CONST-VIBRATIONS Listserve Newsletter # 1
Identification of data points associated with the establishment of the Z curve.

Development of the USBM RI 8507 Z curve is clarified with heretofore unpublished linkage of data points with specific structures that were cosmetically cracked. Added to Figure 54 from RI 8507 are the plaster and lath Z curve and identification of structures that inhabit its lower bound.

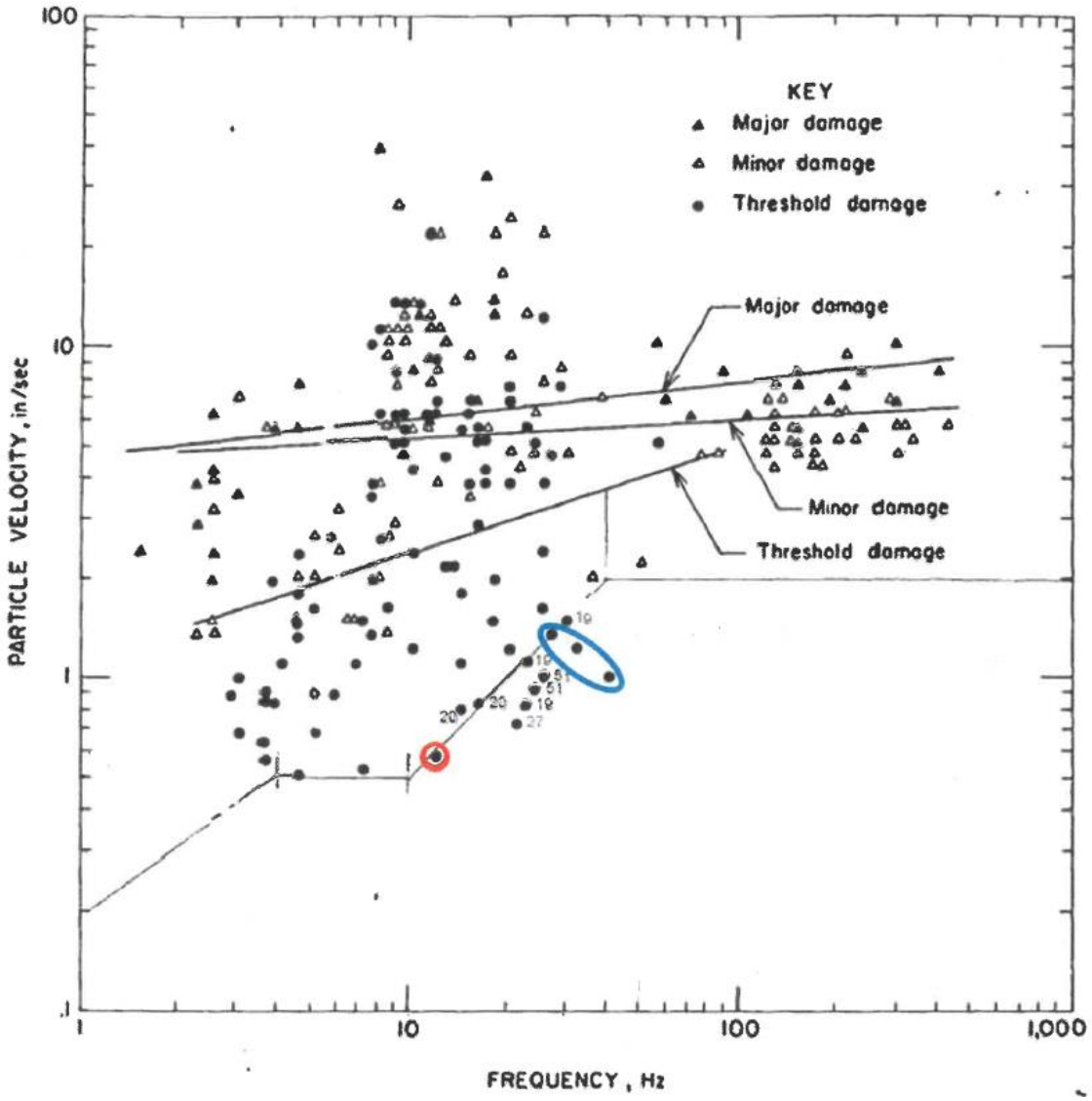

Figure 54 from RI 8507 with additions of 1) plaster and lath Z curve and 2) US Bureau of Mines observations of threshold cosmetic cracking near the Z bounds identified by study and structure.

In the annotated Figure 54 above specific information is provided that is not in the text of US Bureau of Mines USBM RI 8507 (Siskind, et al, 1980). The blue ring identifies those observations of cosmetic cracking from Bulletin 442 (Thoenen & WIndes, 1942) induced by at least two minutes of continuous vibration of a shaker attached to plaster and lath ceilings. These shaker data are "questionably applicable, being of longer duration than actual blasting." The red point and others below

18 mm/s (0.72 ips) are from Dvorak (1962), which are also questionable as discussed below. Numbers are structures identified in Table 3 of RI 8507 in which cosmetic cracks were induced by blasting at the particle velocity and frequency levels denoted by the associated data point. This annotated figure resulted from previously unpublished data discovered at the request of RESPEC (2018) during production of their report for the State of Florida.

The lowest peak particle velocity (PPV) at which the USBM observed cosmetic cracking varied by type of interior wall covering. For plaster and lath interior walls the lowest PPV was 18 mm/s (0.72 ips) at a frequency of 21 Hz in structure 27. For drywall interior walls the lowest PPV was 20 mm/s (0.79 ips) at a frequency of 14 Hz in structure 20. Interior wall covering of structures 19,27 & 51 were plaster and lath and that of 20 were drywall.

All of the data points below a PPV of 0.72 ips regardless of frequency were from the Dvorak (1962) study on masonry structures. Introduction of Dvorak data in RI 8507 reiterated the questions raised in USBM Bulletin 656 (1971) “about the old instrumentation used by Dvorak study”; and went on to say that “it was not possible to verify the reliability or accuracy of any of the old studies, particularly those that published few of their actual data and for which the original time histories have been lost.”

Subsequent editions of the CONST-VIBRATIONS Listserve newsletter will present descriptions of the conditions of structures 19, 20, 27 & 51, color photographs of the structures, description of cracking, source of the heretofore unpublished data as well as a discussion of determination of the excitation frequency associated with the PPV.

REFERENCES

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Nicholls, H. R., Johnson, C. F., and Duvall, W. I. (1971), "Blasting Vibrations and Their Effects on Structures," U.S. Bureau of Mines Bulletin 656, 105 pp.

RESPEC (2018) “Construction Materials Mining Activities Consultation and Study Preparation Services” Report prepared for the State of Florida, Department of Financial Services, Contract FM410.

Siskind, D. E., Stagg, M. S„ Kopp, J. W., and Dowding, C. H. (1980b), "Structure Response and Damage Produced by Ground Vibrations from Surface Blasting," Report of Investigations 8507, U.S. Bureau of Mines, Washington, DC.

Thoenen, J. R., and Windes, S. L. (1942), "Seismic Effects of Quarry Blasting," U.S. Bureau of Mines Bulletin 442, 83 pp.