

Centralized Monitoring Of Inspection Data In France For A Better Euratom Safeguards Implementation

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Abstract :

Inspections carried out on nuclear facilities is an important part of the legal framework that structures the Euratom safeguards implementation. Monitoring the proceedings and outcomes of these inspections gives valuable insights for a country's authorities on the quality of safeguards implementation. For that reason, among its missions, IRSN (Institute for Radioprotection and Nuclear Safety), as technical support for CTE (Euratom Technical Committee, the French authorities' representative for Euratom), centralizes data on inspections carried out by Euratom inspectors on French nuclear facilities. The effort of Euratom inspections in France represents around a third of the overall inspection effort across European Union. This represents 300 inspections per year, mainly focused on the four principal French companies in the nuclear area (EDF, Framatome, Orano, CEA). Orano gathers more than half of the national inspection effort due to its various activities in the fuel cycle, especially enrichment in Tricastin and recycling in La Hague. For each inspection, information is collected either by IRSN agents who accompany most physical inventory verification inspections, or by operators themselves. Typical data are duration, type, effort of inspection and difficulties encountered by inspectors or operators. IRSN also keeps track of the observations expressed by Euratom in the letters received after the inspections and the improvements implemented by operators to respond to these observations. The obtained statistics can be presented at State level, and are also available at operator or even installation level. They also provide an overview of the operators' involvement regarding their regulatory obligations. Besides, the analysis of such data delivers valuable information, which helps IRSN to better assist French operators in the search and implementation of solutions and to report to CTE the difficulties they may encounter. This paper presents how IRSN gathers data on Euratom inspections, how statistics are produced and how the results are used to improve the quality of safeguards implementation in France.

Key words : Euratom, France, TSO, inspections

1. Introduction

Among its missions, the European Commission is specifically responsible for ensuring that nuclear material is not diverted from intended uses declared by users. Inspecting nuclear facilities is one major tool to fulfill this mission and every year, Euratom inspectors visit European nuclear facilities to carry out both accounting and physical verifications.

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2. Data gathering

Three main sources are used to gather information about inspections: direct information when IRSN agents accompany inspections, operators' transmitted reports, and official Euratom mails.

2.1. Direct information from the field: accompanying inspections

As enabled by Article 81 of the Euratom Treaty, French authorities choose to accompany some Euratom inspections. During these inspections, IRSN agents represent the French authorities (CTE). They attend verification activities, advise the operators and share French positions on specific problematics but do not substitute for operators, as these latter are responsible from the viewpoint of Euratom Treaty and regulation.

The accompanied-inspections planning is prepared every year with CTE, and provides about 50 inspection participations. These ones are chosen based on the importance of the facility, but also on the assistance needed by operators, especially smaller ones without safeguards dedicated staff. If any difficulties are foreseen, an operator may request support from IRSN for any safeguards related subject or for an upcoming inspection.

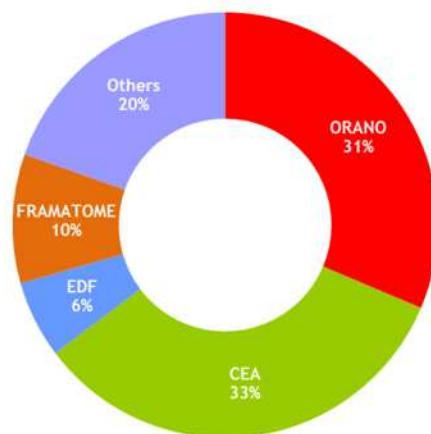


Figure 1 : Distribution of the inspection escort effort by IRSN in 2019

Figure 1 shows the IRSN inspection escort effort distribution for 2019¹. 80% of escort effort focuses on the four main French nuclear companies:

- EDF runs the 56 French nuclear power plants on 19 sites. The French electrician has standardized protocols and nuclear material is only present in the form of fuel assemblies, therefore it only represents 6% of IRSN accompanied inspections;
- Orano gathers the main part of the fuel cycle industrial activities. Conversion activities are performed on Orano Malvési and Orano Pierrelatte sites; UF₆ nuclear material is then processed on Orano Pierrelatte site for enrichment and other chemical transformations; spent fuel assemblies are sent to Orano La Hague for recycling; Orano Melox produces MOX fuel assemblies. Overall, Orano accounts for about one third of IRSN escort effort;
- CEA is the French public research organism with focus on expertise and innovation for low carbon energies, nuclear included. It hosts various and quite unique activities nuclear related. Initial projects, started in the 50s, are now stopped and laboratories, as well as research reactors, are dismantled. CEA represents another third of the IRSN escort effort;
- Framatome manufactures fuel assemblies for nuclear reactors. One factory produces standard assemblies for most EDF nuclear power plants, while the other one (CERCA) focuses on fuel for nuclear research facilities. Framatome represents 10% of the IRSN escort effort.

The remaining 20% of the inspection effort are dedicated to smaller and independent companies, such as research laboratories not affiliated to CEA, or the French National Agency for Radioactive Waste Management (ANDRA). IRSN agents accompany the physical inventory verification and punctually any inspection where French authority representation is necessary.

After each accompanied inspection, IRSN writes a report to the CTE, in order to share the majors remarks and facts that happened during the inspection. This report is the most complete element used for data gathering. It includes accurate estimation of Euratom inspection effort, as well as the operator's staff involvement in the inspection. Accounting and physical verifications are described and difficulties are reported. Accompanied inspections are also an opportunity to monitor the application of decisions taken in meetings with Euratom and CTE, to observe the evolution of practice and to report possible difficulties encountered by the operator.

French authorities also keep track of documents taken by Euratom inspectors during inspections, in order to ensure consistent practices on all French facilities, for security reasons and also industrial confidentiality.

2.2. Information remotely obtained

When IRSN does not accompany Euratom inspections, operators are asked to send to the French Authorities an escort report, which gathers main information on the activities carried out by the inspectors. Two types of templates are available for nuclear power plants and other facility types. IRSN agents may also join the inspection closing meeting by videoconference or telephone, with the possibility to discuss with operators and inspectors directly. Generally, IRSN agents tend to obtain feedbacks on every Euratom inspection carried out.

¹ The 2020 inspection schedule was affected by the Covid-19 pandemic and is not representative; therefore data from 2019 were selected.

2.3. Euratom mails: post-inspection letter and others

Before each inspection, Euratom notifies the operator, the CTE and IRSN of their arrival. IRSN analyses the notification and informs in return if the inspection will be accompanied (or not). The notification provides basic information about the inspection: material balance area (MBA), dates, inspectors' name and the inspection reference.

After each inspection, the European Commission (EC) draws conclusions in a report based on the inspection's findings and transmits any observation it may have to the operator, with a copy to the CTE. This report is called the post-inspection letter.

IRSN classifies the observations of the Commission between several categories:

- major or minor observation: an observation is considered major when it requires discussions, resources and follow up to be addressed. A minor observation corresponds to an accounting or physical error that can be fixed immediately, or an update of the design information;
- physical or accounting observation.

The post-inspection letter enables the operator, if necessary with the help of IRSN and CTE, to implement any required actions or improvements. French authorities request that operators provide an answer to the EC observations within 3 months after the reception of the Euratom post-inspection letter.

Euratom can also punctually send official mails that may concern questions about the latest design information, or accounting discrepancies.

3. Statistics production

3.1. Data organization

IRSN gathers all the information, collected through the different channels presented above, on the inspections performed in France by Euratom in order to produce yearly statistics. For each inspection, information is centralized in a database and organized as follows:

Indicator	Corresponding data
MBA name	FXXX
Operator	CEA/Orano/EDF/Framatome/Others
Site	CEA Cadarache/Orano La Hague/...
Type of inspection	Physical inventory/Routine/Unannounced...
Start and end inspection dates	From XX/XX/XXXX to XX/XX/XXXX
Number of person-day of inspection (PDI)	for Euratom inspectors and IRSN agents
Number of observations in the post-inspection letter	Accounting/physical, major/minor
Answer to the post-inspection letter from the operator	Yes/No

Table 1 : Mandatory information required for each inspection

The information listed above is the minimum required detail for each inspection.

At the end of the year, when all information about the inspections performed during the year is collected, one can extract many statistics, which are used in yearly reports and presentations for the French authorities. The number of inspections and the inspection effort can be shown per operator, per site, per MBA. The evolution of number of observations can be studied for one MBA, or globally for an operator, to monitor any difficulty an operator may have in the implementation of international regulation. Especially, the amount of major observations is closely monitored. One can also follow up on answers to post-inspection letter provided by operators. Similarly, the number of accompanied inspections by IRSN can be estimated per operator (see figure 1) and per site.

3.2. Tools : OSEILLE

In order to help the gathering of all information concerning inspection statistics, IRSN has developed a software called OSEILLE for the management of information related to inspections performed in France by Euratom and the IAEA (notifications, PDI, statistics, observations during inspections...). Among its functionalities, this software includes two modules: one that contains a listing of all the French installations, the applicable documentation and regulatory reference (design information, control application documents (particular safeguard provisions)); another one that processes the notifications of inspections and manages their follow-up.

This tool is also described in Article number #553 of INMM & ESARDA Joint Virtual Annual Meeting of 2021.

3.3. Example of 2019 data

The effort of Euratom inspections in France represented around a third of the overall inspection effort across the European Union before the Brexit. On average, 325 Euratom inspections are carried out each year on French civil nuclear facilities. Those facilities are divided in MBA and

each MBA is inspected at least once a year after the physical inventory, with a few exceptions for small companies or specific MBAs.

In 2019, as can be seen on figure 2, 317 Euratom inspections were performed in France, distributed as follows:

- 142 physical inventory inspections, which represent the main type of inspection carried out by Euratom inspectors;
- 122 routine inspections, which correspond to almost 40% of the inspection effort, were carried out in MBAs with intense activity, in order to verify the accounting in between physical inventories: indeed, several MBAs can declare thousands of accounting lines a month;
- The remaining 53 inspections are divided in other types of inspections: import/export inspections, design information verifications, audits, IAEA-Euratom joint team inspections...

Among those remaining inspections, two kinds were implemented quite recently:

- Unannounced inspections are inspections for which no advance notice is provided to the operator before the arrival of Euratom inspectors. They are implemented in France since 2013, at the request of the European Commission, and only in EDF facilities (nuclear power plants). The operator is notified the morning of the inspectors' arrival. Up to 10 unannounced inspections happen per year, on any EDF site chosen by Euratom;
- Short notice random inspections (SNRI) are notified 48 hours in advance and only concern in France the Framatome factory which produces nuclear power plants standard assemblies, in Romans. These inspections, up to 6 per year, started in 2015.

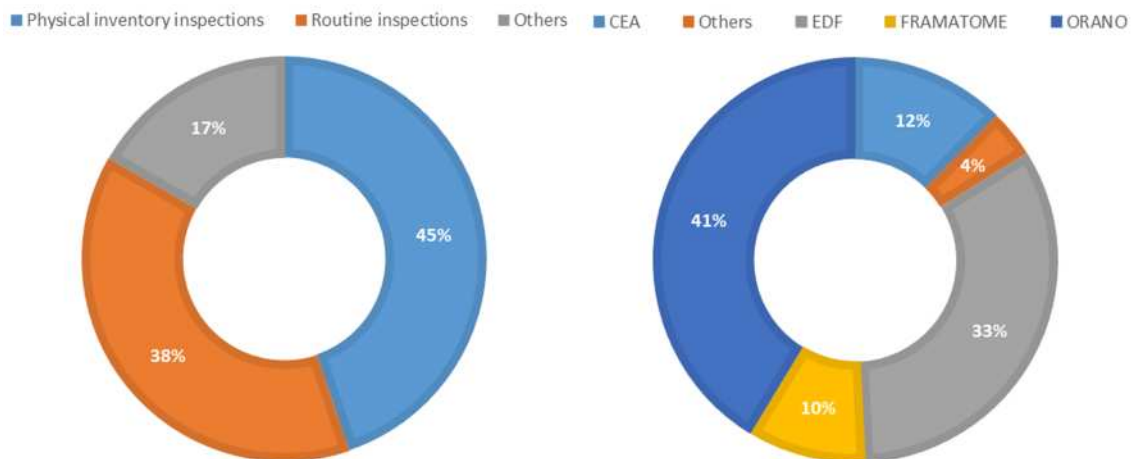


Figure 2 : Distribution of the type of inspections (left) and of company inspected (right) by Euratom in 2019

Also, as shown on figure 2, 96% of Euratom inspection effort focuses on the four main French nuclear companies (EDF, Orano, CEA, Framatome). The French electrician represents one third of the inspection effort. Orano, with its various activities around the fuel cycle, is the most inspected operator in France (more than 40% of the total effort). CEA concentrates 12% of the French inspection effort by Euratom.

If compared with IRSN inspections effort (figure 1), it shows that IRSN accompany equally Orano and CEA inspections, while Euratom dedicates more inspection effort to Orano. This can be explained by the amount of routine inspections carried in Orano facilities, and not

accompanied by IRSN. In 2019, two thirds of total routine inspections took place in Orano sites, in order to verify accounting in between physical inventories. Framatome represents 10% of the French inspection effort by Euratom. The remaining 4% of inspections apply to smaller operators.

4. Applications on how statistics help French authorities in implementing regulations and safeguards

Data collected and statistics are powerful tools for monitoring the implementation of safeguards regulation, as illustrated below.

First of all, it is a technical support for plenary meetings organized annually (or so) between the European Commission, each French major operator and the French authorities. The purpose is to discuss problematics common to several facilities of the same operator. All main French companies have central services that help local operators in the implementation of Euratom regulation. Those services acknowledge decisions taken during plenary meetings and ensure that they are implemented in relevant facilities. For plenary meetings, IRSN provides technical support to the French authorities, and inspection statistics can be a part of. IRSN can also share inspection knowledge with operators themselves. In 2019 for example, for CEA plenary meeting, IRSN provided CEA central service with inspections data from 2015 to 2018, regarding the number of inspections and PDI, the post-inspection letter contents, detailed per site (Cadarache, Marcoule, Saclay). These statistics helped the operator to identify areas for improvement, as well as to understand Euratom remarks or requirements. Following this plenary meeting, CEA implemented requested changes and improved its methods.

The inspection effort evolution over the years is also closely monitored, for several reasons. First, it gives an overview of Euratom involvement and any significant raise would be noted and analyzed. For instance, the French authorities are very interested in the results of the implementation of unannounced inspections in EDF power plants that were part of the Euratom safeguards strategy and supposed to reduce the overall inspection effort on EDF.

Moreover, these data provide information on the operator's involvement. Operators are requested to answer to any post-inspection letter with observations. Keeping track of the answers, their eventual delay and their content provides essential information about the operators' situation. Monitoring post-inspection letter content and answers also help identify repetitive and similar problematics for which plenary meetings and clear national positions are needed.

For instance, one Euratom request for accounting correction became recurrent in post-inspection letters on several facilities of the same operator. French authorities were informed of this situation, and meetings with operators and the European Commission were organized. Statistics of inspection, post-inspection letter and accounting were used as support during discussions and plenary meetings. As a result, the accounting practice that Euratom estimated unsuitable has reduced up to a factor of 50 and the requested correction is now widely implemented.

5. Conclusion

Among its missions defined in the Euratom Treaty, the European Commission ensures, by means of appropriate control measures, that nuclear material is not diverted from intended uses declared by users. This is achieved, among others, by inspections. The effort of Euratom

inspections in France corresponds to 325 inspections per year, which represents around a third of the overall Euratom inspection effort across the European Union. IRSN provides technical support to the French authorities (CTE) and as such, accompany about 50 inspections per year. Based on the knowledge gathered on the field, through official mails and other information given by the operators, IRSN agents centralize standard and formatted data on inspections: duration, type, difficulties encountered, observations the inspectors may have... The IRSN database then provides statistics on various indicators (number and type of inspections, duration, observations...) and their variations can be studied over time. These statistics can reveal the difficulties of an operator, but also its progress. Overall, they are of definite use in order to estimate and improve the quality of the safeguards implementation in France.