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August 18th, 1948

TO: H. J. Dickman

FROM: W. E. Leak

SUBJECT: 1. Examination of Customer's M/721 30-06 cal. with ruptured shell case.  
2. Comparison of (1) with previous strength tests conducted on standard Bolt Action Rifles.  
3. Conclusions.

1. Examination and measurements of the subject gun and fired cartridge case was made by the writer and the following was observed:

- a. Inside of barrel was very dirty and apparently rusty, indicating a failure to clean the gun. The rusty and possibly pitted condition of the bore could have been caused by the corrosive primer mixture used in the ammunition.
- b. The head space measures 2.0505" which is between standard min. and max. dimensions set up for the M/721 30-06 cal.
- c. The shrouded bolt head shows signs of burned powder and rust and there is a possibility that the Extractor\* has been annealed by the high temperatures caused by burning powder under pressure. The escaping breech gas has forced the Ejector\* rearward and to remain flat with the surface of the Bolt face. The Ejector Spring\* thru heat and pressure, undoubtedly has been damaged preventing forward movement of the Ejector.
- d. The cartridge case which ruptured was of Government manufacture, being made in Frankford Arsenal in 1933. Primers used in this ammunition are of a corrosive type. Rupture of the cartridge case was of a longitudinal type, extending from the primer pocket down the body of the case 9/16". The primer was tipped slightly, indicating that it was starting to move out of the primer pocket. Burned powder gas was evident around the circumference of the primer and the ruptured section of the case.
- e. Microscopic examination of the markings on the nose of the Firing Pin and the indentation markings made in the primer prove that the cartridge had been fired by the subject Bolt Assembly.

2. Previous strength tests conducted on M/721 rifles after firing defective ammunition show similar conditions to those found in the subject gun, i.e., gas escape around the primer and inside and around the shrouded head of the Bolt and Extractor. However, the testing of the M/721 with defective ammunition has never shown a permanent set back of the ejector as was found in the subject gun. Ejector set back has been obtained only by firing high pressure loads. Previous testing of defective ammunition in M/721 rifles has shown that a small amount of burned powder could be

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picked up on blotter paper approximately 3" from the breech section of the gun. Defective ammunition tests on other standard Bolt Action Rifles prove them to be incapable to cope with the additional breech gas pressure caused by split shell heads and expanded primer pockets.

3. It is concluded by the writer that:

- a. The cartridge case fired in the subject gun is probably brittle due to ageing.
- b. The shrouded head of the Bolt prevented maximum expansion of the shell head impeding serious injury to the shooter.
- c. Because of the set back of the Ejector, there is evidence of higher than normal breech pressure.
- d. From the strength viewpoint and ability to handle defective ammunition, it is the writer's opinion that the gun performed very satisfactorily.

\*Disassembly was not permitted.

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