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# Explosive Destruction System Update

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# Review of CWD 2013 Presentation

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- The CWD 2013 presentation included:
  - Design details of an EDS Phase 3 system that was delayed
  - A Universal Munition Storage Container
  - A request to upgrade EDS Phase 2 Unit 3 for
    - One day processing
    - Destruction of leaking 4.2 inch mortars, 105mm projectiles, and 155mm projectiles at Pueblo Chemical Agent-Destruction Pilot Plant, PCAPP
  - A request to build a new skid-mounted EDS Phase 2 system for Assembled Chemical Weapons Alternatives, ACWA; also, for use at PCAPP



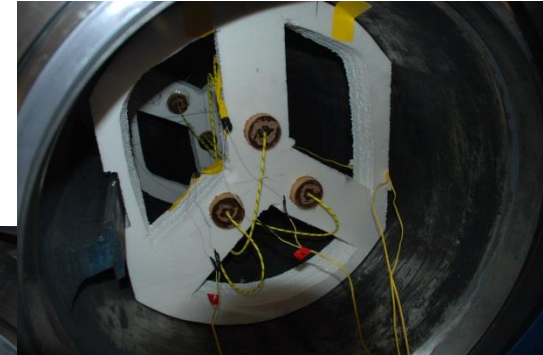
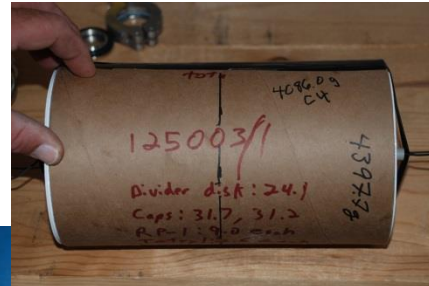
# CWD 2014 Agenda

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- The retrofit of the EDS Phase 2 Unit 3 system designated as EDS Phase 2 Retrofit or P2R.
- Explosive opening subsystem upgrades for P2R at PCAPP.
- The new EDS Phase 2 system designated P2A for Phase 2 ACWA.

# Step 1 was to explosively validate a new vessel.

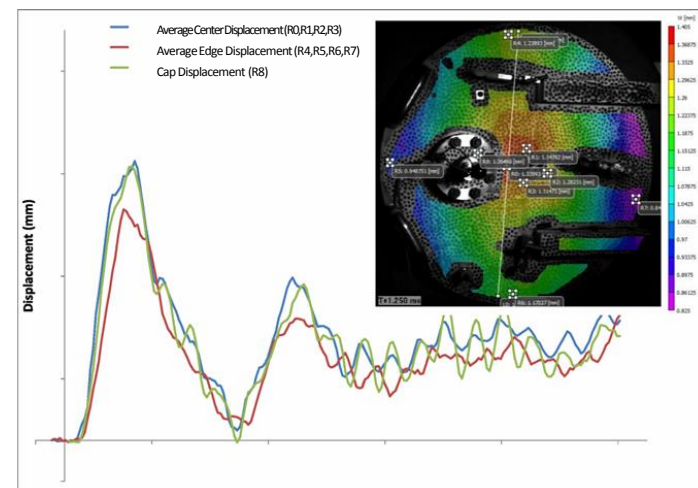
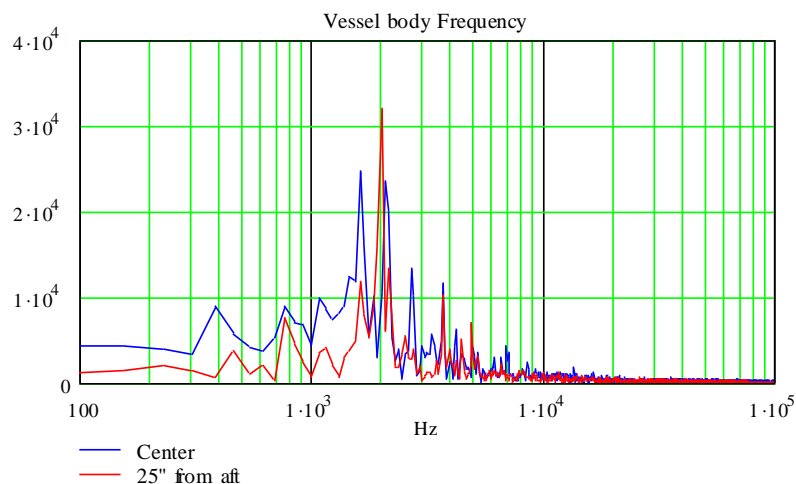
- The vessel (V26) on P2U3 is replaced with an new ASME, Section 8, Division 3, Code Case 2564, 9 pound TNT, vessel.
- The P2U3 is taken to Sandia, New Mexico, to explosively validate the new vessel.



# Five explosive tests were conducted at Sandia, New Mexico.

- Test 1: 9 lbs of bare C-4 = 11.25 lbs TNT or 1.25 times over test
- Test 2: 7.2 lbs of bare C-4 = 9 lbs TNT for comparison to Test 3
- Test 3: 9 lbs of TNT for comparison to Test 2
- Test 4: 6 pack test without bursters = distributed 3 lbs charge test
- Test 5: 6 pack test with bursters = distributed 7.3 lbs charge test

For additional information attend Lee Clemon's presentation.



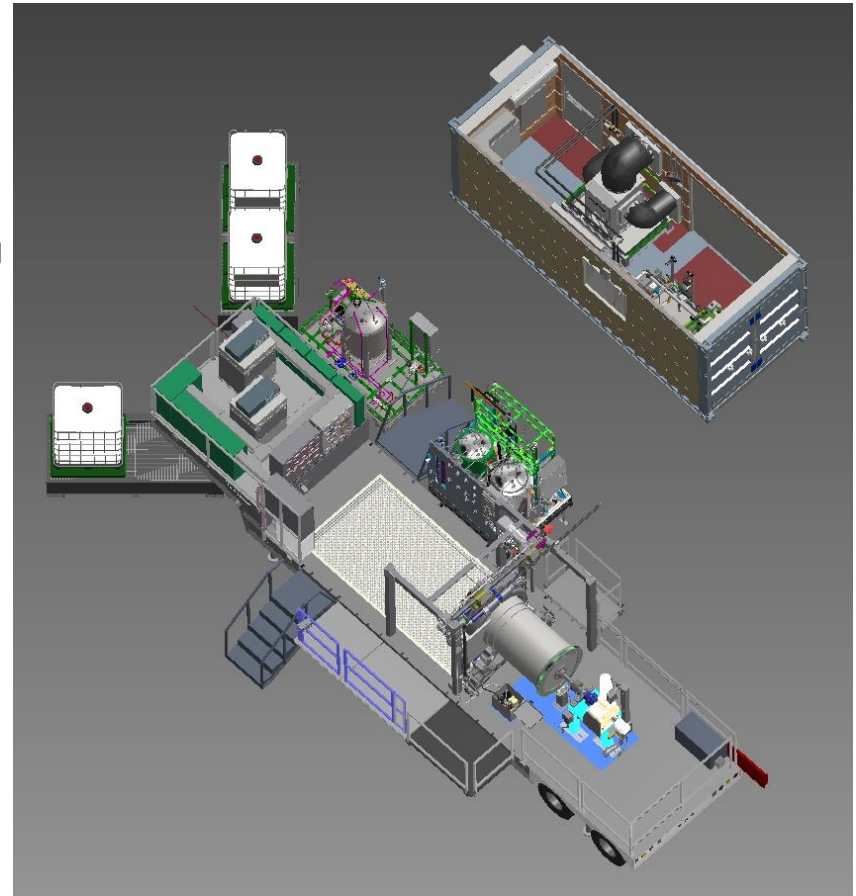
# The next step was to disassemble parts of P2U3 at Sandia, Livermore.

- P2U3 arrived in Livermore at the end of July 2013
- All the hardware on the reagent supply wing was removed.
- New system layouts were developed.
- New hardware and vessel modifications identified



# Next was to modify, reassemble and add to the P2R system.

- Vessel modifications
  - Steam input
  - Nut runner door closure system
  - New sample system
- Modify Reagent Supply Subsystem
- New Boiler-Chiller Container
- New Effluent System
- New Human Machine Interface Readouts



# Vessel removed and shipped to Grayloc Products in January 2014.

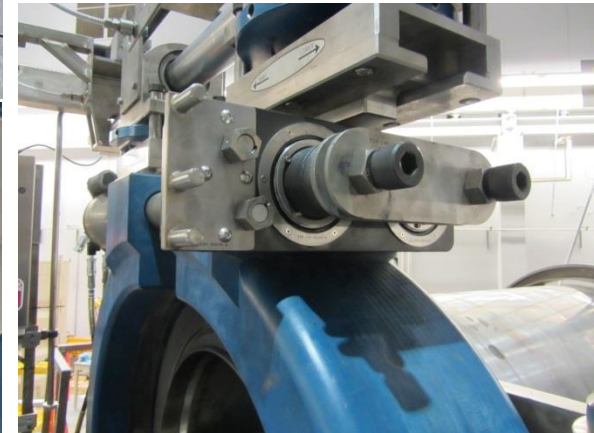
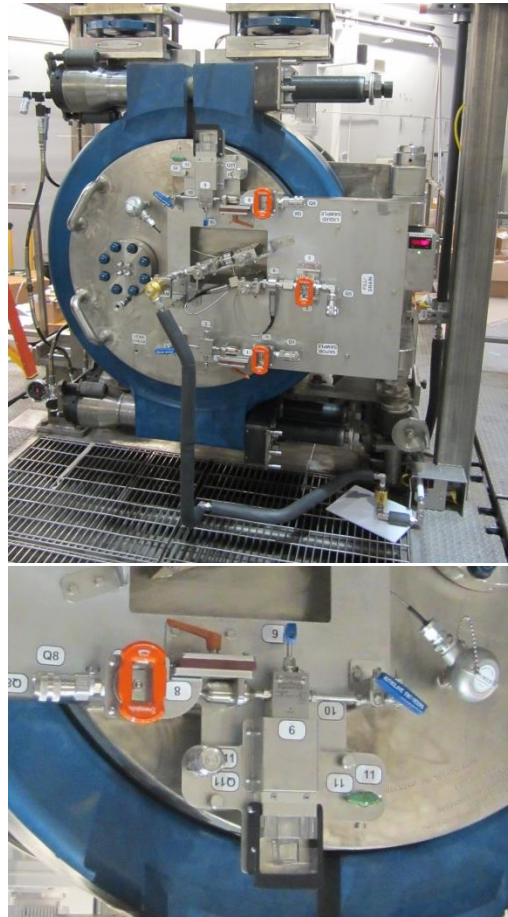
- P2U3 vessel, V26, shipped to Grayloc Products
  - an additional steam port in door
  - required “R” stamp
- Clamp issues and copper deposits in V26 dictated exchange with P2 vessel, V25, for P2R.
  - V25 port modification and “R” stamp
  - V26 will be used for P2A with port, 3-piece clamp, & “R” mods





# The modified vessel has several new features.

- Steam/liquid line attached to door via two rotating unions.
- Nut runners driven by pneumatic wrenches.
- Upgraded sample system.



# The reagent supply is bigger and faster.

- Reagent (MEA) is supplied from a 220 or 330 gallon IBC on a secondary container to the 65 gallon heated tank on the trailer.
- Larger, faster pumps to supply the vessel.



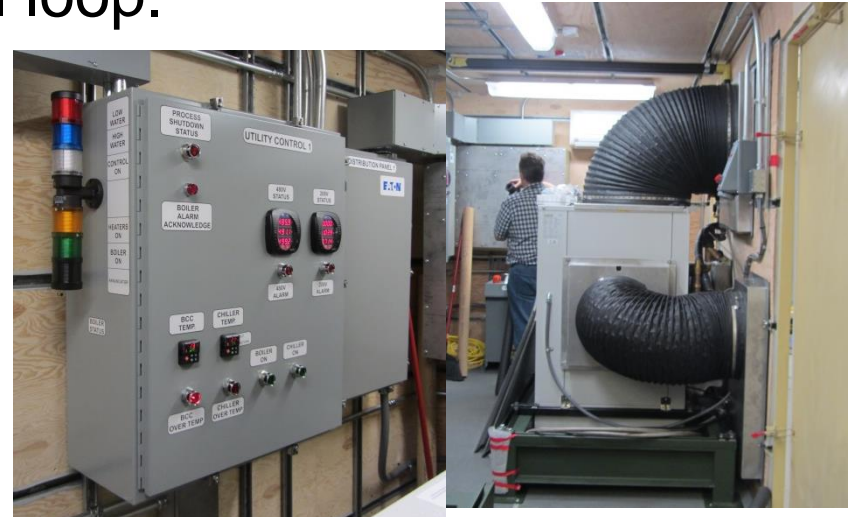
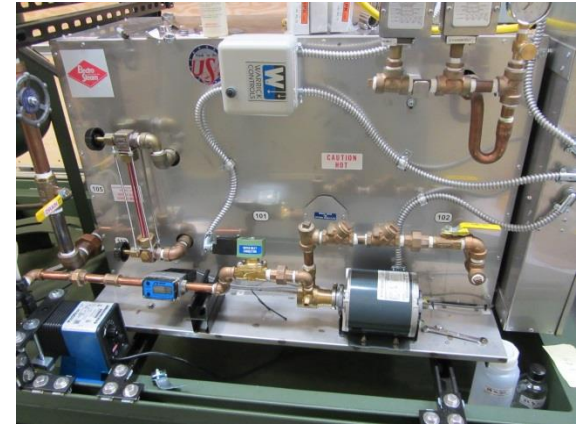
# The Boiler-Chiller is a modified intermodal container.

- Modified 20-foot intermodal container
  - Insulated
  - Heated/air conditioned
  - Man door, sliding barn door, intermodal doors
  - Interior & exterior lights
  - Unistrut mounting points
- Inputs
  - 480 Volts / 200 amps
  - Water
  - Instrumentation



# The Boiler-Chiller Container (BCC) provides utilities to the P2R.

- A 60kW boiler provides steam to the vessel.
- A 10K BTU/hr chiller provides cooling to a jacketed 65 gallon tank food-grade propylene glycol loop.
- A transformer provides 208/110 Volts to the container via a distribution panel.
- The BCC can provide 480 Volts to the P2R.



# The effluent (drain) subsystem has been improved.

- Two 330-gallon plastic IBCs are used for effluent.
  - One for MEA effluent
  - One for rinse water
- A 125-gallon intermediate stainless steel tank is used to hold hot (90-95 C) rinse water until it is cool enough to transfer to the plastic IBC.



# System monitoring is improved by Human Machine Interface, HMI.

- HMI are located:
  - At the processing area of the trailer
  - At the intermediate tank skid
  - Personal Decon Station
  - Command Post
- They provide
  - Tank/IBC levels
  - Tank temperatures
  - Air Operated Valve Status Open/Closed
  - Warnings/Alarms
- Reduce crew communication to CP



# Bottom line is P2R shipped on May 14, 2014

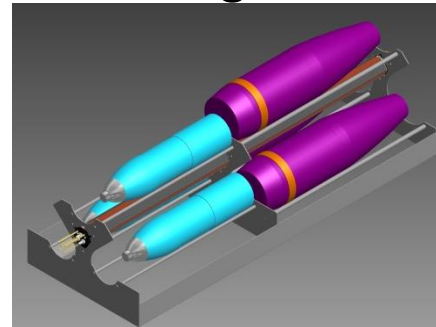
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- P2R is now at Aberdeen Proving Ground, Maryland, for training and testing.
- Ultimate plan is to be ready to start processing at the Pueblo Chemical Agent-destruction Pilot Plant EDS in September 2014.



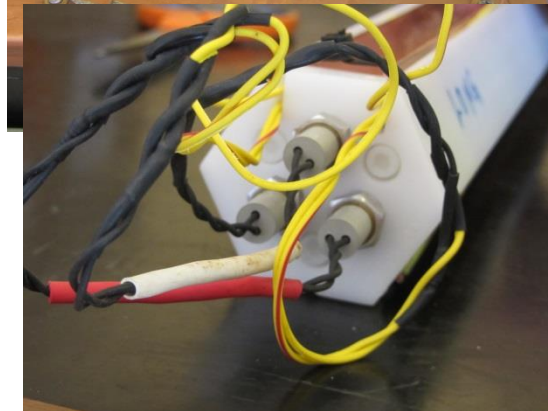
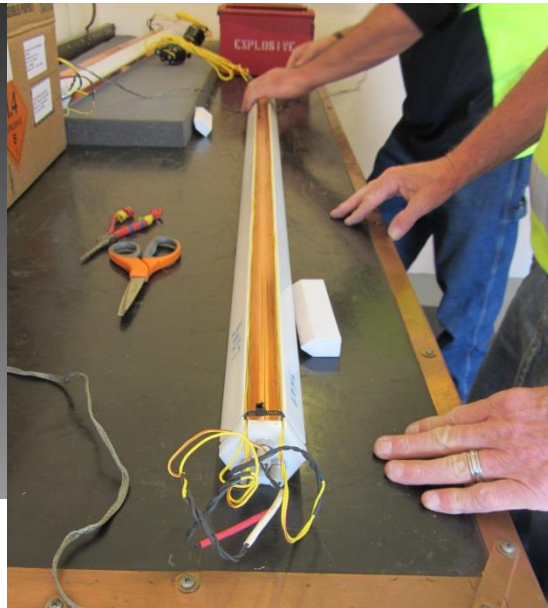
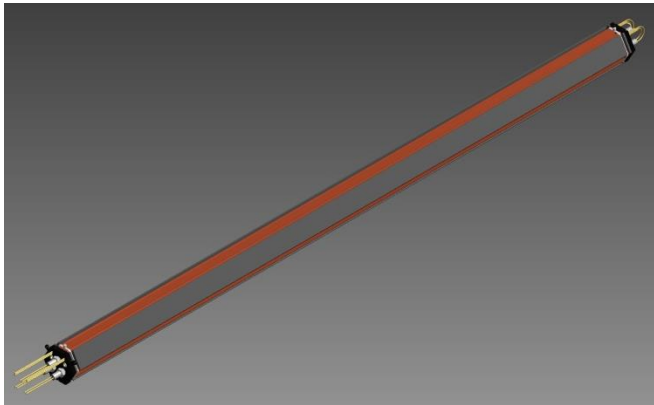
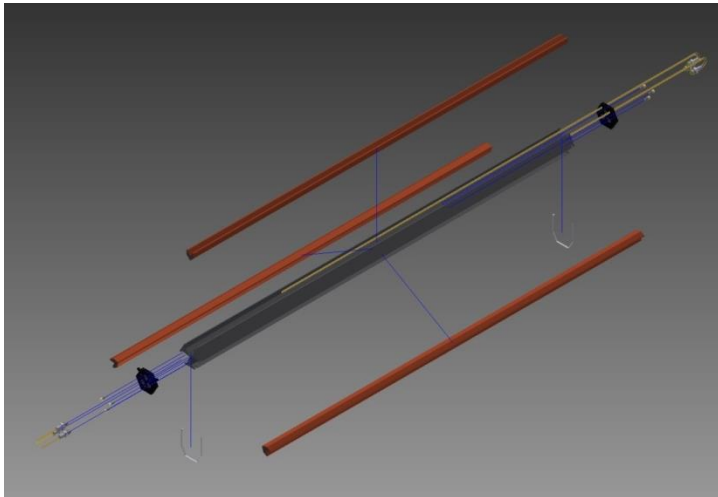
# The Explosive Opening Subsystem, EOS, continues to evolve.

- Copper Linear Shaped Charges (CLSC) now aligned back-to-back in a central modular array.
- CLSC array can be pre-configured and inserted into the munition holder prior to shutting the door.
- Munition holders for:
  - 6 each 4.2-inch mortars
  - 6 each 105mm projectiles
  - 6 each 155mm projectiles
  - 6 each combination of 4.2 and 105 munitions
  - 3 each 155mm with 3 each 4.2 or 3 each 105 munitions

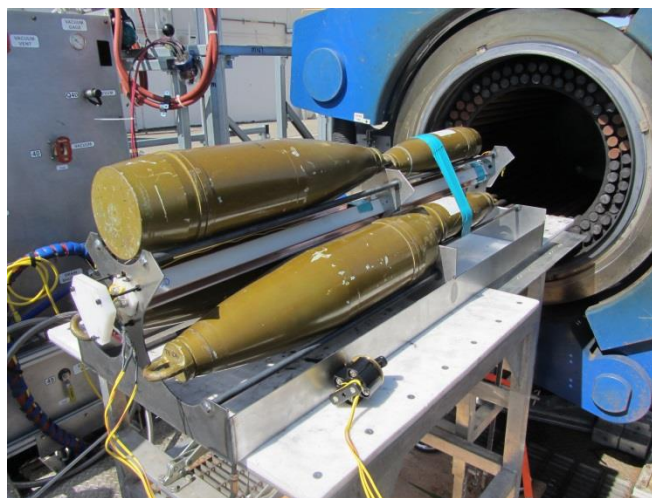
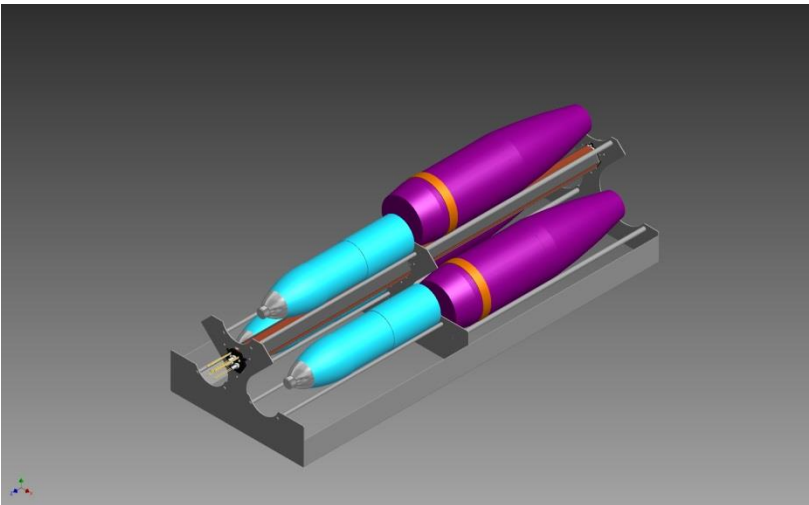
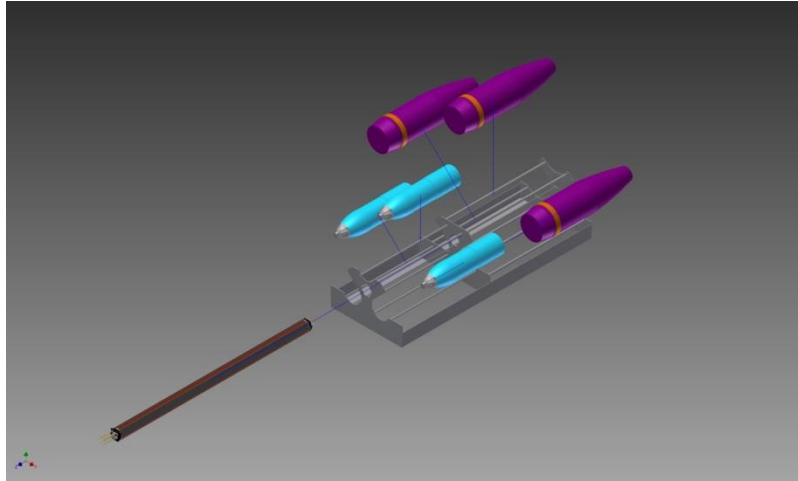




# CLSC and detonators fit into a hexagonal assembly.



# Munitions are positioned in the holder and the CLSC assembly inserted.



# Photos of a three 4.2-inch mortars and three 105mm projectiles test.

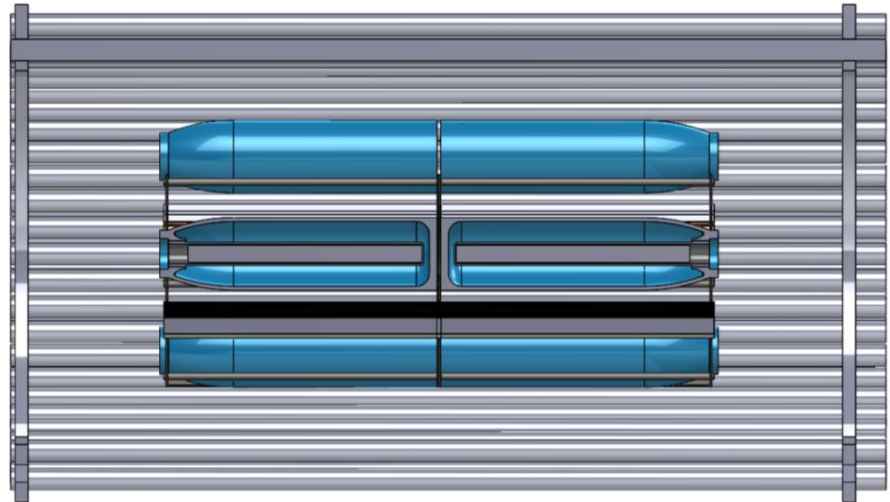
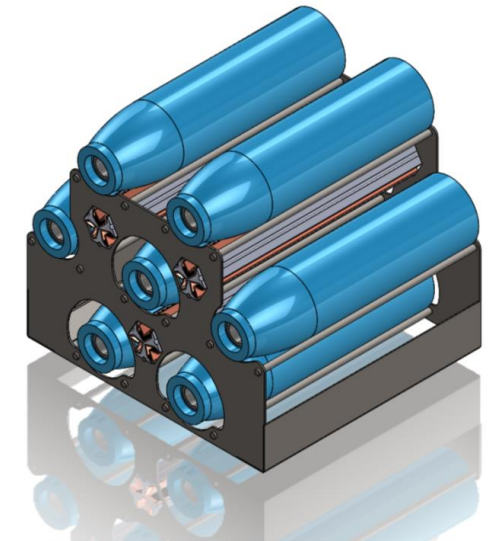




# Additional EOS changes are under consideration.

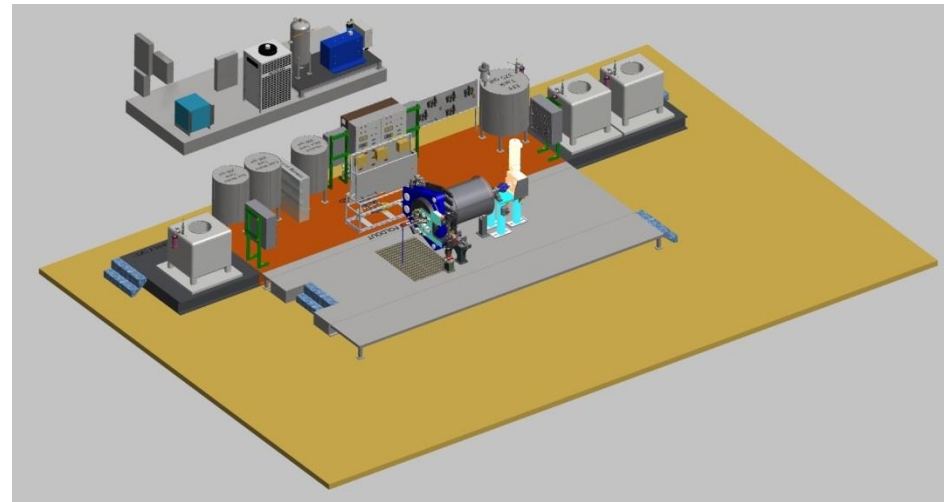
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- Advanced CLSC design give 30% improvement in jet.
- Single three jet CLSC reduces net explosive weight.
- Seven packs and fourteen pack designs for smaller munitions are possible.



# Next up is the P2A system for ACWA.

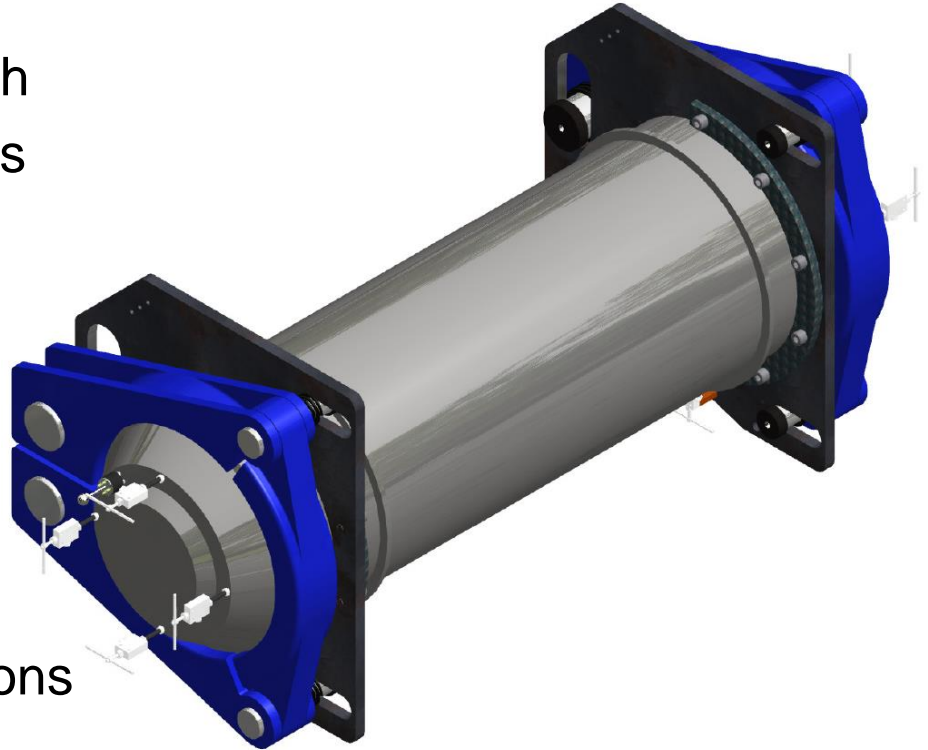
- Designated as the P2A, the new system will:
  - include the P2R upgrades, except
  - incorporate an existing, ASME Code Case 2564 P2 vessel modified with a three-piece clamp (5-minute door closing) and
  - on skids versus a trailer.
- Deliver to the Army in the first quarter of calendar year 2015.



Skid layout

# The P3 design is still on hold.

- 316 stainless steel
- 120 inch (305 cm) internal length
- 5.625 inch (14.29 cm) thick walls
  - Necked down at clamps
  - Existing P2 Grayloc seals
- Door at both ends
- 3-piece clamp design
- Improved hinge design
- Capacity for one M55 or
- 12 to 28 or more smaller munitions
- ASME Code Case 2564
- ~35,000 to 40,000 pounds (16,000 to 18,000 kg)





# Acknowledgements

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