

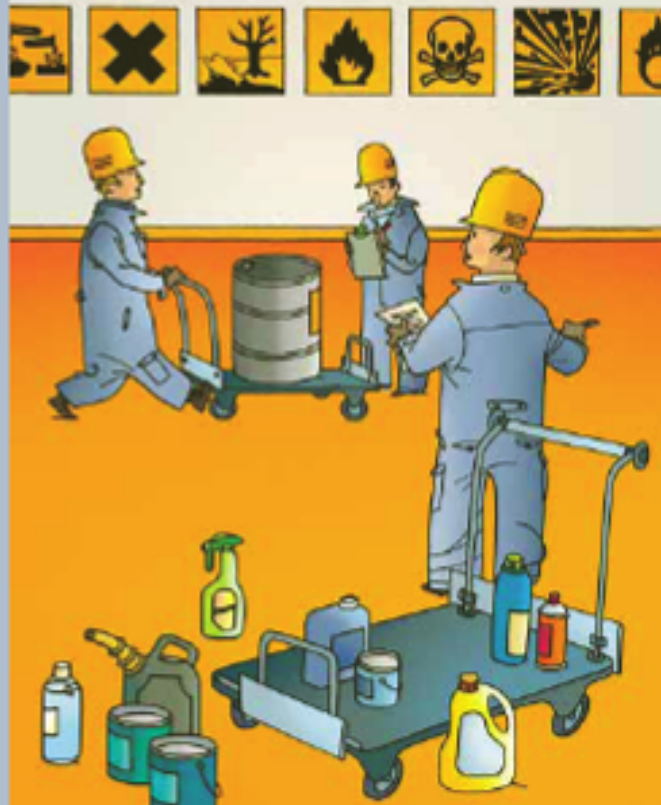
SOBANE strategy: chemical agents

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SOBANE strategy: chemical agents

SPF Emploi, Travail et Concertation sociale



SERIE STRATEGIE SOBANE
GESTION DES RISQUES PROFESSIONNELS

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LEVEL 1: SCREENING

The following table comes from the Déparis guide and can not be used separately
(please refer to the Déparis guide for further information)

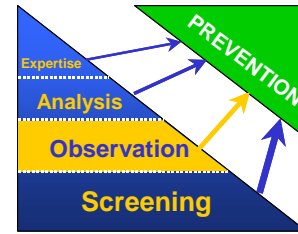
10. Chemical and Biological agents	
Chemical risks (solid, liquid or gas) and biological (bacteria, viruses, liquid body...)	
<p>To be discussed:</p> <ul style="list-style-type: none"> • Chemical and biological risks <ul style="list-style-type: none"> ▪ inventory of the products available and up to date ▪ documentation on the risks available • Training: on the procedures and the risks • Procedures <ul style="list-style-type: none"> ▪ of use: clear and respected (mixtures, proportionings) ▪ in the event of incident (inversion, splash...) respected • Labelling: containers suitable and well labelled • Stocks <ul style="list-style-type: none"> ▪ the toxic, corrosive, flammable, biological... products are stored in spaces suitable, isolated and signposted • Dust, chips, oils, vapours...: <ul style="list-style-type: none"> ▪ exhausted (ventilation, aspiration...) without getting in suspension or dispersed • Chemical and biological waste: <ul style="list-style-type: none"> ▪ evacuated in a controlled way according to a known procedure in suitable containers (dustbins) • Signposting: <ul style="list-style-type: none"> ▪ suitable and respected: prohibition to smoke, buildings at the risk... • Collective protections <ul style="list-style-type: none"> ▪ showers, wash-hand basins, eyewash... well located and in good condition • Personal Protective Equipments <ul style="list-style-type: none"> ▪ gloves, masks, glasses, clothing... ▪ suitable, available and used • Personnel at increased risk: <ul style="list-style-type: none"> ▪ women, pregnant or nursing women, young workers... ▪ suitable health surveillance • Vaccinations: in order • Personal hygiene <ul style="list-style-type: none"> ▪ nobody eats on the work place ▪ no mushrooms or moulds • Air renewal: sufficient <ul style="list-style-type: none"> ▪ the air is fresh, pleasant to breathe, without odours • Smokers <ul style="list-style-type: none"> ▪ smoking zone well located and ventilated 	<p>What to make <u>in practical terms</u> to improve the situation?</p>
<p>Aspects studied more in details:</p>	



LEVEL 2: OBSERVATION

OBJECTIVES

- To study the situation in general and *in the field*, concerning the working conditions with chemicals: gases, liquids, solids (dusts)
- To determine immediate technical or organisational measures which can be taken to eliminate or decrease the risks
- To determine on what an **Analysis** (level 3) must be carried out.



WHO?

- **Workers** and their **local management**
- **People from the company** (hierarchy, engineering and maintenance department, local OH practitioners) knowing perfectly the work situation.

NB: In the case of use of dangerous chemicals, **an Analysis** is always necessary **legally and considering the gravity of the risks**. An OH practitioner will generally lead this **Analysis**.

The **Observation** of the working conditions by the people of the company will facilitate this **Analysis** and should improve considerably its effectiveness.

HOW?

The procedure is similar to the one used for level 1, Screening, using the **Déparis** method and the participants should be the same ones:

1. Definition of the small group of workplaces forming a "**work situation**"
2. Designation of a **coordinator**
3. Preparation of the coordinator: he reads the **Observation** method in detail, train himself to use it and adapt the tool to the work situation
4. Setting up of a **working group** with key workers and members of the supervisory technical staff. This group includes at least one man and a woman in case of mixed group of workers
5. Meeting of the working group in a quiet room close to the workplaces (during 2 hours on average)
6. Clear explanation by the coordinator of the goal and procedure of the meeting
7. Discussion on each item of the method while concentrating on
 - What can be made **in practical terms** to improve the work situation, by whom and when
 - For what the **assistance** of a OH practitioner will be necessary at the **Analysis** level



The discussion relates to the work situation and takes into account the characteristics of the workers and, in particular, their gender, their age (in particular the young or older workers), their knowledge of the local language...

8. After the meeting, preparation of the **synthesis** of the results by the coordinator, using:
 - The sheets used to collect the detailed information during the meeting
 - The list of solutions under consideration with proposals on **who** does **what** and **when**
 - The list of the points to study more in detail on level 3, **Analysis**, with the priorities.
9. The results are **submitted** to the participants, the direction and the company prevention committee for revision, additions and decisions

10. **Pursue** of the study for the unsolved problems by the level 3, **Analysis** method.

*When it is not possible to organize a meeting of 3 to 6 people, the coordinator leads the **Observation** alone or with one or two people and possibly at the workplaces themselves. This non-ideal solution remains useful since it will in any case contribute to the development of the idea of prevention and will prepare the possible recourse to an external OH practitioner.*

The items to be discussed

1. Brief **description** of the work situation:
 - Sketch
 - Identification of the areas where chemicals are used or emitted
 - Identification of the workplaces
 - Identification of the potentially exposed people
2. **Inventory** of the chemicals with **collection** of the occupational hygiene and safety information for each one of them:
 - R and S phrases
3. Labelling and signposting
4. Elimination of the dangerous chemicals
5. Reduction of the exposure
6. Safety during handling operations
7. General or local ventilation
8. Occupational hygiene measures
9. Personal protective equipments (PPE)
10. Storage
11. Protection against fire or explosion hazards and emergency plans
12. Waste management
13. Training and information
14. Medical supervision
15. Synthesis: assessment of the work situation as a whole:
 - Assessment of the efficiency of the prevention or improvement actions
 - *Who* does *what* and *when*, by priorities
 - Assessment of the future situation
 - Nature of **the Analysis**, level 3, urgency and objectives.
 - Measures to be taken in the short run

Terminology

R (risk) phrases	Specific risks associated with the substances or dangerous preparations
S (safety) phrases	Caution advices concerning the substances or dangerous preparations

PROCEDURE



1. Description of the work situation

- Prepare a sketch of the work situation, with:
 - The chemicals storage areas
 - The areas where the chemicals are used: machines, workplaces, baths, mixing stations...
 - The areas where the chemicals are emitted: openings in the equipments, treated surfaces...
 - The exposed workers
 - The sites where they are exposed to these chemicals
 - The location of the ventilation systems:
 - ✧ Ventilation inlets and outlets
 - ✧ Fresh air intakes
 - ✧ General ventilation system
 - ✧ Local exhaust systems
 - ✧ Hoods, laminar flows, glove compartments...
 - The first aid sites: eyewash, emergency showers, extinguishers, fire blankets, emergency phones...

What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?



2. Inventory of the chemicals

- Check that, for your work situation, an inventory of the chemicals was prepared in accordance with the legal requirements
 - If it is not the case: continue as indicated below in seeking information on the containers, packing... at the workplaces
 - ✧ This inventory must obligatorily be prepared on level 3, **Analysis** which will follow this **Observation**
 - If this inventory exists, get the information indicated below and check if it is accurate by comparing it with the information given on the labels of the chemicals
- For your work situation, make the list of all the chemicals used or being in the working area and note the numbers of phrases R (risks) and S (safety measures) or directly the indications on the labels
- In case of combination of phrases (R15/29 for example), note the 2 numbers separately
- Also add the names of the non commercial chemicals with which you come into contact



Example

Product	Phrases n°	Phrases
Toluene	R11	Highly flammable
	R20	Harmful by inhalation
	S16	Keep away from sources of ignition - No smoking
	S25	Avoid contact with eyes.
	S29	Do not empty into drains
	S33	Take precautionary measures against static discharges

- On basis of:

- ◇ The sketch of the work situation
- ◇ The table prepared above



Check the various points of the following sections for the whole group of workers and all the people concerned regularly or occasionally with the work situation: hierarchy, maintenance service, outside firms, apprentices, temporary workers, visitors...

What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

3. Labelling and signposting

Check that:

- All the containers (bottles, tanks, cisterns...) are labelled with:
 - ◇ The name of the chemical
 - ◇ The risk and safety phrases
 - ◇ The corresponding hazard symbols
 - ◇ The name and address of the manufacturer
- If the chemicals were decanted into other containers, those are also labelled
- The labels and instructions on the labels are written in your language
- All the areas at the risk and the storage areas carry the hazard pictograms related to the chemicals used with, when necessary:
 - ◇ No smoking
 - ◇ Do not work with a flame
 - ◇ Do not circulate with motor vehicles
 - ◇ ...

TOLUENE	
	
R11: facilement inflammable	R20: Nocif par inhalation
S16: Conserver à l'écart de toute flamme ou source d'étincelles - Ne pas fumer S25: Éviter le contact avec les yeux S29: Ne pas jeter les résidus à l'égout S33: Éviter l'accumulation de charges électrostatiques	
Nom et adresse du fabricant	



What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

4. Elimination of the dangerous chemicals

Check that:

- Dangerous chemicals not essential for the work are eliminated from the work area
- The less dangerous possible chemicals are used: (ex: cleaning with a grease-removing product poor in solvent, use of water-based paint...)

What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?



5. Reduction of the exposure

Check the possibilities to:

- Reduce the quantities of chemicals at the workplaces to the strict minimum for a day of work
- Isolate or confine the operations generating dust, gases or vapours
- Modify the work processes in order to release less vapour or dust
 - No vaporization or gun painting if it is possible to work differently
 - Not cleaning with compressed air
 - Vacuum cleaning whenever possible
 - General cleaning using a wet rather than a dry process
 - ◇ Watering of the dusts
 - Local exhaust
- Reduce the number of people in the area:
 - ◇ People who are not really concerned by the work should not remain in the surroundings



- Group activities in space and time
 - In space:
 - ✦ Reduce surfaces (baths, workbenches...) on which chemicals (because volatile or heated) are emitted in the air, by means of lids, closed systems...
 - In time: limit the time during which:
 - ✦ Containers remain open
 - ✦ Dust is released
 - ✦ Workers inhale the toxic chemicals
 - ✦ Hands remain soiled by these chemicals
- Separate from other activities in space and time in order to avoid exposure of other workers:
 - In space:
 - ✦ Closed production process
 - ✦ Chemicals used in well delimited and ventilated zones
 - In time:
 - ✦ Maintenance or cleaning activities carried out when the number of workers is the lowest (night, weekend...)

**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

6. Safety during handling

Check that:

- There are no leaks through gaskets, taps, and valves...
- All chemicals are stored in suitable and safe containers
- Containers for domestic use are never used
- Incompatible chemicals are kept apart in the working area
- There are not flame or heat source nearby when someone uses, decants or stores flammable or combustive chemicals
- Ways and exits are marked and are not congested with waste, pallets, chemicals...
- Transport means, work surfaces, containers, handling operations... are such that the risks to spill or break one container are reduced
- In case of a spill, the quantity of product remains limited and on a small surface. Collecting trays or absorbent chemicals are available in the vicinity
- The spilled chemicals and the splashes are immediately cleaned and removed by techniques which do not expose the workers
- The handling of great quantities of chemicals (barrels...) is done safely: ways without obstacles, flat grounds, qualified personnel...



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

7. Ventilation

Check that:

- In case of general ventilation:
 - The area is ventilated in all seasons and at all times without discomfort or draughts
 - ✦ The air inlets and outlets are well located, are sufficiently large and are not encumbered
 - The ventilation system works adequately and insures a sufficient air renewal
 - The air circulates so that the possible emissions are moved away from the workplaces

- It does not remain any strong odour of the chemicals near the workplace (be cautious of odourless chemicals)
- In case of local exhaust:
 - The local exhaust systems are used and in a correct way
 - They are in good condition, without holes or openings in the air ducts
 - Vapours or dusts are effectively exhausted
 - They are exhausted by taking them away from the breathing zone of the workers
 - The air is exhausted outside without recycling in the work environment
- Handling of dangerous chemicals (toxic or volatile) is done in suitable hoods
- Handling of very dangerous chemicals (very toxic or very volatile) is done in special hoods (cupboard with laminar flow or glove compartment)
- The filters in the ventilation system are regularly cleaned and replaced.



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

8. Measures of occupational hygiene

Check that:

- The ground, the benches and machines surfaces are clean and free from deposits (oil, dust, waste...)
- It is prohibited to eat, drink or smoke at the areas where chemicals are used
- Nobody eats, drinks nor smokes at these stations
- A cafeteria is at the disposal of the workers
- No food, drinks or cigarettes are kept at the workplace. They are left in the cupboard of the worker or in a suitable room.
- It is possible to wash the hands and the face before entering the cafeteria to eat, drink or smoke and before leaving the company
 - **For a more specific study of these hygiene problems, use the SOBANE strategy related to the social premises**
- It is possible to take a shower during and after work in case of dirty operations
- Workers wash themselves as prescribed before going to the cafeteria, offices, any public zone or home
- They avoid as much as possible any contact of the hands with the dangerous chemicals
- They take care not to touch their face or mouth with hands that are dirty or have been in contact with dangerous chemicals
- They do not clean their clothing with compressed air
- They do not wipe their hands on their working clothes, but always use rags or absorbent paper provided for that purpose
- Dispensers of absorbing paper or rags are available at all workplaces where one can get his hands in contact with dangerous chemicals.
- After use, the papers and rags are thrown in suitable bins
- In case of prolonged odour of a chemical, or furthermore in case of irritations or other complaints, the hierarchical line, the OH practitioner, the occupational physician are directly informed



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

9. Personal protective equipments (PPE)



Check that:

- **General provisions**

- PPE are always selected with the assistance of an OH practitioner
- The workers received information and adequate training on how to get, use, maintain, arrange and replace PPE
- PPE are always available in sufficient quantity
- They are used adequately for each activity
- They are always cleaned, disinfected and arranged in a hygienic cupboard as described by the manufacturer (especially for gas masks)
- They are washed correctly and sufficiently often by the employer
- They are kept in a cupboard separate from the civil clothes
- They are never carried home
- PPE worn or defective are replaced immediately
- Disposable protections are used only one time and, after use, are thrown in a bin intended for this: they are thus never re-used
- In case of a problem for a worker to use PPE, a solution is always sought and found:
 - ✦ Asthma and dust mask
 - ✦ Orthopaedic soles and safety shoes
 - ✦ Allergy and latex gloves...

- **Face and eyes protection**

- The workers carry safety glasses when they are likely to come into contact with vapour, dust, liquids
- Face shields or tight glasses are used to protect from splashes each time someone works with corrosive substances
- Face protection resistant to the impacts and shocks are used when dust or particles (sanding, welding...) projections are possible
- Safety glasses are optically neutral or corrected for each worker
- They are comfortable and protect effectively all around the eyes (lateral protection)
- Ocular showers are available if chemicals with an additional risk for the eyes are used (S26 sentence)



- **Respiratory tract protection**

- The masks close hermetically around the face, so that polluted air cannot be drawn up by the sides
- They are adapted to the chemicals handled
 - ✦ Dust filters
 - ✦ Specific cartridges for vapours and aerosols
- They are placed and removed from the face in a "not polluted" room
- They are regularly cleaned and maintained
- Filters or cartridges are replaced at the appropriate time



- **Hands protection**

- The gloves are adapted to the chemicals: resistant to acids, to solvents, impermeable...
- They are comfortable and make it possible to work safely: non-skid, allowing fine handling if necessary
- They are taken off by avoiding the contact on the soiled side with the skin

- **Body protection**

- The working clothes are adapted to the chemicals:
 - ✦ Impermeable to water or solvents...
 - ✦ Acid or base proof when necessary



- They are removed and replaced as soon as possible when very soiled by chemicals
- In the case of an urgency, a safety shower is available and is in good operating condition close to the workplaces where dangerous chemicals are used
- **Feet protection**
 - Workers are equipped with shoes or boots resistant to the handled chemicals



What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

10. Storage

Check that:

- Suitable tidying space is available near the workplaces for the raw materials and the finished chemicals
- The chemicals are always stowed away after use, in a stable way and in an adequate site
- They are kept in the solid, hermetic containers designed for this purpose (ex: never in bottles intended for drinks or in food cans...) and adequately labelled
- All containers are kept closed when they are not used
- The chemicals are never stored in the evacuation or access ways or around workplaces
- The storage zones are completely isolated from the workshops and other spaces
- They are accessible only to authorized people
- The workers know and apply the code of conduct for the storage areas (ex: no spark, no smoking, doors closed, locked-up zone...)
- Pictograms are posted and quite visible in the storage areas (ex: not behind a door...). According to the case:
 - ✦ Suitable hazard pictograms
 - ✦ No smoking sign
 - ✦ Fire ban sign
 - ✦ Spark ban sign
 - ✦ ...
- The chemicals which can interact are stored separately: ex: bases and acids, flammable and oxidizing chemicals
In all the cases, they are placed on separate collecting vats
- All flammable chemicals are stored in an ordered way on specific sites (special cupboards...)
 - Without heat sources: no storage in sunny places, close to heat sources (in a boiler room or close to a furnace or an autoclave...)
 - Without risk of sparks: no storage close to metal work, close to welding operations...
- The storage areas are well ventilated and the ventilation openings are maintained open
- The dangerous liquid chemicals are stored on draining vats or in especially designed buildings



What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

11. Protection against fire or explosion hazards and emergency plans



See the SOBANE strategy for the prevention of the risk of fire and explosion for a more specific study of these aspects

Check that:

- It is strictly prohibited to smoke and indeed nobody smokes, except in places especially arranged for this purpose
- A fire permit is requested for any work likely to produce spark or fire in atmospheres with an increased risk of fire or explosion
- The rags soaked with flammable liquids are immediately thrown away in hermetic bins
- There are nowhere great quantities of dust accumulated in the room (on beams...) (risk of dust explosion)
- The emergency equipment is in good working order
- It is located near the workplace and quite visible
- There are enough extinguishers
- Trained first intervention team members are present in each work team and shift
- Fire drills are regularly organized for all the workers
- A first-aid trained worker is present in each work team and shift
- First-aid kits are in good working order, clearly located and available in sufficient quantities
- The system to detect explosives atmospheres is checked and maintained periodically and is in good working state
- An internal emergency plan exists and includes
 - The instructions in the case of fire
 - The services and people to be called
 - ◇ The central first-aid number of the company (on each telephone)
 - ◇ The numbers of the internal and/or external emergency services
 - ◇ The internal first-aid team within the company
 - ◇ The engineering departments able to close the pipes of gas or flammable liquids...
 - The localization of fire fighting equipment: extinguishers, hose reels, hydrants...
 - The location and the way of reaching the emergency exits
 - The location and the way of reaching first aid



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

12. Management of waste

Any waste is a product and must consequently be treated as such (identification, classification, labelling...)

Check that:

- Chemical waste, including the empty containers with residues, are eliminated suitably, without any risk for the workers nor for the environment
- Dangerous chemicals are not rejected directly into the environment (ground, water or air)
- Rags soiled of chemicals during work or used to clean spills are thrown in specific closed bins
- Bins adapted to the types of waste are available in a sufficient number and are adequately located in the work area
- Mixtures of waste are avoided (reactivity between waste)



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

13. Training and information

Check that:

- Clear and practical procedures exist concerning:
 - The way chemicals must be
 - ✧ Handled
 - ✧ Used during work
 - ✧ Stored at the workplace and in general
 - ✧ Evacuated when they become waste
 - The way of using the local aspiration systems
 - The collective prevention measures to adopt by all workers to protect themselves and the others
 - The personal protective equipments to carry
 - The measures to be taken in the case of splashes, spills, incidents, dangerous situations, accidents, urgencies
- The workers respect the procedures and recommendations and work safely
 - The chemicals are used only for what they are intended
 - Collective and personal protections are used effectively
- They are acquainted with the alert and alarm signals and the emergency procedures in the case of incident or accident (fire, explosion, leaks, wounds...)
- At the time of recruitment, they received a practical training and detailed information on
 - The health risks linked to the chemicals they handle
 - The procedures referred above
- These training and information are regularly repeated and updated after any change of the equipment, the process, the chemicals...
- They always examine the safety and health regulations given on the safety sheet before an occasional use of a product
- Temporary workers and apprentices are informed and trained as the personnel of the company



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

14. Medical supervision

Check that:

- The women and young workers are informed about the chemicals likely to have effects on the pregnancy and the fertility:
 - Risk phrases
 - ✧ Heredity
 - R 46: May cause heritable genetic damage
 - ✧ Pregnancy
 - R 61: May cause harm to the unborn child.
 - R 63: Possible risk of harm to the unborn child.
 - R 64: May cause harm to breast-fed babies
 - ✧ Reproduction
 - R 60: May impair fertility
 - R 62: Possible risk of impaired fertility.



- Pregnant or breast-feeding women know the procedure to inform the occupational physician as soon as possible
- They do not work close to toxic chemicals
- Someone is designated to very quickly contact the poison centre, in case of an emergency
- All workers exposed to dangerous chemicals take a medical examination

What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?

15. Synthesis

For each workplace:

- Take stock of the prevention measures considered
- Specify **who** makes **what** and **when**, by priorities using from the answers to the questions:

What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?

- Define **the measures to be taken in the short term** (in particular personal protection):
 - What personal protection?
 - Used by whom?
 - When?



The advice of a qualified OH practitioner is necessary in all the cases:

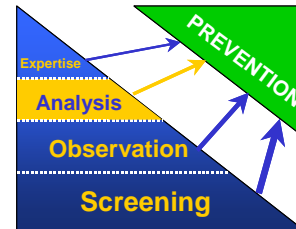
- ***To evaluate the work done by the people of the company at this Observation level***
- ***To appreciate the relevance of the recommended solutions***
- ***To determine the priorities of a complementary Analysis***

SOBANE strategy: Dangerous chemicals

LEVEL 3: ANALYSIS

OBJECTIVES

- To evaluate more in detail the exposure and the risks incurred by workers
- To search further for prevention-improvement measures using more specialized techniques
- To estimate if it is still necessary to make a even more detailed study (**Expertise**, level 4)



WHO?

- People of the company with the assistance of an OH practitioner having methodological competences

HOW?

The steps to be followed by **the OH practitioner** are as follows:

1. **Revision** of the results of **the Screening** and **Observation** levels with **the coordinator** of these two first levels:
 - By re-examining the work done at these levels and the various solutions considered
 - By determining the aspects that require a complementary **Analysis**.
2. **Analysis** itself of the work situation for these particular points, in collaboration with the people of the company
 - By studying these particular aspects more in-depth
 - Possibly by carrying out measurements, always for the purpose of prevention
 - By helping the company to implement the recommended solutions.



POINTS TO BE DISCUSSED

1. Description of the work situation
2. Inventory of the chemicals
3. Labelling of the chemicals and signposting in the buildings
4. Elimination and substitution of the dangerous substances
5. Reduction of the exposure
6. Safety during handling
7. Ventilation
8. Personal protective equipments (PPE)
9. Storage
10. Management of waste
11. Measures in the case of accident, incident or emergency
12. Training and information
13. Medical supervision
14. Measures of prevention specific to certain activities
15. Evaluation of the current and residual risks
16. Synthesis
 - Current risk
 - Assessment of measures of prevention/amelioration considered

- Who does what and when, by priorities
- Residual risk after prevention
- Need for a level 4, **Expertise**
 - ✦ Objectives: on what and for what purpose?

17. Short-term measures

PROCEDURE

1. Description of the work situation

- Reconsider and bring up to date the **sketch** of the work situation prepared at level 2, **Observation**, with:
 - The sites of storage
 - The sites where the chemicals are used: machines, workplaces, baths...
 - The sites of the ventilation systems:
 - ✧ Openings of ventilation
 - ✧ Fresh air intakes
 - ✧ General ventilation system
 - ✧ Local aspiration system
 - ✧ Hoods
 - Sites of first aid: eyewash, emergency showers, extinguishers, fire blankets, emergency phones...
- Locate the various activities where chemicals are used
 - Places where the chemicals are released: openings in the installation, surfaces to be treated.



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

2. Inventory of the chemicals



- Prepare, check or update the inventory of the chemicals used as well as of the intermediate or decomposition dangerous chemicals formed in the working area
 - The intermediate chemicals in a process: ex: the manufacture of chemicals
 - The combustion chemicals: ex: welding fumes, roofs asphalted, exhaust fumes of internal combustion engines (cars, lifting trucks...)
 - Breakdown chemicals: ex: vapour of furnaces, vapour of extrusion devices
 - Decomposition chemicals: ex: asbestos fibres in damaged insulations, unstable product ...
 - Waste
 - Dust of wood, metal, synthetic matters, silica... by grinding, sand blasts
- Check that the MSDS sheets (Material Safety Data Sheet) of all these chemicals are available
- Check that they are held at the disposal of the interested parties, in a clear and practical way
- This inventory must include:
 1. The running name of the product as used by the workers or the common name indicating the intermediate or decomposition product
 2. The commercial name of the product as used by the supplier for the raw materials
 3. The product use
 4. The quantities present at the workplace and stored in the company
 5. The names of the substances constituting the product, as indicated on MSDS sheets of the product
 6. The CAS number of the substances
 7. The range of proportion of the chemical substances in the preparation or the product
 8. The danger symbols
 9. The numbers and the risk phrases R defined by the European legislation
 10. The numbers and the caution phrases S

What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?

3. Labelling of the chemicals and signposting in the buildings

- Systematically re-examine whether labels exist and are accurate on
 - All containers (cans, bottles, tanks)
 - All areas at risk
 - All storage areas

TOLUENE	
 R11: facilement inflammable	 R20: Nocif par inhalation
S16: Conserver à l'écart de toute flamme ou source d'étincelles - Ne pas fumer S20: Éviter le contact avec les yeux S29: Ne pas jeter les résidus à l'égout S33: Éviter l'accumulation de charges électrostatiques	
Nom et adresse du fabricant	

What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

4. Elimination and substitution of the dangerous chemicals

Check:

- The absence of any product prohibited by law
- The possibilities of changing the process so as
 - Not to use the dangerous chemicals anymore (elimination)
 - To replace the chemicals used by others less harmful (substitution)
- The possibilities of transferring the operations where dangerous chemicals are used to a more specialized external firm



What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

5. Reduction of the exposure

Check the possibilities:

- To work with a closed system
- To adapt the work organization to reduce:
 - ◇ The utilisation period
 - ◇ The frequency of use
 - ◇ The quantity of chemicals used
 - ◇ The number of exposed workers
- To completely separate from the rest of the workshop the zones where the chemicals are used
 - Or to insulate the workplaces completely
- To reduce the temperatures of the dangerous chemicals in order to reduce evaporation, the sublimation and the formation of chemicals of decomposition
- To put the mixer or the hopper in depression during the filling or draining



What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

6. Safety during handling

Check that:

- The machines and the tools are in good condition and do not lead to emissions
- No product carrying the R 45, 46, 49 phrases is emitted in the air
- The volatile chemicals and those heated at high temperatures are as little as possible in contact with the air
 - The evaporation and emission surfaces are reduced to the minimum
- One works with as few dangerous chemicals as possible at the same time, in order to limit the risks of chemical reaction
- Incompatible chemicals are kept apart

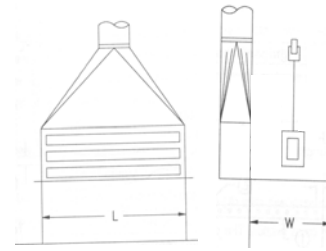


- Fumes and decomposition chemicals are not released in the air or are exhausted effectively

What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

7. Ventilation

- Check the possibilities of installing
 - At least a general ventilation by extraction for the products with a TLV greater than 500ppm and when the emissions are distributed
 - At least a general ventilation by pushing for the products with a TLV between 100 and 500ppm and when the emissions are distributed
 - At least a local exhaust very close to the emission points for the products with a TLV smaller than 100ppm
 - A cupboard with laminar flow or a glove compartment if the chemicals are particularly dangerous
- Whatever the system of ventilation, check that:
 - It works suitably
 - It draws the pollutants out of the respiratory zone of the workers
 - ✦ Test it with a smoke source
 - It does not lead to discomfort for the workers
 - It is adequately and periodically maintained
 - The air flow is actually the one computed by the expert when the system was designed



What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

- In the case of **general ventilation by extraction**: check that:
 - The chemicals are not very toxic (TLV > 500ppm)
 - The work area is never at a significant low barometric pressure whatever the season
 - The air flow is sufficient in all seasons
 - The air intake is large, not encumbered and well distributed in all seasons
 - The introduced air is clean
- In the case of **general ventilation by air supply**: check that:
 - The emissions are not concentrated but are rather scattered on large surfaces
 - The TLV of the chemicals is greater than 100ppm
 - The air flows are sufficient to dilute the pollutants under the TLV concentration
 - The introduced air is well distributed
 - It is clean
 - It is not recycled
 - The air outlets are large and are not encumbered in all seasons

What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?

- **In the case of local ventilation**: check that:
 - The emissions are not on large surfaces but are rather concentrated
 - ✦ All measures are taken to limit emission surfaces: partial lids...
 - The exhaust slots are as close as possible of the emission points and placed according to the properties of the chemicals:
 - ✦ If heavier than air: extraction downwards



- ◇ If lighter than air: extraction upwards
- The shape of the slot is adapted to the form and size of the emission surface
 - ◇ Pipe located above the welding point
 - ◇ Slot at the edge and all along a bath
 - ◇ Exhaust hood all around the parts to be treated
 - ◇ Slot in half-circle at the edge of a barrel
 - ◇ ...
- Exhaust is done uniformly over the whole width and length of the slot
- The air velocity in the aspiration slot is greater than 10 meters a second
 - ◇ Measure using an anemometer
- Transverse draughts do not harm the aspiration
- The calculated exhaust rate is sufficient and is achieved in practice
- If several ventilation ducts are connected to the same fan, these branches are well balanced
 - ◇ The respective flows are achieved
- The exhaust air is rejected outside and is not recycled in the room
 - ◇ For lack of this and if the chemicals are only slightly toxic (Xn)
 - The air is filtered by means of a filter adapted to the chemicals
 - It is monitored before being rejected into the room
 - The filter is regularly replaced
 - The installation is regularly maintained
- In the case of a **hood of laboratory** equipped with a sash:
 - Exhaust is done at the top or bottom according to the properties of the chemicals
 - ◇ If lighter than air: at the top
 - ◇ If heavier than air: at the bottom
 - ◇ If various: both exhausts
 - Work is performed with the sash closed as much as possible
 - The presence of the operator does not generate turbulence toward his face
 - The instruments and assemblies inside the hood do not generate turbulence toward the face of the operator and do not block the air outlets



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

8. Personal protective equipments (PPE)

Check that:

- **General provisions**
 - Personal protections are available if collective protections are not sufficient
 - Taking into account the organizational measures and collective protections, the residual risk justifies to wear PPE
 - The workers requiring PPE were identified and informed of when, how and why they must protect themselves
 - The PPE used are perfectly adapted to the working conditions and provide exactly the protection required
- **Protection of the respiratory system**
 - The masks are adapted to the type of product (organic, inorganic, dust, aerosols, vapour...) and to the concentrations in the air
 - A routine programme of maintenance of the masks (maintenance, control, replacement) was defined and is implemented efficiently
- **Protection of the hands**



- The gloves are chosen according to the chemicals handled: acid proof, solvent proof, impermeable...
- They fulfil the general requirements defined in the EN 420 standard
- **Protective clothing**
 - Protective clothing is used if there is a risk of penetration of a product through the skin, or of skin irritation
 - Protective clothing fulfils the general requirements defined in the ISO 30 standard

**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

9. Storage

Check that:

- The storage areas are isolated from the workshops and other spaces
- They are well ventilated so as avoiding accumulation of chemicals in the air
- The ventilation system takes into account the properties of the stored chemicals:
 - ✦ If lighter than the air: exhaust upwards
 - ✦ If heavier than the air: exhaust on the ground level and flue with grid
- The incompatible chemicals are kept apart in accordance with the legislation in order to avoid any contact (chemical reaction, explosion...)



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

10. Management of waste and discharges

Check that:

- The systems for the elimination of waste were studied
 - In size, according to the volumes of waste
 - In type, according to the types of waste
 - In localization, according to the areas where they are generated
- Procedures were written to limit the spreading of dangerous substances in the environment in case of emission or accidental loss
- Measures were taken so that, in the case of fire, the polluted water is collected in adequate basins
- With regard to the atmospheric discharges:
 - The concentrations are acceptable
 - If it is not the case, the gas are filtered
 - The releases are remotely made from sensible areas (street face, dwelling, air intake...)
 - Neighbours and environmental authorities do not complain about emissions or odours



**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

11. Measures in case of accident, incident or emergency

See the Analysis method of the SOBANE strategy for the prevention of the risks of fire and explosion for a more specific Analysis of these aspects

- Check that:
 - It is impossible for incompatible chemicals to come into contact



- The workers are adequately informed of the explosion or fire hazards (including dust)
- Areas with high risk of fire or explosion are well signposted
- Detectors of explosive vapour concentrations are checked regularly by means of explosimeters
- Measures are taken to avoid accumulation of static electricity
- Re-examine the instructions systematically in the case of
 - Emergency (communication, responsibilities, alarms, first-aid organizations, evacuation...)
 - No smoking
 - No work with a flame
 - No engine-driven machines ...
- On the basis of a validated method (for example the Dow Chemical method), evaluate more specifically the hazards of uncontrolled reaction, explosion or fire in the areas where the chemicals are handled or stored.

What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?

12. Training and information

Check that:

- The training given to the workers is adequate, sufficiently detailed and practical concerning:
 - The health risks
 - The explosion and fire hazards, in particular the risk bound to dust
 - The procedures of use of the chemicals
 - The conditions of use of the local exhaust system
 - The prevention measures to be taken
 - The PPE to carry
 - The emergencies: communication, responsibilities, alarms, first-aid organizations, evacuation...
- The frequency at which this training and information are repeated and updated after a change of process is adequate



What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?

13. Medical supervision

Check that the procedures of communication of information exist so that:

- No pregnant woman, as soon her pregnancy is known, is exposed to chemicals carrying the R 40,61,63,45,46,49 and 68 phrases.
- No worker of less than 18 years is exposed to chemicals carrying the R 60 or 62 phrases.
- Workers pass an appropriate and regular medical examination as soon as they work with chemicals
- The workers pass at least the medical examination defined by the legislation for specific chemicals (for example lead)
- The frequency of the medical examinations is determined by the occupational physician based on all the chemicals to which the worker is exposed.



What practical measures can be taken directly to improve the situation?

What needs to be studied more in detail?

14. Measures of prevention specific to certain activities



- The final table of data sheet 42 gives the list of work situations for which specific prevention data sheets were developed internationally

**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

15. Evaluation of the risks current and residual

- On basis of a validated method (EASE...) or by measurements
 - Describe the exposure in the current situation and the situation likely when all prevention - improvement measures considered will have been taken
 - Evaluate for each exposure the order of magnitude of the average concentration
 - Estimate the risks, taking into account, in addition:
 - ✦ The potential contacts with the skin and the eyes
 - ✦ The potential ingestion of the product
- Estimate the probable daily concentration under these exposure conditions

16. Synthesis

- **The risk in the current situation:** evaluate in which of the following categories each work situation fits at the present time:

1. The exposure is much lower than the limiting values
2. The exposure is not known or is close to the limiting values
3. The exposure is doubtless higher than the limiting values



- Take **stock of the prevention - improvement measures considered**
- Specify **who** does **what** and **when**, by set of priorities using from the answers to the questions

**What practical measures can be taken directly to improve the situation?
What needs to be studied more in detail?**

- **Residual risk after prevention:** evaluate in which of the following categories each work situation is likely to fit when the prevention - improvement measures listed above will be really implemented.

1. The exposure is much lower than the limiting values:
 - The risk can then be reasonably excluded
 - ✦ Define the frequency at which the work situation will have to be reevaluated
2. The exposure is not known or is close to the limiting values
 - An **Analysis** of risk and an additional evaluation are necessary
 - Complementary measures of prevention must be found
 - ✦ Define what has to be investigated at level 4, **Expertise** and with what **objectives**

17. Short-term measures

- Procedures to put out of order temporary
 - ✦ Part of the machines, installation, buildings
 - ✦ Specific equipment ...
- Temporary safety instructions before
 - ✦ The construction of a suitable storage area for the dangerous chemicals
 - ✦ The stock reduction
- How?
- For how long?

SOBANE strategy: Dangerous chemicals

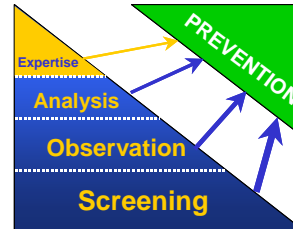
LEVEL 4: EXPERTISE

The purpose of this document is not to describe how the *Expertise* must be led, but

- What it should include
- What one can expect from it

OBJECTIVES

- By special investigations, assessments or measurements, to better characterize the exposure and the risks incurred by the workers
- By a finer analysis of the activities and conditions of exposure, to seek ultimate prevention – improvement measures



WHO?

- This level of the study must be carried out by the people of the company and the OH practitioners with the additional assistance of experts having:
 - Means of measuring and interpretation necessary
 - The technical skill for the search for particular solutions



HOW?

1. Conditions to study in depth:

- Sequence of activities
- Representative work periods
 - ✦ Proof of their representativity
 - ✦ Dates and hours
- Workers concerned
- Homogeneous exposure groups

2. Evaluation:

- Measurement equipment
 - ✦ Characteristics
 - ✦ Calibration
 - ✦ Measurement location
 - ✦ Sampling duration
- Calculation of the average 8-h concentration and/or the short-term concentration
- Interpretation: evaluation of the current risk
- Report of the results and interpretation

3. Specialized study

According to the case

- Calculation of a general ventilation or local exhaust system
- Revision of the industrial process
- Reorganization of the work areas and the operating cycles
- General reorganization of the storage
- ...

4. Evaluation of the residual risk

- After prevention measures have been implemented

5. Medical supervision
