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iCOND

International Conference on
Nuclear Decommissioning

13th Edition

BOOK of ABSTRACTS

November 2024

ORGANIZER

AiNT

IN COOPERATION WITH

AURIVUS framatome GNS TÜVNORD pedi ZURICH

SAVE THE NEW SPRINGDATE

ICOND

14TH EDITION

International Conference on Nuclear Decommissioning

04. - 07. MAI 2026

VERANSTALTER AiNT

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AiNT
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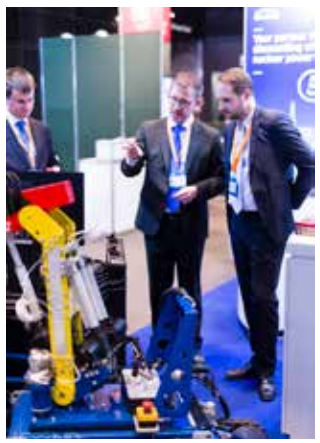

HINTERGRUND

Die Stilllegung kerntechnischer Anlagen stellen alle Beteiligten vor hohe planerische und genehmigungstechnische Anforderungen. In der laufenden Dekade werden sowohl in Europa als auch weltweit zahlreiche Kernkraftwerke aufgrund ihrer Laufzeit und politischen Entscheidungen außer Betrieb genommen. Dieser Umstand erfordert optimierte bzw. zwischen allen Beteiligten abgestimmte Rückbaustrategien. Die Fachveranstaltung fokussiert den rechtlichen Rahmen in Deutschland, vergleicht Stilllegungsstrategien und nimmt die verschiedenen Teilaufgaben des Rückbaus in den Blick. Neben den unterschiedlichen Genehmigungs- und Finan-zierungsstrategien spielt das Personal-management beim Übergang vom Kern-kraftwerksbetrieb zum Rückbauprojekt eine wichtige Rolle. Ebenfalls wird die Zwischenlagerung und Entsorgung radioaktiver Abfälle thematisiert, die für den Rückbau eine wesentliche Randbedingung darstellt.

BACKGROUND

The decommissioning of nuclear power plants, particularly power reactors, present high demands regarding planning and authorization to all parties involved. In the ongoing decade several nuclear power plants will be shut down due to their operating life and political decisions, not only in Europe, but also world-wide. As a result, optimized decommissioning strategies will need to be well-coordinated among all participants.

The ICOND focuses on the relevant legal parameters in Germany and compares decommissioning strategies worldwide. This includes roles of authorization, financial planning, and change management in the transition from nuclear power plant to decommissioned project. Furthermore the different options for interim storage and disposal of radioactive waste are discussed.

ZIELGRUPPE

Die Konferenz richtet sich an Betreiber von kerntechnischen Anlagen, die die Verantwor-tung für die Projektsteuerung und die Rest-stoffentsorgung von Rückbauprojekten haben. Weitere Zielgruppen sind Unternehmen, die mit der Planung und Durchführung von Rückbauprojekten beauftragt sind. Es werden Behörden und Sachverständigen-organisationen adressiert, die in Genehmigungs- sowie Aufsichtsverfahren und die Begutachtungen von Rückbauprojekten eingebunden sind. Ausgehend von Fachvor-trägen diskutieren die Teilnehmer/-innen die Herausforderungen des Rückbaus sowie Planungsvarianten für individuelle Rückbau-aufgaben. Alle Beiträge werden simultan übersetzt (Deutsch/Englisch).

AUDIENCE

ICOND addresses operators of nuclear plants and companies who are working on the planning, implementation and supervision of decommissioning projects; authorities and technical experts whose focus includes the approval and supervisions procedure of decommissioning projects; and research institutions which are responsible for the dismantling of research reactors and the storage and/or disposal of radioactive hazardous waste. ICOND will enable participants to proficiently discuss the challenges of the decommissioning of nuclear plants in a practical way, and to define optimal planning variants for decommissioning implementation. Simultaneous translation (German/English) will be available.

RÜCKBLICK ICOND 2023 REVIEW

Wie schon in den vergangenen Jahren veranstaltete das Aachen Institute for Nuclear Training GmbH (AiNT) auch 2023 wieder die International Conference on Nuclear Decommissioning (ICOND); eine der wichtigsten Branchentreffs im Bereich des nuklearen Rückbaus und der Entsorgung von radioaktiven Abfällen. Zum nunmehr zwölften Mal wurden auch in diesem Jahr bedeutende Innovationen und aktuelle Entwicklungen von 33 Speakern den mehr als 280 Teilnehmenden aus 16 Ländern vorgestellt und gemeinsam diskutiert. Im Fokus standen dabei nicht nur fachlich/technische, sondern auch gesellschaftlich und politische Aspekte. An der ICOND 2023 haben sich darüber hinaus zahlreiche bedeutende Fachunternehmen beteiligt, die ihre Produkte und Dienstleistungen in der begleitenden Ausstellung präsentierten.

In dem Pre-Conference Workshop am 13. November 2023 präsentierten die Speaker ihre aktuellen Produkte und Dienstleistungen für den nuklearen Rückbau. Den TeilnehmerInnen wurden dabei sowohl innovative und hoch anspruchsvolle Messtechniken als auch Rückbau-, Dekontaminations- sowie Behandlungsverfahren anschaulich vorgestellt.

As in previous years, the Aachen Institute for Nuclear Training GmbH (AiNT) once again organized the International Conference on Nuclear Decommissioning (ICOND) in 2023; one of the most important industry gatherings in the field of nuclear decommissioning and the disposal of radioactive waste. This year, for the twelfth time, important innovations and current developments were presented and discussed by 33 speakers to more than 280 participants from 16 countries. The focus was not only on professional/technical aspects, but also on social and political aspects. Numerous major specialist companies also took part in ICOND 2023, presenting their products and services in the accompanying exhibition.

In the pre-conference workshop on November 13, 2023, the speakers presented their current products and services for nuclear decommissioning. Innovative and highly sophisticated measurement techniques as well as dismantling, decontamination and treatment processes were clearly presented to the participants.

AUSSTELLER ICOND 2024 EXHIBITORS

ICOND PROGRAM

SPEAKER REFERENCE WALL

aixIT em Individuelle IT-Lösungen · amentum · AURIVUS · Bayerisches Staatsministerium für Umwelt und Verbraucherschutz · Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz · BUILD INFORMED · BGE Bundesgesellschaft für Endlagerung · Department for Business & Trade · 中核集团 CNNC · cleanLASER Clean-Lasersysteme GmbH · cyclife GROUPE EDF · DORNIER Group · enresa · Fachhochschule Südwestfalen University of Applied Sciences · framatome · GNS · HATCH · IAEA · iUS Institut für Umwelttechnologien und Strahlenschutz GmbH · Jacobs · JEN Jülicher Entsorgungsgesellschaft für Nuklearanlagen · MIRION TECHNOLOGIES · Niedersächsisches Ministerium für Umwelt, Energie, Bauen und Klimaschutz · NRG PALLAS Nuclear. For Life. · NUKEM Technologies · PAUL SCHERRER INSTITUT PSI · Preussen Elektra · RWE · sydkraft · Technische Universität München · TÜVNORD · UK Atomic Energy Authority · vüje · Westfälische Hochschule · wti

MONDAY - NOV. 18TH, 2024

PRE-CONFERENCE WORKSHOP

(Presentations are held in English)

11:30 REGISTRATION

12:00 QUICK LUNCH

DECOMMISSIONING SERVICES & PRODUCTS

13:00 **Welcome**
Dr. Luc Schlömer – AiNT GmbH & Michael Köbl – GNS mbH

13:15 **Belgian Nuclear Landscape Opportunity to Collaborate**
Peter Berben - ENGIE

13:40 **General Approach to the Decommissioning and Processing of Sludge Generated in the Long-Term-Storage at the A1 NPP**
Miroslav Toth – Vuje Norge A.S.

14:05 **Change Management in the AVR Dismantling Project - Well-Prepared for the Final Dismantling Phase**
Marco Steinbusch – JEN mbH

14:30 **Metrological Challenges in Dismantling and Possible Solutions - a Brief Overview**
Dr. Matthias Fritzsche – Mirion Technologies (Canberra) GmbH

14:55 COFFEE BREAK

15:30 **Radiological Monitoring Systems for Waste Characterisation in the Environment of our Decomissioning Solutions**
Dr. Marina Sokcic-Kostic – NUKEM Technologies Engineering

15:55 **Application of 3-D Modelling in Practical Radiation Protection Applications and Training**
Franz Borrmann – IUS Institut für Umwelttechnologien und Strahlenschutz GmbH

16:20 **A Digital Twin Approach to Radiological Clearance and Nuclear Decommissioning using modern web applications and 3D visualization**
Alexander Willkomm – aixITem GmbH
Jakob Hirn – BuildInformed GmbH

16:45 **Industrialization of the cleanDECON Laser Decontamination Technology for NPP - New Market Driven Solutions**
Sergej Retich – Clean Lasersysteme GmbH

17:10 **Technology update on Wave Blast: Innovative Complex Geometry Metal Decontamination**
Brian Gihm – Hatch Ltd.

SIMULTANEOUS TRANSLATION

TUESDAY - THURSDAY
DIENSTAG - DONNERSTAG

TUESDAY - NOV. 19TH, 2024

10:00 **REGISTRATION**

11:30 **QUICK LUNCH**

13:00 **Welcome**
Dr. Luc Schlömer – AiNT GmbH
Michael Köbl – GNS mbH

KEY NOTE - THE CHALLENGE OF D&D - EFFICIENT COOPERATION BETWEEN AUTHORITIES, EXPERTS AND WASTE PRODUCERS?
HERAUSFORDERUNG RÜCKBAU - EFFIZIENTES ZUSAMMENSPIEL VON ABFALLVERURSACHERN, BEHÖRDEN UND SACHVERSTÄNDIGEN?

13:15 **Challenges in Decommissioning and Dismantling from the Perspective of PreussenElektra**
Herausforderungen bei der Stilllegung und im Rückbau aus Sicht der PreussenElektra
Michael Bongartz – PreussenElektra GmbH

13:40 **Nuclear Licensing and Regulations for Supervision of the Decommissioning and Dismantling of the Gundremmingen II Nuclear Power Plant (KRB II)**
Atomrechtliche Genehmigung und Aufsicht bei Stilllegung und Abbau des Kernkraftwerks Gundremmingen II (KRB II)
Ulrich Wiedenmann – Bayrisches Staatsministerium für Umwelt und Verbraucherschutz

14:05 **Current Status of Nuclear Administrative Procedures in Niedersachsen - Germany**
Aktueller Stand kerntechnischer Verwaltungsverfahren in Niedersachsen
Silva Smalian – Nieders. Ministerium für Umwelt, Energie, Bauen und Klimaschutz

14:30 **Challenges in Dismantling of Nuclear Facilities from the TSO´s Perspective**
Herausforderungen beim Rückbau kerntechnischer Anlagen aus der Sicht der Sachverständigen
Dr. Hans Koopman – TÜV NORD EnSys GmbH & Co. KG

14:55 **The Challenge of D&D - Efficient Cooperation between Authorities, Experts and Waste Producers - From an International Perspective**
Herausforderung Rückbau - Effizientes Zusammenspiel von Abfallverursachern, Behörden und Sachverständigen – Aus internationaler Sicht
Tetiana Kilochytska & Shinichi Higuchi – IAEA

15:20 **COFFEE BREAK** sponsored by pedi ZURICH

PROJECT STATUS & BEST PRACTICE
PROJEKTSTATUS & BEWÄHRTE VERFAHREN

16:15 **International Experience and Technology Benchmarks in Decommissioning and Waste Management for Site Regeneration**
Internationale Erfahrungen und technologische Benchmarks bei der Stilllegung und Abfallentsorgung für die Standortregeneration
Rudy Koenig – Amentum Clean Energy Ltd.

16:40 **Boiling Water Reactors - Optimised Dismantling through Parallel pre- and post-Dismantling - Experiences from Projects in Germany and Sweden**
Siedewasserreaktoren – Optimierter Rückbau durch parallele Vor- und Nachzerlegung – Erfahrungen aus Projekten in Deutschland und Schweden
Fabian Attenberger – NUKEM Technologies Engineering GmbH

17:45 **DEPARTURE OF BUSES TO DINNER LOCATION**
Abfahrt der Busse zur Dinner Location

18:15 **CONFERENCE DINNER AT „DAS LIEBIG“** sponsored by TÜVNORD
Conference Dinner im „Das Liebig“

SIMULTANEOUS TRANSLATION

TUESDAY - THURSDAY
DIENSTAG - DONNERSTAG

WEDNESDAY - NOV. 20TH, 2024

DECOMMISSIONING TECHNOLOGIES
RÜCKBAUTECHNOLOGIEN

09:00 **Project Statues of HWRR Decommissioning and Digitalization Technology Application**
Projektstatus des HWRR Rückbaus und der Digitalisierungs-Technologieanwendung
Zhang Yu – China Institute of Atomic Energy

09:25 **Success Factors and Lessons Learned from Uniper’s Swedish D&D Program’s first Half-Time**
Erfolgsfaktoren und Erfahrungen aus der ersten Halbzeit des schwedischen D&D-Programms von Uniper
Dr. Martin Amft – Sydkraft Nuclear Power AB

09:50 **COFFEE BREAK** sponsored by pedi ZURICH

10:45 **Strategies, Innovation and Optimization on Waste Optimization at Garoña NPP D&D by Enresa**
Strategien, Innovation und Optimierung der Abfälle beim AKW D&D Garoña von Enresa
Diego Espejo Hernando – Enresa S.A.

11:10 **Decommissioning Strategies in France - The Fessenheim NPP Example**
Rückbaustrategien in Frankreich - Das Fessenheim AKW Beispiel
Hugo Mejia – Cyclife Germany GmbH

11:35 **Full System Decontamination - A Sustainable Way to Reach More Challenging Targets on Waste Reclassification**
Vollständige Systemdekontaminierung - Ein nachhaltiger Weg zur Erreichung anspruchsvoller Ziele bei der Abfallneueinstufung
Pedro Moreira – Framatome GmbH

INNOVATION AND DIGITALIZATION
INNOVATION UND DIGITALISIERUNG

12:00 **Counting, Measuring, Weighing with AI and 3D Scans for Enhanced Efficiency in Nuclear Power Plant Decommissioning**
Zählen, Messen, Wiegen mit KI- und 3D-Scans für mehr Effizienz beim Rückbau von Kernkraftwerken
Dr. Stefan Hörmann – Aurivus GmbH

12:25 **AI in Practice: Experience and Perspectives from the Decommissioning Plant Gundremmingen**
KI in der Praxis: Erfahrungen und Ausblick von der Rückbauanlage Gundremmingen
Carsten George – RWE Nuclear GmbH

12:50 **LUNCH**

13:45 **MEET YOUR COMPANY**

13:45 **Product Control: Increase of Efficiency and Transparency by Digitalisation and KPIS**
Produktkontrolle: Steigerung von Effizienz und Transparenz durch Digitalisierung und KPIS
Philip Borck & Karolin Möhle – Bundesgesellschaft für Endlagerung mbH

14:10 **An Example of how Modern KI Tools can Lead to an Effective Decommissioning Process through the Use of Interpretable Machine an Hybrid Intelligence**
Ein Beispiel dafür, wie moderne KI-Tools zu einem effektiven Stilllegungsprozess durch den Einsatz von interpretierbaren maschinellen und hybrider Intelligenz führen können
Thomas Kopinksi – FH Südwestfalen

WASTE MANAGEMENT, DECOMMISSIONING & CHARACTERIZATION
ABFALLMANAGEMENT, RÜCKBAU & CHARAKTERISIERUNG

14:35 **Feasibility Study for the Usage of 3D Printed Tools in a Radiochemical Laboratory**
Machbarkeitsstudie für den Einsatz von 3D-gedruckten Werkzeugen in einem radiochemischen Labor
Patrick Haass & Lars Grooten – NRG

15:00 **Thoughts on German Waste Management Strategies**
Überlegungen zu deutschen Abfallwirtschaftsstrategien
Michelle Dicksinson – Amentum Clean Energy Ltd.

15:25 **A Review of the Challenges of Waste Management and Decommissioning of Future Fusion Power Plants**
Ein Überblick über die Herausforderungen der Abfallentsorgung und der Stilllegung künftiger Fusionskraftwerke
Nick Sykes – UK Atomic Energy Authority

15:50 **COFFEE BREAK** sponsored by pedi ZÜRICH

16:15 **Development and Test of a Sorting System for Soil with Conventional and Radiological Contamination**
Entwicklung und Test eines Sortiersystems für konventionell und radiologisch kontaminierten Boden
Dr. Christoph Klein – NUKEM Technologies Engineering Services GmbH

16:40 **Radiological Caracterization of the Control Area of the Large Hot Cells of the JEN in Jülich**
Radiologische Charakterisierung des Kontrollbereichs der Großen Heißen Zellen der JEN in Jülich
Uwe Königs – WTI GmbH

RULES AND REGULATIONS
REGELN UND VORSCHRIFTEN

17:05 **Successor Regulations of the KTA Standards for Nuclear Power Plants and Research Reactors**
Nachfolgeregelungen der KTA-Regeln für Kernkraftwerke und Forschungsreaktoren
Dominic Krönung – BMUV

17:00 **BUSINESS SPEED NETWORKING**

17:30 **GET TOGETHER**
sponsored by framatome

SIMULTANEOUS TRANSLATION

TUESDAY - THURSDAY
DIENSTAG - DONNERSTAG

THURSDAY - NOV. 21ST, 2024

COMPETENCE & TRAINING
KOMPETENZ & WEITERBILDUNG

09:00 **Safety: Today and Tomorrow**
Sicherheit: Heute und morgen
Dr. Daniela Gutberlet – Westfälische Hochschule

09:25 **EducTUM - An Interactive Platform for Education and Training as well as the Maintenance of Competence in the non-destructive Analysis of Radioactive Materials from Decommissioning and Dismantling**
EducTUM - eine interaktive Plattform zur Aus- und Weiterbildung sowie dem Kompetenzerhalt im Bereich der zerstörungsfreien Analyse von radioaktiven Stoffen aus Stilllegung und Rückbau
Dr. Thomas Bücherl – TU München

09:50 **COFFEE BREAK** sponsored by pedi ZÜRICH

RESIDUE MANAGEMENT & CLEARANCE
RESTSTOFFMANAGEMENT & -FREIGABE

10:30 **Materials and Surfaces Release Use of Advanced Devices for Process Scaling**
Werkstoffe und Oberflächen Freigabe der Nutzung fortschrittlicher Geräte ür die Prozessskalierung
Dr. José Luis Leganes Nieto – Enresa S.A.

10:55 **Planning a Laboratory for Release-Related Laboratory Measurements**
Planung eines Labors für freisetzungsbezogene Labormessungen
Dr. Bettina Grauel – Dornier Group GmbH

11:20 **Radiological Clearance of Buildings using the Example of the Decommissioned Proteus Research Reactor at PSI**
Radiologische Freigabe von Gebäuden am Beispiel des stillgelegten Proteus-Forschungsreaktors bei PSI
Dr. Fritz Leibundgut – Paul Scherrer Institut

11:45 **Clearance in Bavarian Nuclear Facilities Using the Example of KKI 1**
Die Freigabe in bayerischen kerntechnischen Anlagen am Beispiel von KKI 1
Sven Böhringer – LfU Bayern

12:10 **The Challenge of Radioactive Waste Disposal - Between Heritage Protection and High-Tech**
Die Herausforderung der Entsorgung radioaktiver Abfälle - zwischen Denkmalschutz und Hightech
Dr. Thomas Lautsch – Bundesgesellschaft für Endlagerung mbH

12:35 **FINAL STATEMENT AND OUTLOOK**

13:00 **QUICK LUNCH**

SIMULTANEOUS TRANSLATION

TUESDAY - THURSDAY
DIENSTAG - DONNERSTAG

SPEAKER ABSTRACTS
MONDAY

PETER BERBEN | **13:15** | **MONDAY**

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BELGIAN NUCLEAR LANDSCAPE OPPORTUNITY TO COLLABORATE

Join for an insightful presentation that delves into the current nuclear context in Belgium, focusing on the significant strides and challenges in the decommissioning and operational lifetime extension program at ENGIE Electrabel.

Belgium‘s nuclear energy sector is undergoing a transformative phase. ENGIE Electrabel, a key player in this domain, is at the forefront of these changes. This presentation will provide a comprehensive update on the ongoing and upcoming projects that are shaping the future of nuclear energy in the country.

Decommissioning Efforts
Currently, two of ENGIE Electrabel‘s nuclear units are in the decommissioning phase. This process involves safely dismantling the reactors and managing the radioactive materials, ensuring minimal environmental impact. Next year, three additional units are scheduled to enter the decommissioning phase, marking a significant step in Belgium‘s transition towards sustainable energy solutions.

Operational Lifetime Extension
In parallel, ENGIE Electrabel is extending the operational lifetime of its two youngest nuclear units. These units will continue to provide reliable electricity until at least 2035. This extension is crucial for maintaining energy security and supporting Belgium‘s energy transition goals.

Challenges and Collaboration
The staggered approach to decommissioning and lifetime extension presents unique challenges for ENGIE Electrabel. Effective collaboration with stakeholders and the supply chain is essential to navigate these complexities. The support and cooperation of all involved parties are vital to the success of these initiatives.

MIROSLAV TOTH | **13:40** | **MONDAY**

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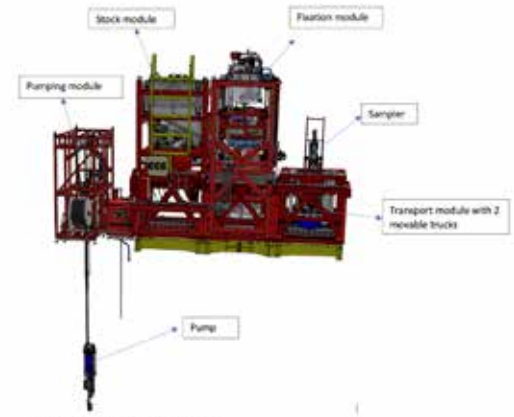
GENERAL APPROACH TO THE DECOMMISSIONING AND PROCESSING OF SLUDGE GENERATED IN THE LONG-TERM-STORAGE AT THE A1 NPP

The main goal of this presentation is to highlight issues in the decommissioning of the Long-term storage(LTS) and consequent processing of radioactive sludge into a solid and safe form for handling and storing. Decommissioning in the Slovak Republic is gaining momentum as two different types of NPPs, with different radiological characteristics, are currently at an advance stage of decommissioning. Two units of the V1 power plant were deactivated in a controlled manner in 2004. The A1unit was shut down in second half of the seventies after 2 minor events. The LTS for spent nuclear fuel was an area where the amount of highly radioactive liquid waste, with a very high content of Cs137, gradually increased. After laboratory testing and pilot plant verification of the proposed methodology, new process equipment was manufactured. To prevent possible penetration and leakage of media through the bottom and walls of the pool and to create a better environment from the point of view of radiation protection in these premises it was decided to relocate all of the sludge into a new tank equipped with a stirrer. This tank contained approximately 12.1 m3 of sludge, which has been treated using the newly designed process equipment.

It is a semi-auto-matic, multi-purpose device that enables the fixation of radioactive sludge into cement or geopolymere matrix. It is a four-module device that allows sludge solidification into 200 l drums or 60 l kegs. The sludge solidification process is controlled from a remote operating panel, installed in an adjoining room. To date 23,906 kg of sludge has been successfully immobilised and fixed into 682 drums with a total activity of 10 TBq, meeting the basic criteria for compressive strength and Li coefficient (index of leachability). The solidification of ILW as a persisting ecological burden has been an important step in the course of the decommissioning of NPP A1.



Process equipment for sludge solidification


Barrels containing solidified sludge loaded in a shielded pallet.

MARCO STEINBUSCH | **14:05** | **MONDAY**

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CHANGE MANAGEMENT IN THE AVR DECOMMISSIONING PROJECT – WELL-PREPARED FOR THE FINAL DECOMMISSIONING PHASE

With the removal of the reactor vessel in 2015 and the completion of the dismantling of the primary circuit components in 2018, the risk potential of the AVR facility was reduced to the extent that, among other things, the obligation to report under the Nuclear Safety Officer and Reporting Ordinance (AtSMV) no longer applied, and the need for nuclear reliability checks for personnel, following an application to the nuclear regulatory authority, could be eliminated. However, a holistic assessment of the decommissioning project, considering the changed conditions due to the advanced stage of decommissioning, was not conducted. As a result, upon completing the dismantling of the primary circuit components and entering the final decommissioning phase, no reduction in residual operating costs was observed. Instead, there were increased project delays.

To counter this effect, a comprehensive review of the entire decommissioning project was carried out in 2019, which concluded that:

- The existing operational manual, including the testing manual, should be updated to reflect the significantly reduced risk potential of the facility.
- The current organizational structure, which included a separation between operation and decommissioning, should be reviewed and adjusted to align with the changed conditions.
- Existing processes should be aligned with the new organizational structure.

The motivation and readiness for change among employees should be enhanced by providing future perspectives.

As a result of the change process, the AVR decommissioning project successfully minimized the observed project delays to a low level by 2023. Additionally, by adjusting the existing decommissioning and inspection manuals, a significant reduction in residual operating costs is expected in the coming years.

DR. MATTHIAS FRITZSCHE | **14:30** | **MONDAY**

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Germany

www.mirion.com

METROLOGICAL CHALLENGES IN DISMANTLING AND POSSIBLE SOLUTIONS - A BRIEF OVERVIEW

Decommissioning of Nuclear Sites seems to be much more complex than anticipated when the decision was made to phase out of nuclear power in Germany.

The measurement tasks for a plant in decommissioning are much more challenging and need new approaches and processes.

Not only the operators see themselves charged with more complicated tasks, also the manufacturers of equipment are facing more challenges, since simply placing a detector in front of a wall is not sufficient to find out if a building can be released from nuclear surveillance or not.

In the last years we collected a lot of experience designing solutions for our customers. The application of robotics, AI and modern algorithms help to solve the issues, but need approval by appraising organisations and finally by authorities.

This presentation will give a quick overview of our latest developments and share some experiences we collected during customer projects.

DR. MARINA SOKCIC-KOSTIC | **15:30** | **MONDAY**

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RADIOLOGICAL MONITORING SYSTEMS FOR WASTE CHARACTERISATION IN THE ENVIRONMENT OF OUR DECOMMISSIONING SOLUTIONS

During the last 30 years NUKEM Technologies Engineering Services (NUKEM) is engaged in the decommissioning of nuclear facilities. Based on the experience of a long time working in this field NUKEM can offer a large variety of devices and systems to perform the decommissioning of nuclear facilities. One focus of activities is the radiological measurement equipment (Monitoring Systems) performed to characterize the radwaste. They include monitors for gamma emitters as well as for neutron emitters. Most of the beta and alpha emitters can be measured by these methods. The rest of emitters are estimated on the basis of the key nuclide method.

The monitoring systems include Bridge Monitors for incoming radwaste, Sorting Monitors to separate low, intermediate and high-level waste, Drum/Container Monitors mainly for outgoing waste, Monitors for Room Clearance Measurements and High Throughput Free Release Measurement Systems. The last monitor was designed for a 100% measurement of soil or building material with up to 50.000kg waste troughput per hour. The system includes a crusher to reduce the waste to a grain size upto 80mm, a conveyor belt system with integrated weighing device and a charger to load well defined batches. The measurement is performed with HPGe detectors and an automated analysis system. According to the measurement results the waste can be guided to different places to separate free released waste from another type of waste.

Decommissioning and dismantling of nuclear sites is an increasing business in Europe and worldwide. New methods and instruments are demanded to perform it high effectively and economically. NUKEM has accepted this challenge and has shown that there is a specific solution for each task.

FRANZ BORRMANN | **15:55** | **MONDAY**

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APPLICATION OF 3-D MODELLING IN PRACTICAL RADIATION PROTECTION APPLICATIONS AND TRAINING

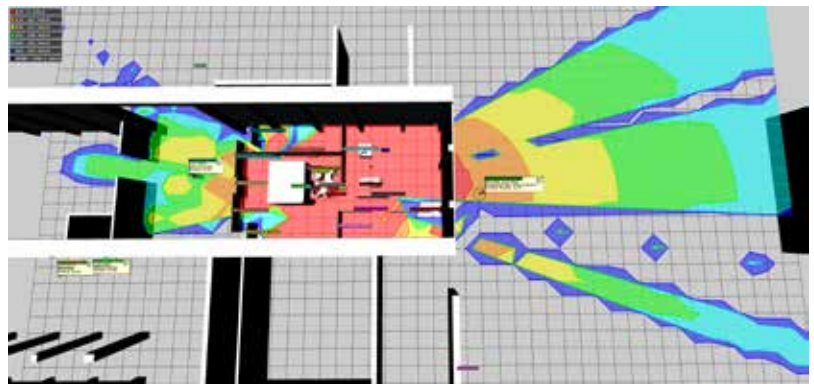
Together with leading EQUANS, iUS have have worked on a high dose rate sorting station (HDL-Sortierstation) for PreussenElektra GmbH (PEL). The role of iUS is to provide assistance for the regulatory documentation and radiation protection services. As the station is intended to travel to all PEL sites within the next 10 years, we had to conduct an analysis of the radiation protection features in the surroundings of each plant. We applied VR-Dose (after a comparison with its results to MCNP 6 as a reference) in order to be able to also analyze various scenarios.

Despite its restrictions as a point-kernel-model (at least for online-calculations) Together with AtkinsRealis Germany, iUS have worked on a radiatiation protection concept for the underwater cutting and dry loading in of reactor internals. VR-Dose has been applied here for simulations and production of training videos, raising the awareness of the personnel for the variation of radiation fields in different situations. Comparing different simulations helped to efficiently optimise the processes with regard to dose uptake.

VR-Dose has proven its applicability in real-world projects and has clearly shown the benefits of scenario-based 3-D-modelling in radiation protection.

The ability to show the scenarios from different perspectives allowed us to produce training videos for different roles and indicate the workforce the hazardous areas that exactly this role will face. The use of standard 3-D-models as sources and shields allowed us to quickly set the different surroundings for the scenarios using a simple 3-D-modelling software.

As a conclusion, the projects show that it is possible to work with a purely conventional approach even in high dose rate areas and that the application of 3-D-modelling tools for radiation protection has clear benefits – in terms of efficiency and of workforce training abilities.



ALEXANDER WILLKOMM
JAKOB HIRN

16:20 **MONDAY**

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A DIGITAL TWIN APPROACH TO RADIOLOGICAL CLEARANCE AND NUCLEAR DE-COMMISSIONING USING MODERN WEB APPLICATIONS AND 3D VISUALIZATION

The decommissioning of nuclear facilities present complex challenges that require precision, efficiency, and safety. Traditional methods often fall short in addressing the intricacies of these high-stakes environments. This presentation introduces a new approach that leverages digital twin technology, integrated with modern web applications, Building Information Modeling (BIM), advanced 3D visualization techniques and integration with measuring instruments, to enhance the planning, monitoring, and execution of nuclear decommissioning.

A digital twin, a virtual replica of the physical environment, enables detailed analysis and informed decision-making by accurately reflecting the current state of the facility. By incorporating web-based platforms, this approach ensures accessibility and collaboration across multi-disciplinary teams. The integration of 3D visualization enhances the understanding of complex data, improving communication and reducing errors. When combined with BIM, the digital twin mirrors the physical and functional characteristics of the facility.

An essential element of this digital twin approach is the integration of data from various measuring instruments, which provide accurate and detailed information critical for monitoring conditions. Incorporating this data into the digital twin allows the system to accurately reflect contamination levels and supports processes like decontamination.

This presentation outlines the development and deployment of a digital twin framework specifically designed for nuclear decommissioning. It explores the benefits of this approach, including enhanced risk assessment, optimized resource allocation, and improved compliance with regulatory requirements. Case studies from ongoing projects demonstrate the practical applications and effectiveness of this approach, highlighting its potential to transform nuclear decommissioning.

SERGEJ RETICH

16:45 **MONDAY**

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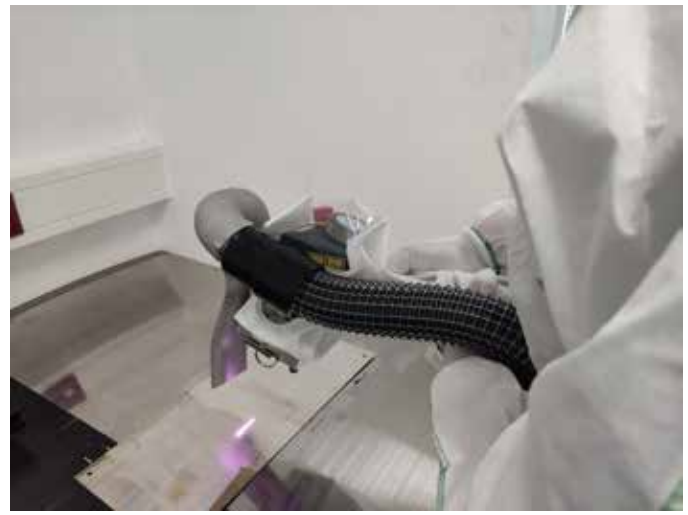
INDUSTRIALIZATION OF THE CLEANDECON LASER DECONTAMINATION TECHNOLOGY FOR NPP - NEW MARKET DRIVEN SOLUTIONS

Laser decontamination using the high-performance CleanLASER is a proven process in various industrial branches. In its optimal use, laser ablation is a very clean process that enables a significant reduction in the distribution of hazardous substances in the work area and opens up the potential to implement decoating projects in the medium or low risk range instead of a high risk sing conventional blasting or grinding processes. The laser process guarantees a reduction in protective measures, PPE and other organisational and therefore overall project costs. At the same time, the amendment of the Hazardous Substances Ordinance (GefStoffV) means that some workplace limit values, such as for carbon monoxide or lead, are being tightened again. Here too, the laser offers more potential for complying with the required values.

In the area of TRGS 519 (asbestos) adjustments have also been made, so that in future 10,000 F/m³ will be the target for low-emission work. In so far as this is the case, the structure of the fibres must be analyzed, meaning that 2000 F/m³ will apply in the case of thick fibres or if no tests are carried out. The CL1000 is authorised by the authorities in Luxembourg as a low-emission process and achieves less than 2000 F/m³.

In the case of radiological decontamination, the laser can gently remove particle contamination from the surface. Media-free laser ablation is efficient, dry and low-noise. In combination with a suitable nuclear suction system, laser plasma emissions can be filtered very efficiently and at low cost. This allows the total costs of laser decontamination, including final disposal, to be reduced to << €3/kg. The cleanLASER special technology features were developed for industrial use as part of the cleanDECON configuration.



BRIAN GIHM | **17:10** | **MONDAY**

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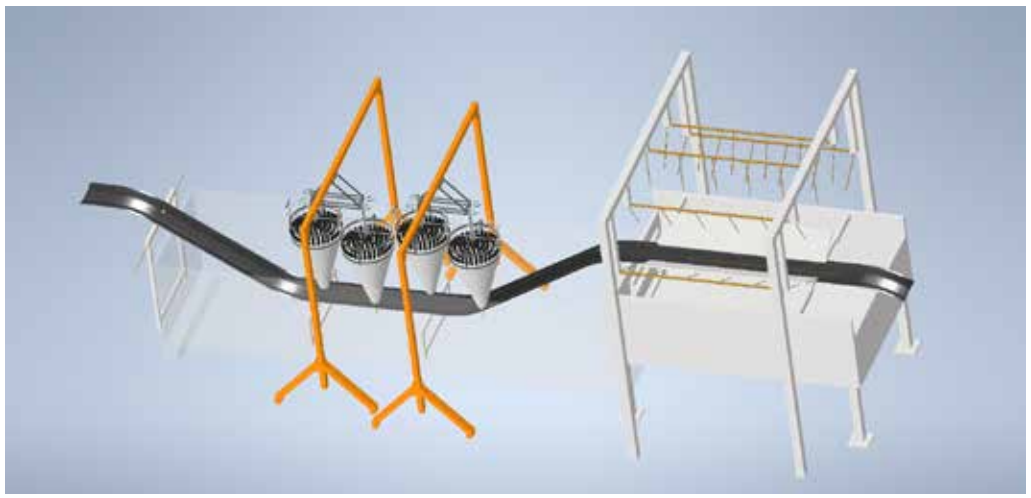
TECHNOLOGY UPDATE ON WAVE BLAST: INNOVATIVE COMPLEX GEOMETRY METAL DECONTAMINATION

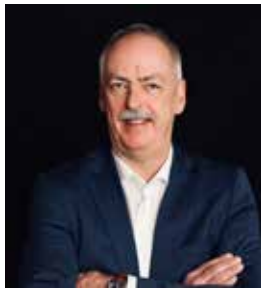
Hatch has been developing the Wave Blast ultrasonic cleaning technology that can decontaminate complex geometry surface-contaminated metal to the level of free release. The system utilizes precision controlled combination of multiple ultrasonic transducers to deliver intense energy to the target areas that is more than 10 times of conventional ultrasound cleaning system.

The technology's effectiveness has been validated through 2 rounds of test campaigns. The system design has been updated to work as a continuous process system, and the 3rd and the final validation test is being planned. The continuous process system uses cone-shaped wave-guide system to generate and focus the ultrasonic beam which is placed as a beam curtain along the waste treatment path. The process capacity can be increased in a modular fashion to increase the throughput.

The main objectives of the third validation test is to establish various operating parameters such as power and water consumption, secondary waste generation, operating labour requirement, throughput capacity, and decontamination performance based on large processing data. Hatch is currently in discussions with potential host sites, and expect to start the validation test in late 2025.



SPEAKER ABSTRACTS TUESDAY



MICHAEL BONGARTZ | **13:15** | **TUESDAY**

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CHALLENGES IN DECOMMISSIONIONG AND DISMANTLING FROM THE PERSPECTIVE OF PREUSSENELEKTRA

With almost three decades of experience in nuclear decommissioning and dismantling (D&D) PreussenElektra (PEL) is accountable for the D&D of its nuclear fleet consisting of eight boiling and pressurized water reactors. Primary objective is the safe and economic D&D of the plants in compliance with the legal and regulatory framework. These requirements should be pragmatically handled while the risk profile significantly reduces along D&D progress.

At PEL, the D&D process is governed by utmost attention on occupational health and safety given the continuously changing environment. The process starts with the shut-down of formerly operational systems. As some systems are needed long-term, temporary systems are introduced that still meet the operational requirements. Technical facilities for material treatment, decontamination, conditioning, release measurements must be qualified, installed and maintained under the regulatory framework while focusing on cost efficiency.

All processed materials must undergo a qualified clearance in line with the applicable radiation protection ordinance. The largest proportion can be released unrestricted or specifically released to a landfill site. One of the biggest challenges in D&D, however, is to identify landfills that accept such material due to concerns from stakeholders such as landfill operators causing delays. Although these disposal routes are clearly regulated by law. Once all systems and facilities are removed and disposed, the building decontamination and release takes over to pave the way towards conventional demolishing.

Experiences from past projects and economies of scale must be systematically utilized including digitized processes, improved cost calculation approaches to reduce or mitigate risks and avoid time delays. In summary, committed, robust and manageable processes with all stakeholders are key for a successful D&D.

ULRICH WIEDENMANN | **13:40** | **TUESDAY**

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NUCLEAR LICENSING AND REGULATIONS FOR SUPERVISION OF THE DECOMMISSIONING AND DISMANTLING OF THE GUNDREMMINGEN II NUCLEAR POWER PLANT (KRB II)

The Gundremmingen II nuclear power plant (KRB II) with the Blocks B and C is a dual-block boiling water reactor plant with a joint operating license and is unique in Germany in several aspects. This was also evident when, in the middle of the last decade, as the end of power operation approached, questions about the decommissioning and dismantling of the plant became urgent. Because of the legislator in the 13th AtG amendment set the latest shutdown dates for Blocks B and C with a difference of four years, namely for Block B on 31.12.2017 and for Block C on 31.12.2021, despite the joint operating license, it was necessary to conduct a multi-stage licensing procedure in order to accommodate the operator RWE‘s wish to be able to start dismantling in Block B while Block C is still in power operation. In addition, the continued validity of the operating licence for the KRB II was essential for this purpose.

Especially in the case of the 1st decommissioning and dismantling licence (1st SAG), it was crucial to only authorise the decommissioning and dismantling of systems and plant components to the extent that, in addition to the safe wet storage of fuel elements still present in the storage pool of Unit B, also the safe operation of Unit C would not be impaired. The task of the Bavarian nuclear licensing and supervisory authority StMUV was therefore in particular to check, whether the above-mentioned safety objectives were met by the scope of dismantling requested by RWE in the first application for licencing. In addition, regulations had to be established to ensure compliance with the safety objectives in the subsequent nuclear regulatory supervisory procedure for the decommissioning and dismantling of the KRB II.

With the shutdown of Unit C on December 31, 2021, the protection objective of safe power operation of Unit C no longer applied, so that this aspect no longer had to be taken into account in the two other decommissioning and dismantling permits (2nd SAG and 3rd SAG), which are now also final and binding.

The purpose of the presentation is to demonstrate how the differentiated situation in the KRB II described above was taken into account in the decommissioning licensing procedures and will continue to be taken into account in the supervisory procedure.

SILVA SMALIAN | **14:05** | **TUESDAY**

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CURRENT STATUS OF NUCLEAR ADMINISTRATIVE PROCEDURES IN NIEDERSACHSEN - GERMANY

The Lower Saxony Ministry of the Environment, as a licensing and supervisory authority, is responsible for a large number of different nuclear facilities, from nuclear fuel supply to nuclear power plants and interim storage facilities to the future Konrad deep geological repository.

A developing challenge is the, soon simultaneous, dismantling of all five nuclear power plants (NPPs) in Lower Saxony. Three nuclear power plants have been already in dismantling for years - Stade, Lingen and Unterweser. The first decommissioning permit for the Grohnde NPP was issued in December 2023 and the first decommissioning permit for the Emsland NPP is imminent. According to the Law the remaining radioactive waste generated during dismantling must be minimized.

In Germany, more than 95% of the mass from the dismantling of NPPs is disposed or recycled conventionally. This means that the majority of the mass flow of massive building structures enters the recycling cycle and find not their way into the final repository. With the ongoing dismantling, the topic of „clearance according to the Radiation Protection Ordinance“ is thus drastically gaining in importance - „clearance according to the Radiation Protection Ordinance“ is based on a procedure defined by the authority.

What this means the authority’s point of view, such as strengthening the previously applicable NPP-specific clearance regulations for the increasing volumes, through increased number of clearance applications, e. g. new ones or extensions of existing ones, substance-specific release schedules, requests regarding measurement technology (hardware changes / new devices, software changes, detailed instructions for the application of the measurement technology), release documentation, ... will be exemplified.

DR. HANS KOOPMAN | **14:30** | **TUESDAY**

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CHALLENGES IN DISMANTLING OF NUCLEAR FACILITIES FROM THE TSO‘S PERSPECTIVE

The dismantling of nuclear facilities is characterised by fulfilling the fundamental safety functions and the aim of completing it quickly and cost-effectively. It cannot be fully planned and requires flexible reactions to unexpected circumstances and changes to plans. Delays resulting from regulatory assessments can also have a direct impact on the dismantling progress. The resulting delays could theoretically be offset by sufficient personnel, but this is not possible in practice due to limited resources. Three aspects help to overcome the challenges of safe and speedy dismantling:

Contents: The quality of the documents and the fulfilment of the requirements resulting from the different licences are crucial for a smooth assessment and approval process. Careful quality assurance by the applicant is time-consuming, but pays off if it avoids requests for additional information. It is important to clarify the requirements for the regulatory assessments with all parties involved at an early stage and to ensure that these are known to the involved staff. On the other hand, the TSO should assess identified deficiencies in terms of their relevance to the overall result.

Efficiency: Standardisation, digitalisation and the structure of the projects influence the efficiency of the procedure. Both the submitted documents and the processes for preparing the documents should be standardised. The digitalisation of processes is well advanced. However, the bundling of related projects into one master process can lead to an acceleration of the overall project.

Communication: Effective communication is crucial for managing the dynamic processes involved in dismantling. This includes agreeing on procedures, document requirements and standards as well as regular coordination on plan changes and prioritisation. Early and targeted communication of problems is important, both in terms of timing and content. Respectful communication of the different stakeholders will help to avoid obstacles.

TETIANA KILOCHYTSKA | **14:55** | **TUESDAY**

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THE CHALLENGE OF D&D - EFFICIENT COOPERATION BETWEEN AUTHORITIES, EXPERTS AND WASTE PRODUCERS - FROM AN INTERNATIONAL PERSPECTIVE

The IAEA General Safety Requirements "Decommissioning of Facilities" (GSR Part 6) defines "decommissioning" as administrative and technical actions taken to allow the removal of some or all the regulatory controls from a facility. Planning of decommissioning should start at the design stage and continue throughout the facility's lifetime to allow smooth and timely transition from operation to decommissioning. Preparation to decommissioning includes complex organisational, financial and technical planning e.g. preparation of a decommissioning plan and approval by the regulator(s), selection of decommissioning strategy including criteria of the "decommissioning end state", collection of relevant information and data to facilitate decommissioning, estimation of decommissioning costs, establishment of decommissioning funding system, development and implementation of the integrated management system to support decommissioning projects, creation of infrastructure for management of waste arising from D&D, etc. The IAEA identified the responsibility of the government, regulatory body and licensee as the main parties involved in the planning, conducting and completion of decommissioning. Also, the IAEA established the requirements addressed to involvement of the interested parties (stakeholders) in decommissioning (SSG-47) and published a number of Nuclear Energy Series reports that collect the Member States experience and lessons learned about approaches, methods and forms of engagement and cooperation with different groups of stakeholders depending on their role in decommissioning process (e.g. NW-T-2.5, NG-T-1.4, NG-G-5.1). The IAEA NW-T-1.10 provides the following observations: "Past experiences have shown that D&ER activities tend to be more effective if communication and stakeholder involvement is planned at an early stage. Good communication strategies will establish trust, cooperation and understanding between different interested parties in D&ER projects....A fundamental goal of stakeholder involvement is to facilitate a consensus between the public, project owner and regulatory authorities on an acceptable D&ER approach". This IAEA presentation will showcase several examples of stakeholder involvement, highlighting the importance of efficient cooperation for the successful planning, execution, and completion of decommissioning and dismantling projects, as well as the role of the IAEA in facilitating these essential dialogues.

RUDY KOENIG | **16:15** | **TUESDAY**

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INTERNATIONAL EXPERIENCE AND TECHNOLOGY BENCHMARKS IN DECOMMISSIONING AND WASTE MANAGEMENT FOR SITE REGENERATION

Optimizing the transition and processes from Decontamination to Deconstruction, from Decommissioning to Repurposing, from Legacy Liabilities to Regeneration and Sustainable Future requires new ways of thinking and organizing work, applying new methods and technologies in combination with proven, practical solutions, and „back to the basics" engagement with regulators and other stakeholders. Decommissioning and regeneration challenges are unique to each site but many of the issues will be common and therefore can benefit from shared international learning. More specifically, learning from different projects carried out in different contexts, geographies and jurisdictions can help building a better-informed view than similar analyses carried out in isolation.

In this paper we discuss some of the approaches and methods of relevance to the planning of decommissioning and regeneration activities in the UK and other countries and how they might apply to Germany. A key aspect is the consideration of how understanding, characterising, rationalising and identifying suitable end states for both the sites and radioactive wastes and materials that will be generated by decommissioning operations upfront in the programme are essential to ensure an optimal balance of risk is introduced in relevant operations (waste-led decommissioning). The paper includes considerations on models for site planning and land use scenarios, showcasing our innovation that has leveraged location-based data and Geographical Information Systems (GIS).

Case studies range from projects that have modernised historic site knowledge into more accessible digital formats, to solutions that are helping decommissioning sites to visualise future site choreography and to explore potential recycling of waste materials for sustainable circular economies.

Amentum Co-Authors:
Prof. Cristiano Padovani, PhD Philip Gibson

FABIAN ATTENBERGER | **16:40** | **TUESDAY**

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BOILING WATER REACTORS - OPTIMISED DISMANTLING THROUGH PARALLEL PRE- AND POST-DISMANTLING - EXPERIENCES FROM PROJECTS IN GERMANY AND SWEDEN

Siedewasserreaktoren (SWR) sind eine wichtige Energiequelle, aber ihr Rückbau stellt eine komplexe Herausforderung dar. In diesem Vortrag werden die Vorteile der parallelen Vor- und Nachzerlegung eines Reaktordruckbehälters erläutert und Erfahrungen aus erfolgreichen Projekten in Deutschland und Schweden geteilt.

Die parallele Vor- und Nachzerlegung eines Reaktordruckbehälters hat sich als besonders effizient erwiesen. Bei der Vorzerlegung (In-Situ) wird fernhantiertes Equipment in Form eines Brennschneidsystems eingesetzt. Dabei werden zunächst Ringsegmente abgetrennt, die mithilfe einer Hebetraverse zu einem eingehausten Nachzerlegeplatz transportiert werden. Bei der Nachzerlegung zerlegt ein Roboter, ebenfalls mit einem Brennschneidsystem ausgerüstet, das Ringsegment in kleinere, verpackungsfähige Segmente. Diese werden anschließend mittels eines Greifers in endlagerfähige Gebinde verpackt.

Insgesamt wurden fünf Reaktordruckbehälter – davon vier in Schweden und einer in Deutschland – erfolgreich zurückgebaut.

Die Erfahrungen aus dem Rückbau des ersten SWR in Schweden waren entscheidend, um das fernbediente Equipment und die Prozessparameter zu optimieren. Dadurch konnte der Rückbau des zweiten Reaktordruckbehälters in etwa der Hälfte der Zeit im Vergleich zum ersten Behälter abgeschlossen werden. Die Rückbauzeit des ersten Reaktors betrug etwa 12 Monate, während der zweite Reaktor in etwa 6,5 Monaten (bezogen auf die Vorzerlegung) zurückgebaut wurde.

Die parallele Vor- und Nachzerlegung bietet eine vielversprechende Methode für den effizienten Rückbau von Siedewasserreaktoren. Die gewonnenen Erkenntnisse aus den Projekten in Deutschland und Schweden sind wertvoll für zukünftige Rückbauvorhaben und tragen zur nachhaltigen Entsorgung dieser Anlagen bei.

SPEAKER ABSTRACTS WEDNESDAY

ZHANG YU

09:00 **WEDNESDAY**

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PROJECT STATUES OF HWRR DECOMMISSIONING AND DIGITALIZATION TECHNOLOGY APPLICATION

This presentation HWRR Decommissioning project current situation, including situation of HWRR, planning, features, first stage of HWRR decommissioning. Introduce development of Heavy Water Research Reactor Decommissioning Engineering Technology Supporting System. Including structure of system, 3D model building, radiation fast calculation, 3D display and human external radiation calculation algorithm, establish of a decommissioning VR scene and train professional personnel, database using in HWRR decommissioning.

DR. MARTIN AMFT

09:25 **WEDNESDAY**

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SUCCESS FACTORS AND LESSONS LEARNED FROM UNIPER'S SWEDISH D&D PROGRAM'S FIRST HALF-TIME

Uniper Nuclear's D&D program encompasses two boiling water reactors at the Barsebäck and Oskarshamn site, respectively. The decommissioning of all four units began in 2020 is scheduled for completion by 2028. Uniper Nuclear serves as both the nuclear operator and the primary D&D service provider through its in-house project organization. This dual role allows the program to minimize the total cost of ownership by efficiently managing D&D activities and optimizing the waste management.

The D&D is divided into 15 work packages (WP), e.g. RPV segmentation. These WP are scheduled using a fleet approach, meaning that staff and equipment are moved from unit to unit and from site to site. This leverages the benefits of a learning curve and technical improvements, which can be readily applied at subsequent units.

The planning and execution of each WP is summarized as "start and adjust", i.e. it commences when a sufficient level of planning is achieved. During the implementation, plans and methods are further developed or adjusted as necessary. This approach is supported by the Swedish Radiation Safety Authority.

The program's waste management optimization fully utilizes Sweden's waste management system:

- SKB's geological repositories
- On- and off-site landfills for VLLW
- Off-site treatment of large components and subsequent clearance
- On-site decontamination of materials and subsequent clearance.

Uniper Nuclear successfully engages local subcontractors. Many of which are new to the nuclear field and receive necessary training during an onboarding process. Conversely, Uniper Nuclear has benefited from the expertise these companies bring from conventional dismantling and demolition projects.

In conclusion, after completing the first half of our D&D program, we can proudly note that the projects are on time and within budget thereby also comparing favorably with other international projects. Our team is prepared to successfully deliver the second half of the projects as well.

DIEGO ESPEJO HERNANDO | **10:45** | **WEDNESDAY**

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STRATEGIES, INNOVATION, AND OPTIMIZATION ON WASTE MANAGEMENT AT GAROÑA NPP D&D BY ENRESA

Enresa faces its third NPP Decommissioning and Dismantling Project (D&D) in Spain but the FOAK with a BWR-type reactor, under the challenge of the responsibility for optimal, safe, and efficient management of the radioactive waste that arises, with the experience acquired after the dismantling of the Vandellós I (gas-graphite reactor) 1995, José Cabrera NPP, 2010, and the experimental fission reactor of CIEMAT, which constitute Enresa's portfolio.

Within the scenario of progressive closure and dismantling of the Spanish nuclear fleet, whose strategic framework is included in Enresa's 7th General Waste Management Plan, the limited VLL / L&IL waste storage capacity in the C.A. El Cabril, due to the high demand for radioactive waste to be managed from the NPPs in operation added to those generated by the D&D projects in progress and to be undertaken in the short-mid-term, together with Enresa's commitment to the optimization and minimization of the volume of radioactive waste, the experience acquired, the lessons learned and the philosophy of continuous improvement, results in the need to find new solutions, develop and perform new techniques and strategies that allow the improvement of radioactive waste management processes throughout its whole cycle, from its generation to its final storage.

This work aims to present the strategies and solutions proposed for the management of radioactive waste to be generated and managed by Enresa at the SMG NPP Decommissioning, with the objective and commitment to safety, quality, continuous improvement, technical excellence and volume optimization, at the following levels of strategy:waste treatment and conditioning; material / waste segregation and classification (S&C); waste characterization and materials free release.

HUGO MEJIA | **11:10** | **WEDNESDAY**

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DECOMMISSIONING STRATEGIES IN FRANCE: THE FESSENHEIM NPP EXAMPLE

In France, there are 11 nuclear power reactors with four types of technology that are under decommissioning: light water (Pressurized Water Reactor, PWR), graphite gas, heavy water, and fast breeder technologies. Consequently, EDF (Electricité de France, French National utility) has developed approaches that depend on the reactor technology to dismantle, such as immediate dismantling for light water reactors, or deferred dismantling for graphite reactors. EDF is responsible for the decommissioning of its Nuclear Power Plants (NPP), and implements state-of-the-art solutions to perform characterisation, decontamination, dismantling removal of radioactive materials, and waste management. The decommissioning project of the Fessenheim NPP, close to the German border led by EDF consists in the dismantling of two 900 MW PWRs shut down in 2020. EDF has put in place a decommissioning program with key milestones, including defueling (completed in August 2022), decontamination of primary circuits (completed in June 2023), preparatory works (ongoing) and dismantling (scheduled early 2026, after obtaining the dismantling decree). EDF's target is to remove hazardous and radioactive materials, dismantle all components and equipment, demolish structures at least down to -1m, and repurpose the site for industrial use by 2042.

Cyclife group has been appointed by EDF to provide engineering services for the dismantling due to its extensive experience in nuclear waste management and dismantling. Cyclife brings its waste-led dismantling approach in three ways:

- The treatment and the recycling of a significant portion of radioactive material in its own facilities (Sweden and France)
- Innovative digital solutions created by Cyclife Digital Solutions
- Optimised scenarios and specialised tooling developed by Cyclife Engineering to efficiently perform dismantling activities.

The Fessenheim decommissioning project serves as a model for future dismantling efforts within EDF's fleet, leveraging lessons learned and Cyclife's expertise to ensure efficient and safe decommissioning.

PEDRO MOREIRA | **11:35** | **WEDNESDAY**

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FULL SYSTEM DECONTAMINATION - A SUSTAINABLE WAY TO REACH MORE CHALLENGING TARGETS ON WASTE RECLASSIFICATION

The implementation of a Chemical System Decontamination (CSD) , also known as Full System Decontamination (FSD) is the “state of the art” concept that has been worldwide recognized as the first step to take into account in a decommissioning plan of a Nuclear Power Plant Facility.

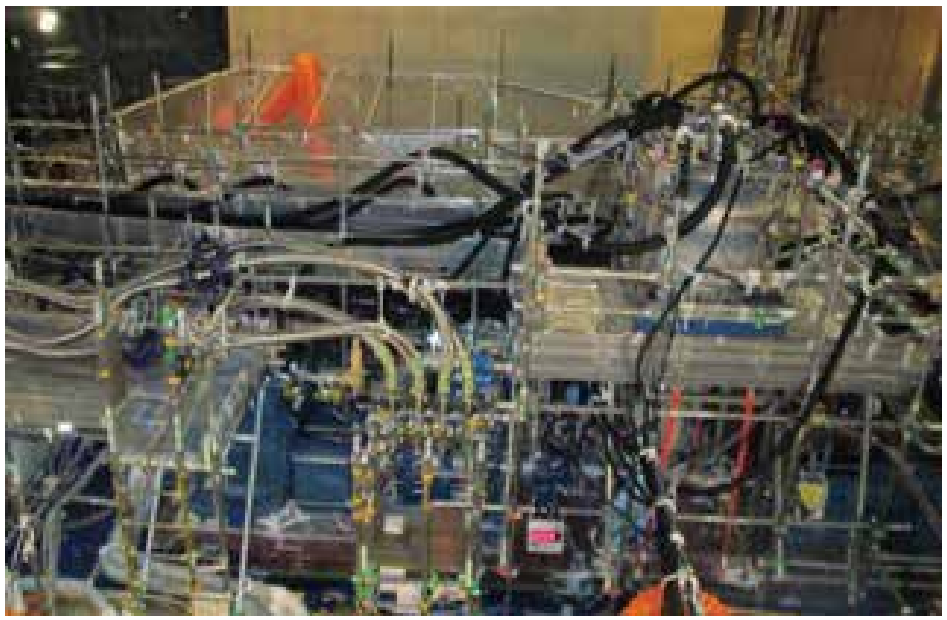
In the first half of 2023 a CSD was performed in the nuclear power plant of Doel 3 in Belgium, shortly after shutdown.

The targets of this CSD were not only ALARA with the consequent simplification in the dismantling plan but also to achieve the melting criteria of the decontamination loop in a maximum possible extent.

The results of this CSD implementation were outstanding. For that, the commitment of the involved project teams together with the already proven Framatome´s technology were the major successful factors.

This presentation will describe the technical approach for the CSD in Doel 3 as well as summarizing its results.

Co-Author: Dimitri Demeyere - Electrabel



DR. STEFAN HÖRMANN | **12:00** | **WEDNESDAY**

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COUNTING, MEASURING, WEIGHING WITH AI AND 3D SCANS FOR ENHANCED EFFICIENCY IN NUCLEAR POWER PLANT DECOMMISSIONING

This presentation delves into the application of laser scanning and AI to optimize decommissioning processes in nuclear power plants. Our solution, named AIDA (Artificial Intelligence for Dismantling Acceleration), creates detailed 3D models with automatic information aggregation. Object recognition and AI parameterization, facilitates precise planning and efficient execution of decommissioning activities. With the case study at the nuclear power plant Gundremmingen, we illustrate significant efficiency gains and practical applications. Virtual walkthroughs reduce radiation exposure and improve logistical planning through precise data integration. The AI seamlessly interfaces with existing IT systems, streamlining workflows and adapting to various project demands.

This results in substantial time and cost savings, establishing new standards or safety and accuracy in nuclear facility dismantling. As a central element of decommissioning strategies, AIDA supports methodologies akin to lean and just-in-time practices, fostering systematic improvements and collaboration across project teams. This presentation highlights the technical role of AIDA in aligning decommissioning operations with modern engineering solutions.

CARSTEN GEORGE | **12:25** | **WEDNESDAY**

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AI IN PRACTICE: EXPERIENCE AND PERSPECTIVES FROM THE DECOMMISSIONING PLANT GUNDREMMINGEN

Decommissioning nuclear power plants is a complex and lengthy task that entails numerous technical and logistical challenges. These include the safe dismantling and disposal of radioactive materials, documentation and tracking of components, and managing limited space and buffer zones. Precise planning data is therefore essential to ensure safety and control costs.

This presentation will delve into the practical experiences and future perspectives of applying AI in the decommissioning of the nuclear power plant in Gundremmingen, a RWE Nuclear GmbH facility. The focus will be on a pilot project where AI was employed to process 3D laser scan data. The pilot aimed to assess the benefits in decommissioning planning and identify how to improve efficiency and accuracy in determining the quantities and masses of components to be dismantled across the entire plant, thereby enhancing long-term planning reliability.
After successful evaluation of the pilot, the technology is currently being rolled out across the entire decommissioning facility, with further development planned. Looking ahead, we see the potential to establish a central tool in the Integrated Decommissioning Process (IRP) following the pull principle. In the future, AI technology could enable end-to-end optimization throughout the entire decommissioning cycle—from dismantling, further segmentation, and decontamination, to the release process. Additionally, integration into economic calculations is being considered.

The presentation will provide concrete insights into the project, its impact on efficiency, and the potential for future AI applications.

PHILIP BORCK & KAROLIN MÖHLE | **13:45** | **WEDNESDAY**

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PRODUCT CONTROL: INCREASE OF EFFICIENCY AND TRANSPARENCY BY DIGITALISATION AND KPIS

The opening of the Konrad repository is linked to the availability of sufficient, finally product-controlled waste packages. The preliminary product control process to ensure the final disposal conditions, starting with dismantling planning, the qualification of conditioning procedures, the conditioning and packaging of waste packages, the documentation of the waste packages through to the final release of the respective waste package, is a long time and complex process. For this reason, the Product Control Division of the Federal Company for Radioactive Waste Disposal (BGE) has established a process control system for the approximately 1000 ongoing application procedures. Under the keywords of „transparency“, „process security“ and „efficiency“, the aim is to ensure a standardised level of information for all parties involved in the process, to formally secure the processes and to enable audit security for all parties by means of a standardised data pool.

Using the digital application platform „Nuclear Waste Logistics“ (NWL), the entire process of product control and process management has now been handled completely digitally for almost two years. This digitalisation initiative, which is unique in the nuclear industry to date, has massively optimised and accelerated the application process. Thanks to KPI tools stored in the NWL, this acceleration was also able to comprehensively optimise transparency, process reliability and efficiency for all parties involved in the process, particularly at the operational process level.

However, the BGE ist not convinced that these steps are sufficient to fulfil the actual goal of transferring 10,000 m³ of product-controlled waste packages to the Konrad repository each year. In order to achieve this, it is particularly important to identify and resolve open points during application procedures that inhibit the industrialised and large quantities of processes. How and under what conditions the BGE plans to organise the process control in product control for this purpose and what changes are necessary in the entire community in order to establish the corresponding steps is explained in this presentation by the BGE‘s product control department.

PROF. DR. THOMAS KOPINKSI | **14:10** | **WEDNESDAY**

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A SHOWCASE ON HOW MODERN AI TOOLS LEAD TO AN EFFECTIVE DECOMMISSIONING PROCESS BY UTILIZING INTERPRETABLE MACHINE LEARNING AND HYBRID INTELLIGENCE.

The promise of modern Artificial Intelligence (AI) is a seemingly effortless implementation and use of machine learning to solve virtually any kind of problem. However, in reality, the path to such a solution encompasses overcoming many hurdles: breaking up data silos, adding the ‚I' into AI by training the models right, aligning the models with our goals, maintaining them properly during operation and understanding the decision-making process within, to name just a few.

In this brief presentation we will outline how the promise can become reality by combining established machine learning tools with recent advancements in AI to engineer a solution for Germany's world-wide unique energy transition, ultimately leading to a more effective decommissioning process.

We will touch on how Large Language Models (the technology behind ChatGPT) - hindered by its shortcomings of algorithmic nature - can be complemented with interpretable machine learning tools to open up the black box characteristic and have decisions of an AI be understood. As we edge closer to a world where AI tools take over more of the data heavy-lifting, it becomes increasingly necessary to comprehend the decisions within these tools and improve trust by making them safe, reliable and auditable.

AI safety is a crucial aspect in a future with ever more processes aided by such tools (especially in environments with an inherently safety-critical nature) - one approach is to create an ecosystem of models which are controlled, audited and monitored by an entity which operates in a way we humans can have an understanding of and control over. By leveraging AI tools based in first principles this safety component becomes reality and provides the first stepping stone for hybrid intelligence - humans operating in tandem with an AI which is safe, aligned, and intrepretable.

PATRICK HAASS | **14:35** | **WEDNESDAY**

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FEASIBILITY STUDY FOR THE USAGE OF 3D PRINTED TOOLS IN A RADIOCHEMICAL LABORATORY

Laboratory equipment for the chemical treatment of samples is mainly made from glass and stainless steel. While laboratory glass is characterized by its chemical inertness, its brittleness requires a supporting structure, typically made from stainless steel, for sophisticated setups. A drawback of these materials is the production of specialized equipment, since the production of custom-made equipment is labor & cost intensive. Chemical characterization often applies the use of harsh chemicals. Even stainless steel corrodes if constantly exposed to the fumes of such chemicals, making periodic replacements necessary. Harboring the risk of contaminations, secondary waste is undesirable in a radiological laboratory. Corroded surfaces are difficult to decontaminate, resulting in disposal as radioactive waste. Compacting of stainless steel for volume reduction is also nigh impossible.

Many single use items, disposables or sample containers are made of plastics & show high levels of chemical resilience. Most of these items are mass produced with no custom-made production of tools available.

In the recent years rapid development of 3D print technology resulted in user-friendly, low maintenance and cost effective machines. This gives the opportunity to allow laboratories, as end users, the production of custom-made tools, which are mostly needed in small quantities only.

The choice of 3D printing technology heavily influences the physical properties of the produced parts. The resilience of the materials which can be 3D printed are not entirely tested. The useability of 3D printed parts under laboratory conditions was investigated. NRG produced test specimen from 6 different materials according to DIN EN ISO 527-2 by 3D printing. The test specimen were exposed to various commonly used chemicals, both in direct contact as well as only the vapor phase. After the exposure the remaining strength of the materials was tested using tensile tests and compared to its initial strength.

MICHELLE DICKINSON | **15:00** | **WEDNESDAY**

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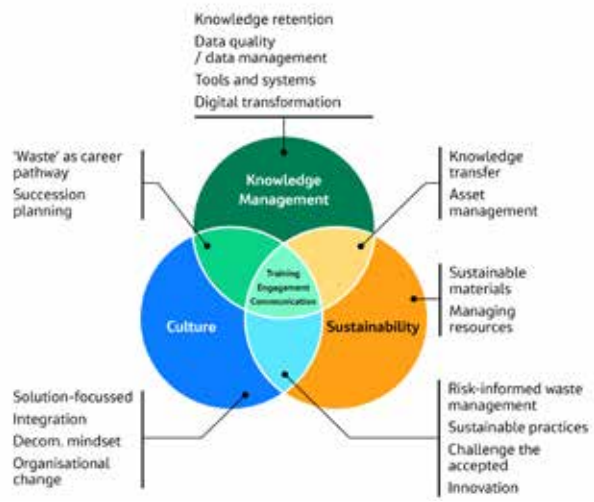
THOUGHTS ON GERMAN WASTE MANAGEMENT STRATEGIES

The decommissioning of nuclear facilities in Germany presents significant challenges, particularly regarding the clearance of materials and the management of vast quantities of lower category wastes. These challenges demand a strategic approach to ensure optimal and efficient waste management, with sustainability as a core consideration during large-scale decommissioning activities.

One of the key strategies under exploration is the reuse of materials, whether it be soils and rubble repurposed for site restoration or metals that can be melted down and reused within the industry. Such practices not only reduce the volume of waste destined for disposal but also align with broader sustainability goals. However, the success of these strategies hinges on the availability of high-quality waste information, necessitating robust characterisation and data management. Additionally, success relies on the establishment of a responsive and well-prepared supply chain, which requires investment, adaptation to nuclear standards, and the integration of best practices from other industries to deliver optimal value within the nuclear sector.

Emerging technologies, such as artificial intelligence, offer the potential to revolutionise waste management by enhancing data analysis and support decision-making processes. By leveraging AI, the industry can better optimise waste reuse, leading to more sustainable outcomes.

These challenges and strategies are not unique to Germany; similar issues are being addressed in the UK, particularly concerning material reuse. This conference provides a valuable opportunity to share lessons learned and explore collaborative approaches that could benefit the broader decommissioning and waste management community.



NICK SYKES | **15:25** | **WEDNESDAY**

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A REVIEW OF THE CHALLENGES OF WASTE MANAGEMENT AND DECOMMISSIONING OF FUTURE FUSION POWER PLANTS

This talk considers the processes for decommissioning and waste management of a future fusion power plants, examining the differences between fission and fusion decommissioning, looking at the lessons that will be learned from the decommissioning of the JET reactor and looking at future challenges and the role of industry in solving them. Fusion is the reaction that powers the sun and all stars. It involves the combining small atoms, such as hydrogen, together to form larger atoms and releases huge amounts of energy in the process. This process does not inherently result in radioactive actinides, in comparison to fission processes. The challenges of decommissioning and waste management will vary dependent of the fusion power plant solution but some of the most common challenges are:

1. Short lived radioactive isotopes created in the structures of the fusion power plants due to interactions, between that structure and the high energy particles created as part of the fusion process.
2. The permeation of tritium, a radioactive isotope of hydrogen, into the structure of the materials.

These challenges are addressed by using robotic systems to handle and store the power plant components that are most affected by the high energy particles and by using heating processes to accelerate the dispersal of tritium from contaminated material.

Both the above processes will be demonstrated as part of the JET decommissioning process and will provide valuable information for the design of future power plants.

There is a significant role for industry in future power plants, where these challenges will need to be addressed at a much greater scale and intensity, to support the development of new processes to handle and recycle the affected materials in a cost effective manner.

DR. CHRISTOPH KLEIN | **16:15** | **WEDNESDAY**

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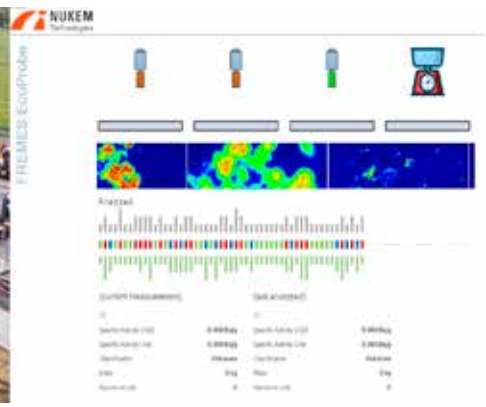
DEVELOPMENT AND TEST OF A SORTING SYSTEM FOR SOIL WITH CONVENTIONAL AND RADIOLOGICAL CONTAMINATION

Soil contamination is a serious environmental problem that poses risks to human health and ecosystems. However, conventional methods for contamination remediation are often time-consuming, costly, and destructive. Innovative, efficient techniques for soil characterization and sorting therefore offer a great benefit to improve the potential of future applications.

Here we present a novel measurement facility that is based on our proven system FREMES and can sort soil with different contamination types, both radiological and chemical. It is based on a combination of gamma-ray spectrometry and optical characterization methods, combined with AI-supported data evaluation. It will be able to measure the concentration and distribution of various contaminants in soil on a large throughput scale, such as radionuclides, hydrocarbons, heavy metals and organic compounds. The facility can also immediately separate small soil portions into different fractions according to their contamination levels, which can facilitate the subsequent treatment and disposal of the contaminated soil.

The measurement facility has been successfully applied in several projects around the world for the characterization of radiological contamination in soil. It has proven to be fast, reliable, and non-destructive, and has provided valuable contributions for the management of contaminated sites. The facility can also reduce the time, cost, and environmental impact of soil characterization and following treatment, which benefits the stakeholders and the society.

Our ongoing improvement of the system design aims to optimize the performance and expand the capabilities of the facility for the detection and quantification of a wider range of chemical contaminants.



UWE KÖNIGS | **16:40** | **WEDNESDAY**

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RADIOLOGICAL CARACTERIZATION OF THE CONTROL AREA OF THE LARGE HOT CELLS OF THE JEN IN JÜLICH

WTI GmbH (WTI) was contracted by Jülicher Entsorgungsgesellschaft für Nuklear-anlagen mbH (JEN) to perform the radiological characterization of the controlled area of the Hot Cell facility (“Große Heiße Zellen”; GHZ). The sampling was subcontracted by WTI to Höfer & Bechtel GmbH (H&B) and the necessary radiochemical analyses were performed by the certified laboratory of the Nuclear Research & consultancy Group (NRG) in Petten (NL). The radiological characterization project of the controlled area of the GHZ started in August 2021 and was successfully completed in December 2022.

The tasks of WTI were the coordination of the project implementation, the planning of sampling, the evaluation of the analytical results, the creation of a contamination register and the documentation of the results from analyses including the preparation of the final report. H&B was responsible for the execution of the orienting measurements on the basis of the sampling concept (grid concept), the sampling and the sample transport as well as for the organization with NRG. NRG performed the radioanalysis on the samples and delivered the analytical results. The presentation describes the project organization, the procedure for determining the sampling points, the sampling procedure, the performed radio-analytics and the preparation of the contamination register.

The radiological characterization of the controlled area of the GHZ was carried out as a preparatory measure for the dismantling planning. The realization of this project was performed in accordance with the requirements as well as in a time- and cost-efficient manner through the close cooperation of JEN, WTI, H&B and the NRG laboratory. The data and results obtained during the project serve JEN as a basis for the dismantling planning of the controlled area and as a basis for the release and clearance concept of the building structure.

DOMINIC KRÖNUNG | **17:05** | **WEDNESDAY**

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SUCCESSOR REGULATIONS OF THE KTA STANDARDS FOR NUCLEAR POWER PLANTS AND RESEARCH REACTORS

After the decision to shut down the NPP in Germany, the Nuclear Safety Standards Commission (KTA) discussed its future and the future of its standards intensively. The need for the KTA standards was analysed and the future working methods were discussed.

In order to secure the need until 2027, all KTA standards were reviewed by the end of 2022 and revised if necessary. The KTA will remain in place during a transitional period until 2027 so that regulations can be revised if necessary. In parallel, a process has been developed to transfer the regulatory content of the KTA standards for the dismantling of nuclear fuel-free nuclear power plants and research reactors and for the operation of research reactors into a set of new regulations by the end of 2027, which will be adopted and maintained by the federal government and the Länder.

Proven processes and structures should be used. The new rules will be developed by working groups consisting of experts from industry, expert organisations and authorities. The work will be organised by a coordinating office within BASE. The rules will become binding due to resolution passed by the Federal States Committee for Nuclear Energy.

The rules on operating, test and emergency manuals and the rules on the electrical power supply of nuclear power plants are being developed as pilot projects in two working groups.

A working group for general questions supports the technical working groups. The pilot projects should be completed by the end 2024 and provide important insights into the planned process. It is clear that the different requirements for rules in the area of dismantling nuclear power plants and research reactors and in the area of operating research reactors are particularly challenging for the development of the new regulations.

SPEAKER ABSTRACTS THURSDAY

DR. DANIELA GUTBERLET | **09:00** | **THURSDAY**

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SAFETY: TODAY AND TOMORROW

The nuclear phase-out in Germany was completed with the shutdown of the last German nuclear power plant on 15 April 2023. In order to enable the safe dismantling of nuclear facilities in Germany and the long-term safe handling of the resulting radioactive waste through to its final disposal, it is necessary to maintain the required competences. In addition, new competences must be developed as soon as the Federal Government has agreed on a site for the final disposal of waste, particularly heat-generating waste.

There is currently no degree programme in Germany that fully covers the individual process steps and their interactions. The Westphalian University of Applied Sciences has therefore decided to close this gap and designed the continuing higher education programme ‘Safety in Nuclear Waste Management’. This provides the necessary competences from the decommissioning and dismantling of nuclear power plants, the release of residual materials, cask development, waste treatment and conditioning, as well as transport of containers suitable for final disposal to a final repository. These technical competences are complemented by procedural competences on the topics of nuclear licensing and supervisory procedures, product control and documentation, as well as dealing with change processes and the moderation of conflicts, especially concerning the interaction with the interested public.

It will take well into the next century to safely and responsibly dismantle, collect, package, temporarily store and finally dispose of all waste produced in the Federal Republic of Germany as part of the peaceful use of nuclear energy. The continuing higher education programme ‘Safety in Nuclear Waste Management’ offers 5 subject-specific Certificates of Advanced Studies, each consisting of 2 subject-specific modules, as well as a Master‘s programme (M. Eng.) to ensure the maintenance and expansion of expertise for the responsible and safe disposal of radioactive waste.

DR. THOMAS BÜCHERL | **09:25** | **THURSDAY**

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EDUCTUM - AN INTERACTIVE PLATFORM FOR EDUCATION AND TRAINING AS WELL AS THE MAINTENANCE OF COMPETENCE IN THE NON-DESTRUCTIVE ANALYSIS OF RADIOACTIVE MATERIALS FROM DECOMMISSIONING AND DISMANTLING

Die Stilllegung kerntechnischer Anlagen stellt große Herausforderungen an die Deklaration der hierbei entstehenden Abfälle. Dies wird durch Änderungen bestehender bzw. Einführung neuer Regelungen, auch im Hinblick auf bereits existierende (Alt-)Abfälle, weiter verschärft.

Da sich der Rückbau noch über Jahrzehnte hinziehen wird, erfordert dies den langfristigen Erhalt der entsprechenden spezifischen Fachkompetenzen. Dies gelingt nur durch kontinuierliche Fort- und Weiterbildung des bereits involvierten Personenkreises bei gleichzeitiger Ausbildung des technisch-wissenschaftlichen Nachwuchses. Auch die allgemeine Information der Bevölkerung darf hierbei nicht außer Acht gelassen werden.

Das vom BMBF geförderte Vorhaben EducTUM (Förderkennzeichen 15S9443) hat die Aus-, Fort- und Weiterbildung, den Kompetenzerhalt sowie die Vermittlung von allgemeinen Informationen aus den Bereichen der Charakterisierung radioaktiver Abfälle und der Produktkontrolle zum Ziel. Es adressiert einen breiten Personenkreis, von allgemein an der Thematik interessierten Personen, über Anwender bis hin zu Fachexperten. Die Art der Wissensvermittlung erfolgt deshalb entsprechend dem Kenntnisstand der einzelnen Personengruppen.

Der Ausgangspunkt hierfür ist die Webplattform https://educTUM.de. In der aktuell stattfindenden ersten Phase ihrer Entwicklung erfolgt eine Beschränkung auf Bereiche der zerstörungsfreien messtechnischen Untersuchungen an radioaktiven Abfallgebinden und hier im speziellen auf Messverfahren, welche Gamma- und Röntgen-Strahlen nutzen.

Die Besonderheit an EducTUM ist die Möglichkeit professionelle Programme online zur Vertiefung der vermittelten Inhalte zu nutzen und der damit verbundene direkte Bezug in die Praxis. Ein Beispiel hierfür ist das Gamma-Spektrometrie-programm LVis, mit dem online Messungen mit unterschiedlichen Detektoren an realen Proben möglich sind. Die Proben stehen an einem Messplatz in der Radiochemie München RCM und werden regelmäßig getauscht.

DR. JOSÉ LUIS LEGANES NIETO | **10:30** | **THURSDAY**

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MATERIALS AND SURFACES RELEASE. USE OF ADVANCED DEVICES FOR PROCESS SCALING

In surface clearance and site release processes, new equipment and platforms that automate tasks while meeting regulatory requirements are essential. These processes involve measuring large areas, both on the ground and on walls. For walls, working at heights and using scaffolds or large structures is challenging, while on land, vast areas and difficult terrain hinder the use of carts or handheld devices. Enresa recognizes the need to explore new platforms/detectors to optimize these processes while maintaining measurement accuracy. Specifically, it aims to verify the feasibility of using gamma spectrometry equipment with drones/rovers.

With over 25 years of experience in surface clearance and site release, Enresa has relied on manual device movement, following a method authorized by the Nuclear Safety Council. As technology advances, automated platforms are required to transport measurement equipment across planned areas, reducing both measurement time and the risk of human error. Given the scale of future projects, the use of these technologies is essential to accelerate and improve the final verification of residual materials.

To this end, Enresa seeks a new platform that can efficiently move its measuring equipment and expedite clearance processes, both in current facilities and upcoming dismantling projects, where the volume of material to be measured will far exceed previous projects.

Additionally, material release processes require highly sensitive equipment to measure large quantities of material with precision. Gamma spectrometry has been the standard, with measurement times of 5-10 minutes per ton. The use of more efficient non-spectrometric detectors could reduce these times. Shielded chambers equipped with scintillation plastics allow for faster measurements while maintaining required acceptance criteria.

DR. BETTINA GRAUEL | **10:55** | **THURSDAY**

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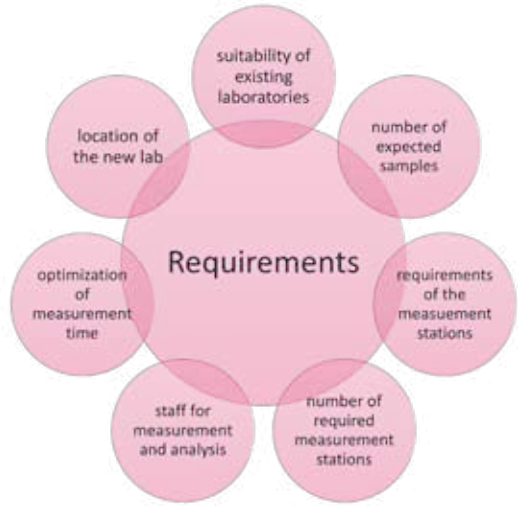
PLANNING A LABORATORY FOR RELEASE-RELATED LABORATORY MEASUREMENTS

The release of building structures for re-use or demolition is one of the final process steps of the decommissioning and dismantling of nuclear power plants. The process is time-consuming and requires significant input. Hence, a thorough planning of the release of building structures is crucial!

Reliable release measurements of building structures are mainly carried out using direct surface measurements or in-situ gamma-spetrometry. However, sampling is needed for the radiological characterization (e. g. nuclide vector verification), with the samples analyzed in a laboratory. Additionally, using samples for release measurements can be a useful tool in the case of inaccessible spots, or when a reduced number of measurements is permitted. A gammaspetrometry laboratory, which will be in operation until the completion of the building structure release, is needed for all this.
Are the already existing laboratories suitable despite the new requirements of release measurements? How many measurement stations are needed and what are their requirements? How many samples are to be expected and how much staff is needed for the analysis of all measurements? What are the possibilities for optimization? And where can a new laboratory be installed, if the existing ones do not meet the requirements?

Dornier Hinneburg GmbH has completed gross planning of such laboratories at several German sites and presents their approach and experiences, to share insight into the thought process of planning a laboratory for release-related measurements.



FRITZ LEIBUNDGUT

11:20 THURSDAY

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RADIOLOGICAL CLEARANCE OF BUILDINGS USING THE EXAMPLE OF THE DECOMMISSIONED PROTEUS RESEARCH REACTOR AT PSI

At the Paul Scherrer Institute (PSI), three former research reactors, a former experimental incineration facility and a radioactive wastewater system are located. All of these facilities are subject to Swiss nuclear energy legislation (KEG) and in decommissioning stage.

In order to be able to put the premises or the building site to a new use, conditions for clearance from this legislation have to be established. PSI has decided to conceptualize and establish a generic procedure that can be applied to the clearance of all existing PSI nuclear facilities.

In a first phase, the decommissioned Saphir research reactor was subjected to this procedure in order to gain the acceptance of the competent authority ENSI. This phase is now well advanced and is approaching finalization The concept underlying this procedure is an overall process consisting of individual sub-processes, some of which build on one another. Classification into various categories is followed by a coordinated further procedure for exemption.

Proteus research reactor, which is also in the stage of decommissioning, the requirement is that the building containing this reactor is to be put to a new use and not to be demolished. The historical investigation has shown that the entire controlled area can be cleared using a simplified procedure. This simplified procedure is based on confirmation measurements carried out by in-situ gamma spectrometry. These are preceded by preliminary measurements using contamination monitors and dose rate meters, which are mainly carried out at suspected places. If any of these preliminary measurements indicate the presence of artificial nuclides, the simplified procedure is abandoned and the regular, comprehensive procedure is followed. This includes any necessary further dismantling with sampling, remediation and dose rate measurement, the establishment of nuclide vectors and, if necessary, scaling factors as well as proof of freedom from contamination.

SVEN BÖHRINGER

11:45 THURSDAY

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CLEARANCE IN BAVARIAN NUCLEAR FACILITIES USING THE EXAMPLE OF KKI 1

According to the Radiation Protection Laws, the clearance of radioactive substances is the only way to reclassify material that comes from the controlled areas of nuclear power plants as non-radioactive substances and thus dispose of it conventionally.

To do this, it must be proven that the clearance values of the Radiation Protection Ordinance are adhered to.

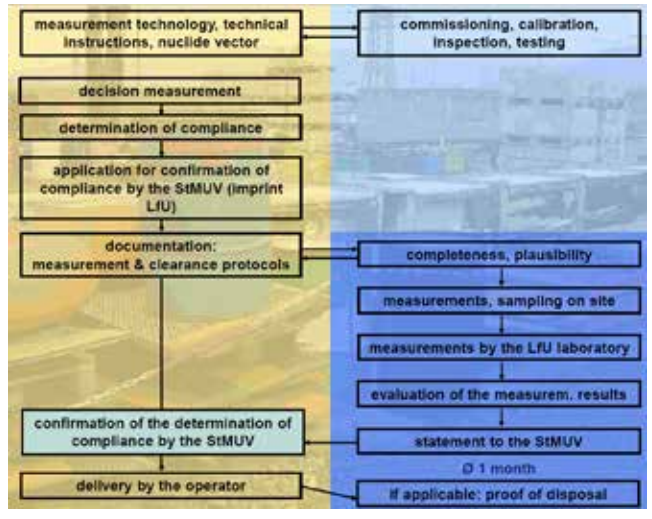
In Bavaria, the method of releasing materials from the controlled areas of nuclear facilities without damage has been in place for more than 50 years. With the Radiation Protection Ordinance of 2001, a legal regulation was created for the first time on the basis of an EU basic standard.

The release regulations were implemented in the operating manuals of the Bavarian nuclear facilities and have since represented the clearance act.

The Bavarian State Ministry for the Environment and Consumer Protection is responsible for overseeing the clearance process. The Bavarian Environment Agency is responsible for the supervisory and expert support of the clearance process.

The clearance process includes numerous measures by both the operator and the state regulatory authorities. In particular, a wide range of suitable measuring devices must be available for implementation in order to be able to provide evidence of compliance with the legal release values.

In the Isar 1 nuclear power plant, around 60% of the systems and installations in the control areas have been disposed unrestricted or specific since the end of operations in 2011.
According to current plans, the entire facility will be cleared by 2032 and the building will then be measured for clearance.



DR. THOMAS LAUTSCH

12:10 **THURSDAY**

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THE CHALLENGE OF RADIOACTIVE WASTE DISPOSAL - BETWEEN HERITAGE PROTECTION AND HIGH-TECH

The Federal Company for Radioactive Waste Disposal (Bundesgesellschaft für Endlagerung [BGE]), based in Peine/Germany, is in charge of the conversion of the former Konrad iron ore mine into a repository for low to intermediate level radioactive waste, the decommissioning of the Asse II mine, after retrieval of the radioactive waste, and the decommissioning of the Morsleben mine with the remaining of the low to intermediate level radioactive waste.

All of these repository projects are located at former mine sites that are between 60 and 125 years old. The legacy status is one of the challenges in our projects, amongst others.

In order to meet these challenges, BGE is developing digital twins of its repository systems with different levels of details for the planning of its projects. These are used for simulation and collision control of the construction processes or for digital commissioning of the emplacement processes.

BACKUP SPEAKER

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BACKUP ABSTRACT

INNOVATION IN PRACTICE: USE OF DIGITAL TOOLS IN SUPPORT OF WASTE-LED DECOMMISSIONING SOLUTIONS

Three-dimensional (3D) digital simulation tools are increasingly being used to study scenarios, to support the development of innovative remote technologies to implement decommissioning activities at nuclear facilities.

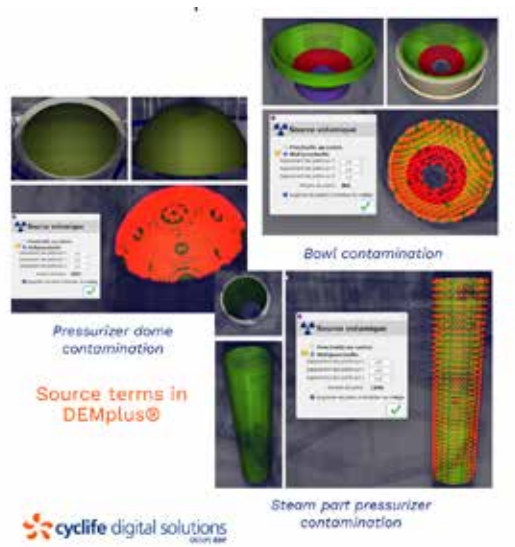
In the field of decommissioning, there is now a range of software that can be used to study issues ranging from the main options for decommissioning to the detailed working methods and waste management associated with these activities.

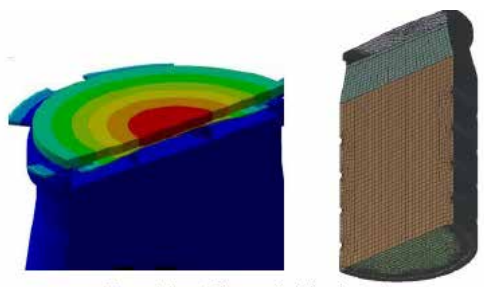
DEMplus® for nuclear, a 3D digital software developed by Cyclife Digital Solutions, has been applied in recent years by several companies in France and by some others worldwide. It is a decision support tool that responds to the challenges of working in nuclear environments and helps leading engineering companies to define operational strategies. Thanks to its global approach, DEMplus® permits to conduct ALARA /ALARP (As Low As Reasonably Achievable / Practicable) methodology.

We will present the results of two different use cases of projects using DEMplus® software to optimise scenarios based on real-time 3D simulations that simultaneously assess costs, lead times, waste streams and dosimetry.

The first use case concerns the decommissioning simulation strategy of the Fessenheim power plant in France. Several decommissioning scenarios have been simulated and compared, with a focus on occupational radiation exposure, making it possible to reduce hazards and secure the critical path by identifying the critical elements, bottlenecks, and stoppers.

The second is the modelling and the dose rate assessment to estimate the doses resulting from the transport, handling, and emplacement of the drums in a disposal vault at the LLWR. This helped to decide whether engineered radiological protection was required, to verify the primary dose rate calculation performed in MCNP6 and to design and construct the vault.





Presentation of drums with finite elements

LARS GROTEN

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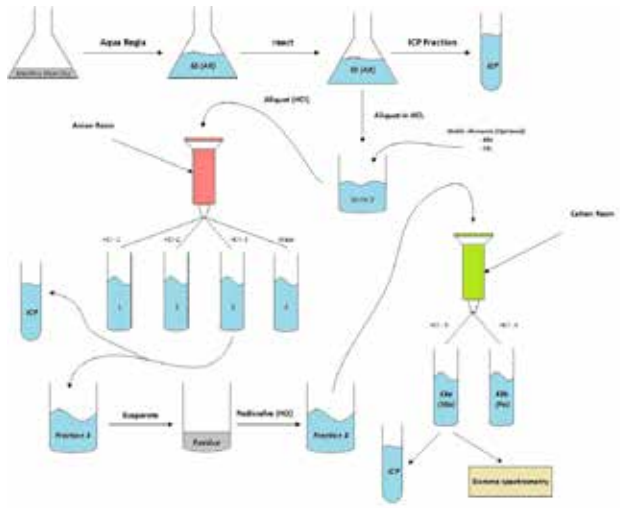
BACKUP ABSTRACT

IMPACT OF ANALYTICAL SCOPE EXTENSIONS FOR SAMPLES OF RADIOACTIVE WASTE

The global aging of nuclear facilities has led to an increased demand for the characterization of radioactive waste, a need further accelerated by Germany's Atomausstieg policy, which hastens the decommissioning of nuclear reactors. Over recent years, NRG has actively participated in the decommissioning of reactors outside the Netherlands, involving both on-site material sampling and radiochemical characterization in our laboratories. The radiochemical characterization provides a myriad of challenges. The type of materials requested for analysis includes a wide variety of different matrices. This can range from steel reactor internals and control rod absorbers to shielding concrete and specific surface contamination analysis. Furthermore, the activity levels of these materials vary significantly, from ultra-low levels necessitating clearance characterization to very high activities (GBq and higher) requiring specialized hot cell setups.

Methods and techniques employed for the characterization of specific nuclides are ever changing. A notable trend observed in recent years is the expanding list of required radionuclides for waste acceptance criteria. Historically, characterization focused on the most prevalent radionuclides, but there is now a growing need to include rarer and less prevalent nuclides.

This evolution presents challenges for characterization. Examples illustrate how the characterization of certain radionuclides differs in work-up steps compared to traditional radionuclides, impacting the time and effort required. Consequently, it is increasingly important to engage in pre-characterization discussions with stakeholders to determine the most relevant radionuclides for the end purpose. Activation calculations and chemical composition should guide the selection of radionuclides for characterization.



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COMPETENCES IN NUCLEAR SERVICES

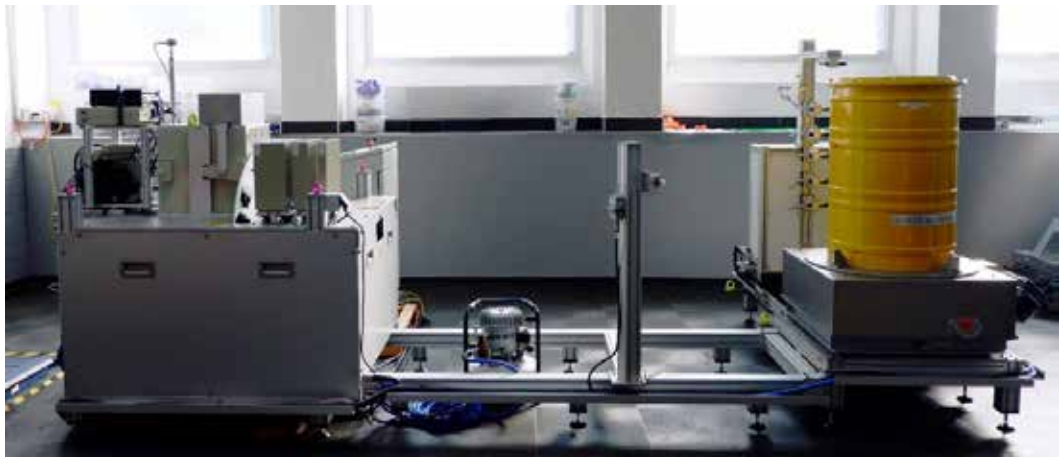
AiNT is a growing company with a focus on consulting, training and development of nuclear radiation measurement technology, which was founded in May 2011. The interdisciplinary team consists of 20 employees, including engineers, physicists, mathematicians and software developers. AiNT is organised in three divisions: consulting & services, research & development and academy.

CONSULTING & SERVICES

AiNT carries out and supports the qualification process of e.g. measurement devices and general radioactive waste treatment approaches.

This includes the preparation of documents as well as monitoring the qualification process by authorities and experts.

All phases of the life cycle of a measuring system are accompanied by AiNT. It starts with the planning of a system, considering pre-defined requirements and specifications, respectively, through to operation and maintenance at the final site. AiNT offers the execution of factory acceptance tests in the AiNT technical centre. Finally, the end of the life phase and the disposal of the measuring system, according to legal and sub-legal requirements, are part of our service spectrum.



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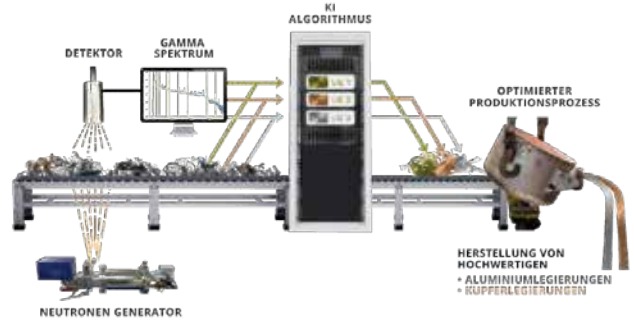
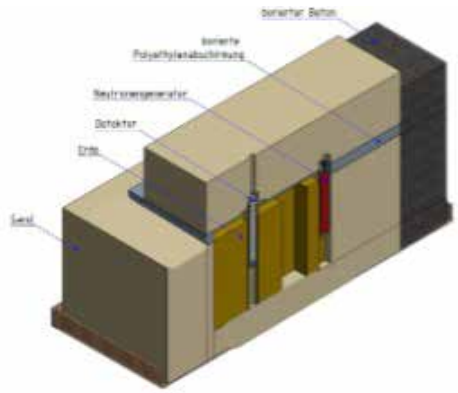
RESEARCH & DEVELOPMENT

AiNT actively conducts research and development (R&D), among others, in the field of nuclear radiation measurement technology. AiNT develops innovative measurement methods and constructs metrological systems for various areas of applications, such as environmental analysis, recycling or nuclear waste characterisation.

One of AiNT's projects is MetalClass. Metals can in principle be recycled an infinite number of times. However, re-melting without loss of material quality is only possible if the elemental composition can be precisely determined prior to re-melting. The non-destructive determination of the elemental composition of e.g. metal scrap in real time, makes it possible to optimally control the input flows of the recycling process. Therefore, in the copper and aluminium production, there is a great interest in the element analysis of recyclable materials in real time in order to classify the metallic secondary raw materials according to existing standards and regulations as well as to recycle them according to type.



As part of the SONDEX R&D project, an innovative measurement method for detecting explosives deep in the ground was developed and experimentally validated for the clearance of unexploded ordnance. It is based on the irradiation of a suspected unexploded bomb site with neutrons and the detection of the short-term prompt gamma radiation induced by the neutron interaction. In an experimental test set-up in AiNT's technical centre, various scenarios were investigated with regard to the measuring arrangement and moisture content during probing.



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AINT ACADEMY

AiNT offers modular training programs for the targeted training and further education of employees and specialists in the field of nuclear technology and the associated qualification and licensing procedures.

- **Build and maintain competence through our modular seminar program**
- **Implementation of customer-specific in-house trainings**
- **More than 70 knowledgeable and experienced lecturers (experts) from various institutions**
- **Networking between the participants**
- **Hybrid solutions**
- **Flexible in terms of location**
- **Also available in English on request**
- **ICOND Organizer**

WE ARE HAPPY TO SUPPORT YOU WITH

- **Training of employees**
- **Development of targeted training courses**
- **R&D projects**
- **Plant tests**
- **Qualification of measuring systems**

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AIXITEM GMBH - CUSTOMIZED SOLUTIONS FOR NUCLEAR FACILITIES

For 25 years aixITem GmbH has been supporting its customers by providing individual IT solutions. For nuclear facilities, we offer various customized solutions for the following applications:

aix.Dosi to support dosimetry
Functions include personal, job and area dosimetry with automatic dose limit monitoring and date checking for configurable events. Access control and other systems are integrated via interfaces. Numerous export and evaluation functions simplify documentation obligations and administrative work. Using a role-based user system and a modular structure, complex application scenarios are configurable. Most importantly, the system aix.Dosi is particularly suitable to support the decommissioning process.

aix.GammaPool for planning and performing gamma spectroscopic measurements
Our aix.GammaPool program manages in-situ and laboratory measurements. In addition to a classic software application, planning and evaluation options also include a web-based module. Based on the data of measuring devices aix.GammaPool automatically generates reports, which are required for notifications to authorities (e.g. to organize clearance and disposal). The software is used, among other things, for clearance measurement, for various measurement tasks in radiation protection and for statistical evaluation processes.

aix.GerVer and aix.QuellVer for device and source management
Our system helps to manage measuring devices and radioactive sources used in nuclear power plants. This includes monitoring the requirements of authorities regarding regular functional testing, calibration and verification.

Individual solutions from aixITem
We customize our applications to our clients' needs. Feel free to contact us. For more information, visit: https://nuclear.aixitem.de

3Decommissioning
The system assists our customers with the planning, execution, and documentation of decommissioning processes. With visual 3D support, numerous scenarios are possible. Interfaces with measuring devices and other programs, such as aix.GammaPool, enable integrated workflows. The decommissioning process is represented as a digital twin, allowing users to keep track of all significant developments.

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COUNTING, MEASURING, WEIGHING WITH AI AND 3D SCANS FOR ENHANCED EFFICIENCY IN NUCLEAR POWER PLANT DECOMMISSIONING

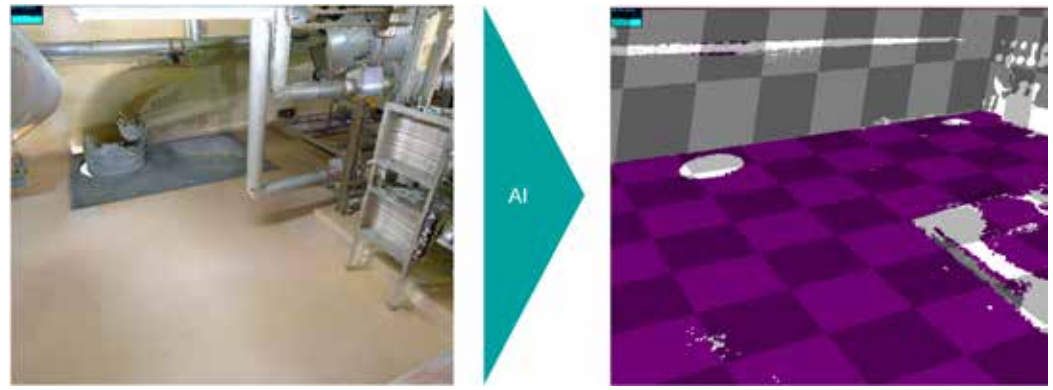
We present an AI to create a digital object database of a complete power plant, as-built. In the complex and safety-critical field of nuclear power plant decommissioning, efficient and precise capturing of plant and building elements poses a significant challenge. Professionals are often disappointed from digital twins either as non-informative laser scans or as CAD models, which either lack detail or are disproportionately time-consuming to create. Our innovative approach overcomes these barriers by leveraging artificial intelligence (AI) to automatically enhance laser scans with meaningful information, thereby producing an alternative to digital twins with high accuracy and in a short time frame.

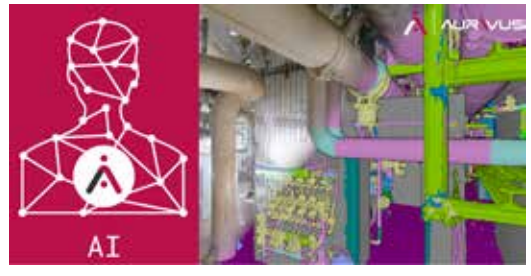
Our browser-based solution analyzes point clouds from 3D laser scans and automatically identifies objects such as pipes, fittings, steel structures, wall surfaces, doors, stairs, and more. Beyond object classification, the AI also captures parameters such as dimensions, type, and weight, enabling a comprehensive and detailed digital representation of the scanned facility along with automatic quantity and mass extraction.

Our technology offers significant advantages, particularly in the context of nuclear power plant decommissioning. A prominent example is our successful pilot with RWE Nuclear GmbH at the decommissioning site of Gundremmingen. Our AI solution allows for full automatic quantity and mass determination across the entire facility, enhancing the reliability of long-term planning and significantly reducing planning risks. This enables calculations decades in advance.

Additionally, the identified plant elements are linked with the plant‘s technical database and document management system, facilitating seamless integration through referencing of plans and descriptions.

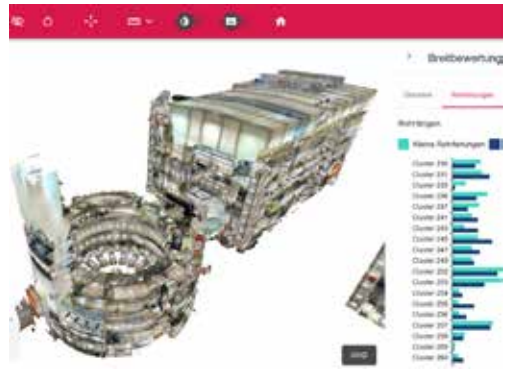
Another feature that enhances planning and communication processes is the virtual walkthrough of the facility, which is provided via our web-based platform in the plant‘s intranet. This function allows users to virtually enter the facility and interact with the detected objects. Objects can be virtually moved, dismantled, or enriched with additional information and documents. This dynamic interaction ensures that all relevant data is always available and up-to-date.





Regular updates of the laser scans also enable tracking of the current state of the facility and documenting progress in the decommissioning process.

In our presentation, we will delve into the architecture and functionality of our AI-driven platform, present real-world use cases, and discuss the positive effects on decommissioning and long-term planning of nuclear facilities. Our goal is to provide professionals with concrete insights into the possibilities and benefits of this technology and to open new avenues for optimizing decommissioning processes.



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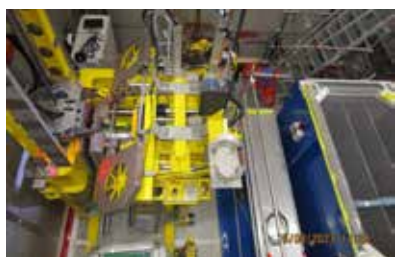
ATKINSRÉALIS - ENGINEERING A BETTER FUTURE FOR OUR PLANET AND ITS PEOPLE

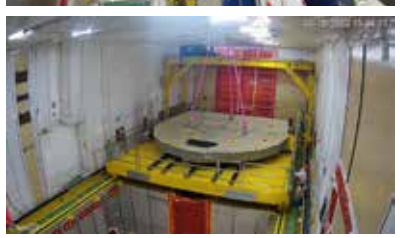
NEW NAME. NEW ERA.

AtkinsRéalis, a world-leading design, engineering and project management organization that connects people, data and technology to transform the world's infrastructure and energy systems. From designing entire cities to delivering nuclear power stations and transforming manufacturing systems, we focus our business in the areas that have the most impact on the way we all live and the resources we demand from the planet. Our markets are Building & places, Defense, Industrial, Mineral & metals, Nuclear, Power & renewables, Transportation and Water.

In Nuclear we lead the world in modernising nuclear in New Build, Reactor Support and Life Extension as well as Environmental Remediation. Our project solutions start at the concept stage, and continue through design and technology development, including new-build programs, and from asset management through to end-of-life and waste management. Our CANDU technology operates on four continents.

Through our subsidiary Atkins Energy Germany GmbH, we are providing products and services that help our clients to safely decommission their nuclear assets and develop a blueprint for a net zero carbon future by build, maintain and decommission their subsurface storage capacity. The energy portfolio comprises PMO and Owners Engineer Services, turnkey radioactive waste management and decommissioning of nuclear facilities e.g., large component and reactor removal as well as underground energy storage expertise. Additionally, all products and services of AtkinsRéalis are available through Atkins Energy Germany GmbH.





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EXPERTS FOR MEASUREMENTS IN RADIATION PROTECTION

Radiation protection is one of the most important part in industrial safety and is subject to strict legal regulations. Exactly for this sensitive area BERTHOLD TECHNOLOGIES provides highly sensitive and reliable instruments.

The Berthold radiation protection division supplies advanced and reliable detection technology for measurement of radioactive contamination, dose and dose rate, activity and airborne radioactivity concentrations. The portfolio ranges from hand-held instruments up to large customer-tailored systems for research, nuclear medicine, nuclear energy and decommissioning.

For many decades, customers have trusted Berthold to support their efforts in creating a healthier world, a safer environment and more efficient manufacturing processes. Our deep understanding of science combined with leading-edge technology empowers our clients with tools and solutions to pursue the most challenging applications - we improve life in meaningful ways.

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THE DECOMMISSIONING SPECIALIST - PROVEN RELIABILITY IN TOUGH ENVIRONMENTS

It's hard to think of an environment where remote control is more critical than in a nuclear plant. Here, Brokk robots are the preferred choice for nuclear decommissioning and can perform difficult tasks in four main categories:

- Dismantling and size reduction
- Sorting waste material
- Decontamination
- Demolition

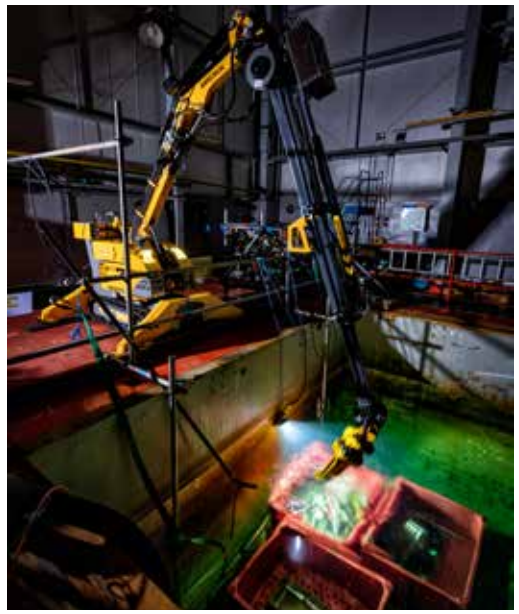
All Brokk robots come with unique features you won't find in typical demolition equipment, plus it can gain access to places where people and other machines can't go.

Remote-controlled handling, heat resistant design, flexible three-arm system, and an electric motor for powerful, quiet, fumeless operation, we leave nothing to chance when it comes to perfecting the performance of our machines. And since the robot is built for adaptability, our engineers can customize the robots to meet your specialized needs.

At Brokk we offer a proven combination of design, engineering and service that can tackle almost any undertaking. With over 8,000 machines working on exciting projects around the world, Brokk has become synonymous with safety, quality and efficiency.

For more than three decades Brokk has been involved in and delivered robots to decommissioning projects all over the world, resulting in an unmatched experience in tailor-made solutions.

Brokk DA GmbH is a certified company according to §25 Radiation Protection Law and we of course have safety-checked and certified personnel available.



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BRENK SYSTEMPLANUNG GMBH (BS)

BS offers consultancy services for over 40 years. With more than 80 staff (engineers and scientists) we provide expert knowledge in the areas of radiation protection, nuclear technology, radwaste management including disposal, NORM, mining engineering, environmental management, plant/process engineering as well as software development, artificial intelligence, and business analytics.

We are a Germany based company with several branch offices. Our customers comprise the private as well as the public sector on national and international level e.g. German and foreign governments and their different regulatory bodies, or IAEA and EC.

Our services in the nuclear sector include all aspects of radiation protection (activation/shielding calculations, dispersion modelling of radionuclides, safety assessments) and decommissioning (concepts, comprehensive support for clearance, radiological characterisation, clearance measurements, licensing support, waste package optimization). Our remarkable set of specific measurement devices allows us to conduct radiation measurements in a timely manner even under exceptional conditions. Our software tool PUG3 supports an efficient and traceable planning and conduct of all steps of a clearance process from the very beginning. In the field of radwaste management we provide services related to waste processing, interim storages and disposals itself. For the latter our services cover the entire life cycle of a disposal for deep geological and near-surface disposal.

Several of our experts are appointed members of national advisory commissions (Commission on Radiation Protection (SSK), Nuclear Waste Management Commission (ESK)) and working groups of international organizations (IAEA, OECD/NEA).

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CYCLIFE, YOUR STRATEGIC PARTNER FOR NUCLEAR DECOMMISSIONING AND WASTE MANAGEMENT PROJECTS

Cyclife's teams have tackled the challenges faced by international customers, working with EDF Group's extensive experience. The aim is to reduce the volume of waste generated and optimise the operating costs of the equipment. Where possible, Cyclife enables the recycling of materials to contribute to a sustainable nuclear industry.

From design to dismantling of nuclear installations, Cyclife works throughout their entire lifecycle with partners. This can be done directly on site or in Cyclife's own facilities. It provides integrated industrial and digital solutions.

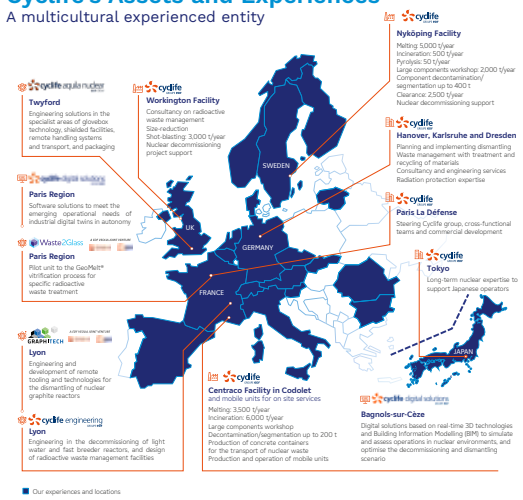
Cyclife has highly qualified staff with a wealth of experience in decommissioning and waste management at its engineering and expertise centres. They work with cutting-edge technology, including the latest digital innovations.

The teams design waste treatment facilities, workshops, remote tools and handling equipment, shielded equipment, and transport/packaging to best meet customers' needs. They can define and implement the full dismantling scenario for a given nuclear facility.

Cyclife also operates three licensed nuclear facilities in the UK, Sweden and France, that process very- low to low-level radioactive waste: waste shredding and decontamination and, where possible, material recycling. They apply Best Available Techniques (BAT) in waste management and decommissioning consulting. They investigate and develop treatment solutions for specific radioactive waste.

Cyclife teams engage with customers early and add value by implementing a waste-led decommissioning approach that supports treatment, optimises waste diversion, and offers free release where possible.

Cyclife's Assets and Experiences
A multicultural experienced entity



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METAL CUTTING CIRCULAR SAWS FOR DISMANTLING OF NUCLEAR POWER PLANTS

A continuous pursuit of innovation is an important factor in the growth of any company. Since its founding in 1984, developing innovative solutions has been the motto of Jepson Power, the inventor of Dry Cutter technology for cutting steel, stainless steel and composite materials. This technology cuts without cooling, with a shorter cutting cycle, almost burr-free and with a longer service life.

Jepson Power's metal circular saws play a crucial role in the dismantling of nuclear power plants. The state-of-the-art saws and saw blades offer numerous advantages that make the process more efficient, safer and more environmentally friendly.

An important aspect is the precision that these metal cutting saws offer. They allow workers to make clean, straight, and nearly spark-free cuts, greatly improving the safety and efficiency of dismantling.

These high performance machines can easily cut through thick metal structures, which significantly speeds up dismantling. This allows workers to get more work done in less time, which in turn reduces costs.

Jepson Power's metal cutting circular saws also offer ecological advantages. By using their saws, there is no need for coolants and lubricants. These therefore do not have to be decontaminated and disposed of.

Furthermore, the saws are lightweight and portable, allowing workers to easily transport them to different job sites. This makes dismantling more flexible and efficient.

In addition to the technical advantages, Jepson Power also offers excellent customer service, providing training and support to ensure the workers can operate the saws correctly and achieve maximum efficiency.

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DORNIER NUCLEAR HINNEBURG GMBH – THE EXPERTS FOR NUCLEAR DECOMMISSIONING

Dornier Nuclear Services GmbH and Hinneburg GmbH are well known to you as singles for years. We are now proud to introduce ourselves as couple – we have merged to Dornier Hinneburg GmbH in August 2024.

1+1 = 4 our clients

With this merger we strive to offer our valued business partners and clients an even wider range of services in the field of dismantling and radiation protection. Please join us on our new journey as Dornier Hinneburg!

We have set ourselves the target of enabling our customers to dismantle their nuclear facilities safely and efficiently. To this end, our holistic disposal planning covers the topics of dismantling planning and waste treatment, disposal planning, packaging planning, radiation protection and shielding, repository documentation.

Internationally, we support our customers in the safe and efficient operation of their nuclear facilities and in the planning of new nuclear construction projects.

Our highly motivated team of experts will provide you with solution-oriented and expert support for your individual tasks.

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RÜCKBAU – ENTSORGUNG – ZWISCHENLAGERUNG: DIE EWN GRUPPE

Die EWN Gruppe, das sind die Entsorgungsunternehmen des Bundes. An den vier Standorten Lubmin, Rheinsberg, Jülich und Karlsruhe bauen sie stillgelegte nukleare Anlagen sicher und fachgerecht zurück. Dies geschieht im Auftrag und durch Finanzierung der öffentlichen Hand sowie unter Aufsicht verschiedener Ministerien und Behörden.

Expertise in Rückbau und Entsorgung

Unter dem Dach der EWN Gruppe versammeln sich über 30 Jahre Erfahrung im Rückbau nuklearer (Forschungs- und Prototyp-) Anlagen. Die dabei entstehenden nuklearen Abfälle werden jeweils vor Ort sicher und fachgerecht verarbeitet und entsorgt bzw. zwischengelagert. Dazu betreiben die EWN wie auch ihre Konzerntöchter JEN und KTE jeweils mehrere Zwischenlager.

Der Leitspruch „Wir setzen Maßstäbe. Mit Sicherheit.“ ist nicht nur unser Claim, sondern der Grundsatz täglichen Handelns.

Insgesamt rund 2.100 Mitarbeitende erfüllen ihn mit Leben: Der Schutz der Belegschaft, der Bevölkerung und der Umwelt hat oberste Priorität.

INTERESSIERT? KONTAKTIEREN SIE GERNE UNSERE ÖFFENTLICHKEITSARBEIT:

EWN	JEN	KTE
Entsorgungswerk für Nuklearanlagen GmbH	Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH	Kerntechnische Entsorgung Karlsruhe GmbH
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KRANTZ GMBH

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KRANTZ - 145 YEAR´S OF EXPERIENCE - TRADITIONALLY COMMITTED TO THE FUTURE

Krantz develops, designs, manufactures and markets air distribution, heating and cooling systems for ceiling and façade installation as well as clean room systems. We also produce filter and damper systems and are experts in thermal purification of exhaust air. You also have the highest level of expertise at your side in the area of plant engineering and services for ventilation of nuclear plants.

Air filtration at its highest level
Our filter systems are specialised in filtering dusts, gases and aerosols from the air and meet high requirements for tightness in their processes. Regardless of whether the application is in a nuclear power plant, high-security laboratory, hospital, isolation ward or in industry, we offer the right filter for your needs. Our high-quality filter systems in a gastight design are planned and manufactured from stainless steel in a wide range of material grades such as 1.4301; 1.4404; 1.4541; 1.4571 etc., precisely to your requirements.

Highest Demands on Tightness and Quality
Our damper systems are designed to precisely control gases and ensure optimum performance in industrial applications.

Range of damper components for applications with high demands on tightness:

- Gastight dampers
- Pressure relief dampers
- Louver dampers
- Non-return dampers
- Pressure surge dampers

In addition to our broad product portfolio in the field of filter and damper systems, we are your specialised partner when standard solutions are no longer sufficient!

Other Krantz Business Units:

- Air&Climate Solutions: Air Distributions Systems, Cooling & Heating Systems
- Air Technologies: Planning and Plant Engineering TGA
- Clean Air Solutions: Thermal exhaust air purification
- Research&Development

MIRION TECHNOLOGIES (CANBERRA) GMBH

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MIRION TECHNOLOGIES (CANBERRA) GMBH

Mirion Technologies is a leading provider of products and services related to measurement, detection and monitoring of radiation. Mirion is built on 60 years of experience in research, problem- solving and product development. We approach our work through a lens of curiosity and rigor, with a spirit that compels us to question and constantly drive innovation in our field

As one of the global leaders in radiation measurement with over 1800 talented professionals, the mission is driven to protect people, property and the environment from the harmful effects of ionizing radiation.

To serve our customers all over the world Mirion maintains locations on different countries. Therefore, we can provide local support according to the country specific requirements for radiation safety.

The portfolio of Mirion Technologies embraces a large variety of solutions for spectroscopy, radiation detection health-physics and camera applications.

For D&D and especially for NDA applications Mirion has broadened their portfolio to provide solutions also for challenging projects. By applying state of the art of technology and science and following the customer's needs, these products are constantly developed further.

Mirion works with great partners to always be able to provide the best solutions and expand possibilities. Especially automatization and robotics applications are a new, exciting field for D&D applications.

Visit our booth to learn more about our capabilities for D&D and radiation safety. We are looking forward exchanging with you!

MÜLLER AG VERPACKUNGEN

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THE PACKAGING EXPERTS - MÜLLER PACKAGING SETS STANDARDS IN QUALITY

Müller Packaging produces industrial packaging made of mild steel, stainless steel and fiber. The UN-approved hazardous goods packaging, including tight head, composite and open head drums up to 250 liters, are produced at the Swiss sites in Münchenstein and Reiden. The company has positioned itself on its global markets as a reliable partner with high adherence to delivery dates - and as a quality leader. Customers receive safe solutions for a wide range of applications in various industrial sectors such as pharmaceuticals, chemicals, cosmetics, flavors and fragrances, mineral oil, paints and coatings, semiconductor and food sectors.

Special requirements from customers are welcome, in line with the motto „Challenges accepted“. Many years of experience, comprehensive understanding and pragmatic processes enable new customer requirements to be realistically classified and efficiently implemented. The in-house design department together with the machine and tool building departments ensure that service and maintenance drive the further development of Müller‘s production while implementing quickly and reliably customer requirements.

The worldwide reputation for delivering consistently recognized quality is created at every single workplace. A „Müller groove“ has been established that enables goal-oriented, collegial work, where the individual counts and top performance is achieved every day.

Müller Packaging is pursuing the goal of reducing its CO2 emissions to net zero by 2045. The company has been committed to environmental protection, occupational safety and human rights for decades. This has led to an EcoVadis silver award.

NKR DEMOLITION SWEDEN AB

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NKR DEMOLITION SWEDEN AB - SPECIALISTS IN NUCLEAR FACILITY DISMANTLING AND LARGE-SCALE DEMOLITION

NKR provides comprehensive services for the decommissioning of nuclear facilities. Our offerings include Project Management, Dismantling, Radiation Protection, Decontamination, Radiological Free Release, Sorting, Packing and Recycling. We utilize a modern fleet of advanced machinery, backed by extensive expertise in construction equipment.

With many years of experience in dismantling nuclear facilities, NKR maintains high standards for health, safety, and environmental practices. We prioritize timely delivery and a safe work environment in every contract we undertake. As industry leaders in demolition and recycling, we proudly boast a recycling rate of 97%.

We combine competence and expertise in dismantling nuclear facilities with many years of experience from conventional demolition. We employ a wide range of tools, from handheld devices and robots to our largest machine with a weight of 200 tons and a reach of 70 m.

We manage general contracts and provide expert project management services for dismantling and demolition. Our project managers have experience in the decommissioning of nuclear facilities and possess extensive knowledge of construction machinery. They are well-versed in handling regulatory requirements for nuclear installations.

Our dedicated team operates throughout Sweden and across Europe.

Contact us for more information!

NUKEM TECHNOLOGIES ENGINEERING SERVICES GMBH

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NUKEM TECHNOLOGIES ENGINEERING SERVICES – YOUR PARTNER FOR NUCLEAR ENGINEERING SOLUTIONS

NUKEM Technologies Engineering Services GmbH is a global leader in radioactive waste management, nuclear facility decommissioning, and engineering. Our expertise spans the entire project lifecycle, from initial concepts and feasibility studies to the development, procurement, and supply of waste processing facilities, as well as the construction of complete waste treatment plants.

Decommissioning, decontamination, and dismantling of nuclear facilities demand not only extensive technical know-how but also a thorough understanding of legal approval procedures. Our deep-rooted experience enables us to precisely assess the needs of nuclear power plant operators and other nuclear facility stakeholders. We offer a comprehensive range of engineering, consulting, and radiation protection services.

Customer focus and quality management are the cornerstones of our corporate policy. We prioritize personalized customer service, timely project execution, transparent documentation, and delivering high-quality products. Our commitment to quality is underscored by our quality assurance system in compliance with DIN EN ISO 9001:2015. We are also certified according to DIN EN ISO 14001:2015 and ISO 45001.

PEDI AG

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ALPHA-TIGHT HOUSINGS AND PROTECTIVE SYSTEMS FROM PEDI ENSURE THE PERSONAL AND ENVIRONMENTAL SAFETY DURING DISMANTLING PROCEDURES

Since more than 60 years, PEDI AG is a competent partner for the nuclear industry all over Europe.

The company is specialized in developing, manufacturing and selling of protecting and shielding products for persons and environment. During the dismantling process of radioactive contaminated equipment, components or building structures, the use of tight housings or encasements is necessary, stopping the distribution of airborne particles and dust. For this purpose, PEDI uses flexible housing materials with high mechanical properties and certified for the use for alpha-tight encasements. A so called dismantling tent serves as a work place for cleaning or maintenance or dismantling activities. Particularly, it can be used for storage or handling of radioactive substances in solid, liquid or gaseous condition. The decontamination tent includes a solid frame structure and a flexible housing. The frame structure remains completely outside of the tent, so it remains free of contamination. The inner space of the housing is completely empty and easy to clean. The housing is permanently evacuated down to -200 Pa. After use, the tent housing will generate a minimum of waste in weight and volume.

In the field of Personal Protective Equipment, a vast range of established protective suits and auxiliaries is available: Depending on the method of operation, the suits are designed for integral ventilation or to wear with mask, for single or multiple use, for light or heavy works.

For the ventilated suits, a breathing air supply is needed. The PEDI air supply and air distribution components are engineered for high reliability, durability and long live cycle. Due to these characteristics, PEDI products assure an immediate readiness for operation at every time.

Airborne particles can be collected with a variety of air samplers, test swabs (smear tests) and screening tests, allowing an efficient air monitoring right around the clock.

More information on www.pedi.ch

SPIE ENERGY SERVICES GMBH

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MORE THAN 30 YEARS OF EXPERIENCE AS A SUCCESSFUL SERVICE PROVIDER

SPIE Energy Services is part of the operational division Industry Service & Wind of SPIE Germany Switzerland Austria. Worldwide, SPIE employs a total of more than 50.000 colleagues.

With more than 30 years of experience as a successful service provider and about 250 employees we support nuclear power plants, nuclear facilities and manufacturing firms as well as research installations and industrial clients. Experienced, specialized teams for maintenance, inspection, decommissioning and waste management, as well as our well-established proprietary EAM software (incl. operations management/waste tracking systems for NPPs) ensure successful projects.

SPIE ENERGY SERVICES

Our NPP services include:

Post-operation & dismantling
- Decontamination, cutting and demolition of components and buildings/NPP as well as entire sites (“greenfield”)
- Removal and decommissioning of highly contaminated systems, machines and buildings using state-of-the-art equipment and remote-controlled appliances
- Cross-departmental decommissioning projects
- Operating residual material processing centers and waste treatment facilities
- Provision of specialist personnel to support post-operation and decommissioning as well as decontamination and waste management

Handling and conditioning
- Disassembly and sorting of contaminated waste with consideration to nuclide vectors and acceptance criteria
- Assessment and radiological characterization of historical waste according to waste disposal legislation
- Conditioning and waste package production for the final repository, incl. disposal documentation
- Planning/implementation of waste treatment systems, special machines, remote controlled systems

Site cleanup & greenfield solutions
- Disposal planning for waste material eligible for clearance
- Complete solutions for the operation of waste management facilities
- Disposal/handling solutions for (TE)-NORM waste
- Clean up of hazardous waste from industrial sites

Our licenses & certifications
- Permission in accordance with Section 25 StrlSchG and SUVA (CH)
- DIN ISO 45001 & SCCP/SCC**/SCP
- DIN EN ISO 9001
- Handling agent for hazardous waste (KrWG)
- Asbestos and man-made fiber removal, work in contaminated areas

Components of an Enterprise Asset Management System

SPIE RODIAS GMBH

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WE RAISE ASSET LIFECYCLE MANAGEMENT PROCESSES TO INDUSTRY 4.0 LEVEL

As an IT consulting company, SPIE RODIAS specializes in the design, implementation and optimization of IT solutions for the maintenance, management, operation and decommissioning of complex facilities. SPIE RODIAS is a leading business partner for enterprise asset management (maintenance systems) based on IBM Maximo and Hexagon EAM. The company advises process-driven industries such as power generation and distribution, automotive, transportation, public transport, paper, chemicals, oil & gas and plant engineering as well as industrial service providers.

SPIE RODIAS supports the introduction of mobile use cases, sensor technology (IoT) as well as condition monitoring and predictive maintenance through the use of artificial intelligence. Depending on the situation, the company relies on both standard market products and its own products, such as the Insight Control Panel maintenance portal, which consolidates data from various sources and makes it available for processing on the desktop and in an offline app.

As a specialist in the digital transformation of operations management, maintenance and aftersales services, the company accompanies its customers into a future-proof Industry 4.0. This ranges from reactive and preventive to condition-based and predictive maintenance, which is sustainable in terms of the UN sustainability goals.

For almost 40 years, SPIE RODIAS has been the market leader in German-speaking countries with its self-developed, comprehensive EAM solutions for nuclear power plants and also develops innovative solutions for decommissioning in this segment. These include the OPTIRA solution for optimizing complex long-term planning projects using mathematical methods. This makes the company a pioneer of a holistic asset management lifecycle approach. SPIE RODIAS is part of the operational division Industry Service & Wind of SPIE Germany Switzerland Austria.

SPIE RODIAS

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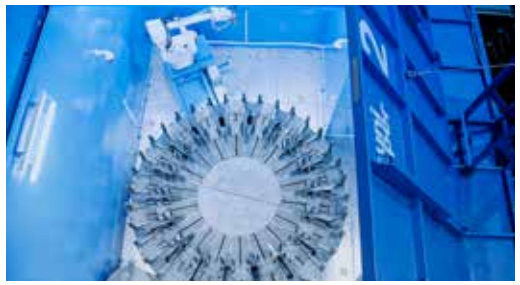
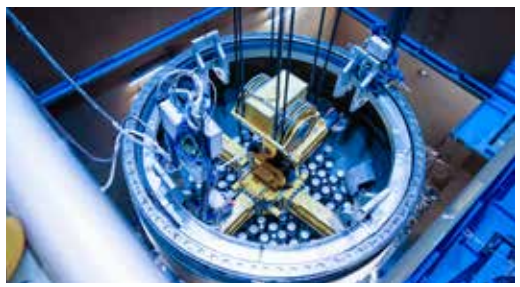
COMPREHENSIVE SERVICES FOR THE DECOMMISSIONING AND DISMANTLING OF NUCLEAR INSTALLATIONS

Uniper and their former companies have decades experiences and competences related to nuclear decommissioning. Our capabilities and experience ranges from decommissioning of research reactors to full scale nuclear power plants covering comprehensively the whole value chain of nuclear decommissioning projects.

Decommissioning planning
Our approach to decommissioning planning considers waste treatment and disposal solutions as early during operation as possible enabling optimization of waste management operations and minimization of the costs of decommissioning. We can support in all questions related to decommissioning planning, including e.g. strategy planning, dismantling and waste management planning and radiation analyses.





Pre-decommissioning and facility shutdown
Well-prepared decommissioning ensures the safe and efficient decommissioning of a facility, and minimizes delays and undue costs. We have capability, experience and know-how also from utility point of view to support our clients in all pre-decommissioning activities to achieve timely and cost effective projects, or support in a specific area such as licensing, waste management or cost analyses.

Dismantling
We have capabilities to perform even the most demanding dismantling activities, including large components (RPV, RPVIs, biological shield, steam generators etc.), volume driven dismantling and heavy liftings. UNS has decades of experience in large component dismantling from projects in the Nordics and Central Europe with excellent track record.

Project management
Successful project management is required in complex decommissioning projects. We have first-hand experience in delivering and managing projects ranging from large decommissioning programs in Sweden to individual dismantling projects and small cost optimization studies.

UNITECH SERVICES GMBH

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DIE RICHTIGE PSA ZUR RICHTIGEN ZEIT AM RICHTIGEN ORT

Die UniTech Services Group ist mit zwei Verarbeitungsanlagen sowie Forschungs- und Entwicklungsstandorten der führende Anbieter von Schutzkleidungsmanagement-Dienstleistungen für die Nuklearindustrie in Europa. Der Hauptzweck dieser Dienstleistung besteht darin, sicherzustellen, dass der Kunde die richtige PSA (persönliche Schutzausrüstung) zur richtigen Zeit am richtigen Ort hat. Seit 2012 bietet die Niederlassung UniTech Service Group Ltd auch einen Gerüstmonitoringund Dekontaminationsservice an.

Für weitere Informationen zu unseren internationalen Kapazitäten besuchen Sie bitte unsere Website www.unitech-services.eu/de/

UniTech bietet auch eine Mobile Supply Store-Lösung an, bei der Produkte in einem rollenden Lagerhaus direkt an den Standort des Kunden geliefert werden. UniTech bereitet derzeit den Bau einer neuen Verarbeitungsanlage im französischen Joinville vor, die im Oktober 2026 eröffnet werden soll. Diese Anlage wird zusätzlichen Service-Support durch einen eigens errichteten Zwischenlagerund Leasingbereich für kontaminierte Materialien undeine eigene Arbeitszone für TMD-Arbeit bieten.

WÄLISCHMILLER ENGINEERING GMBH

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WÄLISCHMILLER ENGINEERING IS A GLOBAL MANUFACTURER OF MANIPULATORS, REMOTE HANDLING SYSTEMS AND ROBOTS FOR THE NUCLEAR SECTOR

For over seventy years Wälischmiller has produced world-class innovative equipment for the nuclear industry. The company is certified according to ISO 9001:2015, ISO 14001:2015, DIN ISO 45001:2018, KTA 1401 and ATEX.

Wälischmiller has a hard earned international reputation for performance, excellence in engineering and exceptional robotic hardware. In the most difficult and challenging nuclear environments, Wälischmiller has demonstrated the ability to bring solutions and success to many of the most difficult high-radiation remediation challenges.

FULL RANGE SUPPLIER
- Products reaching from simple tools to advanced solutions
- Universal grippers
- Mechanical telemanipulators for a wide range of applications (models A100 and A200)
- Remote-controlled power manipulators from the A1000 series for handling heavy loads
- Robot system TELBOT® with unique capabilities which includes unlimited rotation in all axes, no wiring inside or outside the TELBOT® arm, and unlimited fast and precise movement

PRODUCTS FROM A SINGLE SOURCE
- Engineering including product design and development
- High manufacturing depth including single part assembly
- All required specialised staff available within the company
- Installation at sites
- Worldwide service and maintenance

By working closely with our specialist engineers and project managers, you can be confident of receiving not just an off-the shelf product, but a custom-tailored solution to your problems that offers highest quality and guarantee of long-term operational safety to even most-demanding customers.