

Special Publication SJ93-SP2

**UPDATED
TIME DOMAIN ELECTROMAGNETIC SURVEY DATA
SEMINOLE COUNTY, FLORIDA**

Performed For:

**St. Johns River Water Management District
P.O. Box 1429
Palatka, Florida 32178-1429**

(Contract No. 92G201)

Performed By:

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EXECUTIVE SUMMARY

This report covers the integration of additional time domain electromagnetic (TDEM) soundings, made in Seminole County, Florida, during July 1992, to update depth contour maps of the 5,000 mg/l and 250 mg/l isochlors previously constructed. The original contour maps were based on TDEM sounding data collected in Seminole County in 1986 and 1988 (Blackhawk Geosciences, Inc., 1992a). A total of eight additional soundings were collected in July 1992. Two soundings were distorted by buried pipelines and are not utilized in updating the contour map. The results of the recent soundings are contained in the report entitled "Time Domain Electromagnetic Soundings, St. Johns River Water Management District in Northeast Florida, July 1992". In addition, one sounding, Site 13, acquired in August 1991 (Blackhawk Geosciences, Inc., 1992b) is integrated into the construction of the new contour maps.

Four maps are contained in this report. They are:

- 1) Figure 1 - TDEM Survey Location Map. This map shows the location of all TDEM soundings made in Seminole County, Florida.
- 2) Figure 2 - Contour Map of 5,000 mg/l Isochlor. This map shows the depth to the 5,000 mg/l isochlor within the Floridan aquifer. It was prepared utilizing all available TDEM data.
- 3) Figure 3 - Contour Map of 250 mg/l Isochlor. This map shows the depth to the 250 mg/l isochlor within the Floridan aquifer. It was prepared utilizing all available TDEM data.
- 4) Figure 4 - 250 mg/l Chloride Lateral Boundary and Well Location Map. This map shows the lateral position and the 250 mg/l isochlor within the upper Floridan aquifer utilizing TDEM data, well data, and the boundary from Tibbals (1977) publication.

Minor changes were made in the 5,000 mg/l and 250 mg/l isochlor contour maps. The rationales for making those changes and the impact of those changes on the contours are briefly reviewed.

5,000 mg/l Isochlor

The recent TDEM sounding data were collected with the objective of mapping the 5,000 mg/l isochlor. Transmitter loop sizes were selected to detect this isochlor which may occur at depths below surface greater than 1,000 ft. In addition, data were collected at locations to mitigate to the greatest extent possible, inductive noise interference from pipelines and other structures. The TDEM soundings from the 1986 and 1988 surveys were designed to detect only the 250 mg/l isochlor, and in many cases the transmitter loop sizes were insufficient to detect the 5,000 mg/l isochlor.

The updated contour map of the 5,000 mg/l isochlor (Fig. 2) is generally similar to the map previously prepared. The differences are primarily the result of direct detection of the saline ground water with 1992 soundings instead of estimating its depth of occurrence in previous soundings. For example, sounding 16 in the northwest corner of the 1992 survey is in the same area as sounding 17-3 of a prior survey. Sounding 17-3 did not detect saline water and a depth for saline water of 1,600 ft was estimated. Sounding 16(92) directly detects a low resistivity layer and interprets the 5,000 mg/l isochlor at a depth of 1,068 ft. Replacing the estimated depth from 17-3 with the detected depth from 16(92) eliminates the very steep gradient in the contour in this area. Based on the differences observed between soundings 16(92) and 17-3, it was decided not to utilize estimated depths in excess of 1,400 ft when there are no soundings nearby directly detecting the saline water. This decision removes the 1,400 ft and 1,600 ft contours in the western area of the county.

Another area where direct detection of depth to a low resistivity interface, corresponding to 5,000 mg/l chloride, can be compared to estimated depth is near sounding 17(92) and 5-4N and 5-4. Sounding 17(92) interprets the 5,000 mg/l isochlor at a depth of 218 ft which differs from estimated depths of 750 to 800 ft for soundings 5-4N and 5-4. Utilizing the 218 ft causes the new contour to generally parallel the Wekiva River rather than crossing it. The inclusion of the remaining soundings from the present survey result in only slight changes in the 5,000 mg/l isochlor.

250 mg/l Isochlor

The contour map (Fig. 3) of the 250 mg/l isochlor from this study is very similar to the map previously prepared. The differences are primarily the result of higher data density. Sounding 10(92) maps the 250 mg/l isochlor at a greater depth than was inferred from previous soundings in the area around Oviedo. Sounding 16(92) maps resistivity layers corresponding to both the 250 mg/l isochlor and the 5,000 mg/l isochlor. However, the position of the 250 mg/l isochlor is poorly resolved in this sounding and for that reason the position of the 250 mg/l isochlor inferred from sounding 17-3, which better resolves the 250 mg/l isochlor, is utilized in construction of the updated contour map.

The updated lateral 250 mg/l chloride boundary shown in Figure 3 and Figure 4 is unchanged compared to the maps constructed in prior studies.

Summary

In summary, the use of additional data in mapping the depths to the 5,000 mg/l and 250 mg/l isochlors resulted in relatively minor changes to the isochlor maps. The most significant change was made in the 5,000 mg/l isochlor map, mainly because only a few soundings in the early survey, but all in the present survey, directly detected the depth to the 5,000 mg/l isochlor.

References

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Blackhawk Geosciences, Inc., 1992c. Time domain electromagnetic soundings St. Johns River Water Management District in Northeast Florida, July 1992, Golden, Colorado.

Tibbals, C.H., 1977. Availability of ground water in Seminole County and vicinity, Florida: U.S.G.S. Water Resources Investigation 7-97, 4 sheets.

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