CHAPTER 3

EXPLORATION

- Paleolithic Culture
- Mesolithic Culture
- Chalcolithic Culture
- Early Historic Period
- Ancient Mining & Metal Processing Activity Area
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CHAPTER 3

EXPLORATION

Summary:
The third chapter is divided into five sections: Palaeolithic culture, Mesolithic culture, Chalcolithic culture, Early Historic culture and Ancient Mining and Metal Processing Activity Areas. Overall, it gives a brief account of material culture discovered by the present researcher during exploration. It discusses the location of sites and their nature along with their geomorphic setting. The periodization of sites are based on comparative study of ceramics, lithic assemblages, minor antiquity and metal processing indicators.

The first section is on Palaeolithic culture. The first segment of this section gives the general view of Palaeolithic culture followed by cultural stages designated as Lower Paleolithic, Middle Palaeolithic and Upper Palaeolithic cultures. The second segment gives brief account of Palaeolithic research carried out in Rajasthan. The last segment gives account of material culture found by present researcher in the research area.

Palaeolithic Culture

3.1 Paleolithic Culture:
In general, the term Palaeolithic Culture is assigned to the cultural material collected from Pliocene to the entire period of Pleistocene. The tool types and cultural stages of the Palaeolithic period are designated as:

Lower Palaeolithic Culture: the tool assemblage consists of pebble tools (chopper-chopping tools), handaxes and cleavers.
Middle Palaeolithic Culture: the tool assemblage consists of flake tools (awls, points and side scrapers).
Upper Palaeolithic Culture: the tool assemblage consists of blades and bone tools (backed blade, knives, burins and end scrapers).
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3.1.1 Lower Palaeolithic Culture:
An Indian Lower Palaeolithic pebble industry has spread sporadically all over the subcontinent. The findings of Lower Palaeolithic tools from Orissa in Kuliana, Kamarpara and numerous sites along Burhabalang, Brahmani and Mahanadi valleys shows the mixed tool assemblages of Clactonian flakes, chopper chopping tools along with the crude handaxes as well as small symmetrical Upper Acheulian handaxes and cleavers. Subsequently tools found from Giddalur and Nagarjuna Konda in Andhra Pradesh, Kortalayar valley from Attirampakkam and Vadamaduri in Tamilnadu, Malaprabha and Ghataprabha basins and Kibbanhali in Karnataka, Nevasa in Maharashtra, Narmada basin in Madhya Pradesh, Luni valley in Rajasthan and Barda hills in Gujarat have revealed numerous Lower Palaeolithic sites (Sankalia, 1974: 1-17).

In Rajasthan the discoveries of Lower Palaeolithic sites are largely confined to southern and central Rajasthan and partly to the western Rajasthan. The tool assemblages identified as handaxe, cleaver, core chopper/scaper, cores, Levalloisian flakes, blades, points, discoid cores, plain flakes and flake chopper/scaper are confined to Berach, Wagan, Kadmali and Gambhiri river system in southern Rajasthan (Misra, 1967: 22-58). Likewise, handaxe, cleaver, discoid core, plain flakes and flake chopper/scaper are confined to Hokra and Luni valley in central Rajasthan (Allchin et.al. 1978: 124-172). Cores, chopper/scaper are confined to Jaisalmer-Pokaran Road in western Rajasthan (Allchin et.al. 1978: 207).

3.1.2 Middle Palaeolithic Culture:
Middle Palaeolithic culture of India as a separate culture tradition was not identified till 1960s. Although a flake culture as a possible stage in Indian Palaeolithic succession was implicit in Cammaide and Burkitt's reporting of Andhra Pradesh material in the 1930s. It was only in 1956 that Sankalia demonstrated the stratigraphic context of this flake culture in Nevasa, Maharashtra (Sankalia, 1974: 143).

Middle Palaeolithic flake industries of India form the second demonstrable cultural phase of Pleistocene epoch. The important characteristic feature
noticed about this culture is the change in raw material using cryptocrystalline siliceous rock (Bhattacharya, 1996:15). Middle Palaeolithic sites in India are mostly depositional and not original living floors, so this change of raw material even if it is gradual in reality appears to be sudden in nature. A good stratigraphic succession is available at number of sites specially at Bhimbetka, one of the few sites with primary living floor. There is a distinct development of an Acheulian, which is typically Middle Palaeolithic in its flake element (Allchin & Alchin, 1982: 47-57). There is no such cent percent change of raw material observed at Bhimbetka. As far as typo-technological character of this age is concerned no remarkable change seems to have occurred from the preceding culture. Whereas flakes, produced by Levalloisian technique are reported from some areas, in other areas this technique seems to be totally absent. The most predominant type is a large variety of side scrapers, borers and points with specially formed scraper-cum-borer.

The important Middle Palaeolithic stratified sites have been found in Nevasa, Bel Pandhari, Suregaon, Kalegaon and Nandur Madhmeshwar in Godavari valley and its tributaries in Maharashtra signifying Middle Palaeolithic flake industries using Levalloisian technique (Sankalia, 1974: 149). Similarly Malaprabha and Ghatalprabha basins in Karnataka demonstrate the same technological features of Maharashtra Middle Palaeolithic flake industry. Orissa and Andhra Pradesh show almost total disregard for Levalloisian technique; here tools continue in many cases to be prepared on Lower Palaeolithic raw material i.e. quartzite showing no appreciable change in size. Tamilnadu, Madhya Pradesh, Rajasthan and Gujarat throws up the same cultural features of Maharashtra-Karnataka variety of Middle Palaeolithic flake industries. Middle Palaeolithic sites also reported from Bankura and Purulia district of West Bengal and from Rajasthan desert to West Pakistan (Bhattacharya, 1996: 9).

In Rajasthan, Middle Palaeolithic sites are largely confined to central Rajasthan and partly in southern and western Rajasthan. The tools assemblages identified as handaxe, side scraper, double scraper, side-end scraper, concave scraper, core scraper, end-scraper, borer, core, plain flakes and Levallois flakes are confined to Wagan, Kadmali and Berach in southern Rajasthan (Misra, 1967:
The tool assemblages such as cleaver, convex scraper, concave-convex scraper, carinated scraper, burin, borer, hammer stone, core, points, discoid core, plain flakes and levantoi5l flakes are confined to the Pushkar, Budha Pushkar, Hokra, Benara, Sambhar Lake, Marwar Bagra, Khairala, Mogra, Gurha and Thob in central Rajasthan (Allchin et.al. 1978: 127-186). But cleaver, denticular scraper, core and plain flakes are confined to Dandar, Jaisalmer-Pokaran Road, Baridhani and Nagari in western Rajasthan (Allchin et.al. 1978: 202-212).

3.1.3 Upper Palaeolithic Culture:
An Upper Palaeolithic blade and burin industry has emerged as reasonably well-defined entities in India (Possehl and Rissman, 1992: 467). Large blades and various Upper Palaeolithic types had been found as early as in 1932 when Cammiade and Burkitt described the culture scheme for Indian Palaeoliths (Sankalia, 1974: 207). The Series III of Cammiade and Burkitt include the Upper Palaeolithic types only, but in the absence of a proper stratigraphical context for these types had either been described within Middle Stone Age or pushed into Late Stone Age. Large number of insitu finds of Upper Palaeolithic blades has been reported from Rajasthan, Andhra Pradesh, Madhya Pradesh and southeast Uttar Pradesh. The stratigraphic order of the Indian Middle Palaeolithic, Upper Palaeolithic and widespread Indian Microlithic industries has established at Bhimbetka (Agrawal, 1982), in Belan valley (Sharma et al., 1980) and in the Son Valley (Sharma and Clarke, 1983). At Bhimbetka a distinct Upper Palaeolithic layers overlies a flake dominated Acheulian industry and in Andhra Pradesh a cave site called Muchchatta Chintamanu Gavi a cultural layer containing more than 90% bone tools (Bhattacharya, 1996: 20).

In Rajasthan, Upper Palaeolithic sites are largely confined to central Rajasthan and are partly found in western and northeastern Rajasthan. The tools assemblages identified as core trimming flakes, blade-cores, blade roughouts, blades, burins, carinated scrapers, flake-cores and denticular scrapers are confined to Pushkar, Budha Pushkar, Madhya Pushkar, Arjunpura, Mogra and Sar in central Rajasthan (Allchin et.al. 1978: 116–188). Cleaver, denticular scraper, core and plain flakes are confined to Jaisalmer-Pokaran Road and
Nagari in Western Rajasthan (Allchin et. al. 1978: 214-215) and two Upper Palaeolithic sites (not confirmed by the researcher) found around Nim Ka Thana in northeastern Rajasthan (Allchin et. al. 1978: 161).

**3.1.4 Palaeolithic Research Carried Out In Rajasthan**

Rajasthan saw the beginning of Palaeolithic research in 1950s. Antecedent to this period, only three discoveries were made by Carlile in 1871, Hackett in 1870s and Seton Karr in 1928, which are now only of historical importance because exact location and context of those artifacts are unknown (Stein, 1989).

From 1950s onwards, Palaeolithic research in Rajasthan has revealed numerous sites that provide us with a broader and better picture of this culture. In 1950s Deshpande (IAR 1953-54: 37 and IAR 1954-55: 58) discovered Lower Palaeolithic pebble tools, flakes, handaxes and cleavers from Gambhiri and Berach Valley near Chittorgarh. Later following the footsteps of M. N. Deshpande, Rao located six Palaeolithic sites from Bamani and Ruparel, the tributaries of Chambal and Breach Valley near Chittorgarh. In the meanwhile in 1953 Sankalia also discovered Palaeolithic tools in a gravel deposit from the river Banas at Nathdwara in Udaipur District (IAR 1953-54: 37). In 1955 Soundara Rajan found handaxes and cleavers near Bhangarh in Alwar District from Sanwan River, a tributary of Banganga (IAR 1956-57: 8). Again in 1956-57, Rao discovered Lower and Middle Palaeolithic tools from Chamli River, a tributary of Chambal River near Badoli and later also excavated at Sonita, Navaghat and Bhainsrorgarh all on the Chambal River (IAR 1956-57: 5). In 1956-57 Archaeological Survey of India (IAR 1956-57: 5-8) unearthed Lower Palaeolithic tools in Beawar on the Wagan River in Chittorgarh district. In 1958-61 Misra carried out Prehistoric research in eastern and western Rajasthan, in Chambal, Banas and all its tributaries in south Rajasthan, Banganga and Sanwan in north Rajasthan and Luni and all its tributaries in western Rajasthan (Misra, 1966). Allchin, Goudie and Hegde (1978) carried out Prehistory and Paleography research in Great Indian Desert from Jaipur to Jaisalmer and from
Bikaner to Bhiwani in east–west orientation and from Mt Abu to Delhi along the western side of the Aravalli and from Pali to Bikaner in north–south orientation.

3.1.5 Explored Palaeolithic Sites in Research Area

Palaeolithic research carried out by Central and State government bodies viz. Archaeological Survey of India, Geological Survey of India and Rajasthan State Archaeological Department have surveyed the region along the River and its tributaries in Rajasthan. Such research has brought to light number of sites in the southern Rajasthan whereas central, western and northern Rajasthan was shown to be devoid of any Palaeolithic sites. Research Institute of Deccan College under the supervision of Sankalia (1956) and later followed by Misra (1967) carried out their research on the same footings as previously carried out by the government agencies and extended the horizon of Palaeolithic findings to eastern and western Rajasthan. The foreign collaborative work of Allchin, Goudie and Hegde (1978) has further extended the horizon in Great Indian Desert. In spite of all these collective works by different agencies, the present research area was shown devoid of any Palaeolithic findings. In the present survey, three Lower Palaeolithic sites were reported from the research area. The findings of these sites has given lead for the future research in the central and northeastern part of Rajasthan known as Shekawati region whereas Middle Palaeolithic and Upper Palaeolithic sites are still not discernible in the research area.

3.1.6 Description of Sites Reported from Research Area.

Laluda Ki Dhani (LKD):
A Lower Palaeolithic secondary site located on a foothill at Laluda Ki Dhanl (27° 55'258"N – 75° 49'308"E), situated 1 Km west of village Papurna in Khetri taluka of Jhunjhunun (hereafter JJN) district. The village can be approached through a metal road and is nearly 27 Kms north of Nim Ka Thana (hereafter NKT) Khetri Maudh. The explorations in this area revealed one handaxe and two scrapers in quartzite raw material (Figure – 3.1). On the basis of typo-technological studies these tools can be dated to Lower Palaeolithic Period.
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Payga Kundalla (PKD):
Another Lower Paleolithic secondary site Payga Kundalia (27°50'000"N – 75°58'440"E) located 1 Km west of the village Sohanpura in NKT taluka of Sikar (hereafter SKR) district. This village can be approached through a metal road and is situated 31 Kms northwest from NKT (Khetri Maudh). The site is situated near an ephemeral stream that drains the village from north to south and the landform is dominated by small hillocks. The survey in the foothills (Figure – 3.2) of this area discovered one handaxe, one cleaver, two scrapers and three hammer stones (Figure – 3.3). All these tools are in quartzite raw material. On the basis of typo-technology comparisons these tools can also be assigned to the Lower Paleolithic Period. This multi cultural site revealed Mesolithic Rock Shelters with paintings, Chalcolithic and Early Historic potteries, which is discussed in the relevant sections.

Pir Baba Ki Bani (PBB):
Pir Baba Ki Bani (27°57'948"N – 75°52'771"E) is secondary Lower Palaeolithic site that is located 2.5 Km southwest of the Tonda Village in Kheri taluka of JNJ District. This village can be approached through a metal road and situated 37 Kms northwest from NKT (Khetri Maudh). The area is drained by Paneta nalla that is tributary of Chandrawati River. This nalla flows across the village and shows an open shrub area. The exploration for approximately 800 m stretch of the nalla revealed one handaxe, one cleaver and four scrapers in quartzite (Figure – 3.4). Again the Typo-technology of the tools suggests the Lower Palaeolithic Period for this site.
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Figure 3.1 – (a) handaxe; (b - c) scrapers

Figure 3.2 – general view of the site

Figure 3.3 – handaxe; cleaver; scraper & hammer stones
Figure 3.4 – (a) handaxe; (b) cleaver; (c) scrapers
Mesolithic Culture

The second section is on Mesolithic culture. The first segment of this section gives general view of Mesolithic culture. The second segment gives brief account of Mesolithic research carried out in Rajasthan. The last segment gives account of material culture found by the present researcher in the research area.

3.2 Mesolithic Culture:
Mesolithic Culture is a transitional phase between foraging and food production stage. During this period people were more or less semi-nomadic or had a pastoral way of life. After Pleistocene epoch many flora and fauna went extinct. The ecology had changed drastically and humans had no alternative, but to readjust to the new environment (Sankalia, 1974:14). The subsistence base has not changed much during Palaeolithic and Mesolithic period, but during Mesolithic riverine and marine food resources were intensified and are reflected in their tool kit. The available evidence strongly suggests that there was an expansion in human population during Mesolithic period, which might have caused by the introduction of new technology, more efficient exploitation of food resources or an improvement in climate or due to some other reasons as well (Bhattacharya, 1996: 21-28). But the principal environment niches preferred by the Mesolithic people for habitation were sand dunes, rock shelters, alluvial plains, rocky plains, lakeshores and coastal regions (Sankalia, 1974: 231).

The term "Mesolithic" in India is applied to denote the cultural stage represented by microliths without pottery and generally antedating the earliest farming based village cultures. The tool technology during the Mesolithic is essentially based on microliths (Sankalia, 1974:232). The microlithic technique shares more or less the same feature with Palaeolithic flaking except their main emphasis shifts to blade manufacturing by fluting. The microlithic blade basically differs from Palaeolithic flake or blade in having very sharp borders. Retouching in microlithic blade mainly aims at blunting a sharp border. This technique of blunting a sharp border evolved during Upper Palaeolithic phase, where this technique survives in various degrees and by the time Mesolithic culture emerges, it is adopted as the predominant retouching technique (Bhattacharya, 1996: 24–26).
Most of the information on Mesolithic culture in India comes from excavated sites. One of the earliest known microlithic sites in India is Birbhanpur in Burdawa district of West Bengal (Lal, 1958: 48). Where Lal calls this site as non-geometric microlithic industry and assigns its date to the beginning of Holocene epoch. Bhimbetka, the well-known Prehistoric site in India have over 800 caves and rock shelters found in Raisen district of Madhya Pradesh. The archaeological sequence at Bhimbetka shows habitational development from Acheulian to Mesolithic period (Agrawal, 1982: 66). During Mesolithic period cultural assemblages' shows microliths are associated with Chalcolithic and Iron Age pottery, metals, glass and other materials of historic age. Sagamakallu in Bellary district of Andhra Pradesh shows stratigraphic position of the microlithic industry dated broadly between 9000 to 3000 BC (Sankalia, 1974: 246). Baghor II in Son valley of Madhya Pradesh (not to confuse with Bagor in Rajasthan) located on a ridge of Late Pleistocene alluvium known as Baghor formation (Sussman et al 1983: 16), which forms early Mesolithic habitation occupied during early Holocene epoch. The lithic assemblage shows geometric microliths (Sussman et al 1983: 186). Sarai Nahar Rai in Pratapgarh district of Uttar Pradesh present as a single occupation settlement of approximately 2000 Sq m marked by fragmentary architecture in the form of hearth and floors surrounded by postholes (Sankalia, 1974: 239). The site reports presence of sheep, goat, buffalo, cattle and elephants bones (Agrawal, 1982: 67) with the findings of thirteen burials within the settlement (Kennedy and Caldwell, 1984). Lekhahia located in Kaimur River in Mirzapur district of Uttar Pradesh revealed four phases of occupation: the first phase shows Upper Palaeolithic tools with non-geometric microliths, the second phase shows non-geometric microliths without pottery, the third phase shows geometric microliths with pottery and the fourth phase shows geometric microliths with pottery here microliths are further reduce in size compare with the previous phase (Sankalia, 1974: 237–38). Bagor in Udaipur district of Rajasthan, which is situated above the Kothari River, a tributary of the Banas on the east of the Aravalli Range reveals three phases (Misra, 1973a: 93-109). The first phase is a purely microlithic settlement, which shows microliths and animal remains in profusion with structural remains consists of extensive floors made of schist slabs aligned in circular fashion at the periphery of wattle
The site reveals human burials in extended position in east-west orientation. The three C-14 dates assign around 4480 to 3285 BC. In the second phase microliths and animal remains decline compared to the preceding phase and mark the appearance of pottery and metal tools with other cultural materials. The site reveals three flexed burials in east-west orientation with grave goods such as pots, metal tools and ornaments. The two C-14 dates available at the site assign it around 2765 to 2110 BC. In the third phase microliths and animal remains decline further and mark the appearance of iron tools. The potteries are in profusion compared to the preceding phases along with the glass bangles and stone pendants. From the archaeological evidence the site is dated around 600 BC to AD 200. The significant features observed at Bagor phase II is the copper arrow heads. The importance of this copper arrow heads is the typological similarity with the Harappan sites of Kalibangan, Harappa, Jhukar, Mohenjodaro, Kot Diji, Chanudaro, Sutkengen dor and Lothal (Misra, 1973a: 299). The pottery at Bagor gives another significance made of gritty and micaceous clay treated with fine clay slip and burnishing (Misra, 1973a: 299 – 301). Adamgarh is located in Hoshangabad district south of the Narmada River in Madhya Pradesh (IAR 1960-61: 13). The site reveals over five thousand microliths in trench ADG-10 from the levels that contained neither glass nor iron. The pottery, unlike that from Chalcolithic or other known context was apparently found throughout the cut, although never in much quantity. The faunal remains at Adamgarh include dog, sheep, goat, deer, hare and other assorted mammals and reptiles (Bola Nath, 1967). Langhnaj located 100 Kms north of Ahmedabad in Mehsana district of Gujarat revealed abundant of microliths having 45 principal types (Sankalia, 1974: 252). Beside microliths, site revealed important findings of rhinoceros shoulder blade, dentition shell beads, incised potsherds, copper knife and two human skeletons (Sankalia, 1974: 254–256). The site show some kind of economic exchange with the Harappans in Gujarat and their subsistence regime seems to based on hunting and gathering since no domesticated species were found in the site (Possehl, 1980: 67–80).
3.2.1 Mesolithic Research Carried Out In Rajasthan

The Mesolithic research in Rajasthan came to light from the work of Rao in 1950s with the finding of Microlithic sites from Kadmaii, Berach and Gambhiri valleys in Chittorgarh district (IAR 1956-57: 5). During the same period Thapar discovered Microlithic sites from Kakoni on the Parwani in Kota district (IAR 1956-57: 5-8). Later on Soundara Rajan in 1955 discovered more Microlithic sites from Jodhpur district (IAR 1956-57: 8). As a routine village-to-village survey, Archaeological Survey of India in 1956-57 discovered Microlithic sites on the Berach River in Chittorgarh and Udaipur districts and some near Bhainsrorgarh on Chambal River. Similarly, State Archaeological Department of Rajasthan in 1958-63 discovered Microlithic sites from Khainsawar near Nagore in Jodhpur, Bhilwara, Chittorgarh, Ajmer and Tonk districts. In 1971 and 1977 Misra excavated two major Mesolithic sites in Rajasthan. Tilwara (Misra, 1971) located in the eastern fringes of the desert in Barmer district of Marwar region and Bagor (Misra, 1967), which sits over the Kothari River in Udaipur district of Mewar region. The findings at Bagor have given new vista for better understanding of Mesolithic culture in Rajasthan. Hooja (1988) has listed 146 Mesolithic sites in Rajasthan out of which 67 has been reported from Udaipur, Chittorgarh and Bhilwara district in southeastern Rajasthan; 75 sites were reported from Ajmer, Jaipur, Sikar and Jhunjhunun districts in central and northeastern Rajasthan; Barmer, Pali, and Jaisalmer districts in western Rajasthan revealed 5 sites and in Bikaner in north Rajasthan only one site has been reported.

3.2.2 Explored Mesolithic Sites in Research Area

Generally lithic assemblages are taken to predate the use of metal. So, the Mesolithic of Rajasthan is believed to be necessarily earlier than the Chalcolithic. However, there is some, as yet insufficient, evidence to suggest that sometime the technological transition from Lithic to Chalcolithic was not as total as one had previously been led to believe, nor sudden and universal. However, the Mesolithic site of Bagor and Ganeshwar indicates that microlithic using hunter-gatherers inhabited the region even when Chalcolithic stage has been firmly established in parts of these regions. This implies that some degree of hunter-gathering lifestyle continued to be in existence even when a more advanced technological skill had come into use. In this direction present survey on Mesolithic research was
carried out to find sites showing single culture having microliths with or without pottery and multi-cultural site having microliths with other cultural materials. In the light of these assumptions twelve Mesolithic sites reported from the research area have given a single culture with microliths and lithic debitage; multi-cultural sites with Chalcolithic and Early historic pottery and few sites near to the mining areas.

3.2.3 Description of Sites Reported From Research Area

Beed Ki Dhan (BKD):
A multi-cultural site (27°41'N - 75°54'E) located 1 km northeast of Dariba village in NKT taluka of SKR district. The village is situated 23 Kms southeast of NKT (Khetri Maudh) drained by perennial streams with open scrub area having few patches of agricultural field around the site. The nature of the site points towards it being a seasonal settlement. The exploration revealed multi-cultural assemblage of microlithic core (Figure - 3.5) and Chalcolithic pottery. The site measures around 405 Sq m and located in the vicinity of an ancient mining area. Few pottery sherds were also collected from this area, which is discussed in the next section.

Bhadwari (BWR):
A multi cultural site (27°34'166"N - 75°39'182"E) located 0.2 Kms southwest of Bhadwari village in NKT taluka of SRK district. The village is approached through metal road and that is situated 28.5 Kms southwest of NKT (Khetri Maudh). The area is drained by a tributary of Kantli River flowing in west-east orientation of the village. The landform shows series of sand dunes that rise up to 6 - 7 m height from the surrounding area. The ephemeral nature of the site perhaps indicates it being as a seasonal settlement measure 375 Sq m and located on one such sand dune. The exploration revealed microlithic blades and lithic debitage found in a single cluster (Figure - 3.6). Along with microliths, a multi-cultural assemblage of the site reveals Chalcolithic and Early Historic pottery, which is discussed in the relevant sections.
Blharipur (BRP):
A multi-cultural site (27°53'186"N - 75°53'710"E) located 2 Kms south of the village Blharipur in NKT taluka of SKR district. The site is identified as a seasonal settlement measures around 525 Sq m located on the sand dune that rise up to 10 m height from the surrounding area. The area is drained by tributary of Chandrawati River flowing in north-south direction across the village, which is around 41 Kms west from NKT (Khetri Maudh). The exploration revealed microlithic core and a fragment of shell bangle (Figure – 3.7).

Bhudoli (BDL):
A single culture site (27°41'865"N - 75°46'727"E) located 1 Km north of Bhudoli village in NKT taluka of SKR district. The village is nearly 5 Kms south of NKT (Khetri Maudh) and drained by ephemeral streams on the northern, southern and eastern side of the village. The landform around the site shows sand dune ridges that rise up to 4 - 5 m height from the surrounding area. The ephemeral nature of the site perhaps point towards it being a seasonal settlement, which measures only 27 Sq m and located on one of the sand dune revealing microlithic blades and lithic debitage collected in clusters of 2-3 m area.
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Figure 3.5 – core

Figure 3.6 – blades

Figure 3.7 – core & shell bangles
Gidhali / Nali # 1 (GDL):
A single culture site (27°47'448"N - 76°03'696"E) located 1 Km north of the
village Haripura in NKT taluka of SKR district. The village is around 35 Kms west
of NKT (Khetri Maudh). The landform around the site shows series of sand dunes
that rise up to 8 - 10 m height from the village, which is on the verge of
vandalism by the present construction worker. The nature of the site point
towards it being a seasonal settlement, which measures 239 Sq m and located on
one such sand dune revealing microlithic blades, cores and lithic debitage (Figure
- 3.8) with stray findings of terra cotta figurine.

Gidhali / Nali # 2 (GDL):
A multi-cultural site (27°47'435"N - 76°03'630"E) located on the adjacent sand
dune from GDL # 1. The site perhaps point towards it being a seasonal
settlement measures 346 Sq m and located on one such sand dune that rise up
to 6.5 m heights revealing microlithic cores and lithic debitage (Figure - 3.9). A
multi cultural assemblage of the site also revealed Chalcolithic and Early Historic
pottery with stray findings of iron piece, which is discussed in the relevant
sections.

(Juna Tila), (GNR) # 3:
A single culture site (27°40'531"N - 75°48'745"E) located 2 km northwest of
the village Ganeshwar in NKT taluka of SKR district. The village is around 12 Kms
southeast of NKT (Khetri Maudh) situated on the slope of the hillock. The village is
drained by Chandrabhaga nadi, a tributary of Kantli River on the west and Raotala
nalla on the southeast of the village. The ephemeral nature of the site perhaps
points towards it being a seasonal settlement measures only 74 Sq m revealing
microlithic blades and lithic debitage collected from a single cluster in the sand
dune that rise to 12m height from the surrounding peneplain area (Figure - 3.10).
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Figure 3.8 (a) blades & (b) cores

Figure 3.9 - cores

Figure 3.10 - cores, blades & flakes
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Kakrana (KRN):
A multi-cultural site (27°53'476"N - 75°39'458"E) located 0.5 km north of the village Kakrana in NKT taluka of SKR district. The village is around 22 Kms northwest of NKT (Khetri Maudh) drained by Kantli River flowing south to north on the western side of the village. The landform shows number of sand dunes around the site. The ephemeral nature of the site points towards it being a seasonal settlement, which measures 312 Sq m revealing microlithic blades and lithic debitage collected in a single cluster from stabilize sand dune. A multi cultural assemblage of the site also reveals Chalcolithic pottery with stray findings of terra cotta figurine and clay lumps along with the ancient mining area. Beside microliths, Chalcolithic pottery is discussed in the next section.

Mataji No Timbo (MNT):
A multi-cultural site (27°38'160"N - 75°41'655"E) located 2 Kms south of the village Govindpura in NKT taluka of SKR district. The village is around 18 Kms southeast of NKT (Khetri Maudh) drained by Kantli River flowing east to west on the southern side of the village. The landform around the site shows series of sand dunes that rise up to 4 - 5m height from the surrounding area. The site has identified as a seasonal settlement, which measures 429 Sq m located on one such stabilize sand dune revealing microlithic cores and lithic debitage collected in a single cluster. A multi cultural nature of the site revealed Chalcolithic and Early Historic pottery, which is discussed in the relevant sections.

Payga Kundalia (PKD):
A multi-cultural site as mentioned earlier in the Palaeolithic section. The Mesolithic period is identified with three rock shelters (Figure - 3.11) out of which two of them shows painting on it, which has been presumed to be from Mesolithic period (personal communication with Sharmaji, Kot Putali). The painting is in ochre color depicting hunting scenes, group dance and other group rituals (personal communication with Madan Lal Meena, Nim Ka Thana). There are series of cup marks observed on the stone floors, which indicate that it has been used for preparing colors. The exploration has also revealed Chalcolithic and Early Historic pottery, which is discussed in the relevant sections.
Sadmata Ka Maula (SKM):
A multi-cultural site (27°42'142"N - 75°49'926"E) located on the southeast periphery of the village Ganwari in NKT taluka of SKR district. The village is nearly 8 Kms southeast of NKT (Khetri Maudh) drained by a tributary of Kantli River flowing south to north and north to west on the eastern side of the village. The ephemeral nature of the site perhaps point towards it being a seasonal settlement, which measures 1988 Sq m revealing microlithic core and lithic debitage collected in clusters from the slope of the hillock. The landform around the site shows series of hillocks. Along with the microliths, site reveals Chalcolithic pottery, which is discussed in the next section.

Thoi:
A multi-culture site (27°32'595"N - 75°45'196"E) located 0.2 Km on the eastern periphery of the village Thoi in NKT taluka of SKR district. The village is situated on the foothills, which is around 32 Kms southwest of NKT (Khetri Maudh). The area is drained by a tributary of Kantli River flowing south to north on the western side of the village. The landform shows series of sand dunes around the site. The ephemeral nature of the site perhaps point towards it being a seasonal settlement (Figure - 3.12), which has revealed microlithic cores, blades and lithic debitage collected in patches from sand dune ridges. Along with microliths, the site also revealed Early Historic pottery, which is discussed in the relevant section.
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Figure 3.11 - (a - b) general view of rock shelters; (c - e) rock paintings

Figure 3.12 - general view of the site
3.3 Chalcolithic Culture

Chalcolithic is the term synonym for the late Neolithic to recognize the beginning of metalworking. It is a technical step that led smoothly into Bronze Age metallurgy. The word Chalcolithic signifies copper-stone age, a transitional step between Late Neolithic and Bronze Age. A discussion on Chalcolithic stage in India as a chronocultural phase becomes difficult because of the acute incongruence recorded between various regions within the country (Agrawal, 1982).

3.3.1 Chalcolithic Culture in Rajasthan

The cultural distribution of Chalcolithic sites in Rajasthan is marked into three groups:

Group-1: Northern region of Rajasthan categorized as belonging to Harappan culture sites.

Group-2: Southeastern region of Rajasthan categorized as Ahar culture sites.

Group-3: Central and Northeastern region of Rajasthan categorized as Ganeshwar-Jodhpura culture sites.

Group-1: Northern region of Rajasthan categorized as belonging to Harappan culture sites discovered along the Ghaggar-Hakra River and its associate water courses (Stein, 1989). Chronologically, it was followed by PGW and still later by Early Historic period.

The general description of excavated sites in Group - 1:

Kalibangan, situated on left bank of Ghaggar River in Ganganagar district of Rajasthan reveals Pre Harappan and Mature Harappan cultural phases. Harappan character of the site was first recognised in 1950 by Ghosh. The site comprises two mounds KLB 1 & 2. The excavation has brought to light two fold sequence of cultures of which the upper one KLB – 1 is Harappan showing the characteristic grid layout of a metropolis and the lower one KLB – 2 Pre Harappan shows
distinctive ceramics characterized by six fabrics labeled A, B, C, D, E and F. The findings at the site show blades of chalcedony and agate; beads of steatite, carnelian, terra cotta and copper; bangles of shell and terra cotta; terra cotta objects and figurines, stone quern with mullers, bone points and copper celts. An outstanding discovery of the excavation is the evidence of ploughed field from Pre Harappan phase, which shows the unique evidence of agriculture during Pre Harappan period (Lai, 1979).

Sothi, situated near Nohar in Ganganagar district of Rajasthan reveals new fabric consists of red ware with a white base painting executed with black color and sometime cord impression or rusticated surface created by wet hands (Lai, 1979).

Group-2: Southeastern region of Rajasthan categorized as belonging to Ahar culture sites (Sankalia et.al., 1969; Misra, 1967 and Hooja, 1988). Over ninety Ahar Culture sites have been located in the districts of Udaipur, Chittorgarh, Bhilwara, Ajmer, Jaipur and Tonk in Rajasthan and Jawad, Mandsor, Kayatha, and Dangwada in Madhya Pradesh (IAR 1954 to 71; Hooja, 1988).

The general description of the excavated sites in Group-2:
Ahar in the Udaipur city of Rajasthan reveals Chalcolithic and Early Historic phases. Chalcolithic phase noted as agricultural copper using settlement, dated around c.2000 to 1200 B.C. (with MASCA calibration, these dates read as 2580 to 1500 B.C.) (Allchin and Allchin, 1982). The site gives the evidence of rice, millet, domesticated cattle, sheep, goat, dog and other domesticated and wild fauna. Along with the copper artifacts and slags, a circular furnace containing ashes and copper slag was noted (Misra, 1967; Sankalia et.al. 1969). The other findings at the sites were terra cotta objects and structural remains. The characteristic features of Ahar pottery is white painted black and red ware along with other distinctive Red ware, Grey ware, Cream Slip ware and burnished Black ware (Misra, 1967).

Balathal in Udaipur district of Rajasthan reveals Chalcolithic and Iron Age phases with the hiatus between the cultural phases. The Chalcolithic phase is dated around 2500 to 1800 B.C. The structures were made of stones, mud and mud-
bricks, which are rectangular and squarish in plan. The Chalcolithic pottery is marked by fine and coarse ware. Fine ware consists of Red ware, black and red ware and Tan ware. Coarse ware consists of thick bright slipped Red ware, plain Red ware, burnished Grey ware and plain Grey ware mainly decorated with incised and appliques designs. The other characteristic Chalcolithic pottery "Reserved Slip ware", which is found in abundant. The tools and weapons were made of copper, which includes choppers, knives, razors, barbed and tanged arrow-heads. The Lithic industry, which is traits of Chalcolithic Culture in India, is completely absent in Balathal. The economy of the Chalcolithic people was based on farming, stock raising and occasionally hunting (Misra et.al. 1994).

Gilund in Udaipur district of Rajasthan reveals Chalcolithic and Early Historic phases. Chalcolithic phase is marked by microliths, few bits of copper and painted black and red ware. The associate wares include plain and painted Black ware, burnished Grey and Red ware, Black on Cream ware and Black on Red ware. The other findings were terra cotta animal figurines and gamesmen; beads of terra cotta, agate, chalcedony and steatite; sling balls; saddle querns and rubber stones (IAR 1959-60 and Possehl et.al. 2004).

Oliyana a single culture site situated in Bhilwara district of Rajasthan reveals three phases on the basis of structural activity and pottery. Pottery consists of white painted black and red ware, Black Slipped ware, coarse Red ware, Tan wares, and burnished and unburnished Black ware. The decorative motives on pottery were paintings, incision, applique and pinching designs. Structural remains shows wattle and daub construction, which is comprises of mud bricks and mud floor. The artefacts of terra cotta, copper, faience and semi precious stones were in profuse. The site is relatively dated around 3rd to mid 2nd millennium B.C. (Meena, B. and Tripathi, 2000).

Purani Marmi in Chitaurgarh district of Rajasthan reveals Chalcolithic and Early Historic phase. The Chalcolithic pottery is marked by black and red ware, Red Slipped ware, Grey Slipped ware and coarse Red ware. The other findings were large number of terra cotta bull figurines, animal bones, long barrel carnelian beads, few fresh water shells and fluted cores (Mohanty et.al. 2000).
Group-3: Central and Northeastern Region of Rajasthan, categorized as belonging to Ganeshwar-Jodhpura culture site (Agrawaia and Kumar 1982).

The general description of the excavated sites:

Ganeshwar, situated in Sikar district of Rajasthan excavated by R.C. Agrawaia and Vijay Kumar. During the excavation around thousand copper objects in association with so-called "OCP" was found. The object includes copper arrowheads, fishhooks, celts, chisels, balls, rings, bangles, spearheads and the like. The stratigraphic position of the cultural material shows Mesolithic, followed by "OCP", unpainted balck and red ware, PGW and Sunga-Kushana level. The earliest date for "OCP" is dated around 2800 – 3000 B.C. (Agrawaia, 1978, 1981b, and 1984; Agarwala and Kumar, 1982).

Jodhpura, situated on the Right Bank of Sabi River in Jaipur district of Rajasthan reveals stratigraphic position of the cultural material showing "OCP", black and red ware and PGW. At the site black and red ware precedes PGW, which is similar to Noh at Bharatpur district of Rajasthan and Atranjikhera at Etah district of Uttar Pradesh. The earliest date at Jodhpura for the upper level of "OCP" is dated around 2500 to 2200 B.C. (Agrawaia and Kumar, 1982; Agrawala, 1984).

3.3.2 Chalcolithic Research Carried Out In Rajasthan

Chalcolithic research in Rajasthan imparts with preliminary investigation by Tessitor at Kalibangan in the year 1918 to 1921 (Tod, 1894). After two decades, Stein carried out exploration in Saraswati valley as an archaeological tour along the Ghaggar – Hakara River (Stein, 1942) and later Gupta published Stein's work in the year 1989. Ghosh in 1950 to 1953 extended the work of Stein in Ghaggar River and discovered Harappan and Early Historic sites along the dry bed of the river (Stein, 1989). Misra in 1963-64 conducted exploration in south Rajasthan and brought to light the vista for Prehistoric and Proto historic sites in southern Rajasthan (Misra, 1967). Agrawala and Kumar brought to light Shekawati region of Rajasthan with the findings of new sites Ganeshwar and Jodhpura and give new evidence regarding regional Chalcolithic culture of India (Agrawala and Kumar, 1982). Further routine village-to-village survey conducted by Archaeological Survey of India and State Archaeological department and exploration carried by Hooja for
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her Ph.D. dissertation in southeastern, central and northeastern region of Rajasthan has added new sites in Rajasthan (Hooja, 1988).

3.3.3 Explored Chalcolithic (Ganeshwar Related Sites) in Research Area

For the first time in the history of Indian Archaeology a rich find of Chalcolithic copper objects has been found at a single site of Ganeshwar (Agrawala, 1981b; Agrawala and Kumar, 1982). But these findings have raised many important questions that need to be properly understood and answered:

- The site is near to the mines and in association with so-called “OOP” from beginning to the end (Hooja, 1988).
- The copper objects such as thin blades, arrowheads and fishhook show similarity with the Harappans copper objects (Hooja and Kumar, 1995).
- The presence of round terracotta cakes is also equally important for the inter-relationship with the Harappans (Hooja and Kumar, 1995).
- The findings of microliths along with the copper objects at Ganeshwar suggested that they have developed metallurgical technology while still being in foraging stage (Hooja, 1988; Possehl and Rissman, 1992).
- They have exploited and successfully worked on the nearby mining areas as early as 3rd millennium B.C. (Hooja and Kumar, 1995).

In the present survey, 30 Chalcolithic (Ganeshwar related sites) were reported. In the central and northeastern region of Rajasthan that is Ganeshwar culture sites are known from a typical kind of pottery called as “OCP” (Ganeshwar), which emanate as an archaeological entity in its earlier stages of development. The term “OCP” for Ganeshwar pottery was a misnomer which has also been misunderstood. Ganeshwar pottery is defined as red slipped painted pottery with profuse incised design, executed with the help of a sharp, comb like instrument (Agrawala and Kumar: 1982). Due to the sketchy availability of information on Ganeshwar pottery, hitherto nothing much has been said or understood about the culture as a whole. In the present study, an attempt has been made to examine the explored pottery with the aim to present corpus of Ganeshwar ceramics types.
Thus Ganeshwar culture emerges as an amalgamation of Early Chalcolithic culture from northern Rajasthan and Semi-Nomadic Copper using culture from southeastern Rajasthan. The Ganeshwar culture is marked by incised Red ware, Black painted Red ware and Red Slipped ware. The sites of Bagor and Gilund from southeast Rajasthan and Kalibangan from north Rajasthan show resemblance in ceramic tradition with the Ganeshwar incised ware. The incised pottery from Bagor phase 2 (Misra 1973b, Plg: 22-23), incised pottery from Gilund in Chalcolithic level (IAR 1959-60, plate: XLIV) and fabric D from Kalibangan (Bala 1997, plate: 13.11), show the resemblance in design pattern with the Ganeshwar incised red ware. Hence, Ganeshwar culture marked the influence from both the Chalcolithic Culture from northern Rajasthan and Semi-Nomadic Copper using culture from southeastern Rajasthan to form an individual entity in the central and northeastern region of Rajasthan that is known as Ganeshwar Culture.

3.3.4 Description of Sites Reported from Research Area

Bavadi Ki Jhamin (BKJ):
A single culture site (27°42'055"N - 75°50'582"E) located 0.1 Km east of the village Bhitarli Ganwari in NKT taluka of SKR district. There are ephemeral streams running on western and eastern side of the village. The village is nearly 10 Kms southeast from NKT (Khetri Maudh). The landform around the site shows series of hillocks with agriculture fields in the peneplain. On the basis of ephemeral nature of the site, it appears to be a temporary settlement. The site is small and measures 270 Sq m only. The pottery recovered from the site identify as Ganeshwar ware compare with the fabrics and shapes, which shows affinities with Ganeshwar pottery recovered during exploration. The Ganeshwar pottery identified as red ware pots, bowls, basins and dishes except one undiagnostic sherd in gray ware shows vertical grooves on the exterior (Figure – 3.13).

Beed Ki Dhani (BKD):
A multi-cultural site as mentioned earlier in Mesolithic section appears to be a seasonal settlement. The exploration revealed few diagnostic sherds of Chalcolithic period identified as Ganeshwar ware. The Ganeshwar pottery reported from the site includes red ware pots and bowl (Figure – 3.14).
Figure 3.13 – (a) pots; (b) bowl with vertical grooves; (c) bowls; (d) basins

Figure 3.14 – pots & bowls
Bhadwari (BWR):
Beside microliths, the exploration revealed only 9 diagnostic sherds. Out of these 5 sherds have been identified as Ganeshwar ware (Figure – 3.15) on the basis of fabric and shapes except red ware bowl with incised design on neck and body, which appears to be important feature of the Ganeshwar pottery. Remaining 4 sherds identified as Early Historic pottery are is discussed in the next section.

Biharipur (BRP):
A multi-cultural site (27°53'186"N – 75°53'710"E) located 2 Kms south of the village Biharipur in NKT taluka of SKR district. The site is identified as a seasonal settlement measures around 525 Sq m located on the sand dune that rise up to 10 m height from the surrounding area. The area is drained by tributary of Chandrawati River flowing in north-south direction across the village, which is around 41 Kms west from NKT (Khetri Maudh). The exploration revealed diagnostic and undiagnostic sherds, identified as Chalcolithic and Early Historic pottery. The Chalcolithic pottery (Figure – 3.16) shows affinity with Ganeshwar ware in fabric, shapes and incised design whereas Early Historic pottery is discussed in next section.

Gadhka (GDK) (Kunda ki Dhani):
A multi-cultural site (27°46'916"N – 75°52'417"E) located 2 Kms north of the village Mahawa near Narsinghji ki Mandir in NKT taluka of SKR district. The area is drained by an ephemeral streams running on the southern side of the village. The land features shows hills on the north and agricultural fields on the south. The site measures around 800 Sq m and only 2 diagnostic sherds mark Chalcolithic pottery in red ware (Figure – 3.17). The typical feature of the pottery observed while rubbing the surface it turns powdery.
Figure 3.15 – (a) bowls; (b) pots; (c) incised bowl

Figure 3.16 - bowls

Figure 3.17 - (a) pots; (b) basins
Ganeshwar:
Ganeshwar is very important and is a key site for Ganeshwar – Jodhpura culture. R.C. Agarwala and Vijay Kumar excavated the site from 1979 to 1982, but unfortunately, the final excavation report has not been published as yet. The site is situated in Ganeshwar village in NKT taluka of SKR district. The village can be approached from NKT by metal road. The site is nearly 12 Kms southeast of NKT (Khetri Maudh). The village is situated on the slope of a hill and the area is drained by Chandrabhaga nadi (a tributary of Kantli River) on the west and Raotala nala on the southeast. The cultural material is collected from various locations that have been given numbers. Localities 1, 2, 3, and 4 are situated on the northeast and peneplains between the hillock on the east and the sand dune ridge on the west of the village. These mounds are badly disturbed by the road construction and agricultural activities. Though pottery was recovered from various localities, but it appears to be one single mound, except the locality number 5 and 6 that is situated on the foothills of the hillock and locality number 3 is situated on the ridge of the sand dune.

Ganeshwar (GNR) # 1:
A single culture site (27°40'368"N - 75°49'012"E) located 1 Km northwest of the village Ganeshwar. The site measures around 77 Sq m comprise Chalcolithic pottery.

Ganeshwar (GNR) # 2:
A single culture site (27°40'447"N - 75°48'931"E) located 1.5 Km northwest of the village Ganeshwar. The site is spread in an area of 4840 Sq m revealing Chalcolithic and Early Historic pottery with the stray findings of terra cotta ring stand and stone hammer.

Ganeshwar (GNR) # 4:
A single culture site (27°40'447"N - 75°48'931"E) located 2 Km northwest of the village Ganeshwar. The area measures around 992 Sq m revealed Chalcolithic and Early Historic pottery. Besides pottery terra cotta mould, lump of sand stone and mace-head in quartzite found during the exploration.

Ganeshwar (GNR) # 5:
A multi-cultural site (27°39'938"N - 75°49'499"E) located 0.5 Km east of the village Ganeshwar on the slope of hill. The site measures around 1978 Sq m comprise Chalcolithic pottery.
Ganeshwar Pottery Classification has been illustrated below (Figure - 3.18 to 3.25)

Figure 3.18 – Bowls (a) Type A (1); (b) Type B (1); (c) Type B (2); (d) Type B (3)
Figure 3.19 – Pots (a) Type A (1); (b) Type A (3); (c) Type B (1); (d) Type B (2); (e) Type B (2); (f) Type B (3); (g) Type B (4)
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Figure 3.20 - Jars

Figure 3.21 - Basins (a) Type A (1); (b) Type B (1)

Figure 3.22 - Dishes

Figure 3.23 - Handi
Figure 3.24 – (a – h) incised designs
Figure 3.25 – (a – g) Incised & painted sherds
Gidhali/Nali # 2 (GOL):
A multi-cultural site having rich findings of microliths in terms of blades and cores. The exploration has also revealed Chalcolithic and Early Historic pottery. The Chalcolithic pottery shows resemblance with Ganeshwar ware (Figure – 3.26) in fabric shapes and incised design whereas Early Historic pottery is discussed in next the section.

Gogajiwaii Dongri (GWD):
A multi-cultural site (27°40’766"N – 75°37’927"E) located 0.5 Km southwest of the village Guhala in Udaipurwati (hereafter UPW) of JLN district. The site is drained by Kantli River flowing from south to northeast on the northern side of the village, which is situated 20 Kms southwest from NKT (Khetri Maudh). The ephemeral nature of the site identified as a seasonal settlement, which measures around 369 Sq m. The exploration revealed Chalcolithic pottery, which shows affinity with Ganeshwar ware in fabric and shapes (Figure – 3.27). Beside this, site has also revealed Early Historic pottery, which is discussed in the next.

Gujjaro Ki Dhani (GKD):
A multi-cultural site (27°46’101"N – 75°59’672") located 0.5 Km east of the village Bewa Patan in NKT taluka of SKR district. The site is drained by Krishnawati River on the eastern side of the village, which is around 26 Kms northwest from NKT (Khetri Maudh). The site rise up to 3m height from the surrounding area form by agriculture field. This is a very large site measures around 4318 Sq m. The exploration revealed Chalcolithic pottery (Figure – 3.28) shows affinity with Ganeshwar ware in fabric and shapes. The site also revealed Early Historic pottery, which is discussed in next section.
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Jasi Ka Bas (JKB):
A single culture site (27°37'997"N - 75°41'233"E) located 2 Kms south of the village Jasi Ka Bas in NKT taluka of SKR district. The site is drained by tributary of Kantli River flowing in east-west direction on the southern side of the village, which is around 17 Kms southwest from NKT (Khetri Maudh). There are series of sand dunes in a large area and the site is located on one such dune that rises up to 4 m height from the surrounding area. The site measure around 857 Sq m and appears to be a seasonal settlement. The exploration revealed Chalcolithic pottery (Figure - 3.29), which shows resemblance with Ganeshwar ware. The typical feature of the pottery observed here while rubbing the surface it turns powdery. Along with this pottery, site revealed Chalcolithic blades, core and lithic debitage with stray findings of terra cotta bead.

Jodhpura (JPR):
A multi-cultural site (27°47'383"N - 75°40'342"E) located on the periphery of the village Jodhpura in Khetri taluka of JJN district. The village is nearly 13 Kms northwest from NKT (Khetri Maudh). The site is drained by Kantli River on the northern and eastern side of the village. The landform around the site shows open scrub area on the northern and western side and remaining area is surrounded by hills. The site measures around 500 Sq m and appears to be a seasonal settlement. The Chalcolithic pottery shows affinity with Ganeshwar ware in fabric and shapes with few undiagnostic sherd show reserved slip technique on red over yellow slip and incised horizontal grooves (Figure - 3.30). The Early Historic pottery is discussed in the next section.

Jogi Badh (JBD):
A multi-cultural site (27°39'505"N - 75°43'506"E) located 1 Km east of the village Bhagot in NKT taluka of SKR district. The village is around 22 Kms southwest from NKT (Khetri Maudh). The area is drained by ephemeral stream running across northern and southern side of the village. The landform around the site shows sand dunes rises up to 5 – 6 m height from the surrounding area. The site measures 6860 Sq m, which appears to be larger area revealing Chalcolithic and Early Historic pottery. Here the Chalcolithic pottery shows resemblances with Ganeshwar ware in fabric, shapes and incised design. Along with Chalcolithic
pottery, there is few sherds shows powdery nature of the surface while rubbing it (Figure – 3.31). The Early Historic pottery is discussed in the next section.

Figure 3.29 – (a - b) bowls; (c) dish; (d) pots; (e) incised sherds; (f) lithic core & blades
Figure 3.30 – (a) basins; (b) bowls; (c) dishes; (d) pots

Figure 3.31 – bowls
Kakadiyo (KDY):
A multi-cultural site (27°37'929"N - 75°40'016"E) located 1 Km east of the village Thikriya in NKT taluka of SKR district. The village is around 18.5 Kms southwest from NKT (Khetri Maudh). The area is drained by Kantli River flowing on the western and southern side of the village. The site has identified as seasonal settlement measures around 576 Sq m located on the agriculture field that rise up to 3 m height from the surrounding area. The cultural material revealed Chalcolithic pottery (Figure - 3.32), which shows resemblance with Ganeshwar ware in fabric and shapes whereas Early Historic pottery is discussed in the next section.

Kakrana (KRN):
Beside microliths, the site has also revealed Chalcolithic pottery, which shows affinity with Ganeshwar ware in fabric and shapes (Figure - 3.33). There are few sherds, which form powdery while rubbing the surface. The site is near to the ancient copper mining area locally known as "Kakrana Pahar".

Kanwat (KWT):
A single culture site (27°35'560"N - 75°41'279"E) located 2 Km west of the village Kanwat in NKT taluka of SKR district. The village is around 25 Kms southwest from NKT (Khetri Maudh). The area is drained by a tributary of Kantli River flowing on the eastern side of the village. The landform shows sand dunes around the hillock, locally known as "Kanwat Pahar". The site measures around 575 Sq m located on one such dune, which appears to be a temporary settlement. The exploration revealed Chalcolithic pottery (Figure - 3.34), which shows affinity with Ganeshwar ware in fabric.

Kharagbinjpur (KBP):
A single culture site (27°43'156"N - 75°53'319"E) located 0.5 Km northwest of the village Baleshwar in NKT taluka of SKR district. A deserted village as a pilgrim place situated 14 Kms northwest from NKT (Khetri Maudh). Perennial streams running down from the hills drain the area. The dense and open scrub areas with deserted look give picturesque view to the place. The site measures around 1000 Sq m due to the ephemeral nature of the site, it is appears as a temporary
settlement. The site has identified as Ganeshwar culture site on the basis of the pottery (Figure 3.35), which shows resemblances with Ganeshwar ware in fabric.

Figure 3.32 – (a) basins; (b) bowls

Figure 3.33 – (a) bowls; (b) pots

Figure 3.34 – bowls & pots

Figure 3.35 – pot, basin & bowls
Kho:
A single culture site (27°46'000"N - 75°33'570"E) located 1 Km northwest of the village Kho in NKT taluka of SKR district. The village is around 20 Kms northwest from NKT (Khetri Maudh). Ephemeral streams running across the village drain the site, which shows hills and open scrub area. The site appears as a temporary settlement revealed few diagnostic sherds identified as Ganeshwar ware.

Kot:
A multi-cultural site (27°47'850"N - 75°42'072"E) located 1 Km south of the village Sunari in Khetri taluka of JIN district. The village is situated around 15 Kms northwest from NKT (Khetri Maudh). The site is located on the bed of Kantli River, which flows from south to north in the research area. The site measures around 68,400 Sq m having thick habitation deposit, which is visible in the section of the mound. The exploration revealed Chalcolithic and Early Historic materials. On examining the Chalcolithic pottery (Figure – 3.36), it shows major affinities with the Ganeshwar ware.

Mataji No Tibo (MNT):
Beside microliths, the site has revealed Chalcolithic pottery, which shows affinity with Ganeshwar ware in fabric, shapes and incised design. There are sherds, which turns in powdery form while rubbing the surface.

Meeno Ki Dhani (MKD):
A single culture site (27°42'067"N - 75°50'903"E) located 1 Km northeast of the village Bhitarli Ganwari in NKT taluka of SKR district. The village is around 10 Kms southeast from NKT (Khetri Maudh and drained by ephemeral streams running across the village. The land form around the site shows hills and open scrub area with agriculture field in patches. The site is located on one of such field, which measures around 282 Sq m and identified as temporary settlement. On basis of the pottery, it is identified as Ganeshwar site, which shows affinity with Ganeshwar ware in fabric and shapes (Figure – 3.37).
Figure 3.36 - (a - b) bowls

(a)

(b)

Figure 3.37 - (a) bowls; (b) pots

(a)

(b)
Murajawali:
At Murajawali two localities has been identified and named as MWL # 1 (27°43'954"N - 75°52'155"E) and MWL # 2 (27°44'143"N - 75°52'192"E), which is at a distance of 200 m apart from each other. The site is located 1 Km southwest of Gagharewala Balaji Mandir in the village Nimod in NKT taluka of SKR district. The village is around 13 Kms east of NKT (Khetri Maudh) and drained by a seasonal nalla on the southern side of the village. The site is located in an open scrub area and measures around 66 Sq m and 300 Sq m as temporary settlements. The site has been identified as metal processing activity area, which has revealed few diagnostic sherds resemblance with Ganeshwar ware in fabric (Figure - 3.38).

Nalot (NLT):
A multi-cultural site (27°32'N - 75°40'E) located 1.5 Km northwest of the village Nalot in SMP taluka of SKR district. The village is situated 36 Kms southwest from NKT (Khetri Maudh) and drained by ephemeral streams on the northern side of the village. The site is located in an agriculture field measures around 751 Sq m with open scrub area around it. On basis of ephemeral nature of the site, it has identified as seasonal settlement with Chalcolithic pottery (Figure - 3.39) shows affinity with Ganeshwar ware in fabric, shapes and incised design. Where as Early Historic pottery is discussed in the next section.

Narshingpuri (NSP):
A single culture site (27°40'635"N - 75°36'363"E) located 0.5 Km south of the village Narshingpuri in UPW taluka of JNJ district. The village is situated 22 Kms southwest from NKT (Khetri Maudh). The area is drained by a tributary of Kantli River on the northern and southern side of the village. The site is located on a stabilize sand dune measures around 7630 Sq m that rise up to 5.5 m height from the surrounding area. On basis of the material culture, it is identified as a Chalcolithic site reveals Chalcolithic blades having crescent guiding ridge technique and copper arrowhead & antimony rod (Figure – 3.40).
Figure 3.38 - pots

Figure 3.39 - (a) bowls; (b) pots

Figure 3.40 - copper arrowhead & antimony rod
Payga Kundalia (PKD):
It is another important key site represents almost all the cultural phases except Early Historic phase I in the research area. Here the Chalcolithic phase is identified with pottery (Figure - 3.41), which shows affinity with Ganeshwar ware in fabric, shapes and incised design.

Salodara (SDR):
A single culture site (27°52'563"N - 75°57'413"E) located 1.5 Kms north of the village Salodara in NKT taluka of SKR district. The village is situated 34 Kms northwest from NKT (Khetri Maudh). The landform shows hills and agriculture field around the site. The exploration revealed Chalcolithic pottery (Figure - 3.42) collected from the slope of the hill shows resemblance with Ganeshwar ware in fabric and shapes.

Sadmata Ka Maula (SKM):
Beside Chalcolithic pottery, the site has revealed microliths, which has mention earlier in the previous section. There are around 27 diagnostic sherds in red ware, which shows resemblance with Ganeshwar related Chalcolithic site (Figure - 3.43).

Shimarala (SRL):
A single culture site (27°32'N - 75°42'E) located 0.3 Km west of the village Shimarala in SMP taluka of SKR district. The village is situated 29.5 Kms southwest from NKT (Khetri Maudh). The area is drained by a tributary of the Kantli River flowing on the eastern side of the village. The site is located on a sand dune, which measures around 532 Sq m as a temporary settlement. The exploration revealed lithic debitage of Chalcolithic period.

Swamiyo Ka Kuha (SKK):
A multi-cultural site (27°41'413"N - 75°34'374"E) located 2 Km northeast of the village Kotri in UPW taluka of JNJ district. The village is situated 26 Kms southeast from NKT (Khetri Maudh). The area is drained by tributary of Kantli River flowing west-east direction on the northern side of the village. The landform around the site is of sand dune that rises up to 7m height from the surrounding area. The exploration revealed Chalcolithic and Early Historic pottery in an area about 1332 Sq m. The Chalcolithic pottery (Figure - 3.44) shows resemblance in fabric and shapes with Ganeshwar ware except red ware bowl with incised geometric design on the neck, which show its typical pottery to notice.
Figure 3.41 - (a) basins; (b) bowls; (c) pots; (d) incised sherds

Figure 3.42 - (a) bowls; (b) pots
Figure 3.43 – (a) dishes; (b) bowls; (c) pots

Figure 3.44 – (a) basins; (b) bowls; (c) incised bowl; (d) pots
Tapekeshwar (TKW):
A multi-cultural site (27°39'770"N – 75°52'029"E) located 2 Km west of the village Jatala in NKT taluka of SKR district. The village is situated 37 Kms southwest from NKT (Khetri Maudh) drained by Kasawati Nadi near the village. The landform is of dense and open scrub area around the site. The site is situated on the hill behind Tapekeshwar Mandir. Information gathered on personal communication with the priest of the temple that during repair work of the temple large number of sherds and bricks were found. On examining the bricks it is dateable to Sunga – Kushana period. The pottery collected from the area has revealed few Chalcolithic and Early Historic pottery. The Chalcolithic pottery (Figure – 3.45) shows resemblance with Ganeshwar ware in fabric showing powdery nature of the surface while rubbing the surface.

Thaneshwar / Ganwari Banda (TNW):
A single culture site (27°41'532"N – 75°51'659"E) located 0.5 Kms east of the Thaneshwar Mandir in village Bhitarli Ganwari in NKT taluka of SKR district. The village is situated 10 Kms southeast from NKT (Khetri Maudh) and drained by Thana ki Nalla. The site has identified as metal processing activity area measures around 732 Sq m as a temporary settlement. The pottery shows affinity with Ganeshwar ware in fabric and shapes (Figure – 3.46).
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Figure 3.45 - basins

Figure 3.46 - (a) basins; (b) bowls; (c) pots; (d) incised designs
Early Historic Period

The fourth section is on Early Historic period. The first segment gives general view of Early Historic period. The second segment gives brief account of Early Historic research carried out in Rajasthan. The third segment gives an account of Early Historic period in Rajasthan. The last segment gives account of material culture found by present researcher in research area.

3.4 Early Historic Period

The ethos of Early Historic Period in Indian Archaeology is marked from 6th century BC to 6th century AD which witnesses in the rise of imperial powers of Mauryans, Satavahanas (Andhras), Kushanas and Guptas. Excavation at the Early Historic sites from Mauryans to Kushanas (4th century BC to 3rd century AD) mark the prosperity whereas the decline sets in from 4th century AD onwards. During this decline period many sites were deserted and wherever the habitation continues does not reflect the prosperity of the earlier period. The period from 4th century to 10th century AD witnesses the decline in every stage of human activities, which has led to the de-urbanisation (Antonava et.al. 1979).

3.4.1 Early Historic Research Carried Out in Rajasthan

Periodic work has been carried out on several sites in Rajasthan. In 1940-41 Stein surveyed Bikaner and Bahawalpur states, mainly in search of prehistoric sites in the arid beds of Saraswati and Drishadvati (Ghaggar) (Stein, 1989:1-40). Although the chief contribution of his survey lies in a definite identification of Harappan settlements in the region, it has also revealed the existence of the PGW and a new ceramic tradition of the early century of the Christian era, approximately contemporaneous with Kushana and early Gupta periods. This tradition is designated as 'Rang Mahal culture or Rang Mahal ware from the type-site near Suratgarh in Ganganagar district (Stein, 1989: 58-98). The site was mainly occupied during the reign of Kaniska III around AD 250 as the coins found during the excavation. All the identifiable coins were minted either by Kaniska III or by the Murundas, the only exception being three coins of Kaniska I, Huviska and Vasudeva, which might have continued in use during the rule of Kaniska III. This date tallies with a seal, which on palaeographical grounds may be dated circa AD
The upper level of the culture on the basis of C-14 determination has been dated to AD 548 (1480+-70 BC). The ceramics is distinguished by its homogeneity as also by a lavishness of painted designs. Nearly 105 coins out of which, the identifiable ones belong one each to Kaniska I, Huviska and Vasudeva. The remaining belongs to Kaniska III and the Murundas. Besides, there are inscribed clay tablets, terra cotta sealing and bronze seals (Hanna, 1959).

Ahar in Udaipur district of Rajasthan reveals Chalcolithic and Early Historic periods. Early Historic period marked by introduction of iron, NBPW and seals dateable to the 3rd century BC and painted wares of Kushana times and Indo-Greek coins (Ghosh, 1989: 5). The site has revealed black and red ware industry, indicative of the inverted firing technique. Often the pottery is painted with dots and lines in white color. This ware underlies plain red wares of Kushana period, but its relationship with other known wares and the extent of its distribution still remains to be ascertained (Misra 1967 and Sankalla et.al. 1969).

Bairat in Jaipur district of Rajasthan one of the few sites excavated in Rajasthan (IAR-1962-63: 31). Initially Cunningham in 1873 surveyed the region, subsequently his assistant Carleyle in 1878 surveyed it and later, Archaeological Survey of India carried out excavation. The site reveals two Asokan edicts (Bhabru Rock Edict) now in Calcutta discovered from an isolated boulder and the other on a hill called Bijak ki Phadi about 2 Kms from the site. The excavation has revealed PGW and NBPW levels at subsequent phases. Terra cotta figurines, beads, punch mark, and Indo-Greek coins formed other important objects recovered in the excavation.

Balathal in Udaipur district of Rajasthan (IAR-1993-94: 93-97) reveals Chalcolithic and Iron Age phases with a hiatus between the cultural phases. The site has identified as industrial center during Early Historic period, which was evident from iron smelting furnaces and numerous iron tools found during this period (Misra et.al. 1994).

Nagari in Chittaurgarh district of Rajasthan traditionally famous as ancient Madhyamika of the Sibi - janapada (IAR-1962-63: 19-20 and Bhandarkar, 1920). The excavation has revealed Punch marked and tribal coins of Madhyamika and early Kshatrappa. The inscribed stones, moulded plaques and sculptures found here suggest the occupation of the town from c. 3rd century BC to 7th century AD. At the center of the mound was an early Gupta temple dedicated to Siva.

Noh in Bharatpur district of Rajasthan (IAR - 1963-64: 28-29) revealed OCP, unpainted black and red ware, PGW, NBPW and Sunga-Kushana levels. Iron and copper marked its appearance during PGW level with important discovery of charred rice during this level. The other important feature of this site is the continuation between PGW and NBPW levels.

Rairh in Bharatpur district of Rajasthan revealed evidence of occupation from the 3rd century BC to the 2nd century AD with traces of later occupation of Gupta times (Puri, 1941). Soak wells lined with black clay rings were found here in very large numbers, and there were numerous coins consisting of hoards of punch marked and Malwa coins (c. 200 BC to 200 AD) and Mitra coins. Terra cotta figurines, beads, seals and distinctive pottery make up the other finds. Pottery decorated with impressed motifs, concave lids with looped handle, vase knobbed lids and miniature bottles with carination above the base form some of the characteristic types of the early century (Ghosh, 1989:358).

Sambhar in Ajmer district of Rajasthan known for its salt lake (Sahani, 1940). During the excavation a mass of objects includes faceted sealing not identified at the time but later dated palaeographically to the 3rd century BC. The work here in 1936-38 confirmed its occupation from 3rd century BC to 10th century AD, the exposed structures falling mainly between the 2nd century BC and the 9th century.
AD. The coins found comprise punched marked, Indo-Greek, Yaudheya and later Indo-Sassanian issues (Ghosh, 1989: 387).

### 3.4.2 Early Historic Period In Rajasthan

After Painted Gray Ware Culture, all inhabitants in northern Rajasthan seem to have deserted perhaps due to the desiccation of Saraswati River. Then in the early centuries of the Christian era, this saw the rise of flourishing Rang Mahal Culture in northern Rajasthan. The scenario of eastern Rajasthan during Early Historic period seems a continuation of Painted Gray Ware Culture as exemplified at Noh and Bairat as at many sites in northern India.

An Early Historic site of Noh, Bairat, Rairh, Jodhpura, Nagar, Sambhar, Nagari, Rang Mahal and Ahar from Rajasthan forms four stages, which furnishes some ideas of the material culture of the Early Historic period.

**Stage # 1:** From 6th century – 3rd century BC confined two sites Noh and Bairat both in eastern Rajasthan, shows the overlap of PGW and NBPW appears to represent the cultural traits of this period. Pottery types marked as black and red ware and PGW.

**Stage # 2:** From 3rd century – 2nd century BC confined sites viz. Bairat, Noh, Rairh etc. Pottery types marked as NBPW including Plain Grey ware forms main ceramic assemblages. Artefacts marked as uninscribed cast coins; human and animal terra cotta figurines; copper and iron implements; beads of semiprecious stone, glass, ivory and terra cotta; shell bangles and bone tools; a seal with an inscription in Brahmi from Noh and many polished Chunar sandstone pillars from Bairat. Coinages marked as PMC coins, Indo-Greek coins, Mitra coins and Janapada coins of Sibis and Malavas.

**Stage # 3:** From 2nd century BC - 1st century AD confined sites viz. Rairh, Sambhar, Nagar and Noh. Pottery types marked as red ware and occasionally used grey ware in plain spouted jars and knobbed lids. Seals with Brahmi inscription from Ahar and Sambhar.
Stage # 4: From 1st century – 3rd century AD, confined sites viz. Rairh, Nagar, Noh, Rang Mahal and Nagari. Pottery types marked as red ware, red polished ware and Rang Mahal Ware consists of varieties of black painted designs including those of birds and animals and incised ones. Variety of sprinklers and spouted vessels of plain and decorated type besides votive tanks and ritualistic bowls and glaze pottery. Artefacts such as hand made human and animal figurines prepared out of single or double moulds; beads of agate, lapis lazuli, paste, terra cotta, faience and glass; mirror and chariots of bronze from Rairh; soap stone toilet casket; legged and rotary querns; terra cotta rattles; wheels and gamesman; bone, terra cotta, and stone discs; bangles of shells, copper and terra cotta; ear ornaments, skin rubbers, and copper objects and iron implements. Coinages marked as Malavas coins, Kushanas coins and Murundas coins. Bronze seal with Brahmi legends from Rang Mahal.

3.4.3 Explored - Early Historic - I Sites in Research Area

Early Historic I represent unpainted PGW, unpainted black and red ware and NBPW. In the present survey two Early Historic - I sites were reported from the research area.

Kakadiyo (KDY):
Mention earlier in Chalcolithic section as a multi-cultural site. The exploration revealed diagnostic plain gray ware sherds, which marked the Early Historic I level in the research area. Beside Early Historic I pottery, the site also shows affinity with Rang Mahal ware, which is discussed in next section.

Kot:
A multi-cultural site having thick habitational deposit revealing Chalcolithic and Early Historic phases. Here Early Historic I phase is marked by pottery, which shows gray ware bowls, Black and Red ware and Black Slip ware sherds.
3.4.4 Explored - Early Historic - II Sites in Research Area

Early Historic II represents Rang Mahal ware sites. In the present survey 21 Early Historic - II sites were reported from the research area.

Bhadwari (BWD):
As mention previous in Mesolithic and Chalcolithic section as a multi-cultural site. The site has revealed diagnostic sherds identified as Early Historic II pottery (Figure - 3.47) only on the basis of its fabric with 2 diagnostic plain gray ware sherds.

Bhagegawala Tila (BWT):
A single culture site (27°40'637"N - 75°45'096"E) located 2.5 Kms southeast of the village Bhudoli in NKT of SKR district. The village is situated 5 Kms south from NKT (Khetri Maudh) and drained by Chandrabhaga Nadi on the east. The site is located on a sand dune that rises up to 4.5 m height from the surrounding area and measures 2889 Sq m. The site revealed red ware sherd identified as Early Historic pottery (Figure - 3.48) on basis of its ware. There is 1 diagnostic plain gray ware sherd.

Biharipur (BRP):
A multi-cultural site revealed Mesolithic and Chalcolithic material. Beside this, site has also revealed Rang Mahal ware comprises diagnostic sherds in red ware and undiagnostic rusticated and painted sherds except brown ware with thumb nail impression and dark gray ware (Figure - 3.49).

Gadhka (GDK) (Kunda ki Dhanl):
A multi-cultural site (27°46'916"N - 75°52'417"E) located 2 Kms north of the village Mahawa near Narsingh ji ki Mandir in NKT taluka of SKR district. Ephemeral streams on the southern side of the site drain the area. The land features shows hills on the north and agricultural fields on the south. On basis of the pottery, it has been identified as Early Historic site, which measures around 800 Sq m. The pottery is marked by red ware with undiagnostic painted sherd having black color on red slip (Figure - 3.50).
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Figure 3.47 - bowls

(a) (b)

Figure 3.48 - (a) dishes; (b) bowls; (c) pots
Figure 3.49 – (a) pots; (b) rusticated & painted sherds

Figure 3.50 – (a) bowls; (b) painted sherds
Ganeshwar (GNR) # 5:
Along with Chalcolithic pottery, GNR # 5 has revealed sculpture head in black schist stone and painted sherds from Early Historic II (Figure - 3.51).

Gidhaii/Nali # 2 (GDL):
As mention previous in Mesolithic and Chalcolithic section as a multi-culture site having rich findings of microlithic blades, cores and lithic debitage. The site has also revealed undiagnostic sherds having horizontal and wavy applied bands, external ledge on the body and vertical applied bands of sandy texture on the body, which has been identified as Rang Mahal ware (Figure – 3.52).

Gogajiwali Dongri (GWD):
A multi-cultural site. The Early Historic II pottery (Figure – 3.53) identified as Rang Mahal ware shows undiagnostic sherds having rustication on the body with applied bands of wet design, rustication on the body with applied horizontal bands of sandy texture, black color bands on the exterior surface and thumb impression on the interior surface. There is one undiagnostic sherd in plain gray ware.

Gujjaro Ki Dhani (GKD):
A multi-cultural site revealed Chalcolithic and Early Historic II pottery. The Early Historic pottery (Figure – 3.54) identified as undiagnostic painted sherds having black color horizontal bands on exterior surface and reserve slipwares having black color bands over red surface. Besides a spout, lamp and few diagnostic sherds in red ware were recovered from the site.

Jodhpura (JPR):
A multi-cultural site having Early Historic II pottery identified as undiagnostic painted sherds having red slip with black color band and incised leave pattern on the exterior surface. There are few diagnostic sherds in red ware (Figure – 3.55).
Figure 3.51 – (a) painted sherds; (b) black schist stone sculpture

Figure 3.52 – (a) rusticated sherds; (b) pots; (c) rusticated & incised sherds

Figure 3.53 – (a) basins; (b) bowls; (c) incised & painted sherds
Figure 3.54 - (a) bowls; (b) painted sherds; (c) dishes & lamps

Figure 3.55 - (a) pots; (b) incised & painted sherds
Jogi Badh (JBD):
Along with Chalcolithic, the site revealed Early Historic II pottery, which shows rustication on the body with appliquéd bands of wet design and horizontal applied bands of sandy texture with few red ware sherds (Figure – 3.56).

Kakadiyo (KDY):
A multi-cultural site. The Early Historic pottery identified as Rang Mahal ware shows undiagnostic sherds having rustication on the body with horizontal bands of sandy texture and incised horizontal lines (Figure – 3.57).

Kali Khankaria (KKR):
A single culture site (27°50'28''N - 75°56'76''E) located 1 Kms north of Imloha village in NKT taluka of SKR district. The village is around 32 Kms west from NKT (Khetri Maudh) and drained by perennial streams. The land feature shows open scrub area around the site. The site has been identified as Early Historic II on basis of the pottery classified as red ware pots and bowls (Figure – 3.58).

Kot:
A unique site in the research area located on the bed of the Kantli River revealed Early Historic II pottery identified as Rang Mahal ware. The pottery shows undiagnostic sherds having incised stamp marks, horizontal incised lines, nail-headed incised notches and appliquéd pattern (Figure – 3.59). The important findings of terra cotta sealing having five rows of Brahmi script along with terra cotta disc and anvil and fragments of shell – glass – iron bangles.

Mataji No Tibo (MNT):
A multi-cultural site having Mesolithic, Chalcolithic and Early Historic pottery. Early Historic pottery identified as diagnostic and undiagnostic sherds with few sherds shows oblique lines with incised design between them, horizontal incised lines and incised circular mark with stray findings of terra cotta figurine collected from the stabilize sand dune.
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Figure 3.56 - (a) dishes; (b) incised & painted sherds; (c) pots; (d) stamped design

Figure 3.57 - pots

Figure 3.58 - (a) bowls; (b) pots
Figure 3.59 – (a) plain gray ware bowls; (b) bowl, (c) basins; (d) rusticated sherds; (e) black & red ware sherds;
Mokulwas (MKW):
A single culture site (27°43'226"N – 75°54'228"E) located 1 Km south of the village Baleshwar in NKT taluka of SKR district. The village is nearly 14 Kms east from NKT (Khetri Maudh) and drained by perennial streams running down from the hillock. The landform shows dense and open scrub area around the site. The site measures around 6660 Sq m having Early Historic pottery identified as red ware shows resemblance in fabric with Rang Mahal ware (Figure – 3.60).

Nalot (NLT):
A multi cultural site. The Early Historic phase revealed 2 diagnostic sherds with typical Rang Mahal ware showing floral and notch design (Figure – 3.61).

Payga Kundalia (PKD):
As mention earlier as a key site having all the cultural phases in the research area. Early Historic pottery (Figure – 3.62) is marked by red ware along with this; it shows stray findings of glass bangle fragments and arakanut bead collected from the peneplain area.

Sainiyo ki Dhani (SKD):
A single culture site (27°46'139"N – 75°59'604"E) located 0.5 Kms east of the primary school in the village Bewa Patan in NKT taluka of SKR district. The village is around 26 Kms northwest from NKT (Khetri Maudh) and drained by Krishnawati River on the eastern side of the village. The landform shows agricultural field and the site is situated on one of such field that rise upto 3 m height. The site measures around 9379 Sq m revealed Early Historic pottery, which shows typical Rang Mahal sturdy ware and red ware pots and bowls (Figure – 3.63).
Figure 3.60 – (a) dish; (b) bowls; (c) pots

Figure 3.61 – (a) bowls; (b) basins; (c) bowl & basin
Figure 3.62 – (a) basins; (b) pots

Figure 3.63 – (a) turf; (b) pots & bowls; (c) pot
Tapekeshwar (TKW):
A multi-cultural site. Along with Chalcolithic pottery, the site revealed undiagnostic sherds identified as Early Historic pottery, which shows rustication on the body with applied bands of sandy texture (Figure - 3.64).

Thoi:
A multi-culture site. Along with microliths, the site also revealed Early Historic pottery identified as red ware pots and bowls.

Tonda (Rampura - Tonda):
A single culture site (27°50'160"N – 75°53'675"E) located 3 Kms north of Mehada village in Khetri taluka of JNJ district at the distance of 42 Kms northwest from NKT (Khetri Maudh). The site is situated within the reserved forest area, which measures around 1500 Sq m and drained by a tributary of Chandrawati River on the northern and southern side. The site revealed red ware sherds identified as Early Historic pottery with few painted sherds (black on red surface) which is typical feature observed in Early Historic II pottery (Figure – 3.65).
Figure 3.64 - (a) bowls; (b) rusticated sherds

Figure 3.65 - (a) bowls; (b) pots; (c) painted sherds; (d) general view of the site
3.5 Ancient Mining and Metal Processing Activity Area

This chapter deals with the description of ancient mining and metal processing activity areas, which include location of sites - their distribution pattern in different eco zones in research area in particular and Rajasthan in general; study of mines, geology, minerals and metal processing indicators; and comparative study to probe possible relationship with archaeological sites.

3.5.1 Earliest Evidence of Metal

The first metal to be extracted from its ores was copper. Copper-bronze artifacts in the Indian subcontinent are dated from Pre Harappan level and continue as a dominant material for tool production in India, until the emergence of iron in the early centuries of first millennium BC (Hegde, 1991).

The earliest evidence of copper-bronze technology comes from Harappan sites of Harappa, Mohenjodaro and Chanudaro. There are few more other sites in Baluchistan and from unstratified copper hoards (Sankalia, 1970). Beside this, there are several Chalcolithic sites have been excavated in different parts of Indian subcontinent, each yielding copper-bronze objects. The use of copper as a form of ornament has traced back to the early levels at Mehrgarh, where there is evidence for a single copper bead from the Neolithic levels (period IB), circa 6000 BC (Jarrige, 1982). Whereas Sialk in Iran shows the development of copper tools made from cold hammering to castings in open moulds, casting in closed moulds, smelting and casting by cire perdue method in successive periods (Coghlan and Constantini, 1951). Mundigak in Afghanistan shows development in tool typology, as well as the transition from copper to bronze (Casal, 1961).

Another body of data that has yet to be fully understood is the work on the Ganeshwar-Jodhpura culture of Rajasthan (Agrawala, 1984). The site of Ganeshwar is around 35 km from Khetri copper belt. No radiocarbon dates are known from the site and the ceramics allow only general association with the "so called" Ochré Colored Pottery culture (Kenoyer, 1991; Shaffer, 1991). After his survey in 1979, Agrawala reported over thousand copper objects, including 400 arrowheads, 50 fishhooks, 60 flat celts and numerous other objects (Agrawala, 1984).
3.5.1 (a) Copper

Copper occurs in several mineral forms, such as native, sulphide, oxide and complex minerals. Each requires a different metallurgical treatment to obtain copper. The complex ores contain copper with lead, zinc, gold and silver minerals.

The type of copper ore and its tenor generally determine the method of treatment. The lowest grade ores are simple and easily treated. Native copper deposits run as low as 0.4%. Sulphide ores run as low as 0.55% or less and high-grade ores may range from 5 to 30%. Most oxidized ores may range from 0.4 to 10%. Ores carrying 4% or more copper are generally smelted directly to avoid concentration losses; low-grade ores of about 0.6% copper are either leached or concentrated and the concentrated are smelted (Jensen and Bateman, 1981).

Table Shows Copper Mineral Ores (after Jensen and Bateman, 1984)

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Composition</th>
<th>% of Cu</th>
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<tbody>
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<td>Native:</td>
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<tr>
<td>Copper</td>
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<tr>
<td>Sulphides:</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>Azurite</td>
<td>2CuCO_3Cu(OH)_2</td>
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<td>CuSiO_3.2H_2O</td>
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<td>Atacamite</td>
<td>CuCl_2.3Cu(OH)_2</td>
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</table>

Copper is one of the very essential minerals and considerable alloy of copper is used such as bronze and brass. The bronzes are copper-tin-zinc (88% Cu, 10% Sn, 2% Zn) and the brasses are copper-zinc alloys (55 to 99% Cu). There is also a
nickel, aluminum and steel alloy of copper; minor special alloys utilize argon, beryllium, cadmium, chromium, cobalt, iron, lead, magnesium, manganese and silicon.

The chief gangue minerals of copper ores are rock matrix, quartz, calcite, dolomite, siderite, rhodochrosite, barite and zeolite (Jensen and Bateman, 1981).

<table>
<thead>
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<th>Name</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
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<td>SiO₂</td>
</tr>
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<td></td>
<td>Other silica</td>
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</tr>
<tr>
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<td>Bauxite, etc</td>
<td>Al₂O₃.2H₂O</td>
</tr>
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<td></td>
<td>Limonite</td>
<td>Fe₂O₃·H₂O</td>
</tr>
<tr>
<td>Carbonates</td>
<td>Calcite</td>
<td>CaCO₃</td>
</tr>
<tr>
<td></td>
<td>Dolomite</td>
<td>(Ca,Mg)CO₃</td>
</tr>
<tr>
<td></td>
<td>Siderite</td>
<td>FeCO₃</td>
</tr>
<tr>
<td></td>
<td>Rhodochrosite</td>
<td>MnCO₃</td>
</tr>
<tr>
<td>Sulphates</td>
<td>Barite</td>
<td>BaSO₄</td>
</tr>
<tr>
<td></td>
<td>Gypsum</td>
<td>CaSO₄+2H₂O</td>
</tr>
<tr>
<td>Silicates</td>
<td>Feldspar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Garnet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rhodonite</td>
<td>MnSiO₃</td>
</tr>
<tr>
<td></td>
<td>Chlorite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clay minerals</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Rock matter</td>
<td>CaF₂</td>
</tr>
<tr>
<td></td>
<td>Fluorite</td>
<td>(CaF)Ca₄(PO₄)₃</td>
</tr>
<tr>
<td></td>
<td>Apatite</td>
<td>FeS₂</td>
</tr>
<tr>
<td></td>
<td>Pyrite</td>
<td>FeS</td>
</tr>
<tr>
<td></td>
<td>Marcasite</td>
<td>FeS</td>
</tr>
<tr>
<td></td>
<td>Pyrrhotite</td>
<td>Fe₆xS</td>
</tr>
<tr>
<td></td>
<td>Arsenopyrite</td>
<td>Fe₆S</td>
</tr>
</tbody>
</table>

3.5.1 (b) **IRON**

Iron is the second most abundant metal in the earth crust; the character of its natural compounds prevented its use as early as some other metals. It was known by 4000 BC and the Egyptian Pharaohs regarded it more highly than gold, but this probably was the rare meteoritic iron. Apparently by 1200 BC iron was manufactured but was still rare and its industrial use did not commence before
800 BC, which marks the start of Iron Age. Steel came into use about 800 years later and the blast furnace in the 14th century AD (Hegde, 1991).

Around first half of third millennium BC iron objects, which were not deliberately smelted were recovered from Tell Asmar, Chagar Bazaar and Mari in Mesopotamia and Alaca Huyuk in Anatolia (Coghlan and Constantini, 1956). During Bronze Age melting copper, under certain circumstances produce malleable iron in the furnace. It was very likely that these stray iron objects were produced from this unexpected extraction of the metal. Some of them may be produced from naturally occurring meteoritic iron. It is not yet quite clear where exactly the first deliberate smelting of iron started. Archaeological records indicate that from 2000 to 1200 BC iron objects in West Asian sites gradually increased. Almost a similar slow development in the production of iron objects took place in India.

The earliest iron objects in India found at Atranjikhera and Hallur, dated around 11th - 9th century BC. Hastinapur, Alamgirpur, Kausambi and Atranjikhera sites within Ganga - Yamuna Doab dated around 7th century BC. Taxila, Rupar, Hastinapur, Sonkh, Kausambi, Rajghat and Ujjain dated around 6th - 5th century BC. By the 4th century BC iron technology spread all over the country and industry reached its mature stage, which is reflected in archaeological records (Ghosh, 1989).

Of, the iron ore minerals, magnetite is the richest but of minor quantity; hematite is the mainstay of the iron industry; limonite and siderite are of importance (Jensen and Bateman, 1981).

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Composition</th>
<th>% of Fe</th>
<th>Commercial Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetite</td>
<td>FeO,Fe₂O₃</td>
<td>72.40</td>
<td>Magnetic or black ores</td>
</tr>
<tr>
<td>Haematite</td>
<td>Fe₂O₃</td>
<td>70.00</td>
<td>Red ore</td>
</tr>
<tr>
<td>Limonite</td>
<td>Fe₂O₃·nH₂O</td>
<td>59.00 or 63.00</td>
<td>Brown ore</td>
</tr>
<tr>
<td>Siderite</td>
<td>FeCO₃</td>
<td>48.20</td>
<td>Spathic, black band, clay iron stone</td>
</tr>
</tbody>
</table>
Other iron bearing minerals, such as pyrite $\text{FeS}_2$, pyrohotite $\text{Fe}_1x\text{S}$, marcasite $\text{FeS}$, and chamosite $\text{Fe}_2\text{Al}_2\text{Si}_3\text{O}_{10}(\text{OH})_4$ do not occur in significant amounts in high grade large deposits and are not considered as potential iron reserves in the foreseeable future. Common impurities in iron ores are silica, calcium carbonate, phosphorus, manganese (especially in hematite), sulphur, alumina, water and titanium. The making of a usable product of iron involves two steps: first the reduction of the iron ore to pig iron; and second the treatment of the pig iron to make cast iron, wrought iron or steel.

3.5.2 Ancient Mining and Metal Processing Activity Carried Out in Research Area

There are numerous old working sites spread over the entire terrain from Khetri in the north to Zawar in the south and Shakkargarh in the east to Basantgarh in the west. The earliest evidence of old working (C-14 dates of wooden ladder) found at Rajpura Dariba mines, dated back to 2500 years ago (Brewis, 1991). There are no written records available about ancient mining activity, but there are profuse surface indications in the form of mine dumps, slag heaps, retorts, blow pipes etc., which attest to the mining and metallurgical knowledge of the ancient miners (Roy et.al.1998).

The six centers of copper ore deposits in India are: Aravalii region in Rajasthan and north Gujarat, Chhota Nagpur in Bihar, Garhwal and Almora in Uttarakhand, Jabalpur in Madhya Pradesh, Kurnool and Agnigundala in Andhra Pradesh and Chitaldurg in Mysore (Hegde, 1965).

There are around 165 copper minerals, out of which only seven are known from India (Hegde, 1965):

1. Chalcopyrite or copper pyrite ($\text{Cu}_2\text{FeS}_2$), having brass yellow color and metallic luster.
2. Chalcocite ($\text{Cu}_2\text{S}$), having grayish black color.
3. Bornite ($\text{Cu}_3\text{FeSO}_4$), having pinkish brown color.
4. Tetrahedrite ($4\text{Cu}_2\text{SSb}_2\text{S}_3$), (Sulphantimonite) having steel grey color.
5. Covellite ($\text{CuS}$), having indigo blue color.
6. Malachite ($\text{CuCO}_3$, $\text{Cu(OH)}_2$), having bright green color.
7. Azurite ($2\text{CuCO}_3\text{Cu(OH)}_2$), having azure blue colors.
Among these seven, Chalcopyrite is commonly observed copper mineral. A pure chalcopyrite contains 30.5% Copper, 30.6% Iron, and 39% Sulphur. In the Aravalli's, chalcopyrite ore deposit are observed near Khetri, Babai, Singhana, Akhwali, Dariba, Dev Bari, Delwara, Kotri, etc. In Aravalli region at Khetri, Babai, Dariba, and Singhana, chalcopyrite belt are continuous for about 25 km. All these copper ore deposits are delineated with ancient mining (Hegde, 1965).

Copper ore occurs with the old pits, metallurgical slag, scattered pieces of malachite ore and rarely smelting crucibles, which suggested that copper ore were extracted and processed, but the exact dates of mining and smelting are rarely known.

The Aravalli copper ore deposits of Rajasthan were exploited for the purpose of extraction of copper, during the Chalcolithic period (Bhowmik, 1972). Samples of copper ores were obtained from Khetri, Kolihan, and Singhana. The chemical as well as spectrographic analysis was undertaken by Bhowmik with a view to know their chemical composition and to determine the extent to which they vary in composition from each other.

As a result Khetri copper ore is marked by the presence of Aluminium, Silver, Magnesium, Lead, Nickel, Tin, Calcium, and Manganese as the important impurity pattern. Argon, which is the most important ingredient of copper and copper ores from Baluchistan, Afghanistan and Indus Valley, is practically absent; and Nickel which is a prominent impurity of copper ores from Persia, Summer and regions of surrounding Mediterranean is present in very minute quantity and in trace. The major associated elements are Silicon, Iron and Sulphur. The copper content of Khetri copper ores varied from 0.8 to 14 %. As the % composition of Khetri copper ore varies from sample to sample, it may be observed, those copper ores belonging to different sites of the Khetri copper belt varies from each other and does not show unity in the chemical composition (Bhowmik, 1972). The copper ore from Kolihan, on the other hand, revealed a composition, which bears close similarity with those of Khetri (Bhowmik, 1972).
The Singhana copper ore differs from those of Khetri and Kolihan. Nickel, which is present in Khetri and Kolihan ores are practically absent in Singhana. Aluminium is present but the % is lower than those of Khetri and Kolihan are far as the % of copper is concerned. Singhana copper ore stands higher in proportion than those of Khetri and Kolihan (Bhowmik, 1972).

It is revealed from the above facts that copper ore belonging to different localities of Rajasthan copper belt varies from one another. Copper ores exist in the vast area of the Aravalli region and may have different chemical composition in different copper zones. It is needless to mention that all the samples of copper ore from Rajasthan constitute Chalcopyrite (CuFeS₂) associated with Sillicon, Al, Pb and Mg.

Hegde in (1991) selected six ancient copper ore mining and smelting sites in the Aravalli hills for detailed survey. Those were Khetri and Kho Dariba in northeastern part of copper ore belt, Kankaria and Piplawas in central part, and Deri and Ambaji in southwestern part. As a result of his survey the host rocks surrounding the base metal minerals in the central and southwestern parts of the Aravalli Hills are soft. In central part the rocks are soft graphite schist's where as in the southwestern part, it shows termite-chlorite schist's and in the northeastern part copper ores embedded in hard quartzite's. In the central and south western zones of the copper ore belt in the Aravalli Hills evidence of superficial gouging of the oxide rich gossan cap. A majority of these pits measured around 8 to 7 m in diameter and 3 to 4 m in depth. In each pit evidence of fire is setting. A fired pit was cooled down suddenly by pouring water, which causes disintegration, or shattering of the surround rocks. This helped extraction of copper ore bearing minerals from the mine walls.

At all the six sites mention above by Hegde shows superficial gouging as well as deep mines. All the deep mines opened into galleries and narrow tunnels following the configuration of chalcopyrite ore veins at different levels. All these deep galleries were provided with one to one and half-meter diameter ventilation holes at regular intervals. Samples of timber supports received from a gallery at a depth
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of 120 m at Rajpura Dariba mine in Udaipur district was dated 3120 ± 160 yr (Hegde, 1991).

The copper mineralization in Rajasthan is probably one of the most extensive that exists in India and is found in almost all areas in the state. Detailed accounts of these copper deposits are available in a number of works of Agarwala 1971; The Rajputana Gazetteer 1879, The Wealth of India II 1950 and documentation done by the GSI entitled "Exploration for Copper, Lead and Zinc Ores in India" (Lahiri, 1995).

Unfortunately although the copper reserves and old workings of Rajasthan were known and exploited from an ancient period there is a great paucity of scientific dating. Regrettably the available radiocarbon dates for Khetri are only mediaeval. Recently six copper ore mining and smelting sites were investigated for lead isotope dating in the Aravalli's although the results are not available as yet (Hegde 1985).

In the year 2005 application of lead isotope analysis to determine the provenance of copper ore from the Harappan period carried by Hoffman, Law, Raghubans, Burton and Meiggs on seven regional copper sources from Ganeshwar and Singhana slags in Rajasthan, Chagai hills ore from Baluchistan, Shin Kai copper deposit in Waziristan ore, Iranian ore and Oman ore. The result obtain from the seven copper ore samples suggest that Harappa may have been procuring some of its copper ore from northern Rajasthan and most of its raw copper ore from sources to the west.

3.5.3 Explored Ancient Mining and Metal Processing Activity in Research Area

Ancient mining and metallurgical research was carried out to probe its relation with the archaeological sites. In the present survey 18 ancient mining-areas and 14 metal-processing activity areas have been identified from the research area. Hence, this region gives the evidence of exploitation of metals by the inhabitants in different periods.
3.5.4 Description of Sites Reported from Research Area

Akawali Area located in "Akawali Pahar" in Babai village, which is around 29 Kms northwest from NKT (Khetri Maudh) in Khetri taluk of JJN district. The area is divided into five blocks: north block, central block, south block, Kalota south block and eastern block (after GSI). The ancient miners have extensively worked in this area. The old workings comprise small pits, deep shafts, stopes and deep mine.

The general geological succession in Akawali Pahar (after GSI):

<table>
<thead>
<tr>
<th>DELHI GROUP</th>
<th>SUPER GROUP</th>
<th>Intrusive</th>
<th>Metadolerite / Amphibolites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AJABGARH</td>
<td></td>
<td>Quartzites</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td>Quartz-mica schists</td>
</tr>
<tr>
<td></td>
<td>ALWAR GROUP</td>
<td></td>
<td>Andalusite phyllites with inter banded carbon phyllite.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Garnetiferous amphibole chlorite schist</td>
</tr>
</tbody>
</table>

There are four localities identified in and around Akawali Pahar, which has been discussed below as:

Akawali Mine (27°55'688"N - 75°45'349"E) located in Akawali Pahar. The exploration revealed 9 ancient mining areas in two clusters, which comprises pit mines only. In these clusters, one cluster comprise 5 mines while the second cluster comprise 4 mines.

Akawali Mine # 1 (27°55'756"N - 75°45'513"E), which is also located in Akawali Pahar. The mine has identified as ancient mining area comprises small pits, which was extensively work by the ancient miners.

Akawali Mine # 2 (27°55'760"N - 75°45'520"E) located 0.2 km on the top of the Akawali Pahar. The mine identified as deep mine, which was also extensively work by the ancient miners.

Suradhi (SRD) (27°55'961"N - 75°46'625"E) located 2 km northwest Babai village. The mine identified as open mine.
Samiyo ki Dhani located in Baleshwar village in NKT taluka of SKR district. The village is nearly 13 Kms east from NKT (Khetri Maudh). The exploration revealed open mine comprises ancient copper mining area.

Beed Ki Dhani (BKD) a multi-cultural site revealed Mesolithic and Chalcolithic material along with ancient mining comprises open mine, which is around 3 m wide and 15 m deep. The cultural materials were collected from the vicinity of the ancient mining area.

Bavan Kuhi (BVK) (27°44'405"N - 75°29'294"E) located 0.5 km west of the village Dhanota in UPW taluka of JJN district. The village is situated around 40 Kms west from NKT (Khetri Maudh). The area drained by ephemeral streams and the landform shows agricultural land on the northern side of the site. The site has revealed ancient mine area comprises open pit mine having 52 open pits along with the drainage channels, which was used to extract water from the pits and narrow shafts lead into big stopes. The mining area is locally known as Bavan Kuhi (fifty two wells). Some of the stopes are more than 35m wide. Dumps containing around 0.2 million tonnes of slags lying at places in the Dhanota village (after GSI).

Kakrana (KRN) a multi-cultural site revealed Mesolithic and Chalcolithic materials. Along with this cultural material, the site has shows open mine, which indicate mining area used by the ancient miners.

Khetri Mine # 1 and 2 (28°04'267"N - 75°48'287"E) located 3 km south towards the village Kharkhara in Khetri taluka of JJN district. The village is around 34 Kms northwest from NKT (Khetri Maudh). The Khetri mine areas are the part of Khetri copper complex, which extends 3 km by 1 km. The surface manifestations of the sulphides mineralization in this area are quite prominent and present in the form of gossans, old workings and huge heaps of metal slags.
The general geological succession in Khetri mine (after GSI):

<table>
<thead>
<tr>
<th>Intrusive</th>
<th>Quartz &amp; Pegmatite veins</th>
<th>Granite (?)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inorganic dykes &amp; Sills</td>
<td></td>
</tr>
<tr>
<td>DELHI SUPER GROUP</td>
<td>Sericite - quartzite</td>
<td></td>
</tr>
<tr>
<td>AJABGARH Group</td>
<td>Phyllites</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Andalusitic-phylilte / schist with bands of marble.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tremolite-magnetite rock with bands of marble.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Garnetiferous-chlorite-quartzite/schist.</td>
<td></td>
</tr>
<tr>
<td>ALWAR GROUP</td>
<td>Amphibole quartzite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Felspathic quartzite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(?) Basement granite</td>
<td></td>
</tr>
</tbody>
</table>

Kho is a single culture site revealed Chalcolithic pottery along with the ancient mining area comprises open mine for copper. The area also gives the evidence for soap stone mine within the vicinity.

Chandmari Mine (28°00'N - 75°46'E) located 2.2 km south from Kolihan-Chandmari mine. The site is around 27 Kms north from NKT (Khetri Maud). The ancient mining area comprises open mine and deep mine (500m length, 200m wide and 148m deep). The mine was initially used as an open mine and later on forms deep mine. At present Hindustan Copper Limited (hence after HCL) is drilling out the deep mine having the depth around 434 feet. At the footsteps of the open mine, there are opening for old working on its wall, which shows heaps of mine spoil, gossan bands and malachite staining.

The general geological succession in Chandmari mine (after GSI):

<table>
<thead>
<tr>
<th>Intrusive</th>
<th>Quartz veins</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meta-dolerite</td>
</tr>
<tr>
<td>DELHI SUPER GROUP</td>
<td>Peak Quartzites.</td>
</tr>
<tr>
<td>AJABGARH Group</td>
<td>Carbonaceous-micaeous and Andalusitic</td>
</tr>
<tr>
<td></td>
<td>Phyllites.</td>
</tr>
<tr>
<td></td>
<td>Andalusite-biotite-quartzite-schist.</td>
</tr>
<tr>
<td>ALWAR Group</td>
<td>Amphibole quartzite's.</td>
</tr>
<tr>
<td></td>
<td>Talo-magnetite-amphibole-schist.</td>
</tr>
<tr>
<td></td>
<td>Felspathic quartzites with amphibole.</td>
</tr>
</tbody>
</table>
Kolihan Mine # 486 (28°00'934"N - 75°46'215"E) located 2 km west of the village Kolihan in Khetri taluka of JNJ district. The village is around 27 Kms north from NKT (Khetri Maudh). The ancient mining area comprises deep mine. Kolihan section lies in the northern part of Khetri Copper Belt (hence after KCB). The site falls in KCB, undertaken by HCL.

The general geological succession in Kolihan mine (after GSI):

<table>
<thead>
<tr>
<th>Intrusive</th>
<th>Quartz veins, calcite veins and basic sills and Dykes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELHI SUPER GROUP</td>
<td>Peak quartzite.</td>
</tr>
<tr>
<td></td>
<td>Phyllites + andalusite and carbon phyllites.</td>
</tr>
<tr>
<td></td>
<td>Schists with andalusite biotite, garnet, anthophyllite, chlorite etc.</td>
</tr>
<tr>
<td>AJABGARH Group</td>
<td>Amphibole quartzite with impersistent marble bands.</td>
</tr>
<tr>
<td></td>
<td>Felspathic and arkosic quartzites.</td>
</tr>
</tbody>
</table>

Kolihan - Chandmari (28°00'421"N - 75°46'344"E), located between Kolihan and Chandmari, which is 2 km south from Kolihan mine. The mine is around 29 Kms north from NKT (Khetri Maudh). The ancient mining area comprises open pit mine. The intervening section between Chandmari pit in the south and Kolihan mines in the north. The old workings with dumps of mine spoil show that the ancient miners worked in this area. The old workings are mostly located either at hanging wall or footwall side of gossans exposures. These workings seem to extend to a depth of 15-30 m.

The general geological succession in Kolihan - Chandmari mine (after GSI):

<table>
<thead>
<tr>
<th>Quartz veins</th>
<th>Metabasically intrusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELHIスーパー GROUP</td>
<td>Peak quartzite.</td>
</tr>
<tr>
<td></td>
<td>Phyllites-(Carbonaceous, micaeous and Andalusite Phyllites) with intercalations of garnet-amphibole-magnetite-biotite schist + GRAPHITE.</td>
</tr>
<tr>
<td></td>
<td>Schist: (Andalusite-biotite-amphibole-chlorite and garnet bearing schists).</td>
</tr>
<tr>
<td>AJABGARH Group</td>
<td>Amphibole quartzite's.</td>
</tr>
<tr>
<td></td>
<td>Felspar-Amphibole quartzites, with lenses of amphibole-magnetite-talc schist and impure marble.</td>
</tr>
<tr>
<td></td>
<td>Felspathic quartzite.</td>
</tr>
<tr>
<td>ALWAR GROUP</td>
<td></td>
</tr>
</tbody>
</table>
Abrak ki Khan (ABK) (27°49'428"N - 75°52'231"E), located 2 Kms east of the village Mavanda Kala in NKT taluka of JJN district. The village is nearly 13 Kms northeast from NKT (Khetri Maudh). The ancient mining area comprises open mine having quartz-mica schist situated on the hillock, which was extensively worked by the ancient miners.

Gura - Ponkh located in village Ponk in UPW taluka of JJN district. The village is situated 28 Kms northwest from NKT (Khetri Maudh). The area drain by ephemeral streams running across the village and the landform shows hillock and open scrub area around the site. The site has revealed ancient soapstone mine comprises open mine.

Ponkh ki Dhani (27°49'109"N - 75°35'937"E) located in the village Ponk in UPW taluka of JJN district. The village is round 28 Kms northwest from NKT (Khetri Maudh). The ancient mining area comprises open mine.

Sandhawaia Kuha (SWK) (27° 48'N - 75°35"E) located 0.5 Kms southwest of the village Ponk in UPW taluka of JJN district. The village is around 28 Kms northwest from NKT (Khetri Maudh). The site revealed ancient mining area comprises open mine.

The general geological succession in Ponk (after GSI):

<table>
<thead>
<tr>
<th>DELHI SUPER</th>
<th>AJABGARH Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alluvium and Aeolian sand.</td>
<td></td>
</tr>
<tr>
<td>Soft phyllitic quartzites and quartz schist.</td>
<td></td>
</tr>
<tr>
<td>Sheared rock consisting of crushed carbonaceous phyllite, sulphide mineralization.</td>
<td></td>
</tr>
<tr>
<td>Compact hard quartzites.</td>
<td></td>
</tr>
<tr>
<td>Base not seen.</td>
<td></td>
</tr>
</tbody>
</table>

Sawalpur (SWP) (27°38’N - 75°05’E) located 2 km east at the vicinity of the village Sawalpur in NKT taluka of SKR district. The village is around 30 Kms southeast from NKT (Khetri Maudh). The area drain by Buchara Bandh located 3 km on the north and 2.5 km on the south of the village. The ancient mining area comprises open pit mines having quartzite-mica minerals.
3.28 Description of Sites Reported from Research Area

Agri Ki Dhani (AKD) (27°39'44"N - 75°50'779"E) located on the eastern periphery of the village Agri Ki Dhani in NKT taluka of SKR district. The village is nearly 15 Kms southeast from NKT (Khetri Maudh). The area drain by seasonal Bani or Khad ki nalla on the northern side of the slope and the landform shows hillock around the site. The site identified as a metal processing activity area comprises the findings of vitrified clay lumps, metallurgical slags, terracotta tuyeres and unidentified sherds collected from the slope of the hillock. There are also patches of slag deposits on the slope of the hillock.

Baleshwar (BLW) (27°43'31"N - 75°53'418"E) located 1 km southwest of the village Baleshwar in NKT taluka of SKR district. The village is also nearly 13 Kms east from NKT (Khetri Maudh). The area drain by perennial streams running down from the hillock and the landform shows dense and open scrub area. The site identified as a metal processing activity area comprises metallurgical slags spread on slope of the hillock.

Kharagbinjpur (KBP) is a single culture site. Along with Chalcolithic material the site also identified as a metal processing activity area with comprises the findings of vitrified clay lumps and metallurgical slags collected from the slope of the hillock. The site is located on the foothills in the open scrub area of about 1 Km along with the structural remains and slag deposits. The huge slag deposit scattered on the surface indicates that the area was intensively used for metal producing.

Thaneshwar / Ganwari Banda (TNW) is a single culture site. Along with Chalcolithic material the site also revealed metal processing activity area with the findings of vitrified clay lumps, terra cotta tuyeres, stone muller, circular cut stone and lithic debitage collected from the foothills in the open scrub area. The important feature noticed is the insitu terra cotta tuyeres.

Ganeshwar (GNR) # 1 is a single culture site comprising chalcolithic material with indication of metal processing activity area comprises the findings of vitrified clay lumps, charred wood and metallurgical slags lying scattered on the surface.
Ganeshwar (GNR) # 6 is a metal processing activity area (27°40'175"N - 75°49'577"E) located 1.5 km east of the village Ganeshwar in NKT taluka of SKR district. The village is nearly 12 Kms southeast from NKT (Khetri Maudh). The area drain by Chandrabhaga nadi (tributary of Kantli River) on the west and Raotala nalla on the southeast of the village and the landform shows dense and open scrub area on hillocks on the east and sand dune ridges on the west of the site. The site comprises findings of metallurgical slags on the surface of the hillock. There are stone alignments in circular fashion on the surface, presume to be used during metal processing activities.

Shivnaryan ki Dhani (27°49'049"N - 75°53'541"E) located 5 km south of the village Jhilo in NKT taluka of SKR district. The village is around 38 Kms northwest from NKT (Khetri Maudh). The area drain by a tributary of Chandrawati River and the landform shows open scrub area around the site. The findings of terra cotta tuyeres in different sizes collected from open scrub area on the slope of the hillock shows as a macro metal processing activity area.

Murajawali (MWL) # 1 is a single culture site. Along with Chalcolithic material the site has also identified, as a metal processing activity area comprises with the findings of vitrified clay lumps and terra cotta tuyeres collected from the foothills.

Murajawali (MWL) # 2 (27°44'143"N - 75°52'192"E) located 200m northwest of MRW # 1 or 1 km southwest of Gagharewala Balaji Mandir in the village Nimod in NKT taluka of SKR district. The village is nearly 13 Kms east from NKT (Khetri Maudh). The area drain by seasonal nalla flowing on the southern side of the village and the landform shows hillock and open scrub area around the site. The site identified as a metal processing activity area measures around 300 Sqm comprises with the findings of vitrified clay lumps and terra cotta tuyeres collected from the foothills.

Naka ki Dhani (NKD) (27°49'105"N - 75°35'938"E) located 5 km southwest of the village Ponk in UPW taluka of JNJ district. The village is around 28 Kms northwest from NKT (Khetri Maudh). The site identified as metal processing activity
area measures around 300 Sqm comprises with the findings of vitrified clay lumps and terra cotta tuyeres collected from the foothills.

Pitrawali Dongri (27°49'877"N - 75°35'686''E) located 6 km southwest of the village Ponk in UPW taluka of JJN district. The village is around 28 Kms northwest from NKT (Khetri Maudh). The site identified as a metal processing activity area comprises the findings of vitrified clay lumps and terra cotta tuyeres collected from the foothills. The site shows metal producing indicator in form terra cotta tuyeres lying scattered on the surface with patches of fired activity. Around the village, there are number of ancient mining area viz. Sat Kui (near Basadi ki Dhani), Lohi Khan, Ponk ki Bawadi, and Sandhawala Kuha.

Salodara (SDR) is a single culture site. Along with Chalcolithic material the site also shows metal processing activity area comprises the findings of vitrified clay lumps and metallurgical slags along with the drainage channel.

Singhana (SGN) (28°07'N - 75°49'E) located 1 km west of the village Singhana in Khetri taluka of JJN district. The village is approximately 40 Kms north from NKT (Khetri Maudh). The site identified as a metal processing activity area comprises huge metal slag deposits scattered all around the village. Some of the village lanes and houses were constructed over the slag deposits. This shows that the area was intensively used for metal processing or dumping ground for the ancient metallurgists. The present village inhabits over the slag heaps. There are three slag heaps in the village. The site falls in the Khetri Copper Belt (KBC), which is around 80 km copper belt from Singhana to Raghunathgarh. The area forms the northern most continuation of KCB, under cover of blown sand/alluvium and strike of about 11 km. Pb - isotope analysis carried out on slags has given very interesting result.

Kot is a multi-cultural site revealed Chalcolithic, Early Historic - I and Early Historic - II materials. Along with this, it also identified, as metal processing activity area comprises tuyeres and vitrified clay lumps.
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