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# Drawing on outside expertise

Decommissioning is a complex engineering discipline and a defined skill-set is required to navigate this high-hazard world. But when it comes to decommissioning the non-controlled areas of a nuclear site, are the challenges magnified? **Richard Vann** offers his thoughts

**FIRST-GENERATION NUCLEAR POWER STATIONS** and research facilities are reaching the end of their natural design life, and site owners are facing the difficult task of managing their portfolio of assets with maximum respect for safety standards, the environment and their bottom line.

As is the case in many areas of heavy industry, bespoke decommissioning strategies are needed. In the UK alone, the Nuclear Decommissioning Authority (NDA) is managing 17 nationwide sites at different stages in their decommissioning lifecycle. Some will take several decades to execute fully, due not to the scale or volume of work involved, but to the decontamination, dismantling and demolition complexities associated with taking a site wholly offline before clearing it.

Nobody would deny that nuclear engineering is a hazardous and stringently-regulated sector, so the level of risk associated with decommissioning such sites cannot be overestimated. However, this applies to decommissioning works in many other industries, including pharmaceutical, petrochemical and non-nuclear power generation. Rupture a chlorine main on a chemical facility and the consequences could be devastating. Unknowingly expose operators to harmful asbestos and their health is in severe jeopardy.

The key principle of any decommissioning assignment is to identify the risks involved. Whether they are linked to radiation, a potentially explosive environment or working at height (for instance) once they are identified they can be understood, managed and mitigated.

## The evolution of decommissioning

Decommissioning science, has evolved significantly, particularly over the past two decades. Front-end engineering and execution services have become many

times more sophisticated, thanks to specialists in this field. Unfortunately, some industrial operators have not witnessed this evolution, which has led to a continued reliance on traditional methodologies and mindsets. In the nuclear sector, this means many decommissioning projects are being approached exactly as they have been for the past 30 years. Cost, environment and safety efficiencies are therefore being overlooked, particularly when tackling assets on the non-controlled area of a site.

Where do the opportunities lie?

## A cultural shift

Before the potential of modern decommissioning techniques can be realised, a cultural shift is required. The typical procedurally-intensive approach to managing live facilities is necessary, not least because of the site licences that govern them. However, there are specialists with relevant experience whose expertise and advice should be trusted. By bringing in the right knowledge, personnel exposure hours can be drastically reduced, for instance, and assets such as turbine halls, pumping stations, switch rooms and other ancillary buildings outside the radiologically controlled areas, can be cleared safely, with maximum respect for the waste hierarchy and with the client's commercial agenda in mind. Operators do not have to resort to the "it will cost what it will cost" mentality.

## Assessing all options

One of the first activities typically undertaken on a decommissioning project – irrespective of sector – is preparation of a feasibility and options study. Often commencing with a series of management workshops, these exploratory sessions help to uncover the issues associated with a site, before providing a view of the true opportunity or liability of the decommissioning scheme. These independent studies will then offer technical, costed conclusions and recommendations as to the most appropriate options for the site.

This type of project modelling will also incorporate wider considerations such as the skills required for the various stages of the project, and stakeholder relations to safeguard the integrity of the longer-term assignment.

## Defining the shape of the exercise

Everything must be rigorously documented, with detailed specifications of work created for the preparatory decommissioning exercise as well as hazardous material surveys, contractor tenders and so on.





Once a timed programme of works has been drawn up, a skilled project team should be assembled. Invariably, the insight of decommissioning, decontamination, dismantling and demolition engineers will be enhanced by the knowledge of the nuclear operator's own personnel. Such individuals are crucial to planning interfaces between the radiological and non-controlled areas of a site. For example, they can oversee emergency procedures in the event of a non-decommissioning-related incident and ensure non-contamination throughout, while speaking in the language that the site owner requires. The involvement of a radiation protection office (RPO) is also a given.

Other stakeholders will have an interest and involvement in the successful execution of works. These include the nuclear regulator. However, this is not a scenario typical only of the nuclear sector. Rules, hazards and nuances are considered throughout heavy industry, so a competent decommissioning specialist will factor them in to risk assessments and method statements, in the nuclear environment and beyond.

### Arriving at a 'known state'

It does not matter whether a team is decommissioning assets on the site of a coal-fired power station or one with a nuclear reactor – there are many challenges associated with bringing structures to a 'known state'. The true condition of assets is often unclear, and in the absence of accurate blueprints or inventories works will become more complex. It is therefore imperative to gather and interpret as much data as possible, for example on the type and level of hazardous material contaminations and on structural integrity. Only then can safe and informed decisions be made about the next and later steps.

Specific awareness of nuclear sites is imperative. There is likely to be a vast amount of asbestos and there are additional risks including radiological hazards to appreciate. But armed with this knowledge, decommissioning teams can make progress.

### Additional challenges

It would be foolish to overlook any of the many complexities associated with decommissioning in the nuclear engineering sector. For instance, a dose of radiation could be incurred even in non-controlled areas, which would significantly slow the project down; tools can be written off if they are found to be contaminated; and operationally, gaining access to a site is extremely difficult due to rigorous on-ground checks. But these complexities are navigable. Individuals may have to pass through a dosimeter every time they enter and exit certain areas of a



facility, for example, but if this process is found to affect productivity, even simple operational adjustments to the working week can ensure the project remains on schedule.

### Nuclear decommissioning in action

There have been a number of decommissioning milestones over the last two decades which merit acknowledgement.

In May 2017, controlled explosives were used to bring down four cooling towers at Magnox's Chapelcross site, and later that year four cooling towers were demolished in two minutes at Calder Hall on the Sellafield site. Never before had explosives been used on a licensed site in the civilian nuclear sector. A two-year process was needed to convince stakeholders that controlled explosion was the safest method. The alternative methodology – taking these thin-walled structures down mechanically, bit-by-bit – presented greater risk to personnel and the surrounding structures, as it was difficult to predict how the towers would have behaved. Extensive evidenced technical notes were necessary before the blowdowns were sanctioned.

According to the UK's Office for Nuclear Regulation (ONR) these remain the only two instances of explosives being used in civil nuclear decommissioning in the UK. An ONR spokesperson confirmed: "Any proposal to use explosives on a licensed site must be underpinned by a demonstrable, robust and conservative safety justification that meets ONR's expectations in respect of meeting relevant good practice and reducing the risks to as low as reasonably practicable (known as ALARP)."

### What's next?

There are dozens of assets that need tackling in the nuclear sphere and cost is a major factor, but these should not simply be left for the next generation to worry about. With clever thinking, meticulous planning and specialist experience, projects can be executed more smartly. ■