

# ***Technology on the Horizon***

***Office of Surface Mining***

***Appalachian Blasting Workshop***

***Wheeling, West Virginia***

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*November 18, 2008*

# ***Explosives Industry.....***

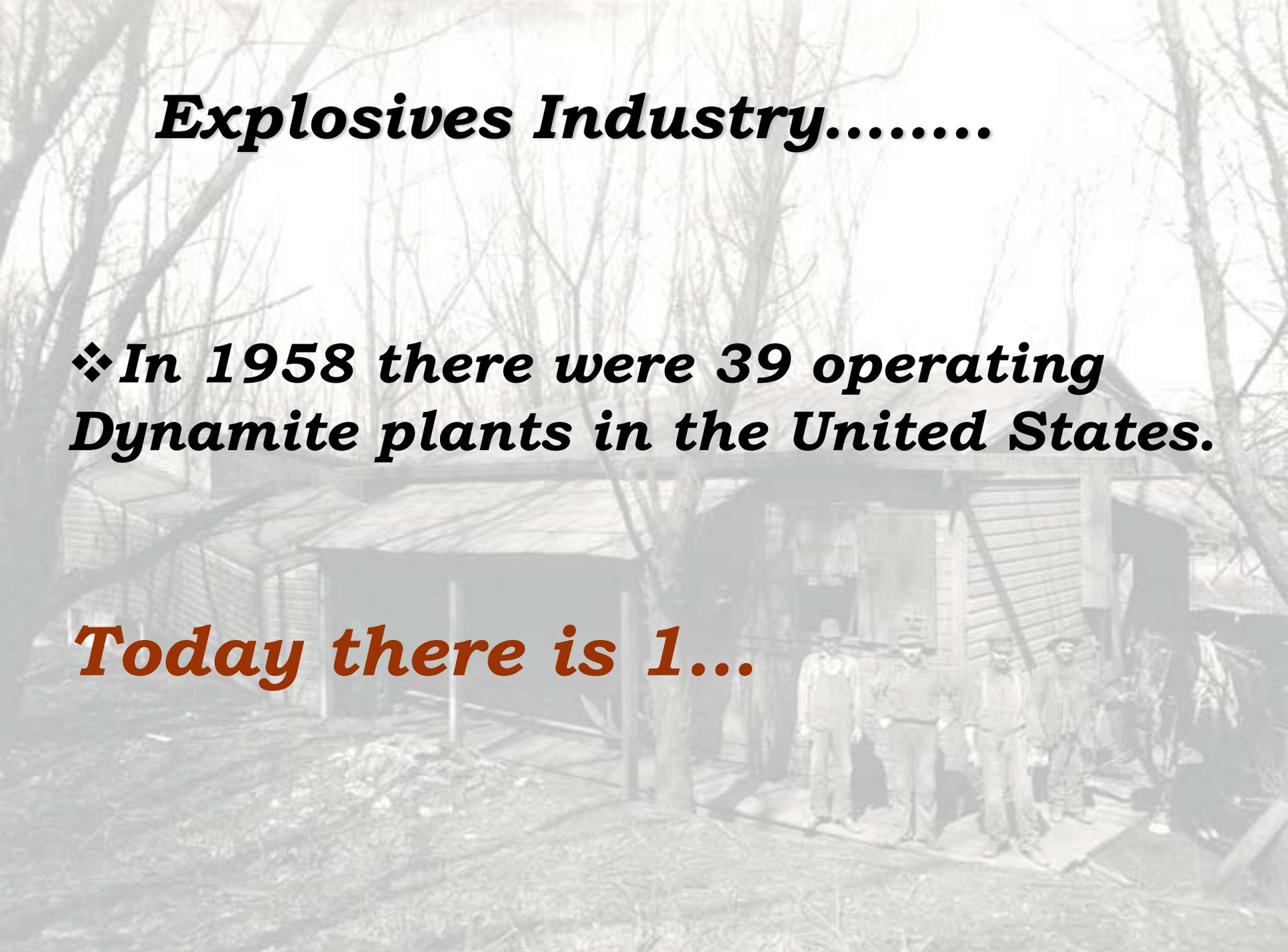


- ❖ ***The Modern Explosives Industry is less than 200 year old..***
- ❖ ***In the past 50 years, we have transitioned from Dynamite to ANFO, Water Gels and Emulsions.....***

# ***Explosives Industry.....***

***❖ In 1958 there were 39 operating  
Dynamite plants in the United States.***

***Today there is 1...***



# ***Explosives Industry Today...***

***The US Explosives Industry is a 7 billion pound market and 120 million detonators...***

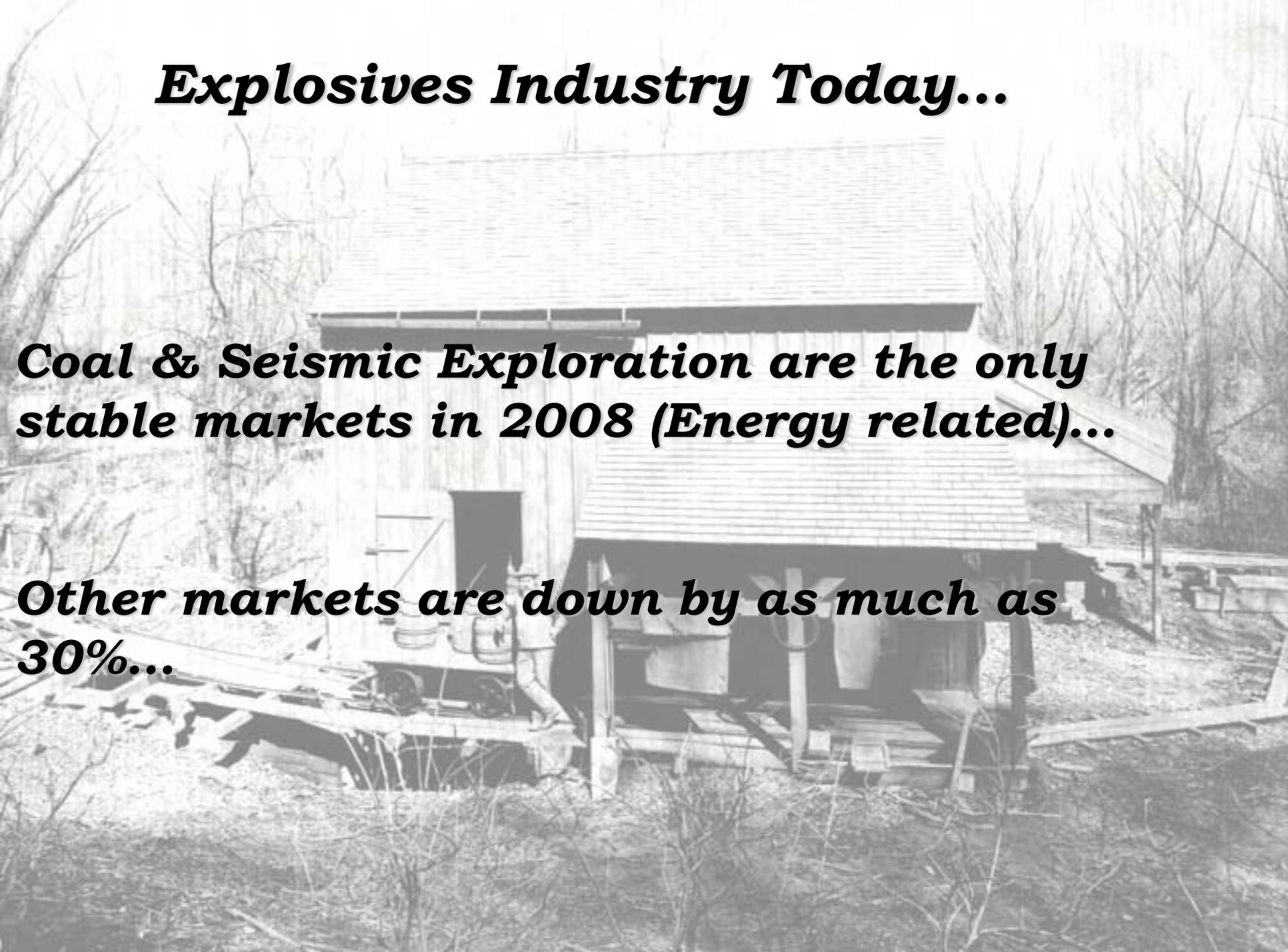
***With consumption at:***

- ***Coal Mining 66%***
- ***Non-metal mines and quarries 14%***
- ***Metal mining 10%***
- ***Construction 7%***
- ***Miscellaneous 3% ...***

# ***Explosives Industry Today...***

***Coal & Seismic Exploration are the only stable markets in 2008 (Energy related)...***

***Other markets are down by as much as 30%...***



*Why Must We Blast ?*

***To irritate neighbors and regulators?***

# *Why Must We Blast ?*

*To irritate neighbors and regulators?*

❖ **Commercial explosives are an integral part of the US economy.**

# *Why Must We Blast ?*

*To irritate neighbors and regulators?*

*❖ Commercial explosives are an integral part of the US economy.*

**❖ The safest & most cost effective method to recover our natural resources**

# *Why Must We Blast ?*

***Blasting operations are regularly and routinely conducted in the construction, mining and quarrying industries.....***

***SAFELY !***

# ***Current and Future Issues...***

***❖ Technological Advancements***

***❖ Personnel Requirements***

***❖ Regulatory Compliance***

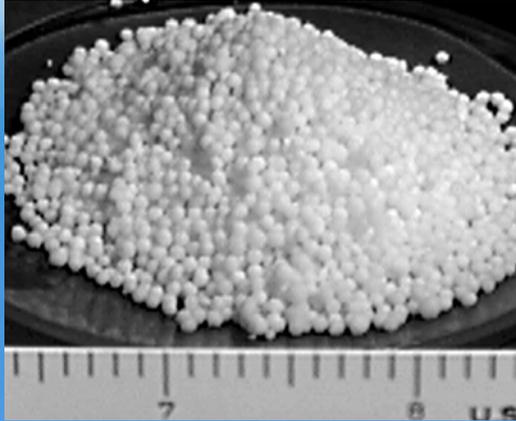
# ***Technological Advancements***

***❖ Emulsion Explosives, both High Explosives and Blasting Agents are continuing to be the Explosives of choice...***

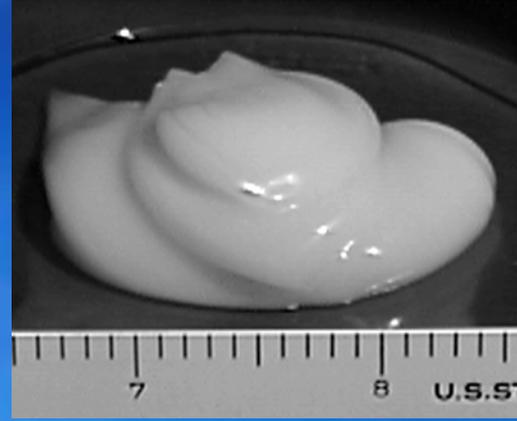
***❖ Nitrogen based products have been the technology trend and will continue...***

# ***AN-Based Products***

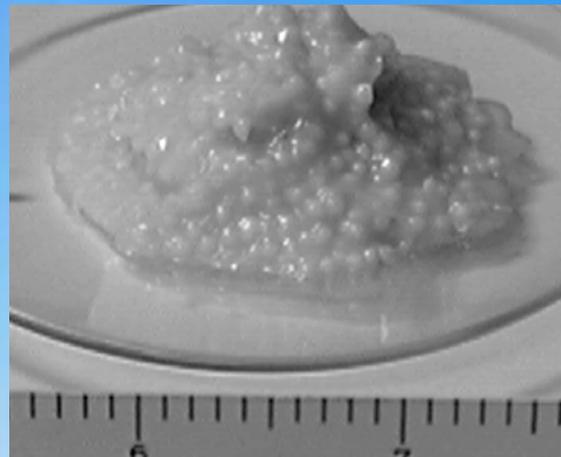
***AN/FO***



***Emulsion***



***Augured Blends***

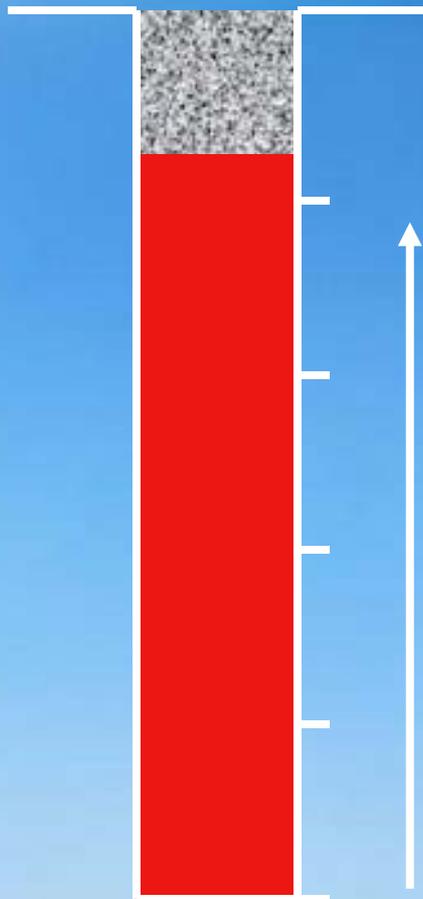


***Pumpable Blends***

# Chemically Sensitized Products

Microspheres

Chemical Gassing



Constant Density  
e.g. 1.25 g/cc



1.15 g/cc

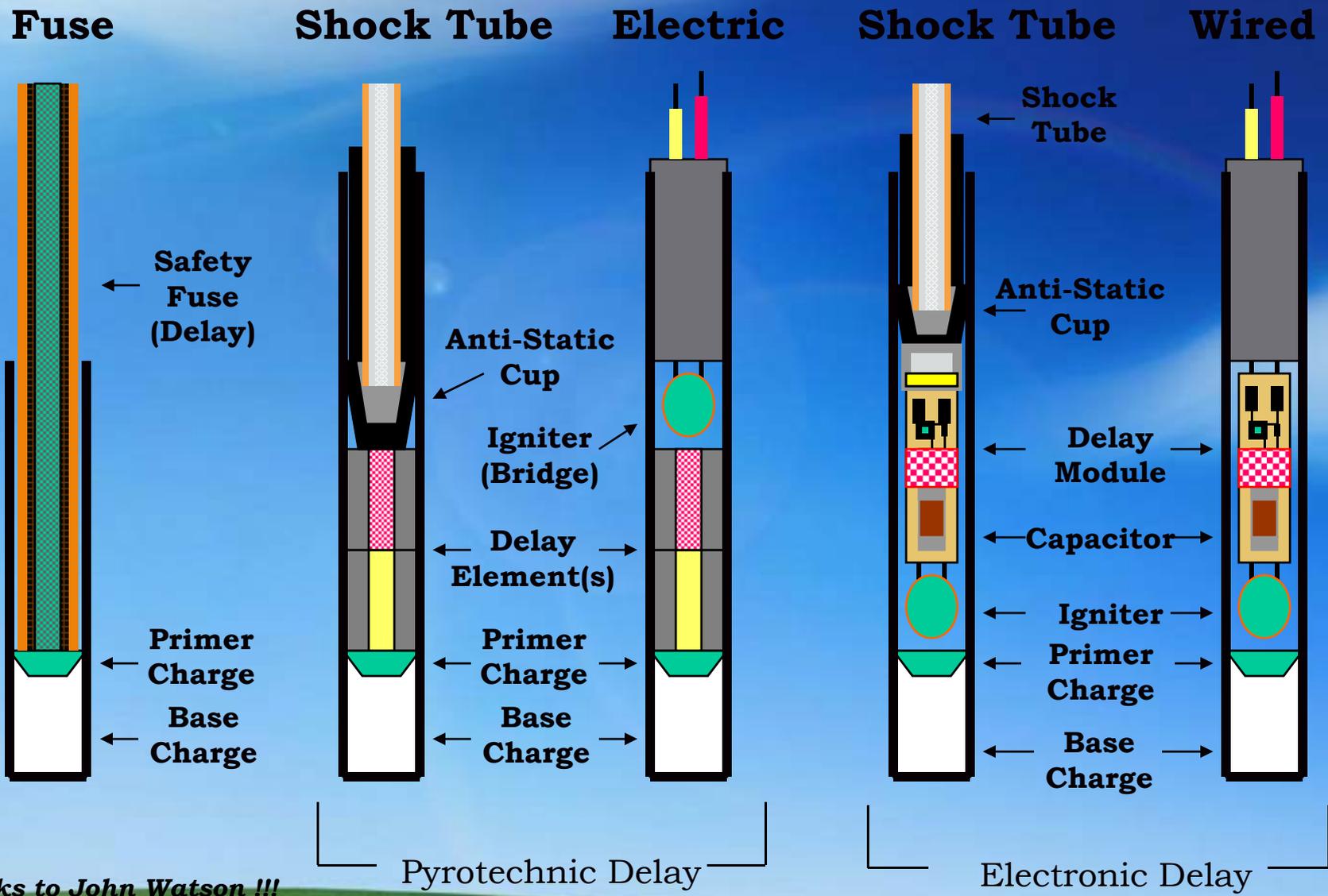
1.18 g/cc

1.21 g/cc

1.25 g/cc

Average Density  
e.g. 1.18 g/cc

# Generic Detonator Construction\*



*\*Thanks to John Watson !!!*

# ***The Evolution of the Explosives Industry....***

➤ ***In the past 20 years, the industry has shifted from a Manufacturer/Delivery business to Full service Drilling & Blasting/ Shot Service.***

➤ ***This has been driven by Technological advancements of Explosives and Regulatory requirements...***

# ***Qualified Personnel***

- ✓ ***The Explosives industry is in “competition” with it’s own customers for the best, most qualified individuals.***
- ✓ ***We must continue to encourage the addition of explosives related courses in trade schools/universities...***

# ***Qualified Personnel***

- ✓ **Regular and quality Re-Training is critical to remain current in emerging technologies.**
- ✓ **Educational levels of Blasting personnel is steadily increasing.**

# ***Qualified Personnel***

***✓ We expect and demand more of Blasters than ever before.***

***✓ The Blaster of today and tomorrow would not be recognized by the previous generations of Blasters...***

*Blast loading Crew, Culebra Cut Panama Canal 1905*



# Blast Loading Crew...Culebra Cut Panama Canal 2005



# ***Qualified Personnel***

***A Blaster is a “respected” profession !***

# ***Regulatory Compliance***



***Over 3,000 government entities regulate the civil use of explosives in the United States.....***



# *Regulatory Compliance*

## **FEDERAL LEVEL:**

✓ **MSHA**

✓ **OSM**

✓ **OSHA**

✓ **USDOT**

✓ **ATFE**

**+ 31 Others**





Safety



Production



Environmental Effects

# Blasting Process Interfaces



Cost



Measurements

*It's Not "just loading holes"!*



**Multiple Technologies are in use on Drills**  
**GPS Systems, Borehole Loggers, Geological analysis etc.**

**Drill reports are more important than ever!**





*The age of "Intelligent" equipment has arrived...*



Print

Date:  
10/26/96

Customer name:  
ABC Mining

Location:  
McArthur OH

Comments:  
Timing Pattern 1

- Layout + Times
- Layout + Hole #
- Table of Times

Preview Page #

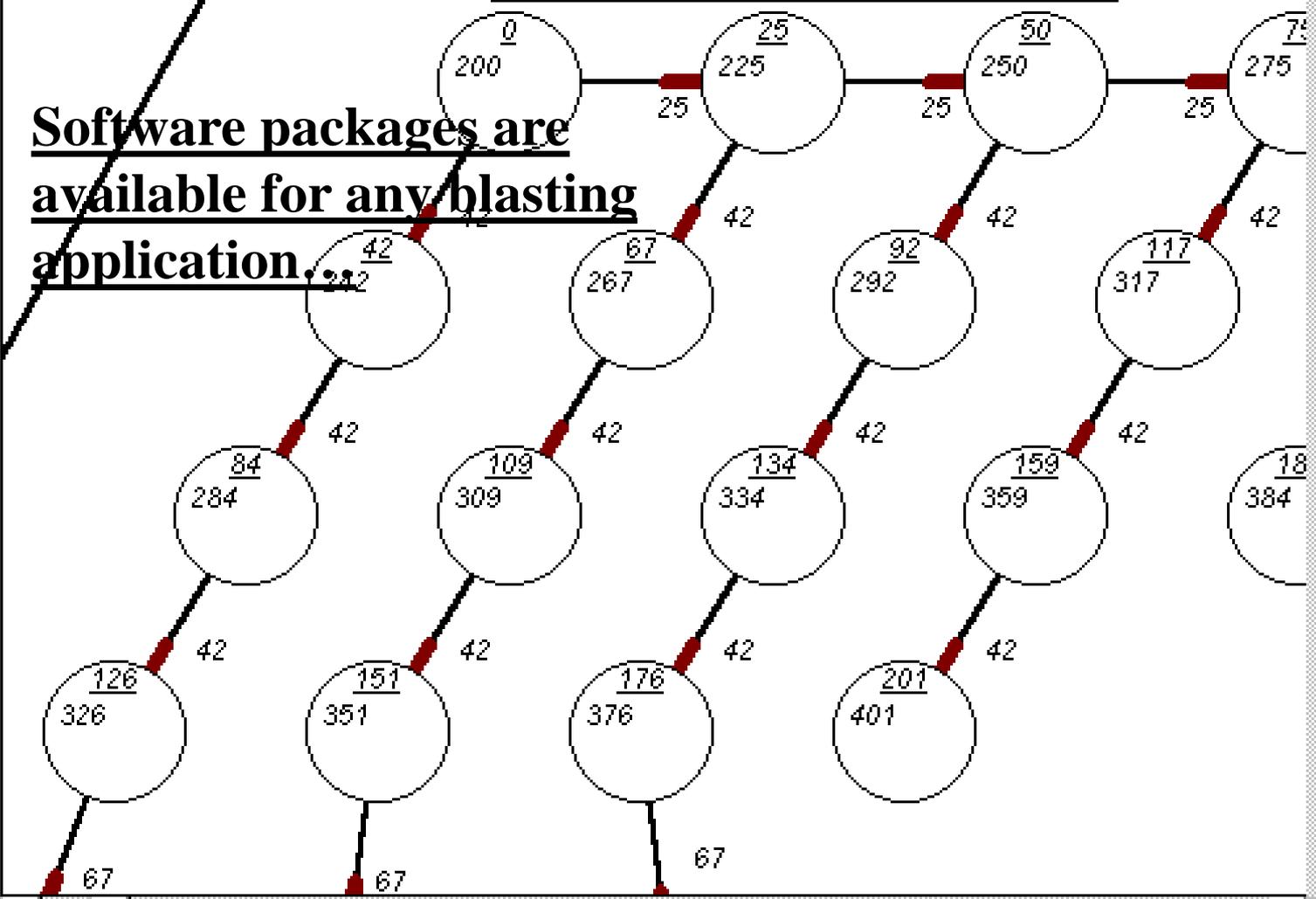
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Preview

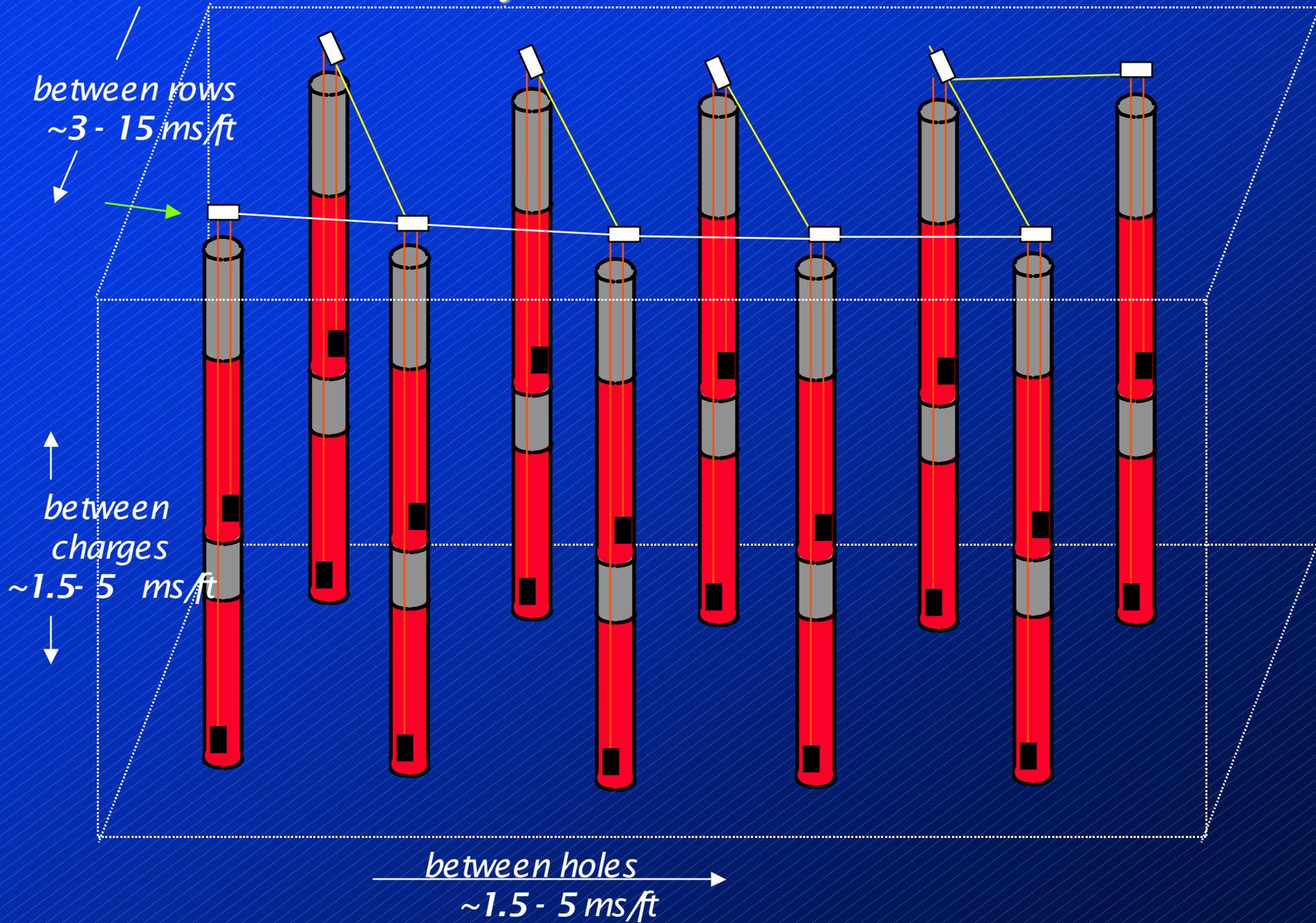
Print

# Printout Preview

**Software packages are available for any blasting application.**



# *Precision delays are now available...*



# ***Fumes (post blast)***

- ***Nitrogen Oxides (NO and NO<sub>2</sub>) - Excess oxygen***
- ***Carbon Monoxide - Oxygen deficient***
- ***Causes***
  - ***Improper priming***
  - ***Lack of confinement***
  - ***Insufficient water resistance***
  - ***Oxygen imbalance***



# ***Security (Federal)***

- **Safe Explosives Act (SEA)**
- **ATF NPRM**
- **ATF Explosives Study Group**
- **DOT/TSA, Hazmat and Explosives**
- **Ammonium Nitrate**
- **Department of Homeland Security**
- **USCG**

## *Summary...*

- ✓ The Explosives Industry will rely on high quality, well trained Blasters for implementation of emerging technologies.*
- ✓ A partnership with Regulators that encourages best practices and safe procedures.*

## *Summary...*

*✓ Research & Development, with a focus on environmentally sound formulas and non-energetic components.*

*✓ Maintain absolute Security in the Manufacturing, Transportation & Use of Commercial Explosives.*



***Thank You....***

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