Insensitive Propellant for 105mm Artillery for Improved IM

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In 2008 a new insensitive propellant, Navy Insensitive Low Erosion propellant (NILE) was tested by US Special Operation Command (SOCOM) in the 105mm Howitzer to assess its utility in replacing the current M1 propellant, which does poorly when subjected to Insensitive Muntions (IM) testing. NILE propellant has been shown to have superior IM properties when tested in various configurations by the US Navy, and it was hoped that these improvements would translate into the 105mm as well. The initial testing was just to screen the ballistic performance of NILE in the 105mm. All tests were done at ambient temperature and NILE performed well. There was a slight pressure excursion when testing occurred at the highest charge weights however. This was assumed to be caused by the fact that the propelling charge configuration was not optimized for NILE â€“ the existing hardware, including the cartridge case and primer were utilized. The propellant granulation for NILE was tailored for this application, but because it was the first time that this propellant was gun fired in the 105mm, it was not completely optimized and the height of the propellant bed exceeded the height of the top of the primer tube. This kind of configuration can cause non-uniform ignition of the propellant bed, generating pressure waves within the charge, leading to higher recorded pressures than actually occur during the event. Further evidence that this was an anomoly was the fact that the resultant velocities for these data points did not increase correspondingly, as they would have if the pressures values were accurate. This data was reported in a previous paper at the 2008 NDIA IM/EM Symposium in Tucson, AZ. In 2009, NILE was retested in the 105mm and the objectives of the test were twofold: 1) to test the performance of NILE at hot, cold and ambient temperatures relevant to the working environment of the 105mm, and 2) to reconfigure the propellant granulation of NILE to prove or disprove the assumption that the charge configuration was responsible for the pressure excursions. Two new granulations of NILE propellant were manufactured and both were used to produce a bi-modal size distribution of grains for better propellant packing and reduced propellant bed height. Both objectives of the test were met successfully and the data from that test series will be presented in this paper.