Nuclear measurement and control solutions



Engineered for your success



ABOUT ULTRA ENERGY

Energy, measured and controlled.

Innovative process measurement and control solutions that help you succeed in your mission.

Helping customers succeed in their missions

Our customers manage critical processes within nuclear facilities, many of which are located in extreme environments. The solutions we engineer deliver accurate measurement and control over processes in a way that's reliable, efficient, sustainable and safe. Through the value we create, our customers achieve the results they need to be successful in their mission.







Serving the nuclear industry since 1956

Part of Curtiss-Wright since January 2025, Ultra Energy's nuclear heritage stretches back nearly 70 years to the first days of the industry's existence. Since then, we have become essential to its safe ongoing operation and ability to comply with increasingly challenging safety regulations.

- Plessey's nucleonics division was founded in 1956
- UKAEA later acquired Plessey's IP, transferring it into Winfrith Safety Systems, which Ultra Electronics acquired in 2006
- Ultra also acquired Siemens Radmon for its radiation monitoring expertise in 2006, with both entities combined to form Ultra Energy
- In 1968, Weed Instrument was founded in the US to design and manufacture nuclear-qualified temperature and pressure sensors
- Weed Instrument was acquired by Ultra in 2008 and added to Ultra Energy's growing portfolio of nuclear expertise
- Lab Impex Systems was acquired in 2014, adding its area, air monitoring and stack effluent expertise to Ultra Energy
- Ultra Electronics, including Ultra Energy, was acquired by Advent International in 2022

Today, we operate out of facilities in the US and UK, with our solutions supporting reliable, efficient, sustainable and safe civil and defense nuclear operations around the world. Our technology is installed in 80% of US nuclear power plants and all currently operating UK nuclear power plants. Our experience in radiation detection also positions us as a leader in radioactive material management and radiological medical applications.



Measurement and control solutions

We solve challenges associated with the effective measurement and control of fission processes, power generation and radioactive materials management.

Our experience, design expertise and solutions enable customers to control complex, critical processes across a range of nuclear applications.

- Control fission and power generation processes in large reactors
- Maintain safe operation of legacy systems to extend plant life
- Maximize time and cost efficiencies in system development for next-generation reactors and SMRs
- Manage the lifecycle of radioactive materials

System design experience helps customers meet their program milestones

Developers of new reactors rely on our ability to innovate with proven technologies, as well as experience in working with nuclear regulators, to deliver program milestones quickly and efficiently. We provide support from concept development and design approval through to commercial launch and beyond.





Applications

Advanced reactors and SMRs

We partner with organizations developing novel reactor and plant technologies to help them meet their challenging program milestones. We work closely with them to develop innovative measurement and control solutions, typically based on our existing, proven technology, to drive timely, cost-effective development of systems.

As an experienced nuclear-qualified solutions provider, we deliver:

- Significant cost and time efficiencies in development programs
- On-time attainment of development milestones
- Stable pathways to regulatory approval and commercial launch

Expert solutions support

Our consultants and designers support the scoping, design, manufacture and integration of innovative systems that draw on the success of our proven nuclear technology. From physics-first principles through to manufacturing and ongoing support, our people possess unrivaled knowledge and expertise. To give the closest possible support, our teams are often embedded on customer sites.

Controlling development cost and time

While development time and cost is critical to a business case, safety is — as always — front of mind. Partnering with Ultra Energy, a highly experienced nuclear solutions provider, is vital to early discovery of potential safety challenges in first-of-a-kind engineering and addressing them fully, in the most cost-effective manner.

Case Stud

Development of a hightemperature neutron flux detector for nextgeneration reactors

Neutron flux instrumentation is present in all nuclear power plants. It provides near real-time insight into core reactivity, enabling reactor control systems to manage fission intensity — and therefore power generation — as well as safety at the facility.

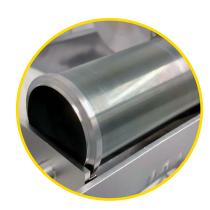
An essential component of this instrumentation are neutron flux detectors (NFD). These are sited in or around the reactor core and create a very small but measurable electronic signal in response to neutron flux. Given their location, they are often exposed to extreme conditions, including high heat, pressure and radioactivity, as well as factors that cause material corrosion.

For developers of next-generation reactors, Ultra Energy has designed and manufactured a new neutron flux sensor capable of operating from room temperature up to 800°C with no change in its performance.









New build large reactors

Our measurement and control systems have supported the development and ongoing operation of large-scale nuclear power generation capacity for many decades.

With increasing acknowledgment of the need to construct additional large plants around the world, the benefits of working with a team that has delivered solutions to multiple large reactor construction projects over such an extensive period include:

- Decades of innovation experience resulting in a portfolio of proven technology
- Significant expertise in adapting solutions to the requirements of new large nuclear power plant projects

Ultra Energy has helped to maintain the nuclear industry's record as the safest and most reliable way to generate electricity with the lowest overall environmental impact.

We've developed technologies that safeguard people, the environment and infrastructure from harm associated with nuclear fuels and processes at nuclear sites. At the same time, our solutions support continuous power generation and, by extension, revenue for operators.

Committed to partnership, innovation and quality

Program teams turn to Ultra Energy because we're recognized as a global leader in measurement and control systems, as well as a supplier with a strong commitment to working partnerships. We consistently deliver solutions that meet our customers' specifications, on time and within budget.

Qualified for use in all current large reactor types

Our solutions have been qualified for use in all leading reactor types, including AGR, PWR, BWR, CANDU (PHWR) and APWR. In the US, more than 80% of nuclear power stations rely on Ultra's temperature sensors for reactor coolant monitoring. The UK's entire active fleet depends on Ultra Energy neutron monitoring systems to operate.





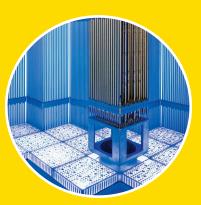
Helping developers meet their program milestones on time

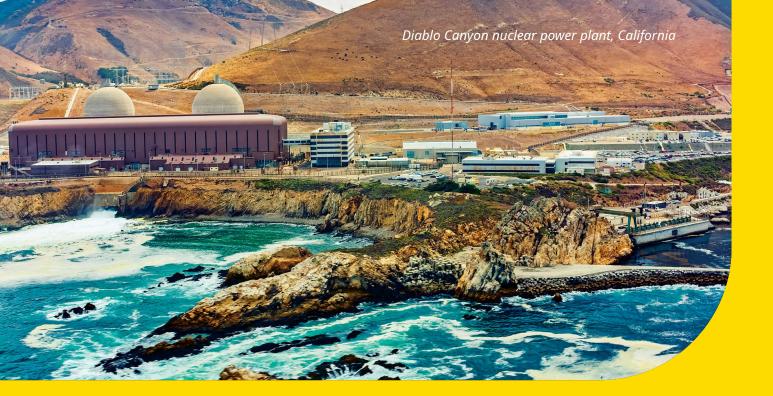
Since the industry began, Ultra Energy has been maintaining the safety of critical processes and radioactive material for a wide range of organizations responsible for nuclear technologies and facilities.

Developers of new reactor types are able to call on our expertise and proven technologies to deliver program milestones more rapidly and efficiently, supporting them through to commercial launch and beyond.

The full managed lifecycle of radioactive material has safety risks at each stage. We play a vital role in minimizing those risks, while also helping organizations to maximize the value they derive from the material under their control.







Plant life extensions

Extending the life of existing nuclear power plants supports the availability of reliable, low-carbon power. We've helped customers across the world to significantly extend the life of established nuclear power plant fleets by maintaining the safe operation of critical systems, regardless of their age or when specific parts were discontinued. Our work maintains operator revenue by ensuring continued power generation and costs vastly less than building a new reactor.

Sustained supply of discontinued parts or complete systems

One of our core competencies is delivering aging and obsolescence programs, including refurbishment, reverse engineering, redesign and remanufacture of parts or entire systems that are no longer in production. Our support often goes beyond immediate needs to provide an ongoing sustainment program all the way up to the point when a plant transitions into decommissioning.

Our aging and obsolescence expertise extends to process definition, sourcing, equipment evaluation and qualification. In addition to meeting our customers' performance requirements, our solutions are built to comply with national regulations and benefit from production in our state-of-the-art nuclear-qualified manufacturing facilities.

Case Stild

Ultra Energy delivered a 15-year life extension for critical computer-based protection systems

Summary

This project extended the operational life of an independent primary protection computer-based system by 15 years. This was achieved through the identification and replacement of life-limited and aging components, removing the need for a wholescale system replacement and saving the operator tens of millions of dollars.

Systems outline

The high-speed digital trip system monitors reactor core temperature through 816 thermocouples and uses digital data processing — checked by discreet pattern recognition logic — to initiate a reactor trip if excess localized core temperatures are detected.

Each channel contains a selection of custom pattern recognition modules and OEM equipment, including buffer amplifiers, high integrity A to D converters, IBM industrial computers and Compag desktop PCs.

Scope of work

Ultra undertook a phased assessment and recovery program. Initially, we reviewed the condition and supportability of custom and commercial equipment. Where items were unavailable, a replacement and justification package of work was completed. Where necessary, we were able to refurbish some units without a requirement for detailed justification.









Applications

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Radioactive material management

Ultra Energy supports the protection of people, infrastructure and the wider environment from harmful exposure to radiation. Our radiation monitoring solutions are based on long-established, field-proven proprietary technology that supports:

- Safe management of any type of radioactive material
- Applications across power generation, medicine and defense
- Detection of radioactivity in any media, including gases, solids, fluids and surfaces

Active lifecycle management of any radioactive material

Ultra Energy's solutions help operators safely manage the lifecycle of fuel used in nuclear power stations, including end-of-process waste. In addition, we help organizations using radioactive material in non-power generating settings, such as medicine or defense systems.

Real-time radiation monitoring

Working closely with customers and leveraging our proven technology, we design, manufacture and supply innovative monitoring systems. These systems monitor the real-time status of radioactive material in specific high-risk locations or across entire sites and wider areas in accordance with relevant legal obligations and organizational safety protocols.





Solutions

Your challenges. Our solutions.

Ultra Energy delivers custom measurement and control solutions to meet our customers' requirements. With nearly 70 years' experience in the nuclear industry, we use our expertise to leverage a portfolio of proven technologies to minimize the risks associated with nuclear processes and enhance productivity to deliver greater value to our customers' stakeholders.

Intelligence and expertise from a global design, manufacturing and project management team

With design, manufacturing and R&D resource based in our own facilities in the US and UK, professional project management teams apply their expertise to ensure solutions meet project needs and are delivered on time to the required quality.

- We build a close partnership with our customers
- Program-defined innovation leverages proven technology
- Solutions teams are committed to delivering program milestones

Guardline modular I&C safety system platform

Ultra Energy's Guardline platform enables the rapid delivery of highly customized I&C safety systems for nuclear power plants. It has a modular architecture enabling pre-qualified, mutually compatible, standard modules to be combined into units that deliver specific technical functionality. Units are combined to create a system that meets the complete range of customer requirements.

- Highly customizable
- Rapidly configured
- Comprehensive functionality



Proven in use

Guardline has seen over 10 million hours of operational safety duty use in the UK Advanced Gas Reactor fleet alone, with further tens of millions of hours use internationally in both safety-critical and safety-related roles.

Wide range of safety applications

Guardline is the evolved product of Ultra Energy's nearly 70 years' experience developing I&C technology for nuclear platforms across the world. Designed to meet the requirements of a wide range of safety applications within nuclear power plants, the open architecture of Guardline's I&C safety system platform allows Ultra Energy to incorporate existing and emerging nuclear safety technology.

- Primary protection
- Diverse protection
- Priority logic
- Post accident monitoring
- Diesel generator

Severe accident monitoring

High-integrity solutions

The platform is a pre-qualified, fully modular system, using self-testing and failsafe designs enabling the implementation of category A, B and C safety functions. All non-programmable system elements support category A functions, while the programmable elements support Category B functions.

Through our modular approach, the platform is designed and qualified to enable diagnostic and monitoring functionality of each module at the unit level.

- Custom solutions to meet plant, regulatory and customer needs
- Replacement of legacy systems in operational plants
- New designs for new nuclear plants
- Fully integrated with sensor and actuator systems

Guardline takes inputs from sensor types across multiple environmental, radiological and nucleonic domains and supports next-generation reactors and small modular reactors.



System (96 series) Customer specific configuration of modules, units, and sub-systems to provide a low risk

tailored solution.







Unit (95 series)

Configurable sub-systems of modules, mounted in 19-inch chassis, in 3U or 6U configurations.





Module (94 series)

The building blocks of the architecture is a catalogue of 3U-high modules, designed to perform a given functional task.

Neutron monitoring solutions

Operators must know the level of neutron flux in a reactor core to make the right safety and control decisions. Ultra Energy designs and manufactures neutron detectors and complete neutron monitoring systems for power and safety management in established and next-generation reactors.

Our neutron monitoring solutions ensure safe, long-term nuclear power generation:

- "Core to control room" solutions to accurately detect neutron flux
- · Full power range of reactors, from start-up to full power
- High-temperature detectors support advanced reactor designs

Our solutions are designed to support the full operating life of a nuclear power plant.

Ultra Energy's "core to control room" solutions accurately detect neutron flux and provide actionable information to human operators, as well as integrating with automated safety control and shutdown systems. Our solutions are designed to support the full operating life of a nuclear power plant.

Custom solutions for existing or new reactor designs

We supply replacement components for existing neutron monitoring systems or create custom solutions for new reactors, helping their developers construct a safety case in the process. Our neutron detector range covers the full power range of the reactor core and now works at up to 800° Celsius, which is of significant value to designers of advanced reactors.

Our Guardline non-programmable safety platform can be configured to a wide range neutron flux monitoring system, which provides signal processing of neutron flux sensors and trip outputs to voting units.

Embedded across civil nuclear power, development reactors and defense

Ultra Energy owns the neutron detector design for the UK's AGR fleet and has manufactured replacement detectors for these sites for the last 10 years. In addition to supplying neutron monitoring solutions to these and other civil nuclear programs, we support research and development reactors and supply the British Royal Navy's fleet of nuclear-powered vessels.





Ultra Energy reduces time and cost to build new neutron detection unit

The ability to measure neutrons accurately and in real time is fundamental to controlling the power a reactor generates, and neutron detectors provide the required information.

Recognizing Ultra Energy's high level of specialist skill in aging and obsolescence for nuclear operators around the world, EDF Energy contracted Ultra Energy to deliver a legacy neutron detector management program.

The customer, which is the UK-operating arm of the French state-owned energy company EDF, now has a guaranteed supply of critical neutron detectors for its fleet of seven Advanced Gas-cooled Reactor (AGR) nuclear power stations in the UK, and can continue operating them to their extended end-of-life target dates. Additionally, Ultra Energy reduced the time to manufacture a unit from two years to eight months.





Ultra Energy's heritage in designing and manufacturing nuclear-qualified precision temperature and pressure sensors and related accessories stretches back to 1968, when Weed Instrument was founded. Ultra Energy acquired Weed Instrument and its technology in 2008. Today, we offer continuous visibility of temperature and pressure within processes at nuclear power plants to support their safe and controlled operation.

- Our comprehensive range delivers your requirements regardless of installation constraints
- Highly experienced design and manufacturing team provides the right sensor at the right time
- Proven effectiveness with installations in nearly all US nuclear power stations

With a comprehensive range of products, we can support significant variation in environmental conditions, physical complexity and other system installation constraints.

End-to-end application engineering service

Our in-house team performs the engineering development, manufacturing, supply chain management and logistics to ensure you get the right sensor, with the right performance, at the right time to meet your needs. Our design and manufacturing capabilities enable customer application-led delivery of individual sensors up to bespoke sensor assemblies.

Annlied in practice

Risk of using off-the-shelf temperature sensors in harsh environments

Products, equipment and systems that must perform in harsh environments are only as reliable as their weakest component. Temperature sensors used in such environments are often the weakest link and the source of costly disruption and downtime. Because they are passive components, temperature sensors degrade under environmental conditions, such as extreme temperature, physical shock or vibration, humidity, corrosion and radiation. The harsher the environment is, the greater the risk of a premature sensor failure. Unexpected loss or degradation of temperature performance can have costly and dangerous consequences in critical applications.

Select a sensor developed to perform in harsh environments

An important part of selecting a temperature sensor for use in a harsh environment is to understand its development history. A sensor's resilience to harsh operating conditions is determined largely during its development process. Using an off-the-shelf temperature sensor that was not developed for harsh environment use, or whose development history is unknown, introduces quality risk that could lead to costly process downtime, or even worse: safety risk to equipment, facilities, workers and communities.







Temperature products



Resistance temperature detectors (RTDs)

Sensors that measure temperature by correlating the resistance of the RTD element with temperature

Thermocouples

- A thermocouple consists of two dissimilar metals joined at one end
- Cooling or heating the junction of the two metals produces a voltage that's correlated with temperature
- Most thermocouple alloys are commonly available as wire



Our temperature transmitters are qualified to IEEE-344 and can be used with RTDs or thermocouples



We provide accessories for your sensor applications, including thermowells, temperature transmitters, heads, connectors or thermocouple wire



Pressure products



Analog pressure transmitters

- DTC3® provides precision differential, absolute and gauge pressure measurements in non-safety critical applications requiring reliable performance and safety
- DTN2070 is designed for harsh nuclear environments and provides precision differential, absolute and gauge pressure measurements in applications requiring performance and functional safety



Electronic pressure transmitters

N-E11 and N-E13 are 2-wire differential, absolute and gauge pressure transmitters that have been type-tested for applications under seismic, radiation, aging and loss-of-cooling accident (LOCA) environments of nuclear power plants per IEEE 323-1974 and 344-1975 requirements



Foxboro™ pressure transmitters

 Our N-I/A series of differential, absolute and gauge pressure transmitters is designed for robustness and reliability to cover most of your application needs, reducing inventory and allowing for fast replacement with less downtime

Draft pressure transmitters

 Our N-DR800 draft series transmitter is a nuclear-qualified analog loop-powered transmitter for very low-pressure measurement such as HEPA vent filter, HEPA filter discharge flow, control room air, containment pressure, scrubber/preconcentrator demister, radiation waste evaporator, vent stack monitoring, turbine building DP and main chimney flow

Extreme environment pressure transducers

 Our NP9000 series pressure transducers are hermetic submersible transducers combining a Wheatstone bridge strain gauge pressure sensor and temperature sensor in one package

Radiation monitoring solutions

Ultra Energy designs and manufactures radiation monitoring systems that alert operators if levels breach set thresholds, helping them to safeguard people, the environment and investments.

Our radiation monitoring solutions:

- Detect and measure radiation, in any media
- Monitor high-risk areas, entire sites or wider areas
- Alert operators to take mitigating action or automatically initiate a response

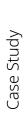
Our sensor range includes equipment that can detect all forms of radiation appearing in any medium, including gases, liquids, solids and surfaces.

Radiation detection heritage

Ultra Energy's heritage in radiation monitoring began in the 1980s, when we started integrating third-party radiation monitoring technology in our solutions. In the early 1990s, we began manufacturing the technology ourselves, integrating it into solutions we developed for the UK's civil nuclear industry. Today, nuclear organizations and sites around the world now use our solutions for both civil and defense applications.

Intelligent decision-making systems detect all radiation leaks and initiate action

Even small doses of radiation are potentially harmful. That's why it's critical that leaks of any kind, in any area, can be detected quickly and mitigating action can be initiated. Our detectors can monitor known at-risk locations or larger geographic areas. If thresholds are exceeded, sensors create and transmit an electronic signal to analysis and decision-making systems that raise an alarm locally and across a network of linked devices.





Protecting the environment and public from radioactive effluent at the world's largest treatment plant

Plans are underway for the design, construction and commissioning of the Hanford Tank Waste Treatment and Immobilization Plant, the world's largest radioactive waste treatment plant. When complete, the waste treatment plant will process and stabilize 53 million gallons of radioactive and chemical wastes being stored in underground tanks in southeastern Washington state, transforming it into stable glass form for permanent disposal.

Hanford required 19 stack effluent monitors installed in four facilities across the site. The customer required a vendor with a proven track record and the necessary in-house expertise required to supply the equipment under the ASME NQA-1 (nuclear specific) quality assurance standard. After winning the bid, Ultra Energy confirmed compliance with industry standards from experience and sampling inspection and provided system design documentation for its stack discharge filtration equipment.

Radiation monitoring products



Radiation detectors

- Geiger Muller-based detectors for environmental and high-dose rate applications
- Ion chamber-based detectors for gamma and neutron applications
- Scintillation probes for gross counting and spectroscopy-based process measurements



Continuous air monitors

- Smart CAM AB+ for alpha-beta aerosol concentration in air
- cms Noble Gas for the measurement of gaseous radioactive isotopes
- SmartMCA Iodine for the measurement of airborne radioiodines
- SigmaCAM for alpha-beta aerosol concentration in air
- 400SBDyC portable air monitor for tritium



Liquid monitors

- Online liquid effluent monitor for assessing radioactive concentration in liquids using adjacent-to-line configuration
- Bypass liquid effluent monitor for assessing radioactive concentration in liquids using bypass configuration



Area monitors

- CMS Gamma GM for continuous gamma dose rate measurement using GM detector technology
- CMS Gamma Ion for continuous gamma dose rate measurement using ion chamber detector technology
- CMS Neutron for continuous neutron dose rate measurement
- PLC Continuous Monitoring Station multi-channel radiation monitoring systems using PLC technology
- AAGM & DAGM analog and digital area gamma monitor that provides a direct replacement for obsolete area gamma measurement stations



Process and interlock radiation monitors for safety applications

- CMS Interlock SIL for high safety-integrity radiation interlock applications
- CMS Process SIL for radiation process measurement applications requiring a high safety integrity



PET stack monitor

PET stack monitoring for pharmaceutical production sites

Radiation monitoring products



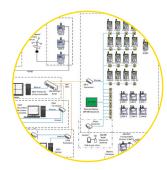
Stack effluent monitoring

- Stack flow monitoring, stack/duct air velocity sensors
- Gaseous probes for extracting gaseous isotopes to assess effluence
- Isokinetic probes for extracting particulate to assess representative effluence
- Shrouded probes for extracting particulate to assess representative effluence
- Stack monitoring solutions, including particulate, iodine and gas
- Stack sampling solutions (particulate), panels and cubicles for continuous radioactive effluent sampling
- Stack sampling solutions (tritium), gas sampling cubicle for assessing tritium effluence



Custom solutions

- Swab monitor
- Borehole monitor
- PLC continuous monitoring station, multi-channel radiation monitoring systems using PLC technology
- Reactor process monitoring



Data acquisition

• 9205 EMS, a central data logger built on a SCADA platform



Integrated building solutions

- Health physics equipment integration
- 9205 EMS, a central data logger built on a SCADA platform

Emergency monitoring and management

- AIDME is a deployable continuous monitoring station for particulate and dose-rate
- CIDS (criticality incident detection systems)



Filtration media

- TEDA Charcoal is a TEDA-impregnated charcoal Maypack filter for radioiodine sampling
- Silver Zeolite Maypack filters for radioiodine sampling

Dosimeters

 Personal dosimeters equipped to alarm in gamma and X-ray presence



Services

- Maintenance support
- Engineering services
- Project management

Solutions

STANDARDS

Operating in a safety-critical industry brings with it the responsibility to meet the highest standards at all times. We are committed to consistently exceeding industry-recognized standards to support our customers' success.

Part of Curtiss-Wright since January 2025, Ultra Energy has a robust quality management system and maintains international certification in all relevant areas. This commitment guides our work and provides reassurance that we will consistently deliver above and beyond the level you require.

We vet companies in our supply chain to ensure they meet our high standards, commit to our code of conduct and always meet our requirements, as documented in our Supplier Requirements Manual.



United States of America standards and certification

- ISO 19443 (QMS for nuclear suppliers)
- AS910:2016 / JISQ 9100:2016 / EN 9100:2018 and ISO 9001:2015 ASQ/ANSI/ISO 9001:2015
- ASME Section III Certification (NPT)
- TSSA N285.0 (CSA)
- ATEX Quality Assurance Certificate
- HAF604 for Design
- Laboratory Scope of Accreditation A2LA ISO/IEC 17025:2017 and ANSI/NCSL Z540-1-1994
- ITAR DDTC Manufacturer and Exporter Registration Statement
- ASME NQA-1 Appendix B Program (Nuclear Quality Assurance)
- CSA N299.1 (Nuclear Quality Assurance)



United Kingdom standards and certification

- ISO 9001 (QMS)
- ASME NQA-1 (Nuclear Quality Assurance)
- CSA N299 (Nuclear Quality Assurance)
- Environmental management ISO 14001 (EMS)
- Occupational health and safety management ISO 45001 (OHS)
- Energy management ISO 50001 (ENMS)
- Cyber Essentials Plus (Information Security)
- AMRC Fit 4 Nuclear
- HELLIOS JOSCAR
- Our suppliers are required to commit to a code of conduct and meet generic requirements, as documented in our Supplier Requirements Manual.

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