489.

On Her Majesty's Service

MinTech Review

Not for publication

No. 6 APRIL 1967

MinTech Review

No. 6 APRIL 1967

Contents

*This notice appears also in *Nature* for 8 April, 1967

Information and Regional Organization Division,
Abell House,
John Islip Street,
London, S. W. 1.

Gunpowder to Basic Research

ERDE Waltham Abbey

Gunpowder manufactured at Waltham Abbey may or may not have played its part in the defeat of the Spanish Armada, as local legend claims, but it is recorded fact that the oldest gunpowder factory in Britain was in continuous operation for four centuries on the site of the present Explosives Research and Development Establishment at the end of Powdermill Lane.

Until late in the 18th century the Government relied largely on private enterprise for its gunpowder supplies, on the grounds that 'the powder merchants could make better gunpowder and much cheaper than the King's servants'. However, their product varied so widely that the Crown decided to supplement the output of its own Faversham mills by buying the Waltham Abbey

factory from John Walton in 1787 - for £10 000 - and operating it as the Royal Powder Mills.

Explosives were manufactured in quantity there during the first and second world wars, but from the beginning of this century the emphasis has been increasingly on research and development, and the production of gunpowder was finally brought to a halt by a German land mine in the winter of 1940.

When the factory was taken over by the Ministry of Supply in 1945 the establishment began to assume its present form and function, which is that of the main Government Laboratory responsible for research on and development of every type of non-nuclear military propellant and explosive. The work of its eight main divisions covers explosives, propellants, materials, analytical services and chemical engineering, and is designed to meet the needs of all three services of the Ministry of Defence.

The interests of the ERDE staff are by no means confined to lethal uses of explosives and propellants: any mechanism, person or process requiring a powerful, measured shove, or any investigation requiring a powerful, measured bang, poses a problem welcomed by the propellant developers. Space vehicle control systems, pilots' ejection seats, explosive welding, diesel engine starting cartridges and simulated sonic booms are all made possible by the use of suitable explosive charges.

Nor is the work of ERDE confined to propellants and explosives. Work on these involves consideration of non-explosive components such as plastics, varnishes, rubbers and adhesives - to determine their possible effects on explosive materials - but the work of the two Materials branches covers a much wider field than this.

The technical development of modern weapons, guided missiles and supersonic aircraft depends largely on the availability of improved structural materials, and the strength and stability of non-metallic materials are the primary concern of these two branches. One of these deals largely with high polymers and the mechanisms and control of thermal, oxidation and radiation deterioration, and with the formulation of programmes for the synthesis of high-temperature-resistant materials. The other is concerned with inorganic or ceramic compounds (such as carbides and nitrides), the natural brittleness of which can be offset by producing them in the form of filaments or 'whiskers' and embedding them in a ductile matrix, which can be either a plastic for low temperature use or a pure or alloyed metal for high temperature applications.

Although practical objectives and current engineering requirements are kept very much in mind, as evidenced by the ERDE contribution to projects such as the Dracone flexible barge and collapsible petrol storage tanks, the work on materials is concerned more with basic than with applied problems. Its value lies more particularly in the pointers it provides to future developments in fields (many of them of direct interest to industry) in which a great deal more basic information is needed than is now available.