

# REFERENCES

---

## Land Subsidence in the United States

### Introduction

- Ege, J.R., 1984, Mechanisms of surface subsidence resulting from solution extraction of salt, *in* Holzer, T.L., ed., Man-induced land subsidence: Geological Society of America Reviews in Engineering Geology, v. 6, p. 203–221.
- Lucas, R.E., 1982, Organic soils (Histosols)—Formation, distribution, physical and chemical properties and management for crop production: Michigan State University Farm Science Research Report 435, 77 p.
- National Research Council, 1991, Mitigating losses from land subsidence in the United States: Washington, D. C., National Academy Press, 58 p.
- Stephens, J.C., Allen, L.H., Jr., and Chen, Ellen, 1984, Organic soil subsidence, *in* Holzer, T.L., ed., Man-induced land subsidence: Geological Society of America Reviews in Engineering Geology, v. 6, p. 107–122.
- White, W.B., Culver, D.C., Herman, J.S., Kane, T.C., and Mylroie, J.E., 1995, Karst lands: *American Scientist*, v. 83, p. 450–459.

### PART I—Mining Ground Water

#### INTRODUCTION

- Clawges, R. M., and Price, C. V., 1999, Digital data sets describing principal aquifers, surficial geology, and ground-water regions of the conterminous United States: U.S. Geological Survey Open-File Report 99-77 [accessed Sept. 17, 1999 at URL <http://water.usgs.gov/pubs/ofr/ofr99-77>]. Freeze, R.A., and Cherry, J.A., 1979, *Groundwater*: Englewood Cliffs, N. J. Prentice-Hall, 604 p.
- Green, J.H., 1964, Compaction of the aquifer system and land subsidence in the Santa Clara Valley, California: U.S. Geological Survey Water-Supply Paper 1779-T, 11 p.
- Helm, D.C., 1975, One-dimensional simulation of aquifer system compaction near Pixley, Calif., part 1. Constant parameters: *Water Resources Research*, v. 11, p. 465–478.
- Heywood, C.E., 1997, Piezometric-extensometric estimations of specific storage in the Albuquerque Basin, New Mexico: *in* Prince, K.R., and Leake, S.A., eds., U.S. Geological Survey Open-File Report 97-47, p. 21–26.
- Holzer, T.L., 1998, History of the aquitard-drainage model in land subsidence case studies and current research, *in* Borchers, J.W., ed., Land subsidence case studies and current research: Proceedings of the Dr. Joseph F. Poland symposium on land subsidence, Association of Engineering Geologists Special Publication No. 8, p. 7–12.
- Ireland, R.L., Poland, J.F., and Riley, F.S., 1984, Land subsidence in the San Joaquin Valley, California as of 1980: U.S. Geological Survey Professional Paper 437-I, 93 p.
- Miller, R.E., 1961, Compaction of an aquifer system computed from consolidation tests and decline in artesian head: U.S. Geological Survey Professional Paper 424-B, p. B54–B58.
- Poland, J.F., 1960, Land subsidence in the San Joaquin Valley and its effect on estimates of ground-water resources: International Association of Scientific Hydrology, IASH Publication 52, p. 324–335.

- Poland, J.F., and Green, J.H., 1962, Subsidence in the Santa Clara Valley, California—a progress report: U.S. Geological Survey Water-Supply Paper 1619-C, 16 p.
- Poland, J.F., Lofgren, B.E., Ireland, R.L., and Pugh, R.G., 1975, Land subsidence in the San Joaquin Valley, California as of 1972: U.S. Geological Survey Professional Paper 437-H, 78 p.
- Poland, J.F., ed., 1984, Guidebook to studies of land subsidence due to ground-water withdrawal: United Nations Educational, Scientific and Cultural Organization, Paris, Studies and reports in hydrology 40, 305 p.
- Poland, J.F., and Ireland, R.L., 1988, Land subsidence in the Santa Clara Valley, California, as of 1982: U.S. Geological Survey Professional Paper 497-F, 61 p.
- Riley, F.S., 1969, Analysis of borehole extensometer data from central California: International Association of Scientific Hydrology Publication 89, p. 423–431.
- Riley, F.S., 1998, Mechanics of aquifer systems—The scientific legacy of Joseph F. Poland, in Borchers, J.W., ed., Land subsidence case studies and current research: Proceedings of the Dr. Joseph F. Poland symposium on land subsidence, Association of Engineering Geologists Special Publication No. 8, p. 13–27.
- Terzaghi, K., 1925, Principles of soil mechanics, IV—Settlement and consolidation of clay: Engineering News-Record, 95(3), p. 874–878.
- Tolman, C.F., and Poland, J.F., 1940, Ground-water infiltration, and ground-surface recession in Santa Clara Valley, Santa Clara County, California: Transactions American Geophysical Union, v. 21, p. 23–34.

#### SANTA CLARA VALLEY, CALIFORNIA

- California History Center, 1981, Water in the Santa Clara Valley—A history: De Anza College California History Center Local History Studies v. 27, 155 p.
- Fowler, L.C., 1981, Economic consequences of land surface subsidence: Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, v. 107, p. 151–159.
- Poland, J.F., 1977, Land subsidence stopped by artesian head recovery, Santa Clara Valley, California: International Association of Hydrological Sciences Publication 121, p. 124–132.
- Poland, J.F., and Ireland, R.L., 1988, Land subsidence in the Santa Clara Valley, California, as of 1982: U.S. Geological Survey Professional Paper 497-F, 61 p.
- Reichard, E.G., and Bredehoeft, J.D., 1984, An engineering economic analysis of a program for artificial groundwater recharge: Water Resources Bulletin, v. 20, p. 929–939.
- Tolman, C.F., and Poland, J.F. 1940, Ground-water infiltration, and ground-surface recession in Santa Clara Valley, Santa Clara County, California: Transactions American Geophysical Union, v. 21, p. 23–34.

#### SAN JOAQUIN VALLEY, CALIFORNIA

- Cone, Tracy, 1997, The vanishing valley: San Jose Mercury News West Magazine, June 29, p. 9–15.
- EDAW-ESA, 1978, Environmental and economic effects of subsidence: Lawrence Berkeley Laboratory Geothermal Subsidence Research Program Final Report—Category IV, Project 1, [variously paged].
- Ingerson, I. M., 1941, The hydrology of the southern San Joaquin Valley, California, and its relation to imported water supplies: Transactions American Geophysical Union, v. 22, p. 20–45.
- Ireland, R.L., Poland, J.F., and Riley, F.S., 1984, Land subsidence in the San Joaquin Valley, California as of 1980: U.S. Geological Survey Professional Paper 437-I, 93 p.
- Manning, J.C., 1967, Report on the ground-water hydrology in the southern San Joaquin Valley: American Water Works Association Journal, v. 59, p. 1,513–1,526.
- Mendenhall, W.C., Dole, R.B., and Stabler, Herman, 1916, Ground water in San Joaquin Valley, California: U.S. Geological Survey Water-Supply Paper 398, 310 p.
- Nady, Paul, and Larragueta, L.L., 1983, Development of irrigation in the Central Valley of California: U.S. Geological Survey Hydrologic Investigations Atlas HA-649, scale 1:500,000, 2 sheets.
- Poland, J.F., Lofgren, B.E., Ireland, R.L., and Pugh, R.G., 1975, Land subsidence in the San Joaquin Valley, California, as of 1972: U.S. Geological Survey Professional Paper 437-H, 78 p.

Swanson, A.A., 1998, Land subsidence in the San Joaquin Valley, updated to 1995, *in* Borchers, J.W., ed., Land subsidence case studies and current research: Proceedings of the Dr. Joseph F. Poland symposium on land subsidence, Association of Engineering Geologists Special Publication No. 8, p. 75–79.

Williamson, A.K., Prudic, D.E., and Swain, L.A., 1989, Ground-water flow in the Central Valley, California: U.S. Geological Survey Professional Paper 1401-D, 127 p.

## HOUSTON-GALVESTON, TEXAS

Gabrysch, R.K., 1983, The impact of land-surface subsidence, *in* Impact of Science on Society, Managing our fresh-water resources: United Nations Educational, Scientific and Cultural Organization No. 1, p. 117–123.

Galveston Bay National Estuary Program, 1995, The Galveston Bay plan—The comprehensive land management plan for the Galveston Bay ecosystem, Oct. 18, 1994: Galveston Bay National Estuary Program Publication GBNEP-49, 457 p.

Holzer, T.L., 1984, Ground failure induced by ground water withdrawal from unconsolidated sediment, *in* Holzer, T.L., ed., Man-induced land subsidence: Geological Society of America Reviews in Economic Geology, v. 6, p. 67–105.

Holzer, T.L., and Gabrysch, R.K., 1987, Effect of water-level recoveries on fault creep, Houston, Texas: Ground Water, v. 25, p. 392–397.

Holzschuh, J.C., 1991, Land subsidence in Houston, Texas U.S.A.: Field-trip guidebook for the fourth international symposium on land subsidence, May 12–17, 1991, Houston, Tex., 22 p.

Kasmarek, M.C., Coplin, L.S., and Santos, H.X., 1997, Water-level altitudes 1997, water-level changes 1977–97 and 1996–97, and compaction 1973–96 in the Chicot and Evangeline Aquifers, Houston-Galveston Region, Texas: U.S. Geological Survey Open-File Report 97-181, 8 sheets, scale 1:100,000.

McGowen, J.M., Garner, L.E., and Wilkinson, B.M., 1977, The Gulf shoreline of Texas—processes, characteristics, and factors in use: University of Texas, Bureau of Economic Geology, Geological Circular 75-6, 43 p.

Jones, L.L., 1976, External costs of surface subsidence— Upper Galveston Bay, Texas: International Symposium on Land Subsidence, 2nd, Anaheim, Calif., December 1976, [Proceedings] International Association of Hydrological Sciences Publication 121, p. 617–627.

Paine, J.G., 1993, Subsidence of the Texas coast—Inferences from historical and late Pleistocene sea levels: Tectonophysics, v. 222, p. 445–458.

Paine, J.G., and Morton, R.A., 1986, Historical shoreline changes in Trinity, Galveston, West, and East Bays, Texas Gulf Coast: University of Texas Bureau of Economic Geology Circular 86-3, 58 p.

Pratt, W.E., and Johnson, D.W., 1926, Local subsidence of the Goose Creek oil field: Journal of Geology, v. 34, p. 577–590.

Titus, J.G., and Narayanan, V.K., 1995, The probability of sea level rise: U.S. Environmental Protection Agency, EPA 230-R-95-008.

White, W.A., Tremblay, T.A., Wermund, E.G., Jr., and Handley, L.R., 1993, Trends and status of wetland and aquatic habitats in the Galveston Bay system, Texas: Galveston Bay National Estuary Program Publication GBNEP-31, 225 p.

## LAS VEGAS, NEVADA

Acevedo, William, Gaydos, Leonard, Tilley, Janet, Mladinich, Carol, Buchanan, Janis, Blauer, Steve, Kruger, Kelley, and Schubert, Jamie, 1997, Urban land use change in the Las Vegas Valley: U.S. Geological Survey, accessed July 27, 1999, [http://geochange.er.usgs.gov/sw/changes/anthropogenic/population/las\\_vegas](http://geochange.er.usgs.gov/sw/changes/anthropogenic/population/las_vegas).

Bell, J.W., 1981a, Subsidence in Las Vegas Valley: Nevada Bureau of Mines and Geology Bulletin 95, 83 p., 1 plate, scale 1:62,500.

Bell, J.W., 1981b, Results of leveling across fault scarps in Las Vegas Valley, Nevada, April 1978–June 1981: Nevada Bureau of Mines and Geology Open-File Report 81-5, 7 p.

Bell, J.W., and Helm, D.C., 1998, Ground cracks on Quaternary faults in Nevada—Hydraulic and tectonic, *in* Borchers, J.W., ed., Land subsidence case studies and current research: Proceedings of the Dr. Joseph F. Poland symposium on land subsidence, Association of Engineering Geologists Special Publication No. 8, p. 165–173.

Bell, J.W., and Price, J.G., 1991, Subsidence in Las Vegas Valley, 1980–91—Final project report: Nevada Bureau of Mines and Geology, Open-File Report 93-4, 10 sect., 9 plates, scale 1:62,500.

- Bernholtz, A., Brothers, K., and Katzer, T., 1994, Artificial ground-water recharge in Las Vegas Valley, Clark County, Nevada— Storing today, treating tomorrow?: International Symposium on Artificial Recharge of Ground Water, 2nd, Orlando, Fla., July 1994, [Proceedings], p. 548–557.
- Burbey, T.J., 1995, Pumpage and water-level change in the principal aquifer of Las Vegas Valley, 1980–90—Nevada Division of Water Resources Information Report 34, 224 p.
- Carpenter, Everett, 1915, Ground water in southeastern Nevada: U.S. Geological Survey Water-Supply Paper 365, 86 p.
- Coache, Robert, 1996, Las Vegas Valley water usage report, Clark County, Nevada, 1996: Nevada Division of Water Resources Report, [50+] p.
- Dettinger, M.D., 1989, Reconnaissance estimates of natural recharge to desert basins in Nevada, U.S.A., by using chloride balance calculations: *Journal of Hydrology*, v. 106, p. 55–78.
- Domenico, P.A., Stephenson, D.A., and Maxey, G.B., 1964, Ground water in Las Vegas Valley: Nevada Department of Conservation and Natural Resources Division of Water Resources Bulletin 29, 53 p.
- Hafen, L.R., and Hafen, A.W., 1954, Old Spanish Trail, Santa Fe to Los Angeles—With extracts from contemporary records and including diaries of Antonio Armijo and Orville Pratt: University of Nebraska Press, 375 p.
- Harrill, James R., 1976, Pumping and ground-water storage depletion in Las Vegas Valley, Nevada, 1955–74: Nevada Department of Conservation and Natural Resources, Division of Water Resources Bulletin No. 44, 70 p.
- Holzer, T.L., 1979, Leveling data—Eglington fault scarp, Las Vegas Valley, Nevada: U.S. Geological Survey Open-File Report 79-950, 7 p.
- 1984, Ground failure induced by ground-water withdrawal from unconsolidated sediment, in Holzer, T.L., ed., *Man-induced land subsidence: Geological Society of America Reviews in Engineering Geology*, v. 6, 221 p.
- Houghton, J. G., Sakamoto, C. M., and Gifford, R.O., 1975, Nevada's weather and climate: Nevada Bureau of Mines and Geology Special Publication 2, 78 p.
- Jones, F. L., and Cahlan, J. F. 1975, *Water, a history of Las Vegas—Volume I: Las Vegas Valley Water District*, 171 p.
- Livingston, Penn., 1941, Underground leakage from artesian wells in the Las Vegas area, Nevada: U.S. Geological Survey Water-Supply Paper 849-D, p. 147–173.
- Malmberg, G. T., 1965, Available water supply of the Las Vegas ground-water basin, Nevada: U.S. Geological Survey Water-Supply Paper 1780, 116 p., 13 plates.
- Maxey, G.B., and Jameson, C.H., 1948, Geology and water resources of Las Vegas, Pahrump, and Indian Springs Valleys, Clark and Nye Counties, Nevada: Nevada State Engineer Water Resources Bulletin 5, 121 p.
- Mendenhall, W.C., 1909, Some desert watering places in southeastern California and southwestern Nevada: U.S. Geological Survey Water-Supply Paper 224, 98 p.
- Mifflin, M.D., and Wheat, M.M., 1979, Pluvial lakes and estimated pluvial climates of Nevada: Nevada Bureau of Mines and Geology Bulletin 94, 57 p., 1 plate.
- Mindling, A.L., 1971, A summary of data relating to land subsidence in Las Vegas Valley: Center for Water Resources Research, Desert Research Institute, University of Nevada, Reno; 55 p.
- Morgan, D.S., and Dettinger, M.D., 1996, Ground-water conditions in Las Vegas Valley, Clark County, Nevada, part 2, Hydrogeology and simulation of ground-water flow: U.S. Geological Survey Water-Supply Paper 2320-B, 124 p., 2 plates.
- Nevada Department of Conservation and Natural Resources, Division of Water Resources and Water Planning, 1992, Hydrographic basin summaries, 1990–1992, [variously paged].
- Plume, R. W., 1989, Ground-water conditions in Las Vegas Valley, Clark County, Nevada, part I, Hydrogeologic framework: U.S. Geological Survey Water-Supply Paper 2320-A, 15 p.
- Quade, J., Mifflin, M.D., Pratt, W.L., McCoy, W., and Burckle, L., 1995, Fossil spring deposits in the southern Great Basin and their implications for change in water-table levels near Yucca Mountain, Nevada, during Quaternary time: *Geological Society of America Bulletin*, v. 107, p. 213–230.
- Riley, F.S., 1969, Analysis of borehole extensometer data from central California: *International Association of Scientific Hydrology Publication* 89, p. 423–431.
- U.S. Department of Commerce, 1997, Las Vegas metro area leads nation in population growth, census bureau reports: Bureau of the Census, accessed July 27, 1999, at URL <http://www.census.gov/ftp/pub/Press-Release/cb97-212.html>

Water Resources Management Incorporated, 1992, WRMI process—Water supply planning for the Las Vegas region, Columbia, Md., [25+] p.

## SOUTH-CENTRAL ARIZONA

- Anderson, S.R., 1988, Potential for aquifer compaction, land subsidence, and earth fissures in the Tucson Basin, Pima County, Arizona: U.S. Geological Survey Hydrologic Investigations Atlas 713, 3 sheets, scale 1:250,000.
- Anderson, S.R., 1989, Potential for aquifer compaction, land subsidence, and earth fissures in Avra Valley, Pima and Pinal Counties, Arizona: U.S. Geological Survey Hydrologic Investigations Atlas 718, 3 sheets, scale 1:250,000.
- Anderson, T.W., Freethy, G.W., and Tucci, P., 1992, Geohydrology and water resources of alluvial basins in south-central Arizona and parts of adjacent states: U.S. Geological Survey Professional Paper 1406-B, 67 p., 3 plates, scale 1:1,000,000.
- Anning, D.W., and Duet, N.R., 1994, Summary of ground-water conditions in Arizona, 1987–90: U.S. Geological Survey Open-File Report 94-476, 2 sheets.
- Arizona Department of Water Resources, 1999, Arizona water information, statewide overview, supply and demand (1994): accessed July 27, 1999 at URL <http://www.adwr.state.az.us/AZWaterInfo/statewide/supplyde.html>.
- Carpenter, M.C., 1993, Earth-fissure movements associated with fluctuations in ground-water levels near the Picacho Mountains, south-central Arizona, 1980–84: U.S. Geological Survey Professional Paper 497-H, 49 p.
- Carpenter, M.C., and Bradley, M.D., 1986, Legal perspectives on subsidence caused by ground-water withdrawal in Texas, California, and Arizona, U.S.A.: International Symposium on Land Subsidence, 3rd, Venice, 1984, [Proceedings, Johnson, A.I., Carbognin Laura, and Ubertini, L., eds.], International Association of Scientific Hydrology Publication 151, p. 817–828.
- City of Tucson Water Department, 1995, Annual static water level basic data report, Tucson Basin and Avra Valley, Pima County, Arizona, 1995: City of Tucson Water Planning and Engineering Division, 140 p.
- Eaton, G.P., Peterson, D.L., and Schumann, H.H., 1972, Geophysical, geohydrological, and geochemical reconnaissance of the Luke salt body, Central Arizona: U.S. Geological Survey Professional Paper 753, 28 p.
- Feth, J.H., 1951, Structural reconnaissance of the Red Rock quadrangle, Arizona: U.S. Geological Survey Open-File Report, 30 p.
- Holzer, T.L., 1980, Reconnaissance maps of earth fissures and land subsidence, Bowie and Willcox areas, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-1156, 2 sheets, scale 1:24,000.
- Holzer, T.L., 1984, Ground failure induced by ground-water withdrawal from unconsolidated sediment, in Holzer, T.L., ed., Man-induced land subsidence: Geological Society of America Reviews in Engineering Geology, v. 6, p. 67–105.
- Holzer, T.L., Davis, S.N., and Lofgren, B.E., 1979, Faulting caused by groundwater extraction in south-central Arizona: Journal of Geophysical Research, v. 84, p. 603–612.
- Johnson, N.M., 1980, The relation between ephemeral stream regime and earth fissuring in south-central Arizona: Tucson, Ariz., University of Arizona, M.S. thesis, 158 p.
- Laney, R.L., Raymond, R.H., and Winikka, C.C., 1978, Maps showing water-level declines, land subsidence, and earth fissures in south-central Arizona: U.S. Geological Survey Water-Resources Investigations Report 78-83, 2 sheets, scale 1:125,000.
- Leonard, R.J., 1929, An earth fissure in southern Arizona: Journal of Geology, v. 37, p. 765–774.
- Peterson, D.E., 1962, Earth fissuring in the Picacho area, Pinal County, Arizona: Tucson, Ariz., University of Arizona, M.S. thesis, 35 p.
- Robinson, G.M., and Peterson, D.E., 1962, Notes on earth fissures in southern Arizona: U.S. Geological Survey Circular 466, 7 p.
- Schumann, H.H., 1995, Land subsidence and earth fissure hazards near Luke Air Force Base, Arizona: in Prince, K.R., Gallo-way, D.L., and Leake, S.A., eds., U.S. Geological Survey subsidence interest group conference, Edwards Air Force Base, Antelope Valley, California, November 18–19, 1992—abstracts and summary: U.S. Geological Open-File Report 94-532, p. 18–21.
- Schumann, H.H., and Cripe, L.S., 1986, Land subsidence and earth fissures caused by groundwater depletion in southern Arizona, U.S.A.: International Symposium on Land Subsidence, 3rd, Venice, 1984, [Proceedings, Johnson, A.I., Carbognin Laura, and Ubertini, L., eds.], International Association of Scientific Hydrology Publication 151, p. 841–851.
- Schumann, H.H., and Genauldi, R.B., 1986, Land subsidence, earth fissures, and water-level change in southern Arizona: Arizona Bureau of Geology and Mineral Technology Geological Survey Branch Map 23, 1 sheet, scale 1:1,000,000.
- Schumann, H.H., and Poland, J.F., [1969–1970], Land subsidence, earth fissures, and groundwater withdrawal in south-central Arizona, U.S.A.: International Association of Scientific Hydrology Publication 88, p. 295–302.

Strange, W.E., 1983, Subsidence monitoring for the State of Arizona: National Oceanic and Atmospheric Administration National Geodetic Information Center, Rockville, Md., 80 p.

## PART II—Drainage of Organic Soils

### INTRODUCTION

Darby, H.C., 1956, *The Draining of the Fens* (2nd ed.): Oxford, Cambridge University Press, 314 p.

Lucas, R.E., 1982, Organic soils (Histosols)—Formation, distribution, physical and chemical properties and management for crop production: Michigan State University Farm Science Research Report 435, 77 p.

Nieuwenhuis, H.S., and Schokking, F., 1997, Land subsidence in drained peat areas of the Province of Friesland, The Netherlands: *Quarterly Journal of Engineering Geology*, v. 30, p. 37–48.

Schothorst, C.J., 1977, Subsidence of low moor peat soils in the western Netherlands: *Geoderma*, v. 17, p. 265–291.

Stephens, J.C., Allen, L.H., Jr., and Chen, Ellen, 1984, Organic soil subsidence *in* Holzer, T.L., ed., *Man-induced land subsidence: Geological Society of America Reviews in Engineering Geology*, v. 6, p. 107–122.

Waksman, S.A., and Purvis, E.R., 1932, The influence of moisture upon the rapidity of decomposition of lowmoor peat: *Soil Science*, v. 34, p. 323–336.

Waksman, S.A., and Stevens, K.R., 1929, Contribution to the chemical composition of peat, part 5. The role of microorganisms in peat formation and decomposition: *Soil Science*, v. 28, p. 315–340.

Wosten, J.H.M., Ismail, A.B., and van Wijk, A.L.M., 1997, Peat subsidence and its practical implications: A case study in Malaysia: *Geoderma*, v. 78, p. 25–36.

### SACRAMENTO-SAN JOAQUIN DELTA, CALIFORNIA

Atwater, B.F., 1980, Attempts to correlate Late Quaternary climatic records between the San Francisco Bay, the Sacramento-San Joaquin Delta, and the Mokelumne River, California: Dover, Del., University of Delaware, Ph.D. dissertation, 215 p.

California Department of Water Resources, 1993, *Sacramento-San Joaquin Delta atlas*: Sacramento, State of California Department of Water Resources, 121 p.

California Department of Water Resources, 1995, *Delta levees*: Sacramento, State of California Department of Water Resources, 19 p.

Delta Protection Commission, 1995, *Land use and resource management plan for the primary zone of the Delta*: Walnut Grove, Delta Protection Commission, 60 p.

Deverel, S.J., and Rojstaczer, S.A., 1996, Subsidence of agricultural lands in the Sacramento-San Joaquin Delta, California: Role of aqueous and gaseous carbon fluxes: *Water Resources Research*, v. 32, p. 2,359-2,367.

Dillon, Richard, 1982, *Delta Country*: Novato, Calif., Presidio Press, 134 p.

Rojstaczer, S.A., and Deverel, S.J., 1993, Time dependence of atmospheric carbon inputs from drainage of organic soils: *Geophysical Research Letters*, v. 20, p. 1,383–1,386.

Rojstaczer, S.A., Hamon, R.E., Deverel, S.J., and Massey, C.A., 1991, Evaluation of selected data to assess the causes of subsidence in the Sacramento-San Joaquin Delta, California: U.S. Geological Survey Open-File Report 91-193, 16 p.

Tans, P.P., Fung, I.Y., and Takahashi, Y., 1990, Observational constraints on the global atmospheric CO<sub>2</sub> budget: *Science*, v. 247, p. 1,431–1,438.

Thompson, John, 1957, *The settlement geography of the Sacramento-San Joaquin Delta, California*: Palo Alto, Calif., Stanford University, Ph.D. dissertation, 551 p.

Weir, W.W., 1950, Subsidence of peat lands of the Sacramento-San Joaquin Delta, California: *Hilgardia*, v. 20, p. 37–55.

### FLORIDA EVERGLADES

Allison, R.V., 1956, The influence of drainage and cultivation on subsidence of organic soils under conditions of Everglades reclamation: *Soil and Crop Science Society of Florida Proceedings*, v. 16, p. 21–31.

Bodle, M.J., Ferriter, A.P., and Thayer, D.D., 1994, The biology, distribution, and ecological consequences of *Melaleuca quinquenervia* in the Everglades, *in* Davis, S.M., and Ogden, J.C., *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, p. 341–355.

- Craft, C.B., and Richardson, C.J., 1993a, Peat accretion and N, P, and organic C accumulation in nutrient-enriched and unenriched Everglades peatlands: *Ecological Applications*, v. 3, p. 446–458.
- Craft, C.B., and Richardson, C.J., 1993b, Peat accretion and phosphorus accumulation along a eutrophication gradient in the northern Everglades: *Biogeochemistry*, v. 22, p. 133–156.
- Davis, J.R., Jr., 1946, The peat deposits of Florida: *Florida Geological Survey Bulletin* 30, 247 p.
- Davis, S.M., and Ogden, J.C., eds., 1994, *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, 826 p.
- Deren, C.W., Snyder, G.H., Miller, J.D., and Porter, P.S., 1991, Screening for heritability of flood-tolerance in the Florida (CP) sugarcane breeding population: *Euphytica*, v. 56, p. 155–160.
- Douglas, M.S., 1947, *The Everglades—River of grass*: St. Simons Island, Fla., Mockingbird Press, 308 p.
- Gascho, G.J., and Shih, S.F., 1979, Varietal response of sugarcane to water table depth, part 1. Lysimeter performance and plant response: *Soil and Crop Society of Florida Proceedings*, v. 38, p. 23–27.
- Glaz, Barry, 1995, Research seeking agricultural and ecological benefits in the Everglades: *Journal of Soil and Water Conservation*, v. 50, p. 609–612.
- Johnson, Lamar, 1974, *Beyond the fourth generation*: Gainesville, Fla., The University Presses of Florida, 230 p.
- Jones, L.A., Allison, R.V., and others, 1948, *Soils, geology, and water control in the Everglades region*: University of Florida Agricultural Experiment Station Bulletin 442, 168 p., 4 maps.
- Kang, M.S., Snyder, G.H., and Miller, J.D., 1986, Evaluation of *Saccharum* and related germplasm for tolerance to high water table on organic soil: *Journal of the American Society of Sugar Cane Technologists*, v. 6, p. 59–63.
- Light, S.S., and Dineen, J.W., 1994, Water control in the Everglades: A historical perspective, in Davis, S.M., and Ogden, J.C., *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, p. 47–84.
- Lucas, R.E., 1982, *Organic soils (Histosols)—Formation, distribution, physical and chemical properties and management for crop production*: Michigan State University Farm Science Research Report 435, 77 p.
- Matson, G.C., and Sanford, Samuel, 1913, *Geology and ground water of Florida*: U.S. Geological Survey Water-Supply Paper 319, 445 p.
- McIvor, C.C., Ley, J.A., and Bjork, R.D., 1994, Changes in freshwater inflow from the Everglades to Florida Bay including effects on biota and biotic processes: A review, in Davis, S.M., and Ogden, J.C., *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, p. 117–146.
- Ogden, J.C., 1994, A comparison of wading bird nesting colony dynamics (1931–1946 and 1974–1989) as an indication of ecosystem conditions in the southern Everglades, in Davis, S.M., and Ogden, J.C., *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, p. 533–570.
- Porter, G.S., Snyder, G.H., and Deren, C.W., 1991, Flood-tolerant crops for low input sustainable agriculture in the Everglades agricultural area: *Journal of Sustainable Agriculture*, v. 2, p. 77–101.
- Ray, J.D., Miller, J.D., and Sinclair, T.R., 1996, Survey of aerenchyma in sugarcane roots (abs.): Fifth Symposium of the International Society of Root Research, July 14–18, 1996, Clemson, S. C., p. 118.
- Shih, S.F., Glaz, Barry, and Barnes, R.E., Jr., 1997, Subsidence lines revisited in the Everglades agricultural area, 1997: University of Florida Agricultural Experiment Station Bulletin 902, 38 p.
- Shih, S.F., Stewart, E.H., Allen, L.H., Jr., and Hilliard, J.E., 1979, Variability of depth to bedrock in Everglades organic soil: *Soil and Crop Society of Florida Proceedings*, v. 38, p. 66–71.
- Smith, G., 1990, The Everglades agricultural area revisited: *Citrus and Vegetable Magazine*, v. 53, no. 9, p. 40–42.
- Smith, T.S., and Bass, O.L., Jr., 1994, Landscape, white-tailed deer, and the distribution of Florida panthers in the Everglades, in Davis, S.M., and Ogden, J.C., *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, p. 693–708.
- Snyder, G.H., and Davidson, J.M., 1994, Everglades agriculture: Past, present, and future, in Davis, S.M., and Ogden, J.C., *The Everglades—The ecosystem and its restoration*: Delray Beach, Fla., St. Lucie Press, p. 85–115.
- Stephens, J.C., Allen, L.H., Jr., and Chen, Ellen, 1984, Organic soil subsidence, in Holzer, T.L., ed., *Man-induced land subsidence*: Geological Society of America Reviews in Engineering Geology, v. 6, p. 107–122.

Stephens, J.C., and Johnson, Lamar, 1951, Subsidence of organic soils in the upper Everglades region of Florida: Soil Science Society of Florida Proceedings, v. 11, p. 191–237.

## PART III—Collapsing Cavities

### INTRODUCTION

Ege, J.R. 1984, Mechanisms of surface subsidence resulting from solution extraction of salt, *in* Holzer, T.L. ed., Man-induced land subsidence: Geological Society of America Reviews in Engineering Geology, v. 6, p. 203–221.

Martinez, J.D., Johnson, K.S., and Neal, J.T., 1998, Sinkholes in evaporite rocks: American Scientist, v. 86, p. 38–51.

White, W.B., Culver, D.C., Herman, J.S., Kane, T.C., and Mylroie, J.E., 1995, Karst lands: American Scientist, v. 83, p. 450–459.

### THE RETSOF SALT MINE COLLAPSE, NEW YORK

Alpha Geoscience, 1996, Geologic and hydrogeologic investigation of the Genesee River Valley, prepared for AKZO Nobel Salt Inc., Clarks Summit, Pa.; Albany, N. Y., Alpha Geoscience Project no. 95132, 31 p., 10 app., 4 plates.

Dunn Corporation, 1992, Hydrogeologic report for the AKZO ash processing plant: Report to Akzo Nobel Salt, Inc., Clarks Summit, Pa., 35 p.

Moran, R.P., Scovazzo, V.A., and Streib, D.L., 1995, Impact analysis—Retsof Mine, Akzo Nobel Salt, Inc.: Report 2455, prepared for the New York State Department of Conservation, J.T. Boyd Co., Inc., 54 p.

Nittany Geoscience, 1995, Groundwater recharge calculations for the Retsof Mine: May 12, 1995, Letter Report, 6 p.

NYSDEC (New York State Department of Environmental Conservation), 1997, Collapse and flooding of Akzo Nobel's Retsof salt mine, Livingston Co., N. Y.: Feb. 1997 Draft report of the Department Task Force, Feb. 1997, 114 p.

Riley, F.S., 1969, Analysis of borehole extensometer data from central California, International Association Of Scientific Hydrology Publication 89, p. 423–431.

Shannon and Wilson, Inc., 1997, Task 3, final report—Retsof Mine collapse, Technical Assistance Grant Committee, Retsof, New York: Seattle, Wash., Shannon and Wilson Inc., 15 p.

Van Sambeek, L.L., 1994, Predicted ground settlement over the Akzo Nobel Retsof Mine, prepared for Akzo Nobel Salt Inc., Clarks Summit, Pa., Project RSI-0525: Rapid City, S. Dak., RE/SPEC Inc., [27+] p.

Van Sambeek, L.L., 1996, Dissolution-induced mine subsidence at the Retsof Salt Mine: Meeting Paper, Solution Mining Research Institute, October 20–23, 1996, Cleveland, Ohio, p. 289–309.

Young, R.A., 1975, The effects of a Late Wisconsin glacial readvance on the postglacial geology of the Genesee Valley, Livingston County, N. Y. [abs.]: Geological Society of America Abstracts with Programs, v. 7, p. 135–136.

### SINKHOLES, WEST-CENTRAL FLORIDA

Atkinson, T., 1977, Diffuse flow and conduit flow in limestone terrain in the Mendip Hills, Somerset (Great Britain): Journal of Hydrology, v. 35, p. 93–110.

Bengtsson, T.O., 1987, The hydrologic effects from intense ground-water pumpage in east-central Hillsborough County, Florida, *in* Beck, B.F. and Wilson, W.L. eds, Karst hydrogeology: engineering and environmental applications: proceedings of a conference sponsored by the Florida Sinkhole Research Institute, February 9–11, 1987, College of Engineering, University of Central Florida, Orlando: Boston, Mass., A.A. Balkema, p. 109–114.

Brooks, H.K., 1981, Guide to the physiographic divisions of Florida: Gainesville, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, 11 p., 1 plate.

Brucker, R.W., Hess, J.W., and White, W.B., 1972, Role of vertical shafts in the movement of ground water in carbonate aquifers: Ground Water, v. 10, p. 5–13.

Culshaw, M.G., and Waltham, A.C., 1987, Natural and artificial cavities as ground engineering hazards: Quarterly Journal of Engineering Geology, v. 20. p. 139–150.

Ford, D., and Williams, P., 1989, Karst Geomorphology and Hydrology: Boston, Mass., Unwin Hyman, 601 p.

Lattman, L.H., and Parizek, R.R., 1964, Relationship between fracture traces and the occurrence of ground water in carbonate rocks: Journal of Hydrology, v. 2, p. 73–91.



- Lewelling, B. R., Tihansky, A. B., and Kindinger, J. L., 1998, Assessment of the hydraulic connection between ground water and the Peace River, west-central Florida: U. S. Geological Survey Water-Resources Investigation Report 97-4211, 96 p.
- Littlefield, J.R., Culbreth, M.A., Upchurch, S.B., and Stewart, M.T., 1984, Relationship of modern sinkhole development to large-scale photolinear features: Multidisciplinary Conference on Sinkholes, 1st, Orlando, Fla., October 15–17, [Proceedings, Beck, B.F., ed., Sinkholes—Their geology, engineering and environmental impact: Boston, Mass., A.A. Balkema], p. 189–195.
- Metcalf, S.J., and Hall, L.E., 1984, Sinkhole collapse due to groundwater pumpage for freeze protection irrigation near Dover, Florida, January, 1977: Multidisciplinary Conference on Sinkholes, 1st, Orlando, Florida, October 15–17, [Proceedings, Beck, B.F., ed., Sinkholes—Their geology, engineering and environmental impact: Boston, Mass., A.A. Balkema], p. 29–33.
- Mularoni, R. A., 1993, Potentiometric surface of the Upper Floridan Aquifer, west-central Florida, September 1992: U. S. Geological Survey Open-File Report 93-49, 1 plate.
- Newton, J.G., 1986, Development of sinkholes resulting from man's activities in the eastern United States: U.S. Geological Survey Circular 968, 54 p.
- Quinlan, J.F., Davies, G.J., and Worthington, S.R., 1993, Review of groundwater quality monitoring network design: Journal of Hydraulic Engineering, v. 119, p. 1,436–1,441. [Discussion, with reply, p. 1,141–1,142]
- Ryder, P.D., 1985, Hydrology of the Floridan aquifer system in west-central Florida: U.S. Geological Survey Professional Paper 1403-F, 63 p., 1 plate.
- Sinclair, W.C., 1982, Sinkhole development resulting from ground-water development in the Tampa area, Florida: U.S. Geological Survey Water-Resources Investigations Report 81-50, 19 p.
- Sinclair, W.C., and Stewart, J.W., 1985, Sinkhole type, development, and distribution in Florida: U.S. Geological Survey Map Series 110, 1 plate.
- Southeastern Geological Society, 1986, Hydrogeological Units of Florida: Florida Geological Survey Special Publication 28, 9 p.
- Sowers, G.F., 1984, Correction and protection in limestone terrane: Multidisciplinary Conference on Sinkholes, 1st, Orlando, Florida, October 15–17, [Proceedings, Beck, B.F., ed., Sinkholes—Their geology, engineering and environmental impact: Boston, Mass., A.A. Balkema], p. 373–378.
- Stewart, M., and Parker, J., 1992, Localization and seasonal variation of recharge in a covered karst aquifer system, Florida, USA: International Contributions to Hydrogeology, v. 13, Springer-Verlag, p. 443–460.
- Tihansky, A.B., and Trommer, J. T., 1994, Rapid ground-water movement and transport of nitrate within a karst aquifer system along the coast of west-central Florida [abs.]: Transactions American Geophysical Union, v. 75, April 19, 1994—Supplement, p. 156.
- Trommer, J.T., 1992, Effects of effluent spray irrigation and sludge disposal on ground water in a karst region, northwest Pinellas County, Florida: U.S. Geological Survey Water-Resources Investigations Report 91-4181, 32 p.
- Watts, W.A., 1980, The Late Quaternary vegetation history of the southeastern United States: Annual Review of Ecology and Systematics, v. 11, p. 387–409.
- Watts, W.A., and Stuiver, M., 1980, Late Wisconsin climate of northern Florida and the origin of species-rich deciduous forest: Science, v. 210, p. 325–327.
- Watts, W.A., and Hansen, B.C.S., 1988, Environments of Florida in the Late Wisconsinan and Holocene, *in* Purdy, B.A., ed., Wet site archeology: Caldwell, N.J., Telford West, p. 307–323.
- White, W.A., 1970, The geomorphology of the Florida peninsula: Florida Bureau of Geology Geological Bulletin 51, 164 p.
- Wilson, W.L., and Shock, E.J., 1996, New sinkhole data spreadsheet manual (v1.1): Winter Springs, Fla., Subsurface Evaluations, Inc., 31 p., 3 app., 1 disk.

## The Role of Science

- Amelung, F., Galloway, D.L., Bell, J.W., Zebker, H.A., and Lacznik, R.J., 1999, Sensing the ups and downs of Las Vegas—InSAR reveals structural control of land subsidence and aquifer-system deformation: Geology, v. 27, p. 483–486.
- Anderson S.R., 1988, Potential for aquifer compaction, land subsidence, and earth fissures in Tucson Basin, Pima County, Arizona: U.S. Geological Survey Hydrologic Investigations Atlas HA-713, 3 sheets, scale 1:250,000.
- Anderson, S.R., 1989, Potential for aquifer compaction, land subsidence, and earth fissures in Avra Valley, Pima and Pinal Counties, Arizona: U.S. Geological Survey Hydrologic Investigations Atlas HA-718, 3 sheets, scale 1:250,000.

- Bear, J., 1979, *Hydraulics of groundwater*: New York, McGraw-Hill, 569 p.
- Biot, M.A., 1941, General theory of three-dimensional consolidation: *Journal of Applied Physics*, v. 12, p. 155–164.
- Blomquist, W., 1992, *Dividing the waters—Governing groundwater in southern California*: San Francisco, Calif., ICS Press, 413 p.
- Carpenter, M.C., 1993, Earth-fissure movements associated with fluctuations in ground-water levels near the Picacho Mountains, south-central Arizona, 1980–84: U.S. Geological Survey Professional Paper 497-H, 49 p.
- Fielding, E.J., Blom, R.G., and Goldstein, R.M., 1998, Rapid subsidence over oil fields measured by SAR interferometry: *Geophysical Research Letters*, v. 27, p. 3,215–3,218.
- Gabriel, A.K., Goldstein, R.M., and Zebker, H.A., 1989, Mapping small elevation changes over large areas—Differential radar interferometry: *Journal of Geophysical Research*, v. 94, p. 9,183–9,191.
- Galloway, D.L., Hudnut, K.W., Ingebritsen, S.E., Phillips, S.P., Peltzer, G., Rogez, F., and Rosen, P.A., 1998, Detection of aquifer system compaction and land subsidence using interferometric synthetic aperture radar, Antelope Valley, Mojave Desert, California: *Water Resources Research*, v. 34, p. 2,573–2,585.
- Hanson, R.T., 1989, *Aquifer-system compaction, Tucson Basin and Avra Valley, Arizona*: U.S. Geological Survey Open-File Report 88-4172, 69 p.
- Hanson, R.T., Anderson, S.R., and Pool, D.R., 1990, *Simulation of ground-water flow and potential land subsidence, Avra Valley, Arizona*: U.S. Geological Survey Water-Resources Investigations Report 90-4178, 41 p.
- Hanson, R.T., and Benedict, J.F., 1994, *Simulation of ground-water flow and potential land subsidence, upper Santa Cruz Basin, Arizona*: U.S. Geological Survey Water-Resources Investigations Report 93-4196, 47 p.
- Helm, D.C., 1975, One-dimensional simulation of aquifer system compaction near Pixley, Calif., part 1. Constant parameters: *Water Resources Research*, v. 11, p. 465–478.
- Helm, D.C., 1978, Field verification of a one-dimensional mathematical model for transient compaction and expansion of a confined aquifer system: American Society of Civil Engineers Hydraulics Division Specialty Conference, 26th, University of Maryland, College Park, Md., August 9–11, 1978, p. 189–196.
- Heywood, C.E., 1995, Investigation of aquifer-system compaction in the Hueco basin, El Paso, Texas, USA: International Symposium on Land Subsidence, 5th, Delft, Netherlands, October 1995, International Association of Hydrological Sciences Publication 234, p. 35–45.
- Holzer, T.L., 1981, Preconsolidation stress of aquifer systems in areas of induced land subsidence: *Water Resources Research*, v. 17, p. 693–704.
- Ikehara, M.E., Galloway, D.L., Fielding, E., Bürgmann, R., Lewis, A.S., and Ahmadi, B., 1998, InSAR imagery reveals seasonal and longer-term land-surface elevation changes influenced by ground-water levels and fault alignment in Santa Clara Valley, California [abs.]: *EOS (supplement) Transactions, American Geophysical Union*, no. 45, November 10, 1998, p. F37.
- Ikehara, M.E., and Phillips, S.P., 1994, Determination of land subsidence related to ground-water level declines using global positioning system and leveling surveys in Antelope Valley, Los Angeles and Kern Counties, California, 1992: U.S. Geological Survey Water-Resources Investigations Report 94-4184, 101 p.
- Massonnet, D., Briole, P., and Arnaud, A., 1995, Deflation of Mount Etna monitored by spaceborne radar interferometry: *Nature*, v. 375, p. 567–570.
- Massonnet, D., and Feigl, K.L., 1998, Radar interferometry and its application to changes in the earth's surface: *Reviews of Geophysics*, v. 36, p. 441–500.
- Massonnet, D., Holzer, T., and Vadon, H., 1997, Land subsidence caused by the East Mesa geothermal field, California, observed using SAR interferometry: *Geophysical Research Letters*, v. 24, p. 901–904.
- Massonnet, D., Rossi, M., Carmona, C., Adragna, F., Peltzer, G., Feigl, K., and Rabaute, T., 1993, The displacement field of the Landers earthquake mapped by radar interferometry: *Nature*, v. 364, p. 138–142.
- National Research Council, 1991, *Mitigating losses from land subsidence in the United States*: Washington, D. C., National Academy Press, 58 p.
- Riley, F.S., 1969, Analysis of borehole extensometer data from central California, International Association of Scientific Hydrology Publication 89, p. 423–431.

- Riley, F.S., 1986, Developments in borehole extensometry: International Symposium on Land Subsidence, 3rd, Venice, 19–25 March 1984, [Proceedings, Johnson, I.A., Carborgnin, Laura, and Ubertini, L., eds.], International Association of Scientific Hydrology Publication 151, p. 169–186.
- Rosen, P.A., Hensley, S., Zebker, H.A., Webb, F.H., and Fielding, E., 1996, Surface deformation and coherence measurements of Kilauea volcano, Hawaii, from SIR-C radar interferometry: *Journal of Geophysical Research*, v. 101, p. 23,109–23,125.
- Tihansky, A.B., Arthur, J.D., and DeWitt, D.J., 1996, Sublake geologic structure from high-resolution seismic-reflection data from four sinkhole lakes in the Lake Wales Ridge, Central Florida: U.S. Geological Survey Open-File Report 96-224, 72 p.
- Terzaghi, K., 1925, Principles of soil mechanics, IV—Settlement and consolidation of clay: *Engineering News-Record*, v. 95, p. 874–878.
- Vadon, H., and Sigmundsson, F., 1997, 1992–1995 crustal deformation at Mid-Atlantic ridge, SW Iceland, mapped by radar interferometry: *Science*, v. 275, p. 193–197.
- Wicks, C., Jr., Thatcher, W., and Dzurisin, D., 1998, Migration of fluids beneath Yellowstone Caldera inferred from satellite radar interferometry: *Science*, v. 282, p. 458–462.
- Zebker, H.A., Rosen, P.A., Goldstein, M., Gabriel, A., and Werner, C.L., 1994, On the derivation of coseismic displacement fields, using differential radar interferometry—The Landers earthquake: *Journal of Geophysical Research*, v. 99, p. 19,617–19,634.
- Zilkoski, D.B., D'Onofrio, J.D., and Frakes, S.J., 1997, Guidelines for establishing GPS-derived ellipsoid heights (Standards: 2 cm and 5 cm), ver. 4–3: National Oceanic and Atmospheric Administration Technical Memorandum NOS NGS-58, [20+] p.

# UNITED STATES GEOLOGICAL SURVEY

## SELECTED PUBLICATIONS AND AVAILABILITY

### PUBLICATIONS

#### Books and other publications

**Professional Papers** report scientific data and interpretations of lasting scientific interest that cover all facets of USGS investigations and research.

Bulletins contain significant data and interpretations that are of lasting scientific interest but are generally more limited in scope or geographic coverage than Professional Papers.

**Water-Supply Papers** are comprehensive reports that present significant interpretive results of hydrologic investigations of wide interest to professional geologists, hydrologists, and engineers. The series covers investigations in all phases of hydrology, including hydrogeology, availability of water, quality of water, and use of water.

**Circulars** are reports of programmatic or scientific information of an ephemeral nature; many present important scientific information of wide popular interest. Circulars are distributed at no cost to the public.

**Fact Sheets** communicate a wide variety of timely information on USGS programs, projects, and research. They commonly address issues of public interest. Fact sheets generally are two or four pages long and are distributed at no cost to the public.

Reports in the **Digital Data Series (DDS)** distribute large amounts of data through digital media, including compact disc-read-only memory (CD-ROM). They are high-quality, interpretive publications designed as self-contained packages for viewing and interpreting data and typically contain data sets, software to view the data, and explanatory text.

**Water-Resources Investigations Reports** are papers of an interpretive nature made available to the public outside the formal USGS publications series. Copies are produced on request (unlike formal USGS publications) and are also available for public inspection at depositories indicated in USGS catalogs.

**Open-File Reports** can consist of basic data, preliminary reports, and a wide range of scientific documents of USGS investigations. Open-File Reports are designed for fast release and are available for public consultation at depositories.

#### Maps

**Geologic Quadrangle Maps (GQs)** are multicolor geologic maps on topographic bases in 7.5- or 15-minute quadrangle formats (scales mainly 1:24,000 or 1:62,500) showing bedrock, surficial, or engineering geology. Maps generally include brief texts; some maps include structure and columnar section only.

**Geophysical Investigations Maps (GPs)** are on topographic or planimetric bases at various scales. They show results of geophysical investigations using gravity, magnetic, seismic, or radioactivity surveys, which provide data on subsurface structures that are of economic or geologic significance.

**Miscellaneous Investigations Series Maps or Geologic Investigations Series (Is)** are on planimetric or topographic bases at various scales; they present a wide variety of format and subject matter. The series also includes 7.5-minute quadrangle photogeologic maps on planimetric bases and planetary maps.

#### Information Periodicals

**Metal Industry Indicators (MIIs)** is a free monthly newsletter that analyzes and forecasts the economic health of five metal industries with composite leading and coincident indexes: primary metals, steel, copper, primary and secondary aluminum, and aluminum mill products.

**Mineral Industry Surveys (MISs)** are free periodic statistical and economic reports designed to provide timely statistical data on production, distribution, stocks, and consumption of significant mineral commodities. The surveys are issued monthly, quarterly, annually, or at other regular intervals, depending on the need for current data. The MISs are published by commodity as well as by State. A series of international MISs is also available.

Published on an annual basis, **Mineral Commodity Summaries** is the earliest Government publication to furnish estimates covering nonfuel mineral industry data. Data sheets contain information on the domestic industry structure, government programs, tariffs, and 5-year salient statistics for more than 90 individual mineral and materials.

**The Minerals Yearbook** discusses the performance of the worldwide minerals and materials industry during a calendar year, and it provides background information to assist in interpreting that performance. The Minerals Yearbook consists of three volumes. Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Volume II, Area Reports: Domestic, contains a chapter on the minerals industry of each of the 50 states and Puerto Rico and the Administered Islands. Volume III, Area Reports: International, is published as four separate reports. These reports collectively contain the latest available mineral data on more than 190 foreign countries and discuss the importance of minerals to the economies of these nations and the United States.

## Permanent Catalogs

“Publications of the U.S. Geological Survey, 1879–1961” and “Publications of the U.S. Geological Survey, 1962–1970” are available in paperback book form and as a set of microfiche.

“Publications of the U.S. Geological Survey, 1971–1981” is available in paperback book form (two volumes, publications listing and index) and as a set of microfiche.

**Annual supplements** for 1982, 1983, 1984, 1985, 1986, and subsequent years are available in paperback book form.

## AVAILABILITY OF PUBLICATIONS

Order U.S. Geological Survey (USGS) publications by calling the toll-free telephone number 1-888-ASK-USGS or contacting the offices listed below. Detailed ordering instructions, along with prices of the last offerings, are given in the current-year issues of the catalog “New Publications of the U.S. Geological Survey.”

## Books, Maps, and Other Publications

### *By Mail*

Books, maps and other publications are available by mail from:

USGS Information Series  
Box 25286, Federal Center  
Denver, CO 80225

Publications include Professional Papers, Bulletins, Water-Supply Papers, Techniques of Water-Resources Investigations, Circulars, Fact Sheets, publications of general interest, single copies of permanent USGS catalogs, and topographic and thematic maps.

### *Over the Counter*

Books, maps, and other publications of the U.S. Geological Survey are available over the counter at the following USGS Earth Science Information Centers (ESICs), all of which are authorized agents of the Superintendent of Documents:

- Anchorage, Alaska—Rm. 101, 4230 University Dr.
- Denver, Colorado—Bldg. 810, Federal Center
- Menlo Park, California—Rm. 3128, Bldg. 3,  
345 Middlefield Rd.
- Reston, Virginia—1C402, USGS National Center,  
12201 Sunrise Valley Dr.
- Salt Lake City, Utah—2222 West, 2300 South
- Spokane, Washington—Rm. 135, U.S. Post Office  
Building, 904 West Riverside Ave.
- Washington, D.C.—Rm. 2650, Main Interior Bldg.,  
18th and C Sts., NW

Maps only may be purchased over the counter at the following USGS office:

- Rolla, Missouri—1400 Independence Rd.

### *Electronically*

Some USGS publications, including the catalog “New Publications of the U.S. Geological Survey” are also available electroni-

cally on the USGS’s World Wide Web home page at <http://www.usgs.gov>

## Preliminary Determination of Epicenters

Subscriptions to the periodical “Preliminary Determination of Epicenters” can be obtained only from the Superintendent of Documents. Check or money order must be payable to the Superintendent of Documents. Order by mail from:

Superintendent of Documents  
Government Printing Office  
Washington, DC 20402

## Information Periodicals

Many Information Periodicals products are available through the systems or formats listed below:

### *Printed Products*

Printed copies of the Minerals Yearbook and the Mineral Commodity Summaries can be ordered from the Superintendent of Documents, Government Printing Office (address above). Printed copies of Metal Industry Indicators and Mineral Industry Surveys can be ordered from the Center for Disease Control and Prevention, National Institute for Occupational Safety and Health, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236-0070

### *Mines FaxBack: Return fax service*

1. Use the touch-tone handset attached to your fax machine’s telephone jack. (ISDN [digital] telephones cannot be used with fax machines.)
2. Dial (703) 648-4999
3. Listen to the menu options and punch in the number of your selection, using the touch-tone telephone.
4. After completing your selection, press the start button on your fax machine.

### *CD-ROM*

A disc containing chapters of the Minerals Yearbook (1993–95), the Mineral Commodity Summaries (1995–97), a statistically compendium (1970–90), and other publications is updated three times a year and sold by the Superintendent of Documents, Government Printing Office (address above).

### *World Wide Web*

Minerals information is available electronically at <http://minerals.er.usgs.gov/minerals/>

## Subscription to the catalog “New Publications of the U.S. Geological Survey”

Those wishing to be placed on a free subscription list for the catalog “New Publications of the U.S. Geological Survey” should write to:

U.S. Geological Survey  
903 National Center  
Reston, VA 20192