UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
ROCKVILLE, MARYLAND 20852

MAR 29 1985

Mr. R. H. Resta, P.E.
Chief, Engineering Division
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Lower Mississippi Valley Division
P.O. Box 80
Vicksburg, Mississippi 39180-0080

Dear Mr. Resta:

In response to your letter dated March 5, 1985, I can assure you that we place a very high level of confidence in the 1983 Gulf Coast area adjustment results. We believe they are the best available heights for the region. However, as an engineer you realize the importance of the assumptions imposed when the adjustment was performed and their impact on the adjusted results.

Specifically, the Lousiana Gulf Coast is an unstable region of the country. As you know, the entire area is subsiding. I have enclosed two publications which estimate the crustal movements in this area (see enclosures 1 and 2). The subsidence varies substantially throughout the region, but as the reports indicate, the subsidence tends to increase from north to south. This increases the complexity of data analysis and adjustment constraints.

The following scenario was developed for the 1983 Gulf Coast adjustment. First, a primary network, consisting of leveling data observed from 1968 to 1982, was adjusted. This assumed that no significant movements occurred between surveys. In this area, there most likely was a small amount of bench mark movement between surveys. However, it is difficult to estimate the true magnitude of these movements without additional releveling. These primary heights were then used to constrain the secondary network. The assumption was made that the secondary network was displaced in the same manner as the primary. In most subsidence areas, crustal movement rates vary considerably. Once again, a more accurate estimate of these movement rates cannot be determined without additional surveys.

As stated earlier, we have high confidence in the adjustment results under the assumptions stated above. The adjusted heights from the area adjustment are the best available estimates for the Gulf Coast region. It should be noted that the assumptions made for this adjustment were necessary because the Gulf Coast vertical network was not designed specifically to monitor subsidence.

In the past, when National Geodetic Survey (NGS) performed leveling and adjustments in this area, the new leveling was forced to fit previously published values of the existing network. The constraints imposed in these past adjustments arbitrarily biased the results such that "true" movement

could not be detected when adjusted height differences were compared. This is the reason adjusted heights should not be used when estimating subsidence. Repeat leveling and/or special adjustments provide the best estimates of crustal motion.

In some subsiding areas, special networks have been established to estimate crustal motion. The Houston-Galveston, Texas, area is a good example (see enclosures 3,4, and 5). The NGS has designed a subsidence plan, called the Geocadastre, for the Louisiana Gulf Coast. Messrs. Gilbert J. Mitchell and David B. Zilkoski, of my staff, briefed the New Orleans District and the Greater New Orleans Planning Council in November 1984. Enclosure 6 describes the Geocadastre in detail.

In conclusion, the major problem in the area is that the Gulf Coast vertical network is not intended to provide detailed crustal motion information. However, we still believe the heights from the 1983 Gulf Coast area adjustment are the best obtainable at this time. We also believe that the Geocadastre is a means of more confidently estimating subsidence in the area. Mr. Mitchell, (301) 443-8143, and Mr. Zilkoski, (301) 443-8567, are available to meet with you to discuss the Geocadastre, the Gulf Coast adjustment, or other special analyses to meet specific project needs. I am pleased that we can participate in this joint effort to better assess your agency's requirements of the geodetic network.

Sincerely yours,

John D. Bossler
Rear Admiral, NOAA
Director
Charting and Geodetic Services

Enclosures