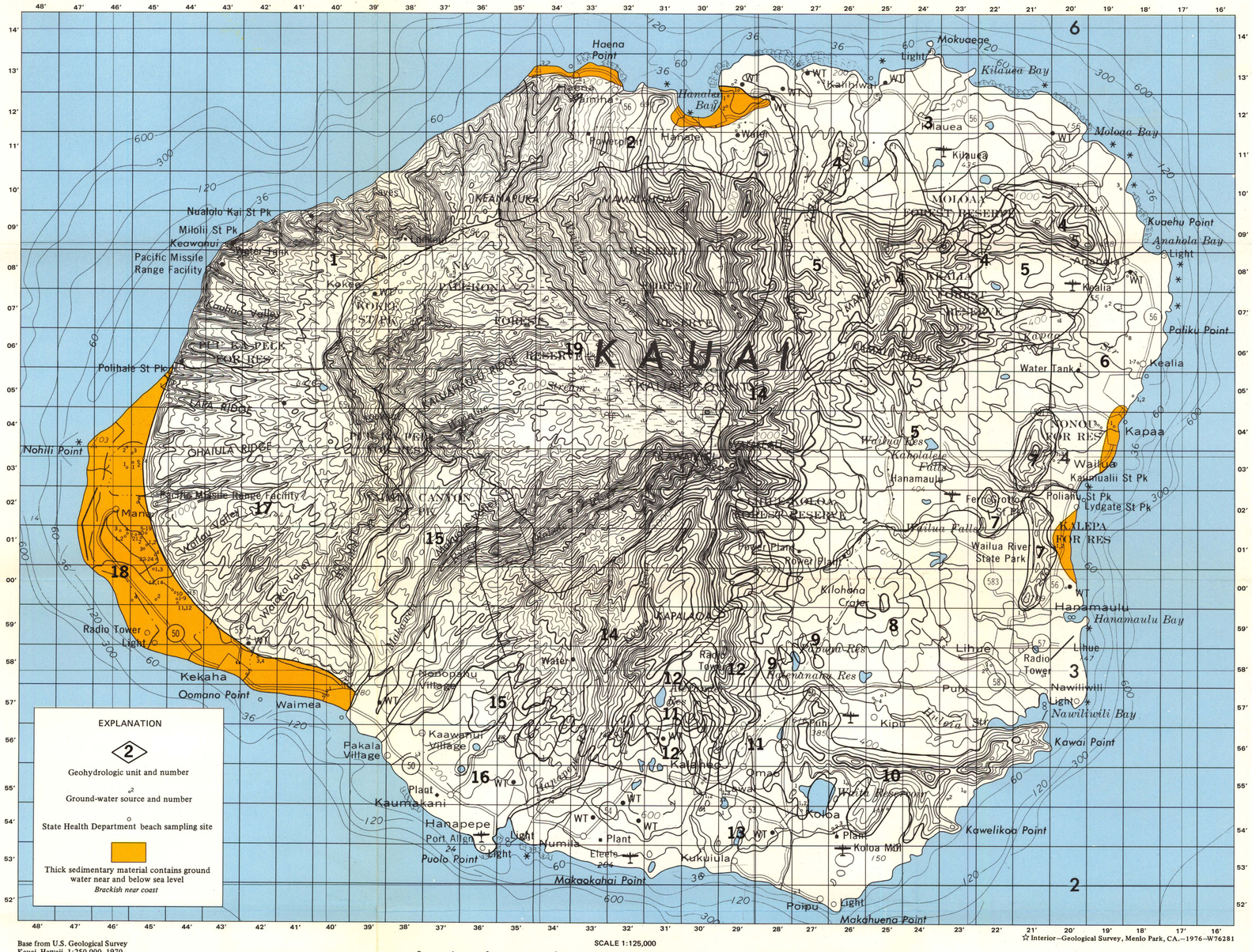
Prepared in cooperation with the
STATE OF HAWAII, DEPARTMENT OF HEALTH



Base from U.S. Geological Survey
Kauai, Hawaii, 1:250,000, 1970

ISLAND OF KAUAI SHOWING GEOHYDROLOGIC UNITS, SAMPLING SITES, AND GROUND-WATER SOURCES

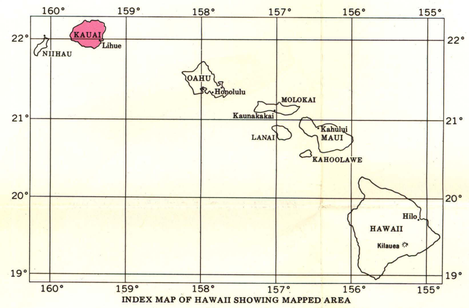


Table 3. Aquifers tapped by wells, shafts, test borings, and tunnels on Kauai[1/]

Unit	Sedimentary rocks	Koloa Volcanic Series	Lava flows in Napali Formation [2/]
1	None	None	Well 0839-01
2	Wells 1229-01, -02	Well 1329-01	Wells 1229-03, 1232-01, 1333-01
3	None	Wells 1019-03, 1327-02 Tunnels 1120-01, 1225-01, 1327-01	None
4	None	None	Wells 1019-02, 1020-02, -03, -04; 1126-01, -02 Tunnels 0622-01, 0623-01, -02 Test borings 0720-01, -02; 1019-01, 1020-01
5	None	None	None
6	None	Wells 0419-01, 0518-02, 0618-01 to -08; 0620-01, 0818-01, -02 Tunnel 0819-01 Disposal wells 0419-03, 0518-01 Shaft 0419-02 Test borings 0719-01, -02	Well 0320-02
7	None	None	Wells 0021-01, 0320-01, -03; 0321-01, 0421-01
8	None	Wells 5822-01, -02; 5923-01 Disposal well 5821-01 Tunnels 5725-01, 5823-01 Shaft 0020-01 Test borings 5725-02, -03, -04	Wells 0120-01, -02
9	None	None	None
10	None	None	Wells 5425-01 to -14; 5427-01, -02; 5523-01, -02, 5526-01, 5527-01, 5727-01
11	None	None	None
12	None	None	Wells 5530-02, -03; 5631-01 Test borings 5530-01, 5630-01
13	Shaft 5534-04	Wells 5227-01, 5426-01, -02; 5435-01, -02, -03; 5531-01 Disposal well 5435-04 Shafts 5330-01, 5534-04 Test borings 5429-01, 5430-01	Well 5529-03 Test borings 5426-03, 5529-01, -02
14	Tunnel 5633-01	None	Well 5634-01
15	None	None	Makaweli Formation: Well 5635-02 Shaft 5635-01
16	Shafts 5534-01, -02	Well 5537-01 Shafts 5534-01, -02; 5638-01	Wells 5533-01, 5534-03
17	None	None	Wells 0545-01, 5840-02, 5942-01 Shafts 0044-15, 0245-02, 0345-04, 5842-02, -03; 5939-01, 5943-01
18	Well 0045-04	None	Wells 0044-01 to -14; 0045-01, -02, -03; 0045-01 to -24, 0146-01 to -04; 0245-01, 0345-01, -02, -03; 0346-01, -02; 5842-01, -04 Shaft 5843-01
19	None	None	Olokele Formation: Test borings 0836-01, -02; 0837-01 to -06

1/ Detailed information of ground-water sources are available at the U.S. Geological Survey.
2/ Aquifer is Makaweli Formation in unit 15 and Olokele Formation in unit 19.

Table 4. Pollution potential of seawater, irrigation water, and common wastes, Island of Kauai

H — HIGH; M — MEDIUM; L — LOW

Geohydrologic unit	POLLUTANT											
	NONPOINT					POINT						
	Seawater intrusion		Irrigation return[a/]		Pasture	Septic tank cesspool	Sewage effluent[b/]	Livestock farm	Industrial waste		Solid waste	Urban[a/] and flood runoff
	Natural	Induced	Sugar	Other					Toxic	Nontoxic		
1	M	M	L	L	L	M	M	M	H	M	M	L
2	L	L-M	M	L-M	L-M	M-H	H	H	H	M-H	M	L
3	L	M	M-H	L	M	M-H	M-H	H	H	M-H	M	M
4	L	L	L	L	L	H	H	H	H	M	H	L
5	L	L	M	L-M	M	H	H	H	H	M-H	H	L
6	L	M	M-H	L-M	M	H	H	H	H	M-H	H	M
7	L	L	L	L	L	H	H	H	H	M	H	L
8	L	M	M-H	L-M	M	H	H	H	H	M-H	H	M
9	L	L	L	L	L	H	H	H	H	M	H	L
10	M	M-H	M	L	L	H	H	M	H	M	H	L
11	L	L	M-H	L-M	L	H	H	H	H	M-H	H	L
12	L	L	L	L	L	H	H	H	H	M	H	L
13	M-H	M-H	M-H	L-M	M	H	H	M	H	M-H	H	M
14	L	L	L	L	L	H	H	H	H	M	H	L
15	L	L	L	L	L	H	H	H	H	M	H	L
16	M-H	M-H	M-H	L-M	M	H	H	H	H	M-H	H	M
17	L	M-H	M-H	L-M	L	H	H	H	H	M	H	L
18[c/]	H	H	H	M-H	M	H	H	M	H	H	M	H
18[d/]	M	H	L	L	L	L	L	L	L	L	L	L
19	L	L	L	L	M	M	M	M	H	M	M	L

a/ Principal sources of herbicides and insecticides.
b/ Some treated sewage effluent used for irrigation.
c/ Sedimentary aquifer underlying coastal plain.
d/ Volcanic aquifer underlying sedimentary deposits.

Note: Explanation of tables found in text under "Presentation of Information by Islands"

Table 2. Rock units on the island of Kauai

Rock unit	Assemblage	General character	Water-bearing properties	Location in geohydrologic unit
Sedimentary material	Beach sand	Unconsolidated.	Highly permeable; water brackish or saline.	Units 2, 3, 6, 8, 10, 13, 16, 18
	Dune sand	Unconsolidated and consolidated.	Permeable; water brackish when situated below sea level; mostly dry when situated above sea level.	Units 8, 10, 13, 18
	Mana plain lagoon deposits	Earthy and marly deposits.	Generally poorly permeable; yield brackish water to wells.	Unit 18
	Alluvium	Poor to well consolidated.	Generally poorly permeable; contains some fresh to brackish water.	All units
Koloa Volcanic Series	Lavas, cinders, ash, tuff	Mostly massive flows; cinders, ash, and tuff sparse.	Poorly to moderately permeable; carry many discontinuous perched-water bodies at high levels, carry basal water when lavas extend below sea level.	Units 3, 5, 6, 8, 11, 13, 16
Makaweli Formation	Lava flows	Mostly massive; accumulated in graben.	Poorly to moderately permeable.	Unit 15
Haupu Formation	Lava flows	Mostly massive; accumulated in caldera.	Poorly to moderately permeable.	Unit 10
Olokele Formation	Lava flows	Mostly massive; accumulated in caldera.	Poorly to moderately permeable.	Unit 19
Napali Formation	Lava flows	Mostly thin bedded; accumulated on the flanks of the Kauai shield volcano.	Highly permeable; carry fresh water at sea level over much of island; water may be dike impounded at high levels.	Units 1, 2, 4, 7, 9, 10, 12, 14, 17

Table 1. Description of geohydrologic units, inventory of pollution sources, and location of monitoring sites on Kauai
[For wells monitored: b=biological; c=chemical; Cl=chloride.]

Geohydrologic unit No.	Name	Topography and rock units	Ground Water: Occurrence	Ground Water: Movement	Sources of pollution and recipient water bodies	Wells monitored b, c, Cl	Candidate monitor wells
1	Napali coast	Steep sea cliffs. Uplands dissected by numerous short streams. Permeable Napali lava flows, cut by numerous dikes in places.	Perched water in uplands, also many discontinuous dike-impounded water bodies. Basal water near shore and southwest part. One small dug well. Important source of small supplies.	Overflow of perched water to dike-impounded and basal-water bodies. Dike-impounded water mostly to streams as spring flow and seeps. Basal water to sea at or near shore.	Solid waste dump and scattered cesspools in uplands. All ground-water bodies are affected. Pollution is small.	0839-01 b monthly	None. Need: None at present.
2	Wainiha-Hanalei	Deeply dissected by streams. Wide valley flats in lower reaches. Narrow coast. Permeable Napali lavas, cut by dikes in places. Valleys underlain by alluvium and coastal flats by beach deposits.	Some dike-impounded water, but most ground water is basal. Several public-supply wells. Important source of future domestic supplies.	Dike-impounded water discharges to basal bodies. Discharge of basal water to sediments; thence, to sea. Water in sediments discharges to sea.	At least 40 cesspools in coastal areas. Basal water in underlying volcanic rocks or sediments receives most cesspool effluent.	1229-03 1333-01 b, Cl monthly 1232-01 Cl monthly At least 3 beach sites	Volcanic aquifer: 3 wells. Sedimentary aquifer: 2 wells. Need: Monitor more of coastal waters if waste disposal increases.
3	Hanalei-Anahola	Broad apron formed by massive Koloa lavas; contains discontinuous beds of soil and ash. Small valleys underlain by alluvium and narrow coastal flats by beach deposits.	Considerable perched water in low permeable lavas. Presence of basal water has not been defined. Perched-water tunnels. Not an important source of domestic supplies.	Perched water discharges as seeps and springs in valleys. At or near the coast, discharge is to sea. Water in sediments discharges to sea. Movement of ground water generally slow in volcanic rocks, faster in sediments.	At least 180 cesspools, mostly in sediments. Also 2 solid-waste dumps, a sludge bed, agricultural waste lagoon, and an injection well. Irrigation water return from golf course and sugarcane fields. Water in sediments and perched water received most wastes.	1225-01 1327-01 b monthly c, Cl annually At least 2 beach sites	Volcanic aquifer: 1327-02. See well map for others. Need: Monitor more of water in sediments or coastal waters if waste disposal increases.
4	Makaleha Mountains and other nearby peaks	Eroded masses of Napali lavas projecting through and standing above surface of younger Koloa lavas. Napali lavas are cut by a few dikes.	Mostly basal water, but dikes may impound some water. Some perched water in southern flanks of Makaleha. At least 6 wells, 3 perched tunnels. Important source of domestic supplies.	Perched and dike-impounded water to springs or to underlying basal water. Most basal water discharges into Koloa rocks, from which the water discharges into stream channels or directly to sea.	Nil.	0622-01 0623-01, -02 b monthly c, Cl annually 1020-03 Cl annually 1126-01 b monthly	See well map. Need: None at present.
5	Mauka areas of Kalihiwai, Anahola, Kapaa, and Wailua	Intermediate uplands, dissected by numerous shallow valleys in Koloa lava terrane. Koloa lavas are interbedded with layers of ash and soil.	Considerable perched water in Koloa lavas. Nature of ground water below stream levels is not known. No development. Not an important source of water at present.	Most ground water discharges as springs and seeps in valleys. Some underflow to deeper water bodies in Koloa lavas.	Scattered cesspools and irrigation water return in mauka areas of Kapaa and Wailua. Perched water is chief recipient.	None.	None. Need: Monitoring of ground-water sources in mauka areas of Kapaa and Wailua, if these sources are developed.
6	Anahola-Wailua	Coastal apron of massive Koloa lavas with interbedded layers of ash and soil. Alluvium under small valleys and beach deposits under narrow coastal flats.	Perched water in inland areas. Basal water near coast. Several basal-water wells in Kealia-Kapaa area. Important local supply of domestic water.	Perched water above stream levels drains to streams as seeps and springs. Basal water discharges to sea as diffused flow. Water in beach deposits moves quickly to sea.	At least 1455 cesspools, mostly in sediments. Also 4 injection wells for sewage disposal, 2 sludge beds, and 2 solid-waste dumps. Irrigation water return from sugarcane fields. Perched water is chief recipient in uplands. Near coast, recipients are basal-water bodies in volcanic rock and in sediments. Proposed sewers will eliminate most cesspools.	0818-01 b, Cl monthly c annually 0818-02 b monthly c, Cl annually 0618-02 0618-05 0620-01 Cl monthly At least 5 beach sites	See well map. Existing wells are too deep to monitor top part of water bodies. Need: Monitor more of coastal waters, if number of cesspool increases.
7	Nonou Mountain, Kalepa Ridge, and Aahoaka peak	Eroded masses of older Napali lavas surrounded by apron of younger Koloa lavas. Mostly permeable, thin-bedded Napali lavas, intruded in part by dikes.	Ground water, probably mostly basal. Dikes may impound or affect flow of ground water. About 6 drilled wells. Important source of domestic water.	Some basal water may discharge directly to sea, but most discharges into Koloa lavas, thence to streams or to sea.	Scattered cesspools in western part of Nonou Mountain. Proposed sewers will eliminate most cesspools. Chief recipient is underlying basal water.	0320-01 b, Cl monthly c annually 0320-03 b monthly	Volcanic aquifer: See well map. Need: None if number of cesspools does not increase significantly.
8	Lihue Basin	Lava shield of Kilohana Crater. Mostly massive Koloa lava flows with interbedded layers of ash and soil. Permeability of lavas generally low.	Most ground water is perched in inland areas. Near the coast, ground water may be basal. Little information on depth of underlying Napali lavas. Several perched tunnels and 2 drilled wells. Important source of small domestic supplies.	Most perched water discharges into stream channels as springs and seeps. Near coast, flow of ground water is to sea. Ground water moves slowly in Koloa rocks, faster in beach deposits.	At least 1065 cesspools in areas not sewered. Also 9 injection wells for sewage disposal, 3 solid-waste dumps, 2 sludge beds, and an agricultural waste lagoon. Pending are 3 sewage injection wells. Chief recipients are underlying perched-water bodies.	5725-01 5823-01 b monthly c, Cl annually 0120-01, -02 Cl monthly At least 5 beach sites	Volcanic aquifer: See well map. Need: Specially drilled wells to monitor water downgradient of proposed municipal sewage-injection wells. Possible monitoring of coastal waters.
9	Isolated peaks of older lavas near Knudsen Gap	Eroded masses of older Napali lavas surrounded by younger Koloa lavas. Napali lavas are intruded by dikes.	Unknown. No development. May be important source of domestic supplies if Napali lavas are not deeply weathered.	Water moves into Koloa lavas, thence to stream channels.	Nil.	None.	None. Need: None.
10	Haupu Ridge	Dissected remnant of main volcanic dome, indented in eastern part by Haupu caldera. Mostly dike-intruded Napali lavas. Caldera is filled with ponded lavas of Haupu Formation.	Probably dike impounded in upland areas. Mostly basal, where developed in southern and eastern parts. Several domestic and irrigation wells. Important source of domestic and irrigation water.	Dike-impounded water to basal water. Most basal water to Koloa lavas, except in eastern part where discharge is to sea directly.	Scattered cesspools in lower flanks. Chief recipient is basal water.	5427-01 b, Cl monthly c annually	Volcanic aquifer: See well map. Need: None unless waste disposal increases significantly.
11	Knudsen Gap-Kalaheo mauka	Intermediate upland. Dissected surface of younger Koloa lavas, which surround and abut masses of older Napali lavas. Koloa lavas are interbedded with layers of ash and soil.	Considerable perched water in Koloa lavas. May be basal in underlying Napali lavas. No development. Possible source of small domestic supplies.	Most discharge to seeps and springs in stream channels or to deeper water bodies by underflow.	Scattered cesspools. Irrigation water return from canefields. Proposed sewers will eliminate some cesspools. Chief recipient, underlying perched water.	None.	None. Need: None unless waste disposal increases significantly.
12	Puu Kolo and other ridges in Kalaheo mauka	Deeply dissected ridge of main volcanic dome and other eroded peaks of Napali lavas surrounded by younger Koloa lavas.	Water mostly impounded by less permeable Koloa lavas, may be basal water. Wells in Lawai area. Important source of domestic supply.	Water moves into surrounding Koloa lavas, where it discharges into stream channels or to downgradient water bodies by underflow.	Scattered cesspools in southern part. Chief recipient is underlying water body in Napali lavas.	5530-03 b, Cl monthly c annually 5530-02 Cl monthly	See well map. Need: None at present.
13	Port Allen-Koloa	Coastal apron formed by younger Koloa lavas. Massive Koloa lavas are interbedded by layers of ash and soil, which lie above or abut older Napali lavas.	Considerable perched water in Koloa lavas. Water may be basal in underlying Napali lavas and in deep-lying Koloa lavas. Shafts and drilled well. Important source of moderate domestic supplies.	Most perched water discharges into stream channels as seeps and springs. Near coast, flow of ground water is to sea by underflow. Movement generally slow in Koloa rocks, faster in beach deposits.	At least 1100 cesspools, also 9 sewage-injection wells, 2 solid-waste dumps, 2 agricultural-waste lagoons, and 1 sludge bed. Thermal water. Chief recipients are underlying perched-water bodies. Proposed sewers will eliminate most cesspools and injection wells.	5534-04 b monthly At least 4 beach sites	Volcanic aquifer: See well map. Alluvium: 5530-01 Need: Monitoring of coastal waters in Poipu and Port Allen areas downgradient of injection sites.
14	Steep east and south slopes of main volcanic dome	Eroded slopes. Mostly Napali lavas intruded by dikes.	Unknown in uplands. Basal water in lower southern flanks.	Moves into Koloa lavas, thence to stream channels or to sea.	Nil.	5633-01 b monthly c, Cl annually	See well map. Need: None at present.
15	Makaweli mauka	Southwestern slope of main volcanic dome. Depression-filling lavas flows of Makaweli Formation.	Unknown in uplands. Basal water in lower part.	Moves into Koloa lavas, thence to stream channels or to sea.	Nil.	5635-01 5635-02 Cl monthly	See well map. Need: None at present.
16	Hanapepe-Waimea	Coastal apron formed by massive Koloa lava flows interbedded with ash and soil beds, which lie above or abut older lava spurs.	Considerable perched water in upper part of Koloa rocks. May be basal at depth and near the coast. Also may be basal in underlying older lavas. Wells in Hanapepe and Kaumakani areas. Important source of small to moderate domestic supplies.	Most perched water discharges into stream channels as seeps and springs. Near coast, basal flow is to sea by underflow. Movement slow in lavas, faster in beach deposits.	At least 750 cesspools in southern part. Also 9 sewage-injection wells, 2 solid-waste dumps, 2 agricultural-waste lagoons, and 1 sludge bed. Irrigation water return. Chief recipients are perched water in upper part and basal water in lower part. Proposed sewers will eliminate some cesspools.	5534-03 b, Cl monthly 5638-01 Cl monthly At least 1 beach site	See well map. Need: If waste disposal increases significantly, ground water in coastal areas or coastal waters should be monitored in more places.
17	Southwest Kauai	Eroded eastern slope of main volcano. Mostly Napali lavas cut by numerous dikes.	Mostly basal, may be dike impounded in uplands and in northern part. Extensive development of basal water. Important source of domestic and irrigation water.	Dike-impounded water moves to basal bodies in lavas or sediments, thence to sea. Basal water in lavas mostly moves into sediments; thence to sea or is lost to evapotranspiration.	Sparsely scattered cesspools. Irrigation-water return. Chief recipient of waste is underlying basal water.	5939-01 b, Cl monthly c annually 5943-01 b, Cl monthly 0245-02 b monthly 0345-04 0545-01 5840-02 5842-02 5842-03 0044-15 Cl monthly	See well map. Need: None at present.
18	Kekaha-Mana coastal plain	Broad sedimentary coastal plain. Includes alluvium washed from uplands, calcareous and clayey lagoon deposits, and calcareous and dune sands.	Artesian basal water in volcanic aquifer underlying sediments. Brackish water in sediments. Extensive development in volcanic aquifer. Few fire-protection wells in sediments. Major source of irrigation ground water.	Basal water in volcanic rock moves into overlying sediments, thence to sea. Basal water in sediments moves freely to sea.	At least 3500 cesspools; also 2 injection wells for sewage disposal, a solid-waste dump, and an agricultural-waste lagoon. Irrigation water return. Proposed sewer system will eliminate most cesspools; the effluent from this system will be used for irrigation. Chief recipient of waste is water in the sediments.	5843-01 b monthly c, Cl annually 0044-02, -03, -04, -10, -13 0045-01, -03 0145-10 Cl monthly 0145-22, -23 Cl periodic 2 beach sites	See well map. Need: The sedimentary aquifer or the coastal waters need to be monitored if large number of cesspools persist
19	Caldera	Central highlands. Olokele lava flows, which accumulated in broad caldera.	Perched water in weathered zones or in alluvium overlying denser rock. No development.	Perched water moves to surface as seeps and springs in stream channels.	Nil.	None.	None. Need: None.