

the Rainbow reefs, and also in the reefs of nearby subbasins which are buried at similar depths. He refers to this as vadose (above the water level) weathering.<sup>19</sup>

There is considerable variety in the evaporitic covering layers which fill the spaces between the reefs, lap up on to their sides, and finally seal them over. Figure 14 is a diagrammatic representation of these different coverings, as they encroach upon the sides of the reefs, and finally cover them. Note that the first of this series (designated no. 1 in the diagram) is a thick deposit of finely layered ("laminated") anhydrite, which is as much as 80 feet thick in some places. More details on the nature of this significant deposit will be given a little farther on in this chapter. The thickness and characteristics of this and the succeeding coverings were learned partly through seismic surveys, but mainly as a result of wells drilled into the basin, as shown in Figure 13, both beside the reefs and into them.<sup>20</sup>

Next above the laminated anhydrite layer is a covering (no. 2 in Figure 14) of approximately 70 feet of a distinctly laminated dolostone. (The term "laminated" always refers to thin layers, often much less than one-fourth inch thick.) Each of the laminations represents at least a slight change in environment--probably an annual or seasonal change in most cases. (Similar layers, representing present-day, seasonal deposition, are common in numerous parts of the world. Such layers are often called "varves.") It is also of interest to note the presence of a five-foot layer of shale near the middle of the thickness of this 70 foot covering of dolostone. The shale represents a time when there was a more distinct change in environment for a period of time, with fine clay sediment being brought in to form the shale. The clay particles were of course brought in by water currents, but the extremely small size of the particles shows that these currents were of a slow and gentle nature, and that there were quiet, non-turbulent periods which gave the particles time to settle out to form the shale.

Above the dolostone covering unit just described, is found a much thicker deposit of alternating anhydrite and dolostone layers (no. 3 in Figure 14). The maximum thickness is 500 feet. This is of sufficient thickness to completely cover the tops of the reefs in some places. In some wells this blanket over the reefs is encountered when a depth of about 4,500 feet is reached. Many of the thick layers of anhydrite and dolostone in this deposit are made up of thin laminations.

#### Microlayers in the Covering

The nature of the layering and lamination in all of these coverings is of great significance for an understanding of the types of environment which dominated the Rainbow area in the milleniums which followed the death of the reefs. A careful study of the evaporite series which we have been discussing has recently been made by G. R. Davies of the Institute of Sedimentary Petroleum Geology in Calgary, Alberta.<sup>21</sup> He and S. D. Ludlam, his associate,