

Givaudan[®]
Leading Sensory Innovation

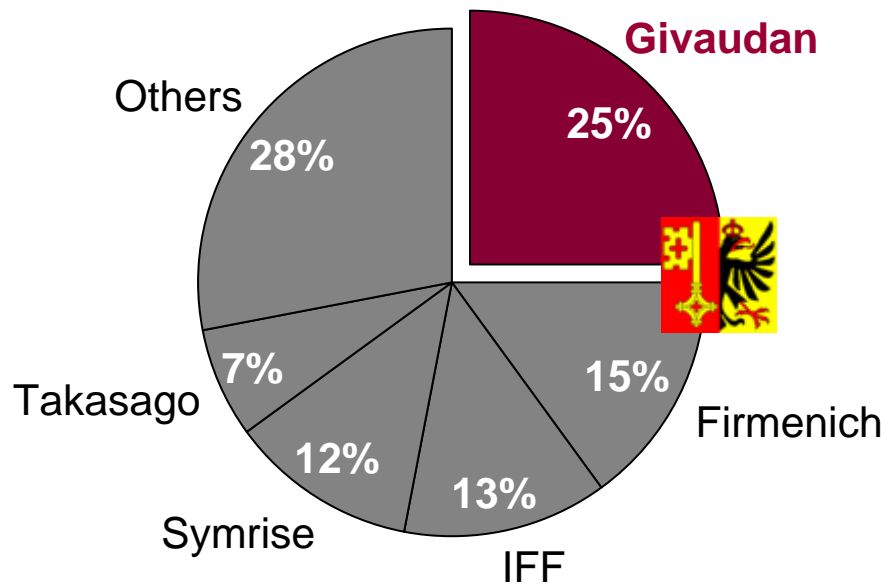


Convention on the Transboundary Effects of Industrial Accidents

November the 26th, 2008

Givaudan leader of the fragrance and flavour market

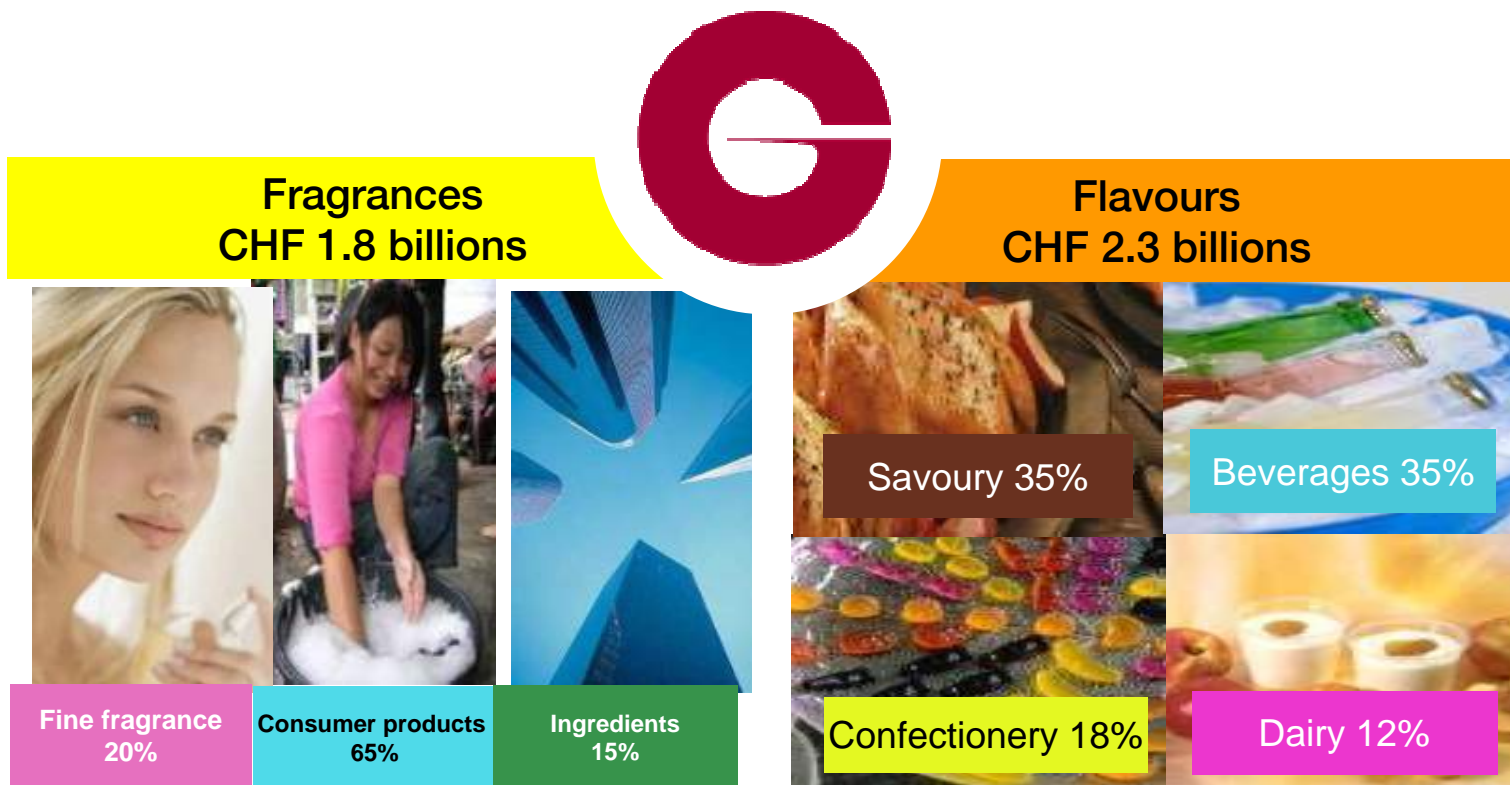
Sales 2007 market share in percent



**Worldwide market
CHF ~17-18 billions**

**Givaudan :
Sales of CHF ~4.2 billions**

Givaudan, leader of the sensory innovation



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Some of our customers



Procter & Gamble



Johnson
A FAMILY COMPANY

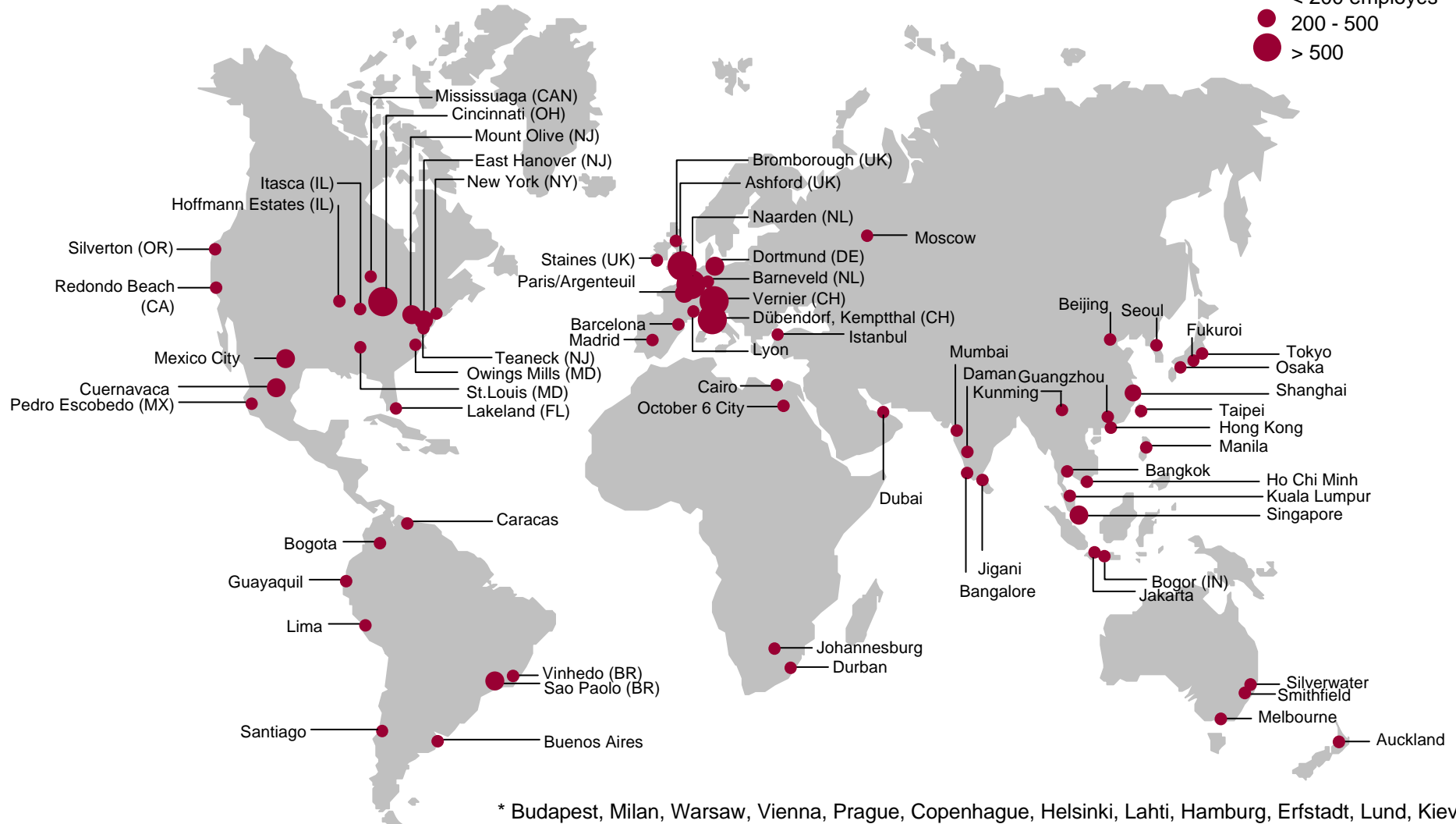


L'ORÉAL

Present all over the world with 9000 people

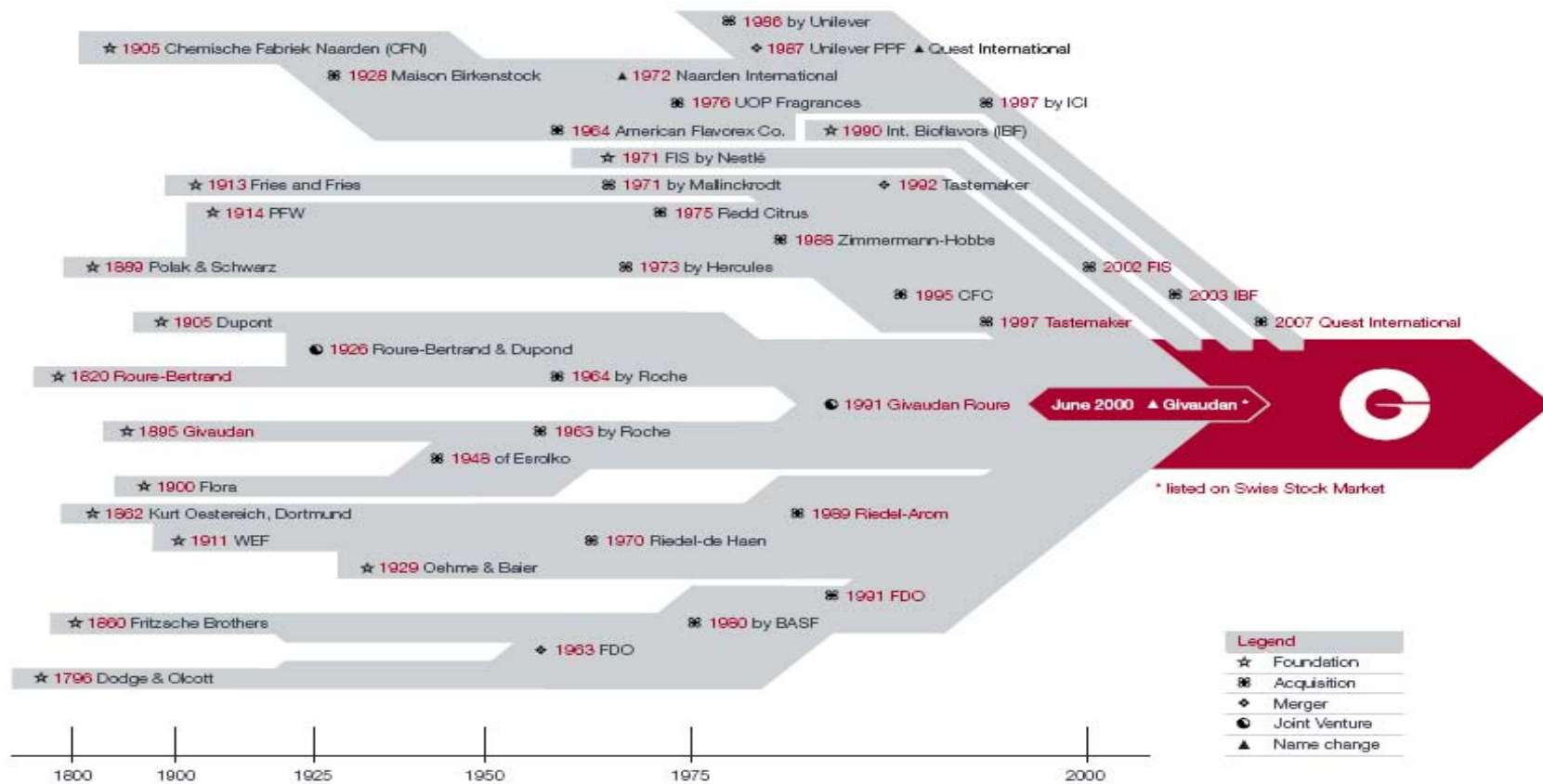


- < 200 employés
- 200 - 500
- > 500



* Budapest, Milan, Warsaw, Vienna, Prague, Copenhagen, Helsinki, Lahti, Hamburg, Erfstadt, Lund, Kiev ne sont pas indiquées

Driving industry consolidation and integrating a rich heritage ...



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Givaudan in Geneva

The Geneva's plant is 110 years old

- Established by Léon Givaudan in 1898
 - 0.62 hectares rent to the city of Geneva

- 110 ans later
 - 22 hectares
 - 70 buildings
 - 850 employees (550 in Operations)
 - 347 union contracts
 - 397 individual contracts
 - 16 apprentices



Xavier Givaudan

Activities on site

- Headquarters
 - CEO
 - CFO
 - Global informatics
 - Legal department
 - Human Resources
 - Communication and investor relationship
 - Global safety and environment
- Production of fragrance compounds
- Production of fragrance ingredients
- Ingredients global marketing
- Global operations for fragrance division



Major accident prevention : what has been done between 1972 and 2000

Complete control of the water effluents

- Construction of a waste water treatment plant adapted to chemical manufacturing :
 - 1st step : chemical treatment (pH, solvent decantation, inorganic salts precipitation) (1972)
 - 2nd step : biological treatment (1982)
- Construction of a large retention basin able to contain the surface water and the water which might be used during fire fighting (4.5 hour retention). It was built after the Schweizerhalle accident

Givaudan is able to face incidents/accidents and reduce their impacts

- A fire brigade specially trained for fire fighting, pollution containing and treating injuries
- Ambulance and 3 trucks also equipped to fight metal fires
- Crisis management
- Excellent contact and coordination with the authorities



Major accident prevention : what has been
done between 2000 and 2007

Study of the impacts of raw material storage

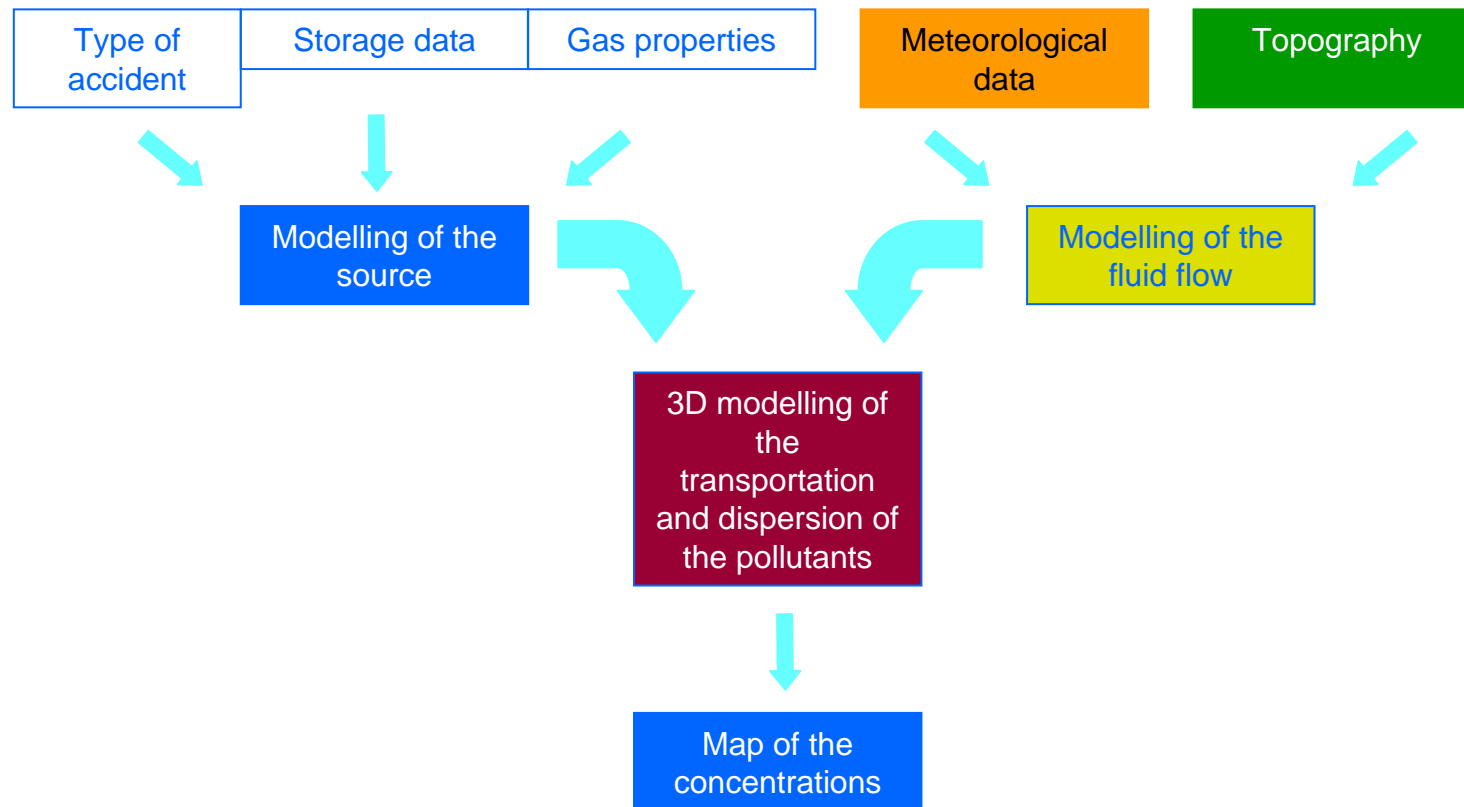
1. Software selection in coordination with the State of Geneva (Mr Susini)
2. Elaboration of 17 scenarios
3. Calculations / modelling
4. Implementation of action plan resulting from the scenario calculations

Software selection

Software implemented : MERCURE from ARIA Technologies,
developped by EDF

- This software is based on a 3D eulerian atmospheric dispersion model
- It takes into account :
 - The dynamic (wind field)
 - The temperature (gradient of temperature)
 - The microphysic of the fluid flow
 - The transportation of the pollutant by the wind
 - The turbulent diffusion of the pollutants
 - The formation of aerosols

Data introduced into the system



Scenarios

- List of the products identified as being stored in large quantities (the threshold quantities are given by the Swiss legislation) :
 - 54 products in 2007

- 17 scenarios chosen according to the following criteria:
 - Product toxicity
 - Flash point
 - Location on site

- Scenarios were discussed and approved by the State of Geneva

Scenarios

Risks :

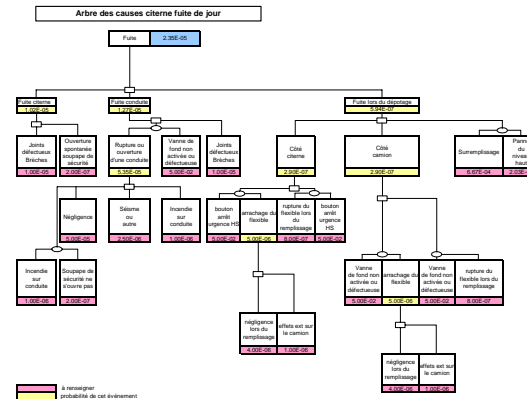
- Drum or tank leak
- Drum or tank explosion

Major accidents :

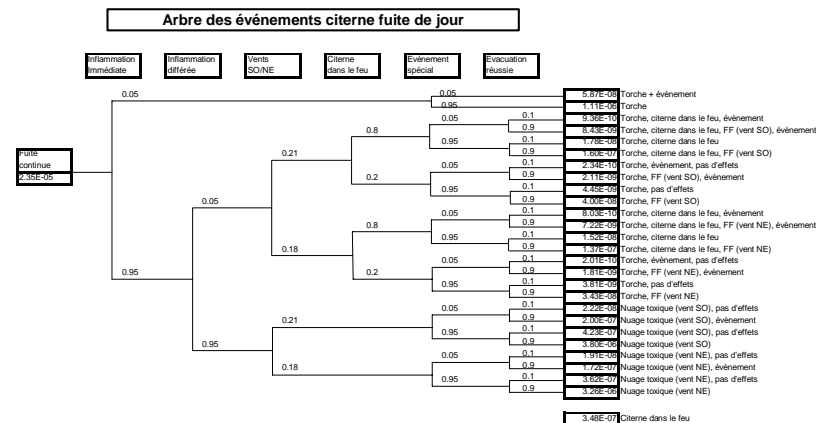
- Toxic product cloud (aerosol)
- Cloud inflammation + combustion products
- Tank explosion due to external events
- BLEVE (Boiling liquid expanding vapor explosion)

Final approach for each product

- Cause tree

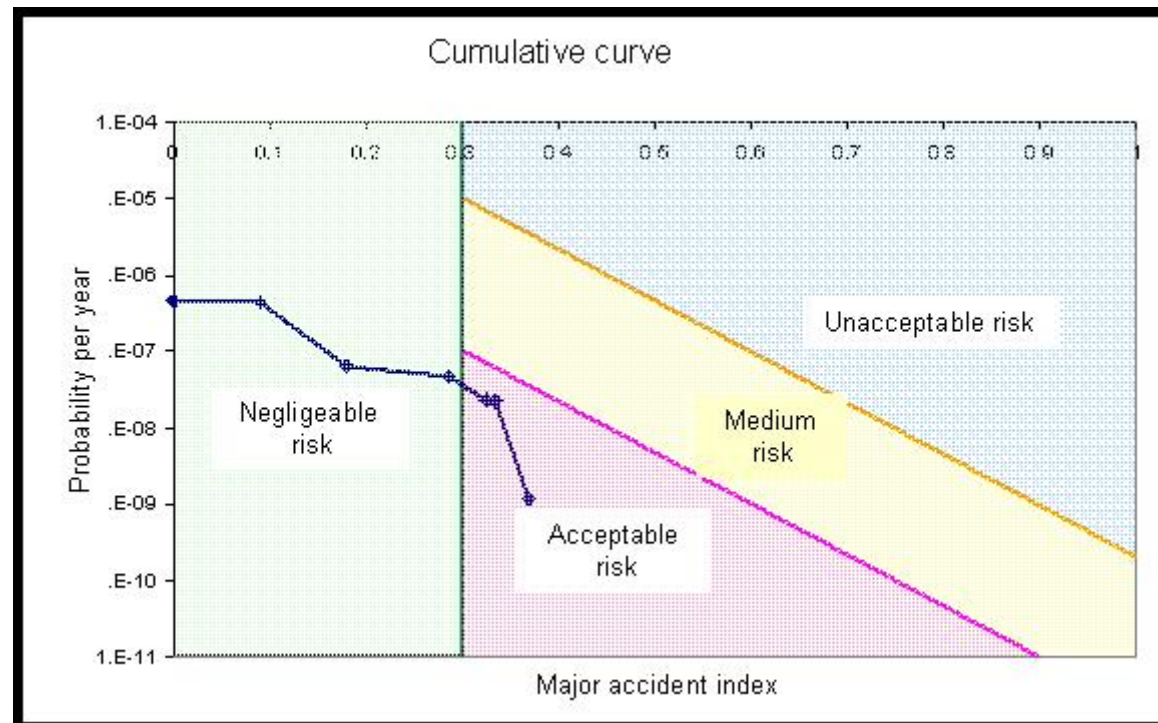


- Failure tree



Final approach for each product

- Calculation with MERCURE
- Evaluation of the number of victims
- **Cumulative curve of criticality :**



Action plan decided after the analysis – some examples (1)

- Doubling of the bottom valve for certain products (Hydrochloric acid for example)
- Reinforcement of risk analysis for the stored products and the chemical processes
- Review of the preventive maintenance frequency of certain equipments
- Use of this analysis inside the crisis management

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Major accident prevention : what is on going
from 2008

New warehouse under 13 % oxygen atmosphere

- This warehouse will hold 80 % of the drums presently distributed all over the plant
- This new technique of reduced oxygen content atmosphere (4th warehouse of this type in Switzerland) prevents or stops fire of any product first tested under 13 %
- This technique also reduces the cost of the warehouse : no sprinkler equipment required

Other actions

- Review all the chemical processes following 2 axes :
 - Detailed study of the thermodynamic conditions with a new hired expert
 - Comprehensive survey of the water cadastre (impact of the different synthesis on the waste water treatment plant)

- Establish a policy for the integration of the Safety integrity levels (SIL) in the design of new equipments

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