essentially elastically isotropic. The object of this study has been to check experimentally the orientation dependence of elastic precursor attenuation against various proposed theoretical models.[19, 25] To date seven specimens have been tested to an impact pressure of 70 kilobars. The specimens have been of two orientations, (111) and (110), and of thicknesses ranging from 0.88 mm to 2.78 mm.

The results of these tests have been checked for consistency with a theory developed by Taylor for elastic precursor attenuation that is based upon crystal dislocation dynamics.[25] If a dislocation density an order of magnitude greater than initially present in the specimens is assumed, then Taylor's theory and the data obtained thus far are consistent. A similar discrepancy in dislocation density between the initial experimental value and that required for agreement with Taylor's theory has been reported by other investigators.[19, 26] This discrepancy is possibly due to dislocation multiplication in the elastic wave front or failure of the Gilman relation as a constitutive relation for the dislocation velocities used in Taylor's theory.[27] The data are shown in Fig. 29 for the tests conducted thus far along with theoretical curves based on Taylor's theory. The theoretical curves were obtained by using the observed quasi-static slip systems for tungsten at room temperature in Taylor's theory.[28] The results are consistent and suggest that, in tungsten, the same slip systems operate at the high strain rates of a shock compression experiment that operate at lower strain rates.

VII. CONCLUSION

The gun facility at WSU is now a reasonably well-equipped and operating laboratory. The performance of the gun is quite satisfactory and staff and students have learned how to operate it and the instrumentation to obtain good experimental data. The higher velocity range, from 0.9 to 1.5 mm/μs, has yet to be explored, but no serious problems are anticipated.

It is expected that the research problems now under investigation will lead to advances in fundamental understanding of shock propagation in solids and in the dynamic properties of solids, and that results will begin to become available during the next year.