

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

TO ACCOMPANY
WRI REPORT 83-4119-A

MAPS SHOWING GROUND-WATER UNITS AND WITHDRAWAL,
BASIN AND RANGE PROVINCE, NEVADA

by

M.S. Bedinger, J.R. Harrill, and J.M. Thomas

INTRODUCTION

This report on ground-water units and withdrawal in the Basin and Range province of Nevada (see index map) was prepared as part of a program of the U.S. Geological Survey to identify prospective regions for further study relative to isolation of high-level nuclear waste (Bedinger, Sargent, and Reed, 1984), utilizing program guidelines defined in Sargent and Bedinger (1984). Also included in this report are selected references on pertinent geologic and hydrologic studies of the region. Other map reports in this series contain detailed data on ground-water quality, surface distribution of selected rock types, tectonic conditions, areal geophysics, Pleistocene lakes and marshes, and mineral and energy resources.

In the Basin and Range province, ground water occurs in basin-fill deposits and consolidated rocks. The basin fill consists mostly of unconsolidated to semi-indurated sedimentary deposits. The material ranges from poorly sorted to moderately sorted mixtures of gravel, sand, silt, and clay that were derived from the consolidated rocks in the nearby mountains. Evaporite deposits, limestone, conglomerate, and volcanic rocks are present in places in the unit. Some of the basins may contain as much as 9,000 feet of basin fill, but the most permeable rocks and most of the recoverable ground water is in the upper 1,000 feet of the unit.

The consolidated rocks consist mostly of sedimentary and volcanic rocks, with lesser amounts of metamorphic and intrusive rocks. The consolidated rocks make up the mountain ranges that border the basins and are the principal source of sedimentary material to the basin fill.

Few wells exist in the consolidated rocks compared to the greater number of wells in the basin fill. The yield of wells tapping many consolidated rock units is due to interception of water in fracture zones. In some areas in the Basin and Range, carbonate rock is extensive in the subsurface and provides interconnection between alluvial basins through fractures and solution channels. Although the consolidated rock commonly has very low permeability, and very low rates of ground-water flow, the entire ground-water system, including basin fill and bedrock, must be treated as one integral system.

GROUND-WATER UNITS

This map shows boundaries of ground-water units, generalized directions of ground-water flow at the water table, areas of natural discharge to streams and lakes, areas of natural discharge by evapotranspiration in areas underlain by ground water at shallow depths, and the distribution of consolidated rock outcrops and areas underlain by basin fill.

Ground-water unit boundaries are based primarily on ground-water divides or surface streams. The ground-water table is used to delineate ground-water units in a manner analogous to the way land-surface topography is used to delineate drainage areas. Where information is available, water-level contour maps were used to define the boundaries. Where data on ground-water levels were lacking, ground-water unit boundaries were drawn on topographic divides that were assumed to overlie water-table divides.

Ground-water units shown on the map may contain one or more areas of natural recharge and natural discharge or ground-water withdrawal by wells. Some ground-water units comprise closed flow systems at the water table; that is, no ground-water flow occurs across the ground-water unit boundaries. However, between other units, ground-water flow may occur across some unit boundaries in basin-fill or consolidated-rock aquifers.

GROUND-WATER WITHDRAWAL

The accompanying map shows boundaries of ground-water withdrawal areas and estimated ground-water withdrawal for 1975.

SELECTED REFERENCES

- Bedinger, M. S., Sargent, K. A., and Reed, J. E., 1984, Geologic and hydrologic characterization and evaluation of the Basin and Range province relative to the disposal of high-level radioactive waste--Part I, Introduction and guidelines: U.S. Geological Survey Circular 904-A, [in press].
- Blankennagel, R. K., and Weir, J. E., Jr., 1973, Geohydrology of the eastern part of Pahute Mesa, Nevada Test Site, Nye County, Nevada: U.S. Geological Survey Professional Paper 712-B, 35 p.
- Cohen, Philip, 1964, Brief appraisal of the ground-water resources of the Grass Valley area, Humbolt and Pershing Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 29, 40 p.
- Cohen, Philip, and Everett, D. E., 1963, Brief appraisal of the ground-water hydrology of the Dixie-Fairview area, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 23, 40 p.
- Crosthwaite, E. G., 1963, Ground water appraisal of Antelope and middle Reese River Valleys, Lander County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report no. 19, 33 p.
- Dinwiddie, G. A., and Schroder, L., 1971, Summary of hydraulic testing in and chemical analysis of water samples from deep exploratory holes in Little Fish Lake, Monitor, Hot Creek, and Little Smokey Valleys, Nevada: U. S. Geological Survey Open-File Report 474-90, 70 p.
- Eakin, T. E., 1960, Ground-water appraisal of Newark Valley, White Pine County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 1, 33 p.
- _____, 1961a, Ground-water appraisal of Pine Valley, Eureka, and Elko Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 2, 41 p.
- _____, 1961b, Ground-water appraisal of Long Valley, White Pine and Elko Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 3, 35 p.
- _____, 1962a, Ground-water appraisal of the Imlay area, Humboldt River Basin, Pershing County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 5, 54 p.
- _____, 1962b, Ground-water appraisal of Diamond Valley, Eureka and Elko Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 6, 60 p.
- _____, 1962c, Ground-water appraisal of Independence Valley, western Elko County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 8, 31 p.

- 1962d, Ground-water appraisal of Gabbs Valley, Mineral and Nye Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 9, 27 p.
- 1962e, Ground-water appraisal of Ralston and Stone Cabin Valleys, Nye County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 12, 32 p.
- 1962f, Ground-water appraisal of Cave Valley in Lincoln and White Pine Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 13, 19 p.
- 1963a, Ground-water appraisal of Dry Lake and Delamar Valleys, Lincoln County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources, Reconnaissance Series Report 16, 26 p.
- 1963b, Ground-water appraisal of Garden and Coal Valleys, Lincoln and Nye Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 18, 29 p.
- 1963c, Ground-water appraisal of Pahrnagat and Pahroc Valleys, Lincoln and Nye Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 21, 36 p.
- 1964, Ground-water appraisal of Coyote Springs and Kane Spring Valleys and Muddy River Springs area, Lincoln and Clark Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 25, 40 p.
- Eakin, T. E., Hughes, J. L., and Moore, D. O., 1967 Water resources appraisal of Steppoe Valley, White Pine and Elko Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 42, 48 p.
- Eakin, T. E., and Lamke, R. D., 1966, Hydrologic reconnaissance of the Humboldt River Basin, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Bulletin 32, 107 p.
- Eakin, T. E., and Maxey, G. B., 1951, Groundwater in Clover and Independence Valleys, Elko County, Nevada, in Eakin, T. E., Maxey, G. B., Robinson, T. W., Fredericks, J. C., and Loeltz, O. J., eds., Contributions to the hydrology of eastern Nevada: Nevada State Engineer Water Resources Bulletin 12, p. 95-125.
- Eakin, T. E., Moore, D. O., and Everett, D. E., 1965, Water resources appraisal of the Upper Reese River Valley, Lander and Nye Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 31, 47 p.
- Everett, D. E., 1964, Ground-water appraisal of Edwards Creek Valley, Churchill County, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 26, 18 p.

- Everett, D. E., and Rush, F. E., 1964, Ground-water appraisal of Smith Creek and Ione Valleys, Lander and Nye Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 28, 21 p.
- _____, 1965, Water resources appraisal of Lovelock Valley, Pershing County, Nevada: Nevada Department of Conservation and Natural Resources, Water-Resources Reconnaissance Series Report 32, 40 p.
- _____, 1966, Brief appraisal of the water resources of Grass and Carico Lake Valleys, Land and Eureka Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 37, 28 p.
- _____, 1967, Brief appraisal of the water resources of the Walker Lake area, Mineral, Lyon, and Churchill Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 40, 44 p.
- Fiero, G. W., Jr., and Illian, J. R., 1969, Regional hydrology Hot Creek Valley flow system, Nye County, Nevada: University of Nevada, Desert Research Institute, Center for Water Resources Research, Miscellaneous Report, 16 p.
- Glancy, P. A., 1968, Water-resources appraisal of Mesquite-Ivanpah Valley area, Nevada and California: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 46, 57 p.
- _____, 1968, Water-resources appraisal of Butte Valley, Elko and White Pine Counties, Nevada: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Reconnaissance Series Report 49, 50 p.
- _____, 1971, Water-resources appraisal of Antelope Valley and east Walker area, Nevada and California: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 53, 69 p.
- Glancy, P. A., and Katzer, T. L., 1975, Water-resources appraisal of the Carson River Valley, western Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 59, 126 p.
- Glancy, P. A., and Rush, F. E., 1968, Water-resources appraisal of Smoke Creek-San Emidio Desert area, Nevada and California: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 44, 57 p.
- Glancy, P. A., and Van Denburgh, A. S., 1969, Water-resources appraisal of the lower Virgin River Valley area, Nevada, Arizona and Utah: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Reconnaissance Series Report 51, 87 p.
- Harrill, J. R., 1970, Water resources appraisal of the Granite Springs Valley area, Pershing, Churchill, and Lyon Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 55, 36 p.

- ____ 1971, Water resources appraisal of the Pilot Creek Valley area, Elko and White Pine Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 56, 46 p.
- ____ 1973, Evaluation of the water resources of Lemmon Valley with emphasis on effects of groundwater development to 1971: Nevada Department of Conservation and Natural Resources, Water Resources Bulletin 42, 130 p.
- ____ 1982, Ground-water storage depletion in Pahrump Valley, Nevada-California, 1962-75: U.S. Geological Survey Open-File Report 81-635, [in press].
- Harrill, J. R., and Lamke, R. D., 1968, Hydrologic response to irrigation pumping in Diamond Valley, Eureka and Elko Counties, Nevada, 1950-65, with a section on Surface water: Nevada Department of Conservation and Natural Resources, Water Resources Bulletin, no. 35, 85 p.
- Harrill, J. R., and Soule, P. L., 1969, Hydrologic response to irrigation pumping in Hualapa's Flat, Washoe, Pershing and Humboldt Counties, Nevada, 1960-67, with a section on Surface water: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Bulletin, no. 37, 75 p.
- Hood, J. W., and Rush, F. E., 1965, Water-resources appraisal of the Snake Valley area, Utah and Nevada: Utah State Engineer, Technical Publication no. 14, 43 p.
- Huxel, C. J., Jr., and Harris, E. E., 1969, Water resources and development in Mason Valley, Lyon and Mineral Counties, Nevada, 1948-65: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Bulletin, no. 38, 77 p.
- Huxel, C. J., Jr., Parker, J. E., and Everett, D. E., 1966, Effects of irrigation development on the water supply Quinn River Valley area, Nevada and Oregon, 1950-64, with a section on Surface water and chemical quality of water: Nevada Department of Conservation and Natural Resources, Water Resources Bulletin, no. 34, 80 p.
- Loeltz, O. J., and Phoenix, D. A., 1955, Geology and ground-water resources of Buena Vista Valley, Pershing County, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Bulletin 13, 51 p.
- Malmberg, G. T., and Eakin, T. E., 1962, Ground-water appraisal of Sarcobatus Flat and Oasis Valley, Nye and Esmeralda Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 10, 39 p.
- Malmberg, G. T., and Worts, G. F., Jr., 1966, Effects of pumping on the hydrology of Kings River Valley, Humboldt County, Nevada, 1957-64: Nevada Department of Conservation and Natural Resources, Water Resources Bulletin no. 31, 59 p.
- Moore, D. O., and Eakin, T. E., 1968, Water-resources appraisal of the Snake River Basin in Nevada: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Reconnaissance Series Report 48, 103 p.

- Olmsted, F. H., Glancy, P. A., Harrill, J. R., Rush, F. E., and Van Denburgh, A. S., 1975, Preliminary hydrogeologic appraisal of selected hydrothermal systems in northern and central Nevada: U.S. Geological Survey Open-File Report 75-56, 267 p.
- Rush, F. E., 1964, Ground-water appraisal of the Meadow Valley area, Lincoln and Clark Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 27, 43 p.
- 1967, Water resources appraisal of Washoe Valley, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 41, 39 p.
- 1968a, Water resources appraisal of Clayton Valley, Stonewall Flat area, Nevada and California: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 45, 54 p.
- 1968b, Water resources appraisal of Thousand Springs Valley, Elko County, Nevada: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Reconnaissance Series Report 47, 61 p.
- 1968c, Water resources of the lower Moapa-Lake Mead area, Clark County, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 50, 66 p.
- 1970, Regional ground-water systems in the Nevada Test Site area, Nye, Lincoln, and Clark Counties, Nevada: Nevada Department of Conservation and Natural Resources, Division of Water Resources, Water Resources Reconnaissance Series Report 54, 25 p.
- Rush, F. E., and Eakin, T. E., 1963, Ground-water appraisal of Lake Valley in Lincoln and White Pine Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 24, 29 p.
- Rush, F. E., and Everett, D. E., 1964, Ground-water appraisal of Monitor, Antelope, and Kobeb Valleys, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 30, 45 p.
- 1966a, Water-resources appraisal of the Huntington Valley area, Elko and White Pine Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 35, 37 p.
- 1966b, Water-resources appraisal of Little Fish Lake, Hot Creek and Little Smokey Valleys, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 38, 38 p.
- Rush, F. E., and Glancy, P. A., 1967, Water-resources appraisal of the Warm Springs-Lemmon Valley area, Washoe County, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 43, 70 p.
- Rush, F. E., and Huxel, C. J., Jr., 1966, Groundwater appraisal at the Eldorado-Piute Valley area, Nevada and California: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 36, 29 p.

- Rush, F. E., and Katzer, T. L., 1973, Water-resources appraisal of Fish Lake Valley, Nevada and California: Carson City, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report 58, 70 p.
- Rush, F. E., and Kazmi, S. A. T., 1965, Water-resources appraisal of Spring Valley, White Pine and Lincoln Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 33, 36 p.
- Rush, F. E., and Schroer, C. V., 1971, Water resources of Big Smokey Valley, Lander, Nye, and Esmeralda Counties, Nevada: Carson City, Nevada, Nevada Department of Conservation and Natural Resources, Water Resources Bulletin no. 41, 84 p.
- _____, 1976, Geohydrology of Smith Valley, Nevada, with special reference to the water use period, 1953-72: Carson, City, Nevada, Nevada Department of Conservation and Natural Resources, Division of Water, Water Resources Bulletin no. 43, 95 p.
- Sargent, K. A., and Bedinger, M. S., 1984, Geologic and hydrologic characterization and evaluation of the Basin and Range province relative to the disposal of high-level of radioactive waste--Part II, Geologic and hydrologic evaluation: U.S. Geological Survey Circular 904-B, [in press].
- Sinclair, W. C., 1962a, Ground-water resources of Desert Valley, Humboldt, and Pershing Counties, Nevada: Nevada Department of Conservation and Natural Resources, Ground-water Resources Reconnaissance Series Report, no. 7, 23 p.
- _____, 1962b, Ground-water resources of Hualapai Flat, Washoe, Pershing, and Humboldt Counties, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report, no. 11, 16 p.
- _____, 1962c, Ground-water resources of Pine Forest Valley, Humboldt County, Nevada: Nevada Department of Conservation and Natural Resources, Reconnaissance Series Report, no. 4, 23 p.
- Van Denburgh, A. S., Lamke, R. D., and Hughes, J. L., 1973, Brief water-resources appraisal of the Truckee River Basin, western Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 57, 122 p.
- Van Denburgh, A. S., and Rush, F. E., 1974, Water-resources of Railroad and Penouer Valleys, east-central Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 60, 61 p.
- Walker, G. E., and Eakin, T. E., 1963, Geology and ground water of the Amargosa Desert, Nevada-California: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 14, 57 p.
- Welch, A., Sorey, M. L., and Olmsted, F. H., 1981, Hydrothermal system in southern Grass Valley, Pershing County, Nevada: U.S. Geological Survey Open-File Report 81-915, 193 p.

- Winograd, I. J., and Thordarson, William, 1975, Hydrogeologic and hydrochemical framework, south-central Great Basin, Nevada-California, with special reference to the Nevada Test Site: U.S. Geological Survey Professional Paper 712-C, 126 p.
- Worts, G. F., and Malmberg, G. T., 1966, Hydrologic appraisal of Eagle Valley, Ormsby County, Nevada: Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 39, 55 p.