'INDUSTRY NEW's!'

Evacuate Without Fear When the Lights Go Out.

Photoluminescent emergency pathway marking systems bring a new level of safety to manufacturing environments.

By Arthur Forst and Robert Katz

Modern manufacturing plants are highly complex environments, packed with machinery, work centers, conveyors, shelves, storage bins, parts, supplies, overhead transport systems, furniture, computers and process control equipment.

Throughout the plant in a constant state of movement and flux are the employees, line workers, assemblers, packers, supervisors, managers, support and administrative personnel.

Employees are typically trained to evacuate the building via the nearest exit. Under normal working conditions, occupants are guided around plant floor obstacles by a well-defined path of egress.

Strategically posted evacuation maps define egress routes from the map locations to the exit doors.

During a fire and smoke or blackout emergency, fleeing occupants can become confused, disoriented and sometimes panicked. Under these conditions, the essential need to ***rapidly move employees from danger to safety in an orderly manner*** can be quickly compromised.

A photoluminescent glow-in-the-dark emergency pathway marking system is a value-added complement to normal safety procedures that not only reduces confusion and panic, but also helps save lives by illuminating the path of egress.

Recent Developments

Two related developments recently forced photoluminescence to the forefront of awareness within the safety community.

1. NFPA 101 LIFE SAFETY CODE:

In December, 2000, a new clause in the 2000 Edition of the NFPA 101 Life Safety Code (Chapter 7, Section 7.10.7.2) **eased and expanded the criteria for photoluminescent above-the-door exit signs** to allow for their use in locations where the signs are continually exposed to a minimum light level while the building is occupied.

The charging illumination on the sign must be a reliable light source as determined by the Authority Having Jurisdiction.

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 - **Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au

2. UL STANDARD 924:

The revised NFPA 101 Life Safety Code (see above) paved the way for adoption of the ***first-ever photoluminescent above-the-door exit sign standard***.

On July 11, 2001, Underwriters Laboratories published UL Standard 924 SUPPLEMENT SG – PHOTOLUMINESCENT EXIT SIGNS.

This revised standard details stringent performance, durability and legibility criteria which a photoluminescent exit sign must meet to be certified in conformance with UL 924.

Above-the-door photoluminescent exit sign listings to a UL 924 standard obtained prior to July 11, 2001 do not conform to the newly adopted standard and are now invalid.

The updated NFPA 101 code in combination with the corresponding UL 924 exit sign standard, for the first time, gives building owners, managers and occupants the choice to use an ETL- or UL-listed photoluminescent exit sign ***in place of electric and radioactive tritium above-the-door exit signs***.

Understanding Photoluminescence

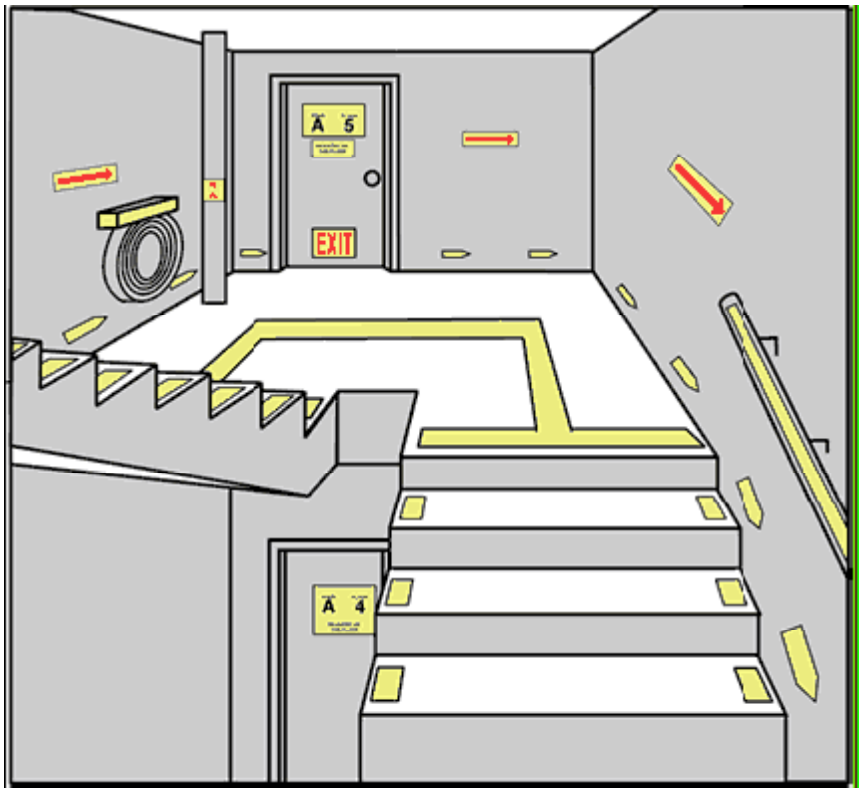

Figure 2

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 - **Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au

The photoluminescent glow-in-the dark phenomenon comes from rare earth mineral crystals found in nature that have the unique capacity to absorb and store energy from ambient light.

When the lights dim or go out, the absorbed light energy is released, and the crystals emit a luminous glow. The glow commences automatically without any human, mechanical or electrical intervention.

It is precisely this ***automatic activation*** that renders photoluminescent products useful during an emergency.

Photoluminescent crystals are the basic component of glow-in-the-dark pigments.

Two pigment types are used commercially.

- **NOVELTY-GRADE** pigments are made with Zinc Sulfide crystals. Zinc sulfide pigments were developed in the 1940s and are now found primarily in toys and novelties.

Some manufacturers continue to use zinc sulfide pigments ***inappropriately*** in a variety of safety products.

- Authentic **SAFETY-GRADE** photoluminescent pigments made with Strontium Oxide Aluminate crystals became commercially available only a few years ago. Gram for gram, strontium oxide aluminate pigments glow ten times brighter and ten times longer than zinc sulfide pigments after exposure to the identical light.

Long afterglow strontium oxide aluminate pigments are now widely acknowledged as ***essential to the effective performance of photoluminescent safety products***.

Photoluminescent Performance.

All photoluminescent products require the presence of natural, fluorescent or incandescent light to charge and store light energy.

The brightness intensity and afterglow of photoluminescent signs and markers depends on several factors:

- ***The type of pigment used***. Strontium oxide aluminate pigment is ***the only pigment appropriate for safety products.***

- ***Level of pigment concentration.*** A higher pigment concentration typically results in a brighter, longer-lasting afterglow.

- ***Intensity of the charging light and the duration of exposure.*** The brighter the charging light, the more energy is absorbed and the brighter the afterglow.

As little as 5 foot-candle illumination (roughly equivalent to the light from a 15 watt incandescent bulb) should be sufficient to charge safety-grade photoluminescent signs.

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 **- Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au

GLOW-TIME:

SAFETY-GRADE photoluminescent signs and markers glow visibly for at least eight hours after all light has been extinguished.

The NFPA 101 Life Safety Code and UL Standard 924 focus on the first 90 minutes of an emergency since that is the time when occupants are most likely to be evacuating a building.

PRODUCT LIFE SPAN:

SAFETY-GRADE photoluminescent signs recharge fully in 30 to 60 minutes when light is restored, ready to glow again for another 8 hours.
Photoluminescent pigments ***charge and discharge indefinitely*** and have no predetermined life span. Depending on wear and tear and environmental conditions, the useful life of a photoluminescent sign can span 20 or more years.

PRODUCT FORMATS

Photoluminescent safety products are available in two basic formats:

☑ **Flexible, pressure-sensitive self-adhesive peel-and-stick appliqués** for concrete floors, wall-board, machinery and equipment.

Peel-and-stick markers are routinely used to denote direction of egress and the presence of obstacles.
For example, disks with arrows adhered to the floor and wall guide occupants along egress pathways from their work-stations to the building exits.

Strips of flexible photoluminescent tape adhered to machines and shelves glow in the dark to warn occupants of dangerous obstacles.

☑ **Rigid signs and markers for installation on walls, doors and columns**.

Rigid photoluminescent evacuation map signs direct occupants from a precise location (e.g., an elevator landing) to alternative evacuation routes. Other rigid photoluminescent signs point to exit doors, identify emergency evacuation stair letters and floor numbers, and pinpoint emergency equipment (e.g., fire extinguishers), areas of danger (e.g., high voltage), and areas of refuge.

Evacuation Route Maps

☑ Evacuation route maps are worthy of special attention. During an emergency, even the most familiar surroundings can become confusing.

☑ Fleeing occupants are often disoriented and encounter difficulty finding emergency evacuation routes and exits they casually pass through every day.

☑ Legible, uncomplicated evacuation maps can provide a lifeline to nervous, frightened occupants seeking a safe, reliable emergency egress route.

☑ Evacuation route maps must be kept current.

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 **- Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au

☑ Space utilization within plant environments is dynamic and changeable.

☑ Equipment is routinely added and retired, and production lines are modified and relocated. Moreover, evacuation route maps, no matter how clearly rendered, are useless if they are invisible in the dark.

☑ To be reliable and effective, map signs must be legible in both light and dark environments and possess the design flexibility to accommodate constant evacuation route changes and updates.

☑ One cost-effective solution is to insert a removable transparent map between a photoluminescent background and clear protective cover and enclose the three components inside a frame. The map will glow in the dark, and the transparency can be readily updated and replaced when necessary.

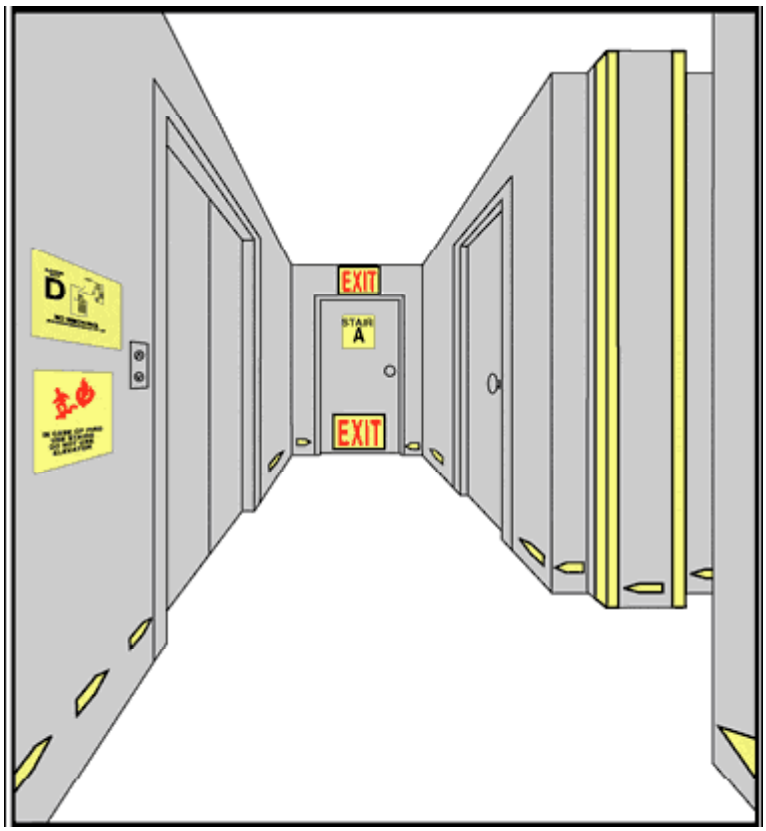

Figure 1

Where to Install a Photoluminescent Emergency Pathway Marking System

- A typical photoluminescent system application calls for a combination of signs, strips and directional symbols strategically placed where they can be easily seen by building occupants and visitors.
- Photoluminescent pathway markings define all evacuation routes and provide visual guidance for safe, rapid, orderly egress.

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 - **Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au

- The glowing directional signs and symbols evoke comfort and alleviate confusion and panic in fire, smoke and blackout conditions.

Figure 1 details the occupant corridor photoluminescent pathway marking system adopted by the ASTM as their implementation standard.

This illustration can be interpreted as follows for a manufacturing plant installation.

1. Mark critical pathways from work centers to points of egress with either discrete floor markings spaced 12 to 24 inches apart or continuous wall board marking strips.

   When using discrete markings, place them on either side of the egress path to delineate a clear, unobstructed walkway to the exits.

2. Clearly mark leading edges of stationary and portable machinery, shelving and walls with photoluminescent appliqués. Photoluminescent signs should reveal conflict areas as well as obstructions that can impede evacuation and injure fleeing occupants.

3. Identify exits with both low-level (i.e., 12 inches above the floor) and UL 924-compliant above-the-door photoluminescent exit signs. Doors that are not exits or that lead to dead-ends should be marked as well.

4. Place photoluminescent code-compliant evacuation maps at strategic junctures along the paths of egress and adjacent to elevators.

5. Photoluminescent stairway identification signs in tactile and Braille format that conform to both local and Americans with Disabilities Act mandates should be placed on the occupant side of exit doors.

6. Permanent photoluminescent signs and markers should identify fire extinguishers, standpipe and fire hose locations, alarms, emergency telephones, first aid kits and first aid stations. Other signs should define danger areas that are difficult to see in darkness.

Figure 2 illustrates the typical emergency stairwell photoluminescent signage and egress marking schematic adopted by the ASTM standards committee.

The potential for accidents is greater in stairwells. Ideally, a photoluminescent escape route, including the components shown on the diagram, should be installed from top to bottom in a continuous manner. This drawing is applicable to all buildings.

In addition to manufacturing floors, public corridors and stairways, photoluminescent signs and markings should reveal routes of egress from back-of-house areas normally accessible to staff, but off-limits to the public.

These locations include mechanical, electrical, telephone, elevator machine, switchgear and water equipment rooms.

SAFETY-GRADE PHOTOLUMINESCENT ADVANTAGES

Installation of safety-grade photoluminescent signs and pathway markers offers building owners and occupants a number of key advantages:

- **Fail-Safe**:
  - **SAFETY-GRADE** photoluminescent signs and markers ***activate automatically*** the instant the lights go out and glow for a minimum of 8 hours.
  - No human, mechanical or electrical intervention is necessary.
  - The signs ***recharge automatically*** all the time, every time as soon as light is restored.
- **Non-Electric**:
  - Photoluminescent signs are non-electric and need no hard-wired electric circuits to operate.
  - They consume no power and, therefore, help ***conserve energy***.
- **Indefinite Life Span**:
  - The ***useful life*** of a photoluminescent sign is ***indefinite***.
  - The glowing pigments last forever.
  - The glowing and recharging phenomena will continue as long as the sign is kept clean and has not been vandalized, defaced, marred or otherwise damaged.
- **Maintenance-Free**:
  - Photoluminescent signs require ***no batteries***,
  - Photoluminescent signs require ***no periodic***
  - Photoluminescent signs require ***battery testing and no bulb replacement***.
  - Moreover, since photoluminescent signs last indefinitely, it is not necessary to record and track photoluminescent sign expiration dates.
- **Non-Radioactive**:
  - Photoluminescent signs are ***non toxic, non-radioactive and environmentally friendly***.
  - Unlike expired tritium-powered exit signs, photoluminescent signs create no hazardous radioactive waste.
- **Economical**:
  - Over the course of a 10-year installation, cost-effective photoluminescent signs save thousands of dollars in maintenance, testing, and electric power.
  - Photoluminescent Emergency Pathway Marking Systems are a recognized, method for improving plant safety.
  - Be sure to insist on **SAFETY-GRADE** photoluminescent products made with Strontium Oxide Aluminate pigments.

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 - **Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au

- Do not accept Zinc Sulfide pigment-based novelty-grade products for safety applications.
- Finally, **be sure all photoluminescent above-the-door exit signs you purchase are ETL- or UL-listed and conform to the UL 924 standard recently adopted on July 11, 2001.**

Arthur Forst & Robert Katz *of Dura Architectural Signage, Long Island City, New York oversee manufacturing, marketing and sales of photoluminescent safety signs and pathway marking products.*
Mr. Forst is an active member of the National Electric Sign Association. Mr. Katz serves as treasurer of the International Photoluminescent Safety Products Council.

Unit 31 Surfers Palms Plaza, 50 St Kevins Ave, BENOWA, Qld, Aust 4217
Tel: +61 07 55977768 - **Mob:** +61 0408 701247 - **Fax:** 61 07 55977977
E-mail: info@nightbright.com.au **Website:** www.nightbright.com.au