CASE STUDIES

WORKSITE SETUP DURING ASBESTOS REMOVAL WORK ON THE MONTPARNASSE TOWER

1. Organisations involved

Regional health Insurance Fund of Ile de France (CRAMIF)

Property Management of the Tower Maine-Montparnasse (ICADE)

2. Description of the case

2.1. Introduction

Banned in France since 1997, asbestos is still present in buildings that were built before this date. Tens of millions of square metres of asbestos materials are still in place.

Asbestos is a natural mineral fibre extensively used for more than a century, in thousands of industrial and domestic products, due to its remarkable technical performances (utility) and its low cost.

Short and repeated exposures to asbestos can cause serious respiratory diseases. These diseases manifest themselves on average 20 to 40 years after the first exposure.

From 400 to 500 times finer than a hair, invisible asbestos fibres in the atmospheric dust become lodged in the bottom of the lungs. They can also cause benign illnesses like pleural plaque or serious ones such as lung and pleural cancer, fibrosis (or asbestosis) etc.

During asbestos removal operations in buildings, the employer must take certain measures to protect his employees, in particular:

- Train and inform workers on the prevention of asbestos-related risks,
- Evaluate the risks,
- Organise the company's asbestos removal plan,
- Make provisions for the protection of all workers by reducing the dust levels in their working environment,
- Make provisions for the protection of individual workers (in particular the protection of respiratory tracts) by wearing suitable equipment,
- Ensure the protection of the worksite environment in order to contain any emissions,
- Make provisions for restoring the buildings following the work,
- Ensure that exposures are traceable.

Built at the start of the 70s, the Maine-Montparnasse tower marks a break with traditional Parisian urban design. For a long time, fire regulations restricted the height of buildings.

Picture 1: View of the Maine-Montparnasse Tower (copyright ICADE)

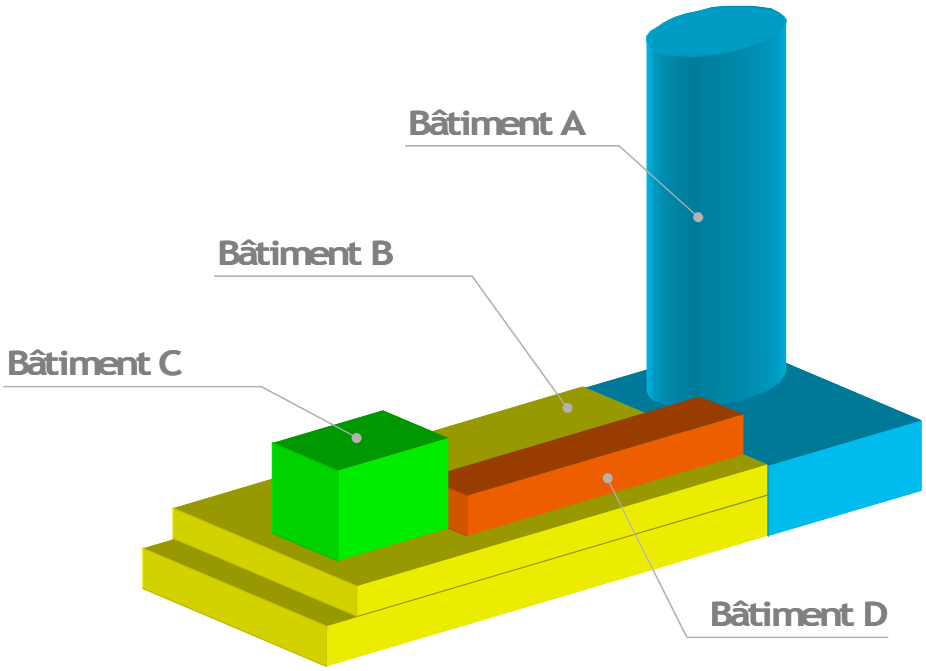
Forty years later, it had been necessary to face up to multiple technical and sanitary challenges, notably by substituting the asbestos fire-proofing with one made of a different material with similar properties.

In 2005, a newspaper led with the asbestos scandal at the Montparnasse Tower, which caused a media frenzy and brought the subject to the attention of the proprietors of the Tower.

In December 2005, the proprietors decided at a General Meeting to remove asbestos from the building.

In figures:

- Height: 210m from the base to the top, making 59 floors.
- Number of employees: the several hundred businesses in the building employ around 5 000 people.
- Technical equipment: the tower has four ñtechnical floorsò dedicated to fluid and energy management; 25 elevators and 5 freight elevators serve the floors.
- Workspace: 120 000m², including 90 000m² for offices. The total area is 155 000m².
- 290 occupants: the principal occupants are banks, mutual and insurance companies.
- Visitors: around 600 000 people come to the tower each year to enjoy the visit panoramic view from the 56th floor.



The Maine-Montparnasse Tower is composed of 4 buildings:

Building A: 60 floors + 7 basements

Building B: 2 floors + 5 basements

Building C: 13 floors

Building D: 3 floors

2.2. Aims

The authorities gave a 36 monthsôtime frame to complete modernisation work in communal areas of the tower, and to remove asbestos from the most severely affected zones.

The aim was to complete asbestos removal and modernisation work on the Montparnasse tower and to remove the waste products created by this work, while keeping the 5 000 onsite employees safe and secure.

2.3. What was done, and how?

A Prefectoral Order of the 28th June 2006, extended in 2009 for 3 years, authorised that these works be undertaken alongside the normal activity of the building on a number of conditions:

Apart from the initial three year delay, the Order adds the duty to inform the authorities and the occupants of the building. It also requires that three registers be kept:

- One concerns the onsite treatment work and requires that measures be taken to reduce dust towards the end of the work in affected zones;

- Another lists maintenance operations undertaken in close proximity to asbestos;
- A final register lists all entries made to high-risk zones.

The obligation to remove asbestos involved first and foremost technical facilities (air-conditioning, electricity, heating, water, etc) situated on the 15th, 42nd,57th and 58th floors of the Tower which are majorly affected by asbestos. For this part, the syndic (managing co-proprietor), the firm ICADE, took on the role of overseeing works for the communal areas. With regard to the private areas (the other floors), ICADE also oversaw works in order to ensure that they were carried out correctly and in accordance with all preventative measures for workers and occupants of the building.

Before beginning each new section of the worksite, an asbestos removal plan is sent to the concerned authorities: the labour inspectorate, the regional health insurance organisation of Ile de France (CRAMIF) and to the Professional Organisation for Prevention in the Construction sector (OPPBTP).

Asbestos removal work is a significantly hazardous job because it involves higher risk asbestos-containing materials. These materials are more likely to release larger quantities of asbestos fibres when being removed than lower risk materials (such as asbestos cement). As a result, workers who are employed in removing higher risk asbestos-containing materials require specific training and should follow specific working practices. Workers should also use sophisticated respiratory protective equipment and are required to be under regular medical surveillance.

The asbestos removal plan describes the nature of the work, analyses the risks involved and sets out the measures taken to ensure the safety of those on the ground and to guarantee the absence of latent pollution after the completion of the work. It also sets out the site management plan. At the start of the work, the high-risk zones are identified, signposted and sealed: static confinement accompanied with a pressure reduction by way of extracting air (dynamic confinement). So-called ñextraction groupsò, responsible for creating this pressure drop of around 15-20 pascals below atmospheric pressure, are equipped with a very efficient filtration system which does not allow the escape of asbestos particles. The air volume is accordingly renewed every eight hours.

The work begins with cleaning out. It involves cleaning and weatherproofing the facilities. This is followed by the asbestos removal. To treat the waste, ñinertingò using 3000 degree plasma torches was preferred to burying it in specialised landfill sites. This is a more onerous procedure, but more environmentally friendly. Finally the last stage of the works take place, renovation of the facilities (electricity, air-conditioning, interior decoration) before returning the building to its occupants.

During the work, the air quality in the tower is monitored almost permanently with around thousands readings taken annually (analyses on the worksites, periodical analyses, environmental monitoring).This data is archived and made available to the buildingôs occupants.

Given the duration of the work, ICADE (which directed the opening stage of the project) advocated, in agreement with the CRAMIF, the use of a supply circuit on the exterior of the building.

The co-proprietors opted to invest in brand new equipment, two outdoor freight elevators, to be uninstalled upon the workôs completion.

On a practical level, this solution ensures that the buildingôs regular users will not be subject to exposure. On a logistical level, this solution provides all of the practical usefulness required.

<u>The installation of the supply circuit</u>

Two outdoor freight elevators dedicated to the site ï capable of carrying a load of 3.2 metric tonnes in a volume of 10m3 ï were installed on the southern façade of the tower. Regular users could, therefore, continue to use the 25 elevators within the tower.

Picture 2: View on the elevator cabins of the Maine-Montparnasse Tower (copyright: ICADE)

Each elevator cabin carried equipment and material necessary for the renovation of the various levels. The elevator would climb the length of a central mast of 200 metres fixed to the façade. Weighing 43 tonnes, this structure sat atop a metal-framed base, itself on blocks fixed into the ground. This setup also allows the companies responsible for disposing of the asbestos to remove it externally.

The renovation of an entire level of around 1200m² equates to a considerable volume of waste to deal with: asbestos contaminated material, suspended ceilings, office partitions, doors, electrical equipment.

In order to link each level to the elevator cage, a gangway equipped with a landing door was installed. On the forecourt, a technical base housed changing rooms and lavatories for the workers, as well as a transfer and delivery area of around 700m² was installed at the foot of the elevators to allow for the loading and unloading of equipment and waste.

Picture 3: View of the technical base (copyright ICADE)

All the asbestos waste is removed to an inerting site. At this stage, asbestos contamination is eliminated by vitrifying the waste with a plasma torch at a temperature of 1600 °C.

Initially set to be operational in 2007, the putting into service of the elevators had to be delayed by several months in order to reinforce the anchorage guaranteeing the stability of the central shaft, allowing the machine to withstand winds of up to 200 km/h.

Another detail that had to be addressed for the worksites on the various levels was the installation of a scissor elevator table at the edge of the façade in order to bridge the gap between the ground and the gangway.

It was also necessary to check that no object or waste could fall from one of the elevators, and wearing hard-hats was compulsory even in the technical base.

Transparency

It is worth noting the effort put into making information available during the first two years. Today, tower staff speak openly of problems caused by the asbestos and the work to remove it. The near twenty Health and Safety committees (CHSCT)[1] of the occupants of the Tower have access to all of the information on prevention measures adopted, and their representatives are represented to the preliminary meeting before the opening of each worksite.

The asbestos removal plans are sent to the Health and safety department of the managing agent of the Tower (ICADE).

To allow for the spread of this information and to fulfil transparency obligations stemming from the Prefectoral Order, a whole range of communication methods were employed.

The health and safety department of ICADE, established to coordinate the works, maintained various information formats, notably the internet portal which included a public section, and one reserved for the occupants and a periodical information letter called ñThe EITMM letterò The first stages of the

[1] Consulted for every company with at least 50 workers, the CHSCTôs job is to contribute to the protection of the health and security of workers, along with the improvement of working conditions. Notably having delegates of the employees in its ranks, the CHSCT has numerous means to successfully carry out its role (information, calling upon expertsé) and the employee representatives benefit from reduced working hours and protection against being fired. These means are reinforced in the case of a high-risk industrial company. In the absence of a CHSCT, the employeesôdelegates carry out these functions.

work were not prepared with sufficient consultation, according to one shop, a member of the board of the EITMM. However, since the establishment of the centre, the cooperation has been real, facilitating research and problem solving.

Biannual reports are sent to the relevant bodies (Labour inspectorate, CRAMIF, Prefecture). They contain detailed information on the stage at which works are at, the preventative measures in place, analysis results, etc...

The global setup put in place here responds well to the difficulties of complex asbestos removal projects which require not only good technical expertise, but also good means of communication.

2.4. What was achieved?

The Maine-Montparnasse Tower is now 90% asbestos-free. The works will be completed in November 2012.

Using the external elevators ensured good working conditions for occupants of and visitors to the Tower, without any risk to health. Moreover, no accident was suffered by workers using the elevator.

The technical base at the foot of the Tower proved to be very useful and permitted monitoring and limiting of access to and from the worksite.

Delivery and removal of asbestos waste was done very effectively thanks to the (external) elevators and this avoided the using the interior elevators at Montparnasse Tower.

There were however some difficulties on the worksite, in particular for workers suffering from dizziness. The internal stairs having been cordoned off to prevent pollution inside the Tower, these workers were therefore assigned to a different site.

In order to reach the worksite on the 57th floor, a worker has to spend 15 minutes in the elevator, which constitutes 1 hour of his day (going up in the morning, lunch break and coming down at night), which reduced the working time by the same amount on the site itself.

Furthermore, the elevators had to be stopped occasionally, either to resolve technical and maintenance problems or because of the weather, strong winds in particular. Each hour the elevator is stopped represents one hour of stoppage of work on the site and it is therefore very costly.

Finally, the worksite facilities had to be under 24 hour surveillance because it is surrounded by a disco and there are a lot of people at night and on the weekends.

Some problems occurred with the Municipality of Paris, who sought to reopen the path which was blocked by the technical base.

2.5. Success factors

The asbestos-removal works at Montparnasse Tower was able to be carried out in the best possible conditions thanks to the exterior elevators that were put in place. The challenge on this worksite was to avoid disturbing those who use the Tower and above all not to contaminate their places of work with asbestos dust. Cordoning off all interior elevators in the Tower made this possible.

Moreover, the communication put in place by ICADE ensured transparency regarding carrying out the works and allowed any problems to be diffused.

Effective cooperation between the various parties also guaranteed the satisfactory carrying out of works.

2.6. Further information

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2.7. Transferability

The solution put in place for this asbestos-removal site was very particular, specifically adapted to asbestos-removal in large buildings.

But the seeking of a technical solution which ensures impenetrable separation between the works and places of employment of the buildingõs occupants may be transposed to other asbestos-removal sites and is essential so that occupants can continue their activities without risk of contamination from the asbestos dust.

The transparency in carrying out the works is an effective means of communication and equally applicable to other worksites, in particular sites that involve many different operations.

3. References, resources:

http://www.travail-et-securite.fr/archivests/archivests.nsf/(alldocparref)/TS691page2_1/$file/TS691page2.pdf?openelement