

1 WHAT IS AT STAKE ?

This report presents IRSN's overall assessment for the year 2013 of safety and radiation protection performance of the 58 nuclear power reactors currently in operation in France. It is based on the Institute's scientific and technical expertise of significant events, and its analysis of several events that it found to be the most noteworthy in 2013.



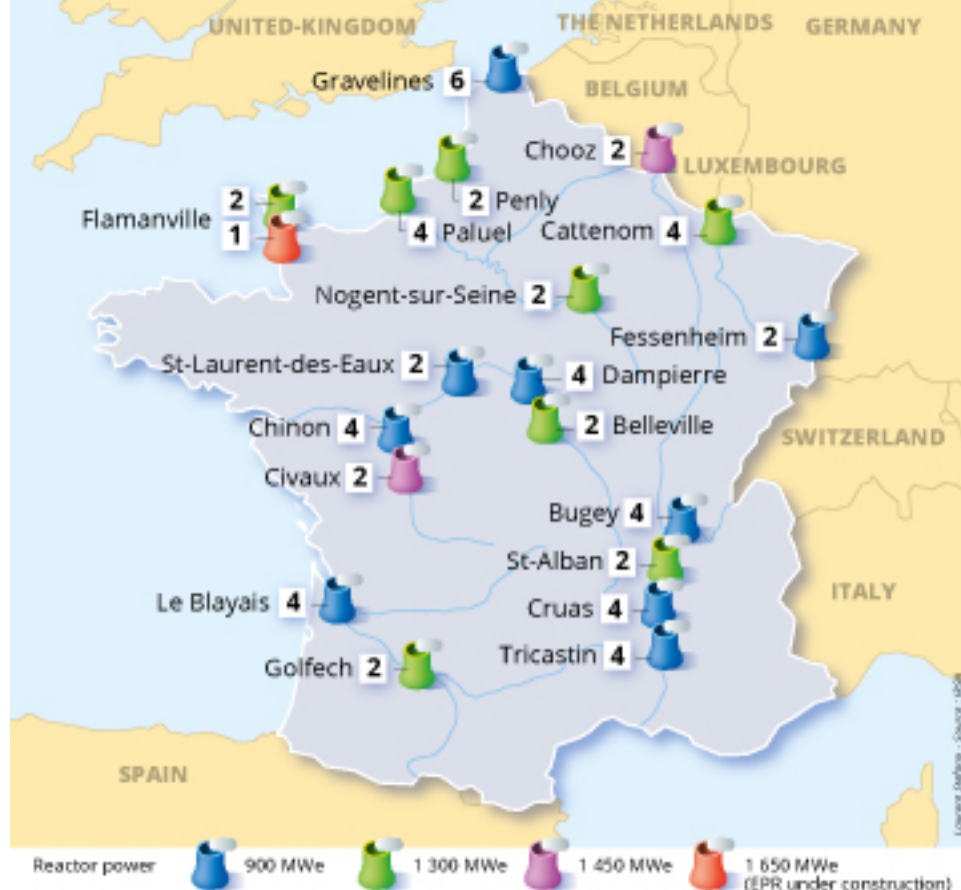
58
REACTORS IN
OPERATION



19
NUCLEAR
FACILITY
SITES

Standardization is a characteristic of the French nuclear power plant fleet operated by French electric utility company EDF.

In a French nuclear facility site plant, there are 2 to 6 Pressurized Water Reactors (PWRs) referred to as "second generation" by comparison to the European Pressurized Reactor (EPR) under construction at Flamanville (Normandy), referred to as "third generation".



FACTORS TAKEN INTO ACCOUNT BY IRSN TO ACHIEVE ITS OVERALL ASSESSMENT

Assessment is performed using data of 'significant events' that plants operators of basic nuclear facilities are required to report to the French Nuclear Safety Authority (ASN) after each minor and major event. Analysis also takes into account lessons from the most noteworthy events and significant upgrades performed with the aim of continuously improving safety at the French nuclear power plant fleet.

SIGNIFICANT EVENTS

Significant events can refer to 'significant safety-related events' or 'significant radiation protection-related events'. ASN classifies each event on the "International Nuclear and radiological Event Scale" (INES) which consists of seven levels.

AREAS OF IMPACT



SAFETY-RELATED EVENTS

Events with a potentially significant impact on nuclear power plant safety.



RADIATION PROTECTION-RELATED EVENTS

Ionising radiation exposure events posing a potential threat to the health of exposed workers or the populations close to the event's location.



ENVIRONMENT

Events with impact on the surrounding environment or on a larger area.

LEVEL ON INES SCALE



LEVELS 0 AND 1

Deviations and anomalies

In France, several hundred deviations (Level 0) per year and about one hundred anomalies (Level 1) per year.



LEVELS 2 AND 3

Incidents

In France, a few cases each year. Five level 2 incidents on pressurized water reactors between 2007 and 2012.



LEVELS 4-7

Accidents

Internationally, two "major accidents" (Level 7) in Chernobyl (Ukraine) in 1986 and Fukushima (Japan) in 2011. In France, one "accident with local consequences" (Level 4) in Saint-Laurent-des-Eaux A (Loire Valley) in 1980.

SIGNIFICANT UPGRADES

Changes and upgrades are made to France's nuclear reactors throughout their operation life, mainly with the aim of continuously improving safety. These modifications are subject of detailed analysis by IRSN.

2 SAFETY PERFORMANCE IN 2013

The number of 'significant safety-related events' remains stable in 2013 compared to 2012. However, variation of this number cannot be directly associated with a variation in safety level. 'Significant safety-related events' are indicative that need to be investigated and understood, in order to identify relevant strategies for improving plant safety during operations.



12 EVENTS PER REACTOR IN 2013
12,5 EVENTS IN 2012

The overall assessment for the year 2013 does not show any significant change in the number of significant 'safety-related events' per reactor.

EVOLUTION OF 'SIGNIFICANT SAFETY-RELATED EVENTS' REPORTED PER YEAR



EVENTS FOR THE YEAR 2013

The overwhelming majority of events that occurred in 2013 had no significant impact on plant safety and no consequences for the health of workers and the public.

Of the 699 events reported in 2013, 85 were classified as Level 1 event on the INES scale, and no Level 2 event were reported.

3 NOTABLE CASES OF 'SIGNIFICANT SAFETY-RELATED EVENTS'

DEVIATIONS FROM AUTHORISED OPERATING MODE

2012: 30
2013: 49

FALLBACK INITIATIONS FOLLOWING A ANOMALY'S DISCOVERY

2012: 68
2013: 60

MAINTENANCE NON-QUALITY EVENTS DURING EQUIPMENT MAINTENANCE OR MODIFICATION ACTIVITIES

2012: 107
2013: 146

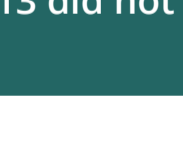
PROPOSALS FOR IMPROVEMENTS

Continue actions to address maintenance non-quality and deviations from reactor operating parameters.

Manage the important staff turnover in knowledgeable staff and significant workloads during reactor outages

3 RADIATION PROTECTION PERFORMANCE IN 2013

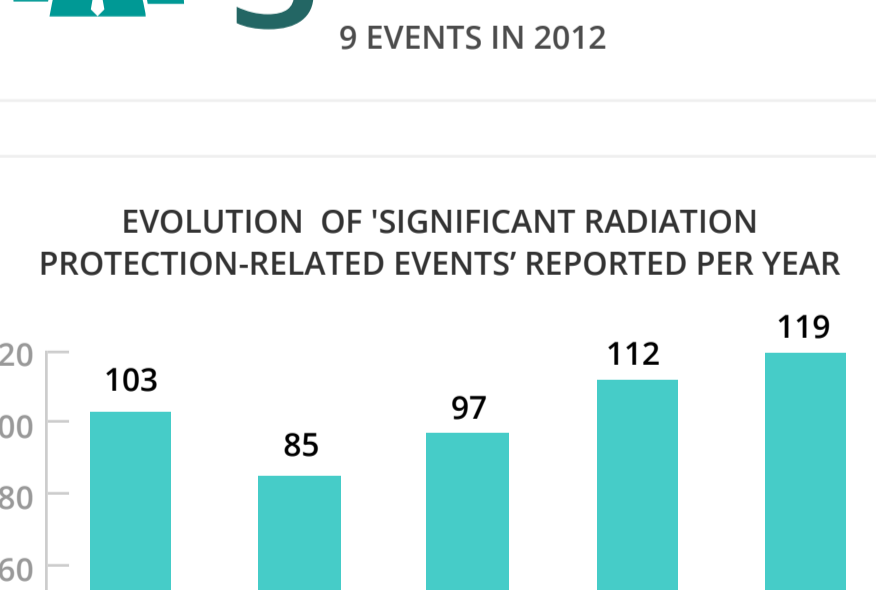
The number of significant radiation protection-related events for EDF nuclear power plants observed since 2010 continued to increase in 2013. However, on human the radiation-related events that occurred in 2013 did not have significant consequences on human health or the environment.



3 EVENTS CLASSIFIED AS LEVEL 1 OR 2 IN 2013
9 EVENTS IN 2012

The number of 'significant radiation protection-related events' increased in 2013 compared to 2012, but events with significant health consequences decreased. Two events were classified as Level 1 events and one as Level 2 event.

EVOLUTION OF 'SIGNIFICANT RADIATION PROTECTION-RELATED EVENTS' REPORTED PER YEAR



EVENTS FOR THE YEAR 2013

40% of events are reported as signalling fault or non-compliance with technical conditions for access to an "orange" controlled area. These figures are similar to those for 2012.

Three factors can explain the increase of the number of significant radiation protection-related events:

- Errors committed during gamma radiography inspections,
- Errors in radioactive source management,
- Contamination outside controlled areas.

2 NOTABLE CASES OF 'SIGNIFICANT RADIATION PROTECTION-RELATED EVENTS'

UNAUTHORISED ACCESS TO AND/OR WORK IN A ORANGE CONTROLLED AREA

2012: 38
2013: 40

ERRORS DURING GAMMA RADIOGRAPHY INSPECTIONS

2012: 13
2013: 17

PROPOSALS FOR IMPROVEMENTS

Implementation of EDF's corrective action plan in all nuclear power plants: preventive measures at 'radiation hotspots', setting lower dosimeter thresholds, raising the audio volume of dosimeter alarms, improving planning for the activities.

Remain attentive to changes in work schedules during reactor outages. 80% of gamma radiography inspections take place during reactor outages.

