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iCOND

5th Edition

International Conference on
Nuclear Decommissioning

BOOK of ABSTRACTS

November 2016

Organizer

AiNT
Aachen Institute for Nuclear Training

In cooperation with

TÜVRheinland®
Genau. Richtig.

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Bildquellen Picture Sources: AiNT, Eurogress Aachen, RWE Power
Für die Inhalte der Abstracts und Company Profiles sind die Vortragenden, bzw. Unternehmen verantwortlich.
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Design, Satz & Druck: Lindemann-Projekte - Dauffenbachstr. 3 - 52080 Aachen

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 politischen Entscheidungen außer Betrieb genommen. Dieser Umstand erfordert optimierte bzw. zwischen allen Beteiligten abgestimmte Rückbaustrategien.

Die Fachveranstaltung fokussiert den rechtlichen Rahmen in Deutschland, vergleicht Stilllegungsstrategien und nimmt die verschiedenen Teilaufgaben des Rückbaus in den Blick. Neben den unterschiedlichen Genehmigungs- und 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.

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. 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.

ZIELGRUPPE

Die Konferenz richtet sich an Betreiber von kerntechnischen Anlagen, die 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).

AUDIENCE

The conference addresses 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 adress research institutions, which are responsible for the dismantling of research reactors and it´s 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. There will be a simultaneous translation (German/English) available.

RÜCKBLICK ICOND 2015 REVIEW

Die „International Conference On Nuclear Decommissioning – ICOND" wurde 2015 zum vierten Mal in Kooperation mit dem TÜV Rheinland durchgeführt und fand erstmalig im neu eröffneten World Conference Center in Bonn statt. Neben den ca. 250 Teilnehmern/-innen nutzten zwei Dutzend Unternehmen die Möglichkeit im Ausstellerbereich des modernen Tagungszentrums Kontakte zu knüpfen und neue Produkte zu präsentieren. Das Teilnehmerspektrum umfasste sowohl Vertreter/-innen der Industrie, der technischen Überwachung, Aufsichts- und Genehmigungsbehörden sowie Energieversorgern und Vertreter/-innen der nationalen und internationalen Presse.

Inhaltlich fokussierte die ICOND Teilaufgaben des Rückbaus und hierzu erforderliche Technologien, verglich Stilllegungsstrategien und legte die rechtlichen Rahmenbedingungen dar. Mit einer ausländischen Teilnehmerbeteiligung von 26 % präsentierte sich die ICOND 2015 zudem internationaler als die vorherigen Jahre, was das Interesse an innovativen Rückbautechniken sowie an den Erfahrungen in Deutschland widerspiegelt.

Bei dem Pre-Conference Workshop tauschten sich die Teilnehmer/-innen zu den verschiedensten Technologien und Erfahrungen aus weltweiten Rückprojekten aus. Die Ökonomie des Rückbaus kerntechnischer Anlagen wurde zu Beginn der ICOND betrachtet und durch die Podiumsdiskussion zum Thema Zeit- und Kostenrisiken ergänzt. In den insgesamt 32 Fachvorträgen wurden neben dem aktuellen Status der deutschen Rückbauprojekte auch verschiedene Perspektiven und Strategien vorgestellt.

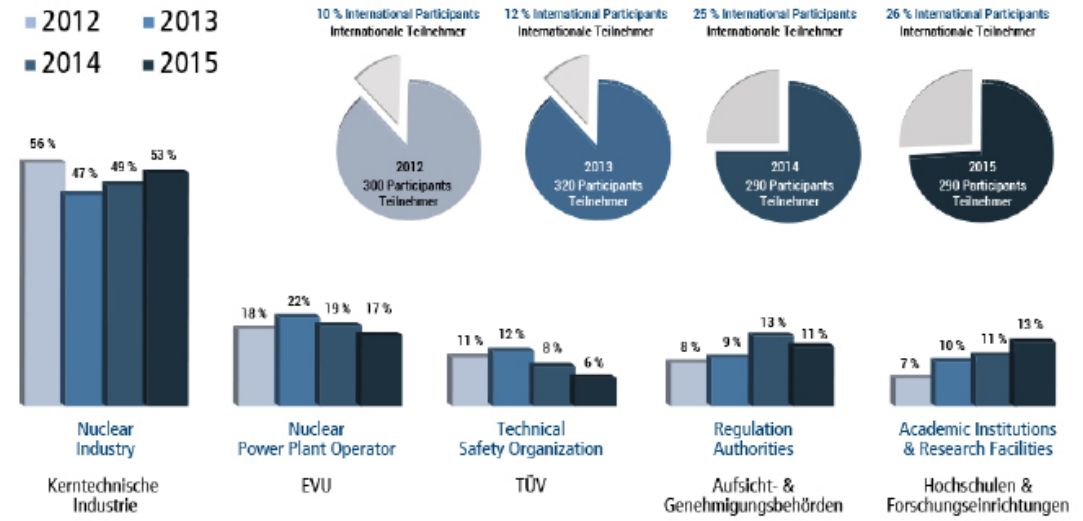
The „4th International Conference on Nuclear Decommissioning – ICOND" was in 2015 again organized in cooperation with the TÜV Rheinland and was held for the first time in the recently opened World Conference Center in Bonn, Germany. In addition to the 250 Participants, two dozen companies used the opportunity to establish contacts and present new products in the exhibition area of the brand new and modern conference center.

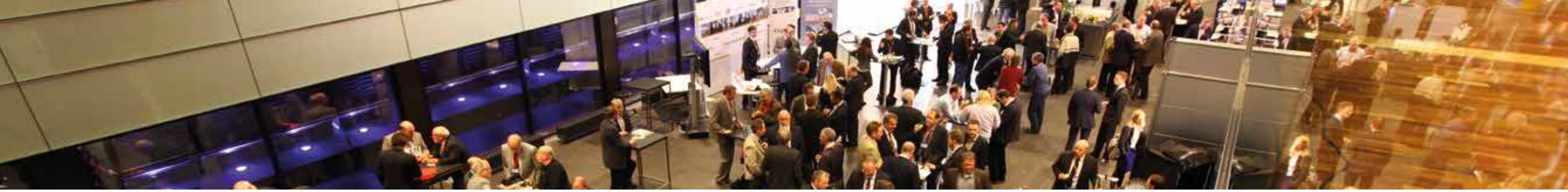
The scope of participants in 2015 comprised representatives of the industry, technical supervision, security commissions, regulatory authorities and utilities as well as representatives of the national and international press. The conference focused subtasks of the decommissioning projects and technologies which are needed therefore, compared decommission strategies and presented legal frame conditions.

With 26% participation from abroad the internationality increased compared to the previous years, which reflects the interest in innovative decommission technologies and the experiences in Germany.

During the Pre-Conference Workshop participants shared experiences about various technologies from worldwide decommissioning projects. The beginning of the conference focused on economic optimization approaches of nuclear decommissioning and got completed with the panel discussion about time and cost risks during decommissioning. Within the 32 lectures the speakers presented beside the current status of the nuclear phase out in Germany also different international perspectives and strategies.

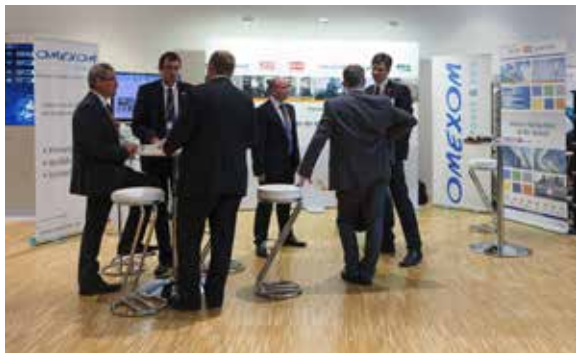
FAKTEN FACTS





EXHIBITORS 2016

ICOND



AiNT Aachen Institute for Nuclear Training

ALE SMARTER, SAFER, STRONGER

Aug. Alborn

BLASTRAC THE INNOVATORS IN SURFACE PREPARATION

BuM

BS Brenk Systemplanung

Caverion Kronz

Fortum

GIS Gesellschaft für integrierte Systemplanung mbH

HOCHTIEF

IEM FörderTechnik

KEP Nuclear

MAMMOET

MIRION TECHNOLOGIES

net RWTH AACHEN UNIVERSITY

NRG

nse international

NUKEM Technologies

pedi ZÜRICH

sat. Kerntechnik GmbH

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ICOND PROGRAMME

SPEAKER REFERENCE WALL

AiNT Aachen Institute for Nuclear Training
amec
ANDRA
AREVA forward-looking energy
Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
BS Brenk Systemplanung
Caverion Krantz
CMI Czech Metrology Institute
ERM
EWN
[GGSC]
Gleiss Lutz
GNS
IFW Leibniz Universität Hannover
JEN
MAGICS Radiation-Hardened Instruments
MAMMOET
MIRION TECHNOLOGIES
NRG
NUCLECO
NUKEM Technologies
OECD
oxford technologies
Preussen Elektra
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VATTENFALL
WAK

MONDAY November 21st, 2016
PRE-CONFERENCE WORKSHOP

12:00 Registration

13:15 **Welcome**
Dr. John Kettler –
Aachen Institute for Nuclear Training GmbH

DECOMMISSIONING TECHNOLOGIES & EXPERIENCES

EN **13:30** **Innovative Lifting Systems for the Nuclear Sector**
Matthijs Eikelenboom – Mammoet Deutschland GmbH

EN **14:00** **Advanced Decontamination of Metal and Concrete Surfaces by Laser Technology**
Dr. Anton Philipp Anthofer – Energiewerke Nord GmbH (EWN)

EN **14:30** **Smart Sensing in Radiation Enviroments**
Jens Verbeeck – MAGICS Instruments N.V.

EN **15:00** **TN Multi Waste Package „All in One Solution“ for Transport – Storage – Final Disposal**
Florence Lefort-Mary – AREVA NC

15:30 Coffee Break

EN **16:00** **Reducing False Alarms in Portal Monitors by FastTrack-Technology**
Christian Günther – Mirion Technologies (RADOS) GmbH

EN **16:30** **Automatization and Support of Clearance Measurements and the Interaction with the Authorities with Software Tools**
Dr. Stefan Wörlen – Brenk Systemplanung GmbH

EN **17:00** **Perspective Ways of Irradiated Graphite Treatment**
Evgueny Bespala – ROSATOM

EN **17:30** **The Radiation Impact of Steam Generator Dismantling on the Workers, Public and Environment**
Dr. Martin Hornacek – Slovak University of Technology in Bratislava

TUESDAY November 22nd, 2016
ICOND

10:00 Registration

12:00 Quick Lunch

13:00 **Welcome**
Dr. John Kettler –
Aachen Institute for Nuclear Training GmbH

STATUS & ECONOMICS

D **13:15** **Results of the Commission Storage of High Active Waste**
Ergebnisse der Kommission Lagerung hoch radioaktiver Abfallstoffe
Ursula Heinen-Esser – Bundesgesellschaft für Endlagerung (BGE) mbH

D **13:45** **Responsibility, Safety and Certainty – A New Consensus on Nuclear Waste Disposal**
Verantwortung, Sicherheit und Gewissheit - Ein neuer Konsens bzgl. der Nuklearen Entsorgung
Hartmut Gaßner – Anwaltsbüro Gaßner, Groth, Siederer & Coll.

EN **14:15** **Decommissioning Costs Reduction due to Novel Clearance Measurement System for Industrial Applications**
Kostenreduktion im Rückbau durch innovative Freimessanlagen für den industriellen Einsatz
Jiří Šuráň – Czech Metrology Institute

D **14:45** **Decommissioning and Future Developments**
Rückbau und zukünftige Entwicklungen
Jan Cornelis Homan – PreussenElektra GmbH

15:15 Coffee Break

EN **16:00** **Nuclear Power Plant Decommissioning in Sweden**
Kernkraftwerksrückbau in Schweden
Magnus Oskarsson – Vattenfall AB

EN **16:30** **International Perspective in Decommissioning of NPPs in OECD Nuclear Energy Agency Countries**
Internationale Perspektive im Rückbau der Kernkraftwerke in den OECD Ländern
Dr. Michael Siemann – OECD Nuclear Energy Agency

D **17:00 - 18:00** **Panel Discussion:**
Proposed Law on the Reorganization of the Responsibility of Nuclear Disposal and Consequences
Podiumsdiskussion:
Gesetzentwurf zur Neuordnung der Verantwortung der kerntechnischen Entsorgung und die Konsequenzen
Participians / Teilnehmer:
Hartmut Gaßner
Prof. Dr. Christoph Moench
Prof. Dr. Bruno Thomauske

18:45 Conference Dinner & Belgian Beer
at the TIVOLI Business Lounge Soccer Stadium
sponsored by TECNUBEL GmbH

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PROGRAMME
ABSTRACTS
COMPANY PROFILES

WEDNESDAY ICOND November 23rd, 2016

PLANNING AND MANAGEMENT OF DECOMMISSIONING PROJECTS

EN **09:00** **Risk Management of the Decommissioning - Status Quo and International Developments**
Risikomanagement für die Stilllegung - Status Quo und internationale Entwicklungen
Dr. Jörg Kaulard – TÜV Rheinland Industrie Service GmbH
Uwe Dannwolf – RiskCom GmbH

EN **09:30** **Reactor Decommissioning - What are the Organisational Characteristics?**
Rückbau von Kernkraftwerken – Was sind die organisatorischen Besonderheiten?
Dr. Peter Walkden – Amec Foster Wheeler plc

EN **10:00** **The Origin of Dismantling Technologies: The BR3-PWR Project - Past Development and Present Situation**
Die Anfänge der Rückbautechnologien: Rückbau des DWR BR3 - Historische Entwicklung und gegenwärtige Situation
Vincent Massaut – SCK•CEN Belgian Nuclear Research Center

10:30 Coffee Break

REMOTE HANDLING IN DISMANTLING

EN **11:00** **Remotely Operated Dismantling under Hostile Radioactive Conditions**
Fernhantierte Zerlegung in einer lebensfeindlichen Umgebung
Bernhard Haist – Oxford Technologies Ltd.

EN **11:30** **Remotely Handled Waste Reconditioning at ENGIE Electrabel**
Fernhantierte Aufbereitung von radioaktiven Abfällen in Kernkraftwerken von ENGIE Electrabel
Peter Berben & Michel Escames – TECNUBEL ENGIE N.V.

D **12:00** **Automatic Dismantling of Reactor Pressure Vessel Internals by Underwater Robotics – AZURo**
Automatisierte Zerlegung von Reaktordruckbehältereinbauten mittels Unterwasser Robotertechnik – AZURo
Gunnar Heinzler – AREVA GmbH

12:30 Lunch

DEMOLITION OF CONCRETE STRUCTURES

D **13:30** **Selective Removal of High Reinforced Concrete Structures**
Definierter Abtrag hochbewehrter Stahlbetonstrukturen
Ulrich Hess – IFW Leibnitz Universität Hannover

D **14:00** **Experiences from the Dismantling of the AVR Biological Shield**
Erfahrungen beim Sägen des AVR-Bioschild
Franz Grouls – Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH

D **14:30** **Experiences from Concrete Demolition of the Research Reactor MZFR**
Erfahrungen beim Betonabbau des MZFR
Werner Süßdorf – WAK Rückbau- und Entsorgungs-GmbH

15:00 Coffee Break

POLLUTANT MANAGEMENT & OCCUPATIONAL SAFETY

D **15:30** **Pollutant Management in Nuclear Decommissioning**
Schadstoffmanagement im nuklearen Rückbau
Dr. Walter Dormagen - TÜV Rheinland Energy GmbH

D **16:00** **Planning & Monitoring of Demolition Work in Terms of Occupational Safety**
Planung & Überwachung von Abbrucharbeiten im Hinblick auf die Arbeitssicherheit
Thomas Wellmann – ERM GmbH

D **16:30** **Ventilation Solutions for Nuclear Dismantling**
Lüftungstechnische Lösungen für den Rückbau
Claus Schweinheim – Caverion Deutschland GmbH, Geschäftsbereich Krantz

17:00 Get Together
sponsored by TÜV Rheinland Industrie Service GmbH

THURSDAY November 24th 2016
ICOND

WASTE MANAGEMENT

EN **09:00** **Waste Management Strategies in 35 Years Nucleco Experience**
Strategien zur Entsorgung von radioaktiven Abfällen - 35 Jahre Erfahrung der Nucleco in Italien
Dr. Gianluca Simone – Nucleco S.p.A.

D **09:30** **RVR: Residue Tracking for Decommissioning**
RVR: Reststoffverfolgung im Rückbau
Dr. Thorsten Schliephake – GNS Gesellschaft für Nuklear-Service GmbH

D **10:00** **Methods and Techniques to Analyse Burn-Up and Defects of Nuclear Fuel Elements of the Reactor Core**
Methodik und Technik der Analyse von Abbrand und Defekten der Kernbrennelemente des Reaktorkerns
Dr. Marina Sokcic-Kostic – NUKEM Technologies Engineering Services GmbH

10:30 **Coffee Break**

EN **11:00** **Facing the Waste Management Challenge: The Role of NRG (The Netherlands)**
Im Angesicht der Herausforderung bei der Abfallbehandlung: Die Rolle von NRG (Niederlande)
Dr. André Wakker – NRG Nuclear Research & Consultancy Group

EN **11:30** **Waste Management in France - Strategies & Financing**
Die Behandlung und Entsorgung radioaktiver Abfälle in Frankreich - Strategien & Finanzierung
Richard Poisson – ANDRA - National Agency for Radioactive Waste Management

12:00 **Final Statement and Outlook**

12:15 **Quick Lunch to Conclude the Event**

ABSTRACTS

SPEAKER

MONDAY 13:30 EN

Matthijs Eikelenboom

Company Mammoet Deutschland GmbH
Am Haupttor / Bau 3737
06237 Leuna - Germany

Website www.mammoet.com

Innovative Liftings Systems for the Nuclear Sector

The dismantling of nuclear components e.g. steam generators or reactor pressure vessels is one of the most ambitious works during the process of nuclear decommissioning. Because of the heavy weights and the big sizes of the components it is very important to find a safe solution which is adapted to the existing infrastructure.

The available working space in the reactor building and in the surrounding is crucial for the way to find the right solution for the project. Also the knowledge of the existing infrastructure e. g. capacity of the overhead crane, interfering edges or allowable ground bearing pressure are main facts. Each project has its own conditions - therefore it is necessary to work closely together with the client to find the best and safest solution for the job.

In general there are three options for the dismantling of big components. The first option is to open the roof to lift the equipment out of the reactor building. If there is a permission to open the roof and there is enough space to assemble a crane, this could be a preferred solution.

The second option is to dismantle the components in the building (in situ). Therefore it is also necessary to remove the components from the installation place.

The third option is to remove the components from its location by the use of overhead cranes or other technologies (e.g. strand jacks) and move it out of the building. That requires a combination of lifting and skidding services. Mammoet provides the know-how and different types of lifting and skidding technologies developed for a various number of projects in the nuclear sector.

In this presentation we want to show different solutions for the moving of large components in the nuclear sector. We want to show examples of innovative decommissioning methods, references to decommissioning projects and new developments for decommissioning projects.

SPEAKER

MONDAY 14:00 EN

Dr. Anton Philipp Anthofer

Company Energiewerke Nord GmbH (EWN)
Postbox 1134
76338 Eggenstein-Leopoldshafen - Germany

Website www.ewn-gmbh.de

Advanced Decontamination of Metal and Concrete Surfaces by Laser Technology

Decommissioning of nuclear facilities means to clean up concrete and metal surfaces from radioactive and chemical-toxic contamination. The state of the art offers several mechanical decontamination technologies for this task with two major disadvantages: suboptimal working conditions (restoring forces, incorporation risk, exposition of workers to radiation) and production of secondary waste (working media, production of dust). Laser technology implies the potential to avoid these disadvantages.

At Technische Universität Dresden there are several developments of laser decontamination technologies for the clean-up of concrete and metal surfaces for the nuclear decommissioning.

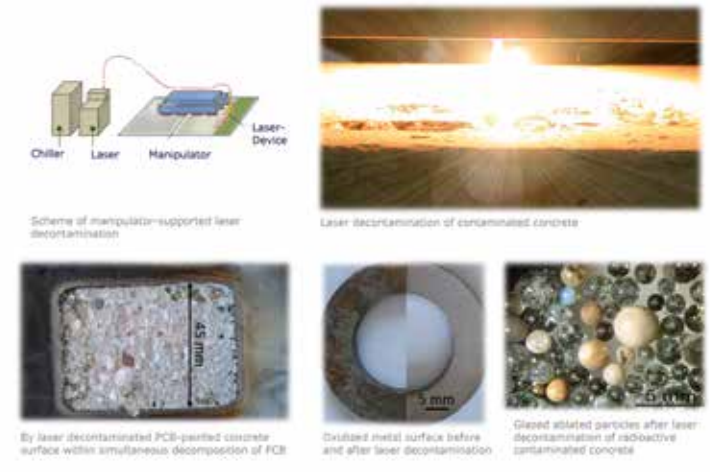
For decontamination of radioactive contaminated concrete surfaces, a 10kW diode laser in continuous wave (cw) mode melts the concrete surfaces and incapsulates the radioactive particles. The products are pre-conditioned glas particles, within a demobilization of radioactivity.

For decontamination and simultaneous decomposition of paints containing polychlorinated biphenyls (PCB) from concrete surfaces, experimental results showed PCB removal of 96.8% from the concrete surface and PCB-decomposition of 88.8% in the laser decontamination process. Significant formation of toxic products was thereby avoided. A surface ablation rate of approx. 7.2 m2/h was realized.

For the decontamination of metal surfaces a pulsed laser with wavelength of 1,064 nm is used. Depending to the kind and thickness of contamination, the laser pulse intensity, pulse length and scan modification can be variied to ablate the contamination without damaging or melting the basic material.

The presented research is domiciled at Technische Universität Dresden, Chair of Hydrogen and Nuclear Energy.

The research is founded by the German Federal Ministry of Education and Research.



SPEAKER

MONDAY 14:30 EN

Jens Verbeeck

Company MAGICS Instruments N.V.
Vlasmeer 5
2400 Mol - Belgium

Website www.magics.tech

Smart Sensing in Radiation Environments

Decommissioning involves the demolition of buildings and other structures, including the parts near the reactor core that may have become radioactive, as well as on-site handling of construction materials and the packaging and transport of these materials for safe storage and disposal. The reduction of human worker exposure as well as cost reduction requires the uses of intelligent robots or manipulators to handle the contaminated parts. These intelligent robots or manipulators can speed-up the decommissioning process. Increasing the intelligence of robots or manipulators can also ease-up the training needs required for employees that need to execute decommissioning tasks. Nowadays a lot of measurements to allow safe storage and transport of nuclear waste or done manually. Based on these manual measurements, simulations models allow users or authorities to generate tables and graphs that estimate parameters for storage or transport. However, these are only snapshots of the behaviour of stored and transported waste and measurements has to be done manually that can lead to an increased uncertainty in measurements. By employing real-time sensor networks, one can remove these uncertainties and act quickly if parameters tend to show sudden changes of gradients. Unfortunately, radiation will damage microchips and sensors, and also corrupt data in silicon memories which does not allow of-the-shelf electronics solutions for long-term use in radioactive environments unless there are heavily shielded. This creates a situation were often electronics abandoned from radiation environments leading to manipulators or robots with only the critical sensors components on-board and no use of real-time sensor networks to follow-up contamination or waste.

This presentation will reveal some of MAGICS' rad-hard electronic technologies that can bring more intelligence, enable sensing capabilities for remote handling tools and allow sensor networks in hazardous environments.

SPEAKER

MONDAY 15:00 EN

Florence Lefort-Mary

Company AREVA NC
Tour AREVA, 1 place Jean Millier
92400 Courbevoie - France

Website www.areva.com

TN® MW Multi Waste Package "All-in-One Solution" for Conditioning – Transport – Storage – up to Final Disposal

When preparing for the decommissioning of a nuclear facility, during its "end of life" management and while performing the actual dismantling operations, one has to consider a large diversity of nuclear waste in terms of types, volumes and activities, such as activated metallic waste, legacy waste, sludge, resins ... Customers are frequently faced with the obligation to undertake multiple and costly waste management operations including handling, reconditioning or re-transferring from one package to another, for example when moving from on-site storage to transportation, or from transportation to final disposal. To address this issue, a new – highly flexible up to reversible – cask system, the TN® MW, is being developed as an "All in One Solution".

With a total weight of 10 T, this cask is compliant with the 2012 IAEA regulations. It is developed on a flexible concept basis, adaptable to the various nuclear needs, including: from IP-2 Type, Type A to B(U) / B(U)F; with different options developed around this cask in order to answer to the requirements of each step of the waste management stream from on-site/international transport, long-term interim storage up to final disposal.

Licensing and manufacturing of number of this TN® MW family is underway.

SPEAKER

MONDAY 16:00 EN

Christian Günther

Contact Mirion Technologies (RADOS) GmbH
Ruhrstraße 49
22761 Hamburg - Germany

Website www.mirion.com

Reducing False Alarms in Portal Monitors by FastTrack-Technology

Portal monitors for vehicles as well as pedestrians are widely used, both in the nuclear business as well as in homeland security applications. Unfortunately, a lot of false alarms are occurring due to the fact that commonplace portal monitors are not able to distinguish between sources carried through the monitor and sources located nearby but outside the pillars of portal monitors. Due to the nature of a single detector any ionizing radiation – irrespective of the location from which it irradiates- will be generating an effect. Significant false alarm rates are the consequence leading to a lack of confidence into the used technology, especially during outages when a lot of persons want to leave the area but need to wait for clarification of the alarm reasons.

In this proceeding a new method is being presented – Mirion´s patented FastTrack-Technology- which amongst other positive features is able to clearly distinguish between sources being carried inside the portal monitor´s pillars and those sources or contamination being located nearby but outside the monitor. In addition FastTrack-Technology by principle is extremely useful in areas with high backgrounds, such as Tschernobyl or Fukushima as well as applications in which high frequency measurements are expected. This may involve outages of NPPs, radiological terror prevention at airports/customs, or large scale congeries of people at world class (sports) events. After having explained the basics of FastTrack-Technology examples of real life applications will be provided.

SPEAKER

MONDAY 16:30 EN

Dr. Stefan Wörlen

Contact Brenk Systemplanung GmbH
Heider-Hof-Weg 23
52080 Aachen - Germany

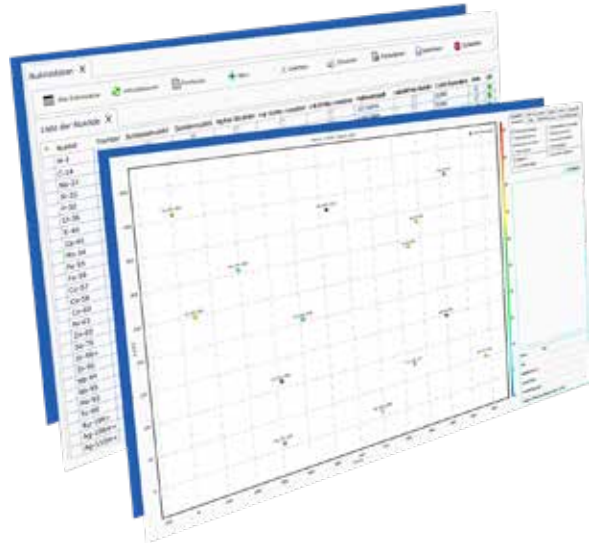
Website www.brenk.com

Automatization and Support of Clearance Measurements and the Interaction with the Authorities with Software Tools

In the course of a decommissioning project, the number of clearance measurements can reach seven digit numbers. As the manual management of such a large number of measurement results is a tedious and error prone process, it is tempting to use modern database technology to automatize this process. In the last years several software tools for the support of clearance measurements have been developed. Here, the support of the clearance of buildings will be exemplified.

The clearance procedures for buildings consist of a radiological characterisation of the various parts of the buildings, a decontamination step if necessary, followed by measurements for checking the success of decontamination, and the actual decision measurements for demonstrating compliance with clearance levels. For a nuclear power plant, the number of samples taken during this procedure can easily reach a few 10,000, while the number of single measurements can reach several 100,000 single surface measurements and several 10,000 measurements with in situ gamma spectrometry. This large number of data together with the correct interpretation according to the valid nuclide vector, the penetration depth of the contamination, the correction for radioactive decay etc. have to be managed.

For this reason, a versatile software tool has been developed by Brenk Systemplanung GmbH that supports the operator in all aspects of clearance of buildings, sites and materials. Many steps of the data evaluation and report generation during the clearance process outlined above can now be carried out automatically. This software tool has been successful in the support of the completion of the clearance process in KWW and is currently installed in several additional facilities. Experience with the use of software tools in actual clearance procedures show significant advantages in the quality of the clearance documentation, the productivity and the acceptance of the clearance documentation with the authorities.



SPEAKER

MONDAY 17:00 EN

Evgueny Bespala

Company Rosatom
24, Bolshaya Ordynka
119017 Moscow - Russia

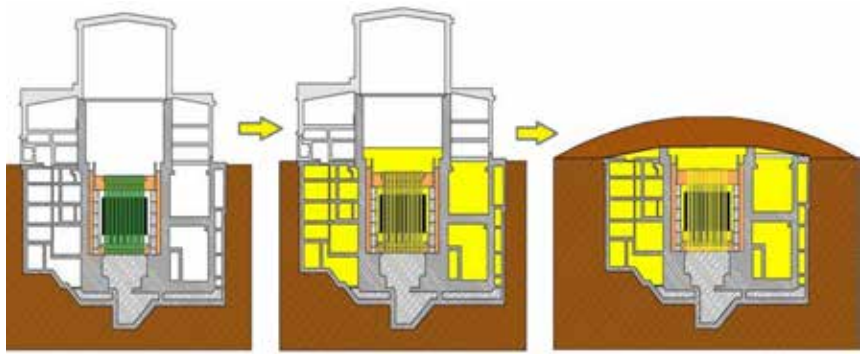
Website www.rosatom.ru

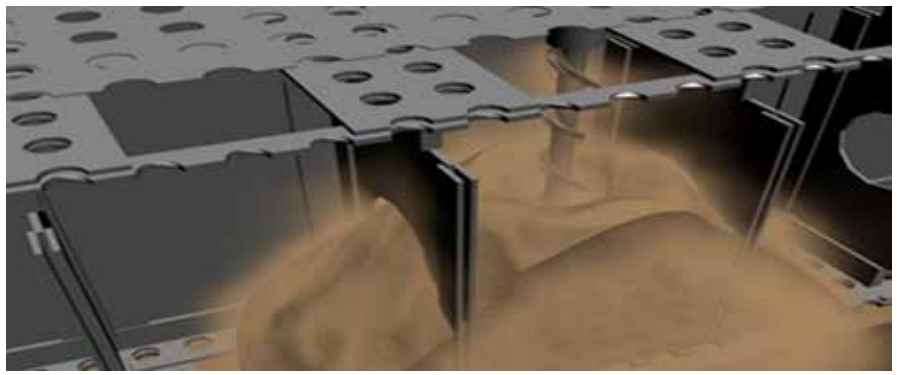
Perspective Ways of Irradiated Graphite Treatment

Many of the first-generation graphite-moderated reactors are now shut down, with more approaching the end of their lives. More than 250.000 tonnes of radioactive graphite («i-graphite») have now accumulated world-wide, 60.000 tonnes of which is located in Russian Federation.

The pilot project of the long-term storage facility for special radioactive waste was completed by "PDC UGR", JSC on the EI-2 production uranium-graphite nuclear reactor (PUGR) site in September 2015. PUGR decommissioning safety is ensured by reliable isolation of RW on the PUGR site, which provide radiation safety of the personnel, public and environment for the whole period of the RW potential hazardousness.

Since 2016 JSC "PDC UGR" performs research work on the development of innovative methods of irradiated graphite treatment. The talk presents the projects in the following perspective areas: development of dismantling technology of the graphite stack during the decommissioning of UGR; justification, experimental verification capabilities and the development of technology for the treatment of graphite stack elements for reducing of the RW class; development method for producing a highly durable compound containing irradiated graphite by isostatic hot pressing in an inert atmosphere. For the approbation of technical solutions is supposed to use as graphite of industry reactors and after studying the graphite of power reactors.





SPEAKER

MONDAY 17:30 EN

Dr. Martin Hornáček

Company Slovak University of Technology in Bratislava
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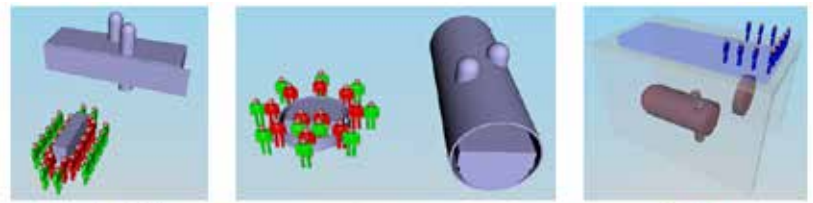
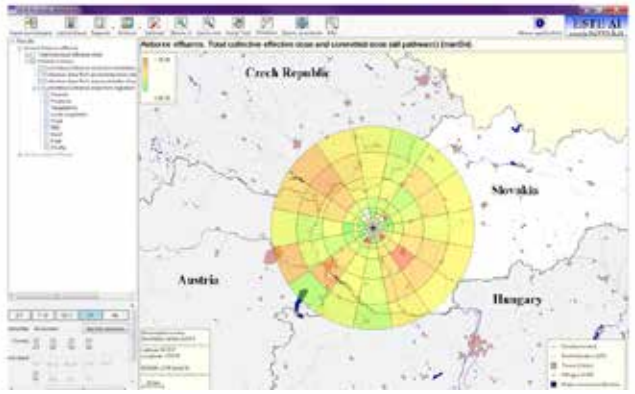
The Radiation Impact of Steam Generator Dismantling on the Workers, Public and Environment

The decommissioning of nuclear power plants involves the dismantling of large components (activated or contaminated parts, e.g. steam generator). The essential prerequisite for planning of this process is the knowledge of the radiation situation. This requires the definition of extensive sets of data (activity of the parts and nuclide composition, cutting possibilities, site specific conditions as well as management strategy of the resulting radioactive waste). The result is the creation of possible dismantling scenarios. However, the input data such as nuclide composition and activity content often vary. From this reason the calculation methodology (minimizing the uncertainties of the input data) was developed. The methodology was applied in the case of steam generator used in Slovak nuclear power plant V1 in Jaslovské Bohunice. This power plant used VVER-440 reactor (Russian type of pressurised water reactor) and was shut-down after 28 years of standard operation. Currently the 2nd and final decommissioning stage is ongoing (duration period from 2015 to 2025). The results of the calculations show that the maximal total collective effective dose of the workers is at the order of hundreds of man mSv. However, this can be significantly reduced by application of remote dismantling techniques or by pre-dismantling decontamination. In the case of the radiation impact on the public and environment the maximal individual effective dose is at the order of tenths of nSv. The conservative assumptions in all the calculations ensure that in the real case the calculated values will not be exceeded. Moreover, the developed methodology can be used not only within the current decommissioning project of nuclear power plant V1 in Jaslovské Bohunice but also in the case of similar operating or shut-down VVER reactors in Armenia, Bulgaria, Czech republic, Finland, Germany, Hungary, Russia and Ukraine where the dismantling of steam generators will become also a topical issue.





SPEAKER

TUESDAY 13:45 D

Hartmut Gaßner

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Responsibility, Safety and Certainty – A New Consensus on Nuclear Waste Disposal

The Federal Government appointed a commission tasked with reviewing financing for the nuclear energy phase-out which submitted their final report on April 27, 2016:

- The government shall be assigned the tasks of intermediate storage, creating containers of waste from reprocessing for final storage as well as transport from intermediate storage to the final repository. The funds necessary for securing financing, EUR 4.7 billion plus a risk surcharge, are also to be transferred to the government.
- Funds for selection, construction, operation and decommissioning of final repositories for nuclear waste will also be transferred to the government. This will amount to EUR 12.5 billion, plus a risk surcharge.
- Accordingly, EUR 17.2 billion are to be transferred. The risk surcharge of around 35% will close the gap between provisions and actual costs.
- This total financing amount of EUR 23.3 billion is to be paid into a new public fund. As operators progressively pay off the risk surcharge they will be released from liability.
- On the other hand, unlimited liability for dismantling, decommissioning and packaging still remains with the companies, as well as the opportunity for cost savings; the Act on extended liability for dismantling and disposal expenses will need to be amended to secure claims from this liability. Financial reporting of remaining provisions and those yet to be created should be more transparent, and consequently easier to verify. Officials should be granted the right to obtain information.
- Furthermore, the Commission recommends discarding the previous option between safe enclosure and immediate dismantling, and instead making immediate dismantling mandatory. Additionally, the Federal Government and the Länder should ensure that approvals for decommissioning and dismantling are granted more quickly and efficiently.
- Finally, the Commission recommends that nuclear power plant operators drop their claims in connection with nuclear waste disposal.

SPEAKER

TUESDAY 14:15 EN

Jiří Šuráň

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Decommissioning Costs Reduction due to Novel Clearance Measurement System for Industrial Applications

The European Metrology Research Program is jointly supported by the European Commission through Article 169 of the European Treaty and the participating countries within the European Association of National Metrology Institutes (EURAMET). Europe is facing an immediate and major challenge: the enormous costs of decommissioning many old nuclear facilities. A significant reduction in the enormous decommissioning costs by development and implementation of new measurement techniques is necessary. The ongoing Metrology for Decommissioning Nuclear Facilities (MetroDecom) project delivers research addressing many aspects of the decommissioning process. The paper describes novel waste pre-selection and free release measurement system distinguished by significantly improved throughput, accuracy, modularity, mobility and unique lead-free shielding. In contrast to existing conservative strategies and systems with high uncertainties of measurement new technology facilitates to discriminate between various waste categories precisely and rapidly with positive economic impacts.

Industrial uptake and exploitation of the system enables operators to decrease mass of solid waste materials incorrectly sent to repositories (including recyclable) thus reduce the disposal costs by about 10%. For the decommissioning of a single nuclear power plant it would lead to millions of Euros of savings. Typical cost of very low level waste (VLLW) and low level waste (LLW) repository space is about € 500/m3 to € 10,000/m3. Decommissioning of Germany's power plant at Greifswald produced more than half a million tons of VLLW and LLW.

The MetroDecom project brings an opportunity for growing European decommissioning industry to improve the management of wastes generated during decommissioning, that can be released into the environment or safely consigned. Underpinned by innovative metrology, nuclear facilities decommissioning will be more safe and cost-effective.

SPEAKER

TUESDAY 14:45 D

Jan Cornelis Homan

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Decommissioning and Future Developments

PreussenElektra is the biggest Nuclear Power Producer in Germany with approximately 40 % of the total installed German nuclear capacity.

At the beginning of 2016 the „Decommissioning and Dismantling" organizational unit was set up with the goal to steer the shutdown plants and prepare the operating units for all the activities in the decommissioning and dismantling phase, starting from post operation until so called "Green Field" (Grüne Wiese).

An update shall be given on the main principles of governance and organizational design, including installed steering and reporting mechanisms.

Furthermore, future expectations shall be shared on upcoming basic conditions and sector developments, assessing the impact of KFK.

SPEAKER

TUESDAY 16:00 EN

Magnus Oskarsson

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Nuclear Power Plant Decommissioning in Sweden

Of Sweden's thirteen nuclear power plants seven reactors are scheduled to be decommissioned during the period 2017-2030; two BWR units in Barsebäck, two BWR units in Oskarshamn, one BWR and one PWR unit in Ringhals and one pressurised heavy water reactor (PHWR) in Ågesta.
The two units in Barsebäck were permanently shut down in 1999 and 2005 respectively, according to political decisions. In Oskarshamn 2 is non-operational since 2013 and will not be restarted. For Oskarshamn 1 the owners has announced that it will be permanently shut down in the summer of 2017. Final shut down of Ringhals 1 and 2 is planned for 2020 and 2019 respectively. The PHWR in Ågesta was permanently shut down 1974 after 10 years of operation.
Decommissioning projects have been started at respectively site for preparation and planning. Some strategic issues will have common national solution whilst other will be more adopted for the respective site.
The national repository for low- and intermediate short lived decommissioning waste in Forsmark (SFR) will most likely not be in operation before the late 2020s, therefore interim storage of waste will be required. The design of the extended SFR will put limits on the strategic choices (such as segmented or hole RPV). The handling of large components is of common national interest. Conventional and very low level waste (VLLW) should also be handled similar.
In the presentation an overview of the decommissioning challenges as well as present planning assumptions and objectives will be given.

SPEAKER WEDNESDAY 09:00 EN

Dr. Jörg Kaulard

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Uwe Dannwolf

RiskCom GmbH
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www.riskcom.de

Risk Management of the Decommissioning - Status Quo and International Developments

Risk management is a well accepted and well developed approach to identify and assess risks and opportunities which jeopardize or improve the success of a project. For large conventional industrial projects risk managenent is an inherent part of the project management whereas risk management for decommissioning projects is recently gaining more interest and importance. Due to the fact that the financial resources for decommissioning of nuclear installations and the disposal of radioactive wastes are limited, the need to control risks is extremely important. Further specific risk drivers in decommissioning projects are e.g. that the timeframe for active decommissioning takes often years after cost estimate is made and that there are significant uncertainties especially at earlier stage of plant operation.

This contribution to the 2016 ICOND provides an approach for managing risks in decommissioning projects. It summarizes the core of a risk management process and explains key aspects and challenges when successfully applying risk management. It provides insights in experiences with risk management for decommissioning projects and completes with an overview on recent international developments in risk management specific to decommissioning and decommissioning cost estimates.

SPEAKER WEDNESDAY 09:30 EN

Peter Walkden

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Reactor Decommissioning - What are the Organisational Characteristics?

International experience indicates that the technical, behavioural and organisational requirements of Reactor Operations and Decommissioning are very different. Reactor Operations is a process and is concerned about stability, predictability, continuous improvement and generating electricity within an established regulatory framework. During Operations, successful utilities rely upon a highly trained indigenous workforce, who define and control the use of specialist contractor input.

Decommissioning is a "one off" project (or programme) with a clear start and finish and a finite budget. Whereas it draws on operational plant history, success depends upon achieving clear goals and objectives, establishing a culture of change and learning from experience, both from other projects (on-site, nationally and internationally) and by making extensive use of specialist contractors experienced in these activities.

There is a growing recognition that all transitions, including those to Defueling and Decommissioning pose common threats. Experience shows that appropriately resourced transition plans help to reduce these threats and maintain both performance and safety culture during major organisational changes. Transition Planning allows both urgent operational and important restructuring tasks to be performed safely, professionally and effectively.

This presentation compares the organisational characteristics of Reactor Decommissioning to those for Reactor Operations and concludes that international best practice indicates that successful decommissioning and clean-up programmes exhibit the following behavioural and organisational characteristics:

- Strong, Visible Leadership;
- An absolute commitment to Safety;
- A focus on a well-communicated Mission and Strategy;
- A culture of Life-Time Planning;
- A strong Programme/Project Management culture;
- Sustainable Human Resources and Supply Chain Strategies;
- Investment in Transition Planning to deliver major transitions.

SPEAKER

WEDNESDAY 10:00 EN

Vincent Massaut

Company SCK•CEN Belgian Nuclear Research Center
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2400 Mol - Belgium

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The Origin of Dismantling Technologies: The BR3-PWR Project - Past Development and Present Situation

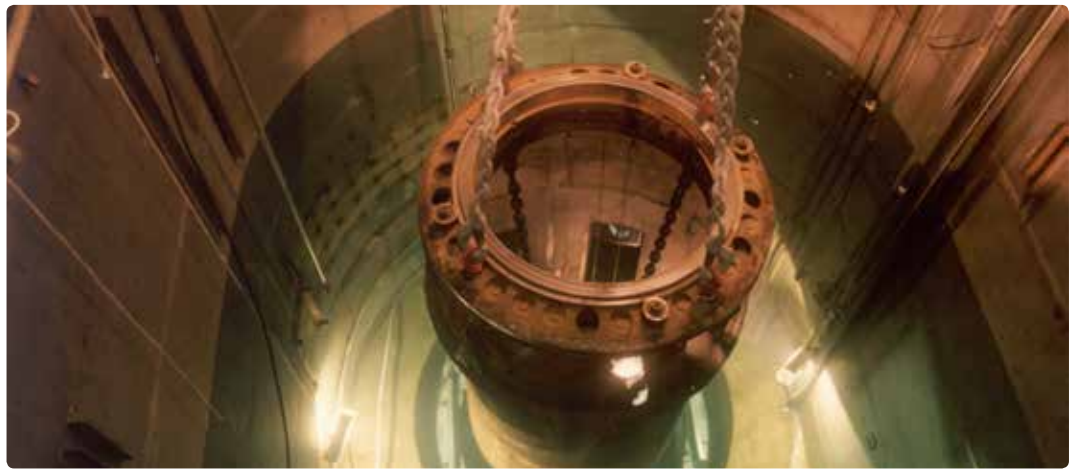
The BR3 project was selected in 1989 as European pilot decommissioning project within the European RTD framework programme. This pilot project concerned the decontamination and dismantling of a pilot PWR plant, the first one built outside of the US. Several techniques of dismantling (and decontamination) were then developped and tested in real scale on actual active materials, representative of future commercial NPP dismantling. Plasma arc cutting, Electric Discharge machining, underwater milling and sawing, high pressure water jet cutting, underwater bandsawing (the first bandsaw ever put under water), etc... were used for dismantling two sets of reactor internals and the reactor pressure vessel. At the same time the main principles of dismantling and the waste and material management were set up for dealing with the large amount of material to be treated for decommissioning a nuclear power plant.

The lecture will show the large experience acquired in various cutting technologies and waste/material management as well as the specific radioprotection and safety aspects attached to decommissioning activities. Most of the techniques and processes developped at that time are still applied today in commercial plants decommissioning.

The BR3 team continues developping tools and techniques for the complete decommissioning of plants, including software for the follow up of materials and radwaste, methods to deal with contaminated and activated concrete, process and principles to completely free release installations and partial facilities, etc.

The very long and broad experience of the team is now used in several decommissioning projects for advising the operators, for preparing the decommissioning plan, for installing the Quality Assurance in the material management, and several other topics.

The team is at your disposal for further developments or for helping you preparing or performing a decommissioning in the safest and most economic way.



SPEAKER

WEDNESDAY 11:00 EN

Bernhard Haist

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Experiences in Decommissioning by Remote Handling

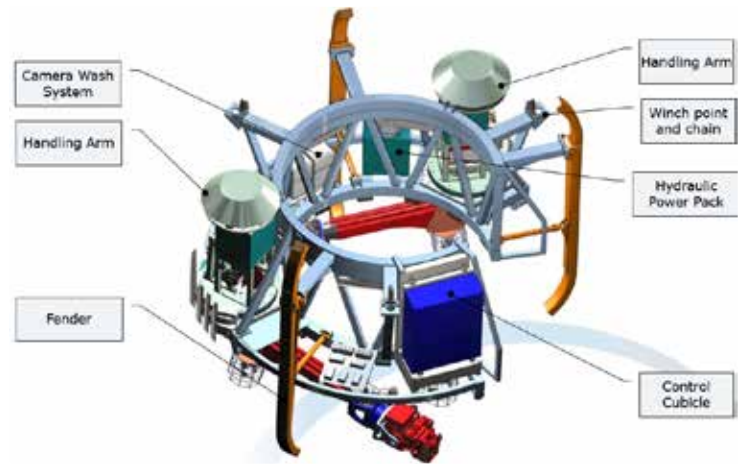
Oxford Technologies was established in 2000 as a spin-off from the remote handling group at JET (Joint European Torus), a thermo-nuclear fusion research project based in Culham, Oxfordshire. As of 2015 Oxford Technologies Ltd forms part of Kurion Inc and of Veolia plc.
In the recent years Oxford Technologies has undertaken design & build projects for decommissioning of legacy burdens within the nuclear fission community.

Two of these projects are briefly introduced, namely the Shaft Intervention Platform (SIP) at Dounreay, and the Sort Segregate Consolidate & Condition (SSCC) facility at Sellafield.

The Shaft Intervention Platform (SIP) at Dounreay is a trolley system which can be driven over a waste shaft at Dounreay, and can lower a C-shaped platform into the shaft to a depth of 65 meters to assist the main waste retrieval system, a central petal grab crane. There are two articulated arms at the underside of the platform, which have a tool changer at their wrist, so as to deploy different tools, to assist in various operations, including retrieval of a failed petal grab. The SIP is remotely controlled via camera feedback, is water washable and radiation hard up to a contact dose rate of a few Gray.

The SIP is also tasked with removing waste and sludge from the 18 m 'stub tunnel' near the base of the shaft using the SIP 'Arms' and remote deployment of a high pressure wash hose.

The Sort Segregate Consolidate & Condition (SSCC) facility at Sellafield is a platform which allows up to six underwater skips to be located for sorting waste from donor skips into receiving skips, in an outdoor pond at Sellafield. An X-Y mechanism above the pond surface positions a telescopic mast with a wrist and gripper, to allow manipulation of waste within and between the skips. The SSCC is remotely controlled via camera feedback, is made of stainless steel, is waterproof and radiation hard up to a contact dose rate of a few Gray.



SPEAKER

WEDNESDAY 11:30 EN

Peter Berben

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76185 Karlsruhe - Germany

Website www.tecnubel.be

Remotely Handled Waste Reconditioning at ENGIE Electrabel

Due to the Belgian regulatory context, the utility ENGIE Electrabel, which operates NPPs at Doel and Tihange, is currently storing radioactive waste (RAW) on Site as a temporary solution. At a certain moment, waste reconditioning was necessary in order to optimize storage capacity.

After having analysed the problem, reconditioning bulk RAW with dose rates above 2mSv/h turned out to be the most effective solution. In detail, two measures were identified:

1. separate hot spots from the intended bulk material in order to reduce the waste volume above 2 mSv/h

2. compress filters to condense the waste volume

The purpose was twofold: first, gain storage capacity and second, limit the volume of more expensive intermediate level waste. Tecnubel was asked to study, implement and execute the operations, which had to be conducted remotely to limit workers dose.

In a tent confinement, a remotely controlled double arm Electrical Master-Slave Manipulator was installed, pending on a moving crane, next to a mobile 100 ton press for compaction. Multiple tools and measurement detectors were available to perform the job.

This project became so successful, obtaining an average of 50% volume reduction, that it was converted into a recurrent project: RAW volume optimization projects are now executed on a yearly basis. They take approximately 6 weeks, mounting the equipment, the operations and dismounting, decontamination included.

The equipment is all modular and compact, and thus easily transportable. This project shows you the capabilities of Tecnubel to develop tailor-made solutions, in a close relationship with the plant operator. During the engineering phase of the project, the utility provided all the input and support required to study possible solutions while during the execution phase radioprotection and maintenance services were delivered by plant's staff.

SPEAKER

WEDNESDAY 12:00 D

Gunnar Heinzler

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91052 Erlangen - Germany

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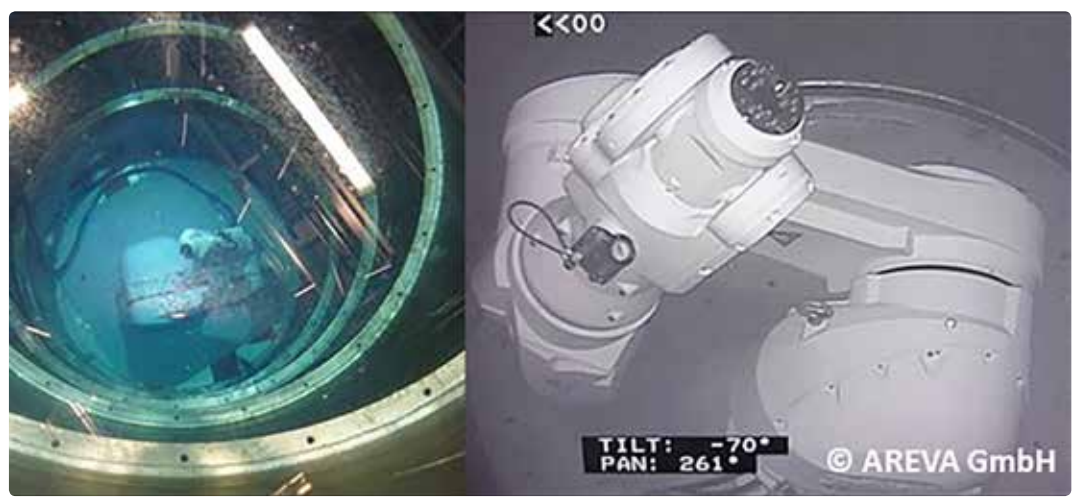
Applications of Underwater-Robotics in Nuclear Power Plants

Cutting and packing of the reactor pressure vessel (RPV) is one important step during decommissioning of nuclear power plants. The RPV and its internals are radiological activated caused by the long standing neutron flux.

In particular the internals which – amongst others – retained the fuel assemblies have to be cut and packed under water due to their high radiological activity. In the past this was largely done manually using remote handled tools (such as rods, grippers and cranes). The operation of the remote handled tools is time consuming and enables access to the respective parts by one direction only. Therefore, it is the objective of the research project to develop (semi-) automate underwater robot for the frequently repeated activities.

This joint research project is sponsored by the German Federal Ministry of Education and Research (BMBF). It is executed together with Fraunhofer IWU – Projektgruppe Ressourceneffiziente Mechatronische Verarbeitungsmaschinen (RMV). The project AZURo started in 2012 and finished 2016.

There are demonstrated benefits of advanced robotics and development challenges. Further, the field testing (separation of core internals) incl. Impressions is described.



SPEAKER

WEDNESDAY 13:30 D

Ulrich Hess

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Selective Removal of High Reinforced Concrete Structures

During dismantling of nuclear power plants, decontamination of the building structure can be achieved by removing only a small portion of the total mass. Afterwards the remaining part of the building structure can be forwarded to the recycling loop. This procedure has high potential to decrease the amount of material to be disposed and so reduce the project costs. A central challenge in this context is the identification of the contaminated areas and the required locally restricted removal of reinforced concrete. Therefore, the aim of the presented research is the development of a removal system which can cut reinforced concrete up to a depth of 30 cm and remove installations like pipes or anchor plates. Based on these requirements a milling drum has been designed, which combines two different cutting techniques. The removal of concrete is undertaken by impact milling cutters made of steel with carbide-strengthened tips. The removal of steel is processed with a dry milling process using tungsten carbide inserts as cutting material.

Because there is no knowledge of the tool behavior during machining of reinforced concrete, the presented research investigates the design of the dry milling process for the application in dismantling of nuclear facilities. At first the process behavior of the milling tools is investigated in laboratory tests. For this purpose, process forces and tool wear of carbide grades are measured during the machining of reinforced concrete. With the knowledge of the process forces, the stiffness and needed power supply of the cutting system can be determined. Further on, the resulting tool wear for different process settings can be used to select suitable tungsten carbide properties and process parameters for a certain composition of steel and concrete. The generated information about process behavior and requirements regarding the mechanical design of the milling drum are used to build a test rig, to validate the construction and tool behavior.

SPEAKER

WEDNESDAY 14:00 D

Franz-Josef Grouls

Company Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH
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Experiences from the Dismantling of the AVR Biological Shield

In the frame of the AVR decommissioning project a major milestone was reached in 2014: the removal of the reactor vessel from the plant. The reactor vessel weighing approximately 2000 Mg was removed in one piece and transported to a dedicated interim storage.

In order to be able to lift out the reactor vessel it was necessary to make an opening, 21 m high and 8 m wide, in the 1,5 m thick cylindrical biological shield. During the power operation phase the biological shield fulfilled its function as radiation protection.

The transport opening was made with wire saw technique. A wire with diamonds cut the concrete including the rebars in pieces suitable for handling. In total 780 Mg in 41 pieces were removed.

This contribution presents the technical procedure and all necessary tasks and necessary supporting activities.

SPEAKER

WEDNESDAY 14:30 D

Werner Süßdorf

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Experience Gained from MZFR Concrete Demolition

The MZFR (Multi-purpose Research Reactor) was a pressurized water reactor cooled and moderated with heavy water. It was operated as an experimental reactor facility of 57 MW electric power output from 1965 to 1984. During operation time, vast experience was gained from the operation of heavy-water reactor systems. After shut down and defueling up to 1987, the MZFR has been under decommissioning. The MZFR decommissioning concept envisages dismantling of the plant in eight steps under separate decommissioning licenses that have already been granted. In late 1998, the primary system as well as the auxiliary systems were disassembled. The seventh step of remote dismantling of the reactor pressure vessel with internals was completed in 2007. Work relating to step eight, dismantling of the activated part of the biological shield, decontamination, and release measurement of the plant as well as demolition of the buildings, will be followed by subsequent release measurement of the site. All former operation systems have already been disassembled and, if necessary, replaced by adapted systems. For instance, the old ventilation facility was replaced by several decentralized ventilation systems. Some buildings have already been demolished. In the remaining buildings, preparatory work is being carried out for demolition. Current activities cover extensive decontamination and in particular the removal and dismantling of activated and contaminated concrete structures. Dismantling of the activated concrete of the biological shield and of tritium-contaminated concrete structures requires various types of complex sawing and drilling methods. Sometimes, replacement measures are taken to maintain static stability. The methods used for this purpose are determined by the structural and radiological framework conditions encountered in the different plant areas. By way of numerous examples, the experience gained will be presented.

SPEAKER

WEDNESDAY 15:30 D

Dr. Walter Dormagen

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Pollutant Management in Nuclear Decommissioning

In Germany, over 30 nuclear power plants were put into operation between 1962 and 1989. This implies that the construction of these power plants falls within the period, where technically excellent products were installed, however nowadays are largely banned due to their harmful effects. Typical examples include asbestos, whose use was widespread because of its high heat resistance in plants as well as PCB, which is thermally stable, flame-resistant and electrically non-conductive and therefore outstandingly suitable as insulating oil in capacitors. Today, looking at the decommissioning of nuclear power plants, special attention must be put on those pollutants.

Typically, these materials must be removed and disposed correctly before the general decommissioning of the nuclear power plant.

This is where the approach of pollution management is established, as it includes the complete expert's services from recording and documenting the contaminant deposits, compiling the remediation plans and specifications to finally approving the measurements after successful restructuring. The particular challenge in dismantling nuclear power plants is to maintain an overview in a complex technical environment and to develop viable and economically feasible remediation approaches. TÜV Rheinland and its experts have over 25 years of experience and knowledge in all aspects of pollution management, acquired during numerous projects in industrial plants and nuclear power plants.

SPEAKER

WEDNESDAY 16:00 D

Thomas Wellmann

Company Environmental Resources Management GmbH
Dülkenstrasse 9
51143 Köln - Germany

Website www.erm.com

Planning & Monitoring of Demolition Work in Terms of Occupational Safety

In the course of the agreed exit from nuclear and fossil-fuel energy, several nuclear power plants will have to be decommissioned and demolished, especially in Germany.

After the end of the power generating operation, the removal of nuclear fuel elements and the release from the Atomic Energy Act, the phase of conventional demolition completes the tiered decommissioning process. This final phase comprises conventional demolition activities, disposal of waste and recycling of the mineral building materials of all structures above and below ground level. For the nuclear power plants in Germany, the conventional demolition phase is currently estimated to take approximately five to ten years. In the case of a pressurized-water reactor with a performance of 1,500 MW and a supervised in-plant area of approx. 350.000 m², up to 400.000 m³ of mineral building material will have to be handled.

Due to this fact, conventional demolition plays a significant role within the entire decommissioning and demolition process of nuclear power plants.

Conventional demolition work is usually categorized as high-risk activity in the construction business. Occupational accidents, damages to property caused by insufficient preparation of the demolition work and occupational health and safety measures during the conventional demolition phase generally lead to considerable delays and corresponding cost increases. Today's presentation "Planning & Monitoring of Demolition Work in Terms of Occupational Safety" will focus on the fundamental aspects of occupational safety during the planning and implementation phase of conventional demolition. We will discuss both the owner's and the demolition company's duties, requirements and responsibilities according to the Construction Site Ordinance and the Hazardous Materials Regulation. It will finally be presented, how a proper risk assessment helps to eliminate uncertainties in cost projections, in the schedule or with respect to legal risk exposure.

SPEAKER

WEDNESDAY 16:30 D

Claus Schweinheim

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Ventilation Concepts for Different Phases During Decommissioning of Nuclear Facilities

Negative pressure cascades and filtering of exhaust air by means of HEPA filters are mandatory also during decommissioning of nuclear facilities. The installed operating ventilation system is not designed and suitable for this task.

In supplement of the operating ventilation system, additional ventilation systems have to be installed and put into operation. Due to the high proportion of chips and plasma dust in the air during disassembly and shredding of the contaminated equipment, special precautions such as separation of chips, use of re-cleanable filter systems and discharge systems for swarf, dust and aerosols must be taken.

Also the dismantling of the building structures made of concrete and steel results in high concentrations of dust. Temporary extraction devices in addition and supplementary to the installed ventilation system will be used. A temporary protective tent will be installed at each workplace, and by means of a re-cleanable HEPA filter system a negative pressure inside the tent and a directed airflow into the tent will be maintained.

For decommissioning of the operating ventilation system an external ventilation system, consisting of control console, pre- and HEPA - filtration including lock and decontamination shower, high performance centrifugal fan, activity monitoring and vent stack, will be installed and put into operation. This ensures further both a directed air flow into the building and filtering of exhaust air. This substitute ventilation system is preferably installed outside the building as a stand-alone solution.

When using external ventilation systems, supply air flows untreated into the building. Due to the natural moisture content of the air and the temperature of the building structures, this results in significant condensation causing contamination spreading and mould growth. Hence the use of desiccant dehumidifiers is technically and economically sensible.

SPEAKER

THURSDAY 09:00 EN

Dr. Gianluca Simone

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Website www.nucleco.it

Waste Management Strategies in 35 Years Nucleco Experience

Since 1980s in Italy the decommissiong of the NPPs and in general the management of radioactive waste is one of most concerning issue. In order to carefully face this issue, during the years Nucleco has developed stategies and methodologies with the main goal to ensure the highest level of safety and reliability in all the processes concerning the management of radioactive waste.

A deep knowledge of the aspects concerning the radioactive waste management has been earned thanks to a continuos research and collaboration with the Authorities and to the vast experience gained. In every situation faced, like the transport of the radioactive waste, their treatment (e.g. dismantling of systems, volume reduction by means of plasma torch, supercompaction of drums and cementification) and their radiological characterization (by means of both non-destructive and destructive methods), Nucleco has always designed and carried out efficient procedures approved by the Authorities.

Some of these aspects are presented and discussed in order to show how far Nucleco has gone in the management of radioactive waste, a relatively new field for some Countries in the EU.

SPEAKER

THURSDAY 09:30 D

Dr. Thorsten Schliephake

Company GNS Gesellschaft für Nuklear Service mbH
Frohnhauser Straße 67
45127 Essen - Germany

Website www.gns.de

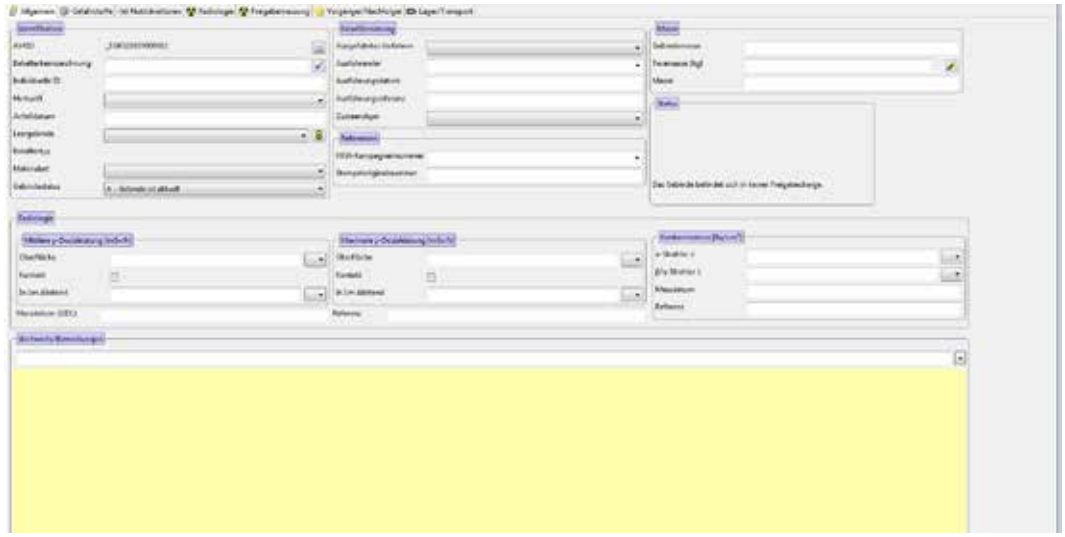
RVR: Residue Tracking for Decommissioning

For more than 25 years GNS has been developing the Waste Tracking and Documentation System (AVK: Abfallfluss-Verfolgungs- und Produkt-Kontrollsystem) as a comprehensive software for tracking radiological waste according to §73 StrlSchV (German Radiation Protection Ordinance), which is used by all the nuclear power plants of the German utilities.

Filling the gap for residue which can be released, GNS provides a new, completive tool: Residue Tracking during Decommissioning (RVR: Reststoffverfolgung im Rückbau). RVR maps all relevant processes during the lifetime of the residue including generation, characterization, processing, relocation, documentation, clearance measurement, and the release of the residue according to §29 StrlSchV to the circular economy after clearance measurements and final transport to a conventional landfill.

RVR consists of two elements - the main module and the input module. The main module is used for planning whilethe RVR input module allows staff without detailed knowledge of the whole RVR system to easily enter the values needed for a quick ascertainment of the residue. RVR uses properties of the predecessor residue to anticipate those of the successor simplifying data acquisition. Generation of the release documentary is supported by RVR. As well the calculation of radioactive decay is accredited by the German responsible authorities. RVR supports checks against legal release limits, radiological analysis, circular empty cask cycles, multiple QR or barcode ID methods, scanner support for data acquisition and data imports from radiation detectors. A full 3D rendered storage facility including drag & drop relocation gives access to the information to the properties of the packages.

RVR is currently in use as a pilot scheme in a German NPP and undergoing final adaptations. Additional modifications to fulfil individual customers' needs can be implemented on request.



SPEAKER

THURSDAY 10:00 D

Dr. Marina Sokcic-Kostic

Company NUKEM Technologies Engineering Services GmbH
Industriestr. 13
63755 Alzenau - Germany

Website www.nukemtechnologies.de

Methods and Techniques to Analyse Burn-up and Defects of Nuclear Fuel Elements of the Reactor Core

Nuclear fuel elements are constructed to give a safe confinement for the nuclear fuel, radioactive fission products, actinides and activation products. The confinement must be given not only during the operation phase of a nuclear reactor but also later during the final storage until all radioactive isotopes are decayed to an acceptable level.

For this reason it is necessary to check the fuel elements during the reactor operation and after this in respect to the contained fissile material as well as to the confinement. In case that damaged fuel rods (sub-elements of the fuel elements) has been found, they have to be separated, repaired – if possible – or they must be safely enclosed for final deposition. Outside Germany it is also possible to recycle the fissile material of a defect rod in a reprocessing plant.

The method for measurement of the fuel elements includes neutron measurement techniques as well as leak tests for radioactive gaseous isotopes. The challenge of the tests is the very high radiation level of the elements requiring remote operated measurement equipment. Most of the measurements are performed in the reactor pond or, whenever possible, in the fuel element storage pool which is available at nearly all nuclear reactor sites and equipped for the handling of fuel elements. The advantage of the storage pool is the possibility to separate the fuel element under inspection from the other fuel elements.

SPEAKER

THURSDAY 11:00 EN

Dr. André Wakker

Company NRG
Westerduinweg 3
1755 LE Petten - The Netherlands

Website www.nrg.eu

Facing the Waste Management Challenge: The Role of NRG (the Netherlands)

The waste management landscape, with ever increasing needs for safe and cost effective decommissioning and waste storage solutions, is challenging. Projects often take too long, cost more, and or more complex than initially thought. Contracts with fuzzy end-states for radioactive waste, and superficial or incomplete characterization strategies, are not exceptional. And political or regulatory hassle doesn't help either.

We at NRG asked ourselves, do want to be part of the problem, or part of the solution? We chose the latter. Time for action! Join our session to learn:

- how NRG takes responsibility and mobilizes its expertise, experience and unique infrastructure towards facing the waste management challenge.
- how NRG works together with international partners.
- how NRG dismantles activated parts and components from reactor internals and characterizes them following stringent waste acceptance criteria.
- how NRG exploits its unique infrastructure at the Petten-site as a "hub" to reduce volume and footprint of low and intermediate active wastes.
- how NRG manages a complex historical waste inventory with an innovative characterization and sorting approach.

SPEAKER

THURSDAY 12:15 D

Richard Poisson

Company ANDRA - National Agency for Radioactive Waste Management
1-7 rue Jean Monnet
92248 Chatenay Malabry - France

Website www.andra.fr

Waste Management in France – Strategies & Financing

Waste management in France is structured mainly around the traditional 3 actors that are the French Safety Authority, the Waste producers and the Waste Manager Andra. The waste management strategy is then implemented nationally via two important tools that are the National Inventory of Radioactive waste (produced under the responsibility of the Waste Manager) and the associated Waste Management plan (produced by a high level working group directly managed by Government and the French Safety Authority). Both are updated every three years.

For the implementation of this strategy, and for waste disposal, the waste manager is leading the following activities:

- The different ongoing projects existing for the disposal of certain categories of waste (Low Level Long Lived waste and High Level Waste). Currently two such projects are ongoing.
- The different operational centers dealing with the disposal of other categories of waste (Low Level Long Lived waste and Very Low Level Waste). Currently three such centers exist.

The financing of these projects and operational sites is specific with both financing via contracts and financing via legal mechanisms. The National Regulations are also specific according the classification of the waste to be managed.

COMPANY PROFILES

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AiNT
Aachen Institute for Nuclear Training

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heavy transport - next level!

Aug. Alborn

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 consultancy services 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.

heavy transport - next level

August Alborn 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.

Individual and economic solutions by the project processing in all areas, permanent call availability, careful planning and coordination accompanied with very short – term actions characterize our provision of service.

We also provide feasibility studies, detailed routes and time planning, route reconnaissance and obtain the necessary permits. This is achieved by 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 pay loads, mobile cranes and special equipment like our 1,440 to. hydraulic gantry.

Our new JMG mobile crane with max. capacity of 35 to. introduce the highest quality standards:

- the most powerful in compact size, the most precise and user friendly with the radio control,
- the most agile and safest among electric cranes.

The 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 125 years.

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SMARTER, SAFER, STRONGER

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BLASTRAC
THE INNOVATORS IN SURFACE PREPARATION

ALE is a Complete Solution Provider for Lifting, Transporting, Installing, Ballasting, Jacking and Weighing Large, Heavy Loads

With a global network of operating centres and a fleet of heavy cranes, specialist transport and installation equipment, ALE combines exceptional project management with engineering intelligence to offer worldwide transportation and lifting services to all industry sectors.

ALE's reputation for safety, precision and responsibility carries a great deal of weight in the nuclear power sector, and we are well equipped to support the increase in nuclear power generation.

Over the last 20 years, we have developed strong working relationships with key providers, supporting projects ranging from the replacement of steam generators and reactor heads to the design of systems for dismantling turbines and electrical generators. We provide engineering resource early in the planning process to produce necessary HSQE and nuclear safety documentation ahead of critical plant outages, minimising operational impact.

Although we prioritise risk and safety, we also champion innovative engineering. Manoeuvres can combine lifting, tilting, skidding and hydraulic turning, and this demands careful planning and faultless execution, with activity scheduled to coincide with planned stoppages to reduce disruption and downtime.

We can design bespoke lifting systems to fit within existing station designs – a skill which has won us recognition for our flexibility and multiple project awards. In addition, one AL.SK crane can be positioned in the centre of the site to install multiple pieces up to 5,000t, replacing individual cranes lifting smaller pieces at each reactor building. With a small footprint and extended radius, AL. SK cranes cause minimal impact and can be located inside the plant with no amends to infrastructure, or outside where they can operate offsite. With a capacity as high as this, clients can produce larger modules to minimise onsite construction.

The Innovators in Surface Preparation- Surface Preparation Machines and Accessories

Blastrac is the leading international developer and manufacturer of surface preparation equipment. We have a full range of over 50 different machines for preparing & maintaining floors and other surfaces of all kinds of materials. Our innovative techniques are developed in-house, on demand through our strong R&D Department. Our range of equipment includes:

Shot Blaster, Horizontal Steel Blasters, Vertical Steel Blaster, Scarifiers, Mullti-task Vehicles, Hand Held Equipment, Single Disc Floor Grinder, Floor Stripper, Dust Collectors. When looking at the use of our equipment we make a distinction between several industries. In these industries some of our machines have specific applications.

These industries are: Remediation, Industrial Flooring, Decorative Flooring, Airports Highways, Steel.

Blastrac Green Technology- Blastrac offers eco-friendly surface preparation solutions in several industries. Our machines don't use chemical substances or waste valuable drinking water. For a clean environment and future.

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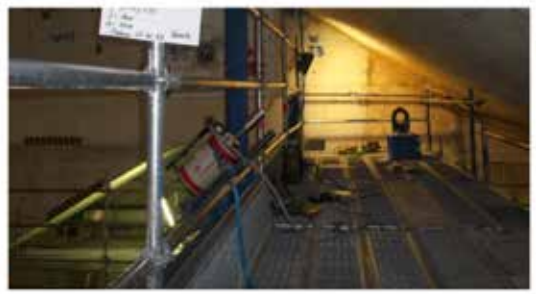
Brenk Systemplanung GmbH (BS)

BS has been active in the consultancy business for more than 35 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, decontamination, 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.



Environmental Resources Management (ERM) - The business of sustainability

Environmental Resources Management (ERM) is the world's leading provider of environmental, health and safety, risk and social consulting services with offices in the US, Europe, the Middle East, Asia, Australia and Latin America. We deliver innovative solutions for business and government clients, helping them understand and manage their impacts on the world around them. We have 160 offices in 40 countries with approximately 5,000 people serving clients globally. Our more than 40 year history, and extensive industry knowledge and truly global footprint enable us to deliver world class sustainable solutions.

We offer services across our client life cycles in five broad practice areas related to environmental, health, safety, risk, and social concerns: Transaction Services, Contaminated Site Management, Impact Assessment and Planning, Performance, Assurance and Risk Management, Product Sustainability Services and Sustainability and Climate Change. Among other services, ERM helps clients safely develop sustainable solutions to their contaminated land management challenges. We strive to achieve our client's technical goals for remediation while helping them to protect human health and ecology, satisfy their regulatory obligations, control costs and manage stakeholder expectations. Our global services include decommissioning, demolition and redevelopment strategies to help capture value from discontinued operations across the globe. Our skill sets combine remediation technology, risk assessment, financial and project management, regulatory negotiations and field services.

Our Contaminated Site Management Services are

- Decommissioning, Decontamination and Demolition (DDD) services
- Remediation Portfolio & Reserve Assessments
- Sustainable solutions, including “green” remediation
- Field Investigations
- Conceptual and Numeric Fate & Transport Modeling
- Human Health and Ecological Risk Assessments
- Remediation Engineering & Construction Management

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Radiological studies, modeling, calculations, nuclear equipments design for nuclear material and waste characterization.

KEP Nuclear engineering team helps customers to find a solution for nuclear waste and raw material characterization. Right characterization makes it possible to choose the right transportation and storage scenario. Our dedicated team is composed of engineers and researchers with a large background in nuclear industry, material management and research. KEP Nuclear is using recent and performant software tools (MCNPX 2.7.0, MCNP 6.1, TRIPOLI 4-9S). KEP Nuclear engineers are assisted by experts in thermic and nuclear measurements.

KEP Nuclear can conduct radiological, modeling and calculation studies, which led to summary and choice of techniques available and usable for the characterization of nuclear materials and wastes.
KEP Nuclear helps customers to design measurement station and delivers instruments (gamma spectroscopy, passive neutron counting and calorimetry) taking into account the particular specifications of the material itself and the nuclear environment (type and dimension of containers, amount and type of nuclear material to assay, high background level produced radio elements such as 137Cs).

KEP Nuclear expertise leads to the mastering of the NDA technics and the choice of the right equipment for instance:

- Collimator, rotating plate, horizontal translation system, removal screen for gamma spectrometer station,
- Calorimeter development or delivery of standard products,
- Neutron counting dimensioning.

In the case of existing measurement stations, optimization studies can also improve the performances and the accuracy.

KEP Nuclear has the mechanical skills to design automated measurement lines which can be coupled with several NDA methods and the mechanical system for the handling of the drums containing the nuclear material, the supervising and the safety checks all along the process. The measurement results from the different NDA measurements are integrated into the KEP Nuclear software which can be interfaced with the customer's operation system.

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The Biggest Thing We Move is Time

Mammoet helps clients improve construction efficiency and optimize the uptime of plants and installations. For that purpose, we provide solutions for lifting, transporting, installing and decommissioning large and heavy structures.

We believe our business is about time: uptime, turnaround time and time to market. To our customers, time is the currency that matters most. That's why we strive to bring their deadlines forward. It's an integrated, daily effort shared by everyone at Mammoet, in every aspect of our services: creative engineering, careful planning and safe delivery.

Our services are focused on the petrochemical and mining industries, civil engineering, power generation and offshore projects. The logistic challenges in these industries are growing daily. Factors such as remote locations, harsh climates and a strong emphasis on the environment are constantly driving us towards smarter and safer solutions. Mammoet's services in engineered heavy lifting and transport comprise:

- Heavy lifting
- Heavy transport
- Plant turnaround / shutdown management
- Sitewide construction
- Modular construction
- Factory-to-foundation / logistics
- Rapid response
- Relocation and decommissioning
- Trading in new and used equipment worldwide

For over two hundred years, we've been known for the unique capability of our state-of-the-art equipment. But it's the trust of our clients that has brought us where we are today. Their confidence inspires 5,000 Mammoet professionals to give it their all each day and truly make a difference in projects all over the world.

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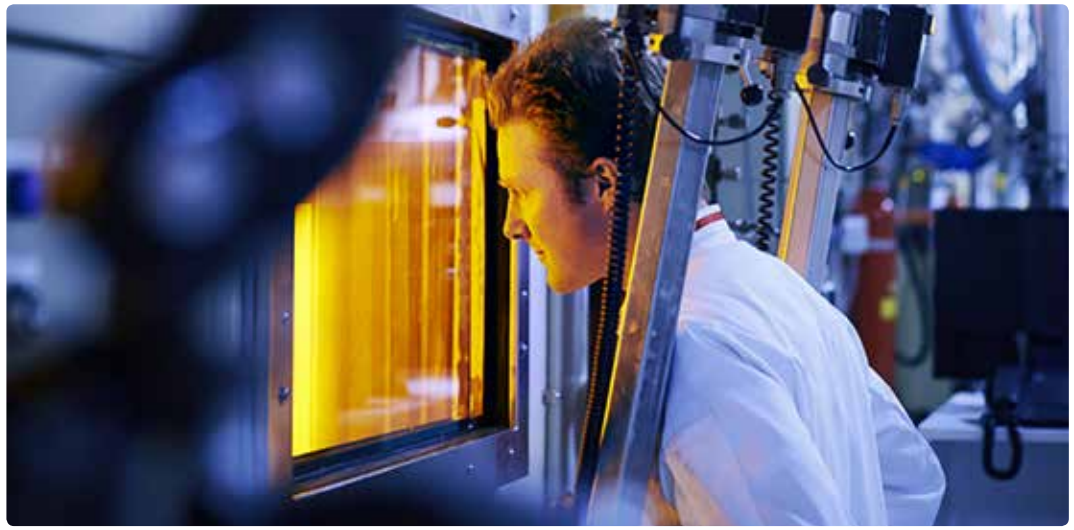
NRG Consultancy and Services (C&S)

NRG Consultancy and Services (C&S), based in the Netherlands, unites more than 60 years of nuclear engineering, research, and 24/7 operational reactor experience into one unique purpose: the safe, reliable and efficient utilization of nuclear technology. Mid-sized, with 125 highly qualified engineers and consultants, we deliver services and solutions in the areas of nuclear safety and licensing, asset integrity, fuel management, inspection services, decommissioning and waste management, and radiation protection.

We give customers and partners access to extensive experience and in-depth expertise. We have recognized, world class experts in various fields. We are independent from other service providers, utilities, or regulatory bodies. Being part of the larger NRG organization (circa 450 engineers, scientists, and operational staff), NRG's unique facilities in Petten (high flux reactor, hot cells, radiochemical laboratories, decontamination and waste treatment facility) and in Arnhem (mock up hall for inspections) are at our disposal.

We strive to be at the forefront, a visionary and innovator in the advancement of nuclear technology. We invest a significant amount of time and resources in research and development to continuously improve nuclear safety, to optimize the use of nuclear assets, and to reduce the nuclear footprint for next generations.

We are expanding our business on an international scale to become a driving force in an international network of innovative nuclear service providers, who jointly offer a broad scope of services in their markets and together establish a preferred supplier status.



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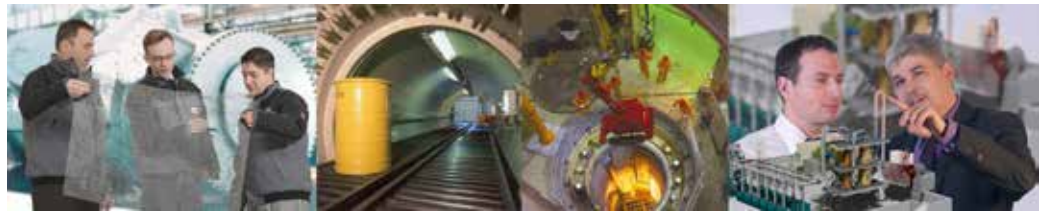
NUKEM Technologies - Your Partner for Nuclear Engineering Solutions

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

The company's engineers develop solutions that are both modern and proven effective. Furthermore, the solutions build upon NUKEMs 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 is based in Alzenau, Germany where also the majority of the more than 110 staff is working.

Consistent customer orientation and quality management are essential cornerstones of NUKEMs 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 NUKEMs 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.



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TECNUBEL
Your project needs our care

Alpha-tight housings and protective systems from PEDI ensure the personal and environmental safety during dismantling procedures.

Since more than 60 years, PEDI AG is a competent partner for the nuclear industry all over Europe. The company is specialized in developing, manufacturing and selling of protecting and shielding products for persons and environment. During the dismantling process of radioactive contaminated equipment, components or building structures, the use of tight housings or encasements is necessary, stopping the distribution of airborne particles and dust. For this purpose, PEDI uses flexible housing materials with high mechanical properties and certified for the use for alpha-tight encasements. A so called dismantling tent serves as a work place for cleaning or maintenance or dismantling activities. Particularly, it can be used for storage or handling of radioactive substances in solid, liquid or gaseous condition. The decontamination tent includes a solid frame structure and a flexible housing. The frame structure remains completely outside of the tent, so it remains free of contamination. The inner space of the housing is completely empty and easy to clean. The housing is permanently evacuated down to -200 Pa. After use, the tent housing will generate a minimum of waste in weight and volume.

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

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

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

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 activities in nuclear decommissioning, going from resource operations to engineered tailor made solutions.

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. In its further geographical expansion, Tecnubel GmbH was founded in 2016 with a first big project at WAK ongoing.

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.).

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TÜVRheinland®
Genau. Richtig.

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.

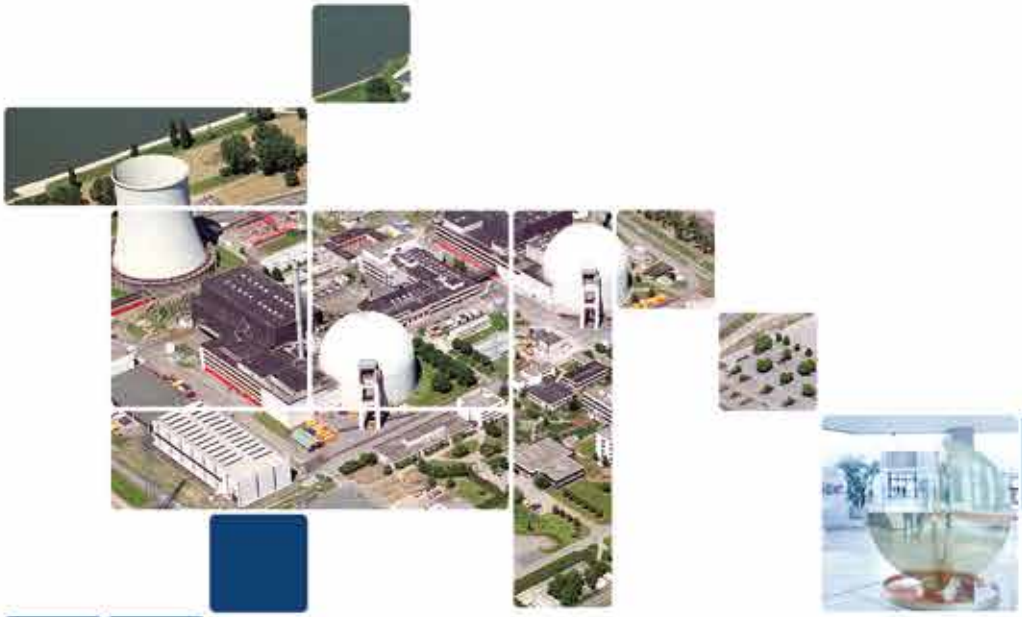
TÜV Rheinland helps companies to observe and comply with safety and quality standards while taking national and international regulations into consideration. Our customers benefit from expertise resulting from a wide range of national and international projects.

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	Products	On-Site-Services & Laboratory
• 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	• 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)	• 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)

NOTIZEN NOTES



www.icond.de

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