



Génération 420

OPERATIONAL RADIO PROTECTION AT EDF RAPID NUCLEAR RESPONSE FORCE

Pierre EYMOND EDF
Nuclear Generation FARN Head



EMERGENCY PREPAREDNESS AND RESPONSE ORGANISATION

1. Global description



EDF Rapid Nuclear Response Force's mission

To bring **assistance** to a site experiencing an accident involving more than one reactor...

... within **12h** after mobilization

Fully operational after **24h**.

To bring and operate its own **mobile equipment** to ensure water, compressed air and electricity supply

To bring **skilled operators** on site in order to help the local shift and possibly take over.

To ensure **logistics** and technical support (using its own logistic means)



HYPOTHESES

1 site, 6 reactors

Major destruction of infrastructure (access roads)

Total or partial unavailability of local teams

Radiological and chemical hazards



Génération 420

REQUIREMENTS

Complete autonomy for the first 72 hours.

A range of logistical solutions to cover a large scope of situations.

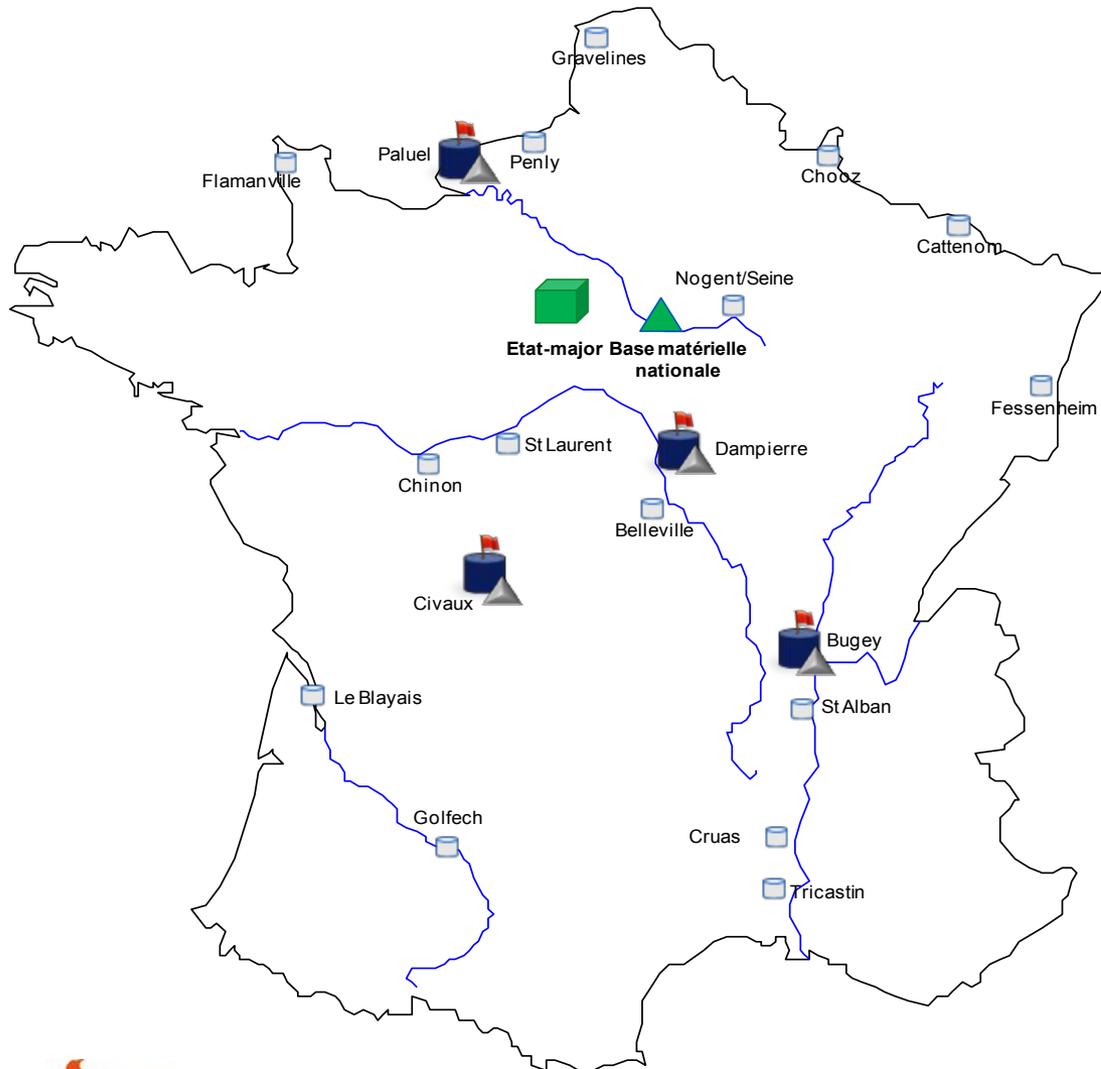
EDF volunteers, part-time workers for NPP (50%-50%).

No use of outsourcing the first 72 hours.



Génération 420

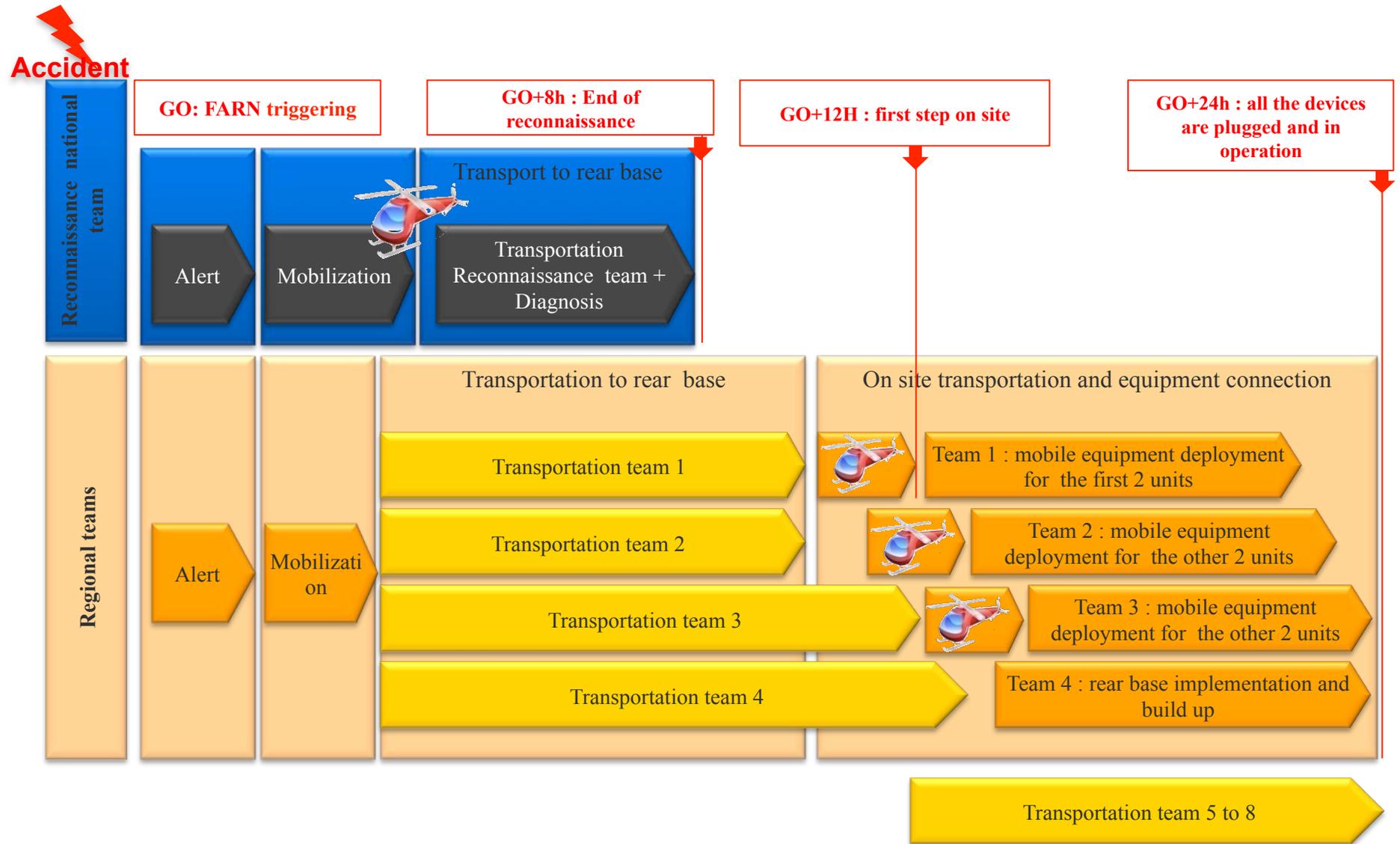
A CORPORATE RESPONSE FOR THE FRENCH FLEET



-  Headquarters
-  National base around Paris
-  4 regional bases on NPP
-  300 people 4x70 + 25



OPERATING PROCESS





EMERGENCY PREPAREDNESS AND RESPONSE ORGANISATION

2. Skills



NUCLEAR INDUSTRY PROFESSIONALS

24/7 each Regional Base is able to mobilize :

1 Team for 2 reactors

1 leader

6 process

6 Intervention & Logistic

1 RP

14

x 4

Able to take over in the control room

Able to set up mobile equipment and logistics

+ 3 reconnaissance team from national headquarters

=> 59* off-site EDF volunteers take action within 24h

TRAINING PROGRAM AND DRILL PROGRAM

5 weeks + 4 weeks for driving *

Priority training

* trucks, forklift trucks, crane...

**Validation
exercise**

1.5 weeks

**Additional
training**

Staff able to take on call duty

Drill





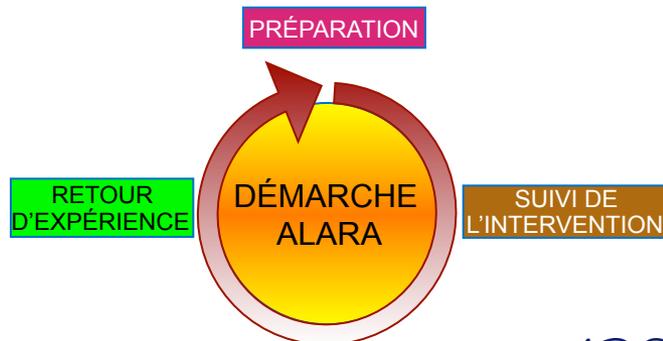
EMERGENCY PREPAREDNESS AND RESPONSE ORGANISATION

3. Radio Protection

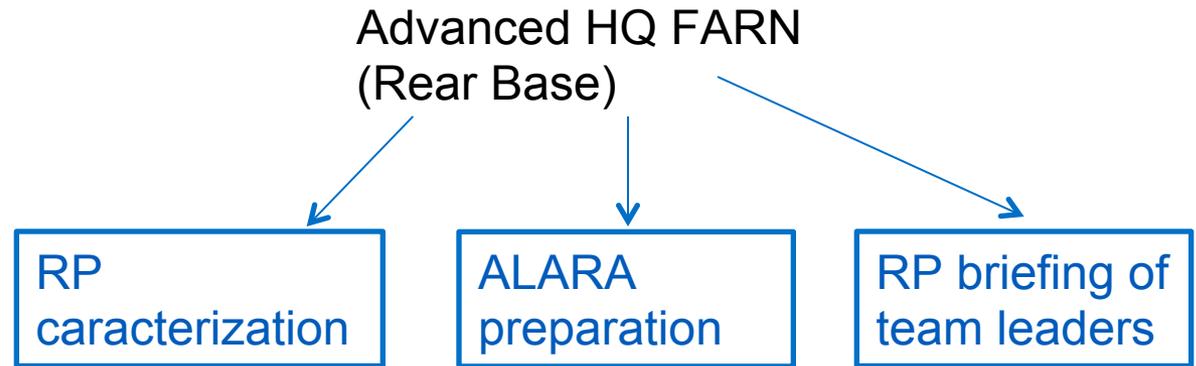
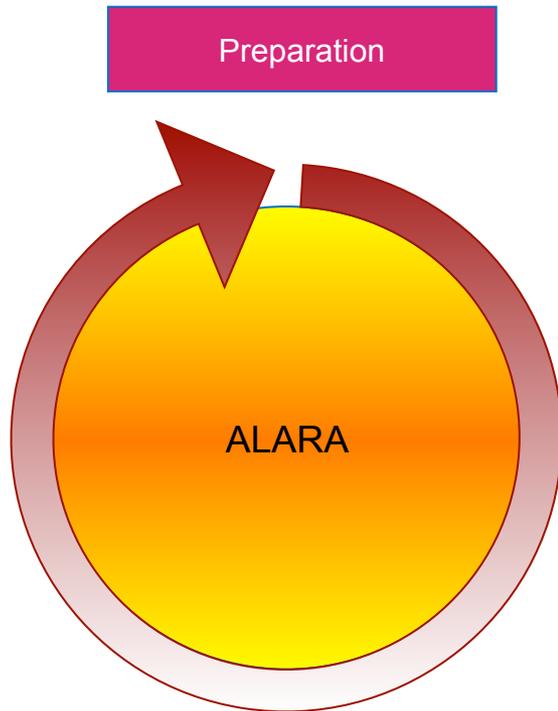


FARN Organization To Deal With Radiological Situations 1/3

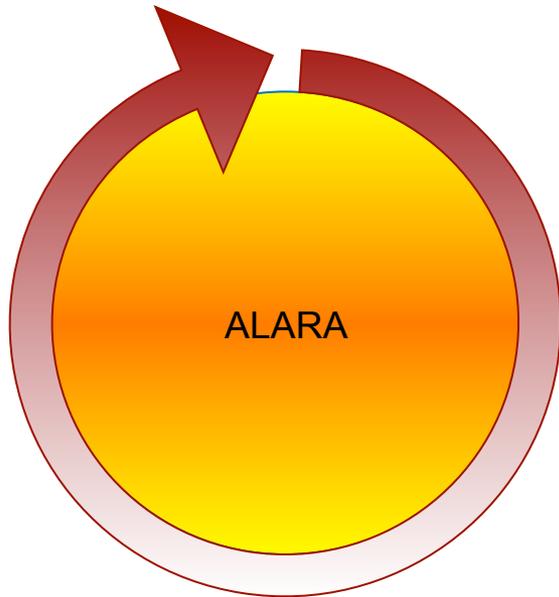
- ▶ Radiation protection officers in each team (14 people)
- ▶ Specific training delivered to staff: stress management, emergency preparedness ...
- ▶ Presence of a radiation protection expert to manage response within reconnaissance team and command team.
- ▶ Presence of an EDF medic on the rear base within 24 hours.



FARN Organization To Deal With Radiological Situations 2/3



FARN Organization To Deal With Radiological Situations 3/3



Intervention



FARN intervention
in NPP

Countermeasure
defined by HQ
implementation

On field radiological
measurement

Real time unplanned
situation
management with
HQ

Génération 420

Radiation monitoring and protection

▶ Robust equipment common to all emergency response personnel (on-site, FARN ...)



▶ Monitoring of external exposure :

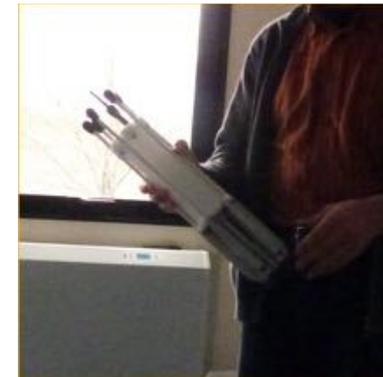
- Gamma and neutron dosimeters
- Operational gamma and neutron dosimeters
- Radiation meters



Radiation monitoring and protection

Environmental monitoring

- Autonomous air samplers assessment of releases into atmosphere.
- Gamma probes broadcasted by satellite release and dose rate monitoring.



Radiation monitoring and protection

► Monitoring of surface contamination and protection against internal exposure

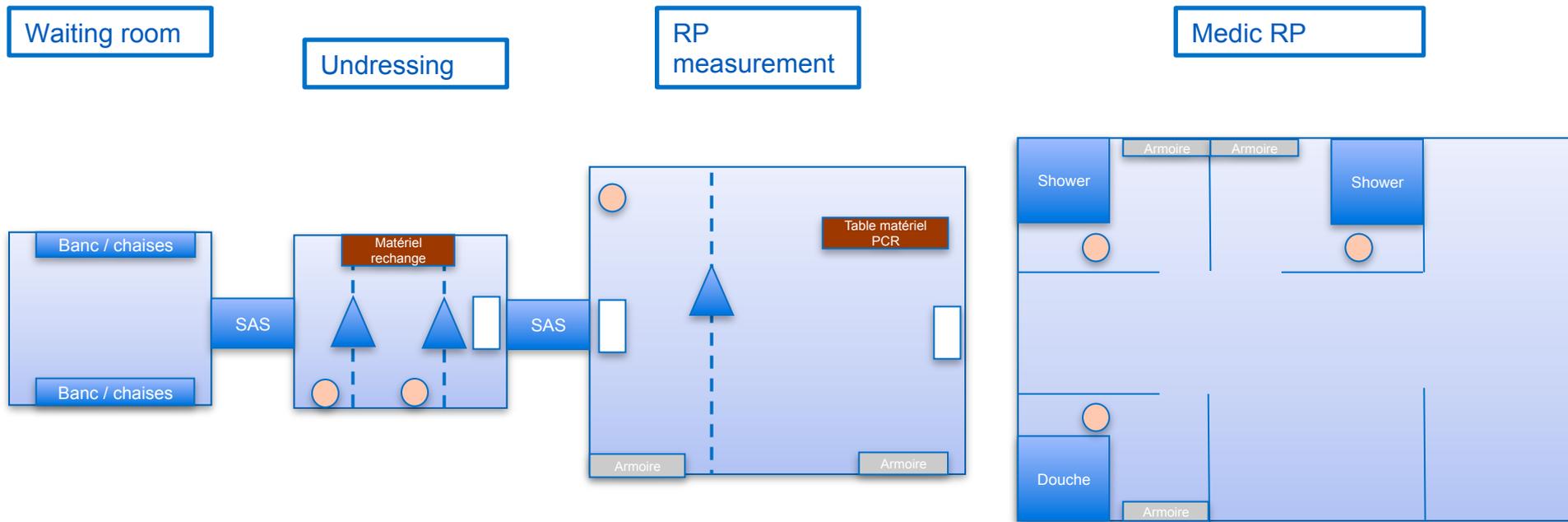
■ Contamination meters



■ Worker protection suit (skin + airways)



FARN RP control and decontamination module



Exercise program

28 full scope exercises since 2012.

Each exercise with a radiological situation.

For 2017: ability to deal with a large scale radiological situation is one of our priority:

ALARA optimization.

Follow up of dosimetry.

Development of cooperation with INTRA (drones and robots) to assess the situation.



EMERGENCY PREPAREDNESS AND RESPONSE ORGANISATION

4. Logistics and mobile equipment



Logistics

Access by airway : Airbus helicopter EC 225, 3,5T lifting capacity

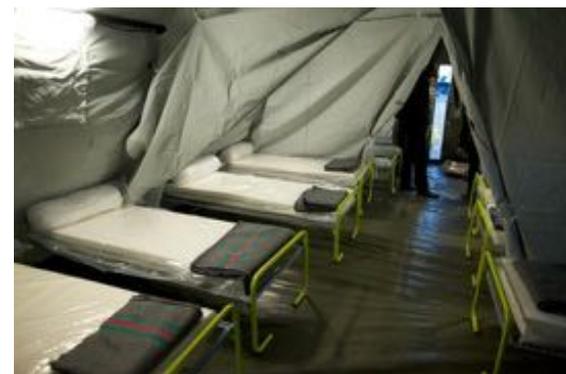
Access waterway : barge, 6T loading capacity



Logistics

Ground access: high motricity trucks





Mobile equipment

Water supply



Water pump : 10 bar, 90 m³/h, 1T



Water pump : 10 bar, 210 m³/h, 3,5T



Filter with mechanical auto-cleaning device : 100 microns



Mobile equipment

Electricity and compressed air supply



Generator : 100 KW, 3,5T



Air Compressor: 7 bar, 24 m3/h, 0.8T