From: Chet Myers
To: Marsh, Michael
Cc: Williams, Ann; Colarusso, Phil
Subject: RE: Call re: blasting at New Bedford South Terminal
Date: Monday, July 08, 2013 2:35:43 PM
Attachments: image001.jpg
image002.png
image003.png
usmc_blountisland_pressures[1].pdf
underwaterexplosions[1].pdf

Hi Mike,

Sorry for not getting in touch with you earlier. We are still working on trying to get Jasco involved. We do not currently have an open contract with them, and our previous contracting process with them was rather contentious. Our fear is that this may turn into a much longer process if we have to include them, but we will do so if EPA is unable to make a decision without their involvement. If that is the case, we should postpone today's teleconference. Otherwise, I am free to talk.

If you recall, we had previously submitted a document entitled "The Environmental Effect of Underwater Explosions", by Keevin and Hempen, 1997 (attached). We had (at EPA's request) used of this document to double-check the impact radius calculated by Jasco.

Apparently, Keevin and Hempen produced a follow-up paper based on the results of blasting in Miami Harbor ("Underwater Blast Pressures From a Confined Rock Removal During the Miami Harbor Deepening Project", Keevin, Hempen, and Jordan, 2007), which seems to conclude that (in practice) maximum pressure and impulse are controlled by the maximum charge weight per delay rather than the total weight of explosive in each shot.

Below is a paragraph from the conclusion of the Miami Harbor paper (bold and italics are mine).

"***The maximum pressures recorded were related to the maximum charge weight per delay and clearly were unrelated to the total weight of blasting agents (e.g., sum of all the explosive weights in the bore holes detonated in a shot) that were detonated.*** The shot pressures were relatively uniform, while the shots varied significantly in total charge weight. Total charge weights for the blasting cap, 1-lb booster, and three pattern shots were: 1 cap, 1 lb, 136 lb, 408 lb and 408 lb. [Data for the blasting cap was recorded but is not reported within this paper to save space.] Maximum recorded pressures (without correcting to a common distance) in order of total charge weight were: 41 psi, 67 psi, 290 psi, 43 psi, and 90 psi. It is easy to note the largest pressure of 290 psi {2,000 kPa [136 lb (61.7 kg), total charge weight; 17 lb (7.7 kg), charge weight per delay]} was for the poorly confined hole of AP36. The range of total charge weights exceeds a multiple of 1,000, while the maximum pressures clearly do not correlate to total charge weight. ***Parameters other than total charge weight control the maximum pressure and impulse.*** Hempen et al. (2005) found similar results for the KVK. KVK Shots 014 and 010 produced comparable peak pressures. Shot 014, had only two shot holes, with a maximum charge weight per delay of 72 lb {33 kg (total charge weight of 98 lb (44 kg)]}, while shot 010 had 25 shot holes, with a maximum charge weight per delay of 73 lb {33 kg [total charge weight over 1,500 lb (680 kg)]}. These results support the suggestion of Munday et al. (1986) that the use of delays effectively reduces each detonation to a series of small explosions. ***Resulting blast overpressure levels are directly related to the***

size of the charge in each delay, rather than the summation of charge weights detonated in all holes. The use of delays has been suggested as a potential mitigation measure to reduce pressure exposure to aquatic organisms (Keevin 1998)."

One important note in the data presented in this paper, is that for fully confined holes (without bubble curtain mitigation), which included AP37 and AP38 (the paper included a comparison of fully confined, partially confined, and open water detonations), the peak pressure for twelve, sequential, 32 pound delay-enacted charges was below the 75.6 psi metric within 60 feet of the blast location, whereas the Jasco model (also without bubble curtain mitigation for apples-to-apples comparison) predicts that one 30 pound charge would exceed the 75.6 psi metric at 350 feet (see Figure 18; again, this is with no bubble curtain). The point being that the Jasco model appears to be conservative when compared with field data, and that the pressure data received from multiple charges (with delay) is not significantly greater than that same data with a single charge.

I'm not sure if this additional paper will help clear up this issue or not.

Please let me know if you would like to proceed with the teleconference this afternoon without Jasco or wait.

Thanks,

Chet Myers
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From: Marsh, Michael [mailto:marsh.mike@epa.gov]
Sent: Monday, July 08, 2013 12:52 PM
To: Chet Myers
Cc: Williams, Ann; Colarusso, Phil
Subject: Call re: blasting at New Bedford South Terminal

Hi Chet - Just checking to see if you've made any progress with setting up a call to answer a few technical questions on blasting. At this point , we have some limited availability this afternoon (7/8), between 2:00 and 3:00, or for a short time at 4:00 to talk. Tomorrow (7/9), we would be available for the call between 1:00 and 4:00.

Please let me know your, and hopefully JASCO's, availability.

Thanks,

Mike

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