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## WEIGHTS AND MEASURES USED AT THE MINES OF LEADHILLS AND WANLOCKHEAD IN THE LATE EIGHTEENTH CENTURY

W.S. Harvey

The following details of some old weights and measures have come to light during research into the introduction of steam pumping engines at the lead mines of Wanlockhead, Dumfriesshire. They provide information on an old system of weights once widely used in Scotland, and they provide some contemporary comparisons with other measures.

### Weights

The basis of the weights used at both mining grounds was the now forgotten 'Amsterdam', 'Dutch' or 'French Troye' weights. They replaced the older weights of the 'Scottish Tron' and were established as the standard Scots weights under an act of 1618.<sup>1</sup> The system was equivalent to one which seems to have been widely used on the Continent at that time, and its introduction into Scotland arose from the very considerable trade that existed with the Low Countries. A set of standard Amsterdam weights was provided for the city of Glasgow by the Conservator of Privileges of Dort, early in the seventeenth century.

Scottish lead was a part, even if only a small part, of this trade at the beginning of the seventeenth century<sup>2</sup> and although the trade as a whole was to diminish in the years which followed, the export of lead from the mines of Leadhills and Wanlockhead continued, and the 'Stone Amsterdam' was to be the standard weight at the mines well into the nineteenth century.

The system was a simple one, being based upon a Stone of 16 pounds, and a pound of 17 ounces and 6.15/16 Drams Averdupois. In practise the latter comparative figure was taken as 17 ounces and 7 drams, and the comparisons may then be expressed as

1 lb Amsterdam	=	1.09 lbs Averdupois
1 stone Amsterdam	=	1.05 stones Averdupois

The original system did not have a weight heavier than the Stone<sup>3</sup> and the use of a ton of 136¼ stones Amsterdam at the mines was probably a local convenience.

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“Report of the Charles Hine. June 1799”  
“Note. The ton is 136¼ stones Amsterdam”.

This is in fact equal to 2000 lbs Averdupois, which was a common weight for the ton at that time.

During the period, the output of smelted lead from the mines was always entered in the Mine Journals in stones, even when large amounts were involved.

“... smelted lead .... weighing 857,625 stones ....”

On the other hand, the lead ore seems to have been recorded in tons.

“... Ore raised this quarter .... 105 tons ....”

Although the output from the smeltermills might be measured in stones, the rates for Bargains in smelted lead were invariably per ton.

“To Robert Hastie and seven more to raise ore  
.... at three Pounds per Tun of Smelted Lead.”

But if the total output of ore was in tons, the amount of ore raised by a partnership of miners “as always measured by the Bing. It was a common term at all lead mines, but the local Bing was very different from the English one, as is shown by the following entry from the ‘Leadhills Diary’.

317th June, (1745) .... sent for to Mr S. between 8 and 9 at night with whom and the Overseers I was in Company till 12. Conversation - the English Bing of Ore is 64 stones weight of 14 lbs Averdupois to the stone. To find the proportions of the English Bing to our Bing which is 72 stones Amsterdam:

$$\frac{64 \times 14 \times 70}{76} = 72 \times 16$$
$$490 = 684 \text{ “ 4”}$$

From this it will be seen that the conversion ratio was in pounds and taken as 70 : 76, and the local Bing was in fact about 89½ stones Averdupois. This meant that the Scots miners had to raise almost half as much ore again as their English counterparts to fill a bing.

The lead smelted from the ore was cast into bars of about 8 stones. At Wanlockhead the weight of the bars was only loosely defined.

“According to the Lease the weight of the Bars is to be 8 stones Amsterdam or thereby”<sup>5</sup>

An arrangement which lead to abuses as the letter quoted went on to explain. But at Leadhills they were more exact.

“The Bars not to contain under Eight stones nor over Eight stones and Six Pounds.”

Since peat was the main fuel for the smeltermills, there was no great demand for coal until the introduction of steam engines in the last quarter of the eighteenth century. Coal for the engines was not only a major item of expenditure, but an accurate measure of the amount used was required if the Duty of each engine was to be properly assessed. The coal used came from the mines at Sanquhar and was measured in Loads. In a letter about the performance of the pumping engine built by William Symington, the writer gives a valuable definition of the weight of the loads being delivered.

“... the engine which at present draws from 37 fathoms burning no more than 10 loads of our Coals each Load being 12 Dutch stones ....”<sup>6</sup>

This shows the Load to be equivalent to about 209 Ibs Averdupois. This is a smaller amount than the 2 to 2½ cwt quoted as the weight of a Load at Sanquhar<sup>7</sup> but the reduction may reflect the long uphill road which the coal carts had to take to Wanlockhead.

Although the Union of 1707 decreed that the English Averdupois weights should be the standard for the whole country, and although this was backed by further Acts of Parliament, the century ended with a variety of local weights still in use in Scotland. Although no instruction terminating the Amsterdam system at the lead mines has yet come to light, it seems probable that the use of these weights continued into the second half of the nineteenth century.

### **Length**

The ubiquitous fathom was the usual measure for the lengths of levels and the depths of shafts, with feet & inches for smaller distances. The yard, often used for the depths of pumping shafts elsewhere, is not mentioned in the old records.

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Distances might be measured to a fraction of a fathom.

“.... the branch .... measures 47 and one sixth Fathoms”.

But could be to the nearest inch.

“William Adamson and Partners .... employed at £6 per fathom having driven 5 fath 2 ft 3 in on these terms.”

### **Volume**

Measures such as the Bing were probably, in practise, volume measures, and the amount of ore in a stope or ‘roosting’ was estimated in cubic fathoms. The only other volume measure met with was the amount of water flowing into or out of the mines. A Journal entry in 1799 indicates that at that time this commanded a validity probably occasioned by the new steam engines.

“.... the feeders issue from the sump and appear to flow about 4 cubic feet per minute ....”

While this may have been no more than an inspired guess, the entry shows that the Overseer saw the flow as a definitive cubic amount rather than in the measures of the alehouse.

On the whole, cubic feet seem to have been preferred to hogsheads as the measure of the output of the new steam pumps. The hogshead was a common measure and could vary from 44 to 60 gallons depending on the liquid being measured. Correspondence between Gilbert Meason the managing partner at the Wanlockhead mines, and James Watt, shows that the latter in fact used a hogshead equal to 52 gallons.<sup>8</sup>

Although lead ore was mined. all over Scotland at one time or another it was only at Leadhills and Wanlockhead that there was any continuous history and even at these grounds the mining was not of great antiquity. Leadmining in Scotland has not had the long and local tradition which has produced the variety of measures used elsewhere, but the dependence of Leadhills and Wanlockhead on what was once a national system provides a peculiar interest.

Today, the wheel has turned full circle and another continental system has become not only the Scottish but the British standard. There is then a need to record not only the old weights and measures but those local preferences recently in use and in particular, the way the measurements were made.

## References

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4. Transcript of a Diary for the year 1745. Author unknown. Galloway Collection, Ewart Library, Dumfries. 'Mr S' refers to James Stirling, mathematician and friend of Sir Isaac Newton who was appointed manager at Leadhills for the Scots Mining Company in 1739.
5. Letter from Thomas Crichton to Messrs Gibson and Home. November 1832. Buccleuch Muniments, Scottish Record Office, Edinburgh.
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Other references illustrating the various weights and measures have been taken at random from Mine Journals of the period in the Wanlockhead Lead Mines Journals, at the Hornel Library, Kircudbright; and in the Scots Mining Company Journals at the Leadhills Miners' Library, Leadhills.

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