El Dorado Engineering, Inc.
Propellant Disposal Technology

Contact: Bob Hayes / 801-966-8288 / bhayes@eldoradoengineering.com
El Dorado Engineering, Inc.  
Designers - Consultants

- EDE Specializes In:
  - Demilitarization of conventional munitions, chemical munitions, bulk Propellants, Explosives, and Pyrotechnics (PEP), and rocket motors
  - Recycling of munitions, explosive, and propellant wastes
  - Environmental consulting, permitting and restoration, related to PEP
  - Hazardous/explosive waste treatment and disposal

- Capabilities Include:
  - Design
  - Consulting
  - Fabrication
  - Installation
  - Commissioning
  - Training
  - Permitting

- Over 34 yrs. In the Demilitarization Business, HQ in Salt Lake City, UT

- Take pride in record of safety, project cooperation, and client satisfaction
• Design, install, & commission numerous turnkey Rotary Kiln Explosive Waste Incinerators including facilities in: Taiwan, U.K. Germany, Albania, Ukraine, Korea, Belgium.
• Design & provide numerous turnkey Transportable Flashing Furnace Systems (Used at: Ravenna AAP, Eglin AFB, Hill AFB, Anniston Army Depot, China Lake, Puerto Rico, Hawaii, Talon West Virginia, Letterkenny Army Depot.)
• Design/Build contained burn facilities for disposal of military & commercial energetic materials
• Design/build contained burn systems to dispose of nitrocellulose based propellant in small tactical rocket motors
• Design/Build turnkey facility for contained burn demilitarization of large AP based propellant tactical rocket motors for U.S. Army*
• Design & construct a facility to demilitarize flares, reclaiming and recycling magnesium
• Design, build, and test water jet washout system for chemical munitions
• Design munition preparation and disassembly equipment
• Design/Build turnkey induction heating meltout system for explosives recycling from mortars*
• Used our understanding of propellant combustion processes and atmospheric dispersion to consult for NASA on go/no-go launch criteria for Space Shuttle Launches, and permitting of test facilities.

Notes: * Ongoing
Demilitarization Technology Considerations

- Safe
- Environmentally Responsible
- Effective
- Robust
- Simple
- Proven
- Inexpensive
- Versatile
Non-Open Burning
Thermal Treatment Alternatives

- Contained Burn
- Rotary Kiln
- Static Kiln
- “Tunnel” Furnace
- Co-firing
- Contained Detonation
- Car-bottom Furnace
- Transportable Furnaces
Contained Burn Systems

- Bulk Propellant, Explosives
- Tactical Rocket Motors
- Air Bag Propellants
- Igniters, Detonators
- PEP Contaminated Waste
Contained Burn Technology System Elements

- **Feed System:**
  - Minimize Handling
  - Batch or Semi-Continuous

- **Containment Vessel:**
  - Promote Proper Combustion
  - Contain Products

- **Ignition Source:** Reliable, Safe

- **Pollution Abatement System**
  - Meter and Scrub Exhaust
  - Prevent Fugitive Emissions

- **Controls**
Contained Burn Technology Scaling

10 pounds per burn cycle

50,000 pounds per burn cycle
Nitrocellulose Based Propellant Contained Burn System
Chamber and Pollution Abatement System
Commercial Clients
Various Turnkey Systems
DOD Tactical Rocket Motor Propellant Disposal

• Large Workload
  – 60 – 1605 lbs Propellant/Motor
  – Challenging Chemistry

• Thorough Technology Evaluation
  – Non Open Burning
  – Numerous Stakeholders

• Contained Burn Selected

• Construction Ongoing
  – Letterkenny, PA
  – RCRA and Air Permits Approved
  – DDESB

• Capacity
  – Up to 805 Pounds per Cycle
  – Up to 3 Cycles per Hour
China Lake, CA NSWC Full Scale Demonstration (400lb/cycle)

- Cylindrical Steel Vessel (15’ X 80’)
- Sized For Gas Generation, Thermal Load, Peak Pressures
- Designed to Optimize Combustion Conditions
- Designed to Withstand Maximum Credible Event (MCE) in Case of Rocket Motor Deflagration
- Contains and Cools Gases After Firing
- Gases are Metered Through Pollution Control System
China Lake Feed System, Large Tactical Rocket Motors:

- Provides Convenient External Loading/Unloading
- Quick-Opening Autoclave Door Design
- Remote Automated Actuation with Ignition Interlock
- Designed for Flexibility to Accommodate a Wide Variety of Loads
- Minden Would Utilize a Cold Burn Tray Loaded by Forklift onto Firing “Shelf”
Pollution Control

- Designed For Chemistry of Workload
- Size/Expense Minimized by Proper Metering
- Stack Emissions Monitored
Minden Contained Burn System

- Safety
- Proven
- Efficient Pollution Control
- Simple Controls
- Throughput
- Relatively Simple Permitting
- Versatile

- 880 lbs per Cycle
- 2-3 cycles per Hour
- 1800-2500 lbs per Hour