

## EVENING MEETING—FEBRUARY 11, 1980

### DEWITT C. VAN SICLEN—Biographical Sketch



DeWitt Van Siclen is a geology professor at the University of Houston who has a special interest in the surface geology near where he lives, which has been Houston (actually Bellaire) since 1952. He's basically a structural geologist, and, since the most distinctive kind of surface features around here are the faults that offset the land, these soon attracted his attention. In 1966 he had occasion to map those faults

active throughout the metropolitan area that were clearly evident at the time, for a group of engineering firms engaged by the City of Houston to investigate the water-supply outlook, with particular reference to the groundwater potential.

Based on earlier experience as an Air Force photographic officer, and with the petroleum industry in surface mapping, core-drilling and logging, and in conventional subsurface exploration, Van Siclen has utilized a wide range of approaches to investigating the active Gulf Coast faults. He has developed especially the coordinated use of airphoto, topographic, and borehole geophysical data to locate faults and to evaluate their activity status.

Dr. Van Siclen's fault studies have ranged from Baton Rouge to Corpus Christi, and clients (some indirectly through engineering firms) from the Corps of Engineers to local school districts; and from major oil, chemical, industrial and utility companies through large and small property developers, builders and investors, to individual homeowners. He's probably more familiar than anyone else with the widely varied needs and viewpoints these people have regarding the occurrence of geologic faults on their property!

A native of Pennsylvania who was raised in New York, Van Siclen received B.A. and Ph.D. degrees in geology from Princeton University in 1940 and 1951, with an intervening M.S. from the University of Illinois. He has taught at the University of Houston full-time since 1959, and currently teaches mostly graduate courses in aspects of petroleum geology and tectonics.

#### HOUSTON'S GEOLOGICAL FAULTS (Abstract)

Some of the normal faults which characterize the Gulf Coast region, and which are responsible for trapping many of its oil and gas accumulations, extend right up to the land surface. More than 200 such faults (averaging about two miles in known length) are known to be actively offsetting the surface in Harris County at present, damaging pavements, buildings and pipelines built over them.

Although potentially present all along the outer Coastal Plain of the northern Gulf of Mexico, this problem is particularly acute around Houston. Here we have been depressuring aquifers at a great rate by withdrawing potable water and locally petroleum, which alters the state of stress and so activates certain of these faults.

Many of the faults can be recognized in places by their expression on airphotos, from scarps seen on one-foot contour-interval topographic maps, and on the ground, and from the damages they do to pavement, etc. However, great care must be exercised to avoid confusing other natural and man-made features with the faults.

Since by definition a fault is "a 'fracture' in the earth along which the rocks or sediments have been displaced," in doubtful cases its reality must be investigated in the subsurface. The commonly-used direct methods of doing so are trenching, geophysically-logged boreholes, and high-frequency reflection seismic; other, indirect methods, although not sufficiently conclusive to use alone, may serve to guide and extend the direct investigations. The most common practice is to drill boreholes 150 to 500 feet deep along lines about perpendicular to the faults, seeking at least one penetration of each fault, plus a second log nearby for precise correlation. The holes are logged for electrical spontaneous potential, and for resistivity using a single-electrode system to obtain maximum bed resolution and character.

The reaction of the developer of a large property upon learning that it has a fault depends generally on whether he is siting industrial buildings or developing residential lots. The builders usually worry a lot, want exact fault locations, and carefully plan around the faulting. But the reaction of a lot of developers depends more on the degree of planning flexibility that they have, which ordinarily is severely limited by prior commitments for financing, major thoroughfares and drainages, etc. While the presence of faults frequently delays development of a tract, the rising value of well-located land is leading increasingly to the development of more faulted tracts by both unknowing (?) and highly knowledgeable parties. Also, a few large (but low) buildings have been designed and constructed intentionally over fairly active faults; one, built about 10 years ago, experienced such severe problems that it is now to be torn down.

Future fault movement is closely tied to future land subsidence, a separate but related phenomenon caused also by lowering of the water-level (piezometric surface) in the aquifers. In southeastern Harris County, where fault movement has been greatest, it is likely to decrease as users shift from well- to surface-water. But increased pumping in northwestern Harris County as that area develops is likely to trigger and accelerate more of the faults there.