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# The Periodical Review of Safety Report in France for Upper-tier Seveso Establishments

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The Seveso III Directive, adopted by the European authorities in 2012, has updated the European regulation on industrial risks and on the prevention of industrial accidents. Among the prescriptions, there is the periodical review of the safety report for upper-tier establishments at least every five years (Article 10-5). In France, this prescription has been transposed in national regulation by the obligation, for operators of these establishments, to write a “review notice” five years after the last safety report has been submitted and accepted by the Competent Authority. This notice must study 11 points to determine if the facilities are still in adequation with their environment and if new technologies or new safety measures may be implemented to improve risk management. Following this notice and depending on its conclusion two options are available. In case of strong changes / modifications (of the facilities, environment, regulation), a revision / new version of the safety report has to be submitted to the Competent Authority. The second option, in case of no major modification and if the conclusions of the existing safety report are still valid, is to update this existing safety report. Contrarily to this last option, the revision of the safety report implies that the French authorities will process it and new prescriptions may be added to the establishment. This paper describes the requirements and contents (the 11 points) of a French review notice of the safety report for an upper-tier Seveso establishment, and its advantages / drawbacks compared to the automatic revision of the safety report every five years.

## 1. Introduction

In the European Union, the industrial risks policy is guided by the Seveso Directive. Its last version (called Seveso III) has been adopted in 2012. Its application field is wide, and among all the prescriptions, there is the obligation, for the most hazardous facilities (upper-tier establishments), to write a safety report. This report must identify and characterize the risks involved by the facilities and the risk management policy and safety measures that the operator has implemented. As the regulation or the facilities evolve, this safety report must be reviewed at least every five years (Article 10-5) or after modifications of the facilities (Article 11).
In France, there were a total of 1 365 establishments subject to the provisions of the Seveso III Directive in 2020, of which 725 were upper-tier establishments, for which the review of the safety report is compulsory.

## 2. The context of major hazard prevention for Seveso upper-tier establishments in France

In France, safety reports are required for more than 28 000 establishments since 1976, as all establishments needing an Environmental Authorization required it, which is a wider scope than only Seveso establishments.

### 2.1 The beginning of safety reports and the impact of the AZF accident

Before 2003, the risk assessment used in safety report was based on the worst-case scenario. It was a deterministic approach.
The Toulouse disaster in 2001, which caused 31 fatalities, over 3,000 injuries and damages estimated at €3 billion, has led to a new French land-use planning approach. Following this disaster, the French legislation was strengthened, particularly on the siting of hazardous facilities, new urban developments in their vicinity and the flow of information between operators, relevant authorities and the local community. The

Technological Risk Prevention Plan (PPRT in French, standing for "Plan de Prévention des Risques Technologiques") is one of the flag-ship measures of the law of July 30, 2003. The aim of the PPRT is to protect people by acting on the existing urbanization and also by controlling the future land-use planning in the vicinity of the existing upper-tier Seveso establishments.
The law of July 30, 2003 has introduced the use of probabilities and frequencies into the French legislation and regulations regarding industrial risks. The risk analysis, at the heart of the safety report, has now to take into account the probability of occurrence, along with the kinetic, the gravity of the potential accidents. Then, combined with the gravity of potential accidents, the probability allows to assess the acceptability of an industrial establishment in its environment and the demonstration of risk control.

### 2.2 The structure of a safety report in France

The French safety report is based on a risk analysis and an assessment of major accident in terms of probabilities, intensities and gravities. The global structure of safety report is described here:

- Description of the studied facilities, identification of the hazard potentials and accidentology study,
- Risk analysis,
- Detailed risks study:
    - Modeling of the dangerous phenomena and evaluation of the safety distances,
    - Evaluation of the severity of the effects (i.e. the number of people impacted),
    - Evaluation of the probability of occurrence of the dangerous phenomena by the use of bow tie methodology,
    - Evaluation of their kinetic,
- Conclusion on the acceptability (see figure below).

**Effect thresholds**

| Effects (examples) | Significant lethal effect | Lethal effect | Irreversible effect | Indirect |
|---|---|---|---|---|
| Thermal (continuous) | 8 kW/m² | 5 kW/m² | 3 kW/m² | / |
| Overpressure | 200 mbar | 140 mbar | 50 mbar | 20 mbar |

⇩ Number of people exposed

**Gravity scale**

| Gravity | Significant lethal effect | Lethal effect | Irreversible effect |
|---|---|---|---|
| Disastrous | > 10 | > 100 | > 1 000 |
| Catastrophic | 1 to 10 | 10 to 100 | 100 to 1 000 |
| Significant | 1 | 1 to 10 | 10 to 100 |
| Serious | 0 | 1 | 1 to 10 |
| Moderate | 0 | 0 | < 1 |

**Range probability scale**

| Probability class | E | D | C | B | A |
|---|---|---|---|---|---|
| Range of probability | 0 to $10^{-5}$ | $10^{-5}$ to $10^{-4}$ | $10^{-4}$ to $10^{-3}$ | $10^{-3}$ to $10^{-2}$ | $10^{-2}$ to 1 |

⇩

| Probability / Gravity | E | D | C | B | A |
|---|---|---|---|---|---|
| Disastrous | ALARP 2/NO | NO | NO | NO | NO |
| Catastrophic | ALARP class 2 | ALARP class 2 | NO | NO | NO |
| Significant | ALARP | ALARP | ALARP class 2 | NO | NO |
| Serious | | | ALARP | ALARP class 2 | NO |
| Moderate | | | | | ALARP |

*Figure 1 : Risk matrix used in France*

The safety report is a key element, as its results are directly used for decision making. The French government has developed a risk matrix for assessing the societal acceptability of the risks generated by a Seveso establishment. The input data are the probabilities of major accidents and the number of people exposed to their consequences. The matrix (see figure above) defines three levels of accidental risk:

- Acceptable (in white on the matrix): the risk is acceptable,
- Unacceptable (in red): the risk is too important, additional safety measures must be implemented,
- ALARP (As Low As Reasonably Practicable, in yellow): the risk has to be reduced in order to become “as low as reasonably practicable”.

In order to help operators to do their safety report, some guidance documents have been produced:

- A guideline describing the “General principles for the elaboration of safety reports” has been issued in 2006. This guideline has been integrated in the circular of May 2010. It reviews all the elements that should be featured in a safety report. This circular makes also available other guidelines regarding for instance the human factor, the assessment of the gravity of an accident, BLEVE and UVCE in LPG units, etc.
- The French National Institute of Industrial Environment and Risks (Ineris) has published many scientific documents about the new risk assessment methodology. They are useful tools for both inspectors and operators, and particularly the Omega 9 guidebook.

## 3. The periodical review of safety reports in France

In France, until 2017, the process of the periodical review of the safety report was “traditional”: the industrial operator had to revise the report. In February 2017, the French Competent Authority (CA) has published a new procedure (Notification of February 8, 2017) that modify the process, and requires that the operators looked at elements that aren’t seen in the safety report, and forced them to ask themselves some questions that they weren’t obliged to ask before. This new process is the obligation to write a “review notice” that asks to look at 11 points. The elements brought in response to these 11 points must lead the operator to see if its establishment is still in adequation with its environment and if new risk management measures may be implemented to reduce the risk level. Depending on the conclusion, the safety report has to be lightly updated or revise it (at least partly) because one of its conclusions has evolved. Once written, the review notice is sent to the CA, which will process it (along with the revised safety report, if applicable).

## 4. The 11 points to look at in the review notice

The notification published by the CA in February 2017 has listed 11 points that must be looked in the review notice. They are the following:

1. Evolutions of professional standards in terms of good practices in safety,
2. New available technologies of safety measures,
3. Technical and scientific evolutions regarding substances and dangerous phenomena,
4. New regulation and new prescriptions taken by the Competent Authority since the last safety report,
5. Non-compliance or gaps noticed during inspection by the Competent authority or following internal inspections, and measures taken following these inspections,
6. Observations make during the periodic inspections of equipment under the Industrial Facilities Modernization Plan regulation
7. Modifications of the facilities that could impact scenarios studied in the safety report,
8. Failure of safety measures, feedback on accident and incident that have occurred on the facilities, the industrial group and sector,
9. Feedback on emergency plan activation and exercises,
10. Evolution of the environment and stakes around the facilities,
11. Need for a new risk analysis.

These points are developed in the next paragraphs.

### 4.1 Evolutions of professional standards in terms of good practices in safety and their application

Most companies are members of professional associations, regrouping actors of a field of expertise, at a regional, national or international level. Some of these associations developed guidebooks or professional standards that regroup the best practices in diverse domains, including safety and risks. For instance, France Chimie, the French association of chemical industry, is regularly publishing technical documents regarding methods to control equipment or presenting methods to take flooding risks or domino effects into account on a facility. These documents enable industrial operators to be aware of the best practices in terms of safety in their field of expertise. This point aims to detail the relevant international standards applied by the operator.

### 4.2 New available technologies of safety measures

This second point is one of the most important of the notice. The facilities operator has to look at its safety measures to check if they still are adapted and if more effective ones can be set up to replace them or to be added to them. The safety measures targeted are the one valorized in the risk estimation (in terms of probability and Severity). Indeed, some technologies can evolve a lot in five years, and new sensors or new automatic safety measures for instance may be available with better characteristics: a better reliability, a shorter response time, a better resistance in a specific environment (severe weather, acid environment), etc.

Not only the operator must look at these technologies, but it also needs to rank them in a list and hierarchize them considering their impact in terms of reduction of the probability of occurrence or severity of dangerous phenomena and their ratio cost / improvement in terms of safety. It must then explain which measure(s) it will set up in its facilities and when. This ranking is a new requirement, implemented in 2020 in a regulatory package concerning industrial risks taken in response to the Lubrizol accident in Rouen in 2019. Furthermore, the CA has precised that no public guidance will be published to help the operators. Indeed, the CA want each operator to brainstorm, to make this exercise to be aware of which solutions exists in term of safety measures adapted to its facilities.

**4.3 Technical and scientific evolutions regarding substances and dangerous phenomena**

As in five years the knowledge of the substances and their hazard may evolve, the notice asks the operator to check if new knowledge has appeared since the last safety report. This knowledge may be their properties of hazard (flash point, boiling point, etc.), the toxic thresholds to study or even the models used to determine the intensity and the distance reached by their effects.

**4.4 New regulation and new prescriptions taken by the CA since the last safety report**

Prescriptions regarding Seveso facilities can be of two different levels: national (France), and specific to the establishment. Indeed, in France, ministerial decrees concerning activities or products list minimal requirements and prescriptions for this activity. On top of these decrees, the Competent authority delivers decrees specific to each establishment, with prescription that can be harsher or lighter (exemptions of some particular prescriptions) for the facilities, depending on their particularities. If new prescriptions regarding accidental risks have been taken since the last safety report, they may have an impact on the facilities (reduction of authorized storage capacity, new safety measures to set up, etc.) and on the scenarios of danger, which, by the way, need to be checked and if needed reevaluate in terms of probability and intensity.

**4.5 Non-compliance or gaps noticed during inspection by the Competent Authority or following internal inspections and measures taken following these inspections**

The CA must inspect an upper-tier Seveso establishment at least once a year, on various subjects. Each inspection results in an inspection report. If non-compliances of the prescriptions have been identified, the operator must take measures in response and eventually write an answer to the observations of the Authority.
This point of the review notice is the opportunity to resume all observations and non-compliances since the last safety report and the actions taken by the operator in response. If some of these have an impact on the scenarios of danger, they must be taken into account in the safety report.

**4.6 PMII**

This acronym stands for the Industrial Facilities Modernization Plan ("Plan de Modernisation des Installations Industrielles" in French). This plan synthetize the policy related to the controls of aging of various equipment on industrial facilities. At this point of the review notice, the operator looks at the controls it had to do regarding the aging of its facilities on the last five years, and identifies the problems or non-conformities constated and replacements or work that have been done following these controls.

**4.7 Modifications of the facilities that could impact scenarios studied in the safety report**

This point is, with the point 2, one of the most important of the notice. As industrial facilities often evolve, it is the place to summarize all modifications that have happened since the last safety report. Indeed, for a major modification, a new safety report is required by the regulation, but a minor one only require the operator to inform the CA. In five years, a lot of minor modifications could have happened, and their addition could have major implications. Even if the changes do not modify the potential major accident and the conclusion of the safety report, this synthesis is useful for the update of the descriptive part of the safety report, but if they have an impact, the study of the scenarios of danger must be reevaluate, whether it raises or reduces the risk level.

**4.8 Failure of safety measures, feedback on accident and incident that have occurred on the facilities, the industrial group and sector**

The safety measures of an industrial facility are regularly solicited, whether for tests or in real situations. This point of the review notice is the opportunity for the operator to make an appraisal of the number of failures of safety measures (if any) regarding the number of solicitations. This allowed both the operator and the CA to see if the safety measures implemented really are efficient and reliable or if they need to be changed.
On this point, a study of the accidentology, both internal (establishment / group) and external (databases, medias, professional associations, etc.) is also asked, in order to see if scenario that haven’t been identified in

the risk analysis of the safety report have occurred in similar facilities. If that is the case, the risk analysis of the safety report needs to be updated, as for the detailed risk study of the new scenarios identified.

### 4.9 Feedback on emergency plan activation and exercises

In France, upper-tier Seveso establishments have to test their internal emergency plan at least once a year with an exercise. Regarding external emergency plan, describing the emergency response of the State services, the frequency of exercises is once every three years.
Following each exercise, a feedback is done, recapitulating procedures and equipment that worked as expected but also what didn't work and need to be improved. Improvements take following such exercises could impact the scenarios studied in the safety report (to reduce the risk level).

### 4.10 Evolution of the environment and stakes around the facilities

The evolution of the environment of the facilities must be studied for two reasons.
The first one is as the environment seen as an aggressor of the facilities. Indeed, if a new industrial establishment has settled nearby, it may be source of domino effects impacting the facilities. So, they could create new scenarios or modify existing ones by increasing their probability of occurrence.
The second aspect of the environment's evolution to look at is as stakes that may be impacted by the scenarios of danger. If new housing, companies, or establishments open to the public have been built within the distance of impact, or if the number of vehicles on the ways of communications has changed, the severity of some dangerous phenomena, that is to say the number of people impacted, may have increased.

### 4.11 Need for a new risk analysis

Thanks to all the elements of the previous points (§4.1 to 4.10), this step is the moment to ask if the facilities need a new risk analysis. As a good practice, Ineris considers that the risk analysis needs to be updated at every review of the safety report (at least every five years). The best option being to update the risk analysis continuously at each change on the facilities.

### 4.12 Decomposition products in case of fire

Another adding of the post-Lubrizol regulation, the review notice following 2021 needs to include the list of the decomposition products that can be found in the smoke in case of a fire on the facilities. This is now required in order to help emergency services to determine the worst-case toxicity of the smoke for the emergency responders, the population and the eventual composition of the ash deposit.

## 5. The conclusion of the review notice and its follow-ups

The elements brought in response to these 11 points must lead the operator to answer these three questions:

- Are safety measures effective? Did new ones need to be implemented to decrease the risk level?
- Are the conclusions of the safety report still valid?
- Is the establishment still in adequation with its environment?

If the answer to these three questions are "Yes", in this case, the operator only has to update the safety report to include the slight evolutions. If at least one answer is "No", a new version of the safety report (a revised safety report) has to be written and then processed by the CA. Following a new safety report, new prescriptions may be added to the establishment.

## 6. Comparison of the review notice process and the automatic revision of the safety report

The comparison is made on the two following items: the scope of the periodical review and the workload for both operators and the CA. A brief synthesis on the limits of such a periodical review is also give in §6.3.

### 6.1 Scope of the periodical review

As shown in the previous chapters, the review notice must look at various points, some of them not being developed in a French safety report, as the history of inspections (internal ones or by the CA) or the emergency plan exercises for instance. So, with the review notice, these items are studied by the operator and interpreted in terms of impact on the risk management on the facilities. This is a progress compared to the automaticity of a revision of a safety report, as these points matter in industrial safety.

### 6.2 Work charge for the operator and the CA

If the modifications of the facilities, the environment or the regulation are slight or inexistent, the procedure of the review notice is lighter than revise a safety report. Indeed, the notice being shorter than a full safety report

(a few dozen pages instead of a few hundred), the operator who must make this document can save some time (even if an update of the safety report may be done, which implied some more work, even to a lesser extent than a revision of the safety report). As the SHE services of industrial establishments often are overloaded, it can be valuable. On the same way, the CA will have to process shorter document and so, will also save time. Still, the CA may (or must) inspect the facilities to check what is said in the review notice.
On the contrary, if the changes may impact the conclusions of the safety report, the operator has to make a new safety report in addition to the review notice, which is more time-consuming for him. Regarding the CA, it will have the two documents to process, but as the review notice is an explanation of the evolution of the safety report, it could not require a lot more time to process both documents.
As a reminder, the CA can still require the operator to revise its safety report at any time, and in particular if it disagrees with the conclusions of the review notice.

### 6.3 Limits of the periodical review

The periodical review, whether as a review notice or as a systematic revision of the safety report has its limits. Indeed, Ineris identified two main limits:

- There is no explicit legal obligation for upper-tier Seveso establishment operators to update its risk analysis, e.g. to take back the tables (or bow ties depending on the method used) and look at each event, each cause and safety measure and ask if they still are possible and if new ones need to be studied. It may take a lot of time to do it for the whole establishment with a relevant work group, but , according to Ineris, it is not a waste of time, and it enables all the members of working group to have a precise idea of what can happened and what is the role and importance of safety equipment and procedures. As said in §4.11, Ineris recommends that the risk analysis must be constantly updated to be representative of the facilities.
- On a wider scope than the risk analysis, the safety report must not be only an administrative document but an evolutive document at the center of the risk management of the facilities, and so need to be operational (can be used for inspections, the emergency plan, the monitoring of safety measures, etc) and up to date. A review every five years can be a good solution as a summary of evolutions, but a constant work to keep the safety report up to date would be more adapted.

## 7. Conclusion

Since the Notification of February 8, 2017 delivered by the French Competent Authority on industrial risks, the periodical review of safety report for upper-tier Seveso establishments, as required by the Seveso III Directive, is made by writing a “review notice” rather than an automatic update or revision of the safety report. This review notice must study 11 points, among which the evolution of the facilities, the environment, the regulatory prescriptions or the feedback on accidents, exercises and inspections.
This review notice is a progress because some of these points may not have been studied before, and depending on the conclusion of the notice, the safety report need to be updated (light changes) or revised (heavy changes, and then processed by the competent authority). However, it is still strongly recommended to update the risk analysis and the bow ties in the context of the periodical review process.

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