In 2010, the Fire & Rescue Brigade of Paris received three new mobile decontamination units (MDU) and also reformed their operational decontamination methods. These new units were part of a national roll-out and were paid for by the French Department of Homeland Security (Home Office) – this was part of a large seven-pronged Defence and Security package. The 2008 White Paper for National Defence and Security placed CBRN threats in the highest tier of serious events that could impact both populations and vital facilities. As a result, many programs were launched to improve the quality and timeliness of operations, especially mass decontamination, including these new MDUs.

**Paris as part of the national operational framework**
Paris is not like any other city in France. It has always been considered the centre of the country, even by terrorist groups who have committed a wave of attacks since the 1970’s until 1996. This quirk of history and geography has meant that the Parisian population have become exposed to mass disruption attacks.

Paris and her closer suburbs are defended against fire and all other major risks by a military bicentennial fire corps, the Paris Fire Brigade or the Fire & Rescue Brigade of Paris (FRBP), as French fire-fighters also partake in a medical and paramedical duty, which represents between 70 and 80 % of its annual activities.

**The new tool!**
Built by two French companies; Utilis well known manufacturer of rapid deploy tactical shelters, decontamination units, COLPRO and command posts, and furnisher of the 2nd CBN Dragoons Regiment of the French Army; and TIB, a little company in the west of France, specializing in emergency vehicle fittings, these units can be described as ‘mobile shower barracks.’

A parallelepiped box carried on a truck is placed in the contaminated area. The outer dimensions are; length: 6,613m, width: 2,549m, height: 2,738m. The outside dimensions to be deployed are; length: 10m, width: 10m, height: 2,738m (dimensional data without tents connected at the ends). It would be set up by three specially trained fire-fighters, including barrack deployment, water alimentation and heating, dispatching of facilities, and so on, in order to receive the first person to decontaminate about fifteen minutes later.

What a revolution after previous generations of mobile decontamination tents, which needed between ten and 15 fire-fighters to install, taking about 30 to...
New Toys for a hard game

45 minutes! This was enough to deliver a safe fatality! Perhaps the next step of development will be a shelter, installed by one person, sitting warmly in the cabin of his vehicle and using a simple joystick. The possible next toy for firefighters? - Wake up, industrialists!

While we are waiting patiently for this future generation of MDU, let’s have a look at how this new tool takes part in the operational management.

Parisian organisation for decontamination – ‘Yellow Plan’

Not long after the 2008 White Paper, French CBRN governmental planning went through a total review to take account of the lessons learned from various studies and numerous national and district exercises.

According to the French national doctrine of operational commitment, in case of a CBRN terrorist attack, one of the main goals for the Incident Management Command is to avoid a mass contamination of hospitals, as happened in Tokyo after the 1995 sarin gas attack. In other words, the aim is to fix contamination on the ground, to hinder or, at least, to limit contamination transfers to the cold and safe zone.

The Paris Fire Brigade, which has performed combat medicine for civilian use under the name ‘Red Plan’, has created a specific operational plan for CBRN attacks, called ‘Yellow Plan’.

So, if you are unable to apply decontamination in medical facilities, does it mean that you have to do it on the field, close to ground Zero and as soon as possible after the event?

Many gold minutes to win the Golden-Hour battle

The solutions in winning the battle of time include:

- Placing and deploying mobile decontamination units in the heart of the city in order to be near to the event. But this theoretical best solution is impossible in Paris due to the tiny central fire stations.
- To quickly deploy MDUs. Realistically, this is the best solution. These MDUs have been implanted in three suburban fire stations. The first one is allocated at Gennevilliers, in the north-west area, under the responsibility of the Paris Fire Brigade; the second one takes places at Villecresnes, in the south-east; the third one at Tremblay, near the main airport of Paris.

The second main goal consists of a rapid triage and treatment, especially in the hot zone. The FRBP medical corps is based on military medicine, which means that every military doctor has received CBRN military and civilian specific training, where the main lesson is to take care of mass casualties in a CBRN toxic and contaminated atmosphere. So, for each event of that kind, the FRBP can immediately engage medical and paramedical staff able to work in the mass casualty collection points by wearing PPE.

After the first emergency triage and stabilisation of injured people in the mass casualty collection points, all the ambulatories and non-ambulatories are carried/ led to the decontamination units, in order to keep the warm zone cleaner and safer.

Then, FRBP immediately deploys the three MDUs. The first one is dedicated to non-ambulatory casualties, and the second for ambulatory casualties. The deployment of the third one depends on the situation – triage will be conducted by a medical advisor, and following this, coupled with a rapid assessment of the number of victims per category, a technical CBRN advisor will decide on the outcome of the third unit – which might not be deployed, freeing up the firefighters for other duties.

Casually categorization and decontamination flux

Of course, we talk about combat medicine. Combat medicine in France gave birth to ‘triage’ during the First World War. The principles of triage have been exported for major disaster like fires, earthquakes, and so on, where few responders and medical staff are faced with mass casualties and a categorization and prioritisation of the injured needs to be made.

In terms of decontamination, the categorization determines the flux of that action, i.e. the rate of exit from the warm zone. We consider that an MDU for ambulatory casualties can decontaminate about 80 persons per hour, whilst a non-ambulatory MDU about 10 to 15 persons per hour.

Technical recommendations for decontamination

As every professional rescuer knows, decontamination in an emergency operation is constituted by the sum of successive and mandatory actions in the following order:

- Complete and early undressing; dry decontamination using a powdering glove containing Fuller’s earth (only in the case of chemical contaminants);
- Showers (washing with a decontamination solution and & rinsing);
- Drying;
- Control of contamination, to certify the efficiency of the action; provisional redressing.

The System can be set up and ready to decontaminate in 15 minutes ©FRBP
New Toys for a hard game

Principles to avoid (or to limit) contamination transfer
One of the major decontamination objectives in-field is to avoid the contamination of hospital facilities, and generally beyond the controlled areas. Some basic rules include:
Medical and paramedical personnel bringing a wounded victim on a stretcher to the entry of the MDU and staying outside, whilst the victim is put on another /specific stretcher. Disabled victims are decontaminated, dried and checked, and then transferred to another stretcher at the last cell (position 4: control), where paramedics from the ‘Red Plan’ takes care of the victims once the ‘Yellow Plan’ team is finished with them.

Main differences between chemical and radiological cases
Contamination by radioactive dust or persistent chemicals implies a difference in terms of materials used, contamination solutions used and practiced gestures. Only the stripping of the first layers of clothing and footwear is mandatory and common to both cases.
In chemical cases, dry decontamination takes place by applying a powdered glove containing Fuller’s earth, which absorbs chemical molecules. Other emergencies require wet decontamination. Water with additives of a surfactant solution compatible with the skin is used with any type of liquid soap. However, bleach is absolutely prohibited on the skin. AP2C, AP4C, SAPE or GDA 2 are the main materials used in contamination control.
In terms of radiological contamination: for solid particles, decontamination by adsorption is irrelevant, instead a wet decontamination shower is used which acts through the mechanical removal of the radioactive dust, this is then verified with a mechanical removal of the radioactive materials used in contamination control.

Specific cases of non decontamination on the ground
All on-site contaminated victims must be decontaminated in the MDU. Only victims whose condition is so severe that it justifies an emergency transport to the hospital, do not need to be decontaminated on site. The medical decision taken by the Medical Chain Director at the request of Medical Chief Officer of the ‘Yellow Plan’ is accompanied by the following compensatory measures, after stabilization of vital functions:

- Packaging of the victim (and medical devices) in a jacket which prevents or limits the transfer of contamination.
- Evacuation (‘small waterwheel’) from the vector to the evacuation area once they have been medically treated.
- Support & evacuation (‘large waterwheel’) in a specific hospital by another medical team.

Personal protection and staffing
Personnel serving in the MDU wear PPE, a (light decontamination suit with a filter respirator device.

- The commanding officer of the decontamination area should be particularly vigilant regarding the physical conditions of personnel serving in the MDU, particularly in the shower cells. When deploying a module with two MDUs, the staff of the 3rd MDU stays around in order to join the first two. The commanding officer of the decontamination area is responsible for equitable distribution of rotations based on the physical condition of working personnel.

Management of contaminated effluents
Each MDU consumes water for washing and rinsing and thus produces effluents which are contaminated waste, and needs to be stored and retrieved as such. There are several solutions to address the contaminated waste products:

- Using all the storage capacity of the MDU at: 9m³ each.
- Chemically neutralization whenever possible.
- Releasing the effluent to sewers when it is acceptable under environmental regulations.
- Retrieving the waste contained in appropriate bins by tank trucks.

Support & evacuation (‘large waterwheel’) in a jacket which prevents or limits the transfer of contamination.

Officer of the ‘Yellow Plan’ is notified of the victims’ arrival at the hospital. do not need to be decontaminated on site. The medical chain director at the request of Medical chain director is accompanied by the following compensatory measures, after stabilization of vital functions:

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Joint training for joint work
In order to serve and employ this new capability, the Commanding General of the FRBP decided to dispatch the first three units in the three specialized stations and gave the firefighters two months of special dedicated training in order to understand their ‘new toy’. At the beginning of June 2010, all the new engines become on-duty and replaced the now ancient decontamination unit.

The first level of training (DEC 1) teaches the common/non-specialized fire-fighters. For two years, all the firefighters of Paris receive a minimal amount of training in decontamination:

- How to undress a lightly injured person (how to explain and help this person to undress oneself)
- How to undress and help a heavily wounded person
- How to help paramedics give a heavily wounded person a decontamination shower. Then, after being allocated to a station, they train on an MDU and learn their own role in a decontamination operation.

The second level of this special training (DEC 2), concerns those few who have served in the two specialized CBRN companies. They are taught how to deploy an MDU and learn every technicality within the machine and all its motors. All the lessons are subject to regular and annual checks by the command chain, in order to ascertain that all the principles are understood.

- The third level of training includes specific CBRN technical advisor courses, where officers learn about the management of a decontamination operation, either in case of a CBRN attack or a major technological disaster.

Several exercises take place once or twice a year, by reconstructing a terrorist attack in an underground subway, resulting in mass casualties. The aim is to give specialized fire-fighters the opportunity to work with non-specialized fire-fighters in decontamination. The organization of the command chain, the transmission of orders to operators, and reporting to the chief are also examined by HQ and civilian authorities.

The Paris Fire Brigade are now awaiting a 4th MDU to be allocated to the School Regiment in order to offer a more realistic training to young fire-fighters.