

[Supplementary material]

Alpine ice and the annual political economy of the Angevin Empire, from the death of Thomas Becket to Magna Carta, c. AD 1170–1216

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OSM1. Colle Gnifetti LA-ICP-MS lead record, AD 1155–1216.

See MS Excel file

OSM2. Geo-archaeological records of lead pollution from western and central Europe, AD 1100–1300.

Geo-archaeological/ environmental record site name	Nature of record	Country	Region	Number of radio-carbon dates contributing to age-depth model for record (& other dating)	Date range of medieval lead (Pb) pollution, between c. AD 1000 & 1300 (based on radiocarbon date ranges)	Date ranges of peaks in lead pollution within record, between c. AD 1000 & 1300	Direction from known lead/silver mining regions	Publication reference & Notes
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1. Lindow Moss (Lindow Bog in Le Roux <i>et al.</i> 2004)	Peat core	United Kingdom, England	North-west England, Cheshire.	11 dates.	Significant rise in Pb <i>c.</i> 900. Period of large-scale production <i>c.</i> 900-1200.	Peak at <i>c.</i> 1150–1200 (largest peak pre 1600) with decline, <i>c.</i> 1200–1250. Rise again post 1250.	South-west of mine of Carlisle. North-east of ‘Mine of Shropshire’ and Denbigh, north-east Wales mine. West of Peak Mines.	Le Roux <i>et al.</i> (2004).
2. Rookhope Bog and Valley Bog	Peat cores	United Kingdom, England	North-east England, Weardale & Teesdale, Durham & North Yorkshire.	Four dates for core RH2; five dates for core RH3; four dates for Valley bog core.	Deforestation in pollen evidence from the mid eleventh century is seen as the marker of the start of iron & lead mining/ smelting. Gradual rise in Pb from <i>c.</i> AD 1100.	Gradual rise from 1100. No decline observed after 1200. Level of production suggested as low but consistent in twelfth & thirteenth centuries.	Located in the north of the Pennine ore-field, in the region of the mines of the Bishop of Durham. Due west of ‘Mine of Carlisle’ region.	Mighall <i>et al.</i> (2004).
3. Toddle Moss, Leadhills, Wanlockhead	Peat core	United Kingdom, Scotland	South-west Scotland, Dumfries & Galloway.	Three dates.	Lead concentration between AD 400 & 1600 is low (small-scale local production). Production between <i>c.</i> AD 900–1310.	Small lead peak at <i>c.</i> AD 1010. Then a drop until a second peak at 1310, then further decline.	Approximately 75km north-west of ‘Mine of Carlisle region’.	Mighall <i>et al.</i> (2014): earliest textual reference to lead mining in the area is from 1239 (mine

					Decrease in production after <i>c.</i> 1310.			owned by monks of Newbattle abbey).
4. Raeburn Flow	Peat core	United Kingdom, Scotland	South-west Scotland, Dumfries & Galloway.	Three dates.	Sustained production reflected in Lead concentration and EF, <i>c.</i> 1050–700 cal. BP (<i>c.</i> AD 970–1320).	Late twelfth–early thirteenth centuries. Large peak indicated in Figure 3c. Then a drop until a second peak post 1250, also shown in Figure 3c.	Approximately 10km north-west of the ‘Mine of Carlisle’ region.	Küttner <i>et al.</i> (2014).
5. Carsegowan Moss	Peat core	United Kingdom, Scotland	South-west Scotland, Dumfries & Galloway.	Four radiocarbon dates, plus ²¹⁰ Pb date for mid-nineteenth century present.	Low-level production from tenth–eleventh centuries. Significant rise in later eleventh century, then drop in early-mid twelfth century, and rise from mid twelfth–thirteenth centuries.	Peak in production cal AD 1215–1300 at 2 sigma (95%)—not late twelfth century. Decline after 1300, until rise again in modern period (nineteenth century).	137km west of Carlisle.	Cloy <i>et al.</i> (2008).
6. Borth Bog	Peat core	United Kingdom, Wales	West Wales coast, Cardiganshire,	Five dates.	Pollution reflecting sustained production at 925±30 BP (cal AD	No peaks noted for the later twelfth or early thirteenth centuries.	No known mining/smelting sites dating from AD 1000–1300	Mighall <i>et al.</i> (2009): First recorded lead mining in the

			10km north of Aberystwyth.		1026–1177, at 2 sigma/95%).		known locally, but an earlier medieval mining/smelting site is located in the Ystwyth valley, 10–20km to the south-west.	region was in 1305, relating to a mine owned by the Cistercian monastery at Strata Florida.
7. Charterhouse	Speleothem	United Kingdom, England	South-west England, Somerset, Charterhouse-on-Mendip, Mendip Hills.	LA-ICP-MS & Uranium-Thorium dates.	Pollution reflecting some production, <i>c.</i> AD 850–950. Then drop to background Pb levels by <i>c.</i> 1100. Some pollution in mid-twelfth century but significant production occurred only from <i>c.</i> 1200 to 1300.	Peak at <i>c.</i> AD 950, then sharp drop to low at 1100. Then minor peak at <i>c.</i> 1160–1170, then sharp drop to <i>c.</i> 1190. Significant rise from <i>c.</i> 1200–1250 (McFarlane <i>et al.</i> (2014: 436, fig.3).	Speleothem is situated within the Mendip Hills ore-field.	McFarlane <i>et al.</i> (2014).
8. Tor Royal 2	Peat core	United Kingdom, England	South-west England, Devon. Located on Dartmoor, 1.5km south-east of	17 dates.	Very limited Pb pollution above background level between <i>c.</i> AD 1000 and 1300 (p. 726). Very slight	No Pb pollution peak between AD 1000 and 1300.	Contributions to slight rises above natural background between 1200 and 1400 suggested as	Meharg <i>et al.</i> (2012).

			Princetown, approximately 20km north-east of Plymouth.		rise from <i>c.</i> 1200–mid fourteenth century, then drop (Meharg <i>et al.</i> 2012: 721).		originating from British Pb sources (Meharg <i>et al.</i> 2012: 725–26, fig 11).	
9. Misten Bog, Hautes Fagnes plateau.	Peat core	Belgium	South-east Belgium, near Eupen, 5km from the German border, equi-distant between Tongres and Cologne.	One date, plus ²¹⁰ Pb dates for upper part of sequence, and linked to radiocarbon dates from nearby pollen cores.	Intermittent small lead peak in early Middle Ages <i>c.</i> ninth and tenth centuries. Then decline in pollution. Lowest pollution between <i>c.</i> AD 1150 & 1200 in Pb concentration, before rise in thirteenth century and drop at Black Death, with post-Black Death recovery.	Lowest points in lead pollution/production, between AD 1150 and 1200.	In close proximity to Belgian ore-fields to the west and Rhineland, Eifel ore field to the south-east.	De Vleeschouwer <i>et al.</i> (2007).
10. Maar lakes (Meerfelder Maar & Schalkenmehrer Maar)	Varved lake sediment cores	Germany	West Eifel region, 70km south-west of Aachen, 50km	Varved.	Despite historical records for small-scale lead mining in the Aachen and Eifel regions from	None. Suggests that production levels were sporadic and small.	70km south-west of Aachen ore-field.	Schettler & Romer (1998).

			north-west of Trier.		the eleventh century, no elevated Pb levels were found between cal AD 1000 & 1300 (Schettler & Romer 1998: 795).			
11. Sonnenberger Moor	Two replicate peat cores, taken 15–20m from each other	Germany	Ober Harz region, crossing southern Niedersachsen, Sachsen-Anhalt and Thüringen.	See Kempter (1996). (Radiocarbon dates not discussed in detail in Kempter & Frenzel 2000).	Sustained production from c. 1080/1100–1250. Sharp decline from 1300, then Black Death impact too (Kempter & Frenzel (2000: 100, fig. 4).	Sharp rise from c. 1080. Peak production at c. 1150–1250 (Kempter & Frenzel 2000: 100, fig 4). Coincides with development of copper and iron mining/smelting in the Oberharz.	Within the Harz ore-field.	Kempter & Frenzel (2000).
12. La Perge and La Melonne	Two coastal marsh sediment cores	France	South-west France, Gironde estuary.	Seven dates for La Perge. Two dates for La Melonne.	Pollution at different periods between c. 1000–600 BP (c. AD 950–1350) (Alfonso <i>et al.</i> 2001: 3606, fig.4).	Sharp rise from c. 1100 to peak in pollution at c. 1150 (800 BP), drops from c. 1150–1250, reaching low at c. 1350 (Black Death) (Alfonso <i>et al.</i> 2001: 3603, fig. 4).	150km south-west of Melle ore-field (in Poitou-Charente). Drop in period 1150–1200 is opposite to CG picture.	Alfonso <i>et al.</i> (2001).

13. Narses Mortes, Mont Lozère	Peat core & smelting sites	France	Central southern France (Lozère), Cévennes, Massif Central.	Seven dates.	Local production <i>c.</i> AD 1000–1280.	Local peak in pollution/ production <i>c.</i> 1156–1264 (at 2 sigma /95% confidence). Continuity of local pollution peak through first half of thirteenth century, contra CG.	Within the Cévennes / Mont Lozère ore-field, approximately 135km west of the River Rhone & 150km north of Montpellier/ the Mediterranean coast.	Baron <i>et al.</i> (2005, 2006).
14. Port-des-Lambert	Peat core	France	Morvan (Bourgogne - Franche-Comté), northern Massif Central.	Four dates.	Sustained but small-scale pollution from <i>c.</i> AD 888–1028 (1070±50 BP) to <i>c.</i> AD 1250.	Low peak in pollution reached <i>c.</i> mid twelfth to mid thirteenth century. Drop after <i>c.</i> mid thirteenth century. The pollution was not produced locally in the twelfth and thirteenth centuries.	Suggested that local post-Roman production dates from the eighteenth & nineteenth centuries only. No close alternative sources in medieval period (Monna <i>et al.</i> 2004: 72).	Monna <i>et al.</i> (2004a).
15. Étang de la Gruère	Peat core	Switzerland	Jura Mountains.	18 dates.	Drop in isotope ratios, indicating	Steady rise in pollution suggested from <i>c.</i>	The Étang de la Gruère core is	Shotyk <i>et al.</i> (1998); while

					<p>some significant production at 1010±30 BP (<i>c.</i> AD 900), Drop flattens at 710±20 BP (<i>c.</i> AD 1250).</p>	<p>1010±30 BP (<i>c.</i> AD 900) to peak at 710±20 BP (<i>c.</i> AD 1250). The pollution did not derive from local production/ smelting.</p>	<p>around 200km north-north-west of Colle Gnifetti.</p>	<p>suggesting a German source for this pollution, and suggesting isotopic matches with German sources, Shotyk <i>et al.</i> also observe, correctly, that the Rammelsberg mine in the Harz was in decline by AD 1025–1050, and that the isotopic signature is not Rammelsberg. No evidence of comparison with isotope ranges from non-German sources. Since</p>
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								1998, more knowledge has been gained of isotope overlaps across Europe and potential impacts of fractionation and the smelting process.
16. Neuburgsattel	Peat cores	Austria	Steiermark, south-east Austria, Johnsbach valley.	One at base of core, others linked to pollen changes.	Significant pollution between <i>c.</i> 1000 BP (<i>c.</i> AD 950) and 800 BP (<i>c.</i> AD 1150) (Marshall <i>et al.</i> 1999: 259, fig. 4).	There is a very sharp rise in Pb pollution at 1000 BP (<i>c.</i> AD 950) to reach a peak at 900 BP (<i>c.</i> AD 1050), then a sharp decline at 850 BP (<i>c.</i> AD 1100), and then a further less steep decline to a base at 800–750 BP (AD 1150–1200) (Marshall <i>et al.</i> 1999: 259, fig. 4). No indications of local production.	900km to the ENE of Colle Gnifetti, at eastern-most extension of the Alpine foothills.	Marshall <i>et al.</i> (1999): the lead pollution peaks in this article, ostensibly focussed on copper, are closest to the lead-silver production chronology in the Harz between <i>c.</i> 950–1050. Lowest point in

								medieval pollution was between 1150 & 1200, directly opposite to CG deposition pattern.
17. Crveni Potok	Peat core	Serbia	Tara Mountains, within the Dinaric Alps.	Nine dates (AMS dates).	Significant Pb pollution from rise <i>c.</i> AD 1170–1180 to decline by <i>c.</i> AD 1250.	Peak at <i>c.</i> AD 1170–1230, then sharp decline to <i>c.</i> 1250.	Approximately 100km west of Serbian/North Balkans ore field; & around 1370km to the east of CG.	Longman <i>et al.</i> (2018): the pattern of pollution between <i>c.</i> 1150 and 1250, most closely matches what is known of Erzgebirge-Freiberg silver-lead production in southeast Saxony, Germany. The medieval Serbian mines developed after 1250.

18. Quinto Real	Peat core	France/ Spain border (Basque Country)	Basque Country, High Aldudes valley, Pyrenees.	Three dates.	Nothing between AD 1000 & 1300 cited by authors.	Possible very minor peak <i>c.</i> 1100 but sharp decline between <i>c.</i> 1150–1200 (Monna <i>et</i> <i>al.</i> 2004b: 208). Very limited production, if any.	No production suggested by authors in this period, despite location in local ore-field.	Monna <i>et al.</i> (2004b).
19. La Molina	Peat core	Spain	North-west Spain, Asturias, Alto de la Espina Mountains.	Six dates.	Small scale production from <i>c.</i> AD 1000–1250.	Small peak in pollution at <i>c.</i> 1200, with rise from <i>c.</i> 1150, and then decline post 1200 (Martínez-Cortizas <i>et</i> <i>al</i> 2013: 81, fig. 6).	Within north-west Spanish/ Galicia-Asturias ore-field.	Martínez- Cortizas <i>et al.</i> (2013).
20. Penido Vello	Peat core (PVO A)	Spain	NW Spain, Galicia, Sierras Septentrionales/ Xistral Mountains.	8 dates.	Significant peak between <i>c.</i> AD 900 and 1000, followed by very limited pollution, then new slight rise between 1150 & 1200, then decline.	Only significant peak: <i>c.</i> AD 900–1000. Rise between <i>c.</i> 1150 & 1200 was minimal.	Within north-west Spanish/ Galicia- Asturias ore field.	Martínez- Cortizas <i>et al.</i> (1997, 2013: 81, fig. 6); Kylander <i>et al.</i> (2005).
21. Lakes of northern Sweden: Koltjärn, Grånästjärn,	Varved lake sediment cores	Sweden	North-east Sweden	Varved.	Rise in production /pollution <i>c.</i> AD 900–1250. Then fall, and new rise late thirteenth–early	Sharp peak in pollution, btw. 1150 & 1200 (1150–1170 lowest isotope ratios).	The Lakes are <i>c.</i> 1850km north- north-east of Goslar (Rammelsberg	Brännvall, M.- L. (1999).

Norrtjärnsjön and Kassjön					fourteenth century, in two cores, prior to fall to a Black Death low.		mine), Harz ore- field; 1920km– 2000km, to north to north-north- east of the Erzgebirge ore- field; 1500 and 1400km north- east of the Pennine and Peak District ore-fields.	
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OSM3. Supplementary note on the importance of wind direction for sourcing pollution.

There have been intermittent changes in atmospheric circulation patterns in the northern hemisphere, associated with changes in the strength of the Icelandic Low pressure and the Azores High pressure systems (indexed as the North Atlantic Oscillation, NAO) over the last 11 000 years (Mayewski *et al.* 2004). These changes often occurred quite rapidly—over several centuries—approximately every 2500 years, the most recent of which is connected to the ‘Little Ice Age’ between *c.* AD 1400 and 1700 (Mayewski *et al.* 2004). The transport of wind-borne pollution to western Eurasia and the Alpine region has been influenced primarily by the strength of the Iceland Low pressure system, to which there has been relatively little major change since the last significant deepening of the system in the mid Holocene, between 6000 and 5000 BC (Swindles *et al.* 2018: 48). Despite changes in the strength of the Iceland Low, the prevailing direction of winds created by this system has been consistent for the last 11 000 years, sending winds over Europe and into the Mediterranean in a north-westerly (NW) to south-easterly (SE) direction (see Figure 5, in the main text).

The best markers of the long-term consistency of this NW to SE wind system are provided by finds of volcanic cryptotephra that originated from volcanic eruptions on Iceland, and were transported by this consistent wind direction. The cryptotephra particles have been recovered from geo-archaeological core records from lakes and peat bogs in Europe, as well as from the new Colle Gnifetti ice core. For example, tephra from the Askja-S eruption, *c.* 11 000 years ago, have been found in the Faroe islands, the Orkney islands, Ireland, Scotland, Wales, Switzerland, Germany, Poland, and southwest Sweden, with an outlier in northern Norway (Jones *et al.* 2017: 528). For historic periods, cryptotephras from Icelandic eruptions have been found in countries along the same NW to SE wind direction track from Iceland. Particles from the AD 860 Icelandic eruption and the Hekla eruption of AD 1104 have been found in multiple peat cores from Ireland (Hall 2005). Tephra from the 860 eruption has also been found in peat cores from Poland, along with particles from the Askja 1875 eruption (Watson *et al.* 2017). Fragments from the so-called Landnám eruption of AD 871±2 years have also been found in Loch/fjord sediments in Scotland (Cage *et al.* 2011). To these finds can be added the likely Icelandic 536 tephra, and the Askja 1875 tephra from the Colle Gnifetti ice core (Luongo *et al.* 2017; Loveluck *et al.* 2018). Icelandic cryptotephra has even been found beyond the Alps in a lake core from Lake Bled, in Slovenia, from the Vedde Ash eruption, dated to between *c.* 12 700 and 11 500 years ago (Lane *et al.* 2011: 1017).

Observational studies over the last 250 years also corroborate the long-term NW to SE wind direction from Iceland crossing NW Europe towards and over the Alps. The passage of the volcanic dust (haze) plume from the eruption of the Icelandic volcano, Laki, which began erupting on 1 June 1783, is recorded over the Faroes, Britain, Ireland, France as far west as La Rochelle, the Netherlands, Denmark, Germany, Italy (Padua and Rome), Hungary, and eventually was recorded in Moscow, Tripoli (Lebanon) and Cairo by the end of June 1783 (Mikhail 2015: 268–69). The Eyjafjöll eruption of 2010 that disrupted air travel over Europe and the Mediterranean regions also had a plume very similar to the Laki plume of 1783, again driven by the long-term NW to SE wind system from the Iceland Low (Davies *et al.* 2010: 607). Tephra from the 2010 eruption was found well to the SE of the Alps, in Rimini, Italy (Rossini *et al.* 2012).

It is also critically important to observe that wind and not proximity to the eruptions governed direction and speed of transport of the plumes and deposition of tephra from the 1783 and 2010 eruptions. For example, the Laki plume of 1783 arrived in Britain on 10 June and was noted in Rome on 16 June. The closest landmass to the eruption was western Greenland but the vestiges of the plume that travelled west are only

recorded at Nook on 30 June, the same date that the plume was recorded as arriving in Moscow, Tripoli and Cairo at the eastern extremities of the plume dispersion (Mikhail 2015: 269). The closely monitored 2010 ash cloud did not travel west to Greenland at all. All the ash was transported on the NW to SE conveyor winds to NW Europe and the Mediterranean (Davies *et al.* 2010: 607). Cryptotephra found associated with Norse settlements on Greenland also reflect the fact that the Iceland Low prevailing wind system transports tephra particles in a southeasterly direction. The cryptotephra associated with the Norse settlements on Greenland were sourced to eruptions in Alaska and the Aleutian islands, not Iceland (Blockley *et al.* 2015).

It is the prevailing NW to SE wind direction reflected in the tephra distributions and volcanic plume/ash cloud studies that provides the principal transport mechanism of lead pollution from Britain to the Colle Gnifetti glacier. It is the same prevailing wind direction, also reflected in the atmospheric circulation data and simulation from *Climate Reanalyzer*TM (Figure 5), that resulted in pollution from the Harz mountains and the Erzgebirge regions being taken eastward and southeastward, far from the Colle Gnifetti glacier in the western Alps. This easterly movement of air masses is also demonstrated by the absence of tephra from Italian volcanoes in the Alps – again showing the importance of wind direction over proximity. The closest occurrence of Italian tephra is to the east of Italy at Lake Bled in Slovenia, which also contained Icelandic tephra (Lane *et al.* 2011). Limited pollution from the Massif Central/southern France and Italy would also have been transported in a southeasterly direction, again demonstrated by the movement of tephra and volcanic ash clouds, discussed above. Surprisingly, recent publications on pollution in other Alpine and Greenland ice cores that used modelling based largely on proximity to possible sources have not considered the tephra evidence for wind direction/atmospheric circulation, and its implications (McConnell *et al.* 2018, 2019; Preunkert *et al.* 2019).

The detailed analysis in this study of the historical, archaeological and geo-archaeological evidence for silver-lead production between c. 1150 and 1220, and tephra/atmospheric circulation data, all point conclusively to British sources providing the vast majority of the lead pollution signal at Colle Gnifetti during those decades.

OSM4. Mine of Carlisle Pipe roll entries: farm payments & cart-loads of lead, AD 1167–1216.

Pipe roll	Mention of mine	Year	Farm payment details (paid in silver) and/or cart-loads of lead	Mention of lead	Destination	Source	Page number(s) of entries, text and notes <i>(Cited text is presented as in the various editions quoted. Mistakes and abbreviations in the medieval Latin have not been corrected or resolved. Repeated details of non-payments have page number citations only.)</i>
1166–1167	Yes	Michaelmas 1167	500 marks for the farm. 308 pounds, 10 shillings, 8 pence paid to Treasury, and lead to Windsor.	Yes	Exchequer for Farm. Lead to Windsor castle for construction.	The Great Roll of the Pipe for the Thirteenth Year of the Reign of King Henry the Second, AD 1166–1167, Pipe roll Soc (XI), 1889, London.	PR13, H2, p. 173, under ‘Minaria Carleoli’: ‘Wills fil Erembaldi red Comp de .D. m. de Minaria de Carleol. In thro .ccc. 7 .viii. li. 7 .x. s. 7 .viii. d. Et p plu(m)bo ad domos R de Windr .x. li. 7 .iii. s. p br R.’
1167–1168	Yes	Michaelmas 1168	14 pounds, 13 shillings for the Old Farm. Plus, 204 (and quarter xx) pounds, 7 shillings for the new farm paid into the Treasury, plus 55 cart-loads sent to Caen.	Yes	Farm to Exchequer/treasury. Lead to Cadomum (Caen, Normandy) for construction.	The Great Roll of the Pipe for the Fourteenth Year of the Reign of King Henry the Second, AD 1167–1168, Pipe roll Soc (XII), 1890, London.	PR14, H2, p. 109, under ‘Minaria Carleoli’: ‘Wills fil Erembaldi red Comp de .xiii. li. 7 .xiii. s. de veti Firma Minarie. In thro libavit. Et Quiet. Et Ide de Nova firma. In thro .cc. 7 qat .xx. 7 .iiii. li. 7 .vii. s. Et p .LV. carectatis Plu(m)bi libatis vic de Norhubrl ad portand ap Cadomum .xxiiii. li. 7 .xv. s. p br. R.’
1168–1169	Yes	Michaelmas 1169	24 pounds, 4 shillings, 8 pence for the Old Farm.	No	Exchequer	The Great Roll of the Pipe for the Fifteenth Year of the Reign of King	PR15, H2, p. 121, under Minaria Carleoli: ‘Wills fil Erembaldi red Comp de .xxiiii. li. 7 . iii. s. 7 .viii. d. de veti firma Minarie de Carl. In

			270 pounds for the New farm. All paid to Treasury.			Henry the Second, AD 1168–1169, Pipe roll Soc (XIII), 1890, London.	thro libavit. Et Quiet est. Et Id de Nova firma. In thro .cc. 7 .lxx. li.’
1169–1170	Yes	Michaelmas 1170	43 pounds, 6 shillings, 8 pence for the Old Farm. 500 marks for the New Farm. Presumably all paid. No shortfall recorded, or how much was paid to the Treasury.	No	Exchequer	The Great Roll of the Pipe for the Sixteenth year of the reign of King Henry the Second, AD 1169–1170, Pipe roll Soc (XV), 1892, London.	PR16, H2, p. 33, under ‘Minaria Carleoli’: ‘Wills fil. Erenbaldi (red Comp) d(e) lxiii. Li. 7 .vi. s. 7 . viii. D. de veti firma Minarie de Carleol. .. Id deb.. .D. m. de Nova Firma.’
1170–1171	Yes	Michaelmas 1171	63 pounds, 6 shillings, 8 pence for the old farm. 30 pounds of silver for the coronation/crown of prince Henry. 500 marks for the New Farm. 38 pounds, 6 shillings, 8 pence actually paid in to Treasury for old Farm, 30 pounds for the coronation & 100 marks for the new farm.	No	Exchequer	The Great Roll of the Pipe for the Seventeenth year of the reign of King Henry the Second, AD 1170–1171, Pipe roll Soc (XVI), 1892, London.	PR17, H2, p. 80-81, under Minaria Carleoli (under Norhumbreland): ‘Wills fil Erenbaldi red Comp de .lxiii. li. 7 .vi. s. 7 viii. d. de veti firma .iii. anni. Minarie de Carleol. In thro .xxxiii. li. 7 .vi. s. 7 . viii d. Et in Soltis p. br R. Aedwardo Blundo . xxx. Li. ad Coronat Reg fil Reg. Id red Comp de .D. m. de Firma anni ptiti. In thro libau. Et Q’et est. Id redd Compotu de .D. m. de Firma h anni. In thro .c. m. Et deb .cccc. m.
1171–1172	Yes	Michaelmas 1172	400 marks for the Old Farm (possibly to pay off previous year’s debt?). 500 marks for the new farm.	No	Exchequer	The Great Roll of the Pipe for the Eighteenth year of the reign of King Henry the Second. AD 1171–1172,	PR18, H2, p. 70, under ‘Minaria Carleoli’ under ‘Everwichscr’: ‘Wills fil Erembaldi deb .cccc. m. de veti firma Minarie Carleol. Et Id deb .D. m. de Nova Firma.’

						Pipe roll Soc (XVIII), 1894, London.	
1172–1173	Yes	Michaelmas 1173	400 marks for the Old Farm. Plus 500 marks for the previous year. Plus 500 marks for this year. (200 pounds, 66 shillings, 8 pence paid in).	No	Exchequer	The Great Roll of the Pipe for the Nineteenth year of the reign of King Henry the Second, AD 1172–1173, Pipe roll Soc (XIX), 1895, London.	PR19, H2, p112-113, under Minaria Carleol, under ‘Norhumberland’: ‘Wills fil Erembald red Comp de .CCCC. m. de veti firma Minar Carleol de tcio anno. Et de .D. m. de anno ptito. Et de .D. m. de hoc anno. S. .m. 7 .cccc. m. In thro .cc. li 7 .lxvi. s. 7 .viii. d.’
1173–1174	Yes	Michaelmas 1174	666 pounds, 13 shillings, 4 pence owed for the old farm. 500 marks owed for the new farm. Nothing actually paid to the Treasury.	No		The Great Roll of the Pipe for the Twentieth year of the reign of King Henry the Second, AD 1173–1174, Henry II, Pipe roll Soc (XXI), 1896, London.	PR 20, H2, p. 107, under Minaria Carleoli, under ‘Norhumbreland’: ‘Wills fil Erenbaldi .DC. 7 .LXVI. li. 7 .XIII. s. 7 .iiii. d. de veti firma Minar. Et .D. m. de Noua firma.’
1174–1175	Yes	Michaelmas 1175	1000 pounds owed for the previous three years. 500 marks for this year. Does not appear that anything was paid to the Treasury.	No		The Great roll of the Pipe for the Twenty-first year of the reign of King Henry the Second, AD 1174–1175, Pipe roll Soc (XXII), 1897, London.	PR21, H2, p. 185, Minaria Carleol, under ‘Norhumb’land’: ‘Wills fil Erenbaldi deb .M. li. de veti firma Minar de .III. annis ptitis. Et .D. m. de hoc anno’.

1175–1176	Yes	Michaelmas 1176	2000 marks owed for the previous 3 years. 500 marks for this year. 126 pounds, 13 shillings, 4 pence actually paid into the Treasury. 40 pounds of lead to Grandmont (Limousin).	Yes	Farm to the Exchequer/Treasury. Lead worth 40 pounds of silver purchased and sent to the monastery at Grandmont/Grosmont in the Limousin, via the ports of Newcastle (upon Tyne) and La Rochelle.	The Great roll of the Pipe for the Twenty-second year of the reign of king Henry the Second, AD 1175–1176, Pipe roll Soc (XXV), 1904, London. J.H. Round, 'Introduction', xxv, in PR 22, 1904, xxi-xxvii.	PR22, H2, p. 141, under Minaria Carleolii, under 'Nordhumberland': 'Willelmus filius Erenbaldi redd. Comp. de .M.M. marcis de .iiii. annis preteritis et .D. marcis de hoc anno. In thesauro .C. et quater .xx. et .vi. li et xiii s. et iiii d. Et pro plumbo ad opus domus dei de Grante-monte. xl. l. per breve regis.' P. 137, under 'Nordhumberland: 'Et pro locandis ii navibus ad ducendum plumbum quod rex dedit ecclesie de Grosmont a Novo Castello usque ad Rochell'.'
1176–1177	Yes	Michaelmas 1177	1440 pounds owed from previous years. 500 marks for this year. 100 pounds actually paid to Treasury.	No	Exchequer	The Great Roll of the Pipe for the Twenty-third year of the reign of King Henry the Second, AD 1176–1177, Pipe roll Soc (XXVI), 1905, London.	PR23, H2, p. 123, Minaria Carleoli, under 'Cumberland': 'Willelmus filius Erenbaldi redd. Comp. de .M. et .CCCC., et XL. Li de pluribus annis preteritis. Et de .D. m de hoc anno. In thesauro .C. li. Et debet .M. et DC et LXXIII. li. et VI s. et VIII d.'
1177–1178	Yes	Michaelmas 1178	1673 pounds, 6 shillings, 8 pence owed for the farm from previous years. 500 marks for this year. Unclear how much was actually paid into the Treasury.	No	Exchequer	The Great Roll of the Pipe for the Twenty-fourth year of the reign of King Henry the Second, AD 1177–1178, Pipe roll Soc	PR24, H2, p. 127, under Minaria Carleoli in 'Cumberland': 'Willelmus filius Erenbaldi debet .M. et .DC. et .LXXIII. l. et .VI. s. et .VIII. d. de firma minarie de pluribus annis preteritis. Et debet .D. m. de firma hujus anni.'

						(XXXVIII), 1925, London.	
1178–1179	Yes	Michaelmas 1179	2340 pounds for the farm for this year and previous years. Nothing paid to the Treasury this year. 100 cart-loads of lead sent to the Cistercian abbey at Clairvaux.	Yes	Lead to Clairvaux.	The Great Roll of the Pipe for the Twenty-fifth year of the reign of King Henry the Second, AD 1178–1179, Pipe roll Soc (XXVIII), 1907, London. (Intro J.H. Round)	PR25, H2, p. 29, under Minaria Carleoli (between Lancastra and Cumberland): ‘Willelmus filius Erembaldi redd comp. de .MM. et CCC et xl l. de minariis Carleolii tam de firma hujus anni quam plurium annorum preteritorum. In thesauro nichil.’Et pro C, carreatis (carretatis) plumbi liberates fratri Simoni ad operationem ecclesie Clareuall’ .lxvi l. et xiii s. et iiii d.’ ‘Et debet .MM. et C. et VI l. et xiii s. et iiii d.’
1180–1181 (Also records details for 1179–1180)	Yes	Michaelmas 1181	For 1179–1180: Farm was 200 pounds divided between 5 holders of the farm. Willelmus paid 50 pounds from his 1179–1180 farm total in 1180–1181. For 1180–1181: Farm was 200 pounds held between 5 holders of the farm. None of the new farm holders paid anything to the Treasury for 1180–1181,	Yes	Farm to Exchequer/Treasury. 185 cart-loads of Lead sent to Clairvaux (probably via Rouen).	The Great Roll of the Pipe for the Twenty-seventh year of the reign of King Henry the Second, AD 1180–1181, Pipe roll Soc (XXX), 1909, London. (1966 reprint) (Intro J.H. Round).	PR27, H2, P. 64, under ‘Minaria Carleolii de XXVI anno’ (1179-80) (between Lincol’scr and Nordhantescr): ‘Willelmus filius Erenbald’ debet respectum de .l. li. de quarta parte anni preteriti. Et Ricardus et Hunfridis fratres de .l. li. de quarta parte ejusdem anni. Et Ricardus de Edmodeshala et Adam nepos Roulini de .C. li. de eadem firma de dimidio anno. De quibus compotus redditur infra.’ P. 64–65, under ‘De XXVII. Anno’: Ricardus de Edmodeshala et Adam nepos Roulini debent respondere de

			<p>but they sent the cart-loads of lead.</p> <p>185 cart-loads of lead to Clairvaux.</p>				<p>.C. l. de dimidio anno. Et Ricardus et Hunfridus fratres de .lxxv. l. Et Adam nepos Rollini debet .xxv. l. de quibus compotus redditur infra. Ricardus et Hunfridus fratres reddt. Comp. de .L. l. de firma minariorum Carleoli de quarta parte anni preteritis. Et de .lxxv. l. de firma hujus anni. In thesauro nichil. Et pro .xxv. cartatis plumbi quod Rex dedit ecclesie Clarevall' .xxv. m. per breve regis. Et pro. C. caretatis plumbi quod Rex similiter dedit ecclesie Clarevall' .lxvi. l. et xiii s. et iiiii. D. per idem breve.Pro .LX. caretatis plumbi liberatis Reinero .xl. l. per breve regis.Et pro .l. caretatis plumbi liberates Reinero ad opus ecclesie de Claresvall .xxxiii, l. et vi. S. et viii. d. per idem breve.'.....</p> <p>Willelmus filius Erenbaldi debet .L. l. de minariis Carleolo de quarta parte .xxvi. anni que supra annotantur. Et .M.M. et .C. et .VI. l. et xiii. s. et iiiii d. de pluribus annis preteritis dum ipse solus habuit minaria ad firmam.'</p>
1181–1182	Yes	Michaelmas 1182	200 pounds owed for the Farm for this year by the five holders of the farm:	No	Exchequer	The Great Roll of the Pipe for the Twenty-eighth year of the reign of King Henry the	PR28, H2, p. 61, under 'Minaria Carleolii quia non erat ei locus in Cumberland': 'Hunfridus frater Ricardi debet .xxxiii.s. et iiiii. d. de firma tertii anni de minaria Carleolii.

			<p>Hunfridus: 44 pounds, 16 shillings, 8 pence.</p> <p>Ricardus (frat): 30 pounds, 3 shillings, 4 pence.</p> <p>Adam & Henricus: 75 pounds.</p> <p>Ricardus (Ed): 50 pounds.</p>			<p>Second, AD 1181–1182, Pipe roll Soc. (XXXI), 1910, London. J.H. Round intro, xxi-xxviii.</p>	<p>Adam nepos Roelin et Henricus Estrensis debent .C. et .VIII. l. et .vi. s. et .viii. d. de firma minarie de anno preterito. Ricardus de Edmodeshala debet quater .xx. l. et .lxvi. s. et .viii. d. eadem firma de anno preterito. Idem Hunfridus debet .xliiii. l. et .xvi. s. et .viii. d. de firma minarie de hoc anno. Ricardus frater Hunfridi debet .xxx. l. et .iii. s. et .iiii. d. de eadem firma minari de hoc anno. Adam nepos Roelin et Henricus Estrensis debent .lxxv. l. de eadem minarie de hoc anno. Ricardus de Edmodeshal' debet .L. l. de eadem firma minarie de hoc anno. Summa debiti hujus anni .CC. l.'</p>
1182–1183	Yes	Michaelmas 1183	<p>Holders of Farm paid the Treasury the full 200 pounds owed for 1181–1182; and they paid 113 (and quarter xx) pounds, 6 shillings, 8 pence for 1182–1183. Willelmus son of Erembald paid 50 pounds, the quarter part of the farm (200 pounds) for 1178–1180, pledged his 220 marks for the farm to Roger de Stutevill, Robert de Vallibus and Reinerum Dap, and still owed 2106 pounds, 13 shillings, 4</p>	No	Exchequer	<p>The Great Roll of the Pipe for the Twenty-ninth year of the reign of King Henry the Second, AD 1182–1183, Pipe roll Soc (XXXII), 1911, London. Intro, J.H. Round, xxiii-xxviii.</p>	<p>PR29, H2, p. 98–99, under 'Minaria Charleolii quia non erat ei locus in Norhumberland neque Cumberland:</p> <p>P98–99: Hunifridus frater Ricardi debet .xxxiii. s. et iiii d. de firma iiii anni de minaria Carleolii. Adam nepos Roelin et Henricus Estreis debent .c. et .viii. l. et .vi. s. et .viii. d. de firma minarie de anno tertio. Ricardus de AEdmodeshala debet quater .xx. l. et .lxvi. s. et .viii. d. de eadem firma de eodem anno. Summa .c. et quater .xx. et .xiii. l. et .vi. s. et .viii. d.</p>

			<p>pence for his previous years when he held the farm for the mine alone. (P.99).</p> <p>So c. 363 pounds actually paid to the Treasury in this year.</p>				<p>Idem Hunfridus debet .xliiii. l. et .xvi. s. et .viii. d. de firma minarie de anno preterito. Ricardus frater Hunfridi debet .xxx, l. et .iiii. s. et .iiii. d. de eadem firma de eodem anno. Adam nepos Roelin et Henricus Estreis debent .lxxv. l. de eadem firma minarie de eodem anni. Ricardus de Edmodeshala debet .L. l. de eadem firma minarie de eodem anno. Summa hujus .CC. l.</p> <p>P.99: 'Willelmus filius Erembaldi debet .L. l. de minaria Carleolii de quarta parte .xxvi. anni. Et .M.M. et .C. et .VI. l. et .xiii. s. et .iiii. d. de pluribus annis preteritis dum ipse solus habuit minariam.'</p>
1183–1184	Yes	Michaelmas 1184	<p>Main holders of the farm for previous years pledge to pay rather than actually pay the Farm, in front of the Sheriffs of Northumberland & Cumberland. Farm set at 313 (et quarter xx) pounds, 6 shillings, 8 pence for previous years' arrears. Direct royal control of mine in this year. Officials make an actual payment of 61 pounds, 11 shillings 'de</p>	No	Exchequer	<p>The Great Roll of the Pipe for the Thirtieth year of the reign of King Henry the Second, AD 1183–1184, Pipe roll Soc. (XXXIII) 1912, London. Intro, J.H. Round.</p>	<p>PR30, H2, p. 42-43, under Minaria Carleolii:</p> <p>P. 43: 'Walterius de Carleolio et Ricardus de Logis et Hunfridis frater eius reddt. Comp. de .lxi. l. et .xi. s. de exitu minarie Carleolii de hoc anno ut custodes. In thesauro liberaverunt. Et quietus est.'</p>

			exitu minarie Carleolii de hoc anno ut custodes’.				
1184–1185	Yes	Michaelmas 1185	<p>Walterus de Carleolio, Hunfridus and Ricardus, as royal officials paid 73 pounds 9 shillings to the Treasury for this year. Circa 18 pounds, 2 marks and 145 shillings paid in by the small holders of the Farm. Roger de Stutevill paid in 26 pounds, 13 shillings, 4 pence, as part of Willelmus f. Erembald’s arrears (for his pledge). And Willelmus f. Erembaldi paid in 50 pounds as a quarter part of the amount owed for the Farm in year 6 of the reign.</p> <p><i>c.</i> 184 pounds actually paid to the Treasury this year.</p>	No	Exchequer	The Great Roll of the Pipe for the Thirty-first year of the reign of King Henry the Second, AD 1184–1185, Pipe roll Soc. (XXXIV), 1913, London. Intro by J.H. Round.	PR31, H2, p. 188, under ‘Minaria Carleolii’.
1185–1186	Yes	Michaelmas 1186	<p>Smaller holders of the farm paid in the sum of 10 pounds, 14 shillings, 4 pence.</p> <p>Ricardus frater Hunfridi paid in 10 pounds towards his arrears on the farm from his fifth year as a farm holder. Roger de Stutevill</p>	No	Exchequer	The Great Roll of the Pipe for the Thirty-second year of the reign of King Henry the Second, AD 1185–1186, Pipe roll Soc. (XXXVI),	<p>PR32, H2, p. 99–100, under ‘Minaria Carleolii’:</p> <p>P. 99: ‘Alanus Monetarius et Ricardus frater Vnfridi reddt. Comp. de .c. l. quisque de .L. l. pro parte sua. In thesauro liberaverunt in ii. tallis.’</p>

			<p>paid in 1 mark as a contribution to Willelmus f. Erembald's arrears.</p> <p>Other small holders of the farm paid in a total of 33 pounds, 13 shillings, 4 pence.</p> <p>Alanus monetarius and Ricardus frater Vnfridi paid in 100 pounds.</p> <p>Total actually paid into Treasury this year: 153 pounds, 27 shillings, 168 pence.</p> <p>28 active part-holders of the Farm of the 'Mine' listed for this year.</p>			1914, London. Intro, J.H. Round.	
1186–1187	Yes	Michaelmas 1187	Just over 72 pounds actually paid into the Treasury by the various holders of the Farm.	No	Exchequer	The Great Roll of the Pipe for the Thirty-third year of the reign of King Henry the Second, AD 1186–1187, Pipe roll Soc (XXXVII), 1915, London.	PR33, H2, p.96–97, under Minaria Carleolii: 'Robertus de Vallibus redd. Comp. de .CC. et .LX. l. et .xxviii, s. et .iii. d. de debito Ade nepotis Roelin et Henrici Lestreis et Ricardi de AEdmodeshala de minaria Carleolii. De quibus idem Robertus recognovit se recepisse plegios dum fuit vicecomes. In thesauro .xxxiii. s. et .iiii. d. de Adam filio AEdmundi. Et .xxxviii. s. .i. d. de Willelmo filio Odardi. .. and 5 others... 'Summa

							<p>.xi. l. et .xvii. d. Et debet .cc. et .xliv. l. et .xvi. s. et .xi. d.</p> <p>Hunifridus frater Ricardi redd. Comp. de .xlvi. l. et .x. s. minarie Carleolii de veteri firma. In thesauro . xix. s. Et debet .xlv. l. et .xi. s. Ricardus frater Hunfridi redd. Comp. de .xx. l. et .iii. s. et .iiii. d. de veteri firma ejusdem minarie. In thesauro .x. l. Et debet .x. l.</p> <p>Willelmus filius Erembaldi In thesauro .xiii. s. et .iiii. d. .. from previous years' debts. ... Alanus Monetarius et Ricardus frater Vnfridi reddt. Comp. de .C. l. de firma minarie Carleolii de hoc anno, quisque de .L. l. pro parte sua. In thesauro liberaverunt in .ii. talliis.</p>
1187–1188	Yes	Michaelmas 1188	<p>60 pounds actually paid in to the Treasury in this year:</p> <p>Ricardus frater Hunfridi paid 10 pounds off from his arrears from previous years.</p> <p>Alanus monetarius and Ricardus frater Vnfridi paid 50 pounds.</p>	No	Exchequer	<p>The Great Roll of the Pipe for the Thirty-fourth year of the reign of king Henry the Second, AD 1187–1188, Pipe Roll Soc XXXVIII, London, 1925.</p>	<p>PR34, H2, p. 192, under 'Minaria Carleolii':</p> <p>'Ricardus frater Hunfridi red. Comp. de .x. l. de veteri firma ejusdem minarie, In thesauro liberavit. Et quietus est. ...</p> <p>Alanus monetarius et Ricardus frater Unfridi reddt. Comp. de c. l. de firma minarie Carleolii hoc anno quisque de .L. l. pro parte sua. In thesauro</p>

							liberaverunt in ii. Talliis. Et quietus est.’
1188–1189	Yes	Michaelmas 1189	43 shillings and 10 pence paid to the Treasury this year (equivalent to 2 pounds, 3 shillings and 10 pence)	No	Exchequer	The Great Roll of the Pipe for the First Year of the Reign of King Richard The First, AD 1189–1190, ed., J. Hunter, 1844, London: Eyre and Spottiswoode. (This is actually the Pipe roll for 1188–1189—the 1844 title was incorrect)	PR1, R1, p.140 under ‘Minaria Carleolii’: ‘Ada Nepos Roelin 7 Henr Lestreis 7 Ric de Admodeshala 7 plegii eo reddt Comp de .cc. 7 .xlix. li 7 . xvi. s. 7 .xi. d. de Vetii firm Carl. In thro . xxxiii. S. 7 .iiii. d. de Willo fil Odardi. Et .iii. s. de Walto Caperun. Et .xv. s. de Ada de Ravenewich. Et .xii. s. 7 . vi. d. de Ric de Truite. S (umma). Lxiii. s. 7 .x. d.’
1189–1190	Yes	Michaelmas 1190	Just over 50 pounds and 46 shillings actually paid to the Treasury.	No	Exchequer	The Great Roll of the Pipe for the Second year of the reign of King Richard the First, AD 1189–1190, ed. D.M. Stenton, Pipe roll Soc (XXXIX), 1925.	PR2, R1, p. 51–52, under ‘Minaria Carleolii: ‘Adam nepos Roelin’ et Henricus Lestreis et Ricardus de AEdmodeshal’ et plegii eorum r. c. de .cc. et .xlvi. li. Et .xiii. s. et .i. d. de veteri firma minarie Carleol. ... Summa .x. s. et .vi. d. .. paid by 3 others. Hunfridus frater Ricardi debet .xlv. li. et .xi. s. de veteri firma eiusdem minarie. Rogerus de Stutevill r.c. de .xxxiii. s. et .iiii. d.

							de debito Willemi f. Erembaldi ... In thes. Lib. Alanus monetarius et Ricardus f. Vnfridi r.c. de .c. li de firma minarie Carleol' hoc anno. uterque de L. l. pro parte sua. In thes . L. li.'
1190–1191	Yes	Michaelmas 1191	10 pounds and 19 shillings actually paid into the Treasury this year (10 pounds from Alan monetarius, 17 shillings from the smaller holders of the Farm).	No	Exchequer	'The Great Rolls of the Pipe of the Third and Fourth Years of the Reign of King Richard the First, Mich. 1191 and Mich. 1192', ed D.M. Stenton, London: Pipe roll Doc (New Series II), 1926.	PR3, RI, p. 55, under 'Minaria Carleol.' : Small farmers.. 'Summa .xvii. s.' 'Alanus monetarius r. c. de .x. li de firma predicte minarie de hoc anno que remanserunt in manu R, quando dedit H. episcopus Dunlem' comitatum de Norhumb' cum pertinentiis. In thes. Lib. Et Q. E.' 'Idem Vic. r. c. de .ii. s. et .vi. d. de villa de Racton de proprestura. Et de .xii. d. de villa de Wauerton de proprestura. In thes. Lin. In ii talliis. Et Q. E.'
1191–1192	Yes	Michaelmas 1192	10 pounds, half a mark, and 2 shillings total actually paid in to Treasury.			'The Great Rolls of the Pipe of the Third and Fourth Years of the Reign of King Richard the First, Mich. 1191 and Mich. 1192', ed D.M. Senton, London:	PR4, R1, p. 196, under 'Cumberland': Entry exactly as for 1191, except for the absence of the Racton and Wauerton entries, and the small farmers only paid half a mark and 2 shillings.

						Pipe roll Doc (New Series II), 1926.	
1192–1193	Yes	Michaelmas 1193	10 pounds 16 shillings, 9 pence actually paid in to the Treasury.	No	Exchequer	The Great Roll of the Pipe for the Fifth Year of the Reign of King Richard the First, Michaelmas 1193’, ed. D.M. Stenton, Pipe Roll Soc., (New Series III), London. 1927.	PR5 exactly as for 1192, except for small farmers: P5, R1, p. 76, under ‘Cumberland’: ‘In thes .xi. s. et .ix. d. per manum Willelmi f. Odardi. Et .iiii. s. per Walterum Caperun. Et .ii. s. per Walterum f. AEdmundi.’
1193–1194	Yes	Michaelmas 1194	Only 7 shillings, 4 pence recorded as paid into the Treasury for the Farm (notionally annual Farm seems to be around 250 pounds).	No	Exchequer	The Great Roll of the Pipe for the Sixth Year of the Reign of King Richard the First’, ed. D.M. Stenton, Pipe roll Soc. (New Series V), London, 1928.	PR6 Formula for old holders of the farm simply repeated from PRs 4 & 5. However, Alanus monetarius is no longer present. Only contributors to a Farm payment were Willelmus f. Odardi and Walterum Caperum. PR6, R1, p. 121, under ‘De Oblatis Curie’ in ‘Cumberland’ : ‘In thes .iii. s. iii. d. per manum Willelmi f. Odardi. Et .iiii. s. per Walterum Caperun.’
1194–1195	Yes	Michaelmas 1195	Only 4 shillings, 20 pence paid into the Treasury by two smaller holders of the Farm.	No	Exchequer	The Great Roll of the Pipe for the Seventh Year of the Reign of King Richard the First’, ed. D.M. Stenton, Pipe roll Soc.	PR7 formula as for PR6. Only 2 of the smaller holders of the farm paid anything: PR7, R1, p. 213, under ‘De Oblatis Curie’ under Cumberland: ‘...’In thes. Iiii. s. per manum Walteri Caprun et xx d. per manum Ade f. Edmundi.’

						(New Series VI), London, 1929.	
1195–1196	Yes	Michaelmas 1196	Only 4 shillings paid into the Treasury by one small holder of the Farm.	No	Exchequer	The Chancellor’s Roll for the Eighth Year of the Reign of King Richard the First., ed. D.M. Stenton, Pipe Roll Soc (New Series VII), London, 1930.	Formula for PR8 as for PR4, with anachronistic and redundant information on past holders of the Farm. Only one small holder of the Farm made a payment to the Treasury PR8, R1, p. 22, under ‘De oblati curie’, in ‘Cumberland’: ...’In thes .iiii. s. per manum Walteri Chaperun’.
1196–1197	Yes	Michaelmas 1197	4 shillings paid from Walter Caperun. 175 pounds paid to Treasury by Alanus Monetarius for previous and current year. Farm now set 50 pounds a year from 1194 onwards.	No	Exchequer	The Great Roll of the Pipe for the Ninth Year of the Reign of King Richard the First, ed. D.M Stenton, Pipe Roll Soc (New Series VIII), 1931.	PR9, R1, p. 180, under ‘De oblati curie’ in Cumberland: Same formula as for previous years – only Walter Caperun made a payment: ‘In thes. Iiii s. per manum Walteri Caperun.’ PR9, R1, p. 182, under ‘Compotos Alani Monetarii de Minaria de Carduil’, in ‘Cumberland’: ‘Alanus monetarius r. c. de L. li de firma minarie de Carduil de anno vi. Et de L. li. de eadem firma de anno vii. Et de L. li. de eadem firma de anno preterito. Et de L. li. de eadem firms de hoc anno. In thes. C et LX li. Et debet xl. Li. Idem r.c. de eodem

							debito. In thes. XV. Li. Et debet xxv li.
1197–1198	Yes	Michaelmas 1198	Walter Caperun is noted as paying 4 shillings again. Alanus paid in 65 pounds – 25 pounds for previous years, 40 pounds for this year. Farm set at 50 pounds a year.	No	Exchequer	The Great Roll of the Pipe for the Tenth Year of the Reign of King Richard the First, ed. D. M. Stenton, Pipe Roll Soc (New Series IX), London, 1932.	PR10, R1, p142—complete repeat of the De oblati curie entry for 1197 (p.142). P.143, under ‘Cumberland’: ‘Alanus monetarius r. c. de xxv li. de reragio firme minarie Carduil de pluribus annis preteritis. In thes. Lib. Et Q E. Idem A. r. c. de L. li. de firma eiusdem minarie. De hoc anno. In thes xl. Li. Et debet x. li.’
1198–1199	Yes	Michaelmas 1199	Walter Caperun pays 2 shillings to the Treasury. Alanus Monetarius paid 100 shillings (5 pounds) owed from the previous year, and 100 shillings (5 pounds) for this year. So total paid in 10 pounds 2 shillings.	No	Exchequer	The Great Roll of the Pipe for the First Year of the Reign of King John, ed. D.M. Stenton, Pipe roll Soc (New Series X), London, 1933.	PR1, John, P210, under De oblati curie, in ‘Cumberland’: ‘...’ In thes ii. s. per manum Walteri Caperun. PR1, John, P. 211, under ‘De placitis Rogeri Le Bigot et Socios eius’: ‘Alanus monetarius r. c. de x li. de reragio firme de Carduil de anno preterito. In thes C. s. Et debt C. s. Idem r.c. de eodem debito. In thes. Lib. Et Q. E.’
1199–1200	Yes	Michaelmas 1200	50 pounds, 24 shillings paid in to the Treasury. 24 shillings from farm owed for previous years by Ricard de Estmodeshal.	No	Exchequer	The Great Roll of the Pipe for the Second year of king John (Michaelmas 1200), ed., D.M. Stenton, Pipe roll Soc. L (New Series	PR2, John, p. 243, under ‘Cumberland’: ‘... de veteri firma minarie de Carduil. In thes .xxiii. s. per manum de Ricardi de Estmodeshal’.

			50 pounds from Willelmus de Stutevill for Farm for this year.			XII), London, 1934.	P. 244, under ‘Respice in Tergo’: Idem W. r.c. de L. li. de firminarie de Carduil. In thes lib. Et Q. E.’
1200–1201	Yes	Michaelmas 1201	6 pounds, 2 shillings paid to the Treasury this year.	No	Exchequer	The Great Roll of the Pipe for the Third year of the reign of king John, ed. D.M. Stenton, Pipe roll Soc. LII (New Series XIV), London, 1936.	PR3, John, p. 252, under ‘Cumberland’: ... ‘Veteri firminarie de Carduil. In thes. ii. s. per manum Waltheri Caperun.’ ‘Idem Vic. r. c. de vi. Li. de firminarie de Carduil. In thes. lib.’
1201–1202	Yes	Michaelmas 1202	Approximately 30 pounds paid in total from new and old farm holders (in pounds and shilling equivalents).	No	Exchequer	The Great Roll of the Pipe for the Fourth year of the reign of king John (Michaelmas 1202), ed. D.M. Stenton, Pipe roll Soc. LIII (New Series XV), London, 1937.	PR4, John, 1201–1202, under ‘Cumberland’: P. 254–255. ‘Hugo Bard xxv li. et viii s. et viii d. de remanenti firme propresturarum et minarie de Carduil sicut continentur in rotulo secundo. In thes lib. Et Q. E.’ ‘Willelmus de Stutevill r.c. de lxxiii s. et vi d. de remanenti firma propresturarum de dim. anno primo. In thes lib. Et Q. E.’ Idem Vic. r.c. de L li. de firminarie de Carduil. In thes. Lx s. Et debet xlvii li.’

1202–1203	Yes	Michaelmas 1203	Only one farm holder, Robert de Curtenai, made a payment this year. 25 pounds paid to the Treasury.	No	Exchequer	The Great Roll of the Pipe for the Fifth year of the reign of King John (Michaelmas 1203), ed. D.M. Stenton, Pipe roll Soc. LIV (New Series XVI), London, 1938.	PR5, John, 1202–1203, under ‘Cumberland’: P. 254: ‘Idem Vic. r.c. de L. li. de firma minarie de Carduil. In thes. xxv li. (per manum Robert de Curtenai). Et debet xxv li.’
1203–1204	Yes	Michaelmas 1204	Only old debtors listed. No payment made this year.	No		The Great Roll of the Pipe for the Sixth year of the reign of king John (Michaelmas 1204), ed., D.M. Stenton, Pipe roll Soc. LVI (New Series XVIII), London, 1940.	PR 6, John, p. 141, under ‘Cumberland’.. Willelmus f. Erembaldi (blank) MM et C et Liiii. Li. Et v. s. et iiiii. d. Willelmus de Stutevil (blank) xxv. Li de firma minarie Carduil de anno preterito. Idem Vic. (blank) L. li. de firma minarie de Carduil de hoc anno’ (blank) No payment made.
1204–1205	Yes	Michaelmas 1205	4 pounds, 9 shillings and 6 pence actually paid to the Treasury in this year.	No	Exchequer	The Great Roll of the Pipe for the Seventh Year of the reign of John (1205), ed. S. Smith, Pipe roll Soc LVII (New Series XIX), London 1941.	PR 7, John, p. 269 under ‘Cumberland’’: ‘...Robertus de Curtenai L. li. de firma minarie de anno preterito. Idem vic r. c. de L. li. de predicta firma de hoc anno. In thes. iiiii. li. et ix. S. et v. d. Et debet xlv. Li. et x. s. et vii. d.

1205–1206	Yes	Michaelmas 1206	Only old debtors listed. No payments made this year.	No		The Great Roll of the Pipe for the Eighth year of the reign of king John (Michaelmas 1206), ed. D.M. Stenton, Pipe roll Soc. LVIII (New Series XX), London, 1942.	PR8, John, p. 43, under ‘Cumberland’:.’Willelmus f. Erembaldi debet MM et C et Liiii. li. et v. s. et iii. d. de firma minarie de Cumberland’. ‘Willelmus de Stutevill debet xxv. li. et viii. s. et viii. d. de firma minarie de Carduil de anno v. Et x equos et ii palefridos de misericordia et iii palefridos pro habendis ferriis et uno mercato.’ ‘Robertus de Curtenai (blank) L. li. De firma minarie de Carduil de anno vi.’ Idem Vic. Debet xLv. li. et x. s. et vii. d. de predicta firma de anno preterito. No actual payments made.
1206–1207	Yes	Michaelmas 1207	Old debtors listed. No payments from any with one exception: Robert de Curtenai paid 15 pounds of his 50-pound farm payment for year 6 (1203–1204), (leaving 35 to pay). Total of 15 pounds paid to the Treasury in this year.	No	Exchequer	The Great Roll of the Pipe for the Ninth year of the reign of King John (1207), ed. A. Mary Kirkus, Pipe roll Soc. LX (New Series XXII), London 1946.	PR9, John, p. 127, under ‘Cumberland’: ...’Robertus de Curtenai r. c. de L. li de firma minarie de Carduil de anno VI.’ ‘In thes. xv. Li. Et debet xxxv. Li. Idem r. c. de eodem debito. In thes. Lib.’

1207–1208	Yes	Michaelmas 1208	Old debtors listed as 1206–1207. No payments made.	No		The Great Roll of the Pipe for the Tenth year of the reign of king John (Michaelmas 1208), ed. D.M. Stenton, Pipe roll Soc. LXI (New Series XXIII), London, 1947.	PR10, John, p. 42–43, under ‘Cumberland’. No payments made.
1208–1209	Yes	Michaelmas 1209	Old debtors listed, except Robert de Curtenai. No payment made in this year.	No	Exchequer	The Great Roll of the Pipe for the Eleventh year of the reign of King John (Michaelmas 1209), ed. D.M. Stenton, Pipe roll Soc. LXII (New Series XXIV), London 1946.	PR11, John, p. 93, under ‘Cumberland’. No payments made.
1209–1210	Yes	Michaelmas 1210	Sums owed listed for the holders of the farm in previous years (total of 245 pounds, 10 shillings owed for previous years, and a further 50 pounds owed for this year). No payments were made.	No	Exchequer	The Great Roll of the Pipe for the Twelfth year of the reign of king John (Michaelmas 1210), ed. C.F. Slade, Pipe roll Soc. LXIV (New Series XXVI), London 1949 (pub. 1951).	PR12, John, p.136–37, under ‘Cumberland’. No payments made this year.

1210–1211	Yes	Michaelmas 1211	Old debtors listed but no payment made this year.	No		The Great Roll of the Pipe for the Thirteenth year of the reign of king John (Michaelmas 2011), ed. D.M. Stenton, Pipe roll Soc. LXXVI (New Series XXVIII), London 1953.	PR13, John, p. 152. No payment made.
1211–1212	Yes	Michaelmas 1212	10 marks paid to Treasury for the farm of the mine. No payments recorded from old debtors.	No	Exchequer	The Great Roll of the Pipe for the Fourteenth year of the reign of king John (Michaelmas 1212), ed. P. M. Barnes, Pipe roll Soc. LXXVIII (New Series XXX), London, 1954.	PR14, John, p. 154, under ‘Cumberland’: ..’Et de X. m. de firma minarie.’
1212–1213	No	No Pipe roll survives for this year					No Pipe roll survives for this year.
1213–1214	Yes	Michaelmas 2014	10 marks paid to the Treasury for the farm of the mine for this year. Old debtors no longer mentioned.	No	Exchequer	The Great Roll of the Pipe for the Sixteenth year of the reign of king John (Michaelmas 1214), ed. P.M. Barnes, Pipe roll Soc. LXXII (New	PR16, John, p. 138, under ‘Cumberland’: ...’Et de X. m. de firma minarie’...In thes. Lib. Et Q. E.’

						Series XXXV), London, 1959.	
1214–1215	No	For Michaelmas 1214–Easter 1215	No entry for Cumberland or Mine of Carlisle in this Pipe roll (Scots annex Carlisle in 1215).			The Great Roll of the Pipe for the Seventeenth year of the reign of King John, ed., R.A. Brown, Pipe roll Soc. LXXV (New Series XXXVII), London, 1964.	PR17, John. No entry for Cumberland or Mine of Carlisle in this Pipe roll (Carlisle annexed by Scots 1215, although temporarily retaken by John in early 1216).
1216–1217	No	No Pipe rolls in these years (Year 18 for John, Year 1 for Henry III)	No Pipe rolls were compiled in/or survive from these years of civil war and French invasion.				No Pipe rolls for Michaelmas 1216 & Michaelmas 1217.
1217–1218	No	Michaelmas 1218	No entries for the northern counties in this Pipe roll.			The Great Roll of the Pipe for the Second year of king Henry III (Michaelmas 1218), ed., E.P. Ebdon, Pipe roll Soc. LXXVII (New Series XXXIX), London 1964 (pub 1972).	PR 2, Henry III. No entries for the counties north of the Humber in this Pipe roll.

1218–1219	No	Michaelmas 1219	Entries for Yorkshire and Northumberland. None for Cumberland, Carlisle or Westmorland.			The Great Roll of the Pipe for the Third year of the reign of King Henry III (Michaelmas 1219), ed., B.E. Harris, Pipe roll Soc. LXXX (New Series XLII), London, 1969–1970. (Pub 1976).	No entries for Cumberland or the mine of Carlisle. Region still contested with Scots.
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OSM5. Peak District Pipe roll entries (Mines of Derbyshire, Mine of the Peak, Wirksworth Wapentake, High Peak): farm payments & cart-loads of lead, AD 1167–1216.

Place/mine/smelting centre	Region	Year <i>(If a year is absent in the sequence, no payment was made that year but all rolls exist, except Michaelmas 1213)</i>	Farm payment details (paid in silver) and/or cart-loads of lead	Reason for production or payment	Destination	Source	Page number of entries, text and notes <i>(Cited text is presented as in the various editions quoted. Mistakes and abbreviations in the medieval Latin have not been corrected or resolved.)</i>
Wirksworth Wapentake &	Wirksworth and Bakewell	1168–1169 (Michaelmas 1169)	30 marks paid by the ‘Homines’ of Wirksworth.	Farm payments	Exchequer	The Great Roll of the Pipe for the Fifteenth year of the reign	PR15, H2, 1168–1169, p. 64, noted under ‘Notingehamscr 7 Derbiscr’:

High Peak			<p>30 marks paid collectively by the 'Homines of Bakewell, Hisford and Hope (located in the High Peak/<i>Alto Pecco</i> region).</p> <p>Therefore 60 marks (40 pounds) paid this year.</p>			<p>of king Henry the Second, AD 1168–1169, Pipe roll Soc. XIII, London 1890.</p>	<p>'Homines de Werkeswurda reddt Comp de .xxx. m. de eod. In thro libauer. ..Et Quieti st.</p> <p>Homines de Bakeswelle 7 de Hisford 7 de Hoppa reddt Comp de .xxx. m. de eod. In thro libauer. Et Quieti st.'</p>
Derbyshire – Peak ore-field	No specific location given, but probably Wirksworth Wapentake (Low/White Peak) mines, as High Peak (<i>Alto Pecco</i>) was in Peverel Honour.	1171–1172 (Michaelmas 1172)	40 shillings of silver and 40 cart-loads of lead, and 10 li. of silver for transport.	Farm and construction at Winchester Palace.	Exchequer & Palace of Winchester (both in Winchester)	The Great Roll of the Pipe for the Eighteenth year of the reign of king Henry the Second, AD 1171-2, Pipe roll Soc. XVIII, London, 1894.	<p>PR18, H2, 1171–1172, 7–8, under Notingehascr. 7 Derbiscr.:</p> <p>P.7: Et p. .XL. carretatis plu(m)bi ad opiendas domos Reg de Winton .X. li. p. br. R.'</p> <p>P.8: 'Id vic redd Comp de .XL. s. de Minar. De Pech h. anno. In thro libavit. Et Quiet est.'</p>
Wirksworth Wapentake	Wirksworth	1173–1174 (Michaelmas 1174)	10 pounds paid to the Treasury	Farm payment	Exchequer	The Great Roll of the Pipe for the Twentieth year of the reign of king Henry the Second, AD 1173–1174, Pipe	<p>PR20, H2, 1173–1174, p. 59, under Notingehascr. 7 Derbiscr.: ...</p> <p>'Et de .x. li. de communi de Werkeswrda' ...In thro lib. Et Quiet est.</p>

						roll Soc. XXI, London, 1896.	
Wirksworth Wapentake	Wirksworth	1174–1175 (Michaelmas 1175)	21 pounds paid for Wirksworth.	Farm payment	Exchequer	The Great Roll of the Pipe for the Twenty-first year of the reign of king Henry the Second, AD 1174–1175, Pipe roll Soc. XXII, London, 1897.	PR21, H2, 1174–1175, p. 29 under Notingehascr. 7 Derbiscr.: 'Et xxi. li. bl. Sr Werchewurda.'
Derbyshire - Peak ore-field	No specific location given but probably Wirksworth Wapentake (Low/White Peak) mines, as High Peak (Alto Pecco) was in Peverel Honour.	1176–1177 (Michaelmas 1177)	20 cart-loads of lead (xx carretatis).	Construction at Woodstock (Oxon), royal palace.	Woodstock, Oxon.	The Great Roll of the Pipe for the Twenty-third year of the reign of king Henry the Second, 1176–1177, 23, Pipe roll Soc. XXVI, London, 1905.	PR 23, H2, 1176–1177, p. 57, under 'Nottingehamscr et Derbiscr' : 'Et pro xx caretatis (carretatis) plumbi ad operiendas domos regis de Wudest. X. m. per breve regis'. Also on p. 57 details work on 'castelli de Pech (Castleton) in the High Peak/Peak Forest.
Derbyshire - Peak ore-field	Probably Wirksworth Wapentake (Low/White Peak) mines, as High Peak (Alto Pecco)	1177–1178 (Michaelmas 1178)	Six cart-loads.	Construction at Woodstock palace	Woodstock Oxon (via Humber & Thames)	The Great Roll of the Pipe for the Twenty- fourth year of the reign of king Henry the Second, 1177– 118, Pipe roll	PR24, H2, 1177–1178, p. 86, under 'Nottingescr et Derebiscr': 'Et pro vi caretatis plumbi missis ad operationes regis ad Wudestoch .xl.iii. s. et .iiii. d. per idem breve.

	was in Peverel Honour.					Soc. XXVII, London, 1906.	
Wirksworth Wapentake	Wirksworth	1180–1181 (Michaelmas 1181)	4 marks (1.3 pounds) paid by Wirksworth Wapentake.	Farm Payment	Exchequer	The Great Roll of the Pipe for the Twenty-seventh year of the reign of King Henry the Second, AD 1180–1181, Pipe roll Soc XXX, London 1909 (1966 reprint).	PR27, H2, 1180–1181, p. 13 under ‘Nottingeser et Derebiscr’: ‘Idem vicecomes debet iiii. m. de Werchewurdewapentagio pro murdro.’
Wirksworth Wapentake	Wirksworth	1181–1182 (Michaelmas 1182)	Just over 2 pounds appears to have been paid (46 shillings by the ‘king’s men of Wirksworth’).	Farm payment	Exchequer	The Great Roll of the Pipe for the Twenty-eighth year of the reign of king Henry the Second, AD 1181–1182, Pipe roll Soc. XXXI, London, 1910. Intro J.H. Round.	PR28, H2, 1181–1182, p. 16, under ‘Nottingeser et Derebiscr’: ‘Idem vicecomes redd. comp. de .iii. m. de Werkewurthwapentagio pro murdro. In perdonis per breve regis hominibus regis de Werkewurda . xlvi. s. et viii. d. pro paupertate sua. Et debet dim. m.’
Wirksworth Wapentake	Wirksworth	1182–1183 (Michaelmas 1183)	Two entries for Wirksworth Wapentake payments in this year. At least 1.5 pounds paid.	Farm payments	Exchequer	Great Roll of the Pipe for the Twenty-ninth year of the reign of king Henry the Second, AD	PR29, H2, 1182–1183, p. 88–89, under ‘Notingeham et Derebiscr’:

						1182–1183, Pipe roll Soc. XXXII, London, 1911. Intro, J.H. Round, xxiii-xxviii.	P.88: ‘Idem vicecomes debet dim. m. de Werekewurdewapentagio pro murdro.’ P.89: Idem vicecomes redd. Comp. de .ii. m. de Werekewurthewapentagio pro murdro. In thesauro xx. s. et viii d.’
Wirksworth Wapentake	Wirksworth	1185–1186 (Michaelmas 1186)	No payment made for the farm this year. Only the amount owed is stated.			The Great Roll of the Pipe for the Thirty-second year of the reign of king Henry the Second, AD 1185–1186, Pipe Roll Soc. XXXVI, London, 1914.	PR32, H2, 1185–1186, p. 104, under ‘Notingham et Derbiscire’: ‘Villata de Werekewurda debet .xx. s. pro murdro’.
Wirksworth Wapentake	Wirksworth	1186–1187 (Michaelmas 1187)	20 shillings (1 pound) from the villata of Wirksworth (not a payment for the Wapentake)	Farm payment	Exchequer	The Great Roll of the Pipe of the Thirty-third year of the reign of king Henry the Second, 1186–1187, Pipe roll Soc. XXXVII, London, 1915.	PR33, H2, 1186–1187, p. 167: nder ‘Nottingescr et Derebiscr’: ‘Idem vicecomes redd. Comp. de xx. s. de villata de Werekewurdr pro murdro. In thesauro liberavit. Et Quietus est.’

Peak mines (Derbs.) – Honour of William Peverel	High Peak (Pech/Alto Pecco)	1187–1188 Michaelmas 1188)	100 cart-loads (c. carretatis)	Construction of Clairvaux abbey (monachis de Claresuall)	Clairvaux, Burgundy, France (Claresuall)	The Great Roll of the Pipe for the Thirty-fourth year of the reign of king Henry the Second, AD 1187–1188, Pipe Roll Soc XXXVIII, London, 1925.	PR34 H2 1187–1188, p. 199. Notingehamscira et Derebiscira – Honor Willelmi Peverelli: ‘ Et pro c. carretatis plumbi quas rex dedit monachis de Claresuall’ ad operiendas domos suas .xxxiii. l. et vi s. et viii d. per breve regis. Et in custamento carriandi idem plumbum de Pecco usque Humbre ix l. et xiii s. et xi d. per idem breve. Et pro locandis ii navibus ad deferendum idem plumbum ab Humbre usque Rothomagum vi l. et xiii s. et iiii d. per idem breve.’
Wirksworth Wapentake	Wirksworth	1187–1188 (Michaelmas 1188)	17 shillings paid for farm of the Wapentake (0.8 of a pound).	Farm payment	Exchequer	The Great Roll of the Pipe for the Thirty-fourth year of the reign of king Henry the Second, AD 1187–1188, Pipe Roll Soc XXXVIII, London, 1925.	PR34, H2, 1187–1188, under Notingehamscira et Derebiscira : P. 198 : ‘Idem Vicecomes redd. Comp. de xx. s. de Werkewurdawapentagio pro murdro. In thesauro xvii. s.
Wirksworth Wapentake	Wirksworth	1193–1194 (Michaelmas 1194)	43 pounds and 12 shillings paid to the Treasury.	Farm payment (in surplus)	Exchequer	The Great Roll of the Pipe for the Sixth year of the reign of king Richard the First, ed., D.M. Stenton, Pipe	PR6, R1, 1193–1194, p. 80, under Nottinghamshire and Derbyshire: ‘Idem Vic. r.c. de quater xx li. bl. de firma de Werkewurda. In thes. xliii. li. et xii. s. bl.’

						roll Soc. XLIII (New Series V), London, 1928.	
Wirksworth & Bakewell wapentakes	Wirksworth and Bakewell (Low Peak)	1194–1195 (Michaelmas 1195)	<p>Payment for the farm of Wirksworth: 2 pounds, 5 shillings and 3 pence paid.</p> <p>Payment for the Farm of the royal mines in 'Blakewell wapentaco'. 16 pounds and 1 mark of silver paid.</p> <p>Just over 18 pounds paid to the Treasury in this year.</p>	Farm payments	Exchequer	<p>'The Great Roll of the Pipe for the seventh year of the reign of King Richard the First', ed. D.M. Stenton, Pipe roll Soc (XLIV, New Series VI), 1929, London.</p>	<p>PR7, R1, 1194–1195, under 'Notingeham et Derebiscr' :</p> <p>P. 15 : 'Idem Vic. r.c. de quarter xx. li. bl. de firma de Werkewurda. In thes. ii. li. et v. s. et iii. d. bl.'</p> <p>P. 21, under 'Item de novis promissis per H. Cant' Archiepiscopum': 'Johannes Buche r.c. de L. m. pro habendis minariis de dominiis domini R. in Blakewell wapentaco hoc anno ad firmam. In thes. xvi li. et i m. Et debet xvi li et i. m.</p>
Wirksworth Wapentake	Wirksworth	1195–1196 (Michaelmas 1196)	5 pounds paid for the farm of Wirksworth.	Farm payment	Exchequer	<p>The Chancellor's Roll for the Eighth year of the reign of King Richard the First (Michaelmas 1196), ed. D.M. Stenton, Pipe roll Soc. XLV</p>	<p>PR8, Richard I (Chancellor's Roll), 1195–1196, under Notting'ham et Derebiscr': ..</p> <p>P. 265: 'Idem Vic. r.c. de quater xx li. de firma de Werkewurd. In thes lib. Et Q. E.'</p>

						(New Series VII), London, 1930.	
Wirksworth Wapentake	Wirksworth	1196–1197 (Michaelmas 1197)	5 pounds paid for the farm of Wirksworth. Plus an arrear farm payment from year seven from Bakewell. 16 pounds paid this year from the Peak.	Farm payments	Exchequer	The Great Roll of the Pipe for the Ninth year of the reign of king Richard the First (Michaelmas 1197), ed. D.M. Stenton, Pipe roll Soc. XLVI (New Series VIII), London 1931.	PR9, Richard, 1196–1197, under ‘Notingham et Derebiscir’: P. 144 : ‘Idem Vic. r.c. de quater xx.li. bl. de firma de Werkewurda. In thes. lib. .. Et QE.’ P. 148, under ‘De Promissis per H. cant’ Archepiscopum’: ‘Johannes Buche r.c. de xii. Li. et xix. s. pro habenda minaria de dominiis R. in Blakewell wapentagio de anno vii. In thes. xi. li. Et debet xxxix. s.
Wirksworth Wapentake	Wirksworth	1197–1198 (Michaelmas 1198)	5 pounds paid to the Treasury in this year.	Farm payment	Exchequer	The Great Roll of the Pipe for the Tenth Year of the Reign of King Richard the First, ed. D. M. Stenton, Pipe Roll Soc (New Series IX), London, 1932.	PR10, RI, 1197–1198, under Nottinghamshire and Derbyshire: P. 112: ‘Idem Vic. r.c. de quarter xx. li. (bl.) de firma de Werkewrde. In thes.lib. Et Q.E.’

Wirksworth Wapentake	Wirksworth	1198–1199 (Michaelmas 1199)	5 pounds paid to the Treasury this year.	Farm payment	Exchequer	The Great Roll of the Pipe for the First Year of the Reign of King John, ed. D.M. Stenton, Pipe roll Soc (New Series X), London, 1933.	PR1, John, 1198–1199, under Nottinghamshire and Derbyshire: P. 200: ‘Idem Vic. r.c. de quarter xx li bl. de firma de Werkewrde. In thes. lib. Et Q. E.’
Wirksworth Wapentake	Wirksworth	1199–1200 (Michaelmas 1200)	82 pounds paid by farm holders of Wirksworth.	Farm payments	Exchequer	The Great Roll of the Pipe for the Second year of the reign of king John (Michaelmas 1200), ed. D.M. Stenton, Pipe roll Soc. L (New Series XII), London, 1934.	PR2, John, under ‘Notingham et Derebiscir’, p. 9: ‘Willelmus de Briewerre r.c. de xl. li. bl. De firma de Werkewrde. De dim. anno. In thes Lib.’ Hugo Bard r.c. de xl. li. bl. de firma de Werkewrde de dim. anno. In thes Nichil. Et in suo superplus quod habet supra in firma comitatus num. xlii. li. pro xl. li. bl. Et Q. E.’
Wirksworth Wapentake	Wirksworth	1200–1201 (Michaelmas 1201)	5 pounds seems to have been paid.	Farm Payment	Exchequer	The Great Roll of the Pipe for the Third year of the reign of king John, ed. D.M. Stenton, Pipe roll Soc. LII (New Series	PR3, John, 1200–1201, under Nottinghamshire and Derbyshire: P. 90: ‘Idem Vic. r.c. de quarter xx. li. (bl.) de firma de Werkewrde. In thes. Nichil. Et in predicto superplus quarter xx li. bl. Et Q. E.’

						XIV), London, 1936.	
Wirksworth Wapentake	Wirksworth	1201–1202 (Michaelmas 1202)	5 pounds paid for this year. Also possible that 5 pounds for previous year was paid in arrears this year – but the entry is unclear, it could relate to Essebrun only.	Farm payment	Exchequer	The Great Roll of the Pipe for the Fourth year of the reign of king John (Michaelmas 1202), ed. D.M. Stenton, Pipe roll Soc. LIII (New Series XV), London, 1937.	PR4, John, 1201–1202, under ‘Notingh’ et Derebiscir’: P. 187: ‘Idem Vic. r.c. de quarter xx. li. bl. de firma de Werkewrda. In thes. Nichil. Et in suo superplus quod habet supra in firma comitatus. Quarter xx. li. Et habet superplus de x. s. et viii d. bl. Idem Vic. C et xiiii s. et ii d. de cremento de (Werkewrda or Essebrun) de anno preterito.’
Wirksworth Wapentake	Wirksworth	1202–1203 (Michaelmas 1203)	74 pounds paid to Treasury from surplus on farm payment this year.	Farm payment	Exchequer	The Great Roll of the Pipe for the Fifth year of the reign of King John (Michaelmas 1203), ed. D.M. Stenton, Pipe roll Soc. LIV (New Series XVI), London, 1938.	PR5, John, 1202–1203, under Notingeham et Derebiscir: P. 164: ‘Et habet de superplus lxxiiii li. et vi s. bl. que locantur ei infra in firma de Werkewrda.’ P. 165 : ‘Idem Vic. r.c. de quarter xx li. (bl.) de firma de Werkewrda. In thes. (Nichil) xii s. bl. Et in suo superplus de anno preterito x s. et vi s. bl. Et in suo

							superplus quod habet supra in firma comitatus Lxxiiii li et vi s. bl. Et debet iiii li. et xi s. et iiii d. bl.’
Wirksworth Wapentake	Wirksworth	1203–1204 (Michaelmas 1204)	45 pounds paid to the Treasury.	Farm payment	Exchequer	The Great Roll of the Pipe for the Sixth year of the reign of king John (Michaelmas 1204), ed., D.M. Stenton, Pipe roll Soc. LVI (New Series XVIII), London, 1940.	PR6, John 1203–1204, under Nottinghamshire and Derbyshire: P. 162: ‘Willelmus comes de Ferrariis r.c. de quarter xx li. bl. Et (de) xl li. num de firma de Werkewrda et Essebrun’. In thes. Lib in ii talliis. Et Q. E.’
Wirksworth Wapentake	Wirksworth	1204–1205 (Michaelmas 1205)	Complicated entry but at least 77 pounds, 13 shillings and 4 pence paid to the Treasury in this year, plus an additional 40 pounds, giving a total of 117.5 pounds paid.	Farm payment	Exchequer	The Great Roll of the Pipe for the Seventh year of the reign of King John (Michaelmas 1205), ed. S. Smith, Pipe roll Soc. LVII (New Series XIX), London, 1941.	PR7, John, 1204–1205, p. 222, under Nottinghamshire and Derbyshire : ‘Willelmus comes de Ferrariis r.c. de quarter xx. li. bl. et xl. li. num. de firma de Werkewrda et Essebrun. In thes. (lib) lxxvii. li. et xiii. s. et iiii d. bl. Et xl li. num. Et debet xlvi s. et viii. d.’
Wirksworth Wapentake	Wirksworth	1205–1206	Farm owed, 45 pounds. Farm paid, 45 pounds.	Farm payment	Exchequer	The Great Roll of the Pipe for the Eighth year of the reign of	PR8, John, 1205–1206, under Nottinghamshire and Derbyshire:

		(Michaelmas 1206)				king John (Michaelmas 1206), ed. D.M. Stenton, Pipe roll Soc. LVIII (New Series XX), London, 1942.	P. 177: Willelmus comes de Ferrariis r.c. quarter xx. li. bl. Et de xl. li. num. de firma de Werkewurda et Esseburn. N thes. quarter xx li. bl. Et xl. li. num. Et Q. E.
Wirksworth Wapentake	Wirksworth	1206–1207 (Michaelmas 1207)	Farm owed, 45 pounds; Farm paid, 45 pounds.	Farm payment	Exchequer	The Great Roll of the Pipe for the Ninth year of the reign of King John (1207), ed. A. Mary Kirkus, Pipe roll Soc. LX (New Series XXII), London 1946.	PR9, John, 1206–1207, under Nottinghamshire and Derbyshire: P. 115: ‘Willelmus comes de Ferrariis r.c. de quater xx. li. bl. Et de xl. Li. num. de firma de Werkewrda et Esseburn. In thes. xl. li. num. Et quarter xx li. bl. Et Q. E.’
Wirksworth Wapentake	Wirksworth	1207–1208 (Michaelmas 1208)	Apparently, the farm for Wirksworth was paid but the specific amount paid is not given. This would be a minimum of 5 pounds (the quarter xx. li farm fee), but at this time it could have been 45 pounds, as in 1206 & 1207.	Farm Payment	Exchequer	The Great Roll of the Pipe for the Tenth year of the reign of king John (Michaelmas 1208), ed. D.M. Stenton, Pipe roll Soc. LXI (New Series XXIII), London, 1947.	PR10, John, 1207–1208, under ‘View of Account’, ‘Notingeham et Derbisir’: P. 207: ‘Comes de Ferrar de firma de Werkewurd’. In thes. Et debet ii m. bl.

Wirksworth Wapentake	Wirksworth	1208–1209 (Michaelmas 1209)	160 pounds actually paid to the Treasury for the farm (over the actual farm owed – 145 pounds).	Farm payment	Exchequer	The Great Roll of the Pipe for the Eleventh year of the reign of King John (Michaelmas 1209), ed. D.M. Stenton, Pipe roll Soc. LXII (New Series XXIV), London 1946.	PR11, John, 1208–1209, under Nottinghamshire and Derbyshire: P. 110: ‘Willelmus comes de Ferrariis r.c. de C et Lx li. bl. de firma de Werkewrda et Esseburn. Et de quater xx li. num. In thes. C et Lv. li. et iii. s. et iiiii. d. bl. Et quater xx li. num.’
Wirksworth Wapeantake	Wirksworth	1209–1210 (Michaelmas 1210)	45 pounds paid to the Treasury	Farm payment	Exchequer	The Great Roll of the Pipe for the Twelfth year of the reign of king John (Michaelmas 1210), ed. C.F. Slade, Pipe roll Soc. LXIV (New Series XXVI), London 1949 (pub. 1951).	PR12, John, 1209–1210, under Notingeham et Derebiscir’: P. 125: ‘Willelmus comes de Ferrariis r.c. de quarter xx li. bl. Et de xl li. num. de firma de Werkewrde et Esseburn. In thes. lib. In ii taleis.’ Et Q. E.’
Wirksworth Wapentake	Wirksworth	1210–1211 (Michaelmas 1211)	45 pounds paid to the Treasury.	Farm Payment	Exchequer	The Great Roll of the Pipe for the Thirteenth year of the reign of king John (Michaelmas 2011), ed. D.M. Stenton, Pipe	PR13, John, 1210–1211, under Nottinghamshire and Derbyshire” P. 212: ‘Willelmus comes de Ferrariis r.c. de quarter xx li. bl. Et de xl li. num. de firma de

						roll Soc. LXVI (New Series XXVIII), London 1953.	Werkewrde et Esseburn. In thes. Lib. In ii taleis.'
Wirksworth Wapentake	Wirksworth	1211–1212 (Michaelmas 1212)	Approximately 97.5 pounds paid for the farm of Wirksworth. (77 pounds, 16 shillings and 8 pence, plus 20 pounds).	Farm payment	Exchequer	The Great Roll of the Pipe for the Fourteenth year of the reign of king John (Michaelmas 1212), ed. P. M. Barnes, Pipe roll Soc. LXVIII (New Series XXX), London, 1954.	PR14, John, 1211–1212, under Nottinghamshire and Derbyshire: P. 162: 'Willelmus comes de Ferrariis r.c. de quarter de xx. li. bl. Et de xl. li. num. de firma de Werkewrde et Esseburn. In thes. Lxxvii. li. et xvi. s. et viii. d. bl. Et xx. li. num.
		1212–1213 (for Michaelmas 1213) No Pipe roll survives					No Pipe roll survives for this year.
Wirksworth Wapentake	Wirksworth	1213–1214 Michaelmas 1214)	Just under 44 pounds paid to the Treasury (6 pounds, 15 pence, plus 37 pounds and 14 shillings).	Farm payment	Exchequer	The Great Roll of the Pipe for the Sixteenth year of the reign of king John (Michaelmas 1214), ed. P.M. Barnes, Pipe roll	PR16, John, 1213–1214, under Nottinghamshire and Derbyshire: P. 157: 'Willelmus comes r.c. de quater xx. li. bl. Et de xl. li. num. de firma de Werkewurde et Esseburn. In thes. Quater xx et i.

						Soc. LXXII (New Series XXXV), London, 1959.	li. et xv. d. et ob. bl. Et xxxvii. li. et xiii. s. num.'
Wirksworth Wapentake	Wirksworth	Michaelmas 1214–Easter 1215	Farm owed stated. No payment made.			The Great Roll of the Pipe for the Seventeenth year of the reign of King John, ed., R.A. Brown, Pipe roll Soc. LXXV (New Series XXXVII), London, 1964.	PR17, John, 1214–1215, under Nottinghamshire and Derbyshire. P.32: 'Willelmus comes de Ferar xl. li. bl. et xx li. num. de firma de Werkewurde et Esseburne.' No payment made during civil war of 1215 (and French invasion 1216).
		Michaelmas 1216 and Michaelmas 1217 (Year 18 for John, and Year 1 for Henry III)	No Pipe rolls were compiled in/or survive from these years of civil war and French invasion.				No Pipe rolls Michaelmas 1216–Michaelmas 1217.
		1217–1218 (Michaelmas 1218)	Nottinghamshire and Derbyshire not included in this Pipe roll. All counties north of the Humber are also missing. No payments made?			The Great Roll of the Pipe for the Second year of king Henry III (Michaelmas 1218), ed., E.P. Ebdon, Pipe roll Soc. LXXVII (New Series	PR2, Henry III. This Pipe roll contains all the southern counties and those of the West Midlands only.

						XXXIX), London 1964 (pub 1972).	
Wirksworth Wapentake	Wirksworth	1218–1219 (Michaelmas 1219)	Farm payments made for 1218–1219 and the arrear farm payment for 1217–1218. Implication is that there was no production in the war years 1215–1216 and 1216–1217. Total of 159 pounds paid to the Treasury.	Farm payments	Exchequer	The Great Roll of the Pipe for the Third year of the reign of King Henry III (Michaelmas 1219), ed., B.E. Harris, Pipe roll Soc. LXXX (New Series XLII), London, 1969–1970. (Pub 1976).	PR3, Henry III, 1218–1219, under Nottinghamshire and Derbyshire: P. 93: ‘Willelmus comes de Ferrariis r.c. de C et Lx li. bl. et quater xx li. num. de firma de Werkewurd et Esseburne de anno preterito et hoc anno. In thes. C et Liiii li. bl. et quater xx li. num.’

OSM6. Mine of Yorkshire Pipe roll entries: farm payments & cart-loads of lead, AD 1167–1216.

Pipe roll	Mention of mines	Year <i>(Only years with entries are noted)</i>	Farm payment details (paid in silver) and/or cart-loads of lead	Mention of lead	Destination	Source	Page number(s) of entries, text and notes <i>(Cited text is presented as in the various editions quoted. Mistakes and abbreviations in the medieval Latin have not been corrected or resolved.)</i>
1162–1163	Yes	Michaelmas 1163	20 pounds for farm of the ‘Mine of Yorkshire’.	No	Exchequer	Pipe roll 9, Henry II, Pipe roll Soc (VI), 1886.	PR 9, H2, P. 10, under ‘Carleolium’: ‘Wills fil. Holdegari red Comp. de. C. 1886.

			This is the only farm payment noted between 1155 and 1216.				li. de Minaria de Carl. 7 de .xx. li. de Minaria de Euerwicscr.’
1180–1181	Not specifically, just metal	Michaelmas 1181	75 cart-loads of lead for Waltham abbey. 240 cart-loads of lead for Cistercian abbey of Clairvaux.	Yes	75 cart-loads of Yorkshire lead to ‘Selebi’ (Selby, E. Yorks?) & London to Waltham abbey. 240 cart-loads of Yorkshire lead sent via Boroughbridge (Ponteburg) to York, and then to Rouen for further transport to Clairvaux.	The Great Roll of the Pipe for the Twenty-seventh year of the reign of King Henry the Second, AD 1180-1181, Pipe roll Soc (XXX), 1909 (1966 reprint) (Intro J.H. Round).	PR27, H2, P. 47, under ‘Honor Comitum Conani’ in ‘Everwich’scr’, p, 47–48: ‘Et pro conducendis .lxxv. carretatis plumbi a Selebi usque Lond’ quod Rex dedit ecclesie de Waltham .C. et V. s. per breve regis.’ (P. 47). P. 48. ‘Et in custamento ducendi .CC. et .XLI. caretatis plumbi ab Euerwic’ usque Rothomagum quod Rex dedit ecclesie Clareuall’ .xxiii. l. et .iiii. s. et .viii. d. per breve regis. Et in custamento ducendi predictum plumbum a Ponteburg usque Euerwic’ .iiii. l. et .iiii. d. per idem breve’.
1181–1182	Not specifically, just metal	Michaelmas 1182	New shipment of 40 cart-loads of lead to Waltham, or additional transport details of part of the 1181 smelt for 75 cart-loads for Waltham abbey, from Henry. Did not go via Selby, but Yarm on the River Tees (so Pennine lead).	Yes	From Pennine mines to ‘Jarun’ (Yarm) to London by sea, then to Waltham abbey.	The Great Roll of the Pipe for the Twenty-eighth year of the reign of King Henry the Second, AD 1181-1182, Pipe roll Soc (XXXI), 1910. Intro, J.H. Round xxi-xxviii. Discussion of lead xxvi.	PR28, H2, p. 47 under ‘Honor Comitum Conani’ (Count of Richmond, N. Yorks.) in Everwich’scr’: ‘Et pro .xl. careeis plumbi missis ad operationem de Waltham .xxv. l. per breve regis et per testimonium Walteri de Gant. Et pro conducendis navibus a Jarun usque Lond’ ad deferendum .lxxv. careas plumbi ad predictam operationem .vii. l. et .ii. s. et .iii. d. per predictum breve et per testimonium predicti Walteri.’

1182–1183	Not specifically, just metal	Michaelmas 1183	Further 25 cart-loads of lead to Waltham abbey.	Yes	To Waltham, via Yarm at the mouth of the River Tees, to London, and then Stratford on Lea.	The Great Roll of the Pipe for the Twentieth year of the reign of King Henry the Second, AD 1182-1183, Pipe roll Soc (XXXII), 1911. Intro, J.H. Round, xxiii-xxviii.	PR29, H2, p. 57, under ‘Everwichscr’: ‘Et in custamento ducendi .xxv. caretatas plumbi a Jarun usque Stradford juxta Lond’ ad operationem de Waltham .xlvii. s. per breve regis’.
1183–1184	Not specifically, just metal	Michaelmas 1184	20 cart-loads of lead for construction at the castle at Gisors (Vexin); & another 25 cart-loads of lead for Waltham abbey.	Yes	To Gisors (Vexin), via ‘Hoiland’ (Lincs), probably Humber port, and Rouen, then to Gisors via Seine and cart. To Waltham from Boroughbridge to London (via Humber).	The Great Roll of the Pipe for the Thirtieth year of the reign of King Henry the Second, AD 1183-1184, Pipe roll Soc (XXXIII), 1912. Intro, J.H. Round, xxiii-xxxiv.	PR30, H2, p.29, under ‘Everwichscira’: ‘Et pro .xx. carretatis ad operiendam cameram Regis de Gisorz .xiii. l. et .xvi. s. et .viii. d. per breve regis. Et pro ducendo eodem plumbo ab Hoiland’ usque ad pontem de Rothomago .xxx. s. et .iii. d. per idem breve. Et item pro .xxv. carretatis plumbi ad operationem de Waltham .xv. l. et .xii. s. et .vi. d. per idem breve. Et pro cariendo eodem plumbo a ponte de Burg usque Lond’ .xlvi. s. per idem breve.’

OSM7. Mine of Shropshire Pipe roll entries: farm payments & cart-loads of lead, AD 1167–1216.

Pipe roll	Mention of mines	Year <i>(Only years with entries are noted.)</i>	Farm payment details (paid in silver) and/or cart-loads of lead	Mention of lead	Destination	Source	Page number(s) of entries, text and notes <i>(Cited text is presented as in the various editions quoted. Mistakes and abbreviations in</i>

							<i>the medieval Latin have not been corrected or resolved.)</i>
1180–1181	Yes	Michaelmas 1181	55 pounds for the farm of the royal mines. Paid. 40 marks for the Farm of the wider mines. Only 6 pence paid to the Treasury. 60 cart-loads of lead to King’s projects in Gloucester.	Yes	From Shropshire mines to Shrewsbury, and then to Gloucester, presumably transported along the River Severn.	The Great Roll of the Pipe for the Twenty-seventh year of the reign of King Henry the Second, AD 1180-1181, Pipe roll Soc (XXX), 1909 (1966 reprint) (Intro J.H. Round).	PR27, H2, P. 19, under ‘Salopescr’, under ‘De placitis Rannulfinde Glanvill et sociorum ejus’: ‘Idem vicecomes redd. Comp. de .LV. l. pro plumbo Regis Ipsi regi liberavit plumbum ad valens .LV. l. per suum. Et quietus est. Idem vicecomes redd. Comp. de .XL. m. de firma minariorum plumbi per Tomam filium Bernardi. In thesauro .vi. d. Et pro .LX. caretatis plumbi ad opus regis .xxi. l. Et pro cariendo eodem plumbo et .C. et .XX. careis de alio plumbo a Salopesberia usque Gloecestr’ .C. et .XII. s. et .X. d. per breve regis. Et quietus est’.
1181–1182	Not specifically, just metal	Michaelmas 1182	Only transport cost details given for the lead from Salisbury to Gloucester smelted in 1180–1181, plus 110 cart-loads of lead to Amesbury abbey for King.	Yes	Two shipments: one from Shropshire (Shrewsbury) to Gloucester; second from Shropshire (Shrewsbury) to Amesbury (both for the King).	The Great Roll of the Pipe for the Twenty-eighth year of the reign of King Henry the Second, AD 1181-1182, Pipe roll Soc (XXXI), 1910. Intro, J.H. Round xxi-xxviii.	PR28, H2, p. 21, under ‘Salopesscr’: Et pro plumbo Regis cariendo a Salopesberia usque Gloecr’ .lxviii. s. et .ix. d. per breve regis et per testamonium Willelmi filii Simeonis et Warini filii Alrici.’....

						Discussion of lead xxvi.	'Pro .c. et x. careatis plumbi ad operationem de Ambresberia .xxxviii. l. et .x. s. per breve regis et per visum predictorum. Et quietus est.'
1182–1183	Not specifically, just metal	Michaelmas 1183	Further 30 cart-loads of lead for Amesbury abbey.	Yes	To Amesbury, via Shrewsbury and Gloucester (along the River Severn).	The Great Roll of the Pipe for the Twenty-ninth year of the reign of King Henry the Second, AD 1182-1183, Pipe roll Soc (XXXII), 1911. Intro, J.H. Round, xxiii-xxviii, lead discussed on p. xxiv.	PR29, H2, p. 1, under 'Salopescr': 'Et pro .xxx. caretatis plumbi ad operationem ecclesie de Ambresberia .x. l. et .x. s. per breve regis. Et in custamento ducendi predictum plumbum a Salopesberia usque Glocecr' .xviii. s. et .ix. d. per idem breve.'
1183–1184	Transport costs for a small final lead shipment only	Michaelmas 1184	Transport costs for a small final lead shipment only.	Yes	To Amesbury abbey via Shrewsbury and Gloucester, via River Severn.	The Great Roll of the Pipe for the Thirtieth year of the reign of King Henry the Second, AD 1183-1184, Henry II, Pipe roll Soc (XXXIII), 1912. Intro, J.H. Round, xxiii-xxxiv.	PR30, H2, p. 90, under Salopescir: 'Et pro plumbo empto ad operationem de Ambresberia .iiii. l. et .xi. s. per idem breve. Et pro eodem plumbo ducendo a Salopesberia usque Gloceestr' .viii. s. et .iii. ob. per idem breve.'
1184–1185	Yes, and metal	Michaelmas 1185	30 cart-loads of lead from the royal mines of Shropshire to Gloucester;	Yes	From Shropshire mines to Gloucester; and	The Great Roll of the Pipe for the Thirty-first year of the reign of King	PR31, H2, p. 127, under 'Salopescir': 'Et in carragio .xxx. caretarum plumbi a minaria usque Gloceestr' . xlvi.

			and a further 30 cart-loads from Shrewsbury to Gloucester. Total: 60 cart-loads of lead.		from Shrewsbury to Gloucester.	Henry the Second, AD 1184-1185, Pipe roll Soc. (XXXIV), 1913, Intro, J. H. Round, xxiii-xxxv. Round 1913, xxx comments on these 60 cart loads.	s. et .iii. d. per breve regis. Et item in carragio .xxx. caretarum plumbi a Salopsberia usque Gloeestr' .xviii. s. et .ix. d. per idem breve.'
1193–1194	Yes	Michaelmas 1194	Mention of Mine of 'Karakawain' (Carehofa/Denbigh) in northeast Wales. Mines in this area were later referred to as the 'Flintshire mines'. No details on quantity of production. Entry made alongside details of provisioning the castle. Entry made under Shropshire.	No	Payment from King	The Great Roll of the Pipe of the sixth year of the reign of King Richard the First, ed. D.M. Stenton, Pipr roll Soc. (XLIII, New Series V), 1928, London.	PR6, R1, p. 141, under 'Salopesscir' : 'Et pro xx ligonibus emptis et missus ad castellum de Karalawain iiii s. per idem breve. Et in operatione cingula circa predictum castellum xx li. per idem breve. Et in liberatione militum et servientum ad custodiam minarie de Karakawain xxviii li. et ii s. et v. d. per breve R. et per testimonium Johannis et Radulfi Extraneorum et Joseph clerici archepiscopi. Et Q. E.'
1194–1195	Yes	Michaelmas 1195	Details the administration of the Denbigh mine by the custodian of the 'mine of Shropshire' and the holder of the farm of the Denbigh mine – Josph Aaron of Gloucester. The entry is made under Gloucestershire. No Farm Payment to the Treasury for Denbigh. Payment (due or paid) by Robert of	No	Exchequer (owed and paid)	'The Great Roll of the Pipe for the seventh year of the reign of King Richard the First', ed. D.M. Stenton, Pipe roll Soc	PR7, R1, p. 182–83, under Gloucestershire, under 'Compotus Josph Aaron de XL Li quas receipt de Vicecomte Wirecestr': P. 182: 'Et xx li. ei liberate fuerunt ad sustentandum cambium de Karrocaucin. In

			Shrewsbury custodian of the mine of Shropshire for the King's works: 16 pounds 14 shillings. Payment due/made of 23 pounds 6 shillings by Archbishop of Canterbury. Almost 40 pounds in total.			(XLIV, New Series VI), 1929, London.	thes. Nichil. Et magistro Roberto de Salopesbir' custodi eiusdem minarie. et cambii de Salopesbir' xvi li. et xiiii s. per breve R. Et archepiscopus Cant' xxiii li et vi s. per preceptum ipsius. De quibus ipse archepiscopus debet respondere. Et Q. E.
1194–1195	Yes	Michaelmas 1195	Second entry for 1194–1195, under Shropshire. These payments owed look like new initiatives to raise finance on the mines after Richard was ransomed and had returned from Germany in 1194 (from his imprisonment, 100 000 marks had been paid for his ransom). Nothing seems to have been paid in by the holders of the Farm, with the exception of the payments suggested by Robert of Shrewsbury and the Archbishop of Canterbury, noted under the Gloucestershire entry.	No.	Exchequer (owed to)	'The Great Roll of the Pipe for the seventh year of the reign of King Richard the First', ed. D.M. Stenton, Pipe roll Soc (XLIV, New Series VI), 1929, London.	PR7, R1, p. 246–47, under 'Salopescir', under 'Nova placita et nova conventiones post reditum regis de Alemania' : 'Joseph Aaron r.c. de xx li. et xi s. et i. d. de exitibus minarie de Karacouein et de xl s. et ii. d. de proficuo cambii de xl li. quas ipse recepit a Vic. de Wirecestr' de quibus debet respondere (et in rotulo de Gloecestr' in dorso) per uisum et testimonium Yuonis Polcier et Baldewini le Vplandeis. et Martini Ruffi. Scilicet de xviii li. de predictis exitibus a termino sancti Johannis Bapt' anni preteriti usque ad pentec' huius anni. Et per usum et testimonium. Hugonis de Norton et Roberti de Baskervill et Hamming Sheakeli scilicet de xlvii s. et viii d. de predicto exitu a termino predicti pentec' usque ad festum sancti Petri ad uinculas sequens. In

							thes. Nichil. Et H. archiepiscopo Cant' xii s. et l. D. scilicet deciman partem totius exitus predicte minarie. Predictorum terminorum. de dono domini R. per breve R. Et Joseph clerico custodi minarie x li. et xiiii s. de liberatione sua de CCC et XXI diebus. scilicet viii d. in die (idem) breve R. Et debet xii s. et ii d. Set reddit inde comptum in rotulo de Gloeestr'sir in dorso'.
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OSM8. Mines of the Bishop of Durham Pipe roll entries: farm payments & cart-loads of lead, AD 1167–1216.

Pipe roll	Mention of mines	Year <i>(only years with entries are noted)</i>	Farm payment details (paid in silver) and/or cart-loads of lead	Mention of lead	Destination	Source	Page number(s) of entries, text and notes <i>(Cited text is presented as in the various editions quoted. Mistakes and abbreviations in the medieval Latin have not been corrected or resolved.)</i>
1210–1211	Not specifically, just metal	Michaelmas 1211	Cost of Farm: 48 pounds of silver, but none paid to Treasury. 73 cart-loads of lead actually sent from the lands of the Bishop of Durham in this year: 40	Yes	Exchequer, and as payment for a royal wine shipment.	The Great Roll of the Pipe for the Thirteenth year of the reign of King John', ed. D.M. Stenton, Pipe roll Soc. (LXVI – New Series Vol.	John was in dispute with the Church between 1208 and 1211. The Prince-Bishopric of Durham came into John's hands on the death of Bishop Philip in April 1208 and was kept vacant until 1211. The King's officials were able to

		<p>sent for the King's works (mostly castle building and renovation in the north of England and in Shropshire after the Scottish and Welsh campaigns); and 33 cart-loads paid in lieu of a 40-mark royal wine bill.</p> <p>This lead is noted as having been produced between 1208 and 1211.</p> <p>In 1211, the Bishop of Durham was also responsible for the transport of 7000 marks of silver from the Treaty of Norham fine from the Scottish King, from Norham (on the River Tweed) to Nottingham, presumably via the North-Sea coast, to the Humber estuary, and along the River Trent to Nottingham.</p>			<p>XXVIII), London, 1953.</p> <p>Doris Stenton Intro, xiii-xxxvii, discussion of Durham entry, xiii-xv; lead payments xiv-xv, transport of 7,000 marks from Norham to Nottingham, xv.</p>	<p>collect debts going back into the reign of Richard I. The account in this Pipe roll details collections from the see from June 1208 to Michaelmas 1211.</p> <p>PR13, John, p. 41, under 'Compotus Episcopatus Dunelm a festo sancti Johannis Baptiste anni x usque ad festum sancti Martini proximo sequentis et inde usque in tres annos proximo sequentes': ...</p> <p>P. 41: 'Predicti custodies r.c. de xl caretatis plumbi que appretiate fuerunt xlviij l. Et xxxiiii carretatis et dim. et frustris plumbi que appretiate sunt lx m. In thes. Et comiti Winton xx carretatas per breve R. Et Roberto f. Rogeri xx carretatas per idem. Et Willelmo Anglico xxxiiii carretatas et dim. et viii frustra pro lx m. quas R. ei debuit pro vinis.'</p> <p>PR13, John, P. 40: 'Et in cariagio vii mille m. de fine R.</p>
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							Scotie a Norham usque ad Nottingeham iiii l. et vi. Per idem breve.’
1211–1212	Yes	Michaelmas 1212	48 pounds, 8 shillings, 1 pence in silver owed for the lead mines of the Bishops of Durham (seems to have been paid). Plus: 15 cart-loads of lead from mines of the Bishop of Durham.	Yes	Farm to the Exchequer. Lead sent by sea, along with other war provisions/materials, from Newcastle to Portsmouth, to William de Wrotham, the commander of the principal base of the royal fleet at Portsmouth, to prepare for a possible campaign in Poitou (which did not then happen in this year).	The Great Roll of the Pipe for the Fourteenth year of the reign of King John (Michaelmas 1212), ed. P.M. Barnes, Pipe roll Soc. LXVIII (New Series XXX), London, 1954.	PR14, John, p. 46–47, under ‘Compotus Episcopatus Dunelm per E Archidiaconum Dunelm et Philipum de Vlecote a Festo Sancti Martini anni xiii usque ad festum Sancti Martini anni huius rotuli’: P. 46: ‘Et de lx li. viii s. et i. d. de proficuo minarie plumbi preter xxii carruz quas R. habuit. P. 47 : Et pro D et lxxv cleiis et C et xxxxi pontibus faciendis et pro CCC et xx esperdutis ferri et pro C et lx baconibus emptis et missis a Novo Castello usque ad Portesmue et liberatis Willelmo de Wroteham et pro xv carretatis plumbi cariandis usque ad Portesmue et liberatis eidem Willelmo lxxiiii li. Et xv d. per idem breve.’

OSM9. Numerical data from the English Pipe rolls and CG lead data, AD 1167–1216.

See excel file

OSM10. Correspondence between Colle Gnifetti yearly mean lead pollution record and British lead production proxies, AD 1167–1216.

Summary of quantified data

Correspondence (peaks and troughs) between Colle Gnifetti Pb pollution record and British Pb production proxies, 1167–1216 (46-year period, as 1171, 1213 & 1216 were removed as records are missing)	Number	Percentage correspondence between records
Overall correspondence with British Pb production (farm payments for Wirksworth, Carlisle, and cart-load payments)	41 of 46 years	89%
Correspondence with Wirksworth Wapentake (Peak District) production (farm payments and cart-load payments from the region)	33 of 46 years	72%
Correspondence with Mine of Carlisle production (farm payments and cart-load payments)	26 of 46 years	57%
Correspondence with Wirksworth Wapentake (Peak District) farm payments	30 of 46 years	65%
Correspondence with Mine of Carlisle farm payments	23 of 46 years	50%

Correspondence with overall cart-load payments (often in lieu of farm payments in particular years)	11 of 46 years (cart-load production was only recorded for 19 of the 46 years, so 58 per cent of cart-loads actually correspond with the CG record)	23%
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Comparative trends by year (peaks and troughs) in CG lead pollution and British lead production proxies

Calendar year in CG pollution record	Lead pollution at CG (peak/trough)	Year of account in Pipe rolls (e.g. '1167' records for the period Sept 1166-end August 1167)	Wirksworth Farm payments (peak/trough)	Carlisle Farm payments (peak/trough)	Recorded provision of 'cart-loads' of lead (a cart-load was approximately 1 ton of metal, but with some regional variations)	Political/economic events impacting on production/transport/generation of cash for farm payments
1167	Peak	1167	Trough	Peak	None	Major construction projects at royal castles in England and Normandy.
1168	Slight Trough	1168	Trough	Slight Trough	Small Peak (55 cart-loads) 55 cart-loads from Carlisle to Caen (Normandy).	Construction work in Caen.
1169	Peak	1169	Peak	Peak	None	Royal construction projects in England (e.g. Orford), Normandy and the Limousin.

1170	Trough	1170	Trough (no payment)	Trough (no payment)	None	Conflict between Henry II and the Church (Thomas Becket, Archbishop of Canterbury), paralysis of aspects of government. Murder of Thomas Becket, December 1170.
1171	Break in core (no record)	1171	Trough (no payment)	Peak	None	
1172	Peak	1172	Trough (no payment)	Trough (no payment)	Small Peak (40 cart-loads) 40 cart-loads of lead sent from Wirksworth to Winchester <i>in lieu</i> of farm payment.	Construction at the royal palace at Winchester.
1173	Trough	1173	Trough (no payment)	Peak	None	War. Rebellion of Queen Eleanor of Aquitaine and sons Henry, Richard and Geoffrey against Henry II. William de Ferrers, heir to 'High Peak' Honour of William Peverel rebels against Henry in 1173—quashed by Henry. Mine of Carlisle still producing.
1174	Peak	1174	Peak	Trough	None	War. William the Lion, King of Scotland raided Tynedale and Carlisle in 1174 in support of Eleanor and sons—disrupted mine of Carlisle production.

						William the Lion was defeated. Wirksworth/Peak District back in production after defeat of Ferrers in 1173.
1175	Peak (but lower than 1174 high)	1175	Peak	Trough	None	End of war. Henry II defeats rebel family members and ends war with Scotland by Treaty of Falaise. Wirksworth production continued, Carlisle had still not recovered.
1176	Trough	1176	Trough	Peak	Four cart-loads (origin not specified).	Post-war lull in royal projects and need for lead as war material (for castles). Possible that Carlisle Farm payment peak could reflect the generation of cash from lead produced during the 1174–1175 war period, which could have been sold/traded earlier due to war conditions in region.
1177	Start of rise to 1179–1180 Peak	1177	Trough (no payment)	Peak	Small Peak (20 cart-loads) 20 cart-loads from Wirksworth/ Derbyshire, probably in lieu of farm payments.	20 cart-loads for construction at royal palace at Woodstock (Oxfordshire).
1178	Continued small rise to 1179–1180 Peak	1178	Trough (no payment)	Trough (no payment)	Small Peak (six cart-loads)	Continued construction at Woodstock palace.

					Six cart-loads from Wirksworth) in lieu of farm payment.	
1179	Peak	1179	Trough (no payment)	Trough (no payment)	Peak (100 cart-loads) (100 cart-loads sent from Carlisle to Clairvaux (Burgundy).	100 cart-loads sent to the Cistercian abbey at Clairvaux, for its rebuilding as part of Henry's atonement for the murder of Becket.
1180	Peak	1180	Start of rise to small peak (limited in 1180)	Trough (no payment)	Peak (560 cart-loads over 1180 & 1181) 185 cart-loads of lead sent from Carlisle to Clairvaux, for the years 1180–1181 combined.	These totals reflect massive production of metal over 1180 and into 1181, and its transport in 1181 before the Michaelmas (Sept) 1181 Pipe-roll accounting point. The quantities were so great that production and transport could not be achieved in one year. Like the re-roofing of Clairvaux, the construction of Waltham Abbey and Amesbury abbey over a short, concentrated time-scale, compared to most major ecclesiastical construction projects, were part of Henry's atonement to the Church for the murder of Becket.
1181	Decline from 1180 pollution Peak to a Trough	1181	Continuation of small rise	Start of rise to peak (in 1182)	240 cartloads sent from the mine of Yorkshire to Clairvaux for the years 1180–1181 combined. 75 cart-loads sent from the mine of Yorkshire to Waltham Abbey for the years 1180–1181 combined.	

					60 cart-loads from the mine of Shropshire to Gloucester over 1180–1181 combined. Cart-loads in lieu of farm payments.	
1182	Small Peak	1182	Small Peak	Peak	Peak (150 cart-loads) 110 cart-loads from the mine of Shropshire to Amesbury abbey. 40 cart-loads from the mine of Yorkshire to Waltham abbey.	Continued royal supply of lead for Waltham and start of large-scale supply for Amesbury.
1183	Small decline	1183	Small decline	Peak	Small Peak (55 cart-loads) 25 cart-loads from the mine of Yorkshire to Waltham abbey. 30 cart-loads from the mine of Shropshire to Amesbury abbey.	Continued supply of abbey construction at Waltham and Amesbury.
1184	Start of rise to 1185–1186 Peak	1184	Trough (no payment)	Small decline in farm payment	Small Peak (45 cart-loads)	Construction at the key Angevin border castle at Gisors (Vexin), on the frontier between Normandy and the kingdom of France.

					20 cart-loads to Gisors (Vexin) from the mine of Yorkshire . 25 cart-loads to Waltham abbey from the mine of Yorkshire .	Continued supply of Waltham abbey.
1185	Peak	1185	Trough (no payment)	Peak	Small Peak (60 cart-loads) 60 cart-loads from the mine of Shropshire to Gloucester.	60 cart-loads for royal construction projects in western England.
1186	Peak	1186	Trough (no payment)	Peak	None	
1187	Peak – but decline from Peak of 1185–1186	1187	Small payment	Small Peak. 65 pounds paid but decline from Peak of 1185–1186.	None	
1188	Trough	1188	Small payment	60 pounds paid but approx. maintenance of 1187 level.	Peak (100 cart-loads) 100 cart-loads from the High Peak District/Wirksworth (Honour of William Peverel) to Clairvaux.	Cart-load production from 1187–1188?
1189	Trough	1189	Trough (no payment)	Trough	None	Henry II died in April 1189. The slight rise may relate to some smelting late in the summer lead-

	(very slight rise compared to 1188)			(minimal payment of 2 pounds made).		mining/smelting season—August-Sept, after the transition period in government from Henry to Richard the Lionheart.
1190	Small Peak	1190	Trough (no payment)	Small Peak	None	Richard departs on the Third Crusade, mid 1190.
1191	Trough	1191	Trough (no payment)	Trough (small payment—10 pounds).	None	Third Crusade. Richard the Lionheart absent from England and the other Angevin realms.
1192	Trough	1192	Trough (no payment)	Trough (small payment—10 pounds).	None	
1193	Start of rise to 1194 Peak	1193	Trough (no payment)	Trough (small payment—10 pounds).	None	
1194	Peak	1194	Peak	Trough (no payment).	None	War with France, in Normandy. Peaks in pollution and Wirksworth farm payment may reflect raising of cash for Richard's ransom, but more likely for provision of war materials for war with France which had begun on Richard's release in February 1194. Richard in England in March-May 1194, then returned to Normandy.

1195	Peak	1195	Peak (but decline from 1194 high)	Trough (no payment)	None	War with France. Massive payments for mercenaries in Normandy, and castle construction/renovation, recorded in Pipe rolls of the Duchy of Normandy.
1196	Peak	1196	Small Trough (small payment—5 pounds)	Trough (no payment)	None	Year-long truce with France.
1197	Decline from 1196 peak	1197	Small Peak	Peak	None	War with France.
1198	Trough	1198	Trough (small payment—5 pounds)	Peak	None	War with France. Pipe rolls of the Duchy of Normandy record lead arriving at Rouen with other metals and war materials for castle building (including Château Gaillard) and fortification of bridges.
1199	Trough (but slight rise from 1198)	1199	Trough (small payment—5 pounds)	Trough (small payment—10 pounds)	None	Death of Richard in April 1199 at Chinon.
1200	Small Peak	1200	Peak	Peak	None	Peaks in farm payments could reflect payment of sums held back during the inter-regnum between Richard and John, or production and cash generation to replenish the royal Treasury after the Treaty of Le Goulet (May 1200), ending war with France (County of the Vexin and large cash payment made to Philip of France).

1201	Trough	1201	Trough (small payment—5 pounds)	Trough (small payment—6 pounds)	None	Peace.
1202	Rise toward Peak summit of 1203	1202	Trough (small payment—5 pounds)	Small Peak		War with France & rival claimant to Angevin throne (Arthur, son of Geoffrey—John's elder brother). Battle of Mirebeau, near Poitiers, July 1202.
1203	Peak	1203	Peak	Small Peak	None	War with France. Increased demand for lead as a war material and for cash to the Treasury.
1204	Peak (but decline from Peak of 1203)	1204	Small Peak	Trough (no payment)	None	War with France. Defeat for John, loss of Rouen and Normandy.
1205	Trough	1205	Peak	Small payment—4.5 pounds)	None	No campaign this year, after loss of Normandy.
1206	Rise toward Peak of 1207	1206	Peak	Trough (no payment)	None	War in Aquitaine, against French and allies.
1207	Peak	1207	Peak	Peak	None	War in Aquitaine against French and allies.
1208	Peak (but decline from Peak summit at 1207)	1208	Peak	Trough (no payment)	Small Peak (18.25 cart-loads) Average of 18.25 cart-loads produced per year from the mines of Durham , between June	War against Scotland.

					1208 and Michaelmas 1211.	
1209	Peak but continuing to decline from 1207 summit	1209	Peak	Trough (no payment)	Small Peak (18.25 cart-loads) Average of 18.25 cart-loads produced per year from the mines of Durham , between June 1208 and Michaelmas 1211.	War with Scotland. Victory for John. Scots pay reparations under Treaty of Norham (paid by 1211).
1210	Trough	1210	Fall in payment to 45 pounds (creating a small trough in payments)	Trough (no payment)	Small Peak (18.25 cart-loads) Average of 18.25 cart-loads produced per year from the mines of Durham , between June 1208 and Michaelmas 1211.	Peace.
1211	Trough	1211	Fall in payment to 45 pounds (creating a small trough in payments)	Trough (no payment)	Small Peak (18.25 cart-loads) Average of 18.25 cart-loads produced per year from the mines of Durham , between June 1208 and Michaelmas 1211. 6 cart-loads purchased from Abbotsbury abbey	Peace. Castle-building on Scottish border and border of Gwynedd (north Wales).

					(Dorset) to Tower of London.	
1212	Rise toward Peak summit at 1213	1212	Peak	Small payment (7 pounds)	Small Peak (15 cart-loads) 15 cart-loads from the mines of Durham to Portsmouth.	War with France. Increased production and farm payments coincide with renewed generation of income and materials for war.
1213	Peak	No Pipe roll for 1213				
1214	Peak	1214	Peak	Small payment (7 pounds)	Four cart-loads purchased (origin: Britain) and sent to castles at Windsor and Odiham, Woodstock palace and Tower of London.	War with France. Increased production and farm payments coincide with renewed generation of income and materials for war. John's allies defeated at Bouvines.
1215	Trough (very sharp decline from 1213–1214 peak)	1215	Trough (no payment)	Trough (no payment)		Civil War in England. John signs Magna Carta on 15 June, revoked by Papacy at John's request 24 August (news of revocation arrived in England in September 1215). John cedes three northernmost counties – Northumberland, Cumberland (including Carlisle) and Westmorland to Scotland.
1216	Trough	No Pipe roll for 1216				Civil War and French invasion against John, led by Louis, the French Dauphin. John takes back Northumberland, Cumberland and Westmorland, May 1216. Louis

						invades SE England with a French army, with support of London and SE English barons, August 1216: three northernmost counties (including Carlisle) surrendered to Scotland again. John dies at Newark Castle (Nottinghamshire), October 1216.
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