23. Significance and Use of Lap-Out Maps in Prospecting for Oil and Gas, by Lon B. Turk, consulting geologist, Oklahoma City, Oklahoma.

The term "lap-out" is used to define sediments, transgressively deposited, whose bottom-sides lap onto an unconformity surface, and whose terminal edges lap-out against the top-side of an unconformity; the same sediments, in turn, are overlapped by other sediments, which successively repeat this relationship to the unconformity at a stratigraphically younger position. In other words, the sediments bear the same relationship to an unconformity as the shingles placed on a roof; the first ones are toward the bottom. A positive area, so buried by transgressive sediments, will show formations that continue over and blanket the crest of the buried area, just like the last shingles on a roof are at the top or crestal part.

A lap-out map is a plan view of the distribution pattern, made by the intersection of transgressive formations lapping out on the TOP-SIDE of an unconformity surface. Petroleum geologists are routinely familiar with paleogeologic maps, showing areal distribution of sediments during periods of truncation. Such periods, commonly examined, are pre-Cretaceous, pre-Pennsylvanian, pre-Mississippian, and many others. In these instances, a plan view is presented of the pattern created by formations exposed after truncation; therefore, the pattern represents intersection of these truncated sediments at the BOTTOM-SIDE of the resultant unconformity. Anticlines on such areal maps are interpreted by the pattern of successively older sediments being inside the pattern of younger sediments. And conversely, synclines are interpreted by older sediments being outside the pattern of younger sediments.

Since lap-out maps deal with the pattern of sediments intersecting the TOP-SIDE of an unconformity, the pattern of younger sediments follows inside the pattern of older sediments. Therefore, to the untrained eye, such a pattern might seem to be depicting a syncline on the usual areal map, but, in reality, on lap-out maps, dealing with the TOP-SIDE of an unconformity, such a pattern indicates burial of a high positive area by transgressive onlap or overlap.

Lap-out maps have a multitude of uses in the search for oil, and likewise, in the study of geologic history of positive areas buried by transgressive seas. First to be considered are the aspects of application of these maps in the search for oil. Levorsen's geologic thinking in "Studies in Paleogeology,"[1] and "Discovery Thinking,"[2] and *Stratigraphic Type Oil Fields*[3] has sparked the industry to a new conception of the areas to be explored for oil and gas reservoirs—new areas that do not require anticlinal or crestal geology. His "wedge belts of porosity and layers of geology" is predominantly a thinking, evolving out of facies changes or TRUNCATION by unconformities, causing wedge belts of porosity, or reservoirs, wedge-edged by truncation.

Since lap-out maps reflect the pattern by which former positive areas of regional proportions have been buried transgressively, these maps define location belts of wedge edges that have three favorable aspects for oil accumulation and exploration areas:

1. They are traps that were formed early in the history of the reservoir rock.
2. They are a petroleum province where trapping conditions are still favorable. dependent on the geologic history of the positive area, involving effect of rejuvenation folding or regional tilting.
3. Most important, therefore, lap-out maps envisage areas where there may be pools of major proportions!

Another application of lap-out maps is the usefulness in studying geologic history of such positive areas. Inclination or attitude of such positive areas at the time of burial can be determined by the relationship between the lap-out pattern and the pre-unconformity areal pattern. Any rejuvenation during burial of such positive areas can be measured relatively by the lap-out patterns. Exact age of burial of any such positive area can be determined.

24. Eola, Oklahoma, Typical Arbuckle Mountain Structure, by R. M. Swesnik, Anderson-Prichard Oil Corporation, and Thom H. Green, Sunray Oil Corporation, Oklahoma City, Oklahoma.

The Eola field is in T. 1 N., R. 2 W., southern Garvin County, Oklahoma just north of the exposed Arbuckle Mountains. It is on the subsurface extension of these mountains and is exceptional in the structural complexities revealed by the drill. Ten wells have been drilled, of which six have been producers. These tests indicate the major structural feature of the area to be a west-northwest striking fault, with the magnitude of the stratigraphic displacement measurable in miles. Highly folded and faulted pre-Deese strata north of the fault form an overturned syncline whose axial plane

[1] *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 17, No. 9 (September, 1933), pp. 1107–1132.

[2] *Ibid.*, Vol. 27, No. 7 (July, 1943), pp. 887–928.

[3] Amer. Assoc. Petrol. Geol. (1941).