of Lone Star, Texas, a Northwest Industries subsidiary, has, to date, the only production process of this kind in the United States. It is based on a German development and equipment and called hot stretched-reduced tubing. All tubing is welded to one large diameter and then later hot stretched-reduced to a variety of sizes, some as small as one half inch outside diameter. Tubing manufactured by this process meets ASTM seamless tubing specifications. Sample barrel blanks were produced by TMD with a simple low Capital investment draw bench operation and submitted to Ilion for technical and economic analysis and testing by R & D.

Also, a whole series of separate tests were conducted in an attempt to establish the adequacy of welded tubing. A group of barrels, 10 each, were processed through the GFM hot-forged process. One group consisted of Verson extruded blanks; another group consisted of drilled blanks and the third group were from Lone Star Steel's welded tubing. Complete shotgun barrels were manufactured from each group and turned over to our Metallurgical section for analysis and to R & D for destructive testing. R & D's testing included plugged muzzle blow-ups, 12-20 ga. burst tests, and high pressure 57-60,000 psi chamber tests. Results of the R & D tests of this welded tubing were better than either of the materials from our current process. Also, plant metallurgical analysis uncovered no flaws attributable to the welding process.

During processing of the TMD cold drawn barrel blanks into finished barrels problems that effected the economics of this as an interim process for barrel manufacture were revealed. A two-pass turn was found necessary to contour the outside diameter of the barrels adding substantially to the operating costs. Also, steel tubing material costs were increased from $ .68 to $ .92 per foot further reducing the operating savings of this interim process. A technical difficulty of