

Using Waterjets to Safely Process MPPEH

Paul L. Miller
Sr. Staff Scientist
Gradient Technology

MPPEH



- Universal problem
- Items often too big to be put into a flashing furnace
- Most qualified scrap dealers won't handle metal in this shape
- Needs to be cut and certified as safe

Oxyfuel Torch Cutting



Photo: USMC

- Oxyfuel torch
 - Traditional cutting method
 - Low capital
 - Minimal training req'd
- Could be a problem if this was a live projectile, had residues, or if the filler reacted

Bitten by an Inert

- “Inert projectiles are sometimes filled with a waxy hydrocarbon material, and the cutting operation has apparently resulted in one recent explosive incident, when an energetic overpressure event occurred from torching an inert filler which ignited and burned rapidly enough to explode a 5-inch shell” – DDESB 2004

Exothermic Torch



- Exothermic torch
 - Traditional cutting method
 - Low capital
 - Minimal training req'd
- Could be a problem if this was a live bomb, had residues, or if the filler reacted

Photo: US Navy

Abrasive (Hot) Saw



- Abrasive Saws
 - Traditional cutting method
 - Low capital
 - Minimal training req'd
- Could be a problem if this was a live bomb or had residual explosives

Hydraulic Shear



Photo: US Navy

- Shears
 - Traditional cutting method
 - High capital
 - Training req'd
- Could *still* be a problem if this was a live bomb or had residual explosives

Shear Problems

- “Recently, a hydraulically operated shear initiated a spotting charge while cutting a BDU-45/B 500 lb practice bomb and caused four injuries” – DDESB 2004

Residual Explosives?



PELAN detection limit is ~500 grams

However, the Mk2 anti-personnel hand grenade contains only 57 grams of TNT

Abrasive Waterjet Cutting



Non-traditional
technology cuts through
metals

Doesn't initiate explosives



Waterjet Demil Line at CAAA



- Waterjet line at CAAA designed to cut live HE projectiles w/ corroded fuzes
- Cutting MPPEH is even easier

How I Spent My Summer Vacation



Gradient Technology

Mattawoman Creek - NSWC-IH



MPPEH



MPPEH



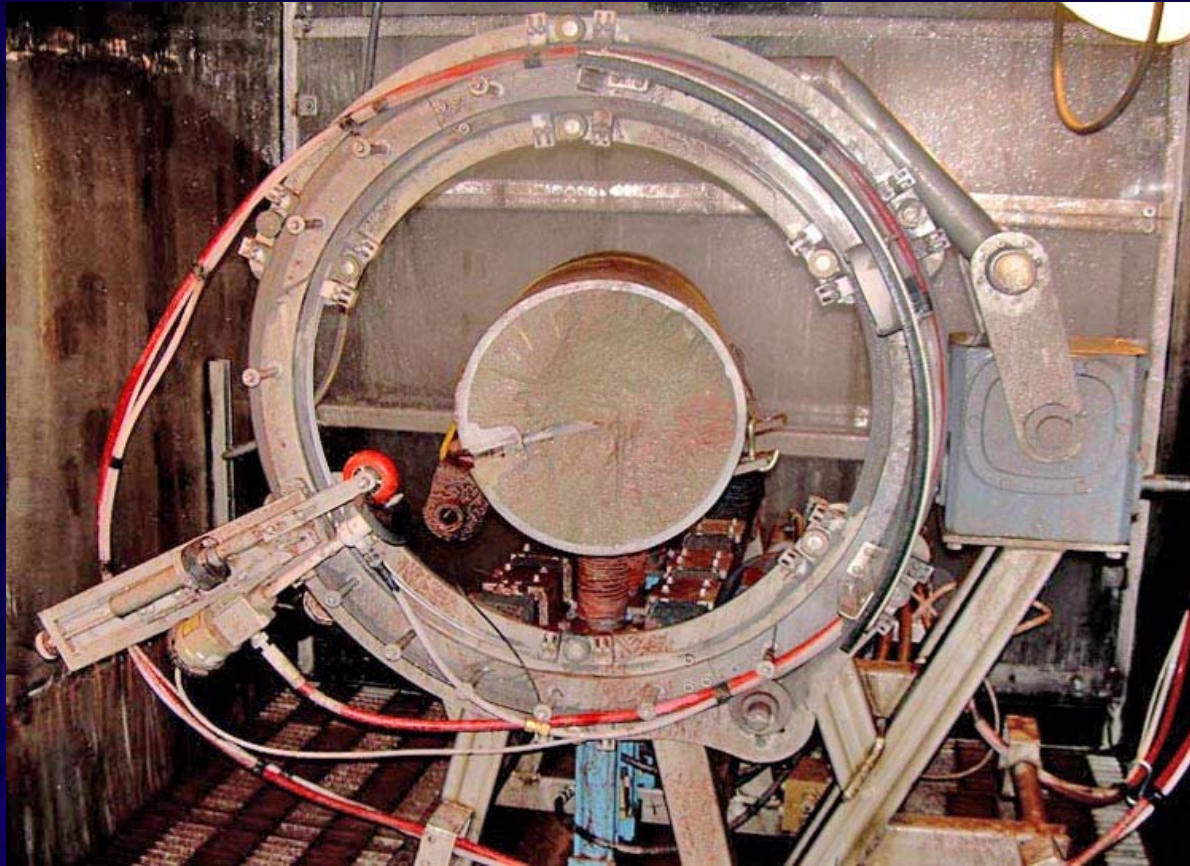
MPPEH



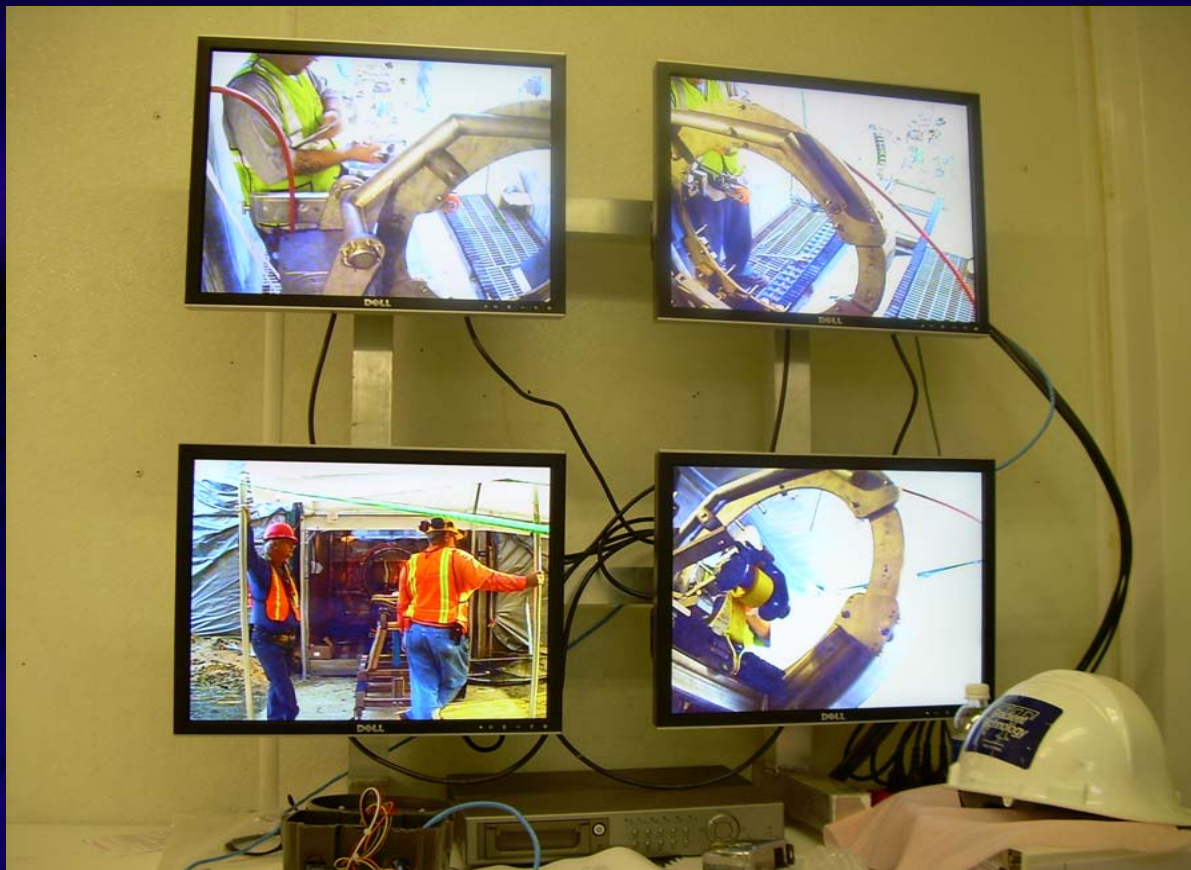
More MPPEH



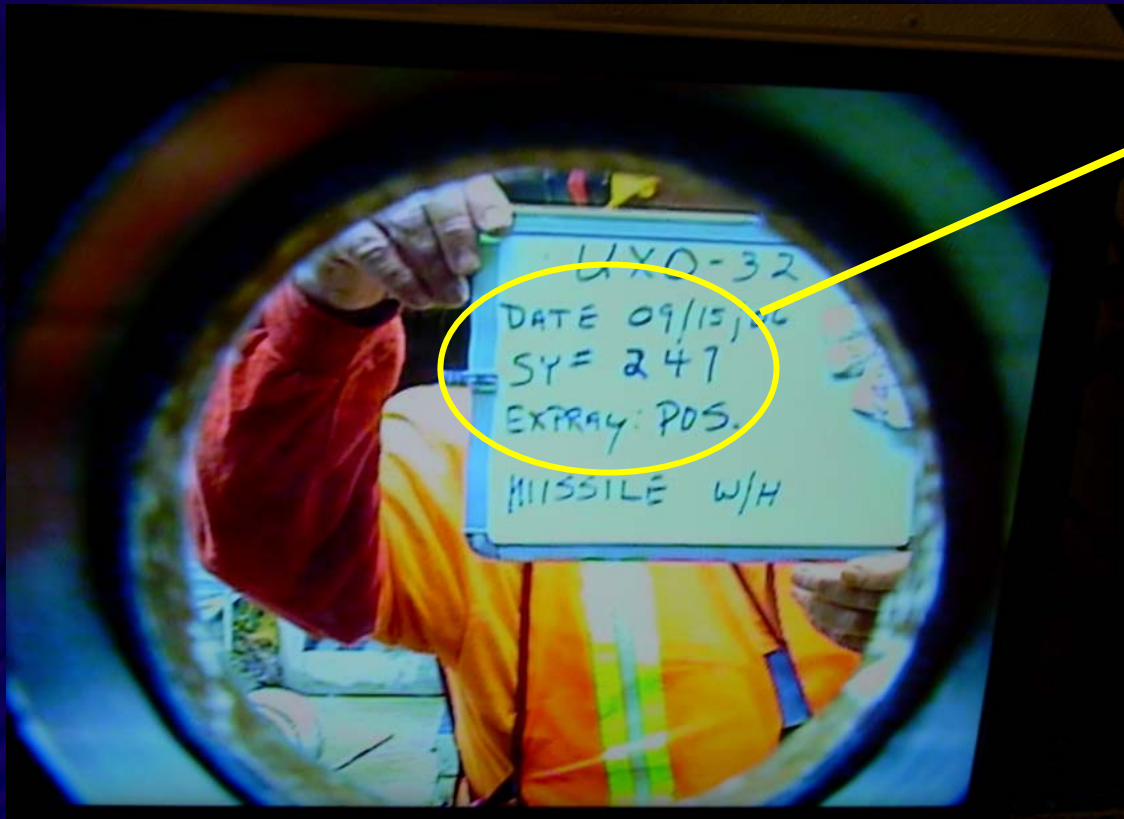
Abrasive Waterjet w/ Mk83



Process Control Room



Good Planning Pays Off



Starting with the seventh item the team found live explosives

Loading Mk84 2000lb Bomb



Placing Mk84 Bomb in WJ



Mk84 Bomb in Position



Waterjet Cut Mk84



2000lb Sea Mine



Missile in Waterjet Cutter



3000lb EX??



Loading 16-in/50 HC



16-in/50 HC Post-Cut



16-in/50 HC Details



20mm Phalanx Ammo Drum



Cut Items



Loading Certified Scrap



Container Sealed



Job Well Done!



Conclusions

- MPPEH can be quickly handled by high pressure abrasive waterjets in a safe and reliable manner
 - Waterjet system *designed* to process explosive items
 - Unusual configurations can be easily accommodated
 - Very large bombs to 20mm
 - Items with fins and badly deformed items