SAND2013-3741C

Miscellaneous ERDS Examples

Local

Regional

Nationwide

Multi-National

International

LOCAL

NEWNET (LANL, New Mexico)

http://environweb.lanl.gov/newnet/default.aspx

What is NEWNET?

NEWNET (Neighborhood Environmental Watch Network) is a network of environmental monitoring stations, and data storage and data processing systems, with public access to the data through the Internet. This allows interested members of the public to have constant access to the stations so they can observe the results at any time. A station manager from each community has access to researchers and support organizations that can provide technical assistance if needed. Station Managers serve as liaisons to their communities and can help citizens understand measurements.

NEWNET was started in 1993 with stations in Nevada, California, Utah, and New Mexico. It is based on concepts developed by the Department of Energy for the Community Monitoring Program at the Nevada Test Site Nuclear Testing Facility. These concepts date back to the Three Mile Island Nuclear Power Reactor accident in the late 1970's.

Stations can vary in configuration. Most NEWNET stations have sensors for monitoring wind speed and direction, ambient air temperature, barometric pressure, relative humidity and ionizing gamma radiation. Wind data are not checked for quality assurance and are not guaranteed.

The NEWNET Goal

The goal of this program is to promote better understanding of the environment through collaboration between the public, government, educational institutions, and industry.

Why NEWNET

With the advance of technology and the public's right to knowledge regarding these technologies, there are many issues of concern. Radiation is one of these issues. For example, public concerns include the dangers of nuclear radiation from the operation of nuclear power plants, the shipment and storage of nuclear waste, industrial and medical uses of radioactive isotopes, and radiation in general. Adding to the concern is the fact that members of the public have little way of knowing what levels of radiation they are being exposed to, and they traditionally have no control over their exposure.

In order to make informed decisions about balancing the risks and benefits of nuclear power, waste storage methods, and other activities that involve radioactive materials, the public needs access to data. The purpose of NEWNET is to provide the public with data on actual radiation levels and to foster an awareness of the relative risks presented by these levels of radiation.

Educational Programs

Since a primary goal of the NEWNET project is to provide information to the public, it is fitting that there are appropriate education programs. NEWNET has collaborated with several local high schools and colleges, providing them with local NEWNET stations. A teaching curriculum might include a study of radiation and detection, data acquisition and plotting, meteorology, or uses of computers.

Guiding Principles

Guiding Principle for NEWNET Data Collection

Radiation monitoring around the Department of Energy facilities is for the health and safety of the local population and environment. The data from publicly supported monitoring sources should be available to the public as accurately and as timely as possible. The NEWNET data will be checked for transmission errors and annotated, but will not be altered.

Guiding Principle for NEWNET Public Interactions

This principle is based on a position put forth by the Committee on Interagency Radiation Research and Policy Coordination (CIRRPC) in their April 1994 publication, "Balancing Radiation Benefits and Risks: The Needs of an Informed Public."

"Does the Federal government have a responsibility to enhance public understanding of issues surrounding specific technologies used by society? If the answer is 'yes,' then the purpose of any government education program should be to provide reliable, accurate, and understandable information to enable individuals and groups to make informed decisions, based on their accurate knowledge of the issues involved. It is not the purpose of such a program to persuade the public to accept or reject a specific technology."

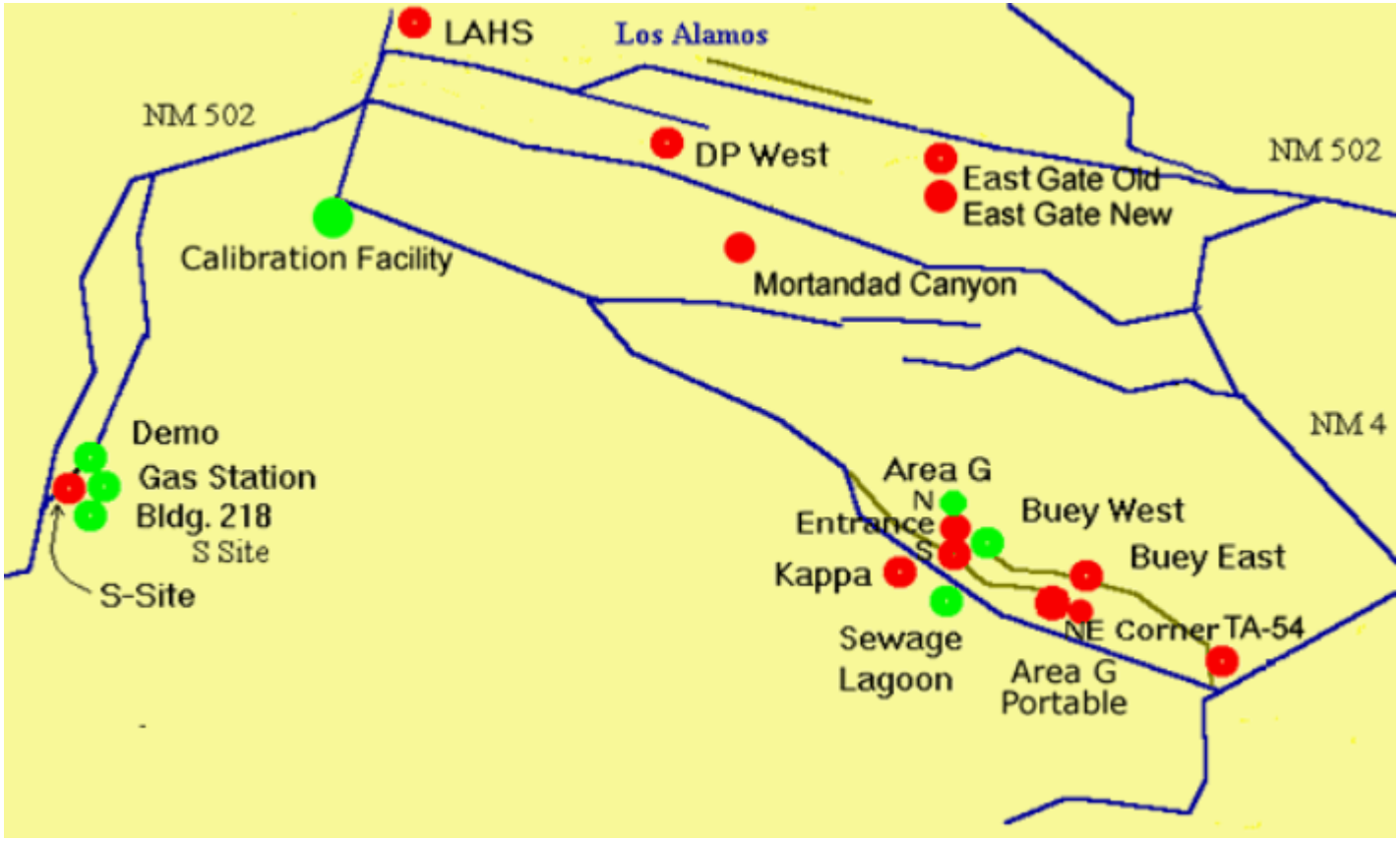
NEWNET Stations by Location

The following stations are part of the NEWNET system to provide public access to radiological and meteorological data.

•Los Alamos National Laboratory Station Map

Active NEWNET Stations	State	First Available Data		
Espanola, Northern New Mexico College	New Mexico	1/3/1995	Station Information	View Data
LANL Buey East	New Mexico	1/3/1995	Station Information	View Data
LANL DP	New Mexico	4/16/1998	Station Information	View Data
LANL East Gate	New Mexico	8/16/2001	Station Information	View Data
LANL East Gate Old Station	New Mexico	4/18/1995	Station Information	View Data
LANL Kappa Site	New Mexico	1/3/1995	Station Information	View Data
LANL Mortandad Canyon	New Mexico	5/19/2003	Station Information	View Data
LANL S-Site	New Mexico	3/21/1995	Station Information	View Data
LANL TA-54 Met Tower	New Mexico	8/23/2001	Station Information	View Data
Los Alamos High School	New Mexico	2/18/1998	Station Information	View Data
San Ildefonso Pueblo	New Mexico	1/3/1995	Station Information	View Data
Santa Clara Canyon	New Mexico	1/1/2006	Station Information	View Data

Los Alamos National Laboratory Station Map



Example: Mortandad Canyon

LANL Mortandad Canyon, NM

Station Name	Mortandad Canyon
Location	LANL Mortandad Canyon
State	NM
Latitude (DD) *	NA
Longitude (DD) *	NA
Altitude (meters)	6495
Installation Date	5/30/2003
Last Calibration Date	NA
Station Manager	Mike McNaughton
Phone	(505) 667-6130
Fax	(505) 665-8858
Views	Data Graph
	Data Table
Other	Station Comments

Data Graph

Gamma Statistics

Minimum (µR/h)	17.6
Maximum (µR/h)	18.7
Average (µR/h)	18.2
Standard Deviation	0.2
Estimated Exposure (mrem)	3.1
View	Data Table
Other	Station Info
	Comments
	Custom Graphing

Data Range

Data are displayed from the selected start date to the specified end date. Defaults to 7 days if no end date is specified. Plot will not refresh unless the start date is changed.
To change the calendar year and start date, click the previous month button on the calendar until you reach your desired month and year.

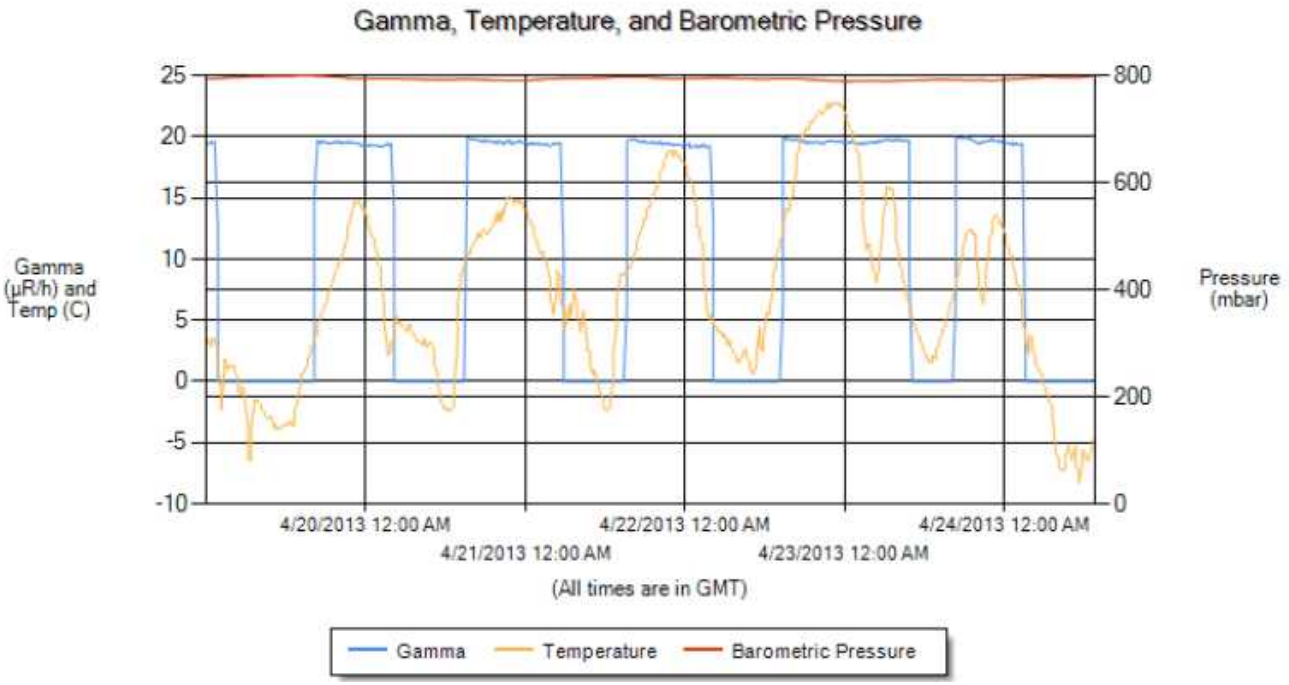
Calendar Year: 2013 2013

Start Date: 04/19/2013

End Date:

Select a New Start Date

Mar			April 2013			May
S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11



Data Table

Mortandad Canyon
LANL Mortandad Canyon, NM

View different station

Data are displayed from the selected start date to the specified end date. Defaults to 1 day if no end date is specified. Plot will not refresh unless the start date is changed. To change the calendar year and start date, click the previous month button on the calendar until you reach your desired month and year.

Calendar Year: 2013

Start Date: 04/23/2013

End Date:

Export to Excel

Select a Start Date:

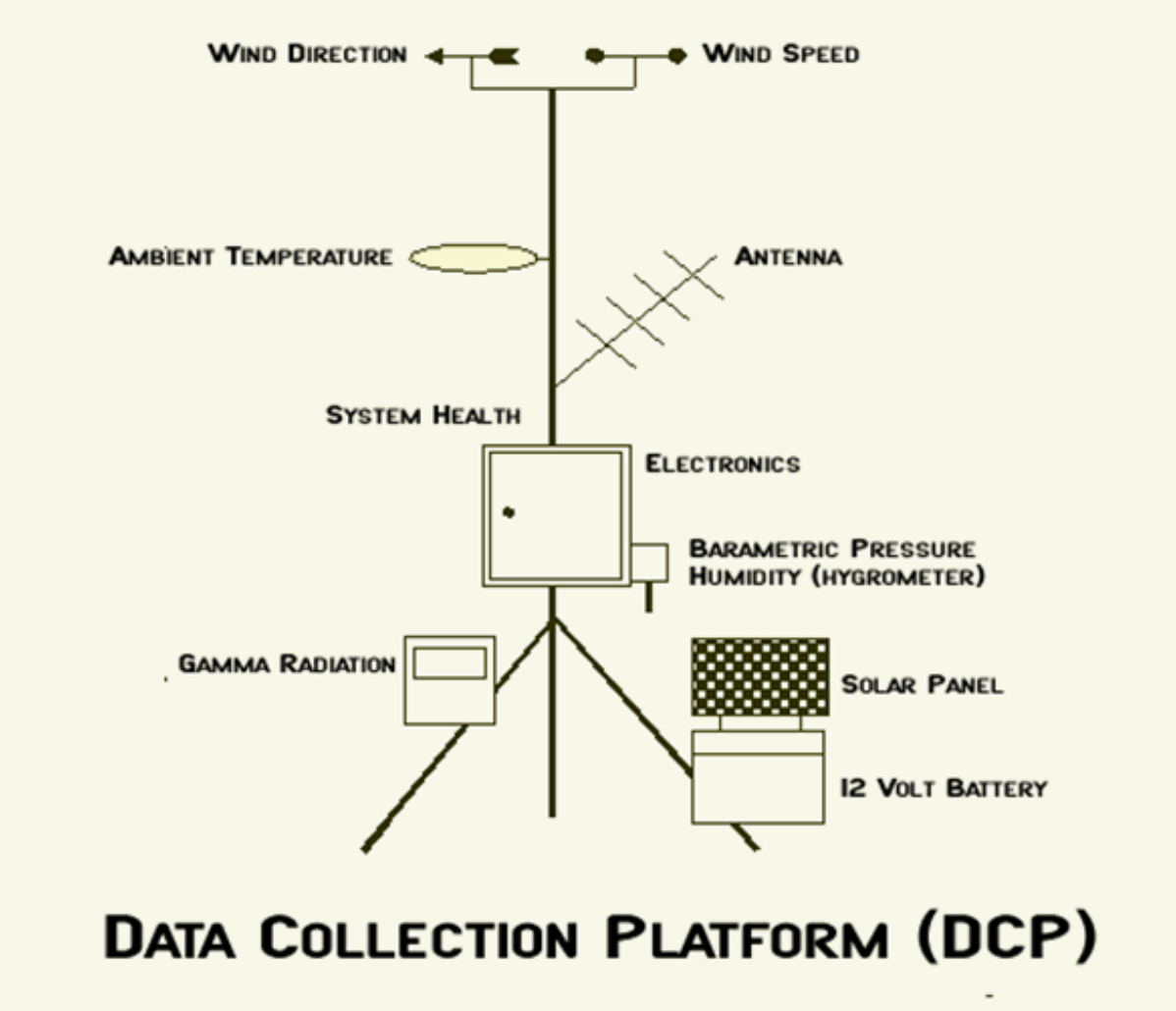
Mar	April 2013					May
S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

Date & Time (GMT)	Gamma (microR/h)	East Wind (mph)	North Wind (mph)	Wind STD	Barometric Pressure (mBars)	Temp (C)	Humidity (%)	Rain (in.)	Battery Voltage (Volts-DC)	View	Other	
4/23/2013 12:15:00 AM	19.51	0.00	0.00		789.21	21.82	10.6		13.03	Graph	Info	Comments
4/23/2013 12:30:00 AM	19.44	0.00	0.00		789.22	21.27	11.01		12.98	Graph	Info	Comments
4/23/2013 12:45:00 AM	19.5	0.00	0.00		789.17	20.97	11.19		12.92	Graph	Info	Comments
4/23/2013 1:00:00 AM	19.61	0.00	0.00		789.16	20.66	11.32		12.85	Graph	Info	Comments
4/23/2013 1:15:00 AM	19.55	0.00	0.00		789.24	20.38	11.33		12.78	Graph	Info	Comments
4/23/2013 1:30:00 AM	19.57	0.00	0.00		789.26	19.77	11.68		12.7	Graph	Info	Comments
4/23/2013 1:45:00 AM	19.49	0.00	0.00		789.34	19.26	11.84		12.66	Graph	Info	Comments
4/23/2013 2:00:00 AM	19.49	0.00	0.00		789.35	18.89	12.02		12.63	Graph	Info	Comments
4/23/2013 2:15:00 AM	19.39	0.00	0.00		789.42	18.44	12.31		12.61	Graph	Info	Comments
4/23/2013 2:30:00 AM	19.48	0.00	0.00		789.47	17.62	12.85		12.59	Graph	Info	Comments

Comment Example:

Entered	By	Comment
8/31/2006	Mike McNaughton	The 249 microR/h spike on Aug 4, 2006, is the result of a calibration with the (nominal) 18.3 microcurie source.
8/6/2004	Mike McNaughton	We will be calibrating the Mortandad Canyon gamma detector on August 6, 2004. I expect the gamma reading to be about 260 +/- 30 microR/h.
9/26/2003	D Young	The Mortandad NEWNET station data will not be updated from approximately 7am to 7pm MDT on 9/27/2003 due to a planned power outage.
6/27/2003	Allen Treadaway	A calibration was performed on the gamma sensor (PIC) on 6/27/03 at about 10:45 MDT.

Transmission of NEWNET Data



NEWNET Station at Los Alamos, NM, H.S.

Transmission of NEWNET Data

NEWNET stations are also known as data collection platforms, or DCPs. The typical DCP has instruments to measure wind direction, wind speed, ambient temperature, barometric pressure, humidity, and gamma radiation. Wind data are not checked for quality assurance and are not guaranteed. The gamma detector has its own digital display which can be read by someone standing beside the station.

Instrumentation

Instrumentation Description

The following is a brief description of the instrumentation on a typical NEWNET Data Collection Platform (DCP). Specifications are from the manuals and data sheets provided by the instrument manufacturers, and may be dependent on periodic calibration being performed at the manufacturer's recommended interval.

•**Gamma Radiation**

•Gamma radiation is measured by a **Reuter-Stokes High Pressure Ionization Chamber**, model RSS-120 (RSS-1013 includes the electronics). This instrument has an ionization chamber filled with argon to a pressure of 25 atmospheres. Reuter-Stokes is a subsidiary of General Electric.

•***Range:*** 0-100 mR

•***Precision:*** ±5%

•***Ionization chamber volume:*** 7.9 liters

•***Energy response:*** 0.07 to 10 MeV

•**Temperature**

•Temperature is measured by a Met One model 064-2 temperature sensor mounted in a model 075 solar shield to reflect solar radiation.

•***Range:*** -50 to +50° C

•**Humidity**

•Humidity is measured with Rotronic Hygromer™, model 200 series.

•***Humidity Range:*** 0-100% RH

•***Precision at 68-77° F:*** ± 2% RH

•***Temperature limits at sensor:*** -5 to 212° F (-20 to 100° C)

•**Barometric Pressure**

•Barometric pressure is measured by a Met One Barometric Pressure Sensor Model 090D. This is available in a number of calibration ranges, determined by the elevation of the station. Barometric pressure decreases by about 1" Hg per 1000 ft of elevation. The value is converted to milibars of barometric pressure, and is reported unadjusted for elevation. (Values normally reported in weather reports have been adjusted to pressure at sea level.)

•***Calibration Range (standard model):*** 26-32" Hg at 0-1500 feet (elevation)

•***Accuracy:*** ± 0.7%

•***Operating temperature range:*** -22 to 50° C

•**Wind**

•Wind data is measured by Met One Model 6266/037 and Model 013/023 Wind Finder Systems, each consisting of a wind speed sensor (anemometer cup) and wind direction sensor (vane). The wind-speed data are not checked for quality assurance and are not necessarily accurate. They should only be used as relative indications, not as absolute measurements.

•***Range:*** 0-100 mph; 0-360 degrees

•***Threshold:*** 1.0 mph, speed and direction indicators

•***Precision:*** ±0.25 mph or 1.5%; ±8 degrees

•***Distance Constant:*** LT 5 feet (speed); LT 1.5 feet (direction)

•***Damping Ratio:*** 0.25 (direction)

•***Temperature Range:*** -50 to +85° C (speed); -50 to 70° C (direction)

REGIONAL

Community Environmental Monitoring Program (CEMP) (Nevada, USA)

Introduction

The Community Environmental Monitoring Program (CEMP) is a network of 29 monitoring stations located in communities surrounding and downwind of the Nevada National Security Site (NNSS), formerly the Nevada Test Site (NTS), that monitor the airborne environment for manmade radioactivity that could result from NNSS activities. The CEMP is a joint effort between the Department of Energy's National Nuclear Security Administration Nevada Site Office (NNSA/NSO), and the Desert Research Institute (DRI) of the Nevada System of Higher Education.

The network stations, located in Nevada, Utah, and California are comprised of instruments that collect a variety of environmental radiological and meteorological data. To manage the stations, DRI employs local citizens, many of them high school science teachers, whose routine tasks include minor maintenance of the equipment, collecting air filters and routing them to DRI for analysis. These Community Environmental Monitors (CEMs) are also available to discuss the monitoring results with the public, and are available to speak to community and school groups. Program funding and equipment are provided by NNSA/NSO. DRI manages the program, provides technical direction, employs and trains CEMs, conducts public outreach activities and collects data to be analyzed by an independent laboratory.

CEMP History

Environmental Monitoring

The emphasis of the CEMP is to monitor airborne radioactivity and weather conditions, and make the results available to the public. Instrumentation that records these data is connected to a data logger, and real-time radiation levels or weather conditions can immediately and easily be seen on a display at each station. These data are transmitted via direct or wireless internet connection, landline or cellular phone, or satellite transmission to DRI's Western Regional Climate Center in Reno, Nevada, and are updated as frequently as every 10 minutes on the World Wide Web at http://www.cemp.dri.edu

Public understanding of the CEMP and monitoring results is important, so great attention has been paid to station location and accessibility, and making the results available. DOE and DRI publish the results of the monitoring program and distribute these reports throughout the network community. The reports provide summaries of average values for each station and the entire network, and show deviations from the expected range values.

Each monitoring station is equipped with:

Particulate Sampler. This instrument detects radioactivity by pulling two cubic feet of air per minute through a paper filter. The filter collects the particles, which are then analyzed by an independent laboratory for radioactivity.

Thermoluminescent Dosimeter (TLD). Knowing what the ambient, or "natural background" levels of radiation is crucial in estimating exposure rates, and this small device does the job. When heated in a special laboratory instrument, the TLD releases absorbed energy in the form of light. The intensity of the light can be measured, and related to the amount of energy initially absorbed through exposure to the energy source.

Exposure Rate Recorder. This piece of equipment, also called a pressurized ion chamber detector, or PIC, makes continuous measurements of radiation exposure rates.

Microbarograph. This instrument measures and records barometric pressure. The data are useful in interpreting the radiation exposure rate records. At lower atmospheric pressures, more naturally occurring radioactive gases, like radon and thoron, are released from the earth's surface and their radioactive decay products contribute to the radiation exposure.
Weather Instruments. The weather instruments at the weather stations record air temperature, humidity, wind speed and direction, solar radiation, barometric pressure, and precipitation data.
More instrument information

Community Environmental Monitors (CEMs)

The primary objective of the CEMP is to involve residents of the communities surrounding the Nevada Nuclear Security Site (NNSS) in offsite environmental monitoring. In addition to equipment operation responsibilities, the CEMs attend annual refresher courses conducted by Desert Research Institute (DRI). This enables them to participate more fully in public education forums, and to better answer questions from the local communities about the monitoring program and data results in their area and throughout the network. The CEMs are trained to understand the results of the environmental monitoring, and are knowledgeable spokespersons on subjects ranging from radiation detection to local environmental conditions. CEMs are effective technical liaisons between local and federal entities, helping to identify the environmental concerns of people in their communities. All members of the public are invited to visit the stations and see the data, which are also on the Internet at

http://www.cemp.dri.edu

CEMP Instrumentation

The electronic instruments for the CEMP network consist of the following sensors:

- RM Young Wind Monitor Model #WS5103
- Licor Silicon Pyranometer Model #LI200X
- CSI Temperature/Humidity Probe Model #C-50Y mounted in a 6-plate Gill radiation shield at 6 ft. height
- Vaisala Barometric Pressure Sensor Model #BP105
- Texas Electronics Rain Gauge Model #TE525
- GE-Reuter Stokes Gamma Radiation Sensor Model #RSS-131

Wind Speed & Direction Sensors

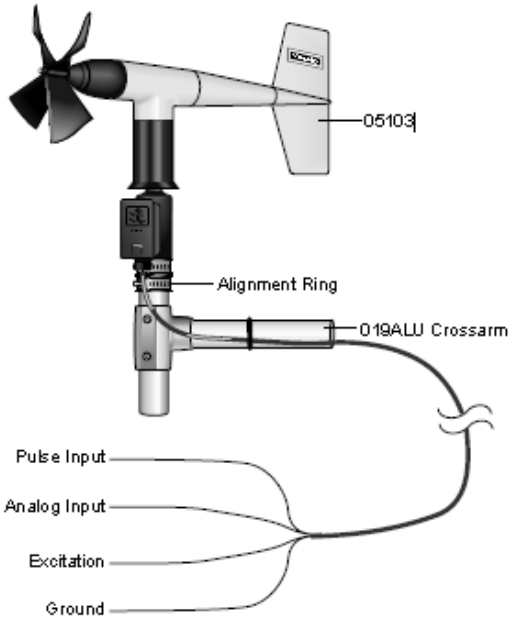
RM Young's 05103 Wind Monitor & 05305 Wind Monitor-AQ

Model 05103 Wind Monitor (shown at right) is a sturdy instrument for measuring wind speed and direction in harsh environments. The Wind Monitor's design emphasizes simplicity and lightweight construction. Thermoplastic materials offer improved resistance to corrosion from sea air environments and atmospheric pollutants.

Model 05305 Wind Monitor-AQ is a high performance wind speed and direction sensor designed specifically for air quality measurements, but is less rugged than the 05103. The Wind Monitor-AQ features low starting threshold, fast response, and high accuracy. It meets or exceeds the requirements published by the following regulatory agencies:

- U.S. Environmental Protection Agency - Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) and On-Site Meteorological Instrumentation Requirements to Characterize Diffusion from Point Sources
- U.S. Nuclear Regulatory Agency - NRC Regulatory Guide 1.23 Meteorological Programs in Support of Nuclear Power Plants
- American Nuclear Society - Standard for Determining Meteorological Information at Nuclear Power Plants

Both models connect directly to Campbell Scientific dataloggers (CR10(X), 21X, CR23X, or CR7).



Wind Speed

The wind speed sensor is a helicoid-shaped, four-blade propeller. Rotation of the propeller produces an AC sine wave; the frequency is directly proportional to the wind speed. The AC signal is induced in a transducer coil by a six-pole magnet mounted on the propeller shaft. The coil is located on the non-rotating central portion of the main mounting assembly, eliminating the need for slip rings and brushes.

Wind Direction

Wind direction is sensed by a potentiometer. With the precision excitation voltage from the datalogger applied to the potentiometer element, the output signal is an analog voltage directly proportional to the azimuth angle.

Construction and Mounting

Construction is of rigid UV-stabilized thermoplastic with stainless steel and anodized aluminum fittings. Propeller shaft bearings and vertical shaft bearings are stainless steel precision-grade ball bearings.

The 05103 and 05305 mount directly on a 1.0 inch IPS Schedule 40 (1.32 in O.D.) pipe. Campbell Scientific supplies a 12-inch pipe for mounting the Wind Monitor to the 019ALU Crossarm. An alignment ring maintains wind direction reference orientation during maintenance.

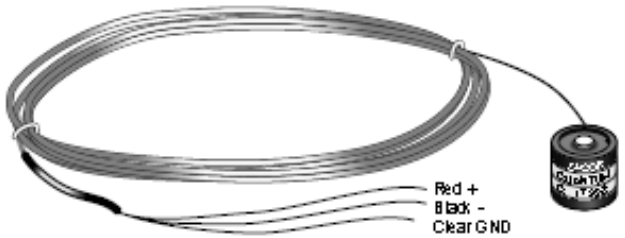
Solar Radiation Sensors

LI-COR's LI190SB Quantum Sensor & LI200X Silicon Pyranometer

LI190SB and LI200X measure solar radiation with a silicon photovoltaic detector mounted in a cosine-corrected head. A shunt resistor in the sensor's cable converts the signal from µA to mV allowing the LI190SB and LI200X to be measured directly by a Campbell Scientific datalogger (CR510, CR10(X), 21X, CR23X, CR5000, and CR7).

LI190SB Quantum Sensor

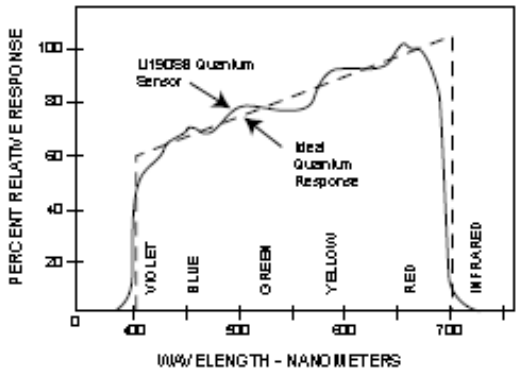
LI190SB accurately measures Photosynthetic Photon Flux Density (PPFD) in both natural and artificial light. PPFD is the number of photons in the 400 to 700 nm waveband incident per unit time on a unit surface. Because PPFD describes photosynthetic activity, the LI190SB is ideal for growth chambers and greenhouses.



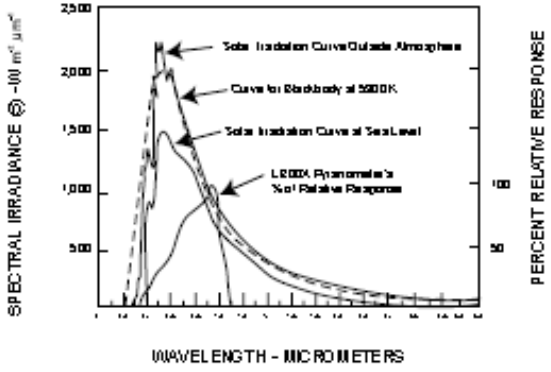
LI190SB Quantum Sensor. The LI200X has a similar appearance and identical wiring.

LI200X Silicon Pyranometer

The LI200X Silicon Pyranometer is calibrated against an Eppley Precision Spectral Pyranometer (PSP) to accurately measure sun plus sky radiation. LI200X is used extensively in solar, agricultural, meteorological, and hydrological applications. The LI200X should not be used under vegetation or artificial lights because it is calibrated for the daylight spectrum (400 to 1100 nm).



LI190SB Spectral Response



LI200X Spectral Response

Temperature and Relative Humidity Probe
Model CS500

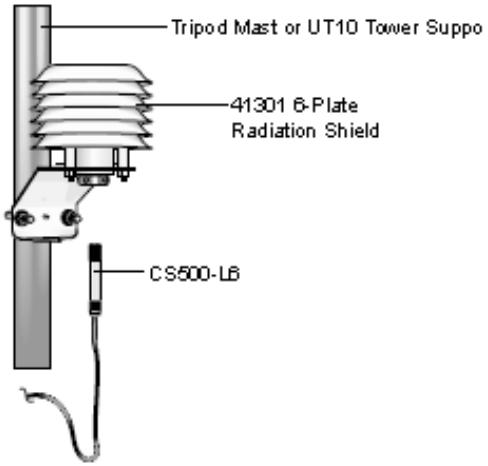
The CS500 is a modified version of Vaisala's 50Y Humitter. The CS500 measures air temperature with a 1000 ohm platinum resistance thermometer (PRT); RH is measured by a laser-trimmed INTERCAP capacitive chip. The chip is field-replaceable, as needed, and eliminates the downtime typically required for the recalibration process.

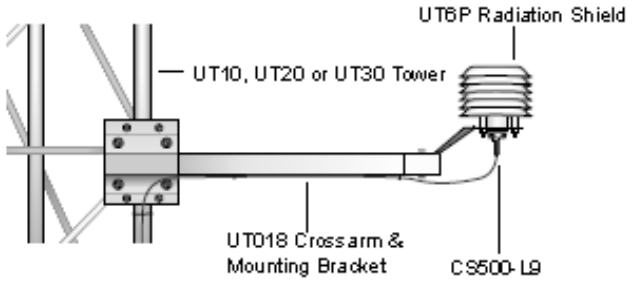
Sensor Mounts

When exposed to sunlight, the CS500 must be housed in a radiation shield. If the CS500 is mounted to a CM6/CM10 tripod or a UT10 tower, a model 41301 6-plate radiation shield is used. If the CS500 is mounted on a UT20 or UT30 tower, a UT018 Crossarm and Mounting Bracket and a UT6P 6-plate radiation shield are used.

Ordering Information

CS500-L6	6 ft lead length for use with CM6/CM10 tripods or a UT10 tower.
CS500-L9	9 ft lead length for use with a UT10, UT20 or UT30 tower and a UT018
9598	Replacement chip for the CS500.
9593	Adapter Plate that secures CS500 in a 41301 or UT6P radiation shield purchased before January 1995.
UT018	Crossarm and Mounting Bracket; required for mounting the CS500 to a UT20 or UT30 tower



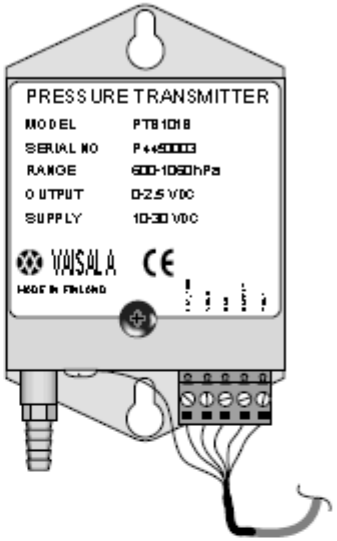


Barometric Pressure Sensor

Model CS105

The CS105 Barometer uses Vaisala's silicon capacitive sensor to measure barometric pressure over a 600 to 1060 millibar range. The CS105 outputs a linear signal of 0 to 2.5 Vdc allowing it to be directly connected to Campbell Scientific dataloggers.

An integral circuit switches 12 volts from the datalogger to the barometer only during measurement, thereby reducing power requirements. Sensor warm-up and measurement time is one second minimum.



The CS105 provides accurate, unattended measurements of barometric pressure over a wide range of elevations.

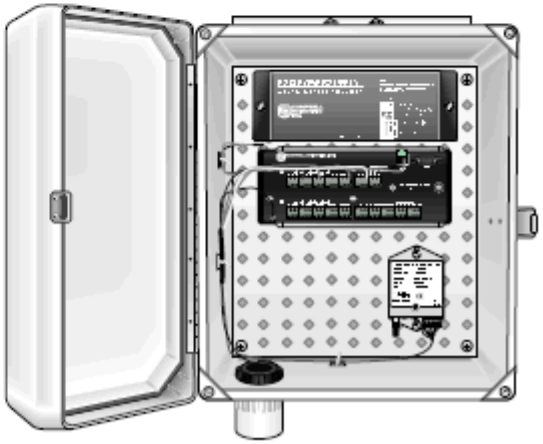
Construction and Mounting

The sensor is housed in an anodized aluminum case fitted with an intake valve for pressure equilibration. Terminal strips provide for datalogger power and signal connections. The barometer is supplied with 2.5' of cable and is intended to mount inside the ENC 12/14 or larger enclosure.

Manufacturer's Specifications

- Total Accuracy[1]: ±0.5 mb @ +20°C
  ±2 mb @ 0° to 40°C
  ±4 mb @ -20° to +45°C
  ±6 mb @ -40° to +60°C
- Linearity: ±0.45 mb @ 20°C
- Hysteresis: ±0.05 mb @ 20°C
- Repeatability: ±0.05 mb @ 20°C
- Calibration Uncertainty: ±0.15 mb @ 20°C
- Long-Term Stability: ± 0.1 mb per year
- Operating Temperature: -40° to +60° C
- Dimensions: 3.8" x 2.3" x 0.8" (9.7 cm x 5.9 cm x 2.1 cm)
- Weight: 4.0 oz (110 g)
  Shipping: 5.3 oz (150 g)
- Supply Voltage: 10 to 30 Vdc
- Current Consumption: <4 mA (active)
  <1 µA (quiescent)
- Warm-up Time: 1 s

[1]The root sum squared (RSS) of end point non-linearity, hysteresis, repeatability, and calibration uncertainty.

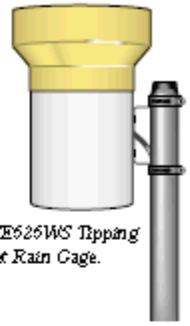


PS12 power supply top, CR10X datalogger, and CS106 inside ENC 12/14 enclosure.

Rain Gages & Snowfall Conversion Adapter

Models TE525WS, TE525, TE525MM, CS705

The TE525 series tipping bucket rain gages are manufactured by Texas Electronics. Both the TE525WS (8" orifice) and TE525 (6" orifice) measure in 0.01 inch increments; the TE525MM measures in 0.1 mm increments. These gages funnel precipitation into a bucket mechanism that tips when filled to a calibrated level. A magnet attached to the tipping mechanism actuates a switch as the bucket tips. The momentary switch closure is counted by the pulse-counting circuitry of Campbell Scientific dataloggers.



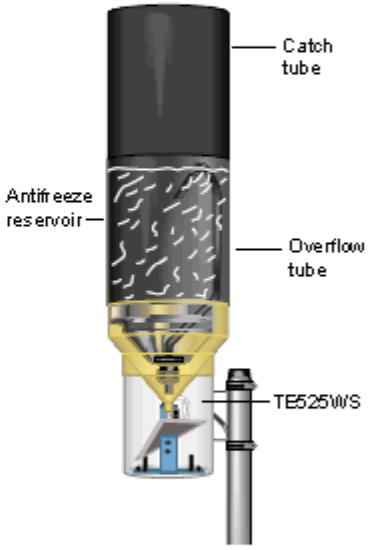
The TE525WS Tipping Bucket Rain Gage.

The CS705 Snowfall Conversion Adapter

Campbell Scientific's CS705 consists of an antifreeze reservoir, overflow tube, and catch tube. Snow captured in the catch tube dissolves into the antifreeze. As the snow melts, a mixture of melted snow and antifreeze flows through the overflow tube into the tipping bucket. The liquid is then measured by the tipping bucket mechanism.

The CS705 possesses inherent delays and is not suitable for real-time precipitation measurements. Three factors contribute to the delays: temperatures of air and liquid in the reservoir, surface tension in the overflow tube, and the form of the precipitation. For rainfall at 25°C, a delay of minutes is expected after the gage receives a minimum accumulation of ~0.03". For snowfall, a delay of hours to tens of hours is expected. The longest delays should be expected for low density snows at very cold air temperatures. However, all precipitation falling into the catch tube eventually flows through the overflow tube and is measured by the tipping bucket gage below.

The CS705's specially shaped cylinder allows it to mount to any 6- or 8-inch tipping bucket rain gage. The CS705 will not directly install on the TE525MM; the MM funnel must first be replaced with an 8-inch funnel.



Transparent view of CS705 snowfall adapter and a TE525WS rain gage.

Mounting

The gage mounts to a user-supplied mast or pole with two 3-inch hose clamps. Accurate measurements require the gages to be level.

Ordering Information

TE525WS-L__	8-inch diameter; 0.01 inch tips; user-specified lead length.* Enter lead length (in feet) after L.
TE525-L__	6-inch diameter; 0.01 inch tips; user-specified lead length.* Enter lead length (in feet) after L.
TE525MM-L__	24.5 cm diameter; 0.1 mm tips; user-specified lead length.* Enter lead length (in feet) after L.
CS705-A	Snowfall conversion adapter and four gallons of 1:1 propylene glycol and ethanol (PGE).
CS705	Snowfall conversion adapter without antifreeze.

**A 25' lead length is recommended for most applications, e.g. TE525WS-L25.*

GE
Energy

Environmental Radiation Monitor (RSS 131 ER)

fact sheet

Solid Performance

Designed to measure low-level gamma radiation, this Environmental Radiation Monitor (RSS 131 ER) is the latest High Pressure Ionization Chamber (HPIC) from GE Energy. With over 30 years of service in multiple utility and government agency environmental radiation monitoring applications around the world, Reuter Stokes Environmental Radiation Monitors continue to provide reliable operation in extreme climates. Versatile, accurate and reliable, the RSS 131 ER is ideally suited for use in Homeland Security applications.

A Full Package

Features typically required for a fully functional system are packaged "in the box." The system is equipped with three weatherproof RS-232 ports and an optional dial-up modem. Although units are often operated as stand-alone systems, many have been incorporated into environmental monitoring stations and may be used in Homeland Security monitoring applications. GE Energy offers meteorological monitoring options, including wind speed/direction, a rain gauge, and barometric pressure. These options contribute to a comprehensive assessment of the impact of radiation on the environment and enables real-time decision-making by authorities.

Configurable by the User

The user has the option to specify parameters such as alarm limits, unit address, and data recording interval (1 sec – 9 hrs). This is accomplished via one of the serial interface ports using a PC – there is no need to open the weatherproof enclosure to make these adjustments, enabling straightforward customization.

Benefits

- Able to identify radiation increases above background levels not detectable with Geiger-Mueller technologies
- Omni-directional – spherical HPIC is not subject to inherent Geiger-Mueller tube limitations
- Fast response time – less than 10 seconds for specified accuracy
- Reliable operation in extreme climates
- Many units in service over 20 years
- Simplified repair and maintenance

Features

- Extended range: 0-100 R/hr (0-1 Sv/hr)
- Unattended gamma radiation monitor – originally designed to monitor nuclear power plant perimeters
- Configurable with a variety of sensors for Environmental and Homeland Security applications
- High signal-to-noise ratio: Internal background as little as 1% of Geiger-Muller based sensors
- Accuracy: +/- 5% at 10 microR/hr
- Configurable alarm set points
- 20,000 data point storage – interval configurable
- Replaces all earlier models, including the RSS 1012, RSS 1013 and the RSS 131

CEMP Instrumentation

The sensors are monitored with a Campbell Scientific Inc. (CSI) CR10X datalogger. Sensors are sampled every 3 seconds and summarized by the data logger for each 10 minute period. Current data readings are displayed on-site with an Intermountain Environmental LCD display Model #LCD1 that has been mounted into the door of the data logger enclosure. The on-site display is updated every 6 seconds. The current readings include: gamma radiation (uR/hr), air temperature (F), humidity (%), wind speed (mph), wind direction (direction octant), solar radiation (ly), station barometric pressure (in.Hg.), precipitation since midnight (in.), and system battery voltage (volts).

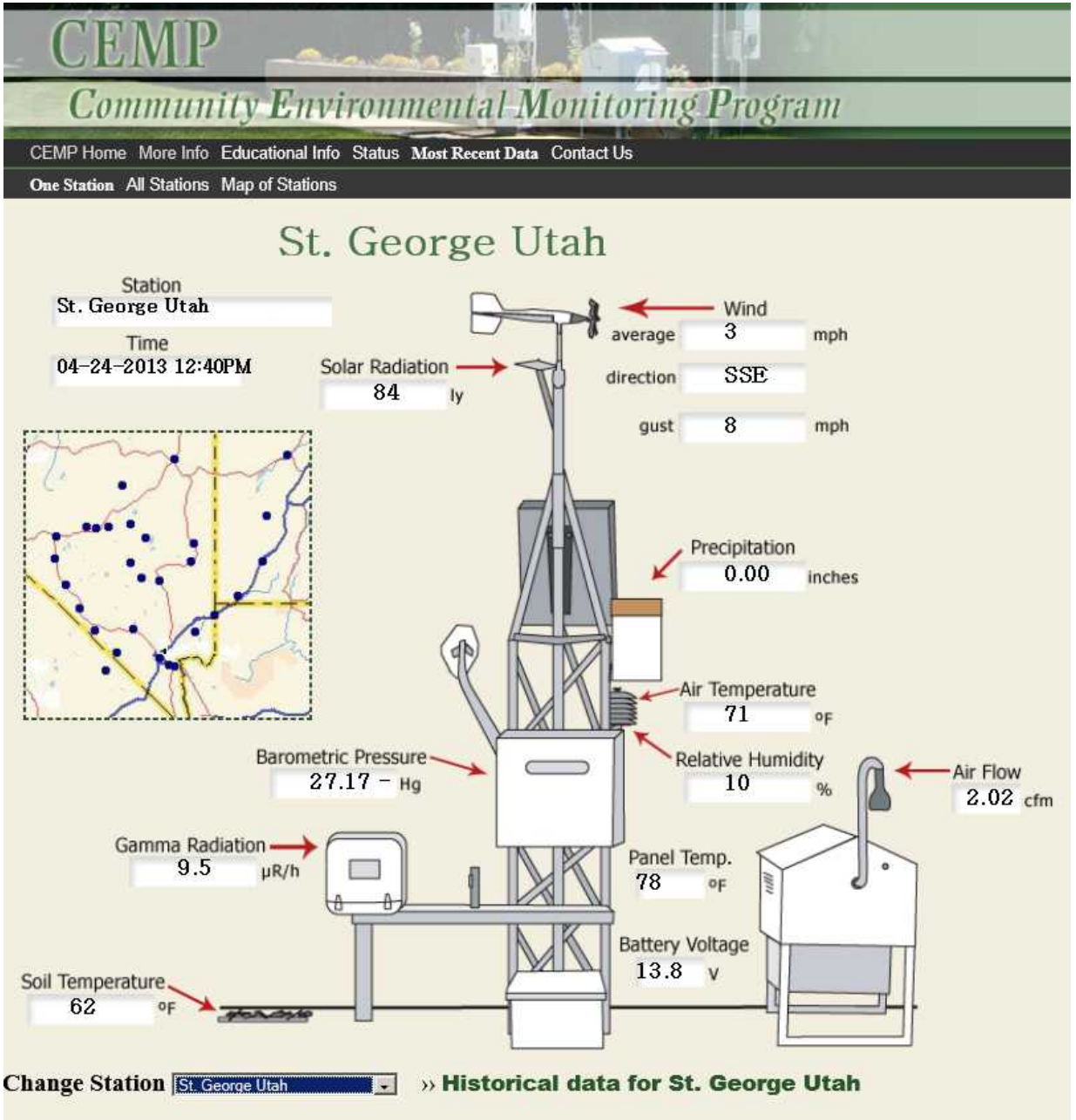
The summarized 10-minute data (hourly for satellite telemetered stations) consists of the following parameters:

Element	statistic
Solar Radiation (W/m2)	average
Wind Speed (mph)	average
Wind Vector magnitude (mph)	vector average
Wind Vector direction (degrees)	vector direction
Standard deviation of direction (degrees)	std. dev.
Max. Wind Gust (mph)	maximum sample (3 sec.)
Max. Air Temperature (C)	maximum
Ave. Air Temperature (C)	average
Min. Air Temperature (C)	minimum
Max. Relative Humidity (%)	maximum
Ave. Relative Humidity (%)	average
Min. Relative Humidity (%)	minimum
Barometric Pressure (mbars)	average
Precipitation (in.)	total for 10 min.
Precipitation running	total (in.), sample
Max. Gamma Radiation (uRem/hr)	maximum
Ave. Gamma Radiation (uRem/hr)	average
Min. Gamma Radiation (uRem/hr)	minimum
Max. Battery Voltage (volts)	maximum
Ave. Battery Voltage (volts)	average
Min. Battery Voltage (volts)	minimum
Datalogger temperature (C)	average
Station ID	sample

Data telemetry from the stations occurs via conventional telephone landline, cellular phone or GOES satellite. Due to the remoteness of 5 of the ranch stations, one-way satellite telemetry was the most viable method to telemeter the data. Data for these stations are summarized into hourly periods and telemetered once every 3 hours. The GOES DCP system assigns specific transmission intervals and times to each platform. Since the satellite telemetry is one-way only, data is stored on-site for later retrieval. Hourly and 10-minute data values are stored using CSI data storage modules and downloaded monthly during a maintenance visit. The capacity of the storage modules would allow for more than 6 months of on-site data storage. After the data is retrieved, it is sent to the Western Regional Climate Center where it is archived and ingested into the database.

Cellular phone service is used at locations where phone landlines were unavailable or installation costs would be excessive. Data retrieval from both cellular phone and landline phones occurs approximately every 3 hours. The frequency of this data calling cycle can be increased to occur every 10 minutes although a 30 minute frequency is the optimal rate to allow for connection and communication with all the CEMP sites. In the event of communication failure with a particular site during a data call, the data is stored by the datalogger and then retrieved on the subsequent call. During a normal calling cycle, each site that experiences a communication failure receives at least one call-back attempt. In case of an extensive failure in any of the communications systems on-site data storage was designed to allow for 20 days of storage on the data logger. Telephone and cellular phone access also permit the reprogramming of the remote units without (??? missing text).

http://www.cemp.dri.edu/cemp/recent/



Observation Information

Observation information can also be seen by placing your mouse cursor over the observation name above.

Air Flow

The average volume of air flow passing through the air filter of the air sampler. Units are in cubic feet per minute.

Air Temperature

The average ambient air temperature during the 10 minute observation period.

Barometric Pressure

The 10 minute average station barometric pressure. Units are inches of mercury. The 3 hour pressure tendency is indicated as follows:

--	Rapidly decreasing
-	Slowly decreasing
blank	Steady
+	Slowly increasing
++	Rapidly increasing

Battery Voltage

The 10 minute average system battery voltage.

Gamma Radiation

The 10 minute average gamma radiation. Units are in micro-Roentgens per hour (µR/h).

Panel Temperature

The internal temperature of the data logger. Used to assure system operates within expected temperature ranges.

Precipitation

The total measured rainfall during the 10 minute observation period.

Relative Humidity

The average ambient air relative humidity during the 10 minute observation period.

Soil Temperature

The 10 minute average 4 inch depth soil temperature.

Solar Radiation

The 10 minute average of incoming short wave (.4µm - .7µm) solar radiation. Units are in Langleys. Instrument is a Licor LI-200S.

Station

The location of this station.

Time

The time (in local standard time) of this station's last reported data.

Wind Average

The 10 minute average wind speed (in miles per hour). Instrument is a RM Young wind monitor.

Wind Direction

The indicated direction is the 10 minute vector average of the 3 second observations. Wind is blowing from the indicated compass direction.

Wind Gust

The maximum 3 second duration wind speed that occurred during the 10 minute observation period.

Station and Network Status - Example

CEMP stations offline

September 16, 2012 We are currently troubleshooting communications issues at CEMP stations located at Sarcobatus Flat, Goldfield, and Tecopa. We hope to have the situation resolved within the next couple days. In the meantime the stations are collecting data normally and information will be automatically backfilled to the web site as soon as communications are re-established. We are continuing to work to resolve IP address issues for the Duckwater station, and in the meantime will be conducting manual data downloads monthly until the issue is resolved.

Tonopah Station back online

August 3, 2012 The Tonopah station is now back online after the installation of a new modem. Data missing from the web site will be backfilled within the next couple days.

Delta PIC output update

July 31, 2012 Data logger PIC output sensitivity value changed to reflect installation of new PIC on 7/26/2012. PIC output data from 7-26 to 7-31, 2012 adjusted to account for change in sensitivity value. (Programmer not available at time of sensor replacement.)

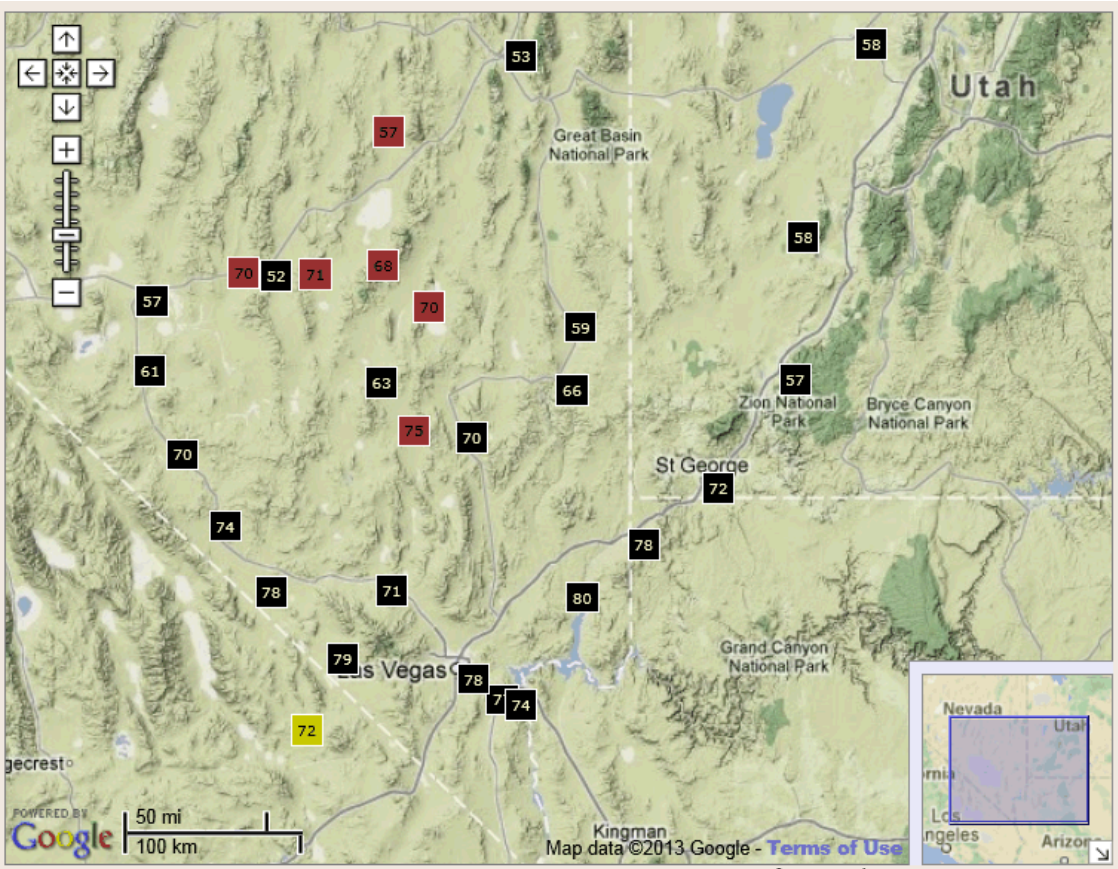
PIC replaced at Delta

July 27, 2012 A new pressurized ion chamber (PIC) was installed on July 26 at the Delta, Utah CEMP station, after the previous PIC exhibited occasional erroneous negative readings over a several day period.

Data listing of All Stations at 12:40 PM 24 APR 2013

Station	Time (local)	Temp.	Precip	Ave. Wind	Rel. Hum.	Bar. Press.	Gamma R...	Soil Temp	Solar R...
Milford Utah	24 Apr 13 12:40 PM	58	0	9	17	25.09	18	51	73
Goldfield Nevada	24 Apr 13 11:50 AM	61	0	9	11	24.47	14.6	62	87
Pahrump Nevada	24 Apr 13 11:50 AM	79	0	7	6	27.24	8	72	88
Overton Nevada	24 Apr 13 11:40 AM	80	0	9	7	28.6	11.7	83	68
Henderson Nevada	24 Apr 13 11:40 AM	77	0	6	7	27.69	14	86	98
Tonopah Nevada	24 Apr 13 11:20 AM	57	0	4	12	24.01	15.9	59	87
Twin Springs Nevada	25 Sep 12 1:00 PM	71	0	4	28	24.91	18.4	69	72
Duckwater Nevada	19 Mar 13 12:40 PM	57	0	5	29	24.67	14.7	50	75
Boulder City Nevada	24 Apr 13 11:50 AM	74	0	7	8	27.52	15.4	74	85
Ely Nevada	24 Apr 13 11:40 AM	53	0	7	17	23.97	11.8	63	90
Caliente Nevada	24 Apr 13 11:50 AM	66	0	6	10	25.61	15.7	58	66
Sarcobatus Flats Nevada	24 Apr 13 10:30 AM	70	0	7	9	25.92	16.7	61	81
Medlin's Ranch Nevada	25 Sep 12 1:00 PM	75	0	6	22	25.46	16.1	81	71
Cedar City Utah	24 Apr 13 12:50 PM	57	0	3	18	24.39	10.7	48	80
Nyala Nevada	25 Sep 12 11:00 AM	68	0	4	34	25.19	14.6	76	29
Beatty Nevada	24 Apr 13 11:50 AM	74	0	4	7	26.56	16.5	64	69
Mesquite Nevada	24 Apr 13 11:40 AM	78	0	10	8	28.07	11.4	80	63
Alamo Nevada	24 Apr 13 11:50 AM	70	0	6	10	26.48	12.7	58	97
Garden Valley Nevada	25 Sep 12 1:00 PM	70	0	4	31	24.87	16.5	60	128
Warm Springs Summit Nevada	24 Apr 13 11:50 AM	52	0	13	15	22.81	19.6	52	87
Delta Utah	24 Apr 13 12:40 PM	58	0	3	19	25.52	12.3	52	65
Amargosa Valley Nevada	24 Apr 13 11:50 AM	78	0	5	6	27.44	10.9	69	85
Las Vegas Nevada	24 Apr 13 11:50 AM	78	0	2	8	27.86	11	73	94

* Data refreshes automatically every 5 minutes.



Data from: Wed Apr 24 14:03:20 MDT 2013

Map of CEMP Stations

About this page

This page displays the most recent data on a map for all stations in the CEMP network. Use the drop down menu to select an element to display. Move the mouse cursor over a data point to bring it to the front and display an enlarged view. The enlarged view includes the station location and the date and time that corresponds to the data value.

The data is color-coded based on recency. A black background indicates the data is no more than 3 hours old; a yellow background indicates the data is more than 3 hours old; a red background indicates the data is more than 6 hours old.

CEMP Home Page Screen Shot

Data Collection Program

The Community Environmental Monitoring Program (CEMP) is a network of 29 monitoring stations located in communities surrounding and downwind of the Nevada National Security Site (NNSS), formerly the Nevada Test Site (NTS), that monitor the airborne environment for manmade radioactivity that could result from NNSS activities. The CEMP is a joint effort between the Department of Energy's National Nuclear Security Administration Nevada Site Office (NNSA/NSO), and the Desert Research Institute (DRI) of the Nevada System of Higher Education. (**more...**)

To access data for a station, click on a site's name or triangle.

Select a station from the map above, or from this list:

Alamo Nevada Go

News

- **Fourth Quarter 2012 Air Sampling and TLD Results** is now available.
- Updated **Scheduled Calibration Tests** for April 2013.
- **Public Notice of Rad Removal from Ranch Sites**
- New article: **Risks and Effects of Radiation: Putting Fukushima in Context**
- **Follow @DRICEMP on twitter** for the latest on the CEMP.

NATIONAL RadNet

http://www.epa.gov/radnet/

- **You are here:** EPA Home
- RadNet Home
- RadNet Data
- Monitoring Results from Albuquerque, NM

Monitoring Results from Albuquerque, NM
RadNet Data

- Map of Monitoring Locations
- Text List of Monitoring Locations
- RadNet Data Sources
    - Near-Real-Time Air Database in CDX
    - Sampling Results Database in Envirofacts
    - Environmental Radiation Data Reports

RadNet gamma detectors measure radiation from all radionuclides in the air that emit gamma rays.

http://www.epa.gov/radnet/radnet-data/radnet-albuquerque-bg.html

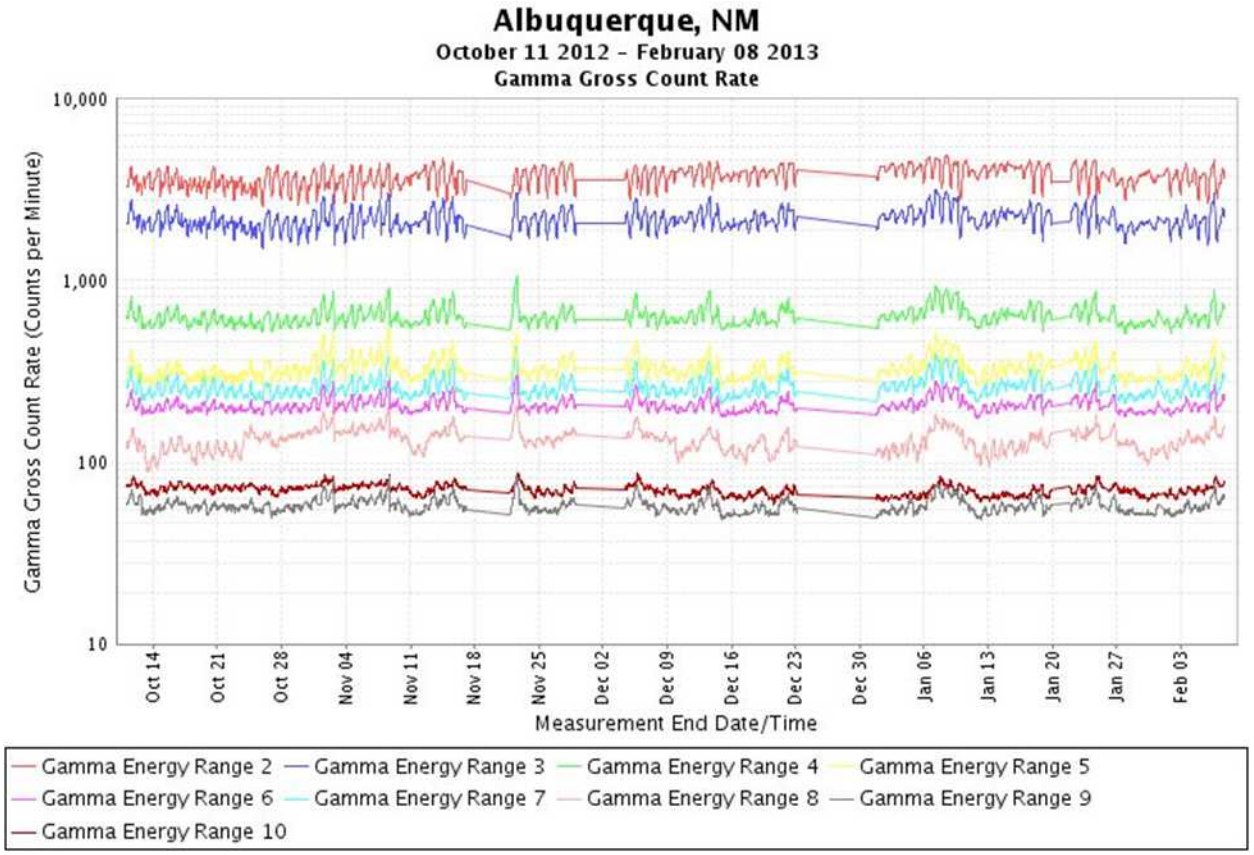
On this page:

The graph below shows the gross gamma count rate data from the air monitor at this location. By reviewing and comparing gamma count rates over time, EPA can tell if changes in the data are caused by the normal fluctuations in background radiation from naturally occurring sources or if they represent new radiation from a man-made source. Not all gamma rays have the same amount of energy. Breaking the data into energy ranges helps scientists determine which radionuclides are present.

More Info

How does EPA use gamma energy ranges?
What are the energy ranges for the gamma charts?
Gamma Rays fact sheet.

Near-Real-Time Gross Gamma Count Rate Data



Notes on the Graph

- Gross, or total, means the measurement is from all gamma emitting radionuclides.
- Count rate tells us how quickly gamma rays are being detected, which indicates how much radioactivity the monitor is seeing.
- Brief gaps in RadNet data represent instrument error.
- Larger gaps (>1 day) occasionally appear when RadNet monitors are taken offline for servicing.
- A blank graph indicates that the monitor is off-line for repair or has been disconnected because of consistently high levels of electrical interference at that location.
- Electrical interference can cause spikes, shown on graphs as one point significantly higher than the rest of the data.
- As you view data, be aware that there are often large differences in normal background radiation among the monitoring locations because background radiation levels depend on altitude and the amount of naturally occurring radioactive elements in the local soil. What is natural in one location is different from what is natural in another.
- To view the data shown in this graph, please use the query tool to search the RadNet database in EPA's Central Data Exchange.
- More information about air monitoring data.

Where can I find sample analysis/laboratory results?

RadNet laboratory results from analysis of air monitor filters and samples of precipitation, drinking water, and milk are available two forms:

Envirofacts includes RadNet data that is measured in the laboratory from air filters collected from each monitor, as well as current and historical radiation data on drinking water, milk, and precipitation.

Environmental Radiation Data (ERD) is an electronic and print journal. It contains data from RadNet and its predecessor systems.

Query Tool

https://cdxnode64.epa.gov/radnet-public/query.do

Tips:

- Using the Query View
- Selecting Customized View Options in Query View
- Selecting a Monitor Type
- Selecting Available Columns
- Establishing Monitor ID and Location Criteria
- Establishing Time Range Criteria
- Submitting Your Query

RadNet Query Builder

Monitor Type: Deployable Monitor List Fixed Monitor List

Available Parameters

- Beta Gross Count Rate(CPM)
- Fixed Monitor ID
- Gamma Energy Range 10 Gross(CPM)
- Gamma Energy Range 2 Gross(CPM)
- Gamma Energy Range 3 Gross(CPM)
- Gamma Energy Range 4 Gross(CPM)
- Gamma Energy Range 5 Gross(CPM)
- Gamma Energy Range 6 Gross(CPM)
- Gamma Energy Range 7 Gross(CPM)
- Gamma Energy Range 8 Gross(CPM)
- Gamma Energy Range 9 Gross(CPM)
- Measurement Start Date/Time

> >> < <<

Selected Parameters

- Measurement End Date/Time

Deployable Monitor Id

- RN01
- RN02
- RN03
- RN04
- RN05

Fixed Monitor Location

- AK: ANCHORAGE
- AK: FAIRBANKS
- AK: JUNEAU
- AL: BIRMINGHAM
- AL: MONTGOMERY

Time Range Criteria

Start Date: 02/01/2013

End Date: 02/08/2013

Note: The query is limited to 400 entries and if both start date and end date are left blank, the query returns 400 most recent data entries.

Using the Query View

https://cdxnode64.epa.gov/radnet-public/enhelpnavradnet.do#usingqueryview

On this page:

Selecting Customized View Options in Query View

Query view allows the user to select from a list of options that allow the creation of a customized report. The list of options includes:

- Monitor type (fixed or deployable)
- Monitor location
- Ambient temperature (degrees Celsius)
- Beta gross count rate (count rate of beta particles detected by the detector)
- Flow rate (average flow rate of air being pulled through the filter)
- Gamma ROI (counts of gamma radiation within nine ranges of energies numbered 2-10)*
- Measurement start date/time
- Measurement end date/time
- Monitor ID (each monitor numbered uniquely)
- Sample ID (unique ID for each data collection period)
- Sampling volume (total amount of air pulled through the filter)

** Since gamma ROI 1 is only used by scientists to stabilize detector operations, this range is not available through this online tool.*

Example for Albuquerque

Note that only last 400 data points are available, regardless of selection (which may be too large). Data are recorded every 15 minutes.

Tips:

- Understanding the Query Results
- Sorting the Data
- Downloading and Printing Data
- Plotting Data
- Returning to the Query Interface

If your browser displays:
Do you want to view only the webpage content that was delivered securely?
Click "No."

If your browser displays:
A yellow bar at the top which says
To help protect your security, Internet Explorer has blocked this website from displaying content with security certificate errors. Click here for options...
Click the yellow bar and select "Display blocked content."

Query Parameters:
Location Names: NM: ALBUQUERQUE,
Query Start Date: 02/01/2012
Query End Date: 02/08/2013
Fixed data selected.

Query Result for monitoring location NM: ALBUQUERQUE. Top 400 Records.

Download Printer-Friendly

Please adjust paper orientation to Landscape in the browser print dialog before printing.

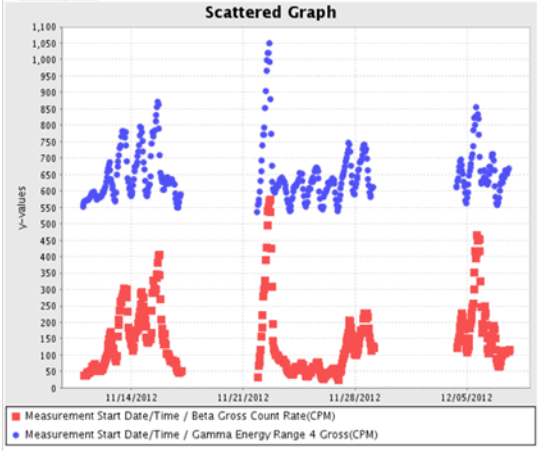
Note: click on a column header to sort results appropriately

Measurement End Date/Time	Fixed Monitor ID	Measurement Start Date/Time	Gamma Energy Range 4 Gross(CPM)	Beta Gross Count Rate(CPM)
2012-11-12 06:08:52	610.0000	2012-11-12 05:08:45	598.0000	71.0000
2012-11-12 07:09:07	610.0000	2012-11-12 06:08:58	595.0000	78.0000
2012-11-12 08:09:20	610.0000	2012-11-12 07:09:12	606.0000	86.0000
2012-11-12 09:09:34	610.0000	2012-11-12 08:09:26	605.0000	89.0000
2012-11-12 10:09:47	610.0000	2012-11-12 09:09:39	613.0000	94.0000
2012-11-12 11:10:01	610.0000	2012-11-12 10:09:53	627.0000	103.0000
2012-11-12 12:10:14	610.0000	2012-11-12 11:10:06	641.0000	122.0000
2012-11-12 13:10:28	610.0000	2012-11-12 12:10:20	657.0000	136.0000
2012-11-12 14:10:42	610.0000	2012-11-12 13:10:33	669.0000	150.0000
2012-11-12 15:10:55	610.0000	2012-11-12 14:10:48	678.0000	165.0000
2012-11-12 16:11:09	610.0000	2012-11-12 15:11:01	688.0000	172.0000
2012-11-12 17:11:23	610.0000	2012-11-12 16:11:15	664.0000	158.0000
2012-11-12 18:11:36	610.0000	2012-11-12 17:11:29	636.0000	136.0000
2012-11-12 19:11:50	610.0000	2012-11-12 18:11:42	625.0000	123.0000
2012-11-12 20:12:03	610.0000	2012-11-12 19:11:56	618.0000	121.0000
2012-11-12 21:12:17	610.0000	2012-11-12 20:12:09	606.0000	108.0000
2012-11-12 22:12:30	610.0000	2012-11-12 21:12:22	588.0000	103.0000
2012-11-12 23:12:44	610.0000	2012-11-12 22:12:35	573.0000	93.0000

RadNet Query Service

This graph is provided to public for monitoring location NM: ALBUQUERQUE

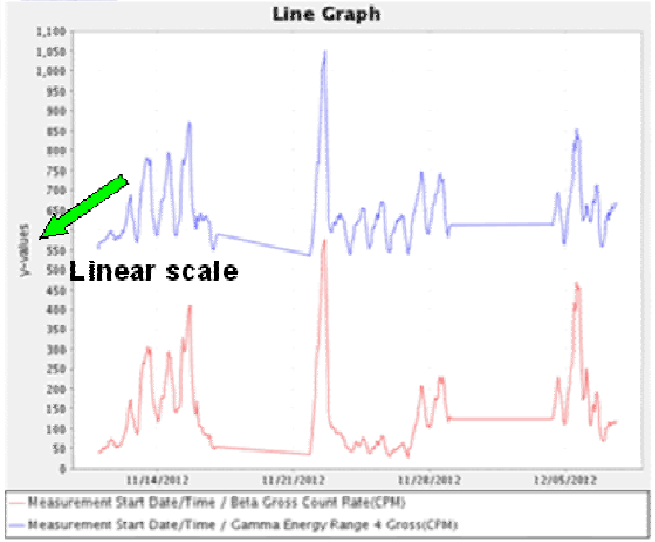
Send to printer



RadNet Query Service

This graph is provided to public for monitoring location NM: ALBUQUERQUE

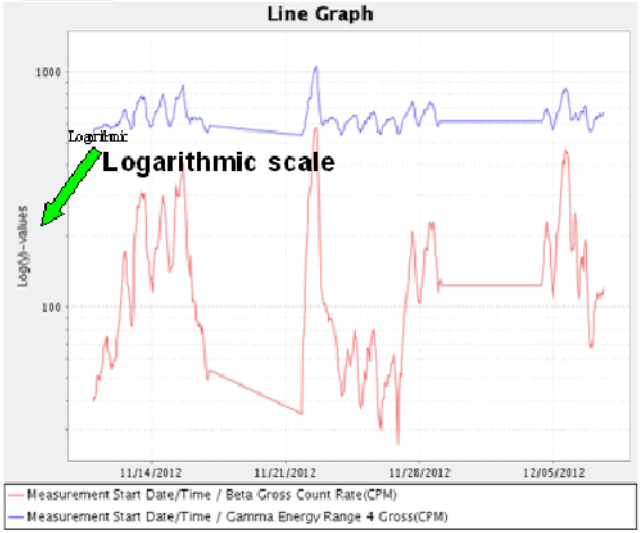
Send to printer



RadNet Query Service

This graph is provided to public for monitoring location NM: ALBUQUERQUE

Send to printer



Example of Query Using Denver, CO & Albuquerque, NM

Query Parameters:

Location Names: CO: DENVER, NM: ALBUQUERQUE,
Query Start Date: 02/01/2013
Query End Date: 02/08/2013
Fixed data selected.
Query Result for multiple monitoring locations. Total Number of Records: 349

Download Printer-Friendly

Please adjust paper orientation to Landscape in the browser print dialog before printing.

Note: click on a column header to sort results appropriately

Measurement End Date/Time	Fixed Monitor ID	Gamma Energy Range 5 Gross(CPM)
2013-02-08 10:12:06	610.0000	342.0000
2013-02-08 11:12:20	610.0000	349.0000
2013-02-08 12:12:34	610.0000	356.0000
2013-02-08 13:12:48	610.0000	385.0000
2013-02-08 14:13:03	610.0000	392.0000
2013-02-01 00:29:50	801.0000	215.0000
2013-02-01 01:30:04	801.0000	215.0000
2013-02-01 02:30:17	801.0000	221.0000
2013-02-01 03:30:31	801.0000	221.0000
2013-02-01 04:30:44	801.0000	234.0000
2013-02-01 05:30:58	801.0000	245.0000
2013-02-01 06:31:11	801.0000	239.0000
2013-02-01 07:31:25	801.0000	250.0000
2013-02-01 08:31:38	801.0000	257.0000
2013-02-01 09:31:52	801.0000	261.0000
2013-02-01 10:32:05	801.0000	266.0000
2013-02-01 11:32:19	801.0000	273.0000
2013-02-01 12:32:32	801.0000	277.0000

Denver

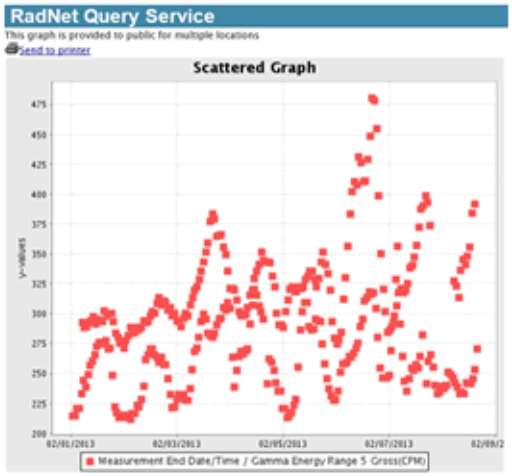
Albuquerque

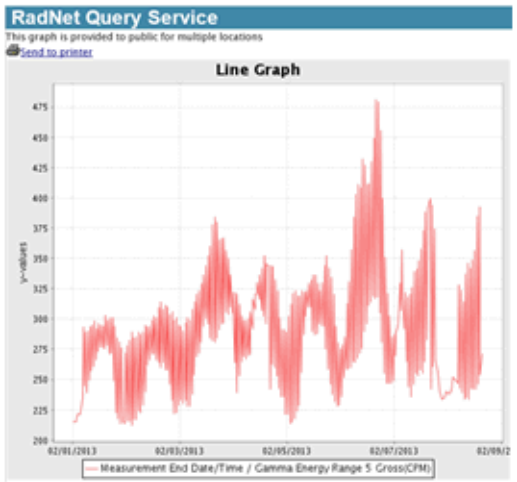
Note: Zero Values for "Beta CPM", "Gamma CPM", "Flow Rate", "Sampling Volume" or "Ambient Pressure" indicate data not available.Combined "Wind Speed" and "Wind Direction" of '0' and '359' indicate data not available.

Graphical Plots for the Past 7 Days

Note: The following plots are only available when a specific fixed monitor is selected

Fixed Monitor Location





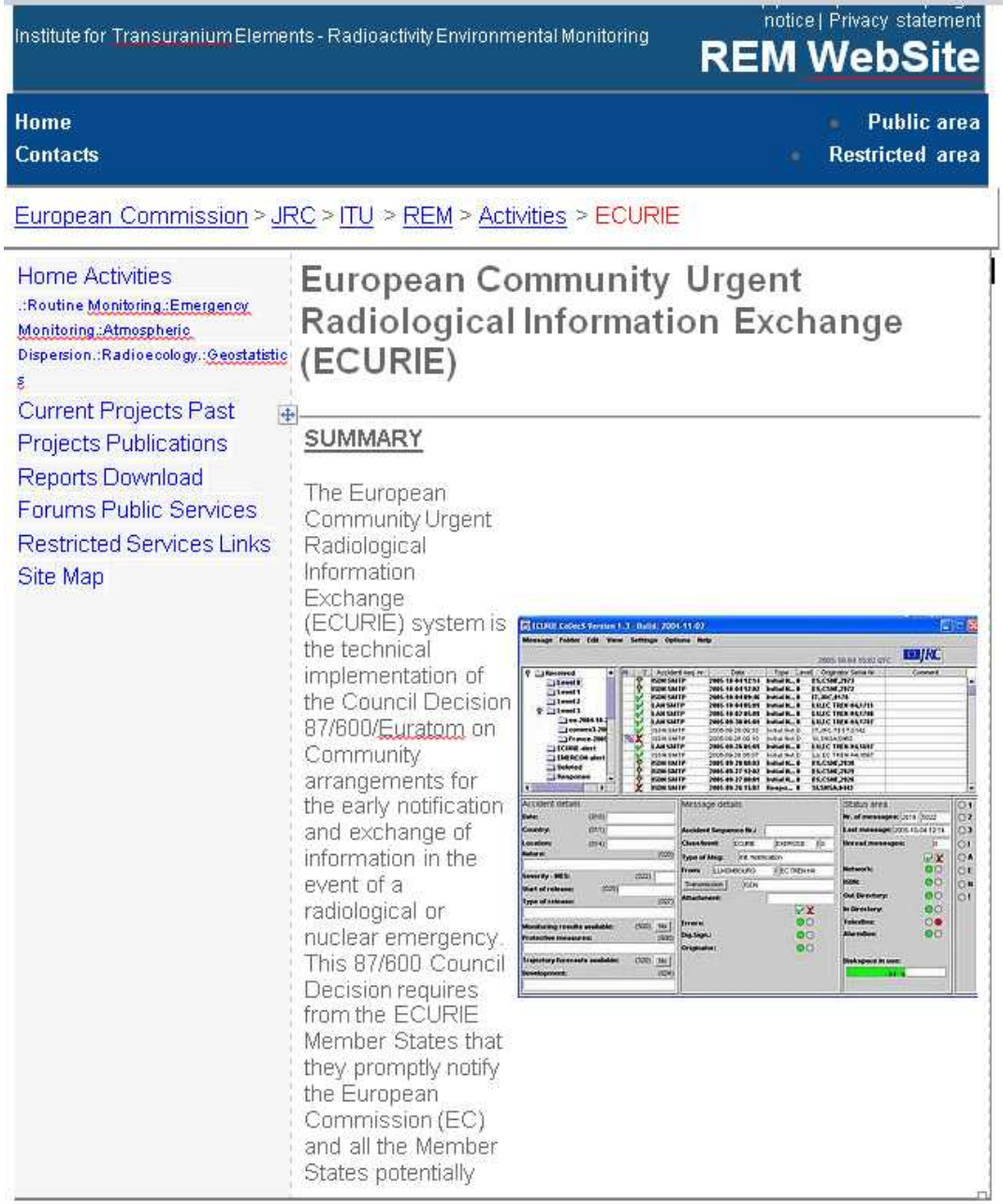
Exported Excel Spreadsheet

	A	B	C
1	Measurement End Date/Time	Fixed Monitor ID	Gamma Energy Range 5 Gross(CPM)
152	2/7/2013 12:06	610	358
153	2/7/2013 13:07	610	373
154	2/7/2013 14:07	610	388
155	2/7/2013 15:07	610	391
156	2/7/2013 16:07	610	399
157	2/7/2013 17:08	610	394
158	2/7/2013 18:08	610	374
159	2/8/2013 5:10	610	328
160	2/8/2013 6:11	610	324
161	2/8/2013 7:11	610	314
162	2/8/2013 8:11	610	337
163	2/8/2013 9:11	610	346
164	2/8/2013 10:12	610	342
165	2/8/2013 11:12	610	349
166	2/8/2013 12:12	610	356
167	2/8/2013 13:12	610	385
168	2/8/2013 14:13	610	392
169	2/1/2013 0:29	801	215
170	2/1/2013 1:30	801	215
171	2/1/2013 2:30	801	221
172	2/1/2013 3:30	801	221
173	2/1/2013 4:30	801	234
174	2/1/2013 5:30	801	245
175	2/1/2013 6:31	801	239
176	2/1/2013 7:31	801	250
177	2/1/2013 8:31	801	257
178	2/1/2013 9:31	801	261
179	2/1/2013 10:32	801	266
180	2/1/2013 11:32	801	273
181	2/1/2013 12:32	801	277
182	2/1/2013 13:32	801	277
183	2/1/2013 14:32	801	275
184	2/1/2013 15:33	801	278
185	2/1/2013 16:33	801	271
186	2/1/2013 17:33	801	272
187	2/1/2013 18:33	801	249
188	2/1/2013 19:34	801	223

Denver

Albuquerque

MULTI_NATIONAL



http://rem.jrc.ec.europa.eu/RemWeb/activities/Ecurie.aspx

http://eurdep.jrc.ec.europa.eu/Basic/Pages/Public/Home/Default.aspx

European Commission
Joint Research Centre
Institute for Transuranium Elements

LEGAL NOTICE

EUROPA | COMMISSION | JRC | ITU | REM

RADIOACTIVITY ENVIRONMENTAL MONITORING

LOGIN

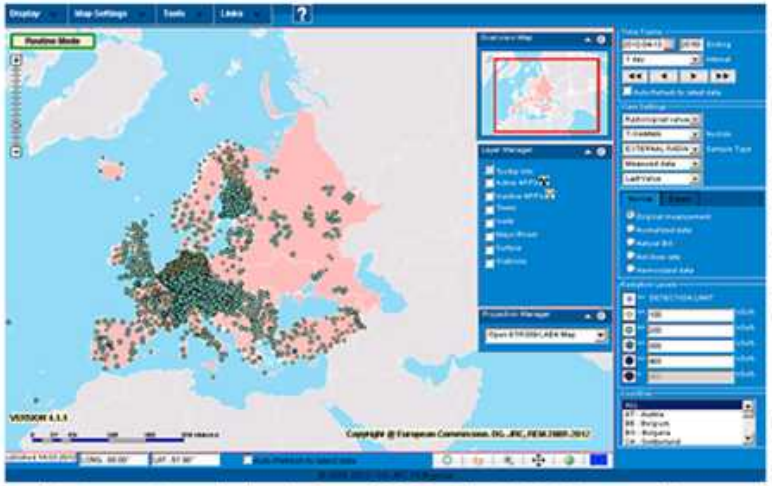
- What is EURDEP
- EURDEP Public Map
- Data-flow
- Official EURDEP CPs
- Relevant Links
- EURDEP Publications
- Support
- EURDEP News
- Countries Statistics
- Transmitted Data
- Private EURDEP

Your Local Time
12 April 2013
8:49:26

Server Time (UTC)
12 April 2013
14:49:24

EURDEP

(European Radiological Data Exchange Platform)



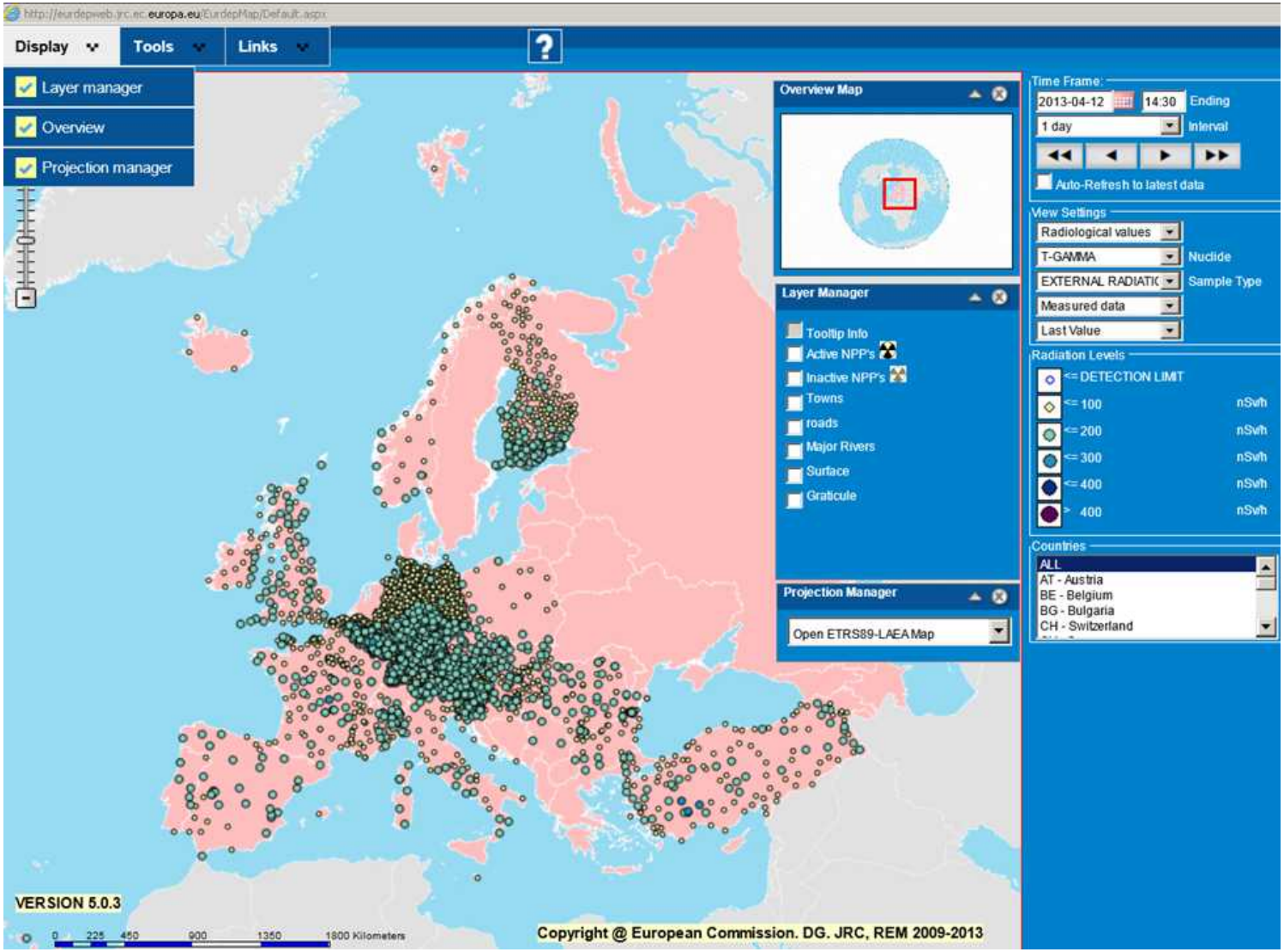
EURDEP (EUropean Radiological Data Exchange Platform) makes unvalidated radiological monitoring data from most European countries available in nearly real-time. The participation of the EU member states is regulated by the Council Decision 87/600 and the Recommendation 2000/473/Euratom. The participation of non-EU countries is on a voluntary basis. Countries sending their national data have access to the data of all the other participating countries. In addition there is the gentlemen's agreement that participating to EURDEP automatically means that data delivery will continue during an emergency but with a higher data transmission frequency.

Description

EURDEP is both a standard data-format for radiological data and a network for the exchange of automatic monitoring data. The latest version of the format is 2.1 and is in use since the beginning of 2002. The EURDEP network is currently used by 33 European countries (35 Organizations) to exchange the data from their national radiological monitoring networks. The data exchange is mostly done on an hourly basis, both during routine and emergency operation.

The central node of the EURDEP network is the EC DG-JRC in Ispra, Italy. The BfS/IAR in Freiburg, Germany and the EC DG ENER in Luxembourg act as mirror-sites for the data. Data is provided by the participating organizations by placing files in the EURDEP format with new monitoring data once per hour on a national (local) ftp-server to which the JRC has read-access. At the JRC all data-files are checked and loaded in a database. The participating organizations and Competent Authorities can subscribe to Email queues to automatically receive the aggregated data once per day, download the data from one of the three central EURDEP ftp-servers or view and download data from the private (password protected) EURDEP Web-site. In addition there is a Public EURDEP Web-site and map with free access, where the data is published with a country-by-country defined delay. The delay imposed by each country can be viewed by clicking on the [Country] label on the public EURDEP map.

http://eurdepweb.jrc.ec.europa.eu/EurdepMap/Default.aspx



http://eurdepweb.jrc.ec.europa.eu/EurdepMap/TimeSeries.aspx?loc=5293&end=201304121450&int=D1&rad=1&test=0

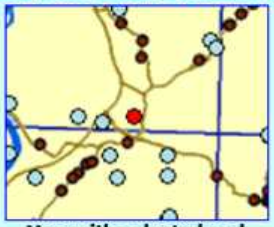
http://eurdepweb.jrc.ec.europa.eu/EurdepMap/TimeSeries.aspx?loc=5293&end=20130412145O&int=D1&rad=1&test=0

Locality: DEZ3360 - FREIBURG I.BR. (FLUGPLATZ) (Germany) Lat: 48.0°N, Long: 7.8°E, HoL: 1 m., HoS:--m.

Time Frame: 1 day

Ending: 2013-04-12 14:50

◀◀ ◀ ▶ ▶▶



Map with selected and surroundings stations

Selection area: 20 km

Available 19 localities: [DEZ3360] FREIBURG I.BR. (FLUGPLATZ)

Station Properties

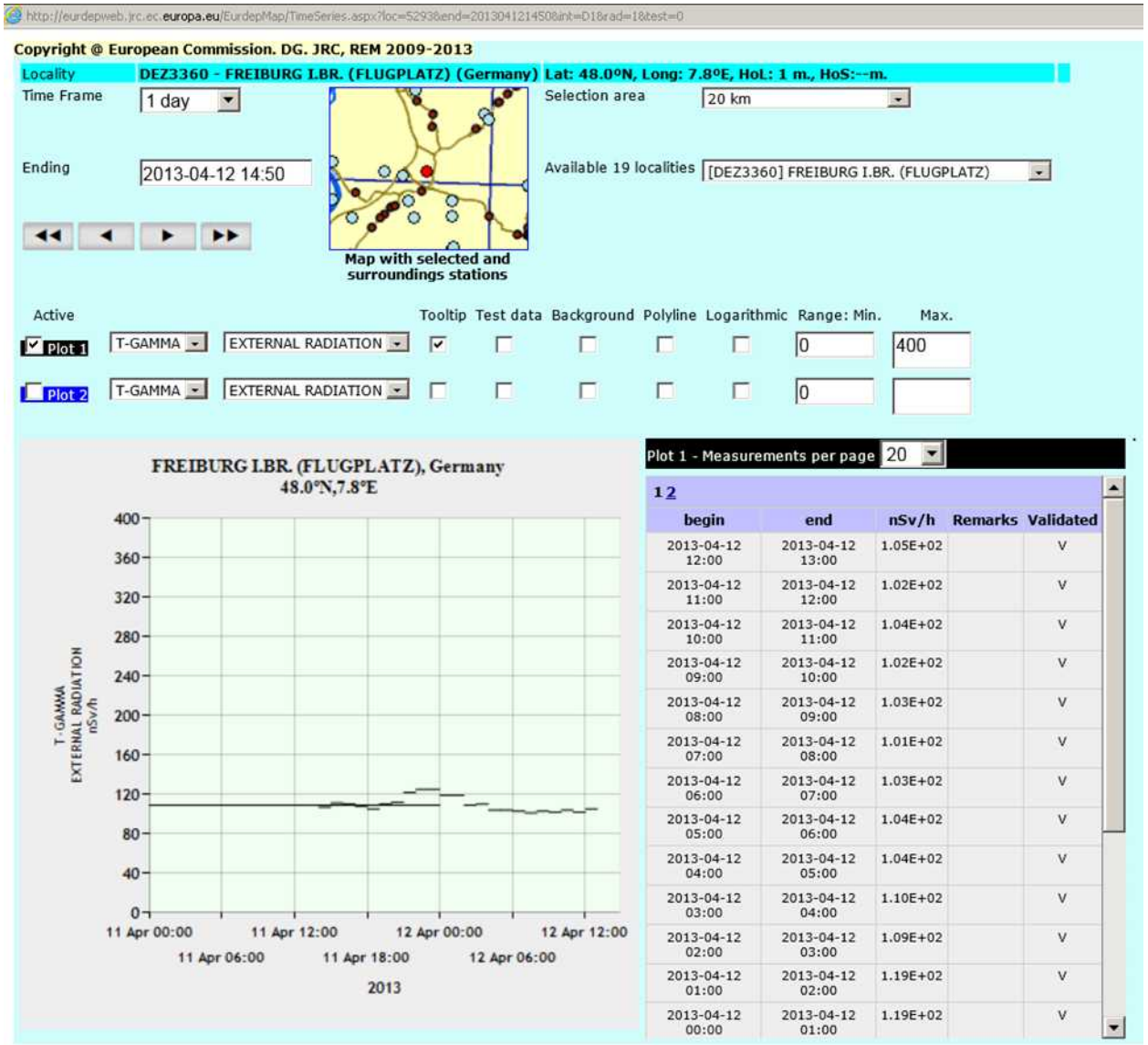
Active			Tooltip	Test data	Background	Polyline	Logarithmic	Range: Min.	Max.
☑ Plot 1	T-GAMMA	EXTERNAL RADIATION	☑	☐	☐	☐	☐	0	400
☐ Plot 2	T-GAMMA	EXTERNAL RADIATION	☐	☐	☐	☐	☐	0	

For data table enter the above code:

Get Table

Can't read? Try different words.

Enter Code and get data table



International

Comprehensive Test Ban Treaty Organization (CTBTO)

http://www.ctbto.org/

http://www.ctbto.org/map/

Radionuclide Air Monitoring Locations

CTBTO Radionuclide Laboratories

CTBTO Radionuclide Monitoring Network Video

http://www.ctbto.org/videos/#play/HDyU6nsUJqA



CTBTO Verification Regime Radionuclide Monitoring

Seventh Annual Radiation Measurements Cross Calibration Conference

Second Annual Cooperative R&D on Environmental Radiation Detection Stations Workshop

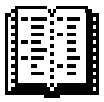
Rabat, Morocco •
June 4-7, 2012

Wacel Hamani
Monitoring Facilities Support Section
IMS Division

Preparatory Commission for the
Comprehensive Nuclear-Test-Ban Treaty Organization
Provisional Technical Secretariat
Vienna International Centre
P.O. Box 1200, A-1400 Vienna, AUSTRIA
Wacel.Hamani@ctbto.org

Plan

1. CTBTO Verification Regime
2. Radionuclide Monitoring (Why? What is measured?)
3. Particulate Monitoring
4. Noble Gas Monitoring
5. Laboratories
6. Fukushima
7. IMS data are available



1. CTBTO Verification Regime –Treaty

- **Comprehensive Nuclear-Test-Ban Treaty (CTBT)**
  Opened for signature on **24 September 1996**
  Signature 183 countries; Ratification 157 (Annexe2: 36).

- **CTBT prohibits all nuclear test explosions** in all environments.

Underwater Tests

Atmospheric Tests

Underground Tests

- Establishes the Comprehensive Nuclear-Test-Ban Treaty Organization (**CTBTO**) to **achieve its object and purpose** and **ensure implementation of its provisions.**

Four Monitoring Technologies

- ✓ **Seismic**

Primary Seismic station
Auxiliary Seismic stations

- ✓ **Infrasound**

Infrasound stations

- ✓ **Hydro acoustic**

Hydro acoustic station

- ✓ **Radionuclide**

RN Particulate Stations
Noble Gas Monitoring capability

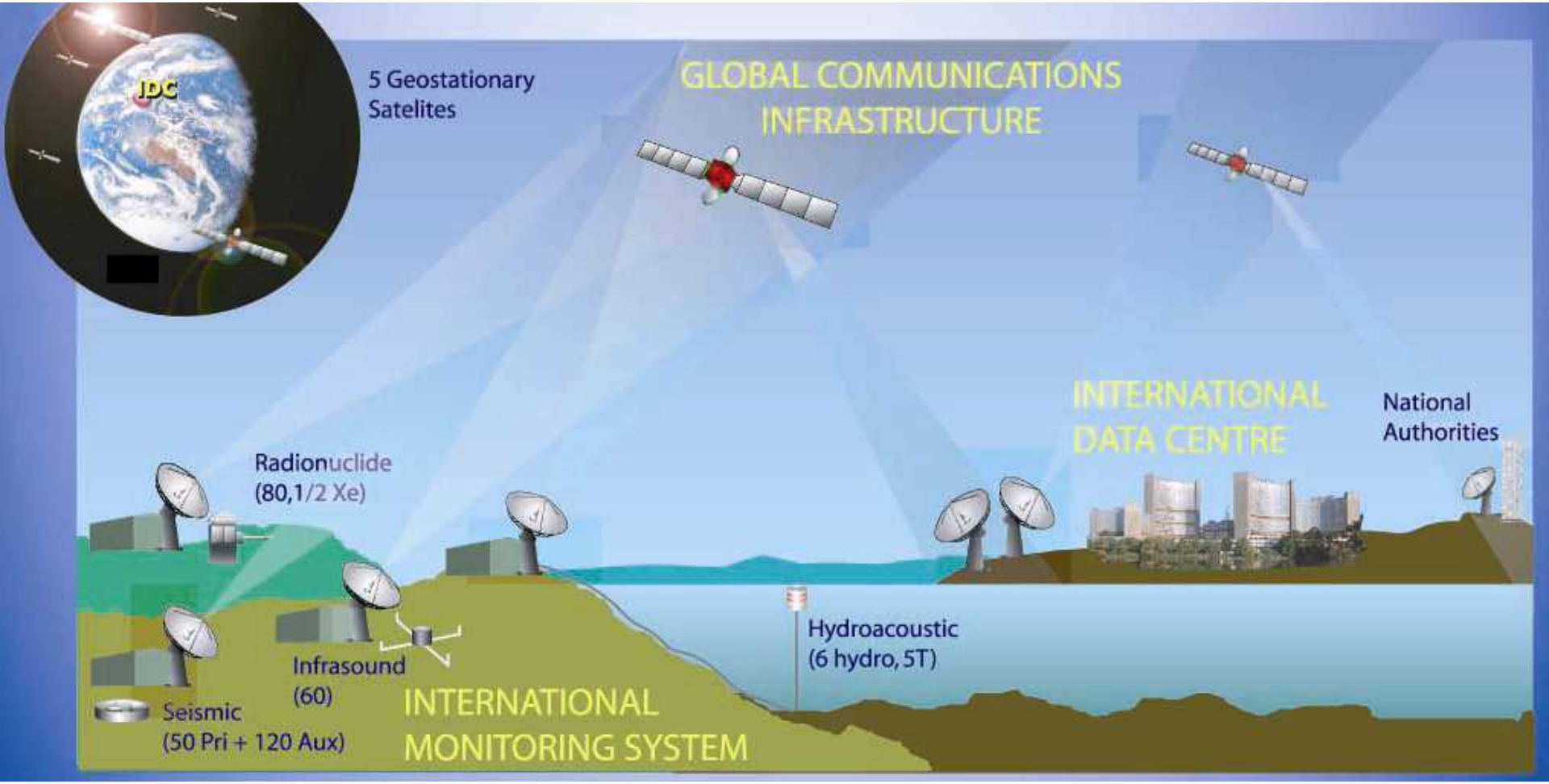
International Monitoring System (IMS)

Build and sustain

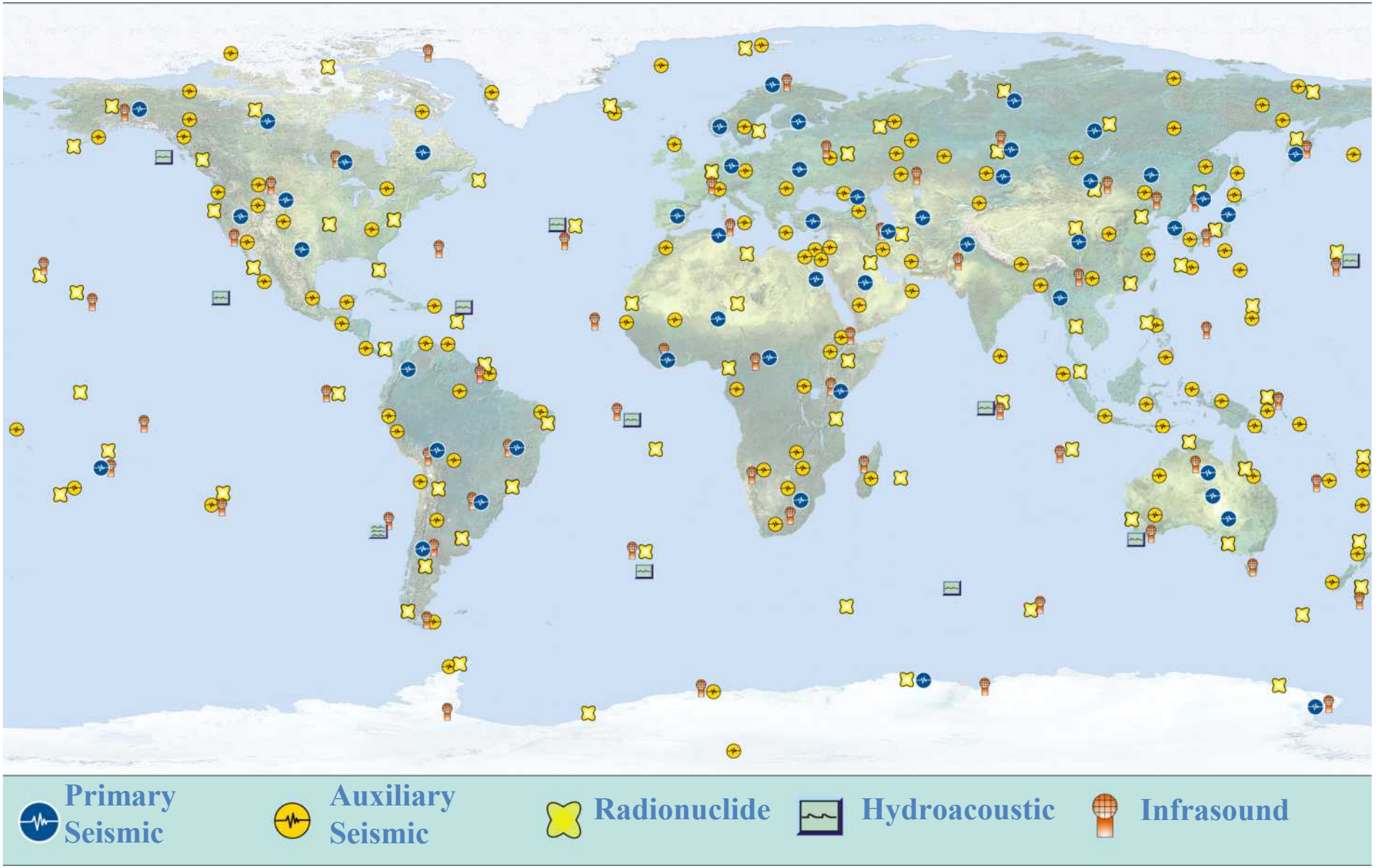
50 primary seismic
120 auxiliary seismic
11 hydroacoustic
60 infrasound
80 radionuclide
16 laboratories

321 stations and 16 laboratories

1. CTBTO Verification Regime –IMS -IDC



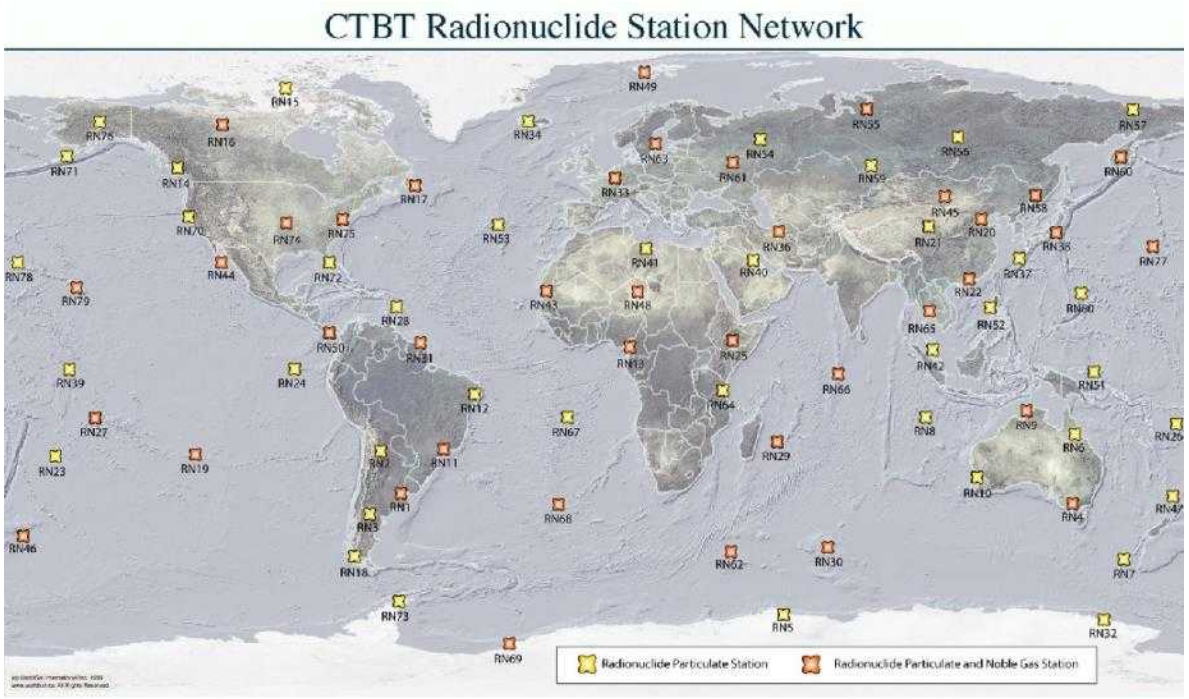
1. CTBTO Verification Regime - IMS Network



2. Radionuclide Monitoring: Why?

What makes the Radionuclide Monitoring Distinguished?

The ability to discriminate between nuclear and non-nuclear events is unique among the other verification technologies.



Provide **unambiguous evidence** of a nuclear explosion through the **detection** and **identification** of fission products.

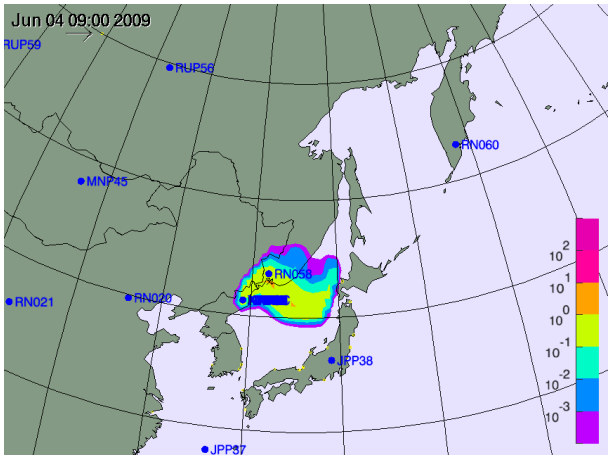
2. Radionuclide Monitoring: Why?

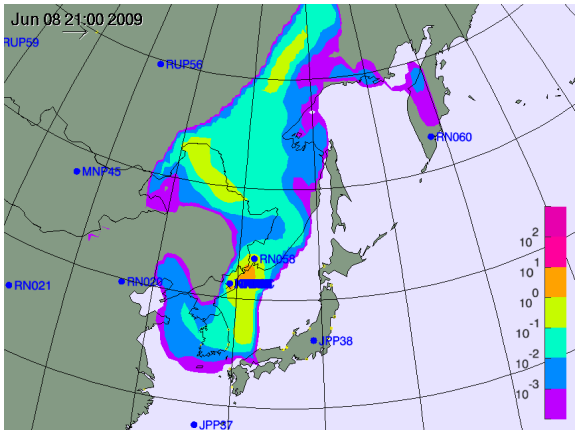
85% → Air blast, shock
Thermal radiation
Heat

15% → Radiation:
5% Initial
10% Residual

- Ratios of various fission products
- Meteorological data
- AT Modeling,

→ Provide information on the **timing** and **location** of a suspicious event.





2. Radionuclide Monitoring: What is measured?

Particulate

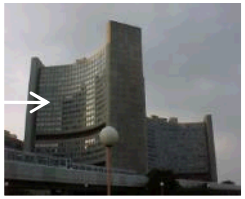
Nuclide	Half-life	Nuclide	Half-life
^{95}Zr	64 d	^{134}Cs	2.1 y
^{95}Nb	35 d	^{136}Cs	13.2 d
^{97}Zr	17 h	^{137}Cs	30 y
^{99}Mo/ ^{99m}Tc	2.75 d	**^{140}Ba**	**12.8 d**
^{103}Ru	39 d	^{140}La	40.2 h
^{106}Ru	1.008 y	^{141}Ce	31.5 d
^{131}I	8 d	^{143}Ce	1.4 d
^{132}Te	3.3 d	^{144}Ce	284.3 d
^{133}I	20 h	^{147}Nd	10.99 d

Radionuclides relevant as nuclear test indicators

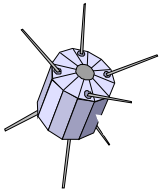
Gas

^{131m}Xe	11.9 d	^{133}Xe	5.24 d
^{133m}Xe	2.19d	^{135}Xe	9.10 h

3. Particulate Monitoring: Station Design



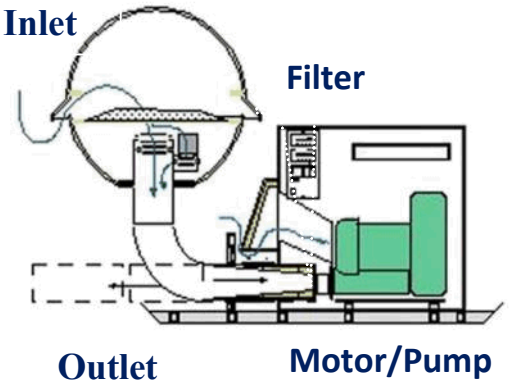
IDC

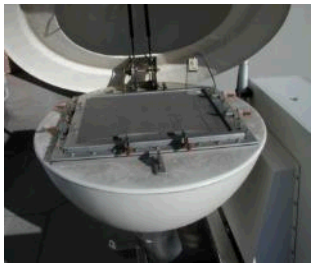


2. Filter handling and Decay

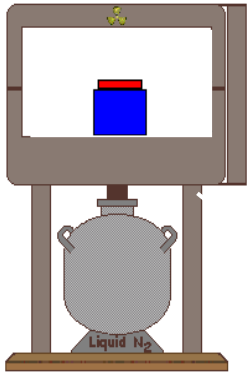
DECAY CHAMBER

1. Sampling





3. Measurement



GAMMA DETECTOR

VSAT ANTENNA

COMPUTER & ELECTRONICS

3. Particulate Monitoring

Minimum Requirements

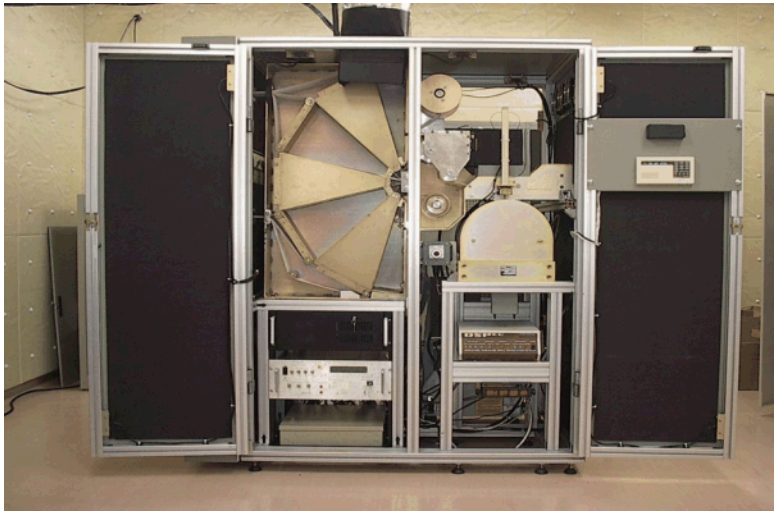
Characteristics	Minimum requirements
System	Manual or automated
Air flow	500 m^{-3} h^{-1}
Collection time [1]	24 h
Decay time[2]	≤ 24 h
Measurement time [3]	≥ 20 h
Time before reporting	≤ 72 h
Reporting frequency	Daily
Filter	Adequate composition for compaction, dissolution and analysis
Particulate collection efficiency	For filter :≥ 80 % at ∅ = 0.2 µm Global [4]:≥ 60 % at ∅ = 10 µm

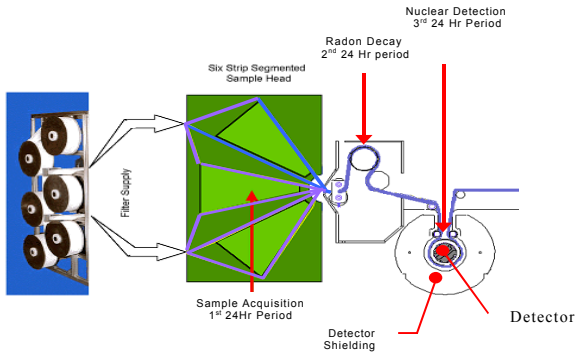
Characteristics	Minimum requirements
Measurement mode	HPGe High resolution gamma spectrometry
HPGe relative efficiency	≥ 40 %
HPGe resolution	**< 2.5 keV at 1332 keV**
Base line sensitivity [5] [6]	**10 to 30 µBq m^{-3} for ^{140}Ba**
Calibration range	88 to 1836 keV
Data format for gamma spectra and auxiliary data	RMS (Radionuclide Monitoring System) format [7]
State of health	Status data transmitted to IDC
Communication	Two-way
Auxiliary data	Meteorological data Flow rate measurement every 10 minutes
Data availability	≥ 95 %
Down time [8]	≤ 7 consecutive days ≤ 15 days annually

3. Particulate Monitoring - IMS Station

3. Particulate Monitoring

RASA Radionuclide Automated Sampler/Analyzer





Cinderella

3. Particulate Monitoring: Network

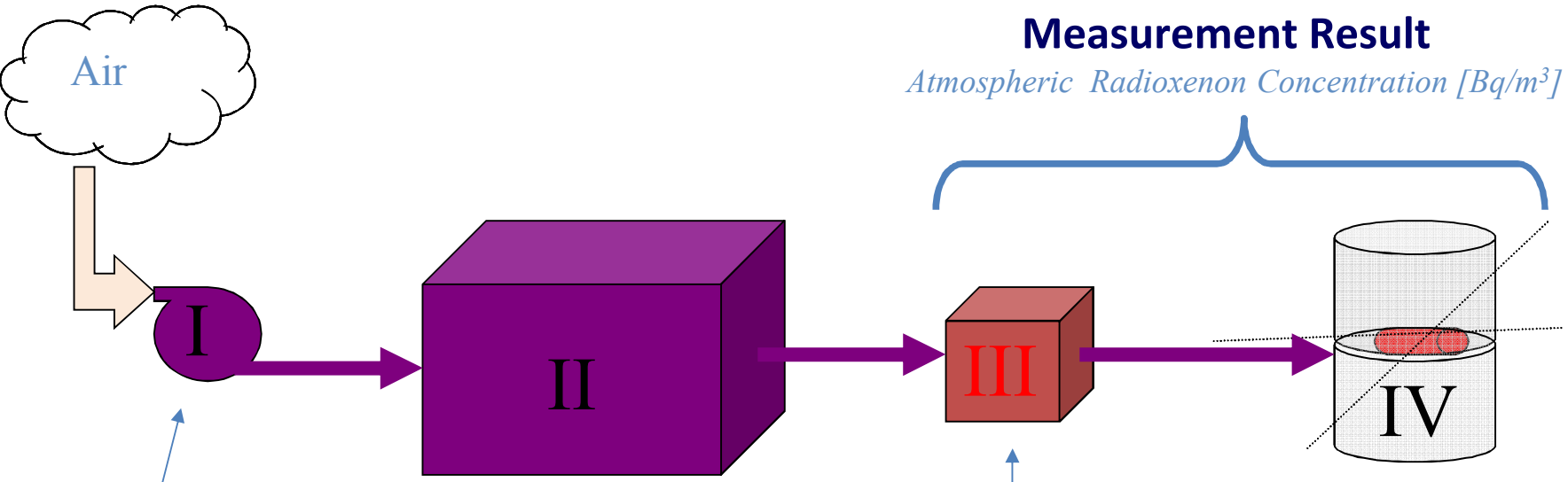
4. Noble Gas Monitoring

Minimum Requirements

Characteristics	Minimum requirements
Total Volume of sample	10 m^3
Air flow	0.4 $m^3 h^{-1}$
Collection time	≤ 24 h
Measurement time	≤ 24 h
Time before reporting	≤ 48 h
Reporting frequency	Daily
Measurement mode	Beta gamma coincidence or High resolution gamma spectrometry
Isotopes measured	^{131m}Xe, ^{133m}Xe , ^{133}Xe, ^{135}Xe
Minimum Detectable	**1 mBq m-3 for 133Xe**

4. Noble Gas Monitoring

Principle of Xenon Sampling and Analysis



Measurement Result

Atmospheric Radioxenon Concentration [Bq/m³]

Collection of Air

Gas Processing & Sample Preparation

Removal of water, O_2, CO_2, Rn (freeze traps, molecular sieves and/or activated charcoal)

- Creation of final Xe-sample
- Gas transport via carrier gas (He, N_2)

Volume Measurement

sampled air equivalent of Xenon

(GC, TCD)

Activity Measurement

(HPGe or beta-gamma coincidence)

4. Noble Gas Monitoring

SAUNA (Sweden)

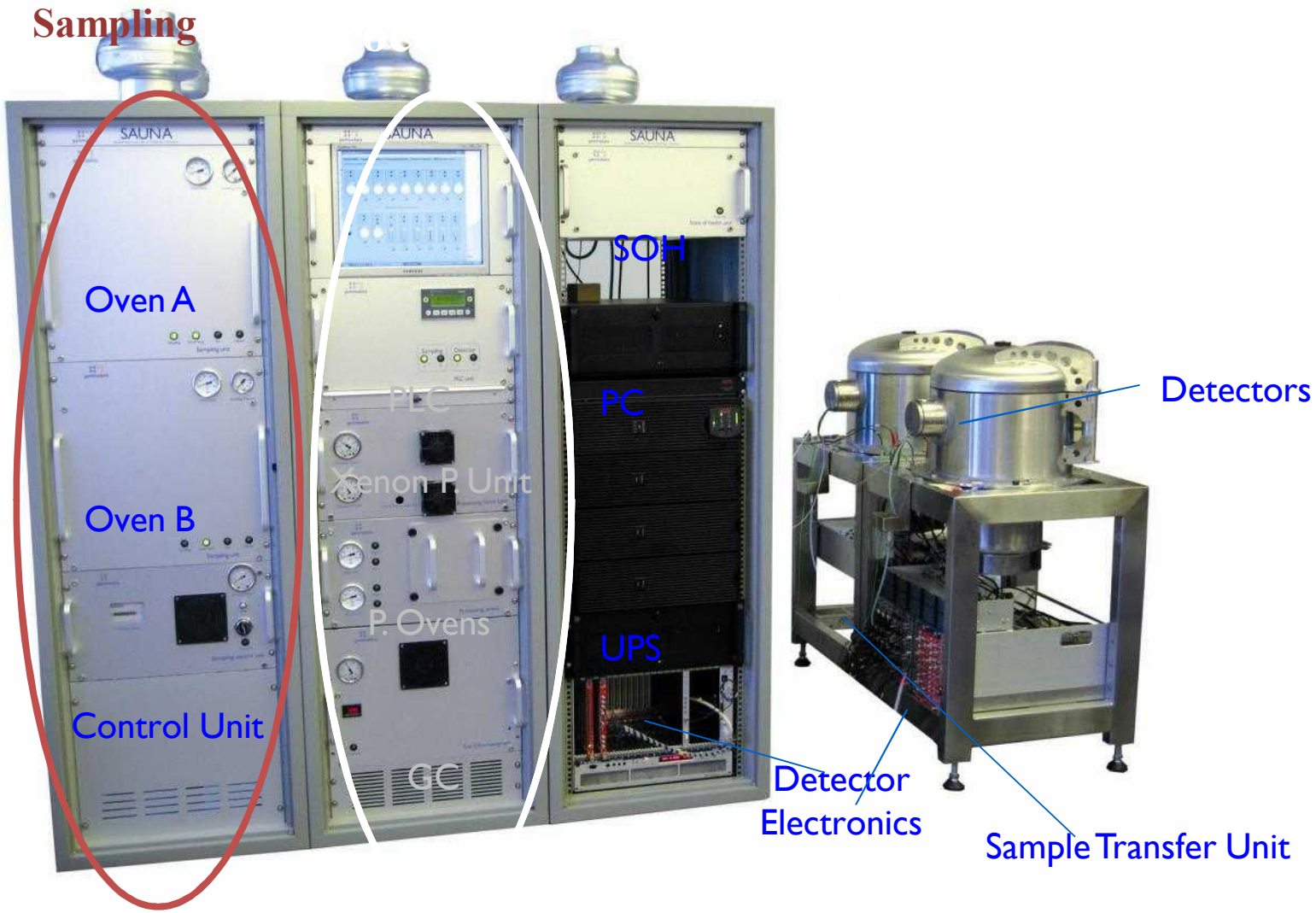
SPALAX (France)

ARIX (Russia)

3 NG Systems

4. Noble Gas Monitoring

SAUNA
(Swedish Automatic Unit for Noble Gas Acquisition)



4. Noble Gas Monitoring

SPALAX

Système de **P**rélèvement **A**tmosphérique en **L**igne avec l'**A**nalyse du **X**énon

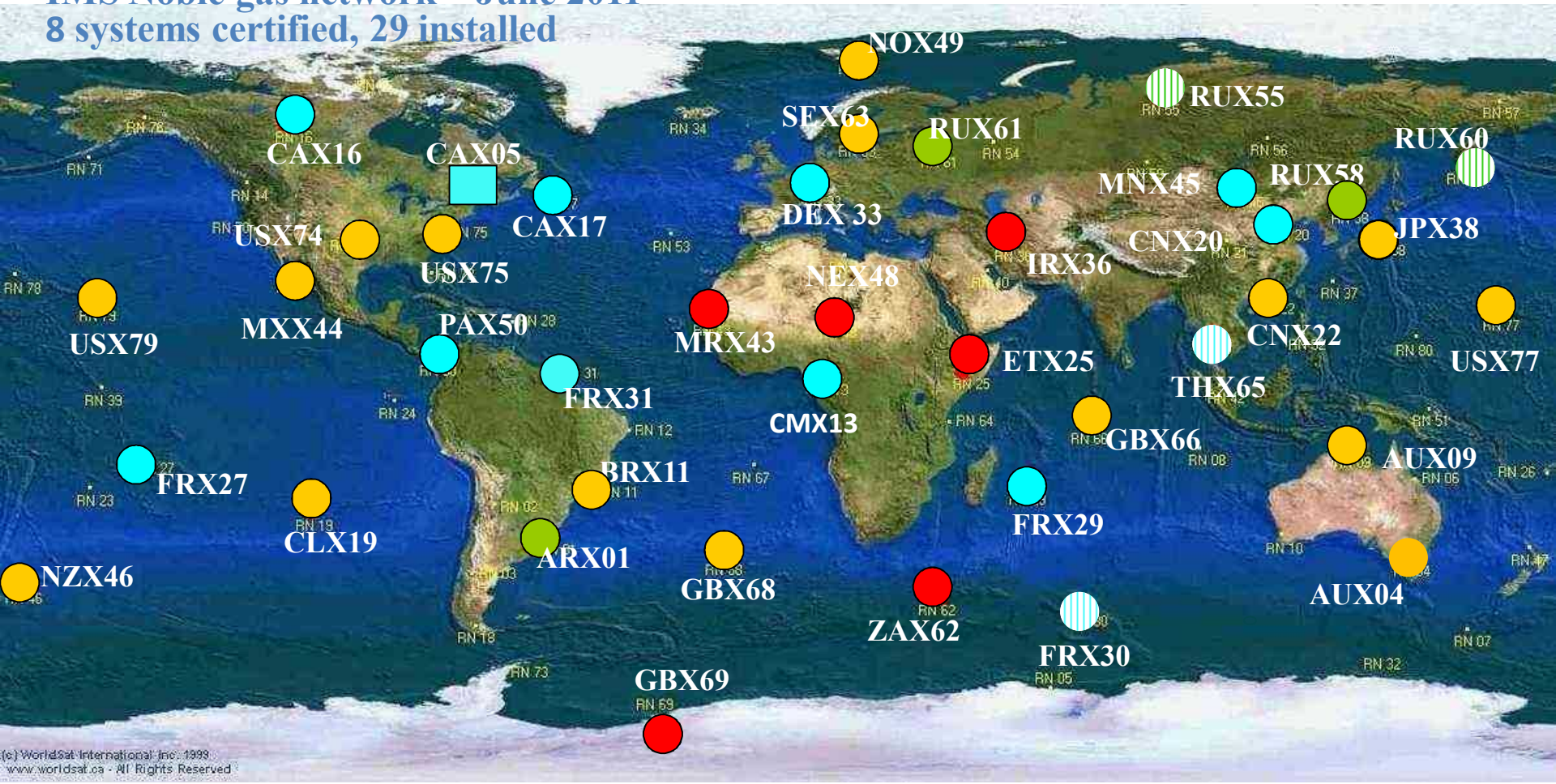
4. Noble Gas Monitoring

ARIX

Analyser of **R**adioactive **I**sotopes of **X**enon

4. Noble Gas Monitoring

IMS Noble gas network – June 2011
8 systems certified, 29 installed



SPALAX 11 SAUNA 15 ARIX 3 not started National Systems

…Systems under installation

5. Radionuclide Laboratories

Support role of 16 Radionuclide Laboratories

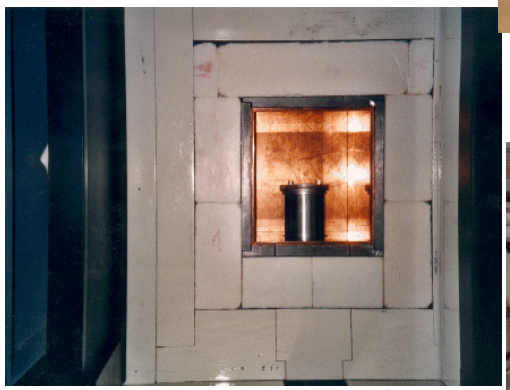
- Confirm the presence of fission and/or activation products

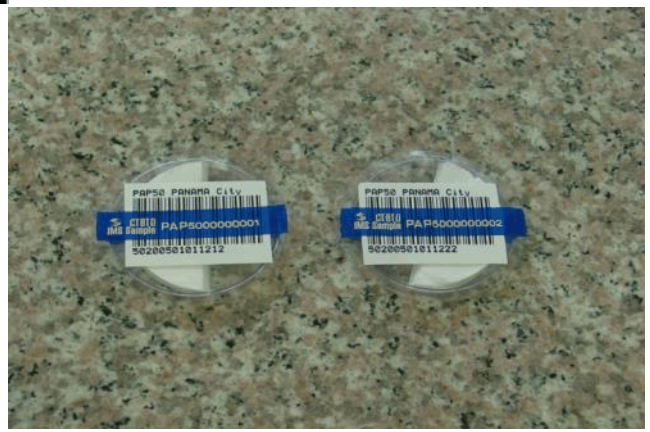
(all Level-5 samples are re-analysed at laboratories)

- Provide more accurate and precise
- Clarify the presence or absence of fission and/or activation products

5. Radionuclide Laboratories

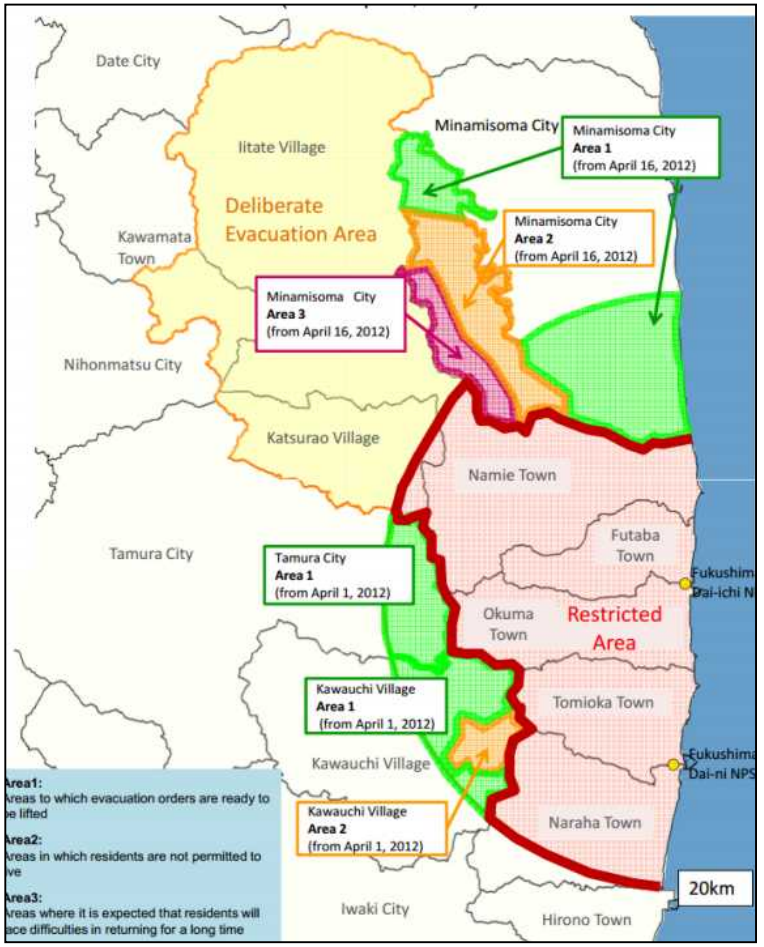
- Re-analyse samples selected for QA/QC (4 samples per year)
- Station back-up samples when a station is down
- Proficiency test exercise samples.





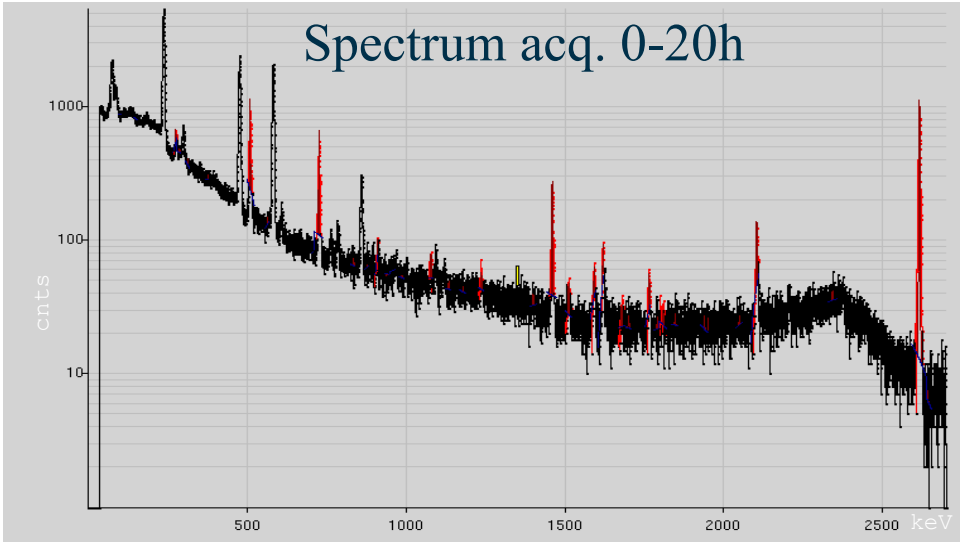
6. Nuclear reactor accident at Fukushima

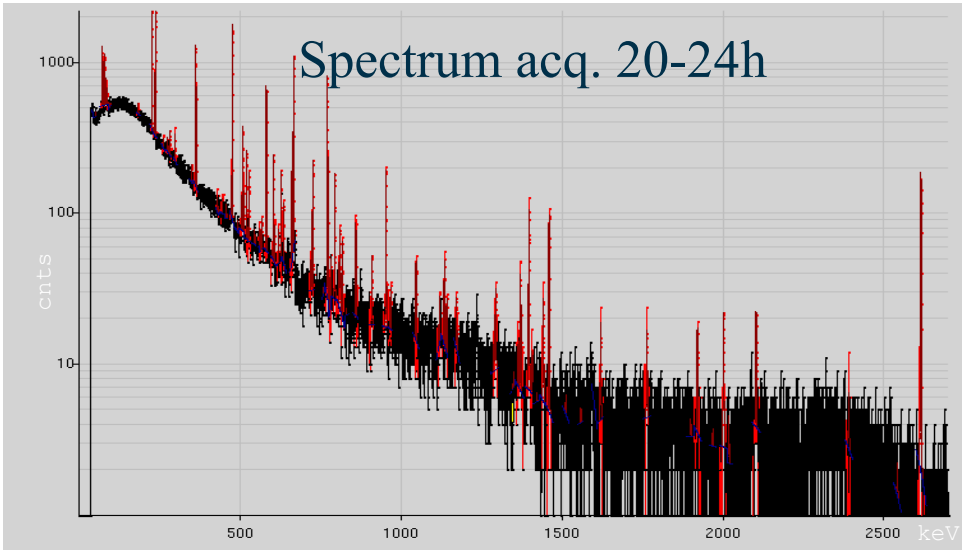
PTS operational experience
lessons learnt from station performance



6. Nuclear reactor accident at Fukushima

RN38 (Takasaki, Japan)
Collection 12 – 13 March 2011





Set of gaseous fission products were detected.

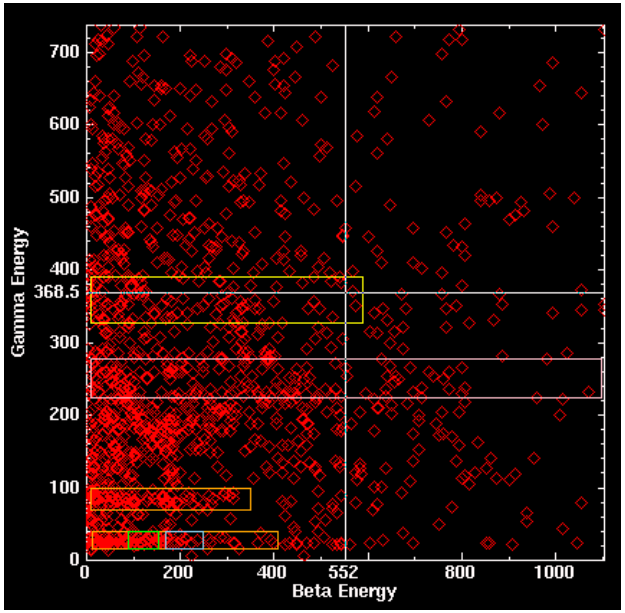
Concentrations are not reliable (sample was on detector)

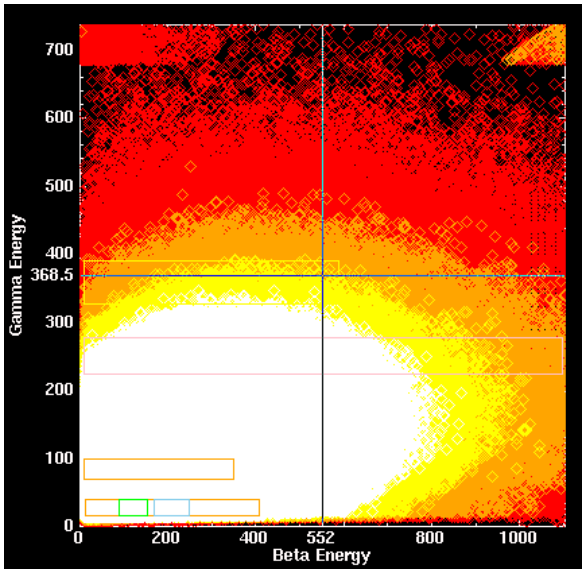
Arrival time of these radionuclides is between 2 and 3 am (UTC) on 15/03.

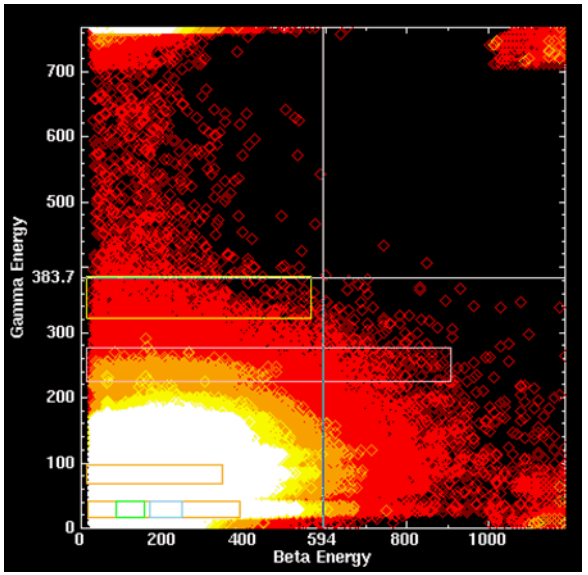
Sample is **level 5** (multiple fission products detected)

6. Nuclear reactor accident at Fukushima

Noble Gas







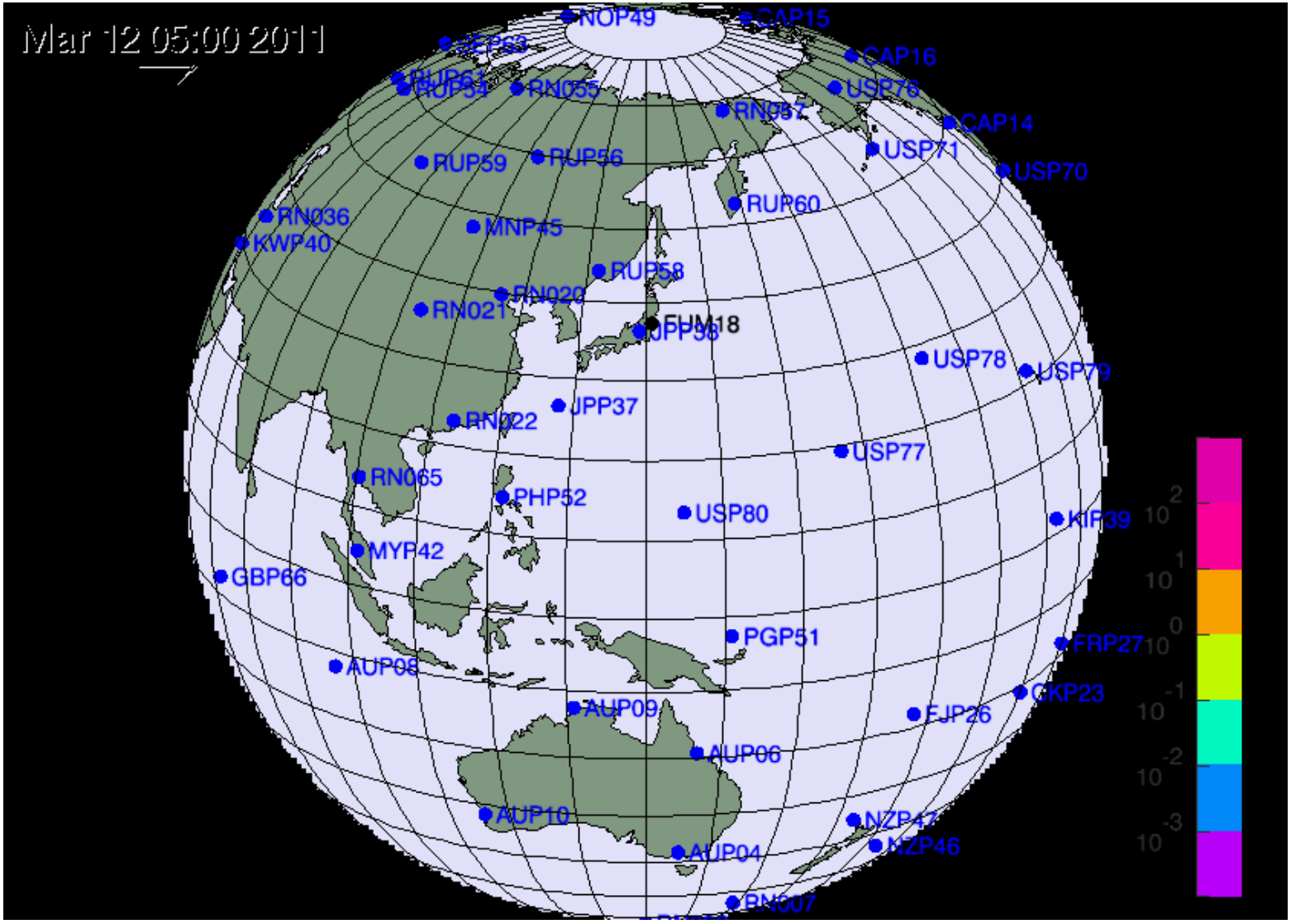
Detection of radioxenon, above dynamic range of measurement system.

Normal spectrum analysis is not possible.

Estimate of Xe-133, in the level of **kBq/m3**

6. Nuclear reactor accident at Fukushima

Atmospheric transport model, East Asian view



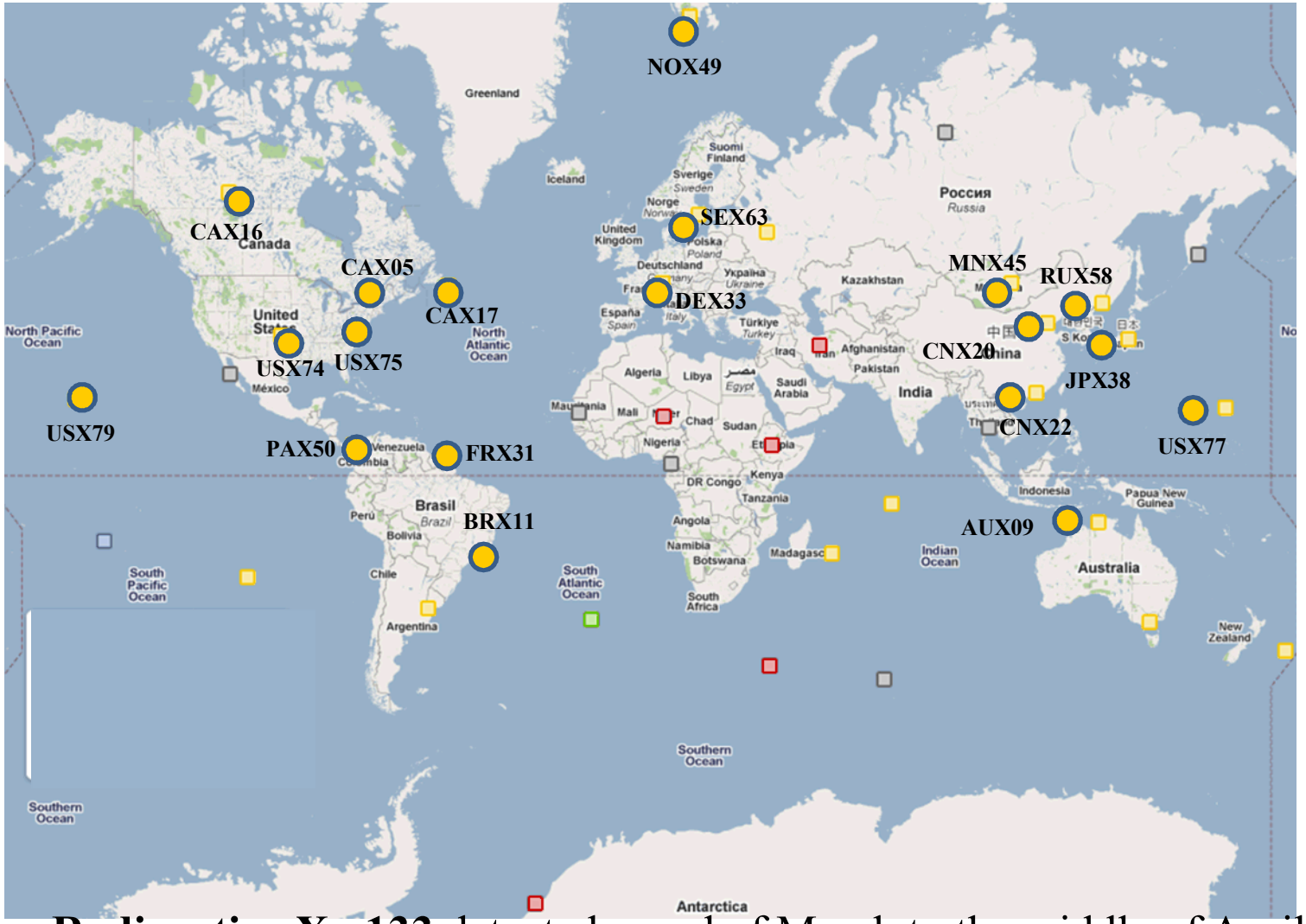
6. Nuclear reactor accident at Fukushima

Particulate network detections

Radioactive Iodine detected - end of March to the middle of April

6. Nuclear reactor accident at Fukushima

Noble gas network detections



Radioactive Xe-133 detected - end of March to the middle of April

6. Nuclear reactor accident at Fukushima

Lessons learned

Radiation protection measures for local operators (procedures, equipment and training)
Real time radiation measurement at the station.
Dynamic range of the RN measurement equipment needs to be reviewed
Eliminating memory effect in the noble gas detector systems is crucial
Contamination at the station.. Review backup power supply at IMS stations

Tool for easier review of complex Spectra

Procedures need to be developed on how to handle a high number of Level 5 samples (e.g. send only first sample from each affected station to avoid sample flood (resource/cost issue))
Procedures for handling high activity samples at laboratories have to be reviewed

Atmospheric modeling, tools to refine source term based on IMS detections

Stress management, lacking stuff, (back up analyst), professionalism and dedication

CRTool v. 1.5.1 (BETA)

Nuclides detections | Isotopic ratios | Categorization Levels

Nuclides | Stations | Options

Interval:

Period: Fukushima ac

Start time: 2011-03-12

End time: 2011-05-31

View:

Scale: Logarithmic

Base: 10

Type: Line

Show:

MDC:

Uncertainties:

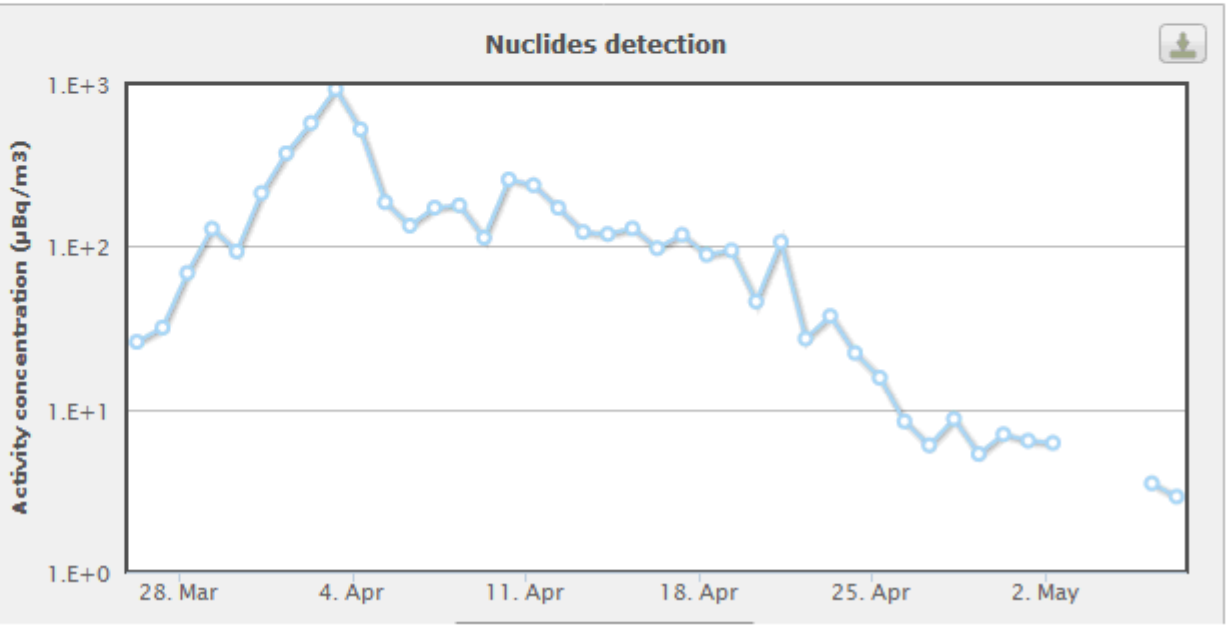
Zoom:

Apply

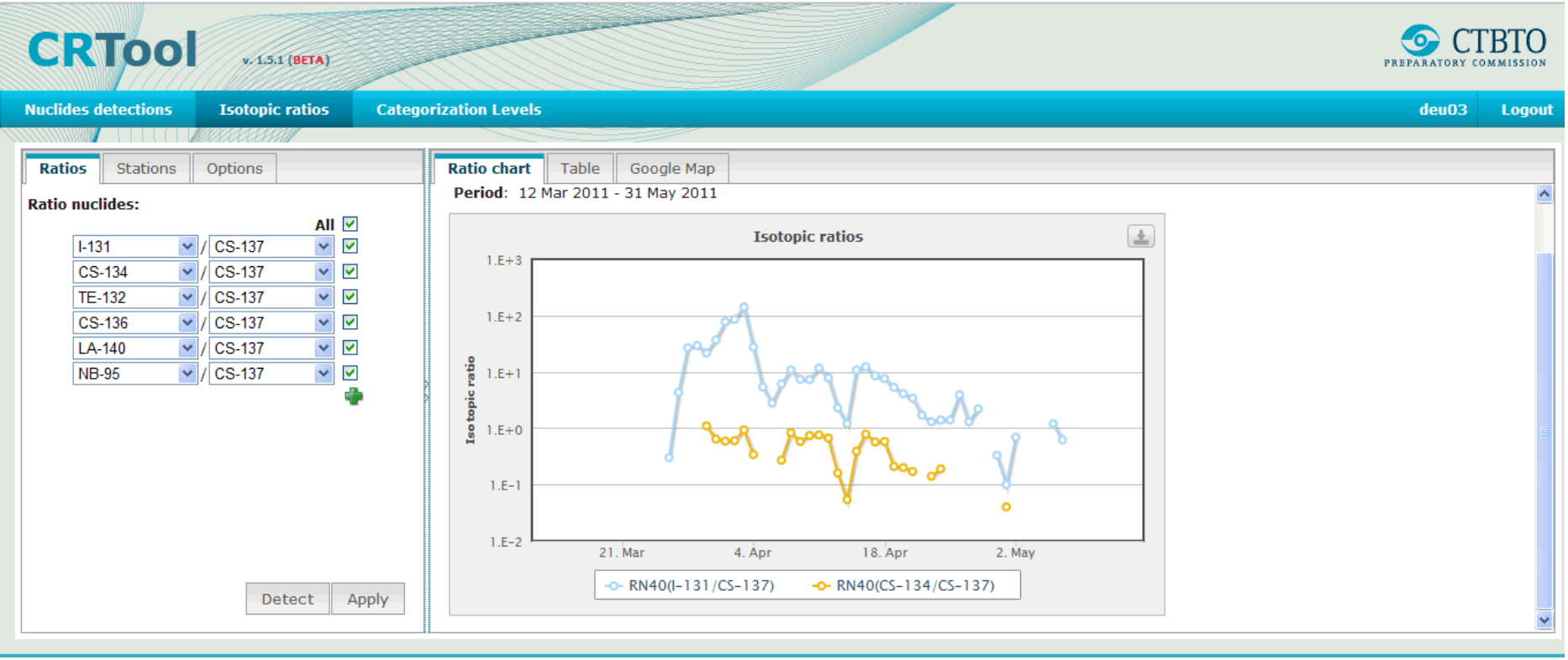
Detections chart | Nuclides detections | Stations detections | Google Map

Nuclides detections

Nuclide(s): I-131
Station(s): RN40, Kuwait
Period: 12 Mar 2011 - 31 May 2011; **Units**: µBq/m3



CR Tools


CRTool
v. 1.5.1 (BETA)
CTBTO
PREPARATORY COMMISSION
Nuclides detections
Isotopic ratios
Categorization Levels
deu03
Logout
Ratios
Stations
Options
Ratio nuclides:
All
I-131 / CS-137
CS-134 / CS-137
TE-132 / CS-137
CS-136 / CS-137
LA-140 / CS-137
NB-95 / CS-137
Detect
Apply
Ratio chart
Table
Google Map
Period: 12 Mar 2011 - 31 May 2011
Isotopic ratios
Iso topic ratio
1.E+3
1.E+2
1.E+1
1.E+0
1.E-1
1.E-2
21. Mar
4. Apr
18. Apr
2. May
RN40(I-131/CS-137)
RN40(CS-134/CS-137)

CR Tools


Nuclides detections
Isotopic ratios
Categorization Levels
deu03
Logout
Period: Fukushima accident
2011-03-12
2011-05-31
Play
Stop
Reset
Current:
01 Apr 11
Level 5: 20
Level 4: 4
Level 3: 10
Legend
RN (NG)
RN (PC)
level 1, 2
level 3
level 4
level 5
North Atlantic Ocean
South Atlantic Ocean
Indian Ocean
Iceland
Sweden
Norway
Russia
United Kingdom
Poland
Ukraine
France
Spain
Italy
Turkey
Kazakhstan
Mongolia
South Korea
Afghanistan
Iran
Iraq
Pakistan
India
Thailand
Algeria
Libya
Egypt
Saudi Arabia
Mali
Niger
Chad
Sudan
Nigeria
Venezuela
Brazil
Bolivia
DR Congo
Kenya
Tanzania
Angola
Namibia
Botswana
Madagascar
South Africa
Indonesia
Papua New Guinea
Australia
30
25
20
15
10
5
0
14 Mar 2011
21 Mar 2011
28 Mar 2011
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the comprehensive nuclear-test-ban treaty
putting an end to nuclear test explosions
Thank you
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