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ROBERT F. SCHMALZ — Biographical Sketch

Dr. Schmalz was born in Ann Arbor, Michigan and received his geological education at Harvard; B.A. (cum laude), M.A., and Ph.D. His special interests are marine chemistry and chemical reactions at the sea floor; the chemistry and ecology of coral reefs; evaporite deposits; low-temperature aqueous chemistry, kinetics and mechanisms in geological systems. Since receiving the Ph.D. in 1958, Dr. Schmalz has been at Penn State University where he is Professor of Geology. Since 1974, he has been Coordinator, Undergraduate Programs, Department of Geosciences, Penn State University. Dr. Schmalz is a member of a number of scientific societies including AAPG, GSA (Fellow), and SEPM. For 1976-77, he is an AAPG Distinguished Lecturer.

EVAPORITES, SULFIDES, AND PETROLEUM (Abstract)

by: Dr. Robert F. Schmalz

Many ancient evaporite deposits exhibit features which are difficult to explain in the framework of a shallow-water salina or sabkha genetic model. Most of these difficulties can be overcome by postulating evaporite deposition in a deep-barred basin filled to sill depth with salt-saturated brine. Such a deep-basin model appears oceanographically and geologically reasonable, even though no such basin is known today.

The deep-basin hypothesis has been applied primarily to the study of ancient "saline giants," but it has geologic implications which are of almost greater interest. A period of stagnation and euxinic sedimentation must develop in the basin prior to the inception of salt deposition. During this period, large quantities of organic material may settle to the basin floor where reducing conditions ensure their preservation, providing a potential petroleum source bed. Sulfate reduction and proteolytic decay in the anoxic bottom water yields hydrogen sulfide which chemically will "strip" the overlying water of dissolved base metals, precipitating extremely insoluble sulfides of copper, lead, zinc, and iron. Because the volume of seawater which must be concentrated in the basin by evaporation before salt precipitation can begin must be at least ten times the volume of the basin, this chemical stripping action may produce an economically significant deposit of sulfide minerals. The salts in a deep evaporite basin thus may provide the seal above a petroleum source bed or the cap over an important ore deposit.

This paragenetic model is shown to conform closely to several well-known sedimentary basins in which salt, petroleum, and sulfide ores are associated, and offers an essential guide in exploration for new reserves of petroleum, natural gas, and base-metal ores.