



**Survival Factors Attachment-
Blast TNT Mass Equivalence
Calculations**

Coolidge, Arizona

PLD21FR003

(5 pages)

Harley Sheryl

From: Stephen Johnson [REDACTED]
Sent: Monday, August 23, 2021 6:08 PM
To: Harley Sheryl
Cc: Stephen Johnson
Subject: Fw: NTSB Investigation - Coolidge, AZ (PLD21FR003)

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From: Waltenbaugh, Danny R. [REDACTED]
Sent: Saturday, August 21, 2021 11:51 AM
To: [REDACTED]
Subject: Fwd: NTSB Investigation - Coolidge, AZ (PLD21FR003)

See below:

Danny Waltenbaugh

Begin forwarded message:

From: "Waltenbaugh, Danny R." [REDACTED]
Date: August 21, 2021 at 11:49:08 AM MST
To: Lyons Sara [REDACTED]
Subject: Re: NTSB Investigation - Coolidge, AZ (PLD21FR003)

Great. Let's assume that based on the video the ground displacement was the first indication of pipeline rupture and the explosion occurs 10 seconds later. This means that approximately ~931MCF of natural gas could have been involved (745,039 vapor weight/pounds). Considering an ambient temp of 78 degrees F. and an initial Atmospheric Pressure of 14.7. The blast TNT Mass Equivalence would be 2,350.45 pounds.

If we estimate only 5 seconds from first appearance of ground displacement to explosion, the TNT mass Equivalent would be 1,175.23 pounds.

Results from Blast Effect Calculator (V6.3):

2,350 lb TNT equiv. - Exposed Side of Structure
Window Breakage: 100%
Dynamic Overpressure Impulse: 574.1 psi-ms
Eardrum Rupture: 100% (Major Damage)
Lethality (lung damage): 67.8%

1,175 lb.TNT equiv. - Exposed Side of Structure
Window Breakage: 100%
Dynamic Overpressure Impulse: 251.1 psi-ms

Eardrum Rupture: 100% (Major Damage)
Lethality (lung damage): 52%

It should be noted that the structure was -45 degrees, Angle of Incident to the explosion and these are estimates of possible damage/injury due to a number of incalculable factors. I will send you more as it is known.

Danny Waltenbaugh
[REDACTED]

On Aug 21, 2021, at 10:06 AM, Lyons Sara <[REDACTED]>

Initial pressure was a little higher than that. Somewhere between 830 and 922 psig. It took only 4 minutes to drop about 140 psig (5:29 – 5:33 AM). I don't have quantity lost in that 4 minute period.

From: Waltenbaugh, Danny R. [REDACTED]
Sent: Saturday, August 21, 2021 12:27 PM
To: Lyons Sara [REDACTED]
Subject: Re: NTSB Investigation - Coolidge, AZ (PLD21FR003)

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How about from the time of the initial pressure drop ~800psi to ~650psi?

Danny Waltenbaugh

On Aug 21, 2021, at 9:13 AM, Lyons Sara <[REDACTED]> wrote:

I have it estimated at ~868 MMCF, but this would have been from the entire time from rupture (~5:34AM) to isolation (~8:09AM).

From: Waltenbaugh, Danny R. [REDACTED]
Sent: Saturday, August 21, 2021 12:05 PM
To: Lyons Sara [REDACTED]
Subject: Re: NTSB Investigation - Coolidge, AZ (PLD21FR003)

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Yes. I will do the MMCF conversion to pounds in vapor; however if can provide the volume in air to pounds for natural gas that would be helpful. I will get all the measurements and building construction data from Jon.

Thank you, it was great meeting you.

Danny R. Waltenbaugh Jr.
Senior Explosives Enforcement Officer/Specialist
Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF)
Phoenix Field Division, Arson and Explosives Group

[REDACTED]
[REDACTED]

On Aug 21, 2021, at 8:46 AM, Lyons Sara
[REDACTED] wrote:

Danny,

It was great meeting you the other day. For the work you're doing with the Pinal County Task Force, I can provide information that you need regarding the pipeline failure. As we discussed, do not share any of our information outside of ATF and our party representatives (specific employees on the Pinal County Task Force). All information we have at this point is preliminary and subject to change.

That said, I believe you only needed the estimated release amount. Is that correct? I have the estimated release of natural gas in MMCF. Let me know if that will work for your purposes.

Thanks,
-Sara

Sara Lyons, P.E.
Pipeline Investigator/Investigator-in-Charge
Office of Railroad, Pipeline and Hazardous Materials
Investigations
National Transportation Safety Board

[REDACTED]
[REDACTED]

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