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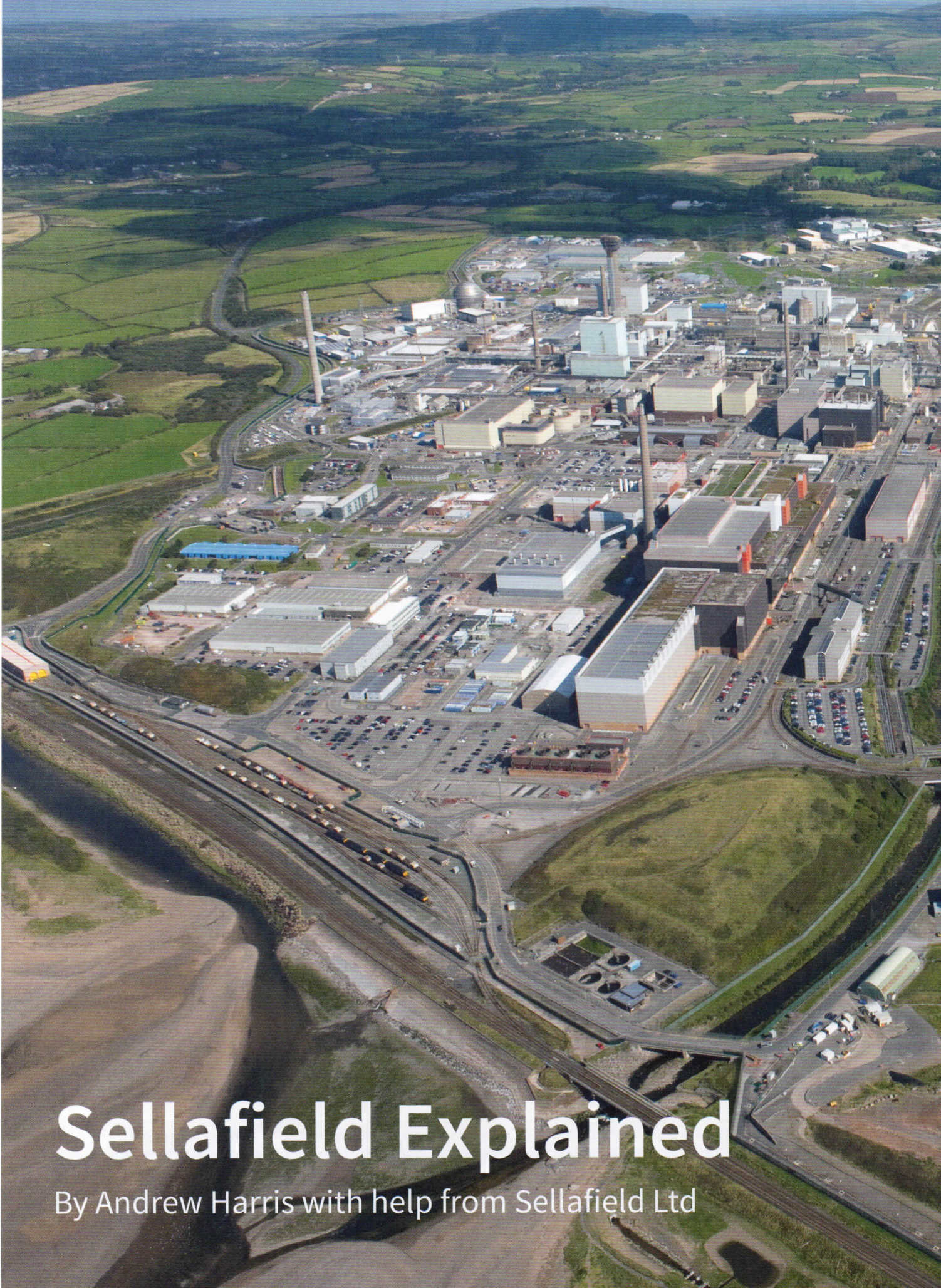
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'An aerial picture of the Sellafield complex



Sellafield Explained

By Andrew Harris with help from Sellafield Ltd

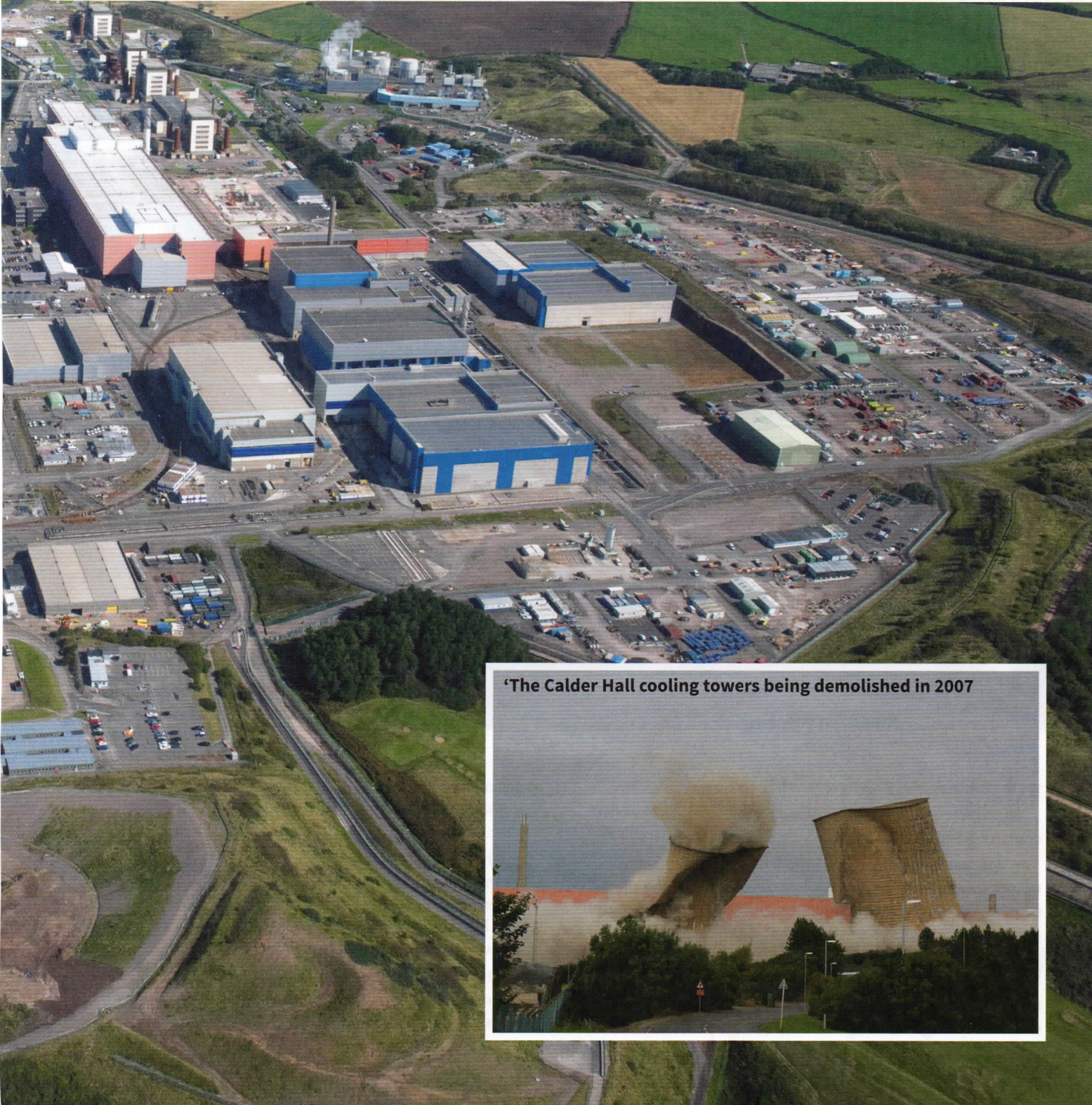
The Sellafield complex can trace its roots back to 1940 when a Royal Ordnance Factory was opened at nearby Drigg to produce high-explosive TNT followed by another ROF factory at Sellafield itself which provided highly-inflammable propellant from 1942. Both factories closed after the war ended but the tradition of dealing with dangerous processes was resumed in 1947 when plutonium and other materials were needed for Britain's nuclear weapons programme.

Sellafield has stayed in the nuclear business ever since providing more than 11,000 local jobs and supporting many more through suppliers. It has also

provided much anxiety over the years; between 1950 and 2000 there were 21 serious incidents or accidents involving off-site radiological releases. During the 1950s and 1960s there were long periods when harmful plutonium and irradiated uranium oxide particulates were deliberately released into the atmosphere. After the Thermal Oxide Reprocessing Plan – THORP - leaked highly radioactive product liquor inside a cell for 9 months just 11 years ago without being detected safety concerns became intense and widespread. Many people in North West England, Ireland and the Isle of Man wondered why we need Sellafield and campaigned for

closure. So why is it needed?

Although it has spawned other activities Sellafield mainly undertakes the essential role of reprocessing nuclear waste and safely storing the residue. The First Generation Reprocessing Plant was completed in 1951 to extract plutonium from spent fuel to provide material able to undergo nuclear fission for the British atomic weapons programme but was closed in 1973. From 1971 to 2001 the successor Magnox Reprocessing Plant reprocessed over 35,000 tonnes of Magnox fuel with 15,000 tonnes of fuel being regenerated. Magnox fuel must be reprocessed as it corrodes underwater





'A Sellafield Ltd employee carrying out decommissioning work

yet dry storage methods have yet to be invented.

More recent reports have identified FIVE special hazards contained within Sellafield's legacy facilities:

- Windscale Pile 1 is one of the 2 original reactors built to support the UK atomic bomb project and is where the country's worst nuclear accident took place in 1957 when a fuel cartridge broke and caught fire. Once the fire was extinguished the core was sealed and just left alone.
- The Pile Fuel Storage Pond – as pictured - contains spent fuel from weapons and energy reactors. The radioactive waste and sludge resulting from the storage process is in a

deteriorating concrete structure filled with water. This pond has not been used for 40 years or so but removal of the sludge is underway.

- The Pile fuel cladding silo contains 3200 cubic metres of aluminium cladding which surrounds fuel rods mostly from weapons reactors of the 1950s. It has been sealed since the 1960s but could be corroded which could cause hydrogen to form with worrying results.
- The Magnox spent fuel storage pond could be the most dangerous building in Europe. Cracks in this 150-metres long open-air pond have caused radioactive material to leak into



LEFT: Work to remove the 'filter gallery' at the top of the Windscale Pile reactor chimney. BELOW: A giant door frame being lifted into place at the Pile Fuel Cladding Silo - part of the process of opening up the silo to retrieve historic nuclear waste inside



the soil. The contents are unknown but could include up to a tonne of plutonium.

- It is suggested that the Magnox swarf storage silo could be the second most dangerous building in Europe. It stores waste management fuel cladding under water. Sludge has leaked through cracks which could corrode storage vessels.

In September 2016 BBC Panorama reported worries about radioactive chemicals being stored in plastic bottles only intended for short-term use. Linked with allegations about staffing levels being unsafe it added to public disquiet about Sellafield. In recognition of these very serious issues the Office for Nuclear Regulation has had as its number 1 priority "Hazard reduction and remediation at Sellafield Ltd's legacy facilities."

The ownership of Sellafield has often changed – most recently in 2015 when the Nuclear Decommissioning Authority's company Sellafield Ltd took over. As this company is a 'new broom' inheriting many problems your columnist invited them to provide the following outline of what they and the Office for Nuclear Regulation are doing and planning to meet the many safety and other challenges at Sellafield.

Sellafield Ltd: "For the 11,700 people who work there, and the community who live around it, Sellafield is a place of work - a factory like any other. Perhaps its unusual emphasis

on safety and security sets it apart but otherwise it operates much the same as any other industrial site in the UK. For the rest of the UK's population though, it's a mysterious relic containing a frightening legacy.

Changing the way people think about Sellafield is no easy task. Most people still think Sellafield is a nuclear power plant, despite electricity production ceasing more than a decade ago. It began as a plutonium factory, creating material for the UK's nuclear deterrent. In 1956, the world's first commercial nuclear power station, Calder Hall, was opened by the Queen and went on to provide carbon-free electricity for 47 years.

In the 1980s and 90s the site branched out into commercial nuclear fuel reprocessing and fuel production. However, the main task of today's workforce is a phased closing down and clearance of the site, a process known as 'decommissioning'. This involves carefully retrieving nuclear waste from aging storage facilities and placing it in modern containment, ready for its ultimate destination – a geological disposal facility.

It sounds straightforward, but back in the pioneering days of the early nuclear industry, when construction and experimentation was happening at breakneck speed, little thought was given to long-term planning. The result is a legacy of waste storage facilities, filled with nuclear material, but with no plans for how their radioactive contents would be emptied.

Now those facilities, built in the 1940s, 50s and 60s and collectively known as the legacy ponds and silos, are reaching the end of their lives. They require urgent and sustained attention to ensure they remain safe while their hazardous inventories are removed so they can be knocked down.

This requires a highly complex work programme to construct new buildings and develop new technology to carefully retrieve this waste, plus the design and build of a fleet of new treatment and storage plants to keep it in. This process has turned Sellafield into the UK's largest building site.

The full decommissioning of Sellafield – a site of more 1,000 buildings on just 6sq km of land – will take more than 100 years. In the meantime, Sellafield is still a commercial operation, taking used nuclear fuel from around the UK and



ABOVE: A wide angle view of the Sellafield complex. RIGHT: The Pile Fuel Storage Pond - one of the highest priority decommissioning projects at Sellafield. See Special Hazards.



the world to be reprocessed, or recycled, in its two nuclear fuel reprocessing plants.

However, both of these plants will close by the end of this decade, bringing to an end Sellafield's commercial activities and allowing its workforce to focus on its primary task of nuclear clean-up.

During more than half a century of fuel reprocessing, Sellafield will have earned billions of pounds for the UK and helped keep the lights on across the country. The 100-year decommissioning programme offers huge opportunities for the local workforce and Cumbria's growing nuclear supply chain.

Many countries around the world are facing similar challenges in nuclear clean-up and technologies and methods being developed at Sellafield are already being exported across the globe. Sellafield Ltd is working alongside the local community to create the Centre of Nuclear Excellence concept, designed to ensure Cumbria derives the maximum benefit possible.

The skills and capability being developed to deal with the past are providing the opportunities which will underpin Cumbria's economy of the future."

Office for Nuclear Regulation: "Sellafield is safe but presents many unique challenges due to its age and history.

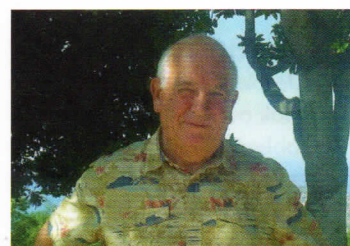
A considerable amount of work is still required to clean up out of date facilities at Sellafield and decommission its older plants. But this does not mean they pose an immediate

safety risk to workers or the public.

As the independent nuclear regulator, we set very high standards throughout the industry and we have seen Sellafield make significant progress in recent years. If we considered any plant to be unsafe we would shut it down or demand action to reduce that risk and return it to safety.

Sellafield is the most intensely regulated nuclear site in the UK. We have more than 50 highly qualified and experienced inspectors in our Sellafield team scrutinising the site to ensure it operates as safely and securely as possible.

Hazard and risk reduction at Sellafield remains our number one regulatory priority. We continue to play a key role in encouraging progress at the site and driving the pace of future hazard and risk reduction projects."



Andrew Harris –
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Senior Media Relations Manager. The illustrations are courtesy of Sellafield Ltd.