

## Editorial

The CONCERT Infrastructures WP emphasises that access to state-of-the-art infrastructure for radiation protection research is key to achieving scientific excellence. Of course, the goal is to obtain the best data. But this is not the only goal -- data sharing is also a major issue. CONCERT applies an open access policy, as clearly indicated in the two transnational calls. However there has been some reluctance to share data. So, in order to better understand your views and needs, a survey has been set-up under the supervision of Balázs Madas (MTA EK).

You are all invited to take part at: <https://www.surveymonkey.com/r/2Z6THF3>

It will not take you long to complete and your responses will allow us to better define our strategy on open access and to seek ways to erode the major barriers that prevent data sharing.

Dr Laure Sabatier, CEA

## The floor to...

The global objective of task 6.1 is to promote the visibility of selected infrastructures dedicated to radiation protection research. Sub-task 6.1.1 is the first step in providing a list of already existing infrastructures across all research domains.

The types of infrastructures are very wide-ranging and comprises: *Irradiation facilities* both for external and internal exposures, including those for animal and plant experiments; *Observatory sites and combined exposures* (internal and external); Existing *epidemiological cohorts* and *biobanks* for modelling and molecular epidemiological studies; *Prospective collections* developed from already existing cohorts such as childhood CT studies or active nuclear workers cohorts, or from new cohorts such as the large national birth cohorts included in the International Consortium; *Databases* including those for archived material and data from laboratory radiobiology experiments (STORE, ERA, JANUS, etc.), radioecology (FREDERICA and databases developed within the STAR and COMET projects) as well as those relevant to emergency preparedness; *"OMICS" platforms* including transcriptomics, epigenomics, proteomics, metabolomics, and fluxomics, and *Biodosimetry platforms*.

Within EU-funded projects, such as DoReMi,

STAR/COMET and MERIL, extensive lists of relevant large infrastructures have already been generated, nevertheless these lists can be further extended. Moreover, large infrastructures will be necessary not only for MELODI and ALLIANCE, but for also the other radiation protection platforms, taking into account surveys such as EURADOS. To best meet the needs of the radiation protection community, the listing may need to be extended beyond Europe in particular for large or very specific infrastructures.

### Listing the infrastructures dedicated to research for radiation protection

The infrastructures listed should fulfil quality criteria defined in sub-task 6.1.2 and be centralised in the CONCERT database (<http://www.concert-infrastructures.eu/>). Currently 55 infrastructures from 18 countries are registered, including 3 from non-European countries. These infrastructures include: 34 irradiation facilities and contaminated sites, 11 databases, sample banks and cohorts, and 10 analytical platforms and tools.

Dr J.-F. Bottollier-Depois  
IRSN  
CONCERT WP6.1.1



Photo: J.-F. Bottollier/IRSN

### Future events:

2nd Call

1 Mar 2017: Opening date

May 2<sup>nd</sup>, 2017: Deadline

### WP 6 News:

Next WP6 meeting:

May 22<sup>nd</sup>, Budapest, Hungary

### AIR<sup>2</sup>D<sup>2</sup>:

- Please complete the online [form\(s\)](#) to register your infrastructure(s) in the database.

- A new option to feature your infrastructure is now available: [add document](#).

### Contents:

Exposure platforms	<a href="#">Chernobyl Exclusion Zone</a>
Databases, Sample banks, Cohorts	<a href="#">Chernobyl clean up workers from Latvia</a>
Analytical platforms, Models, Tools	<a href="#">BFS whole &amp; partial body counting</a>

### Next issue

June 2017

# Exposure platforms

## THE CHERNOBYL EXCLUSION ZONE

A radioecological observatory

A focus for joint, long-term, radioecological research

**R**adioecological Observatories are radioactively (and chemically) contaminated field sites that will provide a focus for joint, long-term, radioecological research. The Chernobyl Exclusion Zone (CEZ) Observatory is one of four proposed by the EC funded STAR and COMET projects.

### Site overview

The Chernobyl Exclusion Zone contains the most radioactively contaminated sites in the world. The area is highly heterogeneously contaminated by a number of radionuclides including  $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$ ,  $^{241}\text{Am}$  and Pu-isotopes. The

•The presence of 'hot particles' means that their behaviour in the environment can be studied

•Dose rates remain sufficiently high that we may expect to observe effects on wildlife in some areas

•Published results on radiation effects from the CEZ are contentious with a lack of agreement on interpretation amongst scientists (see <http://dx.doi.org/10.1002/ieam.238>)



Photo: N Beresford/CEZ

Pr Nick Beresford

•A wide range of species and habitats are present.

**ALLIANCE activities in the CEZ**  
COMET partners have collaborated to conducted studies on radionuclide transfer to wildlife and agricultural products, and also radiation effects to a range of wildlife species (frogs, earthworms and plants). Datasets from the CEZ presenting spatial data on radionuclide deposition, soil properties, land use and radionuclide activity concentrations in wildlife are currently being prepared for

submission to openly accessible data centres. COMET also ran a field studies course for international students in the CEZ.

On-going and future ALLIANCE activities include: jointly supervised PhD on radiation effects in birds and collaboration in RED FIRE, a study looking at the effects of radiation on the Red Forest as it recovers from a largescale fire in the summer of 2016.

The map of the 30-km Chernobyl zone terrestrial density of contamination with strontium-90 ( on 1997 )

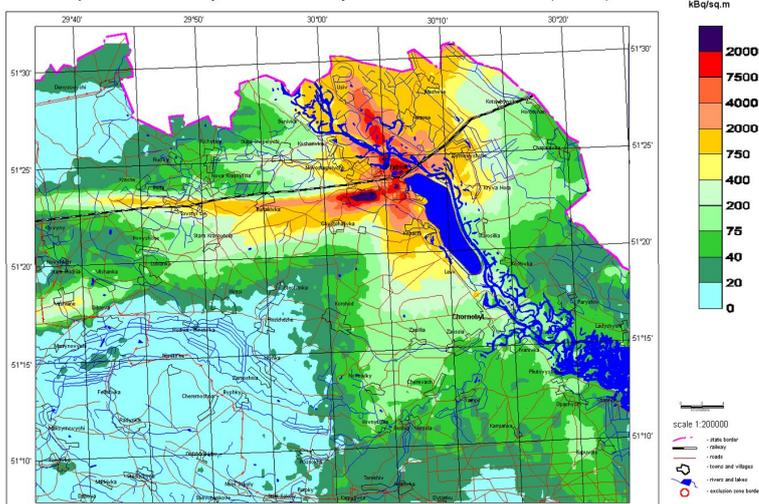


Photo: From NUBIP PROBA database

### Sr-90 in the Ukrainian CEZ

(<http://www.radioecology-exchange.org/content/nubip>)

Ukrainian area of the CEZ (approximately 2600 km<sup>2</sup>) contains forests, abandoned farmlands, wetlands, flowing and standing waters, deserted villages and urban areas. The Belarusian CEZ (approximately 2160 km<sup>2</sup>) consists mainly of forests, swamps, marshes and peat-bogs.

The site is species rich with >400 species of vertebrates, including 67 ichthyoids, 11 amphibians, 7 reptilians, 251 birds and 73 mammals; many are Red Book species. The climate is temperate-continental with the growing period beginning around mid-April and ending in late October.

Why is the CEZ a Radioecological Observatory?

The CEZ has many features making it an important radioecological site:

•Contamination levels are such that the behaviour/transfer/mobility of a number of radionuclides can be studied ( $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$ ,  $^{241}\text{Am}$ , Pu-isotopes, U-isotopes,  $^{129}\text{I}$ ,  $^{14}\text{C}$  and  $^{99}\text{Tc}$ )

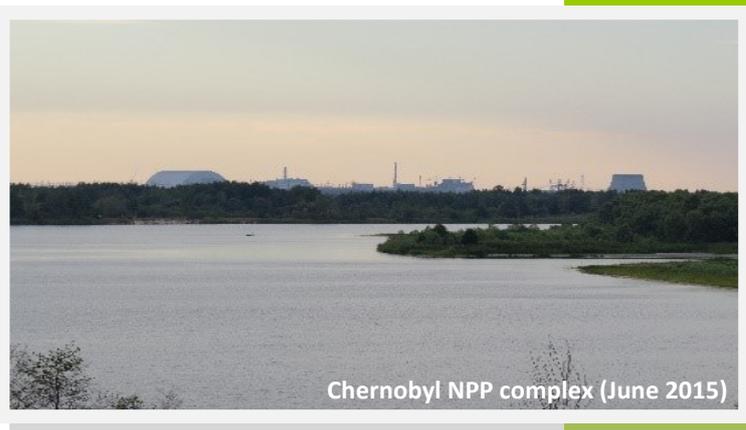


Photo: Nick Beresford/NERC CEZ



### ID Card:

#### Type of ecosystem

contaminated: Terrestrial and freshwater (and urban)

Compartment of environment contaminated:

All sample types

#### Contamination source:

Radionuclides released by the Chernobyl accident (including Cs-137, Sr-90, Am-241, Pu-isotopes, U-isotopes, I-129, C-14, Tc-99) including in the form of 'hot particles'

Radioactivity or dosimetric characteristics:

Activity concentrations and dose rates

#### Total contaminated area:

>4700 km<sup>2</sup>

Species exposed/present in the site:

Area is species rich, e.g. 400 species of vertebrate animals, including: 67 ichthyoids, 11 amphibians, 7 reptilians, 251 birds and 73 mammals

#### Authorized related data/samples:

<http://www.radioecology-exchange.org/content/chernobyl-exclusion-zone>

Presence of an associated contamination:

No significant evidence for this

#### Supporting lab:

Basic laboratory facility are available in the Chernobyl Exclusion Zone

#### Access:

Require permission - achieved through a local collaborator. Work will require pre-planning to ensure permissions etc. are in place

#### Internet link:

<http://www.radioecology-exchange.org/content/chernobyl-exclusion-zone>

#### Other links

<http://www.radioecology-exchange.org/content/radioecological-observatories>

<http://www.ceh.ac.uk/news-and-media/blogs/understanding-ecological-impact-major-fire-chernobyl-red-forest>

<https://resy5.iket.kit.edu/CONFIDENCE/>

#### Contact:

Pr Nick Beresford

[nab@ceh.ac.uk](mailto:nab@ceh.ac.uk)

#### Related to:

ALLIANCE



## LATVIAN STATE REGISTER OF PERSONS EXPOSED TO RADIATION DUE TO THE CHERNOBYL NUCLEAR POWER PLANT ACCIDENT Cohort of Chernobyl accident clean-up workers from Latvia

More than 6,000 Latvian inhabitants were among the Soviet people sent to Chernobyl to clean up the site of the nuclear power plant (CNPP) following the accident in 1986. At that time, most were healthy young males (military personnel and civilians of reproductive age). They stayed in Chernobyl for 1-6 months between 1986 and 1991, performing decontamination, transportation and construction tasks. During their stay, they were exposed to external radiation and radionuclides which were deposited into their bodies. Among the non-radiation factors, the most significant were the

information on their health status from a single source. The data base contains individual data on regular medical check-ups and changes in health, as well as data on the cause of death, work tasks performed in Chernobyl and documented exposure doses (evaluable for 57% of clean-up workers). Mean exposure was estimated at about 130 mSv (min 0.1 mSv, max 500 mSv) but doses recorded in the "Military Passport" may not always be accurate. The register is maintained by specialists from the Centre of Occupational and Radiation Medicine (Pauls Stradins Clinical University Hospital). The research is carried out in collaboration with scientists from the Institute of Occupational Safety and Environmental Health (Riga Stradins University). Latvian scientists have conducted many studies based on the information collected, including studies in collaboration with scientists from other countries. Clinical observations and physiological, immunological and epidemiological studies of the Latvian CNPP workers cohort show that these individuals have a higher incidence of wide-ranging disease than the non-exposed general Latvian population. These findings create a need for further research to determine the reasons and mechanisms for the progression of health disorders in this cohort.



Dr Jelena Reste

Photo: J. Reste/RSU IOSEH



Monument in Riga dedicated to the victims of Chernobyl accident (annual memorial event on April 26<sup>th</sup>)

psycho-emotional stress, the physical overload and the effects of heavy metals and other chemicals. Contrary to Ukraine, Belarus and Russia, the territory of Latvia showed no significant increase in background radiation after the CNPP accident, thus since their return from Chernobyl, the clean-up workers have been living in an area relatively non-contaminated by radiation. Information on the health status of the CNPP accident clean-up workers has been gathered regularly in Latvia from 1987 to the present day, i.e. for about 30 years. Since 1994, this information has been recorded in the Latvian State Register of Persons Exposed to Radiation due to the CNPP Accident. On 1<sup>st</sup> January 2016, the register contained data from 5,043 persons registered as clean-up workers (who were within the 30 km zone of the CNPP), 1,795 persons who suffered effects of the accident, including 153 persons evacuated from Chernobyl and 1,642 children of clean-up workers born after the accident. The CNPP clean-up workers received regular medical follow-up throughout this time period at a single medical centre. This provided the opportunity to gather

### ID Card:

#### Database type:

Individual data on humans exposed to low-doses of ionizing radiation in nuclear power plant accident clean-up works

#### Cohort type:

6000 males, who were protractedly exposed to ionizing radiation during recovery works in Chernobyl in 1986-1991 (external irradiation and internal deposition of long-living radionuclides)

#### Age/follow-up:

- age at exposure: 32±7 years  
- current age: 61±7 years  
- mean duration of follow-up: 29 years  
- follow-up period: from 1986 till now

#### Biobank available:

no, but feasible on demand

#### Data available:

Individual data on working tasks performed in Chernobyl, health condition in dynamics during follow-up period, results of regular medical check-ups, causes of death for cancer and non-cancer diseases

#### Access:

Joint research collaboration. The data are maintained by Latvian State Register; the permission for use should be received; the processing of data may be done without personal sensitive information only; it is not possible to send the database outside

#### Internet link:

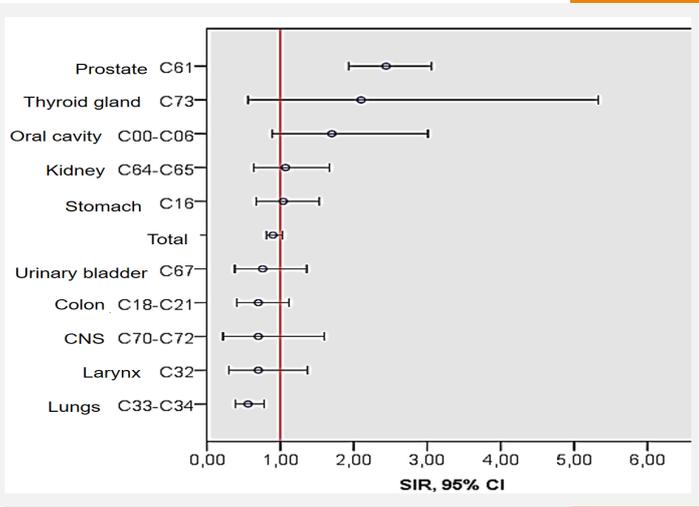
<http://www.rsu.lv/eng/science-and-research/research-organisation/structure/institutes-and-laboratories/institute-for-occupational-safety-and-environmental-health>

#### Contact:

Jelena Reste, Institute of Occupational Safety and Environmental Health, Riga Stradins University, Riga, Latvia  
[jelena.reste@rsu.lv](mailto:jelena.reste@rsu.lv)

#### Related to:

MELODI



Comparison of oncologic morbidity between CNPP workers and general Latvian male population

## BFS IN VIVO MEASUREMENT FACILITIES

### Whole and partial body counting and Quality Assurance

Incorporated gamma-emitting radionuclides can be determined in humans using gamma ray spectrometry to measure the radiation that leaves the body. Since this test is performed on living persons, this type of measurement is called in vivo method. Radionuclides that are (more or less) distributed throughout the body, for example Cs-137 and K-40, are determined by whole-body counters. Nuclides that tend to concentrate in specific organs, especially nuclides such as iodine isotopes in the thyroid or inhaled small plutonium dioxide particles in the lung, are determined by partial body counters.

Oberschleißheim/Neuherberg (near Munich). Each facility permanently operates a stretcher type whole-body counter (WBC), performing about 500 to 700 measurements per year each. The persons monitored come from research and nuclear power reactors, radionuclide production companies and nuclear waste final repositories. In addition, a reference group of unexposed persons from the population is also monitored. Standard counting time is 20 minutes. The WBC in Neuherberg is equipped with four stationary HPGe detectors, and the WBC in Berlin is equipped with two detectors which are used in a scanning mode. In addition, each facility keeps a partial-body counter in readiness. These counters are kept 'ready-to-use' for emergency preparedness and special measurements.

In accordance with the German Radiation Protection Ordinance, the BfS offers in vivo intercomparison analysis for the incorporation monitoring laboratories in Germany. These laboratories have to identify and quantify radionuclides in phantoms. Currently, brick, thyroid, skull and torso phantoms are available. For emergency preparedness, the BfS has begun to produce more radioactive sources with a broader variety of radionuclides. In 2017, the production of special components for phantoms using 3D printing was launched.



Photo: U Gerstmann/BfS

Dr Udo Gerstmann



Photo: O Meisenberg/BfS

#### Available phantoms including a brick phantom and skull, neck and torso phantoms

The counting efficiency of an in vivo counter is normally determined using a calibration phantom. This phantom is similar in size and shape and has similar attenuation characteristics to those of the body of the real person to be screened, and also contains radioactive sources. For whole-body counting, brick phantoms are often used. In vivo counting is a routine method used for monitoring employees who have been potentially exposed to internal radiation. Special applications include, for example, follow-up studies of exceptional incorporation cases or the monitoring of special population groups.

The BfS operates two incorporation monitoring laboratories at its sites in Berlin/Karlshorst and



Photo: O Meisenberg, S Helbig/BfS

#### The three main in-vivo measurement facilities: whole- and partial-body counter in Neuherberg and scanning whole-body counter in Berlin



#### ID Card:

Analytical platform type:  
Internal Dosimetry

Main techniques proposed:  
Whole body counting and organ counting (e.g. thyroid, lung, liver, bone...)

Source:  
Large range of radionuclides with gamma ray emission (Cs-134/137, I-131, Ba-133, Am-241, Eu-152...)

Intercomparison exercise proposed:  
Annual in vivo intercomparison offered

Address:  
Bundesamt für Strahlenschutz,  
Ingolstädter Landstrasse 1,  
85764 Neuherberg, Germany

Bundesamt für Strahlenschutz,  
Köpenicker Allee 120-130,  
10318 Berlin, Germany

Internet link:  
[http://www.bfs.de/EN/topics/ion/service/incorporation/incorporation\\_node.html](http://www.bfs.de/EN/topics/ion/service/incorporation/incorporation_node.html)

Contact:  
Udo Gerstmann  
[ugertsmann@bfs.de](mailto:ugertsmann@bfs.de)  
+49 89 18333-2430

Related to:  
MELODI, EURADOS

## Future events:

### CONCERT Short Courses

**22 May-2 June 2017**

Modelling radiation effects from initial events  
University of Pavia, Italy

**Contact:**

[Andrea.Ottolenghi@unipv.it](mailto:Andrea.Ottolenghi@unipv.it)

**6-16 June 2017**

Assessing risk to humans and the environment  
NMBU, Oslo, Norway

**Contact:**

[deborah.oughton@nmbu.no](mailto:deborah.oughton@nmbu.no)

### Other Events

**8-11 May 2017**

[ConRad 2017](#), Bundeswehr Institute of Radiobiology, Munich, Germany

**14-19 May 2017**

[NEUDOS13](#) Neutron and Ion Dosimetry Symposium  
Krakow, Poland

**23-26 May 2017**

[Opera final event](#)  
Budapest, Hungary

**11-17 June 2017**

[RAD 2017](#) Fifth International Conference on Radiation and Applications in Various Fields of Research  
Budva, Montenegro

**18-28 June 2017**

### [NUBIP and NMBU course](#)

Experimental Radioecology and Radiobiology  
Kiev, Ukraine

**Contact:**

[Olena.parenjuk@gmail.com](mailto:Olena.parenjuk@gmail.com)

[vak@uiar.org.ua](mailto:vak@uiar.org.ua)

**3-8 September 2017**

[ICRER 2017](#), 4th International conference on Radioecology and Environmental Radioactivity,  
Berlin, Germany

**10-12 October 2017**

### [Joint ICRP-RPW 2017](#)

Paris, France

**5-11 November 2017**

[MICROS 2017](#), 17<sup>th</sup> International Symposium on Microdosimetry,  
Venice, Italy

[See also on CONCERT website](#)

Issue	Exposure platforms	Databases, Sample banks, Cohorts	Analytical platforms Models & Tools
<b>Published to date:</b>			
Oct 2015, #1	<a href="#">FIGARO</a> <a href="#">B3, Animal Contamination Facility</a>	<a href="#">FREDERICA</a> <a href="#">The Wismut Cohort and Biobank</a>	<a href="#">RENEB</a> <a href="#">The Hungarian Genomics Research Network</a>
Nov 2015, #2	<a href="#">Pulex Cosmic Silence</a>	<a href="#">STORE</a> <a href="#">French Haemangioma Cohort and Biobank</a>	<a href="#">METABOHUB</a> <a href="#">Dose Estimate, CABAS, NETA</a>
Dec 2015, #3	<a href="#">SNAKE</a>	<a href="#">3-Generations exposure study</a>	<a href="#">PROFI</a> <a href="#">Radiobiology and immunology platform (CTU-FBME)</a>
Feb 2016, #4	<a href="#">Radon exposure chamber</a> <a href="#">Biological Irradiation Facility</a>	<a href="#">Wildlife TransferDatabase</a>	<a href="#">LDRadStatsNet</a> <a href="#">ERICA Tool</a>
Mar 2016, #5	<a href="#">CIRIL</a> <a href="#">Mixed alpha and X-ray exposure facility</a>	<a href="#">Portuguese Tinea Capitis Cohort</a> <a href="#">Elfe Cohort</a>	<a href="#">CROM-8</a> <a href="#">France Génomique</a>
Apr 2016, #6	<a href="#">SCRS-GIG</a> <a href="#">Facility radionuclides availability, transfer and migration</a>	<a href="#">RES<sup>3</sup>T</a> <a href="#">INWORKS cohort</a>	<a href="#">Transcriptomics platform SCK CEN</a>
May 2016, #7	<a href="#">LIBIS gamma low dose rate facility ISS</a>	<a href="#">JANUS</a> <a href="#">EPI-CT Scan cohort</a>	<a href="#">CATI</a> <a href="#">The Analytical Platform of the PREPARE project</a>
Jun 2016, #8	<a href="#">Microtron laboratory</a> <a href="#">Nanoparticle Inhalation Facility</a>	<a href="#">UEF Biobanking</a>	<a href="#">HZDR Radioanalytical Laboratories</a>
Jul 2016, #9	<a href="#">Infrastructure for retrospective radon &amp; thoron dosimetry</a>	<a href="#">Chernobyl Tissue Bank</a>	<a href="#">SYMBIOSE</a> <a href="#">Advanced Technologies Network Center</a>
Sep 2016, #10	<a href="#">Alpha Particles Irradiator</a> <a href="#">Calibration Laboratory at KIT</a>	<a href="#">Chernobyl clean-up workers from Latvia</a>	<a href="#">BfS whole and partial body counting</a>
Oct 2016 #11	<a href="#">Changing Dose rate (SU)</a> <a href="#">Low dose rate (SU)</a>		
Nov 2016, #12	<a href="#">Chernobyl Exclusion Zone</a>		
Dec 2016, #13			
Feb 2017, #14			
Mar 2017, #15			
Apr 2017, #16			
May 2017, #17			
<b>Coming soon:</b>			
Jun 2017, #18	To Be Announced	To Be Announced	To Be Announced