Dr. STHAMER HAMBURG

Sustainability and High Performance – the Challange for new fire fighting foam generations

8th International Conference for Fire Brigades in the High Hazard Industry - Nov 2015

Dr. Rosvita Milo-Rieks

Fire fihghting

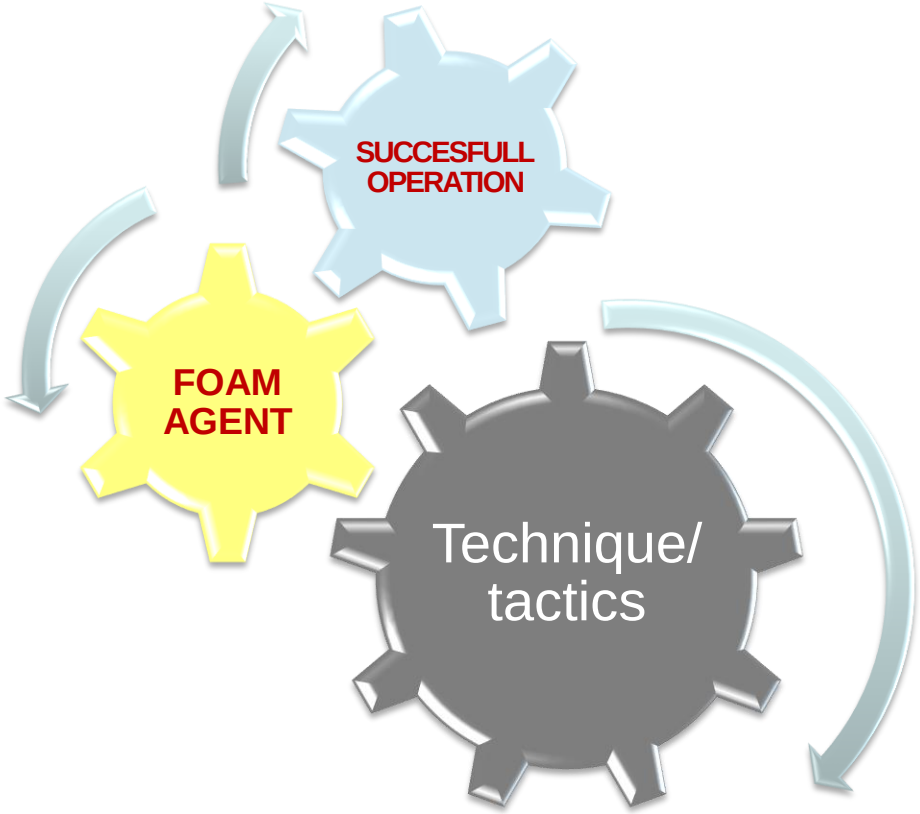
in the

High Hazard Industry

Firefighting operation
- a complex interaction-

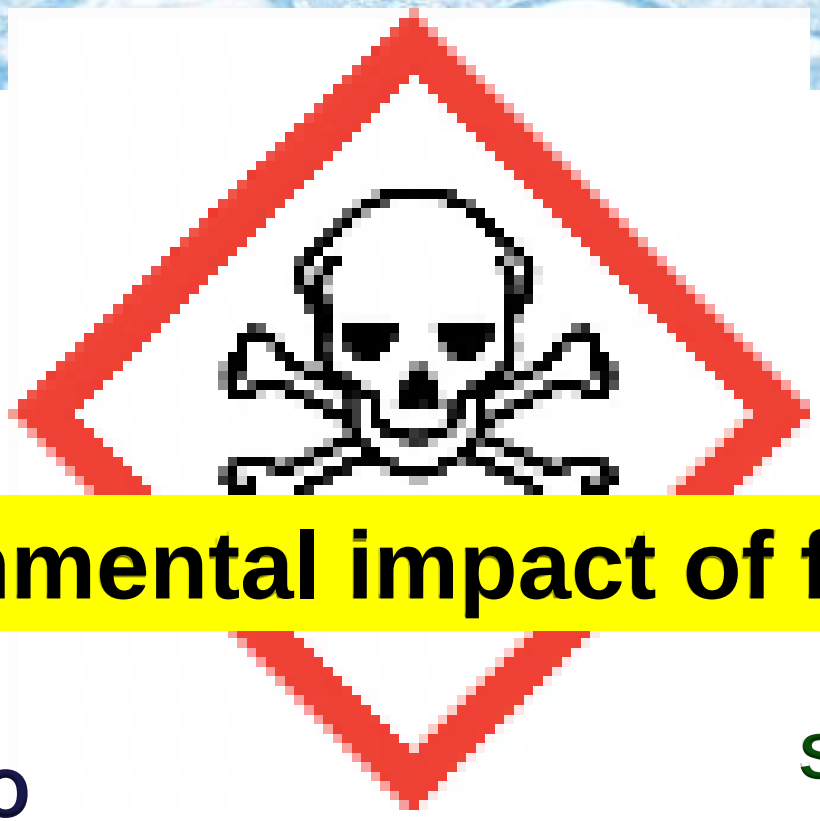
- combustible material
- fire surface and depth
- available equipment
- required specifications
- environmental health

SAFETY



PFOS

PFOA



Environmental impact of foam agent?!

Earthworm

PFOS worldwide

AFFF/AR

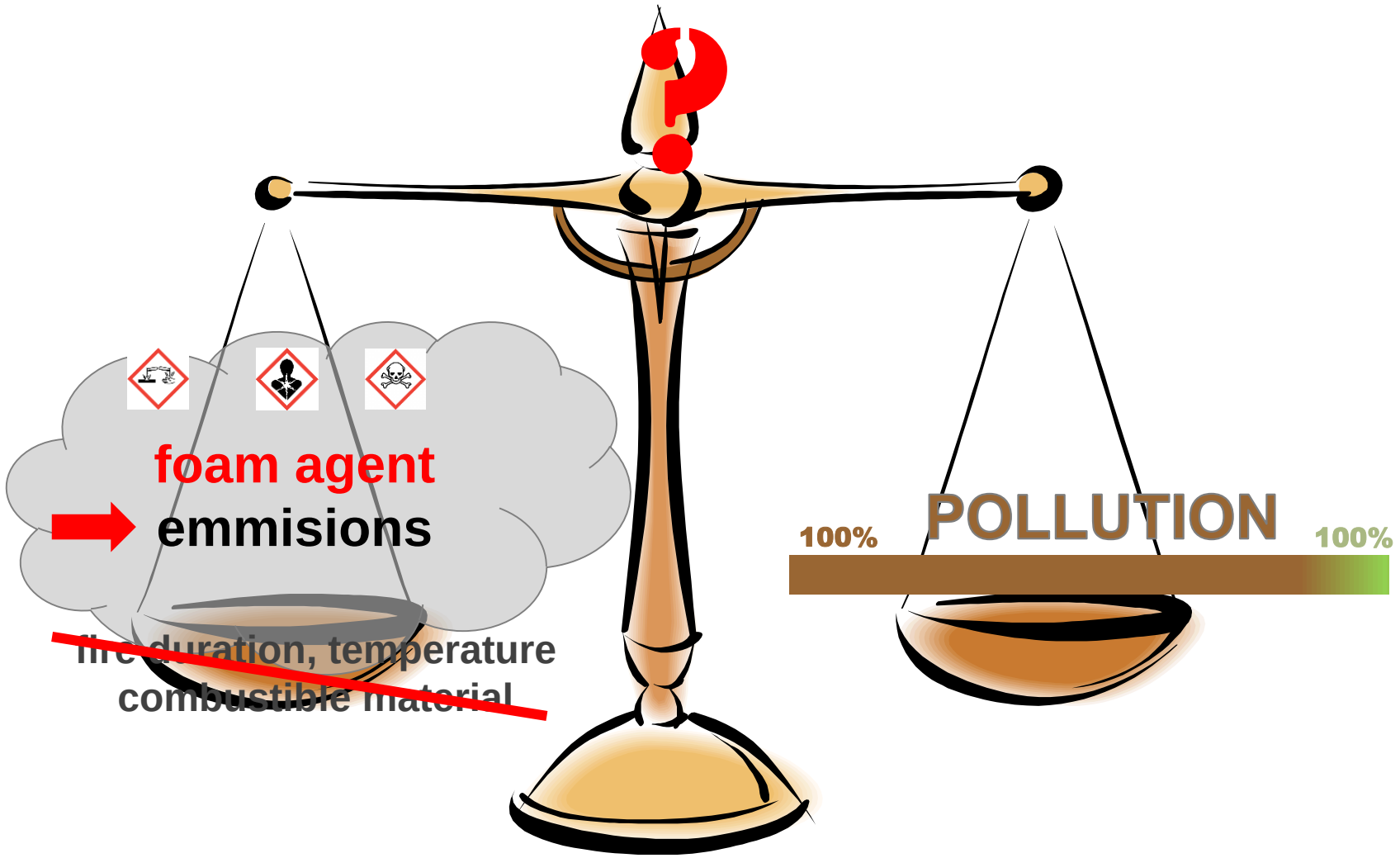
Non biodegradable!!!

Sustainability?!

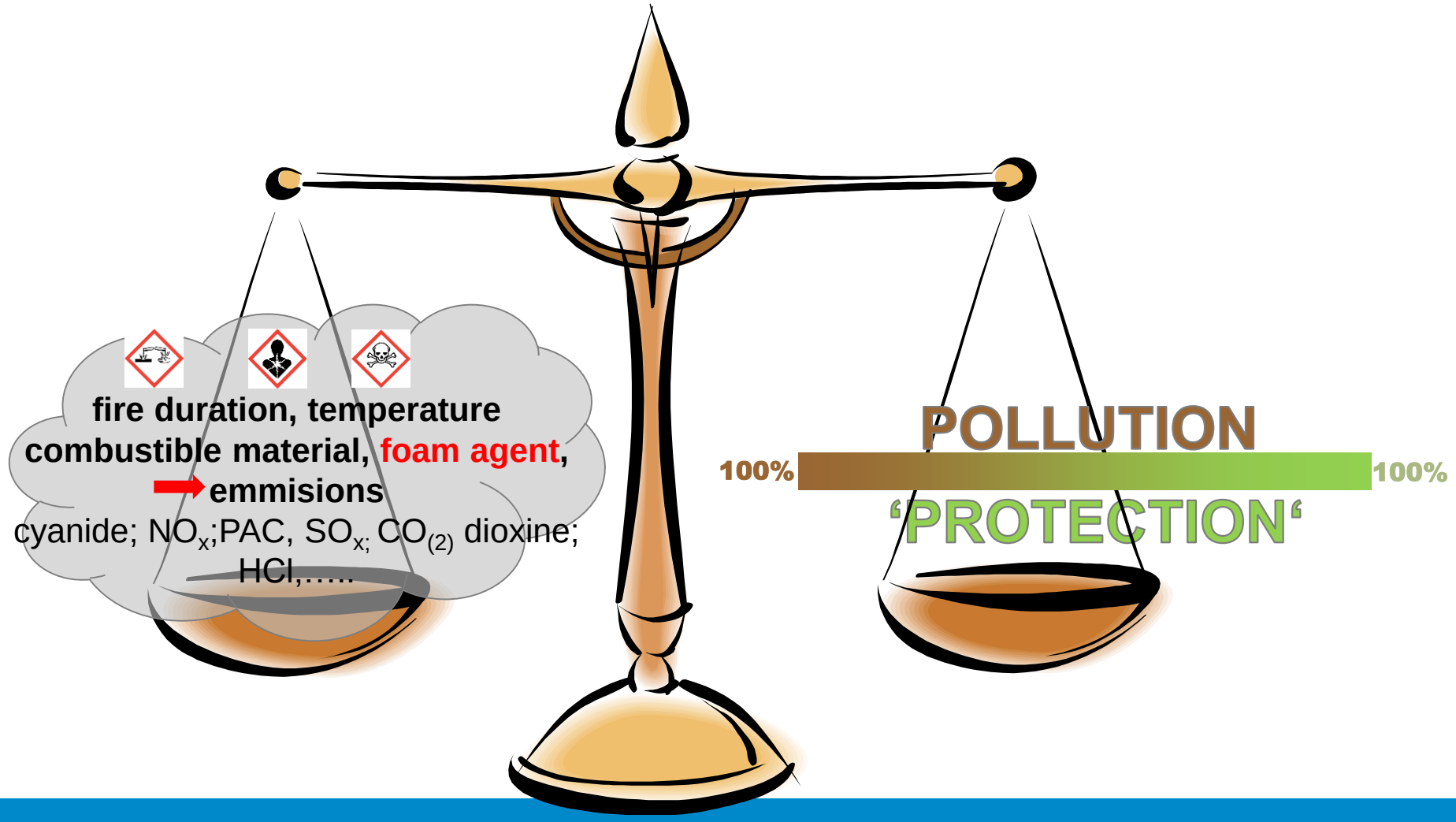
PFOS/PFOA ≠ PFC?!

POP Convention

Environmental impact – foam agent ?



Environmental fire-emmision balance



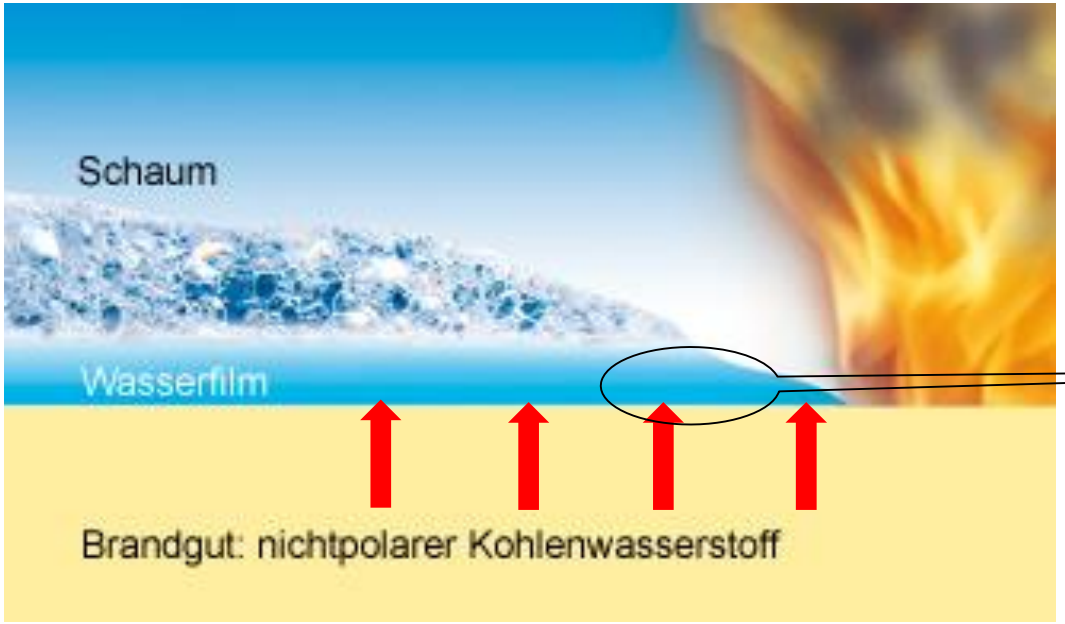
What are the differnces between foaming agents?

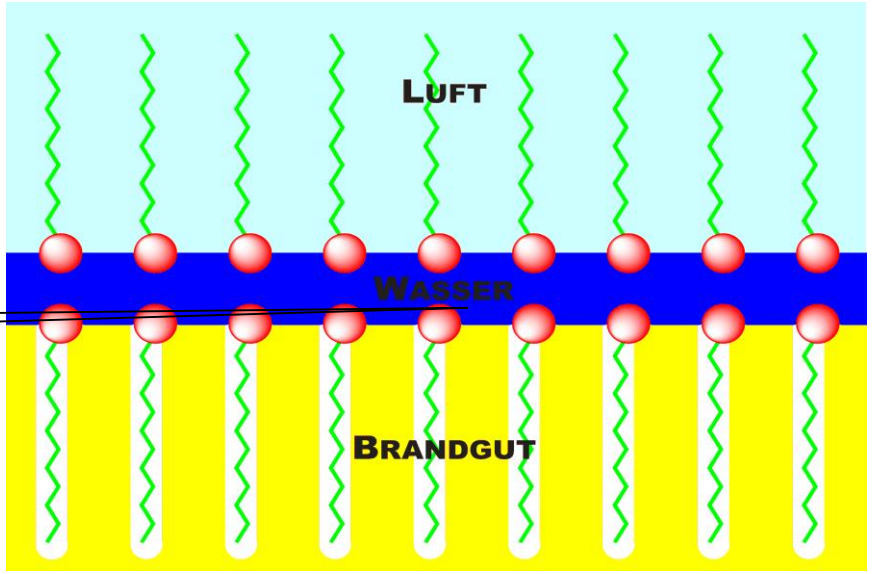
Product overview

Product	film formation	fluorine	viscosity
Synthetic foam/ Class A	no	no	N
AFFF	yes	yes	N
AFFF/AR	yes	yes	P
FF (fluorine-free) /AR	no	no	mostly P
Protein	no	no	N
Fluorprotein/FFFP	yes	yes	N

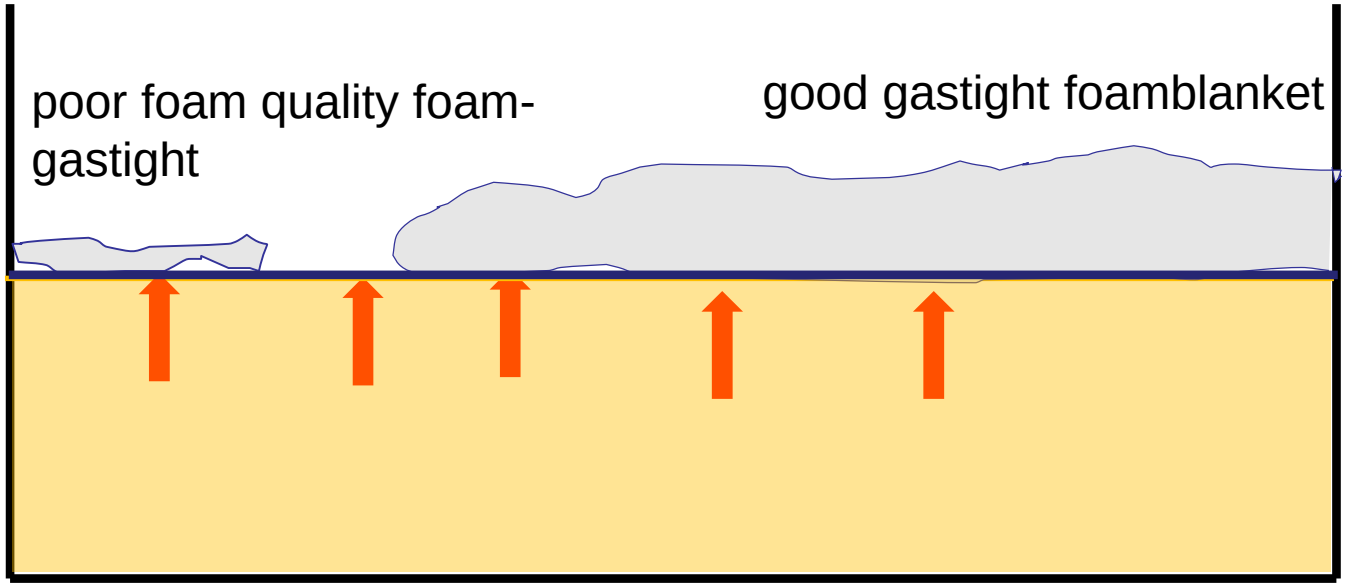
N: newtonian, P: pseudoplastic

The aqueous film formation - the tiny difference



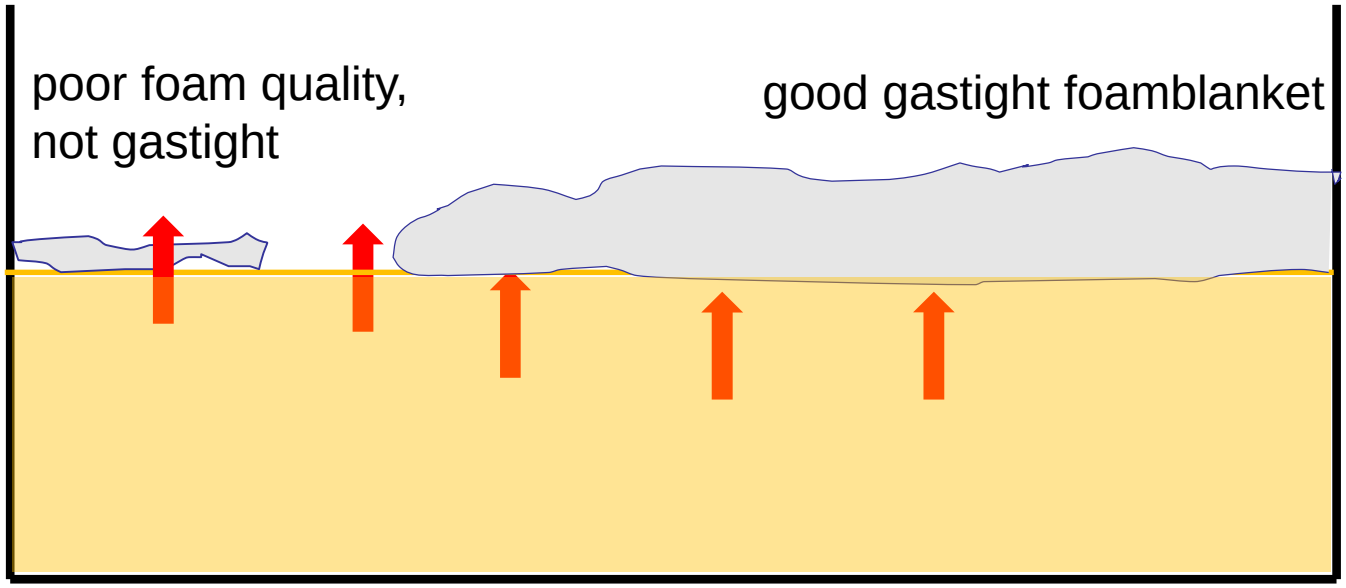


AFFF-/AR film forming foams



Poor foam quality - good extinguishing and burnback resistance

Fluorine free, non film forming, foams



poor foam quality/no foam

!!!no extinguishing - no burnback resistance!!!

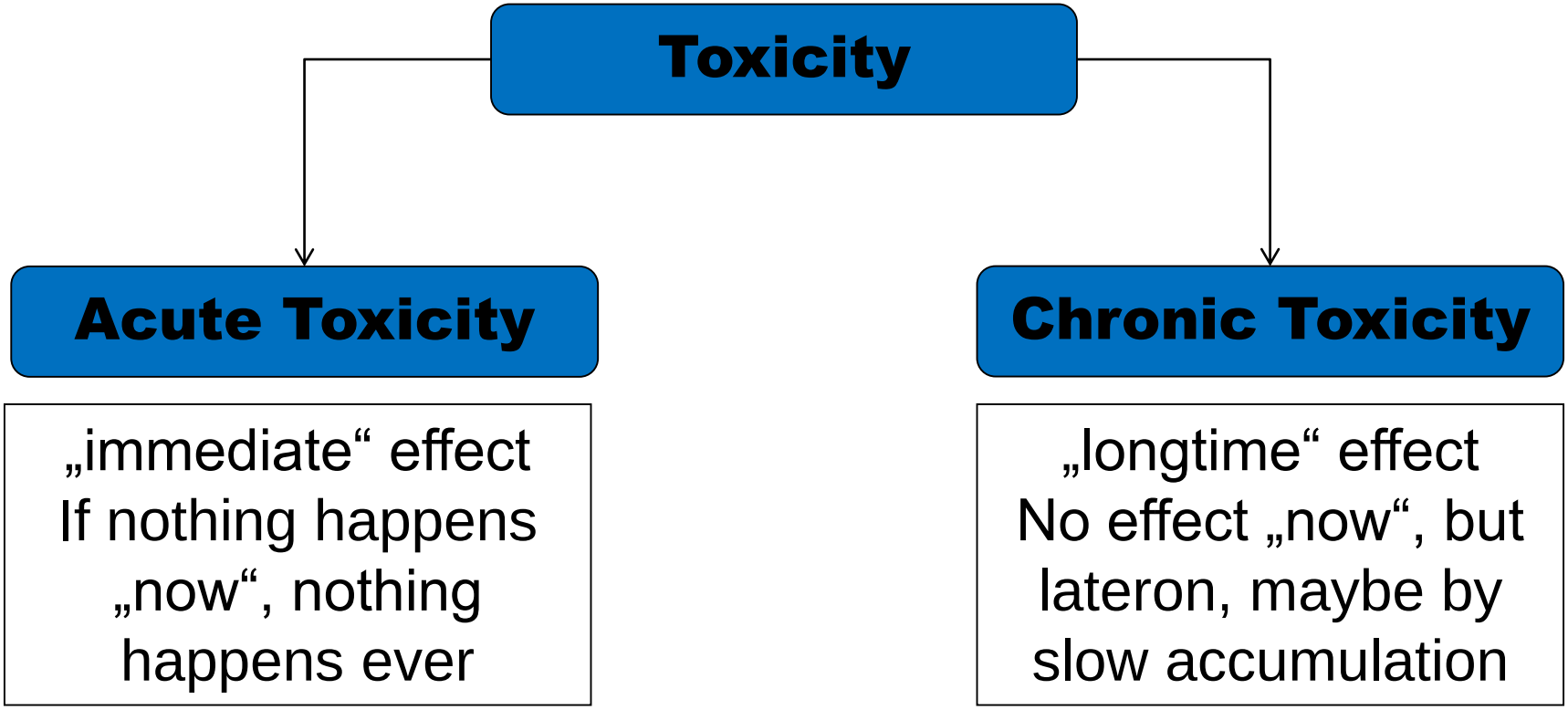

TANK FIRE FIGHTING TEST
26. APRIL 2005
HUNGARY

Comparison application – AFFF vs fluorinefree

Product	AFFF/-AR	Fluorinefree
Foam- application - non polar (small)	possible	„possible“
Poor/non foaming direct application	possible	not possible
EN 1568 (foam applcation) Heptane - 4,5 m^2	IA possible	I possible
Last fire - semi aspirating	Good results	?!
Experiences tank fire fighting	Good results	?!
300 m^2 Kerosine **-** gentle application	Good results	Good results

Environmental impact of foam agents

To describe the environmental impact of fire fighting foams, two different toxicities must be taken into account:



Effectiveness ⟷ Persistence of PFC*

- ✓ **C-F-bond is the strongest carbon-bond known** and of very high thermal and chemical stability. Therefore the food industry is using this material e.g. for coating of packaging materials and pans in increasing extent. Also in the medicine this substance class is used.

Very useful for Fire Fighting Foams

- ✓ **hydrophobic and oleophobic property:** coating of packaging materials, textiles and other surfaces, low emulsifying properties

Very useful for Fire Fighting Foams

* PFC = **P**oly- and per**f**luorinated **C**hemicals, all fluorine containing chemicals including fluorosurfactants

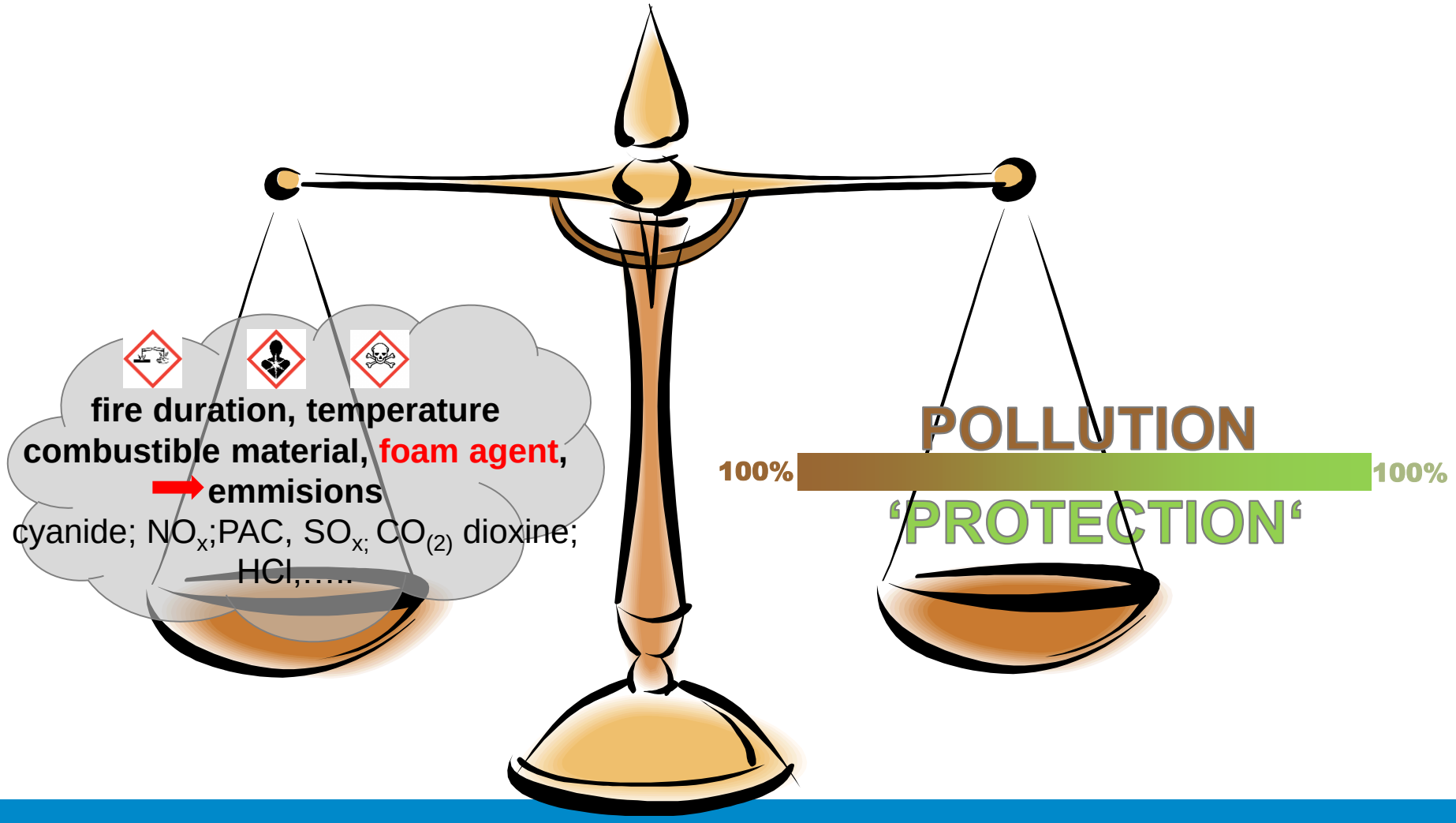
Effectiveness ⟷ Persistence of PFC

- ✓ **PFC´s are not biodegradable, resulting in an enrichment in the environment**
- ✓ **PFC´s are man-made and not natural compounds**
- ✓ **PFOS/PFOA are PBT-chemicals**

Average environmental values of products from Dr. STHAMER:

	Optimum	Class A	AFFF
Extinguishing performance	I	III	I
Degradability	100%	93%	92%
Bacteria toxicity	High	160	10.000
Algae toxicity	High	160	750
Daphnia toxicity	High	130	2.100
Fish toxicity	High	600	2.000
COD (mg O_2/l)	Low	1.200.000	560.000
BOD_5 (mg O_2/l)	Low	680.000	340.000
BOD_5/COD	High	57%	60%
Not bio-degradable ingredient	no	no	yes

At the end – make the total environmental account!



Thank you for your patiance!