

# Watermist Fire Extinguishing Technology

DOE/Contractor Fire Protection Workshop

April 30, 2008





# What is Watermist?

- **NFPA 750 – Standard on Watermist Fire Protection Systems**
- **3.3.17\* Water Mist.** A water spray for which the  $Dv_{0.99}$ , for the flow-weighted cumulative volumetric distribution of water droplets, is ***less than 1000 microns*** at the minimum design operating pressure of the water mist nozzle.
- ***Not to be confused with “Water Spray”***

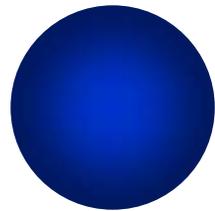


# Watermist Background

- Watermist originally developed for shipboard applications
- Development of land-based systems is limited
- Most versatile systems are derived from ship-board applications



# How does Watermist work?



**Sprinkler**

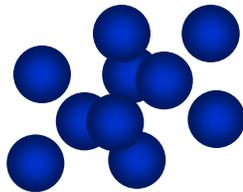
No. of drops  
Drop size (avg)  
Surface area  
Vaporization

1

>1000  $\mu\text{m}$

1

1 sec



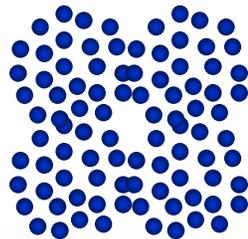
**Class 2 Mist**

40

300  $\mu\text{m}$

10

0.1 sec



**Class 1 Mist**

8000

50  $\mu\text{m}$

400

0.003 sec



# Cooling-

- Ultra fine droplets create extensive cooling surface area
- Air entrainment into the fire plume assists penetration of droplets to the fire
- Cooling of the hot burning gases



# Radiant Heat Absorption

- High mist density (large quantity of small drops)
- Absorbs & scatters heat radiation - prevents fire spread
- Assists fire fighting activity



# Oxygen Depletion (Local Inerting)

- Small droplets turn to vapor faster than bigger droplets
- Water expands 1760 x when turning to vapor (>100°C)
- Vaporization 'blocks' oxygen locally from fire source



# Performance Characteristics

- **Uses Very Small Amount of Water**
  - ❑ **No Thermal Shock**
  - ❑ **No Runoff/Cleanup**
- **Mist is Electrically NON-conductive\***
- **Works in Open Areas**
- **Inexpensive extinguishment**



# Watermist

- **Manufactured by Fike, Chemetron, Marioff, Securiplex, Tyco**
- **Single-fluid/Dual-fluid**
- **One pipe/two pipe**
- **Nozzles flow 1-3 GPM**
- **High, Intermediate, Low Pressure**
- **Self-contained, plant, pumped systems**
- **Total Flood/local application, wet sprinkler, pre-action sprinkler, smoke scrubbing**
- **Light hazard, Ordinary hazard**

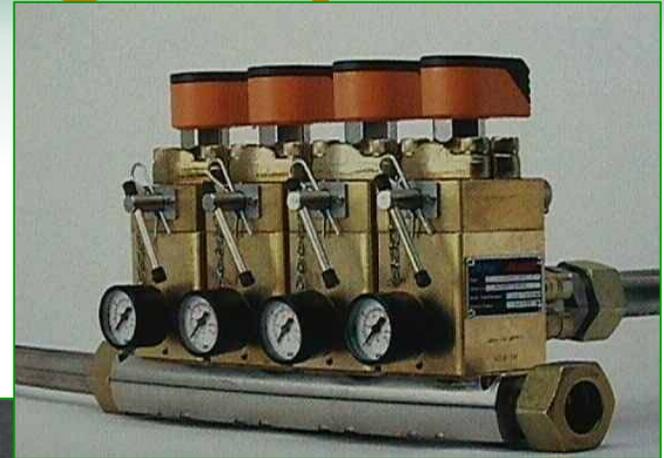


# Water Mist Systems

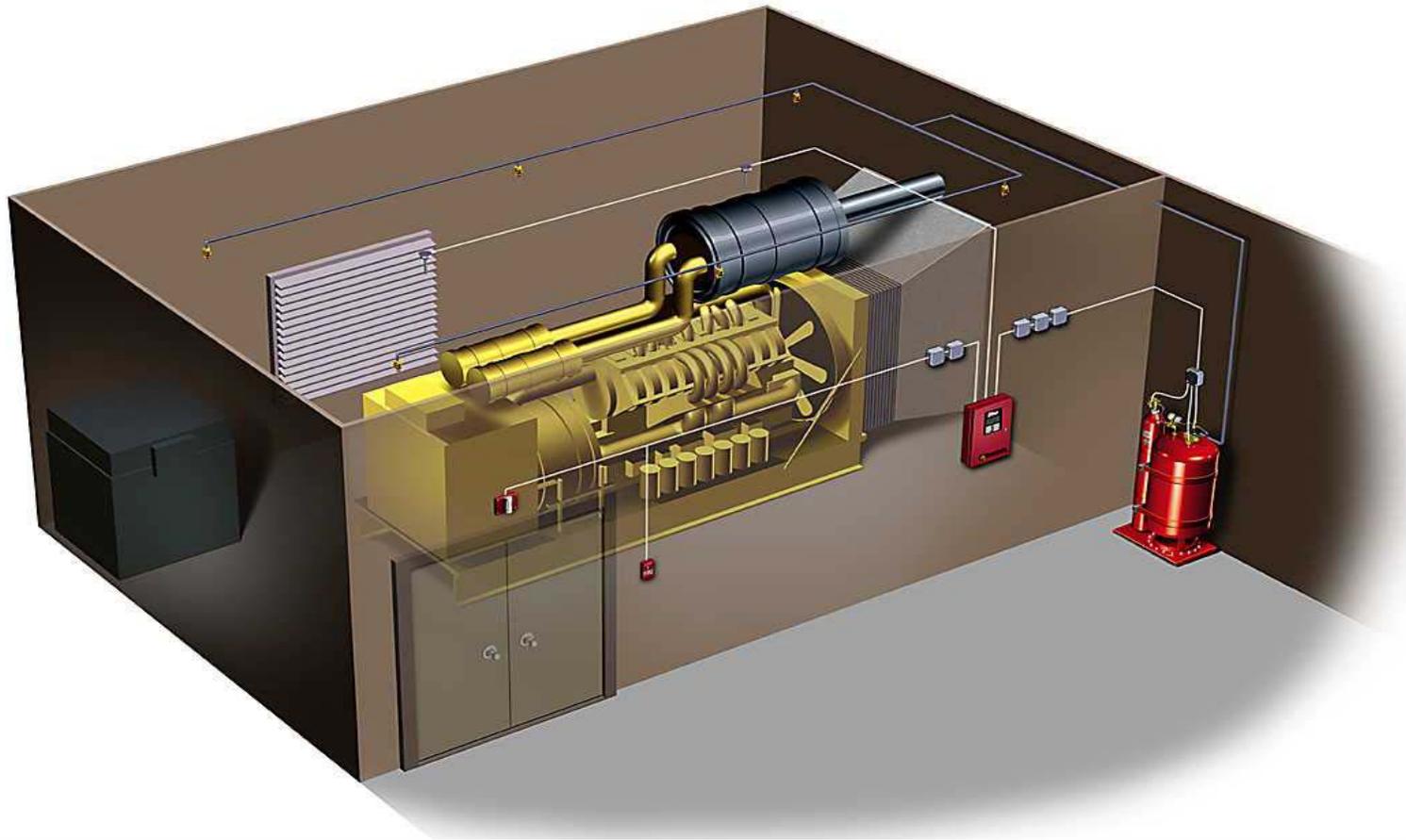


# Water Mist Discharge Options

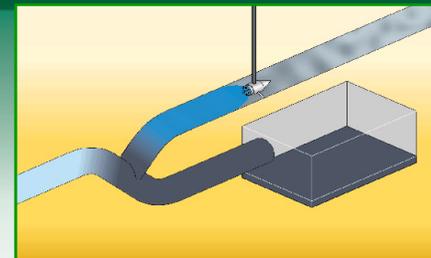
- Pre-action
- Double interlock
- Wet Sprinkler
- Total Flood
- Local Application

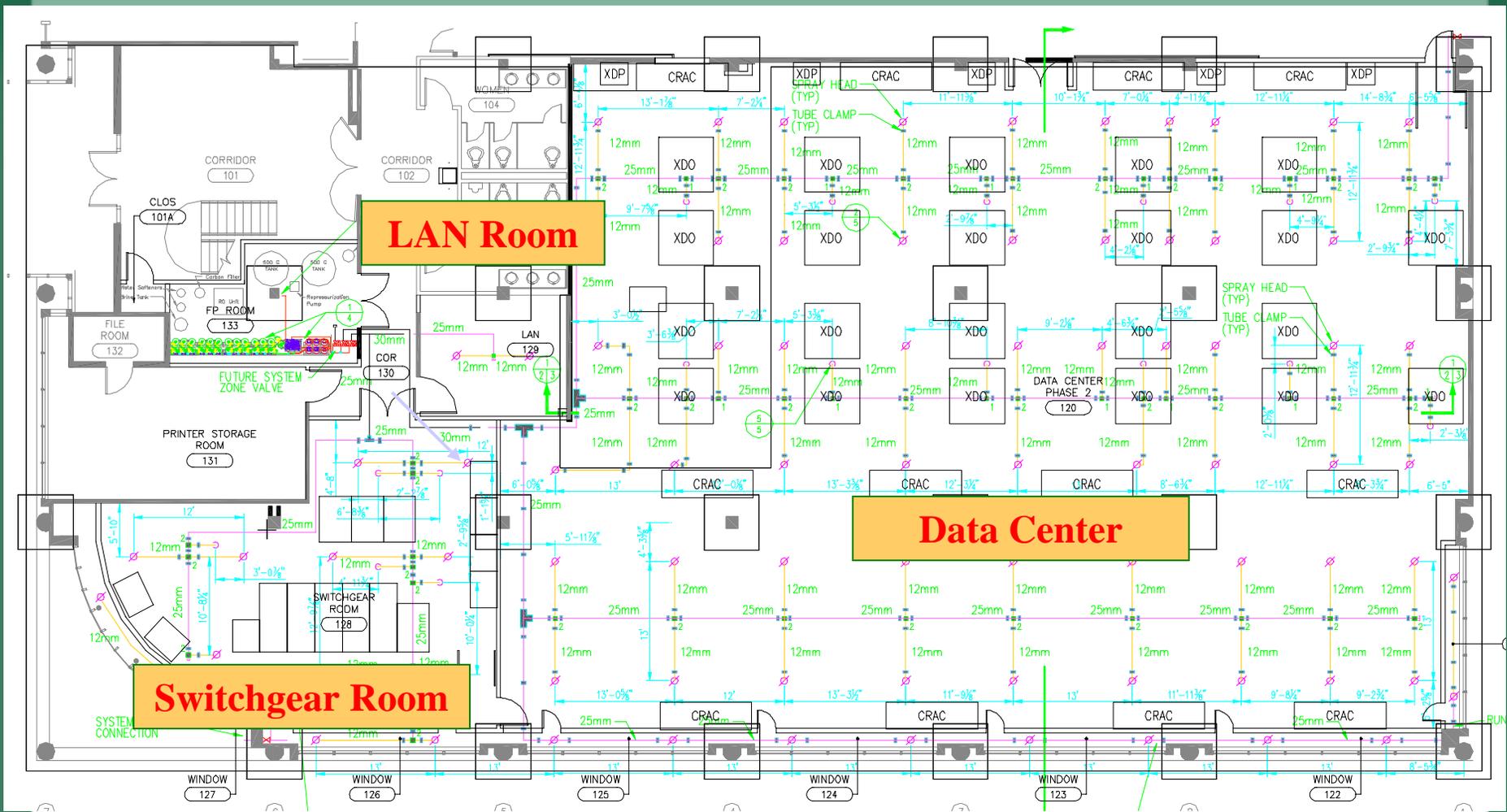


# Water Mist – Typical installation



# Smoke Scrubbing





# Plantwide Deployment



Protection for Nine Diesel Gensets, Four Electrical Rooms and Fuel Transfer Area



# Generator Building Watermist



# Watermist as an Alternative

## ➤ Gaseous Systems

- ❑ Requires tight enclosure
- ❑ Expensive to Recharge
- ❑ Accidental Discharges Common
- ❑ One Shot and done
- ❑ Lethal Concentrations Used in Some Applications

## ➤ Sprinkler, Waterspray

- ❑ Thermal Shock
- ❑ Cannot Extinguish 3-dimensional fire
- ❑ Slow Response
- ❑ Water Usage
  - Significant supply required
  - Poses Environmental Hazard



# Questions?

