





The EIVIC2020 Project "European In-vivo Counting Intercomparison Exercise 2020-2021"

EC Contract ENER/2019/NUCL/SI2.811157

Didier Franck (IRSN, France)

Webinar EURADOS, 04/12/2023

- Background of the project
- Objectives and principal tasks
- Organisation put in place







Background of the Project (and a bit of history ...)

- In 2018, publication by the European Commission (EC) of its Radiation Protection Series <u>Technical Recommendations for Monitoring Individuals for Occupational</u> <u>Intakes of Radionuclides as RP 188²</u>
- This guidance document covers, in-vivo monitoring, dose assessment, quality assurance, and intercomparisons and intercalibrations:
 - In-vivo monitoring techniques are one of the methods used to monitor and assess possible intakes of radionuclides at workplaces within a monitoring programme (workers liable to receive significant internal exposure)
 - Whole body counters are an essential part of emergency preparedness and response plans, as they may allow a fast measurement of the radioactivity potentially incorporated in the bodies of emergency workers during an emergency.
 - For quality assurance of the measurement results, it is essential that the laboratories performing whole body counting regularly participate in suitable interlaboratory comparisons.

² Radiation Protection N° 188, Technical Recommendations for Monitoring Individuals for Occupational Intakes of Radionuclides, Luxembourg, Publications Office of the European Union, 2018, ISBN 978-92- 79-86304-2







2

Objectives :

- (i) To assess the implementation of the individual monitoring requirements in EU Member States based on in-vivo measurements
- (ii) To receive an overview of the performance of in-vivo measurements using whole body counters »

- Given the experience in this domain and a projet already thought in the frame of WG7 of EURADOS to organise in vivo intercomparison, application (Eurados, BfS, IRSN): 13/06/2019
- Acceptation: 26/08/2019







- Project duration: 2 years (obsolete because of the COVID Crisis)
- Participation in the interlaboratory comparison on whole body counting ensuring an appropriate geographical coverage in the EU and beyond:
 - At least one lab per EC member state (in case there is one) and can be extended for some countries
 - Open also to labs from other European countries
- Develpment of a technical Data Base of participating whole body counters, including general information and technical characteristics of the in vivo facilities in Eurpope
- Organisation of a workshop to present results and exchange experience with participants







Structure of the EIVIC project and their Interdependencies

WP 0: Project management

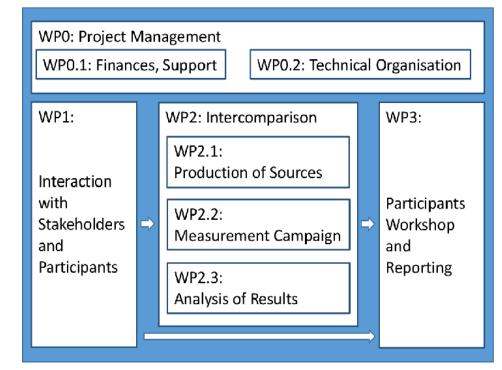
- WP 0.1: Technical organisation
- WP 0.2: Finances, support

WP 1: Interaction with stakeholders and participants

WP 2: Intercomparaison

- WP 2.1: Production of sources
- WP 2.2: Measurement campaign
- WP 2.3: Analysis or results

WP 3: Participants' workshop and reporting









Name	Organisation	Role	
Tiffany BEAUMONT	IRSN	leader WP 2.3	
Werner BUCHHOLZ	BfS	leader WP 2.2	
Didier FRANCK	IRSN	project leader, leader WP 0.2, WP 3	
Kerstin HÜRKAMP	EURADOS	administrative manager	
Maria Antonia LOPEZ	EURADOS	leader WP 1, WP 3	
Oliver MEISENBERG	BfS	deputy project leader, leader WP 2.1	
Juan Francisco NAVARRO AMARO	EURADOS	scientific associate	
Begona PEREZ LOPEZ	EURADOS	scientific associate	
Filip VANHAVERE	EURADOS	EURADOS chairperson	







6

WP1 – Interaction with Stakeholders and Participants

<u>María Antonia Lopez,</u> Juan Francisco Navarro and Amaro Begona Perez Lopez, EURADOS ; Oliver Meisenberg and Werner Buchholz, BfS,

- Establishment of contacts with stake holders and European laboratories performing whole body counting (María Antonia Lopez, EURADOS)
- Constitution of list of participants and sending of official letters to participants (María Antonia Lopez, EURADOS)
- Organisation of virtual meetings with participants (Oliver Meisenberg, BfS)

European Radiation Dosimetry Gro	υρ	EURADOS >		
European Radiation Dosimetry Group e.V. • Post	fach 11 29 + D-85758 Neuherberg	Your reference:		
		Your letter dated:		
		Our retain canada		
		Our reference: Phone number: Fax number:	EURADOS/2020/02/DF +33 (0)1 58 35 78 74	
		E-Malt Date:	didier.franck@irsn.fr 17.01.2020	
nvitation Letter to participate on Whole Body Counting"	n EIVIC2020 - "Organisati	on of a Europ	pean Interlaboratory Comparison	
Dear Sir/Madam.				
	Its aim is to organize the 2	020 Europea	e developed on 2020-2021 (ref n Intercomparison of Whole Body	
hair Werner Rühm; Kerstin Hü	irkamp) together with IRSN- , Werner Buchholz), countin	France (Chair g with the co	osimetry Group, www.eurados.org r Didier Franck; Tiffany Beaumont), ollaboration of CIEMAT-Spain (M.A	
wo brick phantom units simul to the different in vivo laborato			ult male will be transported or sent 020 and summer 2021.	
Please send your answer co before 15 February 2020.	nfirming/refusing particip	ation by e-	mail to EIVIC2020@eurados.org	
urther information regarding the dates proposed (roadmap o			n to be provided by your facility and	
Sincerely,				
44-		_11/=	And the second	
Didier Franck Ph.D.		Maria Ant	onia Lopez Ph.D.	
EIVIC Chair			EIVIC WP1 Leader	
IRSN		CIEMAT Head of Internal Dosimetry Group		
Deputy Head of the Research Dosimetry Department PSE-SANTE/SDOS		Avda. Complutense 40		
B.P. 17 - 92262 Fontenay-aux-Roses Cedex		28040 Madrid, Spain		
-mail didier.franck@irsn.fr		e-mail ma	.lopez@ciemat.es	
Werner Rühm (Chalquerson)	Filip Vanhavere (Vice Chairperson)		EURADOS e.V.	
Helmholtz Zentrum München GmbH Ingelstädter Landstr. 1	SCRINCEN, RDC Boerstang 200		www.eurados.org office/eurados.org	
85764 Neuherberg, Germany Phone: +49 89 3187 3359	2400 Mol, Belgium Phone: +32 14 332859		USt-IdNr. (VAT Reg No.): DE203696163	
wemer zuehim@eurados.org	filip.vanhaverepeurados.org		warestre. (val neg rout treatmen6163	
Certified to be of no	stered in the Register of Associations (Amtag m-profit character (Finanzamt Braurschweig dit Bank AG, D-80311 München - IBAN: DE98	Altewiekring, notify	cation from 2008-03-03).	







Participants

InstitutionCityCountryV/5*SeibersdorfAustriaVSeibersdorfAustriaVLKH University Hospital GrazGrazAustriaVCKCEN Belgian Nuclear Research CentreMolBelgurinVKozloduy Nuclear Power PlantKozloduyBulgariaSUniversity of Zagreb School of MedicineZagrebCroatiaVSURO National Radiation Protection InstitutePragueCzech RepublicVSTS National Institute of Radiation ProtectionHerlevDenmarkVSTUK Finnish Radiation and Nuclear Safety AuthorityHelsinkiFinlandSSPRA French Defense Radiation Protection ServiceClamartFranceCancelledCEA French Alternative Energies and Atomic Energy CommissionSaclagGermanyVUniversity Hospital LeipzigLeipzigGermanyVVUniversity Hospital LeipzigLeipzigGermanyVVTAEAViennaIAEA (Austria)VVSoGINCaorsoItalySSRadiation Protection CentreWiennaIAEA (Austria)VSoGINCaorsoItalySSNational Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSRadiation Protection CentreWiennaSSNRG Nuclear Research and Consultancy GroupKiellerNorwayVITAEASourcear Research and				
LHH University Hospital GrazGrazAustriaVSCKCEN Belgian Nuclear Research CentreMolBelgiumVKozloduy Nuclear Power PlantKozloduyBulgariaSUniversity of Zagreb School of MedicineZagrebCroatiaVSÚRO National Radiation ProtectionPragueCarch RepublicVSURD National Institute of RadiationHerlevDenmarkVST Stational Institute of RadiationIspraEuropean CommissionVSTUK Finnish Radiation and Nuclear SafetyIslinikFinlandSSTUK Finnish Radiation ProtectionClamartFrancecancelledCRANOLa HagueFrancecancelledCRANOLa HagueFranceSCRANODisceldorfGermanyVUniversity Hospital LeipzigDisceldorfGermanyVUniversity Hospital LeipzigElipzigGermanyVUniversity Hospital LeipzigBudapestHungaryVTAEANorwayIthuaniaSSOGINCarosoIthuaniaSRadiation Protection CentreKiplierNorwayVIF Institute of Nuclear ResearchKiplierNorwaySSolan Protection CentreKiplierSlovakiaSRadiation Protection CentreKiplierNorwaySNational Public Health CentreKiplierNorwaySSolan Protection CentreKiplierSlovakiaSRadiation Protection CentreKiplier	Institution	City	Country	V/S*
SCKCEN Belgian Nuclear Research CentreMolBelgiumVKozloduy Nuclear Power PlantKozloduyBulgariaSUniversity of Zagreb School of MedicineZagrebCroatiaVSÚKO National Radiation ProtectionPragueCzech RepublicVSIS National Institute of RadiationHerlevDenmarkVSTUK Finnish Radiation and Nuclear SafetyHerlevDenmarkVSTUK Finnish Radiation and Nuclear SafetyHelsinkiFinlandSSTUK Finnish Radiation ProtectionClamartFrancecancelledServiceCalagueFrancecancelledCRANOLa HagueFranceSServiceJülichGermanyVUniversity Hospital LeipzigLeipzigGermanyVUniversity Hospital LeipzigLeipzigGermanyVTAEAViennaIAEA (Austria)VSOGINCaorsoItalyVSoginKipelerNorwayVIte Institute of Energy and TechnologyKjellerNorwayVSoginCaorsoItalySSNational Public Hearth CentreVilniusItalySSoginCancellerSilveikaSSRadiation Protection CentreVilniusItalySNational Public Hearth CentreKjellerNorwayVSoginCacresoRomaniaSSRadiation Protection CentreVilniusItalySRadiation	Seibersdorf Labor GmbH	Seibersdorf	Austria	V
Kazloduy Nuclear Power PlantKazloduyBulgariaSUniversity of Zagreb School of MedicineZagrebCroatiaVSÜR National Radiation ProtectionPragueCzech RepublicVSIS National Institute of RadiationHerlevDenmarkVFrotectionIspraEuropean CommissionVEC Joint Research CentreIspraEuropean CommissionVSTUK Finnish Radiation and Nuclear Safety AuthorityHelsinkiFinlandSSPRA French Defense Radiation ProtectionClamartFrancecancelledCE Arench Alternative Energies and Atomic Energy CommissionSclayFrancecancelledVUniversity Hospital LeipzigLeipzigGermanyVUniversity Hospital LeipzigLeipzigGermanyVTALA Institute of Centre JülichJülichGermanyVUniversity Hospital LeipzigLeipzigGermanyVTALAViennaJAEAVSSOGINCaosoItalySSolosiKiellerNorwayVENEARomelanNorwayVNational Public Hearth OrbusicandWeiniaSNuclear Research and Consultancy GroupPettenNorwayVITE Institute of Energy and TechnologyKiellerNorwaySNational Centre for Nuclear ResearchMochovceSlovakiaSNuclear Research and Consultancy CoroupSlovakiaSSNational Centre for Nuclear Research <td< th=""><th>LKH University Hospital Graz</th><th>Graz</th><th>Austria</th><th>V</th></td<>	LKH University Hospital Graz	Graz	Austria	V
University of Zagreb School of MedicineZagrebCroatiaVSÚRO National Radiation Protection InstitutePragueCzech RepublicVSIS National Institute of Radiation ProtectionHerlevDenmarkVEC Joint Research CentreIspraEuropeanCommissionVSTUK Finnish Radiation and Nuclear Safety AuthorityHelsinkiFinlandSSPRA French Defense Radiation Protection ServiceClamartFrancecancelledCEA French Alternative Energies and Atomic Energy CommissionSaclayFranceVCRANOLa HagueFranceVVLIA Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigEleipzigGermanyVTAA <hd>Mungarian Academy of SciencesBudapestHungaryVSOGINCaorsoItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVSOGINEnergy and TechnologyKjellerNorwayVIFE Institute of Energy and TechnologyKjellerNorwaySITH-HN Ational Institute of Physics and Muclear EngineeringSnovakiaSAtional Centre for Nuclear ResearchMochovceSlovakiaSIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ResearchMochovceSlovakiaSIFE Institute of Physics and Unclear Engine</hd>	SCKCEN Belgian Nuclear Research Centre	Mol	Belgium	V
Sikro National Radiation ProtectionPragueCzech RepublicVSIS National Institute of RadiationHerlevDenmarkVEL Joint Research CentreIspraEuropean CommissionVEX STUK Finnish Radiation and Nuclear SafetyHelsinkiFinlandSSTUK Finnish Radiation and Nuclear SafetyHelsinkiFinlandSSPRA French Defense Radiation ProtectionClamartFrancecancelledCEA French Alternative Energies and AtomicSaclayFranceSCEA French Alternative Energies and AtomicSaclayGermanyVLIA Institute for Work DesignDüsseldordGermanyVUniversity Hospital LeipzigElejzigGermanyVNational Public Health CentreBudapestHungarySSOGINCaorsoItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and ConsultancyPettenNerwianiaSRadiation Protection CentreVilniusLithuaniaSIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ResearchOtwockPolandSIFE Institute of Physics and Cuclear EngeineringMagureleSiovakiaSIFIN-HIN National Institute of Physics and Cuclear EngeineringMadridSpainSIFIN-HIN Stolage Physics and Cuclear EngeineringMadridSpainSIFIN-HIN Stolage Physics and Cuclear EngeineringMadridSpain </th <th>Kozloduy Nuclear Power Plant</th> <th>Kozloduy</th> <th>Bulgaria</th> <th>S</th>	Kozloduy Nuclear Power Plant	Kozloduy	Bulgaria	S
InstituteHericHericHericPermarkVSTS National Institute of RadiationHericDemarkVEC Joint Research CentreIspraEuropean CommissionVSTUK Finnish Radiation and Nuclear SafetyHelsinkiFinlandSSTUK Finnish Radiation ProtectionClamartFranceCancelledServiceCalmartFranceCancelledCRANOLa HagueFranceCancelledEff French Alternative Energies and AtomSocialGermanyVLIA Institute for Work DesignDisseldorfGermanyVUniversity Hospital LeipzigElejzigGermanyVTAEANulaeryKaeaVVAtANamarySVVSOGINCaorsoItalyaVVRadiation Protection CentreVilniusLithuaniaSRadiation Protection CentreVilniusLithuaniaSRadiation Protection CentreVilniusLithuaniaSTIFLI-HH Mistonal Institute of Physics and MagneleMoreaSAncelledRadiation Protection CentreMochovceSovakiaSSTIFLI-HH Mistonal Institute of Physics and MagneleMoreaSAncelledAtoma Centre Forson RadiationMochovceSovakiaSSTifLi-HH Mistonal Institute of Physics and MagneleMoreaSAncelledTifLi-Histonal Institute of Physics and MagneleMoreaSAncelledS<	University of Zagreb School of Medicine	Zagreb	Croatia	v
ProtectionInternal SectorInternal SectorEC Joint Research CentreIspraEuropean CommissionVSTUK Finnish Radiation and Nuclear SafetyHelsinkiFinlandSSPRA French Defense Radiation ProtectionClamartFrancevORANOLa HagueFrancecancelledCEA French Alternative Energies and AtomicSaclayFranceSFZJ Research Centre JülichJülichGermanyVLIA Institute for Work DesignDüsseldorGermanyVUniversity Hospital LeipzigLeipzigGermanyVNational Public Health CentreBudapestHungaryVSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNtional Centre for Nuclear ReseachOtwockPolandSRG Nuclear Research and Consultancy GroupVeltenNorwayVIFE Institute of Physics and Under EngineeringMagureleSiovakiaSIFUN-HH National Institute of Physics and CompanyMacrialSSIGUASANDELEAR Research AdgeroryUmeåSwedenSIGUASANDELEARWardiaSwedenSSIGUASANDELEARWardiaSwedenSSIFUN-HH National Institute of Physics and CompanySwedenSSIGUASANDELEARWardiaSwedenSSIGUASANDELEARSwedenSSS<		Prague	Czech Republic	V
TUK finnish Radiation and Nuclear Safety AuthorityHelsinkiFinlandSSTUK Finnish Radiation and Nuclear Safety ServiceHelsinkiFinlandSSTAR French Defense Radiation Protection ServiceClamartFrancecancelledORANOLa HagueFrancecancelledCEA French Alternative Energies and Atomic Bergy CommissionSaclayFranceSFZJ Research Centre JülichJülichGermanyVLLA Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigLeipzigGermanyVMTA Hungarian Academy of SciencesBudapestHungarySNational Public Health CentreBudapestHungaryVIAEAKomeItalySSoGINCaorsoItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy roupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandSITIN-HH National Institute of Physics and CompanyMochovceSlovakiaSJAVYS Nuclear and Decommissioning CompanyPatislavaSwedenSITIN-HEI National Defence Research AgencyUmeåSwedenVInversity of LundMalmôSwedenSITIN-HEI Schlare Power PlantViaröbackaSwedenSISI Sufficience Research AgencyS		Herlev	Denmark	V
AuthorityIddIddIddSPRA French Defense Radiation Protection ServiceClamartFranceCancelledORANOLa HagueFrancecancelledCEA French Atternative Energies and Atomic Energy CommissionSaclayFranceSFZJ Research Centre JülichJülichGermanyVL1A Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigEulpzigGermanyVMTA Hungarian Academy of SciencesBudapestHungaryVIAEAViennaItalyVSOGINCaorsoItalySRadiation Protection CentreVilniusLithuaniaSNG Nuclear Research and Consultancy Rouge EngineeringKjellerNorwayVIFE Institute of Energy and TechnologyKjellerNorwaySITIN-HH National Institute of Physics and Nuclear EngineeringMachoveSlovakiaSADYS Nuclear and Decommissioning CompanySuedenSuedenSADYS Nuclear Power PlantVinešSwedenSIniversity of LundVinešSwedenSSIniversity of LundVinešSwedenSSInipals Nuclear Power PlantKairdiaSwedenSSInipals Nuclear Power PlantKairdiaSwedenSSInipals Nuclear Power PlantKairdiaSwedenSSInipals Nuclear Power PlantKairdiaSwedenSSInipals	EC Joint Research Centre	Ispra		V
ServiceIn the serviceIn the serviceIn the serviceORANOLa HagueFrancecancelledCEA French Alternative Energies and Atomic Energy CommissionSaclayFranceSF2J Research Centre JülichJülichGermanyVLLA Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigLeipzigGermanyVMational Public Health CentreBudapestHungarySSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithunaiaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ResearchOtwockPolandSIFUN-HH National Institute of Physics and CompanyMadurelSlovakiaSJAVYS Nuclear and Decommissioning CompanyPatislavaSwedenSIFU Sudsich Defence Research AgencyUmeåSwedenVInversity of LundMalmôSwedenSInversity of LundVaröbackaSwedenVRinghals Nuclear Power PlantKordexSwedenSRinghals Nuclear Power PlantKodeköpingSwedenSRomanySwedenSwedenSSomanySwedenSwedenSSomanySwedenSwedenSS		Helsinki	Finland	S
CEAF French Alternative Energies and Atomic Energy CommissionFranceFranceSFZJ Research Centre JülichJülichGermanyVL1A Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigLeipzigGermanyVMTA Hungarian Academy of SciencesBudapestHungarySNational Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSOGINCaorsoItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNorwayVIFE Institute of Energy and TechnologyKjellerNorwaySITH-HH National Institute of Physics and Nuclear EngineeringMochovceSlovakiaSAVYS Nuclear and Decommissioning CompanySuedenSSITE netsitute of Lenergy PlantMadridSwedenSInversity of LundMalmöSwedenSSInversity of LundKadridSwedenSSInversity of LundKalmaSwedenSSInitro of Power PlantKardiaSwedenSSInitro of Power PlantKar	Service	Clamart	France	V
Energy CommissionInterformInterformInterformFZJ Research Centre JülichJülichGermanyVLLA Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigLeipzigGermanyVMTA Hungarian Academy of SciencesBudapestHungarySNational Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSOGINCaorsoItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupKjellerNorwayVIFE Institute of Energy and TechnologyKjellerNorwaySITIN-HH National Institute of Physics and Nuclear EngineeringMochovceSlovakiaSAVYS Nuclear and Decommissioning CompanySuedenSSITI Suedish Defence Research AgencyUmeåSwedenVIniversity of LundMalmõSwedenVSIniversity of LundKolackaSwedenSSIniversity of LundForsmarkSwedenSSIniversity of LundKolackaSwedenSSIniversity of LundKolackaSwedenSSIniversity of LundKolackaSwedenSSIniversity of LundKolackaSwedenSSIniversity of LundKolackaSwedenSSIniversity of LundKolackaSwedenS<	ORANO	La Hague	France	cancelled
LLA Institute for Work DesignDüsseldorfGermanyVUniversity Hospital LeipzigLeipzigGermanyVMTA Hungarian Academy of SciencesBudapestHungarySNational Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ResearchOtwockPolaniacancelledMuclear EngineeringMagureleRomaniascancelledJAVYS Nuclear and Decommissioning CompanySudakiaSSJJOI Swedish Defence Research AgencyUmeåSwedenSSUniversity of LundMalmôSwedenVSSGinghals Nuclear Power PlantKolrökarkaSwedenSSNaringia Suclear Power PlantKardiaSwedenSSNorinsity of LundKalinôSwedenSSSNaringia Suclear Power PlantKordeköpingSwedenSSSurgenser Kuclear Power PlantKalköpingeSwedenSSSurgenser Kuclear Power PlantKordeköpingeSwedenSSSurgenser Kuclear Power PlantKordeköpingeSwedenS <th></th> <th>Saclay</th> <th>France</th> <th>S</th>		Saclay	France	S
University Hospital LeipzigLeipzigGermanyVMTA Hungarian Academy of SciencesBudapestHungarySNational Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandiaSITIN-HH National Institute of Physics and CompanyMagureleRomaniacancelledJAVYS Nuclear and Decommissioning OmpanyPatislavaSlovakiaSFOI Swedish Defence Research AgencyUmeåSwedenVIniversity of LundMalmõSwedenVRinghals Nuclear Power PlantKorökakaSwedenSForsmark Nuclear Power PlantKorökakaSwedenSBarsebäck Nuclear Power PlantLöddeköpingeSwedenS	FZJ Research Centre Jülich	Jülich	Germany	v
MTA Hungarian Academy of SciencesBudapestHungarySNational Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandSITIN-HH National Institute of Physics and CompanyMochovceSlovakiaSJAVYS Nuclear and Decommissioning OmpanyBratislavaSlovakiaSFOI Swedish Defence Research AgencyUmeåSwedenSUniversity of LundMalmôSwedenVRinghals Nuclear Power PlantSirakaKinghals Nuclear Power PlantForsmarkSwedenSSSomark Nuclear Power PlantKalkopingeSwedenSSSomark Nuclear Power PlantForsmarkSwedenSSSomark Nuclear Power PlantForsmarkSwedenSSBarsebäck Nuclear Power PlantLöddeköpingeSwedenSS	LIA Institute for Work Design	Düsseldorf	Germany	V
National Public Health CentreBudapestHungaryVIAEAViennaIAEA (Austria)VSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandSITEN-HH National Institute of Physics and Nuclear EngineeringMochovceSlovakiaSJAVYS Nuclear and Decommissioning OmpanyBratislavaSlovakiaSFOI Swedish Defence Research AgencyUmeåSwedenSUniversity of LundMalmôSwedenVRinghals Nuclear Power PlantVöröbackaSwedenSFOI Swedish Defence Research AgencyUmeåSwedenSUniversity of LundKalmôSwedenSBarsebäck Nuclear Power PlantLöddeköpingeSwedenS	University Hospital Leipzig	Leipzig	Germany	v
IAEAAViennaIAEAA (Austria)VJAEAViennaIAEA (Austria)VSOGINCaorsoItalyVENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandSIFI-HH National Institute of Physics and Nuclear EngineeringMochovceSlovakiaSJAVYS Nuclear and Decommissioning CompanyBratislavaSlovakiaSFOI Swedish Defence Research AgencyUmeåSwedenVUniversity of LundMalmöSwedenVRinghals Nuclear Power PlantVäröbackaSwedenVForsmark Nuclear Power PlantLöddeköpingeSwedenV	MTA Hungarian Academy of Sciences	Budapest	Hungary	S
AnswinAnswi	National Public Health Centre	Budapest	Hungary	V
ENEARomeItalySRadiation Protection CentreVilniusLithuaniaSNRG Nuclear Research and Consultancy GroupPettenNetherlandsVIFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandSIFIN-HH National Institute of Physics and Nuclear EngineeringMochovceSlovakiaSJAVYS Nuclear and Decommissioning CompanyBratislavaSlovakiaVTecnatomMadridSpainSFOI Swedish Defence Research AgencyUmeåSwedenVUniversity of LundMalmöSwedenVForsmark Nuclear Power PlantForsmarkSwedenSBarsebäck Nuclear Power PlantLöddeköpingeSwedenV	IAEA	Vienna	IAEA (Austria)	v
Radiation Protection CentreVilniusLithuaniaSRadiation Protection CentreVilniusLithuaniaSMRG Nuclear Research and ConsultancyPettenNetherlandsVGroupPettenNorwayVNational Centre for Nuclear ResearchOtwockPolandSIFIE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ResearchOtwockPolandSIFIN-HH National Institute of Physics and Nuclear EngineeringMochovceSlovakiaSMochovce Nuclear Power PlantMochovceSlovakiaSJAVYS Nuclear and Decommissioning CompanyBratislavaSlovakiaSFOI Swedish Defence Research AgencyUmeåSwedenSUniversity of LundMalmöSwedenVRinghals Nuclear Power PlantVäröbackaSwedenSForsmark Nuclear Power PlantForsmarkSwedenSBarsebäck Nuclear Power PlantLöddeköpingeSwedenV	SOGIN	Caorso	Italy	v
NRG Nuclear Research and Consultancy GroupPettenNetherlandsVJFE Institute of Energy and TechnologyKjellerNorwayVNational Centre for Nuclear ReseachOtwockPolandSJFH-HH National Institute of Physics and Nuclear EngineeringMagureleRomaniacancelledMochovce Nuclear Rower PlantMochovceSlovakiaSJAVYS Nuclear and Decommissioning CompanyBratislavaSlovakiaSFOI Swedish Defence Research AgencyUmeåSwedenSUniversity of LundMalmöSwedenVRinghals Nuclear Power PlantForsmarkSwedenSBarsebäck Nuclear Power PlantLöddeköpingeSwedenV	ENEA	Rome	Italy	S
Group Kindle Kindle Kindle Kindle IFE Institute of Energy and Technology Kjeller Norway V National Centre for Nuclear Reseach Otwock Poland S IFIN-HH National Institute of Physics and Nuclear Engineering Magurele Romania cancelled Mochovce Nuclear Power Plant Mochovce Slovakia S JAVYS Nuclear and Decommissioning Company Bratislava Slovakia V Tecnatom Madrid Spain S FOI Swedish Defence Research Agency Umeå Sweden S University of Lund Malmö Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	Radiation Protection Centre	Vilnius	Lithuania	S
National Centre for Nuclear Reseach Otwock Poland S IFIN-HH National Institute of Physics and Nuclear Engineering Magurele Romania cancelled Mochovce Nuclear Power Plant Mochovce Slovakia S JAVYS Nuclear and Decommissioning Company Bratislava Slovakia S Tecnatom Madrid Spain S F01 Swedish Defence Research Agency Umeå Sweden S University of Lund Malmô Sweden V Ringhals Nuclear Power Plant Väröbacka Sweden S Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V		Petten	Netherlands	V
IFIN-HH National Institute of Physics and Nuclear Engineering Magurele Mochovce Romania cancelled Mochovce Nuclear Power Plant Mochovce Slovakia S JAYYS Nuclear and Decommissioning Company Bratislava Slovakia S Tecnatom Madrid Spain S F01 Swedish Defence Research Agency Umeå Sweden S University of Lund Malmô Sweden V Ringhals Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	IFE Institute of Energy and Technology	Kjeller	Norway	V
Nuclear Engineering Mochovce Nuclear Power Plant Mochovce Slovakia S JAVYS Nuclear and Decommissioning Company Bratislava Slovakia V Tecnatom Madrid Spain S FOI Swedish Defence Research Agency Umeå Sweden S University of Lund Malmö Sweden V Ringhals Nuclear Power Plant Vöröbacka Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	National Centre for Nuclear Reseach	Otwock	Poland	S
JAVYS Nuclear and Decommissioning Company Bratislava Slovakia V Tecnatom Madrid Spain S FOI Swedish Defence Research Agency Umeå Sweden S University of Lund Malmö Sweden V Ringhals Nuclear Power Plant Väröbacka Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V		Magurele	Romania	cancelled
Company Madrid Spain S Tecnatom Madrid Spain S FOI Swedish Defence Research Agency Umeå Sweden S University of Lund Malmö Sweden V Ringhals Nuclear Power Plant Väröbacka Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	Mochovce Nuclear Power Plant	Mochovce	Slovakia	S
FOI Swedish Defence Research Agency Umeå Sweden S University of Lund Malmô Sweden V Ringhals Nuclear Power Plant Väröbacka Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V		Bratislava	Slovakia	V
University of Lund Malmõ Sweden V Ringhals Nuclear Power Plant Väröbacka Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	Tecnatom	Madrid	Spain	S
Ringhals Nuclear Power Plant Väröbacka Sweden V Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	FOI Swedish Defence Research Agency	Umeå	Sweden	S
Forsmark Nuclear Power Plant Forsmark Sweden S Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	University of Lund	Malmö	Sweden	v
Barsebäck Nuclear Power Plant Löddeköpinge Sweden V	Ringhals Nuclear Power Plant	Väröbacka	Sweden	V
	Forsmark Nuclear Power Plant	Forsmark	Sweden	S
Rundesamt für Revölkerungsschutz Snigz Switzerland V	Barsebäck Nuclear Power Plant	Löddeköpinge	Sweden	V
Surveyant in Several Unssentice Spice Surveyand V	Bundesamt für Bevölkerungsschutz	Spiez	Switzerland	V

- 35 laboratories were contacted from 21 countries (+ European Commission and IAEA) and were officially registered
- Several laboratories conducted measurements with more than one whole-body counter, so that 41 results were received









Production of Sources and Phantoms

Oliver Meisenberg and Werner Buchholz, BfS (WP 2.1)

- **Objectives:** to simulate measurements that are relevant for the occupational monitoring programmes of individuals exposed to intakes of gamma emitters at the workplace.
 - 4 measurement tasks with a brick phantom of different sizes (P4/70 kg and P5/90 kg) and loaded with various radionuclides were defined:
 - "Victor" (standard nuclides),
 "Emergency", "Medicine", "Calibration
 - Production and qualification of the sources at BfS











Measurement Tasks

- Task 1: ⁶⁰Co, ¹³³Ba and ¹³⁷Cs. Phantom size P4/70 kg (called Victor)
 - Radionuclides frequently used in proficiency tests of whole-body counters because their gamma-ray emissions cover a wide range of energy (80 to 1332 keV) and do not interfere with each other

 Task 2: ¹³⁴Cs and ¹³⁷Cs. Phantom size P5/90 kg (called Emergency)

- Relevant for the monitoring of members of the population after nuclear accidents.
- A metrological challenge when measured with NaI(TI) detectors: correction of the peak area of ¹³⁷Cs at 662 keV taking into account the overlapping contribution of the 605 keV emission of ¹³⁴Cs







Measurement Tasks

- Task 3: ⁶⁸Ge (with its daughter nuclide ⁶⁸Ga in secular equilibrium) and ⁸⁸Y. Phantom size P4/70 kg (called Medicine)
 - > Featuring common radionuclides in nuclear medical diagnostics.
 - The sets of sources were replaced in the middle of the campaign by new sources in the attended tour as well as for the shipment because of the short half-lives of these radionuclides. 2 subtasks created (Tasks 3.1 and 3.2)
 - Difficulties to handle which led to errors in the circuitresulting to several some errors on the circuit

• Task 4: ¹³³Ba and ¹⁵²Eu. Phantom size P4 and P5 (called Calibration)

- Featuring a large variety of gamma-ray emissions over a wide range of energies (80 to 1408 keV)
- Measuring the phantoms of this task enables the participating laboratories to establish an efficiency calibration based on the reported reference activities.
- During all measurement tasks, the phantoms were also prepared with ⁴⁰K rods in order to simulate the natural radiation background of human bodies.







Werner Buchholz and Oliver Meisenberg, BfS, Juan Francisco Navarro Amaro and Begonia Perez Lopez, EURADOS

- Organisation of the circuit for labs: shipment or attended transport
- Realisation of the measurement campaign with attended transport (Werner Buchholz, BfS) in red
- Organisation of shipments (Werner (Buchholz, BfS and Juan Francisco Navarro Amaro, EURADOS) in blue







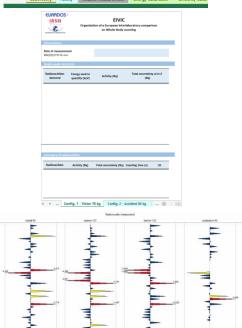


WP2.3 – Collection and Analysis of Results

Tiffany Beaumont and Didier Franck, IRSN ; Oliver Meisenberg BfS

- Collection of technical informations and results centralisation by BfS (BfS Cloud) of the data provided by the participating laboratories (Oliver Meisenberg)
- **Development of a data base** for technical information (Didier Franck and Oliver Meisenberg)
- Data evaluation of results
 According to ISO standards ISO 28 218 and ISO 13
 528 (Tiffany Beaumont)











WP3 – Reporting and Dissemination

Maria Antonia Lopez and Kerstin Hürkamp, EURADOS; Tiffany Beaumont and Didier Franck, IRSN; Oliver Meisenberg, BfS

- **Reporting project status to EC** (Inception reports, Internal Reports, Final report)
- Organisation of a Participants Workshop CIEMAT Madrid, 9 June 2022 and a Webinar (Maria Antonia Lopez and Kerstin Hürkamp, EURADOS)
- Meeting of the Group of Experts referred to in Article 31 of the Euratom Treaty (Tiffany Beaumont, Oliver Meisenberg) Luxembourg 29-30 Nov. 2023
- Publications and communications on the Project
 - Pubishable Reports (EURADOS and RP Report)
 - Journal(s)/conference(s):
 - Lopez et al., ERPW2022 ; Franck et al, Radiat Environ Biophys submitted, Beaumont et al., IRPA (2024)





https://eurados.sckcen.be/news-overview/euradosreport-2023-03-published-eivic-2020-european-vivointercomparison-exercise-2020-organisation-europeaninterlaboratory-comparison-whole-body-counting



