

## Fluid Fertilizers: 50 Years Ago In Britain

*How tenacious inventiveness brought fluids to British agriculture over a period of three decades.*

**Summary:** Our story begins in the late 1950s when we were seeing the first forms of sprayable fertilizers for agricultural lands in Great Britain. It was then J.W. Chafer Ltd. decided to venture forth into an entirely new and challenging technology. It required logistics, imagination, and a willingness to accept new challenges. Ever tenacious, ever inventive, several decades later we had captured 20 percent of the main fertilizer market in Britain and in the most intensive arable farming areas our share often exceeded 40 percent! Read on and you'll learn some of the details of how we accomplished this.

Though there is some evidence of the use of sprayable fertilizers during the nineteenth century, this did not come into its own and become a general practice in Britain until after World War II. For a century or so there had been considerable efforts within the gas and coke industry to dispose of its ammoniacal effluent by spraying it on agricultural land. However, it was not until the 1950s when the British Government, recognizing its value as a source of nitrogen (N), offered a subsidy to encourage farmers to take advantage of its nutrient content.

By the late 1950s, some contractors were adding phosphate and potash to gasworks liquids to provide a full range of plant nutrients in a sprayable form. Though there remained concerns about possible toxic components quite apart from its low nutrient content and limited availability in major agricultural areas,



it did not go unnoticed that by 1957 fluid fertilizers had already caught on and become commercially available in the United States, capturing a significant and growing percentage of the fertilizer market.

### Moving beyond infancy

Meanwhile, J.W. Chafer Ltd, a British manufacturer of agricultural spray equipment since 1901, had developed by the early '60s a system of marketing agrochemicals by offering, on favorable terms,

equipment to farmers who purchased our pesticides. With an existing network of sales and servicing depots throughout the major farming areas of the United Kingdom, our organization was well situated to market and distribute fluid fertilizers. Having no manufacturing facilities we had to rely on external suppliers often situated some distance from our depots. To accommodate this situation we supplied each of our depots with buffer storage tanks. To meet demand at the season's

height, a continuous stream of tankers operating over 24 hours was essential.

### **Moving on site**

To better meet our demand at the season's height, the obvious alternative we soon realized was to manufacture fluid fertilizers on site. Ultimately, this took in five locations.

**Takeley.** At Takeley, in Essex, preliminary experiments were undertaken to produce a urea-ammonium nitrate (UAN) solution. This proved to be an effective way of coping with sudden surges in demand but, unfortunately, also necessitated having to persuade personnel from other departments to work overtime on tasks that were beyond their experience and expectations. A more expansive approach would be required not only for the production of UAN but the many other grades containing phosphate and potash.

**Hutton Cranswick.** In 1964, Chafer located a depot at Hutton Cranswick in Yorkshire. Furthermore, in conjunction with Hutton Cranswick's bulk urea handling system, the production of UAN in equipment already developed on that site became very straightforward.

**Southern England.** It was soon obvious that the production facilities at Takeley and Hutton Cranswick, while effective, had limited capacities inadequate to cope with the rapidly expanding market. Furthermore, in Southern England--Hampshire, in particular-- where the potential demand was considerable, there were no accessible fluid fertilizer plants. In fact it had been necessary, for a year or so, to rely on rail

transport to supply our Micheldever Depot. Parking several tankers in a convenient siding had provided some welcome temporary storage but this was unlikely to continue over a longer term. The proximity of the south coast offered the prospect of importing cheaper raw materials from abroad so it was important to provide adequate storage in order to be able to accommodate quite large consignments of urea and potassium chloride. We also learned from our estimates that deliveries of fluid fertilizer could amount to several hundred tons per day, thus it would require us to either build a high output plant or invest in more product storage facilities. Of these options, building a high output plant capable of 1,000 tons per day was considered preferable but in conjunction with sufficient product storage capacity to accommodate up to three days output.

**East Anglia.** Although some of the most intensive farming was taking place in this part of the United Kingdom, no existing fluid fertilizer production capacity had been established in the heart of this region. Chafer had sales and service depots in Norfolk, Suffolk, Essex, Cambridgeshire, and Bedfordshire but none of these sites was suitable or convenient for large-scale fluid fertilizer manufacture. In 1967, we finally settled on a site at Chedburgh. While we had adequate supplies of ammonium nitrate in the north and west of England, transport of it into East Anglia was not practical. Fortunately we were able to acquire a nitric acid plant and an ammonium nitrate neutralizer, which were promptly dismantled

and reerected in Chedburgh. Daily output of ammonium nitrate was converted to a 32-0-0 UAN solution by adding urea in a simple batch process. Buildings similar to those in use at Micheldever for storage of solid urea and potassium chloride were erected in the middle of the Chedburgh site to provide all-around vehicular access. Operating with more concentrated phosphoric acids, including superphosphoric acid, made it possible to produce a 10-34-0 grade rich in polyphosphates.

**Upton.** A third major plant was established in 1976 at Upton by Gainsborough in Lincolnshire. Experience gained over the previous decade was taken into account when designing the production facilities. Because ammonium nitrate could be delivered by tanker, all operations followed the Micheldever blueprint. The Upton site was also used as a test bed for assessing the viability of simple external mixing used to meet demand for UAN in areas remote from our major plants. It was incumbent on the operator to keep a running tally of the urea and ammonium nitrate deliveries to ensure that the ratio of the nitrogenous components remained within acceptable limits.

### **Mission accomplished**

By the 1980s, volume of fluid fertilizers manufactured and sold by J. W. Chafer Ltd. had grown enough to capture 20 percent of the main British fertilizer market. In the most intensive arable farming areas, our share often exceeded 40 percent! The Chafer team takes great pride in its accomplishments and contributions to the fluid fertilizer industry.

*Derek Palgrave was chief chemist and technical director of J.W. Chafer Ltd. in Yorkshire, England, during the period covered by this review. He is now involved in a program of public lecturing on a wide range of topics, including science and technology.*