Crossland, Ronnie

From: Edlund, Carl
Sent: Friday, February 27, 2015 1:09 PM
To: Crossland, Ronnie; Webster, Susan; Phillips, Pam
Subject: FW: Soaking Single Base Gun Propellants In Water
Attachments: Gun-Propellant-Dissolution-DNT-NG-Taylor-2012-ERDC-CRREL TR-12-9.pdf; SCWO-Full-Scale-Status-Marrone-2012.pdf

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From: Craig, Harry
Sent: Wednesday, February 25, 2015 1:40 PM
To: Maddox, Doug; Shuster, Kenneth; Edlund, Carl
Cc: Thomas F Hall; Faulk, Dennis; Albright, Rick
Subject: Soaking Single Base Gun Propellants In Water

All,

I have some concerns from a few of the discussion items I heard on the call today.

CRREL has done some research on soaking M1 but not M6 propellants in water. What you see is a slow leaching of DNT out of the nitrocellulose matrix. CRREL did not test the stabilizer (diphenylamine) or plasticizer (dibutylphthalate), but were mainly focused on leaching of energetic compounds (DNT, nitroglycerin, nitroguanidine) in these tests. There are also physical changes to the external surfaces of the propellant grains. I would not recommend soaking M6 in water for shipment, as the water would have to be separated and treated with granular activated carbon (GAC) for leached organics including DNT, DPA, N-nitroso-DPA, and phthalates.

There are also some critical issues to address on SCWO and hydrolysis treatment methods, such as the insolubility of nitrocellulose in water and the general difficulty of treating DNT specifically by alkaline (base) hydrolysis. SCWO and hydrolysis treat water phase contaminants, so you have to get the chemicals into solution to treat. This may require grinding the propellant grains to get them to a smaller size to address the solubility issue, which has its own materials handling and safety considerations. Alkaline hydrolysis requires high pH (usually about 12) to chemically degrade nitroaromatics (DNTs) and requires large amounts of caustic hydroxides to accomplish that, then acid to neutralize the waste and then potentially dewatering. Anytime you get a multi-step treatment train, the costs go up.

SCWO uses high pressure and high temperature conditions to degrade contaminants in aqueous phase. SCWO has been around for about 30 years, but has not been widely used because of material corrosion, salt buildup, and high cost issues. The attached review showed there were only 3 operating SCWO treatment systems in the world in 2012, and the one specifically used for DNT wastewater treatment has been taken off-line due to operational problems.

The Dialogue Committee really needs to go beyond the “concept phase” and look at the specifics of application of each technology to this specific waste stream, including all the required material handling steps.

I would be happy to provide any continuing assistance on the Camp Minden project as necessary.

Regards,

Harry