

e d i t o

Welcome to the latest newsletter from FPC, your partner in fire risk analysis, fire safety engineering and incident management.

First of all we are very pleased to announce that FPC got awarded some large and very interesting projects over the past couple of months. This will allow us to further grow and broaden our overall expertise. Consequentially we are on the lookout for qualified engineers and safety practitioners to strengthen our staff...

FPC participated into the NFPA 2007 World Conference organized in Boston, US earlier this year. One of the papers presented at the conference is reproduced in this issue: believe it or not but it shows that water in some cases can become a very dangerous fire extinguishing medium.

This year it is has been 10 years that FPC provides life and fire safety services to Amsterdam Airport Schiphol, one of the leading international airports in the world. It keeps continuing to be a very rewarding mutual business relation and definitely deserves a highlight in this Trends issue.

FPC's involvement into providing emergency response services is further expanding. The services offered range from developing intervention plans for SEVESO companies to training first intervention teams on evacuation strategies at large court houses.

Finally to counter all allegations for drug abuse in the professional cycling industry, FPC has taken action and is sponsoring a local drug free cycling team.



Enjoy reading,
FPC Team

FPC wins major contract in Kuwait



Souren Dakessian, managing director FPC Middle East and Ralf Bruyninckx, managing director FPC NV signing KNPC contract in Kuwait

Kuwait National Petroleum Company (KNPC) is one of the largest oil complexes in the world. Established in October 1960 as a share-holding company owned by the Kuwait government and private sector, KNPC became fully government-owned in 1975. Since 1968 the company had been exporting petroleum products from its Shuaiba Refinery. In 1980, following the restructuring of the oil sector in Kuwait, KNPC was placed under the newly-

created Kuwait Petroleum Corporation (KPC), which was also government owned. Under this position, KNPC took control of distributing petroleum products within Kuwait, along with the ownership of the Mina Ahmadi and Mina Abdullah refineries

In April 2007, KNPC awarded a KWD 1.25 million (Euro 3.25 Million) contract to " FPC Middle East Ltd. in association with FPC Belgium nv" for the preparation

of "Feed & TIC For Phasing Out of Halon Systems and Replacement of The Complete Fire Alarm Systems at all Three Refineries and Local Marketing Facilities". Contract execution period is 40 weeks, commencing in June 2007 with completion due in March 2008.

The FEED (Front Eng Engineering Design) addresses the replacement and removal of existing Halon system presently utilized for the protection of various facilities such as Floating Roof Tanks, Electrical Sub-stations, Computer Rooms, Central Control Rooms (CCR), Local Control Rooms (LCR), Process units, Buildings etc., located within the three Refineries (Mina Abdulla, Mina Al-Ahmadi & Shuaiba

Refineries) & Local marketing (LM) as well as the complete replacement of the fire detection and alarm systems.

In 2003 KNPC appointed FPC Middle East Ltd. to undertake a study for "Phasing out of Halon Systems & Replacement / Upgrading of Associated Fire Detection & Alarm Panels" in the three Refineries & Local Marketing Facilities. Part of the study covered the evaluation of existing halon related and other fire detection and alarm. FPC recommended their upgrade and replacement

with the latest State-of-the-art- Technology system with a common fire protection and detection philosophy to be adopted by KNPC for all their facilities.



Fire Protection of Pyrophoric Products

When water becomes a threat!

As most people know, three things are required to start a fire: fuel, oxygen and an ignition source, the well known fire triangle. However for some materials, the heat supplied by the surroundings can act as an ignition source. When those materials are released to the air, they will spontaneously ignite. These materials are called pyrophoric materials. Because no ignition source is required, these materials will present specific challenges for providing a suitable fire protection strategy.

The most common known pyrophoric material is phosphorus, and pyrophoric products are used in many different types of industries such as:

- Semi-conductor industry (carrier gasses and dopants)
- Pharmaceutical industry (reactants)
- Chemical industry (reactants and catalysts)
- Nuclear industry (zirconium, titanium)
- Petrochemical industry (iron sulfide in tanks)

Because of the growth of most of these sectors, pyrophoric materials are more widely used.



In general, pyrophoricity has two main causes: reactive bonds and high surface to volume ratio's which increases the reactivity. This higher reactivity sometimes implies that the pyrophoric material can react violently with water, which will not only intensify the fire but might

also result in the formation of corrosive, flammable, explosive or toxic gasses that pose additional dangers to emergency responders.

An incident with sodium in Newton, near Boston (USA) clearly illustrates the threat pyrophoric products pose.

During the production of tantalum, a large quantity of molten sodium overflowed. Smaller leaks had occurred before and the local fire brigade was called. The fire brigade was used fighting small fires with sodium chloride powder which is a byproduct in the process and therefore was present on site in large quantities. Water could not be used as the reaction with water is extremely violent.

Normally the powder was applied using scoops which were found inside the sodium chloride containers. For such a large fire, using the scoops would take too long, therefore a shovel was used. The shovel was located in a nearby area which had probably just been cleaned. Some water still remained on the shovel and when the sodium chloride was thrown on the molten sodium, the interaction between sodium and water causes the formation of hydrogen which resulted into a large explosion. This explosion caused the molten sodium, which was still very hot, to splatter in all directions. 11 Firefighters were burned, of which two critically.

This incident clearly shows the most important safety issues concerning pyrophoric materials:

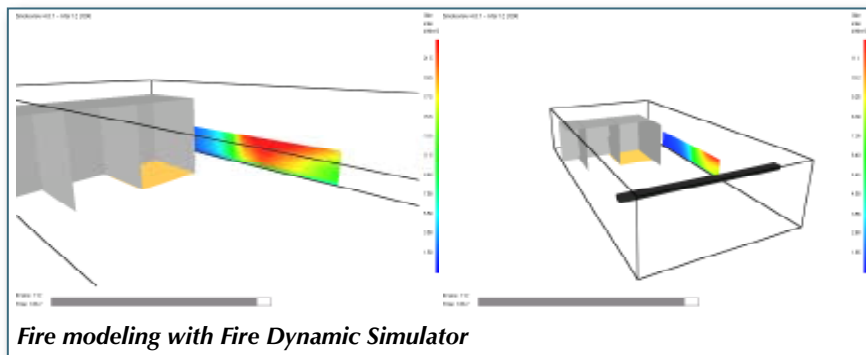
- Large fires cannot be extinguished with water
- Other extinguishing media need to be dry
- Cooling nearby equipment (or rain) can pose a danger
- The reaction with water can cause the formation of toxic, flammable or corrosive gasses.



Class D extinguishers are the prime choice for a first intervention

Because of the possible reactivity with water and the immediate ignition hazard, specific fire prevention measures have to be taken:

- Provide suitable passive fire protection measures (separation distance, walls, dikes...)
- Provide explosion protection if required
- Store the product in inertized containers, either under an inert gas or for solids in an inert liquid.
- Keep those containers away from moisture.
- Minimize the combustion load around these products.
- Provide rapid fire detection as these fires can only be controlled in the beginning stages



- And very important provide information about the product to everyone that can come into contact with it (workers, fire brigade,...).

Very few information is available in codes and standards regarding fire fighting itself. However, some general guidelines can be given:

- If the fire involves pyrophoric gasses, cut off the fuel supply and if necessary dissipate the gas so that it cannot reach flammable concentrations.
- In case of pyrophoric liquids and solids that are not water-reactive, treat the incident as a normal fire, but be wary of the possibility of re-ignition.
- If they are water-reactive, first intervention with class D powder or equal.
- In case first intervention is not successful, make sure a sound fire fighting strategy is in place where product hazards, surroundings and building construction are taken into account.

Especially for the latter, a specifically designed engineering solution is required.

In the past FPC has been involved in designing the fire protection strategy for installations handling those products.

Practical Application

For a chemical company, a study was made for a storage location of pyrophoric catalyst and co-catalyst.

Two storage areas are located close to each other, one containing tri-isobutyl Aluminum (TIBA), the other one containing methyl aluminum oxane (MAO). To determine the protection measures, the heat impact is calculated using the Fire Dynamics Simulator, a CFD model. The physical and chemical properties required to model the fire were obtained from the products' suppliers.

The figure below shows the heat impact from a fire under the TIBA-container on the MAO. The maximum heat radiation is about 22 kW/m², sufficient to spread to the other storage location. If

however the concrete wall were to be extended (figure 2), the heat impact severely drops. This example clearly shows that using detailed fire models, passive fire protection measures can be tailored specifically to the hazards this dangerous class of materials poses.

For another facility, a solution is proposed combining both safe drainage of the product and the controlled reaction of water with the product, using a specifically designed water spray system. It caused a large flare-up of the fire but in a controlled, safe location.

These examples clearly show that fire safety issues with this type of materials require a specific solution, keyed to the site conditions and specific needs of the owner.

For more information please contact Kris De Troch at: kdetroch@fpc.be.

10 Year AAS – FPC a smooth flight

For the past 10 years AAS (Amsterdam Airport Schiphol) and FPC entertain a mutual very rewarding business relation.

Working for a company such as AAS has been a true pleasure, not only from a technical and commercial perspective but also from a people point of view. Although FPC is just one of the many service providers at the airport, the PARTNERSHIP philosophy at Schiphol has been a catalyst to the fire safety project and works very motivating for all FPC team members.

FPC's involvement at AAS has been on several levels and started many years

ago with the development of emergency response software for the entire Terminal Building. At a later stage FPC became responsible for developing the Fire Safety Masterplan for the airport, this all in line with Dutch legislation. During design and construction, FPC's role is to give further advice and to assist AAS project managers with several installation projects that run concurrently.

According to Jeroen De Man, Manager Fire Safety Engineering at AAS, FPC's services are characterised by its very high technical quality combined with practical

logic and always within a framework that was agreed from the onset. Due to the modest style of the FPC team members, an environment is created where content prevails and technical issues can be put up for discussion. In addition, FPC consultants are well aware of the local conditions and legislation and are not hampered by any commercial interests. As such, investment decisions for life and fire safety are almost always based on advice from FPC.

It is AAS and FPC's strong desire to continue this successful partnership for many years to come.



ing. J.N. (Jeroen) de Man, Technical Manager Fire Safety, Terminal Real Estate Department, Amsterdam Airport Schiphol

..... Contract Award

Fire Safety at Brussels Underground Metro Network

In joint-operation with Grontmij, FPC has been awarded a challenging project for the Brussels Underground Metro Network. The Ministry of the Brussels Region has started a major renovation of the metro stations and interconnecting tunnels. As part of this renovation project, metro lines 1A and 1B, including 11 metro stations, have to be evaluated with regard to life and fire safety and upgraded accordingly.

The main objectives of the study are:

- Secure life safety through an adequate evacuation concept
- Facilitate intervention for rescue teams and fire brigade
- Reduce damage to tunnels, equipment and adjacent properties.

The project includes a quantitative analysis, making use of expert software modeling for : fire /smoke development, evacuation

capacity and structural integrity analysis. The outcome of this analysis will form the basis for further design and implementation of measures to improve Life and Fire Safety

at the Brussels Metro. FPC/Grontmij involvement will continue through the bidding and installation phase, up till final testing and commissioning.



Emergency Response Services

Emergency response is an important part of any Risk Management programme. FPC's holistic approach supports companies to be prepared for any type of emergency. Industries that carry high safety risks (off shore, petrochemical, nuclear) or complex building structures with a high occupant load (shopping malls, airports, etc..) all have specific needs with regard to emergency response.

Pre-incident planning

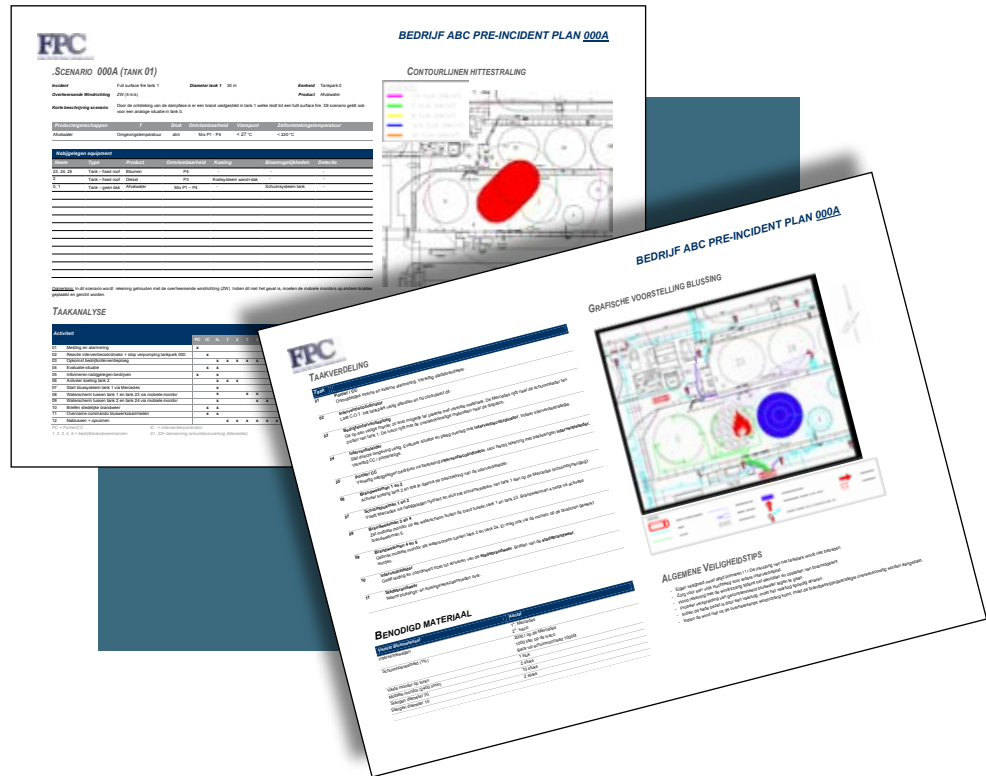
FPC assists Seveso companies with the creation of legally required pre-incident plans. After defining incident scenarios from risk analysis and capturing the current emergency organisation structure, a sample scenario is selected for which a pre-incident plan is designed. Pre-incident plans are a practical tool in which area layout, the evolution of the incident in time, including detailed tasks, and required technical and human resources are defined.

Scenarios are trained with the site intervention teams and local fire brigade. Results from training are assessed, fine tuned and further integrated. In a final step pre-incident plans for the remaining scenarios are created. The pre-incident plans not only bring Seveso company's in line with legal requirements but also assure that the organisation is prepared to deal with specific credible incidents that can occur at the site.

Seveso is a village in Northern Italy unfortunately renown for a chemical disaster in July 1976. During the incident a toxic gas, dioxin, was released. A large part of the community became seriously mutilated by the poisonous gas. As a result the European Commission issued strict regulations to protect people and environment better against industrial accidents.

Training Programmes

FPC assessed the emergency response organisation and fire and life safety infrastructure for the new court house in Antwerp. It is one of the most remarkable buildings of the 21st century in Belgium. Specific challenges are related to the



segregation of the building into different physical security zones for public access, staff, prisoners and guards.

FPC created the emergency response plans and organised several workshops. The training was focussed on awareness creation around first intervention and evacuation. It included the use of video

material, practices around evacuation and communication during incidents.

As a result the emergency response organisation was able to improve it's effectiveness by involving the security organisation early in the evacuation process.

FPC also developed an extensive training



New Courthouse Antwerpen

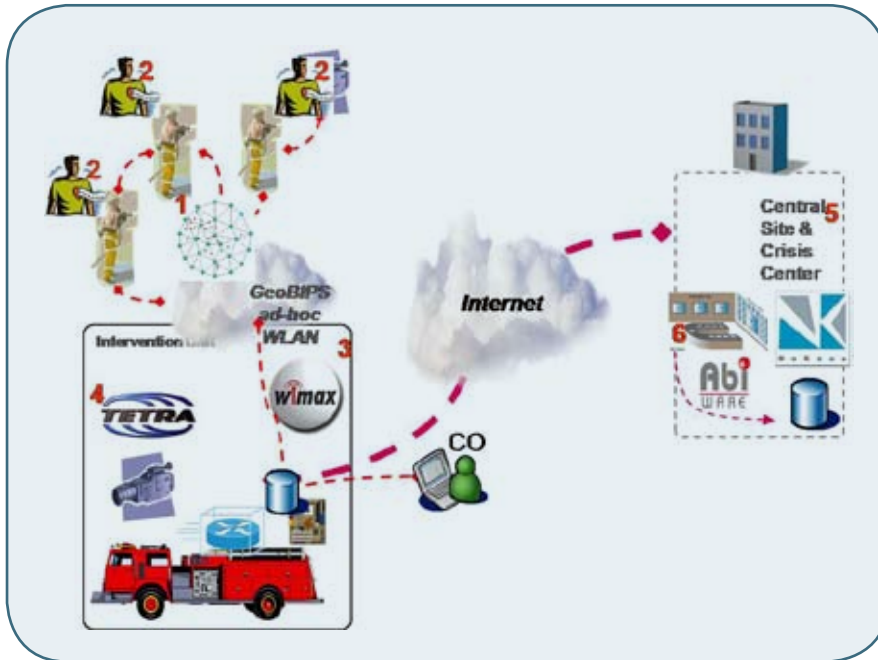
programme for the Hilton International chain of hotels. The objective is to improve the safety awareness amongst Hilton General Managers and provide tools to GM's to support into the critical decision making process during incidents in the hotel environment. Several workshops are being organised for Hilton General Managers in the European and Middle Eastern Region.

Incident Management

NoKeos® is FPC's solution for automating the decision support process before, during and after an incident. It has a wide application range: from airports, hotel business, petro-chemicals over to the public aid services. The area of Information Systems used in crisis management is changing rapidly and as such is an important aspect of the development of innovative solutions.

FPC participates in research projects with other commercial companies and universities to scan the market for new technologies which add value to our customers. As such NoKeos was selected to support the crisis management system of the ADAMO (Advanced Disaster Architecture for Mobility Organisations) research project which is sponsored by the IBBT (www.ibbt.be). The project brings together different technology and knowledge organisations each leaders in their own field: Cisco Systems (www.cisco.be),

FPC, Abiware (www.abiware.be), Riskmatrix (www.riskmatrix.be), Draeger (www.draeger.be), Telindus (www.telindus.be), Astrid (www.astrid.be) and universities of Hasselt (EDM),



Antwerp, Gent and Leuven in Belgium who bring expertise on user interface technologies, ad-hoc wireless networking and legislation.

The objective of the ADAMO project is to specify, research and design a disaster management architecture, delivering a real-time overview of the full deployment of a disaster area, both to the people 'in the field' and to the decision makers in the back-office or crisis-centre through the use of intuitive interactive tables and large displays. This architecture will provide end-to-end bi-directional communication and information to all members of the intervention-chain, from the disaster area up to the crisis-centre/back-office, delivering and providing the right information to the right people at the right time.

For more information please contact Xavier Criel at xcriel@fpc.be.

Chaos or no chaos

On our website www.fpc.be you can read the article 'Chaos or no chaos...That's the question'. It reports on an interview undertaken by Fire Forum Magazine regarding the NoKeos pilot project with the Ministry of Internal Affairs of Belgium and several Public Relief Organisations in Antwerp. Unfortunately the article is only available in Dutch and French.