



www.icond.de

iC&ND

International Conference on
Nuclear Decommissioning

4th
Edition



BOOK *of* ABSTRACTS

November 2015

Organizer

AiNT
Aachen Institute for Nuclear Training

in cooperation with

TÜVRheinland
Genau. Richtig.

SAVE THE DATE



International Conference on
Nuclear Decommissioning



5th
Edition

WORLD CONFERENCE CENTER BONN
NOVEMBER, 22nd - 24th 2016



Pre-Conference Workshop on November, 21st



Thematic Overview

- ❑ **Decommissioning Status in Europe**
- ❑ **Case Studies**
- ❑ **Technology Development**
- ❑ **Licensing & Supervisory Procedure**
- ❑ **Interim Storage & Transportation**
- ❑ **Waste Management & Disposal**
- ❑ **Economic Optimization Approaches**
- ❑ **Strategic Planning**
- ❑ **Operational Efficiency**
- ❑ **Complex Project Management**

ORGANIZER



IN COOPERATION WITH







TABLE OF CONTENT

Page

4 - 9

ABOUT ICOND

Background & Audience
Review ICOND 2014
Exhibitors 2015

10 - 19

PROGRAMME OVERVIEW

20 - 51

ABSTRACTS

52 - 64

COMPANY PROFILES

IMPRINT



Dr. John Kettler, Dr.-Ing. Andreas Havenith
Aachen Institute for Nuclear Training GmbH
Jesuitenstraße 4, D-52062 Aachen - Germany

Tel.: +49 241 47 58 32 45
Fax: +49 241 47 58 32 21
Email: contact@nuclear-training.de

Bildquellen Picture Sources: AiNT, WCC Bonn, Bundesamt für Strahlenschutz, RWE Power, Fotolia, EWN, KIT, Hypertherm Inc.
Für die Inhalte der Abstracts und Company Profiles sind die Vortragenden, bzw. Unternehmen verantwortlich.
The authors of the abstracts and company profiles are responsible for their content.

Design, Satz & Druck: Lindemann-Granduc - Dauffenbachstr. 3 - 52080 Aachen



ABOUT ICOND

PROGRAMME

ABSTRACTS

COMPANY PROFILES





HINTERGRUND

Die Stilllegung und der Rückbau 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 politischer 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 Finanzierungsstrategien spielt das Personalmanagement beim Übergang vom Kernkraftwerksbetrieb zum Rückbauprojekt eine wichtige Rolle. Ebenfalls wird die Zwischenlagerung und Entsorgung radioaktiver Abfälle thematisiert, die für den Rückbau eine wesentliche Randbedingung darstellt.

ZIELGRUPPE

Die Konferenz richtet sich an Betreiber von kerntechnischen Anlagen, die Verantwortung für die Projektsteuerung und die Reststoffentsorgung von Rückbauprojekten haben. Weitere Zielgruppen sind Unternehmen, die mit der Planung und Durchführung von Rückbauprojekten beauftragt sind. Es werden Behörden und Sachverständigenorganisationen adressiert, die in Genehmigungs- sowie Aufsichtsverfahren und die Begutachtungen von Rückbauprojekten eingebunden sind.

Ausgehend von Fachvorträgen diskutieren die Teilnehmer/-innen die Herausforderungen des Rückbaus sowie Planungsvarianten für individuelle Rückbauaufgaben. Die Vorträge werden überwiegend in deutscher Sprache gehalten. Alle Beiträge, außer beim Pre-Conference Workshop, werden simultan übersetzt (Deutsch/Englisch).

BACKGROUND

The closure and the decommissioning of nuclear power plants, particularly power reactors, pose 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 worldwide. With regard to these circumstances there is a need for optimized decommissioning strategies, which have to be well coordinated among all participants.

The focus of this conference is set on the legal parameters in Germany. It also compares the degree of the decommissioning task with other countries e.g. South Korea or Russia. Apart from authorization and financial planning, change management plays an important role in the transition period from nuclear power plant to decommissioning project. The interim storage and disposal of radioactive waste, which will be decisive for future decommissioning projects, is another topic that will be covered at the conference.

AUDIENCE

The conference is addressed to operators of nuclear plants and to companies who are working on the planning, implementation and supervision of decommissioning projects. On the same level authorities and technical experts who are concerned with the approval and supervision procedure of decommissioning projects are involved. Furthermore we address research institutions, which are responsible for the dismantling of research reactors and its radioactive hazardous waste.

The conference should enable its participants to discuss the challenges of the decommissioning of nuclear plants in a practical way and to define optimal planning variants for the implementation. Simultaneous translation (German/English) will be available.



Die ICOND 2014 wurde in Kooperation mit dem TÜV Rheinland und Amec, heute Amec Foster Wheeler, im Congress Center Essen veranstaltet. Die Konferenz brachte ca. 300 Vertreter/-innen der Industrie und der technischen Überwachung, Aufsichts- und Genehmigungsbehörden sowie Energieversorger zusammen – darunter auch Fachleute von RWE, E.ON, Vattenfall, EnBW, EDF, GDF SUEZ und Belgonucleaire. Überwiegend kamen die Teilnehmerinnen und Teilnehmer aus dem operationalen und strategischen Management.

Mit 25% Beteiligung aus dem Ausland war die ICOND 2014 internationaler geprägt als die Jahre zuvor. Themenschwerpunkte des für internationale Besucher angebotenen Pre-Conference Workshops waren die rechtlichen und administrativen Rahmenbedingungen in Deutschland sowie innovative Rückbautechnologien.

In den insgesamt 36 Fachvorträgen wurden unter anderem die juristischen Aspekte eines möglichen Stiftungsmodells zur Finanzierung des Rückbaus und der Entsorgung radioaktiver Abfälle in Deutschland thematisiert. Des Weiteren wurden Strategien für das Rückbaumanagement sowie wirtschaftliche Optimierungspotentiale von Referenten aus dem europäischen Ausland vorgestellt. Wie kann der Rückbau im kalkulierten Zeit- und Kostenrahmen gehalten werden und welche Risiken existieren?

Besonders diskutiert wurde das Benchmarking im Projektmanagement für den Rückbau kerntechnischer Anlagen. Im abschließenden Themenblock wurden die Entsorgung und Endlagerung radioaktiver Abfälle sowie die neuen Freigaberegeln der EU-Strahlenschutzgrundnorm behandelt. Insgesamt nutzen 26 Unternehmen die begleitende Ausstellung, um mit Entscheidungsträgern Kontakt aufzunehmen sowie neue Produkte zu präsentieren.

The ICOND 2014 was organized in cooperation with TÜV Rheinland and Amec, today Amec Foster Wheeler, in the Congress Center Essen, Germany. This conference gathered 300 representatives from industry, technical monitoring and regulatory authorities. Experts from RWE, E.ON, Vattenfall, EnBW, EDF, GDF Suez and Belgonucléaire were among the participants. The majority of the participants were from operational and strategic management.

Due to 25% foreign participation, the ICOND 2014 was more international than the previous years. Key issues of the Pre-Conference Workshop for the international participants were options and strategies to access the German market. Also the legally and administrative framework in Germany and innovative decommissioning technologies were presented.

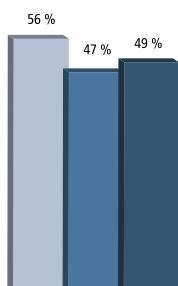
Legal aspects of a possible foundation model to fund the decommissioning and disposal of radioactive waste in Germany were mainly discussed at the conference. Furthermore, strategies for dismantling management and cost effective decommissioning were introduced by foreign speakers. How can we keep up with the calculated time and budget and what are the risks?

Especially discussed was the benchmarking of decommissioning project management. The disposal and final storage of radioactive waste, as well as the new EU Basic Safety Standards including the regulations for release were part of the final topic session. The opportunity of the accompanying exhibition used 26 companies to get in touch with decision makers and to present new products.



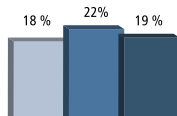
FAKTEN FACTS

■ 2012 ■ 2013 ■ 2014



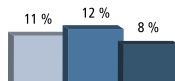
Nuclear Industry

Kerntechnische Industrie



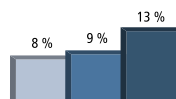
Nuclear Power Plant Operator

EVU



Technical Safety Organization

TÜV



Regulation Authorities

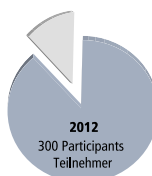
Aufsicht- & Genehmigungsbehörden



Academic Institutions & Research Facilities

Hochschulen & Forschungseinrichtungen

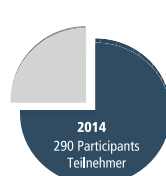
10 % International Participants
Internationale Teilnehmer



12 % International Participants
Internationale Teilnehmer



25 % International Participants
Internationale Teilnehmer



ABOUT ICOND

PROGRAMME

ABSTRACTS

COMPANY PROFILES



ABOUT ICOND

PROGRAMME

ABSTRACTS

COMPANY PROFILES

EXHIBITORS 2015

iC&ND





ANTECH



Caverion



Kronitz



TECNUBEL
Your project needs our care



ABOUT ICOND

PROGRAMME

ABSTRACTS

COMPANY PROFILES





ICOND PROGRAMME



SPEAKER REFERENCE WALL



ANTECH



AVR



Caverion



DREES & SOMMER



e-on



GRS



KÜMMERLEIN
RECHTSANWÄLTE & NOTARE



plenum

RWTH AACHEN
UNIVERSITY

SIEMENS





MONDAY PRE-CONFERENCE WORKSHOP

November 16th 2015

EN

13:15 Welcome

Dr. John Kettler – Aachen Institute for Nuclear Training

Decommissioning Technologies & Experiences

EN

**13:30 Dismantling of Nuclear Research Facilities -
Techniques, Auxiliary Equipment and Further Treatment Facilities**

Burkhard Stahn – AVR GmbH

EN

14:00 Experiences in the Dismantling of the Pressure Vessels

Andreas Loeb – Siempelkamp NIS Ingenieurgesellschaft mbH

EN

**14:30 Decontamination to Achieve Free Release Levels Using
Composite Abrasive Media**

Jim Needham – Aerotech Inspection and NDT Ltd.

EN

15:00 Measurement Technologies for Radiative Decommissioning Waste

Dr. John Mason – ANTECH Ltd.

15:30 Coffee Break

EN

**16:00 Radiochemistry - Linking U.S. Environmental Legacies by
Utilizing Basic Lab Experiences**

Dr. Andreas Kronenberg

EN

16:30 Monitoring of Alpha Gamma Hot Cell Facility by ARG-US RFID

Dr. Yung Y. Liu – Argonne National Laboratory

EN

**17:00 Ventilation Concepts for Different Phases during Decommissioning
of Nuclear Facilities**

Dirk Thybussek – Caverion Deutschland GmbH

EN

17:30 Innovative Technology for Radioactive Liquid Waste Treatment

Adriano Marin – WOW Technology S.p.A.

ABOUT ICOND

PROGRAMME

ABSTRACTS

COMPANY PROFILES

TUESDAY ICOND

November 17th 2015

10:00 Registration

12:00 Quick Lunch

[D] 13:00 Welcome
Dr. John Kettler –
Aachen Institute for Nuclear Training GmbH

STATUS & ECONOMICS

[D] 13:15 Current Status of the Decommissioning Projects in Germany
Aktueller Sachstand bei den deutschen Rückbauprojekten
Dr. Peter Fritz – Dr. Peter Fritz Consulting GmbH
Bruno Kuckartz – TÜV Rheinland Industrie Service GmbH

[EN] 13:45 IAEA Guidance on Occupational Radiation Protection during
Decommissioning of Nuclear Installations
IAEA Richtlinien für den beruflichen Strahlenschutz im Rahmen
der Stilllegung kerntechnischer Anlagen
Peter Hofvander – International Atomic Energy Agency (IAEA)
Dr. Jens-Uwe Schmollack – TÜV Rheinland Industrie Service GmbH

[D] 14:15 Financing Models and Implementation of Decommissioning and
Final Disposal – Germany Compared
Finanzierungsmodelle und Durchführung von Rückbau und Endlagerung –
Deutschland im Vergleich
Prof. Dr. Christian von Hirschhausen –
Deutsches Institut für Wirtschaft (DIW) Berlin

[EN] 14:45 Cost Estimation for the Decommissioning of Nuclear Facilities
Kostenabschätzung für den Rückbau kerntechnischer Anlagen
Inge Weber – OECD Nuclear Energy Agency



15:15 Coffee Break

- D 16:00 Costs and Controlling for the Decommissioning of Nuclear Power Plants**
 Stilllegungskosten und Controlling für den Rückbau von Kernkraftwerken
 Peter Hippauf – Siempelkamp NIS Ingenieurgesellschaft mbH
- D 16:30 Cost Management during Decommissioning – What are the Cost-drivers?**
 Kostenmanagement beim Rückbau – Was sind die Kostentreiber?
 Dr. Bernhard Leidinger – plenum AG

- D 17:00 - 18:00 Paneldiscussion:**
Bottle Necks in Decommissioning – How can we Manage Time and Cost-risks for Decommissioning?
Podiumsdiskussion:
Engpässe bei dem Rückbau – Wie können wir Zeit- und Kostenrisiken für die Stilllegung bewältigen?
 Participants / Teilnehmer:
 Dr. Peter Fritz
 Prof. Dr. Bruno Thomauske
 Prof. Dr. Christian von Hirschhausen

18:15 Show Act

19:00 Beer Tasting powered by Tecnubel NV

19:30 Dinner



**WEDNESDAY
ICOND****November 18th 2015****EXPERIENCES & PERSPECTIVES**

- D 09:00** **Harmonisation of Licensing Procedures for Decommissioning – Possibilities and Limitations**
Genehmigungsverfahren für die Stilllegung – Konvoi oder Kakophonie?
Dr. Christian Raetzke – CONLAR Consulting on Nuclear Law, Licensing and Regulation
- D 09:30** **Loss of the License for Interim Storage Facilities**
Verlust der Aufbewahrungsgenehmigung für standortnahe Zwischenlager
Dr. Bettina Keienburg – KÜMMERLEIN Rechtsanwälte & Notare
- 10:00** **Coffee Break**
- D 10:45** **Managing Complexity of Nuclear Decommissioning & Dismantling Projects – An Advanced Project-Management Approach**
Komplexität von Stilllegungs- und Rückbauprojekten beherrschen – Projekt-Management weitergedacht
Jörg Klasen – EnBW Kernkraft GmbH
Dr. Burkhard Seizer – Drees & Sommer AG
- D 11:15** **Optimization Potentials based on the Experiences of various Decommissioning Projects**
Optimierungspotenziale anhand der Erfahrungen aus verschiedenen Rückbauprojekten
Walter Hackel
- EN 11:45** **Competence Development for Decommissioning**
Kompetenzaufbau für den Rückbau kerntechnischer Anlagen
Prof. Dr. Jan Blomgren – INBex AB
- 12:15** **Lunch**

STRATEGIES

- [EN] 13:30 Russian Strategy for Decommissioning of NPPs**
Russische Strategie für die Stilllegung von Kernkraftwerken
Mikhail Afonyutin – Federal Centre of Nuclear and Radiation Safety (FCNRS)
- [D] 14:00 Cost Minimization of Complex Logistical Processes in the Decommissioning Phase by means of Mathematical Optimization Methods**
Kostenminimierung von komplexen logistischen Prozessen während des Rückbaus mittels mathematischer Optimierungsmethoden
Dr. Philip Harding – Brenk Systemplanung GmbH
- [D] 14:30 Decommissioning of a Non-nuclear-fuel-element-free Power Plant**
Rückbau einer nicht-brennelementfreien Anlage
Dr. Boris Brendebach – Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH
- [EN] 15:00 Decommissioning of the first South Korean NPP – Organization & Planning**
Rückbau des ersten süd-koreanischen KKW – Organisation & Planung
Prof. Dr. Yong-soo Kim – Decommissioning Safety Research Center – Hanyang University Seoul
- 15:30 Coffee Break**

FINAL DISPOSAL IN GERMANY

- [D] 16:00 Current Status of the Final Disposal of High-level Waste in Germany**
Aktueller Sachstand bei der Endlagerung von wärmentwickelnden Abfällen – Die Bund-Länder-Kommission
Prof. Dr. Bruno Thomauske – RWTH Aachen University
- [D] 16:30 Commissioning Time for the Repository Konrad – Consequences for the Decommissioning**
Inbetriebnahmezeitpunkt Konrad – Konsequenzen für den Rückbau
Dr. Klaus-Jürgen Brammer – GNS Gesellschaft für Nuklear-Service mbH
Dr. Erich Gerhards – E.ON Kernkraft GmbH
- [D] 17:00 Waste Management for the Repository Konrad**
Management der Entsorgung der Abfälle an das Endlager Konrad
Iris Graffunder – Energiewerke Nord GmbH
- 17:30 Get together**
sponsored by TÜV Rheinland Industrie Service GmbH

**THURSDAY
ICOND****November 19th 2015****WASTE MANAGEMENT**

- [D] 09:00 Acquisition and Tracking of Radioactive Residues using the new ReVK**
Erfassung und Verfolgung von radioaktiven Reststoffen mit dem neuen ReVK
Stefan Osterlehner & Claudia Haider – TÜV Rheinland ISTec GmbH
- [D] 09:30 Safety Regulations and Implementation in the Development of**
new Transport and Storage Casks for High-active Waste
Sicherheitsbestimmungen und Umsetzung bei der Entwicklung
von neuen Transport- und Lagerbehältern für hochradioaktive Abfälle
Norbert Schmidt & Bruno Dumont – AREVA GmbH
- [D] 10:00 Local Melting of Metallic Wastes from Decommissioning**
Vor-Ort-Einschmelzen metallischer Abfälle aus der Stilllegung
Dr. Georg Brähler – NUKEM Technologies Engineering Services GmbH
Andreas Scheifele – NUKEM Technologies GmbH
- 10:30 Coffee Break**
sponsored by NUKEM Technologies GmbH
- [D] 11:15 Decision-making for Large Component Dismantling**
Entscheidungsfindung für den Abbau von Großkomponenten
Ralf Borchardt & Volker Utke – Energiewerke Nord GmbH
- [D] 11:45 Challenges in the Transport of Large Components**
Herausforderungen beim Transport von Großkomponenten
Helmut Alborn – August Alborn GmbH & Co. KG

- D 12:15 Innovative Method for the Radiological Characterization of MOSAIK® Casks**
Innovatives Messverfahren für die radiologische Charakterisierung von MOSAIK® Behältern
Dr. Andreas Havenith – Aachen Institute for Nuclear Training GmbH
Roland Baumann – Siemens AG
- D 12:45 Final Statement and Outlook**
Schlußworte
Prof. Dr. Bruno Thomauske – RWTH Aachen
- 13:00 Quick Lunch to Conclude the Event**



ic&ND

ABSTRACTS

**SPEAKER****MONDAY 13:30****EN****Burkhard Stahn**

Company AVR GmbH
Wilhelm-Johnen-Straße 1
52428 Jülich - Germany

Website www.avr-juelich.de

ABSTRACT TITLE**Dismantling of Nuclear Research Facilities - Techniques, Auxiliary Equipment and further Treatment Facilities**

On 01.09.2015 Arbeitsgemeinschaft Versuchsreaktor (AVR) GmbH and the Nuclear Services of the Forschungszentrum Jülich GmbH were consolidated in a new company. This company will initially operate under the name AVR GmbH. This presentation contains essential technical expertise and experiences gained in dismantling of the former operational facilities of Forschungszentrum Jülich.

Corrosion of load-bearing parts of the steel construction of the air-cooling system was detected in 1992. This corrosion impacted the structural integrity and safety of the system. Hence, it was concluded that dismantling of FRJ-1 was essential. This was the start of the dismantling era of Forschungszentrum Jülich. Dismantling of the nuclear facilities began with a reactor - the area is now a green field - further dismantling of nuclear facilities continued. Included in these were Hot-Cell facilities, hot zones and collecting facilities for contaminated waste water from various institutes of the Forschungszentrum Jülich as well as the dismantling of a further research reactor which was shut down in 2006.

At every time it was the aim of the dismantling activities to use the optimum suitable technology and auxiliary equipment according to the particular outcome to be achieved. The chosen technology and means were determined by material type, geometry and the radiological conditions. As well as increasing operational effectiveness, the preferred aims were to minimize the impact on the human being and the environment, to avoid a spread of contamination, to minimize the radioactive waste, and to guarantee a safe and verifiable clearance measurement of non-contaminated material.

Therefore, this presentation includes not only the techniques and auxiliary equipment used during the dismantling of the affected facilities but also provides information about facilities and methods which were used for further treatment with the aims of waste minimization and guarantee of verifiable clearance measurement.



**Andreas Loeb**

Company Siempelkamp NIS Ingenieurgesellschaft mbH
Industriestrasse 13
63755 Alzenau - Germany

Website www.siempelkamp.com

ABSTRACT TITLE**Experiences in the Dismantling of Reactor Pressure Vessels**

In this talk we present the experiences for the segmentation of reactor pressure vessels in nuclear power plants.

The dismantling of radiologically contaminated large components is one of the most complex and difficult tasks within the decommissioning of nuclear facilities. This is partly due to the radiological conditions that prevent a direct work on the components to be separated, on the other hand to their dimensions, structures and the installation situation.

In addition to a careful detailed planning of the individual dismantling steps, alongside the many logistical problems, the used technologies and their reliable control when dismantling play a central role.

In the segmentation of activated components shielding applications are usually necessary. All strategies and technical facilities that are used in this area must therefore be suitable for the specific applications.

For the successful execution of those dismantling tasks, various technologies and strategies have been established, which all have their specific advantages and disadvantages.

The feasibility of these tasks is supported by the fact that the personal safety and process safety has experienced and increasingly amount of standardization regarding segmentation tools and segmentation strategies.

At the present time the Siempelkamp NIS, after completion of different projects in dismantling of nuclear facilities, has reputable experience for processes and technologies especially for RV segmentation. Siempelkamp NIS uses e.g. the thermal cutting techniques for the first time in the USA for the segmentation of a reactor pressure vessel.

In this presentation, we present our experiences and achievements from two successfully completed and another currently running project on the segmentation and packaging of reactor pressure vessels.



Jim Needham

Company Aerotech Inspection & NDT Limited
Charlton Drive, Corngreaves Trading Estate, Cradley Heath
B64 7BJ West Midlands - Great Britain

Website www.aerotech.gb.com

ABSTRACT TITLE**Decontamination to Achieve Free Release Levels Using Composite Abrasive Media**

The processing of contaminated components, waste and structures through the nuclear waste stream can have a huge strain on overall economics of the decommissioning process – even in operating nuclear plants. For example, the difference in required care and maintenance for intermediate-level classified waste versus low-level classified waste can be more than two orders of magnitude in cost. Alternatively when post-decontamination swipe tests reach free release levels, selling assets as scrap or selling them for further use elsewhere become viable, cost-saving options.

Since the UK's 2004 Energy Act, several decontamination technologies have surfaced; One of which, composite abrasive blasting, has been successfully implemented to remediate nuclear contaminated assets around the world. This presentation will preview the technology which is already positively affecting the economics of the decontaminating and decommissioning nuclear assets.



**Dr. John Mason**

Company A N Technology Limited
 Thames Park, Lester Way
 OX10 9TA Wallingford - Great Britain

Website www.antech-inc.com

ABSTRACT TITLE**Measurement Technologies for Radioactive Waste & Decommissioning**

Measuring radioactive waste accurately is critical to ensure that decommissioning waste is consigned correctly – either for disposal or storage. But accuracy of measurement is also vital to ensure that the costs of such disposal or storage are minimised.

Any uncertainty of measurement may result in radioactive waste being classified as Intermediate Level Waste (ILW), when a more accurate measurement will confirm that, in fact, the waste is Low Level Waste (LLW). Similarly, some measurement technologies will identify the waste as LLW, when more accurate assay will confirm that the waste is suitable for free release. This presentation provides the audience with a range of technological assay options for the accurate measurement of radioactive waste. It will also provide a valuable insight into the potential for decommissioning projects to achieve significant cost savings using technologies from ANTECH.

The presentation will highlight:

- The use of a Gamma camera for identifying and qualifying radioactive waste in-situ
- Applications of the Wide-Range Segmented Gamma Scanner (WR-SGS) for quantifying radioactive waste in drums from decommissioning operations



**Dr. Andreas Kronenberg**

Contact Gschwender-Horn-Weg 13
87509 Immenstadt i. Allgäu - Germany

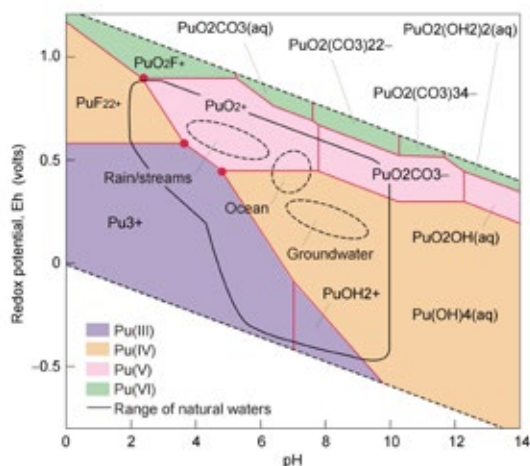
Website www.kernchemie.de

ABSTRACT TITLE**Radiochemistry - Linking U.S. Environmental Legacies by Utilizing Basic Lab Experiences**

The German discussion concerning decontamination, decommissioning, and re-utilization (DD&R) efforts during the phase-out of nuclear energy tends to focus on regulatory problems with little consideration of what had been already achieved. This might be caused by the aging (already retired) nuclear work force, public distrust in earlier stages of nuclear industrialization as well as current economical constraints. Although "untypical" for the German discussion, this talk spans a broader arena by giving examples of the environmental legacy of the U.S. nuclear weapon production complex. The production of nuclear weapons and naval propulsion systems has resulted in the accumulation of radioactive wastes at several locations around the U.S. These transuranic (TRU), high (HLW) and low-level (LLW) radioactive, and mixed wastes are of very complex isotopic and chemical composition and stored under non-ideal conditions; partially in single shell tanks. Hanford Site (with 254,000 m³ of HLW) and Savannah River Site (with 132,000 m³ of HLW) are examples of serious

environmental disasters; ticking bombs. Achievements during the DD&R efforts there may serve as "lessons learned" anywhere else. Other examples at Rocky Flats (plutonium metal PIT production) and some reactor sites complete this little overview and provide the basis for a national (German) outlook:

Chemical laboratory studies, basic radiochemical knowledge about tracer level, complexation and hydrolysis behaviour of fission products, actinides, tritium and medical isotopes may support DD&R efforts by linking types of waste and contaminations. It will be essential to understand DD&R as a truly multidisciplinary and international effort for both radiochemists and engineers.



**Dr. Yung Y. Liu**

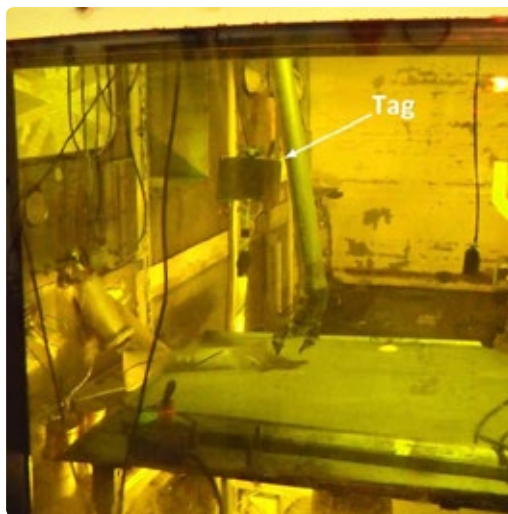
Contact Argonne National Laboratory
9700 S. Cass Avenue
Argonne, IL 60439 - USA

Website www.anl.gov

ABSTRACT TITLE**Monitoring of Alpha Gamma Hot Cell Facility by ARG-US RFID**

Argonne National Laboratory (Argonne) has developed a remote monitoring system for nuclear materials based on radio frequency identification (RFID) technology. The system, called ARG-US, has been used in field testing at selected U.S. Department of Energy sites since 2010. ARG-US utilizes battery-powered RFID tags to monitor the environmental parameters associated with containers of radioactive materials. To demonstrate that ARG-US can monitor radiological facilities, a compact system was installed in the Alpha Gamma Hot Cell Facility (AGHCF) at Argonne in 2013. AGHCF is a Hazard Category 2 radiological facility that is being decommissioned. As such, large quantities of radioactive materials and wastes are being discharged from the hot cell, loaded into transport containers, and shipped away. The deployed ARG-US system monitors worker areas, material transfer areas, cell exhaust HEPA filters, and - on a rover/robot - in-cell locations of AGHCF. Thus far, the system is performing as designed and yielding results that can be corroborated by existing surveillance means.

The in-cell unit is particularly valuable, since it yields information that would otherwise be hard to obtain. This presentation provides highlights of the ARG-US RFID monitoring of AGHCF during the de-inventory of its nuclear fuel specimens and removal of excess contaminated equipment. Also described are the basic processes by which the inventory was handled and removed from the facility, the impact of criticality controls and fuel preparation methods on contamination and radiation levels at the facility, and the benefits of remote monitoring that provided a clearer picture of facility conditions without placing personnel at risk. Finally, this presentation discusses the operational impacts that result from varying facility needs and also how facility personnel have adapted to and overcome the obstacles associated with working in a completely remote environment that challenges workers on a daily basis.



**Dirk Thybussek**

Company Caverion Deutschland GmbH
Uersfeld 24
52072 Aachen - Germany

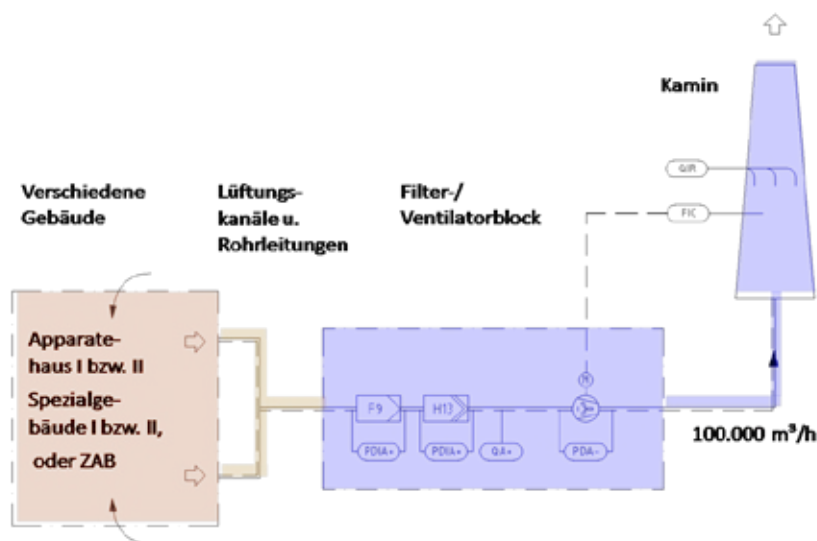
Website www.caverion.de

ABSTRACT TITLE**Ventilation Concepts for Different Phases during Decommissioning of Nuclear Facilities**

In the presentation I will demonstrate the ventilation concepts for the decommissioning process. In the different phases during the decommissioning the request for the air handling changes. The Caverion GmbH with the Business Unit Krantz has produced special equipment and products for the decommissioning of the NPP Greifswald.

The presentation outlines the following points:

- Additional ventilation systems for NPP during decommissioning. The existing operating ventilation systems with the e-feeders and process measuring and control systems must be shut down for decommissioning. Complete replacement of the operating ventilation system.
- Additional ventilations systems for machinery exhaust air. Design and new air flow. During decommissioning, an uncontrolled spread of contamination should be avoided.
- Qualification of online-recleanable filter systems. Recleaning tests with plasma-arc-cutting dust.
- Temporary exhaust systems for decommissioning work, filter systems.
- Additional external ventilation systems. Mobile modular systems as online-recleanable HEPA filter units modular construction kit.
- Mobile solutions for removal of moisture. Condensation and water absorption is facilitated by physics, solution with high-performance condensation dryers.



**Adriano Marin**

Company WOW Technology S.p.A.
Via Villa Rita 13/B
35030 Baone, Padova - Italy

Website www.wowwater.eu

ABSTRACT TITLE**Innovative Technology for Radioactive Liquid Waste Treatment**

A revolutionary technology and equipment for liquid radioactive waste treatment: outperforming ultimate water decontamination and purification process, enhanced sludge concentration, no secondary waste nor consumables, fully automated, remote controlled and self-decontaminating device.

It is based on the newly discovered possibility to control local physical properties in a fluid by means of a patented tool and a specific software. Combined with an evaporation process, the WOW molecular separation reaches a Decontamination Factor (DF) several orders of magnitude higher than any currently applied technology.

The high Decontamination Factors and the high volume reduction of the sludge offers this technology to be suitable for the ultimate treatment of highly contaminated liquid waste such as the Fukushima-Daiichi nuclear reactor's cooling water or the decontamination acid solutions used in NPP's decommissioning.

The equipment easily self-decontaminates at the end of the process. No additional or secondary waste is produced, as no additives, ionic exchange resins, reverse osmosis membranes filters are used.

WOW Technology has been validated by the LENA - Applied Nuclear Energy Laboratory of Pavia's University: a liquid solution 6000 times more contaminated than the Fukushima-Daiichi nuclear reactor's cooling water has been simulated and successfully decontaminated without any additional or secondary waste production.

WOW Technology has performed on industrial scale, with its scaled up device, c/o the Nuclear Repository of S.S.M. located at Saluggia, Italy: 50000 litres of acid radioactive solution have been successfully decontaminated with a Decontamination Factor (DF) of 335000 for Cs-137 by one single evaporation step and without using any additional tool to control the steam's entrainment effect. [Performances independently certified by two advisors: National Physics Laboratory (UK) and Pavia University Radiochemistry Department and L.E.N.A. (Italy)].



**Dr. Peter Fritz**

Company Dr. Peter Fritz Consulting
Im Brügel 4
76356 Weingarten -
Germany

Bruno Kuckartz

TÜV Rheinland
Industrieservice GmbH
Am Grauen Stein
51105 Köln - Germany
www.tuv.com

ABSTRACT TITLE**Current Status of the Decommissioning Projects in Germany**

The presentation „Current Status of the Decommissioning Projects in Germany” provides an introduction into the actual German situation regarding decommissioning of the main nuclear installations. The talk mainly addresses four issues:

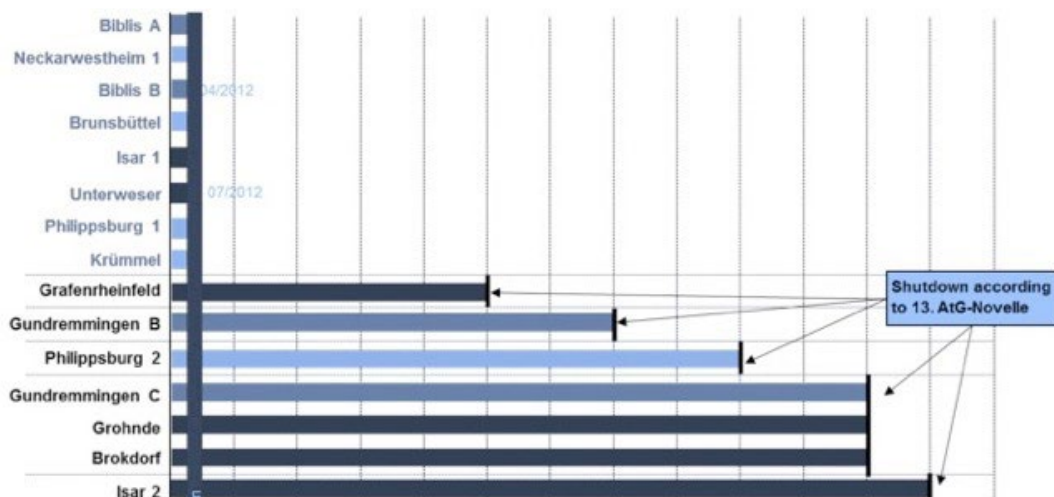
- The first part gives an overall picture of the political developments regarding the decommissioning of nuclear power in Germany with the focus on funding and organisation of the utilities, which is crucial for the understanding of the current situation e.g. envisaged decisions of the Federal Government.

- The second part presents the status of decommissioning in Germany regarding nuclear power plants, research reactors and the main nuclear research plants. The portfolio of nearly all types of nuclear reactors and nuclear installations is the basis for the broad experience in decommissioning in Germany.

- The third part shows exemplarily the different concepts of the different owners of the plants.

- Finally the authors try to give an outlook on:

- a) The schedule for the main nuclear decommissioning projects;
- b) Necessary boundary conditions;
- c) Prospects and obstacles.



**Peter Hofvander**

Company International Atomic
Energy Agency
PO Box 100
1400 Vienna - Austria
Website www.iaea.org

Dr. Jens-Uwe Schmollack

TÜV Rheinland
Industrieservice GmbH
Am Grauen Stein
51105 Köln - Germany
www.tuv.com

ABSTRACT TITLE**IAEA Guidance on Occupational Radiation Protection during Decommissioning of Nuclear Installations**

Since 2013, the International Atomic Energy Agency (IAEA) has conducted a project with the objective to develop guidance material in occupational radiation protection during decommissioning activities at nuclear installations.

The IAEA identified the need for this particular guidance, as decommissioning is a growing activity and occupational radiation protection during such activities is an emerging issue and the experiences are limited. Radiation protection experts from member states with experiences in decommissioning have participated in the project, which is planned to be completed by 2016, and an IAEA technical document will be published as the output of the project.

This presentation provides an overview of the current draft content of the guidance material, and thus shows examples of important issues in the protection of workers which need to be

addressed when moving from an operational phase to decommissioning of a nuclear installation.

The first part of the guidance document covers issues on a general basis, including the change in hazards and risk to workers when moving from operation to decommissioning, the possible change in safety culture and important radiation protection aspects that need to be considered when deciding on decommissioning strategies. The second part covers the adaptation of the radiation protection programme for decommissioning, and includes a discussion on essentials of radiation protection organization, the optimization of protection, planning for dismantlement and radioactive waste management. Issues on radiological characterization and the preparation of the site for decommissioning activities are discussed in the third part, and non-radiological hazards for workers are addressed in the last part of the guidance document.



**Inge Weber**

Company OECD Nuclear Energy Agency
12, boulevard des Îles
92130 Issy-les-Moulineaux - France

Website www.oecd-nea.org

ABSTRACT TITLE**Cost Estimation for the Decommissioning of Nuclear Facilities**

Decommissioning of nuclear facilities is expected to increase significantly in the coming years, and the largest projects could command considerable budgets. Organisations are typically required to produce three main types of decommissioning cost studies for the purposes of:

- securing funding;
- preparing a decommissioning plan for licensing;
- budgeting a project baseline.

An awareness of the context in which a cost estimate is produced is an important consideration in understanding and interpreting it, especially when seeking to benchmark with estimates from another country. This is because the context both defines the nature of the estimate required and determines a number of key factors (assumptions, exclusions, boundary conditions, the attitude towards risk and uncertainty) on which the estimate is based. Key considerations include:

- The overall national policy framework governing nuclear energy
- The regulatory framework for decommissioning
- The experience of technical and financial aspects gained from earlier decommissioning projects
- The integration of decommissioning planning within the overall radioactive waste management system
- Financial arrangements

The NEA Decommissioning Cost Estimation Group (DCEG) has prepared a report "The Practice of Cost Estimation for Decommissioning of Nuclear Facilities" which offers specific guidance in preparing quality decommissioning cost and schedule estimates. It is based on current practices and standards in NEA member countries and aims to help consolidate understanding of the practice and process of decommissioning cost estimation.

The guide accompanies the International Structure for Decommissioning Costing (ISDC) of Nuclear Installations (2012). The ISDC is recommended by the NEA, the IAEA and the European Commission to act as a common platform for presenting cost estimates for decommissioning projects and to facilitate comparisons between cost estimates of decommissioning activities or groups of activities.



**Peter Hippauf**

Company Siempelkamp NIS Ingenieurgesellschaft mbH
Industriestraße 13
63755 Alzenau - Germany

Website www.siempelkamp.com

ABSTRACT TITLE**Costs and Controlling for the Decommissioning of Nuclear Power Plants**

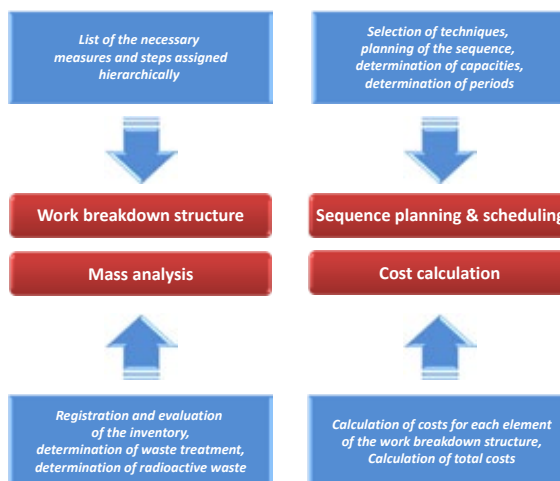
Since 1976 Siempelkamp NIS Ingenieurgesellschaft mbH (NIS) performs decommissioning cost calculations for nuclear power plants (NPP) and facilities. Starting with cost estimates used to establish the financial provisions for the costs after the final shut down of German NPPs, now NIS is involved in various European projects.

In general the cost calculations rely on four steps (figure). First the NPP inventory has to be registered especially considering radiological aspects to evaluate and define the treatment and the resulting amount of radioactive waste. Then all necessary measures and steps can be identified and listed. Afterwards the arrangement in a hierarchical work breakdown structure respects defined criteria like objects, functions or organisational units. Appropriate decommissioning techniques and processes are chosen. By means of linking measures and steps the sequence for the whole decommissioning project is set. The determination of the steps' duration respects personnel requirements and capacities to complete time scheduling. After the

assignment of cost factors (e.g. wages per required qualification, costs of dismantling equipment, costs for consumables, container costs) for each particular step the cost calculation is carried in a bottom-up principle.

As NIS is involved in several actual decommission project, experiences are gained, which are considered consequently in each of the four steps. The improved quality of radiological evaluations, sequences of activities, durations and performances of working steps and most notably the large amount of returned cost items increase the reliability of our calculations.

The method of the NIS decommissioning cost calculation supports a prompt and efficient project controlling. Target figures like dismantled masses, planning periods and milestones and costs as well as degrees of completion are available for plan/actual comparisons. Consequences of possible discrepancies can be evaluated for further planning and decisions.



**Dr. Bernhard Leidinger**

Company plenum AG
THE SQUAIRE WEST 15 | Am Flughafen
60549 Frankfurt am Main - Germany

Website www.plenum.de

ABSTRACT TITLE**Cost Management during Decommissioning – What are the Cost-drivers?**

Running decommissioning projects for power reactors as well as for research reactors often lead to identification of enhancement opportunities which generally are not detected before terminating the relevant project phase. Thus lessons learnt are not supporting the individual project itself, but are available for other future projects.

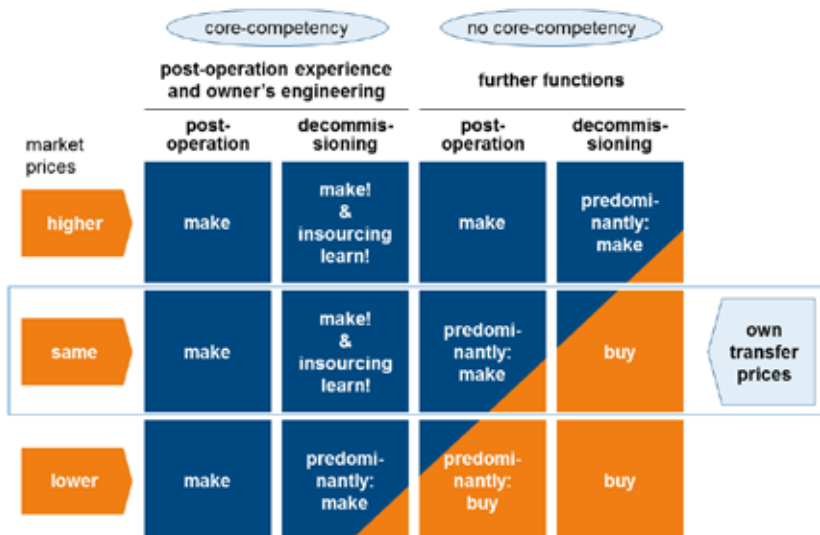
Numbers of consultants companies are ready to help the operators of nuclear plants with structuring the decommissioning projects, but the philosophy of those clients is to have a strong own opinion built on own experience together with good practice from other successful projects.

This can be approach with respect to the strategy of decommissioning. But it does not conclusively ensure meeting the requirements of operational excellence during the implementation of the strategy into real life: often operators of plants identify gaps in perfor-

mance, that can't be closed with the existing management team.

Services offered are covering effectiveness and efficiency of any process within the strategies given. This becomes important as, in the past, operators of nuclear plants were trained to prevent from unplanned off-times, and not to optimize cost of operational processes.

Main cost drivers can be influenced by the project management. A strict resource planning as well as a thorough steering of all measures is a fundamental contribution to success. But what is more is to implement a continuous challenging action focussing oneach and every process in the plant: It must be scrutinized why, how often and to which amount these are necessary. Such reviews can only be performed by external auditors with broad experience in the nuclear field.



**Dr. Christian Raetzke**

Company Kanzlei Dr. Raetzke (Conlar)
Beethovenstraße 19
04107 Leipzig - Germany

Website www.conlar.de

ABSTRACT TITLE**Harmonisation of Licensing Procedures for Decommissioning - Possibilities and Limitations**

According to German nuclear law, decommissioning and dismantling of nuclear power plants requires a licensing process including an environmental impact assessment and a public hearing. Additional permits may be required e. g. for an on-site waste storage facility. The abrupt shutdown of eight German NPPs in 2011 in the wake of the Fukushima accident resulted in a wave of licensing processes in the five federal states („Länder“) where the NPPs are sited. So far, none of the licences have been issued.

A comparison shows that the licensing processes are managed according to different timelines and with different agendas. Furthermore, there seems to be no common understanding among the Länder regulators about some legal notions. There are different views and practices about, inter alia, the extent to which components can be dismantled under the existing operating licence; the relationship between the decommissioning licence and other permits; and the right licensing approach for the ‚conventional‘ demolition of decontaminated structures.

It seems obvious that more cooperation and harmonisation would be helpful. Indeed, there is a possible template for such an approach. In the 1980s, the last three German NPPs were licenced in three different Länder according to the ‚convoy‘ concept, resulting in almost identical licensing processes based on uniform documents and sustained by a close cooperation of Länder regulators and their technical support organisations (TÜV).

However, analysis shows that such a concept would not fully work today, the main reason being that contrary to the situation in the 1980s there is no consensus about the aims and the means. Operators, regulators and TÜVs have their own respective agenda and it seems that no urgent necessity is perceived to achieve a uniform process. Nevertheless, there are some aspects of the ‚convoy‘ concept which could be used to facilitate the current and future licensing processes for decommissioning of NPPs.



**Dr. Bettina Keienburg**

Company KÜMMERLEIN Rechtsanwälte & Notare
Messeallee 2
45131 Essen - Germany

Website www.kuemmerlein.de

ABSTRACT TITLE**Loss of License for Interim Storage Facilities**

Radioactive waste has to be stored in interim storage facilities until it can be surrendered to a final waste repository. Consequently, interim storage is a temporary measure. Therefore, licenses for the storage have always been granted for a fixed period of time, usually starting with a 40 year period from the first emplacement of a cask.

Unless they are renewed, limited licenses lap once the end date is reached. A renewal of limited licenses is possible. That requires an administrative decision concerning the renewal.

Under the Repository Site Selection Act from 2013 a parliamentary reservation has been inserted in the Atomic Energy Act (AEA) for the prolongation of licenses of local interim storage facilities. According to sec. 6 para. 4 AEA the storage of the irradiated nuclear fuel at nuclear plants shall not exceed 40 years starting at the first emplacement of a cask. Licenses for the storage of the irradiated nuclear fuel at nuclear plants may only be renewed on imperative grounds and after it has been discussed in the German Bundestag. Thereby a discussion in the German

Bundestag is a pre-condition for the renewing of licenses for the storage of the irradiated nuclear fuel at nuclear plants by the administration. That is a legislative novelty and raises several questions:

Is a parliamentary reservation according to sec. 6 para. 4 AEA consistent with the constitution?

Does an imperative ground already exist due to the foreseeable lack of a disposal facility for high-level nuclear waste until at least 2050?

Does a missing discussion in the German Bundestag or a discussion with negative conclusions prevent the administration from renewing licenses for the storage of the irradiated nuclear fuel at nuclear plants even if an imperative ground for the renewing exists?

What happens with the irradiated nuclear fuel if licenses are not renewed?

Which remedies exist to enable the operating company to receive a renewing?



**Jörg Klasen**

Company EnBW Kernkraft GmbH
Im Steinbruch
74382 Neckarwestheim
Germany
Website www.enbw.com

Dr. Burkhard Seizer

Drees & Sommer AG
Liebknechtstraße 33
70565 Stuttgart
Germany
www.dreso.com

ABSTRACT TITLE**Managing Complexity of Nuclear Decommissioning & Dismantling Projects –
An Advanced Project-Management Approach**

The decommissioning of nuclear power plants is executed in a classic project manner as it is known from other construction projects. It is obvious to use the known portfolio of project management tools.

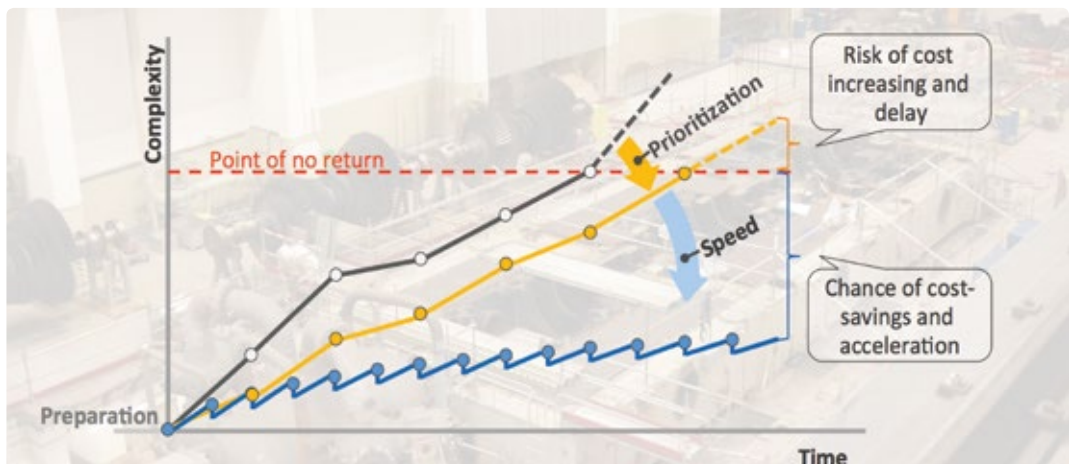
On the other hand the nuclear genes within decommissioning projects cannot be neglected. The complexity that is created by the large size of the project (15 years of duration and high 3-digit million Euros in costs) in combination with safety requirements of nuclear industry has to be handled.

Challenges of project management resulting from these boundary conditions are a cultural adaption, high demands on monitoring and an elaborated risk management.

Complexity can only be managed addressing two main drivers: Prioritization and speed (agility) in project execution.

Prioritization can be realized by applying tools like Earned Value Management. Earned Value Management allows an integrated management of cost, time and scope targets. The performance of the project is evaluated in an objective manner and the future developments are predicted.

A high speed of project execution is established by applying Agile Management like SCRUM-methods, known in context of lean and flexible software development. We adapted this method to the needs of nuclear industry.



**Walter Hackel**

Company Silvia Hackel, Büro für techn. Beratung
Zur Sandmühle 11
63796 Kahl - Germany

ABSTRACT TITLE**Optimization Potentials based on the Experience of various Decommissioning Projects**

At the beginning, the dismantling of a large light water reactor (1300 MWel) is presented with its most important results.

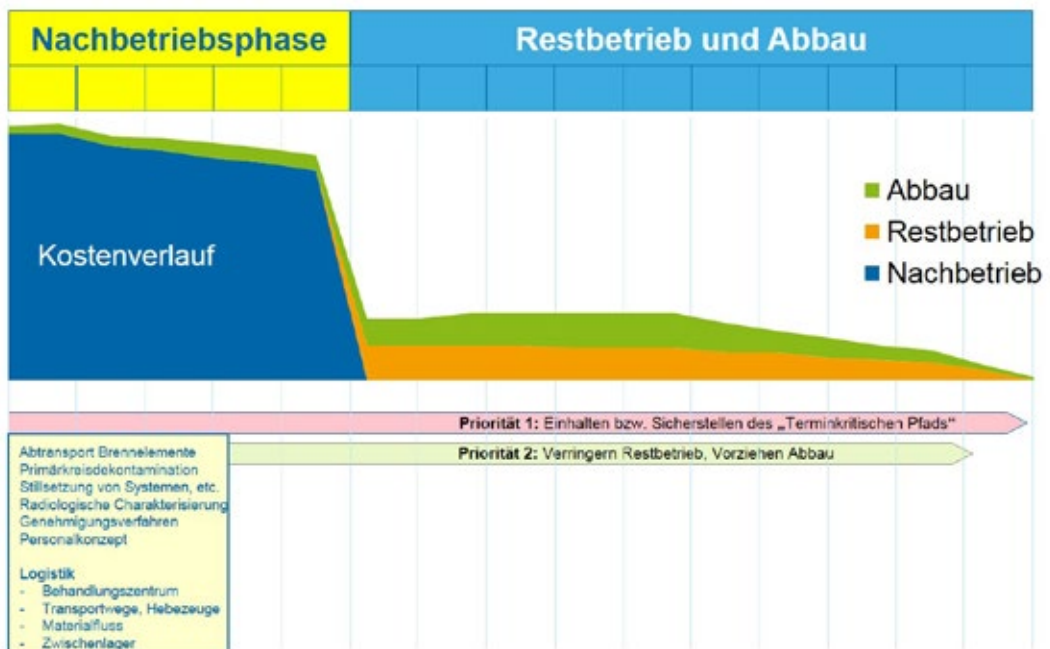
This is the basis to demonstrate optimization potential in decommissioning.

Scope and structure of this performance are based on the opinion of the decommissioning company Siempelkamp NIS Ingenieurgesellschaft mbH in Alzenau.

In a next step, attention is drawn to the importance of the project thinking and the „schedule critical path“.

The main focus of the presentation are some practical examples of optimization potentials in decommissioning of nuclear power plants.

Nachbetriebsphase - Kosten



**SPEAKER****WEDNESDAY 11:45****EN****Prof. Dr. Jan Blomgren**

Company INBEx AB
Klockargården Åkerby
74386 Bålänge - Sweden

Website www.inbex.se

ABSTRACT TITLE**Competence Development for Decommissioning**

Training in full-scope simulators is an integral part of nuclear power plant operations worldwide. These simulators represent large investments, but the fact that large volumes of employees undergo training motivates the cost. Can you practice decommissioning in a similar way?

The situation is similar when it comes to the safety aspects - in both cases a mistake can result in a safety hazard, not to mention the economic risk. There is, however, one important difference: Decommissioning is a one-time activity.

That makes training even more important functionally because it is difficult to build on experience when something is performed once only. Unfortunately, that also makes the investment harder to defend economically. Setting up a realistic training using either full-size mockups or virtual reality is possible today, but costly. Ways to solve this dilemma are presented, aiming at high quality training to a realistic price tag.



ABOUT ICOND

PROGRAMME

ABSTRACTS

COMPANY PROFILES



**Dr. Philip James Harding**

Company Brenk Systemplanung GmbH
Reichsbahnstr. 76
22525 Hamburg - Germany

Website www.brenk.com

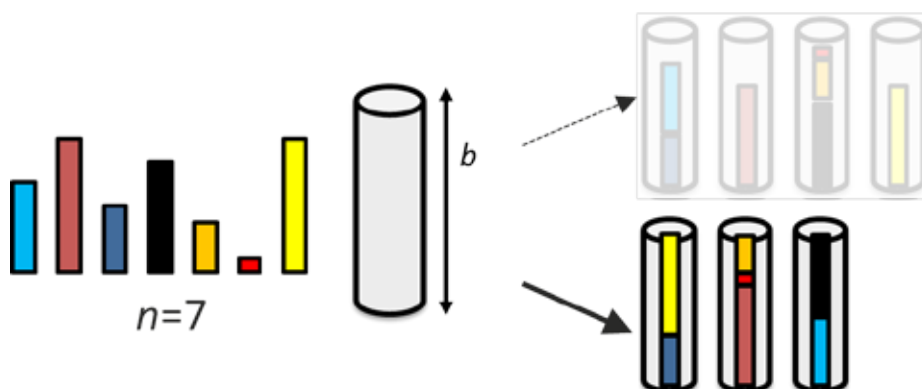
ABSTRACT TITLE**Cost Minimization of Complex Logistical Processes in the Decommissioning Phase by Means of Mathematical Optimization Methods**

In the wake of the preparation to dismantle and pack radioactive waste incurred from the impending decommissioning of several nuclear power plants, techniques to reduce the number of costly waste casks or containers are sought after. The large bandwidth of limits (dose rate, mass, individual nuclide activities, composition ...) the waste packages have to comply with for both interim storage facilities and the repository Konrad render the manual planning of packaging concepts prohibitive. However, in the past, the planning for packaging has been performed in this way, albeit on the basis of several facilitating assumptions.

Surprisingly, to the best of our knowledge, the automated computer-assisted generation of packaging plans for radioactive waste has not been demonstrated previously. In this talk we investigate how such a planning can be performed with the aid of suitable algorithms. These algorithms can be executed by

a computer, thus considerably accelerating the generation of packaging plans, while optimising the utilisation of the waste casks and containers with respect to mass, activity, dose rate, etc. This automated procedure can take into account complex logistical boundary conditions present during decommissioning, such as space requirements, the sequence of the waste and the (lack of) availability of suitable waste casks. In addition, packaging concepts based on several scenarios (cask availability, space requirements, ...) can easily and automatically be generated once the packaging rules have been coded. Finally, we demonstrate the successful application of these algorithms to a real packaging campaign of control rod assemblies of a boiling water reactor, for which excellent results were achieved.

As an outlook, we suggest additional challenges in decommissioning which are amenable to be solved by automated planning.



**Dr. Boris Brendebach**

Company Gesellschaft für Anlagen- und Reaktorsicherheit gGmbH
Schwertnergasse 1
50667 Köln - Germany

Website www.grs.de

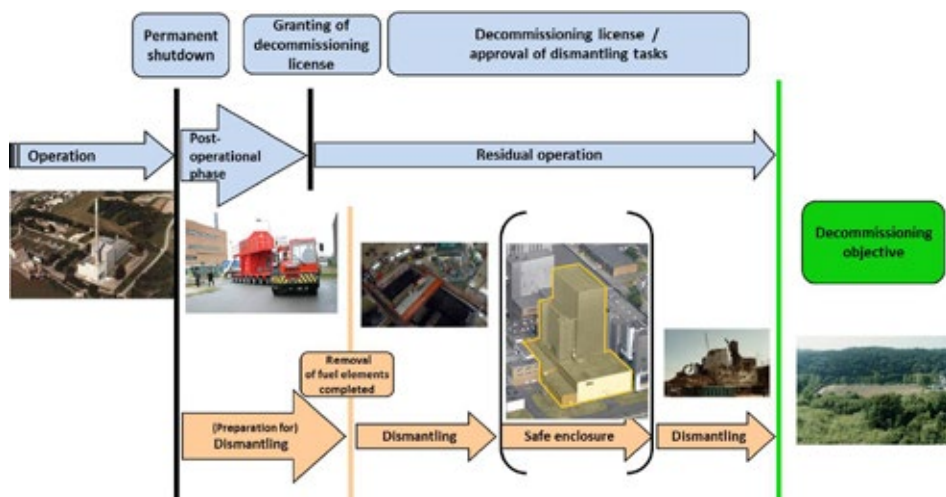
ABSTRACT TITLE**Decommissioning of a Non-nuclear-fuel-element-free Power Plant**

After the events at Japanese Nuclear Power Plant (NPP) Fukushima Daiichi in March 2011 the German government decided to end the use of nuclear energy for the commercial generation of electricity at the earliest possible time by gradually phasing it out. This decision resulted with the 13th Amendment of the German Atomic Energy Act in the final shutdown of the NPPs Biblis A and B, Neckarwestheim 1, Brunsbüttel, Isar 1, Unterweser, Philippsburg 1 and Krümmel on August 6th, 2011 and setting dates for the final shutdown for the remaining nine NPPs on a step-by-step-basis until End of 2022 at the latest. The operator of the NPP Grafenrheinfeld decided to finally shutdown the plant on June 27th, 2015, half a year before its set end-date.

In the meantime, the operators of all finally shutdown NPPs applied for decommissioning licenses. The NPP Gundremmingen B, which has to go into final shutdown by the end of 2017, also applied for a decommissioning license. Eight out of these ten

applications take into account that there might still be fuel elements present in the cooling ponds at the time of the granting of the decommissioning license. Although such a plant status has been known in some decommissioning projects in the past, e. g. at NPPs Greifswald or Obrigheim, it is not a standard condition in Germany so far.

The presentation summarizes the current status in the NPPs in the transition period from operation to decommissioning in Germany as well as the planned activities in the respective first phase of decommissioning. In addition, a summary of the efforts undertaken on various levels to cope with the non-standard configuration "Decommissioning of a non-nuclear-fuel-element-free Power Plant" is presented, e. g. the updates of the (Federal) Decommissioning Guide and the Guideline on Decommissioning of the Nuclear Waste Management Commission (ESK).



**Prof. Dr. Yong-soo Kim**

Company Hanyang University
222 Wangsimni-Ro, Sungdong-Gu
04763 Seoul - South Korea

Website www.hanyang.ac.kr

ABSTRACT TITLE**Decommissioning of the First Korean NPP – Kori #1: Organization and Planning**

Last June Korean government has decided to permanently shut down the first Korean NPP Kori #1. The plant is a 576 MWe PWR that started operation in 1978. It was refurbished in 2007 and approved to run until 2017. In fact, KHNP, a subsidiary utility company of Korea Electric Power Corporation (KEPCO) owned 51% by the government, dropped the application for the relicensing process for extended operation, claiming that decommissioning of the plant would represent an opportunity and a challenge for Korean nuclear industry.

Now government TFT (Task Force Team) consisting of various experts from government, companies, national labs, and universities have been reviewing the organizational, managerial, and technical readiness for the national challenge. They are also examining the completeness and soundness of supply chain of the decommissioning, along with the deep consideration how to nurture expert manpower.

Recently, we have improved various laws and ordinances to get ready for the safe decommissioning of old nuclear facilities while meeting the industrial needs. Regulations of radioactive waste classification and management have been reformed from two category, high and low-intermediate level to 4 category system, high, intermediate, low, and low-low level, recommended by International Atomic Energy Agency. It is believed that the utility company will take the initiative to prepare the first NPP decommissioning project. Now their engineers and researchers are carrying out optional studies to temporarily keep the spent fuels on-site which were discharged from the plant during last four decades, while developing failed fuel management strategy. The end-state of the site, unrestricted vs. restricted release, has not been discussed seriously yet, which has critical influence on the decommissioning planning.

In the coming conference, various aspects of organizational preparedness and strategic planning which have been publicly announced so far for the Kori #1 decommissioning are presented.



**Prof. Dr. Bruno Thomauske**

Company Institute of Nuclear Engineering and Technology Transfer
Elisabethstrasse 16
52062 Aachen - Germany

Website www.net.rwth-aachen.de

ABSTRACT TITLE**Current Status of the Final Disposal of High-level Waste in Germany**

Since 2011 Germany is pursuing a phase out strategy concerning the use of nuclear power for electricity production. This decision was strongly influenced by the Fukushima event. In 2013 the federal government announced that they also had achieved an agreement with the Federal States in Germany on a law to restart the site selection for a repository for spent fuel and high active heat producing waste from scratch. The consequence of this law is a delay of at least two decades to start operation of a final disposal site and additional costs of at least EUR 2.7 billion. The new law was passed in July 2013.

At first a 34-member commission had been installed in April 2014 to evaluate the Site Selection Law and to develop basic principles for site selection, including safety requirements and selection criteria for rock formations. The commission includes representatives from the parliament, academia, civil society organizations, industry, the environmental organizations and trade unions and should forward its recommendations

after a delay in starting the evaluation process now in 2016. The author of this paper is member of the evaluation commission.

The present law has to be reviewed within this time span. The site selection then might start after the next federal election in 2017 probably based on a new site selection law. A new repository site should be, according to the present law, determined until 2031, and for this site the more detailed site investigation will take place followed by a detailed safety analysis, before the erection of the repository can start. Based on the present procedural steps it seems to be rather unlikely to determine a repository site until 2031.

The presentation will concentrate on the role of the Federal and States Commission, the site selection criteria and the involvement of the public during this period and present the actual status.



**Dr. Klaus-Jürgen Brammer****Dr. Erich Gerhards**

Company GNS mbH
Frohnhauser Str. 67
45127 Essen - Germany

E.ON Kernkraft GmbH
Tresckowstraße 5
30457 Hannover - Germany

Website www.gns.de

www.eon-kraftwerk.com

ABSTRACT TITLE**Commissioning Time for the Repository Konrad - Consequences for the Decommissioning**

The Konrad mine is a former iron ore mine which stopped operation in 1976. After that the responsible authority at that time, the Physikalisch-Technische Bundesanstalt (PTB), examined possibilities of a reuse of the mine as a repository for low- and intermediate-level radioactive waste. The PTB initiated the plan approval procedure in 1982. The approval decision was issued in 2002 and was sued by four parties. After the plaintiffs have been unsuccessful before the Federal Administrative Court, in 2007 the conversion of the mine began. The plans were to complete the work to convert the mine within 4 years after a preparation time of 2 years. The as of now responsible Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS) had at that time called the commissioning date the end of 2013. According to this time target, the waste producers planned their capacities for intermediate storage as well as the dismantling of the power plants.

During the conversion of the mine considerable delays in commissioning time and an abrupt increase of costs to be borne by the waste producers have shown. For the past two years, the BfS mentions the year 2022 as the commissioning date. According to an evaluation of the actual project progress, a further delay is to be expected. For the waste producers the following difficulties, e.g., arise from this uncertain situation:

1. Lack of possibility to handle the waste coming up from the decommissioning of nuclear power plants
2. Much longer intermediate storage times
3. Risks concerning possible changes of the state of the art
4. No reliable basis for calculation; Increase of the costs
5. Increased radiation exposure of employees due to multiple handling of waste packages

On this basis, we present and explain the consequent actions for the operators.



**Iris Graffunder**

Company Energiewerke Nord GmbH
Hermann-von-Helmholtzplatz 1
76344 Eggenstein-Leopoldshafen - Germany

Website www.ewn-gmbh.de

ABSTRACT TITLE**Waste Management for the Repository Konrad**

In Salzgitter the Federal Government of Germany is currently building the Konrad repository for radioactive waste with negligible heat generation. The repository has been approved for a waste volume of 303,000 m³, thereof approx. 40% for the public financed waste producers and 60% for the private waste producers. Annually, 10,000 m³ are to be disposed in Konrad.

Already in 2011, each waste producer has reported its planned Konrad waste package volume to BfS. According to its volume fraction, every producer is also granted the right to use the respective share – so called contingent - of the total approved radionuclide activities and water hazardous substances for Konrad.

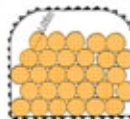
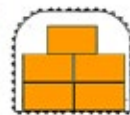
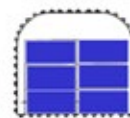
To manage these contingents (accounting and contingent swap) and for coordination of the disposal two Coordination Units are allocated nationwide, implementing the specific disposal planning, together with BfS, on behalf of the over 60 waste producers. One Coordination Unit has been

established for the private sector, GNS assumes this function. One coordination unit was established for the public depositors, EWN takes over this role.

To ensure safe and timely transport of the waste packages from the different locations to the repository, logistic and radiological constraints must be considered.

The main objective of the planning is that after opening the Konrad repository, an optimized disposal of the planned waste volume can be achieved by exploiting the maximum possible activities per year.

One of the largest challenges is the timely completion and proving of the repository documentation, as without a sufficient number of released waste packages a disposal volume of 10,000 m³ cannot be achieved.



**Stefan Osterlehner | Claudia Haider**

Company TÜV Rheinland ISTec GmbH
Boltzmannstr. 14
85748 Garching - Germany

Website www.istec-gmbh.de

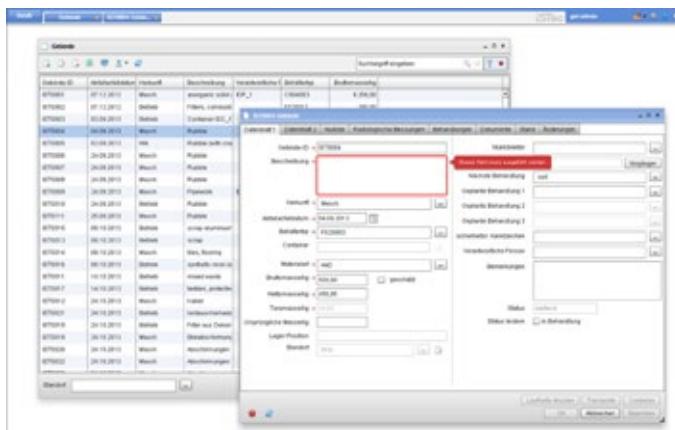
ABSTRACT TITLE**Acquisition and Tracking of Radioactive Residues Using the new ReVK**

The software system ReVK is used for managing of nuclear material. ReVK is an abbreviation/an acronym for the German Reststoff-Verfolgungs- und -Kontrollsystem, which translates to waste material tracking and control system. ReVK is being used by several German but also international decommissioning projects and has been implemented as early as 1995. Works on a complete redesign of ReVK started in 2012 and have been finalized recently. This presentation introduces the newly released ReVK-version.

The purpose of ReVK is to support the management of radioactive waste and materials by registering data regarding the decommissioning and waste treatment of nuclear facilities. This data can comprise various radiological assessments as well as the complete cycle of waste management – from registration of waste package data through tracking – also taking into consideration shipment and transportation procedures. ReVK also provides automatically generated reports and declarations, both for operational and official use in communication with regulatory bodies. Most of the data registered with ReVK derive from the

various dismantling procedures; however ReVK can also manage waste packages generated during the operation time of a facility. In ReVK, the processes of assembly or disassembly of material and/or waste are made transparent by using predecessors of current waste packages: Any given data set of a current package can be simply related to other preceding data sets. ReVK registers results of radiological measurements such as surface contamination or dose rate as well as activity inventory. In addition, ReVK contains a powerful calculation tool taking into account the decay from mother nuclides to daughters and resulting built up over time. Results can also be displayed summing up specific activities or dose rates for nuclide groups.

The ReVK architecture is based on three layers: a database server, an application server and a user interface. ReVK works on nearly all available data base servers. The application server is based on Java and provides a servlet container with the ReVK server application. The user works with ReVK either through a browser based frontend or with a locally installed software client.



**Norbert Schmidt | Bruno Dumont**

Company AREVA NC
TOUR AREVA, 1 Pl. Jean Millier
92084 Paris La Defense - France

Website www.aveva.com

ABSTRACT TITLE**Safety Regulations and Implementation in the Development of new Transport and Storage Casks for High-active Waste**

AREVA is developing a new cask family which complies with the 2012 IAEA regulation for a safe transport and storage of nuclear waste, allowing a simplified management and flexible usage. The Nuclear Power Plants operational waste - such as highly activated metallic structures removed from the primary circuits that were interim stored in the fuel pools - need to be removed and transported outside of the reactor building for further processing and disposition. Moreover, increasing activities in decommissioning and dismantling of nuclear facilities produce additional waste that also requires to be transported and interim stored.

There is a need for more flexible solutions in terms of contents, category types such as B(U) containers, size, mass and ability to be interim stored for long periods (min. 50 years) as well as better adapted to the different types of waste and handling capabilities available within existing facilities. The new family is named TN® MW(Multi Waste). The first version of the TN® MW - dedicated to metallic waste - is based upon proven cask design with shock absorber technologies already in use within AREVA's current fleet of licensed casks.

The main design features of the TN® MW cask family are the following:

- Cylindrical body, build of thick forged steel to provide significant shielding
- Forged steel primary lid equipped with a metallic or elastomer sealing system, depending on the usage
- External shock absorbers only for transportation
- Internal shock absorber
- High resistance to brittle fracture at low temperature

The dimensions of the cask and its internal cavity volume were optimized considering the main waste to be handled and the characteristics and limitations of the nuclear facilities where the casks will be handled. Other considerations were also incorporated into the design to facilitate wet as well as dry loading, and the possible packing in over-packs for long term interim storage solutions considered today and in the future.



**Dr. Georg Brähler | Andreas Scheifele**

Company NUKEM Technologies Engineering Services GmbH
Industriestrasse 15
63755 Alzenau - Germany

Website www.nukemtechnologies.de

ABSTRACT TITLE**Local Melting of Metallic Wastes from Decommissioning**

During D&D of power reactors some 1,000 tons of contaminated metals result. Current practice processes such material in 3 ways:

- direct release, when activity levels are below legal limits (e. g 0.1 Bq Co-60/g)
- melting in an external melting facility, followed by release if possible
- declaration as waste if activity levels exceed the limits and there is no chance for decontamination.

ALD and NUKEM Technologies have designed a melting facility based on vacuum inductive melting technologies which is portable and able to be transported to the reactor site in containers. The removed metal pieces are melt at site and form an ingot which fits into a standard waste container like the 200 litre drum.

Compared to current practice, such a facility offers the following advantages:

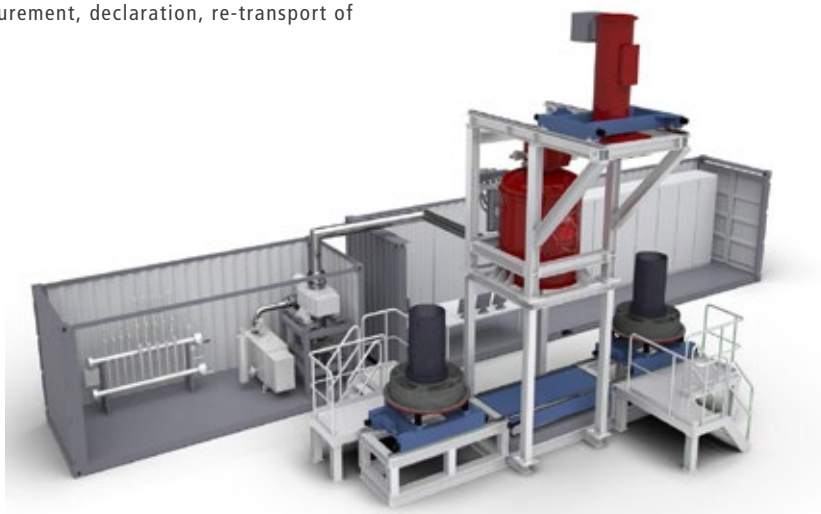
- the local process avoids the transport of the material to an external melter including the cost for measurement, declaration, re-transport of

slag, dust and ingots which cannot be released

- the melting process homogenizes the material and increases its density as much as possible: radioactivity declaration does not require contingency for measurement, and allows the increase of share of release
- the high density allows a compact and safe long term intermediate storage
- the vacuum technology avoids the formation of process off gas, allowing to concentrate volatile nuclides like Cs-134/7 inside the furnace.

When the job is finished at a site, the facility can easily be decontaminated, packed into the transport containers and shipped to the next site.

Besides economic benefits the local melting offers a kind of autarchy and allows risk minimisation: no transports, no material degradation during intermediate storage and reduced problems from deferred final repository.



**Ralf Borchardt | Volker Utke**

Company Energiewerke Nord GmbH
Latzower Straße 1
17509 Rubenow - Germany

Website www.ewn-gmbh.de

ABSTRACT TITLE**Decision-making for Large Component Dismantling**

After the shutdown of five operating power reactors at the same time, the Greifswald Nuclear Power Plant was confronted with a worldwide unique situation.

The dismantling of five power plant units required the construction of an interim storage facility at the site with corresponding possibilities for conditioning to realise the dismantling within a reasonable period. The transport of the large components to the interim storage facility where they will be conditioned at a later time was a major factor in the dismantling process of the power plant units. The components had to be dismantled into the largest possible parts to condition them in well equipped conditioning facilities by using existing transport ways and available transport and lifting technique at a later time.

Besides the safe and reliable dismantling, the main objectives of the large component strategy are the minimization of the following factors:

- dismantling costs
- project duration
- collective dose
- final storage volume

There are many influencing factors caused by different properties of the large components, different facilities and rooms, and further boundary conditions of the dismantling project. Therefore, the decision whether the large component strategy or the in situ dismantling (including conditioning and packaging) should be preferred needs to be grounded on a careful analysis of the individual case, and cannot be made generally.

Also, for the dismantling in the KGR different dismantling strategies were chosen to get a practical confirmation of the different possibilities for conditioning. So, various RPV internals and steam generators have already been conditioned to package size.

For the KGR the immediate and fast dismantling of the large components of the plant is an important precondition for the efficient dismantling of all equipment from the controlled areas of the site.



**Helmut Alborn**

Company August Alborn GmbH & Co. KG
Planetenfeldstraße 102
44379 Dortmund - Germany

Website www.alborn.de

ABSTRACT TITLE**Herausforderungen beim Transport von Großkomponenten**

August Alborn GmbH & Co. KG ein seit 1891 familiengeführtes, erfahrenes und kompetentes Unternehmen, dass sich auf das Verladen, Verschieben und Transportieren von Großkomponenten, schweren Lasten und sperrigen Gütern im konventionellen Bereich wie auch in der Kerntechnik spezialisiert hat.

Individuelle und wirtschaftliche Lösungen bei der Projektabwicklung in allen Bereichen, eine permanente Ansprechbereitschaft, sorgfältige Planung und Abstimmung auch bei sehr kurzfristigen (Re)Aktionszeiten gehören ebenso zu unserem Service wie Machbarkeitsstudien, detaillierte Routen- und Zeitplanung, Streckenerkundung und das Einholen der erforderlichen Genehmigungen.

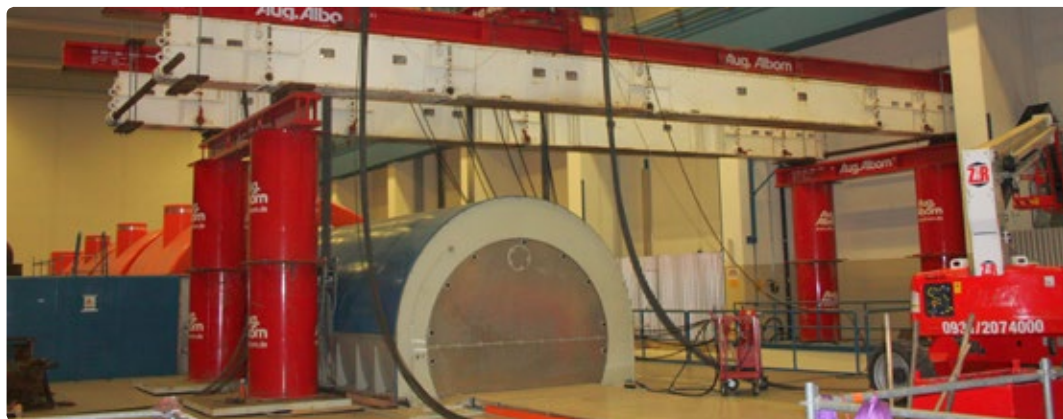
Das erreichen wir durch ein qualifiziertes und engagiertes Arbeiterteam und den Einsatz modernster Gerätschaften und innovativer Technik. Hier stehen die verschiedensten Transport- und Sonderfahrzeuge wie Sattelzugmaschinen, Tieflader mit hohen Nutzlasten, Autokrane und Spezialequipment wie unser 1.440 to. Hubgerüst zur Verfügung. Ergänzt wird unser Qualitätsanspruch von dem verantwortungs-

vollen Umgang mit der Umwelt und der Ausrichtung an der ISO 9001:2008 und SCCp:2011. Wir sind im Besitz einer Genehmigung nach § 15 StrlSchV für die Beschäftigung in fremden Anlagen oder Einrichtungen.

„Wenn du die Absicht hast, dich zu erneuern, tue es jeden Tag“ ist seit über 120 Jahren unser Motto.

Worin bestehen die Herausforderungen beim Transport von Großkomponenten? Jeder Transport muss alle Anforderungen erfüllen wo Beispielhaft zu nennen wären:

- Leichtes Raumprofil des Transportes im Gebäude, Transportweg (Transportgut mit Ladehilfsmitteln und Transportmittel)
- Infrastruktur (ausreichende Tragfähigkeiten von Flächen und Wegen)
- behördliche Genehmigungen
- welche Transportmodi stehen zur Verfügung bzw. werden benötigt? (Innerbetrieblich, Straße, Bahn, Schiff, Luft)
- Welches ist das geeignete Hebezeug
- Besonderheiten Transportgestell, Ladungs-sicherung, Kippstützen



**Dr. Andreas Havenith**

Company Aachen Institute for
Nuclear Training GmbH
Jesuitenstraße 4
52062 Aachen - Germany
Website www.nuclear-training.de

Roland Baumann

Siemens AG
Seligensstädter Straße 100
63791 Karlstein a. Main - Germany
www.siemens.com

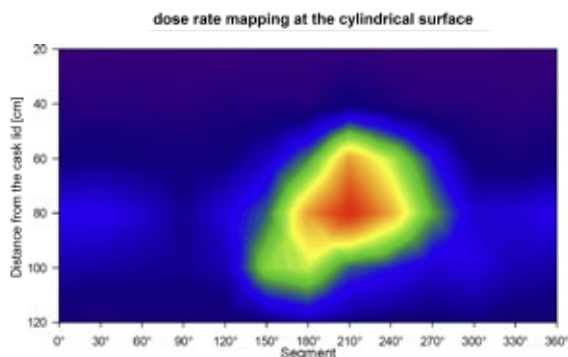
ABSTRACT TITLE**Innovative Method for the Measurement of MOSAIK® Casks**

Radioactive waste has to meet the specifications and acceptance criteria defined by national regulatory and management authorities for its intermediate and final storage. The waste acceptance requirements are derived from a site-specific safety assessment and include specific requirements on waste forms, packaging as well as limitations to activities of individual radionuclides and limitations to masses of non-radioactive harmful substances. To comply with these requirements every waste package has to be characterised in its radiological and chemical composition.

If the waste documentation is insufficient, this characterisation must be performed via radiological measurements. Non-destructive techniques for waste characterisation are one of the core competences of the Aachen Institute for Nuclear Training (AiNT).

A new method for the non-destructive radiological characterisation of MOSAIK® casks will be presented. MOSAIK® casks are heavy shielded and they are

developed to load high-active (HAW) or intermediate-active radioactive waste (MAW). The cask body is made of ductile cast iron (GGG 40) and has a wall thickness of 150 mm. To increase the shielding an additional internal lead shielding up to 120 mm is available. The weight of a MOSAIK® might be about 10 t. In cooperation between the SIEMENS AG and the AiNT GmbH an innovative measurement method was developed and adapted to these heavy casks and boundary conditions of inhomogeneous decommissioning waste. The method is a best estimate technique, determining the specific activity of gamma spectrometry detectable radionuclides. The innovative approach is to couple an integral rotation dependent gamma-scanning with the dose rate mapping at the cylindrical surface. With this approach the inhomogeneous activity distribution is taken into account, what means that the activity can be determined with a lower uncertainty. The lower uncertainties may result in a reduction of the determined activities, which is an advantage for the waste producer.





COMPANY PROFILES

COMPANY PROFILES

*heavy transport -
next level!*



COMPANY DESCRIPTION

heavy transport - next level

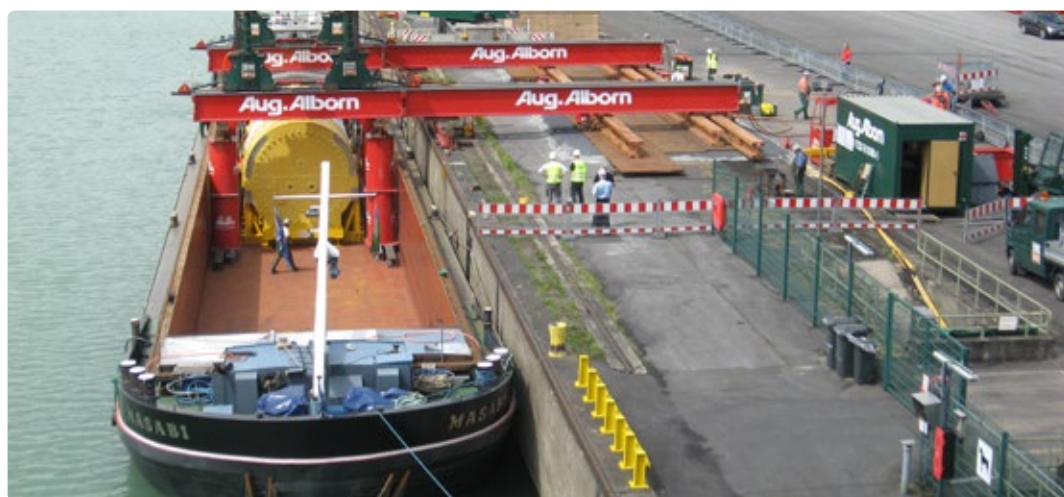
August Albörn GmbH & Co. KG is an experienced and competent family-run company since 1891. We are specialized in heavy lifting, fluids, relocation and transportation of large components, heavy and wide loads in the conventional as well as in the nuclear area.

We offer individual and economic solutions for project processing in all relevant areas. Our services are characterized by careful planning and coordination plus permanent on-call availability and the ability to act on short-terms. We also provide feasibility studies, detailed route and time planning, route reconnaissance, and we are able to obtain the necessary permits.

This is achieved by a qualified and committed team of employees, using advanced equipment and innovative technology. We provide a wide range of transportation devices and special vehicles like saddle trucks, low loaders, flatbed trailers with high payloads, mobile cranes and special equipment like our 1.440 t. hydraulic gantry.

Our responsible use of the environment and resources is reflected in our quality management and certified according to ISO 9001:2008 and SCCP: 2011 Standards.

"If you intend to rebuild yourself, do it every day" is our motto for over 120 years.



COMPANY DESCRIPTION

Omexom Kraftwerk Service GmbH - Subsidiary Company of the VINCI Group

The Omexom Kraftwerk Service GmbH (OKS) is a subsidiary company of the VINCI group, which employs 193,000 employees in more than 100 countries. More than 3,000 employees work for nuclear facilities. Vinci is a world leader in the fields of energy, automation and information technology, construction and concession services.

Omexom Kraftwerk Service is the specialist to meet the requirements of the German nuclear power industry. With 80 qualified employees, OKS delivers Germany-wide services regarding designing, planning, detail engineering, construction, maintenance, documentation and plant inspections for electrical and I & C systems and equipment in nuclear power plants.

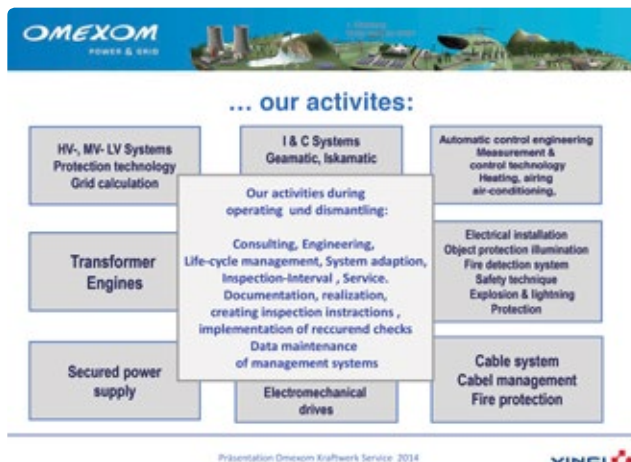
Furthermore, there is a back-up of 200 German specialists hired from our affiliated companies for support in operations in nuclear power plants. Our employees are consistently equipped with radiation protection and safety passports and trained in part as AVO and appointed VDA. We are permanently certified according to ISO 9001:2008, ISO 14001:2004, KTA 1401 und SCC**.

The profit for our customers are years of experience and system knowledge in nuclear power plants (since the construction period started), our technological competence and our decentralized structure.

We are service providers for solutions in electrical and control systems. Together with our German affiliates we are able to combine industrial ideas and standards with special requirements in NPPs. Therefore, we are able to provide cost efficient solutions.

Furthermore, we can provide, together with our affiliate companies in Europe, a range of services that go far beyond the possibilities already known in Germany. Together we have profound experience in dismantling and have already developed systems for decommissioning.

To find appropriate solutions for you please don't hesitate to contact us.



COMPANY DESCRIPTION

Brenk Systemplanung GmbH (BS)

BS has been active in the consultancy business for more than 30 years now. The services cover the areas of radiation protection, nuclear technology, software development, plant and process engineering as well as mining and environment. Founded in Aachen, BS has nowadays additional branches in Hamburg, Bruchsal and Andernach with a total of about 50 employees.

Our work in the nuclear field is executed under contracts with the nuclear industry as well as with administrative bodies of the European Union, international organizations like OECD and IAEA, national governments and responsible licensing authorities of Federal States of Germany. It covers all aspects of radiation protection, like dose assessments, activation and shielding calculations, calculation of dispersion of radionuclides in the environment etc., and a large variety of services in the area of decommissioning and dismantling, like planning, execution of licensing procedures (both in the nuclear and the conventional sector), radwaste management, decon-

tamination, clearance of materials, buildings etc. We have at our disposal a complete set of measurement instruments for radiological characterisation and clearance, including 9 in situ gamma spectrometers, several laboratory gamma spectrometers, contamination monitors etc. Our extensive software packages installed at several NPPs in Germany support clearance processes considerably.

We also deal with NORM and radioactive materials discovered in scrap or waste loads. Our transport license as well as our license for handling radioactive substances allows us to offer complete waste management solutions from a single source.

Several of our employees have been appointed members of advisory bodies like SSK (Commission on Radiation Protection) and ESK (Nuclear Waste Management Commission) as well as international working groups of IAEA, EU and OECD/NEA. Our work with DIN (German Institute for Standardisation) fosters standards on clearance measurements.



COMPANY DESCRIPTION

Berthold Technologies GmbH & Co. KG

Our expertise:

- Contamination Measurement
- Dose and Dose Rate Measurement
- Measurement of Activity and Low-Level-Counting Monitoring of Airborne Radioactivity
- Data Processing

Versatile combination system such as dose and dose rate monitor for gamma or neutron radiation. Integrated dose rate detector.

The small portable evaluation unit LB 134 allows connection of the gamma probe LB 1236-H10, the neutron probe LB 6411 or LB 6411-Pb for high energy neutrons.

Several detectors can be connected to the small, light-weight, portable instrument for the measurement of alpha and beta/gamma radiation with scintillation technology or tritium contamination. It offers various measuring modes: cps, dose rate and dose integration.



COMPANY DESCRIPTION

ANTECH - Non-destructive Radioactivity Measurement Solutions

ANTECH provides non-destructive nuclear measurement solutions and services to the nuclear industry worldwide. Our instruments have applications in nuclear safeguards, waste assay and sentencing, and radiation detection.

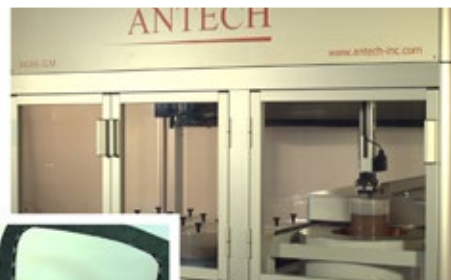
The measurement technologies we employ include passive and active neutron measurement systems and calorimeters for the determination of special nuclear materials (SNM) including uranium, plutonium, tritium and other heat producing radionuclides as well as fission products in waste and for safeguards.

ANTECH gamma ray measuring instruments are used for detecting radiation in the environment and assaying gamma-ray emitting materials ranging from hold-up, exempt and very low level waste (VLLW) to very high activity Intermediate Level Waste (ILW) and remote handled (RH) waste. The selection of

gamma-emitting waste assay solutions includes Far-Field and In-Situ waste measurement instruments, ranging from the RadSearch radioactivity and decommissioning monitor to the QED shielded free release drum assay system.

ANTECH was instrumental in the initial development of the Segmented Gamma Scanner system (SGS) and our range of highly-sophisticated SGS waste measuring instruments now includes the Wide Range SGS (WR-SGS), the Tomographic Gamma Scanning System (TGS) and the Automated Gamma Spectroscopy System (AGSS).

Our broad international customer base includes government nuclear laboratories, power stations and nuclear industry site operators and contractors around the world.



COMPANY DESCRIPTION

Proficiency in Nuclear Engineering

Professional activities in the complex discipline of nuclear engineering demands constant advanced training that takes up after formal studies end. For this reason, we decided to develop a training programme that not only provides instruction in elements of basic knowledge but also facilitates intensive analysis of special subject areas. Our reflections resulted in six training modules that satisfy this requirement.

The training programme by AiNT offers not only a general view of individual topic areas, but also imparts a greater depth of knowledge, e.g. on the issues of radioactive waste disposal or interrelationships in energy policy. The programme is constantly being expanded and refined in response to changes in the field, so that it is possible to address a broad range of technical subjects with internationally recognised speakers.

We are guided strongly by psychological learning principles during the design of our course modules. For example, receptiveness to and retention of the contents of the instruction modules are supported by the structures of the information and a relaxed learning atmosphere. The individual subject areas are introduced by professional, qualified and experienced presenters who have distinguished themselves through exceptional technical skills and teaching qualifications.

Additionally, we offer engineering and consulting service on the highest scientific level. Especially the development of measurement technologies for the characterization of radioactive waste, the simulation of nuclear process as well as waste management belong to our services. We support our clients in the process of conditioning, characterization and packaging to qualify their waste for the German repository Konrad.



COMPANY DESCRIPTION

IT Solutions for Operations, Maintenance and Decommissioning

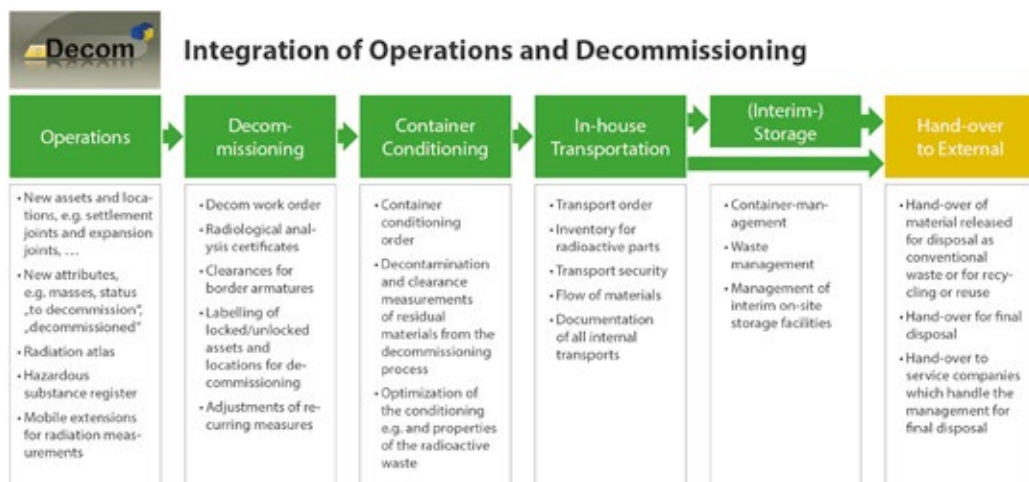
GiS – Society for Integrated System Planning- with its headquarters in Erlangen and its software centre in Weinheim, is dedicated to IT based (operational) management and maintenance solutions for nuclear power plants since its foundation in 1984. Until now, the exclusive market segment of GiS is nuclear power. The company is known as a leading expert in this area these days. All productive nuclear power plants in Germany and Switzerland are longstanding customers of GiS (one exception in each country).

With 85 employees GiS develops professional solutions for customers with high quality requirements, which are particularly noted for their holistic approach, accompanying the entire life-cycle of assets – from design, construction, operations, maintenance to decommissioning whilst ensuring maximum safety and compliance with regulations. The GiS portfolio covers the Enterprise Asset Management System (EAM) as well as the related software development and business process consulting.

Enhancement of the operations management system with decommissioning specific values and functionalities in nuclear power plants.

GiS uses its comprehensive know-how to develop innovative solutions for the decommissioning of nuclear power plants:

The competence portfolio of GiS in the area of decommissioning of nuclear plants contains a wide range of services and software solutions. For example, the company developed cDecom - a holistic, system-independent IT concept which is able to enhance successfully used operations management systems into optimised systems for the decommissioning, mitigating the need for several siloed solutions. Consequently, cDecom lays the ground for a consistent and expedient path of the operations management system to the decommissioning system. Moreover, the solution is particularly cost-efficient due to its evolutionary approach.



COMPANY DESCRIPTION

NUKEM Technologies - Your Partner for Nuclear Engineering Solutions

NUKEM Technologies is world-wide active in the areas of management of radioactive waste and spent fuel, decommissioning of nuclear facilities, engineering and consulting. NUKEM Technologies GmbH belongs to ROSATOM.

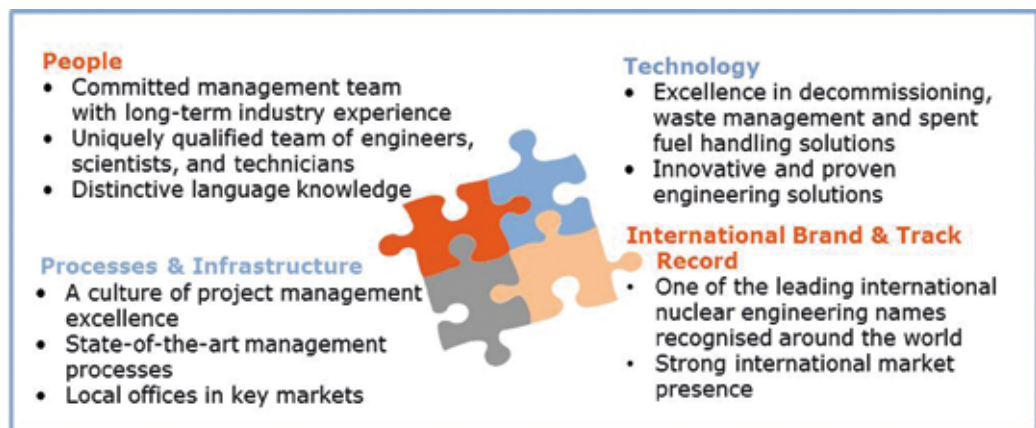
The company's engineers develop solutions that are both modern and proven effective. Furthermore, the solutions build upon NUKEM Technologies' extensive experience within the nuclear sector, which began over five decades ago. The company's activities comprise a broad spectrum of services ranging concept studies to the delivery of turn-key projects, from partial solutions to complete project and contract management. The company's Engineering and Consulting services play an important role in contributing to innovative design and build.

NUKEM Technologies is based in Alzenau, Germany where also the majority of the more than 250 staff is working.

As part of business optimisation processes and successful implementation of the full range of

services on the global market, the organization provides its business activities by two acting companies. NUKEM Technologies GmbH is concentrating on complex turnkey projects and taking on new tasks within the value added chain of ROSATOM. Additionally, NUKEM Technologies is in charge for all international business development activities for both companies. NUKEM Technologies Engineering Services GmbH focuses on implementing classic design and equipment delivery tasks.

Consistent customer orientation and quality management are essential cornerstones of NUKEM Technologies' corporate philosophy. We place a high premium on individualized service, timely project completion, complete and understandable documentation and providing our customers with superior-quality products. A visible sign of our emphasis on quality is NUKEM Technologies' quality assurance system based on DIN EN 9001. In addition, we are proud being certified regarding KTA 1401, DIN EN ISO 140001:2009 and OHSAS 18001.



COMPANY DESCRIPTION

Support in all Phases of Decommissioning and Dismantling

Since its founding in 1872, TÜV Rheinland has been synonymous with safety worldwide. Thanks to new ideas, internal developments, profound expertise and a global network, we can make products, services, systems and people safer and thus more competitive from the outset as well as promote people and train them to become experts.

Since the civilian use of nuclear energy began in Germany, TÜV Rheinland has been gathering comprehensive expertise in all areas of nuclear technology – be it for research reactors, pressurized water reactors, boiling water reactors, fast breeder reactors, high-temperature reactors or uranium enrichment facilities.

TÜV Rheinland helps companies to observe and comply with safety and quality standards while taking national and international regulations into

consideration. Our customers benefit from expertise resulting from a wide range of national and international projects.

TÜV Rheinland has been continuously involved in decommissioning and dismantling nuclear systems for more than 20 years. Based on the experience we have acquired, we can perform a wide range of activities for you that include services such as consulting in approval and supervisory procedures, support in the development of decommissioning and dismantling concepts and the underlying technical reports to practical on-site activities in the area of radiation protection. As a result of company acquisitions and the appointment of experienced employees from the industry in particular, we can provide comprehensive services in the area of dismantling and disposal for the industry.

Services of TÜV Rheinland Industrie Service GmbH and ISTec GmbH for the industry in the area of decommissioning

Consulting Services

- Services regarding Waste Management
- Services regarding Licensing and Supervising Procedures
- Services for final and interim storages
- Decommissioning Concepts
- Technical Services (e.g. Radiation & Fire Protection)
- Training
- Project Management
- Quality Management

Products

- ReVK (Program system for tracking and controlling radioactive waste)
- ADAS (System for the acquisition and evaluation of activity data for collecting radiological measured values and process data)
- VerBA (Improved fire alarm system due to consistent documentation of all events relevant to fire protection and permanent monitoring)

On-Site-Services & Laboratory

- Providing radiation protection engineers and technicians for On-Site-Services
- Radiological Characterization
- Clearance
- Supervising of On-Site staff (rad. Prot.)
- In-House Laboratory
 - Gamma-Spectroscopy
 - Various measurement equipment (e.g. ISOCS, Inspector 1000)

COMPANY DESCRIPTION

D&D Experience in Belgium

Tecnubel has 30 years of experience in providing advanced solutions for the nuclear industry. Together with its subsidiaries Transnubel and ECS, its expertise covers a wide range of maintenance and facility rehabilitation services, nuclear transport and radiation protection services.

It has provided services to various nuclear sites in Belgium and abroad, from nuclear power plants to nuclear fuel cycle facilities and from nuclear research centers to waste treatment facilities. This strong presence in the nuclear industry enables it to provide practical and technical services with high added value delivered with the greatest care and respect for quality, safety and environment.

Tecnubel, Transnubel and ECS are well positioned, within the ENGIE Group (former GDF SUEZ), to offer the preparatory studies and hands-on practical solutions to help minimize risks and resolve

problems of accidental or accumulated contamination, the removal or replacement of ageing or contaminated components, radioactive or toxic waste treatment and more.

Tecnubel is your partner from the beginning of your project until the end and offers a full spectrum of technical skills and capabilities in the field of decontamination and dismantling. It disposes of a wide range of materials and tools for executing D&D projects, including remote controlled equipment (robotized vehicles, electric manipulators etc.)



COMPANY DESCRIPTION

Your Specialist for Beverage & Materials Handling Technology and Special System Constructions

Since it was founded in 1999, with about 40 employees, our company LIESE GmbH has evolved to become a successful, globally active company in the machine construction industry.

In addition to Beverage Technology, we are specialists in Materials Handling Technology and Special System Construction, particularly for systems subject to stringent safety requirements.

Our own Laser Production ensures a high level of in-house manufacturing and ideally complements our service portfolio.

Experience, knowledge and vision form the basis for tackling the most demanding tasks:

Qualified, highly motivated employees, plus knowledge and use of state-of-the-art production technology form the backbone of our success.

Based on our wealth of experience from different fields of industry, we boast a pool of invaluable

expertise. And from this we produce innovative ideas for bespoke solutions.

As well as ensuring maximum functionality, our aspiration to achieve maximum quality and cost efficiency is at the heart of all our work.

If you are planning to develop a machine, purchase a new or replacement machine or system, or refit an old one, you've come to the right place. As your full service partner we offer you:

- Planning: Analysis, drafting, workflow and schedule planning
- Design: Compilation of drawings, incl. documentation, production of hydraulic, pneumatic and circuit diagrams
- Production: Part and system production, automation, programming
- Commissioning: System setup and support during production
- Maintenance: Spare parts supply and on-site service, machine refits





www.icond.de