

IFIW 2013

Croatia, Šapjane, 22. & 23. May

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Fire gases - Risk of long term exposure on firefighter's health

Nikola Tramontana
Primorsko-goranska County Fire Dep.

Šapjane, 24. 04. 2012.
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Fires during 20th century - Common behavior of firefighters

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- Offensive attack,
- BA sometimes available but rarely used,
- Protective clothing (leather, woolen cloth - scarf)
- Aluminium helmet,
- Single-layer leather gloves,
- Clearing of fire lasted for hours (without protective equipment)



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Grant M. Haller / P-I
 Dave Jacobs, 57, checks on beeping machinery next to his bed at Group Health in Bellevue while receiving chemotherapy for the cancer he has in his esophagus.

Cancer takes heavy toll on Seattle firefighters

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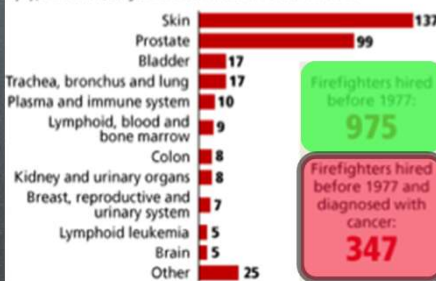
- More than 1/3 of Seattlea firefighters hired before 1977 have developed cancer.

FIGHTING FIRE, THEN CANCER

More than a third of Seattle firefighters hired before 1977 have developed cancer. Under Washington law seven forms of cancer are assumed to be job related when they are diagnosed in a firefighter, but Seattle firefighters say the city isn't doing enough to help screen them for health risks.

Breakdown of firefighters hired before 1977 with cancer

By type of cancer, diagnosed between Jan. 2005 and June 2008



Source: Blue Cross and the Seattle Firefighters Pension Board SEATTLE P-I

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The modern fireground
is one of the
deadliest environments
in the world.

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QuickTime™ and a
YUV420 codec decompressor
are needed to see this picture.

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It is a combination of
forces and factors
that can kill,
cripple, or maim in a
matter of seconds.

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QuickTime™ and a
YUV420 codec decompressor
are needed to see this picture.

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What is the smoke?

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- The smoke the combustion products consist of solid and liquid particulates and gases.

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- The smoke is the result of incomplete combustion and pyrolysis of combustible substances in the fire.

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Combustion products

- Health risks associated with exposure to smoke inhalation and toxic substances released by combustion in a fire are evident.
- Smoke is generally "cocktail" of different substances and gases and it changes depending on the temperature of the burning material and burning.

QuickTime™ and a
AVC Coding decompressor
are needed to see this picture.

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- This is an example of the rapid effects of smoke on the exposed persons

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Even journalists are not
immune

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QuickTime™ and a decompressor are needed to see this picture.

- Smoke from burning combustible material is toxic and contains dangerous levels Hydrogen Cyanide (HCN) and carbon monoxide (CO).

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Carcinogenic substances in smoke

Asbestos

- There is still present in many buildings

Arsenic

By the end of 2004. used in the wood processing industry

Formaldehyde

Combustion products, disinfectants, cleaning agents
It is found in the exhaust of

Benzene

diesel vehicles in the production of paints, plastics,

Cyanide

detergents
Hydrogen cyanide is a product of combustion of plastics

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Croatian dailies - Several titles

Buknuli su odloženi drveni željeznički pragovi koji su inače vrlo zapaljivi, a požar je zaprijetio i okolnim kućama u Kistanjama, tvorničkoj zgradi i drugome. Požar se brzo širi zbog bure koja puše.

Veliki požar izbio je nešto prije 12 sati u Kistanjama, nedaleko od tamošnje željezničke postaje.

Buknuli su odloženi drveni željeznički pragovi koji su inače vrlo zapaljivi, a požar je zaprijetio i okolnim kućama u Kistanja, tvorničkoj zgradi i drugome.

Kako se doznaje od oklajskih dobrovoljnih vatrogasaca, požar se u početku činio bezazlenim, no ubrzo se proširio pomognut jakim burom.

FOTOGALERIJA

Gore željeznički pragovi

U pomoć su pozvani vatrogasci iz zapadnog dijela Šibensko-kninske županije te kanaderi s brojnim vozilima.

Vatrogasci su se posebno pribojavali kako se ne bi zapalile određene štetne tvari koje bi se mogle nalaziti odložene u blizini željezničke postaje i spomenute tvornice.

Agencija Vim | Danas.hr
02.07.2011.



Ž.H.(CROPIX)

The fire near the train station -
railway sleepers.

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Agencija Vim | Danas.hr
02.07.2011.

Firefighters were particularly feared
that the fire did not spread to certain
harmful substances nearby the train
station and a nearby factory!!!

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A scene from Rijeka



Seabral (Željeznice.net)

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...kada, kao specifično sredstvo protivostojanja koji se koristi kao dio gita u razvijenoj javi za postroje kultura.

ali ne piše da li će taj isti otpad stići u krug tvornica nakon što je prošao proces sanacije od kancerogenih premaza ili će isti biti saniran spaljivanjem što bi bilo pogubno za zdravlje stanovnika šire okolice, a ne samo zakonom zaštićene ekološke mreže: Jadro, Kozjak, Mosor, Trogirska zagora.

*"Sjećajući postrojenja za prihvata, pripremamo skladištenje i liječenje drvenog otpada provrstno je predviđen na otvorenom prostora u tvorničkom dvorištu, broj k.č. 1990/1 k.o. Kralj Salunac, a u samom Tvornice cementa Slati Jaraj.....
 Otpisni cementne industrije kao stacionarnog izvora onesčišćujućih razni u zrak je značajan, ali planiranim se zahtevom, odnosno korištenjem drvenog otpada u procesu pečenja klinkera, smanji na zrak emisije u odnosu na sadašnje stanje, što i jest sržna podacima ovog zahteva od strane Nivoitija zahteva."*

Dobro je znati da željeznički pragovi ispuštaju kancerogene plinove već na 20°C i da su opasni za širi okoliš uslijed djelovanja vjetrova. Nemoralno je od strane CEMEX-a govoriti o doprinosu smanjenju količine CO2 u zraku jer se u ovom slučaju ne radi o običnom drvu već o izuzetno kancerogenim željezničkim pragovima, te iverici koja sadrži razna ljepila i otrovne sastojke.

Obzirom da 600 tisuća komada otpadnih drvenih željezničkih pragova namjenjenih spaljivanju nisu dovoljni da ekonomski opravdaju ovo ulaganje jedini zaključak koji se nameće je da CEMEX priprema spalionicu za komunalni i industrijski otpad koji se sada nalazi na Karepovcu i onaj koji će se sakupljati u Centru za gospodarenje otpadom u Lečevici, a na osnovu Idejnog rješenja sanacije odlagališta otpada Karepovac-Split koji predlaže korištenje CEMEX-ove spalionice.

Osim gore navedenog otvara se i mogućnost uvoza jer mali broj spalionica i cementara u Europi ima certifikate i dozvole za izgaranje izuzetno opasnih željezničkih pragova.

Voditelj projekta Studije o utjecaju na okoliš Centra za gospodarenje otpadom u Lečevici Danko Fundurulja, dipl.ing.građ., je potpisnik i uposlenik tvrtke koja je napravila Studiju utjecaja na okoliš CEMEX-ove spalionice! SAPIENTI SATI!

- Gradsko vijeće (4)
- Građanske inicijative (1)
- GUP (4)
- Karepovac (6)
- Obavijesti (1)
- Park šuma Marjan (1)
- Plan upravljanja (12)
- Pontoni na Rivi (1)
- Povijesna jezgra (14)
- Splitska Riva (1)
- Vrtal (3)
- Zapadna obala (9)

NAJČITANJE

19.05.2011. - Kritika upravljanja povijesnom Splitskom jezgrom

11.03.2011. Ivo Batinić je završio sudbinu dalmatinskih jezgri

29.06.2011. - Konkretna anketa Novi spomenik povijesnoj jezgri i Park šuma Marjan

Prosvjed protiv spaljivanja otpada u cementaru Slati Jaraj, ispred ulice Slati Jaraj 24.9.11.11

It is good to know that railway sleepers emit carcinogenic gases at a temperature of 20° C.

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Ž.H.(CROPIX)

All used railway sleepers are contaminated to some extent with herbicides, heavy metals, grease and Coal Tar Creosote.

Used railway sleepers may contain asbestos.

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What about
the
plastic?

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(Zeljko Hajdinjak / CROPIX)

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Fire in the plastic sorting facility

prerastanje u katastrofu nevidenih razmjera veliko. U gašenju je stoga sudjelovao niz postrojbi - uz Javnu vatrogasnu postrojbu Grada Čakovca koja je ovamo došla s dva vozila, bili su i dobrovoljci iz susjednog Totovca, zatim Podbresta, Strahoninca, Novog Sela na Dravi i Gornjeg Vidovca. Vatra je ugašena negdje oko 17 sati. U požaru, srećom, nije bilo povrijeđenih. Opasnost pritom nije prijetila samo od vatre, već i od mogućnosti eksplozije plinske stanice u krugu oporabišta, a i dima. Gasitelji i svi koji su se kraj požarišta zatekli nekim poslom nagutali su se dima, a i mještani Totovca, pa i susjednih sela. No, puhao je i vjetar, pa je to pomoglo da ne bude štetne koncentracije plinova, a zagađenje zraka je bilo samo privremeno. Uz požarište su se ubrzo našli i vođe ljudi "Čakoma", na čelu s direktoricom Snježanom Tkalčec-Avirović, bili su tu i međimurski župan Ivica Perhoć koji je time i predsjednik županijskog Stožera civilne zaštite, a i predsjednik je Nadzornog odbora "Čakoma", gradonačelnik Čakovca Branko Šalamon, inspektor zaštite okoliša, prostornog uređenja i graditeljstva te inspektori zaštite od požara Policijske uprave međimurske.

U utorak su očevid obavili inspektor zaštite od požara Policijske uprave međimurske i vještak Centra za forenzičku ispitivanja, istraživanja i vještačenja iz Zagreba. Kao uzrok požara na oporabištu utvrdili su zapaljenje smeća otvorenim plamenom nepoznatog izvora, odloženog ispred objekta za oporabište PVC otpada. O tome će Općinskom državnim odvjetništvu biti upućeno posebno izvješće.

Šteta 3 i pol milijuna kuna

Šteta od požara sortirnice otpadne plastike na odlagalištu u Totovcu procjenjuje se na oko 3 i pol milijuna kuna. U požaru su potpuno uništene dva bagera, četiri prikolice za baliranje, kontejner, razni alat i neki sitniji inventar, ali i sainsa hala koju je vatrena sila prije otvorenog požara u njemu otpadnog materijala. Od ukupnog iznosa, 1,3 milijuna kuna otpada na "Čakom", ostalo na Grad Čakovec - njegovo vlasništvo je hala, ali i elevatori i preše za baliranje. Požar nam je činio izravnu štetu, još ne možemo procijeniti koliko, jer iako je imovina bila osigurana, osiguranje neće vratiti sve, rekao nam je gradonačelnik Branko Šalamon. Direktorica "Čakoma" Snježana Tkalčec-Avirović kaže da treba računati s tim da će osiguranje "Čakomu" nadoknaditi oko 900 tisuća kuna jer će računati s knjigovodstvenom vrijednošću strojeva. Ostalih 400 tisuća će se osjetiti kao manjak u godišnjoj poslovnoj bilanci, dodaje, rekli su je. U nabavcima novih strojeva trebat će odrediti prioritete, morat će se racionalizirati, a i tražiti odobrenje Grada za dodatno zaduživanje. Nešto će trebati odgoditi, najvjerojatnije jestve koje "Čakomu" trebaju kod oporabišta, rekla je direktorica.

Firefig
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lived.

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Gaseous products formed during combustion of most organic materials can be classified into two main categories based on their toxicity

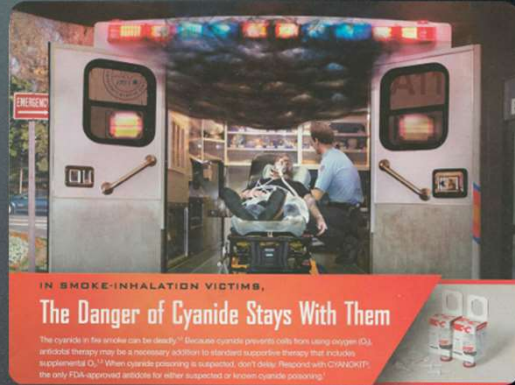
- Asphyxiants
- Irritants

Asphyxiants

- Carbon monoxide (CO) & Carbon dioxide (CO₂)
- Carbon monoxide works as an asphyxiant by reducing the blood's ability to carry oxygen.*
- DO NOT FORGET LACK OF OXYGEN

Carbon monoxide works as an asphyxiant by reducing the blood's ability to carry oxygen.

- Less well-known are **hydrogen cyanide** (interrupt cellular oxidative phosphorylation)
- Exposure to hydrogen cyanide (AC) can be rapidly fatal.



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Cyanide Producing Materials

- Hydrogen cyanide is produced by incomplete combustion of nitrogen and carbon containing substances ($C\equiv N$)
 - Natural Fibers (wool, silk, cotton, paper)
 - **Synthetic polymers** (nylon, polyurethane)
 - Synthetic rubber
 - Melamine (resins for molding, laminating, etc.)

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- Synthetic polymers found extensively in structures
- Insulation
- Carpets
- Bedding (mattresses and pillows)
- Building materials
- Materials can burn up to 2-3 times hotter and faster than natural materials
- Quicker flashovers increase speed of HCN release

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- Hydrogen cyanide has whole-body (systemic) effects, particularly affecting those organ systems most sensitive to low oxygen levels: the central nervous system (brain), the cardiovascular system (heart and blood vessels), and the pulmonary system (lungs).

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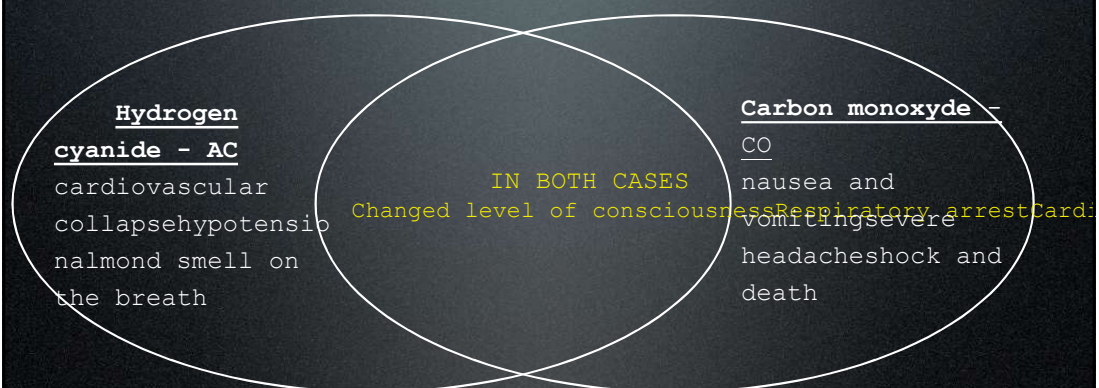
Routes of exposure

- Hydrogen cyanide (AC) can affect the body by inhalation, skin contact, ingestion, or eye contact.

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Symptoms of poisoning



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QuickTime™ and a
AVC Coding decompressor
are needed to see this picture.

- Patients exposed to low concentrations of cyanide have nonspecific symptoms i.e. nausea, vomiting, abdominal pain and irritation of the digestive tract while higher concentrations or prolonged exposure causes cardiac dysfunction and central nervous system dysfunction, and death.

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Just for example...

- Small amounts are present in the environment and in our blood.
- Normal levels of whole blood are between 0 to 20 micrograms per deciliter ($\mu\text{g}/\text{dl}$).
- Cyanide levels as low as 50 $\mu\text{g}/\text{dl}$ in the blood have proven to be toxic, and blood cyanide levels of 250 - 300 $\mu\text{g}/\text{dl}$ fatal.
- Symptoms of cyanide poisoning mimic the signs and symptoms of a myocardial infarction.

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Irritants*

- The sensing irritants that affect the eyes and upper respiratory tract
- Pulmonary irritants.

Depending on the amount and nature of the origin of combustible materials at the same time they are present in almost all fires.

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POSLANI U SMRT: Vatrogasci na Jezercu udišu smrtno opasne tvari!

23. Srpanj 2011. News 1 komentar 10 Reactions



Ono što Imočani nagađaju već danima, za TPortal potvrdila je struka – vatrogasci koji gase požar na Jezercu truju se opasnim tvarima! No stručnjaci upozoravaju kako se posljedice udisanja štetnih tvari neće vidjeti odmah, već nakon nekog vremena.

IMOTSKA FUKUSHIMA

Vatrogasci bi trebali biti primjerenom zaštićeni, a o nesvjesnosti Imotski i vatrogasaca koji gase požar na Jezercu dovoljno govori slika koja je obišla Hrvatsku – vatrogasac daje izjavu za medije "zaštićen" crvenom maramom preko usta.

Sasvim sigurno je da pri tim uvjetima, posebno što se tiče temperatura izgaranja, nastaju velike količine policikličkih aromatskih ugljikovodika, polihalogenirani dibenzodioxini (dioxini) i polihalogenirani dibenzofurani (furani). Neki od njih su izraziti karcinogeni i reproduktivno otrovne tvari, ali se posljedice njihova izlaganja opaze tek mnogo kasnije nakon izlaganja – upozorava Franjo Plavšić, ravnatelj Hrvatskog zavoda za toksikologiju za TPortal.

DRUŠTVENE MREŽE

t f g+ in rss

Fancy kozmetički salon imotski

Mapas Mole LIFESTYLE U TRENDU

na gotovo 100.000 m2

KOLUMNNE - PIŠE: in medias res

POSLEDNJI KOMENTARI

batina ne seri

TRAŽILO SE MJESTO VIŠE – U Imotskom nastupilo 11 klapa - 2 days ago

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The fact is that firefighters perform unprotected fireground operations all the time.

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- Irritating gases formed during combustion are usually divided into two groups compared to their chemical composition:
 - inorganic
 - organic

Inorganic irritants

- Halogen acid.
- Sulfur oxides nitrogen (nitrosing gases) and phosphorus.
- Ammonia, chlorine and phosgene*.

Some of these are used in the military industry as nerve warfare agents.



Organic irritants

- They are formed during the incomplete combustion of organic fuels origin:
 - wood, petroleum products, natural polymers and food products



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- Irritants, depending on whether easy or difficult soluble, causing an irritating reaction.

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- Easily soluble irritants immediately react with the mucous membrane of the eye or upper respiratory tract and cause symptoms of choking and coughing.

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- Hardly soluble irritants cause much milder almost imperceptible stimulus symptoms that do not warn the person of danger until the gas builds up and dissolved in sufficient quantity in the deepest airways - bronchi and alveoli.

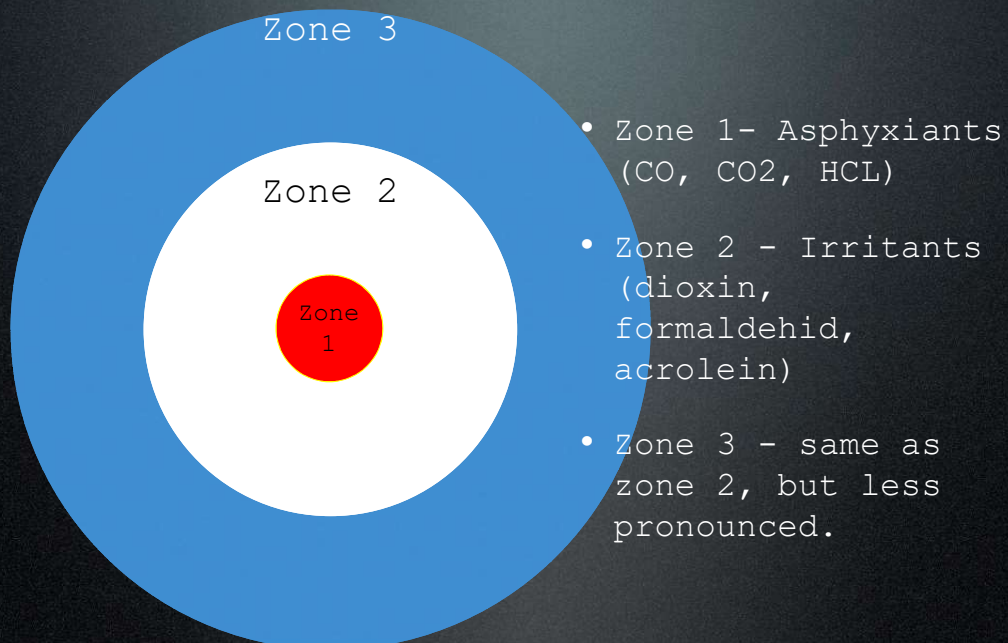
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How to reduce the risk?

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Zone 1



Zone 4

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Do you know this
person?

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Would you confront him?

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Why do we do this...

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...and this?

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We must change our behavior

- For some time we do it in everyday life:
 - smoking
 - alcohol
 - fatty food

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And in the Fire
Service has
undergone changes

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- Safety at Work
- ordinances,
- changing social mores,
- "New blood"
- higher education and teamed with science,
- LEADERSHIP!

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Today's Fire Service?

- Far better training for firefighters.
- Vehicles and equipment are incomparably improved.
- Personal protective equipment provides a much higher level of protection.
- We have been informed about the risks and dangers.

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But...

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- We still do not use seat belts in vehicles,
- we still do not use breathing apparatus in any occasion,
- we still have a chance to see the firemen intervention without full protective gear.
- ...



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And it should be like this,
because ...

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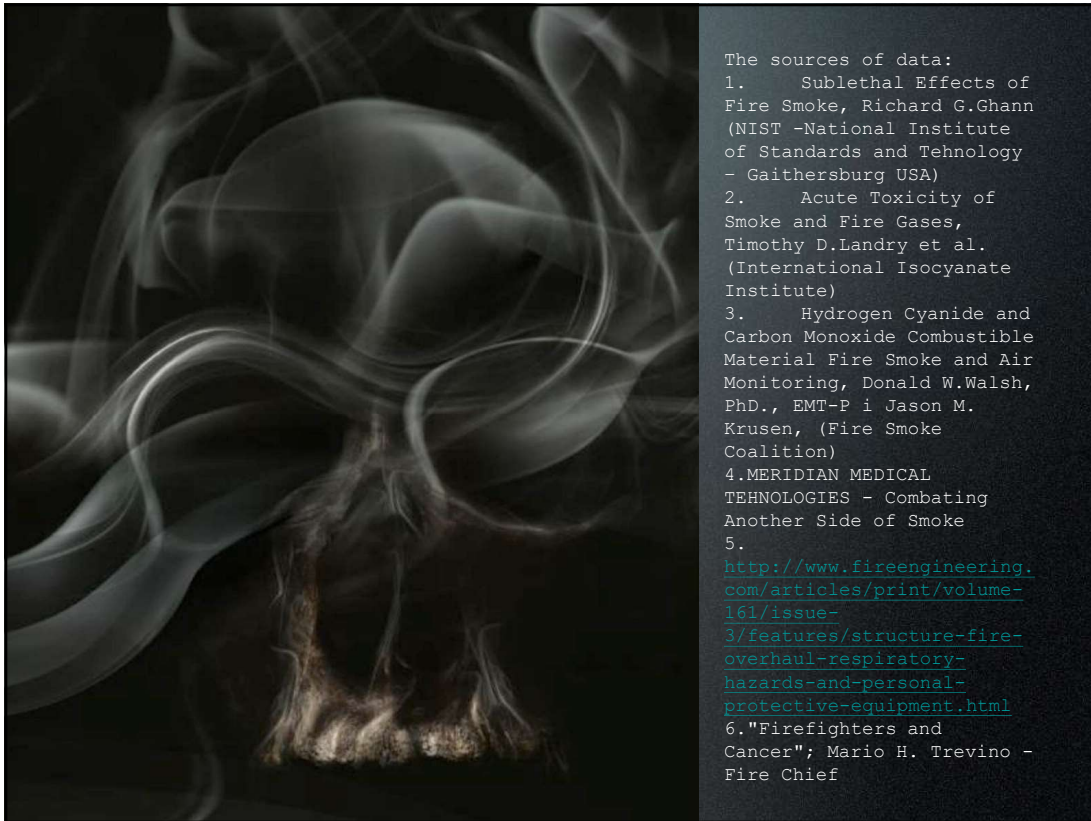
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RECOMMENDATIONS TO THE EVERY FIRE SERVICE

- Increase education of firefighters and civilians about the risk of cyanide poisoning from fire smoke.
- Support the use BA and protective clothes
- Support blood testing for cyanide of firefighters and fire victims.

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The sources of data:

1. Sublethal Effects of Fire Smoke, Richard G.Ghann (NIST -National Institute of Standards and Tehnology - Gaithersburg USA)
2. Acute Toxicity of Smoke and Fire Gases, Timothy D.Landry et al. (International Isocyanate Institute)
3. Hydrogen Cyanide and Carbon Monoxide Combustible Material Fire Smoke and Air Monitoring, Donald W.Walsh, PhD., EMT-P i Jason M. Krusen, (Fire Smoke Coalition)
- 4.MERIDIAN MEDICAL TEHNOLOGIES - Combating Another Side of Smoke
5. <http://www.fireengineering.com/articles/print/volume-161/issue-3/features/structure-fire-overhaul-respiratory-hazards-and-personal-protective-equipment.html>
- 6."Firefighters and Cancer"; Mario H. Trevino - Fire Chief

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Thnks

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