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LCC™

LWR Chemistry and Component Integrity Programme

The annual LCC Programme is focused on reactor coolant, secondary and ternary chemistry and material issues and open to nuclear utilities, manufacturers and vendors, research and engineering organisations as well as regulatory agencies. In the LCC19 Programme, currently 21 organisations in North America and Europe are members.

The Programme was started in 2004.

LCC Programme Content and Description

Nuclear utilities must reduce costs for operation, maintenance and fuel, keep the highest level of safety and lowest possible level of radiation exposure to employees and the public and minimize environmental impact of liquid and solid effluents and wastes.

Emphasis is put on safety, longer fuel cycles, higher burn up of fuel, increased fuel duty with more nucleate boiling in Pressurised Water Reactor (PWR's). Plant power up rates as well as more technical issues like Axial Offset Anomaly (AOA also called Crud Induced Power Shift/CIPS), Stress Corrosion Cracking (SCC) all point to the increased importance of high quality water chemistry and control and safe long term operation of the Nuclear Power Plants.

It is our goal that the LCC Programme shall assist the LCC Members in meeting all these water chemistry and material related challenges in the most efficient way. This Programme reviews and evaluates the developments and trends in the Light Water Reactor (LWR) primary coolant and secondary side chemistry and structural materials technology (excluding fuel materials). This is accomplished by identification of relevant information and a discussion of its significance for the Programme. The Programme reviews all relevant information through publications and international conferences and, when necessary, comments and background information are added.

Additional benefits for the LCC Members can be seen in that the Members gain an increased understanding of power plant water chemistry and material integrity to facilitate more efficient plant operation. Furthermore, the LCC Members can be assisted in the training and education of a new generation of chemistry and material experts in their organizations.



Customer Feedback:
Dr. Christoph Weber

Listen to Dr. Christoph Weber
BKW

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This video thumbnail features a portrait of Dr. Christoph Weber, a man with a grey beard and glasses, wearing a grey suit jacket. The background is a blurred office setting. The ANT INTERNATIONAL logo is in the top right corner. A yellow banner at the bottom contains the text 'Listen to Dr. Christoph Weber' and 'BKW'.



Customer Feedback:
Mr. Niels Van Dijke

Listen to Mr. Niels van Dijke
EPZ

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This video thumbnail features a portrait of Mr. Niels Van Dijke, a man with dark hair and glasses, wearing a patterned shirt. The background is a blurred office setting. The ANT INTERNATIONAL logo is in the top right corner. A yellow banner at the bottom contains the text 'Listen to Mr. Niels van Dijke' and 'EPZ'.

The overall objectives of the LCC Programme are to enable the LCC Member to:

Increase understanding of reactor water chemistry related to a successful plant operation and continued integrity of Reactor Coolant System (RCS) materials while keeping radiation exposure low

Learn from history to prevent "errors" causing components/materials failures.

Guide the plant operators to apply adequate PWR secondary side chemistry for safe, economical and environmentally friendly plant operation with high availability and without significant steam generator degradation or fouling problems or carbon steel Flow Accelerated Corrosion.

Improve plant operation and chemistry control and monitoring

Assist in the training and education of a new generation of chemistry and materials experts.

Establish an independent meeting point for experts to enable free and critical discussions and experience exchange

These objectives are met through critical review and evaluation of the most recent data related to reactor water and secondary side chemistry, identification of the most important new information, and discussion of its significance in relation to water chemistry now and in the future.

The evaluations are based on the large amount of non-proprietary data presented at technical meetings and published in the literature with added point of view of LCC experts

"One of the main advantages with these seminars is the contacts you can make with the experts"

JOLANDA CAPPAERT-DE VOS
EPZ

"Excellent presentation material given in a thoroughly professional manner. Excellent interaction with regard to answering the questions raised by the audience.

CHRISTOPHER SMITH
Rolls-Royce

LCC21 Reports

Key Emerging Issues and Recent Progress in PWR/VVER, BWR and New Reactors

Safety and reliability of power plants are becoming increasingly important factors since many plants are aging and have obtained license renewal for continued power operation and for new reactors using different technologies that are or will be in design, construction, commissioning, or start-up stage. Therefore, sharing plant operating experiences, sharing lessons learned, and sharing new industry research are all crucial in order to maintain the nuclear power plant fleet in a healthy condition as well as for new reactors using different technologies that are or will be in design, construction, commissioning or start-up stages.

For the present edition of the Key Emerging Issues and Recent Progress, ANT International will collect the most relevant experiences and advanced research exposed at the PWRs, VVERs, BWRs and SMRs presented at the 23rd International Conference on Water Chemistry in Nuclear Reactor Systems during Sept. 22-25, 2025, in Korea. The NPC conference is the key point meeting for the nuclear chemistry and radiochemistry international community and provides a forum for utility personnel, engineers, scientists, university researchers, research institutes, and service organizations to interact and address the challenges faced by the nuclear power industry. This report summarizes papers from the NPC 2025 conference and is expected to be a comprehensive summary document incorporating the latest information on nuclear plants water chemistry related topics that would benefit the nuclear operators and regulators, and those who have



not been able to attend the NPC 2025 Conference in Busan (Korea). Topics like Water Chemistry scientific studies on any of the technologies, CRUD and Fuel experience, Potassium Hydroxide alternative to LiOH or Source Term Control in PWR primary systems, Hydrazine Alternatives or improvements by Dispersants or Film Forming products for PWR Secondary system or Noble metals technology for BWR, as well as operating experience from the recently started Advanced Reactors or chemistry regimes for the coming SMR will be treated among other issues.

The LCC21 vol. I and II reports summarise the key results in the following areas:

Vol. I Report Content List

- **PWR/VVER Primary Water Chemistry and Fuel Performance**
 - » Water Chemistry Scientific studies
 - » Fuel Experience
 - » CRUD and Coolant Chemistry
 - » Zinc Addition
 - » Potassium Hydroxide Alternative
 - » Shutdown Chemistry
 - » Source Term Control
 - » Specific Isotopes Control (Ag-110m, Sb-124, others)
- **PWR/VVER Secondary Water Chemistry**
 - » Water Chemistry Scientific studies
 - » Feedwater Quality Improvements and Blowdown Management
 - » Steam Generator Corrosion and Fouling
- **Hydrazine Alternatives**
- **Film Forming Products**
 - » FFP Research
 - » Application Experience
- **Dispersant Addition Experience**

Vol. II Report Content List

- **BWR Chemistry & Radiochemistry**
 - » Water Chemistry Scientific studies
 - » BWR Fuel and Materials
 - » Noble Metal Addition
 - » BWR Secondary Systems
- **Auxiliary Systems Water Chemistry and Waste Treatment**
 - » Cooling Water Systems
 - » Radwaste
 - » Other Aux System
- **Flexible Operation**
- **Chemistry Optimization Programs and Compliance Management**
- **Advanced Reactors and SMR**
- **Lifetime Management, Long Term Operation and Plant Aging**

“The long experience of the LCC Expert Team provides useful information for ‘sunny and cloudy days’ of a chemist’s job!”

MICHAEL BOLZ
NPP Philippsburg

“A.N.T. International provides excellent material for education, this supports the very important transfer of knowledge in times when alternation of generation becomes a problem in many nuclear power plants.”

BERNT BENGTTSSON
Vattenfall

Deliverables

A.N.T. International will provide the LCC Members with the following:

- A Seminar will be held in Spring 2026 in Europe, in Madrid, Spain, to present the results of the LCC Programme. The number of full-time employees per Member that may attend the seminar is limited to eight (8) people per organization.

At the 3 day Seminar, the two LCC21 reports will be presented by the authors. In addition there will be a number of PWR, VVER and BWR presentations on other coolant chemistry/corrosion and structural material degradation topics. To be announced later.

- **Before the seminar, you will have access to:**
 - » High-resolution searchable pdf-files with the complete Reports as well as the presentation material in colour.
 - » The files can be copied to a company server, with full read access for everybody with access to the server.
 - » The contents from the Reports and presentation material in pdf-format can be printed. Also, the contents from the pdf-files can be copied and pasted electronically into other documents, e.g. Word files.
 - » All figures and tables with A.N.T International copyright can be used by the member both internally and externally, provided that the source is stated in the caption.
- **The language of the LCC Programme will be English.**
- **The authors will be available for consulting throughout the year.**
A few telephone or e- mail consultations requiring no additional work are provided at no additional cost to Members.
- **LCC members have an option to purchase:**
 1. [Previous LCC reports](#) at a 50% discount and
 2. Twelve months access to [A.N.T. International Online Education Courses](#) at a large discount.
 3. Consulting hours related to large projects for a discounted hourly rate. [For more information, click here.](#)
 4. Sign up for access to A.N.T. International Wikipedia (AWIKI), [please click here for more information.](#)

Bios of LCC21 Report Author



Mr. Juan de Dios Sánchez has a degree in Industrial Chemistry and has been linked to Cofrentes Nuclear Plant in Spain most of his career. Juan started his work at the nuclear industry in 1982 at Valdecaballeros project and, in 1983, he joined the Cofrentes project for the systems commissioning and startup test. He participated in the set up of the chemistry and radiochemistry laboratories and later on he was appointed as radwaste supervisor and he lead the waste cement system and condensate clean-up filters improvements. He took over Chemistry and Radiochemistry management in 1991 until mid 2006. In this period he played an important role in different chemistry improvement projects such as Depleted Zinc addition, Hydrogen Water Chemistry, Recirculation System Chemical Decontamination and On Line Noble Metal Implementation, as well as in the Plant Environmental Management System. In 2006 he was appointed to lead the Plant Life Management Program, that aims to identify the degradation mechanisms of the safety related structures, systems and components and establish its mitigation and surveillance through the Aging Management Programs. The Plant Life Management Program has been the main support for the last Cofrentes License Renewal application presented to the CSN regulatory body. This renewal covers a period that exceeds the initial 40 years life original design of Cofrentes and the operating license was granted in 2020. Juan has participated in different international projects, such as EPRI BWRVIP, EPRI BWR Water Chemistry Guidelines, BWR European Forum, IAEA iGALL. He has lectured on Chemistry at the Master of Applied Nuclear Engineering (MINA) at Universidad Autónoma de Madrid and CIEMAT, and took part as a lecturer in several fuel and materials seminars.

Terms and Conditions

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The compiled information and the conclusions, as a result of this work, may be used by the purchasing party for its own use for any purpose provided that the source is given. A.N.T. International retains the rights to the compiled information and the conclusions for other uses.

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Insurances of the owner and of others in respect of a nuclear incident shall exclude any right of recourse against the supplier and his sub-suppliers of every tier and kind.



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