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# THE SEVESO DIRECTIVE

**Ike van der Putte**

Source: RPS/EC, DG Environment/ECENA

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## Seveso II Directive - Aim

- **prevention** of major accidents involving dangerous substances
- **limitation of the consequences** of accidents on man and the environment

**high level of protection**
**for man and the environment throughout the European Union**

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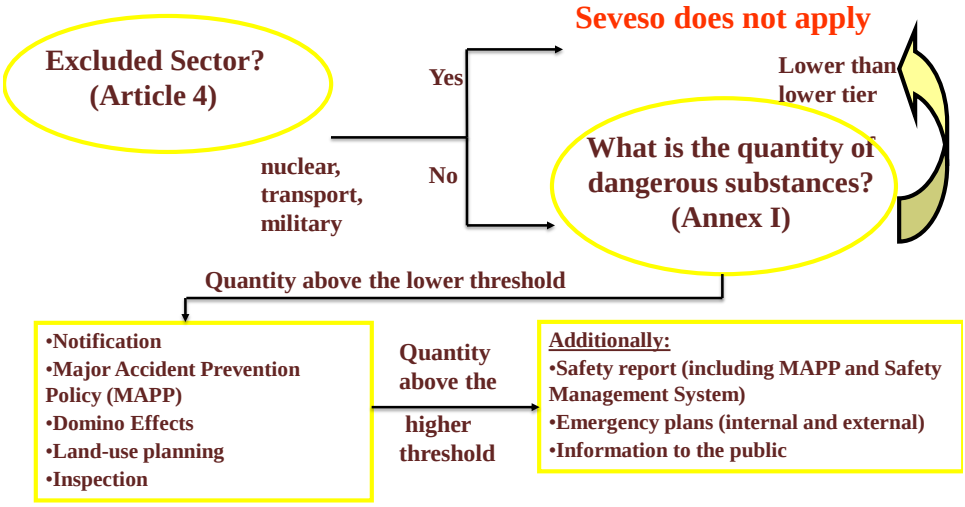
# Seveso Directive – Scope & main obligations








# Seveso Directive – Scope, Methods

- ~ 4000 upper + ~ 4000 lower tier establishments storing dangerous substances -EU
- Mainly chemical and petrochemical industry, storage, big industrial production and energy installations
- Criteria: Hazard: Quantity of dangerous substances present

- .. the Seveso II Directive contains no detailed procedures and guidelines for risk assessment and management.
- A variety of such procedures is currently in use, employing different terminologies and underlying philosophies, making cross-comparison of results difficult.

## Seveso Directive – Control measures aimed at Prevention

**Upper and lower tier:**

- General obligations
- Notification
- Major Accident Prevention Policy
- Domino Effects
- Inspection by Competent Authorities

**For upper tier only:**

- Safety Report
- Safety Management System



## Seveso Directive – Control measures aimed at limitation of the consequences

**Upper and lower tier:**

- General obligations
- Land-Use Planning
- Information to the Public

**For upper tier only:**

- Emergency Planning
- More information to the Public on MAH

# 2015 – Seveso III

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As a result of the review process, on 21 December 2010 the Commission adopted a proposal for a new Directive, replacing the current SEVESO II Directive by 1 June 2015.

- to align Annex I to the Directive to changes to the EU system of classification of dangerous substances (CLP)
- to include corrective mechanisms to adapt Annex I in the future
- to strengthen the provisions relating to public access to safety information, participation in decision-making and access to justice,
- to introduce stricter standards for inspections of installations to ensure the effective implementation and enforcement of safety rules.
- Stricter Landuse planning requirements



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# CORRELATION WITH OTHER EU LEGISLATION

- CLP Directives
  - Definition of Hazardous Substances & Preparations
- REACH
  - Chemical Safety reports
  - New Studies on Chemicals – New Classification possible
- GHS
  - New Classification Rules – Downstream Effect
- Labour safety
  - Complementary to each other

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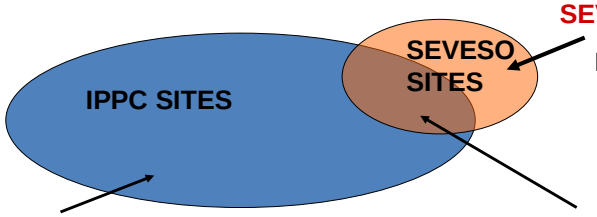
## CORRELATION WITH OTHER EU LEGISLATION

### IPPC Directive - Different scope




**SEVESO SITES ONLY**

**Major Accidents**

**IPPC SITES ONLY**

**Minor and Major Accidents**

**IPPC/SEVESO SITES**

**Minor Accidents/Spills IPPC**

**Major Accidents Seveso**

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CORRELATION WITH OTHER EU LEGISLATION

**IPPC Directive**

- **Synergies**
  - Use of management systems
  - Use of less hazardous materials at the site
  - Reduction in the volume of hazardous material stored at the site
- **Differences**
  - **Seveso** - protection of human health and environment from the negative effects of major accidents through prevention of major accidents using SMS
  - **IPPC** - protecting environment and human health on a long term basis by preventing and minimising pollution through use of BAT and EMS
- **Potential Conflicts**
  - Safety over Environment ?
  - Siting of establishments
  - Technical measures

**REACH/CLP** → **IPPC/SEVESO ?**

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REFERENCES

**1. Chemical Accidents (Seveso I, II and III) - Prevention, Preparedness and Response**
http://ec.europa.eu/environment/seveso/

2. **I.van der Putte. RENA- Working Group 4- ECENA**
http://www.renanetwork.org

3. Report on the Application in the Member States of Directive 96/82/EC on the control of major-accident hazards involving dangerous substances for the period 2009-2011 .Final REPORT FROM THE COMMISSION
Brussels, 28.6.2013 C(2013) 4035



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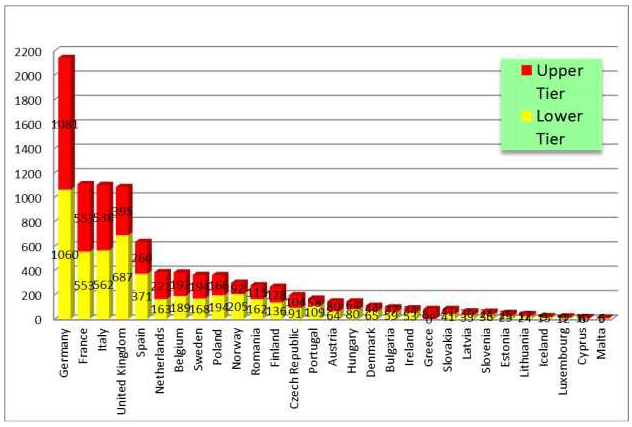
## *To whom does SEVESO apply*

# SEVESO Examples Tier approach

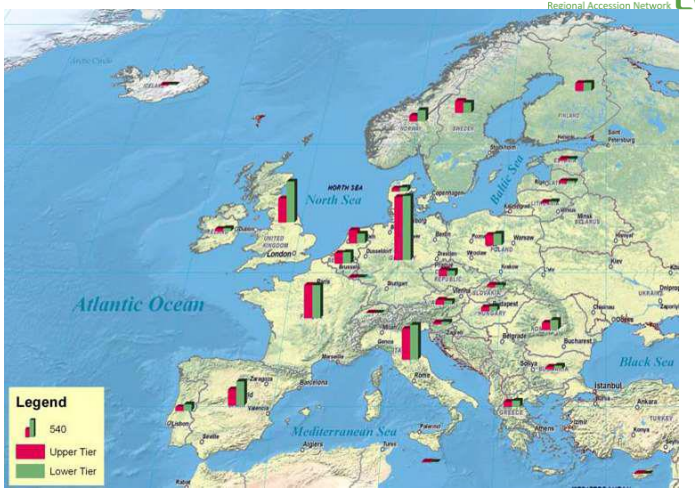
- Two Tier approach is used
- Maximum quantities of dangerous substances (existing or anticipated) are considered
- Compared against threshhold quantities








**Upper tier and lower tier establishments per country in ranked order (Source: EC-JRC-MAHB 2012)**




**Mapped illustration of upper and lower tier Seveso establishments per country (EU and EEA) order (Source: EC-JRC-MAHB, 2012)**



## PRELIMINARY LIST OF SEVESO PLANTS SERBIA

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*In total approx. 105 installations*

**Lower tier plants: 59 installations**

**Upper tier plants: 46 installations**

**Accident prevention policy Notification**

**Safety report Accidents protection plan**

Ref. Ljiljana Stanojevic 2012

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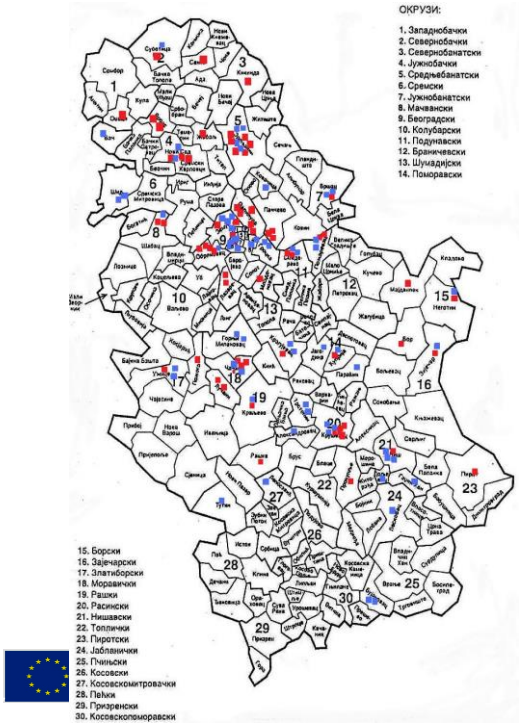


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# *Seveso plants in Republic of Serbia*

Upper tier installations

Lower tier installations

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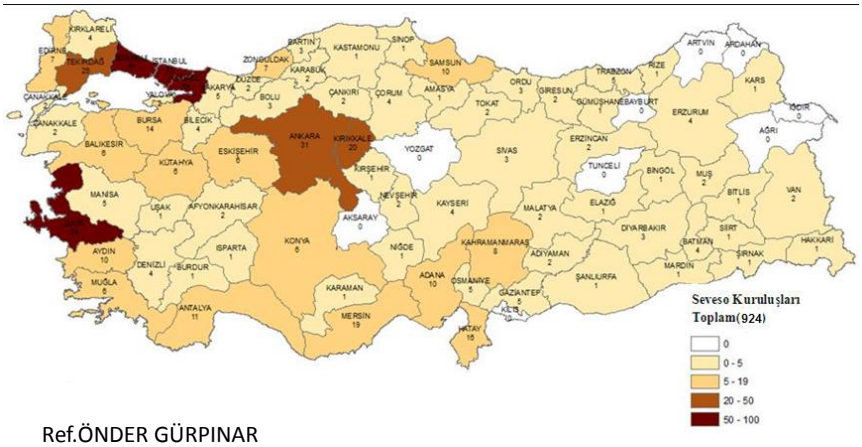
T.C.
ÇEVRE VE ŞEHİRCİLİK
BAKANLIĞI

## GEOGRAPHICAL DISTRIBUTION OF SEVESO ESTABLISHMENTS

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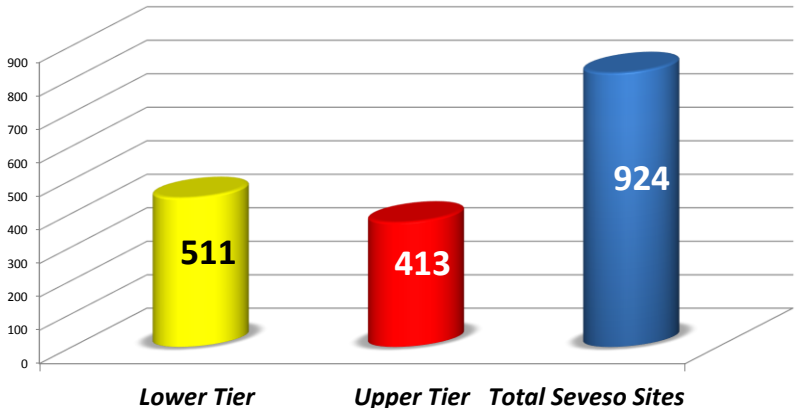
T.C. ÇEVRE VE ŞEHİRCİLİK BAKANLIĞI

## SEVESO ESTABLISHMENTS IN TURKEY

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# Two Tier Approach

- Consequences for Establishment:
- Quantities below lower tier have no obligations
- Quantities above lower tier must be reported to Local Authorities
- Quantities above upper tier have full obligations

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## (What Are Full Obligations?)

- Establishment has to prepare:
- Safety Management System
- Safety report for the Establishment
- Internal Emergency Plan
- Local authorities update external emergency plan
- Involving the public



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## Threshold Quantities

- Given in SEVESO III Annex 1 for two categories of dangerous substances:
  - Generally Classified Substances (part 1)
  - Named Substances (part 2)

## Generic Category of Substances (Part 1):

SEVESO II
Toxic
Very Toxic
Oxidising
Explosive
Flammable
Highly Flammable
Extremely Flammable
Dangerous for the Environment
Other

SEVESO III
**Health Hazards H** 1, 2, 3
**Physical Hazards, P**
- Explosives 1a, 1b
- Flammable gases, 2 cat 1 and 2
- Flammable aerosols, 3a, 3b
- Oxidising gases, 4
- Flammable liquids, 5b, 5c
- Selfreactive & mixt & peroxides, 6a, 6b
- Pyrophoric liquids, 7, cat
- Oxidising liquids and solids

**Environmental Hazards E**, E1, E2
Other





## List of "Named" Substances (Part 2), e.g.

Bromine
Chlorine
Hydrogen
Methanol
Automotive Petrol and Other Petroleum
Spirits

# Named Substances

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- Examples from Annex 1, Part 2:

| Dangerous Substances [CAS Number] | Lower Tier (t) | Upper Tier (t) |
|---|---|---|
| Ammonium Nitrate [6484-52-2] | 350 | 2500 |
| Chlorine [7782-50-5] | 10 | 25 |
| Hydrogen [1333-74-0] | 5 | 50 |
| Liquefied High Flammable Gases (Incl. LPG) and Methane | 50 | 200 |
| Polychlorodibenzofurans and Polychlorodibenzodioxins | | 0.001 |



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**Generic Classification is based on**:

In SEVESO II

•Classification, Packaging and Labelling of Dangerous Substances and Preparations (67/548/EEC)

•Use $LD_{50}$ or $LC_{50}$ values if available, e.g. very toxic if $LD_{50}$ orally in rats is <25 mg/kg

•Use 'R' phrases if available, e.g. risk phrase R11 indicates a highly flammable liquid

In December 2008 the European Parliament and the Council adopted a new Regulation on classification, labeling and packaging of substances and mixtures (CLP - Regulation (EC) No 1272/2008) to align existing EU legislation with the GHS.

In SEVESO III (2015) adaptations were required in classifications (Annex I)

# Generally Classified Substances

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- Examples from SEVESO III Annex 1, Part 1:

| Group of Dangerous Substances | | Lower Tier (t) | Upper Tier (t) |
|---|---|---|---|
| 1. | VERY TOXIC (SEVESO III – H1) | 5 | 20 |
| 2. | TOXIC (SEVESO III – H2, H3) | 50 | 200 |
| 3. | OXIDIZING (SEVESO III – P8) | 50 | 200 |



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# Rule On Addition

- Formula:

$$\sum_i \frac{q_i}{Q} > 1$$

**Triggering criteria regarding**

**Lower or Upper Tier**

$q_i$ - the quantity of dangerous substances *i*

*Q - the relevant threshold quantity to be applied for all dangerous substances*

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# Rules In Annex 1

- Mixtures and Preparations → as Pure Substances (Properties)
- Ignore $q_i/Q < 0.02$
- Add separately $q_i/Q$ for Toxic (H= health hazards), Flammable/Explosive/Oxidising (P = Physical Hazards) and Environmental Hazardous Substances (E = Environmental Hazards)
- In the case of dangerous substances with properties giving rise to more than one classification, the lowest qualifying quantities shall apply.



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# Example 1

| •Name | •Amount •(q) | •Low •Tier (Q) | | •Upper Tier •(Q) | |
|---|---|---|---|---|---|
| | •tons | •tons | •q/Q | •tons | •q/Q |
| • Hydrogen | •10 | •5 | | •50 | |
| • Propane | •20 | •50 | | •200 | |
| • Methanol | •50 | •500 | | •5000 | |
| • Sum: | •80 | •- | > 1? | •- | •> 1? |

Lower Tier !

Upper Tier !

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# EXAMPLE 2

| | Chemical | Classification | Quantity On Site (tonne) | Thresholds (tonne) Lower Tier | Thresholds (tonne) Upper Tier |
|---|---|---|---|---|---|
| A | Ethylene Oxide | Named substance, Toxic and Extremely Flammable | 3 | 5 | 50 |
| B | Methanol | Named substance, Toxic and Highly Flammable | 400 | 500 | 5000 |
| C | Misc. Flammable Liquids | Flammable | 3500 | 5000 | 50000 |
| D | LPG | Named Substance, Extremely Flammable | 10 | 50 | 200 |
| E | Misc. Substances | Extremely Flammable | 1 | 10 | 50 |
| F | Misc. Toxic Substance | Toxic | 5 | 50 | 200 |
| G | Aqueous Waste Stream | R50, Dangerous for the Environment (E2) | 15 | 200 | 500 |
| H | Di-tert-butyl peroxide | Highly Flammable and Oxidising | 20 | 5000 and 50 | 50000 and 200 |



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# EXAMPLE 3

| | Chemical | Classification | Quantity On Site (tonne) | Thresholds (tonne) Lower Tier | Thresholds (tonne) Upper Tier |
|---|---|---|---|---|---|
| A | Ethylene Oxide | Named substance, Toxic and Extremely Flammable | 3 | 5 | 50 |
| B | Methanol | Named substance, Toxic and Highly Flammable | 400 | 500 | 5000 |
| C | Misc. Flammable Liquids | Flammable | 3500 | 5000 | 50000 |
| D | LPG | Named Substance, Extremely Flammable | 10 | 50 | 200 |
| E | Misc. Substances | Extremely Flammable | 1 | 10 | 50 |
| F | Misc. Toxic Substance | Toxic | 5 | 50 | 200 |
| G | Aqueous Waste Stream | R50, Dangerous for the Environment (E2) | 15 | 200 | 500 |
| H | Di-tert-butyl peroxide | Highly Flammable and Oxidising | 20 | 5000 and 50 | 50000 and 200 |
| I | Calcium Carbide Casno:75-20-7 | ?? | 600 | ?? | ?? |

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Typical Oil Terminal

Storage capacity:

- Kerosine 2000 tonnes (flammable)
- Petrol 3500 tonnes (named substance)
- Diesel 1600 tonnes (not classified)
- Heavy Fuel Oil - 5000 tonnes (not classified)

This is a Seveso lower tier site



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Typical Pharmaceutical/ Chemical Company

Storage Capacity

- Flammable chemicals - 20000 tonne
- Benzene - 100 tonnes (toxic)
- Acetonitrile - 150 tonnes (toxic and flammable)
- Hydrochloric acid - 100 tonnes (not classified)
- Sodium hydroxide - 150 tonnes (not classified)

This is a Seveso top tier site

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**EXAMPLE 4 – WHAT ARE THE REQUIRED PROTECTION MEASURES FOR RESIDENTS IN CASE OF AN INCIDENT (RELEASE OF LPG)**

*Vertical LPG Storage Vessels (250m³)*

*Railway Car unloading Station*

*View of Site from Top of Vertical Storage Vessels*

*Cylinder Filling Station*

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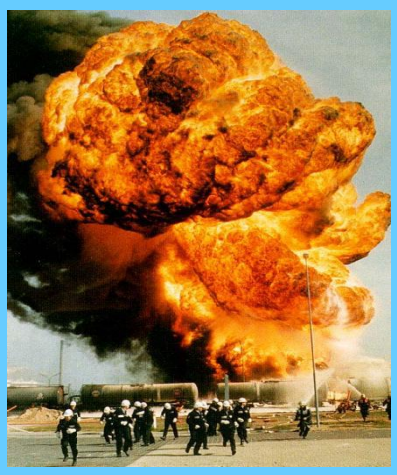
## BLEVE (Boiling Liquid Expanding Vapour Explosion)



## Vapor cloud explosion

Photos taken from article of
Universiti Teknologi Malaysia
Dr. Arshad Ahmad

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