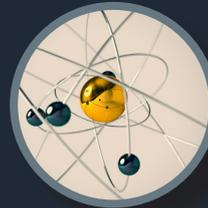




Newsletter #2

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What is PETRUS?

PETRUS III is a Euratom programme for nuclear research and training. The Consortium includes representatives from twelve different countries all over Europe who work in the nuclear domain at universities and different education and training institutions as well as established companies and agencies in the nuclear sector.

The essential objectives of the project are:

- the practical implementation of an accredited training programme following ECVET principals, leading to a recognised qualification in geological disposal
- the creation and design of a multidisciplinary training and research framework for PhD students
- the development of strategies and frameworks for maintaining the PETRUS initiative long-term.

Introduction



Welcome to our second edition!

A warm welcome to this our second edition of the PETRUS III Newsletter.

In this issue, as well as the usual summary of our last meeting and updates on the progress of various work packages, you will find:

- an excellent account of the latest PETRUS III practical training course which was held predominantly at the Josef Research Facility near Prague
- an article on the MIND (Microbiology In Nuclear waste Disposal) proposal for Horizon 2020 by Karsten Pedersen of MICANS
Breaking news ! Just before going to press, Karsten has been informed that the MIND proposal has been accepted! Congratulations, Karsten!
- a run-down of the ANNETTE (Advanced Networking for Nuclear Education and Training and Transfer of Expertise) proposal being put forward by ENEN and explained by Walter Ambrosini



Last meeting

**Welcome to Sweden, welcome
to PETRUS III - see you in Portugal!**

*Petra Norroy
Mines Nancy*



The PETRUS III consortium met at Linnaeus University in the pretty, coastal town of Kalmar, Sweden from 30th September-2nd October. Tommy Claesson made everyone extremely welcome and was an excellent host for the three days. Many thanks, Tommy!

The meeting was fruitful and interesting including a fascinating visit to the Äspö laboratory on the final day and informative presentations on the MIND project (thank you Karsten Pedersen, Micans) and on the ANNETTE project (thank you Walter Ambrosini, ENEN).

Presentations on the current situation of work packages by their leaders showed they are progressing nicely and Abdesselam Abdelouas moved things forward with the considerable work he has achieved for Work Package 1. Both the Steering Board and the End-user Council held their first meetings (cf. separate Minutes for each). Finally, a productive workshop took place on the organization of the forthcoming PETRUS III PhD event to be held in June 2015, further details can be found on our Events page of this edition.

The next meeting is to be scheduled in April 2015 in Lisbon, hosted by IST ID.

WP summaries



WP 4&5 leaders walk you through their tasks in hand.

WP 4 Think-Tank activities and link with the IGD-TP Update

*Bojan Hertl
Arao*



PETRUS III project maintains the strategic structure of the End-user Council whose membership has been extended to continue its important role and is instrumental in helping the coordination of the project. It also strives to widen its perimeter outside of the PETRUS III consortium.

The first End-User Council (EUC) meeting was organised during the third PETRUS III meeting in Kalmar, Sweden, on 1st October 2014. The EUC members are from WMO representatives and other interested organizations. During the meeting the members agreed on the Terms of Reference for EUC work: aims and objectives, scope of the group, members, working methodology, communication procedures and decision-making. At this meeting an approach to the first job description “Performance and safety analysis engineer” was agreed upon and comments sent to WP1.

In order to foster the organization and the management of both the existing PETRUS educational programme and the future Professional Development training programmes that will be set-up in WP2 and

to ensure the sustainability of the initiative, a steering board (SB) was created. The first SB meeting was also organized during the third PETRUS III meeting in Kalmar, Sweden. The Master’s program, PhD program and video conferencing methods were all discussed. It was confirmed that the technical information concerning the demonstrated system, as well as the contact details of the Mines-Nancy technicians would be sent to all present. The possibility of a logistical problem was raised. Interesting stand-points regarding a PETRUS quality label and ENEN added-value were discussed.

Proactive communication and cooperation between the PETRUS III consortium and the IGD-TP and its Competence Maintenance, Education and Training (CMET) working group continue. The latest interaction was related to the planning of the CMET walkabout session at EF5. Walkabout station number 2 dealt specifically with questions directly related to Petrus III WP2 and was jointly hosted by Aalto University and ENEN association.



WP summaries

WP5 Sustainability, external collaborations and link with ENEN

*Walter Ambrosini
President of ENEN*



The deliverable D5.51, being under the responsibility of ENEN, contains a presentation of the ENEN Association and of its structure for the purposes of the PETRUS-III Project. This information is intended to be the basis for the procedure to integrate PETRUS Consortium into ENEN in the near future.

With this aim in mind, the report collects material built up over the years in relation to the ENEN Association and its continuous development since its establishment in 2003. The history of ENEN is summarized and its structure is presented. Recent developments of specific interest to the PETRUS-III Project are highlighted. In particular, the presence in the Association of Working Groups under the leadership of the Secretary General is suggested as a useful means of integration of the PETRUS Consortium into ENEN.

Moreover, the useful dynamics recently generated around ENEN by the attention of the PETRUS Consortium and of the MELODI platform are also featured in the report, referring to a proposal submitted for the recent Horizon 2020 call under Euratom, aiming at achieving a better coordination of E&T initiatives in the various nuclear fields.

The further actions to be performed in the frame of WP5 involve the actual integration of the PETRUS Consortium into ENEN, exploring how to set up a certification similar to the European Master of Science in Nuclear Engineering (EMSNE) also for the Geological Disposal sector, agreements for student exchanges, international cooperation and, finally, the definition of a roadmap for PETRUS Consortium sustainability.

PhD conference

First PETRUS PhD Conference (22 to 26 June 2015)



Venue: Université de Lorraine – Ecole des Mines de Nancy - France
Open to: All

One of the PETRUS program objectives is to continue to improve the scientific knowledge of future experts by addressing the challenge of multidisciplinary skills. One of the aims of the work-package dedicated to this subject is to enhance the young researcher's ability to develop global vision of complex topics related to radioactive waste disposal. These are, by nature, cross-disciplinary issues. Indeed, working in the field of geological disposal requires systems thinking. This brings into play a new educational approach that favors a wider vision of any given problem. The concepts and perspectives of each relevant discipline (chemistry, geology, physics, mathematics, economy and so on) should be considered when tackling any portion of a complex problem.

The PETRUS 2015 PhD Conference is a unique event that intends to bring together PhD students and young researchers, along with professionals and academics in radioactive waste disposal. Through a relaxed and friendly environment, PhD students from across Europe will have a chance to present their research in all aspects of radioactive waste disposal and in turn, gain an insight into the work being carried out by fellow students.

Students and young researchers are invited to submit an extended abstract (4-6 pages) on their research findings. Submissions will be reviewed to ensure quality and relevance. Authors of accepted submissions will then be invited to make either a poster or an oral presentation (as applicable) at the conference.

Prizes will be awarded for the best abstract, best poster and best oral presentation.

The program also includes several plenary lectures presented by reputed Professors highlighting the strength and diversity of research and current topics. Seven lectures built on the research expertise of top academics are expected. Originally designed for PhD students, these lectures will be open to all (particularly Masters students), who wish to explore more advanced topics. Each day offers two lectures. Attendance is free but registration is required through the Conference.

Participation in the PETRUS PhD Conference is free of charge.



**For more information please visit our Web site www.petrus2015.eu
contact : Marion Menchi - Phd-event@petrus2015.eu**

Josef

An international practical training course held under the auspices of the PETRUS III European project took place from 1 to 12 September 2014. The course was organised by specialists from the Centre of Experimental Geotechnics CTU, Prague in cooperation with experts from SÚRAO.



The participants consisted of students from France and Spain and "young professionals" from cooperating organisations all of whom are involved in issues surrounding radioactive waste management.

Experts from SÚRAO spent the first two days of the course with the students familiarising them with the concept and current state of development of deep geological repository design and construction in the Czech Republic. On the second day students visited the Richard low- and intermediate-level waste repository located near the town of Litoměřice north of Prague.

The main part of the course took place at the Josef Research Facility. Students learned about the history of the Josef Facility and the work carried out there and, over a number of days, completed practical exercises in both the surface laboratories and the Josef underground complex. The topics of the exercises ranged from the determination of the properties of bentonite to sprayed bentonite technology and the characteristics of rocks and rock massifs. On one afternoon the students even tried gold panning in the Čelinský stream, and a visit to the nearby Příbram Mining Museum provided a pleasant change to the demanding research schedule.

The students moved back to Prague for the final two days of the course which included a visit to ÚJV Řež where they became acquainted both with the radioactive waste management system employed by that organisation and with ÚJV's involvement in the national deep repository development and construction programme; one of the most popular parts of the excursion to ÚJV consisted of a visit to the research reactor. On the final day of the course each student gave a presentation of their view of the future in terms of the storage and final disposal of high-level radioactive waste. Feedback from participants on the content of the course was very positive.





Proposal for coordinating E&T in the nuclear fields



Walter Ambrosini
President of ENEN

As mentioned elsewhere in this issue, ENEN submitted a proposal for the recent Horizon 2020 call under Euratom, whose main aim is to promote a better coordination in relation to Education and Training in the nuclear fields of Nuclear Safety / Engineering, Geological Disposal and Radiation Protection. The many interfaces existing between these fields ask for identifying useful synergies, avoiding duplicating actions or the neglect of possible gaps.

The basic idea of the proposal was welcomed by different organizations and they provided endorsement letters or are supporting through active collaboration in the project, including the Technology Platforms (SNE-TP, IGD-TP and MELODI), NUGENIA, ESARDA, EUTERP, EHRO-N, FORATOM and ENS, together with the GENTLE Project Consortium. The latter found in the proposed Coordination and Support Action objectives similar to those pursued by the already ongoing project (<http://gentleproject.eu/>), aimed at setting up courses in a Master's degree for Continuous Professional Development in the nuclear field.

The IAEA also expressed interest in being involved in the proposal. In fact, preliminary discussions between ENEN and the Knowledge Management Section of the «atoms for peace» Agency showed that which ENEN proposes for Europe corresponds perfectly to IAEA commitments on a worldwide level. By the way, the MoUs signed in 2009 and 2013 by ENEN and IAEA already envisage a high level of cooperation between ENEN and the regional networks for nuclear E&T operating under the aegis of IAEA; ANENT for Asia, LANENT for Latin America and AFRA-NEST for Africa. A formal letter of endorsement of the ENEN proposal by IAEA reached the Association very recently.

Other actions covered in the proposal are the production of educational material with the ENEN brand name, the application of ECVET principles in an industrial environment and joint E&T activities to be coordinated by Fusenet, the sister network of ENEN for fusion, with the aim of contributing to the process of «nuclearization» in the fusion research and technology environment.

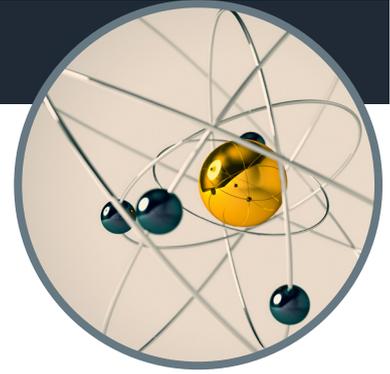
Whether it will be funded or not, the ANNETTE proposal (Advanced Networking for Nuclear Education and Training and Transfer of Expertise) has already generated a positive dynamic among major actors in the field of Education and Training in Europe.

Coordination of E&T is felt to be a real «must» in the nuclear field at the present time: this is, therefore, an excellent period to proceed in the missions of ENEN at the service of European citizens.

MIND



Karsten Pedersen
PhD, professor of Geomicrobiology
CEO MICANS
Microbial Analytics Sweden AB



The MIND proposal aims to develop the safety-case knowledge base about the influence of microbial processes on geological disposal of radioactive waste.

The multidisciplinary MIND programme will address key technical issues that must be tackled to support the implementation of planned geological disposal projects for higher-level radioactive wastes across the EU. Our current understanding of the impact of microbial metabolism on the safety of geological repositories remains tenuous, even though microorganisms may have controlling influences on waste-form evolution in situ, multi-barrier integrity and ultimately radionuclide migration from the repository. For instance, the strong corrosive effect of sulphate-reducing bacteria in oxygen-free environments is often ignored with sometimes devastating consequences (Figure 1).

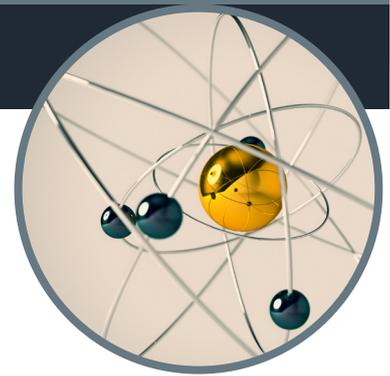


Figure 1. Typical pitting effect of anaerobic microbial corrosion caused by sulphate reducing bacteria on a steel sheet intended as a barrier for migration of radionuclides. Such corrosion has been reported to proceed with a rate of at least 0.9 mm per year which is much faster than what models for anaerobic corrosion without microbes suggest. Some of the pits on this steel barrier reached more than 5 mm in depth.

MIND



*Karsten Pedersen
PhD, professor of Geomicrobiology
CEO MICANS
Microbial Analytics Sweden AB*



The MIND proposal targets a number of “high urgency” and “high importance” topics identified in the most recent IGD-TP Strategic Research Agenda (SRA), focusing specifically on the influence of microbial processes on waste forms and their behaviour, and the technical feasibility and long-term performance of repository components. The project will bring together, for the first time, 15 European groups from 8 countries working on the impact of microbial processes on safety cases for geological repositories across the EU, focusing on key questions posed by waste management organisations. The emphasis will be on quantifying specific measurable impact of microbial activity on safety-cases under repository-relevant conditions, thus altering the current view of microbes in repositories and leading to significant refinements of safety-case models currently being implemented to evaluate the long-term evolution of radioactive waste repositories. The implementation of geological repositories will be accelerated across all European member states through active collaboration between leading groups in the more advanced member states, with those that are at earlier stages of programme development.

The integration of society and policy oriented studies in the project will also extend the impact of the project outside the scientific and technical domain, while a study of expert conceptualization, public perception and risk communication concerning microbial influences in geological disposal, will improve awareness of microbial issues on a broader level. The MIND programme that is proposed is both unique and important, and will help the EU claim international leadership in the understanding of the impact of microbial processes on radioactive waste geological disposal, and indeed other technological areas pertinent to the exploitation of the subsurface.

Structure of the work program

The scientific-technical work program is structured along two work packages (WP1-2), one work package on knowledge management and dissemination and integration (WP3) and one work package on Project Management (WP4). The duration of the project is four years and all work packages run for 48 months, starting and ending simultaneously.

Partners



PETRUS



Partners:

Université de Lorraine (FR) | POSIVA Oy (FI) | ENEN (FR) | Ecole des Mines de Nantes (FR) | Cardiff University (UK) | Linnæus University (SE) | MICANS (SE) | SÚRAO (CZ) | ARAO (SI) | ENRESA (ES) | Aalto University (FI) | Universidad Politécnica de Madrid (ES) | Czech Technical University (CZ) | Universitatea Politehnică din București (RO) | CEA (FR) | IST-ID (PT) | Delft University of Technology (NL) | SCK·CEN (BE) | CIRTEC (IT) | REC (SI) | Nidia (IT) |

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