VIII. Duration and intensity of exploitation

1. C14-dating of prehistoric flint mines in southern Limburg and contiguous areas

While clearing the galleries at Rijckholt charcoal was found in a number of places. Without doubt this would have come from prehistoric fires near the shaft entrances at the surface. Four suitable charcoal samples and a deer antler pick from one of the mines below the floor of the 'Grand Atelier', were used for C14-dating.

Correspondence and the locations of the five Rijckholt samples are included in Report 16. They are also marked on the map of the examined mine field (drawings GB-A^0-8810a to GB-A^0-8810c, scale 1:50). A reduced version at scale 1:400, in colour, of a combination of these drawings is included in Report 2.

C14-dates of other flint sources in southern Limburg and contiguous Belgian and German territories have subsequently become available. The geographic distribution of the locations of these sampling points is indicated in Fig. 35. Figure 36 shows the range of datings of the flint-producing localities in southern Limburg and contiguous Belgian and German areas. The calibration of all BC years, also those of the other flint-producing localities shown in Fig. 36, was based on the CAL.15 program of C.I.O. Groningen Radiocarbon Calibration Program based on Stuiver *et al.* 1993 (Fig. 37).

2. Chronology

The five radiocarbon dates cluster between 5090 ± 40 BP and 5000 ± 40 BP, i.e. 3970 and 3700 BC (Table 6). This is not really surprising, as the samples were all situated rather close together, in the Grand Atelier area and in the adjacent western part of the underground excavation (BOSCH & FELDER 1990, fig. 3). The dates indicate that the 'Grand Atelier shaft system' is broadly coeval with the western part of the main mine field.

The radiocarbon dates show that at least some of the mines were contemporary with the Dutch Middle Neolithic A (according to the proposed new chronological system for Dutch Prehistory), or in cultural terms with the early stages of phase III of the Michelsberg Culture (MK, LOUWE KOOIJMANS 1980).

A more precise insight into the duration of exploitation can be gained through a survey of the occurrence of mined Rijckholt flint in dated settlement sites. In this we are confronted with two major problems: Firstly one must ascertain whether or not the artefacts under consideration really do originate from the Rijckholt mines. As stated above (III.2.), until now there are no criteria allowing a reliable distinction between flints from Rijckholt and from the Belgian mines e.g. at Jandrain-Jandrenouilles (Orp-le-Grand, province of Liège) or Spiennes, province of Hainaut (KARS *et al.* 1990). As an interim solution, only sites in regions for which Rijckholt would have been the closest and most conveniently situated source area (in terms of transportation) were considered. Secondly we have to define general characteristics of 'mined flint' (that also bear on artefacts without cortex). On the basis of a preliminary analysis of the debitage from the Rijckholt flaking floors, and in accordance with the definition given by WANSLEEBEN & VERHART (1990), the following artefact categories are considered to be made of mined flint: semifinished or polished flint axes and chisels, robust blades (minimum width 2.5 cm, minimum length 8 cm), large flakes (larger than 5 cm). Apart from the axes, pointed retouched blades (*Spitzklingen*) and wide end-scrapers on flakes seem to be the most characteristic tool types.

The selected regions comprise the Limburg Meuse valley, the Dutch Eastern River area, the Rhineland, as well as Westphalia and Hesse to the northeast and Baden-Württemberg to the southeast.

Maastricht, Watermolen-Vogelzang (BROUNEN 1995) may provide a *terminus post quem* for the systematic mining activities at Rijckholt. The site, discovered 1991 by Mr. B. Knippels and investigated in 1994 and 1995 by the Gemeentelijk Oudheidkundig Onderzoek Maastricht, is located in the Meuse valley, some 4 km to the north of the mines. Until now (spring 1996), however, no typical artefacts made of mined Rijckholt material were recovered from a stratigraphic position. The pottery may be assigned to the Early Michelsberg Culture (MK I) (according to Prof. Jens Lüning, oral comm., June 1995; this early dating is corroborated by the single radiocarbon

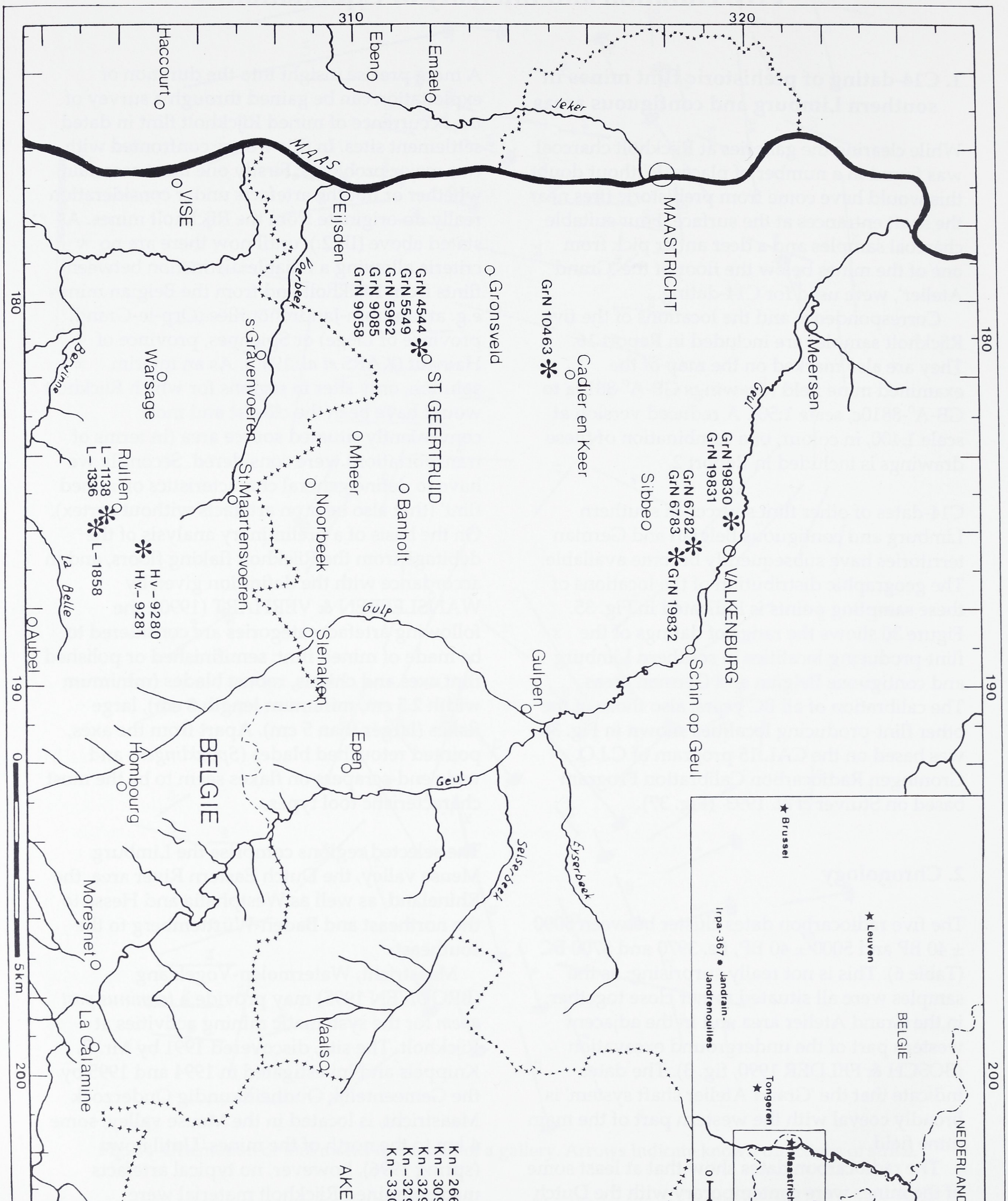

Fig. 35 Locations of flint extraction sites in southern Limburg and contiguous Belgian and German areas for which radiocarbon dates are available.

Sample	Date BP	Cal BC range at 2 sigma	Cal BC range at 1 sigma
GrN 4544 Charcoal from a gallery between shafts 3 and 4	5070 ± 60	3978-3760 3742-3714	3948-3898 3884-3798
GrN 5549 Charcoal from the fill at the bottom of shaft 23	5000 ± 40	3942-3858 3818-3698	3902-3882 3802-3754 3750-3712
GrN 5962 Charcoal from the fill at the bottom of shaft 19	5090 ± 40	3966-3892 3890-3796	3954-3926 3918-3914 3876-3808
GrN 9085 Charcoal from a mine below the floor of the «Grand Atelier»	5080 ± 45	3968-3786	3948-3908 3878-3806
GrN 9058 Deer antler from a mine below the floor of the «Grand Atelier»	5065 ± 45	3966-3774	3946-3898 3886-3844 3842-3798

Table 6 The Rijckholt Radiocarbon dates.

date: 5310 ± 80 BP (GrN 21043), i.e. between 4328 and 3978 BC). Artefacts apparently made of mined Rijckholt flint, however, are reported from the MK I site Inden 9 in the Rhineland (ALDENHOVENER PLATTE 1975; SCHWELLNUS 1983).

In the areas under consideration artefacts made from mined Rijckholt flint are known from a number of sites belonging to the Early and Middle Michelsberg Culture (MK II-III, as defined by LÜNING 1968), its Dutch facies Hazendonk 2, or the local derivative Hazendonk 3 (LOUWE KOOIJMANS 1981; 1983), all dated between 5600 and 4700 BP (LOUWE KOOIJMANS 1976; 1980), i.e. between *c.* 4420 and 3520 BC. Rijckholt artefacts also reached settlements belonging to the Funnel Beaker Culture in the north (STAPEL 1989) and the Schussenried Culture in the south (KEEFER 1988).

In recent years, moreover, an increasing number of finds attributed to the Vlaardingen/Stein/Wartberg group, dated between 4700 and 4100 BP (LOUWE KOOIJMANS 1983), i.e. between 3520 and 2630 BC, indicates that the exploitation may have gone on for a considerable time. This is corroborated by the single pottery shard found during excavations, a base fragment, recovered by van Giffen in the backfill of a mine shaft on the plateau (van GIFFEN 1925, pl. 4: VII, 35), that can be assigned to the Stein group (LOUWE KOOIJMANS 1974; LOUWE KOOIJMANS & VERHART 1990). The settlement data show no evidence for any decrease in the intensity of exploitation in the Stein/Vlaardingen period.

The exploitation of the Rijckholt mines probably did not end after the Stein/Vlaardingen/Wartberg period. Some Rijckholt artefacts were found associated with Bell Beaker pottery at Meerlo, Meerloërheide (VERLINDE 1971, especially fig. 8, 9). It is difficult to assess the duration of the exploitation, because well-dated, single-period sites from later periods are virtually absent, and the relevant artefacts cannot at the moment be distinguished from their Middle Neolithic counterparts (ARORA 1986; SIMONS 1989). The post-Neolithic occurrence of mined flint from Rullen, Valkenburg, the Lousberg, and to a lesser extent Rijckholt on the Aldenhoven Plateau, however, has been extensively documented by ARORA (1985) and SIMONS (1989), and at Spiennes settlement traces from the Bronze and Iron Ages are seen as evidence for the continuing exploitation of that mine site (HUBERT 1980). Thus, at Rijckholt shaft-and-gallery mines were probably used for at least thirteen hundred years, between *c.* 3950 BC and *c.* 2650 BC.

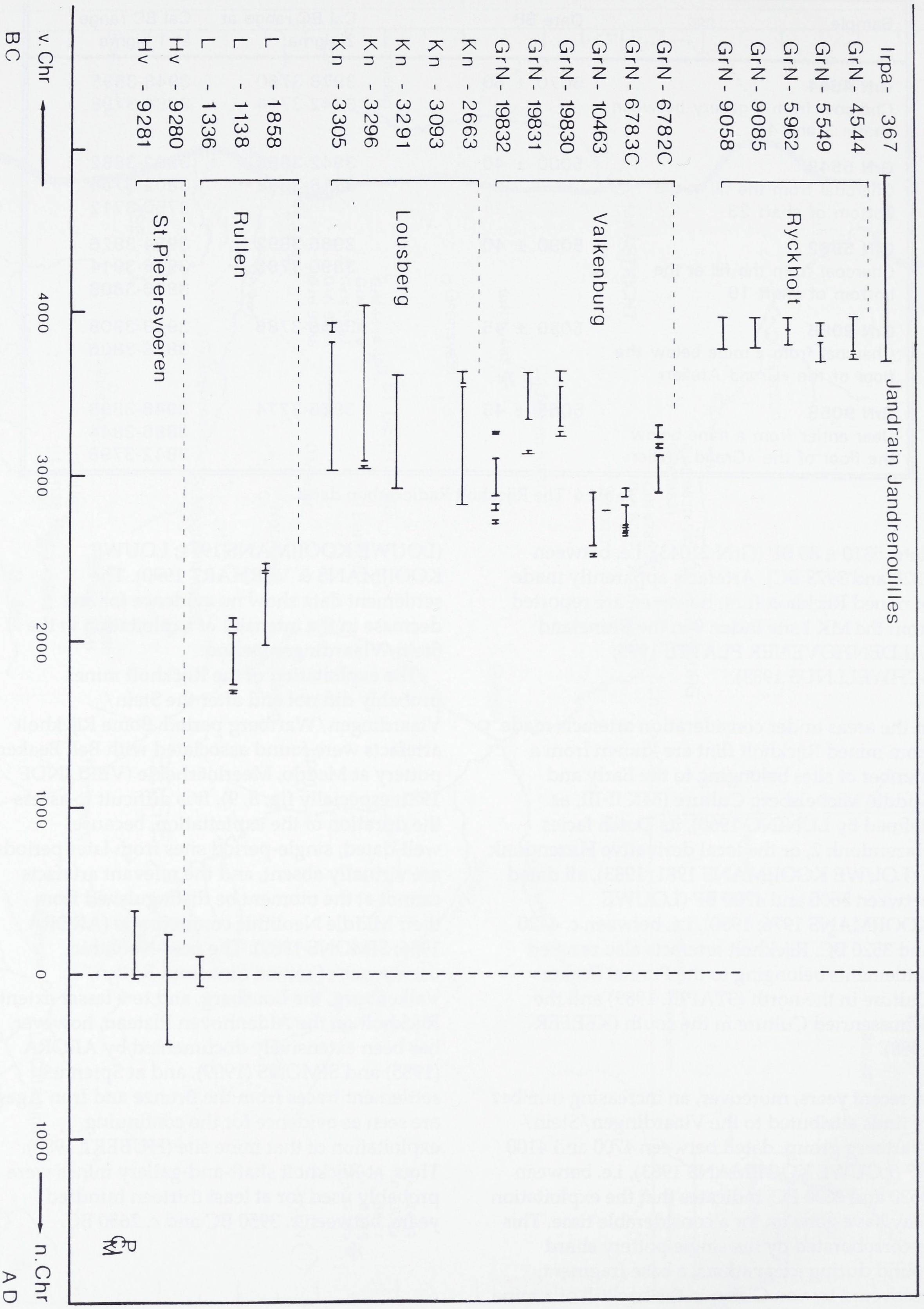

Fig. 36 Distribution of radiocarbon dates from flint mines in southern Limburg and contiguous areas.

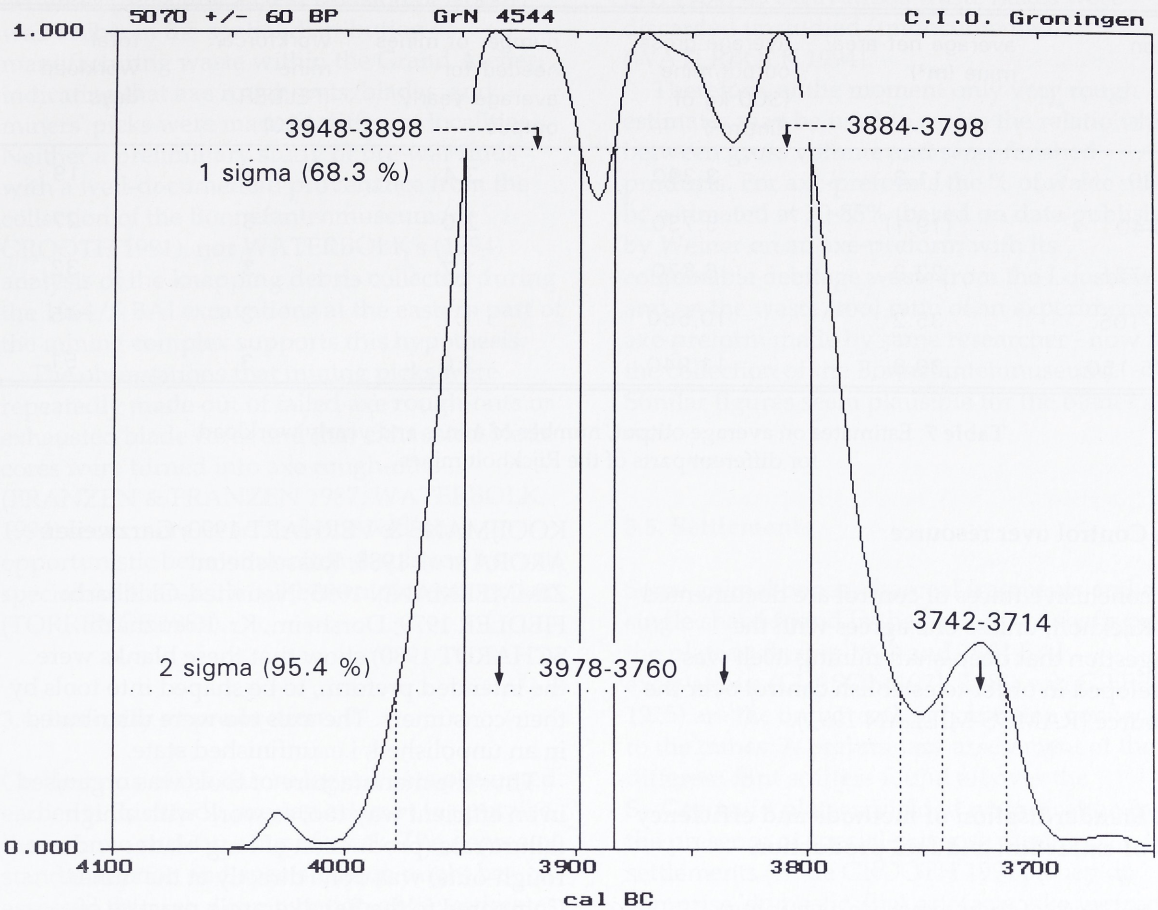

Fig. 37 Calibration diagram of a charcoal sample from the Rijckholt flint mines.

3. Socio-economic aspects

This chapter will try to interpret the organisational aspects of mining at Rijckholt, i.e. the ways it was embedded in the socio-economic life of the communities involved (SAHLINS 1972). In this context it is extremely important to bear in mind that deep-shaft mining was not undertaken for its own sake, but to obtain suitable raw material in a structured way. The ultimate purpose of the process, of course, was to manufacture preforms and (parts of) tools that could be used in a variety of ways, economic as well as social or ritual (McBRYDE 1986; McBRYDE & HARRISON 1981; TORRENCE 1989; de GROOTH 1994; 1997). For a better understanding of the procurement strategies applied, one must study, in an integrated approach, the assemblages both of the extraction and workshop sites and of the settlements consuming their output (ERICSON 1984; TORRENCE 1986).

This procedure involves the careful consideration of aspects such as the duration and intensity of exploitation; the presence or absence of some sort of control over the resource, and, in case access is seen as restricted, of the type of social formation (family, moiety, clan, tribe, etc.) vested with the ownership rights; the relative and absolute volume of production, and the amount of standardisation in production methods, resulting in an efficient use of the resource; the spatial correlates of the reduction sequence, especially the existence of repeatedly used special activity-areas within the site, indicating standardised practices in the division of labour; the location and character (permanent or temporary) of the miners' settlements; the way the distribution of the product was organised (TORRENCE 1986; de GROOTH 1991).

position	average net area/ mine (m²)	average gross output/mine (300 kg of flint/m²)	number of mines needed for average yearly output	workforce/ mine (FELDER 1980)	total workload days
A: 0-30	11.3	3,390	3.4	2	19
B: 30-40	(19.1)	5,730	2.0	3	27
C: 40-72	22.9	6,870	1.7	3	32
D: 72-105	35.2	10,560	1.1	3	45
E: 105-150	39.8	11,940	1.0	3	51

Table 7 Estimates on average output, number of mines and yearly workload for different parts of the Rijckholt mines.

3.1. Control over resource

No conclusive traces of control are documented for Rijckholt, unless one agrees with the suggestion that deep-shaft mining itself was developed in order to establish control over the resource (RAMOS-MILLÁN 1991).

3.2. Standardisation of methods and efficiency of extraction and tool production

On the basis of their expertise as mining engineers, the excavators describe the prehistoric miners as very skilled and efficient, obtaining an optimal result without taking unnecessary risks. Moreover, the systematic procedures followed in the lay-out of both individual mines and the (excavated part of) the complex as a whole, as well as the optimal way the miners adapted these procedures to changing geological circumstances, clearly point to a high level of professional competence, maintained for many generations (see chapter VI.3.).

Dense concentrations of knapping debris are found on the surface above the mining complex (de GROOTH 1991; WATERBOLK 1994). They show that robust blades (with an average width of 20-30 mm), massive flake scrapers, and rough-outs for axes with an oval cross-section were the main types produced on the site. Hoards of, partly conjoinable, blades found both at the mines (OPHOVEN & HAMAL NANDRIN 1955; WOUTERS 1989) and at settlement sites all over the distribution area (e.g. Linden, Kraaienberg 1: LOUWE KOOIJMANS & VERHART 1990; Garzweiler: ARORA *et al.* 1988; Rüsselsheim: ZIMMERMANN 1995; Neuwied-Gladbach: FIEDLER 1979; Dorsheim, Kr. Kreuznach: SCHARDT 1980) show that these blanks were the intended preform, to be shaped into tools by their consumers. The axes too were distributed in an unpolished, i.e. unfinished state.

Thus the manufacture of tools was organised in an efficient way too, as work with a high failure rate (production of long blades and axe rough-outs) was done directly at the mines. Compared to the Bandkeramik practice of transporting unworked nodules to settlement sites (de GROOTH 1987; 1994), this method led to a substantial decrease in the mass of potentially worthless material that had to be transported.

The majority of Rijckholt flint axes are smallish in size (with a length not exceeding 15-20 cm). According to J. Pélégrin (oral communication 19th October 1991 at the *Table-Ronde Internationale: les mines de silex au Néolithique en Europe occidentale* at Vesoul) axes with oval cross sections of this size could have been made by normal, 'competent' knappers. Only the exceptionally large, so-called 'ceremonial' axes (over 25 cm in length) would have been manufactured by skilled, experienced workers.

3.3. Special activity areas

Waste by-products of blade and axe manufacture are found in dense concentrations all over the mining area. According to van der SLEEN (1925) a marked differentiation of activities (reflecting a clear division of labour) was visible in the spatial distribution of manufacturing waste within the Grand Atelier, indicating that axe rough-outs, blades, and miners' picks were made at different localities. Neither a preliminary study of pre-war finds with a well-documented provenance from the collection of the Bonnefantenmuseum (de GROOTH 1991), nor WATERBOLK's (1994) analysis of the knapping debris collected during the 1964/5 BAI excavations at the eastern part of the mining complex supports this hypothesis.

The observations that mining picks were repeatedly made out of failed axe rough-outs or exhausted blade cores and that exhausted blade cores were turned into axe rough-outs (FRANZEN & FRANZEN 1987; WATERBOLK 1994) seem more in accordance with the opportunistic behaviour often displayed by craft specialists, than with full-blown professionalism (TORRENCE 1986).

3.4. Intensity of production

On the basis of the chronological data presented earlier in this study, we can attempt to appraise the volume and intensity of work. The degree of standardisation and specialisation might be assessed through a combination of the estimates of the gross volume of flint extracted (see chapter I.5.10.) with a detailed analysis of debitage waste, exhausted cores, blades, and discarded rough-outs from different parts of the site, thereby determining the actual flint working techniques employed and their efficiency in terms of tool/waste ratios as well as the relative importance of axe *vs* blade production through time. Then one might hope to be able to estimate the workload represented by the waste by-products. With the present data set such a comparison is, unfortunately, impossible, despite the huge masses of workshop debris stored in numerous museums and university collections. During most of the pre-war investigations knapping debris was not collected systematically (e.g. Hamal-Nandrin, cf. WOUTERS 1989), sometimes the material became dispersed in many different collections (van Giffen's 1923 excavations, stored at the RMO [Leiden], the Bonnenfantenmuseum, Maastricht and the Groningen BAI, or its present whereabouts are unknown altogether [most of the material excavated by the French Dominicans, WOUTERS 1989]. Even during the BAI 1964/65 excavations waste flakes were discarded unstudied/undocumented (WATERBOLK 1994).

Therefore, at the moment only very rough estimates may be used to assess the relationship between gross volume and semi-finished products. For axe-preforms the % of waste may be estimated at 70-85% (based on data published by Weiner on an axe-preform with its conjoinable debitage waste from the Lousberg, and on the waste/tool ratio of an experimental axe-preform made by same researcher - now in the collection of the Bonnefantenmuseum). Similar figures seem plausible for the blades as well.

3.5. Settlements

Some animal bones, charcoal fragments and a single shard found in the back-fill of shafts on the plateau during 1923 and 1964 BAI excavations (CLASON 1971; 1981; van GIFFEN 1925) are the only traces of habitation connected to the mines. A preliminary assessment of the different flint scatters found all over the St. Geertruid plateau yielded no indication for the presence of special-purpose mining settlements (cf. de GROOTH 1991). They do comprise 'domestic' flint artefacts, like worn-out or broken polished axes (several of them made from non-local raw materials!), scrapers, borers, arrowheads, and retouched flakes and blades, as well as fragments of stone querns (FRANZEN *et al.* 1991; HAMAL-NANDRIN & SERVAIS 1923; ROEBROEKS 1980; WATERBOLK 1994; and Archives Bonnefantenmuseum). The broad range of activities they represent would argue for them to stem from agrarian settlements. In fact, the fertile loess soil of the plateau would have justified occupation by farming communities in its own right (BAKELS 1978). There is, however, given the lack of extensive excavations or at least a systematic analysis of the relevant surface collections, no way to decide whether the plateau sites should be seen as the result of permanent or periodic occupation. In a qualitative sense these traces are indistinguishable from similar scatters found at several sites on the lower and middle terraces both to the south and to the north of Rijckholt (BROUNEN *et al.* 1990; internal reports by Mr Bert Knippels to the GOBM; and archives Rijksdienst voor het Oudheidkundig Bodemonderzoek and Bonnefantenmuseum).

3.6. Evaluation[6]

In the following discussion it will be assumed that mining at Rijckholt was a male activity, as was the case in all ethnographic examples known to us, where women could at most participate in the tranportation of mined material to the settlements (de GROOTH 1994c). According to generally accepted criteria for the recognition of specialist acquisition of raw material and manufacture of stone tools at mining and quarry sites (ARNOLD 1985; ERICSON 1984; MILLER 1987; TORRENCE 1984; 1986), mining and manufacture at Rijckholt undoubtedly were specialist activities. There is no need, however, to see the excavation of deep shafts *per se* as a task so technically complicated and time-consuming that the miners would have needed daily practice to maintain their skills, and thus necessarily would have been full-time professionals. Basically, the term 'specialist' refers to those people who perform complicated tasks more successfully than others and, because of their special skills, tend to perform them more often as well (ARNOLD 1985) or to co-ordinate the work of less-experienced team-mates (BURTON 1984), without implying anything about the amount of time involved. The criteria apply to both part-time craft specialists working in acephalous societies and full-time commercial professionals (MILLER 1987), and they should cover cases of horizontal or between-group specialisation (LECH 1980) as well.

Given the estimated maximum of *c.* 2,000 shafts (chapter I.5.8.), and 1,300 years of shaft-and-gallery mining (chapter VIII.3.), on the average only one and a half shafts a year would have been exploited. On the basis of FELDER's (1980) calculations it has been shown that 35 days were needed to exploit the average mine, so the average yearly workload for mining would have amounted to 52 days.

With an estimated 15,000,000 kg of flint extracted through deep-shaft mining (chapter I.5.10.), an average gross output of *c.* 11,539 kg would be produced every year. The number of mine-shafts to be sunk in order to achieve this output depends on their size, and thus varies considerably in different parts of the complex. The same holds true for the workload and workforce needed (Table 7).

Thus, in the beginning the sinking of 3-4 shafts would be needed to acquire the necessary amount of raw material, whilst later on a single big mine would suffice.

These figures, of course, reveal nothing about the size of the labour force or the actual time spent on mining. For the smaller mines we can either imagine a two- or three-person team working for 60-70 days, whereas others would be employed in the production of blades, axe rough-outs, and, last but not least, hafted flint picks. Enlarging the number of people involved would automatically lead to a corresponding decrease in the amount of time needed: if four teams worked simultaneously, the job could be done within 19-25 days, on a part-time basis (either by members of a single large community or by four different groups). The largest mine exploited (shaft 44) nearly at the end of the sequence, would employ 4 people, working for 70 days. From an organisational point of view - and taking into account the observed safety procedures such as the presence of connecting galleries between shafts etc. (see chapter VI.3.4.) - one might even argue that, especially in the deeper/later parts of the complex, extraction was not undertaken every year, but was a special activity, performed intermittently, whenever the needs (be they economic, ritual or social, see infra) arose.

Such interruptions would not interfere with maintaining the observed high level of professional skills. On the one hand, in non-industrialised societies technological traditions are passed on from generation to generation, even when the tasks are complicated and actually are rarely performed. On the other hand, the lay-out of former mines would remain recognisable for a long time, through changes in vegetation, the traces of back-filled shafts and workshop sites, rubbish tips, accumulations of debris etc.

From the way the shafts were connected by means of 'safety' galleries an interesting pattern emerges, at least when we assume that mining started at the shallow shafts in the western part of the excavated transect and moved towards the east, where deeper shafts were necessary, over time. First, the excavated part of the mining complex comprises several distinct groups of interconnected mines. On the west-east axis, i.e.

[6] This interpretation partly differs from earlier accounts, which were based on a shorter exploitation period, a higher estimate of the total size of the mining complex, and lower estimates of the amount of waste material created during tool production (e.g. FELDER 1980; FELDER & OFFENBERG 1990).

moving upwards towards the plateau, the interruptions are clearly connected to the presence of geological faults. Such technical restraints cannot account for the segregations visible on the north-south axis (i.e. following the contour lines), and therefore suggest the existence of several independent, coeval organisational units. Secondly, it seems plausible that within these units subsequent (neighbouring) shafts were initially placed on roughly the same contour line (at roughly the same altitude), before the exploitation moved higher up the slope.

We are as yet unable to interpret these units in terms of the social formations (family, moiety, clan, tribe, etc.) involved and the timespan needed in working them. The integration of the evidence from the mines with the (scanty) data on the general character of settlement structure and subsistence strategies of MK/Hazendonk and Stein/Vlaardingen people may, however, provide part of the answer.

The available evidence shows that during both the MK/Hazendonk and the Stein/Vlaardingen periods different subsistence strategies co-existed. In the Dutch coastal and river regions many sites are thought to represent periodic visits of people familiar with agriculture, but depending partly on the exploitation of wild resources as well (LOUWE KOOIJMANS 1985; LOUWE KOOIJMANS & VERHART 1990; van GIJN 1990). The Michelsberg culture on the sandy soils in the Meuse valley is regarded by Wansleeben and Verhart as a more or less mobile society. Any permanent habitation is thought to have been in the shape not of real villages, but of small isolated and dispersed settlements (WANSLEEBEN & VERHART 1990, 399). The same should hold true for the Stein/Vlaardingen sites in this area. The settlement and environmental data for MK and Stein/Vlaardingen habitation in the loess zones of Belgium, Dutch Limburg and the Rhineland conform to this picture, notwithstanding the large (up to 100 hectares: WHITTLE 1977, 228) causewayed enclosures known from this area. One of them lies close to the Spiennes mines, another one was possibly situated eight kilometres to the northwest of Rijckholt, on the other bank of the River Meuse (DISCH 1969; 1971-72). There is, however, little evidence for substantial houses, and very few traces of local crop cultivation or large-scale grazing are visible in pollen diagrams (BAKELS in press). The Stein group seems to have had a much stronger impact on its environment, as documented by recent pollen evidence from the Maastricht-Randwijck site showing heavy deforestation (BAKELS *et al.* 1993), but actual traces of habitation are as insubstantial as are the Michelsberg ones, and an assessment of the relative importance of cereal cultivation versus cattle breeding is impossible at the moment. Whatever their purpose, the enclosures seem to reflect a rather strong sense of territoriality (FLEMING 1982), a notion supported by the presence of distinct regional pottery styles and subsistence strategies within both the MK and the Vlaardingen/Stein groups. On the basis of the available evidence the societies involved may be described as tribal, with only a low level of social ranking, living in dispersed groups that meet for special activities on a regular basis. In such a situation it would be extremely unlikely that groups not belonging to the regional socio-economic polity would have had unrestricted access to high-quality resources. Mining rights rather would belong to the members of several small communities living nearby. These miners did not live permanently at the mines, but settled there periodically in temporary extraction camps. The groups may be conceptualised as having lived within a radius of thirty kilometres, i.e. within a six-hour walking distance of Rijckholt; in other words, as groups in whose common home range (BAKELS 1978, 5) the source of raw material was situated. The environment in the loess zones was rather less diversified than that in the river valley and coastal areas further to the north and northwest. Thus one can easily envisage a number of perishable goods that may have moved to Rijckholt: salt, caviar, smoked herrings and eels, sealskins and other furs. One may even ask, whether it would not have been primarily the miners that were eager to maintain the exchange networks (instead of the other way round) as a means to obtain highly valued and desirable goods.

In that case it would seem that deep-shaft flint mining at Rijckholt was an intermittent activity, not undertaken for purely economic or practical reasons, and that artefacts of mined flint were exchanged not only for economic, but for ceremonial/social purposes in a pluriform, multi-directional network. One should bear in mind, too, that the exploitation period of other flint mines in the region - such as Valkenburg, Lousberg, Rullen, Jandrain-Jandrenouilles - at least partly overlapped with that of Rijckholt (according to the radiocarbon dates in chapter VIII.1.), whilst the 'consumers' outside the region obtained artefacts from these other sources as well. On the other hand, settlement debris from the Rijckholt/St. Geertruid plateau contains quite a number of *Spitzklingen*, arrowheads and axe-heads from non-local raw material, stemming from e.g. northern France.

Perhaps enclosures, systematic mining and structured long-distance exchange all may be regarded as efforts to redefine/re-emphasise middle Neolithic group identity both internally and externally.

Internally, in the construction of mines and enclosures alike, the cooperation of large numbers of people whose day-to-day relationships as close neighbours may well have been rather stressed, could have served primarily to lessen tensions and to re-establish and strengthen traditional kinship ties and reciprocal obligations.

Externally, characteristic flint types may well have served as a means to mark the producers' group identity in their increasingly important communications with the outside world (de GROOTH 1997). Flint mining, then, would have fulfilled a similar function in middle Neolithic communities as did the rituals performed at the ceremonial enclosures. Thus, it would serve as a means of maintaining communication, regulating social relations between social groups which had to reconcile a partly mobile subsistence strategy with the need for establishing a permanent presence in distinct territories (MIDGLEY 1992).

The benefits of the spatial and temporal concentration and intensification of mining activities may then be regarded not only in terms of minimising expenditure of time and energy, but also of stimulating inter-group activities, controlled sharing of scarce resources and intensification of both regional and long-distance communication.

Finally, we must bear in mind that the act of digging deep holes into the earth itself must have had strong symbolic and ritual connotations. At the moment, these can mainly be guessed at. The skull deposited so carefully at the end of a gallery belonging to shaft 8 (VII.5.1.), as well as the other cranium finds connected to the mining fields, offer a tantalizing glimpse.