BEOBAL

Methodological and Cooperation Workshop

23-25 October 2005, Blagoevgrad, Bulgaria

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

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Zoran Vučinić, Bsc. Econ.

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

FONDATION

- **PI Center for Ecotoxicological Research of Montenegro (CETI) is founded 1996's in accordance with Government policy, for the purpose to:**
- **Unite the problems of protecting the environment in one institution,**
- **Organize the monitoring of the all segments of environment (air, waters soils, waste, ionizing and non-ionizing radiation, noise measurements etc.),**
- **Organize control of human and animal food and toxicological analysis of all kind of samples, forensic analyses etc.**
- **To concentrate the expensive instrumental equipment and human resources in one institution.**

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

FONDATION

- December 1996 – CETI founded by decision of Montenegrin government
- 1997–CETI starting with acquisition of equipment and education of the staff
- March of 1998 – Officially starting with the job and realization with Program's
- September 2004 – Took the ISO 9001:2000 Certificate and Accreditation under ISO/IEC 17025 in November 2004

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

ORGANISATION SHEME of CETI:

LABORATORY FOR ECOTOXICOLOGICAL RESEARCH AND RADIATION PROTECTION

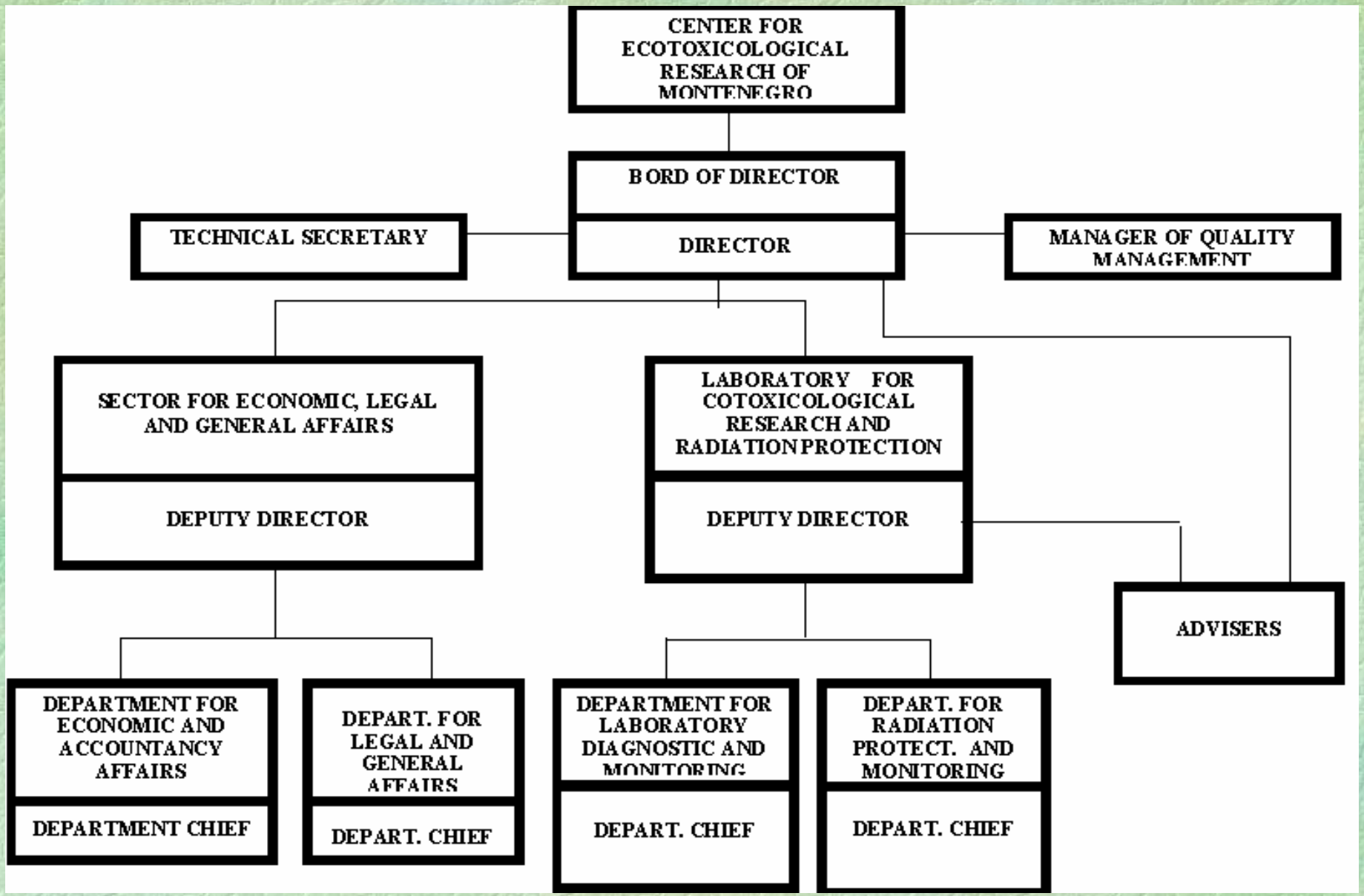
- **I. DEPARTMENT FOR LABORATORY DIAGNOSTIC AND MONITORING**
- **II. DEPARTMENT FOR RADIATION PROTECTION AND MONITORING**

SECTOR FOR ADMINISTRATION

- **DEPARTMENT FOR ECONOMY**
- **DEPATMENT FOR ADMINISTRATION**

Total number of Employs is 63 of permanent staff.

ORGANISATION SHEME:



CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

ACTIVITIES OF THE CENTRE

- **Ecotoxicological research and monitoring of all vital environmental segments: air, surface, underground and sea water, soil, noise and waste, accidents,**
- **Research of ionizing and non-ionizing radioactivity in the environment and working places,**
- **Research of noise and vibration in the vital and working environment,**
- **Measurements of emission at the contamination sources,**
- **Toxicological and expert studies, EIA, projects, programs;**
- **Control and certification of the food and other turnover goods, imported, produced and exported**

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

CENTER LICENCES:

- ISO 9001:2000 Certificate from TUV Bayer SUD-Germany
- Accreditation accordant ISO/IEC 17025 by JUAT is finished in 2004, for: water's analysis, sediment, soil, heavy metals, rad, fish analysis and radioactivity and accreditation by SWEDAK is on a foot in next year.
- CETI is Member of UNEP Global Monitoring Network (GMN) for POP-s
- Member of ALMERA Network IAEA

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

CENTER IS ALSO LICENCES-for:

- Emission control in Air by Ministry of Environmental protection and urban planning,
- Radiation control by Ministry of Environmental protection and urban planning,
- Determination of hazardous Waste by Ministry of Environmental protection and urban planning,
- Control of waters by Ministry of Agriculture
- Food control by Ministry of Health and SCG Ministry of Trade,
- Toxicological analysis by Faculty of Pharmacy-University of Belgrade,

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

STAFF OF THE CENTER:

- **CETI has 63 permanent employs,**

  29 High education,

  18 Technicians

  16 Administrative and other (general) staff

- **STRUCTURE**

  Doctor's: 1 permanently employed , 2 –signatory

  M.Sc's: 3 permanently employed

  Physical chemists, spec.tox.chem:2

  Chemists, spec.sanit.chem:1

  Chemists: 6

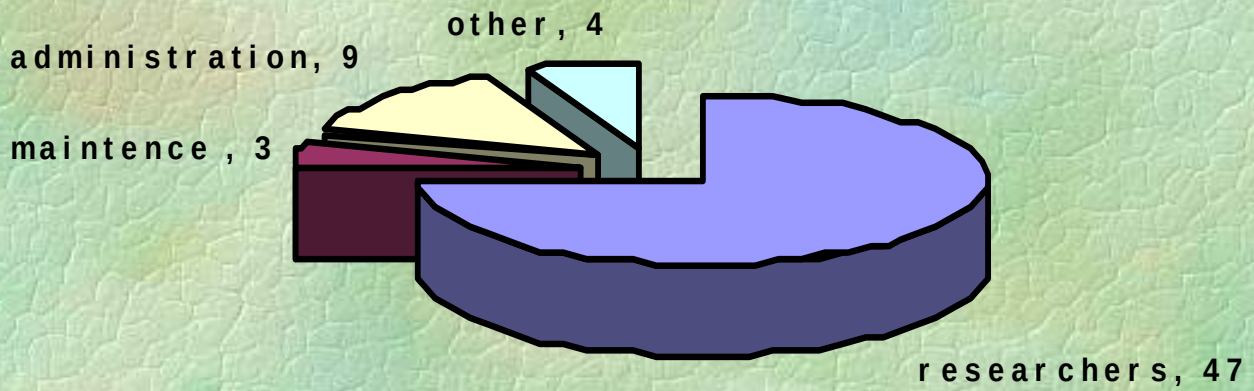
  Technologist's: 14

  Physicists, spec. radio-ecology: 4

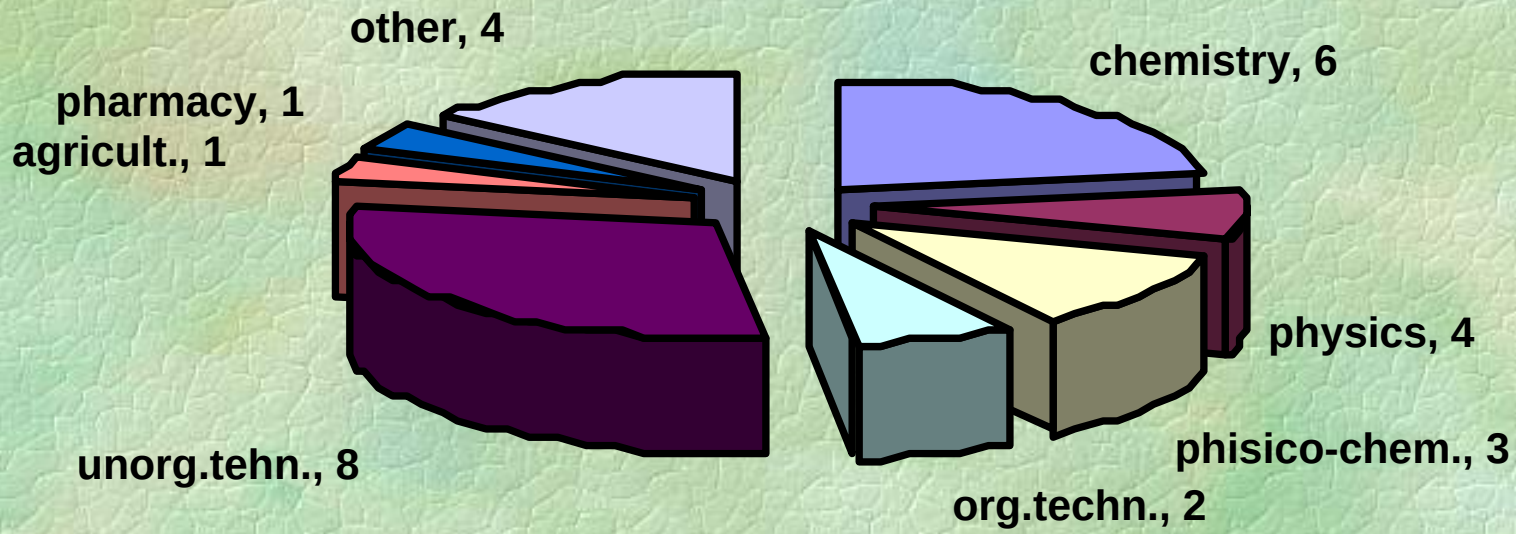
  Chemical, electro and mechanical technicians, : 18

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

EMPLOYEES



RESEARCHES BY BRANCHES



CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

RESEARCH AREA

1. **Air Quality Monitoring and emission measurements**
2. **Surface and underground water Monitoring**
3. **Monitoring of Toxic materials in Soil's**
4. **Waste determination and Waste characterization**
5. **Food and animal feed control,**
6. **Clinical toxicological investigation and forensic analysis**
7. **Occupational toxicology and health protection**
8. **Services for: Inspections, Ministry of interior, Cord's, accidents,**
9. **Projects and Studies, consulting,**

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

CETI from 1998. Year realize next: MONITORING PROGRAMS:

- **PROGRAM OF AIR QUALITY MONITORING IN MONTENEGRO:** 17 Towns on 27 measuring station, 24 h: (SO2, NOx,O3, NH3, Phenols, Form.ald.,fume and soot, H2S, F, PM, Heavy Metal,POP-s and PAH-s)
- **PROGRAM OF SYSTEMATIC INVESTIGATION OF WATER'S QUALITY:** 36 Measuring points on watercourses; 10 on lakes; 20 on underground and 17 on sea cost (56 chemical and toxicological parameters + radiation and microbiology),
- **PROGRAME OF INVESTIGATION OF TOXIC SUBSTACES IN SOIL** : 92 measuring places near landfills and routs and trafo-stations on: Heavy metals, pesticides, PCB-s, PCD-s, PCDD-s and PCDF-s, congeners, PAH-s, mineral oils.(composite samples from points),
- **PROGRAME OF SYSTEMATIC INVESTIGATION OF RADIONUCLIDES** :background radiation 365 day/y;Radio-nuclides in air, Lakes 4/y; Sea water by Gamma spectrometry 2/y; marine bio-indicators 2/y; precipitations 12/y, Drinking waters, Human food, Animal feed, building materials, content of radio-nuclides in soil on 8 locations, Radon map.
- **PROGRAME OF NOISE MONITORING**

I. DEPARTMENT FOR LABORATORY DIAGNOSTIC AND MONITORING

Program of systematic air quality control include:

- **Systematic monitoring of imission of basic and specific pollutants in urban and industrial areas** in 17 settlements (on 21 parameter: SO2, NOx, O3, fume and tar, dust (total PM), total sed.meters, phenols,formaldehyde, H2S, Heavy metals in PM and Sed. meters (Cu,Fe, Cr, Cd, Ni, Zn, Mn, Pb,As,Hg,) and POP-s (PCB-s PCT-s, PCDD-s, PCDF-s, PAH-s)
- **Monitoring of the rainfall quality** in 17 measuring sites on 26parameters, (pH, conductivity, SO4, Cl, NO2, NH3, Na, K, Ca, Mg,Cu, Ni, Cr,Zn .Cd, Pb,As,Hg, PAH-s PCB-s, O.Ch.pesticides)
- **Imission of air pollutants from the motor vehicles exhaust gasses** in 19 urban areas in 35 measuring sites by mobile monitoring vehicle, (HORIBA), permanent with 15 senzors , PC and wind- rose.
- **Monitoring of the influence of polluted air on biological material and bio indicators**.(deposition and bioacumulation of Heavy metals)
- **Measurement of the transboundary air and radiation pollution** on the EMEP stations on two places.

I. DEPARTMENT FOR LABORATORY DIAGNOSTIC AND MONITORING

MONITORING STATIONS

Settlement	Location of station	Latitude	Longitude	Altitude m. a. see	Type of Station
Bar	Hospital	42 º 6’	19º6’	4	Urban/trafic
Berane	Trafostation	42 º50’	19º52’	700	Urban/trafic
Kotor	Port of Kotor	42º26’	18o 46’	1	Urban/trafic
Mojkovac	Center			650	Urban/trafic
Niksic	Center	42º46’	18o 56’	600	Urban
Pljevlja	Center	43º21’	19o 21’	720	Urban/trafic
	Komini	“	19o 21’	780	Industry
Podgorica	CETI	42º26	19o 18’	45	Urban/traffic
	D. Gorica	“	19o 16’	45	Industry /traffic
	Srpska	“	19o 17’	35	Urban/Industry
	Konik	“	19o 12’	45	Urban/trafic
Rozaje	Hospital	42º51’	20º10;	500	Urban
Herceg Novi	Center	42º27’	18o 33’	10	Urban
ZABLJK	HM Station	43º9’	19o 18’	1450	Urban/environm/

I. DEPARTMENT FOR LABORATORY DIAGNOSTIC AND MONITORING

AIR POLLUTION MONITORING

- **Analysis of :SO2, NOx, O3, Fume and smoke, NH3, F, H2S, Formaldehyde, Phenols**
- **Particular matters: PM 2,5 and PM 10, Total amount, Heavy metals in PM (Cd, Pb, Hg, As, Cu, Cr, Ni, Al, Fe, Mn, Zn)**
- **Particular matters: PAH-s and POP-s in PM**
- **Total sediment matters: Heavy metals and POP-s**
- **Rainfalls quality and heavy metals and POP-s in monthly rainfalls**
- **Uraban Air Quality by mobile monitoring vehicle (SO2, NO, NO2, NOx, CO, CO2,CH4, CHx , Tot.CH, O3, PM, Meteorological parameters.**

I. DEPARTMENT FOR LABORATORY DIAGNOSTIC AND MONITORING

INSTRUMENTAL EQUIPMENT FOR SAMPLING OF AIR AND P.M. :

- **F&J High volume sampler,Model T8400E, 70cubic feet/min…….3 pcs.**
- **AT 2000, "Proekos", 170 m3/h……5pcs**
- **AT 908x, , "Proekos", Automatic 8 day sampler, 24h, 21 l/min…….52**
- **AT 201-2 , "Proekos", Automatic 2day sampler, 24h, 21 l/min… ….4**
- **AT 201-4, "Proekos", Automatic 4 day sampler, 24h, 21 l/min……4**

"Proekos" is private producer from Serbia, attested on Military-Technical institute in Belgrade.

- **CETI expect provision of new F& J High volume sampler for radioactivity measurements, and additional PM-10 and PM-2,5 samplers for sampling of particular meters.**

I. DEPARTMENT FOR LABORATORY DIAGNOSTIC AND MONITORING

SAMPLING

1. AT2000 HVP"Proecos

Air is drown trough a Glass mycrofibre filter MN GF/A Watman or Watman 42 (blue), O100mm

Pore size:0-10μ; particle retention 0,7μm

Flow rate: 60m3/h (1000 LPM)

Control of work: electronically-programmable

Time of sample collection:2-24h.

2. F&J HVP

Air is drown trough a Charcoal filter MN GF/A or FP40 ; O102mm

Pore size:0-10μ

Flow rate: optimal :20CFM or 566 LPM ; possible:183-1980 LPM

Control of work: electronically-programmable

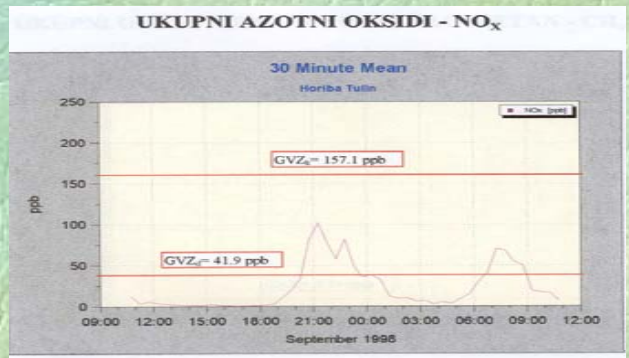
Time of sample collection:0 -24h.

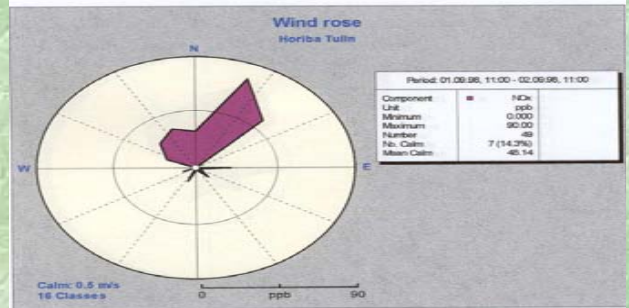
Usual sampling volume of air: 100-300m3


13/05/2005


AIR QUALITY
MONITORING
STATION
HORIBA
NIROSHI
07/10/2005


07/10/2005


UKUPNI AZOTNI OKSIDI - NOx
30 Minute Mean
Horiba Tulln
GVZ8= 157.1 ppb
GVZd= 41.9 ppb
ppb
September 1998


Wind rose
Horiba Tulln
N
W
E
Calm: 0.5 m/s
16 Classes
ppb


ICPS
17 5 '01


AAS
5/2005


GC-CD
17 5 '01


GC-17A
GC-FTD

GCMS

TOC

HPLC

FIA-IC

CETI's PREPARATORY LABORATORIES

SPECTROMETRY, TLC CHROMATOGRAPHY AND FIA

II. DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

Department for Radioecological research and monitoring already four years realize the Program of systematic EVALUATION of radionuclide contents in Montenegro. The Government of Montenegro finances this Program. The Program has been always performed in accordance with prescriptions and demands given in domestic low regulations OG FRY (1997) and OG FRY (1999).

The Program of research of radionuclides:

- **Research of the level of external radiation,**
- **Research of radionuclides in air, solid and liquid rainfalls, lakes and sea-water, soil, drinking waters, human and animal food,**
- **Exposure to ionisation radiation-radon in living and working plaices.**
- **Research of radionuclides in building materials and refractory.**
- **Program of making Montenegrin radon map, calculation of effective doses, founding of critical points.**

II. DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

1. **Measurements of doses from background radiation**, are performed in the three following ways:

- 365 days, 24 hours a day monitoring of the absorbed dose-rate with the PCRM system.
- Every day measurement (at noon) of the absorbed dose-rate with the TOL–F air equivalent gamma-probe.·
- 6-months long measurement of the cumulative absorbed dose in towns of Bar and Podgorica with TLD.

2. **Measurement of radionuclide contents in air** - daily sampling, and summary month **sample is analyzed.**
3. **Measurement of radionuclide contents in Skadar Lake – quarterly samples.**
4. **Measurement of radionuclide contents in sea water,** include:

- Gamma spectrometric analyses of seawater, from near Bar and Herceg Novi – summary monthly samples.
- Gamma spectrometric analyses of bio indication organisms – two times per year.

5. **Measurement of radionuclide contents in drinking water** – quarterly samples.
6. **Measurement of radionuclide contents in precipitation** – summary month samples.

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

7. Measurement of radionuclide contents in human food – practically all types of food is analyzed.
8. Measurement of radionuclide contents in cattle feed.
9. Measurement of radionuclide contents in building materials.
10. Measurements of radionuclide content in soil,
11. Radon measurement in dwelling and working places
12. Program of making Montenegrin Radon map, calculation, of effective doses, founding critical points

ANALIZED RADIONUCLIDES:

Radioecological investigation comprise analysis of the:

1. Terrestrial Radionuclides- naturally occurring (40K, 226Ra,232 Th, 235U and 238U)
2. Cosmogenic origin Radionuclides,- 14 C, 3H, 7 Be
3. Antrophogenic Radionuclides- 137 Cs, 134Cs, 90 Sr , 131I, 129I, 99 Tc and DU and 239 +240 Pu in the surrounding of the Cape Arza which was attacked during bombarding in 1999.

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

OTHER RESEARCH AREAS:

- **Project of decontamination of the contaminated site on Cape Arza with depleted uranium -DU (2000- 2002year). Complete decontamination is already finished and controlled by UNEP mission.**
- **Dosimetry and Gamma spectrometry control of the imported goods,**
- **Dosimetry controls of radiation sources in public places, such as fume detectors.**
- **Participation in REC-REReP 1.7 Project: *Strenghtening National Environmental Protection Agencies and their Inspectorates in SEE trough the creation of regional "Balkan Environmental Regulation compliance enforcement Network"-BERCEN***
- **Participation in IAEA ALMERA Network proficiency testing,**
- **IAEA ALMERA Network member,**
- **IAEA Project: Prevention of illicit trafficking of radioactive and nuclear material in Serbia and Montenegro**

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

PROJECTS WITH IAEA

- **"Testing the efficiency and uncertainty of sample processing for analysis of food contaminants in the Center for Ecotoxicological research of Montenegro, IAEA research Contract 12623 (RBF)**
- **" Marine Environmental Assessment of the Mediterranean Sea", IAEA, RER/7/003**
- **"Air Pollution Monitoring in the Mediterranean Region,"IAEA RER/8/009**
- **" Quality Control Methods and Procedures for Radiation Technology",**

  IAEA, RER /8/010
- **"Strategic Planning for management, Self-reliance of National Institutions" IAEA, RER/0/023**
- **"Search, Location of Orphan Radioactive Sources", IAEA, RER /9/073**
- **IAEA Project:"Prevention of Illicit trafficking of radioactive and nuclear material in Serbia and Montenegro"**
- **Personal Dosimetry in Montenegro, National TC Project 2005-2007 y.**
- **"Quality control Methods and procedures for Radiation Techniques, RER/7/002**

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

PARTICIPATION CETI IN OTHER PROJECTS

- " Nuclear Science for sustainable Environment and Security"- BEOBAL Project with INRNE BAS, Institute from Bulgaria,
- " RIMAWA'' Project, with "Euro –Mediterranean Observatory on Risk Management" Group.
- "Integral management of the Skadar Lake", Ministry of Environment of Montenegro", WB Project,
- In 2002-2003 CETI was participated in Project" Integral Monitoring of Skadar Lake" with Heidelberg Rectors Conference-HRK, Health Institute from Heidelberg "SPMD techniques for POPP-s investigation in Skadar lake"
- Possibility to be incorporate in ADIACOSM Project of INGV Institute from Bologna-Italy, trough Adriatic –Ionic Initiative.
- MEDPOL Regional Project for Cooperation in Adriatic See

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

EQUIPMENT :

Laboratory for Radioecological Researches is well equipped for different types of radioactivity measurement.The following modern and sophisticated instruments are used to perform measurements for the Program of systematic radioecological survey:

- **ORTEC low background gamma-spectrometer with HPGe detector (coaxial, with efficiency of 40 % and resolution of 1.80 keV for 1.33 MeV of 60Co).**
- **ORTEC low background gamma-spectrometer with HPGe detector (coaxial, with efficiency of 35 % and resolution of 1.72 keV for 1.33 MeV of 60Co).**

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

- Genitron AlphaGUARD system for radon measurements (pulse ionization chamber with an active volume of 0.56 L). System includes accessories for field measuring of radon concentrations in soil, water, calibration chamber of 100 liters volume, multi-sensor unit.

4. Thomson & Nielsen system for radon progeny measurements (alpha particle sensitive microchip).
5. Durridge RAD 7 system for radon and thoron measurements (0.7 L sample cell with a solid-state, ion-implanted silicon alpha detector).
6. Berthold TOL–F dosimetry system with 3 probes (gamma, alpha-beta, beta-gamma).

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

7. KOMO-TL contamination monitor. The detector is a Geiger-Müller tube of the pancake type S8 (Russian made), designed to register contamination with ? and ?-ray emitting radionuclides.
8. PCRM – radiation monitor on the basis of Geiger-Muller tube and personal computer.
9. MINI 6100 personal dosimeters.
10. Eberline FHT 770 S alpha - beta counter.

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

SOFTWARES

Spectrum analysis is performed using ORTEC's Gamma Vision software. Radionuclide activity is determined using a relative method with comparison to the well-documented standard sources, or using an absolute method and the appropriate software ANGLE (Jovanovic et al.1997).

STANDARDS

Radiation Protection and Monitoring Department posses set of standards of different type, geometry and density necessary for normal work of Laboratory. By types standards are:

1. Point source standards, produced by Czech Metrological Institute: 57Co;60Co;88Y;133Ba;137Cs;152Eu.
2. Laboratory posses set of calibration multi standards of different geometry, volume, matrixes, densities and different radionuclide mixes. Our standards are produced by Czech Metrological Institute and IAEA LABORATORIES SEIBERSDORF.

Geometries: Marinelli beaker of 1 and 0.5 liter volume. Cylindrical beaker of 0.2 l.

Matrixes: Silicone rubber, 4M HCl, soil.

Densities: 1.0 g/cm3; 1.06 g/cm3; 1.22 g/cm3

Radionuclide mixes:

1. 241Am, 133Ba, 109Cd, 139Ce, 57Co, 60Co, 137Cs, 54Mn, 113Sn, 85Sr, 88Y
2. 139Ce, 57Co, 60Co, 137Cs, 203Hg, 113Sn, 85Sr, 88Y
3. 241Am, 109Cd, 139Ce, 57Co, 60Co, 137Cs, 113Sn, 85Sr, 88Y, 113Hg 57Co, 60Co, 65Zn, 134Cs, 137Cs,41Am

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

METHODOLOGY

All sampling, sample measurements and analyzes are performed in accordance with the standard methods described in:

1. IAEA (1989) Measurement of Radionuclides in Food and the Environment – A Guidebook, IAEA
2. Technical Reports Series No. 295. International Atomic Energy Agency, Vienna.

EML (1997) Procedures Manual HASL 300, 28 Edition. U.S.

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

DOSIMETRY

Equipment for Dosimetric investigation and measurements is the most equipped part of our Laboratory.

1. **Bicron Analyst**, portable analyzer with scintilation detector NaI(Tl) (3x3)".
2. **Victoreen 190 SI** dosimetry system with 2 probes:

- Probe 489 - 120 NaI (2x2)", scintillator optically coupled to PMT.

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

3. Berthold TOL–F dosimetry system with 3 probes:

- **Probe LB 1321 gamma air equivalent**. Energy range from 10 keV to 7 MeV.
- **Probe beta – gamma LB 1231** - Xenon filed. This probe has the ß?-detector LB 6357, which is a large-area proportional counter tube filled with xenon gas.The counter tube window is made of a titanium foil of 5 mg/cm2 density. The effective area of the tube is 160 cm2. Because the ß?-detector cannot distinguish between these types of radiation, the displayed count rate is the sum of ß and ?-radiation induced pulses per unit of time.
- **Probe alpha – beta LB 1232** - Butane filed. The probe has a large-area butane-filled proportional counter tube. An extremely thin foil (0.3 mg/cm2) seals the counting chamber. The effective area of the tube is 160 cm2.

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

4. **KOMO-TL contamination monitor**. The detector is a Geiger-Müller tube of the pancake type S8 (Russian made), designed to register contamination with beta and gama ray emmiting radionuclides.
5. **PCRM – radiation monitor on the basis of Geiger-Muller tube** and personal computer.
6. **MINI 6100 personal dosimeter.** Detector is energy compensated halogen quenched GM tube.
7. **α/ß MEASUREMENTS-**For measurement of gross alpha - beta activity in vide range of samples we use Eberline FHT 770 S alpha - beta counter. **Calibration sources: 90Sr, 241Am, produced by CZECH METROLOGICAL INST.**

II DEPARTMENT FOR RADIATION PROTECTION AND MONITORING

RADON MEASUREMENTS

In Radiation Protection and Monitoring Department we use both main measuring technickques, for active and passive radon measurements.

Equipment for Active Radon Measurements:

1. **Genitron AlphaGUARD system** for radon measurements (pulse ionization chamber with an active volume of 0.56 L).
2. **Durridge RAD 7** system for radon and thoron measurements with a solid-state, ion-implanted silicon alpha detector.
3. **Passive Radon Measurements**

Passive radon measurements we perform using CR 39 Nuclear Track Detectors. This radon detection method primarily we use for purposes of realization of Project: Radon in Dwellings of Montenegro.

Radon Calibration Sources

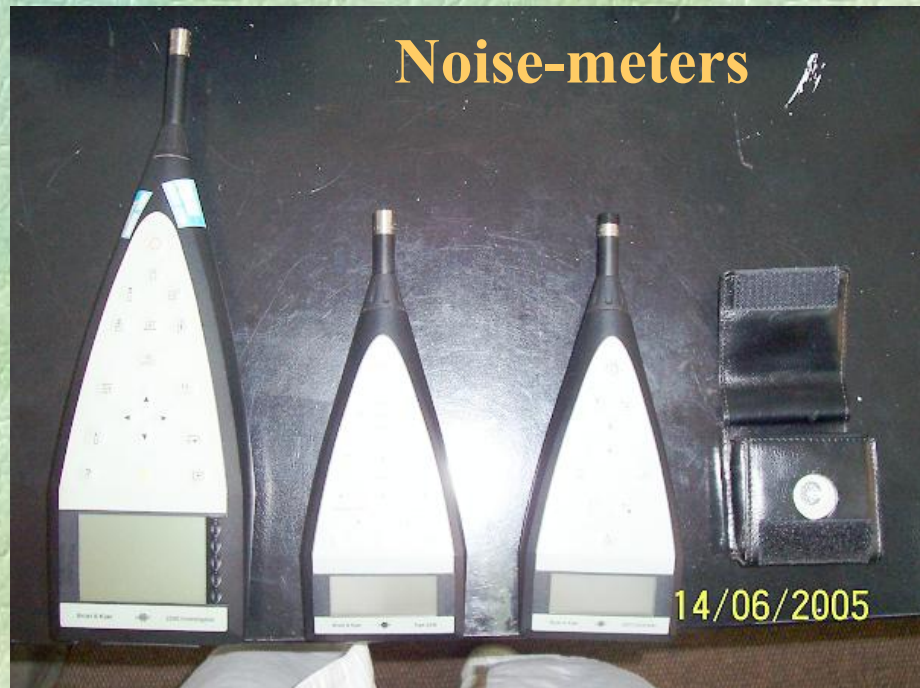
Radiation Protection and Monitoring Department posses complete set of standards of different type, necessary for calibration of all measuring devices used in Laboratory.

Standards are: NIST SRM 4396 226Ra; Pylon type RN 2000 A 226Ra; Calibration source for TN – WL 02, S/N 0852 230Th; Genitron type S/N 9806RA1 226Ra.

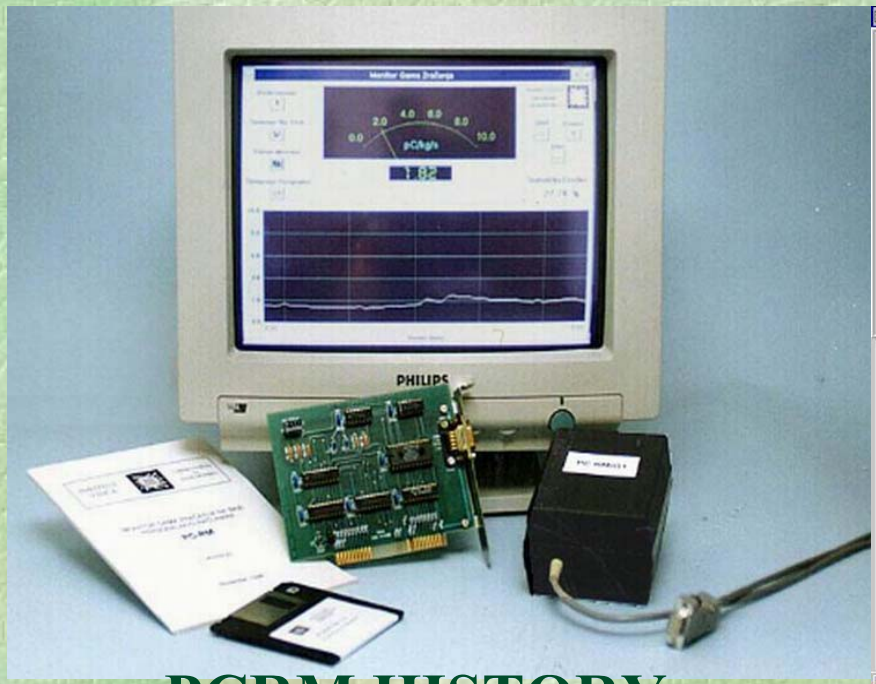

14/06/2005
Gama spectrometry


AquaKIT
RADON
14/06/2005
Radon equipment

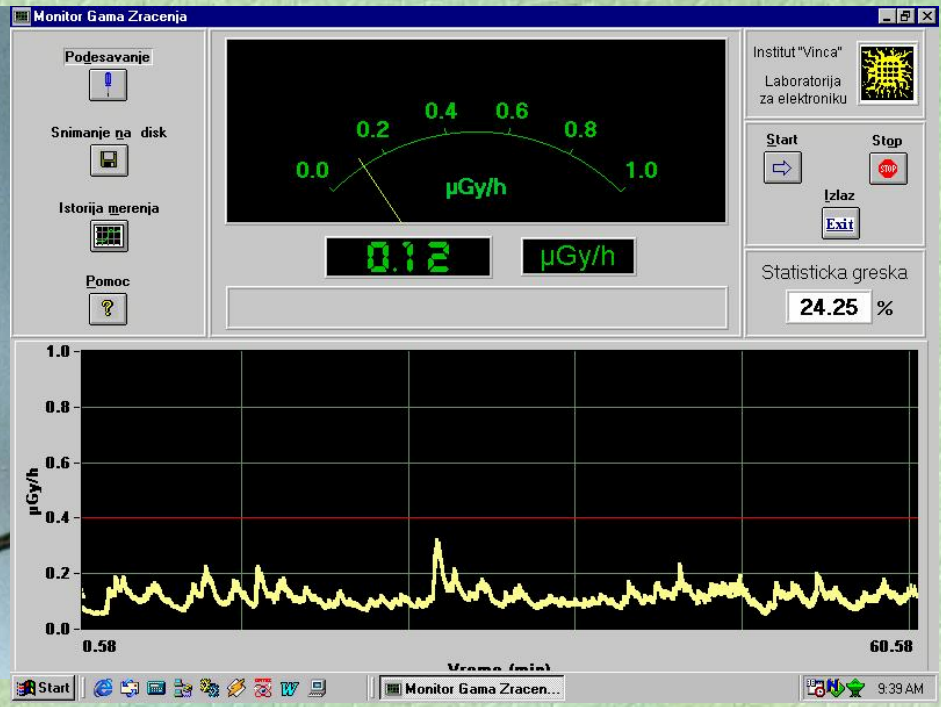

DOZ
14/06/2005
Dozimetry


Noise-meters
14/06/2005

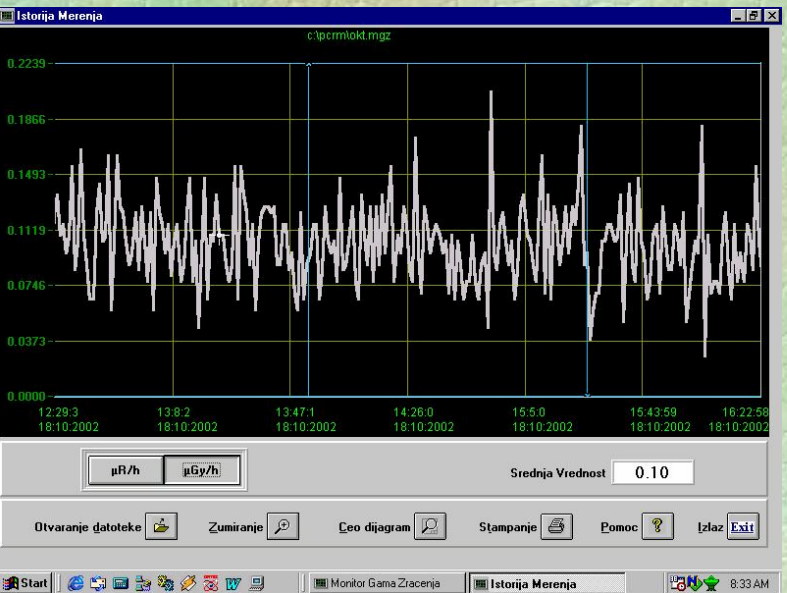
PCRM MONITOR



PCRM MEASUREMENTS



PCRM HISTORY



CALIBRATION STANDARDS

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

OBJECTIVS and GOALS

- **To participate in International Collaboration and Network of the BEO Center of Excellence Research Infrastructure**
- **To broad and enrich of international cooperation,**
- **To advance the existing monitoring of ecosystem processes,**
- **To develop and advance methodology, technology and metrology**
- **To advance Humane Resources in environmental management**
- **To be involve in the active science communication**
- **To participate in application and development of advanced Management system/**

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

PROPOSAL FOR CETI'S PARTICIPATION

Upgrading the existing Environmental Laboratory and HM station on High Mountain Durmitor in Zabljak on 1450m as West Balkan Station

- Provision and installation of new gamma background detector for low dose rate.
- Installation of neutron gas counter
- Provision and installation of Rn low level analyzer,
- Provision and installation of α-background scintillation detector and α- spectrometer
- Provision and installation of the gas concentration monitoring analyzers for O3, NO, NO2, Nox, Sox,CO, Pb, and aerosols collection devices for PM2,5 and PM10(cascade impactor)
- Improvement of computer network and connection with CETI and BEO CoE.
- Upgrading of the collection of meteorological data's..

CENTER FOR ECOTOXICOLOGICAL RESEARCH OF MONTENEGRO

OTHER OBJECTIVS and GOALS

- To rise significantly the level of the instrumental analysis of the Radionuclides and Gas analysis in CETI,
- To upgrade instrumental capabilities of the laboratory of CETI and rise the professional level of the young staff trough education, trainings in the research centers.
- To broad the size of the Accreditation under ISI /IEC 17025 Standard and to obtain ISO 14000 Standard and to establish QC/QA program for new nuclear instrumental techniques (Gas neutron analysis, Alpha Spectrometry,etc)
- To develop and implement advanced methodology, technology and metrology.
- Participation in joint experiments and exchange of the results-inter-laboratory tests for α, β, and γ spectrometry, aerosols etc.

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THANK YOU FOR YOUR ATTENTION