

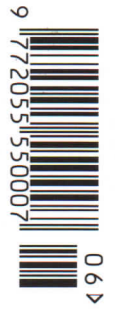
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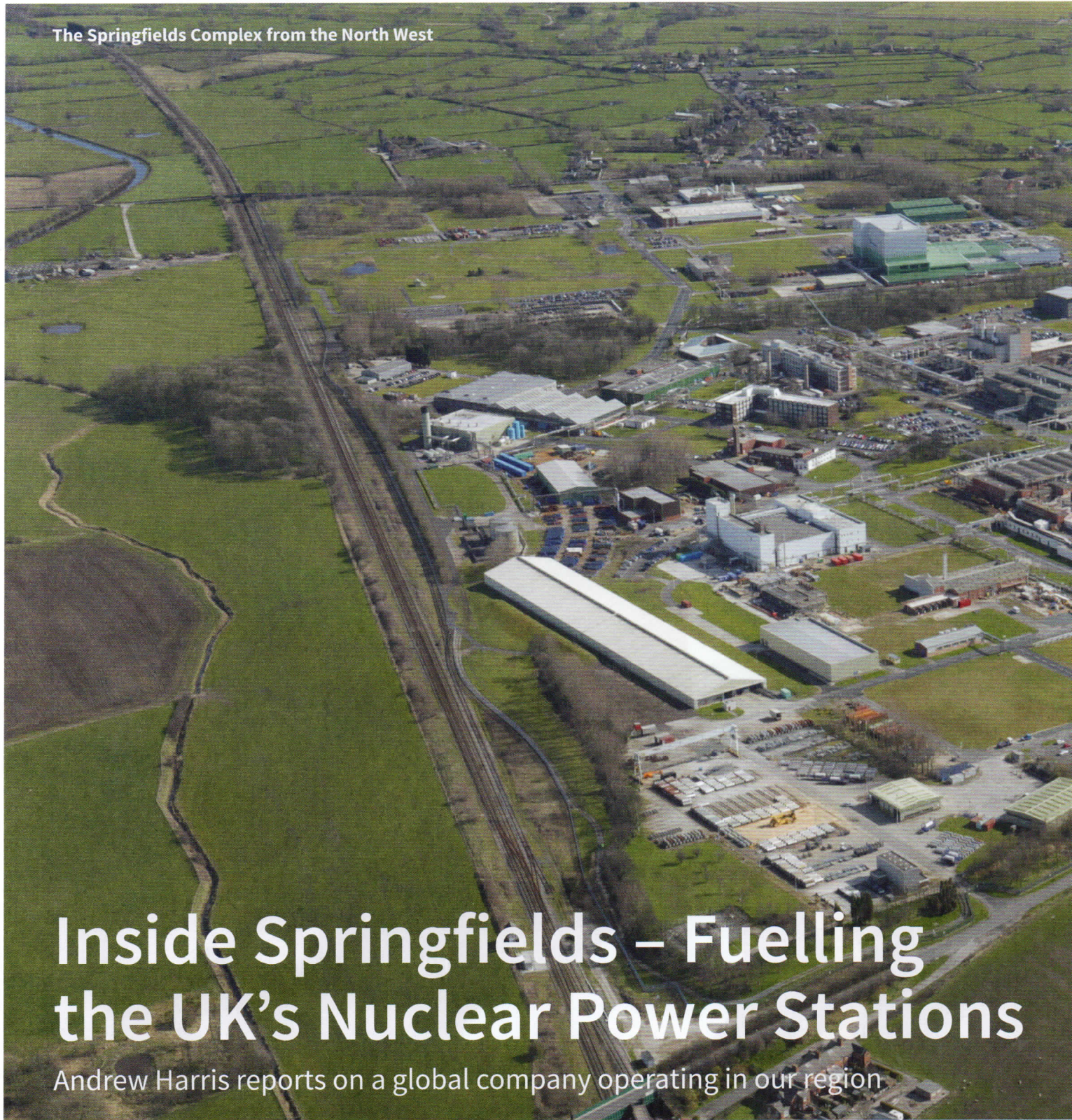
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Inside Springfields – Fuelling the UK’s Nuclear Power Stations

Andrew Harris reports on a global company operating in our region

Springfields is interesting. *Very* interesting – and much more than you would expect to find discreetly located next to the western boundary of Preston. It has been a crucial part of the nuclear industry in Britain for more than 70 years but few people really know what it does as a production facility and hub for Westinghouse – a huge US conglomerate which has operated the 200-acre site on a 150-year lease since 2010.

On the 23rd March 1946 the Government announced that the former war-time munitions factory would be the birthplace of the UK’s civil nuclear power programme – at Preston, Lancashire! It became the first plant in the world to produce fuel for a commercial nuclear power station. Since then it has produced more than 12 million fuel elements and pins and supplied products and services to customers in 11 countries but mainly fuel for the UK’s civil nuclear power

industry which currently provides 15-20% of our electricity depending upon what is available from other sources at any time.

So what is the UK civil power industry? We have built 19 nuclear power stations of which 11 were the old Magnox type which closed between 1991 and 2015. These included the world’s first nuclear power station at Calder Hall in Cumbria from 1956. A further 7 use Advanced Gas-cooled

Not just industry: Springfields includes this attractive Biological Heritage Site



rock which is mined all over the world. The ore that is used contains just 1.5% uranium. To concentrate the uranium content the ore is ground, treated and purified using chemical and physical processes. This results in uranium ore concentrate which is 80% uranium suitable for conversion to become Uranium Trioxide then processed to become Uranium Tetrafluoride and converted to become Uranium Hexafluoride aka UF6 or simply Hex which is enriched for delivery to Springfields.

There are hundreds of buildings at Springfields but manufacturing culminates in the Oxide Fuels Complex - as pictured - which is acknowledged to be one of the most advanced fuel manufacturing plants in the world. Your columnist toured this building and saw state-of-the-art techniques producing AGR and Light Water Reactor fuel as well as other products for the main nuclear reactor designs in use worldwide today.

AGR fuel is made from uranium dioxide powder. Uranium dioxide pellets are stacked inside stainless steel tubes which are then grouped together in a graphite 'sleeve' to form a fuel assembly. Each AGR assembly comprises 36 such tubes containing a total of 2,304 pellets.

Light Water Reactor fuel involves the same process and is used worldwide. Pellets are loaded into 3-metre long alloy tubes which are pressurised and sealed for fitting into a framework to

Reactors which are unique to the UK and are due to close between 2023 and 2030. As it can take 10 or more years to obtain the necessary approvals for a new nuclear power station it is later than you think if – as the government now believes – we need nuclear power to provide electricity without emissions when the sun doesn't shine and the wind doesn't blow.

Our newest nuclear power station is Sizewell B which became infamous

for delays but should be good for 40 years from when it was connected to the grid in 1995 – but we have built no more nuclear power stations since then. Sizewell B uses Pressurised Water Reactors which are popular worldwide. Springfields supplies fuel to all 7 of our AGR nuclear power stations but not Sizewell B. It also currently exports fuel for Light Water Reactors in France.

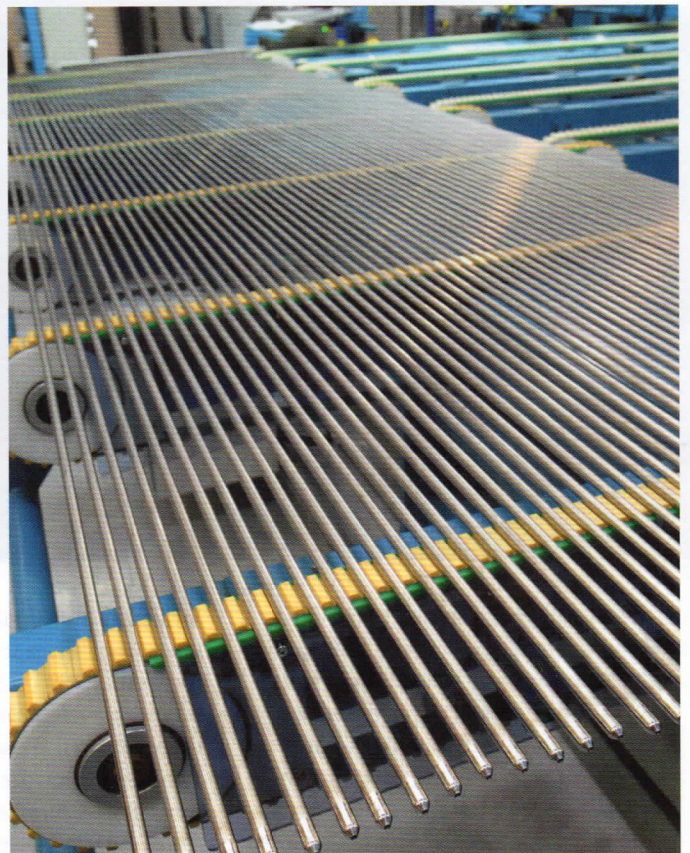
Springfields manufactures nuclear fuel. The raw material used is uranium



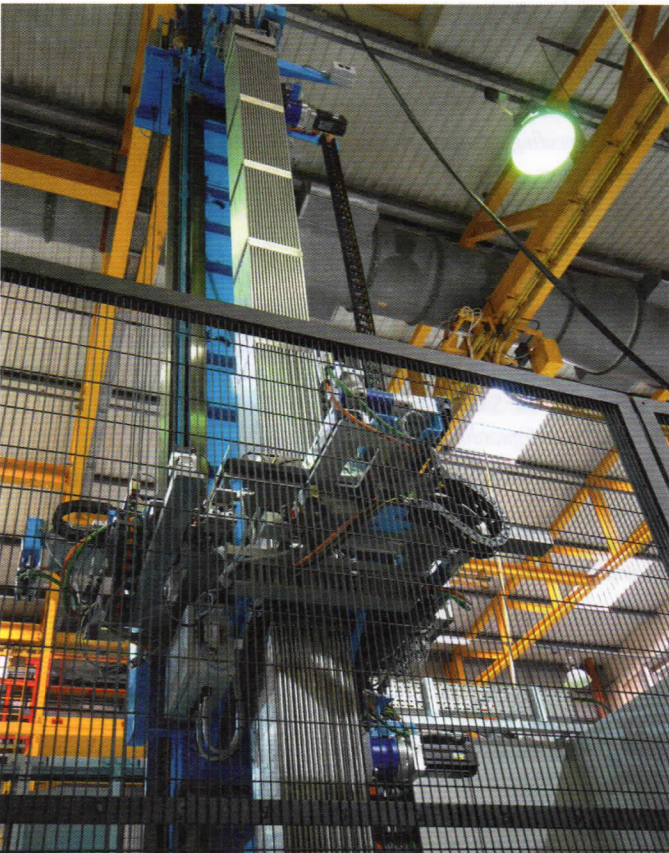
form a fuel assembly. A typical LWR fuel assembly is made up of 264 alloy tubes containing a total of 98,208 pellets!

Springfields is not only a centre for manufacturing nuclear fuel. It is also the hub and centre for the operations of Westinghouse in the UK. This role involves four major activities:

- Westinghouse are world-leaders in nuclear technology and use this knowledge to support and advise on the decommissioning and remediation of nuclear facilities such as Sellafield in Cumbria.
- As consultants Westinghouse support the operation of the UK's fleet of AGR power stations and Sizewell B to keep these plants operating safely, reliably and efficiently.
- The company has developed the AP1000® Pressurised Water Reactor for which it has just won regulatory approval in the UK and this supports the joint venture company NuGen's



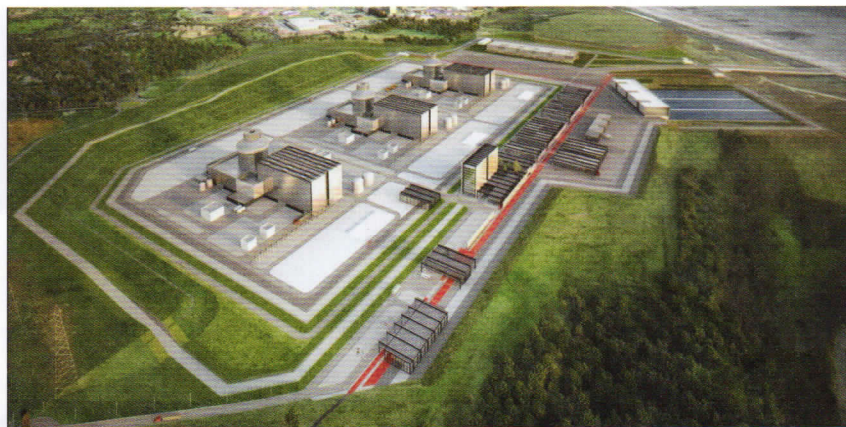
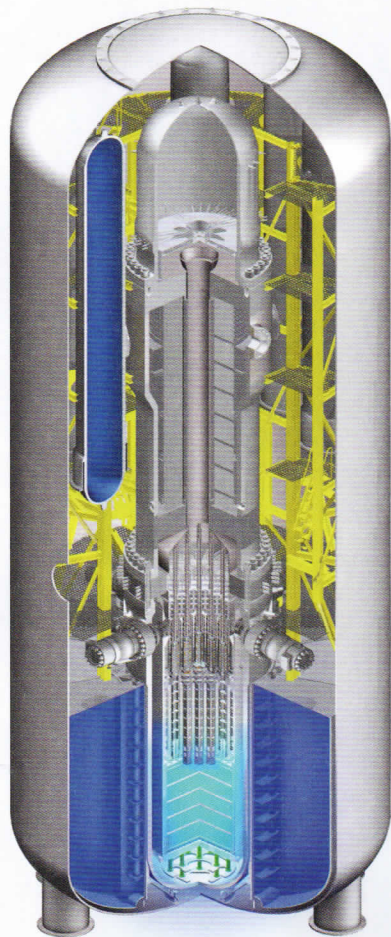
TOP: Final Assembly: The Oxide Fuels Complex at Springfields. LEFT: The AGR fuel assembly in its graphite sleeve. ABOVE: LWR fuel tubes coming off the 'production line'



TOP: This machine pulls fuel rods into the LWR assembly skeleton. ABOVE: This machine creates a perfect alignment of LWR fuel rods. RIGHT: Apprentice training is a high priority at Springfields

plans to use three of them in the Moorside Nuclear Power Station near Sellafield in Cumbria which will be capable of generating 3.8 gigawatts – enough to power 6 million homes! For the moment, however, the scheme is dogged by uncertainty as it is supported by Toshiba which is affected by huge cost over-runs on other projects and has declared a deficit of £7 billion. Westinghouse is 86% owned by Toshiba and has successfully sought US Chapter 11 protection from bankruptcy while it provides for cost over-runs and negotiates new arrangements. Toshiba have announced their ‘proactive consideration of strategic alternatives’.

- The current uncertainties affecting the Moorside project highlight the huge risks and problems of massive investment in large nuclear power stations. Westinghouse have worked-up a brilliant and very practical alternative: the Small Modular Reactor or SMR. Generating a more modest 225 Megawatts



**ABOVE: An artist's impression of the Moorside Nuclear Power Station
 FAR LEFT: A cross-section image of the Westinghouse Small Modular Reactor
 LEFT: Mick Gornall - The UK Managing Director of Westinghouse based at Springfields**

each can be accommodated on a site of just 15 acres. By way of comparison a solar power plant capable of generating that output – when the sun shines – would need 2,400 acres whilst wind power would need something like 16,000 acres! SMR's don't pose the same funding challenge as large power stations and can be clustered to meet known demand and optimise security arrangements. As we live on a small island where renewables can never meet all our power need all of the time they could be the future.

The economy of Lancashire and the North West benefits hugely from having Westinghouse in our region. The company directly employs more than 1,100 people in the UK of whom 92% live in the PR, FY and BB postal areas. Independent consultants have estimated that all UK Westinghouse employees have a total disposable income of more than £40 million pounds a year of which about £19.4 million is retained within our local economy. Indirect benefits are also considerable: the company spent £103 million through 812 suppliers in 2014/15 and indirectly supported an estimated 900 further jobs of which many are local to us. Although Springfields-based employees are generally older – 52% are over fifty – the company is investing heavily in training and with apprentices in particular. The in-house apprentice programme has provided 32% of all current employees and £750,000 is invested each year in training new talent.

Overseeing all this is Westinghouse UK Managing Director Mick Gornall who sums up what the site has achieved and their plans for the future: *“For over 70 years Springfields has been manufacturing nuclear fuel safely and efficiently for reactors in the UK and overseas. Today the site is managed and operated by Westinghouse and it is exciting times for both the site and the company. In addition to fuel*

manufacturing, Springfields is now the hub of Westinghouse's operations in the UK and over the next ten years the company will be expanding its other nuclear services, including its decommissioning and waste management services, particularly at Sellafield, and its operating plants business providing maintenance and outage services to the UK's fleet of reactors.

“Our new build business has recently completed the Generic Design Assessment for the Westinghouse AP1000 reactor which is now licensed for construction in the UK and supports NuGen's plans to deploy three AP1000 reactors at the Moorside site in Cumbria. Westinghouse is also committed to partnering with the UK Government to deliver the Small Modular Reactor (SMR) technology and the fuel for AP1000 reactors and Westinghouse SMR reactors built in the UK would be made at Springfields, safeguarding hundreds of jobs.

“Westinghouse believes that nuclear energy plays a key role in the supply of safe, clean and reliable electricity, and the company is proud to be based in Lancashire where it has a highly skilled and efficient workforce.”

Westerhouse at Springfields is – and will continue to be - a huge asset for our region. They boost the local economy and produce nuclear fuel safely for which we are all grateful.

Andrew Harris (www.andreweharris.co.uk) gratefully acknowledges the help provided by the Westinghouse team at Springfields in the preparation of this article. All the pictures are courtesy of Westinghouse Electric UK Limited.

