



## SPERA Newsletter October 2018

### **ICRP Announcement: Free the Annals**

To Main Commission members, Committee members, and Task Group members, we at the Secretariat wanted to extend a big THANK YOU! We are currently 40% of the way to Freeing the Annals! Currently, there are discussions in place that would bring us much closer to raising €500 000 by the end of 2018 to achieve our goal of making the Annals free to access!

Within the month, we are hoping that number jumps to 60%, and we could not have got to this point without the many people associated with ICRP who have helped us talk to organisations, or make personal donations to this great initiative. The most up-to-date information can be found here: <http://www.icrp.org/page.asp?id=376>.

We still need your help. More and more, we are realising how many individuals and organisations are willing to help us, they just simply don't know we are charity and that we are looking for financial assistance. Last week, ICRP Scientific Secretary Christopher Clement and Committee 4 Chair Donald Cool were in Cleveland, Ohio attending the annual Health Physics Society meeting. Both presented, mentioning our Free the Annals campaign, and held discussions with many individuals about what and why we are aiming to do this. With the support of Committee 3 Chair Kimberly Applegate as well, we are hoping to receive over €50,000 (maybe more!) from conversations that happened at the HPS meeting.

Of course, we do not expect this would be the case at every RP related event that professionals associated with ICRP attend. But it does, however, strengthen the point that many people and organisations are interested in being a part of this. We just need to continue talking about it.

If you're willing to help us, we ask that you add in the attached slide to your presentations when appropriate. Talk to people at these events about what we are trying to do, and if they, or their organisation can help. Even speak with your own organisations. No contribution is too small. We at the Secretariat will do whatever we can to support you. We just need help getting our message out there.

I have also attached a slide advertising for ICRP 2019, please feel free to add this in as well!

As always, should you ever have any questions, or need help with something, please do not hesitate to contact me directly. It would be my pleasure to assist.

Let's Free the Annals!

Sincerely,

Kelsey

### **Kelsey Cloutier**

Development and Communications Manager

International Commission on Radiological Protection

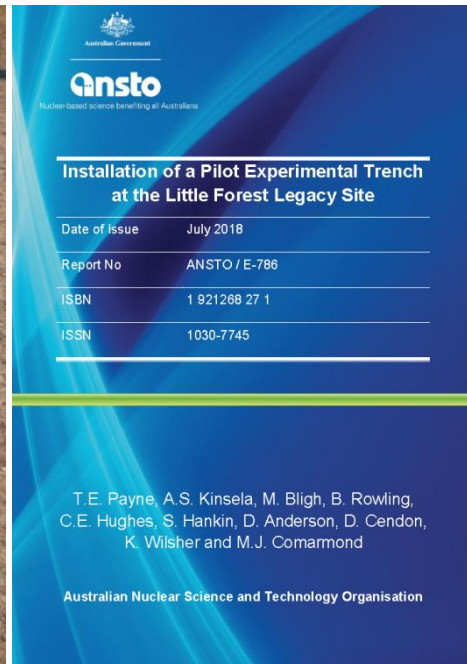
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**ANSTO Lithosphere Research (within Contaminant Science Programme); Update of Little Forest Research Project (Tim Payne, ANSTO; [tim.payne@ansto.gov.au](mailto:tim.payne@ansto.gov.au))**

ANSTO is undertaking a major research project into the Little Forest Legacy Site (LFLS), which was a 1960's era disposal site for low-level radioactive waste. A pilot experimental trench has recently been constructed at the LFLS. The objective of installing this trench was to facilitate experimental field-work aimed at further characterising the site, in particular the hydrology of the excavated trenches and of the near-surface layers in which the trenches are located. The test trench is of similar depth to the waste disposal trenches at the legacy site (3 metres) and extends 6 m in length. An experimental facility of this nature and scale appears to be unprecedented in Australia and provides data which cannot be obtained by laboratory based methods. The construction of the trench has already provided a large amount of information and data related to the LFLS trenches. A detailed report on this work has been placed on the ANSTO website (see below). This work will also be presented at the upcoming SPERA conference in Perth. We are encouraging possible collaborators (and students) to utilise this facility for research into legacy contaminated trench sites (including non-radioactive sites).

T.E. Payne, A.S. Kinsela, M. Bligh, B. Rowling, C.E. Hughes, S. Hankin, D. Anderson, D. Cendon, K. Wilsher and M.J. Comarmond. Installation of a Pilot Experimental Trench at the Little Forest Legacy Site. ANSTO / E-786. 98 pp.  
<http://apo.ansto.gov.au/dspace/handle/10238/8937>.

The cover features the ANSTO logo and the following text:

**Installation of a Pilot Experimental Trench at the Little Forest Legacy Site**

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T.E. Payne, A.S. Kinsela, M. Bligh, B. Rowling, C.E. Hughes, S. Hankin, D. Anderson, D. Cendon, K. Wilsher and M.J. Comarmond

Australian Nuclear Science and Technology Organisation



1960s trench excavation



2017 trench excavation

**Jeffree Conservation & Research** (Ross Jeffree, [ross.jeffree@hotmail.co.uk](mailto:ross.jeffree@hotmail.co.uk); [rossjeffree666@gmail.com](mailto:rossjeffree666@gmail.com))

*IAEA/RCA Project “Enhancing Regional Capabilities for Marine Radioactivity Monitoring and Assessment of the Potential Impact of Radioactive Releases from Nuclear Facilities in Asia-Pacific Marine Ecosystems (RAS 7028).*

The Guidelines for the Sampling, Preparation and Radio-Analysis of Marine Matrices were further developed. Details have been incorporated on the taxonomic groups of fish, mollusc and aquatic plants in the RCA region which are specifically proposed for sampling in order to enhance regional harmonisation of the subsequent radionuclide measurements.

Within RAS 7028 an Expert Mission was undertaken to Indonesia (Java & Sumatra). A Keynote was given at the Indonesian Ministry of Coordination of Marine Affairs. The presentation entitled “Marine Radioecology in the 20<sup>th</sup> and 21<sup>st</sup> Century” addressed Indonesia’s national concern with potential impacts of Fukushima-sourced radionuclides on their national marine waters and consequent socio-economic detriments to their fisheries. At BATAN a series of lectures were given to BATAN staff and the growing number of affiliated students from national universities, in support of capacity building in marine radio-ecological research in Indonesia, viz.; i) Hypothesis formulation and testing in marine radioecology, ii) Advanced aquariology for aquatic radioecology; *better aquariology techniques & technologies for better radio-ecological science*, and iii) Laboratory marine radioecology: *experimental radionuclide biokinetic data: analysis and interpretation*.

#### *Radioecological Research*

Three long-term research themes have been further pursued. A research program in phylogenetic and life-cycle radioecology has continued with several publications in 2018. These studies focussed on i) continued and enhanced transfer of radionuclides to progeny-post maternal exposure, in a small shark (Jeffree et al. 2018), and ii) a phylogeny-based model of bioaccumulation in marine chordates to a fish species from the low salinity Caspian Sea (IUCN-listed critically endangered Russian sturgeon) (Jeffree et al., 2017). Current phylogeny-based studies are investigating the contrasting internal distributions of multiple radionuclides in marine bony and cartilaginous fishes, which are relevant to advanced radiological dose assessment models.

Within the theme of marine radioecology in a high CO<sub>2</sub> world a study investigated ocean acidification impacts on the uptake of radio-labelled heavy metals in the larvae of a Mediterranean sea urchin (Dorey et al., 2018).

## Publications in 2018

Ross A. Jeffree, Scott J. Markich, Francois Oberhaensli, Jean-Louis Teyssie (2017). Radionuclide biokinetics in the Russian sturgeon and phylogenetic consistencies with cartilaginous and bony marine fishes. *Journal of Environmental Radioactivity* 177, Oct., 266-279.

Ross A. Jeffree, Francois Oberhaensli, Jean-Louis Teyssie, Scott W. Fowler (2018). Radioecological aftermath: Maternal transfer of anthropogenic radionuclides to shark progeny is sustained and enhanced well beyond maternal exposure. *Journal of Environmental Radioactivity* 192, 573–579.

Narimane Dorey, Sophie Martin, François Oberhänsli, Jean-Louis Teyssié, Ross Jeffree, Thomas Lacoue-Labarthe (2018). Ocean acidification modulates the incorporation of radio-labeled heavy metals in the larvae of the Mediterranean sea urchin *Paracentrotus lividus*. *Journal of Environmental Radioactivity* 190–191, 20-30.

## ANSTO Aquatic Ecosystems Research (Tom Cresswell; [Tom.Cresswell@ansto.gov.au](mailto:Tom.Cresswell@ansto.gov.au))

A **PhD top up scholarship** (\$7,500 cash per annum) is available at ANSTO in Sydney for a potential PhD student affiliated with a partner university to better understand the ecotoxicological and radiological **effects of NORM scale on aquatic organisms**. Naturally occurring radioactive materials (NORM) scale residues frequently accumulate on the interior surfaces of subsea oil and gas pipes and other structures, and may persist long after extraction operations have ceased. Within such scale materials are a range of metal contaminants, as well as NORM dominated by the U-238 and Th-232 decay series. The project will provide for a more valid assessment of the risk posed by sub sea oil and gas scale to aquatic organisms as compared with current methods which rely on default/reference parameters which may greatly misinterpret the risk. Please see the [project outline](#) for more details of the research. For further information, please contact **Dr. Tom Cresswell** ([tom.cresswell@ansto.gov.au](mailto:tom.cresswell@ansto.gov.au)); (02) 9717 9412.



*Two scenarios of pipeline assessment (routine operation left and degraded pipeline right) that will be undertaken in the research and an example of the build-up of (predominantly) barium sulphate NORM scale in pipelines*

Australian Catholic University Hons. student **Danielle Hill** has completed her research at ANSTO which aimed to better understand the effects of moulting on contaminant bioaccumulation by decapod crustaceans. Several studies have determined that moulting (shedding the exoskeleton or shell) for decapods causes significant differences in the uptake or efflux kinetics of common inorganic contaminants and these differences can last for > 1 month. Danielle fed the spotted shore crab, *Paragrapsus laevis*, with a diet supplemented by moult hormones (e.g. ecdysone) to synchronise moulting and then used radioisotope tracers to understand how moulting effects bioaccumulation kinetics in the crabs. Unfortunately, the moult-inducing part of the study did not work out but

Danielle managed to get a great dataset on the effects of water temperature on  $^{109}\text{Cd}$ ,  $^{54}\text{Mn}$  and  $^{65}\text{Zn}$  bioaccumulation kinetics by the crabs. She will be submitting her thesis on Monday 29<sup>th</sup> October.

The wheat fertiliser study with the University of South Australia researchers **Thea Lund Read**, **Casey Doolette** and **Enzo Lombi** has finished and we are collating the results for several publications. The use of  $^{65}\text{Zn}$  radiotracers has allowed us to follow the foliar application of Zn through 5 months of growth to full plant maturity so that we can quantify the concentration of applied Zn that was translocated to the grain. This has implications for improving grain yield and quality for wheat growers. The team are currently working on a series of Expressions of Interest for external funding into the next round of wheat studies where we will be using radiotracers of  $^{65}\text{Zn}$ ,  $^{75}\text{Se}$  and  $^{54}\text{Mn}$  to understand how the time of fertiliser application and the concentration of elements within the fertiliser impact the grain yield and quality.

University of Melbourne PhD student **Sarah McDonald** has completed her first stage of experiments at ANSTO for her research into the effects of storm water releases on freshwater aquatic organisms. Sarah conducted live-animal radiotracer studies using pulsed exposures (max 6 h duration) to  $^{109}\text{Cd}$ ,  $^{75}\text{Se}$  and  $^{65}\text{Zn}$  interspersed with short depuration phases (max 8 h duration) followed by 7 days of depuration after 3 pulses. Sarah hopes to better understand whether current water quality guidelines, which are mainly based on chronic exposures, are protective for aquatic organisms exposed to high concentrations of metals for short durations, as occurs following stormwater releases. The use of live-animal radiotracer techniques allows Sarah to accurately track the bioaccumulation and depuration kinetics of each metal following each pulse.

**Tom Cresswell** recently represented ANSTO at the Plastics Awareness Global Initiative (PAGI) workshop held at the University of California, San Diego campus in La Jolla, CA. Many studies purport to demonstrate that unrecovered plastics biodegrade in the ocean yet we identified that there is a mislabelling and misunderstanding of the term biodegrade, even in primary peer-reviewed literature. What is often described in these papers is degradation; that is the disintegration of large, macro pieces of polymer into small pieces of the same polymer. Our attention focused on current human efforts to remove plastics from the ocean, the creation of “eco-friendly” plastics and the inevitable creation of micro and nano plastics through degradation. We intend to thoroughly investigate the literature to assess the current risk associated with micro and nano plastics in the marine environment and the potential for transfer through the food chain to human consumers. There appear to be substantial gaps in the knowledge in this area that require further investigation. We discussed current and near-future plastic alternatives and we mused about main requirements for full marine biodegradability. The main outcome of our discussion was that maximum effort needs to be invested in stopping the entry of plastics to the ocean. A perspectives paper on the fate of plastics currently in the global oceans will be produced as an outcome of the workshop.