History of Chemical Fertilizer Development

DARRELL A. RUSSEL AND GERALD G. WILUAMS

ABSTRACT

Neolithic man probably used fertilizers, but the first fertilizer produced by chemical processes was ordinary superphosphate, made early in the 19th century by treating bones with sulfuric acid. Coprolites and phosphate rock soon replaced bones as the P source. The K fertilizer industry started in Germany in 1861. In North America the K industry started during World War I and expanded with development of the New Mexico deposits in 1931 and the Saskatchewan deposits in 1958. Modern K fertilizers are more the product of physical than of chemical processes. The first synthetic N fertilizer was calcium nitrate, made in 1903 from nitric acid produced by the electric arc process. The availability of synthetic ammonia after 1913 led to many new N fertilizers, but physical quality was poor. In 1933 TVA was formed with a national responsibility to increase the efficiency of fertilizer manufacture and use. More than 75% of the fertilizer produced in the United States is made with processes developed by TVA.

Major fertilizers and fertilizer intermediates introduced by TVA include ammonium nitrate, high-analysis phosphates, diammonium phosphate, nitric phosphates, ammonium polyphosphate, urea ammonium phosphates, 11-16-0 and other liquid base solutions, superphosphoric acid, wet-process superphosphoric acid, suspensions, granular urea, and S-coated urea. These have had major impact upon the production of mixed fertilizers, bulk blending, and the fluid fertilizer industry. Future fertilizers not only must be technologically feasible, economical, and agronomically suitable—as have been past fertilizers—but also must meet various air and water pollution standards during production and have reduced total energy requirements.

Additional Index Words: ammonium nitrate, ammonium polyphosphate, calcium nitrate, diammonium phosphate, granular urea, liquid base solution, nitric phosphates, ordinary superphosphate, S-coated urea, superphosphoric acid, suspensions, synthetic ammonia, TVA, urea ammonium phosphates.