



HSE
Occupational Health & Safety
and Environmental Protection unit

Surveillance de l'environnement au CERN

Nourredine Boumehres Responsable technique

Julien Regnard chef de Projets

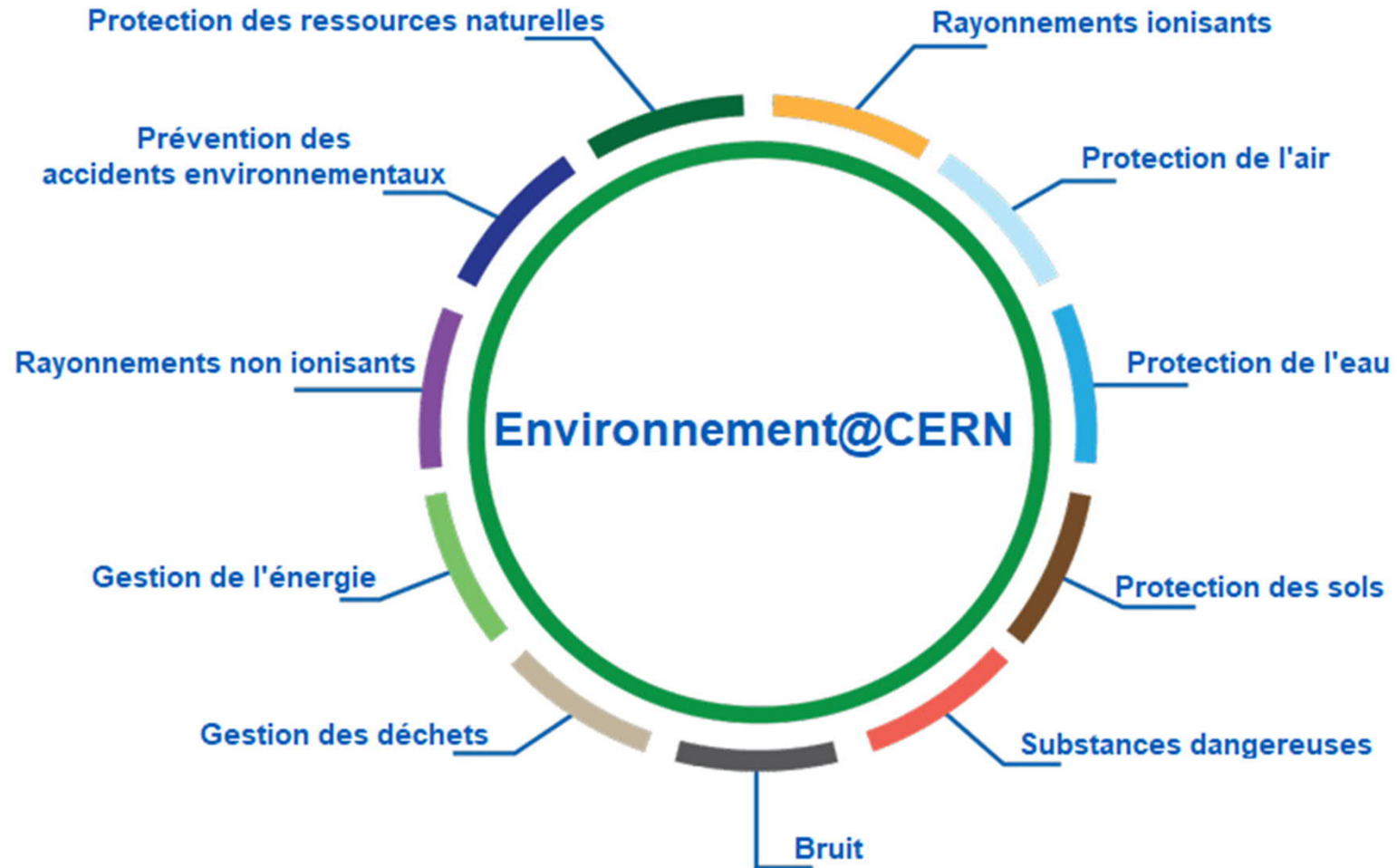
Fabrice Malacrida Expert radioprotection

Andre Dziewa Responsable du laboratoire Environnement



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Le CERN et l'environnement



le complexe des accélérateurs du CERN



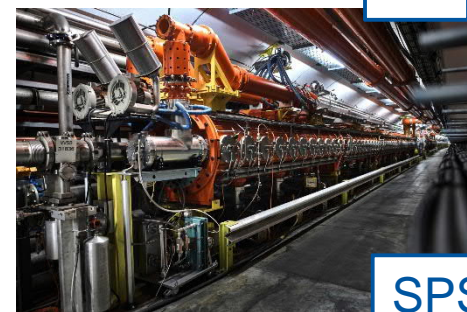
LINAC 4



PSB



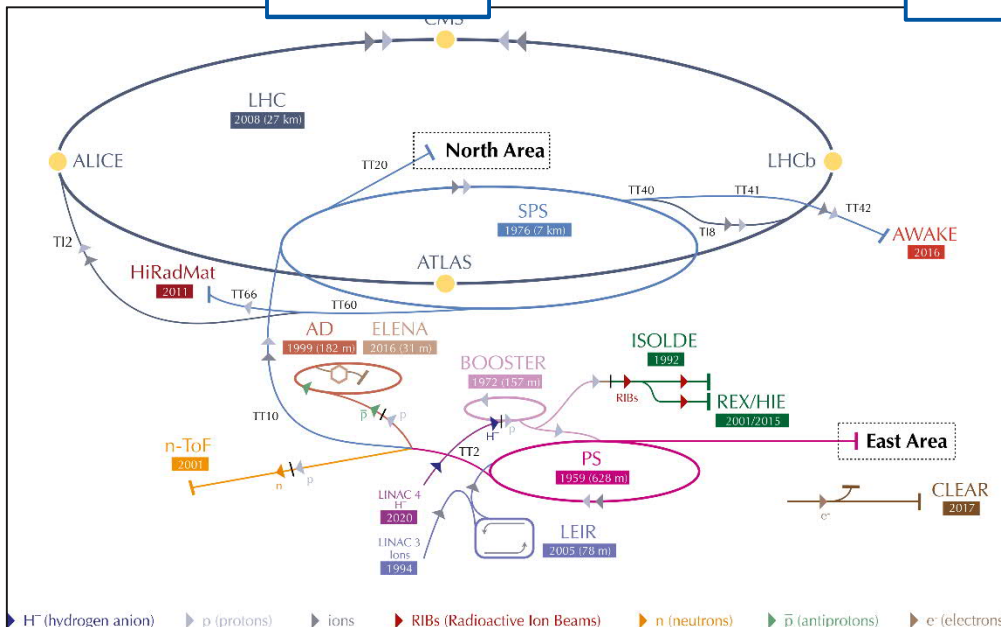
PS



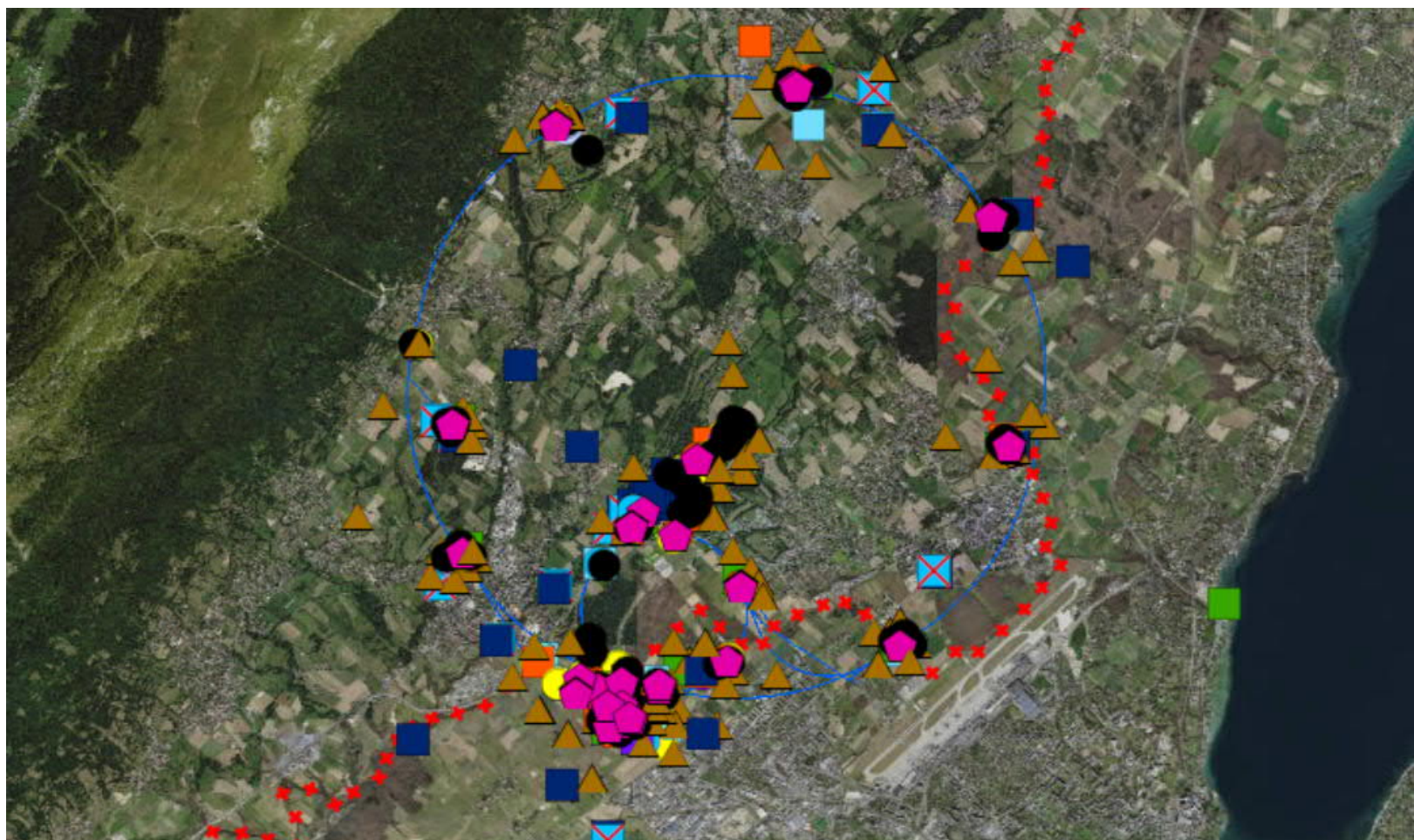
SPS



LHC



Le CERN: un territoire de 650 Ha



- ◆ Emissary
- ▲ Population Group
- Anemometer
- Conventional Effluent Water
- ⊠ Conventional Sampling places in Watercourses
- Environmental Aerosol Sampler
- Pluviometer and Rainwater Sampler
- Radiological sampling places for Grass & Soil
- Radiologic Sampling places in Watercourses
- Stray Radiation Monitoring Station
- TLD dosimeter
- Ventilation Monitoring Station
- Hydrocarbons Detection
- Water Monitoring Station
- Flow Rate Measurement

Le programme de surveillance environnementale

Surveillance physico-chimique

1. Mesure en continu des rejets d'eau vers le milieu naturel
2. Système de prélèvement automatique suite à un dépassement de valeur limite
3. Laboratoire environnemental d'analyses physico-chimiques

Surveillance radiologique

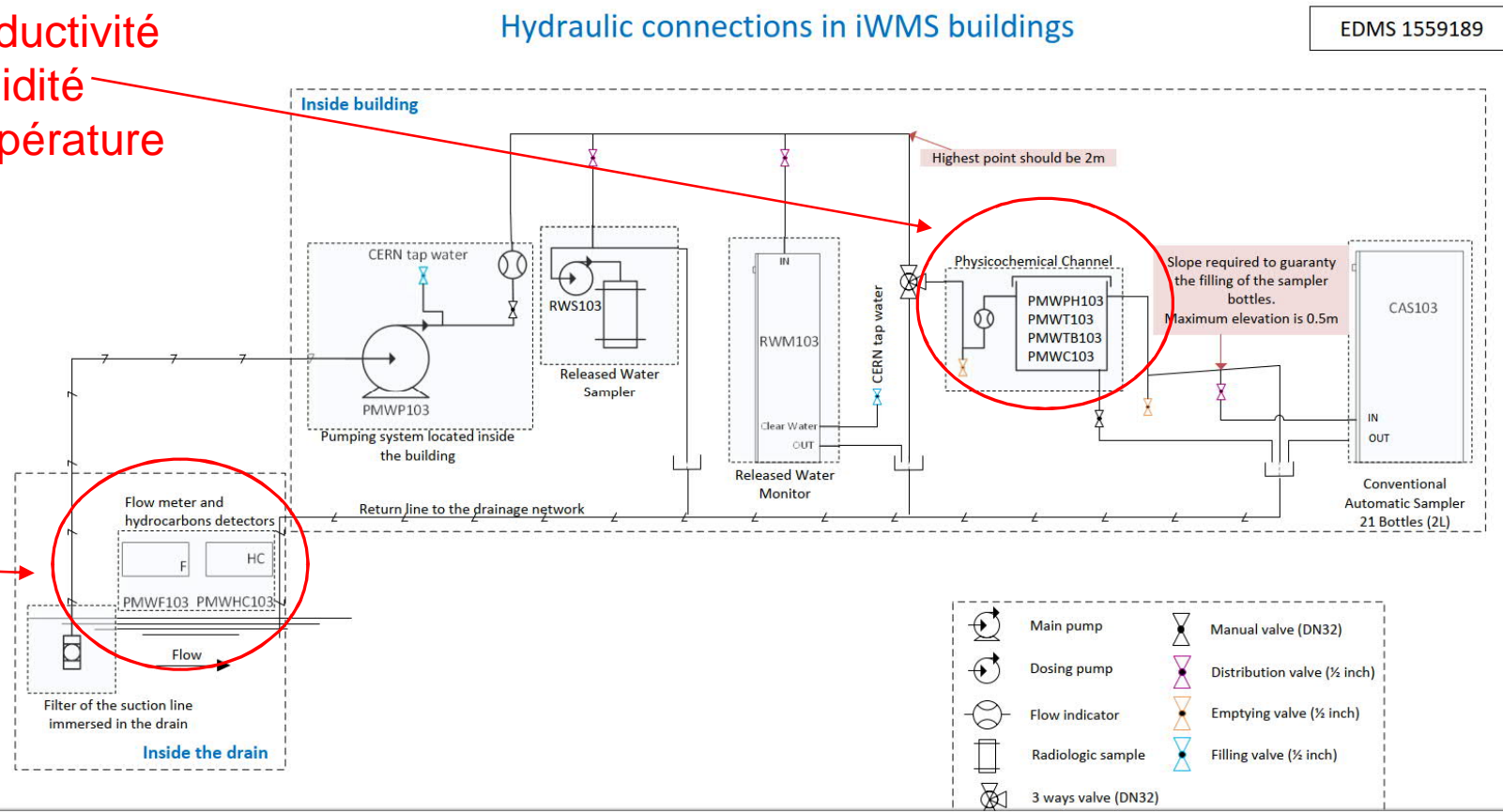
1. Surveillance des rejets d'air et d'eau vers le milieu naturel
2. Mesure en continu du rayonnement diffusé, dosimétrie passive
3. Laboratoire radiologique bas niveau.

Surveillance physico-chimique de l'eau

14 stations de surveillance en ligne des eaux de rejets en rivières

- PH
- Conductivité
- Turbidité
- Température

- Débitmètre
- Détecteur hydrocarbures et Mousse



Station de surveillance de l'eau à Meyrin



1. Débitmètre
2. Détecteurs d'hydrocarbures
3. Pompe à canal latéral, pompage par aspiration 4m³/h
4. Bac de mesure en continu : pH, Température, Conductivité, Turbidité
5. Prélèvement mensuel asservi au débit du rejet (analyses en laboratoire)
6. Prélèvement sur alarme (armoire réfrigérée, 24 prélèvements possibles)



Le laboratoire d'analyses physico chimiques

Chromatographie ionique



Carbone organique et azote



ICP-MS



Le programme de surveillance environnementale

Surveillance physico-chimique

1. Mesure en continu des rejets d'eau vers le milieu naturel
2. Système de prélèvement automatique suite à un dépassement de valeur limite
3. Laboratoire environnemental d'analyses physico-chimiques

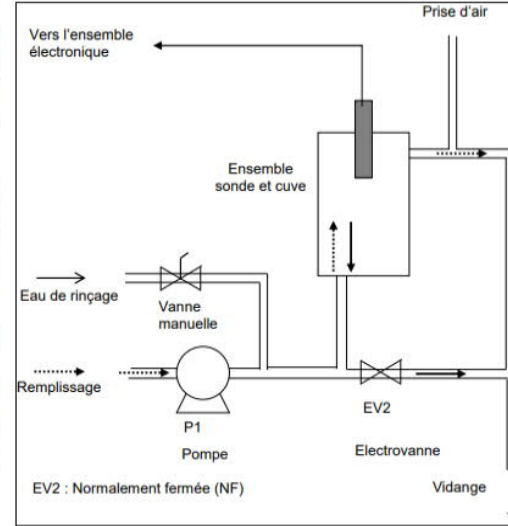
Surveillance radiologique

1. Surveillance des rejets d'air et d'eau vers le milieu naturel
2. Mesure en continu du rayonnement diffusé, dosimétrie passive
3. Laboratoire radiologique bas niveau.

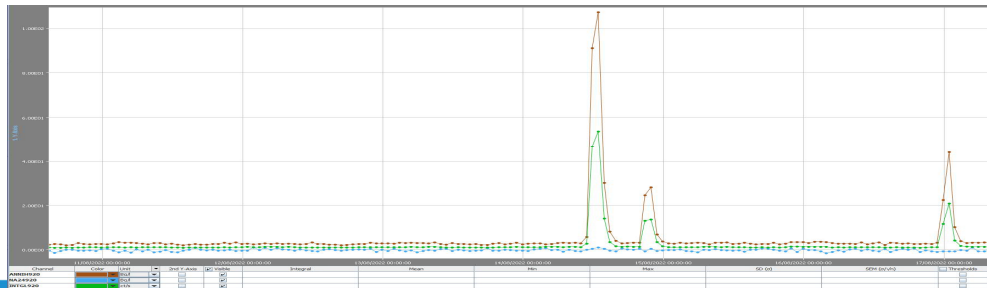
Surveillance radiologique des rejets d'eau



Channels MS	
Annihilation - 511 KeV	
Channel name	ANNIH920
Measure	3.25E+00 Bq/
Uncertainty	2.04E+00 Bq/
<input checked="" type="radio"/> Acknow.	<input type="radio"/> Alarm <input type="radio"/> High alarm
<input type="radio"/> Overflow	<input checked="" type="radio"/> Not Signif.
Sodium - Na 24	
Channel name	NA24920
Measure	1.71E-01 Bq/l
Uncertainty	3.57E+00 Bq/l
<input checked="" type="radio"/> Acknow.	<input type="radio"/> Alarm <input type="radio"/> High alarm
<input type="radio"/> Overflow	<input checked="" type="radio"/> Not Signif.
Global	
Channel name	INTGL920
Measure	1.13E+00 c/s
<input checked="" type="radio"/> Acknow.	<input type="radio"/> Alarm <input type="radio"/> High alarm
Date	17/08/2022 14:00:00
— MS status	
<input checked="" type="radio"/> Commun.	<input checked="" type="radio"/> Sensor
— Parameters	
Alarm T	High alarm T
Annihilation 350.0	9000.0 Bq/l
Sodium 50.0	9000.0 Bq/l
Global 1000.0	9000.0 c/s
Hysteresis 10	%
Meas. Sampling Duration	10 min
Meas. Sampling Starting Time	0 min

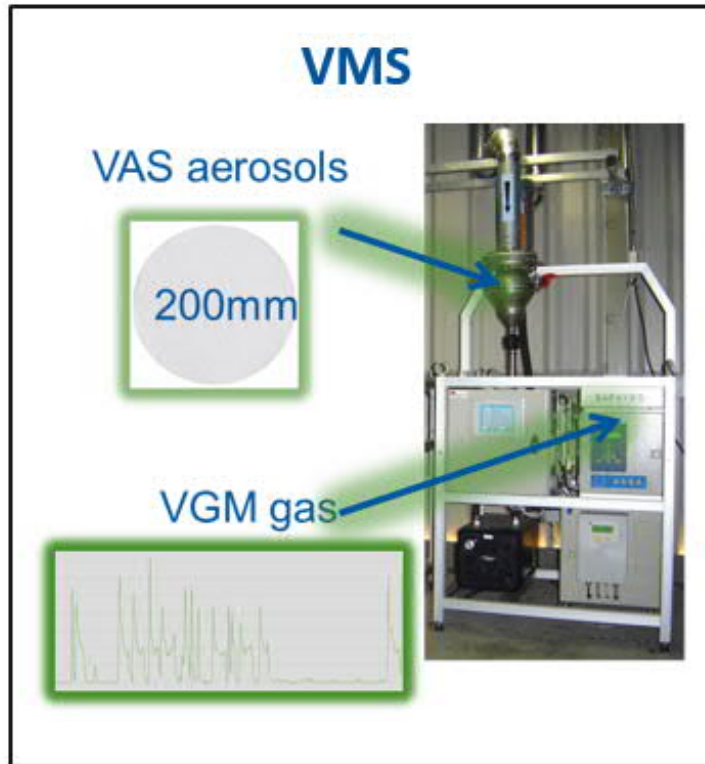


Laboratoire radiologique de bas niveau



Surveillance radiologique des émissions d'air

46 Stations de surveillance des ventilations



Mesures en continu des radionucléides gazeux



Surveillance extraction
d'air Tunnel LHC5



Surveillance extraction d'air Experience _Atlas

Surveillance radiologique des immissions d'air

Aérosols
atmosphériques

13 stations de prélèvements

- Support filtre GF6/ 200mm

Analyses au laboratoire :

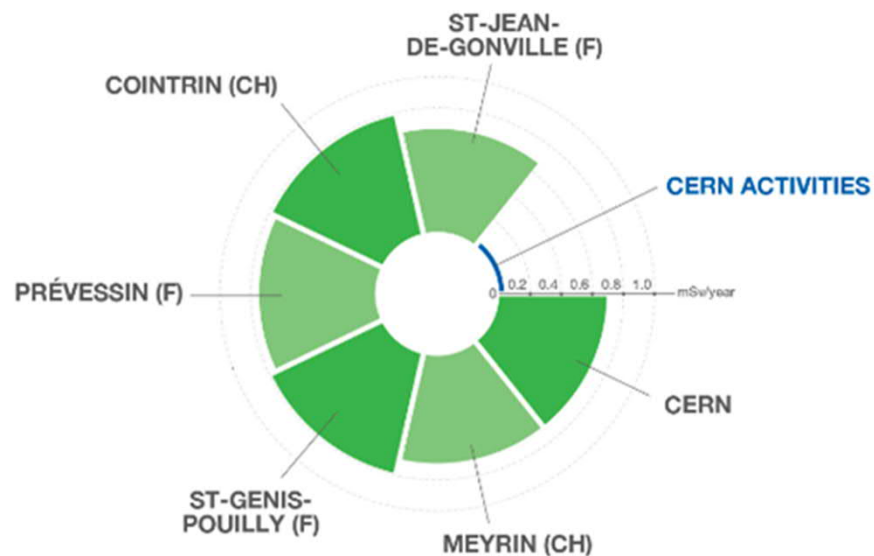
- Alpha /Beta totaux et
- Gamma spectrométrie



Surveillance des rayonnements diffusés

- 36 stations de mesure de rayonnements diffuses ($\gamma+\eta$)

- 80 (TLD) *dosimètres thermoluminescents*



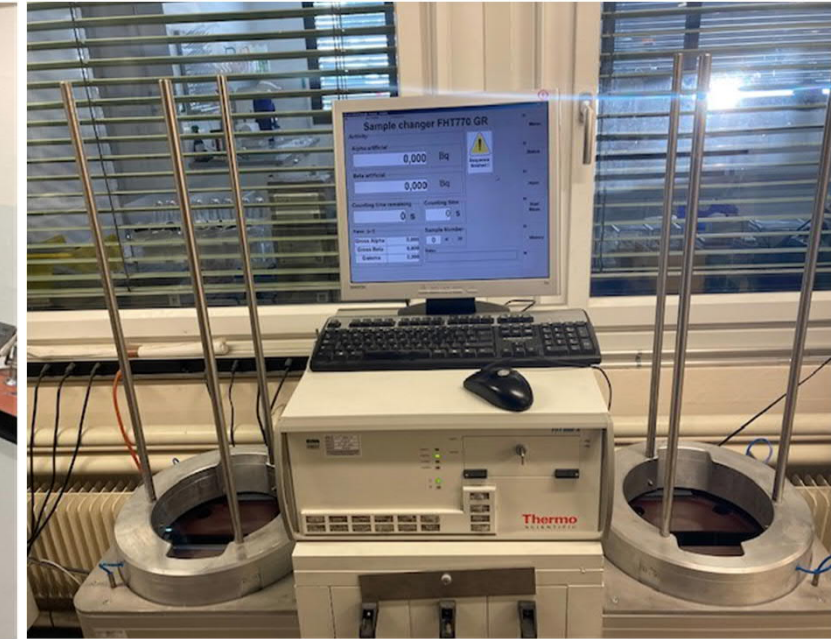
NATURAL SOURCES OF IONISING RADIATION AT CERN AND IN NEIGHBOURING COMMUNITIES. The typical dose of natural sources (green) measured at several places neighbouring CERN sites, compared to the dose induced by CERN activities (blue).

Le laboratoire d'analyses radiologiques bas niveau

Spectromètres Gamma Totaux

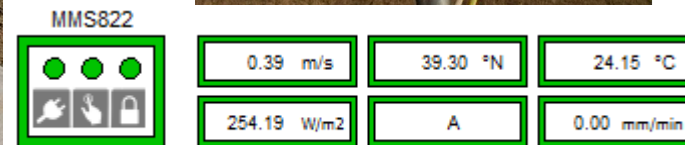
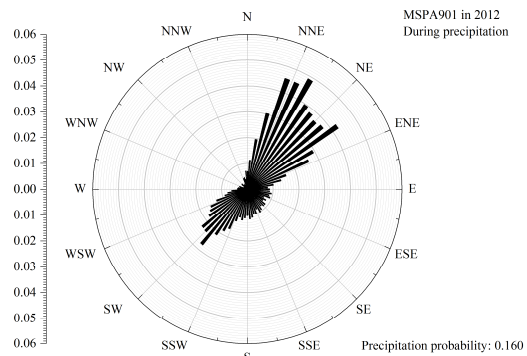
Tritium par LSC

Alpha et Beta



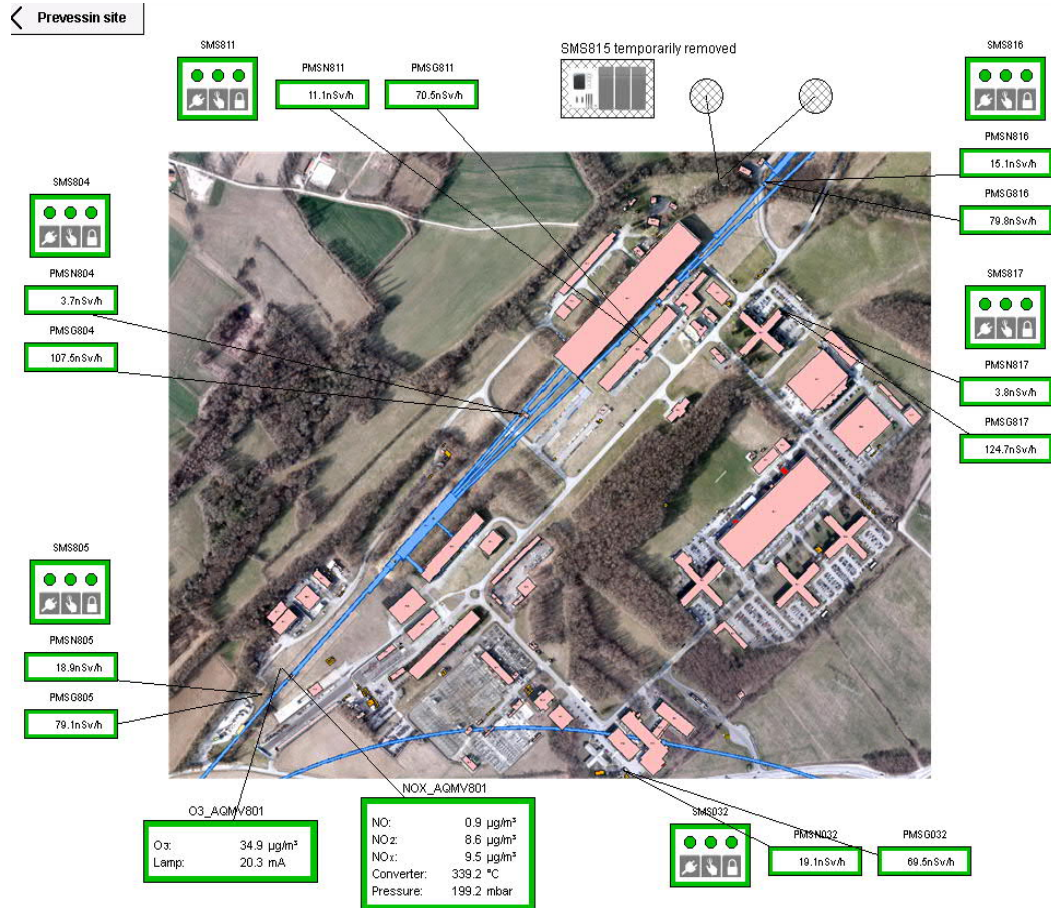
Stations météorologiques

- 5 Anémomètres
- 5 pluviomètres
- 2 collecteurs de pluie



Supervision Remus

Localisation des stations

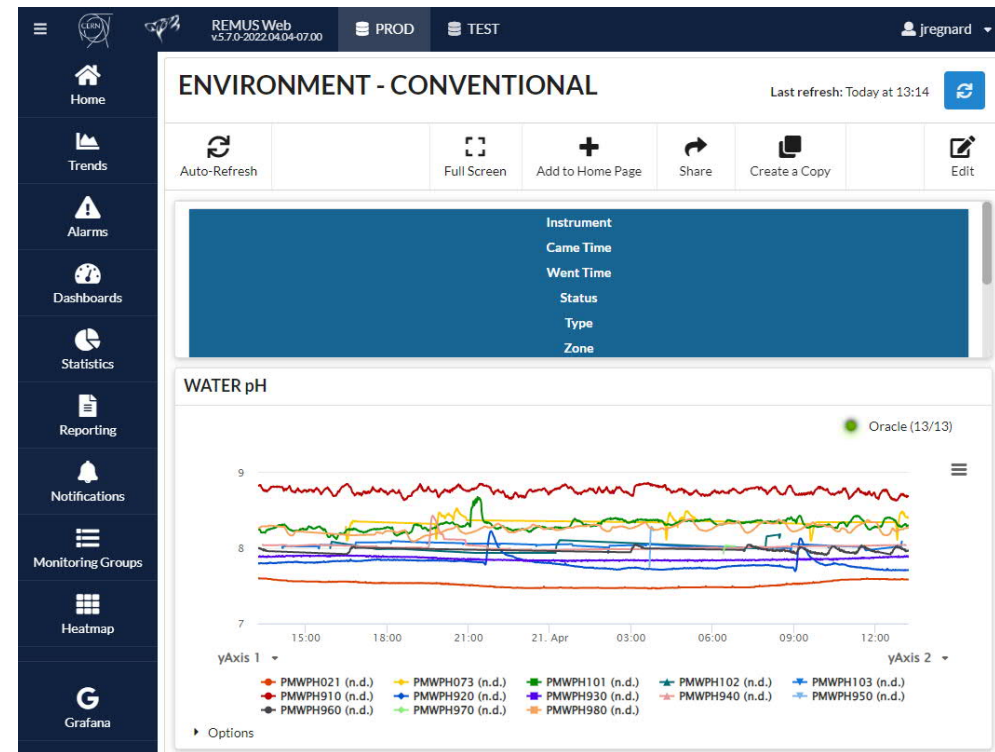
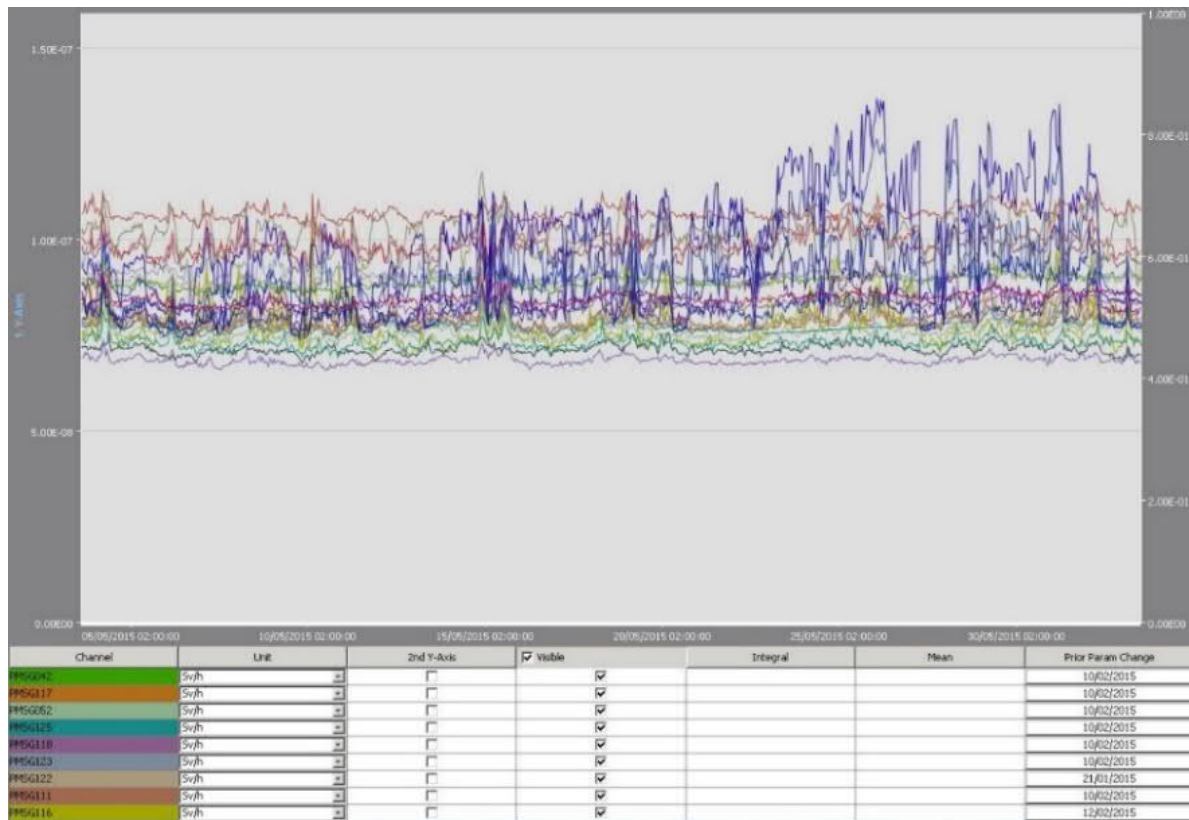


listes des alarmes

Alarm Summary - REMUS - 3.4.0

Alarm Summary							Info	
Search: <input type="text"/> in <input checked="" type="checkbox"/> Instrument <input checked="" type="checkbox"/> Description						Filter applied: Yes		Displayed Alarms/Sys. Faults: 26
<input type="checkbox"/> Case sensitive								Total Alarms/Sys. Faults: 37
Instrument	Came time	Went time	Status	Type	Zone	Description	Level	Mode
VFR804	16/09/2022 09:34:04	16/09/2022 09:34:12	Alarm off - not ack.	System Fault	Environment (radioactive)	VFR1 failure	M	Measure
RVMS970	16/09/2022 09:30:35		Alarm on - not ack.	System Fault	Environment (radioactive)	Communication Fault	M	Measure
MMS822	16/09/2022 09:25:20	16/09/2022 09:27:20	Alarm off - not ack.	System Fault	Environment (radioactive)	USA com: Bad Frame Received	H	Measure
VGM185	16/09/2022 09:23:52	16/09/2022 09:23:55	Alarm off - not ack.	System Fault	Environment (radioactive)	VGM: JBUS Communication Failure	L	Measure
PMWPH102	16/09/2022 09:19:01	16/09/2022 09:19:20	Alarm off - not ack.	Conventional Wa	Environment (non-radioacti	Upper threshold alarm	H	Measure
IVMS102	16/09/2022 09:18:50	16/09/2022 09:18:51	Alarm off - not ack.	System Fault	Environment (non-radioacti	Physicochemical Channel Low Flow	L	Measure
MMS822	16/09/2022 09:07:10	16/09/2022 09:13:10	Alarm off - not ack.	System Fault	Environment (radioactive)	USA com: Keep Alive Error	H	Measure
AMS011	16/09/2022 09:04:52	16/09/2022 09:05:32	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
AMS177	16/09/2022 09:02:01	16/09/2022 09:03:40	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
EAS951	16/09/2022 08:58:44	16/09/2022 08:59:54	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
SMS125	16/09/2022 08:58:34	16/09/2022 08:58:51	Alarm off - not ack.	System Fault	Environment (radioactive)	MS not responding	H	Measure
PMWCAS102	16/09/2022 08:45:34		Alarm on - not ack.	System Fault	Environment (non-radioacti	Alarm Sampler: No Presence of Water	L	Measure
AMS901	16/09/2022 08:35:23	16/09/2022 08:35:42	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
EAS120	16/09/2022 08:33:12	16/09/2022 08:33:32	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
PMWC102	16/09/2022 08:13:56	16/09/2022 08:40:36	Alarm off - not ack.	Conventional Wa	Environment (non-radioacti	Upper threshold alarm	M	Measure
MMS901	16/09/2022 07:25:41	16/09/2022 07:29:41	Alarm off - not ack.	System Fault	Environment (radioactive)	USA com: Bad Frame Received	H	Measure
MMS901	16/09/2022 07:21:41	16/09/2022 07:29:41	Alarm off - not ack.	System Fault	Environment (radioactive)	USA com: Keep Alive Error	H	Measure
AD6v2 Acquisition GPN	16/09/2022 07:02:57	16/09/2022 07:02:57	Alarm off - not ack.	System Fault	SERVERS	Manager not running	M	Measure
VMS031	16/09/2022 06:46:00	16/09/2022 06:47:00	Alarm off - not ack.	System Fault	Environment (radioactive)	Touch Panel: MSLog failure	H	Measure
WMS940	16/09/2022 06:27:50	16/09/2022 06:27:53	Alarm off - not ack.	System Fault	Environment (non-radioacti	Physicochemical Channel Low Flow	L	Measure
AMS905	16/09/2022 06:26:53	16/09/2022 06:27:11	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
PMWRWS920	16/09/2022 06:24:56		Alarm on - not ack.	System Fault	Environment (non-radioacti	Radiological Sampler: Pump Fault	L	Measure
MMS907	16/09/2022 06:16:39	16/09/2022 06:17:09	Alarm off - not ack.	System Fault	Environment (radioactive)	USA com: Bad Frame Received	H	Measure
IVMS103	16/09/2022 06:14:39	16/09/2022 06:14:57	Alarm off - not ack.	System Fault	Environment (non-radioacti	NTP server access fault	L	Measure
WMS806	16/09/2022 05:51:33	16/09/2022 05:52:32	Alarm off - not ack.	System Fault	Environment (non-radioacti	NTP server access fault	L	Measure
WMS804	16/09/2022 05:38:01	16/09/2022 05:39:01	Alarm off - not ack.	System Fault	Environment (radioactive)	Touch Panel: MSLog failure	H	Measure
WMS980	16/09/2022 05:33:47	16/09/2022 05:34:25	Alarm off - not ack.	System Fault	Environment (non-radioacti	NTP server access fault	L	Measure
AMS907	16/09/2022 05:33:46	16/09/2022 05:34:25	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
MMSM	16/09/2022 04:18:45		Alarm on - not ack.	System Fault	Environment (radioactive)	Battery failure	M	Measure
EAS074	16/09/2022 03:38:05	16/09/2022 03:38:23	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
EAS911	16/09/2022 02:40:03	16/09/2022 02:40:23	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
MMS907	16/09/2022 02:30:59	16/09/2022 02:34:59	Alarm off - not ack.	System Fault	Environment (radioactive)	USA com: Keep Alive Error	H	Measure
AMS802	16/09/2022 02:24:55	16/09/2022 02:25:15	Alarm off - not ack.	System Fault	Environment (radioactive)	NTP server access fault	L	Measure
PMWPH950	16/09/2022 02:15:21	16/09/2022 02:20:16	Alarm off - not ack.	Conventional Wa	Environment (non-radioacti	Upper threshold alarm	H	Measure

Supervision des évènements



Collaboration avec les Etats Hôtes

- Le CERN met à disposition son infrastructure et son support technique pour le suivi des stations de mesures et de prélèvement de l'IRSN et de l'OFSP.



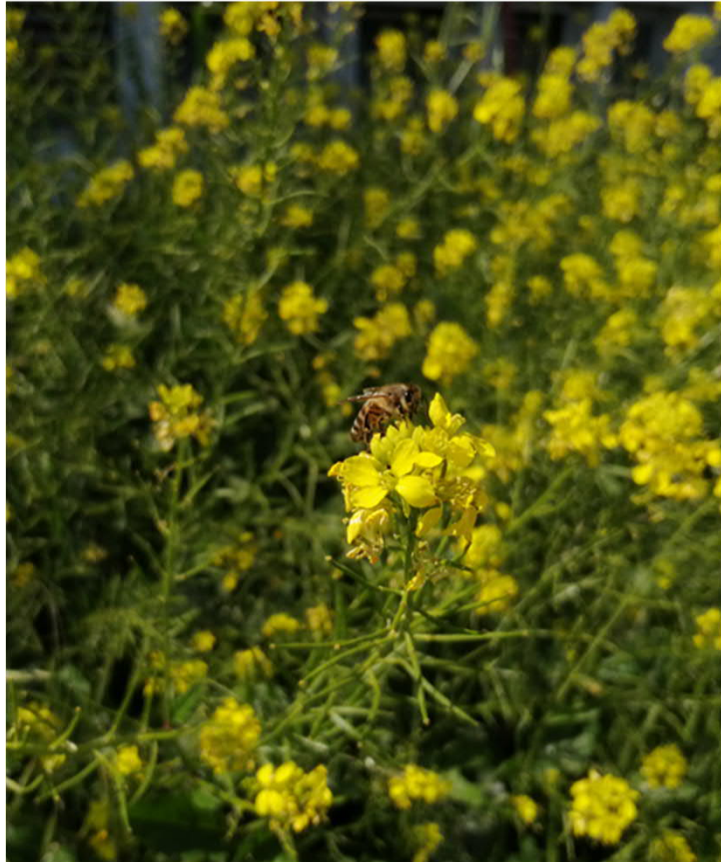
La surveillance du CERN en 1965

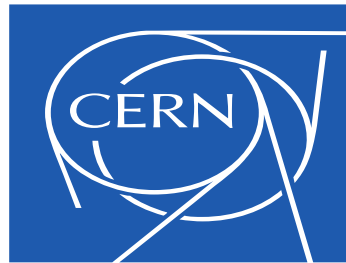


Mesure de la radioactivité sur le PS en 1965



Merci pour votre attention





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