ISPRA proposal for technical guidelines on IED Baseline Report in Italy

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Contents

"Minimum Requirements and Criteria for the preparation of the Baseline Report according to Article 22 of Directive 2010/75/UE":

- General purposes of the document
- Identification of the categories of activities that should prepare the Baseline Report.
- Criteria for the assessment of the hazardous substances with regard to the possibility of soil and groundwater contamination at site of the installation on a case-by-case analysis.
- Operational procedures, criteria and processes for determining the state of soil and groundwater contamination before starting operation of an installation or before a permit for an installation is updated for the first time.
- Criteria for carrying out a quantified comparison with the state of soil and groundwater upon definitive cessation of activities.
- Minimum contents of the Baseline Report.

General purposes of the document

- The present document deals with the **minimum technical requirements and criteria developed at national level** in order to pursue the general purposes provided in article 22 of the Directive on Industrial Emissions 2010/75/EU (IED).
- According to the significant experiences gained in the IPPC permitting procedures, it has been considered appropriate to take into account **the actual possibility for an installation to lead to a deterioration of the quality of soil and groundwater**.
- Therefore the following approach addresses a **practical procedure** to identify which IED installation will require the preparation of the baseline report and the technical criteria for carrying out a quantified comparison between the state of the site described in that report and the state of the site upon definitive cessation of activities, in order to ascertain whether a significant increase in pollution of soil or groundwater has taken place.

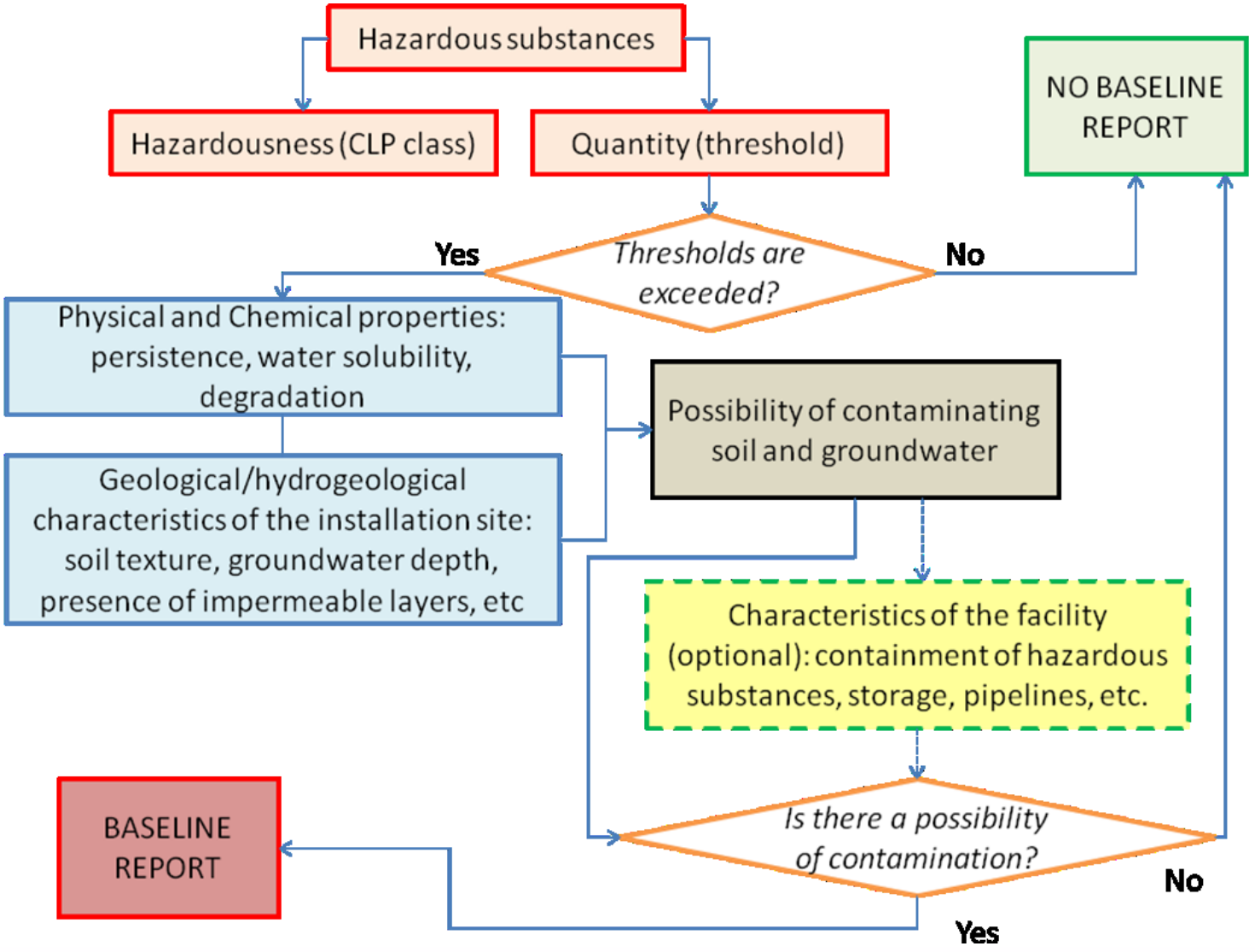
Categories that have to prepare the Baseline Report

Categories of activities set out in Annex I of 2010/75/UE directive, with the exclusion of plants entirely located in the sea, above the thresholds	Thresholds
Refining of mineral oil and gas, gasification and liquefaction plants of coal and shale oils	500 t/day
Large combustion plants with, with the exclusion of gas fed large combustion plants;	300 MW total rated thermal input
Integrated sinter plants for iron and steel production (primary and secondary fusion)	No threshold
Chemical plants with an annual overall productive capacity for each of the following product class greater than the thresholds	**Thresholds* (Gg/year)**
Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)	200
Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides and epoxy resins	200
Sulphurous hydrocarbons	100
Nitrogenous hydrocarbons, such as amines, amides, nitrous compounds, nitro compounds or nitrate compounds, nitriles, cyanates, isocyanates	100
Phosphorus-containing hydrocarbons	100
Halogenic hydrocarbons	100
Organometallic compounds	100
Plastic materials (polymers, synthetic fibres and cellulose-based fibres)	100
Synthetic rubbers	100
Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride	100
Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids	100
Bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide	100
Phosphorous, nitrogen or potassium based fertilisers (simple or compound fertilisers)	300
* The thresholds in the table are referred to the sum of the productive capacities related to the individual compounds indicated in a single row.	

Hazard assessment on a case by case basis for evaluation of relevant hazardous substances

- For activities not included in the previous criteria an **hazard assessment** should be carried out to establish the obligation for a baseline report.
- According to the provisions of the IED, this hazard assessment takes into account the **relevance** of the hazardous substances in terms of **toxicity** and **managed quantity** and the **possibility of contaminating soil and groundwater**.
- Therefore hazard assessment includes the following elements:
  - Characteristics of hazardous substances: CLP classification, managed quantities (threshold values), physical and chemical properties (water solubility, persistence, degradation).
  - Geological/hydrogeological characteristics of the installation site: soil texture, groundwater depth, presence of impermeable layers, etc.
  - Characteristics of the facility (optional): management procedures for the hazardous substances (containment, storage, pipelines, etc.).

Procedure for the case by case Hazard Assessment



Relevance of a substance in terms of hazardousness and managed quantity

Relevance Class	Hazardousness (CLP classification)	Quantity thresholds (Mass flux)
1	H350, H350(i), H351, H340, H341	>= 10 Kg(l)/yr
2	H300, H304,H310, H330, H360(d), H360(f), H361(de), H361(f), H361(fd), H400, H410, H411 R54, R55, R56, R57	>= 100Kg(l)/yr
3	H301,H311, H331, H370, H371, H372	>= 1000 Kg(l)/yr
4	H302, H312, H332, H412, H413, R58	>= 10000 Kg(l)/yr

1. Carcinogens and Mutagenic substances (identified or suspected).
2. Lethal substances, substances harmful for fertility and for fetus, substances toxic for environment.
3. Substances toxic for humans.
4. Substances harmful for humans and for environment.

In the case of more substances, according to the RME (Reasonable Maximum Exposure) criterion, the mass fluxes are added up for substances of the same hazardous class. The total mass flux is then compared to the quantity thresholds.

Relevance of a substance in terms of possibility of contaminating soil and groundwater

- For the evaluation of the "possibility of contaminating soil and groundwater" the **environmental fate** of the "relevant substance" is considered on the basis of **mobility and persistence of the substance** and on the basis of **geological/hydrogeological characteristics of the installation site**.
- When there are **"specific" additional measures** that the operator sets up for the management of the hazardous substances (e.g. containment measures, prevention of the accidents, etc.) that **protect soil and groundwater from contamination**, these may be considered on a case by case basis to decide whether the baseline report is required.

Definitions (developed for the document)

- **Relevant hazardous substance**: an hazardous substance, according to CLP classification, used, produced or released by the activity that in terms of managed quantity, toxicity and physical-chemical properties may cause soil and/or groundwater contamination at the installation.
- **Current relevant hazardous substance**: a relevant hazardous substance pertinent to the activity for which a permit (new or updated) is required according to the IED.
- **Previous managed hazardous substance**: a relevant hazardous substance that have been managed within the site of installation, considering also past operators and activities.
- **Grid sampling**: sampling stations are located in a “casual” or “judged” position within a grid cell.
- **Regular grid sampling**: equal spacing location of the sampling stations. The spacing is defined by the dimension of the adopted grid.
- **Soil layer**: the soil layer with homogeneous lithological, physical and chemical characteristics that should be investigated for the assessment of soil status within the installation.

Definitions (developed for the document)

- **Background level**: a concentration value of relevant hazardous substances in the matrix that is originated by diffuse pollution and/or natural phenomena.
- **Suspected source areas**: areas where, according to the structure of the plant, there is the greatest likelihood of being affected by contamination since the highest level of relevant substances are managed and/or the highest probability of accidental spills of relevant hazardous substances is present, e.g. storage tanks, waste disposal areas, pipelines, etc.
- **Green areas**: areas where is confirmed that no activity managing hazardous substances has been carried out.
- **Brownfield**: a site where relevant hazardous substances may be present in soil and/or in groundwater, as result of past activities.

Definitions (Contaminated Sites Legislation)

- **Characterized site**: a site where a first preliminary investigation step to evaluate the compliance with CTCs and/or a further characterization study for the site-specific risk assessment has been performed.
- **Not contaminated site**: a site where the contamination in soil and/or groundwater is below the Contamination Threshold Concentrations (CTCs - generic screening values) or, if CTCs are exceeded, below the Risk Threshold Concentrations (RTCs – risk-based site specific target levels).
- **Remediated site**: a site where measures to eliminate contamination sources and polluting substances or to reduce soil and groundwater concentration levels below the Risk Threshold Concentrations have been applied.
- **Contaminated site, not remediated**: a site where RTCs are exceeded, remediation is not adopted, but measures for managing risks are applied:
  1. **Operative Safety Measures**: temporary measures act to guarantee an adequate safety level to humans and environment and to contain the contamination avoiding the spreading to other environmental media;
  2. **Permanent Safety Measures**: permanent measures act to isolate definitively the contamination sources from other environmental media and to guarantee an high safety level to humans and environment.

General criteria for soil characterization (1)

- The location of soil sampling stations should be generally based on a **grid sampling procedure**.
- Minimum criteria for **soil sampling** are the following:
  - Maximum grid dimension of 100x100 square meters.
  - A denser spatial distribution of soil samples (reducing consequently the dimension of the grid) may be applied to **suspected source areas**.
  - **Soil layers** that should be mandatory assessed are: 0 – 0,3 m and 0,3 – 1 m below ground surface (b.g.s.).
  - **Deep discrete soil samples** may be collected at suspected source areas (e.g. presence of underground storage tanks of relevant substances).
  - Minimum **three soil samples** associated to each layer.
  - Generally speaking the representative soil sample is formed by a **composite sample** of at least 10 points within each grid.
  - Additional discrete samples may be included to evaluate **specific layers** (depending on different lithologies, other soil characteristics or specific patterns) that should be considered separately.
  - Discrete samples are needed in case of **presence of volatiles** as relevant hazardous substances

General criteria for soil characterization (2)

- Soil analyses must include the **relevant hazardous substances** managed by the facility and their **hazardous (according to CLP classification) sub-products** that may be generated by their natural transformations in the environment.
- In the case of suspected **high soil background levels**, the operator may also add natural and/or diffusely originated chemicals (Metals and inorganics, PAHs) to the analytical set.
- Physical and chemical soil properties (e.g. organic carbon content, pH, soil texture, etc.) must be included in the assessment.
- In each case, composite sample and/or discrete samples, the **representative concentration** value of the relevant hazardous substance for each layer should be an **"averaged" concentration**.

Specific criteria – New installation on Green areas

- **Regular grid sampling** (non targeted).
- Collection of **composite samples**.
- Targeted sampling may be applied to suspected source areas
- Also discrete samples may be added (e.g. volatile substances, specific patterns, deep samples).
- Available data from **other legal procedures**, e.g. EIA, if coherent with the general provisions, may be used for the report

Specific criteria – New installation on Brownfields

1. **Remediated site, Not contaminated site:**
   - — Procedure is the same of green areas.
   - — Results of all available investigations should be included in the baseline report.
2. **Contaminated site not remediated, Not characterized site:**
   - — Targeted sampling focused on the characteristics of the previous and current activities.

- The analytical set should cover **current relevant hazardous substances**.
- Previous managed substances may be added in the case that future impacts of historical contamination cannot be clearly distinguished from the new one.
- Use of **available soil characterization** data:
  - — At each sampling location only one discrete sample for the layer 0-1 m b.g.s. is available. This may be associated to the 0,3-1 m b.g.s. layer.
  - — New discrete samples should be collected for the surface layer (0-0,3 m b.g.s.) in suspected source areas affected by atmospheric precipitation of the relevant hazardous substances (e.g. proximity to current/past emission points).

Specific criteria – Installations updating the permit

- For installations **updating the permit for the first time**:
  - **Targeted sampling is suggested**, focused on the characteristics of the **previous and current activities** and the **available and suitable results of soil characterization** according to the contaminated sites legislation.
  - The analytical set should cover **current relevant hazardous substances**.
  - The operator may integrate the analytical set with the **previous authorized substances** taking into account that, as stated by Art 22 point 3, paragraph 2, **at site closure the associated risks associated have to be assessed**.
  - The **risk assessment procedure may be carried out in the context of the baseline report** and the results used at site closure, if no land use change occurred.
  - Previous managed substances may also be added in the case that future impacts of historical contamination cannot be clearly distinguished from the new one.

- For the installations **updating the permit for modification of the industrial process**, two cases have to be considered:
  - the **available baseline report should be integrated with new relevant hazardous substances** deriving from the process, with the same criteria of the previous report.
  - **a new baseline report should be prepared**, since the new process manages hazardous substances that have to be considered as relevant.

Criteria for groundwater characterization

- Groundwater sampling (generally a targeted sampling) is based on:
  - the extension of the site;
  - the hydrogeological conditions.
- Minimum criteria:
  - one monitoring point representative of a **200x200 square meters area**;
  - **at least three monitoring points**: one upgradient the potential sources and at least one downgradient.; the three points should not be on the same flow line.
- The monitoring points should investigate the shallow aquifer.
- Deep aquifer should be investigated if there is a suspect of contamination, the possibility of interactions with the shallow one and if groundwater is used within the installation.
- Pumping wells may be used as preferential sampling locations, when groundwater is used for the activities, only if their characteristics are known (date of installation, constructive information, geologic/stratigraphic logs, fenestration interval, depth, etc.).

Criteria for groundwater characterization

- The investigation includes:
  - the reconstruction of the **piezometric surface** of the groundwater within the interested aquifer on the basis of the site-specific data.
  - analyses of **current relevant hazardous substances** and their **hazardous sub-products** (according to CLP classification) that may be generated by their natural transformations in the environment.
  - **natural chemicals** (Metals and inorganics) may be also included, in the case of **suspected high groundwater background levels** above the threshold values defined at national level according to Directive 2006/118/EC (Groundwater Directive).
  - an evaluation of the **potential presence of the free phase of HCs and chlorinated HCs**, in the case of management of these substances or of down gradient proximity to one or more recognized contaminated sites with heavy groundwater contamination.
- Available data on groundwater **not older than one year** from the baseline report redaction may be used. New samples obtained from existing monitoring points should be added, if the previous characterization is not sufficient for the baseline report.

Risk-based comparison criteria for soil

- The proposed criteria for carrying out a **quantified comparison** of the baseline conditions with the state of **soil** upon definitive cessation of activities are **risk-based**:
  1. Compliance with **ecological guideline values** to be delevoped at national level.
  2. Compliance with the acceptable **concentrations delta** between baseline and site-closure conditions (especially for substances that do not have still a guideline value)
  3. Evaluation of the **human health risk** associated to baseline and site closure conditions and setting an acceptable **risk delta** for both carcinogenic and not carcinogenic substances
- All the proposed criteria contribute to assess the **significant increase in soil pollution** between baseline and site-closure conditions, taking into account actual and planned future land use of the site.

Comparison criteria for groundwater

- Comparison criteria for groundwater:
  1. Compliance with **threshold values** defined at national level according to Directive 2006/118/EC (Groundwater Directive).
  2. Compliance with **ecological guideline values** to be delevoped at national level, for substances that does not have a threshold value
  3. Compliance with acceptable **concentrations delta** between baseline and site-closure conditions.
  4. Evaluation of trends in groundwter contamination on the basis of monitoring results.
  5. Evaluation of the **human health risk** associated to baseline and site closure conditions and setting an acceptable **risk delta** for both carcinogenic and not carcinogenic substances.
- All the proposed criteria contribute to assess the **significant increase in groundwater pollution** between baseline and site-closure conditions.

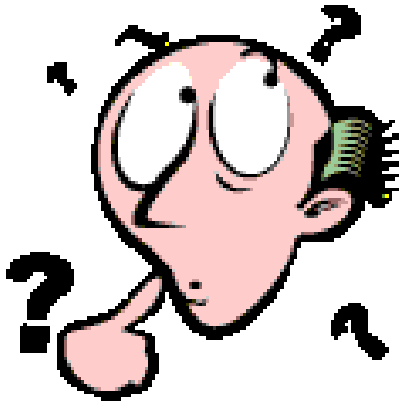
Minimum contents of the Baseline Report

- The minimum information included in the Baseline Report is:
  - current approved land use of the site and, if available, the past and the future planned land use;
  - if known and relevant, the description of past activities carried out within the site;
  - general information on the geological/hydrogeological setting of the site;
  - the results of hazard assessment, if carried out;
  - the identification and mapping of suspected source areas;
  - the description of available data used for the baseline report, including sampling strategy, sampling locations and information on physical and chemical analyses carried out on soil and groundwater;
  - the detailed description of planned new data collection including sampling strategy, sampling locations and information on physical and chemical analyses carried out on soil and groundwater;
  - the results and discussion of soil and groundwater characterization;
  - the description of soil and groundwater status assessment and the selected criteria to evaluate the significant changes at site closure.

Conclusions and follow ups

- The proposal is in discussion with the Ministry for the Environment and a formal agreement is expected.
- The following aspects are still debated:
  - use of composite and/or discrete samples;
  - accounting for historical activities on the site;
  - risk-based approach for the quantified comparison;
  - use of ecological criteria for this kind of assessment.
- These guidelines, when agreed with the Ministry for the Environment, will be delivered to the Commission by the Ministry as an Italian proposal.

Thank you for your attention!



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