



Springfields Fuels Limited

## Plans and Challenges at the Springfields Site

*Simon Marshall October 2006*

---

### 1. Background


The Springfields site is located between Preston and Blackpool and has an area of 83 hectares. The site dates from the Second World War and has been variously owned by the MoD, UKAEA, BNFL and now the Nuclear Decommissioning Authority (NDA) for whom it is operated by Westinghouse.

Following the war, the site became involved in the early stages of the UK military and civil nuclear programmes, providing the first fuels for both the Windscale Piles and the Calder Hall Magnox reactors.

The site was split in 1971 with the creation of BNFL, with the UKAEA retaining a portion of the site for R&D activities. These ceased in the mid 1980's and BNFL then took control of the whole site.

In the early 2000's, the site was the sole manufacturer of nuclear fuel for the UK's AGR and Magnox reactors and had supplied LWR fuel for Sizewell B and for export. Intermediate products such as  $\text{UO}_2$  powder and natural  $\text{UF}_6$  were manufactured and exported under contract to other fuel manufacturers or enrichment facilities. With the impending closure of the Magnox reactors, it became apparent that the uranium hexafluoride business would become uneconomic because it shared many overheads with the Magnox fuel business.

The site then embarked on an 'oxide only' contraction, with an accelerated decommissioning programme of redundant facilities to allow the site to remain profitable. This involved a major workforce restructuring and a planned reduction from some 2000 people in 2000 to some 800 in 2008.

In 2004, two changes occurred which impacted this strategy. The first was the signing of a contract with Cameco for the toll conversion of  $\text{UO}_3$  to  $\text{UF}_6$  (hex), which would enable the Hex plants to remain open. The second change was the creation of the NDA, who took ownership of the site, and subsequently Springfields Fuels Limited as the site M&O contractor, with Westinghouse UK as its parent company. This change took BNFL (through  Westinghouse) from an owner/operator to M&O contractor.

The site currently employs a workforce of around 1650, of whom approximately 200 are employed as either contractors or agency supplied workers.

## **2. Current Key site work phases**

*2006-2009*

The focus is on continued manufacture of Magnox, Hex and Oxide products. The Magnox closure programme starts this year with its associated supply chain and workforce restructuring challenges. Elimination of the historic uranic residue backlog is a key regulatory commitment

*2009-2016*

The manufacturing focus continues for Hex and Oxide products (at reduced Oxide volumes as the first BE AGR stations close). The uranic residue backlog has been treated, and the Magnox plants Post Operational Clean Out (POCO) are complete with final decommissioning in progress.

*2016-2023*

Oxide manufacture continues at further reduced volumes. Hazard reduction continues with the closure/POCO/decommissioning and demolition of the Hex and associated plants.

*2023-2028*

Oxide manufacture ceases, all uranic material is removed from site, Oxide POCO commences

*2028-2031*

Final support buildings are demolished as the site end state is neared. Final ground remediation and waste removal lead to assumed closure in 2031.

## **3. Site Priorities**

As an M&O contractor, the site is reliant on funding from the NDA to discharge its business. A prioritisation matrix is available should funding be restricted which dictates the priority in which available funding is utilised. This prioritisation is as follows:

- Essential Safety, Health, Environment and Security
- Continued fuel manufacture
- Transformation and Innovation
- Decommissioning and end of site

## **4. Essential Safety, Health, Environment and Security**

The site has a policy of safety by choice, not by chance. The primary manner in which this is executed is via partnership working with the workforce, represented by the staff and trade unions. This partnership working commenced in the early 1990's using a joint behavioural

skills workshop approach, primarily to improve the working relationship between the management and the workforce representatives. The first evidence of the success of this approach was the joint approach to workforce restructuring, where the site numbers have reduced from some 4,000 in the 1980's to today's 1650 and a target of some 800 in 2008, all by voluntary means. The second is the approach to safety improvements which has seen a reduction in 3 day lost time accidents from 1 per week in the early 1990's to single figure numbers per year in 2005 and 2006. A key element of this is the behavioural observation programme which recently celebrated its 20,000 safety observation since its inception.

In recognition of its approach to safety, SFL was runner-up in the manufacturing sector of the RoSPA safety awards, achieving Highly Commended. This was the sixth successive year that Springfields received a senior award from RoSPA. Not content with this, the partnership approach is always continuing to seek ways to further reduce the accident rate. A Human Performance approach to work control is underway, and projects to improve data analysis and near miss reporting are nearing completion.

Our contractors are fully engaged in our behavioural observation programme, and they too have enjoyed an excellent safety record in recent years.

Whilst Hex plant remains open, the Cameco arrangement provides  $UO_3$  powder direct to the process plants, negating the large scale chemical processing of Uranium Ore Concentrate (UOC). This has allowed the front end chemical conversion process for purification of UOC to cease, with a resultant 90% reduction in beta discharges.

Over the past 5 years average individual annual radiation doses have remained consistently less than 1mSv.

## **5. Commercial operations**

The site has a lifetime monopoly supply contract with British Energy for the supply of AGR fuel, and a 10 year contract for the toll conversion of Hex with Cameco. With the last Magnox fuel being manufactured in 2007, a detailed strategy review has just been completed and is with the NDA for consideration. This indicates that increased asset utilisation at Springfields has the opportunity to generate significant additional revenue from commercial operations which the NDA can use to off-set the cost of decommissioning at Springfields and elsewhere. This may result in an extension to the site lifetime if for example, the BE AGR stations are granted lifetime extensions.

## **6. Transition and Innovation**

The NDA has initiated a macro economic assessment on potential asset and liability values for its uranium stocks under several future scenarios. Subject to Government approval, the outcome of this assessment will be used to inform and develop policies and strategies for the future management of the UK's uranium. The outcome of these strategic reviews will then be used to inform the sites' Lifetime Plans. These stocks comprise:

- a. Management of natural and enriched uranium residues currently located at a number of NDA sites
- b. Management of tails depleted  $UF_6$  from the enrichment process

- c. Management of UK Magnox depleted  $UO_3$  from reprocessing
- d. Management of oxide reprocessed  $UO_3$  from reprocessing of AGR/SGHWR fuel in Thorp.

SFL is working closely with all NDA sites to identify and characterise the natural and enriched residues identified above. The natural residues can be processed through existing facilities on site prior to Magnox closure, and a case is being made to keep open the enriched residues plant for the lifetime of the BE contract which will then allow recovery of the enriched residues. The benefit of early completion of this work is that the resultant uranium can then be fed into the commercial market.

Springfields is the only site in the UK with the skills, experience and infrastructure which provide the foundation for future treatment options of the UK's civil uranium materials. SFL is actively participating in ongoing economic studies related to the ultimate disposition of this material.

## **7. Decommissioning**

The current decommissioning policy is:

*To complete final decommissioning of all buildings and facilities immediately after commercial operations have ceased and post operational clean out has been completed, unless any further use is identified. To remediate the site at the end of its operational life, remove the outer site security fence and formally de-licence the site.*

This policy and the decommissioning methods have been endorsed by the Site Nuclear Safety Committee, in accordance with the Nuclear Site Licence, and have been agreed by the Nuclear Installations Inspectorate.

In recent years, SFL has safely completed the decommissioning of redundant buildings ranging from manufacturing facilities with heavy uranium contamination such as the A26 Uranium Oxide and Granule Production Plant to uncontaminated office and workshop facilities. The programme of work has essentially "caught up" with buildings which were no longer in use.

One notable opportunity for accelerated clean-up relates to the East Site Burial Pits, work on which is currently shown in the Lifetime Plan to commence in 2023. This facility consists of 7 underground burial pits, containing materials deposited in the mid to late 1950s. The total cost of this project is £17M, making it one of the highest cost clean-up projects identified for the site – for comparison, decommissioning of the Oxide Fuel Complex is estimated at £18M. Work is currently taking place to confirm the characterisation of waste in the pits which is understood to include contaminated slurry, scrap billet moulds and one pit contains beryllium filters concreted in drums. It is also anticipated that asbestos will be present.

## **8. Challenges**

Until last year, the business plan called for a substantial reduction in staffing levels as Magnox production was completed, the Hex business was closed and with the limited remaining AGR lifetimes. With the expansive business scenarios identified above, one serious consequence for the business is a re-appraisal of the manpower profile required to operate the

site. There is a need to move from planned closure arrangements, with agreements for staff to leave at predetermined points, to a recruitment programme, which includes both technical staff and increased numbers of engineering apprentices and graduates. The site is considering the skills and competencies required to deliver its existing plan and the strategy for resourcing future opportunities described in this paper. This work will be completed during this financial year, with implementation to follow. As is typical with the nuclear industry as a whole, the demographics of the site are such that any future resourcing strategies will consider the issues associated with employees with average service of 22 years. Knowledge transfer and knowledge retention from these longer serving employees is key to the continued success of some of the operations on site.

Key skills identified to date are:

- Safety and risk management including criticality
- Project management
- Commercial

The aforementioned business priorities require a coherent approach to improvement. SFL benefits from inclusion in the Westinghouse Customer 1<sup>st</sup> programme. This enterprise-wide improvement programme is based in the following 4 elements:

- Six Sigma: Evolved from Motorola and focuses on reducing variability
- Lean Enterprise: Evolved from Toyota and focuses on reducing waste
- Human Performance: Evolved from INPO/WANO and focuses on behavioural improvements
- Behavioural Differentiation: Evolved from Terry Bacon's theory on Behavioural Differentiation and focuses on differentiation through behaviour toward customers.

A structured training programme is tailored to different levels of the organisation. Springfields will also take advantage of the Westinghouse Fuel Manufacturing System, which will identify and share best practice across all Westinghouse manufacturing sites. This training forms one aspect of the skills development programme which is fundamental to the success of the site.

Given the NDA's current strategy of ultimate competition of all of its nuclear sites, Westinghouse is actively working with NDA to secure the best possible long term arrangements for operating the Springfields site in order to promote innovation and secure future business at the centre of the UK's nuclear power programme. Clearly, in a time of so-called *nuclear renaissance*, Westinghouse is seeking to ensure the maintenance of leading-edge nuclear fuel manufacturing and associated skills at the Springfields site for many years to come.