

## Photoluminescence comes to the Rescue

- Earthquakes,
- Natural Disaster,
- Acts of Terrorism,
- Power Failures, and
- Fires can happen at any time of the day or night.

Panic and Fear can often Grip us all.

The Northridge Earthquake, California, January 17th 1994  
September 11, 2001, Terrorists attacked America  
California hit by more blackouts 10-05-2001

**EARTHQUAKES**

ERUPTION  
FIRES  
FLOODING  
6.8 Quake Hits Seattle, Northwest  
TSUNAMI  
NATURAL DISASTERS  
Malaysia 1992 Black September nationwide power blackout...  
ACTS OF TERRORISM  
Crying, praying and running as the walls began to shake.  
EARTHQUAKE February 3, Turkey 8.5  
POWER FAILURES  
recent crisis in California and the possibility that hackers ... could lead to widespread power failures  
EARTHQUAKE January 1 - Mindanao, Philippines -- 7.5M EARTHQUAKE April 20 - New York - 5.0M  
Earthquake derails Amtrak train near Los Angeles October 16, 1999

No power in New Zealand's largest city 20 February 1998  
Major power outage hits First Coast 4/29/2002 JACKSONVILLE

We all know that disasters lurk around every corner, and they can happen at anytime, anywhere and without warning.

All of us at one time or another will encounter and deal with disasters in greater or lesser magnitude. Our measure of preparedness dictates how well we weather such events, do we come out unharmed, or looking like we've been through a major war.

Sometimes disasters are relatively minor, such as a simple 2 minute power failure. Occasionally, thankfully less often, they can be horrendous, such as;



### **First US Interstate Bank Fire, May 1988**



During the late evening of May 4, 1988, and the early morning of May 5, 1988, members of the Los Angeles City Fire Department successfully battled what has proven to be the worst, most devastating high-rise fire in the history of Los Angeles.

Extinguishing this blaze at the 62-story First Interstate Bank Building, 707 West Wilshire Boulevard, required the combined efforts of;

- 64 Fire companies,
- 10 City rescue ambulances,
- 17 Private ambulances,
- 4 Helicopters,
- 53 Command Officers and support personnel.

A total complement of 383 Fire-fighters and Paramedics, and considerable assistance from other City departments attended this major event.

"It is humbling and terrifying to realize how close we came to losing control of this fire! Had it not been for the extraordinary commitment to duty, staunch determination to extinguish the fire at all costs, and unabated heroism and courage of our brave Firefighters, I am convinced that the fire would not have been contained as it was in 3-1/2 hours."

"In most other cities, the building could have become a charred skeleton and, even worse, Firefighters would have lost their lives. In my view, our City is blessed with the most professional and dedicated Firefighters in the world and this is why only one civilian life was lost and only four floors were gutted."

"The Department has documented specific acts of heroism for future recognition, but I feel compelled to personally thank you for performing your assigned role at the First Interstate Bank Fire."

“As your Chief Engineer, I have received countless accolades on your behalf from throughout the world and know that from the Department's standpoint, this was perhaps our proudest moment for revealing what our people are capable of achieving.”

“You share a role in this achievement and are to be commended for your courage and dedication that prevented the First Interstate Bank Fire from becoming an even greater tragedy.

“For this, the citizens of Los Angeles owe a tremendous debt of gratitude”.

## ● Oklahoma City Bombing – April 19, 1995



The **Oklahoma City bombing was an attack on April 19, 1995** aimed at the Alfred P. Murrah Federal Building, a U.S. government office complex in downtown Oklahoma City, Oklahoma. The attack **claimed 168 lives and left over 800 injured**.

Until the September 11, 2001 attacks, it was the deadliest act of terrorism on U.S. soil. Shortly after the explosion, an Oklahoma Highway Patrol officer pulled over 27-year-old Timothy McVeigh for driving without a license plate and unlawfully carrying a weapon.

Within days after the bombing, Timothy McVeigh and Terry Nichols were both arrested for their roles in the bombing. Investigators determined that McVeigh and Nichols were sympathizers of an anti-government militia movement and that their motive was to avenge the government's handling of the Waco and Ruby Ridge incidents.

McVeigh was executed by lethal injection on June 11, 2001; Nichols was sentenced to life in prison. A third conspirator, Michael Fortier, who testified against the two conspirators, was imprisoned for failing to warn the U.S. government. As with other large-scale terrorist attacks, conspiracy theories dispute the official claims and point to additional perpetrators involved.

The attacks led to widespread rescue efforts from local, state, and federal agencies, along with considerable donations from across the country.

As a result of the destruction of the Alfred P. Murrah Federal Building the U.S. government passing legislation designed to increase protection around federal buildings and to thwart future terrorist attacks. Under these measures, law enforcement has since foiled over fifty domestic terrorism plots.

On April 19, 2000, the Oklahoma City National Memorial was dedicated on the site of the Murrah Federal Building to commemorate the victims of the bombing and annual remembrance services are held at the time of the explosion. - **LEST WE FORGET!**

## New York, September 11, 2001 Terrorist Attack



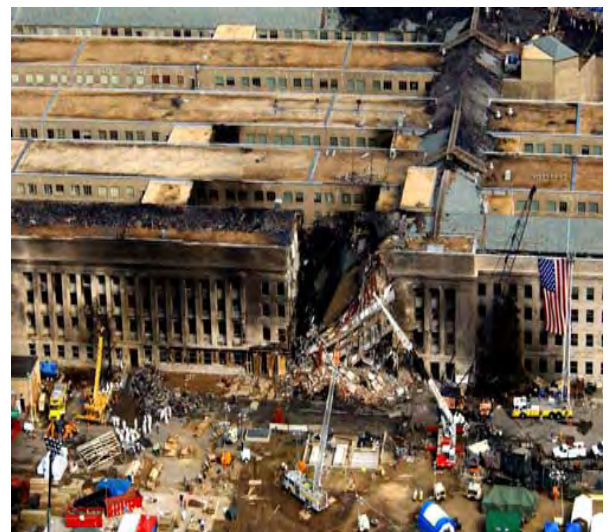
The **September 11, 2001 attacks** (often referred to as **9/11**) consisted of a series of coordinated suicide attacks by al-Qaeda on that date upon the United States of America. On that morning nineteen terrorists affiliated with al-Qaeda hijacked four commercial passenger jet airliners.

Each team of hijackers included a trained pilot. The hijackers intentionally crashed two of the airliners (American Airlines Flight 11 and United Airlines Flight 175) into the World Trade Center in New York City, one plane into each tower (1 WTC and 2 WTC), resulting in the collapse of both buildings soon afterward and extensive damage to nearby buildings.

The hijackers crashed a third airliner (American Airlines Flight 77) into the Pentagon in Arlington County, Virginia, near Washington, D.C.

Passengers and members of the flight crew on the fourth aircraft (United Airlines Flight 93) attempted to retake control of their plane from the hijackers; that plane crashed into a field near the town of Shanksville in rural Somerset County, Pennsylvania.

In addition to the 19 hijackers, 2,974 people died as an immediate result of the attacks, and the death of at least one person from lung disease was ruled by a medical examiner to be a result of exposure to WTC dust. Another 24 people are missing and presumed dead. The victims were predominantly civilians. **LEST WE FORGET!**



## **Northeast Blackout of 2003** - Biggest Blackout in North American History



The Northeast Blackout of 2003 was a massive power outage that occurred throughout parts of the North-Eastern United States and Ontario on Thursday, August 14, 2003.

Although not affecting as many people as the later 2003 Italy Blackout, it was the largest blackout in North American history.

It affected an estimated 10 million people in the province of Ontario (about one-third of the population of Canada), and 40 million people in eight US States (about one-seventh of the population of the U.S.). Outage-related financial losses were estimated at \$6 billion USD (\$6.8 billion CDN).

## **2004 Madrid train bombings – 11<sup>th</sup> March 2004**



In Madrid, Spain on 11 March 2004 ten explosions, packed into 13 rucksacks and detonated by cell phones, occurred on four commuter trains at the height of rush hour killing 191 civilians and injuring over 1,800. Police also carried out a controlled demolition of 3 other explosive devices. The first group suspected of involvement was the Basque ETA; however investigations later focused on the Islamic extremist Moroccan Islamic Combatant Group (GICM). It was the deadliest attack on European civilians since the Lockerbie bombing of 1988. To date more than 70 men have been arrested in the bombing.

## London train & bus bombings - 7 July 2005

The **7 July 2005 London bombings** (also called the **7/7 bombings**) were a series of coordinated terrorist bomb blasts that hit London's public transport system during the morning rush hour. At 8:50 a.m., three bombs exploded within fifty seconds of each other on three London Underground trains.

A fourth bomb exploded on a bus nearly an hour later at 9:47 a.m. in Tavistock Square. The bombings killed 52 commuters and the four radical Islamic suicide bombers, injured 700, and caused disruption of the city's transport system (severely for the first day) and the country's mobile telecommunications infrastructure



## Hurricane Katrina – 28<sup>th</sup> August 2005

On August 28<sup>th</sup>, 2005, Hurricane Katrina hit the southern coast of the United States with devastating effect. It was reported that more than 1,800 people lost their lives, and more than \$81 billion dollars in damages occurred.

As a result, efforts to assist those affected by Hurricane Katrina still continue, as those affected by the terrible hurricane continue to work to regain the health and livelihood that they had before the storm. The resources below provide access to historical information related to the event, as well as on-going aid and assistance that is currently available to the affected public.



A disaster can be of limited scope, as with water dripping on a computer system, or it can be of city-wide magnitude, as with a major earthquake, flooding, Fire or an Act of terrorism.

All of these extremes fall within the realm of disaster planning. All levels of disaster must be examined, thought out, discussed, planned, implemented, and most importantly (and most often forgotten) tested over and over again.

73% of deaths in fires in buildings are caused by smoke. Fires can produce dense smoke which can quickly fill buildings from the ceiling down within minutes, and many accidents can happen when people try to evacuate buildings during power failures and fires, when lighting is limited or no longer available. (**Even Emergency Back-up power can fail**)

A simple Long-persistence **Photoluminescent Emergency egress system**, marking out escape routes can make an important contribution to people's abilities to find their way out of a building quickly, efficiently and above all safely.

Reports show that on September 11<sup>th</sup> 2001, a high percentage of the occupants in the Twin Towers, who escaped the collapse, can attribute or at least in part their escape due, to the fact that placement of **PHOTOLUMINESCENT paint and markings** on the egress paths assisted occupants during egress and that training programs had been put in place following the bombing of the World Trade center 1993.

**Photoluminescent materials** and the planning of such **Photoluminescent systems**, is the basis for this website. This website explains what a **Long-Persistence Photoluminescent Emergency egress system** is and how it can further contribute to human safety in circumstances in which there is;

- 1) Reduced lighting or smoke from fires in buildings.
- 2) Where there are way finding difficulties.
- 3) Where not all routes are familiar to the majority of building users.

The effectiveness of **Photoluminescent materials** are appraised in relation to electrical lighting systems. Although not yet introduced fully into codes and standards, recent research and development work in USA, Great Britain Germany, Sweden, suggests that a **Photoluminescent escape system**, if correctly applied, can be more effective and efficient than Standard emergency lighting in terms of maintenance, costs, and as an aid to Safe evacuation.

## INTRODUCTION

Most people are unfamiliar with the word **Photoluminescent** and if we were to use the term "Glow in the Dark" or "Luminous" most people would associate it with Novelty toys or in worst case scenario, they would associate it to Radio Active Materials. Few recognize or realize the actual **Safety Benefits of Photoluminescent (Glow in the Dark) materials** for use in life saving situations.

The concept of **Photoluminescent material** is not a new development. In early wars, the Army they would smear it over their hands so as to be able to read Maps and Signal in hours of darkness.

Earlier **Photoluminescent materials** have been justifiably considered to be unsatisfactory as part of safety systems, considered more suitable for novelty application such as Glow in the Dark Toys.

This conclusion together with a general lack of familiarity with **Photoluminescent products** is reflected in the absence of little or no allowance for the Photoluminescent materials in Building Codes and Life Safety Codes.

In recent years, technology has greatly advanced the performance and characteristics of **Photoluminescent materials**. Together with this, there have been further developments, new sophisticated ways the materials are now used, a better appreciation of their unique functions, abilities for safety applications and a greater variety of types of material to suit **specific safety needs**.

Around the world, there is now also an increasing awareness and appreciation of the value of well-planned **Long-persistence Photoluminescent Emergency egress systems**, which solves several safety and evacuation problems that are seldom answered by other means.

For instance, the provision of guidelines and direction indicators at ground level can help to overcome the problems of evacuation caused by lack of visibility and disorientation in smoke conditions.

By accepting and adding these guidelines, governing bodies will obviously fore-fill an important role in creating a safer society for all! We believe our **Photoluminescent materials and systems** deserve the earnest consideration of all those concerned, including;

- ✓ Building Owners,
- ✓ Facility Manager,
- ✓ Fire Marshall's,
- ✓ Safety Inspectors,
- ✓ Architects, legislation and enforcement of safety provisions.

The purpose of this website is to provide a preview of the potential applications of **High Performance Long-persistence Photoluminescent Emergency egress systems**.

A **Long-persistence Photoluminescent Emergency egress system** is a combination of **Photoluminescent materials** located in;

- ❖ buildings,
- ❖ ships,
- ❖ defense establishments,
- ❖ underground railways,
- ❖ Tunnels ,Mines etc,

In a manner in which the visible directions help to ensure a safe, and above all, orderly evacuation and prevention of panic if power fails and:

1. **There is no emergency lighting**, or
2. **The emergency lighting does not work** or
3. **Smoke obscures the emergency lighting**.

**Photoluminescent materials** absorb and store light energy when excited by natural or artificial light sources such as fluorescent light, U.V Light, sunlight, etc.

Once excited, **Photoluminescent materials** will gradually and continuously release absorbed energy in the form of visible light for a period of time even after the excitation source is removed and will remain visible to dark-adapted eyes for more than 20+ hours.

The types of **Photoluminescent materials** used are:

- Paints,
- PVC Foils,
- Plastic sheet,
- Tapes
- Plastic Marker Indicators.
- Ceramics Markers
- Carpet and Flooring Vinyl's

These are arranged as stripes, bands or arrows on walls, floors and stairs, on and around doors, behind emergency equipment, and as printed signs and diagrams.



## Advantages;

- ✓ Good illumination of areas to be safeguarded
- ✓ Good visibility of markings, diagrams, signs, telephones, fire extinguisher, rescue equipment
- ✓ Good psychological effect inspires confidence and discourages panic
- ✓ Perfect recognition of corners, turnings, taps, switches
- ✓ Economical, even small rooms or dead ends can be equipped with **Photoluminescent products** at minimal cost.
- ✓ The layers of **Photoluminescent materials** are very thin, so they may be applied everywhere without decreasing the space of the passage. Wear-resistant paints can even be applied to floors.
- ✓ **Photoluminescent coatings** are very robust and due to their thinness not in danger of mechanical damage. At the same time, they are resistant to mechanical strain. Even strong mechanical abrasion cannot lead to failure; at worst, the light intensity decreases, if part of the coating is knocked off.
- ✓ **Photoluminescent products** are usually applied on large areas. Therefore, partial soiling does not impair the effectiveness. Their efficiency is only slightly affected by single objects or persons in front of the coated areas.
- ✓ **Photoluminescent products** are usually applied in the form of a guidance line, on the floor or the lower part of the wall, so that this can be followed even in strong smoke by crawling.
- ✓ **Photoluminescent products** are unconditionally suitable for use in areas with risk explosion.
- ✓ The functioning of the **Photoluminescent materials** is guaranteed from 50 to 100C - provided the materials are given sufficient light before blackout, total or partial failures are impossible.
- ✓ Part of the lighting system providing energy to the materials may fail, but does not lead to failure of the materials; it only decreases the light intensity in an emergency.
- ✓ All possible defects of the lighting system will be immediately obvious, such as breakdown of light installation, soiling of the **Photoluminescent coatings** or mechanical damage.
- ✓ **Photoluminescent systems** function for more hours than electric systems, providing an aid to fire and rescue workers. The glow of the materials will not dazzle their dark-adapted eyes -no additional expenses.
- ✓ This system needs no maintenance other than cleaning of and when necessary.
- ✓ No checks of functioning need be made.
- ✓ Visual inspections are sufficient.

## Disadvantages:

- Lower brightness than lamps - decrease of light intensifies as stored light is emitted. However, this decrease is compensated to a great degree by the adaptation of the eye to the decreasing light -it is necessary to illuminate the evacuation routes at least from time to time -the light intensity depends on the brilliance of the light prior to the blackout, and on the source of light.