9. THE LEAD

Valerie E Dean and Maureen Young

Geologically, Siller Holes lies within the Midland Valley, slightly north of the Southern Uplands fault line.

Some 243 pieces of slag and 20 pieces of ore (galena) were retrieved from the site along with the fragments of leather, pottery and textiles. It was noticeable that most of the lead finds were from the disturbed areas around the north-eastern end of the pond.

With the generous assistance of Dr Maureen Young of Historic Environment Scotland's Conservation Centre, 19 random samples were analysed by qualitative X-ray fluorescence to ascertain the presence of silver (see Appendix 2).

From the spectra the samples could be differentiated into two groups – ore and slag (Table 8).

Lead and/or zinc were the main elements of the group deduced as being ore, one sample was barium-rich and another had a large amount of copper. Ten of these eleven samples had traces, probably less than 0.1%, of silver. Eight samples contained trace elements, less than 1%, of cadmium and tin. None of these samples contained iron.

Table 8 Selected notable elements observed in the spectra

Find no.	Sent for XRF (visual ID of sample)	Major element(s)	Main secondary elements	Minor elements	Trace elements (<*c* 1%)	Sample type (deduced from spectrum)
Siller Holes 74	1 ore/rock	Fe			Sr	slag/stone
Siller Holes 117	1 slag+ore	Fe	Pb, Zn		Cd	slag/stone
Siller Holes 286	1 slag	Fe	Pb, Zn		Cd	slag
Siller Holes 332	1 slag + very little ore	Fe	Pb	Zn		slag/stone
Siller Holes 354	1 slag	Fe	Pb	Zn		slag
Siller Holes 381	1 slag	Fe, Zn	Pb		Cd	slag
Siller Holes 433	1 ore (surface melted)	Fe		Pb, Zn		slag/stone
Siller Holes 614	1 slag	Fe	Pb	Zn		slag
Siller Holes 320	1 ore	Zn	Pb		Cd, Ag	ore
Siller Holes 346	1 ore	Pb		Zn	Sn, Cd, Ag	ore
Siller Holes 395	2 ore	Zn, Pb			Sn, Cd, Ag	ore
Siller Holes 641	1 ore	Zn		Pb	Cd	ore
Siller Holes 647 bag 2 of 2	1 ore	Pb	Zn		Sn, Cd, Ag	ore
Siller Holes 677 bag 1 of 2	1 ore	Pb, Zn, Ba			Sr, Cd	ore (Ba-rich)
Siller Holes 677 bag 2 of 2	1 ore	Pb		Zn	Sn, Cd, Ag	ore
Siller Holes 687	1 ore	Pb, Zn			Sn, Cd, Ag	ore
Siller Holes 689	1 ore	Cu	Zn, Pb		Hg, Cd	ore
Siller Holes 690	1 ore	Zn, Pb			Sn, Cd, Ag	ore
Siller Holes Geol. 4	1 thin blob melted lead	Pb			Sn, Cd, Ag	ore

The eight samples of slag contained significant amounts of iron and lead and varying amounts of zinc. No samples of this group had traces of silver; given the frequency of silver traces in the ore, this indicates efficient transfer of the silver to the lead.

Sample Geol 4, deduced as ore, was an anomaly, being a thin, melted blob comprising almost pure lead. Its find spot at Siller Holes was not known.

Lead isotope analysis had previously been done on other samples of galena from Siller Holes (Rohl 1996: 178). The results are shown below (Table 9).

Analysis of the lead beads from the Bronze Age site at the nearby West Water Reservoir has shown their lead provenance to be in the Central Midland Valley or Southern Uplands of Scotland, although the isotope ratios are not consistent with those for the medieval lead-mining site at Siller Holes (Hunter et al 2000: 139).

It would be a useful future project if core samples from the boggy area could be analysed to identify the timing of any lead pollution.

Table 9 Lead isotope analysis

Sample	Region	$^{208}Pb/^{206}Pb$	$^{207}Pb/^{206}Pb$	$^{206}Pb/^{204}Pb$
SIL 1	Midland valley	2.10309	0.86110	18.029
SIL 2	Midland valley	2.10426	0.86146	18.033
SIL 3	Midland valley	2.09876	0.85826	18.084