

Statement of Significance

Cârnic Massif, Roşia
Montană, jud Alba
Romania

Prof Andrew Wilson
Prof David Mattingly
Michael Dawson FSA MIfA

September 2010 with
additional summary July
2011





This Statement of Significance has been written by Professor Andrew Wilson, University of Oxford, Institute of Archaeology and Professor David Mattingly, of the University of Leicester, School of Archaeology and Ancient History. The project was managed by Michael Dawson FSA MifA, Director of CgMs Consultancy Ltd. The contents of the report reflect the views of the three authors ©. No part of this report is to be copied in any way without prior written consent. Every effort is made to provide detailed and accurate information, however, the Universities of Oxford, Leicester and CgMs cannot be held responsible for errors or inaccuracies within this report.

CONTENTS

Preface

Executive Summary

1.0 Introduction

2.0 Statement of Significance

3.0 The Significance of Specific Attributes

4.0 The Significance of Historic Processes

5.0 Bibliography

LIST OF ILLUSTRATIONS

- Fig 1 Roman Roşia Montană
- Fig 2 The Cetate opencast, seen from the Cărnic Massif
- Fig 3 Entrances to the ancient mine galleries at Găuri
- Fig 4 The Roman circular mausoleum at Tău Găuri, in its temporary cover building
- Fig 5 The Cărnic massif seen from Roşia Montană
- Fig 6 The modern village of Corna and, in the background from left to right, waste from the Cetate opencast; Cărnicele; and the Cărnic massif. The proposed mining project would raze much of the Cărnic massif to about the level of the top of the Cetate waste spills, and bury the site of Corna village under the tailings facility to the level of the bottom of the spire of the church on the left, and the base of the church on the right.
- Fig 7 Tăul Cornei, an early modern header pond for ore-crushing machinery, seen from Piatra Corbului. The Roman necropolis lay just beyond the pond.
- Fig 8 Entrances to modern mine galleries in the Jig-Văidoaia massif.
- Fig 9 Ore-crushing technology - the stamp mills of Rosia Montana and their predecessors: a) Traditional stamp mill at the old Minvest mining museum of Rosia Montana; b) Woodcut showing a stamp mill, from Georgius Agricola's De Re Metallica, 1556; c) Roman anvil stone from a stamp mill (Villamontan de la Valduerna, Spain); d) Anvil stone from a traditional stamp mill, Roşia Montană.
- Fig 10 Găuri - opencast working with a deep cut where a vein has been followed from the surface.
- Fig 11 Roman mine gallery with trapezoidal cross-section in the Cărnic massif.
- Fig 12 Roman trapezoidal gallery in Păru Carpeni, with working marks on the walls and roof showing how the gallery was advanced a few centimetres at a time.
- Fig 13 Roman stepped descending gallery in the Cărnic massif.
- Fig 14 Superimposed Roman galleries in the Orlea massif. (The bracing timbers are modern.)
- Fig 15 Cărnic 10 - Roman working chamber
- Fig 16 Cărnic - Roman exploitation chamber with basins (now flooded) cut in the floor.
- Fig 17 Păru Carpeni - chamber for a wooden drainage wheel in the Roman mine network. The wooden bearing block for the wheel axle is visible towards the top of the picture, and Roman wooden shoring towards the bottom.
- Fig 18 Shothole for explosive charge in the wall of an early modern mine gallery in the Cărnic massif.
- Fig 19 Communist-era transport gallery in the Cărnic massif.
- Fig 20 Abandoned extraction machine in the Cetate opencast.
- Fig 21 Communist era pillared exploitation chamber in the Cărnic massif.
- Fig 22 Itinerary of visit of UK experts

APPENDICES

Appendix 1: Itinerary of visit of UK experts

Appendix 2: Roşia Montană and Other Roman Gold Mines

Appendix 3: Statements of Significance

Appendix 4: Letter of Endorsement from the Institute for Archaeologists

PREFACE

The Statement of Significance for Roşia Montană area was written (...) in a short time frame of only two months, between August and September 2010. The authors have placed the evidence at Roşia Montană in its international context. We have also examined the area's potential, noting other World Heritage Sites as they have developed after inscription in the UNESCO list, to show that Roşia Montană has the necessary significance and potential to become a World Heritage Site.

The report was re-issued in July 2011 with the addition of an extended Executive Summary. This makes no material change to the report itself. It gathers together the significance statements written for the principal areas of evidence investigated by RMGC and examined during a three-day field visit in August 2011. The summary does, however, emphasise the interrelationship of the evidence which highlights Roşia Montană's unique contribution to world culture. Not only is this region important to history of the Roman Empire and the province of Dacia, but to the development of gold mining in the Austro-Hungarian empire and later still during the repressive years of the later 20th century. Gathering together site-specific significances also emphasises the nature of investigation to date. The report emphasises the significance of taking a landscape based approach to the heritage of the Roşia Montană region. It also highlights important periods for which the documentation is currently poor or non-existent, for instance, the transitions from pre-Roman Dacia to Roman province, from Roman Dacia to early medieval Transylvania, and later the high medieval and Austro-Hungarian periods.

Explicitly this document supports the protection of this landscape and the conservation and enhancement of its outstanding universal value.

EXECUTIVE SUMMARY

This Statement of Significance, which focuses on the Cărnic Massif of Roşia Montană, concludes that the Cărnic Massif constitutes part of a wider cultural landscape of high significance, comparable in magnitude to “outstanding universal value” in the UNESCO criteria for World Heritage status¹. The evidence of Roman mining in Cărnic is part of the largest, most extensive and most important underground mine complexes within the Roman Empire. It is, in this important respect, unique.

The underground evidence of mining, galleries, adits and technology gains in significance because it is associated with an historic landscape above ground with evidence of processing, settlements, ritual and communities. Further evidence, from epigraphy, wax tablets and closely dated archaeological deposits, enhances Roşia Montană as one of the world’s outstanding heritage assets.

From the outset the authors had assumed that the Statement of Significance would focus, as has the work of Roşia Montană Gold Corporation, principally on the Roman evidence. However, the site inspection above and below ground quickly made it clear that Roşia Montană represents a landscape of probably unparalleled complexity, of great significance for the history of other periods too. In the Corna and Roşia Montană valleys and on the mountains of Cărnic, Cetatae, Carnichel and Jig-Văidoaia Roman, medieval, 18th- and 19th-century mining, together with the galleries and installations of the communist period have together created a unique palimpsest of exploitation. Moreover, the pre-Roman Dacian and post-Roman phases of activity have not been studied at all. Even at the current level of understanding it represents a resource of unique significance.

This report, produced on the basis of field and literature research in August and September 2010, places Roşia Montană in its international context. We conclude that the cultural landscape of Roşia Montană is of **outstanding international significance**. The Roman mines at Roşia Montană represent the most extensive and most important underground Roman gold mines known anywhere. In combination, the subterranean workings, the surface landscape of ore processing areas, settlements, religious places and cemeteries, and the documented history of the associated communities constitute an extraordinarily detailed record of Roman, medieval, Early Modern and communist-period mining exploitation. With additional potential to illuminate the transition from the pre-Roman and post Roman periods, they constitute a powerful case for regarding the Roşia Montană mines as of equivalent importance to listed World Heritage sites. If assessed against the UNESCO

¹ See Section 2.9

criteria of significance of **outstanding universal value** (only one of which need to be satisfied to make a site eligible for World Heritage status), the Roşia Montană region clearly meets the following four criteria:

(ii) exhibits an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or **technology**, monumental arts, town-planning or landscape design;

(iii) bears a unique or at least **exceptional testimony** to a cultural tradition or **to a civilization** which is living or which has disappeared;

(iv) is an **outstanding example** of a type of building, architectural or **technological ensemble or landscape** which illustrates a significant stage(s) in human history;

(v) is an **outstanding example** of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.

The Cărnic massif in particular contains the most extensive complexes of underground workings in the Roşia Montană region, and these must be preserved as an ensemble, in their entirety.

Our assessment of the significance of the individual elements of the landscape is as follows, but in considering this it is essential to recognise that **the overall significance of this mining landscape as a whole is greater than the sum of its parts. Allowing the archaeological discharge of any one of these sites would do irreparable damage to the integrity of the mining landscape as a whole.**

The authors of this report advocate total preservation *in situ* and further archaeological and historical investigation of this exceptional landscape. We are aware that there is strong pressure to allow the mining development to proceed, but a decision to permit the destruction of elements of this landscape in favour of gold mining is certain to be controversial and to be strongly challenged. In our opinion the Romanian government and the RMGC will be vulnerable to accusations of cultural vandalism if the mining project goes ahead. Despite a substantial budget having been expended, the currently achieved level of mitigation is completely inadequate to be considered as preservation by record. In particular, we draw attention to the many questions that remain about the location of Roman settlements and the full extent of underground workings and the lack of any detailed record of the other

highly significant phases of settlement and mining activity. If mining were to go ahead, we believe a massively increased archaeological budget and expanded archaeological team will be required to document what will be lost. Even then, preservation by record would hardly be an acceptable substitute for the loss of a unique landscape of outstanding world significance.

Highly Significant (= of Outstanding International Significance)²

The Roman mining landscape³

Unusual for the Roman empire, and unique for the province of Dacia (modern Romania), is the combination of evidence for underground mining exploitation, above-ground processing and related surface habitation, cemeteries, sanctuaries and other remains, which together constitute an ancient mining landscape. Its coherence means it can be understood in a manner rare elsewhere. The importance of this landscape is increased by the comparatively tight dating of the ancient Roman mining works, and particularly by the discoveries of numerous wooden artefacts and mining implements within the galleries. Especially significant are over 30 wooden writing tablets which open a remarkable window on the world of the *Alburnus Maior* mining community, recording organisational features of the mining operations, loans, wage labour contracts, the sale of slaves, details of ethnic groupings of miners and the dissolution of a burial club or *collegium*.

There is also an extremely large dossier (in comparison with other Roman mining communities) of stone inscriptions, including many new examples found *in situ* during recent excavations. These provide exceptional information on the religious preferences, ethnic composition and status of the mining community at Roşia Montană. Together with the settlement and cemetery data, they help create an extraordinarily rich picture of the life of a mining community in Roman Dacia, whilst the historic landscape retains the potential to reveal pre- and post Roman activity.

Numerous underground elements of the Roman mine galleries are either unique or of exceptional international importance. The trapezoidal cross-section of the Roman galleries is strongly associated with Roman mines in Romania, and may have been introduced from the neighbouring provinces of Upper Moesia (Serbia/Kosovo) or Dalmatia (Bosnia/Croatia). The shape is probably related to ease of movement and particularly transport of ore through the galleries, while maintaining a stable geological profile. The discovery of a wooden water-lifting machine in 1855 in the Roman networks opening off the Cătălina Monuleşti gallery was of great importance,

² See Criteria in Section 1.9

but like so many such discoveries in Early Modern mining works was not properly recorded. The discovery of four further water-lifting wheel installations in the Păru Carpeni galleries in 2004-2005, and another in Cătălina Monuleşti, represents a thoroughly unique opportunity to record such technology under modern excavation conditions.

The ancient mining zone of Roşia Montană was structured around the exploitation of four main massifs – Cetate, Cărnic, Jig-Văidoaia, and Orlea, in both opencast and underground workings, with underground workings also in the areas of Hăbad, Carpeni, Cărnicele and Coş-Lety. Most of these areas have known associated surface sites – settlements, ore-processing areas, religious buildings, and cemeteries – and their existence can be assumed for those that do not. The combination of underground workings, above-ground opencast workings, ore-processing, settlements, sacred sites and cemeteries adds up to a mining landscape of unique significance whose integrity should be maintained, as destruction of any part of it would diminish it greatly.

The underground workings and ore-processing sites of the Roman period are all *highly significant*. The Roman galleries, exploitation chambers and drainage works are all of exceptional international interest and importance. They should be preserved *in situ*. The ore processing sites in the Roşia Montană mining landscape are greatly understudied at present, but are of high international importance and are highly vulnerable to destruction in the current development programme. Given the scale of Roman activity around Roşia Montană, there is considerable potential for the processing technologies adopted to have been technologically advanced. One possibility is that the ore processing areas could produce evidence for Roman-era water-powered stamping mills (as in some major Spanish mines).

*Tău Găuri (Roman mausoleum)*⁴

Highly significant. The Tău Găuri monument is a stone circular mausoleum, with a circular drum of ashlar blocks enclosing a low tumulus over two phases of primary cremation burials. The mausoleum is a rare example of a circular stone mausoleum known from Romania. It is certainly worthy of preservation, and further research in the vicinity might establish more clearly the funerary context and whether there were additional burials here.

³ See Section 4.-4.22

⁴ See Section 3.8

Hăbad (Roman settlement and religious buildings)⁵

Highly significant. The Hăbad settlement comprises the vestigial remains of buildings, which are important to record, but may not merit conservation and presentation. However, the sacred areas of the Hăbad Brădoaia are a different matter, as the buildings there are associated with inscribed altars, which provide important information on the mining community and its religious beliefs, as well as ancient toponyms and information on *collegia* (guild) organisations. Comparison with the Nanului valley sites suggests that further religious structures and altars may exist in close proximity. It is not certain that the excavations carried out at the Hăbad sites have fully explored them and the connection between sacred areas and habitations at these sites are still unclear.

Nanului Valley (Roman religious site)⁶

Highly significant. The religious structures of the Nanului valley have very high cultural significance, both in Romanian and wider European contexts. These are fairly extraordinary and unusual Roman 'temple' complexes, with a plethora of gods represented on the numerous altars erected here. In Roman archaeology the sites are very unusual in character. Full publication of these sites will be of high interest and it is possible that further structures and inscriptions remain to be discovered in the area.

Carpeni (Roman underground workings, and surface buildings)⁷

Highly significant. The Carpeni hill has rightly been identified as of extremely high significance within the overall Roşia Montană complex. The water wheels are a unique and exceptional discovery, while the buildings with hypocausts on the top of Carpeni are to date the most prestigious architectural complexes of Roman date recorded, even if their interpretation is not yet certain. There is a need for further investigation of the surface and subsurface archaeology.

Cărnic (Roman underground workings)⁸

Highly significant. This is the most extensive and most significant Roman mining system mapped anywhere in the empire. In addition to complexity and extent of the underground mining works here, the Roman galleries in the Cărnic massif contain at least three major types of working that are unparalleled elsewhere, even within Roşia Montană: pillar-supported working chambers; spiral staircase galleries, and vertical working spaces ('dépilages') whose roofs are cut in reverse stairs. A fourth type, extensive stepped descending communication galleries, is paralleled in other

⁵ See Section 3.11

⁶ See Section 3.15

⁷ See Section 3.7- 3.20

⁸ See Section 3.21-3.23

areas of Roşia Montană (Tarina) and elsewhere (Kosmaj, Serbia), but the instances in Carnic are longer and exceptionally well preserved. The Roman Cărnic workings are of exceptional international significance and should be preserved *in situ* in their entirety.

The subterranean archaeological research from 2000-2006 is presented in the reports as 'an almost complete topographical survey of the underground works in this southern area of the massif, totalling about 16 km of works, 4 km of which are Roman (12 km of modern works opened by explosives and dating from the 17th to the beginning of the 20th centuries).⁹ These results are certainly impressive, but the northern part of the massif does not seem to have been subjected to the same intensity of exploration. It is noticeable that the main cluster of known ancient works explored in the Cărnic massif are concentrated in the central and southern parts of the massif, with a surprising absence of ancient remains known in the North. While the ore bodies may be richer in the central and southern part of the hill, it is significant that the Roman galleries of the 'St. Ladislau' Mine, in which several wax tablets were found in 1820, have not been relocated in the recent investigations. Although the recent work has mapped all the Roman workings which are accessible through the Early Modern and communist-period galleries, it is very likely that further ancient workings remain to be found in the northern part of the massif. In the area of the best preserved Roman galleries, later mine workings have truncated and obliterated features, necessitating interpolation and interpretation. There is no doubt that it is possible that in the future new knowledge of Roman and later mining technology might suggest alternative interpretations and reconstructions. If these uniquely important features are destroyed, such revision will be impossible. Although no new writing tablets have been found in recent work, past discoveries in the Cărnic massif mean that there must be a presumption that such material still exists in parts of the ancient galleries – perhaps particularly in areas not currently accessible from later galleries.

*Corna area*¹⁰

Highly significant. There must be a major missing settlement site to the S of the Cărnic massif (the equivalent of Early Modern Corna). This is a major gap in the archaeological record, as is the evidence of Roman and Early Modern ore processing in the Corna valley. The trial trenching carried out here was on too small a scale to have adequately explored the archaeological potential.

⁹ CHBR p. 89.

¹⁰ See Section 3.26-3.27

Coş-Lety (Roman underground workings)¹¹

Highly significant. Roman wax tablets are known from the Coş-Lety area and it is important that further efforts are made to record the Roman workings there. The cultural significance of a potential source of written documents of Roman date cannot be over-emphasised. It is important that this area is included in the protected zone of the proposed mine development. Many questions remain. No ancient settlement has yet been found associated with these galleries, but the settlement for the mines in Cos-Lety, Jig-Văidoaia and N side of the Cărnic massif is probably located beneath the historic centre of Roşia Montană and may extend down the valley towards Ţarina. It is here that the major settlement of the region (probably the one called Alburnus Maior) is to be expected.

Jig-Văidoaia (Roman cemeteries and ore-processing site)¹²

Highly significant. Neither cemeteries nor ore processing evidence are yet published. This is one of only two ore processing zones yet located at Roşia Montană, though there must have been others. It is possible that settlement traces will also exist close to the mines. Further work is needed on the surface and subsurface archaeology in the area threatened by mine development. If sealed ancient galleries are located, writing tablets and wooden features may be preserved.

Ţarina (Roman cemetery, ore processing areas, probable settlement)¹³

Highly significant. The Ţarina area is very significant. However, attention has focused on the cemetery area and more attention needs to be directed towards locating the associated settlement and investigation of the ore processing areas of Roman and later date.

Orlea (Roman underground workings)¹⁴

Highly significant. In the Orlea sector part of a Roman gallery was made visitable in the 1970s, and slightly higher is a small Roman working, intersected by a modern gallery at the Racoşi level. In the Roman galleries here a wooden notched ladder was found, and radiocarbon dated to the 2nd century AD.¹⁵ The underground evidence at Orlea is very significant. The preservation of wooden elements illustrates the potential for the future discovery of writing tablets, hydraulic features and other technological artefacts. No Roman settlement or ore-processing area has yet been discovered on the surface here, but must have existed, given the density of ancient

¹¹ See Section 3.30-3.31

¹² See Section 3.32 – 3.33

¹³ See Section 3.35 – 3.36

¹⁴ See Section 3.34 – 3.40

¹⁵ CHBR p. 94.

mining. Further work is needed to identify them.¹⁶ Early Modern activity here may also be very significant, but has not been researched in any detail.

Early Modern period mining landscape and workings (17th-19th centuries)¹⁷

The underground workings of the 17th-19th centuries are *highly significant*. This is one of the largest mining complexes of the Austro-Hungarian empire and evidently retains many unusual technological features (such as wooden trackways) that illustrate the mining techniques of the time. A crucial aspect of the period was the use of explosives in opening galleries, allowing a deeper and more extensive penetration of the massifs than ever before. Detailed recording of the mining features of this period could illuminate the organisation and sequence of development of the Austro-Hungarian imperial mining enterprise. The early modern mining landscape merits much more detailed investigation. In the Cărnic massif only one of the Early Modern galleries has been excavated, and in only two sectors have they been planned; many of the Early Modern galleries must remain unplanned, and largely unrecorded. This is a significant and major omission in the archaeological research programme. It is clear that, on these grounds alone, granting the archaeological discharge would be problematic. It would involve the destruction of a major piece of industrial archaeological heritage without proper record, bringing into question the application of the 'preservation by record' strategy.

Similarly, the ore-processing sites of the early modern period are also *highly significant*. The industrial archaeology of the stamping sites is of considerable interest, but at present not recorded in detail in the Roşia Montană area.

Overall, the early modern mining landscape is *highly significant*. Roşia Montană and its landscape can illustrate in great detail the Early Modern mining heritage of Romania. This is not achieved by present overviews and the data gathered. Until more detailed work is done, it is difficult to ascribe precise significance to many of the component sites, but clearly Roşia Montană, Corna and the other hamlets assimilated into the two main centres all are highly significant. So too are the cemetery areas, where inscriptions and monument types should be systematically recorded to trace chronological phasing and community composition. The ore processing features are also under-explored, specifically the artificial ponds (tăul) and canals that provided the water to drive the stamping mills. At the peak of production, there were hundreds of stamping mills in the Roşia Montană landscape and an appropriate sample of these sites should be excavated, in order to record

¹⁶ CHBR p. 94-5.

¹⁷ See Section 3.45-3.49

more fully the characteristic features of these water-powered crushers and associated processes of grinding, beneficiation, washing and melting of the gold ore. The extraction and processing of other minerals from the ores, notably silver, also needs to be investigated archaeologically to improve knowledge and understanding of the technologies involved.

***The 20th-century mining landscape*¹⁸**

Highly significant, if socio-politically underappreciated in Romania at present.¹⁹ The industrial archaeology of the communist era mines has not been undertaken on any scale, and the component parts are disappearing fast as buildings fall into disrepair, machinery is broken up and the mine workings are under threat of obliteration in the proposed development. Yet this period was also part of Romania's mining history and the Communist era represents a third significant phase of large-scale exploitation at Roşia Montană whose techniques are worthy of detailed study. In the future, historical interest will focus on this period and it is important that documentary sources are supported by archaeological record.

A more ambitious programme of collecting data on the mines and mining paraphernalia of the modern period should be embarked on, drawing on the experience of, for instance, the Bochum mining museum in Germany which accords equal significance in its displays to every period of activity.

Significant (= Of National Significance)

Roman cemeteries, opencast and some underground workings

The opencast workings of the Roman period are *significant*, and would be of high significance if more of the Cetate works survived intact. Several cemeteries, settlement sites and underground workings of the Roman period are also *significant* in themselves; and they contribute importantly to the high significance of the Roman mining landscape as a whole.

*Cetate (Roman opencast and underground workings)*²⁰

Significant. The overall cultural value of the Cetate area has been substantially reduced by the destructive opencast mining. This makes the remaining galleries and associated archaeological features potentially of high significance and it should be

¹⁸ See Section 3.50 – 3.52

¹⁹ Andreşoiu 2007, 166

²⁰ See Section 3.2 – 3.4

established that all information of potential value has been salvaged prior to further destruction.

Hop-Găuri (Roman cemetery)²¹

Significant. In the Hop-Găuri necropolis 250 cremation graves, and five features of uncertain function (possible burials), were excavated in 2000-2002.²² The grave goods indicate a date range for this cemetery within the 2nd century AD, in the reigns of Hadrian and Antoninus Pius. Many of the burials may be of the Mala Kopašnica-Sase (MKS) type, which would indicate Dardanian colonists, but the published documentation is unclear on this. The Hop cemetery has been well excavated, over an extensive area, though until final publication of the site it is unclear whether significant interpretive questions remain unanswered. As with other cemetery excavations around Roşia Montană, this will be an important type site for assessing the prevalence of Dardanian migrants at the mines. This is a significant site.

Cărnicele (Roman underground workings)²³

Significant. It is important that further efforts are made to record the Roman workings there.

Tăul Cornei (Roman cemetery)

Significant. The Tăul Cornei cemetery has been well excavated, over an extensive area and is now partially published, though interpretive issues remain unclear. As with other cemetery excavations around Roşia Montană, this will be an important type site for assessing the prevalence of Dardanian migrants at the mines.

Pârâul Porcului-Tăul Secuilor (Roman cemetery)²⁴

Significant. At Pârâul Porcului-Tăul Secuilor a Roman necropolis of the 2nd century AD with 287 cremation graves has been identified, of which 277 have been excavated. Inscriptions and fragments of elaborate funerary monuments have come from this cemetery and there may well be further material built into modern walls and boundaries. The nature of associated buildings (settlement or religious structures) remains unclear and might be clarified by further excavation. The identification of the settlement to which the cemetery related is a priority for further research.

²¹ See Section 3.6 - 3.7

²² *Alburnus Maior I*, 185-242; *Alburnus Maior II*, pl. 31.

²³ See Section 3.24 - 3.25

²⁴ See Section 3.39 - 3.40

The Medieval and Renaissance mining landscape

Significant. The rarity of medieval traces in the Roşia Montană area gives any evidence of mining from this period a high national importance, but it is unlikely that the mine works of this period will have European-wide significance. Nonetheless, this is still an element in the story of Roşia Montană and should not be neglected. The technologies employed and scale of workings need to be studied as part of the diachronic story of mine history at Roşia Montană.

Balmoşeşti - Gura Minei (Medieval settlement)²⁵

Significant. The apparent absence of other known medieval settlement in the Roşia Montană area, indicates this is of considerable local importance for understanding activity in the region in the post-Roman period and prior to the re-colonisation of the valley by large-scale mining operations in the Early Modern period.

Some significance (= Regional or Local Significance)

Tăul Țapului (Roman settlement)²⁶

Significant. Prior to the full publication of what was excavated here it is difficult to judge the true significance of this site. Nonetheless, however vestigial the remains of buildings, all the mining settlements of Roman date are likely to contain important clues as to the cultural affiliations of the different communities around the main mine workings.

²⁵ See Section 3.41

²⁶ See Section 3.13 – 3.14

1.0 INTRODUCTION

Background

- 1.1 This report is a Statement of Significance. It is focussed on the remains of Roman and later mining in the Roşia Montană region, with particular emphasis on the Cărnic Massif, situated at the head of the Corna and Roşia Montană Valleys within the Metaliferi Range of the Apuseni Mountains of western Romania.
- 1.2 Romanian Law 5/200 recognises that Roşia Montană possesses areas of cultural value. The law establishes areas of patrimony within which local and regional planning boards are required to establish protected zones. Archaeology, both above and below ground, at the Orlea Massif and the Carpeni hill have been identified as a protected zone as has the mausoleum at Hop-Găuri.
- 1.3 (...)The purpose of the report is to inform (...) in the decision-making with regard to the potential impact of further mining on the Roman mine workings and other mining heritage at Roşia Montană. It has been written by Prof. Andrew Wilson, University of Oxford, and Prof. David Mattingly, University of Leicester, with Michael Dawson of CgMs. Drafted between July 30th and September 30th 2010, it represents an appraisal of evidence from published and other literature, including material related to the environmental impact assessment prepared by Roşia Montană Gold Corporation (RMGC), and observations made during a site inspection in September 2010.²⁷

Statements of Significance

- 1.4 A Statement of Significance is part of an approach to heritage practice commonly referred to as *informed conservation*. It is a mechanism for establishing the level of significance of a heritage asset which provides the basis for future decision making. Statements are used by a multiplicity of agencies including UNESCO, national governments, NGOs and regional authorities, to provide the basis of sound and informed management.
- 1.5 The statement itself is the sum of values assigned to a heritage asset. These derive from attributes or elements of significance accrued by the asset and can be historic, aesthetic, scientific, communal or associational in nature. Such broad areas of

²⁷ See Appendix 1 for itinerary.

significance are necessarily sub-divided further into increasingly specific areas from which a heritage asset derives its value. In some cases, though not all, the magnitude of significance is expressed in national, regional or local terms.

1.6 The statement is part of 'a logical progression from understanding the history and fabric of the heritage asset, into an explicit assessment of the significance, and from there, directly into the formulation of policies for retaining that significance'.²⁸

1.7 The text of this Statement has three parts – a statement of overall significance, individual assessments of significance based on specific attributes, places or elements within the landscape, and a third section on the significance of historic themes. These indicate the contribution that the Roşia Montană landscape makes to understanding wider issues of mining technology, organisation and communities throughout history. Where appropriate, significance is expressed quantitatively in light of comparative analysis and qualitatively in terms of survival and associational value. In this statement the emphasis in assessments of specific attributes is a function of scholarly research (historic value) as the opportunity for further consultations was limited by the project timescale.

1.8 A statement of significance is the sum of values (significance criteria) assigned to a series or list of attributes (elements of significance). Significance criteria used by us include:

- Ability to characterise a period
- Rarity of survival
- Extent of documentation
- Association with other monuments
- Fragility/vulnerability
- Diversity – the combination of high quality features
- Potential – to yield further insights
- Representative value – the ability to demonstrate social or cultural developments
- Historical continuity – in buildings and activities
- Formal, visual and aesthetic qualities
- Evidence of social history
- Contemporary community value
- Power to communicate values and significance

²⁸ Clark 1998

- 1.9 An indication of the magnitude of significance is expressed according to a hierarchy of values (Grades of Significance):
- Highly Significant – elements of the site which are of outstanding, undisputed national and international significance
 - Significant – of national significance
 - Some significance – of regional/local significance
 - Neutral – does not add or detract from the significance of the site
 - Detracts – Diminishes the significance of the site.
- 1.10 The **Statement of Overall Significance**, in Section 2, summarises our views of the overall degree of significance, with a brief narrative of attributes, their significance and magnitude of significance. In Section 3, **The Significance of Specific Attributes** assesses the significance of the *individual sites* and localised *groups of sites* within the Roşia Montană landscape organised by periods. In Section 4 **The Significance of Historic Processes** presents the evidence thematically: first, looking at the evidence of *mining technology*; second, considering the quality of the evidence for *mining organisation*; third, the evidence for the *mining communities*; and fourthly the *future potential* for the Roşia Montană area to yield significant additional information (and add further to its significance).
- 1.11 The Statement of Significance is contingent upon evidence gathered to date and dependent upon the form and availability of that evidence. This statement is based on a literature search undertaken from currently available published work on Roşia Montană in general and Cărnic in particular. It draws on our knowledge of mining archaeology elsewhere and, in particular, our expertise as Roman archaeologists. It includes empirical observations made by us during a site inspection to Roşia Montană between 8th and 12th September 2010 and evidence supplied by RMGC during the site visit and related to their application to mine in the Cărnic area, summarised in the *Cultural Heritage Baseline Report*.²⁹ Although a wide range of additional data was made available regarding the process of governmental review this aspect plays no part in this statement.
- 1.12 As external experts, we reviewed a great deal of the published and unpublished reports of the Alburnus Maior Project and were in general very impressed by the scale and quality of the archaeological work carried out in the last 10 years.³⁰ The results of

²⁹ CHBR = Stantec 2006; see also Moore 2007; Roşia Montană Project 2006a/b.

³⁰ *Alburnus Maior* I = Damian 2010; *Alburnus Maior* II = Simion *et al.* 2004; *Alburnus Maior* III = Damian *et al.* 2008; see also Cauuet *et al.* 2009a/b.

these surveys and excavations have informed our judgements of the significance of the Cărnic massif and its environs.

- 1.13 The Scope of the Statement, however, is necessarily limited by the evidence which was available. The principal document with which the study began was the *Cultural Heritage Baseline Report (CHBR)*, a summary report based on historic and archaeological research in the area. As the conclusion of that document makes clear³¹ the main focus of the research was the impact of further mining on evidence from the Roman period and existing structures. Many of the date back to the mid 20th century and some much earlier. Of course the impact of further mining on the present day community was an important facet of the report as well as the potential loss of ethnographic data, such as memories of practices stretching back at least to 1919 and perhaps earlier. The *CHBR* was supplemented by extensive and detailed reports on the below ground archaeology of the Roman period. Especially important were the reports by Cauuet *et al.* (2009) of the University of Toulouse Le Mirail and RMGC on the mine galleries of Cărnic and the *Alburnus Maior* volumes by Damian (2010, 2008) and Simion *et al.* (2004), both pre-circulated. However, less research has been carried out on the period when the first Austro-Hungarian mining took place and later when mining was undertaken during the communist era. For the 20th century Rîşcuiţa and Popoiu have provided an insight into the contemporary and interwar period and both studies were pre-circulated to the UK group.
- 1.14 We include appendices related to the work at the end: Appendix 1, the itinerary of the September 2010 visit to Roşia Montană; Appendix 2, considering a measure of significance testing for Roşia Montană *vis à vis* other Roman mining sites in Romania and elsewhere in the empire; Appendix 3, an explanation of criteria used by a variety of national and international heritage bodies in assigning significance to cultural heritage.

Sites Landscapes and Communities

- 1.15 Traditionally, heritage management has been focussed on the notion of the 'site', with significance being ascribed according to the architectural, artistic or historical characteristics of each case. The unique character of a site, whether in terms of intrinsic components or to absolute rarity, leads us to ascribe value. Thus, for example Stonehenge, one of many stone circles in the UK, is valued above many others because of its greater scale and complexity and for certain unique features such as the horizontal lintels. One of the limitations of this approach is that it does not address the

possibility that the value of a group of sites may be significantly greater than the sum of the individual site components. It has been increasingly recognised that for some locations, judging the cultural importance of past activity needs to take account of larger areas and longer time spans. The Salisbury Plain area around Stonehenge is a case in point, as it contains numerous burial monuments, ritual complexes (including other henges) and settlement sites that were contemporary with Stonehenge. The detailed information on this wider landscape informs and transforms our understanding of the central monument. Despite the fact that this area has been extensively researched over many years, it is still revealing surprising discoveries, such as a recently reported additional stone henge monument.³²

- 1.16 'Cultural landscapes' and 'landscapes as cultural heritage' have emerged in recent years as key concepts in European discussions about patrimony.³³ The process is well illustrated by the European Landscape Convention of 2000 (ratified by Romania in 2001), which explicitly lays the framework for greater protection and emphasis on sustainable development of historic landscapes.³⁴ It is important to consider here the purpose of the European Landscape Convention:

*'Landscape is a key factor in individual and social well-being and in people's quality of life. It contributes to human development and serves to strengthen the European identity. It plays an important public interest role in the cultural, ecological, environmental and social fields and is a valuable resource conducive to economic activity, notably tourism. ... Developments in agriculture, forestry, industrial and mineral production techniques ... have in many cases led to the destruction of landscapes ... public authorities have a duty to define the general framework for ensuring this quality. The Convention establishes the general legal principles, which should serve as a basis for adopting national landscape policies.'*³⁵

- 1.17 Since the European Landscape Convention post-dates the initial discussions with RMGC about the future of the landscape around Roşia Montană, it may prove a useful additional measure in the continuing debate about the relative merits of preservation *in situ* as opposed to preservation by record.

- 1.18 A significant added dimension of cultural landscapes is that these encompass not merely natural and man-made elements of our environment, but also the social

³¹ CHBR, pp 115-116 Conclusion.

³² Parker Pearson *et al.* 2010, 14-21.

³³ Bartels and Küpeer-Eichas 2008; Bartels *et al.* 2008; Clark *et al.* 2003; Fairclough and Rippon 2002; Orejas *et al.* 2009; Ruiz del Árbol and Orejas 2005.

³⁴ Council of Europe 2000; see also Fairclough and Rippon 2002, 1-37 for detailed discussion of archaeological implications of the European Landscape Convention.

processes by which communities are formed and sustained. The concept of 'landscape biography' has been advanced in some recent work. This is in itself an important development that foregrounds the landscape, rather than the site, as the object of study, but which also makes explicit the link between *communities* and the *landscapes* they inhabit and exploit. It also serves to emphasise that landscapes are dynamic, not static entities, with profoundly different relationships to human actors at different stages of development.³⁶

- 1.19 Mining landscapes in particular have been the focus of considerable debate.³⁷ However, although many ancient mining locations have been identified across Europe, relatively few have been subjected to profound investigation and the more detailed case studies have a particular importance for our knowledge and understanding of ancient mining technology. The Alburnus Maior project is thus one of a small number of landmark studies of mining landscapes. For example, the Las Medulas project in NW Spain has revealed in extraordinary detail the complete landscape of the largest Roman opencast gold mine in Spain, complete with aqueducts, hydraulic works, settlement sites, processing areas and waste dumps, cemeteries and communications infrastructure spread across an area in excess of 40 sq km.³⁸ As a result of the archaeological initiative, this uniquely important site for understanding Roman hydraulic mining has been inscribed on the World Heritage List and become a tourist attraction in the region. Another detailed investigation, relating to Roman imperial quarrying operations in the eastern desert of Egypt, has similarly revealed an extraordinary picture of a complex and large-scale transformation of the landscape through extractive activity.³⁹ These case studies have a particular emphasis on Roman period extraction of minerals and decorative stone. However, many mining and quarrying operations were much more long-term undertakings and there are a number of good models for diachronic studies of mining landscapes. For example, the Wadi Faynan Landscape Survey in Jordan attempted a reconstruction of successive phases of copper exploitation from the Chalcolithic, Bronze Age, Iron Age, Roman, Byzantine and Islamic eras. It revealed not only the story of successive redrawing of the regional settlement map, but also the incremental impact of metallurgical pollution of the environment.⁴⁰

³⁵ Déjeant-Pons 2002, 15.

³⁶ Mattingly 2005, 63.

³⁷ Domergue 1990; 2008; Orejas 1999; 2002; Bartels *et al.* 2008.

³⁸ Sánchez-Palencia 2000; Sánchez-Palencia *et al.* 1996; 2008a/b.

³⁹ Maxfield and Peacock 2001a/b; Peacock and Maxfield 1997; 2007, on the quarry sites of Mons Claudianus and Mons Porphyrites.

⁴⁰ Barker *et al.* 2007; cf. also Hauptmann 2007.

- 1.20 It is against the baseline of these best documented and most important mining landscapes that the significance of Roşia Montană must be assessed.⁴¹ As we shall see, the work of the Alburnus Maior project has produced an important dossier of new data, which reinforces the long-established view that Roşia Montană is a mining landscape of the highest international significance.
- 1.21 The widening scope of research of mining landscapes, beyond the technology of surface or underground workings and of processing and metallurgical techniques, is also reflected in the way that mines have increasingly been presented to an interested public as more than individual industrial monuments. The process is well illustrated by the inscription of a number of mining landscapes in the UNESCO World Heritage list: see for example, Goslar and Harz Mountains, Germany; Røros, Norway; Las Medulas, Spain; Hallstatt/Salzkammersgut, Austria; Sewell mining town, Chile; Zollverein coalmine, Germany; Blaenavon coalmining, UK; Ironbridge Gorge, UK; Cornwall and West Devon Mining Landscapes, UK.⁴² What all these localities now offer visitors is an exploration of the mining or quarrying activity in its broader context of landscape and community, rather than being focused on a single site of historical interest. Roşia Montană and its mining landscapes can match any of the sites mentioned in the UNESCO list for the quality and significance of its archaeological remains and its importance to the industrial story of mankind. It is beyond the scope of this report to discuss in detail the feasibility of developing Roşia Montană as a major tourist attraction in this way. However, it is worth noting that the examples cited above demonstrate that it can be done successfully, that it can produce jobs and economic value in the associated communities and generate a new sense of pride and association with the past landscape for the present population.

⁴¹ See further examples in Appendix 2.

⁴² See whc.unesco.org/en/list, and cf. discussion in Domergue 2008, 49-52.

2.0 STATEMENT OF SIGNIFICANCE

Statement of Overall Significance

Roşia Montană as a Cultural Landscape

- 2.1 Our conclusion, explained in detail below, is that the cultural landscape of Roşia Montană is *highly significant*, which in this case corresponds with *outstanding international significance*. Attention hitherto has tended to focus almost exclusively on the Roman period evidence, which is undoubtedly of particular interest. The Roman mines at Roşia Montană represent the largest (most extensive) and most important underground Roman gold mines known anywhere.
- 2.2 Unusual for the Roman empire, and unique for the province of Dacia (modern Romania), is the combination of evidence for underground mining exploitation, above ground processing and related surface habitation, cemeteries, sanctuaries and other remains, which together constitute an ancient mining landscape. Its coherence means it can be understood in a manner rare elsewhere. The importance of this mining landscape is increased by the comparatively tight dating of the ancient Roman mining works (between AD 106 when the Romans conquered Dacia, and AD 271 when they abandoned it), and particularly by the discoveries of numerous wooden artefacts and mining implements within the galleries, and especially of over 30 wooden writing tablets.⁴³ The absolute rarity in a European context of a large group of legible Roman writing tablets must be stressed here. While written documents are more common in arid areas, such as Egypt, fragile wooden artefacts need exceptional conditions to be preserved in Europe. Whilst isolated examples have been found from time to time in wells or other waterlogged contexts, this group constitutes one of the two largest known assemblages of Roman writing tablets in Europe. The most famous group comes from Northern England, from the Roman fort of Vindolanda, and has served to make that site one of the top tourist attractions in the Hadrian's Wall area. The cultural significance of this material for European patrimony cannot be over-stated. The writing tablets open a remarkable window on the world of the *Alburnus Maior* mining community, recording organisational features of the mining operations, loans, the formation of mining partnerships, wage labour contracts, the sale of slaves, details of ethnic groupings of miners and the dissolution of a burial club or *collegium*. The writing tablets, all dating from between AD 131 and AD 167, also associate the mines with a major historical event, in that they seem to have been hidden in mine galleries which were abandoned during the Marcomannic invasions of AD 167.

⁴³ Noeske 1977; Russo 1975.

- 2.3 There is also an extremely large dossier (in comparison with other Roman mining communities) of stone inscriptions known from the locality, including many new examples found *in situ* during recent excavations. These provide an exceptional level of additional information on the religious preferences, ethnic composition and status of the mining community at Roşia Montană. Together with the settlement and cemetery data, this evidence helps to create an extraordinarily rich picture of the life of a mining community in Roman Dacia.
- 2.4 Numerous underground elements of the Roman mine galleries are either unique or of exceptional international importance. The trapezoidal cross-section of the Roman galleries is a feature strongly associated with Roman mines in Romania, whose significance is not currently properly understood but may have been introduced from the neighbouring provinces of Upper Moesia (Serbia/Kosovo) or Dalmatia (Bosnia/Croatia). The shape is probably related to ease of movement and particularly transport of ore through the galleries, while maintaining a stable geological profile. The discovery of a wooden water-lifting machine in 1855 in the Roman networks opening off the Cătălina Monuleşti gallery was of great importance, but like so many such discoveries in Early Modern mining works was not properly recorded. The discovery of four further water-lifting wheel installations in the Păru Carpeni galleries in 2004-2005, and another in Cătălina Monuleşti, represents a thoroughly unique opportunity to record such technology under modern excavation conditions.
- 2.5 In addition to this, the Roman galleries in the Cărnic massif contain at least three major types of working that are unparalleled elsewhere, even within Roşia Montană: pillar-supported working chambers; spiral staircase galleries, and vertical working spaces ('dépilages') whose roofs are cut in reverse stairs. A fourth type, extensive stepped descending communication galleries, is paralleled in other areas of Roşia Montană (Ţarina) and elsewhere (Kosmaj, Serbia), but the instances in Cărnic are longer and exceptionally well preserved.
- 2.6 Roşia Montană is the type-site for Roman underground gold mining in Dacia, and among the two or three most important mining sites known anywhere in the Roman empire. The trapezoidal cross-section of the galleries is distinctive, and the abandonment of the mines while exploitation was in full swing has preserved many working faces and traces of exploitation that give an exceptional picture of Roman mining organisation, strategies, and practices. The Cărnic massif contains the most extensive complexes of underground workings in the Roşia Montană region, several of

which represent unique types of working, and these must be preserved as an ensemble, in their entirety.

- 2.7 However, the cultural landscape of Roşia Montană is not restricted to the Roman episode of exploitation. Although medieval activity was more restricted, it was clearly present and needs to be researched in fuller detail. The Cărnic and Orlea massifs also contain an extensive network of Early Modern mining galleries dating from the 17th to 19th centuries. These constitute an important monument of Early Modern industrial archaeology in Romania. In some cases they include wooden rails from early mine railways, an extremely rare and important survival. The enhancement and organisation of mine production to serve the mints of the Austro-Hungarian empire merits much greater attention – not least the introduction of novel techniques of exploitation and processing and the in-migration of new groups of people to swell the mining community. The effects of this phase of exploitation are still very evident in the diverse churches of the Roşia Montană/Corna community and in the architectural variation within the settlements. By the late 19th to early 20th century, many private mines were in operation around Roşia Montană and this forms part of the family history of the modern mining community. Again, this merits documenting in greater detail than hitherto achieved.⁴⁴
- 2.8 Finally, the communist era mining has been on a large scale both underground and in opencast workings. The technological achievements of this era of mining merit a fuller record and the recently abandoned physical plant should be recorded and oral histories should be gathered before they are lost.
- 2.9 Together, the subterranean workings, the surface landscape of ore processing areas, settlements, religious places and cemeteries, and the documented history of the associated communities are an extraordinarily detailed record of the activity of Roman, medieval, Early Modern and communist-period mining exploitation. They constitute a powerful case for regarding the Roşia Montană mines as of equivalent importance to listed World Heritage sites. If assessed against the UNESCO criteria of significance of **outstanding universal value** (only one of which need to be satisfied to make a site eligible for World Heritage status), we believe that for Roşia Montană a strong case can be made that it meets the following criteria:

⁴⁴ Popoiu 2010; Pošepny 1868a/b; Rîşcuţa 2007 make important contributions to the historical, ethnographical, socio-economic and cultural record of the Early Modern mining communities, but there is potential to extend the documentation archaeologically and thematically.

(ii) exhibits an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or **technology**, monumental arts, town-planning or landscape design;

(iii) bears a unique or at least **exceptional testimony** to a cultural tradition or **to a civilization** which is living or which has disappeared;

(iv) is an **outstanding example** of a type of building, architectural or **technological ensemble or landscape** which illustrates a significant stage(s) in human history;

(v) is an **outstanding example** of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.

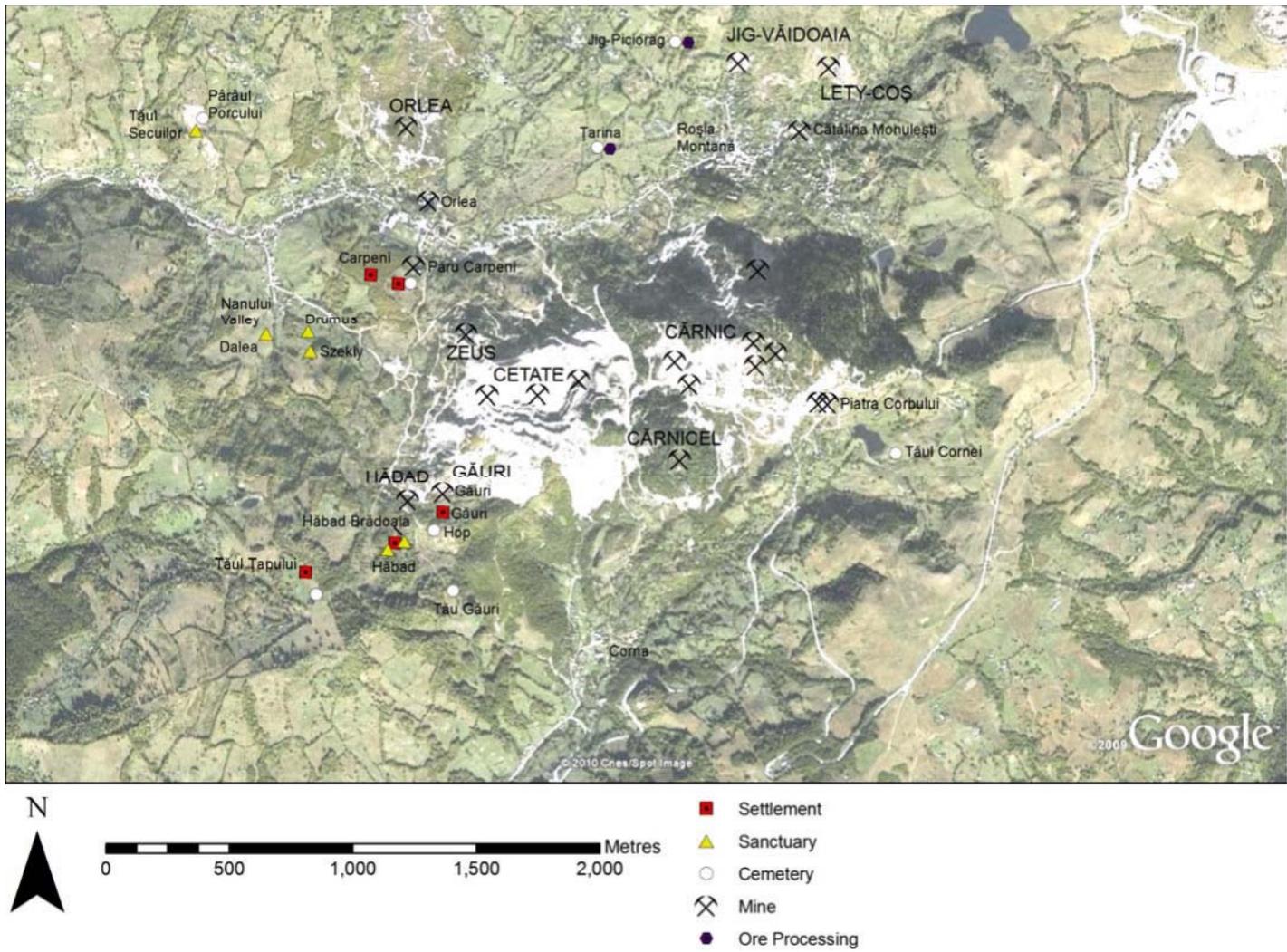


Fig 1 Roman Roşia Montană

3.0 THE SIGNIFICANCE OF SPECIFIC ATTRIBUTES

Historic mining landscapes

Roman cultural landscapes: zones of mining activity, and related surface sites

- 3.1 The ancient mining zone of Roşia Montană was structured around the exploitation of four main massifs – Cetate, Cărnic, Jig-Văidoaia, and Orlea, in both opencast and underground workings, with underground workings also in the areas of Hăbad, Carpeni, Cărnicele and Coş-Lety. Most of these areas have known associated surface sites – settlements, ore-processing areas, religious buildings, and cemeteries, and their existence can be assumed for those that do not. The following description starts with Cetate and related sites to the West, and then continues around in a roughly anticlockwise manner, describing the main underground workings and surface archaeology of the different zones.

Cetate and Hop-Găuri

- 3.2 The Cetate ('fortress') massif is now largely destroyed by communist-era opencast mining but was formerly one of the two major massifs of the area, along with Cărnic. Until the commencement of the large opencast mine in the 1970s, the Cetate massif had four ancient opencast pits ('curtile Romane') on the top, and the sides were riddled with mine galleries of ancient, medieval and Early Modern date. Photographs taken before the recent mining began show the massif as being similar in shape and nearly as large as the Cărnic massif. Nearly all of this has been destroyed by the recent opencast, but ancient workings remain visible in two sectors:
- 3.3 In the Zeus sector, in the NW of the Cetate massif, Roman opencast and underground workings are recorded. Gallery G1 was filled in the 2nd century AD; fill continued to accumulate until the 4th century AD. In the Găuri ('holes') area, in the SW part of the massif, there are ancient fireset workings and ancient and medieval tunnels leading in from the southern edge of the massif.



Fig 2 The Cetate opencast, seen from the Cărnic Massif

- 3.4 Shortly to the S of the Găuri mine galleries, excavations revealed an area of Roman settlement, a cremation necropolis, and so-called 'sacred areas' (votive altars), and a possible roadway (perhaps connecting the Roşia valley with the Corna valley across the col at the W side of Cetate).⁴⁵ These were evidently related to the Găuri mine galleries, and there must also have been primary ore processing sites off the south-western slopes of the Cetate mountain massif, as yet undiscovered.⁴⁶

⁴⁵ *Alburnus Maior I*, 43-76 and 78-81.

⁴⁶ *CHBR*, p. 72.



Fig 3 Entrances to the ancient mine galleries at Găuri

3.5 *Significance statement:* Significant. The overall cultural value of the Cetate area has been substantially reduced by the destructive opencast mining. This makes the remaining galleries and associated archaeological features potentially of high significance and it should be established that all information of potential value has been salvaged prior to further destruction.

3.6 In the Hop-Găuri necropolis 250 cremation graves, and five features of uncertain function (possible burials), were excavated in 2000-2002.⁴⁷ The grave goods indicate a date range for this cemetery within the 2nd century AD, in the reigns of Hadrian and Antoninus Pius. Many of the burials may be of the Mala Kopašnica-Sase (MKS) type, which would indicate Dardanian colonists, but the published documentation is unclear on this. The necropolis occupies ground on the top and the very steep sides of a ridge, suggesting intense local pressure on space.

3.7 *Significance statement:* Significant. The Hop cemetery has been well excavated, over an extensive area, though until final publication of the site it is unclear whether

significant interpretive questions remain unanswered. As with other cemetery excavations around Roşia Montană, this will be an important type site for assessing the prevalence of Dardanian migrants at the mines. This is a significant site.

- 3.8 About 200 m to the S of the Hop-Găuri cemetery and on a prominent spur on the opposite side of a minor valley stood a stone circular mausoleum, the Tău Găuri monument.⁴⁸ The monument comprised a low circular drum of ashlar quality blocks, some with mouldings, enclosing what was probably originally a low tumulus over two phases of primary cremation burials. This now awaits restoration and the construction of a permanent cover building. Apart from two further cremation graves uncovered closely adjacent to it, the monument appears to have been an isolated monument. However, as the immediately surrounding zone was only partially explored, it is possible, even likely, that more burials existed here and this was part of a second cemetery zone in the Hop-Găuri area.

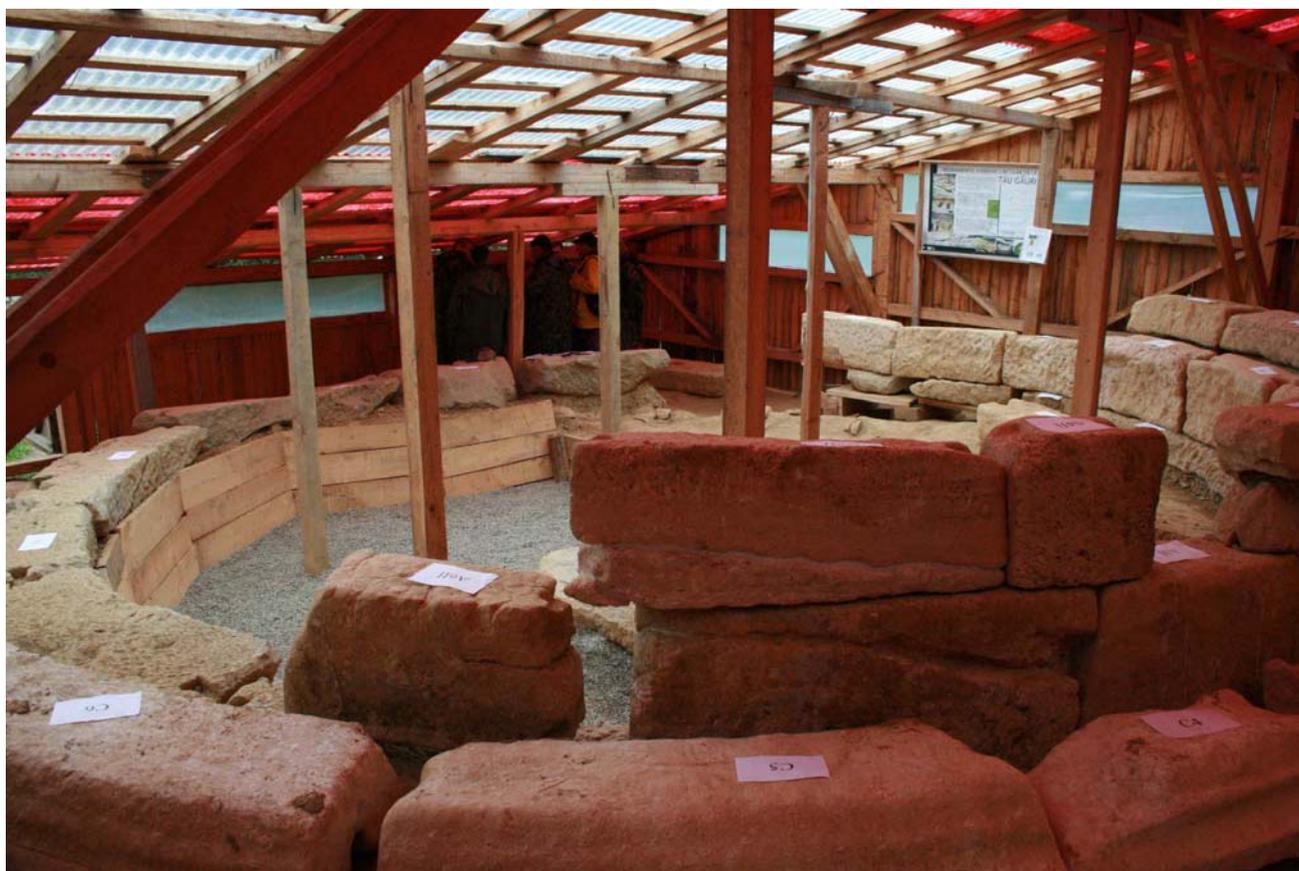


Fig 4 The Roman circular mausoleum at Tău Găuri, in its temporary cover building

- 3.9 *Significance statement:* Highly significant. The mausoleum is a rare example of a circular stone mausoleum known from Romania, one possibly similar monument was

⁴⁷ *Alburnus Maior I*, 185-242; *Alburnus Maior II*, pl. 31.

⁴⁸ *Alburnus Maior II*.

excavated at Ulpia Triana Sarmizegetusa in the 1930s⁴⁹. On the other hand, the monument may simply be a larger scale and more grandiose version of a form of circular burial monument erected over cremation burials that seem typical of Dardanian migrants in Romania.⁵⁰ It is certainly worthy of preservation, and further research in the vicinity might establish more clearly the funerary context and whether there were additional burials here.

- 3.10 To the West of Cetate lie a number of localities with surface evidence for ancient sites, which, together with the presence of artificial waste dumps (of unknown date) suggests that this area was also worked in the Roman period. These include Hăbad, Tăul Țapului, and sites in the Nanului valley.

Hăbad

- 3.11 Parts of a Roman settlement were excavated at Hăbad, revealing buildings with stone wall footings and two altars. A so-called 'sacred area' slightly to the N at Hăbad Brădoaia had previously yielded 27 votive inscriptions and some stone wall footings; but this may have been part of a settlement in which votives were set up.⁵¹ The 2001 excavations at Hăbad Brădoaia produced a further five votive altars and two other epigraphic fragments. Some of the dedications are by the community of the K(astellum) Ansis, which is probably to be identified as the ancient name for Hăbad.⁵² There appears to have been a further sacred structure 100 to the W of the Hăbad plateau on the Vasinca property, where a further five altars have been found. In total then, the Hăbad area has produced c. 40 inscribed votive altars. The settlement must have been related to ancient mining galleries, which are known in the area but not currently visible on the surface. In 1983 the entrance of a gallery was found, and another gallery, the La Studentu gallery, was investigated between 1999 and 2001; cut with tools but of a very different cross-section from Roman workings, it is probably of medieval or Renaissance date, though reworked in the Early Modern period as evidenced by the installation of wooden shoring and an iron railway.

- 3.12 *Significance statement:* Highly Significant. The Hăbad settlement consists of fairly vestigial buildings, which are worthy of record, but probably do not merit conservation and presentation. However, the sacred areas of the Hăbad Brădoaia are a different matter, as the buildings there are associated with inscribed altars, which provide

⁴⁹ Daicoviciu and Floca 1937.

⁵⁰ *Alburnus Maior* II, Plate 46, with legend, illustrates a small and focused concentration of finds of barrow type burials (widely dispersed in Moesia Superior, Moesia Inferior and Thrace to south of the Danube) in the Romanian mining region.

⁵¹ *Alburnus Maior* I, 117-42 (Hăbad) and 143-84 (Hăbad Brădoaia). For altars from the the earlier excavations by Wollmann, see *Alburnus Maior* I, 148-52, 176-84.

important information on the mining community and its religious beliefs, as well as ancient toponyms and information on *collegia* (guild) organisations. Comparison with the Nanului valley sites suggests that further religious structures and altars may exist in close proximity. It is by no means certain that the excavations carried out at the Hăbad sites have fully explored them and the connection between sacred areas and habitations at these sites are still unclear.

Tăul Țapului

- 3.13 Excavations at Tăul Țapului revealed two stone-walled buildings of a Roman settlement, with several Roman tumuli nearby.⁵³
- 3.14 *Significance statement:* Some significance. Prior to the full publication of what was excavated here it is difficult to judge the true significance of this site. Nonetheless, however vestigial the buildings, all the mining settlements of Roman date are likely to contain important clues as to the cultural affiliations of the different villages around the main mine workings.

Nanului Valley

- 3.15 To the West of Cetate, the Nanului Valley feeds into the Roşia valley; excavations here found a series of 'sacred areas' or religious buildings associated with 35 votive altars inscribed in Latin.⁵⁴ The three main religious structures, situated on parallel ridges 100-200 m apart from each other, are known after the modern property owners: *Dalea* (with at least 13 altars to Fortune, Aesculapius, Mercury, Apollo, Silvanus, Nymphs, Liber, Terra Mater [Mother Earth], Iuppiter Optimus Maximus [Jupiter Best and Greatest, abbreviated to IOM]); *Drumus* (altars to IOM, Terra Mater, the *genius* (spirit) of the Sardiates, Janus Geminus, Apollo and reference to a *collegium* or guild of the Sardiates); Szekley (altars to Mercury, Apollo, Neptune). The range of deities attested at these three closely clustered sites is striking and would suggest that this part of the landscape had unusual religious significance for the mining community. The identification of four cremation graves suggests an associated funerary zone.
- 3.16 *Significance statement:* Highly significant. The religious structures of the Nanului valley have very high cultural significance, both in a Romanian and a wider European context. These are fairly extraordinary and unusual Roman 'temple' complexes, with a plethora of gods represented on the numerous altars erected at these locations. In

⁵² *Aburnus Maior* I: 151-52 plausibly seeks a link with a Dalmatian *civitas Ansum*.

⁵³ *Aburnus Maior* I: 81-91.

⁵⁴ *Aburnus Maior* I, 243-368.

Roman archaeological terms, the sites are very unusual in character. Full publication of these sites will be of high interest and there remains the possibility that further structures and inscriptions remain to be discovered in the area.

Carpeni

- 3.17 The Carpeni hill lies to the Northwest of Cetate and North of the Nanului Valley, overlooking the Roşia Valley. Within the hill a network of mining galleries (Păru Carpeni) has been explored, and two drainage wheel systems were found in 2004. One included a series of at least four wheel rooms, some with wooden shoring still in place. Dendrochronology from one of the rooms gives a date of c. AD 155 – this would be entirely consistent with these galleries being abandoned in the Marcomannic Wars.
- 3.18 On top of the Carpeni Hill were two structures with hypocaust and tiles with the stamp of *Leg. XIII Gemina* (the 13th Legion).⁵⁵ The hypocaust tiles and flue tiles seem to have been for heating, rather than identifying these buildings as baths complexes. They seem to have been prestige buildings within a larger settlement area, and the tiles with the stamp of the 13th Legion, stationed at Apulum, suggests military involvement in the construction. As a number of soldiers serving as *beneficarii consularis* are known from Roşia Montană, this may well have been their base.
- 3.19 On the NW part of the Carpeni Hill there was also a funerary zone where 8 cremation graves have been excavated out of what was presumably a larger area of graves.
- 3.20 *Significance statement:* Highly significant. The Carpeni hill has rightly been identified as of extremely high significance within the overall Roşia Montană complex. The water wheels are a unique and exceptional discovery, while the buildings with hypocausts on the top of Carpeni are to date the most prestigious architectural complexes of Roman date recorded, even if their interpretation is not yet certain. There is a need for further investigation of the surface and subsurface archaeology.

Cărnic

- 3.21 'The Cărnic massif is one of the two largest mining sectors in Roşia Montană, and the most important from a patrimonial point of view since the neighbouring massif of Cetate was significantly impacted by open cast mining.'⁵⁶ Cărnic is topographically and geologically the heart of the mining system at all periods; it has the largest and most

⁵⁵ CHBR, p. 73; *Alburnus Maior* I, 369-450.

⁵⁶ CHBR, p. 89.

important area of underground mining, both in the extent of its Roman, Early Modern and recent galleries, and in the deposits of gold exploited in antiquity. There are 4.5 km or more of Roman galleries including at least three types of Roman working which are unique to this massif. Wax tablets were found in the 19th century in at least two galleries: several tablets were discovered in 1820 in the 'St. Ladislau' Mine, driven into the massif from the N and 11 tablets in 1850 in the 'Ohaba – Sf. Simion' gallery, driven into the Cărnic massif on the S side, W of the Tăul Cornei. The findspot of several other tablets found in the Cărnic massif also in 1850 does not seem to have been closely reported. While the finds of writing tablets all dated before AD 167 suggest that these galleries were abandoned in the Marcomannic Wars and not re-used, other networks in the heart of the massif have produced some definite evidence for 3rd-century activity; in the present state of our knowledge the Cărnic massif contains possibly the only networks with certain 3rd-century AD workings, i.e. re-occupation/re-working after the presumed abandonment in the Marcomannic Wars. In several of the networks (1, 2, 3 and 10) Roman working had stopped prematurely before the ore bodies were exhausted, suggesting that the galleries were abandoned suddenly for other reasons – presumably, either the Marcomannic invasions or the Roman withdrawal from Dacia in the AD 270s under Aurelian.



Fig 5 The Cărnic massif seen from Roşia Montană

3.22 The following main networks of galleries were recorded by the French/Romanian team directed by Cauuet between 2000 and 2006:⁵⁷

- Cărnic 1 network – exploration galleries, with trapezoidal cross-section; exploitation galleries with superimposed drifts, the upper trapezoidal; a vertical working chamber whose ceiling is stepped in reverse, and an exploitation chamber with the roof supported on pillars of undug rock. Small sumps were dug in the floor of this chamber to collect water and use it for mineral testing of samples from working faces. In this chamber were found wooden utensils including an ore shovel, and a scoop for testing the concentration of crushed ore. The creation of this complex is dated to between AD 106 and the mid Antonine period by Loeschcke Type X lamps, but one 3rd-century AD radiocarbon date from the pillared working chamber indicates some later Roman activity.
- Cărnic 2 – later than Cărnic 3, opened after it. Fragments of 2nd-century lamps were found in the blocking of the entrance, and in the fill at the end of exploration galleries.
- Cărnic 3 – galleries dated by 2nd-century lamps.
- Cărnic 6 – galleries with wood yielding radiocarbon dates of 2nd/3rd and 3rd/5th centuries AD suggest that activity here was probably 3rd-century.
- Cărnic 7 – trapezoidal galleries and chambers worked by fire-setting, dated to the Roman period by 2nd- to 4th-century radiocarbon dates from fire-setting.
- Cărnic 9 lower – dated to the 2nd century AD by Loeschcke X lamps.
- Cărnic 10 upper/intermediate – dated to 2nd century by Loeschcke X lamps.
- Cărnic 13 – underground galleries close to surface and largely choked by muddy inflows. A roll of litharge (lead oxide derived from the cupellation of silver) was found here, which had probably been washed in from the surface, confirming evidence for lead and silver production as well as gold, and suggesting ore-processing near the gallery entrance.
- Cărnic 14 – opencast and some underground workings.

⁵⁷ *CHBR*, pp. 89-92, *Alburnus Maior* I, 466-71; Cauuet 2008; Cauuet *et al.* 2009a, 113-84 ; Cauuet *et al.* 2009 b/c..

3.23 *Significance statement:* Highly significant. This is the most extensive and most significant Roman underground mining system mapped anywhere in the empire. The work of the French/Romanian team has been outstanding, and sets a new standard for underground mining archaeology elsewhere. The subterranean archaeological research conducted between 2000 and 2006 is presented in the reports as 'an almost complete topographical survey of the underground works in this southern area of the massif, totalling about 16 km of works, 4 km of which are Roman (12 km of modern works opened by explosives and dating from the 17th to the beginning of the 20th centuries).'⁵⁸ These results are certainly impressive, but the northern part of the massif does not seem to have been subjected to the same intensity of exploration. It is noticeable that the main cluster of known ancient works which were explored in the Cărnic massif is concentrated in the centre and the southern part of the massif, with a surprising absence of ancient remains known in the north. While the ore bodies may be richer in the central and southern part of the hill, it is surely significant that the Roman galleries of the 'St. Ladislau' Mine, in which several wax tablets were found in 1820, have not been relocated in the recent investigations. Although the recent work has mapped all the Roman workings which are accessible through the Early Modern and communist-period galleries, it is very likely that further ancient workings remain to be found in the northern part of the massif. It is also the case that in the area of the best preserved Roman galleries, later mine workings have truncated and obliterated features, necessitating interpolation and interpretation. There is no doubt that Cauuet and her colleagues have done an excellent job in making sense of the complex maze of tunnels that result, but it is possible that in the future new knowledge of Roman and later mining technology might suggest alternative interpretations and reconstructions of key features. If these uniquely important features are destroyed, such revisiting of interpretation will be impossible. Although no new writing tablets have been found in the recent work, past discoveries in the Cărnic massif mean that there must be a presumption that such material still exists in parts of the ancient galleries – perhaps particularly in areas that are not currently accessible from later galleries.

Cărnicele

3.24 Cărnicele is a small hill on the SW of the main Cărnic massif. Early Modern and recent workings were partly explored in 2000, but parts of the network remained inaccessible because of collapse and flooding. No Roman or medieval workings were found in this exploration, but an access to two small galleries with a characteristically Roman

⁵⁸ CHBR, p. 89.

trapezoidal cross-section was uncovered by chance through bulldozing. These short workings ended in mining faces.⁵⁹

- 3.25 *Significance statement:* Significant. It is important that further efforts are made to record the Roman workings there.

Corna area

- 3.26 No settlements or ore-processing areas are yet known which might be related to the underground workings on Cărnic (South side) and Cărnicei, but the necropolis at Tăul Cornei was probably related to such settlement and processing sites, which are to be sought in the vicinity and along the southern slopes of the Cărnic and Cărnicei massifs.



Fig 6 The modern village of Corna and, in the background from left to right, waste from the Cetate opencast; Cărnicei; and the Cărnic massif. The proposed mining project would raze much of the Cărnic massif to about the level of the top of the Cetate waste spills, and bury the site of Corna village under the tailings facility to the level of the bottom of the spire of the church on the left, and the base of the church on the right.

⁵⁹ CHBR, p. 88.

3.27 *Significance statement:* Highly significant. There must be a major missing settlement site to the south of the Cărnic massif (the equivalent of Early Modern Corna). This is a major lacuna in the archaeological record, as is the evidence of Roman and Early Modern ore processing in the Corna valley. The trial trenching carried out in the Corna valley was on too small a scale to have adequately explored the archaeological potential.



Fig 7 Tăul Cornei, an early modern header pond for ore-crushing machinery, seen from Piatra Corbului. The Roman necropolis lay just beyond the pond.

Tăul Cornei

3.28 Tăul Cornei is an artificial header pond that drove stamp mills in the Corna valley in the late medieval and Early Modern period (water-powered stamp mills are attested in the Corna Valley as early as AD 1579⁶⁰). Adjacent to it on the S side is a Roman necropolis, c. 95% of which has been excavated, yielded 324 cremation burials of the 2nd century AD.⁶¹ Again, these are a mixture of cremation *in situ* and the reburial of remains cremated outside the grave (*ad ustrinam*). This necropolis must surely have

⁶⁰ CHBR, p. 16.

⁶¹ *Alburnus Maior* I, 32; *Alburnus Maior* III.

been related to an undiscovered settlement connected with the exploitation of the southern side of the Cărnic massif.

- 3.29 *Significance statement:* Significant. The Tăul Cornei cemetery has been well excavated, over an extensive area and is now partially published, though interpretive issues remain unclear. As with other cemetery excavations around Roşia Montană, this will be an important type site for assessing the prevalence of Dardanian migrants at the mines.

Coş-Lety

- 3.30 Between the Cărnic and Jig-Văidoaia hills lies the Coş-Lety area, underneath the NE part of the historical zone of Roşia Montană village. Several finds of writing tablets were made in different galleries of the Lety massif in the late 18th century: one tablet in a lateral gallery of the St Joseph mine in 1788; a further two tablets in a mine gallery in 1789, and six tablets and a human skeleton in 1791. This zone is also the location of the 19th-century Cătălina Monuleşti gallery which gave access to ancient workings in which 10 wax tablets were found in 1855, with lamps, pottery, mining tools, and shoring as well as at least one, and possibly two, drainage wheel installations. A Roman drainage wheel installation has recently been discovered in the Cătălina Monuleşti gallery by the French team; this may or may not be a rediscovery of the 1855 find.
- 3.31 *Significance statement:* Highly significant. Since Roman wax tablets are known from the Coş-Lety area, it is important that further efforts are made to record the Roman workings there. Again, the cultural significance of a potential source of written documents of Roman date cannot be over-emphasised. While it is important that this area is included in the protected zone of the proposed mine development, many questions remain about the archaeological development of this area. No ancient settlement has yet been found associated with these galleries, but the settlement for the workings in Cos-Lety, Jig-Văidoaia and N side of the Cărnic massif would most likely have been located underneath the historic centre of Roşia Montană and/or perhaps extending down the valley towards Țarina, and it is here that the major settlement of the region (probably the one called Alburnus Maior) is to be expected.

Jig-Văidoaia

- 3.32 This massif lies on the North side of the valley, overlooking the NW part of Roşia Montană village. The known underground workings here, visible in the rock face, were

excavated by gunpowder with shot-holes, so are not earlier than the 17th century. These do not communicate with any Roman galleries, and no Roman galleries have yet been identified in this area. However, at Jig-Piciorag there is a Roman necropolis (with 34 cremation burials excavated) and a Roman ore-processing site on the slope above it, implying the existence of ancient mine galleries above this whose entrances remain undiscovered.

- 3.33 *Significance statement:* Highly significant. Neither cemeteries nor ore processing evidence are yet published, but there were evidently some inscriptions and funerary monuments here. This is one of only two ore-processing zones yet located at Roşia Montană, though there must have been others. It is possible that settlement traces will also exist close to the mines. Further work needs to be done on the surface and subsurface archaeology in the area that is threatened by the mine development. If sealed ancient galleries are located, there is again a possibility that writing tablets and wooden features will be preserved.



Fig 8 Entrances to modern mine galleries in the Jig-Văidoaia massif.

Orlea-Tarina

- 3.34 The Orlea and Tarina hills lie on the N side of the Roşia valley, and contain a dense network of mineral veins. Much of the hillside is covered with ancient waste dumps, and there are areas of old opencast workings and collapsed mineshafts, pits and ditches,⁶² presumably the water-channels for driving Early Modern stamp mills. Although the whole area has not yet been systematically explored, 1.5 km of Roman galleries and 5 km of Early Modern galleries are known so far.⁶³ The French mining archaeologists consider that up to twice this amount may exist, the openings of ancient works buried under more recent mining waste.⁶⁴ In the Tarina area, a sloping gallery descending presumably from the surface was discovered, with elements of timber shoring still in place, radiocarbon dating of which indicated an early Roman date (up to AD 126).⁶⁵
- 3.35 At Tarina, a necropolis with 495 burials was excavated, a mixture of cremation *in situ* and cremation in which the body has been burned outside the grave and the cremated remains placed in the grave. The latter form is more dominant in this cemetery. Some inscribed tombstones and elaborate monuments are known from the cemetery.⁶⁶ To the South and East of the necropolis excavation uncovered a possible primary gold ore-processing area, with stone grinding mortars, grinding tables, and a canal system – it is unclear whether the latter was for driving Roman stamp mills, or for the hydraulic sorting of crushed ore.
- 3.36 *Significance statement:* High significance. The Tarina area overall appears very significant archaeologically, though so far most attention has focused on the cemetery area. More attention needs to be directed to locating the associated settlement and investigating the ore processing areas of Roman and later date.
- 3.37 In the Orlea sector a stretch of Roman gallery was made visitable in the 1970s and incorporated in the first mining museum of 1981; it runs for 45 m with a trapezoidal cross-section, 1.8 m high and 1.4 m wide at the top, 1.8 m at the base; it then turns N for some 60 m, with more variable cross-sections. Slightly higher is a small Roman

⁶² CHBR, p. 93.

⁶³ Of an estimated 10 km of old workings, 6.5 km have been surveyed, CHBR, p. 94.

⁶⁴ CHBR, pp. 94-95: 'As the modern workings which allow access did not cover the entire area, it is possible that there may be twice as many ancient workings under this slope, particularly in the surface layer, and that an extensive clearance of the surface could reveal many entrances to operations or explorations ... it seems possible that some sloping galleries could be reopened and excavated from the surface. It is also likely that workshops for handling the ore were installed on the surface, next to these access points.'

⁶⁵ 1965 +/- 40 BP; calibrated using OxCal and the 2009 atmospheric curve = 46 BC to AD 126 at 95.4% probability. The date range given in CHBR, p. 94 uses an old and less correct calibration curve.

⁶⁶ *Alburnus Maior I*, 38-39.

working, intersected by a modern gallery at the Racoşi level. In the Roman galleries discovered here a wooden notched ladder was found, and radiocarbon dated to the 2nd century AD.⁶⁷

- 3.38 *Significance statement:* Highly significant. The underground evidence at Orlea is very significant and the preservation of wooden elements illustrates the potential for the future discovery of writing tablets, hydraulic features and so on. On the surface, no Roman settlement or ore processing area has yet been discovered in the Orlea sector, but can be presumed to have existed, given the density of ancient mining there, and further work is needed to identify them.⁶⁸ The Early Modern activity here may well also be very significant, but does not appear to have been researched in any detail.
- 3.39 To the West of Orlea lies a Roman necropolis at Pârâul Porcului-Tăul Secuilor; with 287 cremation graves identified, of which 277 have been excavated, a mixture of cremation *in situ* and *ad ustrinam* (on a pyre outside the grave); over half were covered by a mound of earth ringed at the base with a single row of stones. Grave goods date the cemetery to the 2nd century AD.⁶⁹
- 3.40 *Significance statement:* Significant. Inscriptions and fragments of elaborate funerary monuments have come from this cemetery and although extensively excavated, there may well be further material built into modern walls and boundaries. The nature of associated buildings (settlement or religious structures) remains unclear and might be clarified by further excavation. The identification of the settlement to which the cemetery related is a priority for further research.

The Medieval and Renaissance mining landscape

Balmoşeşti - Gura Minei

- 3.41 A substantial settlement delineated by ditch and bank has been located high on the northern slopes of the Roşia valley near Balmoşeşti and Gura Roşiei at a location known as Islaz. Few details are yet published and the *Cultural Heritage Baseline Report* suggests the site was of Roman date, though we were informed during our field visit that it is now thought to be a fortified medieval settlement.⁷⁰

⁶⁷ CHBR, p. 94.

⁶⁸ CHBR, p. 94-5.

⁶⁹ *Alburnus Maior I*, 34-36.

⁷⁰ The site is 'located at about 3 km of Gura Roşiei and at 4 km of the Piaţă site, at the end of the St. Cross site (level +714). The area is located N of the main road connecting the two locations. In the peak area of the northern slope of the Roşia Valley, between the Balmoşeşti hamlet and the Vârtop village, in the site called Islaz. On this occasion a fortress with ditch and *vallum* was identified and dated to (on the basis of the discovered archaeological inventory) the Roman period.' CHBR, p. 257 ; cf. also *Alburnus Maior I*, 36-38.

3.42 *Significance statement:* Significant. Given the absence of other medieval settlement in the Roşia Montană area, this is of considerable local importance for our understanding of activity in the region in the post-Roman period and prior to the re-colonisation of the valley by large-scale mining operations in the Early Modern period.

Mine workings

3.43 The evidence for medieval mining galleries is at present rather slight – as for example at the La Studentu gallery in the Hăbad area. The diagnostic criteria for identifying these galleries are that they are less regularly cut than the Roman galleries using hand tools. It seems likely that a fuller inventory of all the underground mine works in the various massifs would identify further examples.

3.44 *Significance statement:* Significant. The rarity of medieval traces in the Roşia Montană area gives any evidence of mining from this period a high national importance, but it is unlikely that the mine works of this period will have European-wide significance. On present evidence, it appears that exploitation was on a much reduced scale in the medieval era. Nonetheless, this is still an element in the story of Roşia Montană and should not be neglected.

The Early Modern mining landscape⁷¹

3.45 The Early Modern mining landscape is in part well known from historical and topographical researches, notably the survey of Poşepny.⁷² Individual building surveys have recently been carried out of some of the main historic properties in Roşia Montană and nearby villages.⁷³ It is interesting that the CHBR makes a distinction between the recording of the ‘architecture’ of these structures and ‘archaeological investigations’. The result is that we have a very incomplete picture of the Early Modern mining *landscape*, despite the fact that a considerable quantity of data has been recorded on *individual buildings* spread across the landscape. This is a classic example of the phenomenon observed at the start of this report that cultural heritage value is sometimes applied to sites/buildings, rather than to landscapes or communities, with much of the bigger picture being lost.

3.46 The modern toponym of Roşia Montană applies to an extended area of nucleated settlement in the Roşia valley on the N side of the Cetate and Cărnic massifs. It is

⁷¹ The Early Modern Period-late 17th to 19th century

⁷² Poşepny 1868a/b.

⁷³ CHBR, pp. 56-69; Popoiu 2010, 16-37, 82-114, 137-47..

known that contemporary Roşia Montană has assimilated a number of smaller hamlets, which were formerly separate settlements running down the Roşia valley towards Abrud. The *CHBR* survey distinguishes two settlement areas within Roşia Montană: a nucleated core around the main square at the E end of the valley and a ribbon-like settlement running down the line of the stream towards the W and encompassing Țarina, Orlea, Susași and Gura Minei, etc.⁷⁴ Corna village also appears to be the product of a series of three initially separate hamlets on the S side of the Cărnic massif: Corna Centru, Tăul Cornei and Bunta.⁷⁵ What is currently lacking in the documentation is a clear sense of how and when the assimilation of a series of separate mining settlements was achieved. There appear to have been significant differences between the two settlement areas on either side of the Cărnic massif: Roşia Montană was multi-ethnic and incorporated many different groups of people, while Romanians were more predominant at Corna.⁷⁶ There are 10 religious buildings, relating to seven denominations, and 12 cemeteries relating to these communities. Again, it would be interesting to explore the historical contingency of this observation – is this a recent development, or does it reflect profound differences in the mining community throughout the Early Modern and modern periods? There is currently too little chronological precision in the accounts of this period. With the available map sources (especially Pošepny) and documentary records, it ought to be possible to target archaeological investigations equivalent to those conducted on Roman period sites and that could illuminate further the developmental sequence of the surface archaeology of the 17th-early 20th centuries.

3.47 *Significance statement:* Highly significant. Roşia Montană and its landscape can illustrate in great detail the Early Modern mining heritage of Romania. This is not achieved by present overviews and the data gathered. Until more detailed work is carried out, it is difficult to ascribe precise significance to many of the component sites, but it is clear that Roşia Montană, Corna and the other main hamlets assimilated into the two main centres all are highly significant. So too are the cemetery areas, where inscriptions should be systematically recorded and monument types recorded to trace chronological phasing and community composition. A third area that is under-explored concerns the ore processing features – specifically the artificial ponds (tăul) and canals that were constructed to provide the water to drive the stamping mills. At the peak of production, there were hundreds of individual stamping mills in the Roşia Montană landscape and a good sample of these sites should be excavated, in order to record more fully the characteristic features of these water powered crushers and the associated features relating to further grinding, beneficiation, washing and melting of

⁷⁴ *CHBR*, pp. 57.

⁷⁵ *CHBR*, p. 58.

⁷⁶ *CHBR*, pp. 58 and 63-64.

the gold ore. The extraction and processing of other minerals from the ores, notably silver, also needs to be investigated archaeologically to improve knowledge and understanding of the technologies involved.

- 3.48 The underground evidence relating to this period is clearly abundant and is discussed more fully below (see **mining technology** section). A crucial aspect of the period was the use of explosives in opening galleries, allowing a deeper and more extensive penetration of the massifs than ever before.
- 3.49 *Significance statement:* Highly significant. This aspect merits much more detailed investigation than hitherto accorded it.

The 20th-century mining landscape

- 3.50 Much the same comments already made of the Early Modern period apply equally to 20th-century mining landscape, with the added point that the rejection of the communist regime since 1989 has opened the way for the landscape features of this period to be obliterated without record.⁷⁷ In 100 years' time, what are the questions we shall want to ask about the communist period mining works at Roşia Montană? And will the evidence to answer them still exist in documentary archives and in the archaeological record? Industrial archaeology in other parts of the world recognises the significance of the recent past, when mechanisation and new technologies transformed the nature and scale of exploitation. While the *CHBR* seems to envisage the most recent phases of mining as marking an end of the cultural landscape of the region, it has surely been simply the most recent phase of successive phases of exploitation, each of which erases some part of the past culture, but also puts in place new elements of significance.⁷⁸
- 3.51 *Significance statement:* Highly significant, if socio-politically underappreciated in Romania at present. A more ambitious programme of collecting data on and the mining paraphernalia of the modern period should be embarked on, drawing on the experience of, for instance, the Bochum mining museum in Germany – which accords equal significance in its displays to every period of activity. The evidence of underground workings is dealt with in the next section below.

⁷⁷ It is noteworthy that the *CHBR*, p. 18 accords very little attention to the Communist period and emphasises 'reprisals and torture' carried out by the state against former private mine owners suspected of hiding caches of gold ore. There is no overall assessment of the potential heritage significance of the features of modern underground and opencast workings, or the architectural heritage of the 20th-century mining administration complexes, stockyards, machinery and plant.

⁷⁸ *CHBR*, p. 19: 'The disappearance of the traditional mining industry during the 1950's and the extinction of private property in the gold-mining industry, compounded by surface exploitation in the 1970's, also significantly impacted the cultural landscape.'

3.52 Despite the extensive survey, the trial pitting and the full-scale excavation of selected areas of key sites, there remain many features of the overall mining landscape that are not adequately recorded or understood. While a good sample of the most visible archaeology has been recorded, one can question whether this is enough to justify, in such an exceptional heritage landscape, the archaeological discharge of large blocks of the terrain. Given the highly significant status accorded to the complex overall, at the very least it would be reasonable to require a higher level of completeness to allow preservation by record rather than preservation *in situ*.



Fig 9 Ore-crushing technology – the stamp mills of Roşia Montana and their predecessors:
a) Traditional stamp mill at the old Minvest mining museum of Roşia Montana;
b) Woodcut showing a stamp mill, from Georgius Agricola’s *De Re Metallica*, 1556;
c) Roman anvil stone from a stamp mill (Villamonta de la Valduerna, Spain);
d) Anvil stone from a traditional stamp mill, Roşia Montana.

4.0 THE SIGNIFICANCE OF HISTORIC PROCESSES

Mining technology

- 4.1 Roşia Montană provides an exceptional illustration of different mining techniques used throughout the ages, some of which are unique examples for their period. The overall rating for mining technology is: highly significant.

Roman

- 4.2 The Roman workings include opencast workings, 7km of underground workings with many galleries dug using picks or hammer and chisel, with a characteristic trapezoidal cross-section, and others dug using fire-setting techniques. The tool-dug galleries include stepped descending galleries, and, uniquely, a spiral staircase descent, working chambers with the roof supported on pillars of undug rock, and vertical exploitation chambers. Several installations for water-lifting wheels have been found in the Păru Carpeni and Cătălina Monuleşti areas.



Fig 10 Găuri – opencast working with a deep cut where a vein has been followed from the surface.

Opencast workings

4.3 Although most of the Roman opencast workings on Cetate have been destroyed by the modern opencast pit begun in the 1970s, some remains survive that show Roman opencast techniques not commonly documented elsewhere. In the Zeus sector on the NW side of Cetate, narrow open cuts, over 6.5 m deep, show where Roman miners have followed ore veins down from the surface. The walls of these cuts have sockets for bracing timbers to prevent collapse. These narrower workings would formerly have connected with the much wider opencast pits – the four *curtile Romane* that existed

on Cetate prior to the 1970s. In the Găuri sector (on the SW side of Cetate), firesetting techniques have been used to break up the very hard Dacite rock here, working down from the surface on three superimposed levels 14 m long, 1.30 m wide, and 18.4 m deep.

- 4.4 *Significance statement:* Significant. Would be highly significant if more of the Cetate works survived intact.

Underground workings

- 4.5 The Roşia Montană mining zone preserves an extraordinarily rich set of evidence for Roman subterranean mining, with a wide variety of techniques and types of working that reveal important evidence about miners' strategies of exploration and exploitation, and how these are adapted to local conditions within a particular massif or ore body.
- 4.6 **Galleries:** Horizontal and sloping galleries include: adits, essentially entrance passageways driven in from the outside of the hill; drifts, where a vein is followed along its length; exploration galleries; and communications galleries between different parts of an underground network. Most of the Roman galleries at Roşia Montană are dug with a characteristic trapezoidal cross section, so that the gallery widens from 1-1.4 m at the ceiling to 1.8-2.5 m at the floor, with a height usually between 1.5 and 2 m. This shape is optimised for safety, as the sloping walls provide some lateral discharge of vertical thrust from above, and the dimensions are designed for ease of movement, allowing miners circulating in the galleries or transporting ore to walk upright. This is a contrast with prehistoric or medieval mining works, which tend to be lower and narrower, minimising the amount of rock to be excavated but making movement through the mine more difficult. The Romans had evidently realised that it was worth making the galleries bigger in order to facilitate the removal of waste rock and ore from the working face to the surface.
- 4.7 Trapezoidal galleries as found at Roşia Montană are characteristic of other Roman mines in Romania, but are not well known outside Romania. Recent research suggests that they probably exist in Roman mines in Serbia, which may be the region of origin of this technique; if so, the trapezoidal shape of the galleries at Roşia Montană would be a further reflection of the settlement of Dardanian miners there. As there is no firm evidence for pre-Roman underground gold mining in Romania (the Dacian gold seems to have derived from alluvial deposits), the trapezoidal galleries can hardly be a Dacian technique, and their sudden appearance at Roman-period mines in Romania is

best explained by the import of the technique by the mine administration and/or its workforce from elsewhere.



Fig 11 Roman mine gallery with trapezoidal cross-section in the Cărnic massif.

4.8 Although the trapezoidal gallery cross-section is paralleled at other Roman mines in Romania, the galleries at Roşia Montană are particularly well worked and preserved, enabling deductions to be made about working techniques. Examination of the side walls and ceilings of some galleries shows that they were worked by advancing across the whole cross-section of the gallery a few centimetres at a time⁷⁹, either with a pick or more usually with hammer and chisel. Galleries that have been abandoned before being finished also suggest that the working face was left relatively neat; this clean method of working would have aided the miners in distinguishing whether the ore veins continued in the direction they were working, or not.

4.9 In sloping exploration and communication galleries, steps were cut in the floor to make movement along the gallery easier. Most stepped galleries are found in the Cărnic massif, although one is known from Păru Carpeni; stepped galleries are again a characteristically Roman feature not found in prehistoric or medieval mining. The long

curving stepped gallery Cărnic 2 - G32 in the Cărnic massif, 70 m long, with 125 steps descending 30 m, is an especially fine example; this ends suddenly in a blank wall and must still have been in the course of being dug when the mining works here were abandoned, probably in either AD 167 or 271. In areas of very hard rock, fire-setting was used to break up the rock and make it easier to work. This involved lighting fires against the walls and roof of a chamber, causing the rock to fracture with a characteristically rounded gallery or chamber profile. Particularly good examples of working chambers in which this technique was used survive in the Piatra Corbului part of the Cărnic massif.



Fig 12 Roman trapezoidal gallery in Păru Carpeni, with working marks on the walls and roof showing how the gallery was advanced a few centimetres at a time.

4.10 Niches for oil lamps to illuminate the galleries, and perhaps particularly the working face, are found in the walls of the galleries. As with other Roman mines, many of these have an uneven base in which it would be impossible to stand a lamp – but the exceptional preservation at Roşia Montană has provided the answer to the mystery of how they functioned. In the Cărnic massif the Franco-Romanian mining archaeology

⁷⁹ Cauuet 2009b Cărnic 13, Fig 800.

team found lumps of clay pressed onto the base of some lamp niches, and one of these bore the imprint of the base a Roman lamp; clay was thus used to keep the lamps in place.



Fig 13 Roman stepped descending gallery in the Cărnic massif.

4.11 **Exploitation workings:** Where miners encountered veins of ore underground, these might be worked in one of several ways. The simplest, in the case of a vein of limited height and width, would be to follow it with the gallery, as a drift. But if a vein running horizontally extended vertically (or nearly so) above or below normal gallery height, it was worked as a series of superimposed drifts, the upper with a trapezoidal cross-section, and the lower ones laterally offset from it, following the slanting of the vein.

In some cases three or even four superimposed galleries can be traced (e.g. Cărnic 1, G2).



Fig 14 Superimposed Roman galleries in the Orlea massif. (The bracing timbers are modern.)

4.12 Where a vein dipped more sharply the exploitation chamber would need to descend rapidly. Vertical exploitation chambers with ceilings that look like steps in reverse (e.g. Cărnic 3, G50) show that the Roman miners dug these chambers as a series of short horizontal working levels of a more or less standard height, stopping each level when the vein ran out and deepening the floor to create a new level as far as the vein extended horizontally again. Such vertical working chambers with a ceiling of reversed stairs are unique to the Cărnic massif.

- 4.13 The exploitation of wide veins, crossing veins or complicated brecciated structures demanded expanding and widening the working chamber, in some cases (again, unique to Cărnic) creating veritable halls with the roof supported on pillars of undug rock (e.g. Cărnic 1, Ch. 1). Geological analysis of the mineral content of the ore in such pillars reveals the extent to which the Roman miners were concerned about the safety and stability of their underground workings; even where the rock has an extremely high metal content, of e.g. 27.4 g/tonne of gold, 21 g/tonne silver, pillars of rock were left undug to support the roof (Cărnic 1, Ch. 5).⁸⁰
- 4.14 Geological research has identified several cases (e.g. the vertical working chamber Cărnic 1 – D10; the ascending drift Cărnic 2 – G71; Cărnic 3 – D9 and G53; Cărnic 10 – D2) where ancient exploitation of heavily mineralised structures with high gold and silver content has stopped prematurely, and this cannot be attributed to the difficulties of underground working in these locations, but must instead be a result of external circumstances.⁸¹ Based on indications from the wooden writing tablets and the historical context, the obvious inference is that these external circumstances were either the Marcomannic invasions of AD 167 or the Roman withdrawal c. AD 271. If this is so, these areas should provide a snapshot of Roman mining exploitation areas in mid-operation (much as an unfinished sculpture reveals the working methods of the sculptor). Given the other 2nd-century finds in these galleries of the Cărnic network, the Marcomannic wars might be the preferred context for such an abandonment.
- 4.15 This unique snapshot of work in progress has enabled observations and deductions about Roman mining practices that are wholly new and unparalleled from other mining sites. It shows, for example, that the large working chambers were developed by driving radiating galleries off them in a star-shape and then knocking through the walls of the galleries, leaving some pillars of rock to support the roof. In the working faces of some drifts slots have been cut in the rock, apparently to take samples of the ore to test whether it was worth continuing further. This hypothesis is strengthened by the discovery of basins cut in the floor of some of the working chambers, and the find of a wooden panning scoop; it seems that samples of ore were being crushed, panned and concentrated in the basins as a constant check on the mineral content of the gallery faces that were being worked.

⁸⁰ DFS 2009, 70.

⁸¹ DFS 2009: 74, 76-77, 82-4, 99, 105.



Fig 15 Cărnic 10 – Roman working chamber

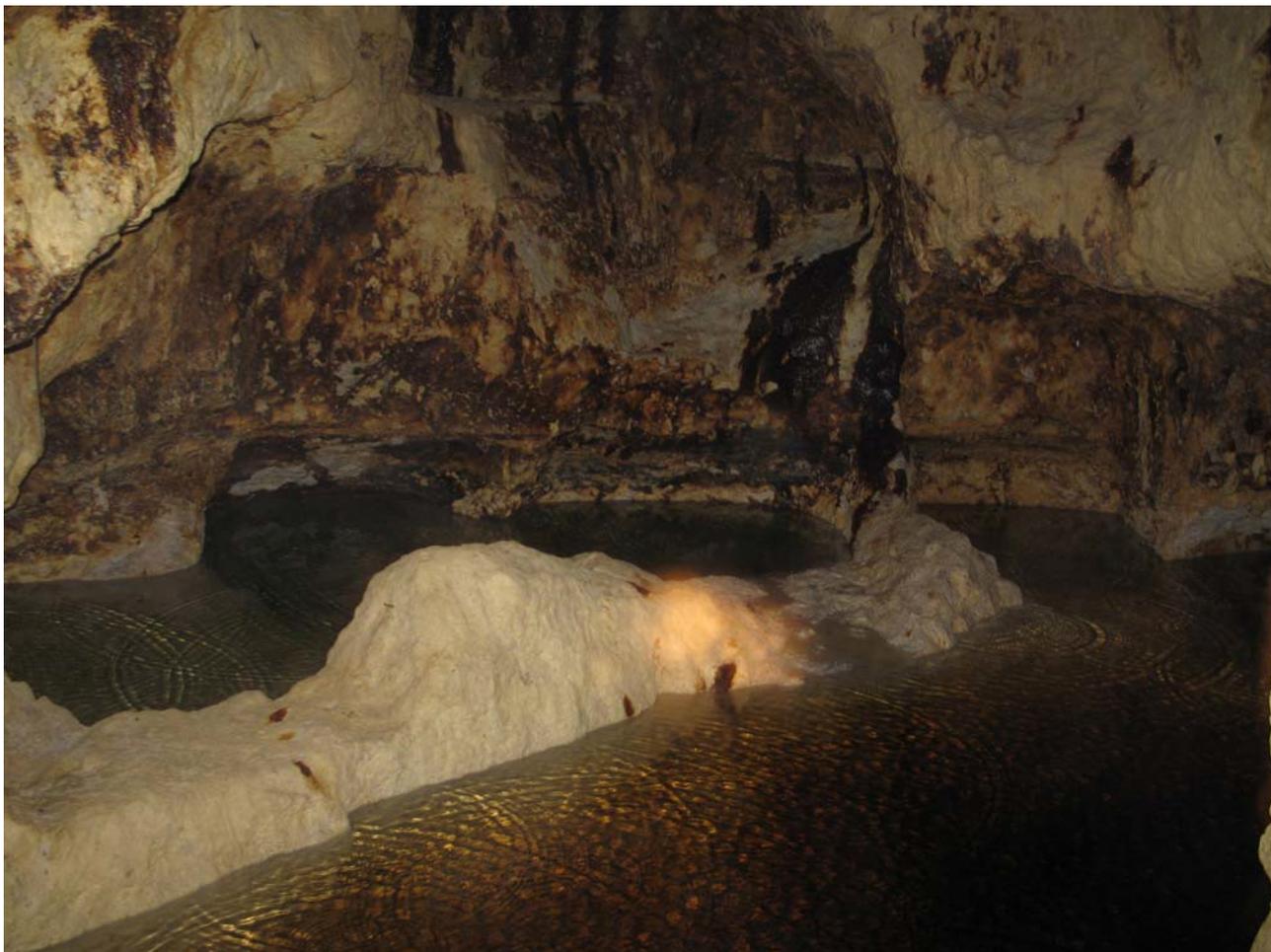


Fig 16 Cărnic – Roman exploitation chamber with basins (now flooded) cut in the floor.

- 4.16 The underground conditions of preservation have allowed the discovery of wooden mining tools and equipment, including a mineral shovel, a scoop for testing the concentration of crushed ore, and several ladders made out of a single tree trunk with notches cut for the steps. Together, all these finds constitute a remarkably detailed picture of working practices and techniques in Roman underground mining.
- 4.17 **Mine drainage:** Dealing with underground water is one of the major problems in mining engineering, and the state of preservation of some of the evidence from Roşia Montană provides unparalleled opportunities to study the Roman technology for tackling these problems. Where galleries within a massif were above the ground surface surrounding the hill, they could in principle be drained to the outside of the hill by means of a drainage gallery. For deeper mining below the water table, water-lifting devices (drainage wheels or Archimedes screws) were required.
- 4.18 Two areas of the Roman mines at Roşia Montană have produced evidence for water-lifting wheels – the Păru Carpeni network and the Cătălina Monuleşti mine. This is of considerable importance because, although water-lifting wheels and wheel-chambers

are known from other Roman mines, this is the first time that they have been discovered under controlled excavation conditions, allowing for the recovery of much more information than in the past. Indeed, many previous discoveries were made, and subsequently destroyed, in modern opencast operations at mines elsewhere, and so the wheel chambers can no longer be examined even if elements of the wheels survive in museums. The wheels, driven by men treading the outside of the rim, had hollow wooden compartments on the rim, which picked up water at the bottom of the cycle and discharged it into a wooden channel in the upper gallery at the top. In Păru Carpeni four, and perhaps five, water-lifting wheel chambers were discovered in series, each lifting water up to a gallery from which another wheel lifted it to the next. One wheel is reported to have been discovered in 1855 in the Cătălina Monuleşti mine; a wheel installation has more recently been discovered there which may be the same one, or a second one.



Fig 17 Păru Carpeni – chamber for a wooden drainage wheel in the Roman mine network. The wooden bearing block for the wheel axle is visible towards the top of the picture, and Roman wooden shoring towards the bottom.

4.19 Water-wheels have not to date been discovered in the Cărnic massif, suggesting that the mine workings there were served by one or more drainage galleries draining water out to the surface at the side of the hill, which are yet to be found. In Cărnic 1 - G23 a drainage channel was cut in the floor of the gallery, originally covered over with wood so that it would not impede movement along the gallery.

4.20 *Significance statement:* Highly significant. The Roman galleries, exploitation chambers and drainage works are all of exceptional international interest and importance.

Ore processing

- 4.21 Once the ore was extracted from the mine, it had to be pounded, crushed and milled to enable sorting by hydraulic concentration. The high-grade material was then smelted to release the metal. Very little is known in detail about how these processes operated at Roşia Montană in the Roman period, Only two ore-processing zones have yet been discovered, at Jig-Văidoaia and Țarina, with evidence of hand-mills for grinding crushed ore, and of metal-working. There is great potential to learn more, particularly about the crushing and smelting of the ore
- 4.22 *Significance statement:* Highly significant. This aspect of the Roşia Montană mining landscape appears to be much understudied at present, but is of high international importance and is highly vulnerable to destruction in the current development programme. Given the scale of Roman activity around Roşia Montană, there is considerable potential for the processing technologies adopted to have been technologically advanced. One possibility is that the ore-processing areas could produce evidence for Roman-era water-powered stamping mills (such as seem to have been identified at some of the major Spanish mining districts⁸²).

Medieval and Renaissance workings

- 4.23 As already noted, underground galleries dated to the medieval and Renaissance periods are surprisingly few, indicating a sharp contrast between the scale of Roman and medieval mining at Roşia Montană. The medieval and Renaissance workings are identified on the basis that they were dug with tools rather than explosives (whose use in mining starts in the 17th century) but have a different profile from the Roman galleries, which they sometimes intersect. An example of such medieval or Renaissance workings is the La Studentu gallery in the Hăbad sector.
- 4.24 *Significance statement:* Significant. The rare evidence of medieval exploitation is important for that very reason. The technologies employed and scale of workings need to be studied as part of the diachronic story of mine history at Roşia Montană. The medieval exploitation at Roşia Montană will clearly not be of European significance, in that more significant mines of that period are known elsewhere.

Early Modern period workings (17th-19th centuries)

Underground workings

4.25 Over 10 km of Early Modern galleries have been traced which were dug by blasting with gunpowder. The characteristic traces are 'shot holes' in the walls of the galleries for the insertion of explosive charges. The cross-section of the galleries tends to be more rectangular, or sometimes with a slightly rounded ceiling. The mapped extent of the workings of this date in the Cărnic massif is impressive and of European significance.



Fig 18 Shothole for explosive charge in the wall of an early modern mine gallery in the Cărnic massif.

4.26 Transport galleries with wooden rails from early mine railways have been discovered in the Cărnic massif, an exceptional and important survival. One of these galleries was partially excavated, but others are mentioned but not recorded in any detail. These early railways would have had wooden trucks pulled by animals.

⁸² Burnham 1997; Lewis 1997, 106-110.

- 4.27 The Early Modern workings include some vast working chambers ('corandas') of extraordinary size. To date, however, the 10 km of galleries and exploitation chambers have not been dated more closely than within the broad bracket of 17th-19th centuries AD. Indeed, relatively little archaeological recording has been done of the Early Modern galleries and works.⁸³
- 4.28 *Significance statement:* Highly significant. This is one of the largest mining complexes of the Austro-Hungarian empire and evidently retains many unusual technological features (such as the wooden trackways) that illustrate the mining techniques of the time. Detailed recording of the mining features of this period could illuminate the organisation and sequence of development of the Austro-Hungarian imperial mining enterprise.

Ore-processing

- 4.29 The beneficiation and ore-processing activities required by the boom in mining under the Austrian empire generated a characteristic early industrial landscape of 'tauls' or header ponds for the water to drive stamp mills for crushing the ore. There is documentary archive evidence for a large number of stamp mills in different valleys already in the 17th century (in the Corna Valley alone there were 77 in 1676; 119 in 1757; and 226 in 1772).⁸⁴
- 4.30 These stamp mills, in which a water-driven wheel turned an axle with cams that raised and then dropped heavy stamps operating within a vertical framework, were used until the mines were nationalised under the communists in 1948. The technology is identical to stamp mills illustrated in Georgius Agricola's 1538 publication on mining, *De Re Metallica*, and is thought to be of Roman origin. Roman anvil stones with wear marks similar to those on surviving Early Modern anvil stones from Roşia Montană are known from Roman mining sites in Spain, Portugal and Wales.⁸⁵
- 4.31 Two of these stamp mills survive, relocated to the open-air Minvest mining museum. For the rest, what remains is the landscape of header ponds and channels feeding off them: Tăul Cornei, Tăul Brazi, Tăul Siccata, Tău Găuri, Tăul Țapului, Tăul Secuilor, etc. Of these the most clearly visible and understandable in terms of its function is Tăul Cornei, scheduled to disappear under a waste dump if the mining project proceeds.

⁸³ Compare the single summary paragraph accorded these workings in the *CHBR*, p. 99, with the much longer account of Roman workings.

⁸⁴ *CHBR*, p. 16; Popoiu 2010, 18, 150 (fig.).

⁸⁵ E.g. Três Minas (Portugal), Dolaucothi (Wales) (Burnham 1997; Lewis 1997).

- 4.32 *Significance statement:* Highly significant. The industrial archaeology of the stamping sites is of considerable interest, but at present not recorded in detail in the Roşia Montană area.



Fig 19 Communist-era transport gallery in the Cărnic massif.

20th-century workings

- 4.33 The extensive network of 20th-century galleries was dug by blasting and used a narrow gauge iron railway for the transport of ore. In the communist period after the nationalisation of the mines in 1948, the underground workings were extended to connect all the main working areas underground, with a grid system of exploration galleries criss-crossing the Cetate, Cărnic and Orlea massifs in particular, and large transport galleries linking these areas. These were wide galleries reinforced with concrete blocks, and equipped with iron railways, in some cases with tracks in both directions.



Fig 20 Abandoned extraction machine in the Cetate opencast.

- 4.34 In the 1970s, a large opencast pit was developed by Minvest on Cetate, worked by a series of concentric stepped benches. The base of the opencast now lies at 890 m, whereas formerly the summit of the hill was at 1003 m, meaning that up to 113 m of the hill has been quarried away. One extraction machine abandoned in the opencast may still be seen in place.
- 4.35 *Significance statement:* Highly significant. The industrial archaeology of the communist era mines has not been undertaken on any scale, and the component parts are disappearing fast as buildings fall into disrepair, machinery is broken up and the mine workings are under threat of obliteration in the new proposed mining development. However, this period was also part of Romania's mining history and the Communist era represents a third significant phase of large-scale exploitation of ore bodies at Roşia Montană whose techniques are worthy of detailed study. In the future, historical interest will focus on this period and it is important that documentary sources are supported by archaeological record.



Fig 21 Communist era pillared exploitation chamber in the Cărnic massif.

Roşia Montană as an illustration of mining processes

- 4.36 Roşia Montană preserves a remarkable palimpsest of evidence for different mining strategies and techniques over a period of nearly 2000 years – Roman, medieval, Early Modern, and 20th-century. The Roman evidence is especially rich, and of outstanding international significance, and several of the types of Roman underground workings in the Cărnic massif are unique in the Roşia Montană region and ought to be preserved *in situ*. As the 2009 report of the Franco-Romanian mining team states,⁸⁶ 'Certains ouvrages de Cărnic ne se retrouvent pas encore ailleurs dans l'espace minier, comme les chambres de piliers, les chantiers verticaux taillés en gradins, les puits inclinés hélicoïdaux avec marches et les longues galeries de recherches ouvertes en descenderies avec marches.' Yet the importance of the site for understanding ancient mining techniques lies not only in the survival of unique elements: it is the extensive networks of interconnected galleries, working chambers and drainage installations that enables one to understand how Roman mines, and the wider mining landscape of which they were a part, really functioned. Likewise, the Early Modern

landscape was structured in large part around the 'tauls' and the water-powered stamp mills along the channels that flowed from them, with the two main settlements of Roşia Montană and Corna related to the main valleys in which the stamps operated. This wider overview of ancient mining is not something that can be adequately preserved by salvaging merely a sample – either of underground galleries or of tăul ponds – and sacrificing the rest.

Organisation of mine workings

Roman

4.37 The epigraphic evidence from the Roşia Montană area can be combined with data from other Roman imperial mining areas to construct a picture of how Roman mining activity was organised. The general picture is of varying degrees of State control, attested by the involvement of the army – the mining control fort and administrative centre at Ampelum – and the presence at Roşia Montană of some soldiers seconded as *beneficarii consularis* etc. The tile stamps of the 13th Legion also indicate an active official presence. However, it is characteristic of Roman state control that this did not necessarily equate with direct military supervision of the extraction and processing work. It seems that the Roman state encouraged or mandated colonisation of the area by skilled miners from neighbouring provinces, particularly Dardanians and Dalmatians (see next section). The Roman state often used mixed forms of exploitation, involving both forced labour and free waged labour (the latter illustrated by the labour contract writing tablets). Miners and mine contractors often belonged to consortia (*societas*) and professional associations (*collegia*), such as burial clubs. All these are attested at Roşia Montană: the writing tablets include labour contracts for waged labour;⁸⁷ but they also name slaves and record the purchase of slaves (including children) – in one case at the settlement around the legionary fortress of Apulum/Alba Iulia. One tablet records the setting up of a partnership or consortium, the *societas danistariae*, specifying the amount of capital that each partner contributes at the outset (*IDR* 1, 44). *Collegia* are attested both in votive inscriptions and in one of the writing tablets, in which a burial club or *collegium* is wound up in February AD 167 because too few of its members remain.⁸⁸

4.38 The professionalism of miners is evidenced by the technological discussion above and the scale of the underground workings gives insights into the organisation. It is possible that the mining district was not administered as a uniform block, but that

⁸⁶ Cauuet *et al.* 2009a, 211.

⁸⁷ *TabCerD* X, XI and XII.

⁸⁸ *TabCerD* I (28 March 167).

different areas of the massifs were actually exploited in different ways – some perhaps under direct state supervision, others leased to contractors, etc.⁸⁹ The size of some of the networks, which must each have been a single concession operated by an individual or a *societas*, indicates considerable capital and may allow some estimates of the size of workforces in particular mining concessions.

- 4.39 The archaeological evidence for the distribution of settlement indicates that the mining community was split into a number of villages, each with its own cemetery and probably ore-processing facilities, and associated with a set of mine workings in a particular massif. Some of the sites discovered are probably to be equated with various toponyms attested in the writing tablets – Immenosum Maius, Deusara, Kartum, and the Vicus Pirustarum, although we cannot yet propose exact matches and it is possible that one or more of these might lie outside the region. The votive altars allow the identification of a further site, Kastellum Ansis, as Hăbad. The main settlement of the region, to judge by the frequency with which it occurs in the writing tablets, was the still unidentified main centre of Alburnus Maior, the location where nine of the documents were drawn up and witnessed.⁹⁰
- 4.40 We gain an impression of underground workings operated largely by entrepreneurs or companies employing a mixture of free and servile labour. We do not know whether the military were involved in ore-processing, but the military administrators at the very least must have ensured that the state received its share of the gold and silver from the mines and supervised the transport of ore down the Roşia and Arieş valleys to Ampelum/Zlatna and then to Apulum/Alba Iulia, This is where further epigraphic finds and potentially tablets could help elucidate additional details of the mining administration. We do not yet know the full story, but there is huge potential to come closer to this at Roşia Montană than at other known Roman mining sites.
- 4.41 *Significance statement:* Highly significant. Roşia Montană is the only Roman mining district where free waged labour is directly attested, and the degree of detail provided on the workings of a *societas* and a *collegium* is exceptional. The value of the written evidence is enhanced by being able to propose matches with some of the archaeologically attested features; the building with the hypocaust features and stamps of the 13th Legion is well placed to control the route out of the mining zone down the Roşia valley. As with the Early Modern period, there is a great opportunity to

⁸⁹ As Hirt 2010, 232-35 suggests.

⁹⁰ The documents signed and witnessed at Alburnus Maior are: *TabCerD* I, II, IV, V, IX, X, XIII, XVIII and XXII. The theory that the toponym *Alburnus Maior* mentioned in the writing tablets may refer not to a specific site, but rather to a wider mining region, such as the 'Golden Quadrilateral' has a long history, summarised by Russu 1975, p. 186. This is, however, impossible: in Roman administrative and legal practice, the location where a documents is drawn up and witnessed is always a specific place (town or village) rather than a district or region.

bring together historical sources and surface evidence for the organisation of mining and processing activity here.

Medieval mine organisation

4.42 At present little is known of the medieval mining organisation, beyond the fact that there were German miners in the region under the authority of Hungarian kings by the 13th century. By the 14th century, gold mines were evidently owned by local patricians, but it is unclear what this translated to on the ground. Cetate appears to have been a focal point of mining activity.⁹¹

4.43 *Significance statement:* Significant. Certainly merits further work to combine archaeological and historical sources.

Early Modern mine organisation

4.44 Although there are signs that mining activity was reviving in the late medieval period, the major resurgence was due to another imperial intervention. From 1688-1848 Transylvania was under the control of the Hapsburg empire, having been liberated from Ottoman control. This was a period of significant redevelopment of the Roşia Montană mining district, with various measures taken to stimulate migration of labour, the opening of new mines and the increase in processing capacity.⁹² It is interesting that the Hapsburg control of Transylvania in part echoes Roman administrative arrangements, with the Austro-Hungarian fortress at Alba Iulia replicating the Roman legionary fortress of Apulum at the same location just outside the mountain range to the SE of Roşia Montană. The administration of mining districts is not always a smooth process of contracts signed and ore exported. Mining communities can be volatile, especially if pressed by imperial regimes. The available source material for the Austro-Hungarian period is a potentially rich resource for building a detailed picture of the normal operation of the mining administration and what could go wrong (and how this might be reflected in the archaeological record):

4.45 'As early as 1781-1782, the people of Roşia Montană lodged a complaint against compulsory labour hours with the authorities (Wollmann *et al.*, 1982). In the uprising that followed, led by Horea, Cloşca and Crişan, people from villages of the Arieş Valley

⁹¹ CHBR, p. 15-16; Popoiu 2010, 16-17.

⁹² CHBR, p. 16-17, Popoiu 2010, 17-19; Pošepny 1868a; Sântimbreaanu and Wollmann 1974; and Wollmann 1998 are the key scholarly works, along with Sântimbreaanu 1989.

burned the Hungarians' houses, the Catholic Church and a few mine entries; however, the imperial authorities suppressed the uprising.⁹³

- 4.46 There is considerable potential to build on the historical and map-based studies achieved to date, with enhanced assessment of the industrial archaeology left behind by the Hapsburg mine organisation.
- 4.47 *Significance statement:* Highly significant. As for the Roman period, there is a great opportunity to bring together historical sources and surface evidence for the organisation of mining and processing activity here.

20th –century mine organisation

- 4.48 The early 20th century saw much private mining exploitation 'based on associations of individuals and small share companies. Concessionary companies mined the deeper deposits and individuals the shallower ones, often on steeper slopes.⁹⁴ All this changed in 1948, with the nationalisation of the mines under Communist control and private exploitation being forbidden. The memories of the communist period are still fresh and, for some of the mining community, bitter. Yet this was also a period of large-scale exploitation, achieved with a large infrastructure of facilities and workings. The record of these years should be retained for future generations to study; it is interesting to note that very little detail of this phase is included in the *Cultural Heritage Baseline Report*.
- 4.49 *Statement of significance:* Significant. The Communist regime dominated Romanian history and society for 40 years and its effects are still felt today. While there is an understandable inclination to reject the events and realities of these years, it will be important to future generations to understand them. The profound impact that the Communist administration of mining activity had on many families in Roşia Montană (both good and bad) needs to be recorded in detail for posterity. The centres of mining administration are historic monuments too and before allowing these to be lost to neglect or active demolition, decisions should be taken as objectively as possible about what of this recent phase of mining history can and should be conserved.

⁹³ CHBR, p. 17.

⁹⁴ CHBR, p. 17.

Mining communities

Roman

- 4.50 Archaeological and epigraphic evidence from Roşia Montană and other Roman mining sites in Dacia indicates that a sizeable population group active in the Roman mining operations in Dacia were migrants of Dalmatian and Dardanian origin, attested principally by Dardanian and Dalmatian names on inscriptions, dedications to the Dea Dardanica ('Dardanian goddess'), and the MKS burial type characteristic of the areas where these settlers came from.⁹⁵ The settlement of these people in Dacia would have been ordered (perhaps through forced resettlement) or encouraged by the Roman state in order to exploit the mines, using personnel skilled in mining in their region of origin. This picture is richly illustrated at Roşia Montană by several strands of evidence: a writing tablet of AD 159 mentions the *Vicus Pirustarum* or 'village of the Pirustae', a Dalmatian people;⁹⁶ names on funerary stelae and votive altars include some characteristic Illyrian names (Bato, Beucus, Dasius, Verzo, etc.); and finally, the distinctive trapezoidal cross-section of Roman mines in Dacia, so characteristic of the Roman workings at Roşia Montană, seems also to be paralleled at some Roman mines in Serbia (e.g. Kosmaj), and the provinces of Dalmatia and Upper Moesia may be the origin of this technique.⁹⁷
- 4.51 But Dardanian and Dalmatian settlers were by no means the only people at Roşia Montană: inscriptions from the site also indicate the presence of others: Greeks, Roman citizens, and military personnel, principally *beneficarii consularis*, who were soldiers of the 13th legion seconded to Roşia Montană with administrative duties concerned with mining administration.⁹⁸
- 4.52 The religious dedications at the various settlements and sacred areas in the mining zone give further insights into the nature of the communities there. The votive altars are dedicated to much the same array of deities as found in other Balkan mining sites, and many are of course particularly appropriate to mining communities: Terra Mater (Mother Earth); Sol (associated with gold); Diana (with silver); Mercury (trade and commerce); Silvanus (a woodland deity, perhaps of particular relevance to loggers and carpenters involved in providing the timber shoring for mine galleries). Interestingly, the *beneficarii consularis* dedicated mainly to Jupiter Optimus Maximus

⁹⁵ Daicoviciu 1961; Mrozek 1968; Noeske 1977; Russo 1984; Tudor and Vladescu 1972.

⁹⁶ *TabCerD* 9., 6th May AD 159.

⁹⁷ See Dušanić 1977 for a summary of the Roman mining evidence in the Dalmatian and Dardanian areas.

⁹⁸ Hirt 2010, 232-35; Noeske 1977.

(Jupiter Best and Greatest), a deity strongly identified with the welfare of the Roman state.

- 4.53 The distribution of inscriptions and of more elaborate Roman funerary monuments (for instance those ornamented with sculptures of lions, pine cones, etc.) is of interest in that it may hint at social differentiation among the mining communities. Final conclusions cannot be drawn until all the new inscriptions and sculptural elements are published, but the initial impression is that there is more of this material in the Roşia valley than in the Corna valley. The main ritual and religious centres seem to have been to the W of the Cetate massif (in the Nanului valley and Hăbad area), while the cemeteries with the largest numbers and more elaborate tombstones were Pârâul Porcului, Țarina and Jig, with the cemeteries on the fringes of the Corna valley at Tăul Cornei and Hop yielding such items only rarely (the mausoleum at Tău Găuri is exceptional in every sense). This may hint at some social differentiation between the settlements and people on the North side of Cetate and Cărnic and those on the South of these massifs.
- 4.54 Full publication of all the cemetery excavations may reveal further patterning in burial monuments, rituals and grave inclusions that hint at social or ethnic divisions within and between different funerary sites. It may also give pointers to the presence or not of actual Dacians among the mining community. Isotopic analysis of teeth from the cremated remains could look at aspects of diet among the mining community and could help distinguish between people who lived all their lives in the area of Roşia Montană and those who migrated to the mining district after childhood.
- 4.55 *Significance statement:* Highly significant. The combination of a rich epigraphic record, extensive cemetery excavations and potential for scientific analysis affords an unprecedented level of detail on the make-up of a Roman mining community in comparison with evidence known from other mining sites in the Roman empire..

Medieval

- 4.56 At present there is 'no flesh on the bones' of the bare historical narrative. Archaeology needs to be employed more actively to locate and document the evidence of the mining community in this period.
- 4.57 *Significance statement:* Significant. The contrast between the Roman, Medieval and Early Modern phases of mining can only be fully appreciated if all are researched on an equal basis.

Early Modern

- 4.58 In many periods of mining activity, the essential story of mining communities involves the integration of migrant groups with established populations. The Austro-Hungarian exploitation of Roşia Montană was accomplished in part through the in-migration of mining experts and experienced labour from Germany, Hungary and Austria, bringing with them new material culture, building styles and adding to the mix of religious affiliation in the valley.⁹⁹ The archaeological correlates of this mixed community could be further explored.¹⁰⁰
- 4.59 *Significance statement:* Highly significant. The story of the Early Modern community extends beyond a few historic houses in Roşia Montană.

20th century

- 4.60 There has been an attempt in recent years to record the oral memories of members of the modern mining community. This is a tremendously important initiative and one that evokes the long continuity of mining communities in the Roşia Montană area, sometimes prospering, sometimes struggling under the weight of State control. It creates a link between the modern population and a landscape biography of successive phases of mining activity.
- 4.61 *Significance statement:* Highly significant. The starting point with successful conservation measures to preserve aspects of the mining landscapes and the past mining heritage of Roşia Montană is to engage the residual mining communities with the past. The construction of a landscape biography that links the present community with a long history of mining community is a key desideratum of successful Cultural Resource Management of the area's heritage.

Potential to yield future information

- 4.62 Despite the richness of the evidence surviving at Roşia Montană for the scale, technology and organisation of mining, and for the life of the mining communities, over nearly 2000 years, the site still holds enormous potential to yield more

⁹⁹ CHBR, p. 17, 'They changed the ethnic composition and aspect of the place by bringing in elements of Western culture, such as Central-European homes, elements of baroque decorative art, German clothing, furniture ironware, chinaware, and Vienna glassware.'

¹⁰⁰ CHBR, p.56-71 provides a list of buildings of the Early Modern period, but without conveying a sense of how these functioned as parts of a complex and diverse living community.

information, much of which will be lost of the archaeological remains are not preserved *in situ*.

- 4.63 A number of gaps in the archaeological record suggest areas where much more is to be learned:

Settlement

- 4.64 A pattern of distributed nucleated settlement in the Roman period, with small villages dotted around the various hillsides where mining operations were going on, is implied by the distribution of necropoleis around massifs with underground workings. However, many more necropoleis than settlements have been recognised. One or more major settlements associated with mine workings in the southern part of Cărnic and at Cărnicele are to be expected in the vicinity of the necropolis at Tăul Cornei. Likewise, there are necropoleis and ore-processing area at Jig-Văidoaia, and also at Țarina, which must be linked with the mine workings in these areas, but no settlement is yet known that can be associated with them. Likewise no settlement is known that would go with the mine workings in the Orlea massif and the necropolis at Pârâul Porcului-Tăul Secuilor. Medieval and Early Modern settlement (in the latter case beyond the identified historic buildings of the historic core of Roşia Montană itself) are still poorly explored.

Ore-processing

- 4.65 Ore-processing sites are known only at Jig-Văidoaia and Țarina, and even there they are poorly understood. Were water-powered ore-crushing machines being used, as in other Roman mines in Spain, Portugal and Wales, and indeed as at Roşia Montană itself some 1500 years later? What smelting technologies were used?

Underground mining galleries and networks

- 4.66 At Jig-Văidoaia the presence of ancient mines is implied by ore-processing areas high up the hillside; surely the miners were not carrying ore up the hill to process it, and even though no Roman mine galleries are known here they are to be expected, their entrances covered by later mining waste.

4.67 A similar point may be made for the Orlea and Țarina sectors, where the *Cultural Heritage Baseline Report* states:

'The workings investigated in this sector were relatively evenly distributed, which reflected among other things, the strong density of the ore bodies. As the modern workings which allow access did not cover the entire area, it is possible that there may be twice as many ancient workings under this slope, particularly in the surface layer, and that an extensive clearance of the surface could reveal many entrances to operations or explorations. In the light of current information, it seems possible that some sloping galleries could be reopened and excavated from the surface. It is also likely that workshops for handling the ore were installed on the surface, next to these underground access points. Therefore, it seems to be of major importance, in view of the rarity of remains of ancient handling workshops known currently in the valley, to plan for extensive surface excavations of both entrances to galleries and spaces devoted for processing the ore, i.e. for ancient metallurgy.'¹⁰¹

4.68 At Cărnic, the same point holds true even more strongly. The map of underground workings in the Cărnic massif that accompanies the proposal for archaeological discharge shows a large concentration of Roman galleries in the south-central part of the massif and around Pietra Corbului, with a small network N of the central part of the hill. It is evident that the underground survey strategy has necessarily been conditioned by access through the communist-era network of tunnels within the interior of the massif, but this is less likely to intercept the Roman workings that entered the massif from the northern side, since the recent grid of galleries is less dense here. However, since the Romans seem to have riddled the other main massifs of the region with tunnels from all accessible sides, it is certain that they worked Cărnic from the N too. Indeed, a plan of the Cărnic works explored in 2000-2005 strongly suggests this, with a number of short galleries traced on the N side of the massif; it is unlikely that all Roman mine galleries here have yet been found and more are to be expected here.

4.69 The same observation can be made for Cărnicele, in this case confirmed by the fact that the underground survey found no Roman galleries, but some Roman exploration galleries, whose entrances had been covered with later mining waste, were found by chance during bulldozing works.

4.70 Indeed, Cărnic is an area where many elements of the picture are still incomplete – although it was the richest ore body and contains the largest Roman gallery networks,

¹⁰¹ CHBR, pp. 94-95.

we are still missing drainage galleries, mine adits and entrances, underground workings on the N side of the massif, and settlement and ore processing areas on the S side.

Early Modern workings

4.71 The extensive 17th-/19th-century underground workings are barely recorded, everywhere, beyond basic topographical planning. They constitute an important monument of Early Modern industrial archaeology in Romania. In some cases they include wooden rails from early mine railways, an extremely rare and important survival. Surprisingly and regrettably, these Early Modern galleries have not been the subject of much study in the archaeological work to date; indeed, one might say that they have been almost completely neglected in favour of documenting the ancient works. No attempt has been made to date them more closely than between the 17th and 19th centuries, although a study of the placement, frequency and sizes of shot-holes might identify diagnostic patterns or features that could allow closer dating. As is clearly stated in the documentation supplied to us:

‘Ces travaux modernes n’ont pas fait l’objet d’investigations particulières, exceptée la voie de roulage en bois d’une galerie de Piatra Corbului: dans deux secteurs, ils ont été néanmoins relevés en plan ce qui permet de confronter nos relevés avec les plans d’archives.’¹⁰²

4.72 It would seem, therefore, that in the Cărnic massif only one of the Early Modern galleries has been excavated, and in only two sectors have they been planned ; many of the Early Modern galleries must remain unplanned, and largely unrecorded. This is a significant and major omission in the archaeological research programme, and it is clear that, on these grounds alone, granting the archaeological discharge would be problematic, as it would involve the destruction of a major piece of industrial archaeological heritage without proper record, thus bringing into question the application of the ‘preservation by record’ strategy.¹⁰³

¹⁰² *Document Final de Synthèse* 2009, p.55 on the underground investigations in the Cărnic massif.

¹⁰³ Note that ‘modernes’ in this context means 17th-19th centuries, that is works of considerable antiquity.

5.0 **BIBLIOGRAPHY**

Alburnus Maior I = Damian 2010

Alburnus MaiorII = Simion *et al.* 2004

Alburnus Maior III = Damian *et al.* 2008

CHBR – Cultural Heritage Baseline = Stantec 2006

DFS = Cauuet 2009a vol 1 or 2 (French edition)

TabCerD = Russu I I 1975

Andreşoiu B, et al 2007 *Kombinat. Ruine Industriale Ale Epocii de Aur/Industrial Ruins of the Golden Era, Bucureşti: Igloo*

Barker G, Gilbertson D, Mattingly D, 2007 *Archaeology and Desertification: the Wadi Faynan Landscape Survey, southern Jordan*. Oxford: Oxbow.

Bartels C, Küpeer-Eichas C, (eds.) 2008 *Cultural Heritage and Landscapes in Europe/ Landschaften: Kulturelles Erbe in Europa (Proceedings of the International Conference, Bochum, 8-10 June 2007)*, Bochum (German Mining Museum Bochum).

Bartels C, Ruiz del Árbol M, van Londen H, Orejas A, (eds) 2008 *Landmarks. Profiling Europe's Landscapes*, Bochum (BDM, COST, CSIC).

Burnham B C, 1997 Roman mining at Dolaucothi: the implications of the 1991-3 excavations near Carreg Pumsaint, *Britannia* 28: 325-36.

Cauuet B, 2008 Les mines d'or et d'argent romaines de Roşia Montană (nord-ouest Roumanie). Unpublished paper for 'Conference sur l'archéologie préventive, Council of Europe, Paris.

Cauuet B, *et al.*, 2009a *Raport de Cercetare Archeologică Preventivă Masivul Cărnic, Roşia Montană, România Proiectul Minier Roşia Montană Document Final de Sinteză 2009 Volumul 1 Text integral Ilustraţii Explorare Ilustraţii Geologie* RMGC/Universitatea Toulouse Le Mirail.

Cauuet B, *et al.*, 2009b *Raport de Cercetare Archeologică Preventivă Masivul Cărnic, Roşia Montană, România Proiectul Minier Roşia Montană Document Final de Sinteză 2009 Volumul 2 Ilustraţii Arheologie* RMGC/Universitatea Toulouse Le Mirail.

Clark K 1998 *Conservation Plans A Guide for the Perplexed*, *Context* 58, Edinburgh: IHBC

Clark K 1999, *Conservation Plans In Action*, EH:London

Clark K 2001, *Informed Conservation*, EH:London

Clark J, Darlington J, Fairclough G, 2003. *Pathways to Europe's Landscape*, Heide.

Council of Europe, 2000 *European Landscape Convention*. European Treaty Series no. 176. Council of Europe, Strasbourg.

Daicoviciu C, 1961 'Castella' Dalmatarum in Dacia. *Apulum* 4, 51-8.

Daicoviciu C, Floca O, 1937 Mausoleul Aureliilor de la Sarmizegetusa, *Sargetia* 1, 1-23.

Damian P (ed.), 2010 *Alburnus Maior I*, Cluj-Napoca: Mega 2nd ed.

- Damian P *et al* 2008 *Necropola Romană de Incinerare de la Tăul Corna, Partea I, Alburnus Maior III*, Cluj-Napoca:Mega.
- Déjeant-Pons M, 2002 The European Landscape Convention, Florence, in Fairclough and Rippon 2002, 13-24.
- Domergue C, 1990 *Les mines de la Péninsule Ibérique dans l'antiquité romaine*. Rome.
- Domergue C, 2008 *Les mines antiques: la production des métaux aux époques grecque et romaine*. Picard, Paris.
- Dušanić S, 1977 Aspects of Roman mining in Noricum, Pannonia, Dalmatia and Moesia Superior. *Aufstieg und Niedergang der römischen Welt* 6.1: 52-94.
- Fairclough G, Rippon S, 2002 *Europe's Cultural Landscape: archaeologists and the management of change*. EAC Occasional Paper 2, Brussels.
- Hauptmann A, 2007 *The Archaeometallurgy of Copper. Evidence from Faynan, Jordan*. Berlin, Springer.
- Hirt A M, 2010 *Imperial Mines and Quarries in the Roman World. Organizational aspects 27 BC – AD 235*, Oxford.
- Lewis M J T, 1997 *Millstone and hammer: the origins of water power*. Hull , University of Hull.
- Mattingly D J, 2005 Cultural landscapes in Europe: projects and networks, in Ruiz del Árbol and Orejas 2005, 61-67.
- Maxfield V A, Peacock D P S, 2001a *The Roman Imperial Quarries. Survey and Excavation at Mons Porphyrites. Volume 1: topography and quarries*. London.
- Maxfield V A, Peacock D P S, 2001b *Survey and Excavation at Mons Claudianus 1987-1993. Volume 1I: Excavations Part 1*. Cairo.
- Moore H, 2007 *Summary of the Cultural Heritage Management Plans Included in the Report on the Environmental Impact Assessment for the Roşia Montană Project*, Giffords/RMGC.
- Mrozek S, 1968 Aspects sociaux et administratifs des mines d'or en Dacie. *Apulum* 7/1, 307-26.
- Noeske H-C, 1977 Studien zur Verwaltung und Bevölkerung der dakischen Goldbergwerke in römischer Zeit. *Bonner Jahrbücher* Band 177: 271-416.
- Oltean I, 2007 *Dacia. Landscape, Colonisation, Romanisation*. London.
- Orejas A, 2001 *Atlas Historique des Zones Minières D'Europe. 500BC-500AD*. OPOEC, Luxembourg. Vol. I.
- Orejas A, 2003 *Atlas Historique des Zones Minières D'Europe. 500BC-500AD*. OPOEC, Luxembourg. Vol. II.
- Orejas A, Mattingly D, Clavel-Lévêque M, (eds) 2009 *From Present to Past through Landscape*. CSIC:Madrid.
- Parker Pearson M, Pollard J, Thomas J and Welham K. 2010. Newhenge. *British Archaeology* Jan/Feb 2010: 14-21.
- Peacock D P S, Maxfield V, 1997 *Survey and Excavation at Mons Claudianus 1987-1993. I. Topography and Quarries*, Cairo:IFAO.

- Peacock D P S, Maxfield V, 2007 *The Roman Imperial Quarries. Survey and Excavation at Mons Porphyrites 1994-1998. Volume 2. The excavations*. London: Egypt Exploration Society.
- Popoiu P, 2010 *Roşia Montană Studiu Etnologic - Roşia Montană Ethnological Study, Ediţia II-a, Cluj Napoca: Editura Mega*.
- Pošepny F, 1868a *Die montangeologische Aufnahme des Verespataker Goldebergbauebietes im Komitat Alsófeh  und ein Manuskript*.
- Pošepny F, 1868b *Geologisch-montanistische Karte des Goldbergbaureviers Abrudbanya-Verespatak*.
- Rişcuţa C, 2007 *Exploatarea Roşia Montană Investiţii economice şi realităţi social-culturale (1919-1948) - Roşia Montană Mine Economic Investments and Social Cultural realities (1919-1948)* Alba Iulia: Anthropos-Alburnus Maior.
- Roşia Montană Project, 2006a *4 Potential Impacts (Including Transboundary) on the Environmental Components and Related Mitigation Measures. 4.8 Social and Economical Environment, 4.9 Cultural and Ethnical Conditions, Cultural Heritage*, EIA Study Report Vol 14, S C Roşia Montană Gold Corporation
- Roşia Montană Project, 2006b *Plan M – Cultural Heritage Management Plan Part II Mangement for the Historical Monuments and Protected Zones from Roşia Montană Area, Part III Cultural Heritage Management Plan*, Management Plans Vol 33, S C Roşia Montană Gold Corporation
- Ruiz del  rbol M, Orejas A, (eds 2006. *Landscapes as Cultural Heritage in the European Research*. CSIC, Madrid.
- Russu I I, 1975 *Inscri ile Daciei Romane Vol I Introducere Istorică si Epigraphic  Diplomele Militare & Tabli ele Cerate*, Bucureşti: Academiei Republicii Socialiste.
- Russu I I, 1984 *Inscri ile Daciei Romane Vol III*, Bucureşti: Academiei Republicii Socialiste.
- S nchez-Palencia F J, (ed) 2000 *Las M dulas (Le n). Un paisaje cultural en la Asturia Augustaza*, Le n.
- S nchez-Palencia F J, Fern ndez-Posse M D, Fern ndez Manzano J, Orejas A, 1996. *La zona arqueol gica de Las M dulas, Le n. Gui  arqueol gica*. Le n.
- S nchez-Palencia F J, Orejas A, Ruiz del  rbol M, 2008a *The Roman Gold Mines of Northwestern Hispania: Miners and peasants*, in Ch. Bartels and K ppeer-Eichas, C. (eds.) *Cultural Heritage and Landscapes in Europe/ Landschaften: Kulturelles Erbe in Europa (Proceedings of the International Conference, Bochum, 8-10 June 2007)*, Bochum (German Mining Museum Bochum): 427-452.
- S nchez-Palencia F-J, Orejas A, Ruiz del  rbol M, Sastre I, 2008b 'Las M dulas (Le n, Spain). A rural and mining landscape' in Bartels C, Ruiz del  rbol M, van Londen H, Orejas A, (eds.), *Landmarks. Profiling Europe's Landscapes*, Bochum (BDM, COST, CSIC): 113-124.
- S ntimbreau A, 1989 *Muzeul mineritului din Roşia Montană*, Bucuer şti.

- Sântimbreau A and Wollmann V, 1974 Aspecte tehnice ale exploatării aurului în perioada romană la Alburnus Maior (Roșia Montană), *Apulum* 12, 240-77.
- Simion M, Apostol V, Vleja D, 2004 *Monumental funerary circular – The Circular Funerary Monument, Alburnus Maior II*, Bucharest: Muzeul Național de Istorie a României. National History .
- Simion M, 2006 Mining Districts in Roman Period in Romania. Assessment of Published Sources in Romania, in Stantec Consulting 2006: 130-42.
- Smith L-J 2004 *Archaeological Theory and the Politics of Cultural Heritage*, London: Routledge
- Stantec Consulting, 2006 *Cultural Heritage Baseline Report*, Stantec Consulting/S C Roșia Montană Gold Corporation SA.
- Tudor D, and Vladescu C, (1972). Dardanii la Romula-Malva. *Apulum* 10: 183-90.
- Wollman V, 1996 *Mineratul metalifer, extragerea sari si carierele de piatra in Dacia Romana - Der erzbergbau, die salzgewinnung und die steinbruche im romischen Dakien*, BMN XIII Cluj.

APPENDIX 1

Appendix 1: Itinerary of visit of UK experts

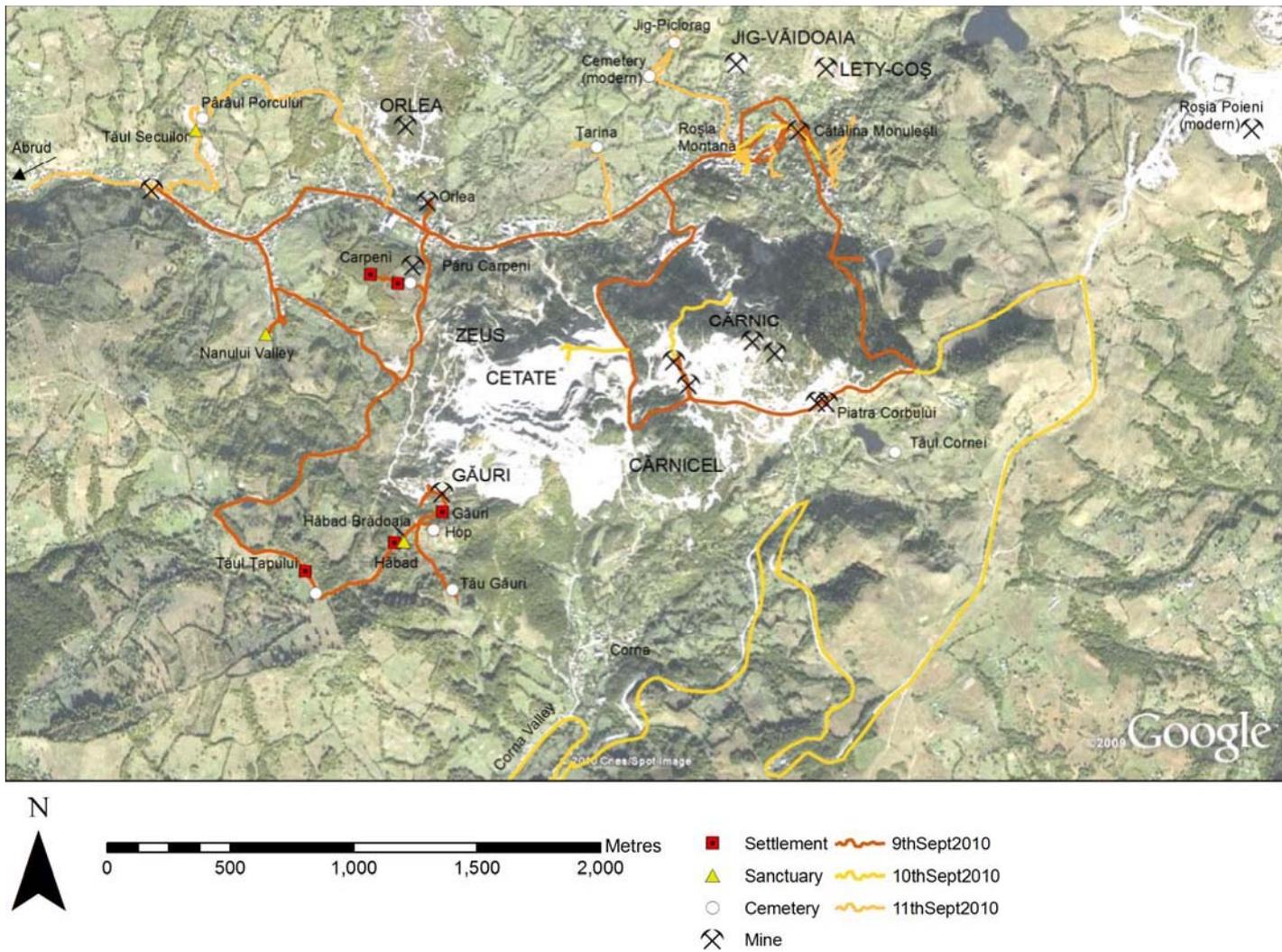


Fig 22 Itinerary of visit of UK experts

Site Visit and Inspection: Roşia Montană

Wednesday 8th September 2010

Arrival at Cluj Napoca and travel to hotel near Roşia Montană via Alba Iulia.

Thursday 9th September 2010

9 am arrival at Roşia Montană.

Introduction to mining areas RMGC and Health and Safety Issues.

Presentation of documents by RMGC.

Visit to Arul Apusenilor exhibition on Roman and later mining activity.

Site Visits:

am – **Surface sites.** Tăul Tapului, Hăbad, Hăbad Brădoaia, Hop, Tău Găuri, Hop-Găuri (cemetery and settlement area), Găuri mineworkings, Nanului Valley, Păru Carpeni settlement & Carpeni hypocausted building, Cărnic Massif view across Cetate, Pietra Corbului, Corna Valley panorama.

pm – **Underground sites.** Cătălina Monuleşti mine gallery, Păru Carpeni to Ţarina and Orlea galleries & old mining museum (lapidary display and mining machinery).

Friday 10th September 2010

Review

Site Visits:

am – **Underground.** Cărnic galleries (including Pietra Corbului) (Cărnic 1, 13, 6, 2, 3) and (Cărnic 9, 10).

pm – Abrud and Corna Valley, Corna, Tăul Corna, views of Roşia Poieni copper mine and Roşia Montană Valley, Cetate rim and opencast, NW side of Cărnic.

Saturday 11th September 2010

am – Presentation by RMGC.

Site Visits (all surface)

am – Review of workshop where 3D model of mine gallery was being produced, Jig-Vădoaia, Jig-Piciorag, Ţarina, Orlea, Pârâul Porcului & Tăul Secuilor, panorama towards Zeus area of Cetate, Communist era main mine entrance and stockyard West of Orlea.

pm – departure for Cluj Napoca.

Sunday 12 September 2010

Return to UK.

APPENDIX 2

Appendix 2: Roşia Montană and Other Roman Gold Mines

The table below is adapted from material published in the *Cultural Heritage Baseline Report*.¹⁰⁴ In that study a number of conclusions are drawn that seem to diminish the significance of what has been found at Roşia Montană and there is an implication that future research at some of the other known gold mining sites in Romania or elsewhere in the Roman empire will more than off-set the destruction of the mining landscape at Roşia Montană.

'[T]he Roman gold-mining locations listed ... demonstrate that Roşia Montană cannot have been unique in terms of its Roman mining history. Furthermore, the evidence to date strongly hints at the presence of at least 47 Roman gold-mining centres and related developments in Transylvania and Banat, of which at least 14 have already produced evidence of major Roman gold-mining operations with associated settlements and related infrastructure. Whilst it is clear that some have disappeared under more recent developments over the last 200 years, others seem to shine brightly as beacons encouraging future archaeological activity and research. ... the sum of archaeological research to date gives "a deformed image of Alburnus Maior." It is important that this point is stressed. The leads and hints elsewhere strongly imply that future archaeological research elsewhere in Romania will change current impressions of Roşia Montană. The place and the programme of archaeological investigations from 2000-2006 are apparently of unparalleled importance now; however, it appears that they may well not always be.¹⁰⁵

'This summary assessment confirms that there is now known to have been extensive gold mining in several provinces of the Roman Empire. ... Many of these sites can merely be identified as places in which international scholarship has concluded that there was gold-mining activity. On the other hand, a significant number of others can be shown to have been major centres with associated infrastructure and technical development, which closely parallel those at Roşia Montană. Some of these, indeed, also include well-preserved remains. Despite its undoubted archaeological and historical significance, the conclusion must be that Roşia Montană is one of a number of gold-mining centres at least of comparable importance throughout the Roman Empire. Research into Roman gold mining and gold mines continues and develops apace, and there can be no doubt that many more sites await discovery and archaeological elucidation.¹⁰⁶

These comments can be challenged. While there is no doubt that there were many mining sites across the territory of the Roman empire, it is apparent that some of these locations were significantly more important than others in the Roman period. Others have gained a particular significance because of modern archaeological research as type sites for our knowledge and understanding of ancient mining. Many of the entries listed relate to hydraulic mines in which aqueducts were used to erode and wash gold-bearing alluvium, and these are wholly different from underground mines such as Roşia Montană. In the table below, we have reworked the reference material to note the number of index entries for each site from the two most important overview studies of Roman mining, by Domergue (2008 – especially important for mining technology) and Hirt (2010 – the best modern study of what is known of the Roman mine administration). What is apparent from this presentation of the data is that there is a small cluster of six key ancient sites, including Roşia Montană (Romania) along with Tres Minas, Las Medulas, Vipasca, Tharsis and Rio Tinto (all in the Iberian peninsula). These are the key type sites for Roman gold mining, but what is particularly apparent from the detailed information available from these locations is that there is no such thing as a standard Roman mine – each of these major exploitations was unique in some respects in the methods used, the ore bodies accessed and organisation of the mining communities within the landscape. Given that the evidence from Rio Tinto has largely been destroyed as it was recorded, the evidence on the ground at the other sites in this group has an added value.

¹⁰⁴ The table conflates information in *CHBR*, pp. 100-08, Tables 5.1-5.10.

¹⁰⁵ *CHBR*, p. 104

¹⁰⁶ *CHBR*, p. 109.

One of the interesting points about using the studies by Domergue and Hirt as indicators of the overall importance of Roşia Montană in overview accounts of Roman mining is that they essentially draw on different types of evidence to tell their stories. While Domergue is principally concerned with the mining and metallurgical features and technologies, Hirt concentrates on the epigraphic and literary evidence. The prominence of Roşia Montană in Hirt's book is in part connected to the celebrated wax writing tablets from the mines there, which shed light on many aspects of the organisation and activities of the mining community. However, it is also the case that Roşia Montană has yielded a significant number of inscriptions on stone as well, providing information on the social composition of this community and their religious practices on a scale that is almost unparalleled at most of the other mining centres.¹⁰⁷ Despite their different aims, both Domergue and Hirt accord Roşia Montană particular importance, and indeed in their surveys it emerges as the most important mining site outside the Iberian peninsula for understanding the techniques and administration of Roman mining.

It is a key principle of Cultural Resource Management that one seeks to protect what is currently of unique importance – until future work demonstrates that the other Romanian mining sites were of equal or greater importance (and replicate the technological features recorded there) the presumption must be that Roşia Montană was the largest and most significant mining site in Dacia and among a small group of pre-eminently important Roman mining sites from elsewhere. The survey of other Romanian mining sites by Simion (Appendix D in the *CHBR*)¹⁰⁸ is a precious resource on a poorly exposed set of documentation on Romania's mining heritage, but it also makes clear the gulf between these other sites and Roşia Montană in terms of recorded evidence of the mines, the associated mining landscapes and associated epigraphic discoveries.

Comparison with other Roman mining sites does not support the conclusions drawn in the *Baseline Report* that Roşia Montană is simply one example among many of a Roman gold mine. It is undoubtedly one of the most important examples based on modern research, and that gives it a high status and significance in cultural heritage terms. Even if there was extensive research at other Romanian mining sites it is likely in terms of what we know about Roşia Montană that it would retain its primacy among Roman mining districts in Romania. Another Romanian site of potential international significance is Pianu de Sus in the Mures valley, but this represents a different sort of exploitation technology in the context of hydraulic working of alluvial deposits.¹⁰⁹

¹⁰⁷ The Clauss Slaby Datenbank (<http://www.manfredclaus.de/>) includes 139 Latin texts from Roşia Montană; cf also Russo, 1984. To our knowledge, no other Roman mining site has produced such a large total.

¹⁰⁸ Simion M, 2006 'Mining Districts in Roman Period in Romania. Assessment of Published Sources in Romania', in *CHBR*, pp 130-42.

¹⁰⁹ Oltean 2007, 181, 183.

Mines By region	Interpretation of Evidence	Refs in Domergue 2008 and Hirt 2010
Dacia		
ALBAC	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
SCĂRIȘOARA	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
NEAGRA	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
BISTRA	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
AVRAM IANCU	Roman gold-washing	Domergue 2008,, 0 refs; Hirt 2010, 0 refs
VIDRA	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
CÎMPENI	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
LUPȘA	Roman gold-washing	Domergue 2008, 0 refs; Hirt 2010, 0 refs
HĂDĂRĂU	? Roman settlement	Domergue 2008, 0 refs; Hirt 2010, 0 refs
PEȘTERA	? mining (cave)	Domergue 2008, 0 refs; Hirt 2010, 0 refs
BUCIUM *	Roman settlement and goldmines	Domergue 2008,0 refs; Hirt 2010, 0 refs
ROȘIA MONTANĂ (ALBVRNVS MAIOR) *	Extensive evidence and research undertaken.	Domergue 2008, 20 refs; Hirt 2010, 22 refs
VALEA DOSULUI*	Roman gold-mining settlement	Domergue 2008, 0 refs; Hirt 2010, no refs
TECHEREU	Roman gold-mining settlement	Domergue 2008, 0 refs; Hirt 2010, no refs
ALMAȘU MARE *	Roman gold-mining settlement	Domergue 2008, 0 refs; Hirt 2010, no refs
POIANA *	Roman gold-mining settlement	Domergue 2008, 0 refs; Hirt 2010, no refs
STĂNIJA	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
CIB *	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
BAIA DE CRIȘ*	Roman gold-washing and settlement Roman galleries, water-slucies, etc.	Domergue 2008, 0 refs; Hirt 2010, 2 refs
RIBIȚA	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
ȚEBEA	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
CARACIU	Roman gold - mining settlement Evidence of mining galleries and gold-washing reported	Domergue 2008, 0 refs; Hirt 2010, no refs
MESTEACĂN	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
BRAD (LA PETRENEȘTI)*	Roman evidence Evidence of galleries and cemeteries	Domergue 2008, 0 refs; Hirt 2010, no refs
PORCUREA	Roman evidence	Domergue 2008, 0 refs ; Hirt 2010, no refs
HĂRȚĂGANI	Roman evidence 18th century refs to Roman use of thermal springs reported	Domergue 2008, 0 refs; Hirt 2010, no refs
BĂIȚA*	Roman gold-settlement Galleries and extensive mining evidence, buildings, etc	Domergue 2008, 0 refs; Hirt 2010, no refs
FIZEȘ*	Roman gold-mining settlement Water-wheel found in mine	Domergue 2008, 0 refs; Hirt 2010, no refs
HONDOL	Roman evidence Some evidence of Roman mining	Domergue 2008, 0 refs; Hirt 2010, no refs
SĂCĂRÎMB (CĂINELUL DE SUS)	Roman evidence Extensive traces of Roman goldmines reported in 1890's	Domergue 2008, 0 refs; Hirt 2010, no refs
(CRIȘCIOR)	Early 19th century traces reported	Domergue 2008, 2 refs; Hirt 2010, no refs
ISCRONI	? evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
MAIDAN	Roman gold-working?	Domergue 2008, 0 refs; Hirt 2010, no refs

Mines By region	Interpretation of Evidence	Refs in Domergue 2008 and Hirt 2010
SASCA MONTANĂ	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
MOLDOVA NOUĂ	Roman evidence	Domergue 2008, 0 refs; Hirt 2010, no refs
BORLOVA	Roman evidence Gold-washing installations etc.	Domergue 2008, 0 refs; Hirt 2010, no refs
BOLVAŞNIŢA*	Roman evidence Gold-washing installations etc (nr. MEHADIA CASTRVM)	Domergue 2008, 0 refs; Hirt 2010, no refs
Dacia (cont)	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
BOCŞA MONTANĂ*	Roman evidence Many tools (for iron, tin, silver and ? gold-mining)	Domergue 2008, 0 refs; Hirt 2010, no refs
DOGNECEA *	Roman evidence Gold-washing and? galleries	Domergue 2008, 0 refs ; Hirt 2010, no refs
TURNU RUIENI	Roman evidence ?	Domergue 2008, 0 refs; Hirt 2010, no refs
VÂRCIOROVA	Roman evidence ?	Domergue 2008, 0 refs; Hirt 2010, no refs
PIANUL DE JOS	Hydraulic mining	Domergue 2008, 2 refs; Hirt 2010, 1 ref
Britain	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
LOUENTINON? (DOLAUCOTHI or PUMSAINT)*	Extensive evidence of Roman gold-mining, galleries and water-system	Domergue 2008, 4 refs; Hirt 2010, 10 refs
Gaul	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
GEMILIACUM (JUMILHAC-LE-GRAND) *	Roman settlement and gold- mine	Domergue 2008, no refs; Hirt 2010, no refs
ST YRIEIX-LA-PERCHE	Roman gold-mining	Domergue 2008, no refs ; Hirt 2010, no refs
BLATOMAGUS	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
FORGEAS	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
Spain	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
URROS	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
SERRA DE S. JUSTA	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
MACEDINHO	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
JALES	Roman gold-mining	Domergue 2008, 2 refs; Hirt 2010, no refs
TRES MINAS *	Roman gold mines	Domergue 2008, 20 refs; Hirt 2010, 6 refs
POCO DAS FREITAS	Roman gold-mining	Domergue 2008,2 refs ; Hirt 2010, no refs
SERRA DE ARGÁ	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
FRANCA	Roman gold-mining	Domergue 2008,0 refs ; Hirt 2010, no refs
BEMBIBRE	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, 1 ref
RIO ERIA	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, 1 ref
VALDUERNA	Roman gold-mining	Domergue 2008, 8 refs; Hirt 2010, no refs
MONTEFURADO	Roman gold-mining	Domergue 2008, 1 ref; Hirt 2010, no refs
RIO CABRERA	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
RIO TURIENZO	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
LAS MEDULAS*	Major Roman gold mines & infrastructure. World Heritage site.	Domergue 2008, 13 refs; Hirt 2010, 6 refs
PUEBLA DEL BROLLON	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
CASTROPODAME	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
EL CAUREL	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, 1 ref
LAS OMANAS	Roman gold-mining	Domergue 2008, 7 refs; Hirt 2010, no refs
LA LEITOSA	Roman gold-mining	Domergue 2008, 3 refs; Hirt 2010, no refs
PARAMO DEL SIL	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
VALLE RABON	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
MONTEROSO	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs

Mines By region	Interpretation of Evidence	Refs in Domergue 2008 and Hirt 2010
IBOLLO	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
ALTO DEL PALO*	Open-cast mining with water system. Extensive remains	Domergue 2008, 0 refs; Hirt 2010, no refs
ABLANEDA	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
MIUDES	Roman gold-mining	Domergue 2008, 0 refs; Hirt 2010, no refs
BRANA	Open-cast mining	Domergue 2008, 0 refs; Hirt 2010, 1 ref
IBOYA	Open-cast mining	Domergue 2008, 0 refs; Hirt 2010, no refs
FRESNEDO	Open-cast mining	Domergue 2008, 1 ref; Hirt 2010, no refs
RIO DE ORO	Open-cast mining	Domergue 2008, 0 refs ; Hirt 2010, no refs
CALE	Roman	Domergue 2008, 0 refs; Hirt 2010, no refs
THARSIS*	Roman settlement and more	Domergue 2008, 15 refs; Hirt 2010, 1 ref
MEIMOA	?	Domergue 2008, 0 refs; Hirt 2010, no refs
VIPASCA (METALLUM VIPASCENCE)*	Extensive epigraphic evidence; mines/galleries ? Goldworks. Famous site	Domergue 2008, 23 refs; Hirt 2010, 52 refs
Spain (cont)	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
CAVEIRA	Roman	Domergue 2008, 2 refs; Hirt 2010, no refs
URIUM (RIOTINTO)*	World famous mines. Extensive evidence	Domergue 2008,42 refs ; Hirt 2010, 9 refs
Noricum/Dalmatia/Pannonia , Moesia superior	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
(Nr) DONJA GUSTERICA *	Roman settlement and gold- mines	Domergue 2008, no refs; Hirt 2010, no refs
NOVO BRDO *	Roman settlement & gold- mines	Domergue 2008, no refs; Hirt 2010, 1 ref
(Nr) GORNO KOBILE*	Roman settlement & gold- mines	Domergue 2008, no refs; Hirt 2010, 1 ref
DOLNO KOBILE*	Roman settlement & gold- mines	Domergue 2008, no refs; Hirt 2010, 1 ref
DOLNO UJNO*	Roman settlement and quarry	Domergue 2008, no refs; Hirt 2010, 1 ref
GOLEMO SELO*	Roman settlement & gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
BISTRITSA*	Roman settlement & gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
PANCHAREVO*	Roman settlement & gold-mine	Domergue 2008, no refs ; Hirt 2010, no refs
GERMAN	Roman ? gold-mine	Domergue 2008, no refs; Hirt 2010, , no refs
GORUBLJANE *	Roman settlement & gold- mines	Domergue 2008, no refs; Hirt 2010, no refs
CANDALICAE	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
BISTUA NOVA and BATHIATAE region	Several Roman gold-mines identified	Domergue 2008, no refs; Hirt 2010, no refs
RUDNIK*	Roman gold-mining similar to Roşia Montană	Domergue 2008, 1 ref; Hirt 2010, 1 ref
KUCAINA	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, 1 ref
MAJDANPEK	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, 1 ref
RUSMAN	Roman gold-mining	Domergue 2008, no refs; Hirt 2010, 1 ref
KRIVELJ*	Roman settlement & goldmine	Domergue 2008, no refs; Hirt 2010, no refs
SLATINA	Roman ? goldmine	Domergue 2008, no refs; Hirt 2010, 2 refs
ZLOT	Roman ? goldmine	Domergue 2008, no refs; Hirt 2010, no refs
SOCANICA*	Roman gold-mining settlement & bridge	Domergue 2008, no refs ; Hirt 2010, 11 refs
LECE	Roman ? goldmine	Domergue 2008, no refs; Hirt 2010, 1 ref
ISKRETS	Roman ? goldmine	Domergue 2008, no refs; Hirt 2010, no refs
DOMAVIA/GRADINA *	Extensive infrastructure similar to AMPELVM	Domergue 2008, no refs; Hirt 2010, 16 refs

Mines By region	Interpretation of Evidence	Refs in Domergue 2008 and Hirt 2010
SPLONUM*	Epigraphic evidence of emigrants to Roşia Montană	Domergue 2008, no refs; Hirt 2010, 1 ref
SKELANI	Gold-mining	Domergue 2008, no refs; Hirt 2010, 3 refs
VARVARA	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
KOSMAJ*	Extensive evidence similar to Roşia Montană	Domergue 2008, no refs; Hirt 2010, 9 refs
VISIBABA	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
PLEVLJE	Gold-mining	Domergue 2008, no refs; Hirt 2010, 2 refs
NARONA	Gold-mining	Domergue 2008, ; Hirt 2010, no refs
CAVTAT	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
AEQUUM*	Emigrants to Roşia Montană	Domergue 2008, no refs; Hirt 2010, no refs
NERETVEI	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
POLJICA	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
CETINA VALLEY	Gold-mining	Domergue 2008, no refs; Hirt 2010, 1 ref
RIDATAE	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
DOCLEA	Gold-mining	Domergue 2008, no refs; Hirt 2010, no refs
Egypt	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
(Nr.) GHUZZA*	Roman Fort, with settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
ABU ZAWAL*	Roman road-station and gold-mine	Domergue 2008, no refs; Hirt 2010, 2 refs
BUKHALUG*	Roman settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
ERIDIYA*	Roman settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
(Nr) ATALLA*	Roman Fort and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
PERSOU (Nr)*	Roman settlement and cluster of gold-mines	Domergue 2008, no refs; Hirt 2010, 2 refs
Egypt (cont)	Evidence Interpreted	Refs in Domergue 2008 and Hirt 2010
MALGE	Possible Roman gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
UMM RUS	Two Roman (?) gold-mines	Domergue 2008, no refs; Hirt 2010, no refs
WADI DABAB	Possible Roman gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
(Nr) SIQDIT*	Roman settlement and gold-mine	Domergue 2008, no refs ; Hirt 2010, no refs
SUKKARI*	Roman settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
WADI EL-AMBOOT	Roman gold-mine	Domergue 2008, no refs ; Hirt 2010, no refs
ATTUT	Roman gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
(Nr) BARAMIYA*	Roman Fort and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
DUNQASH *	Roman settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
SAMUT (1)*	Roman settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
SIBRIT	Possible Roman gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
HAMESH	Roman gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
GELLI*	Roman settlement and gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
UMM GARRIAT	Roman ? gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
ABU FAS	Roman ? gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
ALFAWA NW COMPASI	Possible Roman gold-mine	Domergue 2008, no refs; Hirt 2010, no refs
* = site from which significant evidence of more than minimal Roman gold-mining activity has been assembled		

Appendix 3

Appendix 3. Significance Statements employed by a variety of international bodies

Introduction

A statement of significance is the sum of values (significance criteria) assigned to a series or list of attributes (elements of significance) in determining the significance of a heritage asset. An indication of the magnitude of significance is expressed according to a hierarchy of values (Grades of Significance).

A Statement of Significance is part of an approach to heritage practice commonly referred to as *informed conservation* established internationally by the Venice Charter in 1964 (ICOMOS 1964). It is a mechanism for establishing the level of significance of a heritage asset which provides the basis for future decision making. Statements are used by a multiplicity of agencies including UNESCO, national governments, NGOs and regional authorities, to provide the basis of sound and informed management.

The statement is part of 'a logical progression from understanding the history and fabric of the heritage asset, into an explicit assessment of the significance, and from there, directly into the formulation of policies for retaining that significance' (Clark 1998).

The following outline the form in which the Statement of Significance has been used by various organisations.

1. UNESCO - World Heritage Sites¹¹⁰

A Statement of Significance in an application for World Heritage status would have to satisfy one of the following criteria, expressed as **outstanding universal value**:

- (i) it represents a masterpiece of human creative genius;
- (ii) exhibits an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;
- (iii) bears a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;
- (iv) is an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates a significant stage(s) in human history;
- (v) is an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;
- (vi) be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance.
(to be used in conjunction with other criteria) ;

¹¹⁰ Extract and slightly paraphrased from the *Operational Guidelines for the Implementation of the world Heritage Convention*. 2008 UNESCO

Integrity and/or authenticity

To be of outstanding universal value, a property must also meet the conditions of integrity and/or authenticity and must have an adequate protection and management system to ensure its safeguarding.

Authenticity

Properties nominated under criteria (i) to (vi) must meet the conditions of authenticity. (the Nara Document on Authenticity, provides a practical basis for examining the authenticity of such properties and is summarized below).

The ability to understand the value attributed to the heritage depends on the degree to which information sources about this value may be understood as credible or truthful.

Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage, and their meaning, are the requisite bases for assessing all aspects of authenticity.

Judgments about value attributed to cultural heritage, as well as the credibility of related information sources, may differ from culture to culture, and even within the same culture.

The respect due to all cultures requires that cultural heritage must be considered and judged primarily within the cultural contexts to which it belongs.

Depending on the type of cultural heritage, and its cultural context, properties may be understood to meet the conditions of authenticity if their cultural values (as recognized in the nomination criteria proposed) are truthfully and credibly expressed through a variety of attributes including:

- form and design;
- materials and substance;
- use and function;
- traditions, techniques and management systems;
- location and setting;
- language, and other forms of intangible heritage;
- spirit and feeling; and
- other internal and external factors.

Attributes such as spirit and feeling do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless are important indicators of character and sense of place, for example, in communities maintaining tradition and cultural continuity.

2. National Trust of England Model

Based on 'guidance produced for the National Trust by Alan Baxter and Associates for the Tyntesfield Conservation Plan (2005) and used in the Chedworth Conservation Management Plan (Sec7, 7.1.2 p41)

Assessment of Significance

Basis of Assessments

Criteria for determining Significance of Buildings¹¹¹
Architectural Interest
Historic Interest

¹¹¹ Derives from the criteria originally published in PPG 15 para 6.10-6.16 now in PPS 5 following the UKs Planning (Listed Buildings and Conservation Areas) Act 1990

Historical Associations
Group Value

Scheduled Ancient Monuments¹¹²

Ability to Characterise a period
Rarity of Survival
Extent of Documentation
Association with other monuments
Fragility/Vulnerability
Diversity - the combination of high quality features
Potential

Collections and Archives

Rarity
Quality of Design
Historic interest of use or associations with important individual or within the place
Unity with other aspects of the property such as buildings or landscapes
Documentation – the extent to which provenance can be proved
Condition

Landscape

Group Value
Documentation
Condition

Intangible Heritage¹¹³

Representative value – the ability to demonstrate social or cultural developments
Historical Continuity – in buildings and activities
Formal, visual and aesthetic qualities
Evidence of social history
Contemporary community Value
Power to communicate values and significance

Degrees of Significance

Highly Significant -
Significant -
Some Significance -
Neutral -
Detracts -

Statement of significance

Summary narrative of attributes, their significance and magnitude of significance expressing the overall degree of significance.

Individual Elements of Significance

Text Comprising:

- Brief Narrative Description
- Assessment of significance
- Conclusion based on significance criteria

¹¹² Originally published in the UK as the Secretary of States non-statutory criteria for SAMs in 1983

¹¹³ Based on the work of Semple Kerr in Australia, recently promoted by Clark 1999, 2001, the process critically reviewed by L-J Smith 2004. 105-124.

3. English Heritage - Informed Conservation

'Put simply Conservation Plans incorporate a logical development progressing from understanding the history and fabric of the site, into an explicit assessment of the significance, and from there, directly into the formulation of policies for retaining that significance¹¹⁴.'

Clark's volume *Conservation Plans in Action*¹¹⁵ provides a series of model Briefs for Conservation Plans in general and specific situations, including buried archaeology.

Assessment of Significance. Assesses the significance of the site both general and in detail for each of the main components of the site, making specific value judgements about the degree of historical, ecological, geological, cultural, aesthetic, archaeological, technological, social and other types of significance. Overall summary of significance (1 side A4) Statutory status of all or parts; Significance by cultural/land use phase; Significance by component/area/compartment (may be table or descriptive) other values or way site is significant (e.g. community).

Assessing significance involves defining two sets of criteria: the value to be used, and the way in which 'degrees' of significance are to be established. These will depend on the individual nature of the site.

The finished **Statement of Significance** includes:

A general statement of significance, setting out the key values for the place.

An assessment of the significance of the elements of the site in such a way as to reflect historical, architectural, archaeological, visual, landscape or social significance. In terms of archaeology the significance criteria quoted are those in PPG 16.¹¹⁶

4. Australian Practice – New South Wales Government

Statements of Heritage Significance

The main aim in assessing significance is to produce a succinct statement of significance, which summarises an item's heritage values. The statement is the basis for policies and management structures that will affect the item's future. It is important to get it right. In most cases a short paragraph will suffice. An item of particular importance to the heritage of the State may require a statement that takes up a page or more.

The following criteria and guidelines indicate the kinds of questions that should be asked in making a heritage assessment. The guidelines are not a substitute for independent critical analysis and sound judgment. The particular qualities of the individual item should guide the assessment process. The inclusion and exclusion guidelines are a checklist only – they do not cancel each other out. The exclusion guidelines should not be applied in isolation from the inclusion guidelines, but should be used to help in reviewing and qualifying the conclusions reached.

An item is **significant** in terms of the particular criterion if the kind of attributes listed in the inclusion guidelines help to describe it. Similarly, the item is **not significant** in terms of the particular criterion if the kind of attributes listed in the exclusion guidelines help to describe it.

All criteria are expressed in optional terms as State or local. In most cases the level of significance will be the last question that needs to be addressed in the assessment process.

¹¹⁴ Clark K 1998 *Conservation Plans A Guide for the Perplexed, Context 58*, Edinburgh:IHBC

¹¹⁵ Clark K 1999, *Conservation Plans In Action*, EH:London

¹¹⁶ See above in the National Trust section: these are published as the Secretary of States non-statutory criteria for SAMs in 1983, also Appendix 4 of former UK PPG16

The NSW heritage assessment criteria encompass the four values in the Australia ICOMOS Burra Charter, which are commonly accepted as generic values by Australian heritage agencies and professional consultants:

- **historical significance**
- **aesthetic significance**
- **scientific significance**
- **social significance**

The values are expressed as criteria in a more detailed form than this to:

- maintain consistency with the criteria of other Australian heritage agencies;
- minimise ambiguity during the assessment process; and
- avoid the legal misinterpretation of the completed assessments of listed items.

The values are based on the criteria used by the Australian Heritage Commission for the assessment of potential items for the Register of the National Estate and are in line with the standard criteria adopted by other state heritage agencies.

Criterion (a)

An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (b)

An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (c)

An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);

Criterion (d)

An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;

Criterion (e) An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (f)

An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (g)

An item is important in demonstrating the principal characteristics of a class of NSW's:

- cultural or natural places; or
- cultural or natural environments.

or a class of the local area's

- cultural or natural places; or
- cultural or natural environments

5 Australian Collections¹¹⁷

The statement of significance is also used in respect to artefacts and collections as illustrated here by reference to

Criteria for national significance

Primary criteria

Historic significance

- Is the item or collection associated with an important historical event? Did it contribute to changing the course of national history or have an impact on the development of Australia or a part of Australia?
- Is the item an outstanding example associated with an important event, person, place, period, activity, industry or theme?
- Is the work an outstanding example representing the course or pattern of Australia's natural or cultural history?
- Is the item or collection associated with a pivotal discovery or innovation in the history of science, technology or design in Australia?

Artistic or aesthetic significance

- How important is the artist, writer, designer or creator?
- Is it an excellent example of a style, design, artistic movement or iconography?
- Does the work have an important or pivotal place in an artist's *oeuvre*?
- Does the work depict an important place, person, period, activity, story, idea or event?
- Does the work show outstanding artistic, design, innovation or technical accomplishment?
- Does the item have outstanding aesthetic value?

This criterion is most relevant to works of art, craft, design and decorative arts, but may also apply to items of technology, or mineral specimens or folk art. Items do not have to be art works to have artistic or aesthetic value. Some pictures may have little artistic significance but have historic value instead.

Scientific or research significance

- Does the item or collection support research on an important, rare or endangered aspect of the natural environment?
- Does the item or collection have outstanding potential to yield information or knowledge that will contribute to an understanding of Australia's natural or cultural history?
- How or why is the item or collection of outstanding scientific interest or research potential?

This criterion only applies to items or collections of **current** scientific value, or with **research potential** such as archives, natural history or archaeological collections. Items such as historic scientific instruments are generally of historic significance.

¹¹⁷ This section is based on the Collections Council of Australia policy - <http://significance.collectionscouncil.com.au/part6-accessandeducation-sosforolympictorch> accessed 28th September 2010

Social or spiritual significance

- How is the item or collection of outstanding social or spiritual value for a group or community?
- Does the work embody beliefs, ideas, customs, traditions, associations, practices, places or stories that are highly important for a particular group?
- How is the important social or spiritual significance of the item or collection established or demonstrated?

Social or spiritual significance is always specific to a particular, identified group of people. Social or spiritual significance only applies to items and collections where there is a **demonstrated contemporary attachment** between the item or collection and a group or community. Items or collections of social history interest are of historic significance. Religious items that are no longer used are more likely to be of historic or artistic significance. If the item or collection has spiritual or social significance, this needs to be demonstrated through consultation with the community or group.

Comparative criteria

Items or collections must be significant under one of the primary criteria, before considering the comparative criteria. The comparative criteria interact with the primary criteria to help clarify and elucidate whether the item or collection is important enough to meet the 'threshold' of national significance. The comparative criteria may **increase or decrease** significance, depending on how they interact with the primary criteria.

Provenance

- Does the item have a particularly well documented provenance?
- How does this add to the meaning and importance of the item or collection?

Note: Provenance is part of the research in the assessment process as well as a comparative criterion.

Rarity or representativeness

- How rare is the item or collection? Is it the only one that exists in the country or the world?
- Is the item an outstanding or iconic example, representative of its class or type?

In some cases, items may be both rare and representative, such as examples of nineteenth-century working dress. An item that is merely representative is unlikely to be of national significance. It has to be significant under one of the primary criteria.

Condition or completeness

- Is the item in original or intact condition?
- Does the item or collection display outstanding integrity and completeness for its type?
- Does the condition of the item make an important contribution to understanding its use, history, creation or development?

Interpretive capacity

Does the item have a highly important place in the collection or in its place of context?

6 Heritage Lottery Fund (HLF) - Conservation Planning UK¹¹⁸

In making an application to the HLF the fund asks that a Conservation and Management Plan is prepared in which a Statement of Significance established the basis of an assets importance and the rationale for management decisions.

Statement of Significance

A Statement of significance is an explanation of what is important about the heritage and to whom it is important, including expert values and community values. Applicants are encouraged to assess significance in terms of:

- historic interest;
- natural or scientific interest;
- aesthetic or architectural interest;
- a source of evidence or knowledge; or
- of social or community value (including spiritual values).

In addition it is important to note if an asset is officially protected or designated in some way (for example registered museum, scheduled monument, site of special scientific interest, conservation area, listed building or other type of protected site).

¹¹⁸ www.hlf.org.uk/HowToApply/.../Conservation_management_planning.pdf accessed 28th September 2010

Appendix 4



6 October 2010

Roşia Montană – Statement of Significance

This report has been issued by Oxford University, Institute of Archaeology, credited to the principal authors Wilson, Mattingly and Dawson. The production of the report has been managed with respect to editorial, data collection, contextualisation and professional support by Michael Dawson of CgMs Consulting Ltd.

This is to confirm that Michael Dawson is a Member of the Institute for Archaeologists (MifA). As such he has demonstrated the necessary technical and ethical competence. In producing this report he is bound by the Institute's *Code of conduct*, by-laws and professional standards. As a member he has agreed to be subject to our disciplinary procedures and is subject to investigation in the event of an allegation of malpractice. These are the criteria that define a professional archaeologist.

Michael Dawson is a Director of CgMs Consulting Ltd, which I can confirm is an IfA-Registered Organisation. Organisations registered by IfA are monitored for their compliance with the *Code of conduct* and standards. In managing the production of this report they must demonstrate effective quality assurance mechanisms to ensure that their work meets professional requirements. To ensure that the standards of the Institute are met the IfA maintains a complaints system for investigating any concerns about the conduct or competence of Registered Organisations.

Yours faithfully,

Peter Hinton BA FSA FRSA MifA MIAM
Chief Executive

