Notes on the Grossman Well and the "Chekika Plume"

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THE WELL

The story of the Grossman well begins with the purchase in 1917 of a large tract of land in central Dade County by Samuel Grossman, described by family members as a "paperbox manufacturer" from Cleveland, Ohio. According to some reports, Grossman paid $4 per acre. The land included a stand of hardwood, which the family named Grossman Hammock, and later became part of Chekika State Recreation Area (fig. 1). The land-surface elevation in the hammock area is 0.5 to 2.0 feet above that of the surrounding grassy wetlands, permitting hardwood vegetation to thrive. Before the land purchase by Grossman, the hammock had been used by groups of native Americans. When members of the Grossman family visited the hammock area in the 1920's, they found typical south Florida native American crops still growing there.

The Grossmans tried tomato farming in the 1920's. The plants grew well, but the remoteness of the area and the difficulty of bringing the crop to market made the venture unprofitable. At that time, the site was accessible only by an 8-mile rock road that was often flooded. Today, the area southeast of the parking lot of the present recreational area (fig. 2) shows evidence of having been used for "rock-plow" farming, whereas the area to the northwest of the recreational area has a pinnacle rock surface that is typical of the undeveloped rocky glades—a term applied to the flat, grassy region of marginal wetlands in Dade County where limestone rock of the Biscayne aquifer extends upward to land surface without a cover of organic sediment (peat or marl).

In the 1940's, the area around Grossman Hammock was used for oil exploration activities, conducted under terms of State Lease No. 1 of the Trustees of the Internal Improvement Fund (a State board created in 1855 to promote the economic development of the state's wetlands areas). The particular circumstances and purposes leading to the drilling of the "Grossman well" in 1944 by a firm called the Miami Shipbuilding Company were unclear at the time and have not become clearer with the passage of time. According to the recollection of N.D. Hoy (U.S. Geological Survey, retired), the firm was associated with W.G. Blanchard, a sponsor of several oil exploration projects in southern peninsular Florida during this period. Apparently, the driller had little knowledge of the subsurface conditions that he was likely to encounter. An individual named "Mr. Starr" began to visit offices of the Florida Geological Survey and the U.S. Geological Survey to ask for information and advice, and reported that "freshwater with an odor of sulfur" had been encountered at about 1,200 feet below land surface.

Herman Gunter, State Geologist of Florida, then asked Garald G. Parker of the U.S. Geological Survey in Miami to investigate "Mr. Starr's well" and to obtain water samples for analysis.

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N.D. Hoy of the U.S. Geological Survey visited the site on December 23, 1944. Upon his arrival, he found water gushing from the well casing, which extended 1 to 2 feet above land surface in an otherwise undisturbed natural rocky glades setting. All drilling equipment had been removed. Upon inquiry, he was informed that drilling had been discontinued about 2 months earlier. He was also told variously that the well was for oil exploration and for the purpose of "finding out what kind of water was down there." Years later, in 1969, a Grossman family member stated that the well "was a test prior to actual drilling" of a deep oil well. In 1949, the Coastal Petroleum Corporation drilled an 11,519-foot deep oil test well a short distance away from the 1944 well. Only minute quantities of oil were found, and the deep oil well was abandoned in the early 1950's.

During his first visit, Hoy measured the flow from the 12-inch black iron casing to be about 2,350 gallons per minute, and water sample analyses showed the water to have a chloride concentration of about 1,250 milligrams per liter. The 1,250-foot deep well had penetrated the Upper Floridan aquifer, the source of water flowing from the well. In southern Florida, the Upper Floridan aquifer is artesian and water in the upper part of the aquifer is brackish. Rock samples had been sent by the driller to the Sun Oil Company, and a lithologic and paleontological log was prepared in November 1944 (Merritt, 1995a). The well was logged by the Florida Geological Survey in 1969, the U.S. Geological Survey in 1974, and the South Florida Water Management District in 1983.

When Hoy later visited the site, he found that a drill bit had been placed in the top of the well in attempt to cap it. Pieces of wood were jammed into openings around the drill bit, but water still escaped from the well in jets 6 to 10 feet in height. According to Adler (1973), soil dikes were erected in the mid-1940's to contain the artesian well discharge. These became the banks of the present swimming lake. Because these dikes were overflowed, a smaller pond 15 to 20 feet deep (the present "fishing lake" shown in fig. 2) was dug in 1947 to provide fill for building embankments south and east of the two ponds to prevent further southward flow of the brackish water into the adjacent rocky glades land.

Hoy recalls that the area around the well was otherwise undistinguished grassy rocky glades land with no trees. Apparently, the natural hardwood hammock, the site of the present campground and park headquarters, was located a slight distance to the northwest of the well site. In the early 1950's, Mark L. Grossman landscaped the area around the two ponds for use as a privately operated commercial park. Additional fill was used to build an ornamental cairn of rocks around the well (fig. 3) and a nearby waterfall and for an elevated picnic area. Ornamental vegetation was planted. In 1954, the park was opened to the public as "Mineral Springs and Lake Chekika." Swimming in the well water that contained high concentrations of sulfur was considered to have health benefits by many visitors to the park.

In later years, electrical service and access by paved roads were provided. Three times in the 1960's, the flow rate was measured to be 1,170 gallons per minute by the U.S. Geological Survey, and many additional water samples were collected for analysis. The park was purchased by the State of Florida in 1970 and opened as Grossman Hammock State Park. In 1974, it was renamed Chekika State Recreation Area (fig. 2). In 1991, the park was donated by the State of Florida to the Federal Government in support of the enlargement of Everglades National Park to include a greater part of the original Everglades flow system. The recreation area was closed for almost 2

years following the immense destruction of Hurricane Andrew in August 1992, but is now open once again as part of the Everglades National Park system.

THE PLUME

Although water from the Grossman well was too salty to be potable, it apparently had little effect on the vegetation in the area. The study of aquatic plant biology by Adler (1973) found only slight transient changes in groups of plant species close to the well in areas frequently flooded by the artesian water, and ornamental terrestrial vegetation thrived in the immediate vicinity of the well. However, the well water found multiple pathways to enter the surficial Biscayne aquifer, source of Dade County's drinking water, by flowing over land surface within the embankments, leaking through holes in the clay liner of the swimming lake, entering the aquifer directly through the deeper fishing lake, and seeping into the aquifer through holes in the rusty, corroded well casing. In 1978-79, a U.S. Geological Survey reconnaissance of ground-water quality in the East Everglades—the area bounded by Tamiami Trail on the north, Levee 31N on the east, and Everglades National Park (prior to 1991) on the west and south (fig. 1)—detected high chloride concentrations in the ground water southeast of the recreational area. (The general direction of ground-water movement in the Biscayne aquifer in the area is to the southeast.) Test wells were drilled, and surface resistivity measurements (Technos, Inc., 1979) were acquired at numerous locations to define the extent of the brackish water plume as precisely as possible (fig. 4). The source of the brackish water was clearly the Grossman well. The brackish water plume was detectable as far as 8 miles to the southeast of the recreational area (Waller, 1982).

Desiring to protect its water supply and concerned about the possibility of contamination of water pumped from future well fields, Dade County requested that the State of Florida end the discharge of salty water to the Biscayne aquifer. The State was given time to construct two 45-foot deep Biscayne aquifer wells that now supply water to a new fountain at the north end of the lake (fig. 2). Then, on March 7, 1985, the Grossman well was plugged by filling the 480 feet of corroded iron casing with cement. Dade County continued a program of ground-water quality monitoring (Labowski, 1988), and the U.S. Geological Survey conducted studies of the future movement and rate of dispersal of the remnant plume using computer simulation models (Merritt, 1993; Merritt, 1995b). Results of the modeling in 1993 indicated that the plume would be largely dissipated by the early 1990's.

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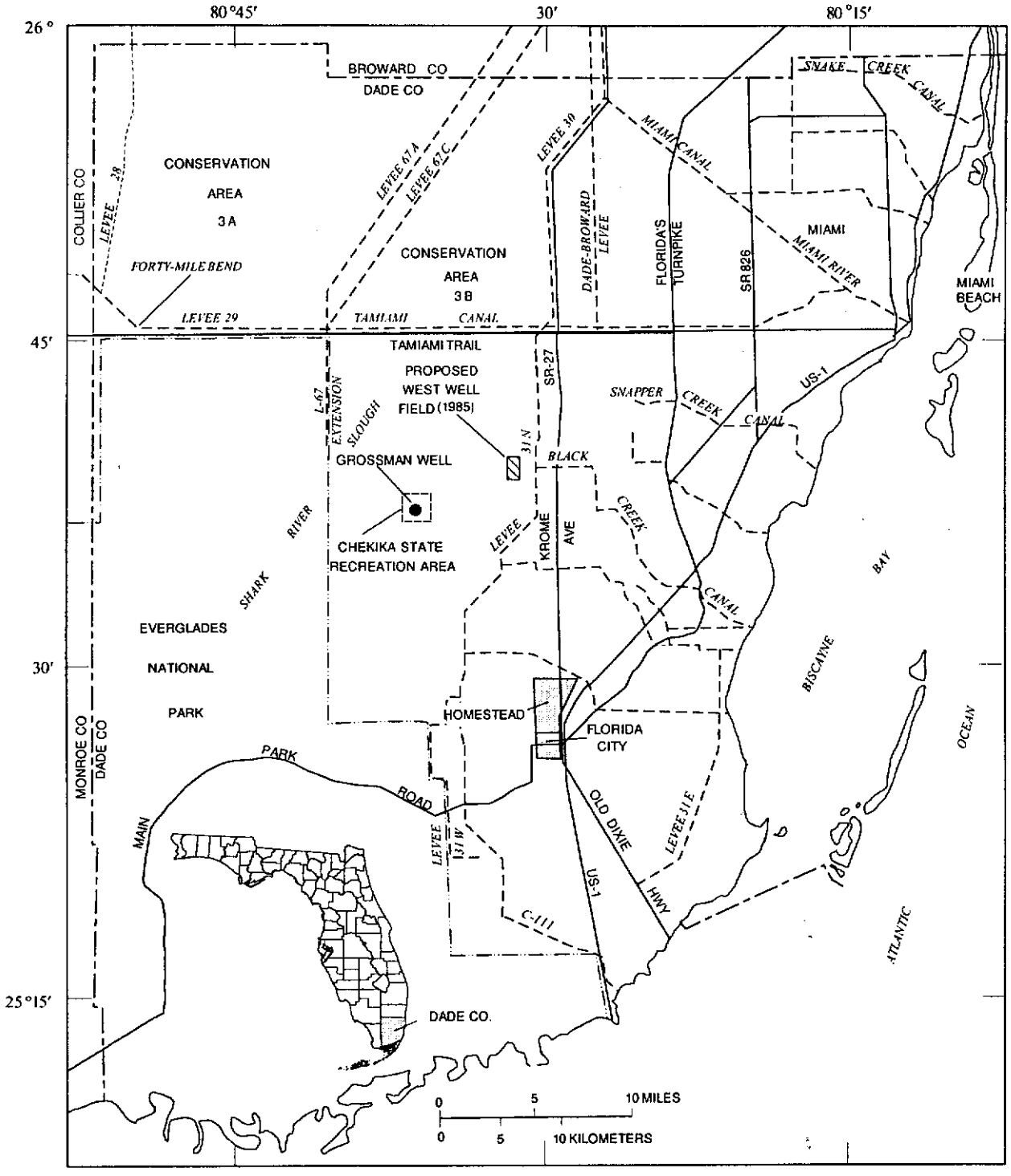

Figure 1. Location of Chekika State Recreation Area in Dade County, Florida.

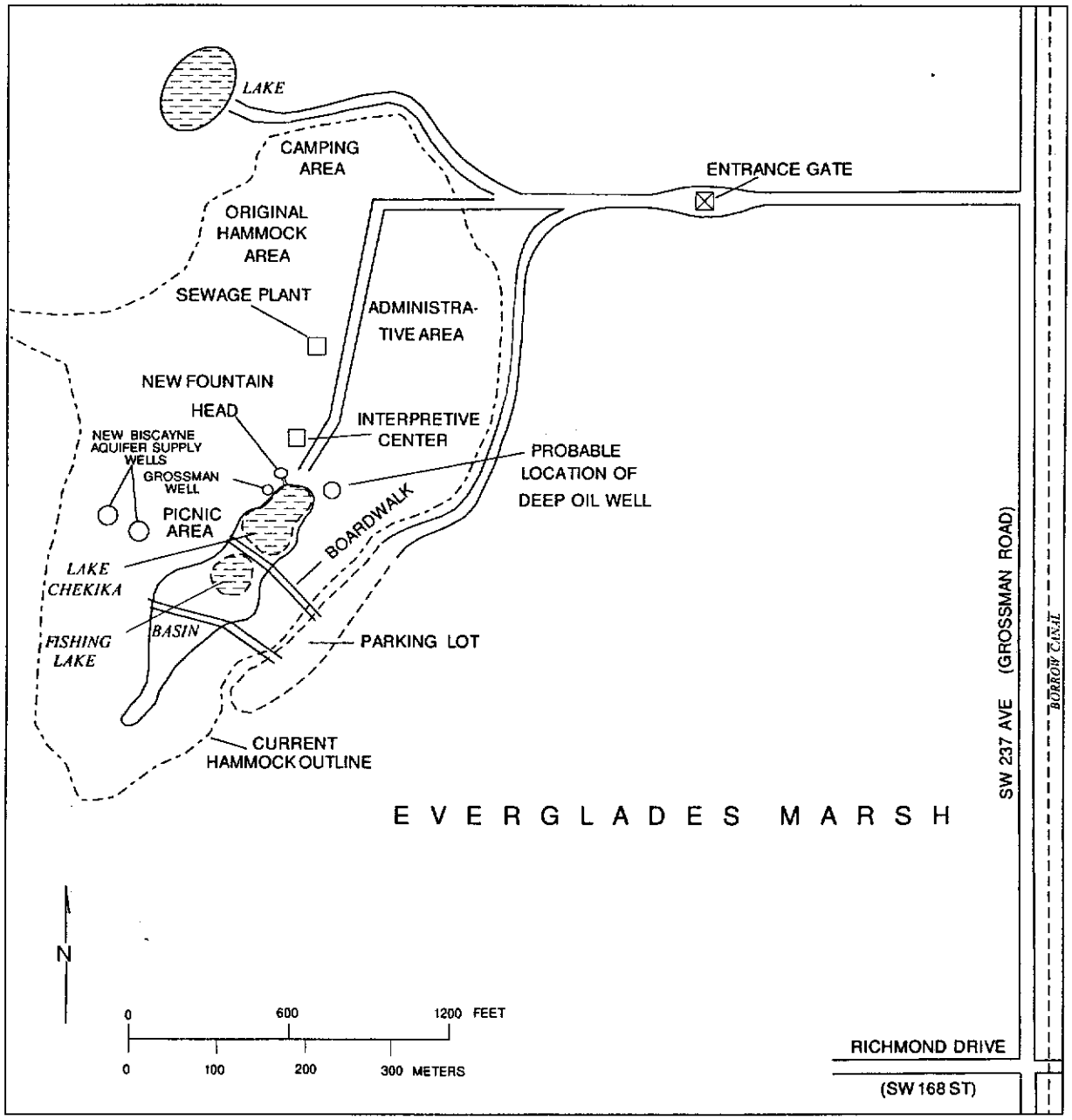

Figure 2. Location of wells and various cultural and geographical features in Chekika State Recreation Area.

Figure 3. The flowing Grossman well at Chekika State Recreation Area and surrounding landscape, in June 1970. Lake Chekika is beyond and to the right of the well. Photograph courtesy of the Miami Herald.

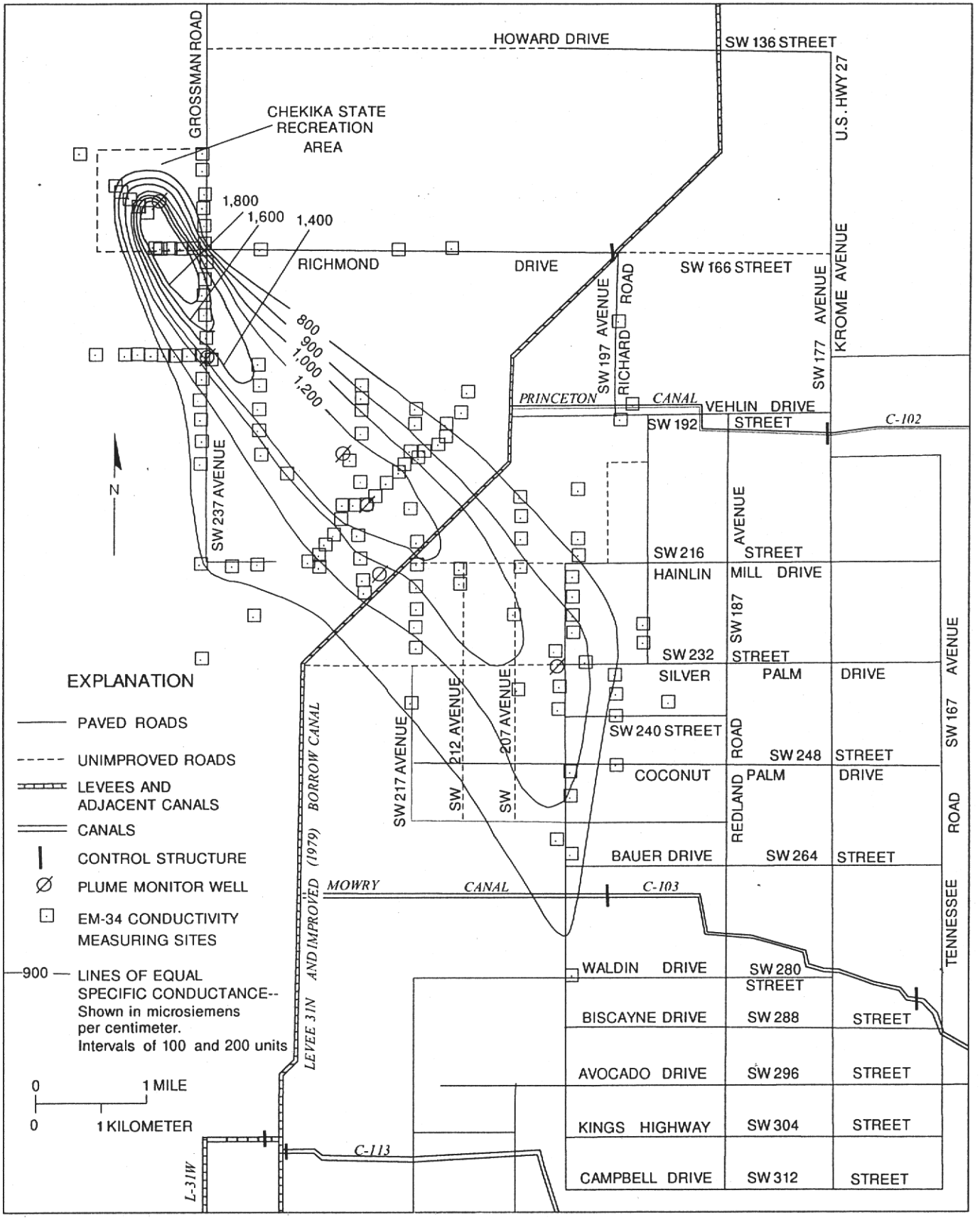

Figure 4. Lines of equal specific conductance based on the EM-34 survey of March 1979, 10-meter horizontal dipole orientation.