

Table 3.4.1 D: Ammunition for Shooting Ranges – Bismuth

Financial Parameter	Measure/Metric	Source of Information
<i>Required Data</i>		
Initial purchase price for chemical/alternative	<p>In 2005, bismuth dealer prices fluctuated from an average of \$3.55 per pound in the first quarter to an average of \$4.57 per pound in the fourth quarter. The fourth quarter 2005 price represented a 33% increase over the fourth quarter 2004 price.</p> <p>Lead raw material price: \$0.65 per pound, Platts Metals Week North American producer price, December 2005</p>	<p>Carlin, 2006a</p> <p>Gabby, 2006a</p>
Initial purchase cost for end-product/component	Pricing for bismuth ammunition was not available because it is sold only to law enforcement agencies.	
Availability of chemical/alternative	<p>Bismuth consumption in the U.S. in 2005 was estimated at 2,280 metric tons. Worldwide demand is growing at about 5% per year, driven in part by its use as a replacement for lead but a global shortage is not expected. Low prices could constrain bismuth supply to the market.</p>	Carlin, 2006a
Availability of component/end-product	Bismuth frangible ammunition is available from at least one manufacturer, Bismuth Cartridge Co. This manufacturer currently only markets its Bismuth Reduced Hazard Ammunition to law enforcement agencies.	<p>Flaherty, 2006</p> <p>Bismuth, 2006</p>
<u>Key</u> end-of-product life costs	The bismuth core fragments into dust when shot into mild steel targets. The bullet particles can be swept up and disposed of as non-hazardous material.	
Capital costs	Bismuth frangible bullets are cast, swaged and then plated with a copper jacket. (Bismuth, 2006) This manufacturing process differs from the lead bullet manufacturing process, and therefore, it is likely that switching to bismuth bullet manufacturing would require significant capital investment.	Bismuth, 2006