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Radiating World-Wide Influence

A Commons committee this week savaged the Government's handling of the sale of Amersham International. Walter Patterson reflects on the chain of events that took a small firm from the original nucleus to a world-wide hot property.

If you ask the nuclear industry, they will tell you that one of their most unpopular products is radioactivity. The public does not like radioactivity. It brings people out in demos. Nevertheless, in February 1982, the UK Government put up for sale a company whose business is selling radioactivity; and the public in thousands offered over £1 billion for the company, some 20 times the price put upon it by the Government. The company is called Amersham International. In the past four decades it has made a pleasant, modest Buckinghamshire town a world-wide byword for the acceptable face of radioactivity.

A radioactive atom has an unstable core or nucleus. Sooner or later the nucleus gives a sort of hiccup, and disgorges a fragment of itself. This fragment may be a “alpha particle” - a helium nucleus; a “beta particle”- an electron, with a positive or negative charge; or a “gamma ray” - equivalent to an X-ray, like a flash of high-energy light.

From a lump of radioactive material these breakdown fragments fly off in all directions, radially outward; the material “radiates” and the fragments are called radiation. The radiation carries energy. If it encounters molecules of living tissue it can damage them; this is the property of radiation which makes it a hazard, and causes public concern.

But the energy also makes the radiation readily detectable; a single alpha or beta particle or gamma ray from a single disintegrating nucleus will trip a suitable counter. It is this property of radioactivity – its very detectability – which Amersham International has turned into a multi-million pound enterprise.

The enterprise had its origins during the second world war. The Government invited a small company named Thorium Ltd to undertake the refining of radium for use in luminous paints for instruments and gunsights. The company purchased a house in Amersham for the purpose and recruited a young chemist named Patrick Grove to take charge of the operation, which got under-way in May 1940. By 1945 Grove, after a visit to the US, was convinced that the new technologies of nuclear reactors and accelerators would make many new radioactive materials available for use in medicine and industry. The Government agreed, and the Amersham activities were reorganised to take advantage of these new opportunities, under the name of The Radiochemical Centre (TRC), a Government-owned company managed by Thorium Limited. Thorium Limited soon dropped out of the picture; and when in 1954 the Government created the UK Atomic Energy Authority, TRC became part of the AEA.

By this time TRC was buying radioactive material from the Atomic Energy Research Establishment at Harwell, and putting materials from Amersham into Harwell reactors, to expose them to neutrons and create new radioactive materials or “radioisotopes.” But the attitudes of Amersham and Harwell differed. From its inception TRC approached the radioactivity business as a strictly commercial undertaking. You ascertained the desires of your customers, provided what they required, and charged an appropriate price for the service. If you could not sell it you did not make it.

Harwell preferred to regard the whole exercise as a research activity, provided free to clients – but of course paid for by the public, through the Parliamentary Grant to the AEA. The issue was resolved in 1958, when TRC was given the sole right to manufacture and distribute radioactive materials under the aegis of the AEA.

By the end of the 1950s TRC had customers in more than 50 countries; more than 50 per cent of sales were exports. Radium had become less and less significant, in comparison with the new radioisotopes produced in reactors and accelerators. Three product lines emerged. The simplest were pure radioactive elements, like cobalt-60, made up into measured strengths and suitably packaged for use as sources of radiation for academic research and also for industrial radiography – rather like self-contained X-ray units needing no power supply.

More complex were “labelled compounds”: chemicals, some familiar and some exotic, in which the normal stable carbon or hydrogen nuclei had been replaced by carbon-14 or hydrogen-3 (tritium). A researcher could keep track of such a labelled compound during its passage through a chemical process, or indeed through a living organism like a plant or animal, by measuring the radiation given off by it – even in quantities almost too small to measure any other way, practically molecule by molecule. Labelled compounds were already becoming more important than simple sources in the 1950s.

In the 1960s they were joined by a yet more sophisticated product line. Medical investigators were finding the detectability of radioactivity a versatile and very accurate means of analysing both healthy and unhealthy patients. A particular drug or other biologically interesting material could be tagged with radioactive atoms, which would then act like invisible transmitters, sending out a signal to indicate where in the body the material was present and in what quantity.

A further refinement of this approach was called “radioimmunoassay” (RIA). The first TRC clinical RIA kit was put on the market in 1966, for measuring the insulin level in the blood of diabetics. Chemicals were made up with appropriate radioactive tags – tiny quantities of radioactivity, but detectable nevertheless – and sold as a kit. A medical investigator would get a thimbleful of blood from the patient. The investigator would follow a prescribed procedure with the chemicals in the kit, mixing measured amounts of the chemicals with the measured blood sample. The the resulting mixture would be put into a standard radioactivity counter – like a Geiger-counter but more discriminating. Within an hour or so the investigator would have a very accurate measurement of the quantity of insulin in the patient's blood.

By the end of the 1970s Amersham was marketing kits for detecting and measuring many other medically important substances – various thyroid hormones, foetal fluids to determine the health of unborn children, digoxin for heart disease, and a long catalogue of others – at less than £1 per test. They had by this time many competitors, especially in the US; but their market share remained impressive.

Many interesting and useful radioisotopes can be created in nuclear reactors, but only those which can be made by bombarding targets with neutrons. Other useful materials can be created only by bombarding targets with positive particles – especially protons. In 1964 TRC commissioned the first cyclotron at Amersham, a machine able to deliver protons with an energy up to 20 million volts. In 1982 they are in the final stages of commissioning a second, more powerful 40-megavolt cyclotron, with a more versatile beam control, able to irradiate several targets simultaneously.

The product which emerges from a run in one of these massive, heavily shielded installations, with

their remote manipulators and thick concrete walls, is a smidgin of finely powdered radioisotope, scraped off the copper target by precision milling – barely enough powder to cover your little finger nail. But that tiny quantity of radioisotope is enough to label chemicals for many hundreds of orders.

These orders are always filled very quickly, usually within 24 hours; indeed they often have to be, since the radioactivity of many useful materials decays very rapidly. On an average day the company dispatches some 1,200 shipments; the total can reach 2,000 per day when business is especially active. The whole operation is now elaborately computerised; the throughput would be impossible otherwise.

In 1971 an Act of Parliament established TRC as a separate commercial entity – but one whose shares were still owned 100 per cent by the AEA. From the late 1960s onward, TRC added a series of overseas partnerships and subsidiaries; by 1982 they numbered five – in the US, the Federal Republic of Germany, Australia, France, and the Netherlands. In 1981 the decision was taken to change the name of TRC to Amersham International.

Within the UK the decision occasioned some surprise; surely "The Radiochemical Centre" was a more accurate description of the company's activities? However, a senior AI executive pointed out that by this some 85 per cent of the company's business was with overseas customers – and all of them for more than 20 years had referred to their suppliers simply as "Amersham". Far from obscuring the nature of the company's activities, the name change at last identified the parent company with all its overseas affiliates – even as AI was opening a gleaming new purpose-built factory in Cardiff.

Nor did the virtues of the company go unrecognised in the larger business community, as the frenzy of February demonstrated. It is hard to believe that the City would show similar fervour, if Mrs Thatcher were to offer shares in her pet nuclear enterprise, the National Nuclear Corporation. The management of AI do not, indeed, consider themselves to be part of the nuclear industry. Yet throughout its four decades Amersham International has presented a striking demonstration of hard-headed, realistic and successful planning and pursuit of a science-based commercial activity – in stark contrast to the performance of other UK enterprises involving unstable atomic nuclei. The rest of the UK nuclear establishment could use a hefty dose of AI.

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