EEAE ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΑΤΟΜΙΚΗΣ ΕΝΕΡΓΕΙΑΣ
GREEK ATOMIC ENERGY COMMISSION

Environmental Radioactivity

Monitoring Activities in GREECE

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Euratom Art. 35-36 Experts' Meeting 2018

Greek Atomic Energy Commission

Regulatory authority in Greece

- Competent authority for the control, regulation and supervision in the fields of nuclear energy, nuclear technology, radiological, nuclear safety and radiation protection.

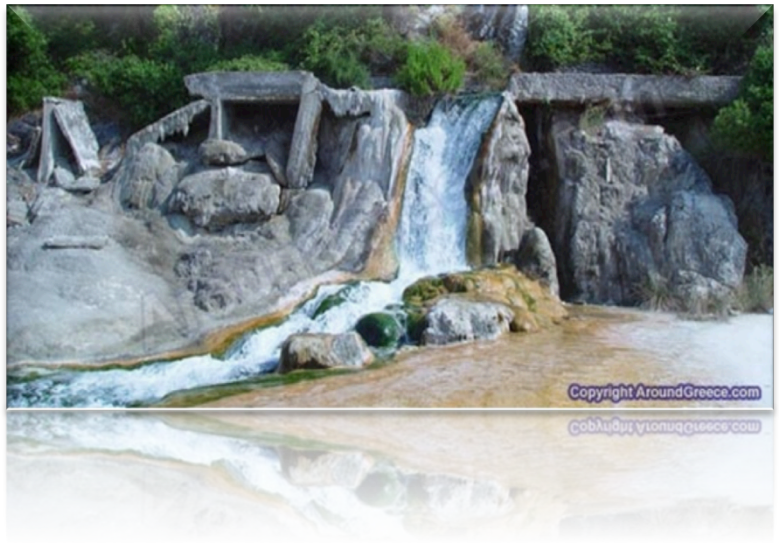
- Public entity (Legal person of public law)

Activities

- Legislative and regulatory work
- Inspections and licensing of facilities/activities
- Individual monitoring of occupationally exposed workers
- Calibration of ionizing radiation instruments
- **Environmental radioactivity monitoring**
- Preparedness and response to radiation emergencies
- Combating of radioactive materials illicit trafficking
- Education and training
- Research and development
- International relations
- Public information

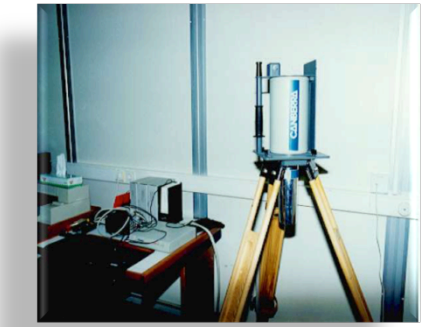
Environmental Radioactivity Monitoring Programme

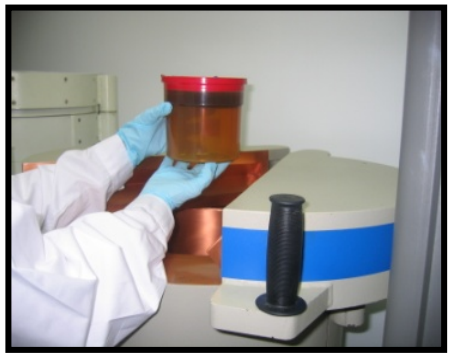
- Telemetric network (air, aerosol)
- Airborne particulates, milk, mixed diet, water, fallout
- Drinking water monitoring (2013/51/EURATOM)
- Surface water (rivers & lakes)
- Imported food stuffs
- Spring water monitoring (U-isotopes, ^{226}Ra, Radon)
- Greek research reactor monitoring
- Measurements of NORM samples
- Inspections in entrance points (customs)
- Imported scrap & final product
- Emergency response



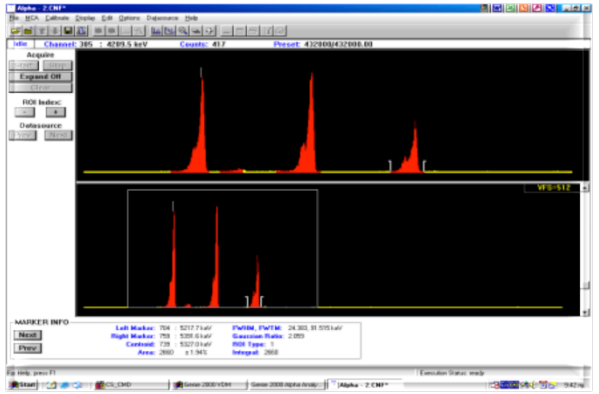
EEAE Infra-structure

- Telemetric network for radioactivity monitoring
- Gamma-spectroscopic system: 2 HPGe (70% & 50% low energy)
- Alpha-spectroscopic system :12 chambers PIPS
- Total α/β : 1 proportional counter
- Liquid scintillation counter
- In situ γ-spectroscopy: 2 HPGe (20% & 50% low energy)
- Mobile laboratory: HPGe 30%, proportional counter, etc.
- Portable XRF unit
- Fully equipped radiochemical laboratory
- Whole body counter, thyroid uptake
- Radon measurements

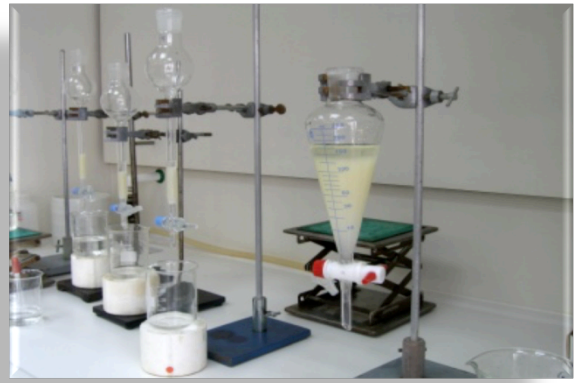




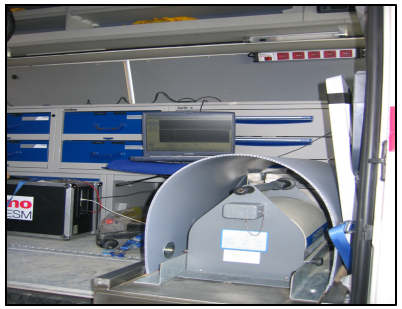
Laboratory Measurements

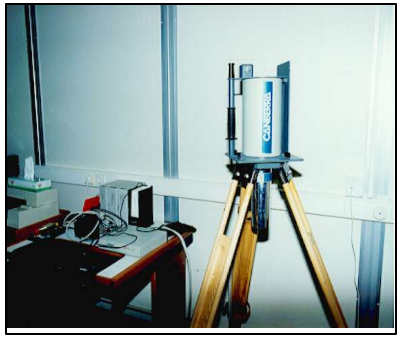


- Gamma spectrometry (in situ / laboratory)
- Alpha spectrometry (U-isotopes, Th-isotopes, ^{241}Am, ^{239}Pu, ^{238}Pu, ^{226}Ra, ^{210}Po)
- Radon concentration measurements
- Total alpha/beta measurements
- Liquid scintillation (^{3}H, ^{14}C, ^{90}Sr, ^{210}Pb, Radon)



In-situ Measurements





In-situ measurements are usually included in the environmental radioactivity monitoring programme.

In situ measurements are performed for:

1. *the qualitative and the quantitative determination of a potential radiological contamination,*
2. *the radiological inspection of scrap metals,*
3. *the in-situ characterization of the materials and*
4. *the characterization of places during decommissioning activities.*

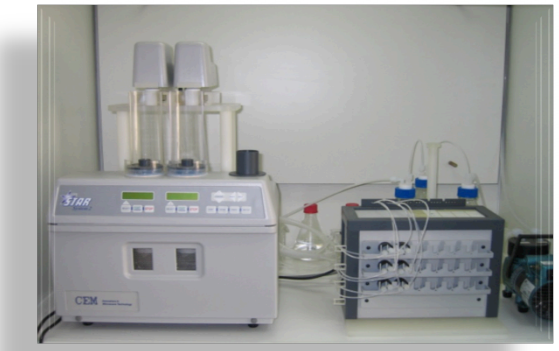
Measuring Devices in EEAE

AANALYST chamber

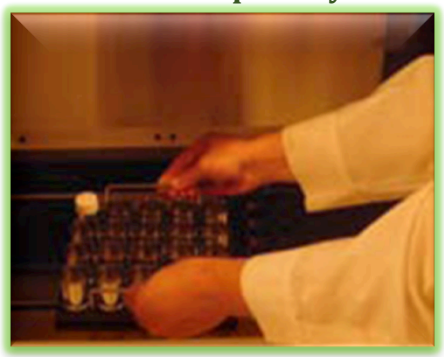
AANALYST

GERMANIUM DETECTOR

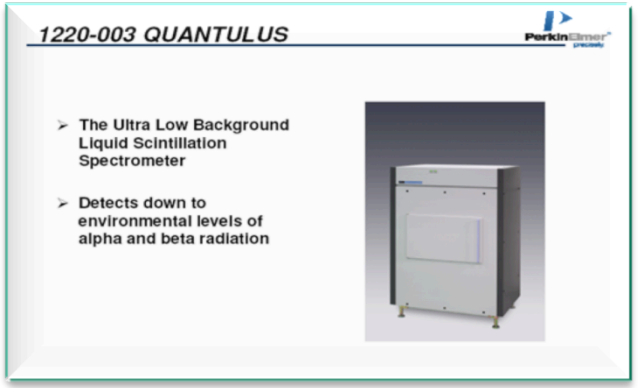
Microwave digestion



LSC sample tray



LSC counter



Radon Measurements

Measurements of indoor radon concentration in dwellings and workplaces by the use of

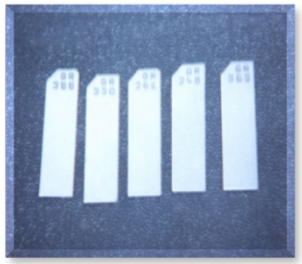
- passive radon dosimeters
- electrets

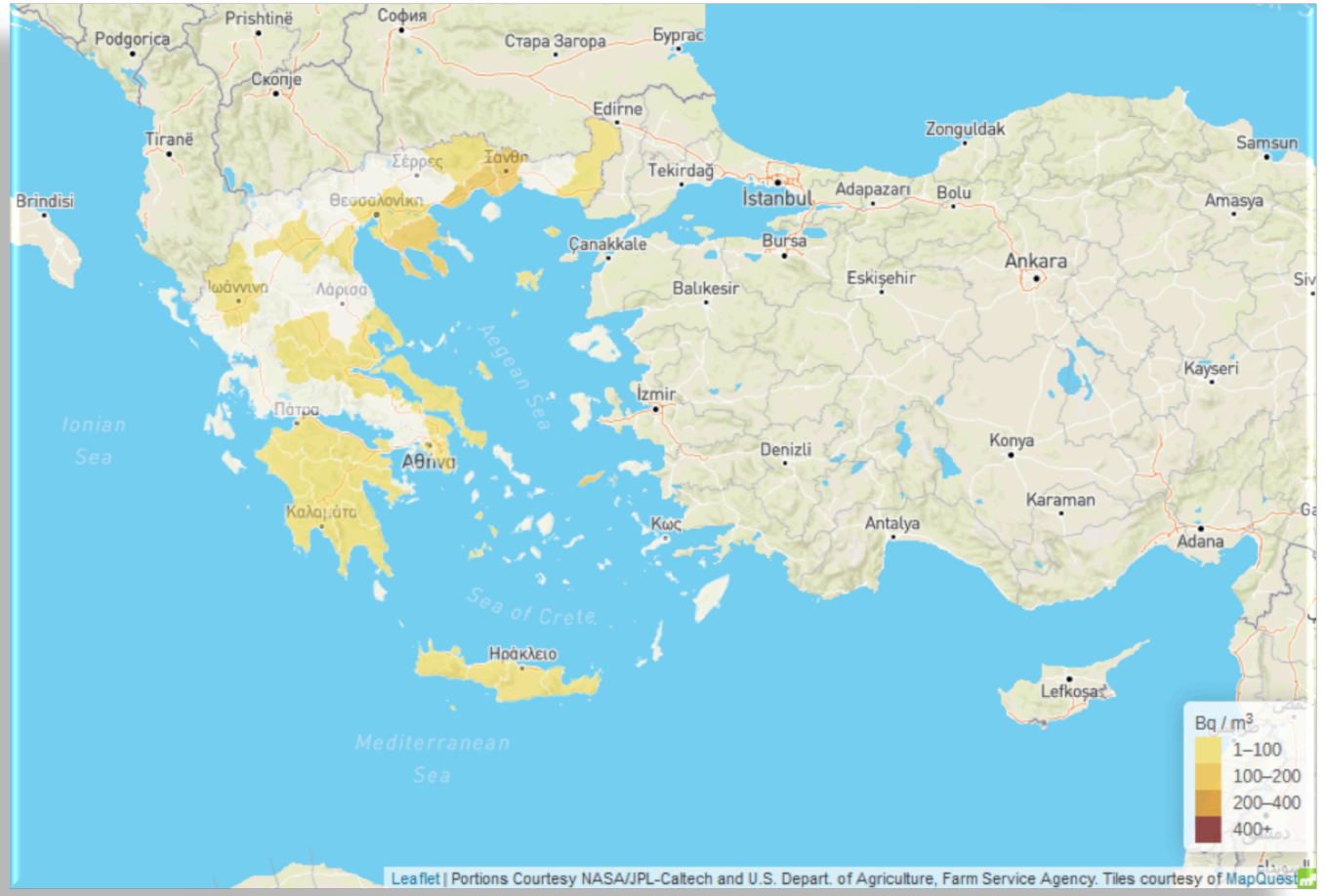
Measurements of radon concentration in water (LSC)

The Radon Laboratory performs measurements of indoor radon concentrations in dwellings and workplaces by the use of passive radon dosimeters. The radon dosimeters are consisted of a CR-39 alpha track detector material supplied by the Track Analysis System Ltd (TASL) of Bristol and the black SSI radon holder.

RML's Radon dosimeters

Radon detectors





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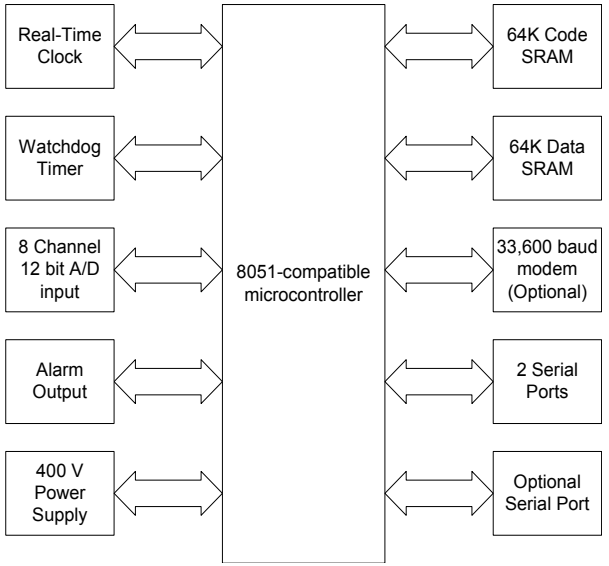
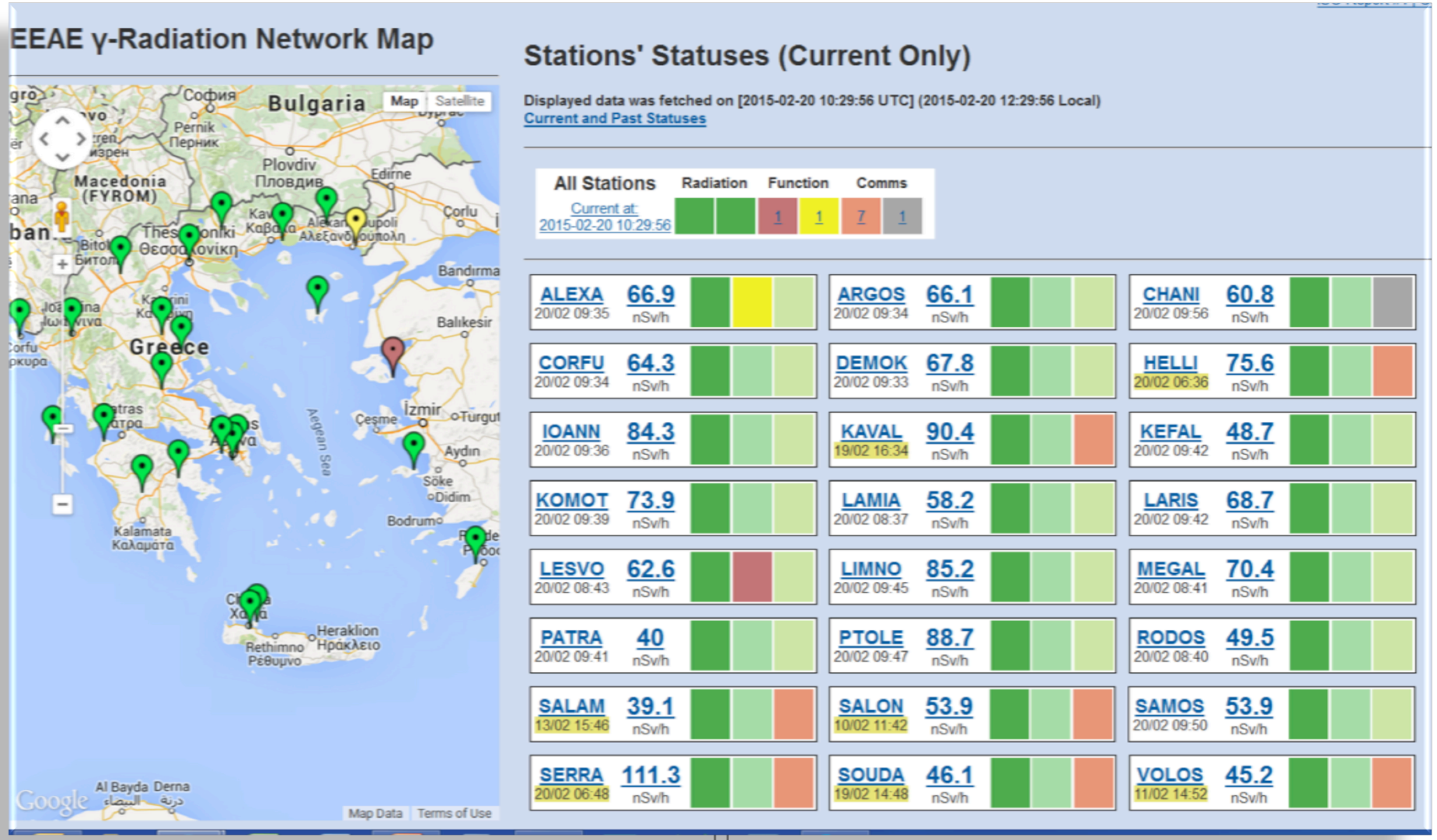
Telemetric Monitoring Network in Greece

- High Pressure Ion Chamber
- Argon
- 25 Atm
- Volume 8.5 lt
- 50 keV – 10 MeV
- 10^{-8} – 10^{-3} Sv/h
- Resolution : ± 4%
- -40° C - +55° C



- Aerosol filter+pumping system
  Glass fibre filters 0.5 μm, air pump ~6m^3/h
- PIPS (alpha/beta detector) 1700 mm^2
  Resolution: ~55keV – α
  ~30 keV - β
- NaI(Tl) detector, 2” PM-tube
  Resolution: 8.5% (662 keV Cs^{137})
- Weather Station
  Temperature, wind velocity, wind direction, rain gauge

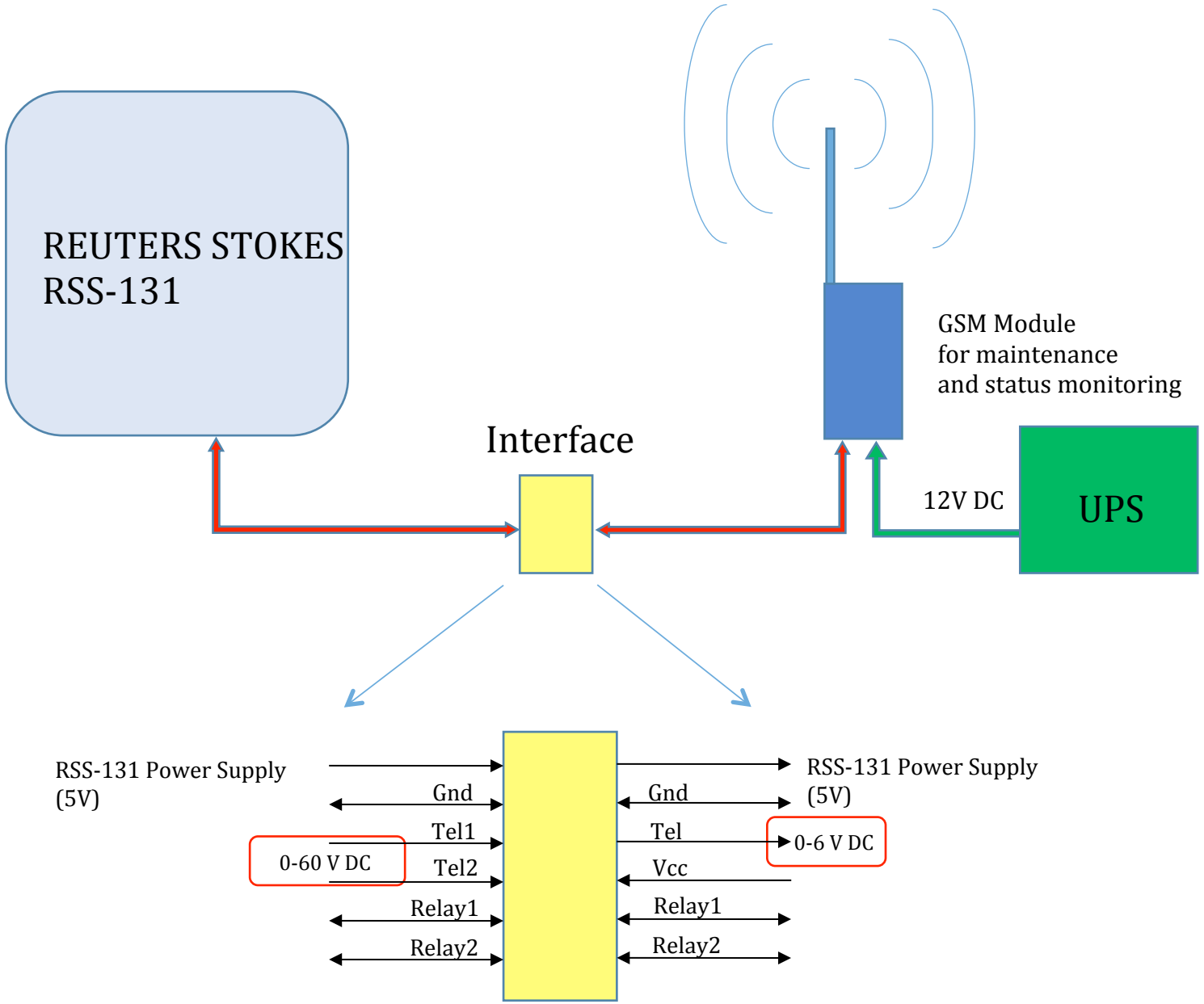
Upgrade Software – New System Communication Network



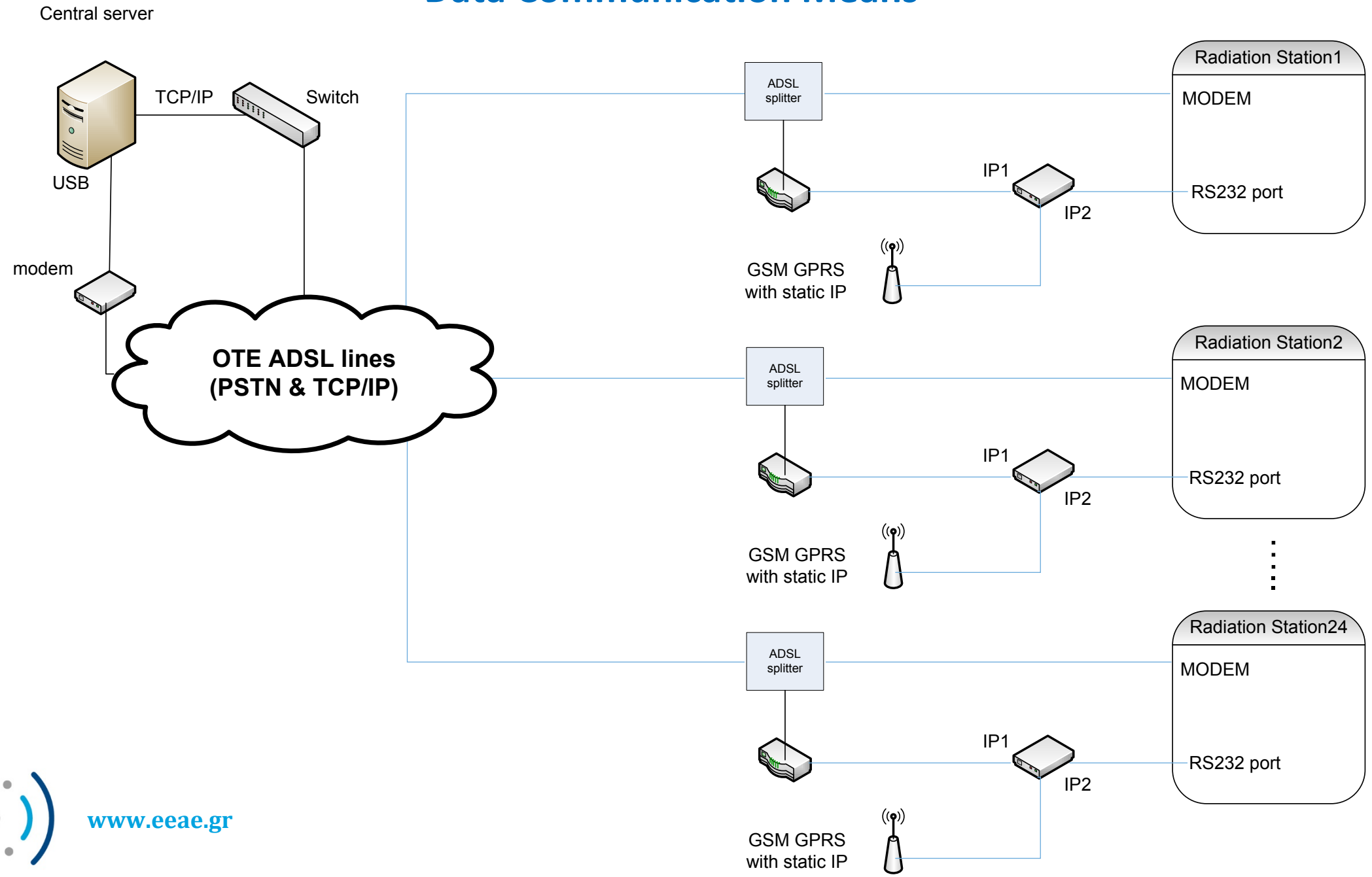
Upgrade with a GSM Maintenance Communication System

- Power 220 V
- PSTN Failures
- Reset
- Calibration coefficients lost (reload)
- Any Other (firmware download, etc)

- Repair → e.g. micro- processor change



Data Communication Means



Integrated Management System

ISO 9001

ISO 17025

- individual monitoring of occupationally exposed workers
- gamma spectrometry measurements
- Alpha spectrometry
- radon measurements
- calibration of ionizing radiation instruments
- non-ionizing radiation measurements

ISO 17020

- inspections body of type A

ISO 29990

- design, development and provision of non-formal education and training in radiation protection and nuclear safety

Safety culture

www.eeae.gr

IAEA Safety Standards
Leadership and Management for Safety, GSR Part 2

Quality Assurance / Intercomparisons

- GAEC's laboratory systematically participates in the intercomparison exercises of the following organizations:

✓ *WHO (World Health Organization)*

✓ *ALMERA*

✓ *IAEA (International Atomic Energy Agency)*

✓ *BfS (Bundesamt für Strahlenschutz)*

✓ *NPL (National Physical Laboratory)*

✓ *EU (European Commission)*

✓ *PROCORAD (Association for the Promotion of Quality Controls in Radiotoxicological bioassay).*

Collaborating laboratories in Greece

Environmental Radioactivity Laboratory, INRASTES, NCSR “Demokritos”
Nuclear Engineering Department, National Technical University of Athens
Nuclear Technology Laboratory, Department of Electrical and Computer Engineering
Technical University of Crete, School of Mineral Resources Engineering
Hellenic Centre for Marine Research
Department of Nuclear and Elementaty Particle Physics, School of Physics, Aristotle University of Thessaloniki
Physics Department, University of Ioannina
Laboratory of Medical Physics, University of Ioannina

Thank You !

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