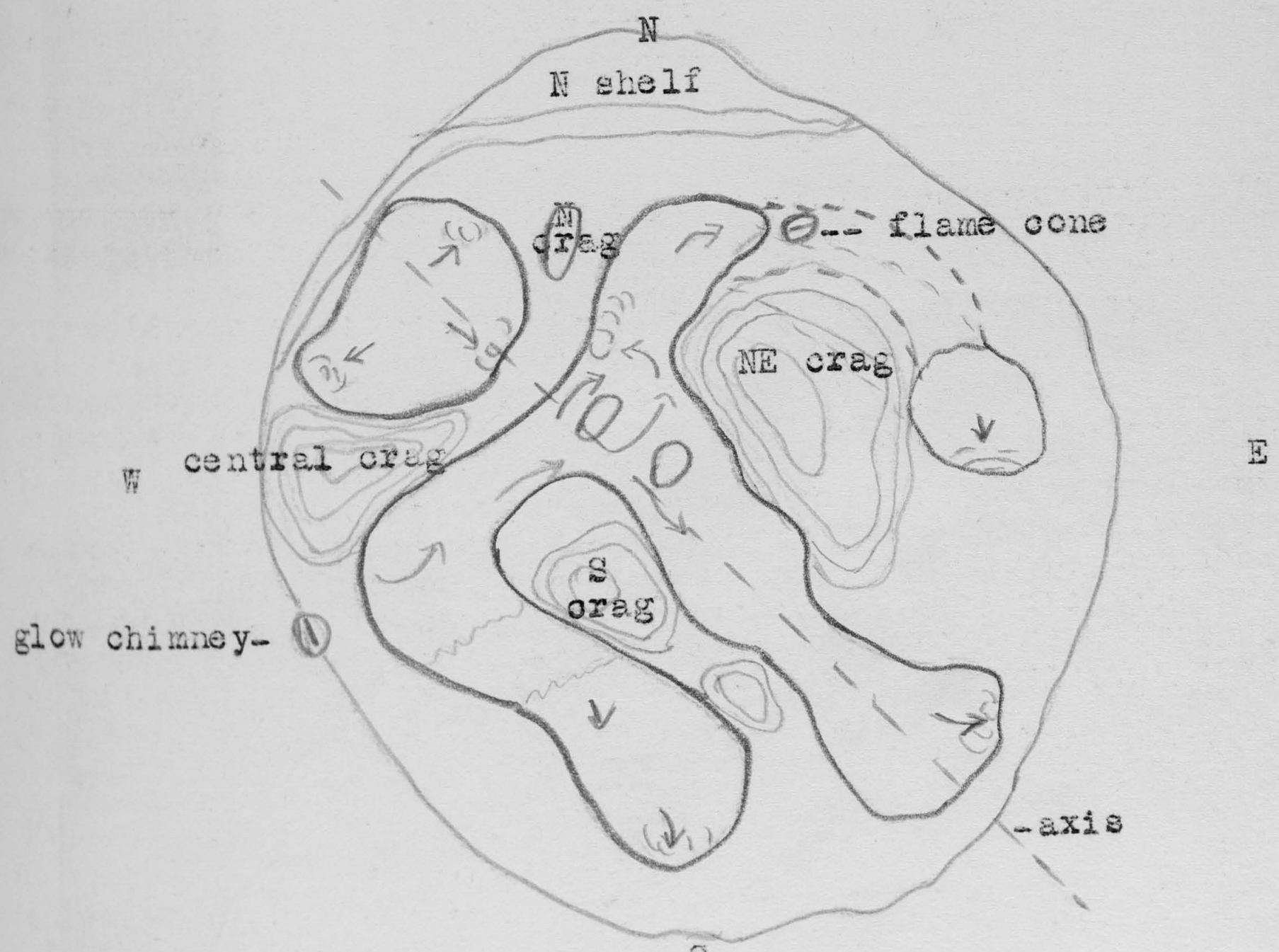
I P J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date August 22, 1920

2 p.m. With F. Omori and M. S. Maso to Halemaumau.
Floor of pit shows growth of platforms and the development of NE crag until it appears as high as the so-called central crag -- the mass W of central pool. There is a glowing wall chimney SW said to be place of recent cascade out of the wall of the pit into the SW arm; appears a little more S than the Kau rift crack. There are only two islands now -- the smallest one is gone -- and the arrangement of the entire pit bottom suggests a symmetry about a NW-SE axis as shown in sketch. Flame cone on bench at N. arm and circular streaming counter-clockwise around NW island of center. Strong gas pressure, spraying central fountains of travelling type where the currents meet N of island, spear of blue flame from cone one foot, more or less, long. Occasional cracking and foundering in W pond. Spraying fountain developed in E pond after a spell of crusting.

3-5 p.m. Sketch Halemaumau:-



From Uwekahuna the Mauna Iki source pond locality could be seen to be smoking strongly, but no flowing is reported there.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day		Date	
Monday		August	23, 1920
Tuesday		"	24, "
Wednesday		"	25, "

August 23. With Hovey, Maso, Omori, Richards and Thomson to rift chasm NE of Cone Peak. No tendency of chasm to close, remains a wide open fracture 20 feet open in places. No important changes noticed. Some hot vapor in places.

August 24. With Washington, Hovey, Thomson, Omori and Fisher to Cockett's Trail, six craters. Beyond third crater the hot steam holes in ground give pronounced nucleation effects when cigar is thrust in the vapor.

Some recent fresh scar of falling rock under NW side of overhang at Devil's Throat.

Heavy rain.

August 25. Trip with visiting geologists to lower end of 1920 flows Kau Desert.

Steaming crack in old ground W of lower part of the Sand Dune flows.

Crossed 1920 aa above Puu Kouele and then the 1920 pahoehoe. No new lava observed, not especially hot, lower terminus of pahoehoe slightly above Puu Kouele.

Went to Kamakaia trig station and from summit could see no activity of flows. Slight fume along pahoehoe tunnel line. Returned by the frozen cascades of lava E of Sand Dune lava heap.

T A J

9:30-10:30 a.m. Fume moderately thin. Lakes about 8 or 10 feet below surrounding platforms except E lake which was 5 or 6 feet below. Streaming out of SW arm; one branch making a whirl around the northern central islet, which is about one foot above liquid, and the other going into SE arm. Two glowing vents in NE floor near N end of central arm. There has been recent landslide from the lower N ledge. One grotto active in central pool by old central island and another one active on S side of W pool.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Wednesday Date August 25, 1920

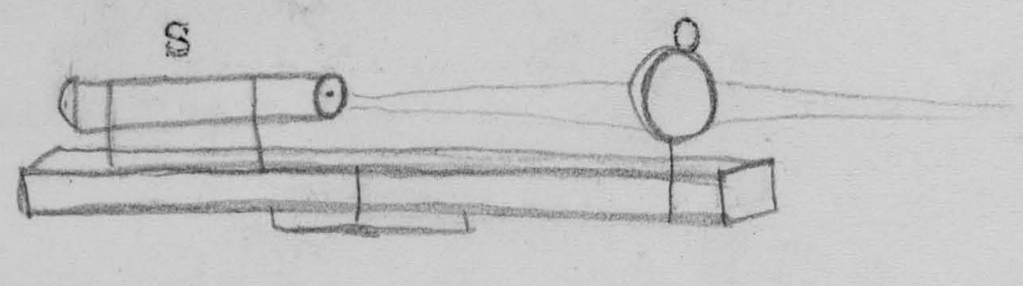
t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NNE	Lake at N central islet	80 40	-19 55	-02	640	231	
	N	same	63 00	-18 14	-02	705	230	
	NNE	Peak center island	60 44	-11 21	-02	854	171	
	N	same	88 22	-13 05	-02	745	173	
	NNE	Peak E crag	103 10	-14 40	-02	637	166	
	N	same	46 43	-11 20	-02	852	170	
	NNE	Lake at point E crag?	95 28	-17 04	-02	785	240	
	N	same ?	56 40	-14 30	-02	935	240	
		(Point uncertain)						

R H F

Day Thursday Date August 26, 1920
Friday " 27, "

August 26. With W. J. Fisher to test spectroscope. Viewed pit from N shelf. Less gas pressure and considerable fume. A pot and filagree flame cone on N platform. Streaming slow out of SW channel. Fountains few. Lakes about 6 feet below banks.

Set up spectroscope (direct vision grating and prism) with acromatic objective of about 8-inch focus in front of slit. Could pick out flame in sodium line against the continuous spectrum of the filagree openings. Objective focussed image of flame on slit.



T A J

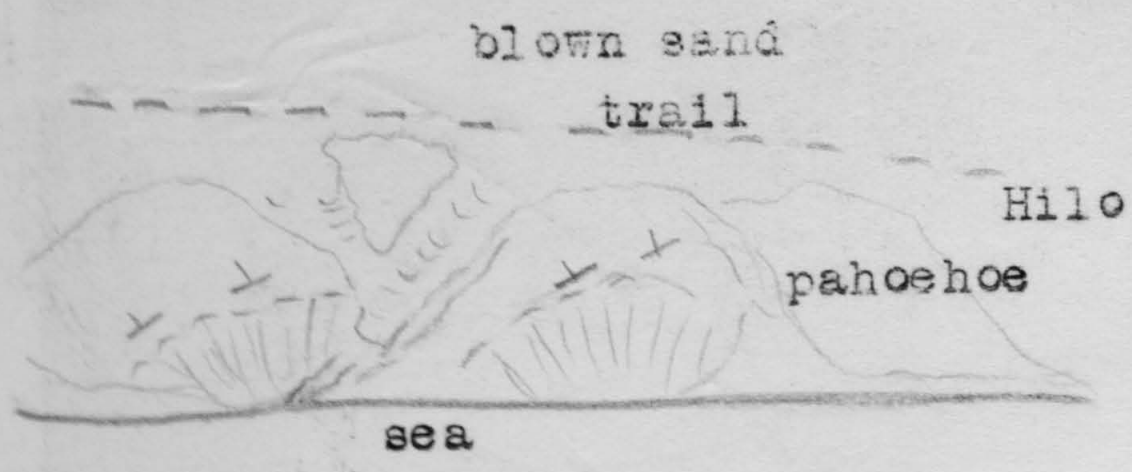
August 27.
4 p.m. Lakes about 6 or 7 feet below platforms. Southern of two central islets only 2 or 3 feet above liquid while northern one is 5 or 6 feet high. Rapid current out of SW arm. All lakes crusted over. Glowing vent in talus near Kau Desert crack to SW.

R H F

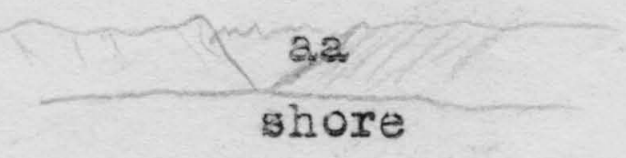
With visiting geologists to 1840 flow at shoreline N of Kapoho (Nanawale). Motor to Koae, then straight track through Kuleanae and finally over pahoehoe about 5 miles walk. Very fine types of Hawaiian tropical food trees and large monkey-pod trees with magnificent bird-nest ferns.

Flow is aa with pahoehoe river courses and large cinder and sand hills along a ledgy shore. The flow of gulch between sand hills overlaps the sand section. There were more than one explosion center along the shore. Top of sand 80 feet above the sea. Flow takes origin in forest, very flat grade, probably along the cone line farther back near the lava trees.

1840 flow Nanawale:-



Section:-



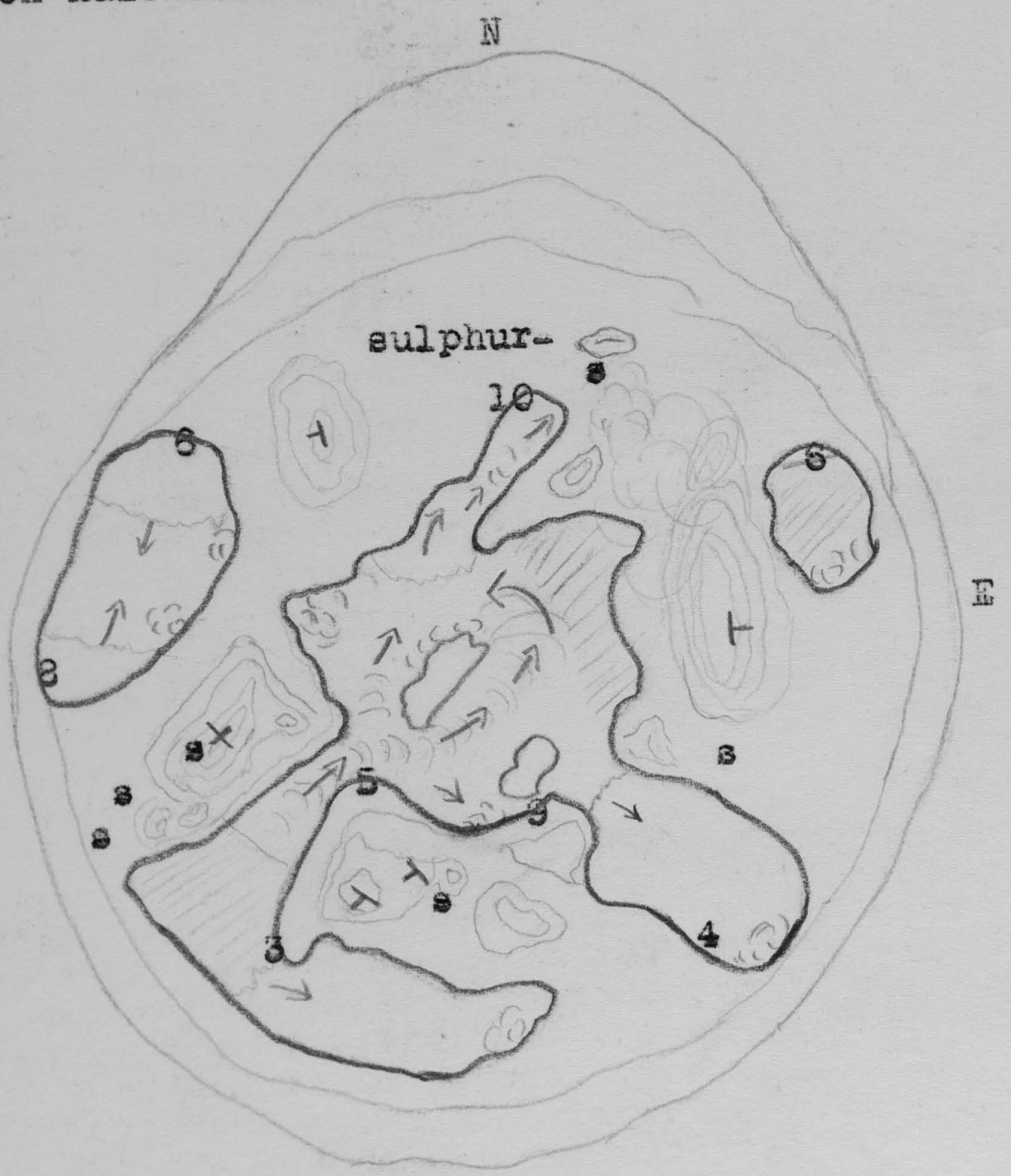
T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date August 29, 1920

3-4 p.m. With Omori.
Fume thin. Eleven fountains. Streaming from SW around island. Occasional rapid streaming into N cove, where the bench is smoking and sulphur stained. Tunnel under bench N side of E pond, perhaps goes through to N cove. Rapid flow through channel from SW arm. W pond with thin skins and bright lines. This is the habit of the other pools. So far as can be seen, chimney SW must be at rift. Upper veneers of lined plaster on walls of pit have fallen off NE and E and lower part all around. Remains of upper bench lines generally preserved except W, SW and S.
Loud hissing and growling noise sometimes N and E, and much rumble from N side of W island.

3:30 p.m. Sketch Halemaumau:-



s -- smoke

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Sunday Date August 29,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
3 p.m.	N	Lake S grotto W pool	88 13	-21 42	-03	594	235	
	NNE	same	54 37	-17 51	-03	726	233	
	N	Lake N central islet	64 38	-18 16	-03	720	237	
	NNE	same	78 39	-19 47	-04	662	237	
	N	E crag	46 40	-11 22	-02	830	166	
	NNE	same	102 21	-15 36	-05	615	171	
	N	Central crag (W)	88 20	-13 05	-02	745	172	
	NNE	same	60 45	-11 21	-04	854	170	
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date August 30, 1920
Tuesday " 31, "

August 30. With Omori and Washington to Postal Rift tunnel and through it for collection of salts and photographs. J. A. Thomson with party to Halemaumau.

4:30 p.m. Halemaumau showed overflow of banks of E pond with spurting of small pot adjacent; and infall of spatter banks and much rapid streaming in the other pools.

At 5 p.m. and thereafter the outline of E pond became defined but the other pools rose, W pond becoming crusted heavily except for small spurt cone at SW end and SW arm became heavily crusted over its entire SE surface, the streaming pouring from there through the channel to center. Bright lines and thin skins over center and SE arm. Active grotto continuous at W end of W island, occasional prolonged spurting fountain in center migrating to W cove, four or five other fountains on banks variable. Numerous flame pots N, SE, S, against wall at top of talus SW, and next to E pond on its SE side, and much blowing noise indicating strong gas pressure. Streaming around island and to the SE arm. E pond remains high.

August 31.
Forenoon. With Washington, Thomson, Omori, to Mauna Iki.

Source pond more caved in than when seen August 10. Walls of pit about 30 feet high and the floor slumped, with a pudding cone which had welled up in center. Caving now in progress, two falls of rock seen. Bright red iron oxides. No hissing. Hot smoking place on E side over tunnel. Find new tunnel opening in roof 300 yards to E with hot air 200+° rising and worm stalactites inside; an interesting feature of these stalactites is their occurrence in part on broken surfaces of the roof wall in isolated patches. No activity at the northern pit. Some copper salts still depositing and much heat along tunnel lines. Vapor seen (on cloudy morning) along both the new rift cracks W of Puu Koae. Fume (bluish) along the tube line leading to front of flows at Kamakaia.

T A J

10 p.m to midnight. Halemaumau. Lakes appeared to be stationary at about the same level as on 29th. Liquid about 7 or 8 feet below banks around central pool and W pond, less around SE arm. Rapid streaming out of SW arm continues. Many flaming vents at different points on floor, and three or four close together near Kau Desert wall crack, some 10 or 15 feet or more above liquid.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date September 3, 1920
Saturday " 4, "

Sept. 3.
9 a.m. to 12 noon. With Omori to Halemaumau and SW heap and SW rift in Kilauea floor, and Lee's Pit.

Lava shows twelve fountains, nine of them in main lake, during a spell of breaking up. Western island in central pool has broken in two leaving a pulpit rock S and a splashing shoal N. Rising at 10 a.m. and thereafter in main and eastern pools but not in W pond, bringing these pools up to W pond level. Eight foot margin around W pond, only 3 feet ± around center pool. Islet shoal becomes entirely submerged and the pulpit rock barely emergent. Streaming from SW arm at its W end to its SE end and through channel to center pool. Then slow circular movement around the western islets, through channels to SE, to N cove, and through channel between islets and central crag mass northward. Four vigorous border grottoes with overhang and stalactites around W pond. Some fallen rocks under walls.

Fume moderate from the floors and crags, only blue gas from the fountains. Occasional central fountains, sometimes prolonged. Flaming hole N, E, SE and against SW rift talus as before. Latter at top of talus, sulhpur stained, really a spatter cone cementing the rocks.

Exploring the rift outside of Halemaumau, found very brilliant red and orahge and sulphur yellow coloring in patches of decomposed rock, ground wet with steam, vapor rising very irrespirable with what is probably SO_3. Decomposition of the rock along the vaporing cracks very complete. Top of SW heap tumbled but not fuming. Found delicate gypsum crystals on worm stalactites in Peter Lee's caverns, and the lava rope cascade of 1919 has there been knocked down by vandals.

T A J

Sept. 4.
2 p.m. Fume thicker than common, though seeing was good. Moderately rapid streaming out of SW arm, one branch from which went along side central crag to isthmus between central pool and W bay, the other to SE arm. One large grotto along S floor S of southern central islet. One continuous fountain to the E of N central islet. Lakes 8 or 10 feet below banks.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Saturday Date September 4,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
2 p.m.	N	Lake at N central islet	63 15	-18 34	-03	735	246	
		Lake S side W bay	89 05	-21 17	-03	597	232	
		E crag	46 41	-11 30	-04	853	173	
	NNE	Lake at N central islet	80 35	-20 10	-05	665	243	
		Lake S side W bay	54 21	-17 34	-04	735	232	
		Peak E crag	103 30	-14 41	-05	637	166	
		Depression central lake	257	feet				
		" E crag	181	"				
								R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date September 5, 1920

4 p.m. SW arm starts central fountaining of large size which migrates to NE bank.

Rapid streaming through SE narrows in spells.

Crust which finally breaks up with southward migration at E pond.

New (?) Pulpit rock at S side of SW channel.

Only two islands, and a greatly widened space between E and W islets; latter appears to be the N member of former two halves.

Fume rather thin.

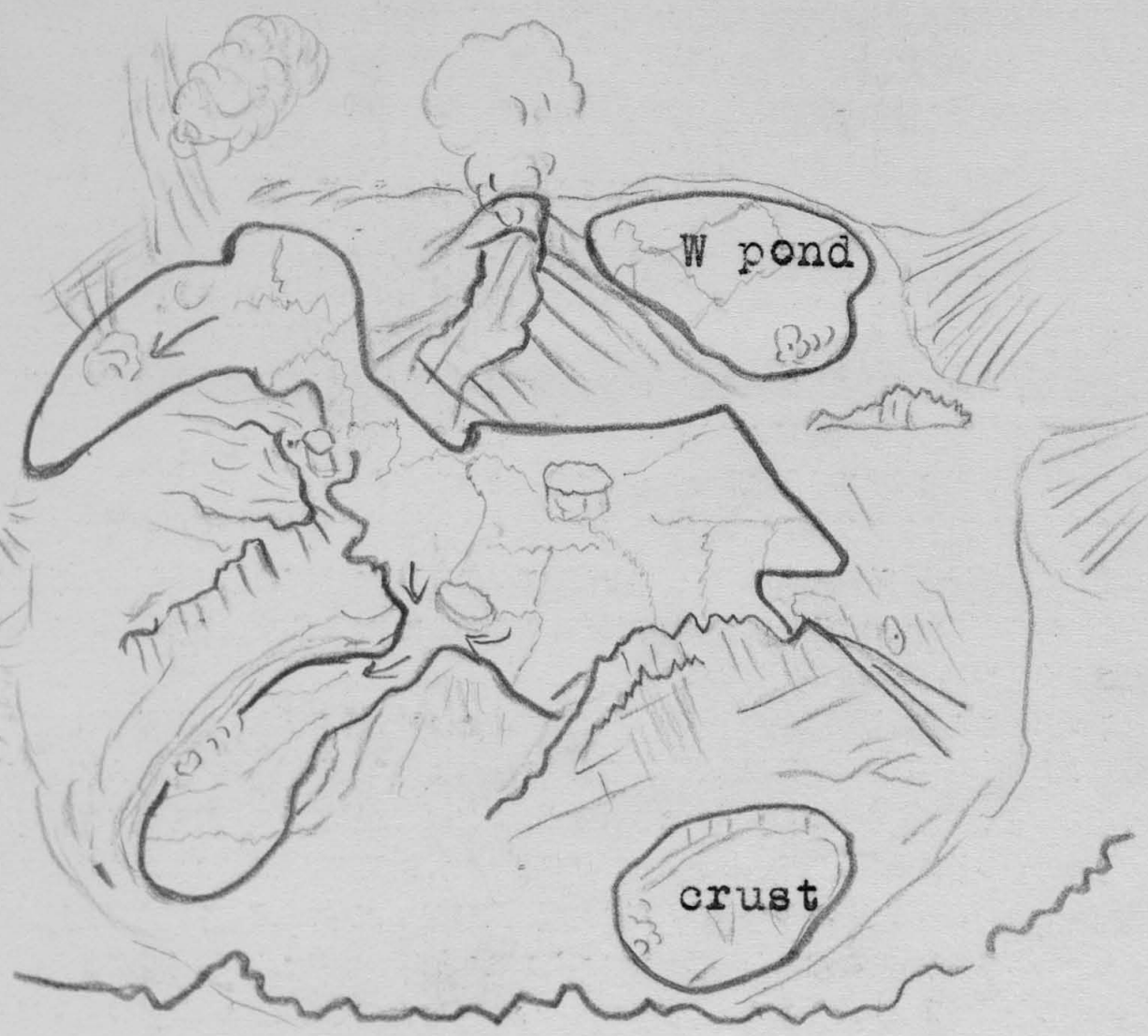
SW rift at solfatara base of wall very hot and fumy and sulphurous and the rift stained above one-third way up wall.

Smoke from cracks in islets, crags and floors.

Much turbulent fountaining along base of bank S side SE channel.

SW arm appears high, W pond 4-foot banks, E and SE 6-foot, center 6-foot, SE channel 10-foot.

Floor of pit from E at 3:30 p.m.:-



T A J

240 U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Tuesday Date September 7, 1920
Wednesday " 8, "

Sept. 7.
11:30 a.m. Three islets again, the S half of former W island again-appearing in the opening where SW channel comes to center, but farther away from N islet than former length of island. Must be accretionary growth on SW channel side.

W pond quiet and crusted mostly. Large continuous fountains N of center of central pool. Speed of streaming various. No marked changes. Smoke from NE crag.

Sept. 8. With Omori, Clark (U.S.G.S.), Finch and Thomson to so-called 1868 flow and to ball lava locality. Then on 8 miles toward Kalapana. Heiau discovered near Puu Ahi with petroglyphs. Finch films. Found a few petroglyphs also on so-called 1823 aa flow.

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Tuesday Date September 7, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
11:30a	Lower N shelf	W pond)	1	W P	8x	f/16	2	5x7
	"	Center) panorama	2	"	"	"	"	"
	"	NE crag)	3	"	"	"	"	"
	"	E end shelf (upright)	4	"	"	"	"	"
	"	NNE sta. Shows shore-line marks. (Omori in picture)	5	"	"	"	"	"
		Postal Rift cavern 3rd opening, from interior. Drip marks. Omori.	6	"	"	f/11	1 min	"

Tessar lens.

T A J

1920, Sept. 7

Jag

243

1920, Sept. 7

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Jaj

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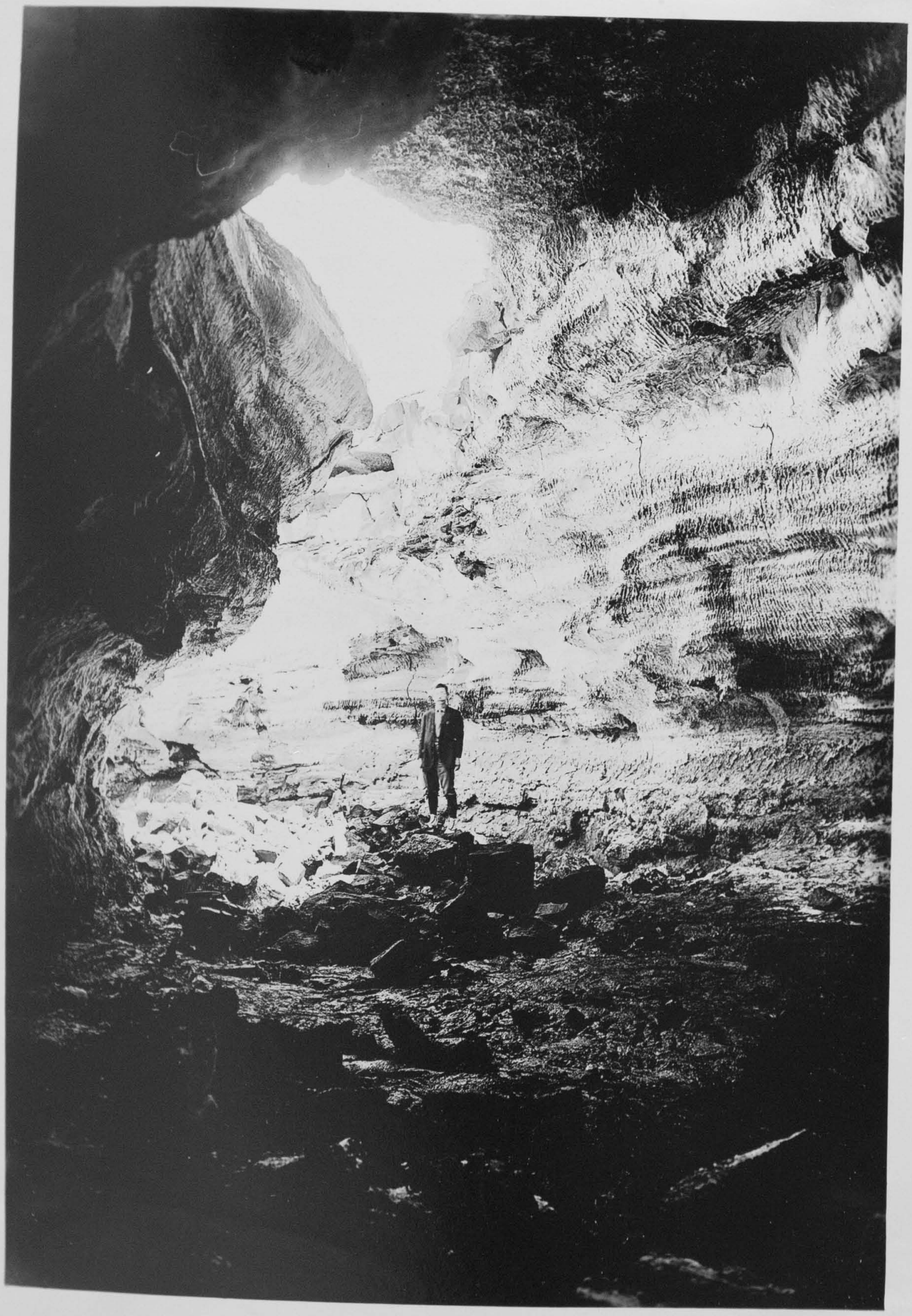
1920, Sept. 7

245

1920, Sept. 7



6

Dep. Omori in a Lava Tube -

PHOTOGRAPH RECORD 246 Hawaiian Volcano Observatory

Day Wednesday Date September 8,1920

t	sta	subject	no	pl	scr	stop	ex	cam
10:30 a.m.		Close up of "lava balls" in bank along 1868 crack	1	film	3x	US 16	1	Kodak
"		Assembled "lava balls" in 1868 crack	3	"	"	"	1	"
		Picture writing to the E of 1823 flow by an old heiau	4					"
		Another section of same	5					"
2p.m.		Looking along escarpment from the SW. Puu Kapukapu in distance	6					"

R H F

1920, Sept. 8

3

RHF

1920, Sept. 8.

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RHJ

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date September 9,1920

3:30 p.m. E-W crack through ground between NE crag and point N of SE narrows, and down crack 15 feet (chasm 4 feet wide) torrent pouring from center pool to SE under platform.

E-W crack through pulpit rock W of NE crag making new pool 8 by 15 feet E of N cove.

N-S crack from end SW arm northward extending the arm in an L.

Lake banks 4 to 12 feet high. Highest SE and E pond. Only 2 feet at narrows of SW channel, 5 feet at W pond.

Break through NE crag in line with crack through N pulpit (E-W).

The cascade in E crag mass is where a small lake was reported first week in August.

The movement seems to be a lifting of the sector blocks (?), rather than a very pronounced sinking so far as can yet be told.

NOTE. With H. S. Washington, after discussion of H_2O in fume, took pipe with waste wired on it, kerosene on waste, and thrust the torch, first flaming, then smoking mass of smoulder, into fume at SW edge of pit. A burning cigar in some of the solfataras will nucleate water vapor. No such nucleation could be obtained in the crater fume. No such nucleation of the Halemaumau cloud was effected by the SW heap fountain December 1919. Yet the crater cloud itself is full of fume particles which nucleate the water vapor of the Kilauea floor, but do not nucleate its own water vapor to leeward of pit, although analysis shows 70% H_2O. Why?

With Washington and J. A. Thomson to gravel flats of 1790. Much of a sandstone-like rock with vugs containing crystals of hematite and other minerals, some round white crystals like analcite, others like nepheline. This hematite-bearing rock a distinct product of deep ejection. Why hematite? Does this mean special oxidation of the iron? Washington will analyze these minerals.

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL

Day Friday Date September 10, 1920

10:30 to 11:30 a.m. Streaming out of SW arm to central pool, a large part of this current directed to a small cascade near S point of E crag. E lake larger. W pond deeply crusted and 12 or 15 feet below banks Some fountaining in N pot at old N arm. S side of pit smoky. The cascade could be seen from the SE platform, pouring into a hole in the platform at S end of E crag.

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date September 10,1920

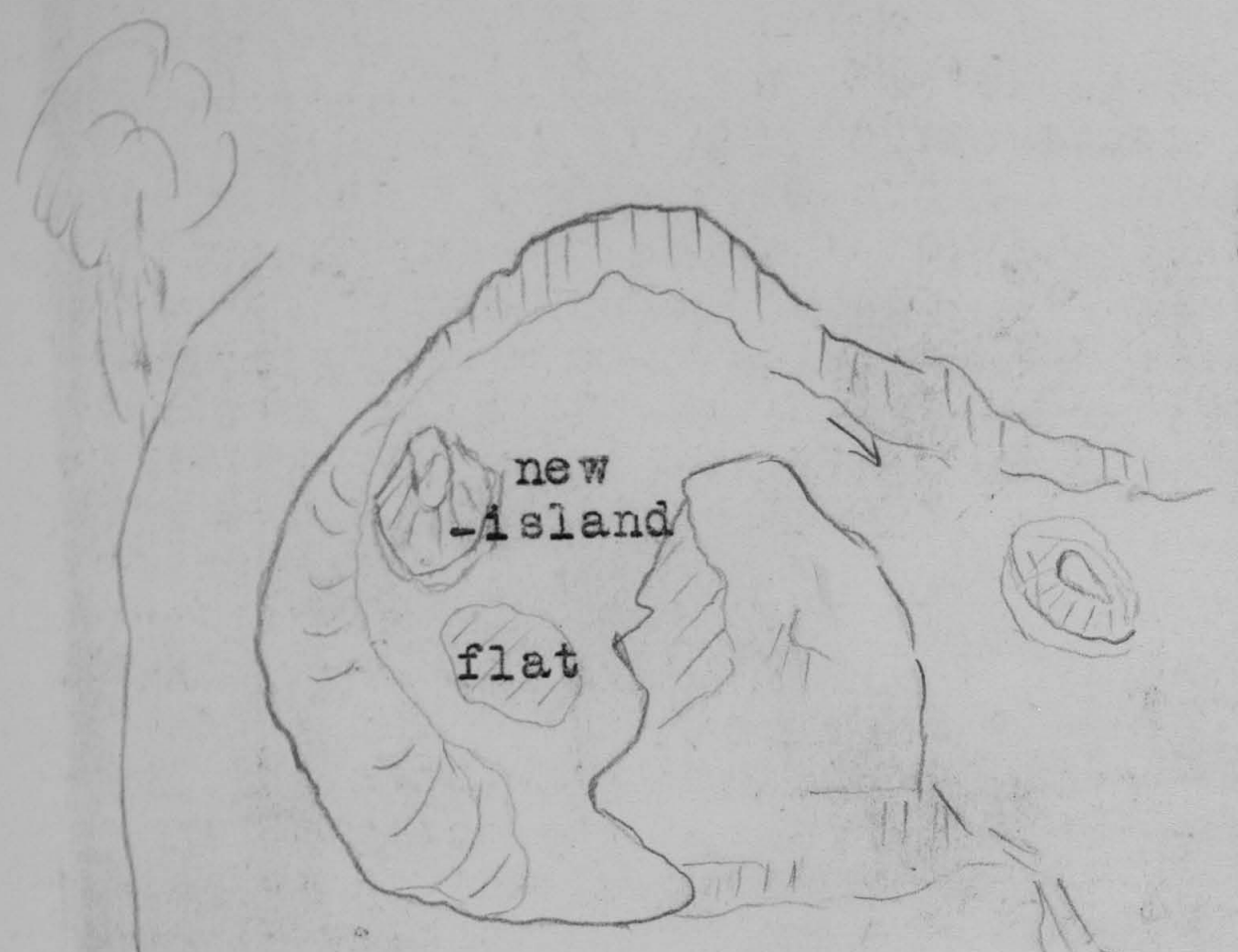
t	sta	pt	hor	vert	lev	dist	elev	h. i.
11a.m.	N	Lake at N islet	63 03	-19 38	-08	735	260	
	NNE	same	80 28	-21 32	-10	665	260	
	N	Peak E crag	46 43	-11 26	-06	853	171	
	NNE	same	?103 30	-14 47	-10	637	166	
	N	Peak W crag C I	88 22	-13 06	-06	745	172	
	NNE	same	?60 47	-11 21	-10	854	168	
	N	Lake W pond	94 05	-21 09	-07			
	NNE	same	?54 10	-17 39	-10			
		Depression lake	273 feet					
		" W crag	182 "					
		" NE crag	181 "					

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date September 11, 1920

2:30 p.m. Sketch of SW arm from S pressure ridge:-



Walls of lake basins mostly 20 feet high. Crusted pools in E and N new pots, two levels in N one. Islands larger, vertical sided, 10 to 20 feet high. Lakes sluggish, slow streaming from SW in center.

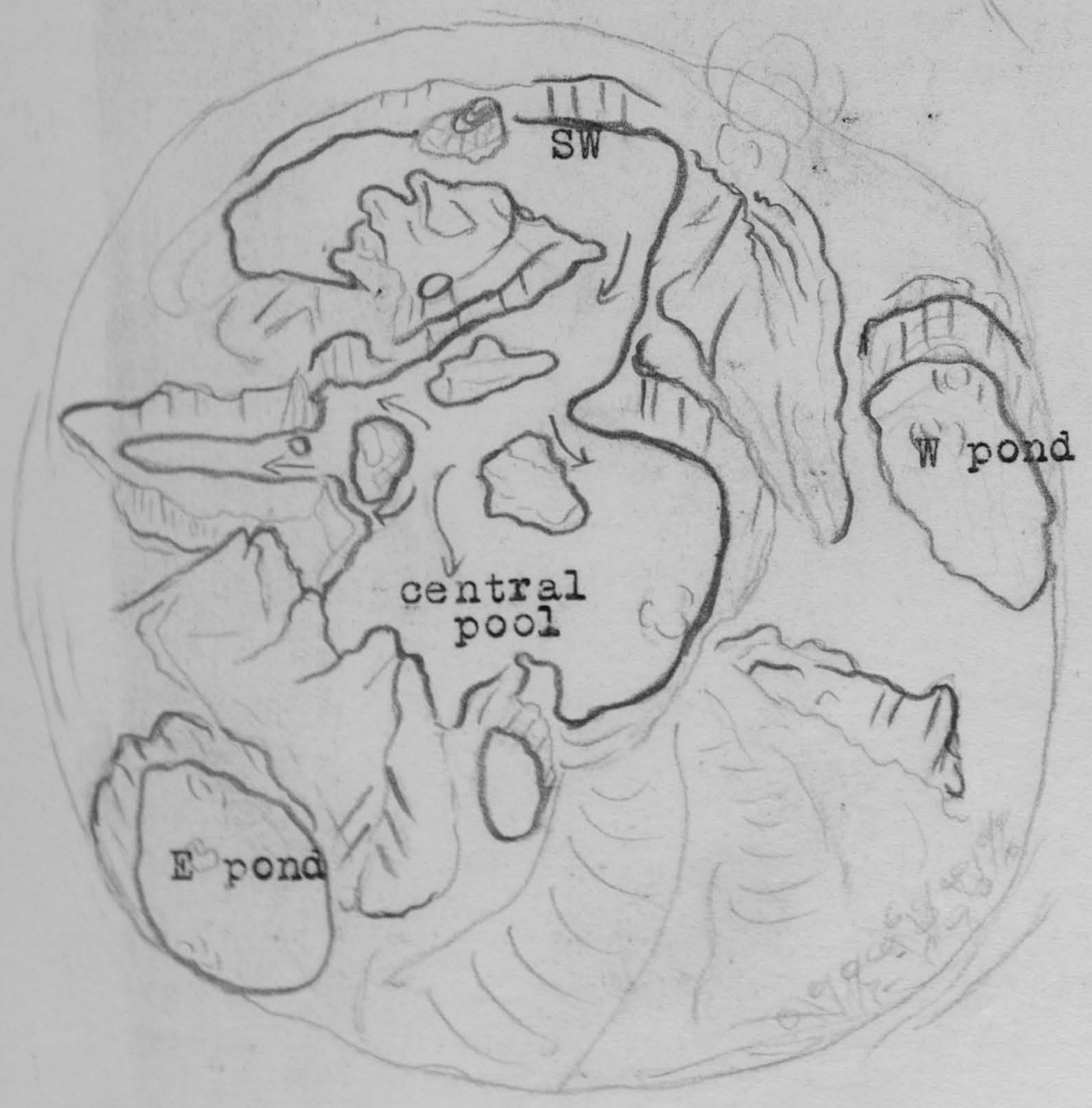
New island on SW side of SW pond, stands high, its origin not apparent. Recent landslips fall on NNE floor. Much smoke from western and southern crag masses. Some bubble fountaining in E pond. Noise of splash fountaining.

Not more than five or six fountains seen.

E pot crevassed through to NE margin of SE arm.

Bank at S side of entrance channel to SE arm has collapsed and left an islet and a talus, where pillar and tunnel evidently were before.

Sketch Halemaumau from point between NNE and NE:-



At 3:10 p.m. bubbling torrent pouring S of islet in SW arm.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day		Date		
Sunday		September	12,	1920
Monday		"	13,	"
Tuesday		"	14	"
Wednesday		"	15,	"

Sept. 12.
3 to 4 p.m. Pit moderately fumy. Rapid streaming out of SW arm, one branch going to SE arm through the narrow entrance 5 or 6 feet wide and the other N to a long border fountain along N bank of central lake. Central islet surrounded by platforms about 2 feet above liquid. A platform height chokes entrance to SE arm. Live lava in the E and N pots. Red shows all around banks of W pond as though it were falling. This pond appears 4 or 5 feet lower than central pool. No central fountaining in any lake.

R H F

Sept. 13.
3 p.m. Main changes are increased platforms at low lake level N, around islands, at SE entrance and at SW arm.
Lakes fluctuating rapidly. New pots crusted but glowing, the N pot showing an inner hole at lower level. Cliffs around lake basins 20 feet high. Nine fountains.

Sept. 14.
3 p.m. Lake fluctuating. Level with inner new platforms at 3 p.m.; down 5 feet at 4 p.m. N islet like a mushroom. Rocks falling NE wall of pit. Sailors from warships have been down on floor. Streaming vigorous in channels to E and N. Seven or eight fountains. Much puffing at E pond at 3 p.m.

Sept. 15. Reported much the same and rocks falling NE. Strong streaming SE.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Mon. & Tues. Date Sept. 13 & 14, 1920

t	sta	subject	no	lens	scr	stop	ex	cam	
September 13.									
3 p.m.	Bet. NNE & NE	Center	1	Tessar	8x	f/16	1	5x7	
	"	SE	2	"	"	"	"	"	
	"	W pond and N shelf (double exposure)	3 & 4	"	"	"	"	"	
September 14.									
3 p.m.	Lower N shelf	Lake (28 inches)	1	Zeiss 6 inch Anas. lens	film	f/16	1/8	Cirkut	
	"	" (8 inches)	2	"	"	"	1/4	"	
								T A J	

255

1920, Sept. 13

256

1920, Sept. 13

3+4

Jo 9

JOURNAL

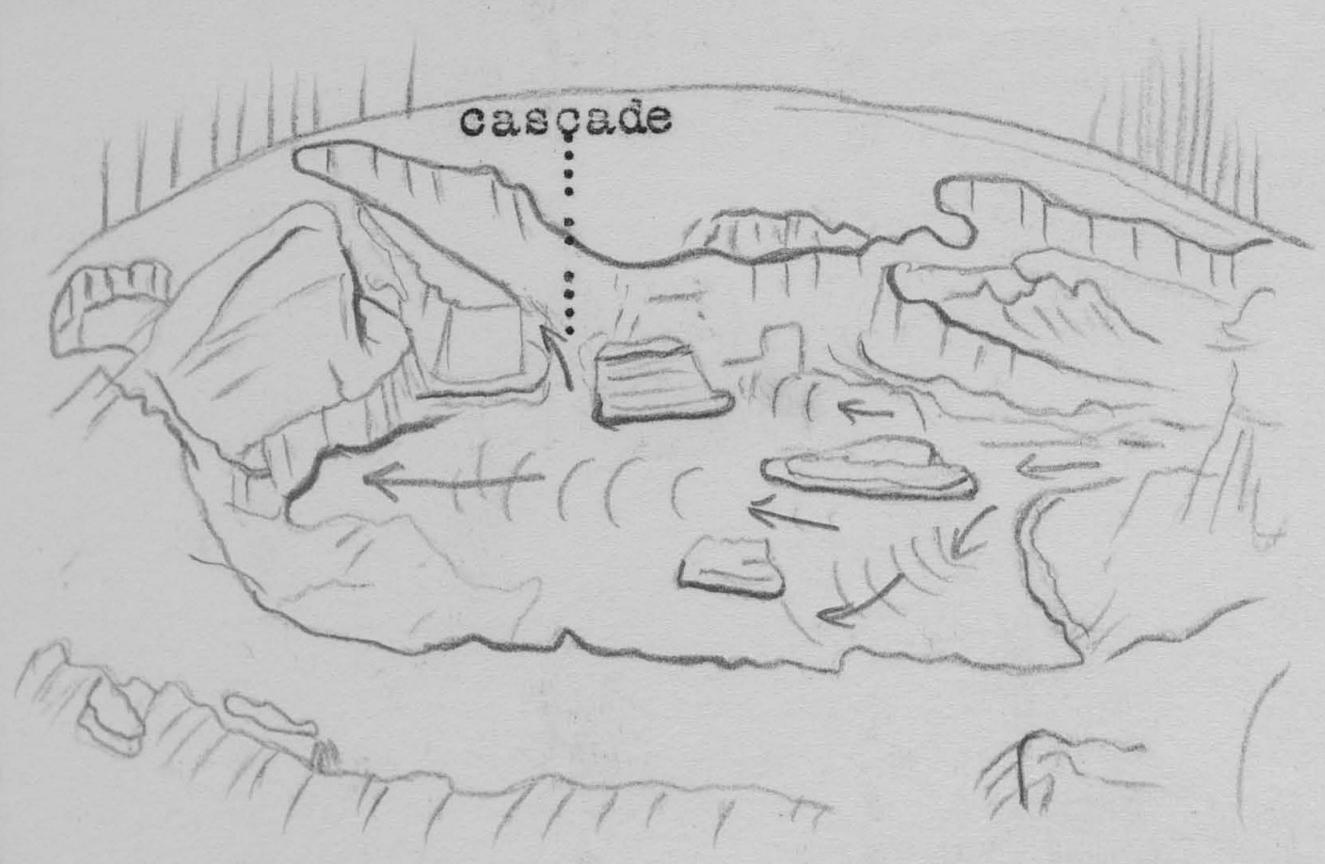
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date September 16, 1920

10:15 a.m. Walls enclosing E and W ponds 15 feet high. Center more complicated: the platform of outer ring all around 15 feet more or less above lake level. Not so however with the inner circle which has subsided with the liquid in part (same as in 1918). The inner bench portions of the three crag masses are only 8 feet more or less above the lake; and the new platforms at lake edge are 2 to 3 feet high. There is a line of fracture, faulted down on the side of the center of the pit which involves the N point, the W point including the SE half of the W crag mass, and the western part of the S crag-mass, bounded by the SW arm and the new break through from the E end of SW arm. The SE island stands high (12 to 15 feet) like the walls of SE arm. The two western islands are low comparatively, the SW one with a two-foot platform around it. With a subsidence the bench magma thus tends to fault concentrically going down most in the center. The NE crag-mass is still high, though the cracks through it N and S mark tangential breaks extending from the central downsunken prism.

Quiet skins E and W ponds. Soft skin on cascade pond ESE. Central streaming from SW with currents in central pool NW, NE and SE and through SE channel into SE arm. Fountaining against E bank of E pond and against E bank of W pond. Much vapor from SW rift solfatara inside of pit. Fume now abundant, at 6 a.m. it was very thin.

11 a.m. Lake from N:-



Cascade developed from center to SE arm, 12-foot drop, back current to cascade from SE arm. ESE pot low, inner shelf 15 feet down, liquid 5 feet lower. Walls around SE arm 25 feet high during lowering. Bank of red hot structureless paste revealed on right bank of fall below the bench markings above. For thirty minutes no evident change, cascade continues, no lowering of central and western lakes nor of E pond, but ESE pot is extra low. This cascade development is in line with the unusually swift flow in spasms repeatedly noticed at the SE narrows as on September 5. Such swift flow estimated 8 meters per second was noticed by Dr. Omori yesterday.

Note similar cascade into S arm November 23, 1919, followed a little over four days later by the great subsidence. We are now very near equinox, just at the end of the Kilauea flow, and all symptoms point to a coming subsidence at equinox. Situation as to cracking benches and islands was similar May 1916, followed by great subsidence.

NOTE. Professor Omori made an observation of the bottom rock of Keanakakoi to the effect that soundings in the cracks, 4 to 6 inches wide open, yield very uniformly a depth of 15 or 16 feet showing what very heavy massive rock is cracked to form the floor. Let a weight down the cracks with a piece of string.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Thursday Date September 16, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	N	Lake at N central islet	62 56	-20 11	-06	735	269	
		Peak W crag	89 32	-13 05	-07	750	173	
	NNE	same	60 50	-11 16				
	N	Lake at end of S platform by middle central islet	71 10	-16 41	-05			
		N station about 2 feet higher than NNE.						
		Depression lake 280 feet " W crag 184 "						R H F

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date September 16, 1920

t	sta	subject	no	lens	scr	stop	ex	cam
10:15a	Upper N shelf	W pond	1	Tessar	8x	f/11	1	5x7
	"	Center	2	"	"	"	"	"
11a.m.	ENE	Cascade SE narrows	3	"	"	"	"	"
	SE	" " "	4	"	"	"	"	"
								T A J

1920, Sept.

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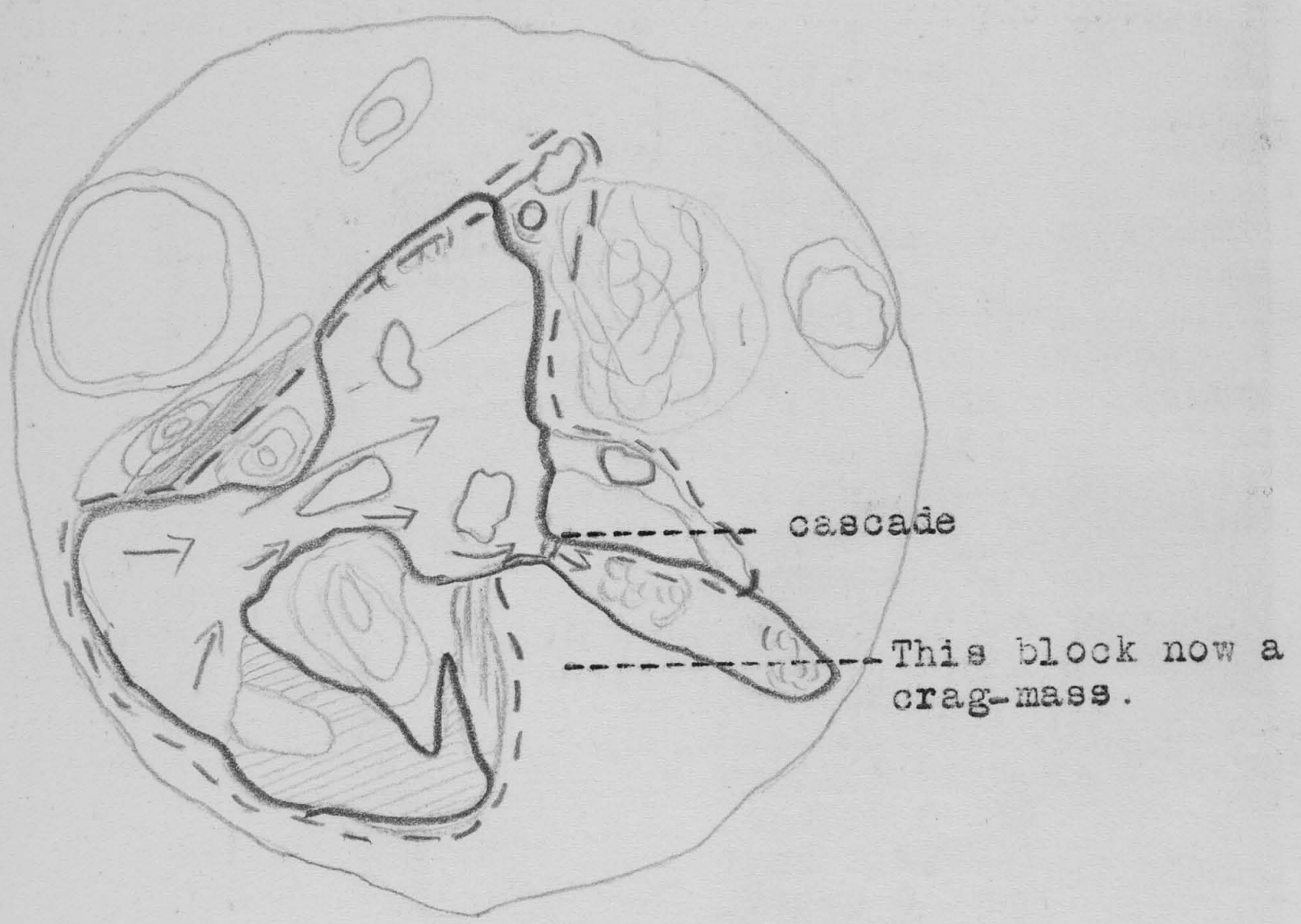
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Friday Date September 17, 1920

3 p.m. Lake lower, Caseade continues. Strong flow across S side of central pool from the SW pool, the eastern part of SW arm being crusted and an apparent source for the out-streaming. Walls of SE arm 30 feet high, of center 25 feet high, of SW arm 20 feet high, of W pond 15 feet high. Could not see E pond. Cascade flatter but very violent. Island and shore platforms 6 feet above liquid. Fume thicker. S part of W crag mass and other parts of inner ring lower.

Sketch from SW:-



Dotted line -- down-faulted

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date September 18, 1920

11 a.m. to 4 p.m. Made complete survey of pit. Angular locations of stations including NW height and S saddle in pressure ridge.

Lake high and spells of rising with noon-day falling of lake (rising of crags?). SE cascade has ceased. In morning the walls around the lake cups appeared only 15± feet high and the central lake had so risen that the E and N pots were connected through to the lake by way of the chasms which had formed the pots. The fracture block of the ESE bench had thus become a nearly isolated table, sloping toward the S. The cascade narrows leading to SE arm was very narrow, only 4 or 5 feet wide.

A new flat platform point protruded from the fracture block into the SE arm. The latter was quiet until afternoon.

The streaming was moderate and in the usual directions with much of black satiny skins and tearing skins making bright-line patterns. There were occasional large central fountains. Some talus slipping was heard. A very hot flame hole with puffing yellowish and bluish dense vapor above it glowed above the inner recesses of the N pot. Two tunnel ways appeared to extend northeastward and eastward from the NE arm of the lake as revealed during the noon sinking.

SW arm, W pond and E pond were at first quiet. After 1 p.m. there developed more intense fountaining and streaming with a lower lake, cracking and foundering in the W pond with much caving in of spatter margins and intense central and margibal fountaining with blue gas puffs. Caving in of spatter margins in main and SW lakes also. Streaming southeastward as well as northeastward from W part of SW arm. Fountaining also in E pond. Stalactites hanging around small N island. This island is a low cake, SW island slightly higher, SE island a high pulpit 10 feet high.

By 4 p.m. there was a return of strong rising with swift current (but not cascade) into SE arm, the two pots flooded from the lake, platform points submerged, and the N island nearly submerged.

All day the fumes much thinner than of late and seeing was possible from all sides.

Sketch 3 p.m.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD — 1 — Hawaiian Volcano Observatory

Day Saturday Date September 18,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11:30a	High SW pt. ("SW")	NNE	0	- 1 16	+06			4 ft.
	W	"	0	- 1 02	+10			"
	High NW pt. ("NW")	"	0	- 1 49	+10			"
	N	"	0	- 0 58	+07			"
	SW	E side N pot	R 7 41			874		
	W	same	R14 45					
	NW	same	R29 29					
	SW	W cove	R 0 12					
	W	same (approximately)	R12 54					
	NW	same	R49 34					
	SW	N cove	R 7 41					
	NW	same	R37 39					
	SW	NE point lake	R11 56	-21 42		710	281	
	NW	same	R46 13					
	SW	NE cove	R17 08					
	NW	same	R41 01					
	SW	N peak NE crag	R17 15	-13 04		878	202	
	NW	same	36 59					
	SW	S peak NE crag	R27 01	-12 36		865	195	
	NW	same	44 27					
	SW	E cove entrance	R34 11					
	NW	same	54 26					
	SW	Entrance SE narrows E side	R38 26					
	NW	same	61 05					
	SW	Entrance SE narrows SW side	R40 13					
	NW	same	62 02					
	SW	E end SE break (block)	R45 42					
	NW	same	R56 25					
	SW	Inner end SE arm	R54 03					
	NW	same	R59 15					
	SW	Point E side SE arm	R47 14					
	NW	same	R60 52					
	SW	Cliff broken block back of this point	R44 22					
	NW	same	R59 26					
	SW	Pt. of S crag E of S cleft	R41 28					
	NW	same	R67 58					
	SW	Summit S crag	R45 59	-22 29		575	275	
	NW	same	R70 12					
	SW	Summit SW crag, N escarpment	R38 39					
	NW	same	R72 22	-18 29	-10			
	SW	SW peak SW crag	R43 57					
	NW	same	R79 18					
	SW	E corner SW arm	R57 01					
	NW	same	R78 30					
	SW	S margin SW arm	71 43					
	NW	same	R87 27	-17 00	-10			

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

 Day Saturday Date September 18,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
	SW	Bowlder SSW edge floor base	R 84 31	-31 12		415	-247	
	NW	same	R 90 56					
	SW	Western narrows inner SW arm	R 63 53					
	NW	same	R 93 29					
	SW	Eastern narrows inner SW arm	R 49 08					
	NW	same	R 86 30					
	SW	SE end SW arm island	60 36					
	NW	same	R 87 20					
	SW	Bowlder SSE edge floor	63 25	-17 03		840	-260	
	NW	same	R 67 56					
	SW	Point SSW channel	R 24 00					
	NW	same	81 22					
	SW	Cove bend N, SW channel	R 8 36					
	NW	same	87 07ca					
	SW	Summit smoke W crag	L 7 12					
	W	same	R 35 51					
	NW	same(5 ft. below sum.)	R 89 37					
	SW	Lower SE peak W crag	R 3 51					
	NW	same	R 70 54					
	SW	W pt. central pool	R 17 35					
	NW	same	R 63 53					
	SW	S pt. " "	R 28 03					
	NW	same	R 72 18					
	SW	W pt. SW island	R 22 28					
	NW	same	R 70 47					
	SW	E pt. " "	R 26 22					
	NW	same	R 65 06					
	SW	S pt. N island	R 17 17					
	NW	same	58 56					
	SW	N pt. N "	R 15 30					
	NW	same	55 18					
	SW	SW point SE island	R 36 19					
	NW	same	65 37					
	SW	NE pt. SE island	R 32 53					
	NW	same	60 06					
	SW	S end N crag remnant	L 2 59					
	NW	same	39 50					
	SW	N end " " "	L 10 18					
	W	same	L 3 29					
	NW	same	R 17 24					
	W	S end N crag remnant	R 8 37					
	SW	S end NE crag mass	R 34 19					
	NW	same	R 28 27					
	SW	N end " " "	R 14 29					
	NW	same	R 49 46					
	SW	E corner W pond	L 10 49					
	W	same	R 5 00					
	NW	same	R 52 32					
	SW	W tangent W pond(ca)	L 34 30					
	SW	Broken pulpit rock N of SW crag	R 29 39					
	NW	same	75 26					

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Saturday Date September 18, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
	SW	Talus N margin W pond (bench level)	L 25 37	-18 43		707	-240	
	W	same	L 19 47					
	SW	Lake, E side W pond	L 11 15	-23 31		663	287	
	W	same	R 2 42					
	NW	same	R 43 38					
	SW	Lake, W side N island	R 15 11	-25 00		601	279	
	W	same	R 31 46					
	NW	same	R 57 44					
	SW	Grotto inner end SE arm	R 52 36	-16 34		916	271	
	W	same	R 55 34					
	NW	same	R 59 02					
	SW	NE edge E pond	R 21 41					
	NW	same	R 29 00					
	SW	E end lower N shelf	R 9 40	- 6 23		948	-111	
	NW	same	R 16 08					
	SW	W end upper N shelf	L 25 21	- 4 14		1000	- 76	
	NW	same	L 34 53					
	SW	N side E fracture pot (bench level)	R 37 02	-17 29		832		
	NW	same	52 33					
	SW	N corner SE fracture block	R 36 55	-19 16		754	-263	
	NW	same	56 38					
	SW	NE station	R 28 40	- 0 47				
	SW	SE "	R 51 20	-1 13				
	NW	same "	R111 59					
	N	same	R 95 29	+ 0 29	- 11			
back)	NNE	same	L 63 42	+ 0 32	-07			
from)	-- NE	same	L 77 58	+ 0 02	-05			
rim)	W	High SW station	R110 38	+ 0 09	+10			
	SW	W station	L 56 19	- 2 03				
	N	same	R116 42	+ 0 20	-06			
	NNE	same	L 50 38	+ 0 23	-07			
"	NE	same	L 63 53	- 0 17	-05			
	SW	NW height	L 35 55	- 0 34				
	N	NW station	118 39	+ 1 19	-07			
	NNE	same	L 31 35	+ 0 57	-06			
"	NE	same	L 42 43	+ 0 01	-06			
	NW	Summit SW crag	86 28	-24 16	-10			
	NW	W corner SW arm	R102 21					
	NW	Rift solfatara	R105 18	-15 54	-10			
	NW	Tangent N side W pond	31 51					
	NW	" SW corner W pond	107 30					
	NW	" SW end of W crag mass	105 55					
	NW	Tangent N end same	55 24					
	NW	Little peak SW arm island	90 42	-18 41	-10			
	NW	Tangent to floor N foot of talus	R 16 39					
	NW	Tangent floor N top of talus	R 6 37					

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD — 4 — Day Saturday Date September 18,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
	NW	Tangent E pond N	R 28 37					
	NW	" " " S	R 38 26					
	NW	Saddle station S pressure ridge	R 74 42	-0 17	-10			
			61 01	+0 30	00			
	N	same	L 102 02	+0 32	-07			
	NNE	same	L 121 58	+0 05	-05			
	NE	same						
	NW	Tangent S side SE fracture block	R 59 58					
	NW	Tangent S ebd small N pt. pulpit rock (contact with platform below)	R 40 13					
	NW	N end same pulpit rock	31 38					
			0	-0 19	-06			4 ft.
	NNE	N station	L 17 56	-0 56	-06			"
	NE	same	0					
	NE	NNE						
	NE	Old NE half dome sta.	R 91 43					

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Sunday Date September 19, 1920
Monday " 20, "

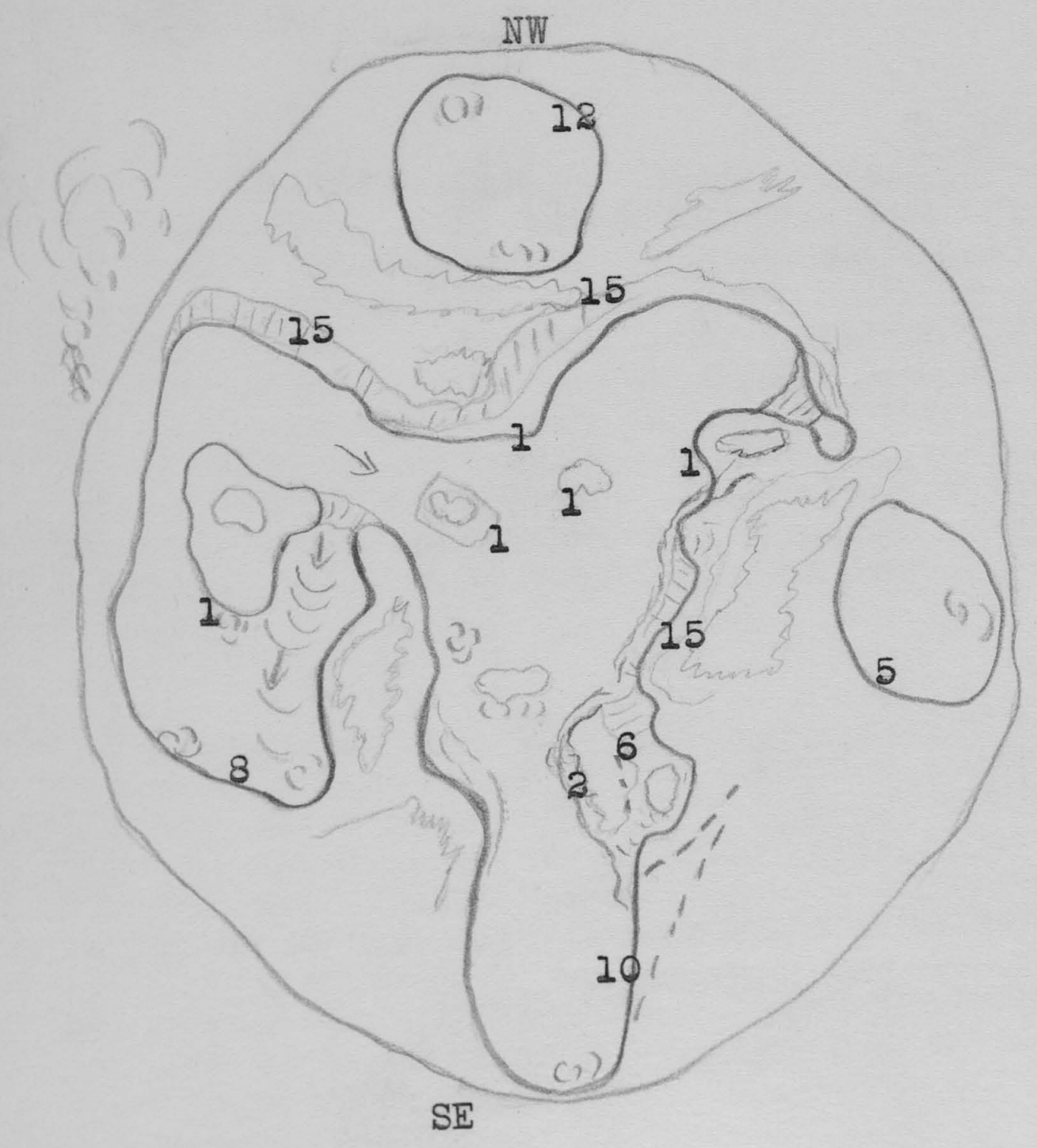
Sept. 19. Fume over Halemaumau thin.

Sept. 20. 10 a.m. Fume very thin, rapid rise of lakes. Marked symmetry of whole lake outline, like a bird on its back. Lakes greatly enlarged, islets low. Quiet, nine to eleven border fountains splashing. Black satiny skins. Streaming slight. Subsidence begins at 10:30 a.m.

SW rift crack fumarole makes stain more than one-third way up wall of Halemaumau. New flood platforms. Arch between SW arm island and S crag-mass.

Rise and flooding suggests December of 1912.

Sketch from S at 10:30 a.m. :-



T A J

Tuesday September 21, 1920
Wednesday " 22, "
Thursday " 23, "

September 21.
4:30 p.m. Lake down 3 to 4 feet relative to bench, revealing new flood plain up to level of edge of SE fracture block and much higher on the other crag masses than when seen yesterday. Central region in general 4-foot rim, marginal ponds 3 -foot. Subsided lake narrower than the risen lake mapped September 20.

Platform bridges N and S of SW arm island and across entrance to SE arm. Festooned surface. Streaming from these places to the SE, three bands, and two bands streaming eastward N and S of SW islet of central pool. Five to seven fountains, occasional central fountain in N part of central pool. Fume very thin all day. The relief of the pool cliffs outside of and above the inner platforms (8, 10 and 15 feet yesterday) much less than yesterday, 5 to 10 feet.

T A J

September 22.
10:30-11:30 a.m. Fume very thin. Rapid streaming out of SW arm to central pool. SE arm separated from main pool by a bridge between S platform and SE fracture block. The SE islet is also connected with S platform. SW arm islet connected to SSW floor. Central pool made smaller at NE by built out platform. One quiet pot in N floor. A very narrow bridge connects SW arm islet to S crag. A large grotto on SE side of SE islet. Streaming into SE arm under bridge above mentioned. Intermittent fountaining in central pool, sometimes two at once. Central pool appears to be 3 or 4 feet below banks.

R H F

September 23.
3:30 p.m. Circuit of pit by E and N shows high lake, one-foot banks of inner platforms. Outer platforms higher (7 or 8 feet) at W pond, in center and at SE arm; lower (2 to 3 feet) at SW side of SW arm and at E pond. Ten to twelve fountains. Usual streaming. E portion of SW arm and whole of SE arm more separated off as ponds by the bridges at their connecting channels. The SE bridge flat not now connected with SE island. Strongest fountaining at the SE side of this island. Fume thin in pit, but thick from SW cracks in Kilauea floor where the solfataras are increasingly hot, acid and brightly colored.

In pit the NNE cracks in floor again smoking strongly. Whole N cove and E fracture pot more overflowed. S crag-mass becoming small by overflow platform growing around it. Fumes from SW rift at base of wall not dense. Fluctuations from rising to sinking between 2 and 3 p.m.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Wednesday Date September 22,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11a.m.	NNE	Lake at N islet	78 42	-20 58	-08	636	242	
	N	same	63 24	-18 26	-08	712	232	
	NNE	E crag	103 14	-14 38	-09	655	169	
	N	same	47 30	-11 18	-08	868	171	
	NNE	Peak W crag	60 44	-11 12	-08	852	167	
	N	same	88 23	-12 57	-08	742	169	
	NNE	Overflow bench of Sept. 20	75 56	-18 20	-09	724	238	
	N	same	69 24	17 51	08	750	240	
	NNE	S grotto W pond	55 07	-18 09	-08	735	240	
	N	same	88 22	-22 12	-08	605	243	
								R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Saturday Date September 25, 1920
Sunday " 26, "
Monday " 27, "

September 25.
9:00 p.m.

Night view discloses no changes. Streaming bands from under arches of crust at SE and SW arms. W pond lower in its banks than the eastern ponds. Flame crack at N pot and at a filagree cone over grotto E end of SW arm. Another glow crack at base of SW wall at the rift solfatara. Twelve fountains and of these the N central region shows from one to five fountains and sometimes one large continuous one. Streaming from SW to center as usual. Fume moderately thin.

September 26.
10 to 11 a.m.

Only marked change is that the liquid is up brimming and has been overflowing at E pond, and is down 12 feet or more at W pond. Swift streaming into SE arm as torrent from central pool under an arch of crust. Main lake margins 2 to 3 feet high, SW island somewhat increasing in height. Dense vapor from summit W crag.

NOTE. This group of alternations whereby different sides of the pond system rise and fall differently ought to be studied photographically from a fixed point with exposures every hour, to determine how E and W alternate, and how bench magma and lake magma alternate.

The SW solfatara gave temperature C. 170°.

September 27.
4 to 5 p.m.

Lakes high and fume very thin all day. Find E and W ponds only 1 to 2 feet below their banks. E pond puffing with a filagree cone flaming on its S side. SE arm and SW arm sluggish. Streaming from SW to center. N islet entirely gone, and was gone yesterday, as shown in photo. Other two islands large and 6 to 8 feet high. S bank of SE arm high showing differential uplift. Island platform of SW arm tilted NW. Fume mostly from top of W crag. Twelve fountains.

At 4:30 p.m. sudden break away of crust at tunnel entrance to SE arm and a torrent poured for fifteen minutes into arm like a cascade. The slowed and crusted.

T A J

PHOTOGRAPH RECORD

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date September 26, 1920

t	sta	subject	no	pl	scr	stop	ds	path
11a.m.	NW station (over monument) to W crag	3	W P	8x	f/11	1	5x7 T A J

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1920, Sept 26

3

Jaj

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Tuesday Date September 28,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
2:30p		Survey for base-line and position of stations. Large transit.						
	Hut stone	NNE sta.	0	+0 11	-05			5 ft.
	"	SE sta. to rod on 5-foot mark	L 63 31	+1 02	-04			
		Distance, direct stadia reading -				840	wrong	
		To SE station part distance ------				545		
		Second part distance to station---				269		
						814		
		plus stadia constant				1		
						815		
		horizontal correction				-0.2		
		Result				815		
	Hut stone	N	L 3 55	+0 14	-05			
		NW	L 18 48½	+0 43	-05			
	SE	NNE	0	-0 35	-04			
		NE edge sta. to 5-foot mark	R 18 48½	+0 50	-04			
		N station	L 17 2½	-0 21	-04			
		NW	L 37 55	+0 20	-03			
		W	L 58 10½	+0 08	-03			
		SW	L 71 23	+0 26	-03	1021	9	
		S saddle	L118 49	+1 03	-04			

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date September 28, 1920
Wednesday " 29, "

September 28.
2:30-4:00 p.m. Much as yesterday. W and E ponds high, 1 to 2 feet down; remainder has 4 to 6-foot banks. The S side of SE arm is uplifting as a SE dipping surface so that the inner shelf S of entrance to SE arm is tilting up. The bench S of W crag is tilting up northward. The eastern and northern benches are probably tilting northeastward. This all appears to be a new sectoral upthrust in center, the sectors being obliquely tilted. Fume today moderate.

About 3:30 p.m. the tunnel entrance to SE arm cleared of crust and started a rush torrent, almost a cascade, through the tunnel from the lake to the SE. E pond remained high and puffing. Surface of N cove appears fresh. Twelve to fifteen fountains.

September 29.
1:35 p.m. Conditions in pit much the same. Banks a little higher. E pond at first down 3 feet; W pond also. Streaming through tunnel into SE arm. Later E pond rose to overflowing and the SE arm backed up and torrent slowed. Pond bubbling 10 feet across, oval, in N cove extension (N pot) appears higher than central lake.

SURVEY for fundamental pair of triangles.

Approximate triangles estimated in advance:

SE - NNE - Hut Stone -	45½°	NNE - SE - W -	58°
NNE - SE - Hut Stone -	71°	SE - NNE - W -	69°
SE - Hut Stone - NNE -	63½°	NNE - W - SE -	53°
	180°		180°

Fundamental base NNE - Hut Stone in four shots stadia with leveled transit.

To be located -- NE and N and NW stations.

h.i. 4' 8"

SE to -				
Hut Stone	00	00	00	
NNE	70	40	45	
W	128	50	15	
				" "
NNE to -				
Hut Stone	00	00	00	
NE edge (white spot of recent loc)	30	46	15	
	45	48	15	(level 00)
SE	135	04	30	
NW	116	01	00	
W	166	37	30	
N				

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date September 29,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1:35p	NNE	Lake, point N of tunnel leading to SE arm	72 06	-16 48	-03	800	240	
		S peak of NE crag	63 04	-13 47	-03	615	154	
		Smoke peak W crag	106 26	-10 17	-03	852	154	
	W	SE	0					4 ft
		NNE	L 51 38					
		N	L 74 21					
		NW	86°57'30"					
								T A J

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Hawaiian Volcano Observatory

JOURNAL

Day Friday Date October 1 1930

10:30 a.m. Continued thin fume in pit and dense fume with solfataric acids SW, and increasing sulphur, alum and fume in area just NE of old NE half-dome station of 1917 (NW of hut).

Lakes about the same in activity, six to eight fountains. The tunnel SE has fallen in and is now an open channel, with fluctuating spells of rapid flowing into SE arm. Narrows N and S of SW arm island still arched over. SW and W the edges of lakes 3 feet down, E pond 4 feet down; towards center the sectors are lifting up; banks and islands 8 to 10 feet high. Fresh overflows NE side of E pond and S side of SW arm. Fume chimney top of W crag.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date October 1, 1920

t	sta	pt							h. i.
10:30a		Measurement of Base line Hut Stone to NNE monument.							
		Hut Stone (H S) -- + chiselled NNE -- iron spike							
							Stadia	H.rod	
		H S to 1st stop					4.43	3.34	4.66
		Levelled instrument and transited					2.29		
		1st stop to 2nd stop					3.54	2.52	4.66
		Levelled & transited					1.53		
		2nd stop to 3rd stop					5.52	4.72	4.66
		Levelled & transited					3.90		
		3rd to 4th stop					11.25	10.40	4.66
		Levelled & transited					9.55		
		4th to 5th stop					1.78	1.20	4.66
		Levelled & transited					0.24		
		5th to 6th stop					2.53	2.07	4.83
		Levelled & transited					1.60		
		6th to 7th stop					3.48	3.32	4.66
		Levelled & transited					3.16		
		7th stop to NNE					1.30	1.11	4.66
		Levelled & tramsited					0.92		
		F + c (stadia constant) = 1.19 foot							
								T A J	

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Sunday Date October 3, 1920

9:25 a.m. Five fountains in action. Quiet skins. Slow streaming. Big noisy blowing grotto SE side of SE island. This island 10 feet high but SW island, eroded away on its NW side, only 3 feet high. SW island small, with surface sloping to SE; large channel NW of it, small channel S of it. SW island appears overturned S.

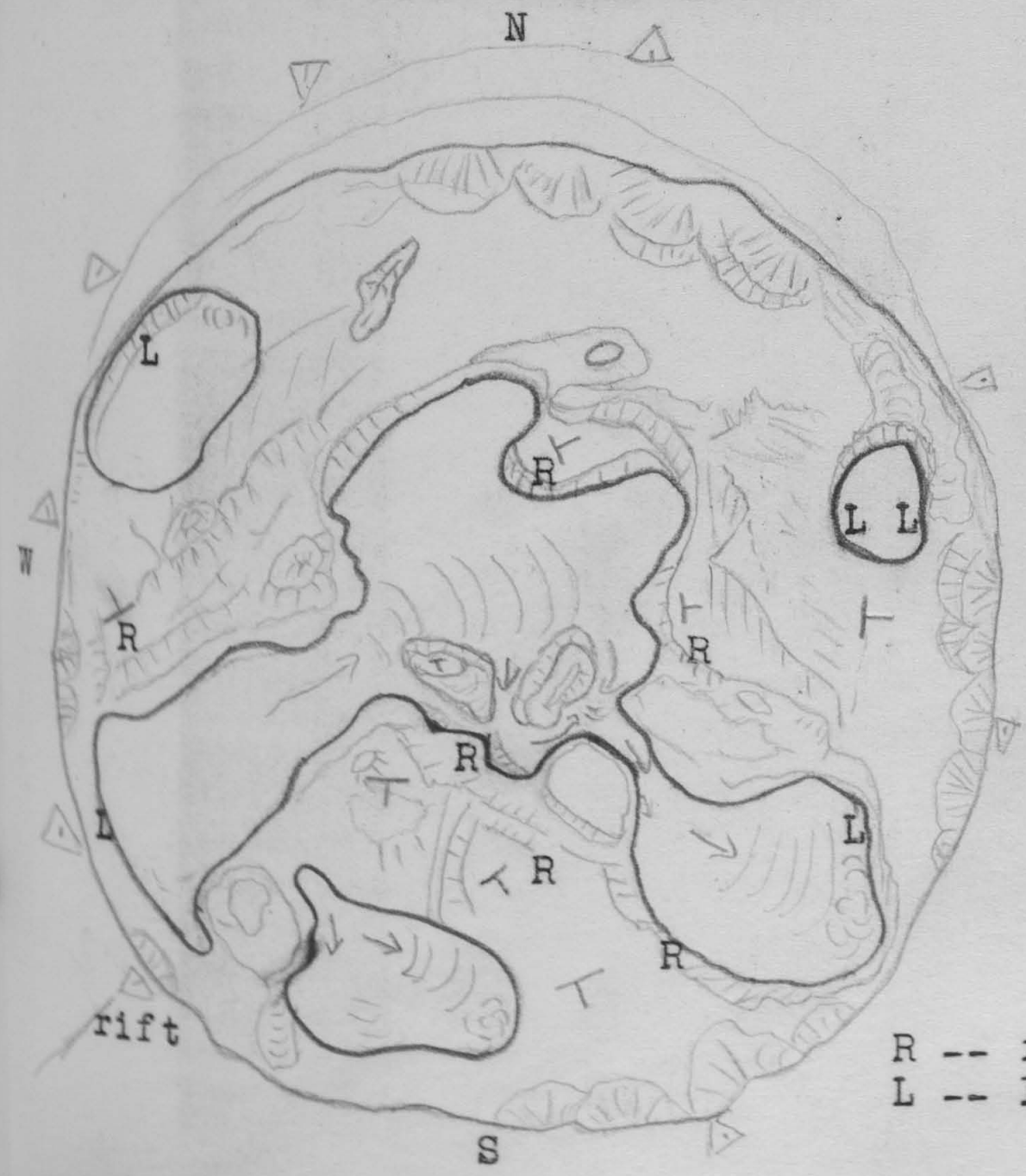
Lake banks 4 feet high W pond; 3 feet high in SW bay; rising to 8 feet high at E end SW arm pond; 10 to 15 feet high S side SE arm; 3 feet high N side same; 6 to 8 feet high around center lake; 3 feet high around E pond.

Lift of the sectoral crags continues, now conspicuous in SSE crag peak, which is rising into a high point and lifting the cliffs over E side of the chasm leading to SW arm pond and over S side of SE arm. The point of upraised recent bench S of narrows leading to SE arm has again broken down in a square block, leaving a big crevasse between it and SSE peak. The whole bench of the S crag mass along S side of central pool is uplifted and the whole S flat is tilted SE and S.

A similar sectoral tilt of the W crag mass toward N is conspicuous, lifting the shore bench of SW channel and central pool and creating a new scarp 20 feet high with inface to S, over the W side of SW arm bay. The NE crag mass is also lifting and the E pot is high and dry and sulphur stained and the surface of the E flat appears to be tilted eastward.

Dense fume from summit W crag, from S crag mass, from SE island over the big grotto. Fume in pit as a whole thin.

It is notable that there are considerable talus accumulations N, E, S, and W, and absence of talus opposite SW arm, SE arm, E pond and W pond. In part this is because of the engulfment of the talus by the pools, but not so obviously so at SW arm. The talus E and S and perhaps NNW are on the downtilt side of the rising sectors.



Sketch 10 a.m.

R -- rising
L -- low

10:30 a.m. SW arm bay and E pond were rising and lakes generally higher. A hissing vent can be heard to the SW at the SW rift solfatara which is fuming but slightly. S pond now quite shut off with streaming through tunnel on N side only of partition from SW bay.

SW island has flat developing E side, as though it would soon be added to S crag mass.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date October 4, 1920

5:00 p.m. Lakes lower. Hissing and glowing SW wall vent. Eleven to fourteen fountains. Radiating fan of bright-lines in center, SE and SW pools. Tendency to develop central fountains in lines, which migrate with the currents and become larger as they progress. Three such fountains seen simultaneously in three different places: W pond, center and SE arm. W pond fountain migrated to N bank, central ones all migrate to NE cove, SE migrated to end of arm.

SW island 5 feet high and larger; SE island 8 feet high. Shore margin of yesterday everywhere upraised. Lift of sectors shown by W pond, 8-foot bank on SE side, 3-foot bank NW; shown by E pond, 5 or 6 feet high SW side, 3 feet high NE; by SW bay 3-foot bank at W and 6-foot bank E. Banks of main lake generally 8 to 10 feet high.

Much noise of plashing and puffing fountains. Usual fluctuations of sinking and rising. Tunnel under the chasm crust, on central pond side, between S and SE crags. Dense white fume from W crag summit. N pot small and glowing.

The radiating bright-lines, large and migrating central fountains, tipped crags, tilted cups of the ponds, currents from the W, islands, and general condition of the pit landscape all recall the scene in September-October, 1916.

Noted a break or crevasse parallel to the face of NE crag on central pool side; checks with the downfaulting shown in sketch September 17.

NOTE. The travelling central fountains develop when currents are accelerated and surface thereby broken: this probably due to release of bubbles from the under layer of large bubbles, which otherwise are released only by disturbances of rise and fall at shore contacts.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Tuesday Date October 5. 1920
Thursday " 7, "

October 5.
2:30 p.m. Lake up again. SW island has an outlier E connected by a flat bridge, and there is a bridge S connecting with S crag mass.

E pond overflowing on NE side for 50 feet to N, flush with bank oh SW side. W pond 1 foot down NW side, 5 feet down SE side. Six or seven fountains in all. Main lake has been overflowing N cove extension. N pot has larger glowing fractured area W of it. Hissing SW wall vent continues.

W pond started a spurting fountain against bank W corner which sprayed 80 feet vertically, made a fountaining area 20 feet across and gradually spread across S side of pond. Then the crust broke up and general bubble fountaining and sinking of the surface two to three feet ensued. The spraying, sheets of yellow-green flame and puffs of semi-transparent fume of the big fountain suggested the Alika source fountains on a small scale.

Since the N island disappeared, the lake has been rising and there is no trace of that island. The island growths must depend on current transportation of foundered material and deposition where current sweeping on bottom is least. This is one more line of proof that the lakes are shallow.

The point S of entrance to SE arm, a fracture block, has sunk 4 or 5 feet in two days and now is a low platform only 4 or 5 feet above the liquid.

October 7.
1:45 p.m. N pot brimming and crusted. E pond 1 foot down, three marginal fountains. W pond brimming NW side, 8-foot wall SE side; at 2:15 breaks up and sinks 2 feet with fountains.

SW arm open again NE side of island, strong streaming into it from SW bay and many shore fountains at 2:20 p.m.

N bay crusted, four central fountains in central pool, streaming from SW, and to SE, grotto tunnel at S chasm. SW island connected by bridge and with spit extension E.

SW arm fountains at inner end. Ten to fourteen fountains at different times.

Smoke increasing over tunnel from W pond to central pool N side of W crag.

Fresh driblet overflows from W pond and E pond. East-west crack athwart sunken point S side of SE narrows.

Avalanche W of W crag. Uplift of SW scarp of W crag mass increases. Some cracks across N floor. Large spraying central fountains seen in several places.

Channel wide from SW bay to SW arm, channel narrow leading to SE arm. Most fume is from SE island, S chasm and W crag.

Against W wall of pit W of W crag mass where mass has lifted, there is a sag and a pressure ridge where the floor has met friction in crushing along the wall.

Rampart of flame cones and spatter cones building against E wall of E pond. Five fountains there. Recent overflow from pond S as well as N.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

SURVEY RECORD

Day Thursday Date October 7, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
1:45p	NE	NNE	0					4 ft.
	NNE	NE	0					
	NE	Middle peak NE crag	67 12	26 07	0	347	170	
	NNE	same	33 55					
	NE	Peak W crag	64 46	9 35	0	940	159	
	NNE	same	76 10					
	NE	Lake, E point SW isl.	78 13	20 30	0	650	240	
	NNE	same	53 16					
	NE	Lake, W side W pond	48 13	12 56	0	1061	244	
	NNE	same	97 04					
	NE	Lake, SE end SE arm	129 30	24 22	0	543	245	
	NNE	same	23 43					
	NE	Summit SE crag	94 12	16 16	0	692	202	
	NNE	same	46 22					

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date October 8, 1920
Saturday " 9, "

October 8.
10 a.m. General rising continues with thin fume except for chimney making dense white vapor on summit of W crag and the increasing volumes of fume from the red solfatara SW.

Streaming E in SW arm, open channel N of island in that arm, bridge and tunnel S of island.

In central pool crust over N cove, streaming and central fountains in middle, SW island more massive in its E extension, grotto tunnel at S chasm, usual streaming through narrows to SE arm. Large fall of spatter bank seen E side of central pool.

W pond shows break-up, subsidence and recovery. Both E and W ponds high. E pond puffing on NE edge.

N pot at first quiet, then breaks up with fountaining and liquid sinks 3 feet and continues boiling.

Considerable chasm along wall crack developing W of W crag. SW bay has been overflowing its banks on SW side.

About ten fountains.

October 9.
Morning. Same kind of activity with breaking up spells in W pond. Fume thin in pit and thick at Red Solfatara. W pond also seen overflowing.

T A J

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JOURNAL

Hawaiian Volcano Observatory

Day Sunday Date October 10 1920

11:15 a.m. More overflowing of marginal areas. W pond has overflowed along wall from beneath W station to the N floor pouring through gap between N small crag and lower N shelf. Both SW arm and SW bay have overflowed on bench all the way from beneath SW station to nearly beneath S saddle station. E pond has overflowed from a point beneath midway between SE and NE station to a point under NNE station. N pot has overflowed sending a stream to wall N. It has also overflowed the N cove niche or extension. Central pool has overflowed N cove extension and the platforms N and S of the down-faulted southeastern part of W crag mass.

Lift of the crags N and S of SE arm has raised the cup of the latter so that the pool there is stagnant and there is no overflow from that arm, but it builds apatter ramparts at its inner end.

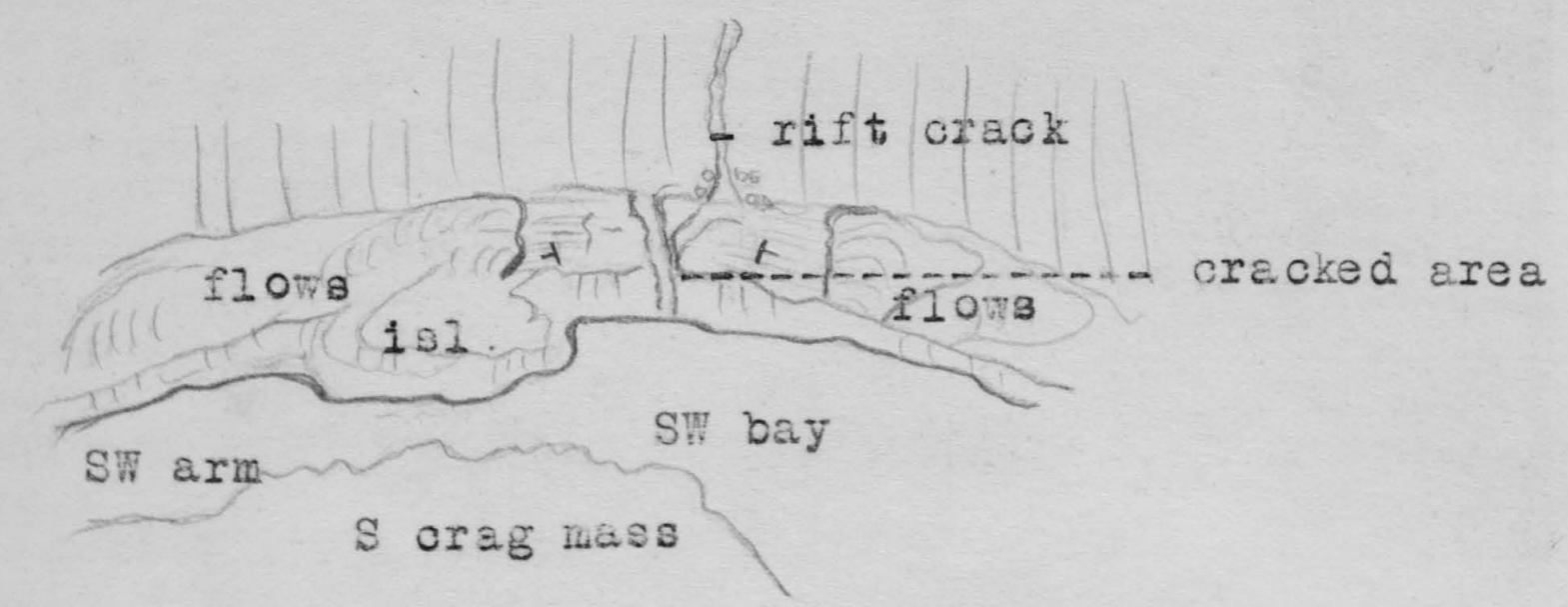
Eighteen to twenty fountains seen in action at once during a depression spell, seven or eight during a rising spell. Many caverns revealed. Migratory large fountains in center. Streaming to NE cove from SW channel.

N pot greatly enlarged, 5o feet long, streaming to NE, fountaining cavern NE end. Open cavern E cove, S cove, SE side of SW channel, S corner of SW bay, at W cove, etc. Noises of plashing and at E pond of puffing fountains.

Both island stand high and are large (SW 10 feet, SE 15 feet high). Bench S side of SE narrows lifted again, 10 feet high. Cracks showing tumescence on N floor slopes of W crag uplift, on floor NE of N pot, on floor S of SE arm. This and all the E pot region tilted up northward.

Once more the augmented tilts following border fills are seen as though the adjustment were isostatic. N point 18 feet high and raised inner benches all around the central lake on the faces of the uptilted units. Fume quite abundant. Small E-W pressure ridge on N floor between the flows from W pond and N pot. Appears to be thrust from the south.

Between the overflows from W side of SW bay and SW side of SW arm is the rift wall vent fuming and stained and the bench beneath is swollen up with a SW trending crack across it.



T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Tuesday Date October 12, 1920
Thursday " 14, "

October 12.
5 p.m. Report of great activity and fountaining yesterday evening, probably a rising spell.

Tonight lakes rather quiet, crust SW and SE, nine or ten fountains. Breaking up seen in SW arm.

Fresh extension of flow along base of N talus from W pond, joining with flow from N pot.

Glow SW rift wall-vent and glowing lava SW side of SW arm island as though that channel were open leaving the island isolated again. W island of central pool again has crust connecting it with S crag mass.

Depression of E pond slight, other lakes 6 or 8 feet, W pond probably less. Spurting cone seen against SW wall somewhere near the rift. Pit fairly bright at night and fume thin except from Red Solfatara.

October 14.
10 a.m. Big fall of spatter bank W bay. This bay now the NW bay of lake for the N cove and NE cove have both become raised platforms since a month ago.

New pot 15 feet in diameter open and glowing against SW wall just N of SW rift crack. Opposite rift crack a new driblet cone 10 feet high, close to crack, was flaming. Whole SW bench between SW arm and wall covered with a live flow from this cone making a small cascade 3 feet wide into SW arm over the bank which is about 2 feet high and still farther E is flowing and filling against the foot of the wall under the W part of pressure eidge. Snaky piles of pahoehoe near the cone.

Middle of pit bench magma rising, former NE cove lifted into a crag including the pulpit rock on the S side of N pot. Latter an oval E-W and tumescence cracks E of it more open and ground there more swollen up. New cracks parallel to margin along S margin of W pond which is enlarging by infall on that side. Southeastern fault block subsided portion of W crag mass becoming engulfed by accretions of rising lake.

W island has additional extension at lake level NE and is large and high (15 feet). SE island 30 feet high and some violent fountaining in channel S of it.

Nine to ten fountains. Rising toward 11 a.m. Central pool surrounded by 20-foot walls except for 2-foot inner platforms W and N, outlying pools all have 1 to 2-foot banks (N, E, SW and W and wall end of SE arm). Overflows around N edge of bottom area as before, the N pot and W pond flows joining, but not the E pond flows.

Streaming from the SW and to the SE and against N bank of W pond. Fume dense from top and N base of W crag, and steamy fume from much of S crag mass. Fume from low levels is blue, from higher places is white. Noises of quiet plashing.

10:50 a.m. Sudden violent fountaining under tunnel overhang at E end N pot and then a welling up rapidly like an artesian doming at W end of pot and pool filled to brimming with bubble fountaining. Then subsided a foot and became quiet. Streaming from W to E. The effect was as though the break up had caused a sudden foaming.

New avalanche material under NW station on the fresh flows from W pond.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date October 14, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NE	N	0					
	NNE	N	0					
	NE	N grotto W pond	26 32	-13 25	00	959	229	
	NNE	same	40 06					
	NE	E tip W island	58 51	-20 51	00	835	242	
	NNE	same	83 04					
	NE	SE grotto SE arm	110 27	-23 44	00	542	239	
	NNE	same	111 52					
	NE	W grotto E pond	39 18	-47 00	00	235	252?	
	NNE	same	113 28	23 06	00	525	224	
	NE	Summit SE crag	75 00	-15 01	00	736	198	
	NNE	same	88 08					
	NE	Summit NE crag	48 52	24 36	00	337	154	
	NNE	same	102 48					
	NE	Summit W crag	45 46	- 8 19	00	954	140	
	NNE	same	58 37					
	NNE	New pot SW wall base	66 28					
	NNE	New cone SW rift crack	68 28					

Mean lake 237 feet
W crag 97 feet high
Increase of relief crag 20 feet

NE edge now same elevation as NE monument of November 28,1919.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Friday Date October 15, 1920
Saturday " 16, "
Sunday " 17, "

October 15.
6 p.m. Flaming cone SW rift crack, flames E end SW arm, end SE arm and at other grottoes. Eleven fountains. Swift streaming from SW to center and from center to SE. Heights of ponds and shores about the same. No fresh flows. W island connected by isthmus with S crag mass. Considerable bay N side SE arm.

October 16.
3:30 p.m. Quiet at first, then break-up with cracking and foundering in center. Seven or eight fountains. Outer shores low, center shores 10 or 15 feet high. New cracks in back slope of W crag mass S of W pond. N pot and N cove crusted. Glow cone S corner of SE arm. Fall of marginal banks S side SW channel. Some fresh driblet overflow N and S of W pond. Former island in SW arm now a peninsula, fill of fresh flows SW of it.
3:45 p.m. N pot breaks up. SE island high and narrow leaning southeastward, looks as though it might fall over.

Mauna Loa. Mr. Albert Judd reported that cowboys of Dent's ranch had seen smoke over the Kahuku flow locality of October, 1919, and that he had seen a cumulus this morning which looked like fume.

This evening at 6 p.m. a wisp of fume on the mountain over Uwekahuna as seen from H. V. O. and smoky appearance to sky. The fume wisp disappeared. No glow.

October 17.
11:30 a.m. Lake very hot, nine fountains. Much caving of spatter banks. SW wall cone and flow from it glowing. Steady streaming SW to center and center to SE. Bench magma rising. Shelf of down-faulted portion of W crag on side toward central pool becoming submerged, only a few jagged red remnants of rock protruding above overflow bench. Fresh driblet overflows indicating spasms of brimming SW arm, W pond and E pond. Streaming from inner end of SW arm westward, then around bend northeastward through the channel to center.

This morning about 8 O'clock a heavy avalanche seen sending up red cloud of dust from W wall of pit W of W crag.

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Monday Date October 18, 1920
Tuesday " 19, "

October 18.
4:30-5:00 p.m. South wind all day makes the fume from Red Solfatara very conspicuous, white steamy volutes from recent rain. Fume at pit thin. Visited solfatara, found the bright red largely replaced by more rusty red, perhaps from rain wash.

Pit from SW and S very clear. Large wall crack chasm W of W crag. Down-faulted block of W crag chiefly an overflow bench.

Lakes overflowing strongly. SE arm overflowing its SE end and the flow has poured along base of E wall northward to pool with flows from E pond.

E pond overflowing strongly both N and S, flows joined with N shelf flows of N pot and W pond.

W pond overflowing N and S. SW wall cone at least 20 feet high above SW arm, a wide conical heap, flat, flaming on top, flanks crevassed and showing collapsed pits. Crevasses of tumescence. Glow.

SW arm crusted at first, blowing border fountains and puffing filagree cones flaming at E end. Later breaks up with brilliant cracking and foundering and many fountains.

Seven to twenty fountains at different times. Streaming in a curve from SE channel to S side SE arm. Flaming cone on SE bank SE arm. Open cove through from N cove to N pot.

NE cove of lake surmounted by raised platform 20 feet high with deep cavernous overhang beneath. Appears to be a cave going under N end of NE crag toward E pond.

Fresh avalanche material from yesterday's avalanche W of SW bay on bench.

SE island has toppled in a SW direction as expected and is an inclined scarp.

New islet near NE point. Streaming to NE and into N pot.

Movement a pronounced flooding following crag lift.

October 19.
6 p.m. Strong flowing from E and W ponds, new glowing flows on SW bench trickling, many flames and border grottoes. Immense grotto half dome on S face of upraised N point. N pot now N arm. Flame hole in SW wall cone.

Lake high, flooded through E crevasse. Streaming out from E end SW arm. Nine fountains.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Wednesday Date October 20, 1920
Thursday " 21, "
Friday " 22, "

October 20.
6:30 a.m. Distinct brown fume on Mauna Loa, over Mokuaweoweo, small jet, making a trail northward.

Halemaumau reported still high, active and flowing somewhat; some avalanches.

October 21.
4 p.m. W and E ponds 1 foot down.

Streaming out of innermost E end of SW arm. Flow running from SW wall cone. More blocks appear to have slid down fault face of W crag mass. NE crag very steep and its extension N of NE cove and S of N arm 30 to 40 feet high.

SE island has extension S and W island has new platform. Both are connected to S crag mass.

Fresh flows all around wall base W, NW, N, NE, E; the SE arm overflows have even dribbled a little way S. Flows on bench from SW wall-cone from base of W crag-mass to E of SW arm. Only two interruptions to flows all around, one at W crag against wall and one for 100±feet S of SE arm.

Pot in E cove extension again. N pot is now N arm. More fume today, very dense from W crag and Red Solfatara.

4:15 p.m. Small slide under NW. Quiet, five or six fountains.

October 22.
8:30 p.m. Nine to fifteen fountains, six at one time in center. Lakes crusted, then bubbling break-ups. Torrent through narrows to SE arm from under a heavy crust over SE part central pool. Then a fountain ploughed its way 100 feet from open central pool to narrows, cracking the crust as it progressed until all broke up, the congestion at narrows was relieved, and the torrent slowed down because the SE arm rose to the common level. The drainage of SE arm had been faster than the supply through the narrows. The heavy crusts had blocked the supply and dammed the narrows: here is an additional proof of shallowness if any were needed. Query: may not the diversity of level which occasions cascades be due to the building up of bottom and damming narrows from below, thus shutting off supply to the cauldron arm which receives the fall?

Streaming out of SW arm. Heavy bombardments NW cove and S side SE arm. Blowing fountains spraying far over banks from under crust S side E pond. Flaming cone N side E pond. W pond similar. Bridge between E pot and central pool. Fracture block S side E pot 30 feet above pot. Heavy pudding of fresh glowing flow from SW bench filling most of S wall valley far to E of SWaarm, not joined through however to SE arm. SW bench flows trickling and cone at wall alive.

Walls around lake appear high with continued lift of bench magma. Crusts most of the time between E and W islands and S crag mass. E and W ponds brimming and SW arm close to bank level, also SE end of SE arm. Bay N side SE arm appears to be enlarging.

Fume from Red Solfatara dense.

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Thursday Date October 21 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
4 p.m.	NE	N	0					4 ft.
	NNE	N	0					
	NE	NE crag	48 51	-22 06	0	318	130	
	NNE	same	104 42					
	NE	Lake point of W isl.	59 18	-18 58	0	601	207	
	NNE	same	85 13					
	NE	W crag	44 43	- 6 53	0	959	116	
	NNE	same	57 37					
								T A J

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date October 22,1920

t	sta	subject	no	pl	scr	stop	ex	cam
8:30p	SE	SW (night views)	1			f/6.3	5	P
	"	NW	2			"	6	"

Calm weather, heavy vapor cumulus atmospheric convection.

T A J

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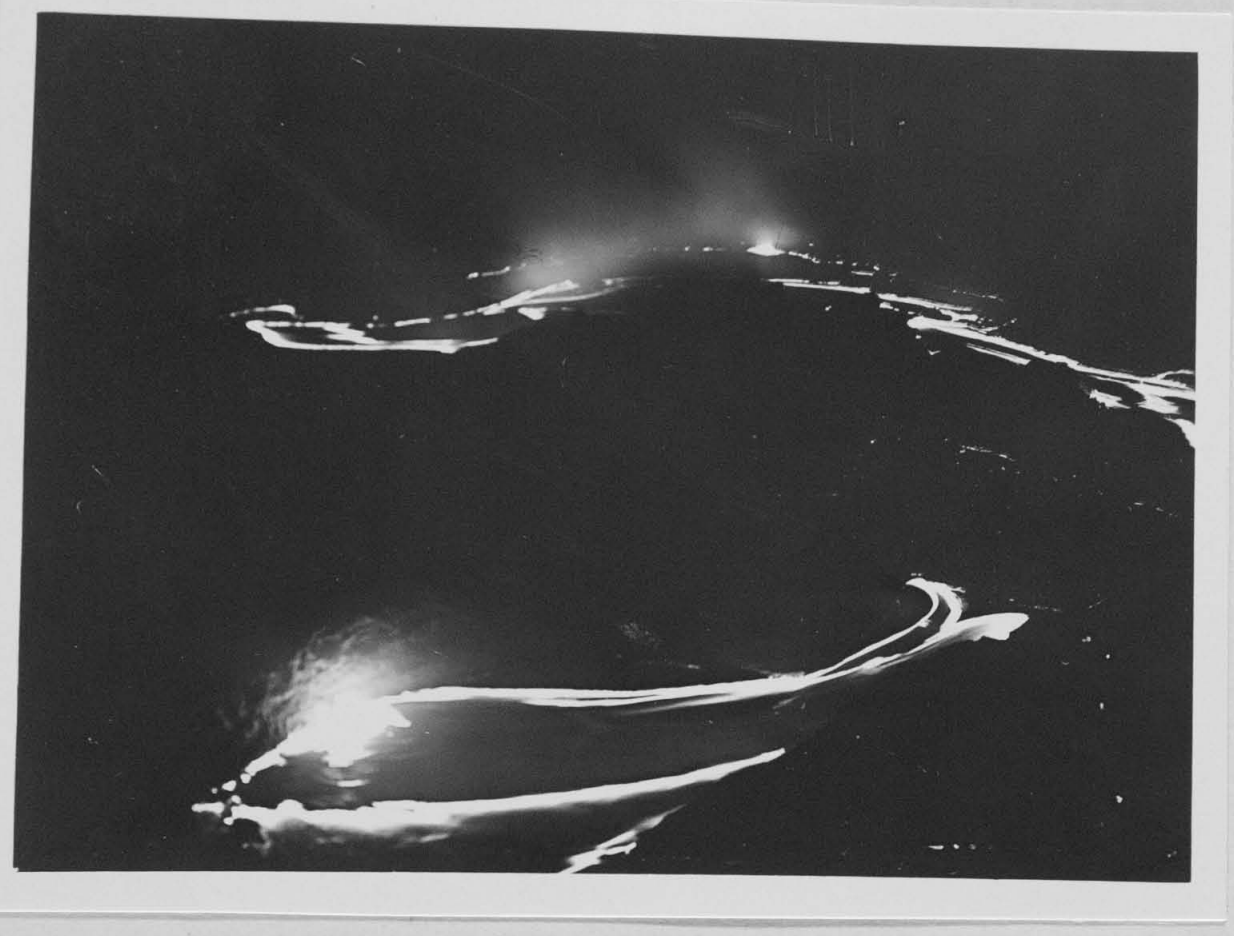
1920, Oct. 22



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Fog

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Saturday Date October 23, 1920

10:15 a.m. From SE station.

W side of pit overflowing from SW bay, SW arm and W pond, voluminously. Other pools high. Eight fountains. Very hot at edge. Festooned stream from SW bay drowning SW wall cone. Two similar streams from SW arm to S flooding S wall valley again. At 10:20 another stream begins to pour into talus from S corner of SE arm. Fresh smooth pools in wall valley with crack and founder pattern, fed from SE arm and E pond all around base of wall from SE pond to N. Flood from SW bay has penetrated between W crag mass and wall. Live flow from W pond around N base of wall joining flood from E pond. Fill nearly across bridge from central pool to E pot. Greater part of down-faulted portion of W crag mass, NW side of SW channel, flooded and becoming drowned. Isthmus connections still between E and W islands and crag mass.

Fume thin. Noise fountaining. SW arm island surrounded by bench floods and lake. Hence defined banks of SW and W pools obliterated.

10:30 a.m. Cracking and foundering process spreads across N floor flows. These flows all around E and N sides of pit at base of wall show rim of shell lava against wall one to two feet high where the crack and founder process has deflected the pooled flows and lowered them.

Migrating lines of fountains in central pool from W to E.

10:35 a.m. SE arm making toes out to its NE corner starting flow toward E pond.

10:45 a.m. Great flood starts like river northeastward from W pond and pours all along base of N wall.

11:00 a.m. This flood reaches E pond and cascades into it, breaking up its crust and surrounding it. Cascades 2 feet high.

11:10 a.m. E pot boiling. Flood from W pond advances beyond E pond southward. The rise of W pond has flooded through southward on W side of W crag and the festooned front headed toward SW bay can be seen on S side of W crag mass.

First effect of cascade into E pond is to release the gas of the pond and lower the surface to 4 feet down. Big cascades N and E sides.

Isthmus S from E island now flooded.

11:30 a.m. Two powerful torrents, one from SW arm flooding S talus, one from W pond flooding E pond. A third is the main lake flooding SE arm. Last two in adjustment, SW arm flood building. Wide stagnant flow between W crag mass and wall from W pond. N arm brimming and practically level with flow from W pond. As soon as the S flow joins through to SE arm the three crag masses will be isolated. W pond and SW bay are seen to be definite source wells; E pond, E pot, probably N arm, and SE arm are definite sink holes. Probably SW arm is a sink hole also, but overflooded at present.

11:50 a.m. Break-up with violent fountaining W side SW bay.

JOURNAL

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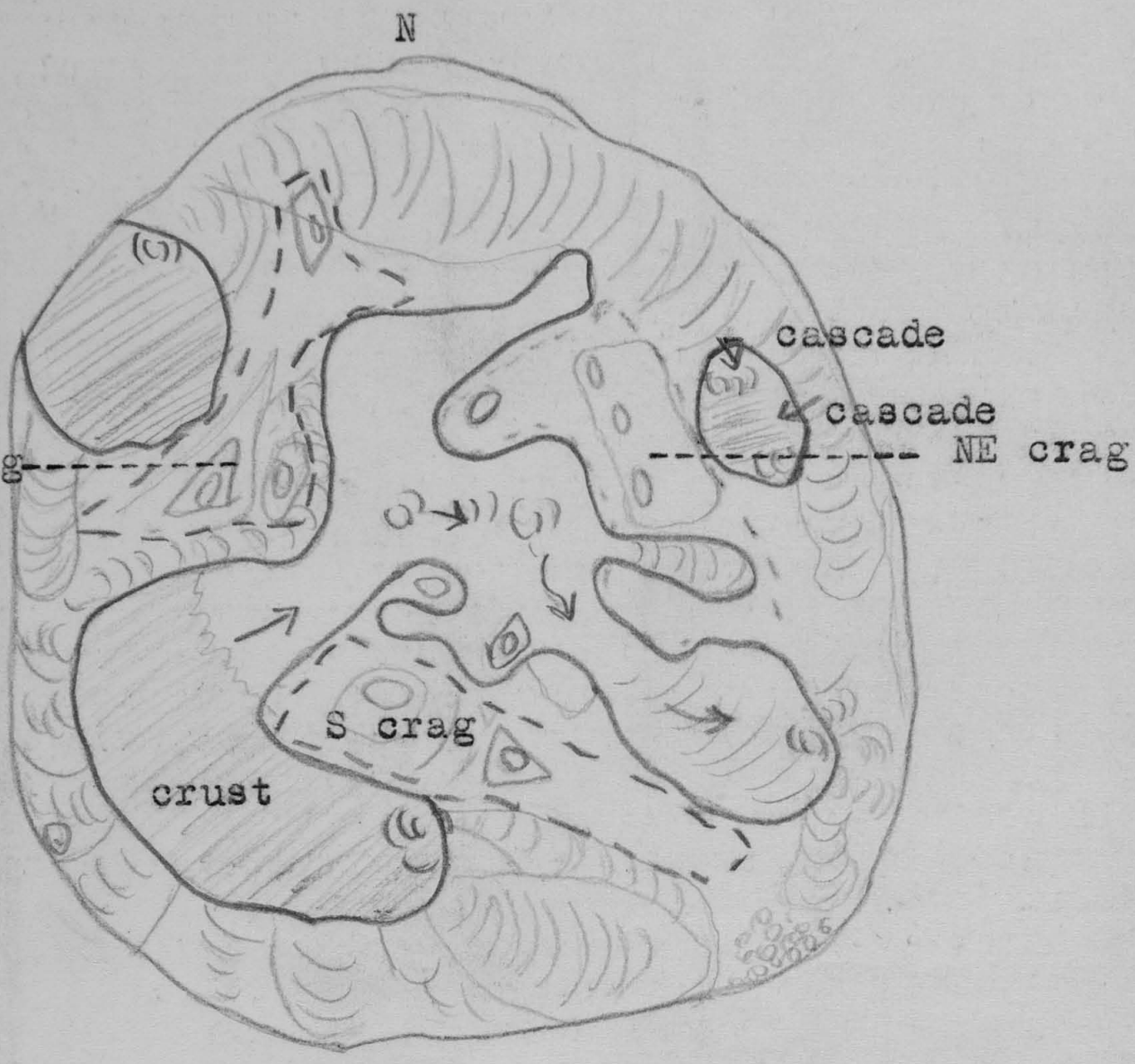
Hawaiian Volcano Observatory
Day Saturday Date October 23, 1920

Noon. Sketch Halemaumau:-



Dotted lines -- crag masses.

12:05 p.m. W pond shows its edges. E and SE flows nearly joined.

T A J

3-4 p.m. All lakes 2 to 3 feet below lower inner rampart except the E which is 4 or 5 feet below. One fountain continuous in E part of central pool. Migratory fountains break off from this and travel to the NE crag. The streaming from the SW arm divides on reaching the central pool, one branch going to the SE arm and the other to a long grotto along the isthmus between the W pond and central pool. A noisy grotto developed on the S side of SE arm. (The SE islet is connected with the S crag mass), The lakes fell about a foot at 4:00 p.m.

R H F

8-10 p.m. Circuit of pit by W and N. After the quiet of this afternoon's sinking spell, new flood begins and pours from SE end of SE arm both S and N; S branch joins with a new flood from SW arm, pooling and filling S; N branch joins with a southward overflow from E pond and overcomes it. It then

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
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JOURNAL

 Day Saturday Date October 23, 1920

pours on north. There it encounters an overflow W from N arm and joins it. W pond this time remains 1 to 2 feet down blowing and spurting high, blowing and flaming cone on its W bank. Pool and fill N. Quiet center of dispersion of most of the evening flowing seems to be SW bay, overflooding from a dark crust to the SW against wall, to the NE into lake, and from SW arm to S wall-valley fill. Enormous volumes pour for two hours or more from SE corner. SE arm bending N to find the best downgrade, exactly the opposite of the flood of the morning. The axis of uplift must be from W to E across middle of pit with marginal fills determining somehow the changes of peripheral grade.

T A J

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

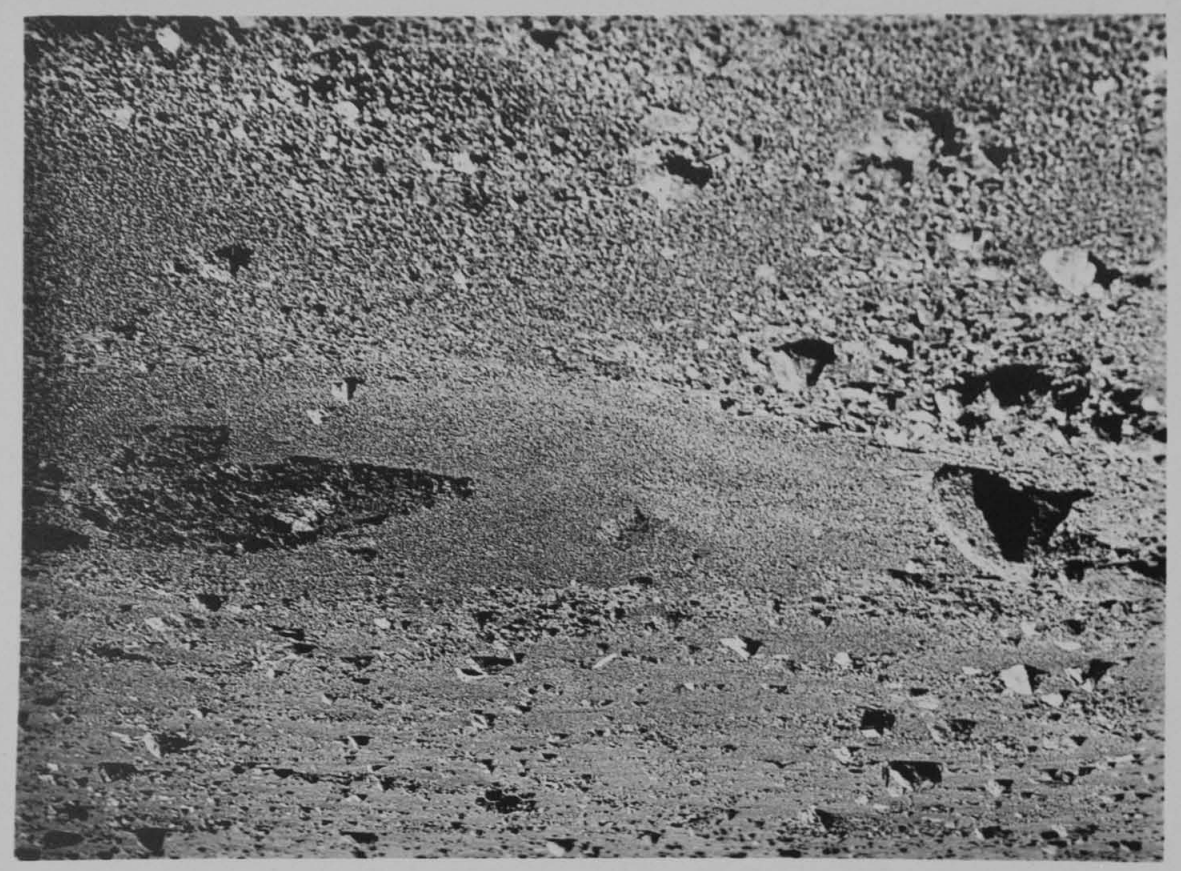
Hawaiian Volcano Observatory

Day Saturday Date October 23, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
9:15a		Gravel S of Keanakakoi to Halemaumau showing fume column from Red Solfatara	1		8x	f/16	1	P
		Turtle-back bomb and a broken bomb and their pits (Double exposure)	2		"	f/6 & f/16	1	"
		Small ring crater pit W of road S of Keanakakoi (back of built-up wall). Scale one foot long	3		"	f/16	1	"
		Buried turtle-back bomb and its pit, back of walled road S of Keanakakoi, W of road	4		"	"	1	"
		SE station to W wall, SW arm and bay overflowing	5		"	"	1	"
		SE station to E pond and NE crag	6		"	"	1	"

T A J

1920, Oct. 23



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1920, Oct. 23

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JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date October 24, 1920

11:45 a.m. SW wind. Eleven fountains. Floor flows glowing, and cracking and foundering. Ponds defined in banks one to two feet down, said to have been overflowing this morning. Trace of a gas vent in the fresh flows SW wall cone site. Nearly all taluses covered. Streaming from SW bay both to SW arm and central pool. E and W islands connected to S crag mass. Large grottoes built E end SW arm. Backslope of NE crag has caved and tumbled. Continuous new floor edge all around pit with crag masses like islands, and edge above sunken deflated floor. The points of fresh bench NE, W and S show uplift and tilt centrifugally since yesterday. Crags partly drowned, especially S crag mass, new floor continuous from SE to SW arms.

8-10 p.m. Lakes very quiet and crusted SE, SW and N, some open lava SW channel and center. Ponds 1 or 2 feet down. Glowing flows everywhere heavily crusted. Six fountains.

9 p.m. W pond rises and overflows all around and short streams E and S which quickly stop.

After this, break-up and slight lowering of lakes, rapid stream into SE arm, eleven fountains. Large spurting and spraying fountains around edges W pond. Small wall avalanche NE.

10 p.m. W pond full again and slightly dribbling over. E pond crusted and a few border fountains all the evening.

The general situation appears to be a reaction after the strong flows, with probably a lift of the bench magma in progress which keeps pace with the liquid rise.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

SURVEY RECORD

Day: Sunday Date: October 24,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
			0					
11:45a	NE	N	0					
	NNE	N						
	NE	NE crag (middle)	48 53	-21 45	0	314	126	
	NNE	same	105 04					
	NE	W crag	44 53	- 6 36	0	959	111	
	NNE	same	57 46					
	NE	SE crag	76 44	-12 18	0	706	153	
	NNE	same	89 41					
	NE	NW side W pond	27 40	-11 03	0	994	194	
	NNE	same	40 32					
	NE	E point W island	61 00	-17 54	0	620	200	
	NNE	same	86 03					
	NE	SE end SE arm	108 26	-18 48	0			
	NNE	same	100 32					
	NE	Edge floor SSE(red spot R)	107 40	-13 55	0	793	196	
	NNE	same	105 00					
	NE	Tangent floor S	122 08					
	NNE	same	125 36					
	NE	Tangeht floor N	R 5 00					
	NNE	same	32 10					
	NE	Edge floor N	10 33	-14 12	0			
	NNE	same	43±					
	NE	Edge floor SW (white spot L)	77 33	- 9 28	0	1035	172	
	NNE	same	78 48					
	NE	Edge flow W pond side	28 15	-10 24	0	1600	194	
	NNE	same	37 54					

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Monday Date October 25, 1920
Tuesday " 26, "
Wednesday " 27, "

October 25.
5:30 p.m. Lakes 4+ feet down with little sign of tilting. Eleven to eighteen fountains. Steady streaming eastward and bright lines. Central fountains and border grottoes, no blowing conspicuous. Filagree cone W side E pond.

Tunnels under thick bridges shown between islands and S crag shore, and also under S chasm from central pool side. Little glow in the bench flows. E pot wholly crusted. W pond higher than the other pools, perhaps 3 feet down.

Stalactites and overhang.

T A J

October 26.
5:30-7:30 p.m. Streaming out of SW arm to central pool varied from rapid to sluggish. Current into SE arm at all times and occasionally to N part of central pool. Lakes 3 to 5 feet below lower inner banks and varied in height with frequent crusting over and subsequent foundering. A blow hole at N end of NE crag hissed loudly from time to time. Avalanche to the E from NE crag.

R H F

October 27.
3 p.m. Much the same. Border lakes 4 to 5 feet down, center 6 to 7 feet down. Sluggish. N and SE arms crusted. No glow at SW wall. Slow streaming. Nine fountains. Tunnels open. Slight evidence of new centrifugal tilt. No fresh avalanche material or cracks in floors showing uplift. Streaming E. Dense fume from Red Solfatara. Fume W and S. in pit.

5:30± a.m. Smartly felt earthquake, prolonged, seemed N-S, deranged instruments.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date October 28, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
11:20a	SSW platform to Red Solfatara		1		8x	f/8	1/3	P
	W	W pond (cracking and foundering)	2		"	f/11	1	"
		Deep cracks under smoke peak W crag, from edge pit S side of W niche	3		"	"	1	"
	N	NE crag	4		"	"	1	"
		Vandalism of sailors U.S.N., sign "New Mexico" NW wall	5		"	f/16	1	"
	SE	S crag mass	6		"	"	1	"

T A J

1920, Oct. 28

2

3

1

4

1920, Oct. 28

3

5

Fog

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date October 28, 1920
Friday " 29, "

October 28.
11:40 a.m. Veering winds. Very dense rapid whitish fume billows up from Red Solfatara. Circuit of pit by W and N shows lakes rising again with filagree border cones and blowing flames SW arm, SE arm, E pond; lakes 3 to 6 feet below banks. Streaming E in N cove, SE arm and SW arm, and as usual SW bay to center. At first only three fountains seen, quiet crusts; later sewen or eight fountains. Fresh avalanche material SE.

Note two large chasm cracks, open downward, vertical and trending east-west, under smoke hole of summit W crag and extending down to and under the floor down W side of crag mass.

Small hole broken in over E pot. Sharp pinnacle in down-faulted part of W crag, SE side. Considerable smoke from E crag mass.

New driblet flows from SW wall crack on bench, small flat area of pahoehoe toes radial to origin, one tongue has flowed over bank into SW bay.

T A J

October 29.
10 a.m. Quiet wrinkled skins. Streaming slow eastward. E and W ponds quiet. Five or six fountains. New breakdown of point SW of SE narrows, with E-W chasm and involving the E island peninsula; remnant of E island small. W island on the other hand become a large raised peninsula. New inner platform around central pool one foot high and narrow. Banks of outlying pools 2 to 4 feet high, not showing the low platform. Hence center probably lifting. Occasional central fountain prolonged and migrating E. No fresh flows. A small cove developed on NW side of SW narrows, in overflow platform 4 feet high which covers the debris of downfault of W crag. Continuous grottoes SE and SW sides of SE arm, E side of E pond, SE side of N arm, N side of W pond, E end of SW arm (with filagree flame cone), S side central pool between the two island peninsulas, and more or less at E cove.

S and W crags smoke, NE and N crags not. Is the smoke on the side of the rising lava?

T A J

5-6:30 p.m. Streaming out of SW arm to central lake sluggish but continuous. A torrent poured through the narrows into the SE arm on two occasions when a border fountain was active for a few minutes at the E end of that arm. Central fountains active most of the time in central pool, sometimes four or five at once. A large grotto was continuously active at entrance to E cove of main lake. Flames from a vent near E part of SW arm were shooting five or six feet into the air.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Friday Date October 29,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NE	N	0					
	NNE	N	0					
	NE	W crag summit	44 48	- 6 34	0	963	111	
	NNE	same	57 36					
	NE	NE crag summit	49 00	-21 38	0	314	125	
	NNE	same	105 00					
	NE	Point W island peninsula	60 38	-18 45	0	599	203	
	NNE	same	86 03					

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date October 31, 1920

10:15 a.m. A flooding movement in progress from the SW bay as a source. Central lake with banks W and S overflooded, clear across isthmus of E island, nearly across isthmus of W island, all over W point to base of W pinnacle. Liquid one foot below bank of SW bay and arm, 3 feet below bank SE arm, 4 feet E pond, 5 feet W pond, 2 feet N arm.

Four or five fountains in W, SE and E pools; none center or SW. Small opening in E pot. Fresh stone falls N, NE and E.

Streaming from SW bay, clogged festoons of skin in SE arm. Streaming N in E pond and S in W pond.

If the rising continues there will be overflows SE, N and SW. The new breakdown block of peninsula S of SE narrows is entirely submerged and the remnant of E island is a little peaked rock only 4 feet high.

Island peninsula of SW arm nearly submerged and SW arm stagnant; blowing cone E end.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date November 1, 1920
Tuesday " 2, "

November 1.
Afternoon. Streaming out of SW arm divides near center of main lake with the larger branch going to the SE arm and the smaller to the grotto on the SE side of the NE peninsula. The crust in the SE pot was slowly foundering with a very sluggish current pouring in from the main lake. The western islet extension of the S crag mass has built out to the NE so that there is a distinct narrows (less than 100 feet) between it and the NE peninsula. There has been an avalanche to the N from the E part of the S crag mass. E lake 8 or 10 feet below bank and quiet. A grotto in the E part of the W bay together with the one by the NE peninsula was the only fountaining activity.

A cascade with a visible drop of at least 5 feet was pouring into the NE pot; width 5 to 7 feet.

A fountain broke out in the middle of the center pool at 3 p.m. and lasted but a second. A small grotto was occasionally active in central pool side of the gap in the S crag mass. SE islet isolated. Center of pit comparatively free from fume while seeing is poor at the SW and NE.

R H F

November 2.
4:45 p.m. Bright-line streaming out from SW bay; central pool and SE arm full of bright lines. Occasional small migratory central fountains, but only three or four border fountains visible N pot crusted and separated by narrow bridge from N cove, walls 8 feet high. Banks W pond 4 feet high, E pond and SE arm 7 feet, SW bay 5 feet. W point platform 2 feet high, island platforms 3 feet high.

Renewed tumescence and uplift of crag sectors. Block S of E pot has lifted and become deeply crevassed, and E pot is again a cove of central pool. SE crag is uplifted and the point S of SE narrows has again broken down leaving a pulpit rock. E island again connected by a bridge of crust to SE crag mass. W island is a large peninsula. New cracks in floor E and pressure eidge along edge of floor SSE. E and W ponds crusted mostly. Some puffing from border skins. N point is lifted into a large crag.

New smoke from E pond shore, from the crag block S of E pot, and much from S and W.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Thursday Date November 4, 1920
Friday " 5, "

November 4.

9:15 a.m. Border pools crusted, usual streaming from SW in central pool. New heavy tumbles of rock on floor SE, E, NNE and SW. Strong uplift of the N point crag so as to show on its S face two convergent bench levels dipping NE, the upper at a high angle, the lower flat. Three new small islets, one N of E island, one at tip of N point crag, connected to shore by narrow isthmus of crust, and one at entrance to N arm. Latter has its inner pot again separated by a bridge from lake, with deep rumbling of fountains within. Only three or four small grottoes in action in entire lake and no central fountains.

New crag developing NNW side of lake involving the old N crag remnant; surface dipping NNW and parting from W crag at the narrow ledge which separates W pond from central pool. The fresh overflow platforms around the islands and shores of central pool have increased in size constricting the lake basin. E island has again a large base, is isolated, and the S chasm cove SSW of it is extended and the chasm makes a smoky gorge beyond.

Stones heard falling. No noise in pit except N pot rumble and a little hissing. NE side of W crag a knife-edge arete, no more floor surface between it and W pond. This and the S crags appear stationary, E and N crags rising. W and SW pools 4 to 5-foot banks, E and SE pools 7 or 8 feet down. Bay N side of SE arm emlarged in direction of E pot.

9:45 a.m. Violent fountain through crust SE side of W pond and complete break up of crust on pond with foundering and lowering two feet. Then recovery. Fountain roars and throws spray 30 feet up.

November 5.

11 a.m. W pond only 2 feet down and rising and crusted. E pond 10 feet down. SE arm 15 feet down. New platforms central pool 5 to 6 feet high. Great crevasse SE athwart NE crag from N pot. Chasms of E pot and S gorge enlarged. Stones heard falling on NE crag and from walls. Crag masses evidently in strong motion. A little hissing. Outlying pools crusted, central streaming from SW, rapid current through SE narrows. Islands high. Crust over N cove. Rock falls from S side SE arm; big one at 10:19 a.m. New taluses enlarging SE and NNE. Almost no fountains. SW arm and SW bay 12 to 10 feet down.

11:45 a.m. Fountain in S chasm and streaming with fountains from center thither.

T A J

11 p(?) m. Alex reports a slide of rock from SW side of channel and that the liquid has subsided leaving the platforms about 30 or 40 feet above the lakes.

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date November 5, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. j.
11 a.m.	NE	N	0					4 ft.
	NNE	N	0					
	NE	W crag summit	45 08	- 6 42	+04	966	115	
	NNE	same	57 45					
	NE	NE point W island peninsula (lake)	59 14	-20 20	+04	588	219	
	NNE	same	86 06					
	NE	Peak SE crag	76 26	-12 32	+04	706	157	
	NNE	same	89 37					
	NE	Peak NE crag	48 48	-21 53	+04	313	126	
	NNE	same	105 05					
	NE	Peak N point crag (outer end)	38 54	-15 42	+04	551	156	
	NNE	same	79 07					
	NE	Peak S crag	65 54	-11 49	+04	789	166	
	NNE	same	80 05					
	NE	Inner end SE crag	108 10	-20 19	+04	674	250?	
	NNE	same	107 44					
	NE	N side W pond	29 13	-11 08	+04	1014	201	
	NNE	same	40 28					

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Saturday Date November 6, 1920
Sunday " 7, "

November 6.

8:10 a.m. Alex reports a large cascade at the mouth of E channel as seen from SE rim of pit.

8:50 a.m. Also a slide of rock from SW bench of E channel.

4-6 p.m. This disturbance now seen to be a repetition of the cascade of September 16 from central pool into SE arm. Double fall around a ledge in the middle of narrows; this ledge a new one made by the downbreaking of one of the two shelves on each side of the narrows. There has also been a stream pouring through the tunnel of the E pot chasm from central pool to SE arm. Cascade about 6 feet high and a rather irregular jumble of rapids, with filling and falling from time to time changing the height. From SE end the surface streaming W to the cascade. Marked change since yesterday in W pond, now 18 feet down, with spatter veneer which is falling into crusted pool below. Veneer mostly fallen from W side and falling N and S sides.

Main pool a little higher than yesterday, platforms 4 or 5 feet high. SW pool 20 feet down, E pond 15 feet.

Big crack 3 feet wide from N pot SE through NE crag. N pot broke up a little, also E pond, during visit. Streaming vigorous from SW to center, river of melt from SW bay all the way to SE arm. More constricted channels between the islands and peninsulas. N cove crusted. Eight or nine fountains, some central ones, migratory.

Bright flame chimney in source of dense fume rising at summit of W crag. This visible only at dark.

Falls of rock now and then from fresh scars N side NE crag, S of SE narrows, W of S chasm and probably from places on W crag mass. Crags cracking and moving markedly.

The SW arm island again produced by breaking away from SW bank to which it had been attached by a bridge, its top now a few feet below the high bank.

November 7.

2 p.m. Circuit pit E and N. Cascade SE channel less high and crusted over. General situation the same. Considerable falls of rock in progress from veneer on SE wall of Halemaumau. Two falls seen. Large new talus accumulated below, from wall to edge SE arm. This due to subsidence bench magma on this side. SW arm 12 feet down, SE arm 18 feet down, E and W ponds 15 feet down. Central river-like streaming as in September from SW bay to SE arm and bending S through a narrow pass between E and W islands to S chasm. SW arm crusted, streaming with bright-line pattern takes its rise in SW bay. Streaming S in E pond. Streaming W to the cascade in SE arm.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Tuesday Wednesday Date November 9, 1920 " 10, "

November 9.
10 a.m. to 12 noon. No very marked changes. N pot has welled up and filled to within 4 feet of upper bank, restoring N arm and burying bridge and islet of N cove. There are two pots there apparently, one near the N cove, which broke up, fountained and sank, and the main one farther east.

The lake has risen and the SE cascade has disappeared. There is a new platform making a flat between the E and W islands and another flat or shoal protruding out from the point S of SE narrows. Fountaining at S side of E island making a spatter dome with stalactites. Otherwise only three or four small fountains. Streaming from SW and to SE as usual. Fountaining spell on NE side of W pond. Ponds and pools mostly 10 or 12 feet down. Quite smoky.

Climbed down to inner N floor by chasm in E end of lower N shelf. Easy climb. Went out to edge of N cove and to divide between central pool and W pond. Details suggest the conditions of the summer of 1917.

November 10.
11:25 a.m. Cascade again in action from central pool southward into narrows of SE arm, and also another southward through narrows between E and W island platforms to region of S chasm. Whole appearance resembles the September crisis. The cascade has moved more north, so that it is falling southward, the point S of narrows being built out. Large high platforms around the islands. Torrent sweeping from SW bay eastward. Few fountains. Streaming in SE arm northwestward to the vortex at foot of fall. Streaming into E pot cove. E and W ponds 15 feet down. Walls of SE arm 20 feet high. Some small falls of rock.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Wednesday Date November 10,1920

t	sta	subject	no	pl	scr	stop	ex	cam
11:25a	Lower shelf	W crag	1		8x	f/22,5	1	P
	"	NE "	2		"	"	1	"
	"	Center	3		"	"	1	"
	Lower shelf (farther W)	SE cascade	4		"	"	1	"

T A J

1920, Nov. 10

315

1

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2

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

JOURNAL Day Thursday Date November 11, 1920

3:00 p.m. Cascade has shifted to a straight fall 12 feet high into the E pot cauldron. SE arm now streaming out (NW) from the narrows, remainder crusted. Cauldron of E pot streaming W to the vortex at foot of cascade. Splash and irregularity at verge of cascade indicating rock below. Another such evidence of a shallow bottom seen in a standing rapid 50 feet W of the cascade off the end of the N point. This point greatly built out, constricting the lake. Streaming S between E and W islands and around E island so that the streaming is N on the E side of that island. Fountain SW of SW arm island, another E end of SW arm, and one in E pond. Otherwise the gas pressure appears satisfied by the cascade. Hot rapid streaming from SW bay across lake to cascade. E and W pond 15 feet down, SE arm 18 feet, E pot 25 feet, central lake below island platforms 6 feet, SW pools 15 feet. Tunnels indicated at NE cove and at W margin of SW bay. Rocks sliding S of SE narrows.

Visited the Red Solfatara and found the surface deposits around the main smoke hole pale yellow and the chasms glowing 3 feet down cherry red, at least 800° C. Dense vapor puffing up and the rocks hissing with the rainfall. The temperature has risen 600° without any visible lava: gas reaction heat and oxidation.

At SW wall crack small smoking pressure ridge parallel to wall.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

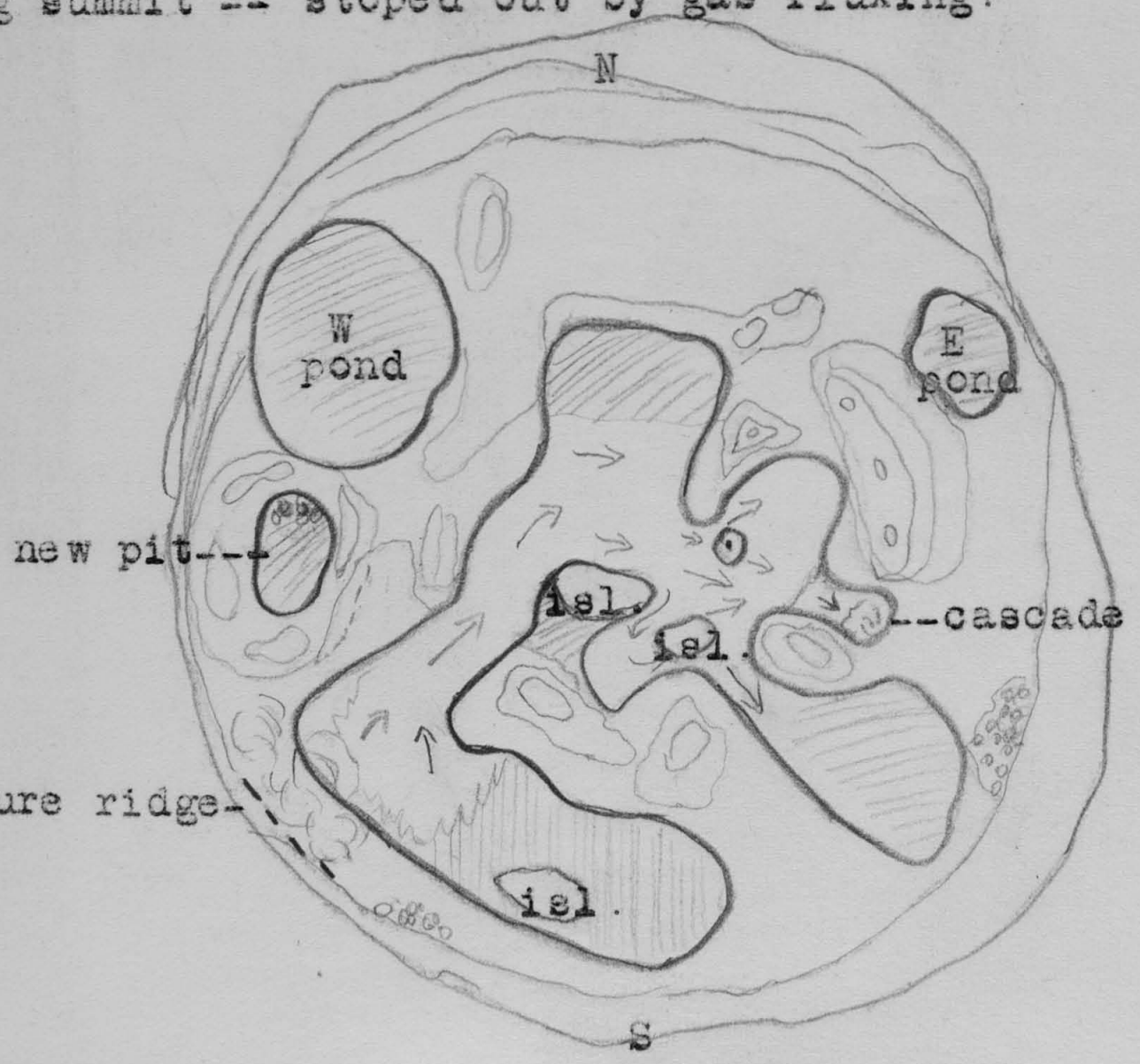
Day Friday Date November 12, 1920

10 a.m. Streaming inward into SE arm. Cascade into E pot and standing rapid farther W as before. Remarkable migration (?) eastward of island in SW arm; has moved about 75 or 100 feet, nearly horizontal shore marks. Is now nearer inner end of SW arm.

Large ledge of platform W of SW channel has sunk down and left chasm cove of lake SW of it changing shape of SW channel.

E and W ponds 12 feet down. Break up spells in N cove, W pond and SE arm. Avalanche on SW black ledge. Heavy fall of SW bank of W pond making immense splash. Two N pots in upraised bench of N arm. Glow above E pond on S side. Seven or eight fountains.

10:40 a.m. Whole top of smoking W crag collapsed and sent up cloud of dust and sand. The dense vapor at once ceased and blue thin fume rose from the pit which remained. Readjustments of talus afterwards. Looking down into the new pit it was seen to be 100 x 50 feet in dimensions and 50 feet deep to a pool of black upwelling pahoehoe with a pile of debris on N side of bottom area, Narrow partition between new pit and W pond. New pit appears 30 feet deeper than level of W pond lava. Evidently there was a large void under the smoking summit -- stoped out by gas fluxing?



9 p.m. Cascade more rapid and at the standing wave, between point of E island and the N point, a new islet formed by accretion on the bottom, and dividing the torrent. Everything else as before. SE arm occasionally breaks up brilliantly.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Friday Date November 12,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.	NE	N	0					
	NNE	N	0					
	NE	NE crag	48 22	-22 50	-2	316	133	
	NNE	same	104 54					
	NE	NW tip W island	55 21	-18 38	-5	694	233	
	NNE	same	78 00					
	NE	W crag (before collapse)	45 07	- 7 02	-2	963	118	
	NNE	same	57 53					
								T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Saturday Date November 13, 1920
Sunday " 14, "

November 13.

10-11 a.m. With Dr. Tilyard of New Zealand.
Cascade still rushing. New islet larger. Torrent from W to E as before. Five or six fountains. Pale blue fume from Halemaumau, dense white fume from Red Solfatara. Banks of outlying pools 15 to 25 feet high.

7± p.m. Cascade ceased about this time.

November 14.

3 p.m. Cascade torrent is transferred to narrows leading to SE arm. This a series of rapids, one a small fall. E pot entrance crusted and the pool level with lake. W point being flooded.

Made circuit by E and N. No marked changes but lakes have risen a little, 12 to 15-foot walls. A few fountains, notably at W base of N point crag. Cracking and foundering crusts in pool between E and W islands and the S chasm. Occasional border fountains W and E ponds. Fountain SW of SW arm island. Black pahoehoe in W crag pit. Fume thin and diffused.

T A J

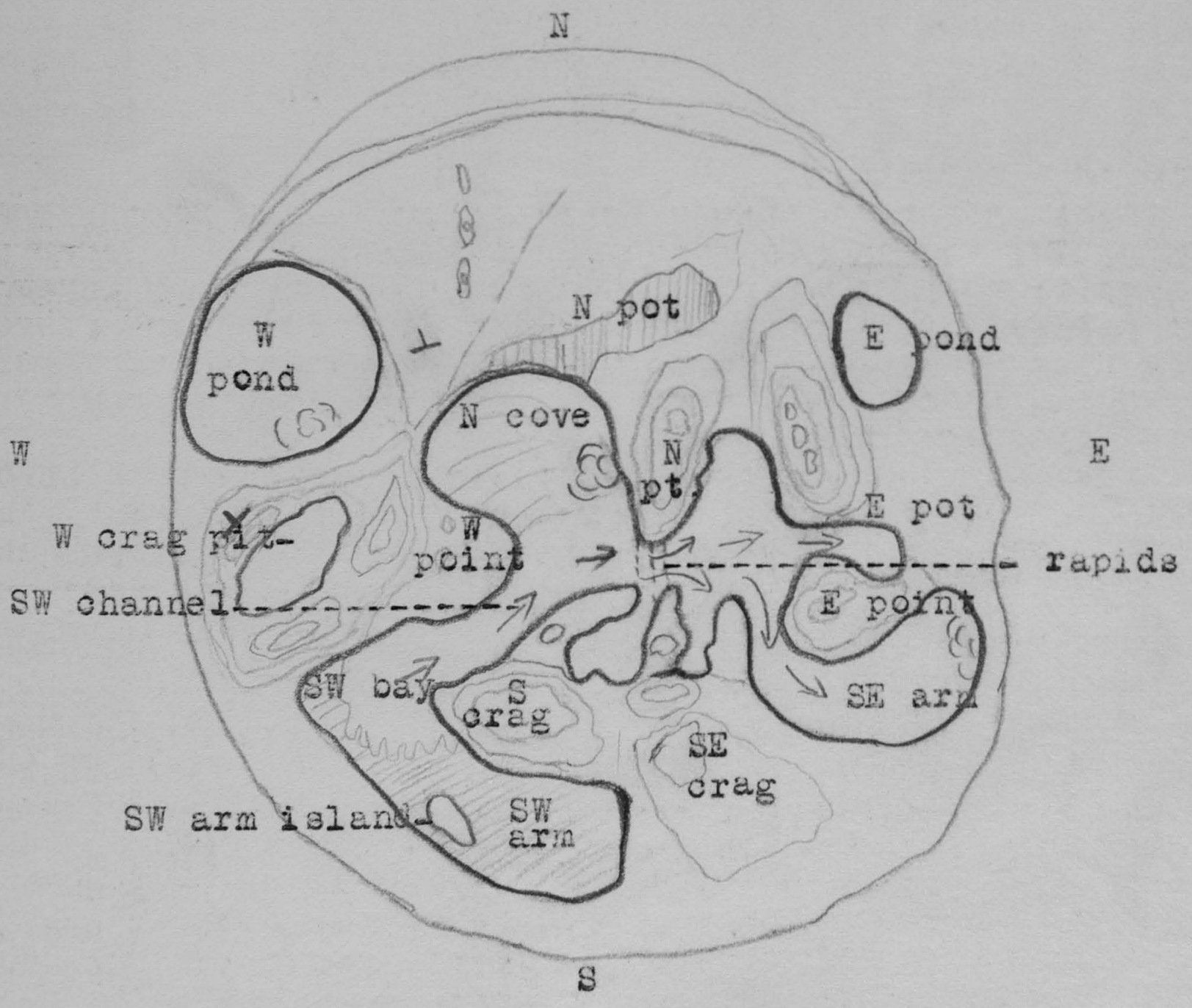
JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date November 15, 1920

10 a.m. Streaming into E pot resumed, comtinues from SW across lake into SE arm. New lake platforms one foot high. Pool between islands nearly shut off Torrent into E pot swifter than into SE arm. Pools higher; E pond 6-foot walls, W pond 12-foot, SW bay 8-foot and SE arm 12-foot walls. N arm flooded with a pudding of frozen pahoehoe 3 feet above lake level. Fume thin and diffused, patches from all the crags. Puffing fountains four to five in number. Standing rapid S of N point peninsula. Lake greatly constricted in last week, with points built out southward from N point crag mass, (now a big addition to NE crag mass), northward about the two islands and from SW side of SE narrows. W point is large and low,and N arm and much of N cove are lifted surfaces. Main lake is resolved into a meandering stream with quiet adjacent pools.

10:15 a.m. W point being flooded as yesterday.

Sketch Halemaumau:-



10:30 a.m. Lake rising and points flooding. T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date November 15, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
10:30a	N	W crag pit	1		8x	f/22	1	P
	"	Center	2		"	"	"	"
	"	NE crag	3		"	"	"	"
	NW	E pot	4		"	"	"	"
	W (45° down) to W crag pit		5		"	"	"	"
	Bet. SW & W stas.	Red Solfatara jets	6			f/8	1/300	"

T A J

1920, Nov. 15

22

bof

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6

Jag

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Tuesday Date November 16, 1930
Wednesday " 17, "

November 16.

11 a.m. From Uwekahuna. Wind veering and nearly calm. Dense fume puffing from Red Solfatara and moderate fume in pit. Fountaining rumble occasionally noisy.

Looking toward Mauna Iki: vapor jet from 1919 rift below Puu Koae but no smoke beyond.

7 p.m. Halemaumau. Cascade again pouring into SE arm and current in arm rushing to vortex. Swift golden epaulette pattern from E central narrows eastward. Streaming from SW to center. E and W ponds quiet. Occasional fountains N cove. Little change in height of banks. Some glow on the N floor of pit.

T A J

November 17.

8:10 a.m. Alex reports:

From the E it could be seen that lava was flooding the new floor below.

10:30 a.m. Subsidence of liquid in lakes to 5 feet below bench.

11:55 a.m. From SE side of pit a cascade at mouth of E arm could be seen.

2 p.m. From S saddle:

Five fountains counted; puff noisy. Cascade SE has stopped and lakes have risen, building new very wide marginal platforms 1 to 2 feet high. Rocks tinkling. Platform bridges across SE narrows and between islands, shutting off SE and S ceatral pools. SW arm island a wide egg-shaped platform. SW and SE arms crusted. Streaming NNE from SW narrows and E through the E central narrows. Fume rather thin. Fountains in E pond, three in N cove, one in S central pool. Banks 8 feet SW, 12 feet SE, 5 feet E pond.

From SSW:

W pond 10 feet down. Two terrace levels at NE cove. Seven fountains from here.

From SW:

N arm crusted. Two patches stained, smoking and glowing opposite SW rift on black ledge.

From W:

Black pahoehoe in W crag pit higher, in heavy crusted folds, with fresh debris on it and rocks falling. The glow observed last night on N floor merely small cracks stained white. E pot crusted at lake platform level. No platform in W pond. Three half-dome grottoes N, E and NW of main lake.

2:30 p.m. From NW:

Big fountain at E end SW arm island, and streaming eastward in that arm.

From N:

The biggest part of the new platforms is limited to central region. Remnants of islands very small. Pulpit rock S of entrance to E pot.

T A J

325

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Thursday Date November 18,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11a.m.	NE	N	0					
	NNE	N	0					
	NE	N peak W crag mass	44 47	8 48	0	929	145	
	NNE	same	59 04					
	NE	NE peak	48 20	23 12	0	316	136	
	NNE	same	104 54					
	NE	NW point W island platform	55 45	18 35	0	682	230	
	NNE	same	78 48					
								T A J

Hawaiian Volcano Observatory

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

JOURNAL

Hawaiian Volcano Observatory

Day Thursday Date November 18,1930
Friday " 19, "
Saturday " 20, "

November 18.

11 a.m. Quiet rising continues Occasional outbreak of noisy big fountains in N cove and in center, latter migrating to E banks. A rapid stream pouring through SE arm narrows to SE. Usual current from SW. Large fountains produce a lowering of about one foot. Breakings up and lowerings in W and E ponds occasionally. Border cliffs of these ponds about 12 feet high. New platforms around central pool 4 feet high today. Many white stained glowing places on floors, the same fuming, and this increasing on SW black ledge.

Went down on N floor. Heavy folded elephant skins on N cove. Open pot at N pot. Too much blue fume to get S of E pond. Raised edge of floor in front of wall crack, latter very hot. Small pond between E and W islands and S chasm has sinking spell. Smoke in W crag pit. Glow at night a.m. much lessened.

5 p.m. Mauna Loa. Summit fume very plainly visible.

November 19.

Morning. Fume increased in Halemaumau.

November 20.

5 p.m. Cascade narrow, pouring toward E pot under a crust. Bridge across central E narrows and lava bubbling up from under E side. Bridge across SE arm narrows. Streaming in a curve from S central pond under the SE arm bridge. Pools low,15 to 20-foot walls. Six fountains. Fountain in noisy rumbling grottoes. Much smoke. Heavy fall of rock S side SE arm narrows. Cracks in edge N side SE arm. SW bay crusted, flame chimney NE of it.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date November 21, 1920
Monday " 22, "

November 21.
10:30 a.m. Circuit of pit by E and N. Very smoky after rain
From N station:
W pond 20 feet down, S wall appears to be lifting. Bright lines and two fountains. Central streaming from SW slow through gorge between platforms 6 feet high. E pond low. Crags may be lifting.
From W niche:
Looking down into W crag pit, floor of pit has a glowing orifice over a cupola where a fountain is noisily pounding below. Large talus has developed at SW rift. Streaming E behind SW arm island. No visible cascade at E pot. Bridge 4 feet high across E central narrows. Five or six fountains, including big ones with stalactite grottoes at E ends of SW and SE arms.
From SSW station:
All the crags seem high and crowded, lakes narrow. Smoke from SW black ledge and from all the crags. Large fountain against N bank.
Red Solfatara continues its dense fuming and patches on N side are still red. Glowing cracks.
Flaming vents and blowing fountains appear to indicate rising, with rising of crags dominant.

November 22.
11:45 a.m. Pit very smoky and weather rainy. Inner platform lower, 3 to 4 feet high, as though the lake had been rising. W pond marginal shelf has entirely fallen on side of NW wall leaving the red wall in contact with the pond greatly enlarging the pond and giving it two square corners on that side. Twenty foot walls. E pond 10-foot wall. Few fountains. SE arm all shut off and E central region mostly a platform. Streaming slow eastward.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date November 22,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11:45 a.m.								
	NNE	N	0					
		N peak W crag	59 25	-8 48	0	854	132	below NNE
		(distance of Nov.18)					145	" NE
								T A J

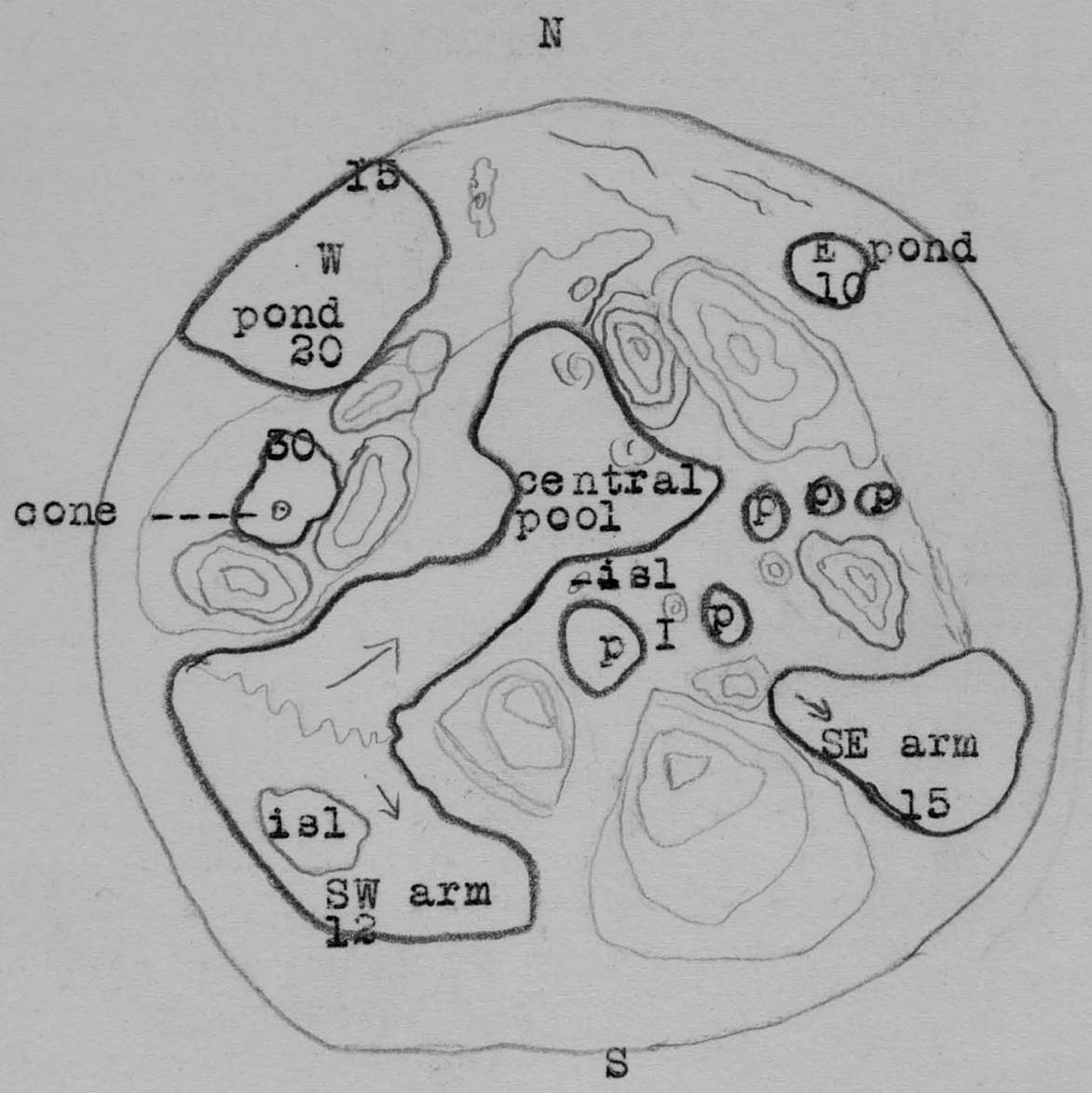
JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day: Tuesday Date: November 23, 1920

10:30 p.m. Rapid fluctuations in fume:at 8 a.m. pit thick with fume, at 9:30 very thin, now thicker again through less than yesterday. This doubtless due to a rise of lake magma for there are fresh dribble overflows on the central platforms and a fresh shore mark in W pond 3 feet above liquid. W pond 15 feet down. Central platforms 2.5 feet high. Five ponds in platform, S and SE center, E of center and two in E pot beyond. SE arm pond lower than central pool and latter lower than W pond. Partitions SW and NNE of W crag pit lower. Four or five fountains; two continuous ones against NNE crag. SW channel narrow. Occasional fountain in S central pond. Heavy crust E pond which is, 10 feet down. N arm a crusted niche, smoking.

10:40 a.m. Fountains increasing in number. E side of W pond has greatly fallen in.



p -- pond
I -- island

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Tuesday Date November 23,1920

t	sta	subject	no	pl	scr	stop	ex	cam	
10:30	a.m.								
	NNE	W pond	1		8x	f/22	1	P	
	N	Center	2		"	"	1	"	
								T A J	

1920, Nov. 23

1

2

Jaj

11:30 a.m. Fume very thin. Strong rise of liquid lava. Blowing noise SW. W island flooded, platforms all covered, and E and S central ponds obliterated. Small protruding crag of E island. SW arm island nearly covered. Some fountaining against partition in SE arm at NW end. Streaming S, N and E in central pool; satiny skins. W point flooded. Four or five fountains. Flood surface continuous with E pot, SE arm, N and NE coves, SW arm, S central region. W pond 6 feet down, SW arm 7 feet, SE arm 8 feet, E pond 4 feet.

From SW station:

New overflows into N arm. SW base of S crag mass flooded.

From W station:

W crag pit shows no glow in cone on its floor and chasms opening SW and NE from it through to SW black ledge and towards W pond. W pond heavily crusted and only 5 feet down at its N corner. New avalanche debris on lower N shelf at its W end.

12 noon/ From N station:

West pond cracks up, fountaining and subsidence. N arch of W crag a narrow knife-edge wall breaking away from the inclined surface at its N end. Partition notch between W crag pit and W pond lower. Grotto half dome N side N cove nearly drowned under new flows covering N arm bench. The downgrade from W and SW to center, and thence to SE arm, is pronounced. Two fountains in E pond.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date November 25, 1920

9 a.m. The lakes were down 3 feet below the platform of yesterday and four ponds lay E of center, and SE arm was shut off as before. N arm was filled to the brim of its niche, but the N cove of the lake lay below it. Fountains W side of E pond, inner end SE arm pond and one or two others.

9:20 a.m. Strong rise of liquid, floods all the platforms, joins through to SE arm and by 9:45 overbrims N arm and starts flooding N floor. E island and SW arm island entirely submerged. Flood through S chasm from both SW arm and from central pool, probably meeting. E and W ponds rise, but not so much as lake. W pond remaining 8 feet down, E pond 6 feet.

Fume greatly thinned during rise, thicker this morning early. Quiet satiny skins during rising, only E pond fountaining. Smoke from crags and SW floor cracks.

10 a.m. SW arm margin 4 feet high; SE arm 8 feet. N floor flooded half way to wall. W point and all other platforms entirely obliterated.

10:15 a.m. The only noise in the pit the crunching of invaded talus and the snapping of fresh crusts. Some gas blowing. Bubbling in SE arm. E pot chasm nearly joined through to SE arm.

10:25 a.m. From W station. Rising still. Walls NE sides of E pot and SE arm onlt 2 to 3 feet high. S crag and E crag block are practically islands. Black pudding of pahoehoe spreading on floor of W crag pit. Lake hot but without fountains. SW arm main source. E pond 4 feet, W pond 6 feet down. All the exposed broken walls of W crag interior and exterior red, purple, and sulphur yellow with excessive oxidation. Small black hole in wall S side of W crag pit. With absence of fountaining no blue gas, only thin pale whitish fumes from the bench magma.

11 a.m. From SW station. Streaming slower. Rise appears to have nearly reached its limit. Lake banks in places only 1 to 2 feet high.

Red Solfatara found still making the brilliant colors on N side, at lower temperature. Red heat in main crack; 2 feet wide; color of deposits a pale buff brown (tanbark brown); noise a purring. No lava splash.

SW bay and arm heavy crust, main streaming to E, still no fountains. Lava overriding S slope of E crag block. W pond still 5 or 6 feet down. SW arm 3 to 4 feet. SE arm 3 to 7 feet (higher bank S).

3 p.m. From H.V.O. saw blue smoke in desert SW. Viewed from Uwekahuna this was identified as coming from the 1919 rift line below the slag heap in the dunes, W of Kamakaia. May be beyond, in Pahala.

Fume from Halemaumau continues thin.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date November 25,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
9:15 a	NE	N	0					
	NNE	N	0					
	NE	NE crag	48 08	-23 28	0	316	137	
	NNE	same	104 46					
	NE	N peak W crag	44 40	- 8 34	0	924	139	
	NNE	same	59 09					
	NE	Platform point S side central pool (lake level)	55 36	-17 37	0	679	215	
	NNE	same	78 47					
	NE	W corner W pond	35 34	-11 39	0	1089	225	
	NNE	same	44 03					
9:20a	NE	Grotto SE arm pond	108 16	-21 37	0	582	231	
10:15a	NNE	same	55 46	- 8 51	0	1289	201	
	N	W	0					
	NE	Grotto W niche E pond	45 42	-45 14	0	223	224	
	NNE	same	114 16	-21 27	0	550	216	

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date November 26, 1920

3-5 p.m. Fume thin. One border fountain in SE arm, two in E part main lake, one in W pond and one in SW arm. One central fountain at times in main lake. Streaming from SW arm to the two border fountains in E side of main lake and at times to a concealed grotto in the bank of the W crag, W side of main lake. W pond crusted over. Main lake 7 or 8 feet below bank.

R H F

9-10 p.m. Lake high; seven or eight puffing fountains; fresh glow of flows on N floor. Streaming to SW from central pool. Quiet crusting spells and spells of breaking up amd sinking crusts. Spectacular break up of W pond, 10 feet or more below its banks. Other outlying pools 7 or 8 feet down. The SE central pond or pot, near former E island, higher than the rest, with narrow cascades pouring down a slope into E pot region. Chair niche fountains.

T A J

9:30 a.m. to 12:30 p.m. Kau Desert.

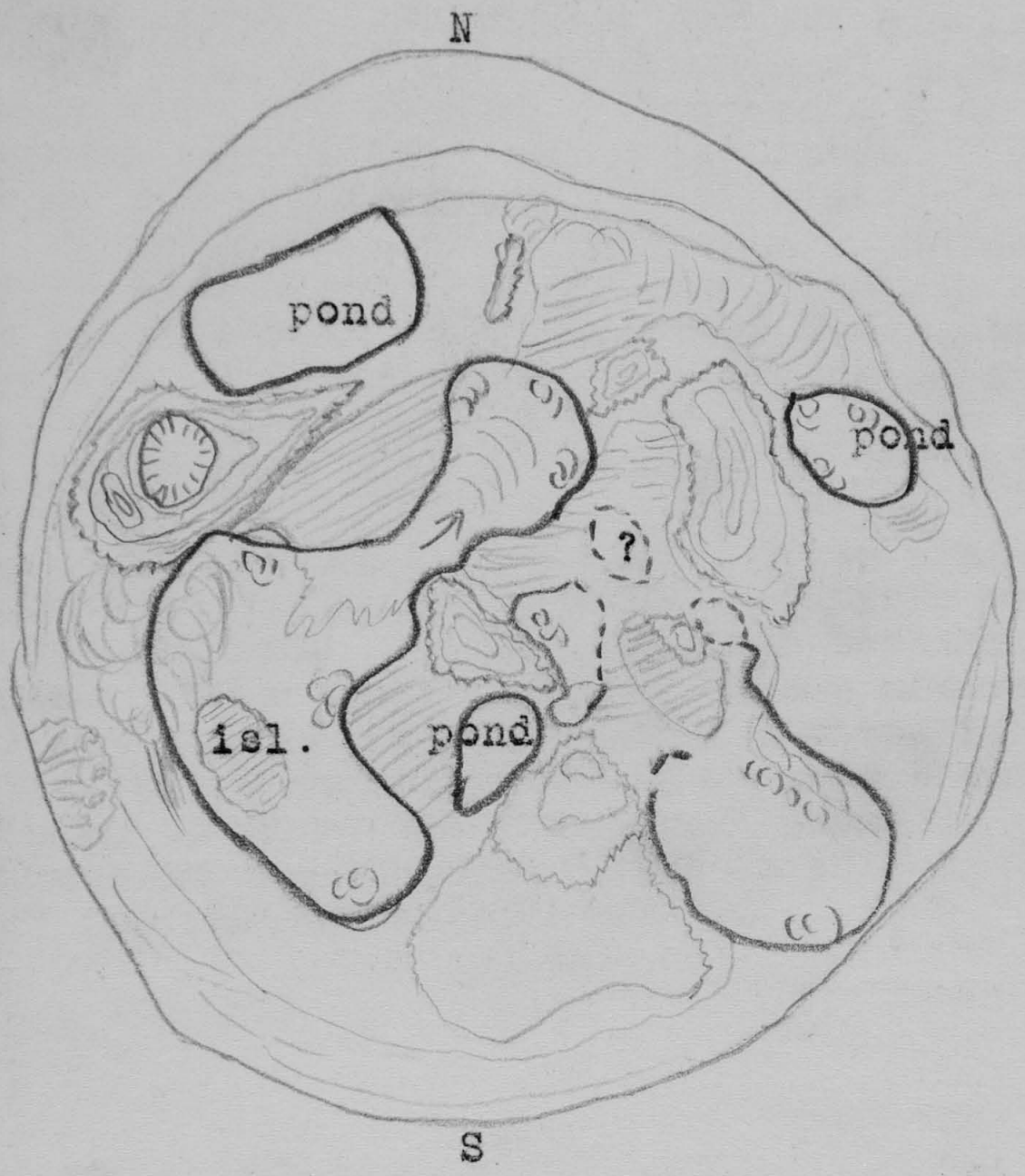
Entered from Bull Pen. Went below lower slag heap. But found nothing, not even any appreciable steaming. Returning we went up along the western side of the January,1920, aa and climbed the lower slag heap, from which a good view of the lower country was obtained through field glasses. Cracks in and near the small outbreak W of the lower slag heap were hot and steaming: western rift just above the dune area.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Saturday Date November 27, 1930
Day Sunday Date " 28, "

November 27.
Noon. Sketch from S: Shaded -- platforms



Noon. Flooding.
12:15 p.m. Lowering.
Lakes up to one foot from top. The E pond and N cove overflowing; latter flow has flowed all the way to E pond. E pond dribbling over S end. About fifteen to twenty fountains of the blowing, niche-building type. Streaming SW to N. During high level all the platforms obliterated. S side E crag block and SW side of S crag covered with new flood. During the lowering the large central platform areas and SW arm island were revealed as shown in map. Fume very thin from pit, very dense SW solfatara.

November 28. Fume continues thin and conditions much the same.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date November 29,1920.

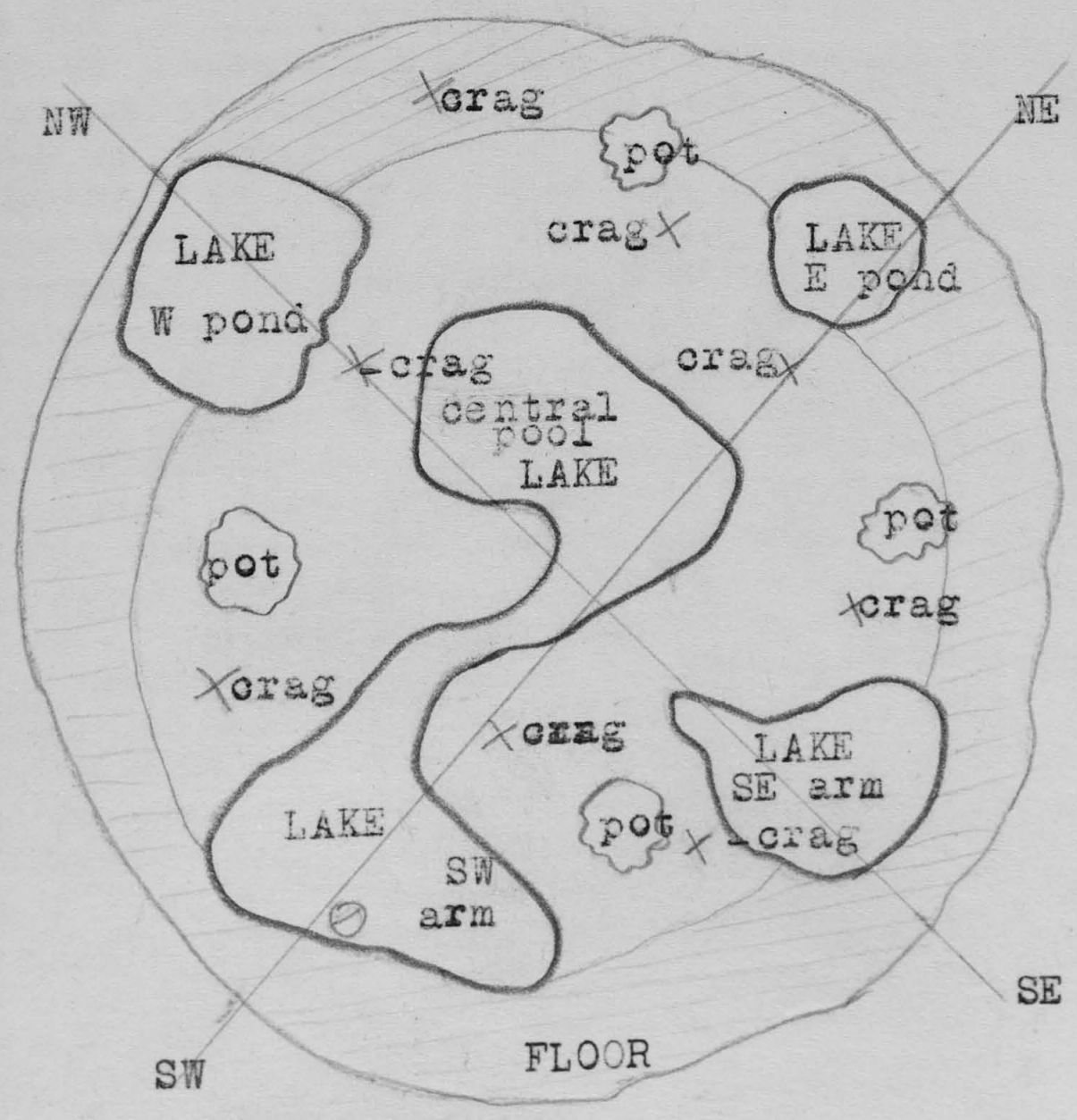
10:30 a.m. Lava rising 10 to 10:30 a.m., some breaking up in center and at W pond about 10:35 with development of large fountains migrating to banks.

Situation like November 27 but platforms restored 1 to 3 feet above lakes. Main lake now two similar pools SW arm and center with a 15-foot wide channel between. Wide platform separates off SE arm. Two ponds S of center. SW arm and central pool 3 feet below platforms. W pond flush with rim on SW side, 1 foot down on NE side. E pond 2 feet below rim. SE arm 3 to 4 feet below rim. Streaming SE in SE arm and in SW arm, also NE from latter through channel to center. W crag pit has much talus, a small dead-looking spiracle in SW part and no fresh lava; the notches NE and SW of it caving away. The talus about base of SW rift on black ledge is large, and suggests some movement on the rift. Fume dense and rapid at Red Solfatara.

Ten to seventeen fountains. Broad festoons over the new flow northeastward from N cove. N niche entirely gone and N pot not defined. S and SE crags becoming small by submergence. Fume from the crag masses moderately abundant. The SW arm island appears slowly pushing E, partly perhaps by accretion at E end and caving away on W end. Note symmetry developing as shown on next page. (Sketch).

There have been recent flows in over crust of E pot from center, but no pot is now defined.

Symmetry sketch:



T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date December 1, 1920
Thursday " 2, "

December 1.
10 a.m. to 12 noon. Lakes high. Eight or nine fountains. New overflows on SW black ledge from SW bay; others S from SW arm, E across east central bench from main lake, S for 100 feet from E pond, and N from W pond and N cove. Benches about 2 feet for E and W ponds, 4 feet for central lake, the platforms of latter tilting centrifugally. Big talus of new fall under SW station. Notches N and S of W crag pit more fallen away and some falls seen there. Migratory central fountains moving NE. SE arm now entirely shut off by a broad platform from central pool. Spatter heaps. Hot lakes. W pond brimming at noon. Only slight signs of the E and S central ponds in the shape of slightly slumped areas in the platform. A small sag at E pot also. There is some appearance of a driblet source on bench at SW rift.

The Red Solfatara, after rain, making very large and dense cloud of fume. Pit making very little fume. Red heat at Solfatara continues.

December 2.
6 to 10 p.m. A crisis of strong overflowing of bottom of pit like October 23.

The recent rise culminated this evening and at 6 p.m. the SE arm overflowed in direction of E pond, the flow reaching the pond and stopping there.

About 7 p.m. the W pond overflowed and sent a big torrent across the N floor nearly to the E pond.

Both of these preliminary overwellings ended with breakings-up of crust at their sources and temporary lowerings with much fountaining at SE pool and W pond.

From 7:45 to 10 p.m. came the grand climax. All the pools rose and overflowed: the SW bay appeared to be the main center of dispersal, with streaming S through SW arm, NE through main lake and a backing up of lava in direction of W pond to the N until a front was seen making N on W side of W crag. A standing fountain started SE of the center of the pit and sent a torrent E which continued its flow until after I left Halemaumau. From ten to twenty fountains were in action at different times. The N cove was overflowing to join the floods which covered the N floor. The lowest point to which all floods converged appeared to be the E pond. The fill finally assumed a nearly level aspect with a smooth glowing edge against the base of the wall of the pit all around, and the crags stood as islands in the level flood, which became evenly crusted, with crusts cracking and foundering in different places. The standing fountain SE of center boiled up steadily like an artesian well. The end of SE arm maintained large spurting fountains, but all of the arms lost their identity of outline and the raised liquid level made the crag relief much less. There were occasional rock falls around edge of pit, especially E.

At 10 p.m. the flood was at its height and the fountains few, but no sign of cessation of the rise had yet appeared. Definite flow zones continued E from the standing fountain, N, NE and S from SW dark area, and NE from W pond.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Friday Date December 3, 1920
Saturday " 4, "

December 3,
Forenoon. Lakes high. A flow from the W pond that started about 11 a.m. followed around the wall and cascaded into the E pond which was several feet down. A branch from this flow poured into the N end of the main lake for a short time about 12 o'clock noon.

5 p.m. The lakes were down a few feet below their banks and were not crusted over as border and central fountains were playing in all lakes.

December 4.
10 a.m. Entire floor of pit covered with flowing lava. The streaming was from the W around the walls of the pit and across center to the E pond; the streaming terminated in a circular cascade into the E pond which was very small and 8 or 10 feet down. Two small cascades with a drop of one or two feet near the center of pit marked the eastern outlet of the main lake; except for this none of the lakes except the E pond had any outline. The cup of the W pond was revealed for a few minutes at 10:30 a.m. when a fountain broke out and lowered the level of the liquid about 2 feet. Within ten minutes the W pond was again brimming The flow northward out of the main lake ceased for a while at 11 a.m. The S crag mass is very small, in two parts, about 14 to 16 feet above the flood at their bases. A fountain broke out by the base of the W crag in the main lake at 11:30 a.m. and a rapid stream from the SW arm poured to it; the overflow from the main lake ceased. The flow from the SE arm to the E pond remained constant. A flow from the space between the W crag and the wall had poured northward into the W pond. Considerable blue fume arose from the cascade site of the E pond.

R H F

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Saturday Date December 4, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
10a.m.		(NE smoky and very hot)						
	NE	N	0					
	NNE	N	0					
	NE	Peak W crag near W pt.	52 13	-6 05	0	1030	110	
	NNE	same	61 08	-5 37	0	1010	99	
	NE	Peak center NE crag	48 14	-21 24		390	114	
	NNE	same	107 30	-9 16	0			
	NE	Lake at center	57 06	-16 15		575	168	
	NNE	same	86 38	-12 09	0	745	160	
	N	NNE	0					
	N	Peak W crag near W pt.	98 30	-6 33		890	102	
	N	S point NE crag	44 18	-6 50		895	100	
	NNE	same	107 11	-9 00	0	652	103	
	N	Lake at center	61 34	-10 58		845	164	

R H F

340

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Saturday Date December 4,1920

t	sta	subject	no	pl	scr	stop	ex	cam
10a.m.	N	Entire pit flooded R H F						

1920, Dec. 4

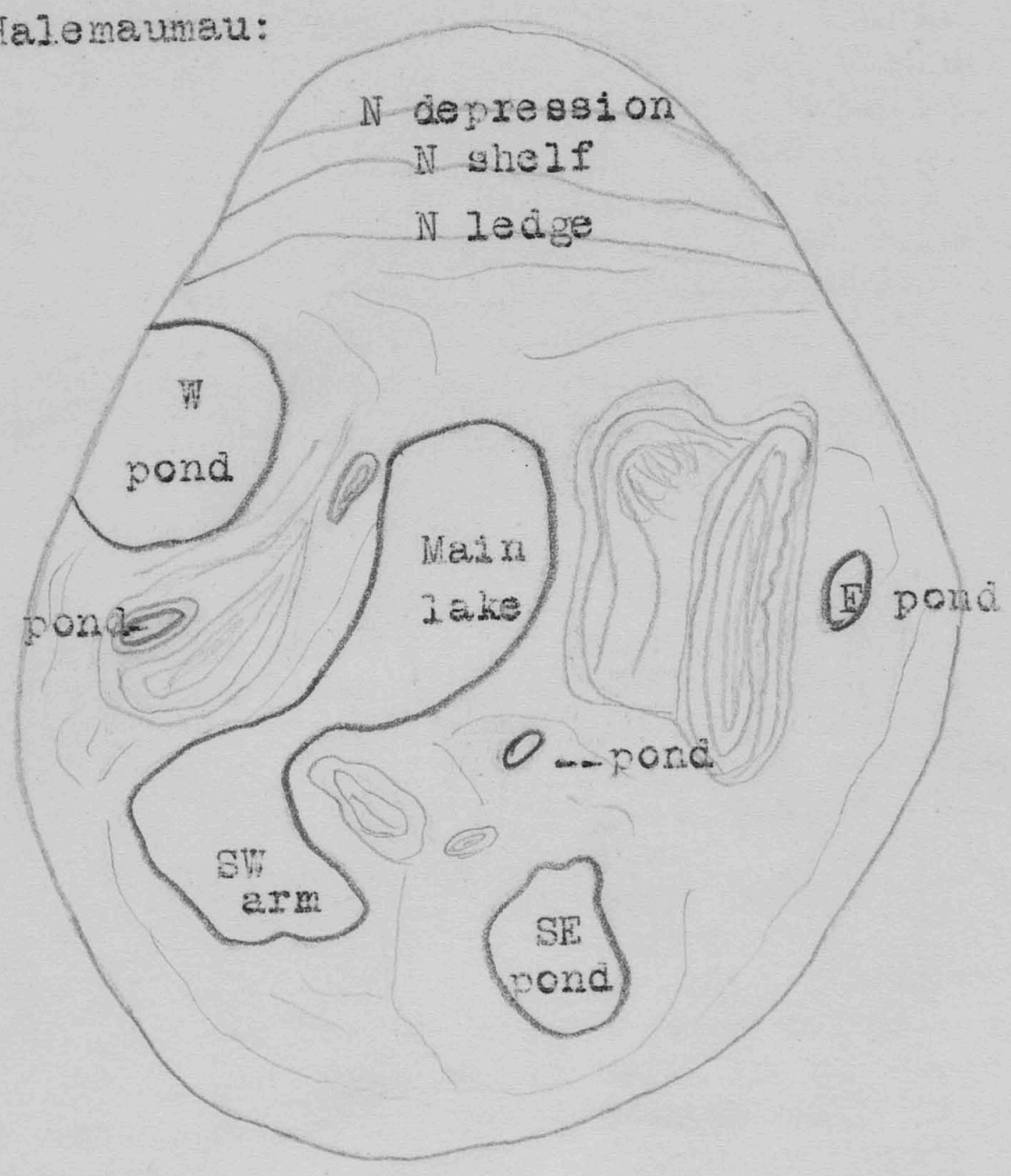
BHJ

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Sunday Date December 5,1920

December 5.
10-11 a.m. E lake very small and crusted over, some 8 or 10 feet below bank. SE arm, W pond, central lake and SW arm 5 or 6 feet below bank. Border fountains broke out at two or three places from time to time in central lake and caused streaming out of the SW arm to them. At other times lake quiet. Border fountains active in E part of W pond. W crag pot lowered in its cup 3 or 4 feet, and showed foundering crust occasionally. From 10:15 to 10:30 a.m. the main lake and SW arm rose 4 or 5 feet. The other lakes lagged behind this rise a few minutes. By 11 a.m. the lakes had lost their outlines. The rise of the E pond was 8 or 10 feet in less than an hour. The main lake overflowed to the N and SE, the SW arm to the SW and the SE arm to the SE.

11 a.m. Sketch Halemaumau:



R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Monday Date December 6, 1920
Tuesday " 7, "
Wednesday " 8, "

December 6.
1 to 2 p.m. SW arm, main lake, SE pond, E pond, 5 or 6 feet below banks; W pond 3 to 4 feet below. Streaming out of SW arm across main lake to a border fountain at the N end. Two grottoes on S side of SE pond. Some fountaining in small E pond. Otherwise the lakes were quiet. There was a small glowing cone near E pond on the crag side. The small pond W of the S point of NE crag fountaining at 2 p.m. and suddenly sank 10 feet.

December 7.
1 to 2 p.m. Indications of the crags and central floor rising while the liquid is nearly stationary. The bank of the SW arm on the wall side about 1 foot below liquid. Banks on E side of this arm, around most of the main lake, and S side of W pond 7 to 9 feet high. A block of floor near W crag mass has cracked off and is tilted with a down slope to the N. This block is nearly an island, S end 8 or 9 feet high, and N end 2 or 3 feet high. E pond a little larger and 5 or 6 feet down. SE pond 4 or 5 feet down. E central pondlet about 2 feet down and crusted over. The pond in the W crag mass appeared to be dead with its floor sloping down to the N, as though the crag mass were rising. Two grottoes active in main lake.

December 8.
10-11:30 a.m. Pit a little more fumy than common. Lakes appear to be much the same as on 7th. W bank of SW arm 1 or 2 feet high. Bank around main lake 6 or 8 feet high except to the E where it is 8 or 10 feet; floor here tilted E, making with NW extension of NE crag a beginning of a crag mass parallel to NE crag. A crack extends from main lake past center pondlet and zigzags to SE arm. SE arm 3 or 4 feet down. The fracture block by W crag is now an island of the main lake, the N end of this block that was low on the 7th is now flooded. Another block nearer the crag has sunk and is tilted with N end 6 or 7 feet below old floor and the S end 4 or 5 feet below. Fresh avalanche material from lower portion of wall on SE floor. At 11 a.m. SW arm was overflowing to the S toward wall of pit, one branch going along wall to S and the other northward between W crag and wall. Soon southern part of this arm was overflowing to the S and the SE arm toward the SE wall. The E pond remained 6 or 7 feet down. W pond became level with its bank along the wall. W crag mass is tilting northward has lifted a portion of the clinging floor on the S 8 or 9 feet above adjacent floor.

Streaming was in opposite direction from the narrows joining the main lake and SW arm, one branch feeding the SW overflow and the other going to N part of main lake. Two border fountains continuous in SW arm, one in W pond, one of the two in SE arm went out of action when the overflow started.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date December 9, 1920
Friday " 10, "
Saturday " 11, "

December 9.
10:30 a.m. to 12 noon. Fume very thin. Four vigorous grottoes active in the SE lake, four in SW arm, one in W pond and one small one in main lake. SE arm one foot down, SW arm overflowing, E pond brimming. A flow from W pond that reached beyond E pond was still glowing. Small cascade into center pondlet by flow from surrounding overflow for a few minutes at 11 a.m.
A crack that extends NNE across floor from the NW extension of the NE crag has enlarged.

December 10.
12:30-1:30 p.m. Tremendous floods pouring out of SW arm, one stream going directly across from the S part of that arm to the SE lake and another around the wall to the same lake both dropping 3 or 4 feet as they empty into SE lake. A large stream from W pond is joined by one from main lake and cascades into E pond with a drop of 10 feet. A new small pot in the center floor was fountaining. The island and adjacent fracture block by the W crag in the main lake have disappeared. The liquid lava is at least 7 feet higher than on the 9th. The E part of S crag mass was almost covered by the flood.

December 11.
10-11 a.m. Fume thin but thicker than yesterday. Lakes lower. SE lake 5 or 6 feet down; E pond 8 or 10 feet; main lake and SW pond 7 or 8 feet; and SW arm 2 or 3 feet below S and SW bank. Former island of SW arm had undergone considerable uplift and stood 5 or 6 feet above adjacent floor. W crag mass higher and tilted to NW more. Avalanches fell from S end of NE crag toward the wall. Small avalanche from lower part of crater wall between E pond and SE lake. A small cone that was glowing had been built up around the pot in the center floor (mentioned on the 10th).

R H F

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thurs & Sat Date Dec. 9 and 11, 1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
December 9.								
11a.m.	NE	N	0					
	NNE	N	0					
	NE	Center peak NE crag	48 15	-18 22		290	96	
	NNE	same	107 20	- 8 37		567	86	
	NE	W peak W crag	51 15	- 4 19		1045	79	
	NNE	same	60 07	- 3 48	0	1015	67	
	NE	Pt. of isl. main lake	46 18	-11 17	0	738	147	
	NNE	same	69 54	-10 39	0	735	138	
	NE	Lake at E of SW grotto	76 44	- 8 43	0	955	146	
	NNE	same	82 06	- 6 36	0	1182	137	
December 11.								
10a.m.	NE	N	0					
	NNE	N	0					
	NE	Near W pt. W crag	49 47	- 4 06	0	994	71	
	NNE	same	60 36	- 3 34	0	955	60	
	NE	Center peak NE crag	48 02	-17 15		290	90	
	NNE	same	107 41	- 8 00		567	80	
	NE	Lake	40 46	-10 38	0	775	146	
	NNE	same	63 44	-10 51		705	135	

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Sunday Date December 12, 1920
Monday " 13, "

December 12.
4:45 p.m. Circuit pit W and N. Great floods just starting and the uplifted floors of previous flowing cracked radial to center and showing glow down cracks. SE pool sending rapid flow to and cascading into E pond. Fifteen to seventeen fountains.

SW arm flooding SW and SE. W pond flooding NE and S past the W crag pit which is flooded from this flow.

Main lake receiving current from SW bay and this current forks on each side of large flat island made of broken W platform uplifted. Fountains around NW, N and NE borders of main lake and radial fan of bright lines to them.

E central depression (former E pot) with pool of live lava welling up.

S of here a large flaming dome. Streaming NE from W pond all along wall-valley to E pond where it meets stream from SE pool and both gradually drown and obliterate the E pond.

N bank of main lake too much uplifted to let lake overflow. All the crag masses have been lifting up towards center of pit and tilting away from center. W crag most uplifted, its southern peak now much higher than its northern and the lake bench becoming another scarp. W crag bench and NE crag bench and W island all 15 to 20 feet above central lake; S crag bench and N bench 8 to 10 feet above lake. Cracks radial from lake N and NE in bench.

Fume thin. Red Solfatara has glow at one place only, bright scarlet glow 10 feet down, appears to be burning gas. Dense fume.

December 13.
5-6 p.m. Fresh glowing flows from the lakes on N floor, SW, W and SE and the flow from the SE pool along the wall northward was found cascading into the pit of the E pond. The liquid level in the pond was 15 feet down. The cascade was of heavy porridge-like lava.

The flaming cone SE of the central lake is at the site of the standing fountain of Dec. 2. This cone now blowing loudly with steady flames.

The streaming in central lake is northward from SW channel and a row of grotto niches with high spraying fountains has formed on W side of N end. Other spraying fountains in W pond, SW arm, N side of SE arm and in E pond on its SW side.

The flow from W pond around N side of pit has now overridden the edge of lower N shelf and trickled inward a few feet on the shelf.

At 6 p.m. the SE pool was fountaining in many places and subsiding and the E pond had risen until its surface was only 8 feet down. The cascade became sluggish and small. Thirteen fountains, spray 50 feet high.

SPECIAL NOTE. At 5:15 p.m. took temperature with mercurial thermometer of fuming crack where postal cards are scorched 200 feet NE of Halemaumau near hut. Found temperature 220° C. Placed in crack two-foot pipes of black iron, galvanized iron and copper. Crack about 2 feet deep and 2 inches wide. Built

cairn over spot. Pipes about ½ inch in diameter.

This for a test of the effect of the gases on the pipes, as suggested by J. M. Young, in preparation for an experimental steam engine with tubular boiler.

December 14.
11 a.m. to 12 noon.

Lakes 8 to 10 feet down, W pond less than center and SE, E pond still less, only about 5 feet. No overflows in motion and increased fume from crags. Island nearly joined to W point. Climbed down and crossed very hot fresh flow N, with its medial zone slumped down. Reached edges of main lake and W pond. Large dome grottoes; rapid current to NW grottoes in main lake with travelling large central fountains. High flings of melt at W pond. Large grotto SW side E pond and numerous grottoes SE pool.

The uplift of NE crag mass has broken joint along a SE line to wall of pit on NE side of SE arm, making an escarpment facing SW 5 feet high extending SE across the narrow ledge bounding SE pool on the SE. The ledge has stayed down at end of SE pool, but the N wall of pool has lifted up with the lift of NE crag mass.

No blowing in central cone. Ten fountains. SW arm higher than the rest.

Evening. The lakes were still down, and crags smoky.

NOTE. The old N crag was submerged completely about December 5 and the SE crag is now also completely submerged leaving only a small peak on the W side of the S crag mass.

T A J

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PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Tuesday Date December 14,1920

t	sta	subject	no	pl	scr	stop	ex	cam
11 a.m. to 12 noon. Tessar lens.								
	E end N shelf	W pond	1	W P	8x	f/22	1	5x7
	"	Center	2	"	"	"	"	"
	"	E pond	3	"	"	"	"	"
							T	A J

1920, Dec. 14

1

Fog

1920, Dec. 14

3

2

JOURNAL

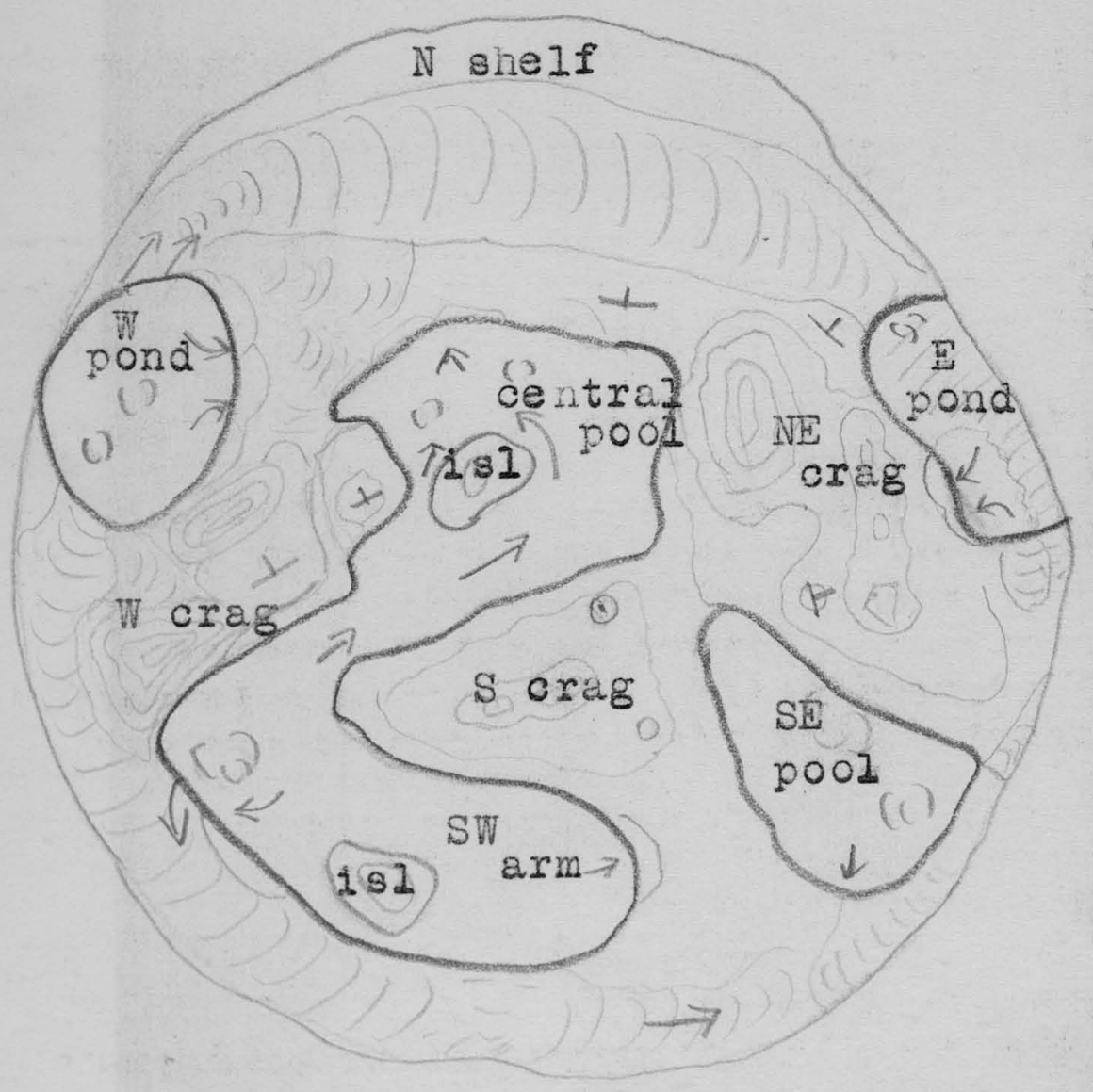
U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Wednesday Date December 15, 1920.

10 a.m. Ten to fifteen fountaining areas. Strong overflows just commencing. E pond enlarged northward into an oval lake nine times larger than before, at least 100 feet long, under NE station. Smoke from the uplifted portions of all the crags, especially on the central pool side of the NE crag. Noise plashing and puffing of fountains and crisp tinkling of cooling pahoehoe surfaces. Bubble fountaining on SW side of E pond, migrating to fountaining grotto. Islands W side central pool and SW side of SW arm.maintain themselves. The S crag is now very low. The S peak of the W crag is now higher than the N peak. The NW peak of the NE crag is now much higher than the old ridge. The E face of the old ridge is nearly vertical. Large quiet migratory fountains develop in different places from time to time.

The flows of this morning from W pond to E pond by N floor, short overflows N and S from SE pool, long overflows of S floor from SW bay, floods southward from W pond. Banks of central pool 3 to 10 feet high, of E and W ponds 1 to 3 feet high, of SE and SW arms 0 to 6 feet high. Flooding is evidently in excess of rising of the crags as in December of 1918. Lakes about 105 feet below rim.

11 a.m.



11:15 a.m. The flows appeared stagnant and the central lake was lowering.

Observation of low cascade of W pond flow into E pond showed latter holding its level remarkable, not deranding small frozen cascade shells at its border by any fluctuation of level. The "porridge" of the pahoehoe lava pouring into the pond from under the breaking crusts of the flow showed hundreds of bursting bubbles 1 to 3 inches in diameter, and so did the whirlpool of lava a foot below where the torrent went into E pond. <u>This characteristic of pahoehoe melt</u>.

11:25 a.m. E pond sinking 2 feet with border fountaining. W pond starting renewed overflows.

<u>NOTE</u>. The minute bubbling and blistering of pahoehoe in marked contrast to aa.

Travelling fountains in line on N side of central pool island.

<u>Mauna Loa</u>. At 5 p.m. and after, column of fume at 12000 feet SW, also on summit. Drift to SW. Thin but definite smoke jets. No glow after dark.

Night. Bright glow from Halemaumau.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

 Day Wednesday Date December 15, 1920

4-6 p.m. Pit moderately fumy. Two large grottoes in SE arm, two in W pond. Central fountains playing in all pits. Fountaining in E pond over locality of the small E pond site; foundering of crust in the N end of the enlargement of this pond. Occasional rapid streaming out of SW arm to main lake. SE pond enlarging along crack leading to main lake.

All lakes 4 or 5 feet down except main lake whose banks in most places are higher. A flaming vent was located in the SE corner of the W pond. The cone in the center of the pit was flaming brightly.

3:30 p.m. Mauna Loa. Fume seen from 11000 foot place on Mauna Loa.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date December 16, 1920
Friday " 17, "
Saturday " 18, "

December 16.
4 p.m. Crag came into view from Observatory; 3 or 4 feet above rim when observed. The crag is the NW extension of the NE crag.

R H F

December 17.
11:50 a.m. Circuit pit by W and N. Very hot fume rising at Red Solfatara. Much fume from a chimney in NE crag mass where old NE cove was formerly, now near summit. Fume from the other crags. Central lake 8 or 10 feet below its uplifted banks. Uplift of crags shown by new open tumescence cracks radial from center. Near one of these a glowing, fuming and flaming hole at site of former N pot. Another glowing craterlet in a small cone SE of center of pit.

E pond brimming and 200 feet long. SE pond 4 feet down, SW arm 3 feet down, W pond 3feet down. By noon some rising of the pools by a foot or so. Much turbulent perpetual fountaining, fifteen to twenty fountains in action and many bubble fountains; some travelling fountains. NW end of SE pool enlarged, curving towards E pot site. Many large fountains in central pool and currents changeable. Bubble fountaining in a zone across middle of E pond with bombardment on NE and SW banks. Streaming N and SE in central lake. Fresh tumble from old NE crag S end.

Pit very bright at night a.m. N floor does not appear more than 100 feet down.

December 18.
10 a.m. From 10 a.m. to noon the marginal lakes were repeatedly overflowing. At 10:15 the E lake overflowed chiefly northward. The SE pool had been brimming over but it lowered slightly when the E lake overflowed. During the morning the SW arm overflowed the whole S floor. About 11:15 the W pond overflowed across the N floor and kept overflowing after noon. These flows were not excessive, and there was considerable smoke from the crags. Fifteen to twenty fountains. Violent spraying fountains at E pond with puffing flame bursts and great quantities of Pele's hair. Much bubble fountaining in all the pools and much ballooning of skins. Wall of pit in several places appears only 80 to 90 feet above floor.

Went down to N edge main lake where yawning radial cracks show tumescence. Inspected front of flow from W pond and noticed that the bubbling of gas at the fresh breaks where the melt wells out was by scores of bubblings at the overflow from lake and fewer at the branch flows and still fewer at the toe outbreaks. Minute bubblings along the bright lines at edge of the festooned belt. The diminution of bubbling coordinate with the increase of viscosity and restraint of gas escaping from solution? Maximum in lake itself where the coalescence of bubbles makes the perpetual fountains and high flings. High flings mean rupture of thick viscous surface melt.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Friday Date December 17,1920

t	sta	subject	no	pl	scr	stop	ex	cam
11:50a.m.								
	Middle of N shelf	Pit	1	6 inch film	K 3	f/11	½	Cirkut
	"	"	2	"	K 2	f/16	"	"
	NNE	"	3	8 inch film	"	f/11	"	"
								T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SURVEY RECORD

Hawaiian Volcano Observatory

Day Saturday Date December 18,1920

t	sta	pt	hor	vert	lev	dist	elev	h. i.
								5 ft.
10:14a	NE	N	0					
	NNE	N	0					
	N	W	0					
	NE	NW side W pond	30 26	-4 51	0	1127	96	
	NNE	same	37 26	-5 35	0	862	84	
	NE	Summit W crag(S peak)	49 00					
	NNE	same	58 58	-1 43	0	976	31	
	NE	Summit NE crag(NW ")	35 51					
	NNE	same	82 59	-1 52	0	521	34	
	NE	E end SE pool	114 14					
	NNE	same	114 16	-4 46	0	1037	87	
	NE	W end SW arm island	73 44	-4 57	0	978	86	
	N	same	28 10	-3 41	0	1179	76	
	NE	Summit S crag	67 07	-5 35	0	763	74	
	N	same	35 23					
	NE	Summit middle peak	47 21	-12 56	0	269	62	
		old NE crag	109 30	-4 37	0	559	45	
	NNE	same	44 55					
	NE	Grotto W side E pond	121 30	-9 25	0	560	93	
	NNE	same	67 44	6 37	0	684	79	
	NNE	N end central island	33 19	-7 06	0	660	82	
		(central lake level)						
	N	same						

Below 3727 (NE):

W pond	96.5
Center lake	92.5
SE pool	100.0
E pond	106.0

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Sunday Date December 19, 1920
Monday " 20, "

December 19.

1:30 p.m. Fume moderately thin. Lakes about 1 to 2 feet below banks, except central lake whose banks are about 4 or 5 feet high. Fountaining in all lakes, bubbling fountains in E lake very numerous.

2:30 p.m. The SW arm was overflowing to the S and a small trickle was pouring over the E bank of the W pond. SE and E pond brimming. A cone near the W crag pot site was hissing very loudly and ejecting small bits of melt.

The numerous fountains and grottoes in all lakes were making much Pele's hair.

Could not get close to main crack at Red Solfatara but thought I could hear rumbling.

R H F

4 p.m. With Dr. van Leeuwen, botanist, of Buitenzorg.

S wind. Pit with fresh flows from marginal ponds, twenty or twenty-five fountains, much bubbling, rising crags, building grotto domes, noises of puffing and splashing, fume from crags. Dense fume from Red Solfatara. Old NE crag surfaces practically vertical by overturning. E floor of central pool shore uplifting and tilting to SE. Caving at site of former E pot, or S end of NE crag mass, the SE pool extending itself in that direction forming a hooked cove at its NW end. Streaming SW in SW bay.

Visited rift crack in desert at widest opening , some steam farther SW. Note distinct downthrow in blocks of ground on E side, no new motion definitely indicated.

T A J

December 20.

3 p.m. Last night floods from wall to wall and cascading into E pond. Crag rising strongly (NE crag, in view from H.V.O.)

Now the SW bay, SE pool, E pond and W pond all flooded level with encircling fresh glowing fill that has two-inch crust. This fill has been cracking and foundering across S side of pit and lowering at wall margin. Enormous fountains occasionally center and SW, steady bombarding of large ramparts W sides of E and SE pools. Twenty to thirty fountains and much bubbling. Enormous spatter dome NW corner N cove. Large dome flaming SE of central lake.

T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Tuesday Date December 21, 1920

11 a.m. to 12 noon.

Border lakes overflowing and the fills cracking and foundering. SW bay flows E along wall valley, SE pool N, W pond NE filling N floor to a level 6 feet or more above E pond. A chute cascade from this N fill to E pond. Central cone hissing and changed shape with spiracle on top. Large cone at N pond site.

S crag remnant increasingly submerged. Spatter ramparts N and E of E pond. Long row of scalloped high ramparts NW of main lake. Streaming NE and SW from middle of SW bay. Streaming SE and NW in SE pool. Streaming N and E in E pond. SW arm island and central pool island still persist.

Falls of rocks E slope of old NE crag which is nearly vertical. N fill not more than 15 feet below N shelf. Abundant smoke from crags. Fifteen fountains more or less. Fume from Red Solfatara. SE wind. Cracking and foundering crusts across N and S fills.

At noon entire spatter rampart of SE end of SE pool collapsed.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

PHOTOGRAPH RECORD

Hawaiian Volcano Observatory

Day Tuesday Date December 21, 1920

t	sta	subject	no	pl	scr	stop	ex	cam
11a.m.	S saddle	Pit	1	27 inches of 8-inch film.	K 3	f/11	½	Cirkut (levelled)
	SE	"	2	21 inches 8-inch	"	"	"	"
	NE	"	3	36 inches 6-inch	"	"	"	"

Photographs for survey tests. Height of SW station and rocks of SE visible, but monuments destroyed. W, NW, N and NNE have monuments. S saddle on the right of highest lump of pressure ridge.

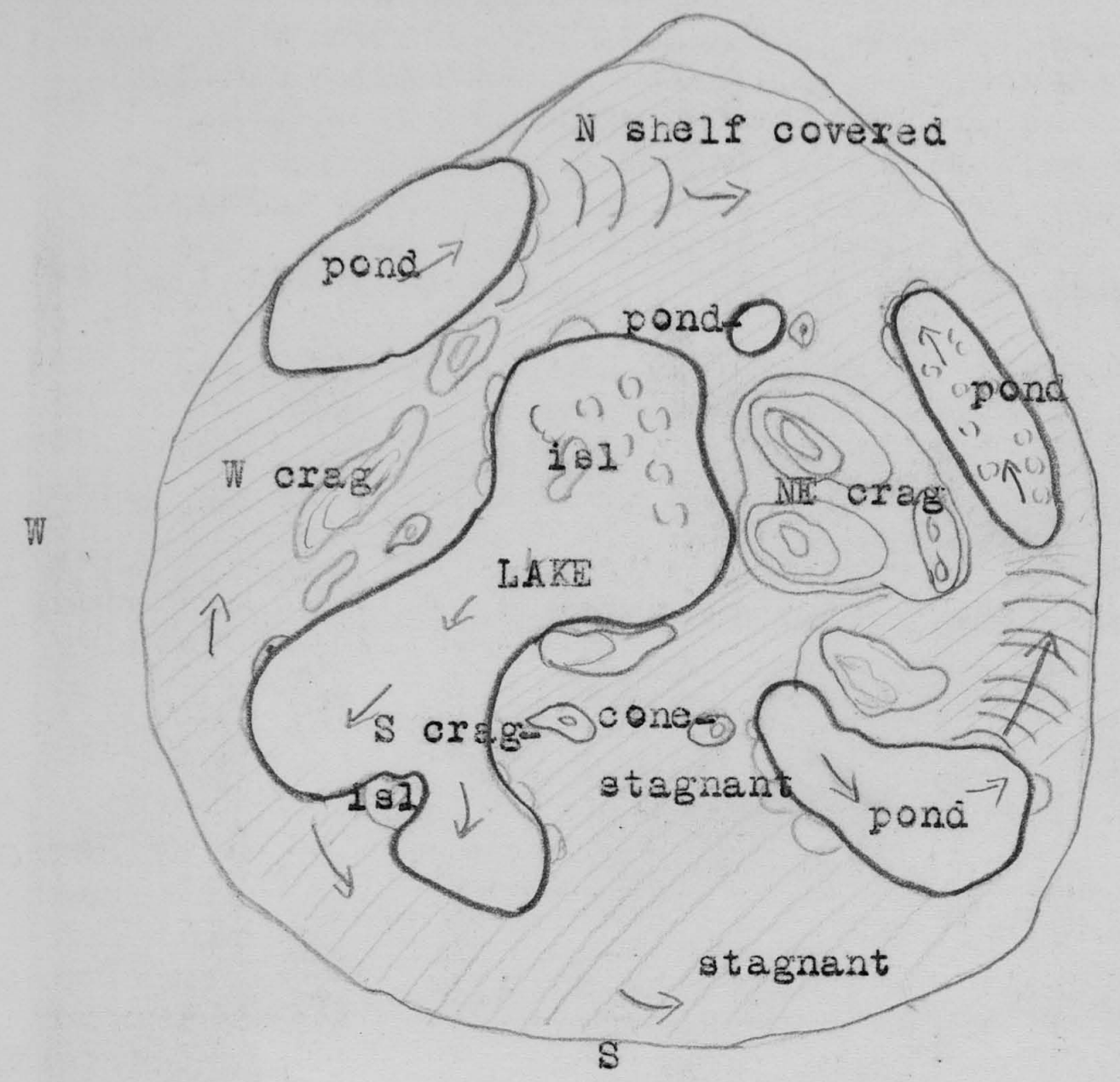
T A J

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

Day Thursday Date December 23, 1920.

10 a.m.



NW peak of NE crag well above far rim of pit seen from S. Ten to twelve fountaining grottoes and very hot bubblings. N shelf drowned. Pools marked only by some ramparts. Doughnut cone SE of center with 2-foot orifice splashing. Immense flood pouring from SE pool to E pond. Streaming <u>SW</u> from central pool.

11 a.m. Streaming SW bay to E; <u>before</u>, it was to NW behind W crag. Only small ramparts around N cove, flood appears to have joined through from W pond to main lake. Two uptilted bench crags E and S of main southern peak of W crag. W crag as a whole greatly drowned and S crag only 6 or 8 feet high. SW arm island a low partially buried peninsula. Wall appears about 75 feet high at NE station. Lowering in central pool one foot at 11 a.m.

Maximum of bubble fountaining in E pond and N cove of central pool. Sources appear to be the W pond, the SW bay, and probably the central cone feeding the floods of the SE pool.

Day rainy with light SW wind. Visited Red Solfatara from SW side and found the red hot crack one to two feet wide with live lava visible 10 to 12 feet down, black pahoehoe; rumbling and puffing and flaming indicating the presence of a cupola over a lava fissure directly connected with Halemaumau and liable to outflow at any minute. The depression between here and SW heap at least 15 feet lower than the live lava in the crack. The 1919 rift across this depression steaming and stained, but without evident gas pressure or any perceptible

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

 Day Thursday Date December 23, 1920

motion in the ground.

11:30 a.m. The central lake down 3 feet, other pools slightly down, SE pool still overflowing. Fountaining increased, ramparts more in evidence. Cracking and foundering S fill.

5 p.m. SW bay overflowing freshly. SE pool now not overflowing as though the bench magma block had teetered over to the W. Abundant fountaining, thin blistered skins, flames through skins, great quantities of burning gas. Flaming cone in hollow W of W crag. Rows of grotto caverns evenly spaced N side SW arm.

No new developments at lava in crack at Red Solfatara.

Went to wide open crack in desert SW of Kilauea (1919 chasm) and placed an eight-foot rod across a narrow warm part of crack showing deep rock fissure below, marking rod with blue pencil where sides of chasm came. Chasm about 4 feet wide here. Placed about 5:30 p.m. Left this as a marker in case chasm opens wider during present crisis.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Friday Date December 24, 1920
Saturday " 25, "

December 24,
3 to 5 p. m. Southwesterly storm. With Col. Hiram Bingham and Professor Myers and Richard Cooke.

Lava in pit 50 feet down, overflows recent but not so voluminous as day before. Central pool lowered 4 or 5 feet relative to banks. Much rain steam on fresh crusted surfaces. Large and small fountains.

Red rift SW not so noisy as day before and lava in it lower. No fresh flow along the crack.

Spurting cone on flank of W crag, middle part.

December 25. Southwesterly storm continues. Nothing particularly new reported from the pit. Lava 40 to 45 feet down and still flooding.

T A J

Day Sunday Date December 26, 1920.

5 to 6 p.m. Storm continues, with thunder and lightning but wind has ceased.

Pit continues flooding with hundreds of bubble fountains, large stalactite grottoes, flaming balloon skins and spurting cones. NE crag appears 60 feet above lake.

Level of lava 50 feet below NE and W stations, 35 feet below SW, 30 feet below N, 40 feet below SE.

W crag low; large spurting cone E of it. N ramparts of central lake and island in central lake have risen. S crag mass and SW arm island have risen, but drowning has diminished their relief; only the NE crag has risen strongly.

Streaming N in central pool, E pond and W pond. Floods nearly up to upper bench N. 1300 feet diameter of nearly continuous liquid lava N-S.

Fountains of W pond in view from H.V.O. Rosette type of bubble fountaining in golden pudding in E pond. Large grottoes outline the several lakes in the midst of the crusted or partly crusted floods about them.

Red Solfatara has a blowing cone with 3-foot flames above it, glowing filagree over a cupola with boiling lava below. Noisy. Appears ready to flow at any time. Cone 3 feet above general level.

T A J

December 26-27.
12 midnight to 1 a.m.

Rapid streaming to the NE out of SW arm. Border fountains along E bank of SW arm throwing the melt 30 or 40 feet into the air. Cone in W crag splashing 70 or 80 feet high. The pot in the central floor exhibited a very voluminous flame from time to time, numerous flaming vents all over pit. Red Solfatara hissing loudly, with flames shooting high into air and occasionally ejecting lava.

R H F

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Monday Date December 27,1920

4:30 to 6 p.m.

Lakes visibly 6 or 7 feet higher than on 26th. Twenty to forty feet below rim. Last flow over N floor 8 or 9 feet below outer N sunken floor. Two spouting cones in Red Solfatara region, a new one about 100 feet nearer rim of pit. The old one 5 or 6 feet high and about 2 feet across was sending lava 30 or 40 feet high. The new one had a small spatter overflow down the crack and was ejecting lava to a height of 20 or 25 feet. Both making much Pele's hair. About 6 p.m. the spatter from the old cone increased enough in volume to build up a feeble driblet flow to the S.

SW arm overflowed a little to the S. A top vent over a closed grotto site at NW end of E lake was ejecting lava and emitting a voluminous flame. The crack leading northward in N floor from main lake had a small boiling pot. A filagree patch was located at base of N.end of new NE crag. The cone in the W crag mass was occasionally sending up lava 4 or 5 feet high. All lakes brimming except at higher positions of their banks, as around most of main lake and portions of SW arm.

Temperature of new "post card crack" apparently no higher.

A small flow started from the side of Red Solfatara cone about 7 p.m. and the driblet flow increased. Each stream 3 or 4 feet wide. The upper cone ceaded spouting when the flow started. The two small streams joined a little below the cone source.

R H F

Evening.

Lakes up 4 or 5 feet, fountains more visible from H.V.O. Two spurting fountains on rift line SW. Whole NE crag visible with glowing lava visible on H.V.O side. About 7 p.m. the SW cone at Red Solfatara fume locality flowed, and from Uwekahuna the flow seen, a sluggish glow along rift direction SW about 300 feet beyond the cone. Cone a spurting beehive. Activity of pit the same.

No glow Kau Desert.

T A J

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

JOURNAL

Day Tuesday Date December 28, 1920.

10:30 a.m. Visited stick across Kau rift. No sign of movement. Big waves in E pond, by collapsing banks.

Made circuit of pit E and N. At SE station the highest level reached by the upturned edges of the slumped flood crusts is 20 feet below station. At SW and N benches, in places, the marginal cliff of the pit is only 10 to 15 feet high. NE and W it is about 30 feet.

Middle floors and NE crag have been lifting rapidly. SE and central pools 3 to 8 feet below edges. E pond flush with edge and overflowing slightly S; W pond overflowing slightly N. SW arm defined below banks 2 feet. Row of five big spatter domes NE side SW arm. No special spurting of central cones. Large fountaining domes at ends of E pond. Much bubbling SW bay, E pond, N cove. Noises of splashing. Large cones at N pot locality. Wide flat floors N and S, thick crusts. S crag a small remnant. W crag greatly diminished. Nearly whole interior in view from H.V.O., NE crag mass very conspicuous.

Towards noon lakes settled in their cups and appeared in adjustment with the SW rift flow. No rising in crag diagnosed in evening and no higher appearance than evening before.

Visited the cones and flow of SW rift. Upper cone 4 feet high, in rift crack, with driblet spiracles: 300 feet from pit. Lower cone 10 feet high, a double dome, on a glistening glassy pahoehoe heap, 500 feet from pit. Flow from here covering rift crack to valley between here and SW heap of December, 1919, and making a flat pool in bottom of valley, the front bending NW. Total length 500 feet, more or less, Toes pushing slowly. Not much noise from cones, and no splashing. Fume column of this rift id gone, only thin vapor rising.

No movement in the rift is apparent. No action in SW heap or NE fume patch.

T A J

PHOTOGRAPH RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Tuesday Date December 28,1920

t	sta	subject	no	pl	scr	stop	ex	cam
10a.m.	N of SE	to NE crag	1		8x	f/22	1	5x7
	"	E pond	2		"	"	"	"
	E of SE	SE and SW pools	3		"	"	"	"
		Near view of N end E pond and NE crag	4			f/8	1/100	"
	N high ground	E side of pit	5		8x	f/22	1	"
	"	W " " " (5 and 6 panorama. Both have Mr and Mrs Goodale and James Tsuchiya in foreground)	6		"	"	"	"
		Lower cone Red Solfatara	7		"	f/16	1	"
		Upper cone SW crack	8		"	"	"	"
	SW heap to new flow		9		"	f/22	"	"

T A J

1920, Dec. 28

1

2

Jaggar

1920, Dec. 28

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Jap

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1920, Dec. 28

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370

1920, Dec. 28,

9

Jag

11 a.m. to 12 noon.

Lakes brimming and producing small overflow. Considerable fume from many of the islands and higher portions of central floor. Lava about 5 or 6 feet down at a low place between NE and NNE stations. Highest portions of rim 30 to 35 feet above floor. Floor around main lake and inner portions apparently continue to rise. Banks of lake S of W crag have risen perceptibly and now about same height as W crag. Center island also higher.

Cool lava of a new flow on lower places of N sunken floor. Large half circle grotto on SW bank of northern end of E lake. SW arm island disappeared. Both cones at Red Solfatara hissing loudly but not spattering. Flow, if any, feeble.

Afternoon. Lakes flooding floors in all directions. The low point in the rim where the lava was 5 feet down in the morning was but 3½ feet above liquid at 5 p.m. Flow from the lower Red Solfatara cone broke out at 6 p.m. with much more lava flowing than in previous outbreak. (Reported by P. G. Gates)

R H F

Night a.m. W and E ponds and N end central pool visible from H.V.O.
Night p.m. SE pool fountains and occasionally SW pool fountains in view. Spray from fountains N as high as crag -- 70 feet. No change during night.

Reports of more collapse of banks of SE and E pools. These collapses enlarging the pools outward, and they take place while pools are practiacily brimming full. Similar collapses must have happened in SW pool, to judge by its increase. Must be due to tumescence fracture.

T A J

SURVEY RECORD

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Wednesday Date December 29,1920.

t	sta	pt	hor	vert	lev	dist	elev	h. i.
11a.m.	NNE	Peak new NE crag (58 - 13 = 45)	86 18	+6 45	0	490	58	
	N	same (52 - 11 = 41+)	49 36	+5 00	0	645	52	
	NNE	NE crag (+4 - 13 = -9)	113 21	+0 20	+4			
	N	same (0 - 11 = - 11)	40 29	+0 02	+0.3			
	NNE	Grotto E lake (19 + 13 = 32)	113 12	-4 09	0	274	19	
	N	same (22 + 12 = 34)	24 30	-2 07		613	22	
	NNE	Grotto main lake	61 40?	-1 31		704	19	
	N	same	79 30?	-1 50?		632	20	

Old W crag on level with N station plus h.i.

R H F

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Thursday Date December 30, 1920.

4-5 p.m. Lakes nearly flush with banks. Last overflow around E lake about 1 foot below low point in rim between NE and NNE. N sunken floor covered from last overflow. Both bubble and large fountains in all lakes. All grottoes except three, two at S end of SW arm amd one at SE part of SE arm, located on inner banks of lakes (towards center of pit). The grottoes were making immense quantities of Pele's hair.

A fracture block island in SE arm and adjacent to southern extension of new crag is horizontal and 3 or 4 feet above liquid. The island in the main lake and the old floor adjacent to W crag continue to tilt and increase in height.

The flow from Red Solfatara cone which was reported by Alex to have been dead in the forenoon was again evident as a lava rivulet. Both cones hissing.

R H F

Hear puffing at H.V.O.

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday Date December 31,1920.

10-11 a.m. Circuit of pit by E and N. Lakes high, mostly not overflowing. The lakes fountaining continuously from scores of large bubbling dome bursts, bigger than a week ago, with ballooning skins everywhere.

SE pool with large spatter domes E end and currents meeting in middle.

SW pool greatly enlarged to the E and S, with spatter domes.

E pond a long lake extended to nearly the margin of floor, with large domes, and rapid rush to grottoes SW side.

N pot a cove of the central leke with high fountains and surrounded by high spatter rampart. Hissing filagree cone flaming on its E side.

NW of central pool, a trench-like cove with boiling fountains and a rampart.

W pond boiling all over with continuous migration of balloon crusts to its E margin. Brimming.

NE crag high; W crag low. Large dome 11 feet high spurting on E side of W crag.

Streaming from central pool to SW arm. Fountaining in SW arm. Scores of bubble fountains and some big fling fountains in N cove.

At SW rift the lower cone large and hissing and flow in SW valley larger. Upper cone an arch vomiting lava both sides, a fresh flow from it progtessing SW.

Fume from pit very bad, high NE wind.

12:30 to 3 p.m. Walked out on N floor. Fresh overflows from W and E ponds. E pond flow now level with edge of Halemaumau between NE and NNE stations. Both E and W ponds seem to be acting as source ponds and building themselves up as slag heaps above N floor.

All the outlying pools tend to centripetal streaming with big spatter grottoes on the side away from the Halemaumau wall. Strong tumescence has lifted the former floor E of central pool into a crag, the S floor same way. The W point crag is higher than the W crag summit and the island is very high with tilted surface.

At 3 p.m. SW and SE pools had overflowed their ends, SW overflow in progress

5 p.m. From H.V.O. the NE crag summit level with far cliff of Kilauea.

T A J

10-11 p.m. A distinct white flame was noticed several times near the wall bank of the W lake issuing through cracks. Small explosions could be heard from time to time at the flame locus. The explosions often preceding the flames.

R H F

375

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory

PHOTOGRAPH RECORD

Day Friday Date December 31, 1920

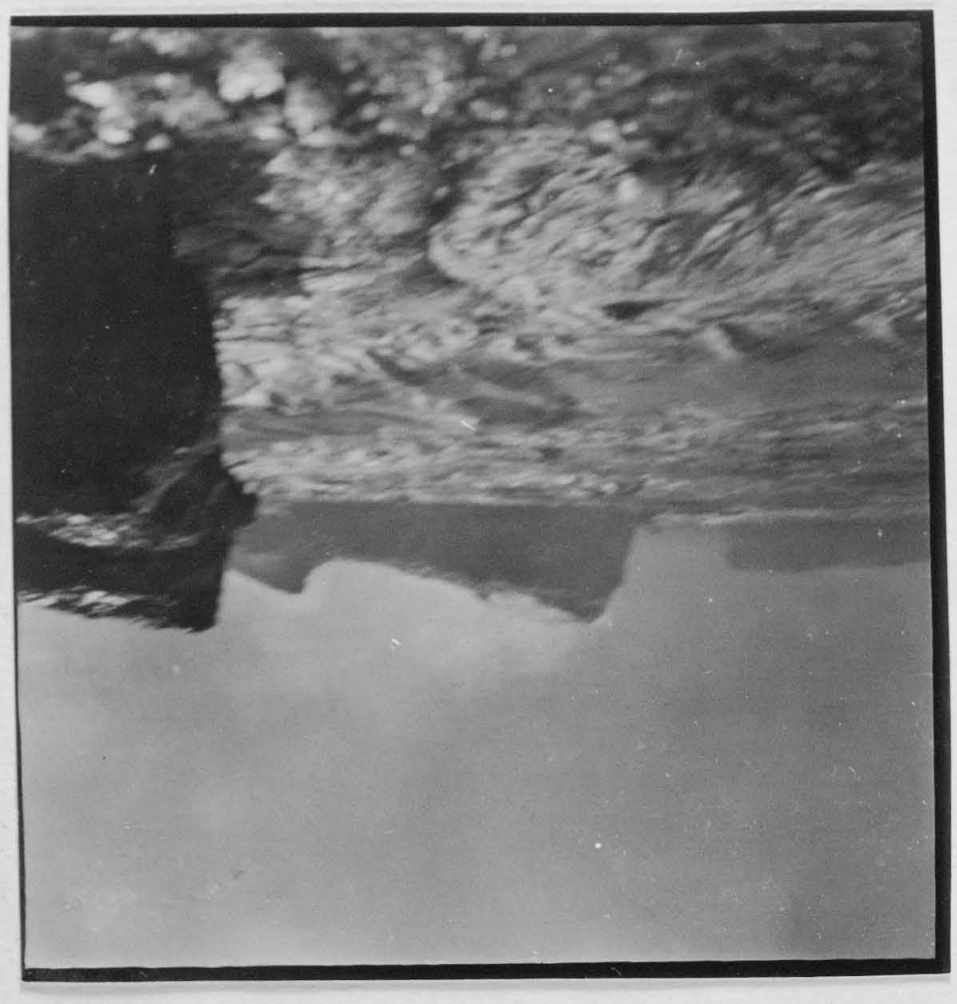
t	sta	subject	no	pl	scr	stop	ex	cam
12:30	N	Pit	1	6-inch film	K3	f/11	½	Cirkut (levelled)
to	N high ground	"	2	8-inch film	K3	"	"	"
3 p.m.		Fountaining cove NW of central pool	3			f/7	1/100	Stereo Kodak
		same	4			"	"	"
		same	5			"	"	"
		same	6			"	"	"
		N rampart to cent.pool	7			"	"	"
		same	8			"	"	"
		Balloons on W pond looking S	9			"	"	"
		same	10			"	"	"
		same	11			"	"	"

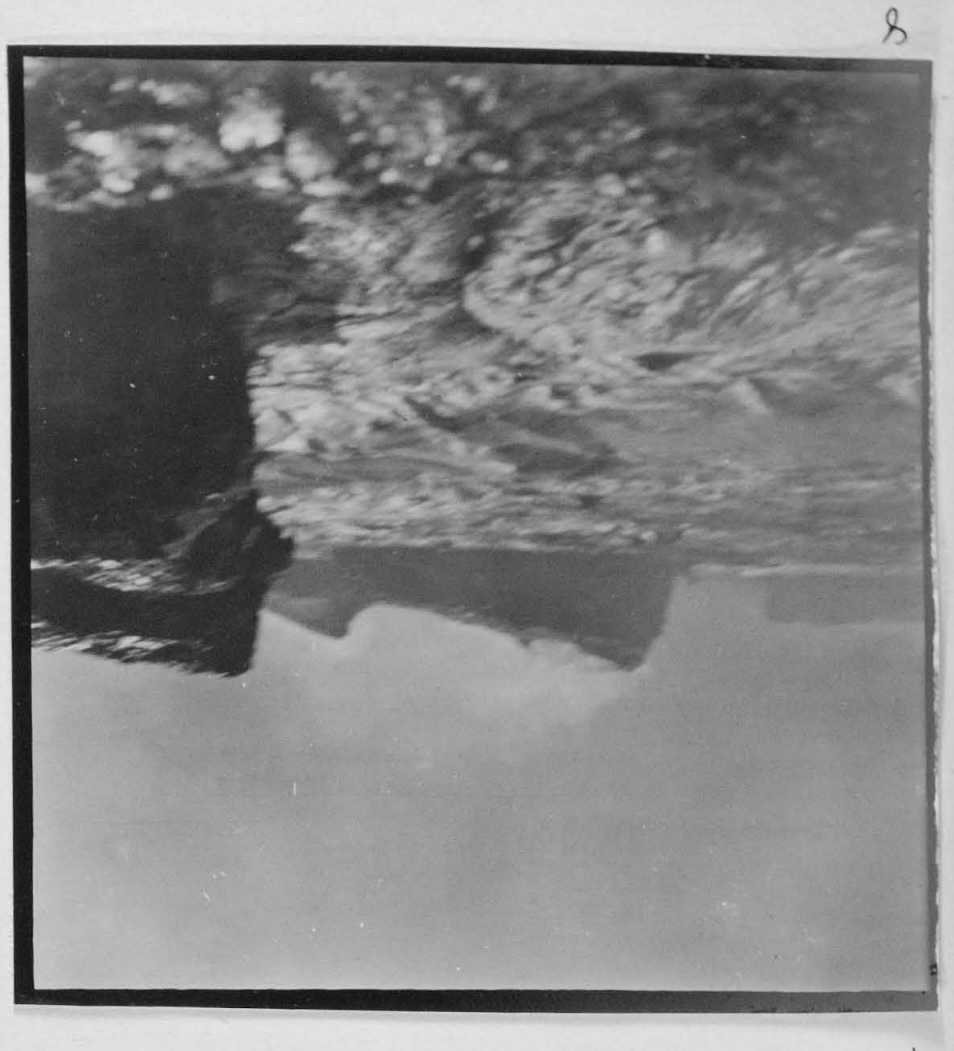
T A J

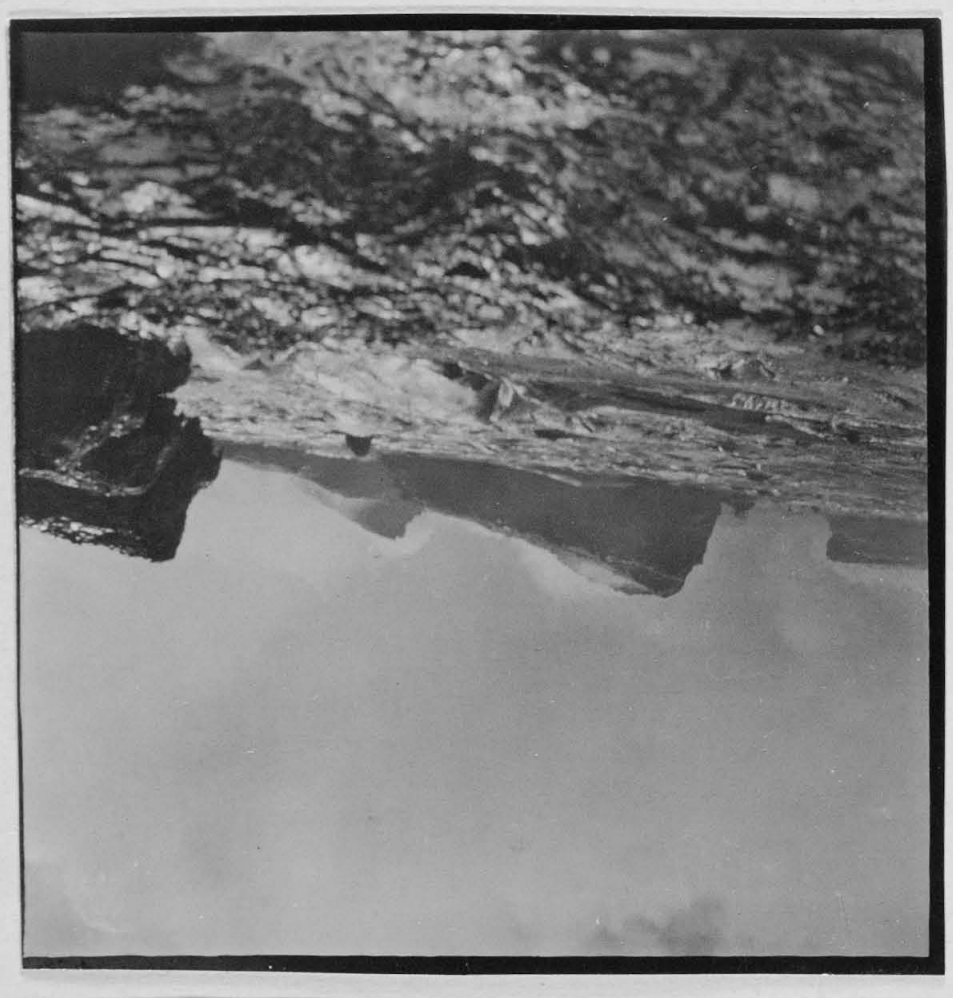
3

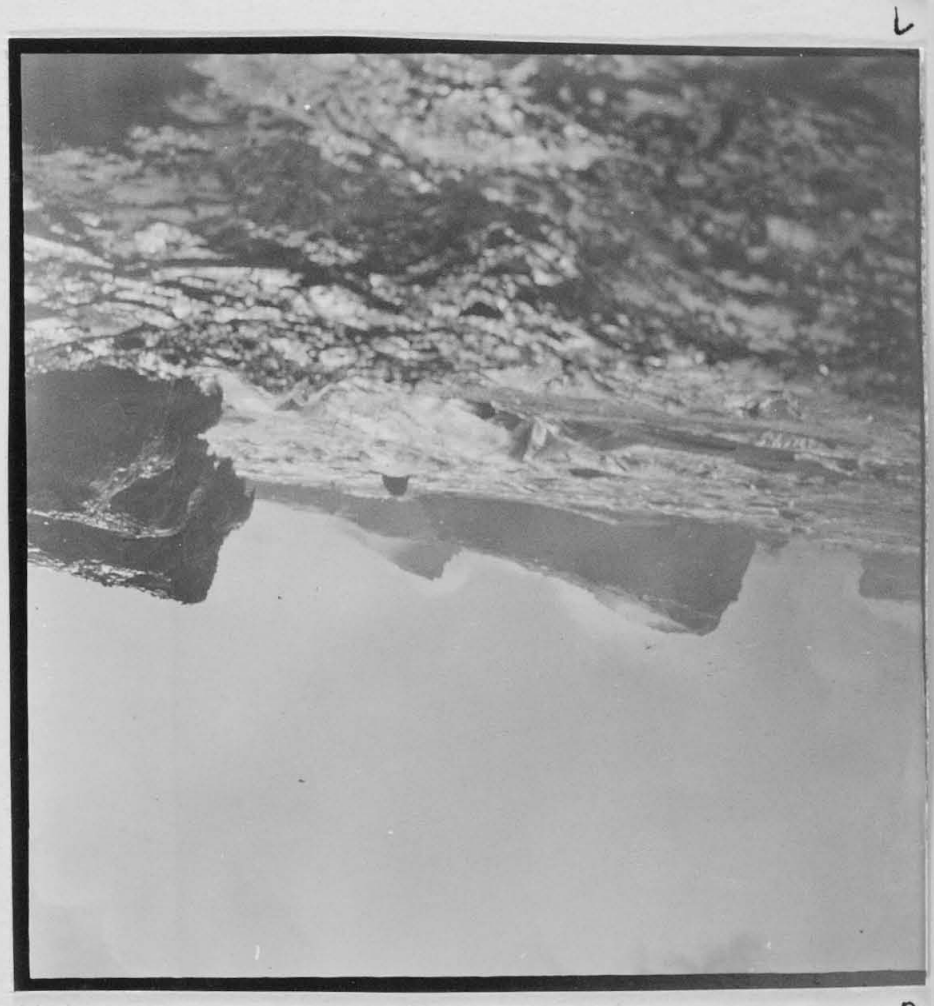
4

5









9

10

11

Jan

JOURNAL

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU
Hawaiian Volcano Observatory
Day Friday - Saturday Date December 31,1920 - January 1,1921

9 p.m. to 1 a.m.

Slow overflow from W lake to N floor going at 9 p.m. Streaming out of main lake to SW arm. Flow from Red Solfatara pushing forward with toes to the N and S. Both cones hissing and spouting lava. A small overflow on low NE rim about 11 p.m. At 12 midnight the lava in the E lake stood 5 feet higher than the low part of NE rim. A glowing vent could be seen in the S face of the new NE crag some 50 feet above the liquid. The E lake and SE arm overflowed and joined about 11 p.m. Fountaining at SE end of SE lake shooting melt 40 or 50 feet high.

R H F