UNITED STATES
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GEOLOGICAL SURVEY

SOURCES OF DATA FOR EVALUATION OF SELECTED GEOTHERMAL AREAS IN NORTHERN AND CENTRAL NEVADA

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Introduction

This report lists sources of published and unpublished data for areas in northern and central Nevada selected on the basis of geologic, geophysical, geochemical, and heat-flow evidence as being the most promising for the development of geothermal resources. Each geothermal areas consists of one or more hydrographic areas, as defined by the office of the Nevada State Engineer and the U.S. Geological Survey (Scott and others, 1971, table 1, fig. 5) (see map), and contains one or more major hydrothermal discharge outlets. Not all place names in the report are shown on the map in the pocket; those not shown may be found in the references cited.

The data categories are those required to define the geothermal reservoir parameters (boundaries, effective porosity, intrinsic permeability, specific storage, chemical and mineralogical composition of rocks), fluid and temperature parameters, and sources and rates of input and output of heat and fluid. The cited references are listed alphabetically by author at the end of the report. In addition to the listed published and unpublished reports, files of unpublished data may be consulted at the addresses given below.

Department of Agriculture
Renewable and Natural Resources
University of Nevada
Reno, Nevada 89507

Department of Agriculture
University of Nevada
Reno, Nevada 89507

Desert Research Institute
Center for Water Resources Research
Water Resources Building
University of Nevada
Reno, Nevada 89507

Environmental Research Laboratory
2769 South Highland Drive
Las Vegas, Nevada 89102

Nevada Bureau of Environmental Health
N.I.C. Building
Carson City, Nevada 89701

Nevada Oil and Gas Conservation Commission
Mackay School of Mines
University of Nevada
Reno, Nevada 89507

Sierra Pacific Power Company
100 East Moana Lane
Reno, Nevada 89502

State Engineer
Department of Water Resources
201 S. Fall Street
Carson City, Nevada 89701

U.S. Bureau of Land Management
Federal Building
300 Booth Street
Reno, Nevada 89502

U.S. Bureau of Reclamation
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 4850
Reno, Nevada 89502

U.S. Geological Survey
Water Resources Division
District office
Room 229 Federal Building
705 North Plaza Street
Carson City, Nevada 89701

The data categories; and a brief explanation of each, are as follows:

Hydrographic areas: Name and number [San Emidio Desert (22)] of State hydrographic areas included. (See Scott and others, 1971, table 1, fig. 5).

Geothermal land classification: Known geothermal resources areas (KGRA's) within area; also lands valuable prospectively for geothermal resources within area.

Geologic maps and other surface geologic data: County or State geologic maps; geologic quadrangle maps; other detailed maps or reports; soil maps; radiometric dates of rocks; general geologic information.

Hydrologeologic maps: Maps showing hydrogeologic units, faults having hydrologic significance, phreatophyte areas, and areas of groundwater recharge and discharge.

Subsurface geologic data: Drillers' logs and geologists' logs; cores and other sample data; structure contour maps and structure sections; isopachous maps; lithofacies maps.

Temperature and heat-flow data: Discharge temperatures of wells and springs; temperature profiles or logs of wells; temperature or temperature-gradient maps; heat-flow maps or point data.

Surface or airborne geophysical data: Gravity maps; airborne or surface magnetic maps; electrical-resistivity soundings, profiles, or maps; spontaneous-potential maps or profiles; magneto-telluric maps; reflection-seismic profiles or soundings; refraction-seismic profiles; airborne-gamma maps or profiles; miscellaneous surface or airborne geophysical data.

Passive seismic data: Microseismic records; microearthquake records.

Borehole geophysical data: Electric logs (induction, resistivity, or spontaneous-potential logs); temperature logs; fluid-resistivity (or fluid-conductivity) logs; gamma logs; acoustic logs; gamma-gamma logs; neutron-epithermal neutron logs; neutron-gamma logs; fluid-flow logs; miscellaneous borehole geophysical logs.

Geochemical data: Standard inorganic chemical analyses of spring or well waters, streamflow, or precipitation; organic chemical analyses; microbiological analyses; trace-element analyses; stable or unstable isotope analyses.

Meteorological data: Precipitation records, graphs, or maps; temperature records, graphs, or maps; miscellaneous meteorological data.

Botanical data: Phreatophyte maps; other vegetation maps.

Hydraulic data: Water-level contour maps or point data; well discharges; spring discharges; streamflow records; pumping-test or specific-capacity data; soil-moisture data.

Water-budget data: Estimates of ground-water recharge, subsurface flow, ground-water storage, ground-water discharge, or perennial ground-water yield.

Black Rock Desert area

Hydrographic areas: San Emidio Desert (22); Hualapai Flat (24); Mud Meadow (26); Summit Lake Valley (27); Black Rock Desert (28); Pine Forest Valley (29).

Geothermal land classification: Fly Ranch KGRA (in Hualapai Flat); Gerlach Hot Springs KGRA (in Black Rock and San Emidio Deserts); Double Hot Springs KGRA (in Black Rock Desert). All hydrographic areas contain some lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Bonham, 1969, pl. 1, Washoe County, 1:250,000, fig. 29, San Emidio Prospect.

Bradberry & Associates, 1964, p. 1-11, Gerlach Hot Springs

Feray and others, 1968, Highway geologic map

Hague and Emmons, 1877, Fly Ranch, Pinto Mountains, Double Hot Springs

Overton, 1947, Gerlach Hot Springs area

Russell, 1885, Gerlach Hot Springs (Mud Springs), Fly Ranch

U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.

Willden, 1963, pl. 1, Jackson Mountains, 1:250,000

_____1964, pl. 1, Humboldt County, 1:250,000

Willden and Mabey, 1961, giant dessiccation fissures on Black Rock and Smoke Creek Deserts.

Hydrogeologic maps:

Glancy and Rush, 1968, pl. 1, Smoke Creek and San Emidio Deserts, showing consolidated rocks, older and younger alluviums, playa, phreatophytes, wells, springs, and streamflow measuring sites, 1:250,000.

Harrill, 1969, pl. 1, Hualapai Flat, showing 5 geologic units, 2 hydrologic units, 4 categories of phreatophytes, playa, faults in alluvium, and water-level contours.

Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction.

Sinclair, 1962a, pl. 1, Pine Forest Valley, showing bedrock, older and younger alluviums, wells, springs, distribution of phreatophytes, and water-level contours, 1:250,000.

_____1962b, pl. 1, Hualapai Flat, showing bedrock, alluvium, playa lake, distribution of phreatophytes, wells, and springs, 1:125,000.

_____1963a, pl. 1, Black Rock Desert area (hydrographic areas 26, 27, and 28), showing bedrock, alluvium, lake deposits, wells, auger holes, springs, depth to water, and chemical quality of selected water samples, 1:250,000.

Subsurface geologic data:

Glancy and Rush, 1968, table 18, drillers' logs of 10 wells in Smoke Creek and San Emidio Deserts.

Harrill, 1969, table 20, drillers' logs of 15 wells in Hualapai Flat; table 21, geologists' logs of 11 test holes in Hualapai Flat.

Nevada State Engineer, unpublished drillers' logs of water wells

Sinclair, 1962b, table 4, drillers' logs of 14 wells in Hualapai Flat

_____1963a, table 4, drillers' logs of 19 wells in Black Rock Desert area.

Temperature and heat-flow data:

Glancy and Rush, 1968, table 16, discharge temperatures of 21 wells and springs in Smoke Creek and San Emidio Deserts.

Harrill, 1969, table 11, discharge temperatures of 19 wells and springs in Hualapai Flat.

Sinclair, 1962a, table 3, discharge temperatures of 15 wells and springs in Pine Forest Valley.

_____1962b, table 2, discharge temperatures of 4 springs in Hualapai Flat; table 3, discharge temperatures of 5 springs and wells in Hualapai Flat.

_____1963a, table 3, discharge temperatures of 8 springs in Black Rock Desert.

Surface or airborne geophysical data:

McGinnis and Dudley, 1964, p. 25-27, information on depth of fill between Hualapai Flat and Black Rock Desert.

U.S. Geological Survey, 1972a, aeromagnetic map, 1:250,000

_____1972b, aeromagnetic map, 1:250,000

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, 1:1,000,000 map showing epicenters of earthquakes.

Slemmons, Jones, and Gimlett, 1965, fig. 3, p. 529, one earthquake of magnitude 4.0 to 4.9 occurred near Double Hot Springs during 1932-60.

Borehole geophysical data: None available

Geochemical data:

Clarke, 1914, chemical analyses of hot springs at Fly Ranch and Gerlach (Hot Spring Station).

Clarke and Chatard, 1884, chemical analyses of hot springs at Fly Ranch and Gerlach.

Desert Research Institute, unpublished chemical analyses of water samples from springs and wells.

Droste, 1961, description of clay-mineral composition of playa deposits of Smoke Creek and Black Rock Deserts.

Glancy and Rush, 1968, table 16, field chemical analyses of 22 samples of ground water and surface water in San Emidio and Smoke Creek Deserts.

Harrill, 1969, table 11, chemical analyses of 25 samples of ground water and surface water in Hualapai Flat.

Sinclair, 1962a, table 3, chemical analyses of 16 samples of water in Pine Forest Valley.

_____1962b, table 3, chemical analyses of 9 samples of ground water and surface water in Hualapai Flat.

_____1963a, table 5, chemical analyses of 16 samples of ground water in Black Rock Desert.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Glancy and Rush, 1968, table 2, freeze data for 5 stations; table 3, summary precipitation data for 16 stations; table 4, monthly and annual precipitation at 6 stations; all in Smoke Creek and San Emidio Deserts region.

Hardman, 1936, precipitation map of Nevada

_____1965, do.

Harrill, 1969, table 1, freeze data for 4 stations in or near Hualapai Flat.

Sinclair, 1962a, fig. 2, temperature and precipitation at Quinn River Crossing.

_____1962b, fig. 2, temperature and precipitation at Gerlach

_____1963a, fig. 2, temperature and precipitation at 4 stations in Black Rock Desert area.

U.S. Weather Bureau, 1914-72, temperature and precipitation data

Botanical data:

Glancy and Rush, 1968, pl. 1, distribution of phreatophytes; table 11, acreage of phreatophyte species; both for Smoke Creek and San Emidio Deserts.

Harrill, 1969, pl. 1, distribution of phreatophytes; table 9, acreage of phreatophyte species; both for Hualapai Flat.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

Sinclair, 1962a, pl. 1, distribution of phreatophytes in Pine Forest Valley.

_____1962b, pl. 1, distribution of phreatophytes; p. 11, acreage of phreatophytes; both for Hualapai Flat.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Desert Research Institute, unpublished water-level data for Hualapai Flat.

Glancy and Rush, 1968, table 5, measurements and estimates of streamflow; table 7, estimated average annual runoff; table 12, discharge records of selected springs; table 13, water-level data for 23 wells, yield and drawdown data for 7 wells; all in Smoke Creek and San Emidio Deserts.

Harrill, 1969, pl. 1, fig. 10, water-level contour maps; table 19, water-level and specific-capacity data; fig. 5, tables 7 and 8, streamflow data; all for Hualapai Flat.

Sinclair, 1962a, pl. 1, water-level contour map; table 1, yield, drawdown, and specific capacity for 8 wells; table 2, water-level data for wells; all for Pine Forest Valley.

_____1962b, table 1, depth to water in 23 wells; table 2, records of springs and 4 discharge estimates; all for Hualapai Flat.

_____1963a, pl. 1, table 2, depth to water in 28 wells; table 3, discharges of 10 springs; both for Black Rock Desert area.

U.S. Geological Survey, 1960, 1963, and 1970, streamflow data

_____unpublished records of streamflow and miscellaneous measurements of stream discharge.

Waring and others, 1965, p. 32-33, references to 16 springs

Water-budget data:

Glancy and Rush, 1968, table 9, subsurface flow; table 10, estimated recharge; table 11, estimated discharge; p. 46, perennial ground-water yield; p. 49, ground-water storage; all in Smoke Creek and Emidio Deserts.

Harrill, 1969, table 4, estimated recharge; table 9, estimated discharge; table 10, ground-water storage; p. 29, subsurface flow; p. 54, perennial ground-water yield; all in Hualapai Flat.

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Sinclair, 1962a, p. 10, estimated recharge; p. 11-13, estimated discharge; p. 14, ground-water storage and perennial ground-water yield; all for Pine Forest Valley.

_____1962b, p. 8, estimated recharge; p. 11, estimated discharge; p. 9, subsurface flow; p. 12, ground-water storage; p. 11, perennial ground-water yield; Hualapai Flat.

_____1963a, table 1, estimated recharge; p. 14, subsurface flow; p. 17, ground-water storage; p. 16, perennial ground-water yield.

Carson Desert

Hydrographic areas: Carson Desert (101)

Geothermal land classification: Stillwater-Soda Lake KGRA; most of remaining area classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Axelrod, 1956, fig. 7, Red Mountain area, 1:14,800
Banaszak, 1968, southern Sand Springs Range
Feray and others, 1968, highway geologic map
Gale, 1913, potash deposits
_____1914, potash and other saline deposits
Hague and Emmons, 1877, early description of geology
Hance, 1914, potash deposits
Jones, 1914, Lake Lahontan
Morrison, 1959, soil profiles
_____1964, pl. 3, Carson Lake quadrangle, 1:31,680; pls. 4, 5, and 6, Stillwater, Fallon, and Soda Lake quadrangles, respectively, 1:48,000.
_____1965, Quaternary geology
Morrison and Frye, 1965, regional Quaternary correlations
Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1971, soils
Nickle, 1968, southern Buena Vista Hills
Page, 1965, part of Stillwater Range, 1:125,000
Reeves and Kral, 1955, Buena Vista Hills
Russell, 1885, Lake Lahontan
Schilling, 1965, isotope ages of 6 rocks in peripheral mountains
Schrader, 1947, Carson Sink area
Silberling and Roberts, 1962, pre-Tertiary stratigraphy
Silberman and McKee, 1972, isotope ages of several rocks
Slemmons, 1956, geologic setting of earthquakes
_____1957, geologic effects of earthquakes
Southern Pacific Co., 1964, general mapping; economic mineral deposits.
Speed, 1962a, gabbro in West Humboldt Range
_____1962b, do.
_____1966, Mesozoic orogeny
Speed and Armstrong, 1971, isotope ages of several rocks
Tatlock, 1969, Pershing County, 1:200,000
University of Nevada and others, 1962, pl. 4, 1:31,680
U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.
Vanderburg, 1940, mining districts in Churchill County
Wallace and others, 1970, Unionville quadrangle, 1:62,500
Wallace and Silberling, 1964, Mesozoic tectonic events
Willden and Speed, 1968a, pl. 1, Churchill County, 1:200,000
Young, 1963, part of Stillwater Range

Hydrogeologic maps:

Clyde-Criddle-Woodward, Inc., 1971, p. 45, depth to water table, 1:125,000.

Glancy and Katzer, 1973, pl. 1, wells, phreatophytes, and chemical sampling sites.

Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction.

Rush, 1972, bathymetry of Soda Lakes

Stabler, 1904, depth to water, 1:125,000

University of Nevada and others, 1962, pl. 9, 1:63,360

Subsurface geologic data:

Garside and Schilling, 1967, 1:1,000,000 map showing locations of oil and gas test wells.

Glancy and Katzer, 1973, numerous drillers' logs of wells; some stratigraphic interpretations.

Kingman, 1965, logs of test holes on U.S. Navy property near Fallon, Nev.

Lintz, 1957, locations of oil and gas test wells

Morrison, 1959, drillers' logs of numerous shallow and deep wells; stratigraphic interpretations.

Nevada State Engineer, unpublished well logs

University of Nevada and others, 1962, appendixes A and B, drillers' logs of 2 wells; descriptions of bedrock cores from Sand Springs Range.

U.S. Bureau of Reclamation Region II, Sacramento, Calif., unpublished well logs.

Schilling and Garside, 1968, oil and gas well data, 1953-67

Temperature and heat-flow data:

Breese, 1968, report of thermal-spring discharge near center of Big Soda Lake.

Glancy and Katzer, 1973, discharge temperatures of several wells

Kingman, 1965, p. 19, discharge temperatures of 2 wells

Nevada State Engineer, unpublished discharge temperatures of wells reported by drillers.

Sass and others, 1971, table 8, heat flow at 5 drill-hole sites in Sand Springs area.

University of Nevada and others, 1962, table 5, discharge temperatures of 17 wells; discussion of temperature gradient in 1 well.

Waring and others, 1965, p. 34, discharge temperature of Borax Spring, 3 miles east of South Carson Lake.

Surface or airborne geophysical data:

U.S. Geological Survey, 1972a, aeromagnetic map, 1:250,000

Wahl, 1965, gravity map, 1:250,000

Passive seismic data:

Byerly, 1956, Fallon-Stillwater earthquakes of July 6 and August 23, 1954.

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, 1:1,000,000 map shows about 20 earthquake epicenters in area.

Slemmons, Jones, and Gimlett, 1965, fig. 3, minor historical earthquakes

Tocher, 1956, Rainbow Mountain fault movement

Borehole geophysical data:

University of Nevada and others, 1962, p. 113-117, gamma and neutron logs of a test well 480 feet deep in Sand Springs Range.

Geochemical data:

Desert Research Institute, unpublished chemical analyses of water samples.

Glancy and Katzer, 1973, numerous analyses of major ions in water samples.

Kingman, 1959, table VII, p. 19, comparison of chemical analyses of waters from U.S. Navy test hole 3 and City of Fallon No. 1 or No. 2 well.

Miller, Hardman, and Mason, 1953, p. 30-35, chemical analyses of 133 samples of irrigation water.

Nevada Bureau of Environmental Health, unpublished chemical analyses of water samples.

Nevada Bureau of Mines, unpublished chemical analyses of water from 3 wells and from Borax Spring.

Stabler, 1904, table 2, chemical analyses of 12 samples of ground water; table 3, "partial analyses" of several hundred samples of ground water; several "iso-ionic" interpretive maps of ground-water chemistry.

Stearns and others, 1937, several spring waters described, with references to chemical analyses by Peale (1886).

University of Nevada, Department of Agriculture, unpublished chemical analyses of water samples.

University of Nevada, Renewable Resources Department, unpublished chemical analyses of water samples.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples.

Waring and others, 1965, p. 34 and 35, mineralogical data for 3 spring waters.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes
Gifford and others, 1967, precipitation probabilities
Glancy and Katzer, 1973, summary of basinwide precipitation and estimates of precipitation for various altitude zones.
Hardman, 1936, precipitation map of Nevada
_____1965, do.
Kohler, Nordenson, and Baker, 1959, evaporation maps
U.S. Weather Bureau, 1914-72, temperature and precipitation

Botanical data:

Glancy and Katzer, 1973, 1:250,000 map showing distribution of phreatophytes and estimated rates of natural discharge by evapotranspiration.
Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.
U.S. Bureau of Land Management, unpublished range-forage maps
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished phreatophyte maps, 1:62,500.

Hydraulic data:

Desert Research Institute, unpublished data
Glancy and Katzer, 1973, water levels in wells, discharges of wells and springs; streamflow records.
Stabler, 1904, 1:125,000 map of southern Carson Desert showing depth to water.
U.S. Geological Survey, 1960, 1963, and 1970, streamflow data
_____1953-73, water levels in observation wells.
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished ground-water hydraulic data; unpublished records of streamflow and miscellaneous measurements of stream discharge.

Water-budget data:

Glancy and Katzer, 1973, tables of estimated recharge, discharge, and subsurface flow, ground-water storage in upper 100 feet of deposits, and perennial ground-water yield.
Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Brady's Hot Springs area

Hydrographic areas: Bradys Hot Springs area (75); Fireball Valley (77)

Geothermal land classification: Bradys Hot Springs KGRA; part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Anctil and others, 1960, 1:24,000 map of Brady Hot Springs and vicinity showing geology and locations of test wells.

Anctil and Schafer, 1957, geology of area in T. 23 N., Rs. 27 and 28 E., MDBM.

_____1962, appraisal of geothermal resources of Brady Hot Springs

Axelrod, 1956, fig. 5, Desert Peak area, 1:19,200

Feray and others, 1968, highway geologic map

Moore, 1969, pl. 1, Lyon, Douglas, and Ormsby Counties, 1:250,000

Oesterling, 1962, Brady Hot Springs

Oesterling and Anctil, 1960, Brady Hot Springs

Schilling, 1965, p. 56, isotope age of 1 rock sample from Hot Springs Mountains (andesite tuff, 13.9 million years).

Southern Pacific Co., 1964, geologic map, economic mineral deposits, 1:24,000.

U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.

Willden and Speed, 1968a, pl. 1, Churchill County, 1:200,000

_____1968b, text

Hydrogeologic maps:

Harrill, 1970, pl. 1, 1:250,000

Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.

Subsurface geologic data:

Harrill, 1970, table 12, drillers' log of 1 well in area

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished drillers' logs of 9 test wells and 2 auger test wells.

Temperature and heat-flow data:

Anctil and Schafer, 1962

Oesterling, 1962

Oesterling and Anctil, 1960

Waring and others, 1965, p. 34, discharge temperatures of Brady's (Fernley) Hot Springs.

Surface or airborne geophysical data:

U.S. Geological Survey, 1972a, aeromagnetic map, 1:250,000

Wahl, 1965, gravity map, 1:250,000

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, 1:1,000,000 map showing epicenters of earthquakes.

Slemmons, Jones, and Gimlett, 1965, data on historical earthquakes

Geochemical data:

Clarke and Chatard, 1884, chemical analysis of sample from Brady's Hot Springs.

Harrill, 1970, table 9, chemical analyses of 6 water samples from wells; analysis of sample from steam well includes SiO_2, Na, K, Li, F, NO_3, PO_4, B, As.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, do.

Harrill, 1970, table 2, precipitation at 13 stations in west-central Nevada; table 3, freeze data at 4 stations in west-central Nevada; pl. 1 (inset map), locations of weather stations.

U.S. Weather Bureau, 1914-1972, temperature and precipitation records

Botanical data:

Harrill, 1970, pl. 1, distribution of phreatophytes

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Harrill, 1970, pl. 1, water-level altitudes in 7 wells

Waring and others, 1965, discharge of Brady's Hot Springs

Water-budget data:

Harrill, 1970, table 6, ground-water recharge; table 7, ground-water evapotranspiration; table 5, average annual runoff; table 10, ground-water storage.

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrographic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Ruby Valley

Hydrographic areas: Ruby Valley (176); Clover Valley (177)

Geothermal land classification: Part of Ruby Valley is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Collinson, 1966, Medicine Range
Eakin and Maxey, 1951, p. 75-78, discussion of general geology
Feray and others, 1968, highway geologic map
Granger and others, 1967, pl. 1, Elko County, 1:250,000
Hope, 1970, Elko County, 1:200,000
Hose and Blake, 1970, White Pine County, 1:150,000
Howard, 1971, northern Ruby Mountains
Rigby, 1960, fig. 4, Buck Mountain area, 1:125,000; fig. 5, Bald Mountain area, 1:125,000.
Sharp, 1939a, structure of Ruby Mountains and East Humboldt Range
_____1940, geomorphology of Ruby Mountains and East Humboldt Range
Schilling, 1965, isotope ages of rocks in peripheral mountains
Thorman, 1970, Wood Hills and Pequop Mountains
U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.
Willden, Thomas, and Stern, 1968, Jiggs Quadrangle, 1:62,500
Willden and Kistler, 1967, early Paleozoic deformation in Ruby Mountains.
_____1969, Jiggs Quadrangle, 1:62,500

Hydrogeologic maps:

Eakin and Maxey, 1951, pl. 2, Ruby Valley 1:125,000
Horton, 1964, locations of three hot springs in valley
Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction.

Subsurface geologic data:

Eakin and Maxey, 1951, table 6, logs of one well
Nevada State Engineer, unpublished well logs
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished well logs.

Temperature and heat-flow data:

Eakin and Maxey, 1951, p. 84, brief description of Sulphur Hot Springs
Nevada State Engineer, unpublished well and spring-discharge temperature data.
Waring and others, 1965, p. 33, discharge temperatures of two hot springs

Surface or airborne geophysical data:

Gibbs, Willden, and Carlson, 1968, gravity maps

Passive seismic data: Environmental Research Laboratories, unpublished records of known earthquakes.

Borehole geophysical data: None available.

Geochemical data:

Eakin and Maxey, 1951, table 5, chemical analyses of three water samples.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples.

Meteorological data:

Eakin and Maxey, 1951, table 1, precipitation at four stations; table 2, snowfall at 16 stations.

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, do.

Kohler, Nordenson, and Baker, 1959, evaporation maps

U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:

Eakin and Maxey, 1951, table 4, evapotranspiration by phreatophytes

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Desert Research Institute, unpublished data for springs

Eakin and Maxey, 1951, table 7, records for 23 wells

Snyder, 1963, table 4, records for 7 springs and 3 wells

Water-budget data:

Eakin and Maxey, 1951, discussion of ground-water-budget items

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Crescent Valley-Whirlwind Valley area

Hydrographic areas: Crescent Valley (54); Whirlwind Valley (60)

Geothermal land classification: Beowawe KGRA; adjacent area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Edwards and McLaughlin, 1972, p. 4, isotope ages of 2 rocks in peripheral mountains.

Feray and others, 1968, highway geologic map

Gilluly and Gates, 1965, pl. 1, northern Shoshone Range, 1:31,680

Gilluly and Masursky, 1965, pl. 1, Cortez Quadrangle, 1:62,500

McKee and Silberman, 1971, p. 29, 32, 40, isotope ages of 16 rocks in peripheral mountains.

Muffler, 1964, pl. 1, Frenchie Creek Quadrangle, 1:62,500

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1964a, soils map of Whirlwind Valley.

_____1964b, soils map of Crescent Valley

Nolan and Anderson, 1934, description of geologic setting and deposits related to geothermal activity.

Roberts, Montgomery, and Lehner, 1967, pl. 3, Eureka County, 1:25,000

Schilling, 1965, p. 36, 37, 62

Shawe, Reeves, and Kral, 1962, pl. 15, 1:125,000

Silberman and McKee, 1971, p. 23-24, isotope ages of 8 rocks in peripheral mountains.

Southern Pacific Co., 1964, files include 1:24,000 maps for part of area.

Stewart and Carlson, 1972, north-central Nevada

U.S. Department of Agriculture, Soil Conservation Service, unpublished detailed soils maps for area north of T. 30 N.

U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.

White, D.E., and others, unpublished maps of Beowawe and vicinity on file in U.S. Geological Survey Western Region office in Menlo Park, Calif.

Hydrogeologic maps:

Eakin and Lamke, 1966, pl. 1, 1:500,000; pl. 1A, 1:1,000,000

Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.

Nolan and Anderson, 1934, fig. 2, map of Beowawe geyser area

Rinehart, 1968, fig. 1, map of Beowawe geyser area

Zones, 1961, pl. 1, Crescent Valley, 1:250,000; fig. 6, well yields

Subsurface geologic data:

Nevada State Engineer, unpublished drillers' logs of wells in Hot Springs Point area of Crescent Valley.

Zones, 1916, table 5, drillers' logs of 18 water wells; fig. 3, grain size of fill in Crescent Valley.

Temperature and heat-flow data:

Nevada Bureau of Mines, unpublished temperature records and fluid production rates for Magma Power Co. test wells at Beowawe.

Nolan and Anderson, 1934, fig. 2 and p. 218-226, temperature data

Rinehart, 1968, p. 7704-7705, temperatures at Beowawe, including change in temperature with time.

Sass and others, 1971, table 8, heat flow for 3 test holes ("Lander," "Tenabo," and "Gold Acres").

Waring and others, 1965, p. 35, discharge temperatures of Beowawe geysers and 2 other hot springs in area.

Zones, 1961, table 1, discharge temperatures of 3 wells and 2 springs in Crescent Valley.

Surface or airborne geophysical data:

Mabey, 1964, gravity map of Eureka County and adjoining areas

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Rinehart, 1968, p. 7704-7705, seismic "signatures" of the geysers

Slemmons and others, 1965, data on earthquakes

Slemmons, Jones, and Gimlett, 1965, one earthquake epicenter (5.0-5.9 magnitude) within area during 1854-1960.

Borehole geophysical data: None available

Geochemical data:

Desert Research Institute, unpublished chemical analyses of water samples.

Eakin and Lamke, 1966, table 11, chemical analyses of 8 samples of Humboldt River water.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of 9 samples of well and spring water.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, precipitation map of Nevada

U.S. Weather Bureau, 1914-72, temperature and precipitation records for stations at Battle Mountain, Beowawe, Emigrant Pass Highway Station, Rand Ranch Palisade, and Cortez Gold Mine.

Zones, 1961, p. 6, 7, fig. 2, description of climate; fig. 4, monthly precipitation at Beowawe (?), 1949-57.

Botanical data:

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1964a, map showing irrigated and phreatophyte areas in Whirlwind Valley; table 2, ground-water use.

_____1964b, map showing irrigated and phreatophyte areas in Crescent Valley; table 3, ground-water use.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

Zones, 1961, pl. 1, distribution of phreatophytes in Crescent Valley

Hydraulic data:

Nolan and Anderson, 1934, fig. 2 and text, information on flow and geysering at Beowawe.

U.S. Geological Survey, 1960, 1963, 1970, streamflow data

_____, 1953-73 water levels in observation wells

Zones, 1961, table 3, water levels and discharge data for 35 wells; table 4, water levels in 12 observation wells; fig. 4, water-level hydrographs for 5 wells; table 2, single discharge measurements for several streams.

Water-budget data:

Eakin and Lamke, 1966, table 12, water budgets for Crescent and Whirlwind Valleys included with those for several other hydrographic areas.

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Zones, 1961, (Crescent Valley only), p. 20, recharge and surface inflow; p. 21, evapotranspiration; p. 22-23, ground-water outflow and pumpage; p. 23-24, water budget.

Washoe area

Hydrographic areas: Truckee Meadows (87); Pleasant Valley (88)

Geothermal land classification: Steamboat Springs KGRA; Moana Springs KGRA. Both hydrographic areas classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Bonham and Papke, 1969, pl. 1, Washoe and Storey Counties, 1:250,000
Feray and others, 1968, highway geologic map
Hill, 1915, pl. 19, mining districts, 1:125,000
Silberman and McKee, 1972, p. 11, isotope age of one rock sample
Thompson and White, 1964, pls. 1 and 2, Steamboat Springs area, 1:62,500.
U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.
White, 1967, fig. 5, map of Lower Terrace near Geyser well
_____1968, pl. 3, geology, wells, springs, drill and auger holes, 1 in. = 100 ft.
White, Thompson, and Sandberg, 1964, pl. 1, Steamboat Springs thermal area, 1:3,600.

Hydrogeologic maps:

Cohen and Loeltz, 1964, pls. 1 and 2, Truckee Meadows Area, showing 3 alluvial and 1 Pliocene units, bleached and unbleached consolidated rocks, wells, springs, test-boring sites, and water-level contours; 1:62,500.
Guyton & Associates, 1970, fig. 5, Truckee Meadows, showing irrigated acreage and ditches; about 1 in. = 1½ mi.
Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.
VanDenburgh, Lamke, and Hughes, 1973, pl. 1, Truckee River basin, showing 2 alluvial units, bedrock, phreatophytes and irrigated areas, wells, and springs.
White, 1967, fig. 5, Lower Terrace area of Steamboat Springs
_____1968, pl. 3, Steamboat Springs area, showing geology, wells, springs, drill and auger holes.
White, Thompson, and Sandberg, 1964, pl. 1, Steamboat Springs thermal area, showing detailed geology, wells, springs, drill and auger holes, 1:3,600.

Subsurface geologic data:

Guyton & Associates, 1970, figs. 2 and 3, geologic sections across Truckee Meadows.
Nevada State Engineer, unpublished well logs
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished logs of wells and test holes.
VanDenburgh, Lamke, and Hughes, 1973, table 22, logs of 26 wells
White, Thompson, and Sandberg, 1964, table 3, logs of 27 wells and drill holes; pl. 2, geologic sections.

Temperature and heat-flow data:

Cohen and Loeltz, 1964, table 5, discharge temperatures of 66 wells; p. 47 and 56, discussions of temperature.

Guyton & Associates, 1970, table 3, temperature of water from different zones in 6 wells; see also fig. 26 and p. 28-29.

Sass and others, 1971, heat flow for several drill holes in nearby areas

Sierra Pacific Power Co., unpublished temperature data for company wells and test holes.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., temperature log of one well.

VanDenburgh, Lamke, and Hughes, 1973, table 18, discharge temperatures of 17 wells.

Waring and others, 1965, p. 34, discharge temperatures of Moana Springs, Steamboat Springs, and several other hot springs in the area.

White, 1967, temperature data for Geyser well

_____1968, table 4, discharge temperatures of 71 springs; tables 18-24, discharge temperatures of 8 wells; tables 27-34, discharge temperatures of 8 drill holes; table 37, discharge temperatures of 21 springs; table 39, discharge temperatures of many wells; some duplication of Cohen and Loeltz (1964) data.

Surface or airborne geophysical data:

Thompson and Sandberg, 1958, structural significance of regional gravity surveys.

U.S. Geological Survey, 1972a, aeromagnetic map of part of area, 1:250,000.

White, Thompson, and Sandberg, 1964, pls. 3-5, magnetic, electrical-resistivity, natural-potential, and gravity profiles of Steamboat Springs area.

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, shows many earthquake epicenters of magnitude < 6 between 1854 and 1960.

Slemmons, Jones, and Gimlett, 1965, data on historical earthquakes

Borehole geophysical data:

Sierra Pacific Power Co.,unpublished logs of company test holes

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished logs.

Geochemical data:

Cohen, 1962a, sulfate in ground water of Truckee Meadows

Cohen and Loeltz, 1964, table 5, chemical analyses of waters from 91 wells, 8 springs, and 14 stream sites.

Desert Research Institute, unpublished chemical analyses of water samples.

Guyton & Associates, 1970, tables 3 and 4, chemical analyses of water samples from 25 wells, including samples from different zones in 6 wells.

Nevada Bureau of Environmental Health, unpublished chemical analyses of water samples from several stream sites.

VanDenburgh, Lamke, and Hughes, 1973, table 18, chemical analyses of waters from 27 wells and 9 stream sites.

White, 1968, tables 18-21, 27-39, numerous partial chemical analyses of water samples from Steamboat Springs area.

White, Hem, and Waring, 1963, p. 11, 12, 40, 47, 53, chemical analyses of water samples and discussion of results.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, do.

Kohler, Nordenson, and Baker, 1959, evaporation maps

U.S. Weather Bureau, 1914-72, temperature and precipitation records

VanDenburgh, Lamke, and Hughes, 1973, table 4, average annual precipitation at stations in and near study area; table 12, precipitation by altitude; text, lake-surface evaporation.

White, 1968, p. 20-42, figs. 10-23, tables 6-16, effects of barometric pressure and precipitation on thermal activity at Steamboat Springs.

Botanical data:

Guyton & Associates, 1970, fig. 5, irrigated areas in Truckee Meadows

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

VanDenburgh, Lamke, and Hughes, 1973, pl. 1, irrigated and phreatophyte areas.

Hydraulic data:

Cohen and Loeltz, 1964, table 4, pumping-test data for 14 wells; figs. 1 and 2, water-level hydrographs for 6 wells.

Desert Research Institute, unpublished data

Guyton & Associates, 1970, table 1, specific capacity and transmissivity; table 2, monthly pumpage, 1960-69; figs. 6-25, monthly pumpage and water levels in wells; all in Truckee Meadows.

Sierra Pacific Power Co., unpublished water-level data for 24 observation wells.

U.S. Geological Survey, 1960, 1963, 1970, streamflow data for Truckee River, Hunter Creek, Peavine Creek, Galena Creek, and Steamboat Creek.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished water-level data.

VanDenburgh, Lamke, and Hughes, 1973, table 21, water-level and discharge data for 38 wells; table 23 and fig. 2, water levels in 5 observation wells; table 24, discharge of 8 springs; tables 6 and 7, annual streamflow of Truckee River and tributaries; table 14, ground-water pumpage for Sierra Pacific Co. wells; text, ground-water pumpage for smaller public-supply and industrial wells.

White, 1967, water-level and discharge data for Geyser well and adjacent geyser and vents.

_____1968, tables 3-5, 13-21, 27-34, 36-40, figs. 10-22, 42-47, discharge and water-level data for springs and wells in Steamboat Springs area.

Water-budget data:

Cohen and Loeltz, 1964, budget estimates, for the most part superseded by those of VanDenburgh, Lamke, and Hughes (1973).

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

VanDenburgh, Lamke, and Hughes, 1973, tables 16, 17, and text, budgets; table 11, surface-water inflow and outflow; table 12, potential recharge; table 13, ground-water inflow and outflow; text and table 20, stored ground water and available supply of ground water.

Pueblc Valley-Continental Lake region

Hydrographic areas: Pueblo Valle); Continental Lake Valley (2)

Geothermal land classification: Part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:
- Blake, 1873, diatoms in a hot spring in Pueblo Valley
- Feray and others, 1968, highway geologic map
- Peale, 1886, lists and analyses of mineral springs
- U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.
- Wendell, 1970, structure and stratigraphy of Virgin Valley-McGee Mountains area.
- Willden, 1964, Humboldt County, pl. 1, 1:250,000

Hydrogeologic maps:
- Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.
- Sinclair, 1963b, pl. 1, 1:250,000

Subsurface geologic data:
- Nevada State Engineer, unpublished drillers' logs of wells drilled since 1963.
- Sinclair, 1963b, table 4, drillers' logs of 14 wells.

Temperature and heat-flow data:
- Sinclair, 1963b, table 5, discharge temperatures of 2 wells and 1 spring.
- Waring and others, 1965, p. 32, discharge temperatures of 2 springs

Surface or airborne geophysical data: None available

Passive seismic data: None available

Borehole geophysical data: None available

Geochemical data:
- Sinclair, 1963b, table 5, chemical analyses of water samples from three wells and from Bog Hot Springs (Si, Ca, Mg, Na, and K).

Meteorological data:
- Fritts, 1965, tree-ring evidence for climatic changes
- Gifford and others, 1967, precipitation probabilities
- Hardman, 1936, precipitation map of Nevada
- _____ 1965, precipitation map of Nevada
- Sinclair, 1963b, fig. 2, temperature and precipitation at Virgin Valley and Denio.
- U.S. Weather Bureau, 1914-72, temperature and precipitation

Botanical data:

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

Sinclair, 1963b, pl. 1, distribution of phreatophytes

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Sinclair, 1963b, table 3, records of wells, depth to water in 17 wells.

Water-budget data:

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Sinclair, 1963b, table 1, ground-water recharge; table 2, ground-water discharge; p. 17, ground-water storage and perennial ground-water yield.

Mason Valley

Hydrographic areas: Mason Valley (108)

Geothermal land classification: Wabuska KGRA in northern part of valley; most of surrounding area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Bingler, 1972, isotope ages of 4 rocks in or near the valley
Feray and others, 1968, highway geologic map
Hill, 1915, mining districts
Knopf, 1918, Yerington District
Moore, 1969, pl. 1, Lyon, Douglas, and Ormsby Counties, 1:200,000
Reeves, Shawe, and Kral, 1958, pl. 11, Minnesota Mine, 1:4,800
Ross, D.C., 1961, Mineral County
Schilling, 1965, isotope age of a rock near the valley
Silberman and McKee, 1972, isotope ages of 3 rocks in or near the valley.
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.

Hydrogeologic maps:

Horton, 1964, 1:1,000,000 map showing location of one spring in valley.
Huxel, 1969, pl. 1, seven lithologic units and faults, 1:62,500; pl. 2, wells, springs, and water-level contours, 1:125,000; pl. 3, distribution of phreatophytes, cropland, and pasture, 1:125,000; fig. 4, transmissivity map of valley-fill reservoir
Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction.

Subsurface geologic data:

Garside and Schilling, 1967, map shows location of one oil test well in area.
Huxel, 1969, table 26, drillers' logs of 13 wells; fig. 3, isopach map of sand and gravel in upper 100 feet of saturated alluvium.
Lintz, 1957, p. 44, log of a 262-ft test well
Nevada State Engineer, unpublished well logs
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished well logs.

Temperature and heat-flow data:

Huxel, 1969, table 20, discharge temperatures for 28 wells and springs
Nevada State Engineer, unpublished temperature data
Sass and others, 1971, table 8, heat flow for 3 drill holes near Yerington.
Waring and others, 1965, p. 34, discharge temperature of springs at Wabuska.

Surface or airborne geophysical data:
U.S. Air Force, 1968, Bouguer gravity map

Passive seismic data:
Environmental Research Laboratories, unpublished records of all known earthquakes.
Slemmons and others, 1965, map shows two epicenters of earthquakes in valley.

Borehole geophysical data: Nevada Oil and Gas Commission, unpublished data on one oil test well in valley.

Geochemical data:
Huxel, 1969, table 20, chemical analyses for 18 water samples; table 21, chemical analyses for 20 water samples; table 22; chemical analyses for 21 water samples.
Nevada Division of Health, unpublished data
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of well and spring waters.

Meteorological data:
Fritts, 1965, tree-ring evidence for climatic changes
Gifford and others, 1967, precipitation probabilities
Hardman, 1936, precipitation map of Nevada
_____1965, precipitation map of Nevada
Huxel, 1969, table 2, monthly temperature at Yerington; fig. 2, precipitation at Yerington.
U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:
Huxel, 1969, pl. 1, distribution of phreatophytes
Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.
U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:
Desert Research Institute, unpublished data
Huxel, 1969, fig. 5, depth to ground water map; fig. 7, average monthly flow into Mason Valley table 7, surface-water inflow, outflow, and water loss; table 8, miscellaneous streamflow measurements; table 9, surface-water flow; table 25, records for about 270 wells.
Waring and others, 1965, p. 34, discharge of springs at Wabuska

Water-budget data:
Huxel, 1969, water budgets
Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Grass Valley

Hydrographic areas: Grass Valley (71)

Geothermal land classification: Leach Hot Springs KGRA; entire valley is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Dreyer, 1940, figs. 3 and 5, Goldbanks Mining District
Feray and others, 1968, highway geologic map
Ferguson, Muller, and Roberts, 1951, Winnemucca quadrangle, 1:125,000
Gilluly, 1967, Winnemucca quadrangle, 1:62,500
Hawley and Wilson, 1965, pls. 1 and 2, Quaternary geology of Winnemucca area.
Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1965, soils maps.
Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, Soil Conservation Service, detailed soils mapping in progress. Data at SCS Winnemucca field office as of December 1972.
Nichols, 1972, part of Tobin Range
Roberts, 1943, Rose Creek tungsten mine, pl. 1, 1:24,000
Silberman and McKee, 1971, p. 28, one isotope age of a granite
Southern Pacific Co., 1964, geologic maps, economic mineral deposits, 1:24,000.
Tatlock, 1969, Pershing County, 1:200,000
U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.
Willden, 1964, pl. 1, Humboldt County, 1:250,000

Hydrogeologic maps:

Cohen, 1964a, pl. 1, bedrock-alluvial contact, three alluvial units, wells and springs, phreatophytes, water-level contours, 1:250,000; p. 4, reference to several reports that describe the hydrogeologic aspects of the far northern part of the valley.
Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.

Subsurface geologic data:

Cohen, 1964a, table 9, logs of 26 wells and U.S. Geological Survey auger holes, all but 3 of which are in or north of north part of valley.
Hawley and Wilson, 1965, pl. 3, geologic cross sections
Nevada State Engineer, unpublished drillers' logs of 22 wells south of T. 35 N. since Cohen's (1964a) tabulation.

Temperature and heat-flow data:

Cohen, 1964a, table 7, discharge temperatures of 33 wells and 4 springs, all in or north of north part of valley; table 8, discharge temperatures of 4 additional wells, all but one of which are as above.

Dreyer, 1940, fig. 9, discharge temperatures of 15 orifices in the Leach Hot Springs group.

Sass and others, 1971, table 8, heat flow for 3 drill holes

Waring and others, 1965, p. 34, discharge temperatures of Leach's Hot Springs and Nelson (Guthrie) Springs.

Surface or airborne geophysical data:

Wilson, 1970, aeromagnetic map of area that includes north half of valley, 1:62,500.

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, data on earthquakes

Borehole geophysical data: None available

Geochemical data:

Cohen, 1964a, table 7, chemical analyses of water from 36 wells, 4 springs, all in or north of north part of valley.

Dreyer, 1940, p. 23, chemical analysis of Leach Hot Springs

Miller, Hardman, and Mason, 1953, p. 44, chemical analyses of water from 4 wells and 1 hot spring.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of many samples from Humboldt River, several ground-water analyses.

Meteorological data:

Cohen, 1964a, p. 5, table 1, climate; table 5, precipitation by altitude zones.

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____ 1965, precipitation map of Nevada

U.S. Weather Bureau, 1914-72, records of precipitation and temperature at Winnemucca, Buffalo Ranch, Paris Ranch, Golconda, Rye Patch Dam, and Imlay stations; precipitation storage gages at Pole Creek, Clear Creek Canyon, Sheep Ranch Canyon, Spaulding Canyon, Dun Glen; other data at now-abandoned stations also may be available.

Botanical data:

Cohen, 1964a, pl. 1, distribution of phreatophytes

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1965, map shows irrigated and phreatophyte lands, scale 1 in = 6 mi; table 2, ground-water use by phreatophytes.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Cohen, 1964a, pl. 1, water-level contours; table 8, water-level and discharge data for 61 wells in or north of Grass Valley; p. 22, discharge of springs.

Desert Research Institute, unpublished hydraulic data

U.S. Geological Survey, 1953-73, water levels for several observation wells.

Water-budget data:

Cohen, 1964a, p. 23, water budget; p. 19 and table 5, ground-water recharge; p. 20, ground-water outflow; p. 21 and table 6, evapotranspiration; p. 22, spring discharges and pumpage; p. 23, perennial yield.

Eakin and Lamke, 1966, table 12, fig. 33, water budgets

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Dixie-Fairview Valley area

Hydrographic areas: Fairview Valley (124); Stingaree Valley (125); Cowlick Valley (126); Eastgate Valley (127); Dixie Valley (128); Pleasant Valley (130); Jersey Valley (132).

Geothermal land classification: Part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Axelrod, 1956, fig. 10, 1:30,000
Burke, 1967, Holocene faults in Dixie Valley
_____1973, southern Tobin Range
Feray and others, 1968, highway geologic map
Ferguson and others, 1951, Mt. Moses quadrangle, 1:125,000
Ferguson, Muller, and Roberts, 1951, Winnemucca quadrangle, 1:125,000.
Gilluly, 1967, Winnemucca quadrangle, 1:62,500
Moore, 1962, isotope ages of rocks
Muller, Ferguson, and Roberts, 1951, Mt. Tobin quadrangle, 1:125,000
Nevada Bureau of Mines and Desert Research Institute, 1963, pl. 3, 1:31,680.
Page, 1965, part of Stillwater Range, 1:125,000
Roberts, 1965a, Paleozoic and Mesozoic facies, 1:200,000
Southern Pacific Co., 1964, geologic maps, economic mineral deposits, 1:24,000.
Speed and Jones, 1969, fig. 2, Boyer Ranch Formation, 1:250,000
Staatz and Bauer, 1954, radioactive deposits
Tatlock, 1969, Pershing County, 1:250,000
Thorstenson, 1968, Chalk Mountain
U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.
Willden, and Speed, 1968a, Churchill County, 1:200,000

Hydrogeologic maps:

Cohen and Everett, 1963, pl. 1, shows consolidated rocks, older alluvium, younger alluvium, phreatophytes, playa, generalized water-level contours, wells, flowing wells, and springs, 1:250,000.
Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.
University of Nevada and others, 1962, Sand Springs Range, Fairview Valley, and Four Mile Flat.
Zones, 1957, changes in hydrologic conditions in Dixie and Fairview Valleys after earthquake of December 16, 1954.

Subsurface geologic data:

Cohen and Everett, 1963, table 9, drillers' logs of 25 water wells
Nevada State Engineer, unpublished drillers' logs
Nevada Bureau of Mines and Desert Research Institute, 1963, logs of wells in Sand Springs Range area.

Temperature and heat-flow data:

Cohen and Everett, 1963, table 7, discharge temperatures of 39 water wells, with depths of wells; table 8, discharge temperatures of 6 springs.

Lawrence, 1971, Senators Fumaroles, Dixie Valley

Nevada Bureau of Mines, unpublished data for Devils Ranch Springs, hot springs on northwest side of Salt Marsh Valley, Hyden Hot Springs. Sou Hot Springs (also called "Gilberts Hot Springs"), hot springs in T. 27 N., R. 40 E., sec. 28, extinct hot springs 2-3 miles above Boyers Ranch, hot water in Dixie-Comstock Mine, and Dixie Hot Springs.

Surface or airborne geophysical data:

Nevada Bureau of Mines and Desert Research Institute, 1963, gravity, aeromagnetic, and refraction-seismic surveys of Atomic Energy Commission bomb test site in Sand Springs Range.

Thompson and others, 1967, Dixie Valley

U.S. Geological Survey, 1972a, aeromagnetic map, 1:250,000

Wahl, 1965, gravity map of part of area, 1:250,000

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Ryall, 1972, seismic potential

Savage, 1972, microearthquakes near Fairview Peak

Slemmons and others, 1965, earthquake epicenters

Slemmons, Jones, and Gimlett, 1965, records of numerous historic earthquakes.

Tocher, 1957, Dixie Valley-Fairview Peak earthquakes of December 16, 1954.

Borehole geophysical data:

University of Nevada and others, 1962, p. 118-125, gamma and neutron logs of a test well 935 feet deep in Fairview Valley.

Geochemical data:

Cohen and Everett, 1963, table 6, chemical analyses of water samples from 13 wells.

Desert Research Institute, unpublished chemical analyses of ground waters and surface waters.

Miller, Hardman, and Mason, 1953, p. 50, chemical analyses of 20 samples of irrigation water (major ions only).

Nevada Bureau of Environmental Health, unpublished chemical analyses of numerous samples of ground waters and surface waters (major ions only).

University of Nevada and others, 1962, appendix G, chemical analyses of about 20 water samples.

University of Nevada, Department of Agriculture, unpublished chemical analyses of ground waters and surface waters.

University of Nevada, Renewable Resources Department, unpublished chemical analyses of ground waters and surface waters.

Meteorological data:

Cohen and Everett, 1963, table 1, monthly and annual precipitation at Eastgate, Fallon, and Lovelock; table 3, estimated average annual precipitation and ground-water recharge; table 2, monthly and annual temperature at Eastgate, Fallon, and Lovelock.

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, probability of precipitation

Hardman, 1936, precipitation map of Nevada

_____1965, precipitation map of Nevada

Kohler, Nordenson, and Baker, 1959, evaporation maps

Botanical data:

Cohen and Everett, 1963, pl. 1, areal extent of phreatophytes

Nevada Resources Action Council and others, 1973, vegetation map, 1:1,000,000.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Cohen and Everett, 1963, pl. 1, generalized water-level contours; table 7, pressure heads or water levels in 66 wells, discharges of 45 wells; table 8, discharges of 10 springs (9 or 10 are thermal).

University of Nevada and others, 1962, p. 56-66, pumping-test data, summaries of transmissivity, permeability, and storage coefficient by pumping tests; estimates of ground-water velocity.

U.S. Geological Survey, 1960, 1963, 1970, streamflow data.

Zones, 1957, changes in hydrologic conditions after earthquake of December 16, 1954.

Water-budget data:

Cohen and Everett, 1963, table 3, ground-water recharge; table 4, ground-water discharge by wells, springs, and natural evapotranspiration; table 5, annual subsurface ground-water flow from valleys tributary to Dixie Valley; p. 24, ground-water storage; p. 24-25, perennial yield.

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Buffalo Valley and lower Reese River Valley

Hydrographic areas: Lower Reese River Valley (59); Buffalo Valley (131)

Geothermal land classification: Part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Feray and others, 1968, highway geologic map
Gates, 1956, Shoshone Range
Gilluly, 1954, Roberts Thrust
_____1960, Roberts Thrust
Gilluly and Gates, 1965, pl. 1, 1:31,680; pl. 2, 1:15,840; both in northern Shoshone range.
McKee, 1970, Fish Creek Mountains
Roberts, 1949, Antler Peak quadrangle
_____1951, Antler Peak quadrangle
_____1965a, Paleozoic and Mesozoic facies map, 1:200,000
_____1965b, Antler Peak quadrangle, pl. 4, geologic map, 1:62,500; pl. 3, geologic map of southeastern part of quadrangle, 1:31,680 (pls. 4 and 6 reprinted as pls. 1 and 2 in U.S. Geol. Survey Prof. Paper 459-B).
Roberts and Arnold, 1952, thrust faults in Antler Peak quadrangle
Schilling, 1965, fig. 7, location of four sites where isotope ages of rocks were determined.
_____1971a, fig. 1, location of 15 sites where isotope ages of rocks were determined.
_____1971b, fig. 1, location of 13 sites where isotope ages of rocks were determined.
Shawe, Reeves, and Kral, 1962, fig. 35, McCoy District, 1:43,000
Silberling and Roberts, 1962, pl. 2, Sonoma Range 1-degree quadrangle, 1:375,000.
Southern Pacific Co., 1964, geologic maps, economic mineral deposits, 1:24,000.
Stewart, 1969, Battle Mountain quadrangle and part of Dunphy quadrangle
Stewart and Carlson, 1972, north-central Nevada
Stewart and McKee, 1970, Lander County, 1:250,000
Tatlock, 1969, Pershing County, 1:200,000
Wallace and others, 1959, Buffalo Mountain quadrangle
Willden, 1964, pl. 1, Humboldt County, 1:250,000; fig. 11, northern part of Battle Mountain, 1:125,000.

Hydrogeologic maps:

Eakin and Lamke, 1966, pl. 1, Humboldt River basin, 1:500,000, shows valley-fill deposits, consolidated rocks, area where annual runoff exceeds 5 inches, area where depth to water is 10 feet or less and where depth is 10 to 25 feet, and approximate water-level contours.

Mifflin, 1968, 1:1,000,000 map showing ground-water flow direction, ground-water recharge and discharge.

Waring, 1918, pl. VIII, Reese River basin and adjacent parts of Humboldt River basin; shows generalized geology, locations of wells and springs, depth to water, irrigated areas, and areas where depth to water is less than 10 feet, 1:250,000.

Subsurface geologic data:

Nevada State Engineer, unpublished drillers' logs of most of wells in area.

Temperature and heat-flow data:

Sass and others, 1971, table 6, fig. 10, locations and values of heat flows within the Battle Mountain heat-flow high.

Waring, 1918, p. 124-127, discharge temperatures of 7 wells and springs.

Surface or airborne geophysical data:

Erwin, 1967, gravity map of Battle Mountain and adjacent areas

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, locations of six earthquake epicenters in area; also historic fault displacements.

Slemmons, Jones, and Gimlett, 1965, data on earthquakes.

Borehole geophysical data:

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished electric log of Hudson Oil Co. No. 1 well.

Geochemical data:

Waring, 1918, p. 125 and 127, chemical analyses of about 20 water samples from wells and springs.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____ 1965, precipitation map of Nevada

U.S. Weather Bureau, 1914-72, temperature and precipitation records for Battle Mountain.

Botanical data:

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1964b, area no. 59, vegetation and phreatophyte maps.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

U.S. Bureau of Land Management, unpublished range-forage maps.

Hydraulic data:

Eakin and Lamke, 1966, pl. 1, approximate water-level contours

Nevada State Engineer, unpublished water-level data and well-discharge data as reported on drillers' logs.

Waring, 1918, p. 124 and 126, data for about 50 wells, including water levels and yields.

Water-budget data:

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Northern Big Smoky Valley

Hydrographic area: Big Smoky Valley, northern part (137B)

Geothermal land classification: Darrough Hot Springs KGRA in southern part of valley; most of surrounding valley is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Edwards and McLaughlin, 1972, one isotope age of a rock in the area
Feray and others, 1968, highway geologic map
Ferguson and Cathcart, 1954, Round Mountain quadrangle
Kay and Crawford, 1964, pl. 1, Petes Summit and Market Peak sheets, 1:35,000; pl. 2, Northumberland sheet.
Kleinhampl and Ziony, 1967, northern Nye County, 1:200,000
Krueger and Schilling, 1971, isotope ages of 3 rocks in the valley
McKee, 1968a, Spencer Hot Springs quadrangle, 1:62,500
McKee and others, 1971, isotope ages of 13 rocks in or near the valley.
McKee and Ross, 1969, description of a window in Roberts Mountains Thrust at Petes Summit.
McKee and Silberman, 1970, isotope ages of Tertiary igneous rocks
McKee and Stewart, 1971, stratigraphy and isotope ages of Tertiary volcanic rocks.
Means, 1962, pl. 1, central Toiyabe Range, 1:20,000
Ross, 1953, pl. 1, 1:24,000; pl. 2, 1:4,800, Reese River district
Sargent and McKee, 1970, Bates Mountain Tuff
Silberman and McKee, 1971, isotope ages of 3 rocks
_____1972, one isotope age of a rock
Stewart and McKee, 1968a, Mount Callaghan quadrangle, 1:62,500
_____1968b, southeastern part of Lander County
_____1970, Lander County, 1:250,000
Stewart and Palmer, 1967, Callaghan window
U.S. Department of Agriculture, Soil Conservation Service, unpublished soils maps.
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.
Washburn, 1970, Paleozoic stratigraphy of Toiyabe Range, fig. 2, 1:100,000.

Hydrogeologic maps:

Horton, 1964, 1:1,000,000 location of six springs in valley
Meinzer, 1915, 1:250,000 map
_____1917, pl. 1, bedrock, alluvium, and springs, 1:250,000; pl. 2, wells, contours of water depth, and water-use areas.
Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction.
Rush and Schroer, 1970, pl. 1, 1:250,000 map showing 7 rock units, 4 phreatophyte units, wells, springs; fig. 4, map showing transmissivity of valley alluvium.

Subsurface geologic data:

Elliott, 1966
Koschmann and Bergendahl, 1968
Kral, 1951
Meinzer, 1915
_____1917, p. 159, analyses of soil samples for grain size
Nevada State Engineer, unpublished well logs
Robinson, 1953
Rush and Schroer, 1970, table 30, logs of 16 wells; fig. 3, map showing thickness of alluvium.
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished well logs.

Temperature and heat-flow data:

Meinzer, 1917, p. 153, discharge temperatures of 8 springs; p. 155, discharge temperature of 4 wells.
Nevada State Engineer, unpublished discharge temperatures of wells
Rush and Schroer, 1970, table 29, discharge temperatures of 48 wells; fig. 2, map showing areas of warm ground water.

Surface or airborne geophysical data:

Davis and Stewart, 1970, aeromagnetic map of Austin area
Healey, 1968, gravity map, 1:250,000
Robinson, 1970, relations between geologic structure and aeromagnetic anomalies.
U.S. Air Force, 1968, Bouguer gravity map
U.S. Geological Survey, 1967, aeromagnetic map of parts of Austin, Spencer Hot Springs, and Wildcat Peak quadrangles.
_____1971, aeromagnetic map, 1:250,000

Passive seismic data:

Douglas, Ryall, and Williams, 1970, spectral characteristics of microearthquakes.
Environmental Research Laboratories, unpublished records for all known earthquakes.
Slemmons and others, 1965, four epicenters in valley

Borehole geophysical data: None available

Geochemical data:

Hardman and Miller, 1934, chemical analyses of water samples
Meinzer, 1915, do.
_____1917, do.
Miller, Hardman, and Mason, 1953, chemical analyses of irrigation waters.
Nevada Division of Health, unpublished chemical analyses of water samples.
Rush and Schroer, 1970, table 32, chemical analyses of water samples
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples.

Meteorological Data:

Fritts, 1965, tree-ring evidence for climatic changes
Gifford and others, 1967, probability of precipitation
Hardman, 1936, precipitation map of Nevada
_____1965, do.
Rush and Schroer, 1970, fig. 13, table 8, fig. 14, summary of precipitation; table 15, growing-season data.
U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:

Meinzer, 1917, phreatophyte map
_____1927, description of some vegetation in valley
Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.
Rush and Schroer, 1970, pl. 1, distribution of phreatophytes
U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Cooley, 1968, seepage from streams crossing alluvial fans
Desert Research Institute, unpublished data
Meinzer, 1917
Robinson, 1953
Rush and Schroer, 1970, fig. 5, map showing depth to ground water; table 7, streamflow; fig. 11, graph showing streamflow in basin area; table 28, streamflow data; table 29, well records.
Waring and others, 1965, p. 35 and 36, discharge data for 7 springs

Water-budget data:

Rush and Schroer, 1970, extensive discussion of budgets
Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Smith Creek Valley

Hydrographic area: Smith Creek Valley (134)

Geothermal land classification: Most of valley is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Bonham, 1970, part of Shoshone Mountains, 1:62,500
Feray and others, 1968, highway geologic map
Gilluly and Gates, 1965, northern Shoshone Range
Ketner, 1965, economic geology
Krueger and Schilling, 1971, isotope age of a rock in the valley
McKee and others, 1971, isotope ages of 17 rocks in or near the valley
McKee and Silberman, 1970, isotope ages of Tertiary igneous rocks in or near the valley.
McKee and Stewart, 1971, isotope ages of Tertiary volcanic rocks in or near the valley.
Stewart and McKee, 1969, west-central Lander County
_____1970, Lander County, 1:250,000
U.S. Geological Survey and Nevada Bureau of Mines, 1964, page-size geologic map of Nevada.

Hydrogeologic maps:

Everett and Rush, 1964, pl. 1, 1:250,000, shows three lithologic units, one phreatophyte unit, playa, wells, and springs.
Horton, 1964, 1:1,000,000 map shows location of two hot springs in valley.
Mifflin, 1968, 1:1,000,000 map shows areas of ground-water recharge and discharge and ground-water flow directions.

Subsurface geologic data:

Everett and Rush, 1964, table 7, drillers' logs of 5 wells
Nevada State Engineer, unpublished well logs
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished well logs.

Temperature and heat-flow data:

Everett and Rush, 1964, p. 8, description of two warm-spring areas with temperatures given; p. 12, reference to hot springs, table 5, discharge temperatures of 8 wells and springs.
Nevada State Engineer, unpublished temperature data
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., two unpublished temperature profiles for a 150-ft test hole on playa.
Waring and others, 1965, p. 35, discharge temperatures of two springs

Surface or airborne geophysical data:

Robinson, 1970, aeromagnetic map

Passive seismic data:

Douglas, Ryall, and Williams, 1970, spectral characteristics of microearthquakes.

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, 1:1,000,000 map shows three earthquake epicenters in valley.

Slemmons, Jones, and Gimlett, 1965, earthquake data

Borehole geophysical data: None available

Geochemical data:

Everett and Rush, 1964, table 5, chemical analyses of water samples from 11 wells.

Nevada Division of Health, unpublished chemical analyses

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples.

Meteorological data:

Everett and Rush, 1964, tables 1 and 2

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, do.

U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:

Everett and Rush, 1964, table 4, acreage of phreatophytes; pl. 1, distribution of phreatophytes.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

U.S. Bureau of Land Management, unpublished range-forage maps.

Hydraulic data:

Desert Research Institute, unpublished data

Everett and Rush, 1964, table 6, records for 18 wells, including water levels.

Water-Budget data:

Everett and Rush, 1964, ground-water budget

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Rawhide Flats

Hydrographic area: Rawhide Flats (123)

Geothermal land classification: Part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:
Feray and others, 1968, highway geologic map
Ross, 1961, pl. 2, Mineral County, 1:250,000
Schilling, 1965, isotope ages of four rocks in or near the valley
Silberman and McKee, 1972, isotope ages of three rocks in or near the valley.
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.
Willden and Speed, 1968a, pl. 1, Churchill County, 1:200,000

Hydrogeologic maps:
Everett and Rush, 1967, pl. 1, two lithologic units, one phreatophyte unit, wells, springs, 1:250,000.
Horton, 1964, 1:1,000,000 map shows location of one spring (Lee Hot Spring) in valley.
Mifflin, 1968, 1:1,000,000 map shows ground-water recharge, discharge, and flow direction.

Subsurface geologic data: Nevada State Engineer, unpublished well logs

Temperature and heat-flow data:
Everett and Rush, 1967, table 8, discharge temperature of one well in valley.
Nevada State Engineer, unpublished data
Waring and others, 1965, p. 34, discharge temperature of Lee Hot Springs.

Surface or airborne geophysical data: None available

Passive seismic data:
Environmental Research Laboratories, unpublished records of known earthquakes.
Slemmons and others, 1965, 1:1,000,000 map showing earthquake epicenters
Slemmons, Jones, and Gimlett, 1965, data on earthquakes

Borehole geophysical data: None available

Geochemical data:
Everett and Rush, 1967, table 8, chemical analysis of one ground-water sample.
Nevada Division of Health, unpublished data

Meteorological data:

Everett and Rush, 1967, table 1, precipitation at five stations near the area.

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, do.

U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:

Everett and Rush, 1967, table 5, water use by phreatophytes; pl. 1, distribution of phreatophytes.

Nevada Resources Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Desert Research Institute, unpublished data

Everett and Rush, 1967, table 9, records for two wells

Waring and others, 1965, p. 34, discharge of Lee Hot Springs

Water-budget data:

Everett and Rush, 1967, p. 28, water budget

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Railroad Valley-Hot Creek Valley area

Hydrographic areas: Little Fish Lake Valley (150); Little Smoky Valley (155); Hot Creek Valley (156); Railroad Valley (173).

Geothermal land classification: A small part of the area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Cebull, 1970, southern Grant Range
Cook, 1966, southern Hot Creek Range
Cornwall, 1972, pl. 1, southern Nye County
Feray and others, 1968, highway geologic map
Ferguson, 1933, Tybo District
Hose and Blake, 1970, White Pine County, 1:150,000
Hyde and Huttrer, 1970, Paleozoic rocks of central Grant Range
Kleinhampl and Ziony, 1967, northern Nye County, 1:200,000
Lowell, 1965, Ordovician rocks in Hot Creek and Monitor ranges
Quinlivan and Rogers, 1970, Tybo quadrangle
Schilling, 1965, isotope ages of 5 rocks in or near the area
Scott and Trask, 1972, Lunar Crater volcanic field
Snyder and others, 1969, Lunar Crater quadrangle
Summerfield and Peterson, 1971, two soil maps of Railroad Valley area, 1:250,000.
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.
VanDenburgh and Rush, 1973, pl. 1, Railroad Valley

Hydrogeologic maps:

Horton, 1964, 1:1,000,000 map shows location of 9 hot springs in valleys.
Maxey and Eakin, 1950, pls. 4 and 5, Railroad, Hot Creek, Reveille, Kawich, and Penoyer Valleys.
Mifflin, 1968, 1:1,000,000 map shows ground-water recharge, discharge, and flow direction.
VanDenburgh and Rush, 1973, pl. 1, Railroad and Penoyer Valleys, shows two alluvial units and consolidated rocks, wells and springs, phreatophyte areas, and playas.

Subsurface geologic data:

Eakin and others, 1951, table 9, drillers' logs of 29 wells in Railroad and Hot Creek Valleys.
Garside and Schilling, 1967, 1:1,000,000 map showing locations of oil and gas test wells
Lintz, 1957, p. 31, data for oil test well
Maxey and Eakin, 1950, table 9, drillers' logs of 36 wells
Nevada Oil & Gas Conservation Commission, unpublished logs of oil test wells.
Rush and Everett, 1966, table 15, drillers' logs of 7 wells
Schilling and Garside, 1968, logs of oil test wells

Temperature and heat-flow data:

Eakin and others, 1951, table 6, discharge temperatures of 17 springs; table 9, discharge temperatures of 9 wells.

Mifflin, 1968, discharge temperatures of 14 springs in Railroad and Little Smoky Valleys.

Nevada Oil & Gas Conservation Commission, unpublished temperature data for oil test wells.

Rush and Everett, 1966, table 13, discharge temperatures of 5 wells and 9 springs.

Sass and others, 1971, table 8, heat flow for 5 wells in Little Fish Lake Valley, Little Smoky Valley, and Hot Creek Valley.

VanDenburgh and Rush, 1973, discharge temperatures of about 25 wells and 30 springs; temperature log of a deep oil test well.

Surface or airborne geophysical data:

Ekren and others, 1971, pl. 1, gravity map includes south end of Railroad Valley.

Healey, 1968, reconnaissance gravity map

U.S. Air Force, 1968, Bouguer gravity map

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, 1:1,000,000 map show 9 epicenters within the area.

Slemmons, Jones, and Gimlett, 1965, earthquake data

Borehole geophysical data:

Nevada Oil & Gas Conservation Commission, unpublished logs of oil test wells in Railroad Valley.

Schilling and Garside, 1968, logs of oil test wells in Railroad Valley

Geochemical data:

Maxey and Eakin, 1950, chemical analyses of 3 water samples

Mifflin, 1968, appendix table 5, chemical analyses of waters from 14 springs in Railroad and Little Smoky Valleys (12 analyses include tritium).

Nevada Division of Health, unpublished chemical analyses of water samples

Rush and Everett, 1966, table 13, chemical analyses of waters from 6 wells and 10 springs (including 4 in Railroad Valley).

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples.

VanDenburgh and Rush, 1973, chemical analyses of water from 34 wells and 20 springs, also 5 streams.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes
Gifford and others, 1967, precipitation probabilities
Hardman, 1936, precipitation map of Nevada
_____1965, do.
Maxey and Eakin, 1950, table 1, precipitation data
U.S. Weather Bureau, 1914-72, temperature and precipitation records
VanDenburgh and Rush, 1973, average annual precipitation at 13 stations in and near the study area.

Botanical data:

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.
U.S. Bureau of Land Management, unpublished range-forage maps
VanDenburgh and Rush, 1973, p. 1, distribution of phreatophytes

Hydraulic data:

Garside and Schilling, 1967, 1:1,000,000 map shows 35 wells in Railroad Valley; data on these wells are generally available from the Nevada Oil and Gas Conservation Commission, Reno, Nev.
Maxey and Eakin, 1950, tables 2, 3, 4, 5, and 6, discharge of streams and springs; table 9, records for 36 wells.
Mifflin, 1968, appendix table 4, discharge of 14 springs in Railroad and Little Smoky Valleys.
Snyder, 1963, table 4, records for 2 springs under the name "Sand Spring Valley" and records for 14 springs and 15 wells.
VanDenburgh and Rush, 1973, water-level and discharge data for 126 wells; discharge data for 34 springs in Hot Creek and Railroad Valleys.
Waring and others, 1965, p. 36, discharge data for springs in Hot Creek and Railroad Valleys.

Water-budget data:

Maxey and Eakin, 1950, ground-water budget estimates
Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.
VanDenburgh and Rush, 1973, budgets, recharge, inflow and outflow, discharge.

Winnemucca segment

Hydrographic area: Winnemucca segment (70)

Geothermal land classification: Part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Bateman, 1953, Golconda tungsten deposit
Cohen, 1961a, Humboldt River valley near Winnemucca
_____1962d, stratigraphy and origin of Lake Lahontan deposits
_____1963a, Humboldt River valley near Winnemucca
_____1964b, do.
_____1964c, do.
Erickson and Marsh, 1972, Golconda and Iron Point quadrangles
Feray and others, 1968, highway geologic map
Ferguson, Muller, and Roberts, 1951, Winnemucca quadrangle
Ferguson, Roberts, and Muller, 1952, Golconda quadrangle
Gilluly, 1967, Winnemucca quadrangle, 1:62,500
Hawley and Wilson, 1965, Quaternary geology
Hotz and Willden, 1961, Osgood Mountains quadrangle, 1:48,000
_____1964, do.
Southern Pacific Co., 1964, geologic maps and economic mineral deposits, 1:24,000.
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.
Willden, 1964, Humboldt County, 1:250,000
Wilson, 1963, alluvial fans in Winnemucca area

Hydrogeologic maps:

Cohen, 1962b, East Range fault as a hydraulic barrier
Eakin and Lamke, 1966, pl. 1, 1:500,000
Harrill and Moore, 1970, tributary area north of Winnemucca segment
Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction.

Subsurface geologic data:

Cohen, 1961c, specific yield of alluvium
_____1962c, specific yield and porosity of alluvium
_____1962d, geologic section of Humboldt River valley
_____1963a, pl. 6, thickness of medial gravel unit
_____1963b, specific yield and particle size of alluvium
_____1964b, fig. 8, specific yield
_____1964d, fig. 19, thickness of medial gravel unit
Nevada State Engineer, unpublished drillers' logs of wells
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., logs of about 160 shallow auger test holes in flood plain of Humboldt River.

Temperature and heat-flow data:

Cohen, 1962b, thermal water in a well and several springs

_____1962e, table 1, temperatures of about 70 water samples

Waring and others, 1965, p. 33, discharge temperature of Golconda Hot Springs.

Surface or airborne geophysical data:

Dudley and McGinnis, 1962, seismic refraction and earth resistivity

McGinnis and Dudley, 1964, seismic studies

Wilson, 1960, Humboldt River

_____1970, aeromagnetic map, 1:62,500

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, 1:1,000,000 map shows an earthquake epicenter in the area.

Slemmons, Jones, and Gimlett, 1965, data on earthquakes

Borehole geophysical data: None available

Geochemical data:

Cohen, 1962b, siliceous and calcareous deposits at springs

_____1962e, table 1, chemical analyses of 101 water samples from wells and springs.

Kerr, 1940, p. 2026, states that rock overlying the ore deposit at Golconda is of hot-spring origin.

Penrose, 1893, mentions the hot springs near Golconda and suggests a hot-spring origin for the manganese ore.

Meteorological data:

Cohen, 1964d, fig. 3, precipitation map of Humboldt River valley near Winnemucca; fig. 4, average monthly temperature at and near Winnemucca; fig. 5, average monthly precipitation.

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, precipitation probabilities

Hardman, 1936, precipitation map of Nevada

_____1965, do.

Nevada Department of Conservation and Natural Resources, U.S. Geological Survey, and U.S. Bureau of Reclamation, 1972, precipitation data for 5 storage gages in Sonoma Mountains.

U.S. Weather Bureau, 1914-72, temperature and precipitation records for Winnemucca.

Botanical data:

Cohen, 1964d, fig. 6, vegetation map

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1965, vegetation map and phreatophyte map.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

Hydraulic data:

Cohen, 1961b, relation of surface water to ground water along flood plain of Humboldt River.

_____1961c, specific yield of alluvium

_____1962b, hydraulic-barrier effect of East Range fault

_____1962c, specific yield and porosity of alluvium

_____1963b, specific yield and particle size of alluvium

_____1964b, fig. 8, specific yield; pl. 2

_____1964d, figs. 13 and 14

Water-budget data:

Cohen, 1963a, p. 93, water budget

_____1964d, table 13, do.

Scott and others, 1971, fig. 5, estimates of annual surface and ground-water flows between hydrographic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Monitor Valley

Hydrographic areas: Monitor Valley, northern part (140A); Monitor Valley, southern part (140B).

Geothermal land classification: A small part of the area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Edwards and McLaughlin, 1972, isotope age of one rock in area
Feray and others, 1968, highway geologic map
Kay and Crawford, 1964, Toquima Range
Kleinhampl and Ziony, 1967, northern Nye County, 1:200,000
Krueger and Schilling, 1971, isotope ages of two rocks in area
Lowell, 1965, Ordovician rocks in Hot Creek and Monitor Ranges
McKee, 1968a, Spencer Hot Springs quadrangle, 1:62,500
_____1968b, Ackerman Canyon quadrangle, 1:62,500
McKee and others, 1971, isotope ages of 14 rocks in the area
McKee and Ross, 1969, northern Toquima Range
McKee and Silberman, 1970, isotope ages of Tertiary igneous rocks
Roberts, Montgomery, and Lehner, 1967, pl. 3, Eureka County, 1:250,000
Sargent and McKee, 1970, Bates Mountain Tuff
Schilling, 1965, isotope ages of two rocks in the area
Silberman and McKee, 1971, isotope ages of two rocks in area
Stewart and McKee, 1968a, Mount Callaghan quadrangle, 1:62,500
_____1970, Lander County, 1:250,000
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.

Hydrogeologic maps:

Horton, 1964, 1:1,000,000 map shows location of two springs
Mifflin, 1968, 1:1,000,000 map shows ground-water recharge, discharge, and flow direction.
Rush and Everett, 1964, pl. 1, three lithologic units, two phreatophyte units, playas, wells, and springs, 1:250,000.

Subsurface geologic data:

Nevada State Engineer, unpublished well logs
Rush and Everett, 1964, table 11, drillers' logs of 15 wells
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished well logs.

Temperature and heat-flow data:

Nevada State Engineer, unpublished temperature data
Rush and Everett, 1964, table 9, discharge temperatures of 8 wells and springs; table 10, discharge temperatures of 21 wells.
Sass and others, 1971, table 8, heat flow at one drill hole
Waring and others, 1965, p. 36, discharge temperatures of two springs

Surface or airborne geophysical data:

Healey, 1968, gravity map, Smoky Valley to Railroad Valley, 1:250,000
Robinson, 1970, aeromagnetic data
U.S. Air Force, 1968, gravity map
U.S. Geological Survey, 1971, aeromagnetic map, 1:250,000

Passive seismic data:

Douglas, Ryall, and Williams, 1970, spectral characteristics of microearthquakes.
Environmental Research Laboratories, unpublished records of known earthquakes.

Borehole geophysical data: None available

Geochemical data:

Nevada Division of Health, unpublished chemical analyses of water samples.
Rush and Everett, 1964, table 9, chemical analyses of water samples from 10 wells and springs.
U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes
Gifford and others, 1967, precipitation probabilities
Hardman, 1936, precipitation map of Nevada
_____1965, do.
Rush and Everett, 1964, table 1, precipitation at 8 stations; table 2, temperature at 2 stations.
U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.
Rush and Everett, 1964, table 5, evapotranspiration by phreatophytes; pl. 1, distribution of phreatophytes, 1:250,000.
U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Desert Research Institute, unpublished data
Rush and Everett, 1964, table 3, streamflow summary; table 10, records for 47 wells in three-valley hydrologic unit.
Waring and others, 1965, p. 36, discharge of 2 springs

Water-budget data:

Rush and Everett, 1964, ground-water budget
Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir.

Buena Vista Valley

Hydrographic area: Buena Vista Valley (129)

Geothermal land classification: Part of area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Cameron, 1939, northeastern Humboldt Range
Feray and others, 1968, highway geologic map
Ferguson and others, 1951, Mt. Moses quadrangle, 1:125,000
Ferguson, Muller, and Roberts, 1951, Winnemucca quadrangle, 1:125,000
Jenney, 1935, central Humboldt Range
Loeltz and Phoenix, 1955, pl. 1, 1:156,000; text p. 17-23
Muller, Ferguson, and Roberts, 1951, Mt. Tobin quadrangle
Page, 1965, part of Stillwater Range, 1:125,000
Reeves and Kral, 1955, pl. 1, Buena Vista Hills, 1:48,000; pl. 2, (geology and magnetic), southern Buena Vista Hills, 1:6,000; pl. 4, (geology and magnetic), northern Buena Vista Hills; pl. 6, (geology and magnetic), northeastern Buena Vista Hills.
Silberling and Wallace, 1967, Imlay quadrangle, 1:62,500
Southern Pacific Co., 1964
Tatlock, 1969, Pershing County, 1:250,000
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.
Wallace and others, 1959, Buffalo Mountain quadrangle, 1:48,000
_____1970, Unionville quadrangle 1:62,500
Willden and Speed, 1968b, fig. 4, part of Buena Vista District, 1:24,000; fig. 6, Copper Kettle District, 1:24,000.

Hydrogeologic maps:

Loeltz and Phoenix, 1955, phreatophytes, playa, locations of wells and springs.
Mifflin, 1968, 1:1,000,000 map shows ground-water recharge, discharge, and flow direction.

Subsurface geologic data:

Loeltz and Phoenix, 1955, table 10, logs of 10 water wells
Nevada State Engineer, unpublished well logs

Temperature and heat-flow data:

Loeltz and Phoenix, 1955, table 7, discharge temperature of Kyle Hot Springs, discharge temperatures of several cool wells.
Nevada Bureau of Mines, unpublished data
Waring and others, 1965, p. 34, discharge temperatures of Kyle Hot Springs and two other springs.

Surface of airborne geophysical data:

U.S. Geological Survey, 1972a, aeromagnetic map, 1:250,000

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, epicenters of three or four earthquakes greater than 4.0 Richter magnitude.

Slemmons, Jones, and Gimlett, 1965, major and minor historic earthquakes.

Borehole geophysical data: None available

Geochemical data:

Desert Research Institute, unpublished chemical analyses of water samples.

Loeltz and Phoenix, 1955, table 7, chemical analyses of 12 springs and well waters.

Miller, Hardman, and Mason, 1953, p. 30, chemical analyses of 15 samples of irrigation water.

Nevada Bureau of Environmental Health, unpublished chemical analyses of water samples (major ions only).

University of Nevada, Department of Agriculture, unpublished chemical analyses of water samples (major ions only).

University of Nevada, Renewable Resources Department, unpublished chemical analyses of water samples.

Meteorological data:

Fritts, 1965, tree-ring evidence for climatic changes

Gifford and others, 1967, probability of precipitation

Hardman, 1936, precipitation map of Nevada

_____1965, do.

Kohler, Nordenson, and Baker, 1959, evaporation maps

Loeltz and Phoenix, 1955, p. 12 and 13, precipitation at two nearby stations.

Botanical data:

Loeltz and Phoenix, 1955, pl. 1, distribution of phreatophytes, 1:56,000; table 4, evapotranspiration by phreatophytes.

Nevada Resource Action Council and others, 1973, generalized vegetation map, 1:1,000,000.

U.S. Bureau of Land Management, unpublished range-forage maps

Hydraulic data:

Loeltz and Phoenix, 1955

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished data.

Water-budget data:

Scott and others, 1971, fig. 5, estimates of annual surface- and ground-water flows between hydrologic areas; estimates of annual runoff, perennial yield, and water stored in upper 100 feet of ground-water reservoir

Elko segment

Hydrographic area: Elko segment (49)

Geothermal land classification: Elko Hot Springs KGRA; most of the area is classified as lands valuable prospectively for geothermal resources.

Geologic maps and other surface geologic data:

Bradberry & Associates, 1964
Dott, 1955, Elko and northern Diamond Ranges
Feray and others, 1968, highway geologic map
Fredericks and Loeltz, 1951, fig. 2, 1:125,000
Granger and others, 1957, pl. 1, Elko County, 1:250,000
Hope, 1970, Elko County, 1:200,000
Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1964c, soils maps.
Regnier, 1960, Cenozoic geology near Carlin, pl. 1, 1:125,000
Sharp, 1939b, Humboldt Formation, fig. 9, 1:750,000; fig. 8, 1:48,000.
Smith and Ketner, 1972, Carlin quadrangle, 1:125,000
U.S. Geological Survey and Nevada Bureau of Mines, 1964, fig. 3, page-size geologic map of Nevada.

Hydrogeologic maps:

Eakin and Lamke, 1966, pl. 1, 1:500,000
Fredericks and Loeltz, 1951, fig. 2
Mifflin, 1968, 1:1,000,000 map showing ground-water recharge, discharge, and flow direction

Subsurface geologic data:

Fredericks and Loeltz, 1951, table 3, drillers' logs of 12 wells
Garside and Schilling, 1967, 1:1,000,000 map showing location of oil and gas test wells.
Lintz, 1957, locactions of oil and gas test wells
Nevada State Engineer, unpublished drillers' logs (173)
Schilling and Garside, 1968, oil and gas well data, 1953-67

Temperature and heat-flow data:

Fredericks and Loeltz, 1951, table 4, discharge temperatures of 5 wells; table 5, notes on discharge temperatures of 3 other wells; p. 49, discussion of temperatures of springs and wells.
Sass and others, 1971, table 8, heat-flow data at one drill-hole site (Swales Mountain).
Waring and others, 1965, p. 33, discharge temperatures of Elko Hot Springs and several other hot springs in adjacent hydrographic areas.

Surface or airborne geophysical data:

Mabey, 1964, gravity map of Eureka County and adjacent areas

Passive seismic data:

Environmental Research Laboratories, unpublished records of known earthquakes.

Slemmons and others, 1965, three epicenters of earthquakes of magnitude less than 6.0 between 1854 and 1960.

Slemmons, Jones, and Gimlett, 1965, earthquake data

Geochemical data:

Eakin and Lamke, 1966, table 11, chemical analyses of water samples

Fredericks and Loeltz, 1951, table 4, chemical analyses of water from 5 wells.

U.S. Geological Survey, 1960, 1963, 1970, chemical analyses of streamflow.

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished chemical analyses of water samples from 4 wells and 2 springs; also many analyses of surface waters.

Meteorological data:

Eakin and Lamke, 1966, p. 19-25, discussion of climate in Humboldt River basin.

Fredericks and Loeltz, 1951, p. 43, brief discussion of climate

Hardman, 1936, precipitation map of Nevada

_____1965, do.

U.S. Weather Bureau, 1914-72, temperature and precipitation records

Botanical data:

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1964c, map showing irrigated and phreatophyte lands; also see table 2, ground-water use.

Nevada Resource Action Council and others, 1973, 1:1,000,000 vegetation map of Nevada.

Hydraulic data:

Desert Research Institute, unpublished data

Fredericks and Loeltz, 1951, table 5, water-level and discharge data for 12 wells; p. 41 and table 2, discharge and specific-capacity data for 7 wells; p. 50, pumping-test data for several wells.

U.S. Geological Survey, 1953-73, water levels in observation wells

_____, 1960, 1963, 1970, streamflow data for Humboldt River (2 stations) and South Fork of Humboldt River (1 station).

U.S. Geological Survey Water Resources Division District office, Carson City, Nev., unpublished water-level data for 5 wells.

Water-budget data:

Eakin and Lamke, 1966, table 12, fig. 33, and p. 56

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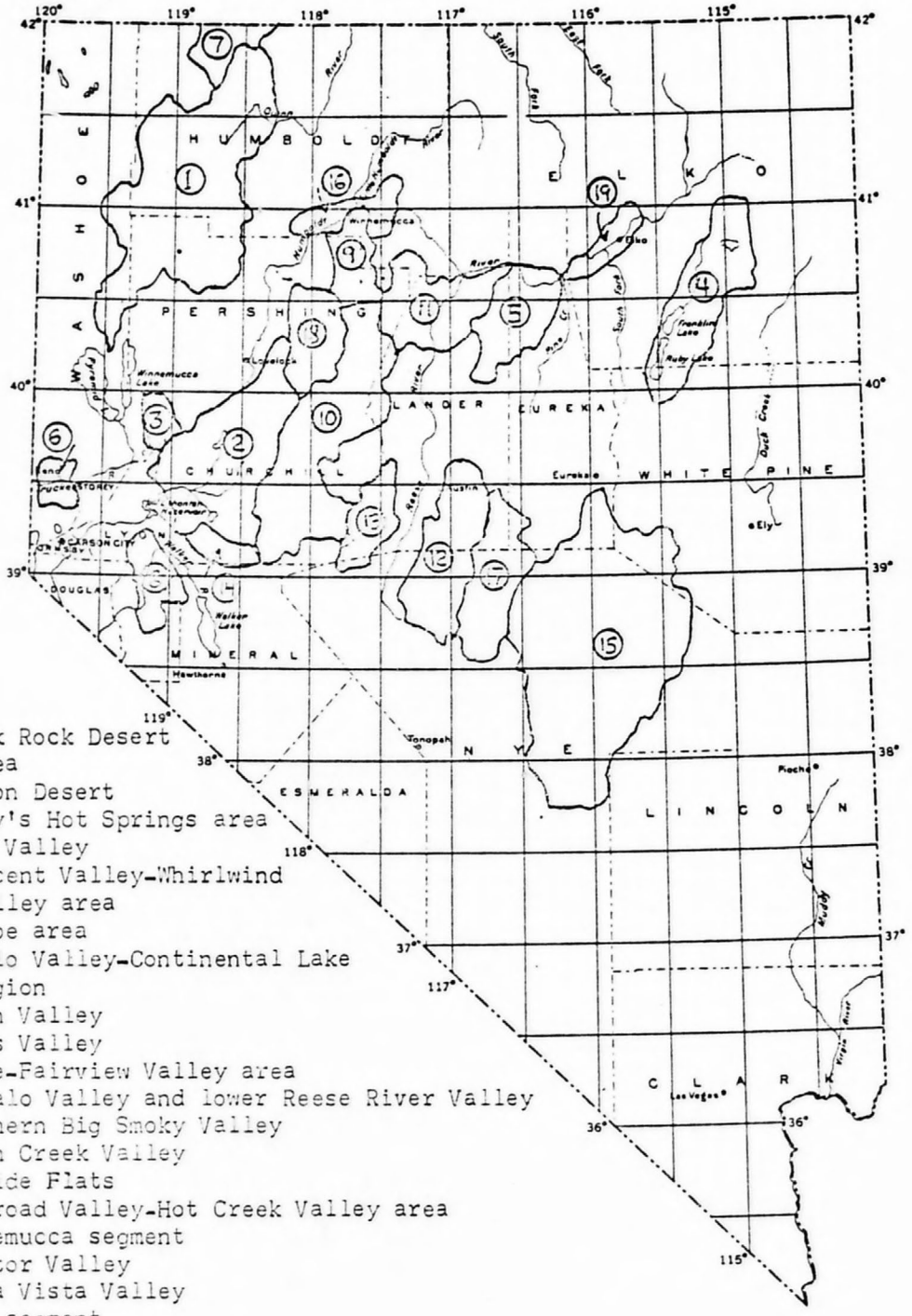
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NEVADA

TOPOGRAPHIC DIVISION
PACIFIC AREA
MENLO PARK, CALIFORNIA



1. Black Rock Desert area
2. Carson Desert
3. Brady's Hot Springs area
4. Ruby Valley
5. Crescent Valley-Whirlwind Valley area
6. Washoe area
7. Pueblo Valley-Continental Lake region
8. Mason Valley
9. Grass Valley
10. Dixie-Fairview Valley area
11. Buffalo Valley and lower Reese River Valley
12. Northern Big Smoky Valley
13. Smith Creek Valley
14. Rawhide Flats
15. Railroad Valley-Hot Creek Valley area
16. Winnemucca segment
17. Monitor Valley
18. Buena Vista Valley
19. Elko segment

Figure 1.--Map of Nevada showing selected geothermal areas