CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

THE EARLY MIDDLE PERIOD STONE BEAD INTERDEPENDENCE NETWORK

A thesis submitted in partial fulfillment of the requirements
For the degree of Master of Arts in Anthropology

By

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Dedicated to the Spirit of love and truth.

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ABSTRACT

THE EARLY MIDDLE PERIOD STONE BEAD INTERDEPENDENCE NETWORK

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The purpose of this thesis is to explore southern California early Middle period gifting and reciprocal exchange networks and the underlying motivations responsible for the creation, maintenance, and possible rejection of social relationships. Geospatial patterns in the distribution of early Middle period stone beads, an important stylistic variant imbued with social meaning, coupled with the uneven distribution of stone beads and other symbolic artifacts in mortuary contexts suggest stone beads communicated important information about social identity. A fine-grained talc-schist chemical sourcing protocol is developed using Laser Ablation Inductively-Coupled Plasma Mass-Spectrometry (LA-ICP-MS) that identifies soapstone source locations used in the production of stone beads (Sierra Pelona) and other artifacts (Catalina) while the source(s) of chlorite schist and chlorite talc schist used to craft the majority of early Middle period beads remains unknown. A theoretical model of *mutual interdependence,* adapted from systems theory approaches to the study of southern California hunter-gatherers and the more recent *Interdependence Hypothesis* is merged with the *power and force* model to explain underlying motivations for the creation and maintenance of obligatory gifting and reciprocal exchange relationships that reveals important information regarding social interaction among small-scale groups as well as factors that led to the emergence of large-scale complex hunter-gatherer societies. The model is applied to the ethnographic Cahuilla representing a large scale mutual interdependence network regulated by the institution of ceremonialism and compared to the early Middle period mutual interdependence stone bead obligatory gifting and reciprocal exchange network, a possible remnant of the Early period *Olivella* Grooved Rectangular Bead (OGR) sphere of influence, that connected the Los Angeles area to the southern Channel Islands, San Gabriel and San Bernardino Mountains, lower Mojave River, and Coachella Valley. By the Late period the stone bead exchange network, which had previously operated parallel to the Santa Barbara Channel shell bead exchange network, was absorbed by it.

CHAPTER 1

INTRODUCTION

The past several decades of archaeological research on Prehispanic exchange networks in the southern California area (see Figure 1-1) reveal the importance of crafted items in the creation and maintenance of social relationships (King 1974a, 1976, 1990; Blackburn 1974; Arnold 1983, 1987, 2000, 2001a; 2012; Hudson and Blackburn 1986, 1987; Bennyhoff and Hughes 1987; Scalise 1994; Raab and Howard 2002; Howard 2002). In the Santa Barbara Channel, shell bead and chert drill craft specialization played an important role in solidifying the political and economic power of a central leadership leading to the development of ranked societies during the Middle/Late Transition (cal. A.D. 1150 to 1300), possibly in response to dramatic environmental change (Arnold 1987, 1991, 1992a; Raab and Larson 1997; Jones et al. 1999; Stine 1994). Others, most notably King (1990), focus on the reconstruction of Prehispanic social systems and material exchange networks from a politicoeconomic perspective and find evidence for the emergence of social complexity (i.e., ranked societies) at the end of the Early period (i.e., 1400 B.C.; see Table 1-1).

The important role beads played in Prehispanic gifting and exchange networks in southern California society is underappreciated but cannot be understated. Gifting and exchange networks intertwined with economic, political, social, and ceremonial subsystems (Arnold 1992b; Blackburn 1974; King 1990; Strong 1929) were integral to the development of cooperative relationships and marriage alliances, strengthened intra- and inter-group cohesion and promoted economic stability (Rick et al. 2005:194). Beads were an important medium of gifting and exchange between tribal, political, and spiritual leaders and communicated information regarding wealth, status, and as a form of ornamentation, were an aspect of material culture most directly related to social identity (Joyce 2005; McCafferty and McCafferty 2009; McCafferty and McCafferty 2010). In the absence of a writing system, material cultural was crucial to communicating important information (Costin 2010:211). Examining the underlying motivations that led to the creation and maintenance of gifting and exchange relationships and how they were communicated through crafted items such as beads is pivotal to our understanding of cultural adaptation and the emergence of social complexity among southern California hunter-gatherers.

The purpose of this thesis is to explore southern California early Middle period (see Table 1-1) gifting and reciprocal exchange networks and the underlying motivations responsible for the creation, maintenance, and possible rejection of social relationships. Such a complex topic requires the examination of multiple lines of evidence relating to the procurement, production, and distribution of stone beads as well as the potential social, political, economic, and symbolic information they communicated. Through a combination of background research, geospatial distribution analysis, fieldwork, collections analysis, and LA-ICP-MS chemical source characterization and provenience analysis I find convincing evidence that stone beads were a stylistic variant that

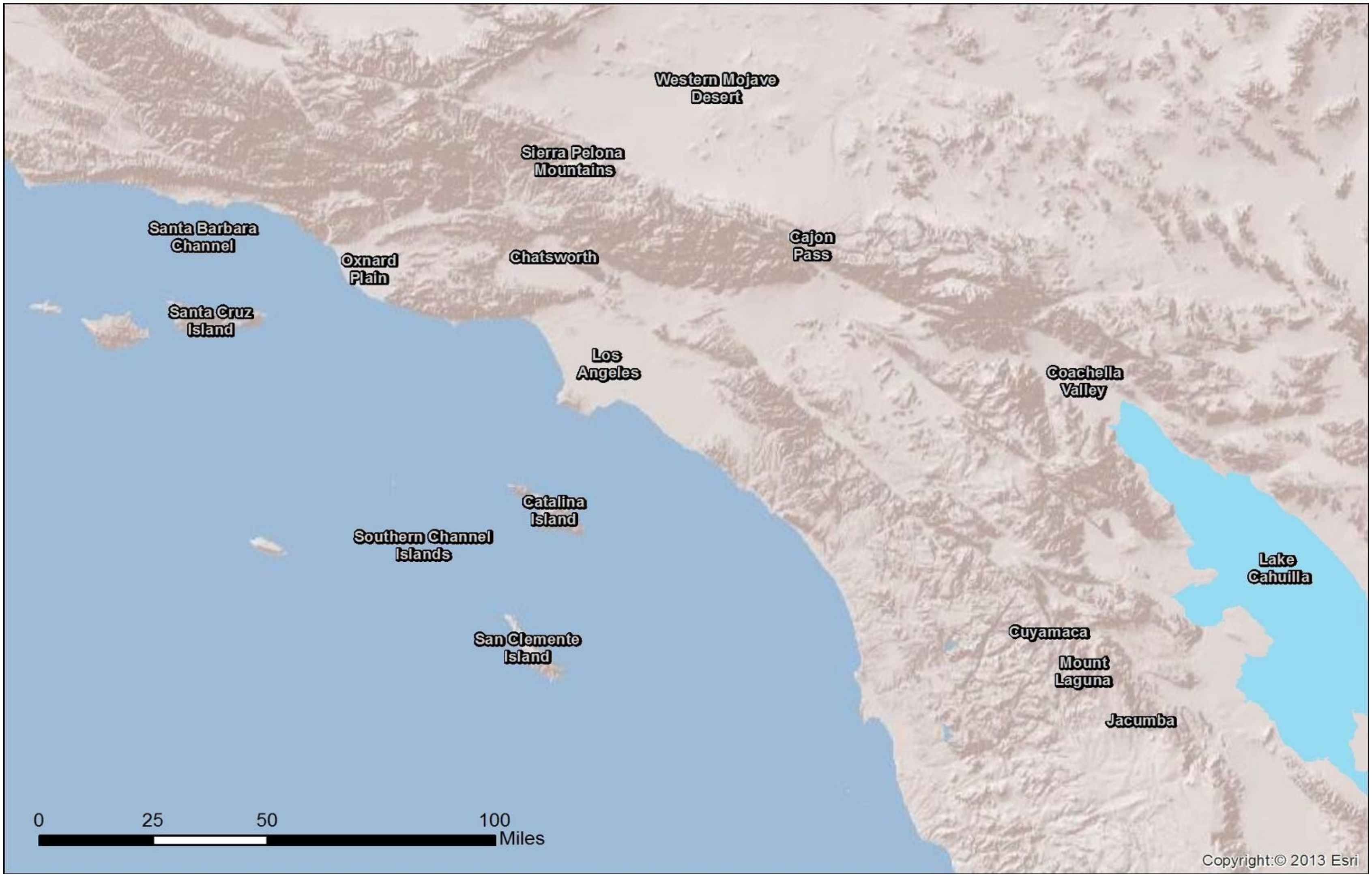

Figure 1-1. Greater Southern California area

communicated important information about social identity within an early Middle period mutual interdependence obligatory gifting and reciprocal exchange network. The research improves our understanding of hunter-gatherer social complexity and the intricacies of social interaction and the negotiation of social identity, while highlighting the important role of managers in emerging large-scale networks and the establishment of institutions in large-scale networks to regulate mutual interdependence relationships. Further, it provides an explanation for the origin of the early Middle period mutual interdependence stone bead exchange network, as well as reasons for its dissolution leading up to its absorption into the Santa Barbara shell bead economy by the Late period.

Table 1-1. Southern California cultural sequence (adapted from King [1990: Table 1] and Arnold 1992:64)

Period	**Years BP**	**Calendar Years**
Late	650-146	A.D. 1150-1804
Transitional	800-650	A.D. 1150-1300
Late Middle	1650-800	A.D. 300-1150
Early Middle	3350-1650	1400 B.C.-A.D. 300
Early	7950-3350	6000-1400 B.C.

The focus of theoretical models that address hunter-gatherer social identity and explain the underlying motivations for creating and maintaining exchange relationships has been on the use of craft production as a measure of complexity and the importance of wealth items (e.g., sewn-plank canoes) in constructing politicoeconomic and social relationships in emerging *complex* societies (Arnold 1995; 2001b; Brumfiel and Earle 1987; Clark and Blake 1994; Hayden 2001). Others, most notably Sassaman (1993, 1998, and 1999), have developed theoretical concepts of social identity that demonstrate hunter-gatherer social complexity is no longer limited to non-agricultural chiefdoms and that egalitarianesque societies are no longer antecedents to but rather components of complex societies (Sassaman 2004:229)

In his previous work, Sassaman (1993, 1998, and 1999) developed what I have termed the *power and force* model that argues crafting for reciprocal exchange along with other cultural actions were a means of asserting egalitarianism and that crafted stylistic variants (e.g., soapstone ollas among the Chumash) communicated important information about social status and identity, and thus played an important role in the maintenance of exchange relationships. A complimentary model of *mutual interdependence*, adapted from systems theory approaches to the study of southern California hunter-gatherers (i.e., Bean 1972 and Blackburn 1974) and the more recent *Interdependence Hypothesis* (Tomasello et al. 2012) borrowed from evolutionary anthropological theory, is developed in tandem with the *power and force* model to explain underlying motivations for the creation and maintenance of obligatory relationships among small-scale groups, emerging large-scale societies, and established large-scale societies like the Cahuilla.

The Cahuilla document an important history of mutual interdependence and the use of power and force, which draws comparisons with early Middle period social networks explored during this study. Admittedly, the Cahuilla are among the most studied aboriginal groups in southern California (e.g., Blake 1856; Barrows 1900; Kroeber 1908; Strong 1929; Bean 1972; Bean and Saubel 1972; Bean and Blackburn 1976), and thus there is a rich array of ethnohistoric and ethnographic data to reference. In addition, the Cahuilla remained relatively autonomous during the Mission Period and carried on many aspects of Prehispanic customs, ceremonies, and socio-economic status, all of which were documented at the beginning of the twentieth century. The Cahuilla occupied territory crucial to the current research and they participated in an elaborate mutual interdependence gifting and reciprocal exchange network that utilized beads as a medium in the maintenance of obligatory relationships as well as in economic exchanges. Cahuilla ceremonialism, as documented by Strong (1929), Bean (1972), and others was representative of the pan-southern California socio-religious system discussed elsewhere as a *sacred bundle complex* (Mohr and Sample 1967; also see Strong 1929) that regulated the mutual interdependence network in Cahuilla society. Perhaps most importantly, the Cahuilla maintained a semblance of their egalitarianesque society as opposed to the Chumash who developed a ranked society during the Transitional period (Arnold 1992, 1995, 2001a, 2001c; Arnold and Green 2002), or perhaps earlier (Gamble 2002, 2005; Gamble et al. 2001, 2002; Kennett and Kennett 2000; King 1990).

Statement of Research

It is argued herein that small-scale groups voluntarily entered into and maintained mutual interdependence obligatory gifting and reciprocal exchange *relationships* out of a need for social interaction that reinforced small-scale identities, created a new partnership identity, and provided opportunities to transform social identities through displays of talents, skills, and craft. As the process of creating and maintaining relationships continued, an organic large-scale mutually interdependent obligatory gifting and reciprocal exchange *network* emerged that resulted either in the creation of a new large-scale group identity and establishment of institutions, norms, and rules to regulate mutual interdependence, or as was the case with the Early Middle Period Stone Bead Interdependence Network, the failure to establish social mechanisms, which lead to its dissolution and absorption into the institutions of competing networks, most notably the Transitional/Late period Santa Barbara shell bead economy.

Theoretical Framework

The thesis is founded in social theory that examine the underlying social, politicoeconomic, ceremonial/ritual, and ideological motivations for and dynamics of hunter-gatherer social interaction. Central to this discussion are politicoeconomic and ceremonial subsystems and the role of crafts in forging social identity and social relationships. Aspects of systems theory (see Blackburn 1974; and Bean and Blackburn 1976), Substantivism (Baugh and Ericson 1994; Earle 1977; Earle and Ericson 1977; Ericson 1977; Earle 2010; Polanyi 1944, 1957), and World-Systems perspective (see Chase-Dunn and Hall 1997; Chase-Dunn and Mann 1998), as applied to the study of material exchange, gifting, and social interaction, provide a foundation for the development of a theoretical model of mutual interdependence and power and force.

Several basic tenets of Substantivism and World-Systems perspective are adopted. First, Polyani's (1944) substantivist perspective is readily applied to Prehispanic southern California societies during the Middle period. According to Polyani, the economy is intertwined with all other aspects of social life such as religion, kinship, or politics. Further, modes of exchange were conditioned by the social construct. For instance, reciprocity was consistent in egalitarian societies and redistribution of wealth was characteristic of centralized political hierarchies, while our modern Western Civilization is ruled by market exchange (Earle 2010:205-206). The processes by which societies negotiated their relationship with the material world, in this case reciprocal exchange, are further explored.

Second, I assume that Prehispanic societies were involved in tri-level exchange networks on the local, regional, and larger scale that impacted everyday life of these people and the mechanisms of social change (Chase-Dunn and Mann 1998:XI). Rather than focusing on world-wide systems or global markets, I consider whole-systems (see Chase-Dunn and Hall 1997; Chase-Dunn and Mann 1998), a concept applicable to discussions of even the smallest social groups. In this context, it is possible to explore social interaction among hunter-gatherers on the local (i.e., small-scale relationships), regional (i.e., large-scale networks), and larger (i.e., regional networks) scale of analysis.

With these assumptions and concepts in mind, the thesis will consider important aspects of craft, social identity, and systems theory. Where appropriate, the Cahuilla Indians of the Coachella Valley, Banning Pass, and Santa Rosa and San Jacinto Mountains will be used as a case study. The Cahuilla, Serrano, Cupeño, Luiseño, and Gabrielino, all Takic speaking groups, inhabited southern California from the southern Channel Islands to the shoreline of Lake Cahuilla at the time of European contact and constituted a regional network of large-scale mutual interdependence obligatory gifting and reciprocal exchange networks connected through a pan-southern California socio-religious system (Strong 1929:348). The Cahuilla are among the best ethnographically studied groups in southern California with concern to social interaction, ceremonial integration, and material exchange.

Important to this discussion is the role of craft and social identity. Anthropological research into craft and social identity blossomed out of the foundational work of V. Gordon Childe (Costin and Wright 1998:vii). Central to Childe's thesis were the social relations of craft production and role of craft specialists within those relationships (Wailes 1996: 9). Childe's theoretical underpinnings are now intertwined with modern anthropological theory of craft and social identity (Costin and Wright 1998:vii), and are invoked in studies that relate craft production as a measure of social complexity. While the current research deviates from the narrow view of social complexity associated with the emergence of ranked societies and employs a liberal perspective of social complexity as it pertains to hunter-gatherer society, it is nonetheless important to acknowledge the contribution of this foundational work to modern archaeological thought.

Crafted items such as beads and ornaments were integral to all aspects of Prehispanic southern California society and were among the most widely exchanged cultural material, thus they are well suited for the study of hunter-gatherer craft and social identity. Production, distribution, and consumption (i.e., the economic system; see Costin 1991:1) patterns indicate that beads and ornaments permeated politicoeconomic, secular economic, mortuary, ceremonial/ritual, and social subsystems of culture (Arnold 1992a; King 1990). While archaeologists study craft from technological, economic, and political perspectives (e.g., Brumfiel and Earle 1987; Carballo 2012; Clark 1996; Clark and Perry 1990; Graesch 2004; Hirth 2009; Sheets 2010) recent trends in the archaeology of craft and social identity (e.g., Arnold 2012; Costin 1998; Flad and Hruby 2007; McCafferty and McCafferty 2010; Peelo 2011; Robinson 2010; Sassaman 1998; Wallis 2008) has started to unravel how the practical and symbolic mechanisms of craft production created social identifies, categories, and relationships (Costin 1998:3). These contemporary studies of craft generated interest in how social identity developed from the interplay of social or politicoeconomic organization of the economic system and the social perception, practical or metaphorical, of crafted items (Costin and Wright 1998:vii).

While research into craft and social identity has generally favored ranked societies, Sassaman (1993, 1995, and 1998) has successfully adapted aspects of it to the study of hunter-gather and/or egalitarian societies and developed an interpretive theoretical model of social identity and underlying motivations for maintaining social relationships through exchange of crafted items. The *power and force* model accounts for the negotiation of obligatory gifting and reciprocal exchange relationships in hunter-gatherer societies. It is complimentary to the mutual interdependence model, which explains underlying motivations for the creation and maintenance of gifting and exchange relationships among small-scale relationships, emerging large-scale networks, and established large-scale networks. After discussing the two theoretical models I attempt to demonstrate how mutual interdependence and power and force are complimentary theoretical constructs that provide a more satisfying explanation of complex hunter-gatherer society.

To accomplish this I examine the interplay of mutual interdependence and power and force among the Cahuilla, who may be described as a large-scale egalitarianesque society with established institutions and rules (e.g., Bean 1972; Kroeber 1908; Strong 1929). It is recognized that there is a high degree of social complexity and variability among hunter-gatherer societies (e.g., Arnold 1992, 1995, 2001a, 2001c, 2012; Gamble et al. 2001; Lee and DeVore 1968; Kelly 1995; Price and Brown 1985; Sassaman 2004), which challenges the romanticized notion of egalitarianism as *primitive communism* (Morgan 1965 [1881] and Engels 1972 [1889]). Although true egalitarian societies may never have existed, archaeologists are still able to explore aspects of one if its key components, obligatory reciprocity. For the purposes of this study, I consider egalitarianism as a general term to describe non-hereditary, unranked, complex hunter-gatherer societies that practiced obligatory gifting and reciprocal exchange.

Mutual Interdependence

Originally, I advanced a model of mutual interdependence in a research paper on craft and social identity in Prehispanic Cahuilla society (Eddy 2006), but let it lie dormant for years as I pursued the development of a soapstone sourcing protocol, the results of which I finally provide in this thesis. Recently, the concept of mutual interdependence was brought to the forefront of anthropological thought in an article published in Current Anthropology, which proposed an *Interdependence Hypothesis* to explain the evolution of human cooperation (Tomasello et al. 2012). The authors argue that at some point in human evolution, collaboration with others was necessary to ensure the survival of the group as well as for procreation, and that collaboration may explain human's unique cognitive abilities and social organization (Tomasello et al 2012:674).

Mutual interdependence provides an explanation of the underlying motivations for the creation, maintenance, and rejection of obligatory gifting and reciprocal exchange relationships among small-scale groups and emergent societies. It is an adaptation of Durkheim's (1933) economic interdependence, which relates the importance of craft production and the system of interdependence it created between segments of society for goods and services consumed, and Blackburn's (1974) ceremonial integration model, which is discussed in the context of Bean's (1972) analysis of the Cahuilla Indians. Although Durkheim is criticized for his idea of moral obligation and overstating the role of institutions (e.g., kinship, alliances, and ceremonialism) in governing reciprocal relations (Jones 1986; Narotzky 2007:46), the ability of such institutions to regulate aspects of social interaction and exchange within egalitarian societies should not be so easily dismissed.

Interdependence begins in small-scale contexts, likely originating among collaborative foragers and represents a cognitive evolution that associated a need to acquire food with coordinated resource procurement and processing strategies involving the cooperative communication of ideas and technology (Tomasello et al 2012:674). Group-level collaboration developed as a result of population increases within the group and competition with other social groups, leading to the creation of social institutions, norms, and rules; mechanisms developed to create and reinforce a group social identity (Tomasello et al 2012:674). The development of group social identity was necessitated by a need to confirm in-group membership among cooperating strangers that communicated shared abilities, beliefs, and trustworthiness (Tomasello et al 2012:681). Institutions, norms, and rules also regulated mutual interdependence as incentives for each individual to cooperate diminished (Tomasello et al. 2012:681) and the pathway to gaining reputation as a respected coordinator (i.e., managers) was more difficult.

The model of mutual interdependence, as it is applied here, deviates from Durkheim's (1933) concept of economic interdependence while complimenting Tomasello et al.'s (2012) Interdependency Hypothesis in its assumption that participatory small-scale groups were capable of short-term self-sufficiency, but voluntarily entered into obligatory reciprocal gifting and exchange relationships out of a need for social interaction that reinforced small-scale identities while also creating a new partnership identity. The motivation for entering into obligatory gifting and reciprocal exchange relationships was not derived entirely from an evolutionary need to reduce risk and ensure the survival of the group, although it does provide a mechanism for banking resources to protect against starvation while also leading to opportunities for procreation, but emanated from a need to reproduce, create, and transform social identities. Maintenance of obligatory gifting and reciprocal exchange relationships allowed for the reproduction of both small-scale and partnership identities, while also providing opportunities for individuals to transform their personal identity through acts, talents, display of skills, or craft. As small-scale groups continued the process of creating and maintaining relationships, an organic large-scale mutually interdependent obligatory gifting and reciprocal exchange network emerged. At this point, two outcomes were possible: 1) a new pan-group social identity was forged through the establishment of institutions, norms, and rules that regulated mutual interdependency, and thus, a new society thrived; or 2) a large-scale group failed to establish social mechanisms, no pan-group social identity emerged, small-scale groups were eventually absorbed into the institutions of competing networks, and social identities were once again transformed.

Power and Force

Large-scale societies that develop a pan-group social identity through the establishment of social institutions, norms, and rules will yield power and force to maintain mutual interdependence. Crafting for reciprocal exchange was one mechanism used to assert egalitarianism (Sassaman 1998:94) that when combined with other cultural actions, such as defining and enforcing rules and boundaries and control over access to resources, was viewed as a means of power and force that affected social identity, which itself was created, duplicated, and adapted through social interactions (Sassaman 1998:94; 1999:94; Wolf 1982). The exertion, manipulation, and perception of power by those who possessed it affected all aspects of society, and everyone in society actively participated in the sociopolitical dynamic (Sassaman 1998:94; Giddens 1984; Wolf 1990).

Power, it was argued, was a motivating factor driving obligatory gifting and feelings of indebtedness that develop out of reciprocal exchange; in order to generate more power and social leverage, pressure may be applied through coercion and force (Sassaman 1998:94). The exertion of power and manipulation in social relations influences decisions regarding the possibility of disengagement from an obligation, which may also be affected by the time and labor spent on the production of craft (Sassaman 1993:39-40). In addition, power can be obtained and exerted by dominating groups who establish boundaries and force their cultural identity on subordinate groups through the dispersal of their crafted items and control over reciprocal exchange relations (Sassaman 1998:94).

Sassaman (1993:37) originally applied the power and force model to the Chumash of the Santa Barbara Channel who wielded power and influence to resist the adoption of ceramic technology and crafted items from neighboring groups to the east in an effort to maintain established exchange networks associated with the soapstone olla industry, thus ensuring the long term economic security of the Chumash in ways no technology, however more efficient, could (Sassaman 1993:37, 73). While the example was effective in communicating how power and force could be used in the negotiation of reciprocal exchange relationships, the Chumash had developed a simple chiefdom during, or prior to, the Transitional period several centuries before intensification of the soapstone olla industry on Catalina Island (Howard 2002).

The Cahuilla Indians

The Cahuilla, on the other hand, provide an extraordinary example of mutual interdependence and the use of power and force in an egalitarian society. What arguably began with simple voluntary reciprocal gifting/exchange relationships between small-scale groups to fulfill a need for social interaction, developed into an elaborate ceremonial institution that required the participation of neighboring groups, ritualized the act of gifting and reciprocal exchange, and helped forge a pan-group identity (Bean 1972:135-159). Unfortunately little is known about the evolution of the Cahuilla society from small scale groups to a mutually interdependent obligatory gifting and reciprocal exchange network supported by institutions, rules and norms. Rather, most of our information relates to the social mechanisms of the gifting and exchange network, of which the institution of ceremonialism is paramount.

Mutual interdependence was regulated in Cahuilla society by the ceremonial institution and the rules that governed Cahuilla ritual behavior: 1) participation by members of both moieties (i.e., Wildcat and Coyote) was required for most rituals; 2) invitations must be extended to immediate kin of person honored or celebrated; and 3) gifting to the host for the purpose of redistribution to guests at the conclusion of the ritual (Bean 1972:153). Participation in ceremonies was virtually mandatory, but also beneficial as they provided an opportunity to reproduce group identity and create or transform individual identities.

The Cahuilla held ceremonies so regularly that after the completion of one ceremony the next was already being planned (Bean 1972:135). In essence, ceremony and ritual were always on the mind of the Cahuilla. Artisans were motivated to intensify craft production in the weeks prior to a ceremony in order to contribute to the communal gift (Bean 1972:124-124) and build up a supply of crafted objects that they could use for personal trade, gifting, and/or gambling at the ceremonial venue (Bean 1972:138). Artisans acted within this capacity to showcase their skills from a desire to elevate their social status through public notoriety and recognition of their craft. On the other hand, crafting was manipulated by politicoeconomic leaders as a means to assert egalitarianism through the redistribution of goods and force individuals who invested critical labor in craft production to meet their obligations to the group, thus ensuring that they would receive equally critical subsistence resources and goods. The assertion of egalitarianism also manifests in the ritual destruction of property following the death of an individual (e.g., Bean 1972; Hooper 1920; Patencio 1943).

Ritualized gifting[1] occurred during ceremonies, most notably in the redistribution of subsistence resources and craft goods from the leader of the host group to leaders of all visiting groups (Bean 1972:153). All visiting groups were expected to contribute goods and resources to the host group, who had accumulated goods and resources from the members of its group, and thus all shared in bounty. Beads and other symbols of wealth and status were gifted or exchanged between politicoeconomic leaders and possibly ceremonial and religious leaders to reaffirm political, economic, and/or social status. Ceremonies also provided a venue for groups and individuals to establish new domestic exchange relationships, reconnect with existing exchange partners, arrange marriages, introduce new family members, tell stories, sing songs, and dance, all of which created opportunities to build reputation and establish identities.

As indicated in the first rule of ritual behavior, performance of most ceremonies required participation from both moieties and neighboring groups. By cooperating in the communal gift, the Cahuilla were assured that the ritual cycle continued, reciprocal gifting relationships were maintained, and group social identity was reproduced, while participation in the ceremonies and social gathering associated with the ritual acts guaranteed opportunities for individuals to create or transform social identities. On the other hand, failure to contribute to the communal offering and participate in the ceremony could be met with ostracization, a refusal of goods and resources, and the loss of status; many other consequences might befall an individual that refused to meet their obligations. The threat of punishment, a form of politicoeconomic power that could be exerted by leaders in a show of force, was an effective deterrent but likely one not often invoked because the benefits of participation far outweighed the risks.

Discussion

The purpose of this theoretical discussion was to develop a model of hunter-gatherer social interaction that can be applied to the study small-group relationships, emerging large-scale networks, and established large-scale networks among hunter-gatherers while also addressing the underlying motivations for creating, maintaining, and even rejecting relationships, which is multifaceted and complex. This model proposes that one of the critical factors that led to these relationships was the need for social interaction. Forging new relationships created new identities for groups and individuals that were reproduced and transformed over and over again through the maintenance and the creation of new relationships. This may explain the evolution from small-scale group mutual interdependence to a large-scale group mutual interdependent gifting and reciprocal exchange networks regulated by institutions and enforced by politicoeconomic leaders who wielded power and influence.

The next logical question is whether or not mutual interdependence and power and force have distinct signatures in the archaeological record. It is argued here that several aspects of mutual interdependence gifting and reciprocal exchange networks can be identified in the archaeological record through empirically observed patterns in the spatial and temporal distribution of stylistic variation. In this respect, style is defined as the formal variation of a cultural material that communicates information about social and/or personal identity (Weissner 1983:256).

First, crafts were an important medium in gifting and reciprocal exchange relationships that were also symbols of social identity, which was reproduced and transformed through social interactions. When combined with cultural actions like defining territorial boundaries, stylistic variations in artifacts that symbolize group identity, like beads, can be used to measure the geographic extent of a gifting and exchange networks sphere of influence. The spatial distribution of a stylistic variant may also reveal information regarding the scale of the gifting and exchange relationship (i.e., small-scale relationships, emerging large-scale network, established large-scale network). On the other hand, goods and resources that do not represent stylistic variants in southern California, such as obsidian, were exchanged across multiple network boundaries, as demonstrated by the presence of Coso obsidian throughout southern California during the Middle period (McFarland 2000; Sutton et al. 2007)

The distribution of *Olivella* grooved rectangular (OGR) beads, a stylistic variant used during the Early period (4,000 B.C. to 3,000 B.C.), is a good example. During this time, several shell and stone bead types were produced and distributed throughout the Santa Barbara Channel and surrounding area, including *Olivella* whole shell beads, and clam and hard stone (i.e., serpentine/jadeite) disc beads. OGR beads, on the other hand were distributed exclusively in areas occupied historically by Uto-Aztecan speaking peoples that included the southern Channel Islands, south central coastal mainland (i.e., Los Angeles and Orange counties), western Mojave Desert, western Nevada, and central Oregon (Howard and Raab 1993; Jenkins and Erlandson 1997; Raab and Howard 2002). Only one OGR bead is known from the Santa Barbara Channel (King 1990:110). The distribution of OGR beads prompted Raab and Howard (2002:593) to suggest that the beads were transported through a cultural interaction sphere linked to a Takic language community that were inhabiting coastal southern California at that time (Vellanoweth 1995). I suggest that the boundaries of OGR bead distribution may reflect a mutual interdependence gifting and reciprocal exchange network that may or may not be associated with any specific language family but likely involved small-scale groups that shared similar social, political, and spiritual beliefs.

Sassaman's (1993) comparison of soapstone ollas with ceramic vessels among the Chumash also demonstrates how the distribution of a stylistic variant can be used to identify the existence of an exchange network and measure its sphere of influence. While the exchange network was not mutual interdependence-driven per se, but rather, under the control of the Chumash hereditary leadership, it still provides a good illustration. The form or character of a soapstone olla is quite similar to a ceramic vessel and both can be used effectively for cooking or storage. However, soapstone ollas symbolized participation in island/coastal exchange networks and communicated information regarding status, wealth, and power in Chumash society (Howard 2002:598). The rejection of ceramic technology assured the continuation of the island/coastal exchange network and solidified the political power of those who negotiated the exchange. It also served to reinforce social, political, economic, and ceremonial beliefs and practices of Chumash society while ensuring that symbols of wealth, status, and power remained symbols of wealth status and power.

It is also worth noting that the use of power and force was not exclusive to large-scale mutual interdependent gifting and reciprocal exchange networks regulated by institutions, but was also an important measure of control in the Chumash simple chiefdom. However, evidence of simple chiefdoms is currently limited to the Transitional Period, or perhaps late Middle period in the Santa Barbara Channel. I therefore propose that the association of power and force with mutual interdependence is adequately justified in this study of early Middle period exchange systems in southern California.

The second aspect of the mutual interdependence and power and force model that may have an archeological correlate relates to individuals who held leadership positions and were able to wield power and influence over others. Archaeological research has demonstrated that the treatment of the dead may reveal insight into social organization (Brown 1971; Gamble et al. 2001, 2002; King 1990; O'Shea 1984; Peebles 1971), although there are those who caution against mortuary data as the sole source of empirical evidence for social complexity (Chapman and Randsborg 1981; Hodder 1982; Shanks and Tilley 1982). In some cases, mortuary data tells us more about the social position of the living than the dead (Braun 1984:191; Pearson 1982, 1999).

For instance, it is observed among the Cahuilla that political and ceremonial leaders, people who held administrative positions, people of wealth, such as craftsmen and women, and members of their families received extraordinary material contributions from the living in an effort to honor them and provide for a comfortable afterlife (CSRI 1995). There is also considerable ethnographic documentation of ritual destruction of personal possessions and the burning of the house after death (e.g., Bean 1972; Bean and Saubel 1972:128; Hooper 1920; Patencio 1943; Ramon and Elliott 2000; Strong 1929:121), which is confirmed in the archaeological record and pushes its antiquity back to the Late period (e.g., Mirro and McDougall 2012; Love et al. 2001). Yet, differences in the elaboration of burial accompaniments including individuals buried with no offerings or possessions, especially among individuals in the same burial area or cemetery, suggest offerings were not distributed equally among the dead. In other words, Cahuilla mortuary offerings reflected the individuals status in society regardless of whether or not the items buried were their personal possessions of the individual or not.

The difficulty for the archaeologists lies in the assignment of individuals exhibiting status to specific roles or leadership positions (e.g., politicoeconomic or ceremonial leaders, craft specialist, etc.), which is not beyond the realm of possibility. For instance, a Late period Cahuilla cremation feature excavated at Indian Wells contained the burnt remains of a house containing an adult man and woman, presumed to be a married couple (Love et al 2001). A number of items related to the production of arrows (e.g., numerous finely made highly-skilled lithic projectile points and arrowshaft straighteners) were buried along with the remains, which the authors interpreted as evidence of a craft specialist dubbed a "master arrow maker" (Love et al. 2001:53).

The extensive layers of achieved social status in Cahuilla illustrate the difficulties inherent in assigning leadership status to an individual. For instance, was the master arrow maker also a leader who wielded power? Further, we know from the ethnographic record that power was not simply wielded by politicoeconomic leaders, like the *Net* who occupied the Big House and protected the *maiswat* or sacred bundle, but ceremonial leaders and shamans also held considerable power. The *paxaaˀ* was a ceremonial leader and assistant to the *Net* who was responsible for ensuring the proper order and performance of ritual acts and punishing those who misbehaved during ritual (Bean 1972:106). Another individual who wielded power in Cahuilla society was the *puul* or shaman who possessed supernatural powers and demonstrated that power in religious, economic, political and social institutions (Bean 1972:109).

I therefore propose that leadership that wielded power, whether politicoeconomic, ceremonial, or spiritual manifests in mortuary contexts, most notably in cemeteries or discrete burial areas associated with the interned or cremated remains of adults. Ethnographic and archaeological data on Cahuilla society, which reflects an established large-scale mutual interdependence obligatory gifting and reciprocal exchange network, suggest that leaders who wielded power and influence would be associated with lavish burial accompaniments and symbolic items that represented their power, whereas adult burials signifying non-leadership status would be buried with utilitarian objects and few, if any, symbolic items. The importance of place or spatial relationships between burials must also be considered.

On the other hand, adult burials containing moderate to high numbers of shell beads but no other symbols of wealth or status may reflect individuals who attained status in non-leadership positions or were relatives of a leader in some capacity (CSRI 1995; cf. Dahdul 2002:64). Infant and child burials, which may also be accompanied with lavish goods and symbols of power and prestige, likely do not reflect positions of power or influences, assuming that children were not directly involved in the negotiation and execution of reciprocal exchange relationships. Green (1999) has suggested that lavish burial goods associated with infants and children were offerings or investments not related to the child's social status, but rather reflected the emotional saliency of an individual or group over the death. Finally, the master arrow maker at Indian Wells provides an example of an individual who likely gained status as a craft specialist and was buried with the means of their craft, although the possibility that this individual wielded some form of power and influence cannot be ruled out. While there is enough information to make general observations and interpretations of status, there is obviously much that still needs to be done regarding the signature of social, politicoeconomic, ceremonial, and religious status in burial contexts.

CHAPTER 2

METHODS AND RESEARCH

General Methodology

In order to examine something as complex as Prehispanic obligatory gifting and reciprocal exchange networks it is necessary to draw information from multiple qualitative and quantitative data proxies. A general methodological framework is developed that incorporates pragmatism and a mixed-methods approach. Pragmatic knowledge claims that focus on actions, consequences, and situations rather than previously established methodologies (Creswell 2003:11). As a result, methodological stricture gives way to an adaptive system of research (see Patton 1990) that asks, above all else, *what works*? Pragmatic thinking is not tethered in its approach, allowing the researcher access to a myriad of analytical procedures to dissect a problem and derive knowledge (Creswell 2003; also see Tashakkori and Teddle 1998; and Patton 1990).

Creswell (2003:12; also see Cherryholmes 1992) argues that pragmatism provides a basis for knowledge claims. Several of Creswell's claims are adopted and applied to the research problem. Summarized below are the knowledge claims that form the basis of the current methodology:

1. Pragmatism is not committed to any one system of philosophy and reality. Inquiries draw liberally from both quantitative and qualitative assumptions.
2. Any/all, methods, techniques, and procedures of research can be used to best meet the specific needs and purpose of the research.
3. Truth is based on what works in a given situation. Thus, both quantitative and qualitative data are used derive knowledge of the research problem.
4. It is necessary to provide a rationale for mixing quantitative and qualitative data to derive knowledge of the research problem.
5. Pragmatists recognize that research does not occur within a vacuum, and that social, political, or historical biases must be accounted for.

Pragmatic thinking is complimented by a mixed-methods approach. As shown above, pragmatists are concerned with the research problem above all else and are open to employing any number of techniques, methods, or procedures to derive knowledge from the problem. Qualitative data derived from background research, fieldwork, geospatial analysis, and collections analysis and quantitative data obtained from LA-ICP-MS analysis is filtered through the lens of the mutual interdependence and power and force theoretical model.[2]

The pragmatic mixed-methods framework reinforces the purpose of the research, addresses the guiding question, and influences data collection, analysis, and interpretation. Whether explicitly stated or implied, most archaeological research in California, and elsewhere, employs a mixed methods approach.

Terminology

Several important terms related to the raw lithic materials used to craft stone beads and other artifacts are defined. Additional terms, such as egalitarianism, are defined throughout the text where appropriate. During the course of this research it became apparent that terms *soapstone* and *steatite* were used interchangeably; the former corresponds to myriad of mineralogically distinct and perhaps chemically variable distinct rock. The terms are convenient and boast a history of use in California archaeology and elsewhere (e.g., Norway, Greece, eastern United States, Italy, etc.) and perhaps most importantly they are immediately recognizable to the archaeologist and general public alike.

In a previous study of soapstone production, Romani (1982:26-29) proposed using the term *soapstone* in lieu of *steatite* and other terms to describe a broad class of sheet silicate rocks. Sheet silicates are a class of minerals commonly found in intermediate and felsic igneous rocks, many metamorphic rocks, and fine-grained sedimentary rocks and sediments. Common sheet silicate minerals include serpentine, talc, pyrophillite, micas, and chlorite (Nesse 2000:235).

Others define *soapstone* as impure massive fine- to coarse-grained talcose rocks composed of 50 to 95 percent talc (Williams and Rosenthal 1993:30). Conversely, the term *steatite* is often used in industrial connotations to describe high talc content stone with few impurities and no visible grains (Allen et al. 1975:69; Gary 1942:146; Johnson 1941:332; Wright 1957:623). Wells (1975:1) restricted the term *soapstone* to impure massive talcose rocks and *steatite* to high purity talcose rocks, although percentages were not provided. Wlodarski (1979:331-332) proposed a *soapstone continuum* that encompassed massive talcose rock of variable mineralogy with purity levels ranging from very low to near pure. On one end was the mineral serpentine, resulting from initial hydration of ultramafic rocks during metamorphosis, and on the other end was pure talc, a hydrous magnesium silicate ($Mg_3Si_4O_{10}(OH)_2$), representing the final product of metamorphism. In between were mineralogically distinct and utilizable soapstone (e.g., coarse-grained micaceous, fine-grained talc schist, chlorite schist, etc.).

Wlodarski's (1979) term *soapstone* will be used herein as a general term when discussing the broad range of mineralogically distinct fine- to coarse-grained sheet silicate rich rocks (e.g., talc-schist, chlorite schist, chlorite talc schist, etc.). The term *steatite*, while popular, will be restricted to high purity (90 to 100 percent) fine to non-grained talc rock. Soapstone will further be divided into mineralogical groups, when known, based on primary and secondary mineral content and/or grain size (i.e., fine- or coarse-grained) following Romani (1982). Coarse-grained soapstone may be defined by a grain size of 0.5 mm or larger, compared to fine-grained soapstone with grains less than 0.1 mm (Williams and Rosenthal 1993:29-30). Romani differed in the interpretation of fine-grained and coarse-grained soapstone. For instance soapstone from the Airport Quarry on Santa Catalina Island was referred to as micaceous or coarse-grained compared to the western shore of Catalina, which was considered fine-grained due to the high talc, chlorite and other sheet silicate mineral content (Romani 1982:28).

For the purposes of this thesis, fine-grained soapstone will have a compact, massive structure exhibiting mineral crystals less than 0.5 mm and visible under hand lens magnification, whereas coarse-grained soapstone will include all micaceous varieties found on Catalina Island and others that exhibit visible crystals greater than 0.5 mm.

Primary and secondary mineralogical identification on the basis of visual analysis alone is not a reliable means of classifying fine-grained soapstone. Accuracy of visual analysis improves with coarse-grained soapstone due to the presence of larger crystal inclusions. Unfortunately, macroscopic mineralogical identification of fine-grained soapstone artifacts has prevailed in the archaeological literature despite available geologic, geochemical, and/or petrographic (i.e., thin-section) analytical methods. Only three known geologic or geochemical analyses were conducted previously on fine-grained soapstone beads and other artifacts recovered in southern California (Alcorn 1996; Basgall and True 1985; and Williams and Rosenthal 1993) prior to the most recent studies using Laser Ablation Inductively Coupled Plasma Mass Spectrometry [LA-ICP-MS] (i.e., Clark 2009; Eddy 2009; and Tupa 2009).

In these previous studies, stone beads recovered from the Juniper Flat area near the confluence of the San Bernardino Mountains and the Mojave Desert were sourced to a local quartz biotite schist deposit by geologic survey, but have not been confirmed through petrographic or geochemical analysis (Alcorn 1996:73). A total of 56 gray-black stone disk beads recovered from the Ridge Site (SBR-713) in the Crowder Canyon in the Cajon Pass of the San Bernardino Mountains were subjected to X-ray Fluorescence (XRF) analysis (Basgall and True 1985:5-51). The beads were not crafted from talc schist due to low magnesium content and the complex elemental composition likely indicated metasedimentary origin (perhaps chlorite-schist). Williams and Rosenthal (1993) conducted energy dispersive X-Ray (EDX) analysis on fine-grained and coarse-grained soapstone recovered from Catalina Island and identified various combinations of talc, chlorite, actinolite, and anthophyllite.

Until the mineralogy of fine-grained soapstone artifacts in southern California are determined by geochemical or petrographic analysis, the use of mineralogical classifications based on visual analysis is considered tentative and open to correction. This thesis will use the term *fine-grained soapstone* for raw source materials with few to no visible crystals collected from source locations for which mineralogical content has not been determined. Fine-grained soapstone for which geochemical, petrographic, or mineralogical analysis has been completed will be classified according to primary and secondary mineral composition, as suggested by Romani (1982). Further, this thesis promotes a distinction between fine-grained soapstone (e.g., talc schist, chlorite schist, talc-chlorite schist, etc.) and serpentine, in contrast to Wlodarski (1979:332), due to the relative hardness of the serpentine compared to talcose- or chlorite-rich rock. These terms are defined in Table 1-1 below.

Table 2-1. Rock types discussed in the study

Term	Grain Size	Hardness (Mohs Scale)	Sheet Silicate Mineral Composition
Serpentine	Fine <u><</u>0.1mm	4-5	Serpentine, Asbestos
Steatite	Fine-grained to extremely fine-grained <u><</u>0.1mm	1	Near pure talc
Fine-grained Soapstone	<0.5 mm	1-3.5	Talc, Chlorite, Pyrophillite
Coarse-grained soapstone	>0.5mm	1-1.5	Talc, Chlorite, Actinolite, Micas

Quantitative Data

Quantitative data was derived from previous LA-ICP-MS studies on Catalina Island soapstone and artifacts from the southern Channel Islands, Los Angeles, and the Coachella Valley (Clark 2009; Eddy 2007a, 2009; and Tupa 2009) and new data presented in this thesis. A statistically valid sample of 25 unmodified soapstone fragments needed for multivariate analysis (Truncer et al. 1998:25) was collected from Prehispanic quarries in the Sierra Pelona Mountains bordering the Santa Clarita Valley and Western Mojave Desert, and several quarries/source locations in San Diego (see Figure 2-1; also see Appendix B). LA-ICP-MS analysis focused on the types of soapstone that were visually similar to artifacts in the region. Stone beads were obtained from seven Middle and Late period sites in Los Angeles, Ventura, Riverside, and San Bernardino Counties (see Figure 2-1). Table 2-2 provides a list of all source locations and archaeological sites that contributed to the LA-ICP-MS chemical composition database. LA-ICP-MS analyses were carried out using both quadrapole and time-of-flight (TOF) ICP-MS at the Institute for Integrated Research in Materials, Environment, and Society at California State University, Long Beach.

Identifying the source location of raw material used in stone bead production is a critical step in reconstructing Prehispanic exchange networks and economic systems (i.e., procurement, production, and distribution). Toward this goal, the mineralogical and chemical composition of soapstone from these locations is examined to identify potential *fingerprints* or *signatures* that distinguish soapstone at the regional (i.e., geologic formation). The primary goal is to differentiate soapstone among the Sierra Pelona Schist, Catalina Island Schist, and the Julian Schist formations. I also attempt to distinguish among individual quarries within each formation. A discussion of previous southern California soapstone sourcing studies is provided as context for the development of the source characterization and artifact provenience methods discussed in detail in Chapters 3 and 4.

Southern California Soapstone Sourcing: A Review

Soapstone chemical sourcing is not new to archaeometry. The science was pioneered by Allen et al. (1975) and Pennell (1977) using Instrumental Neutron Activation Analysis (INAA) to quantify rare earth element (REE) concentrations of talc-laden soapstone (also see Holland et al. 1981; Luckenbach et al.1975; Rogers et al. 1983).

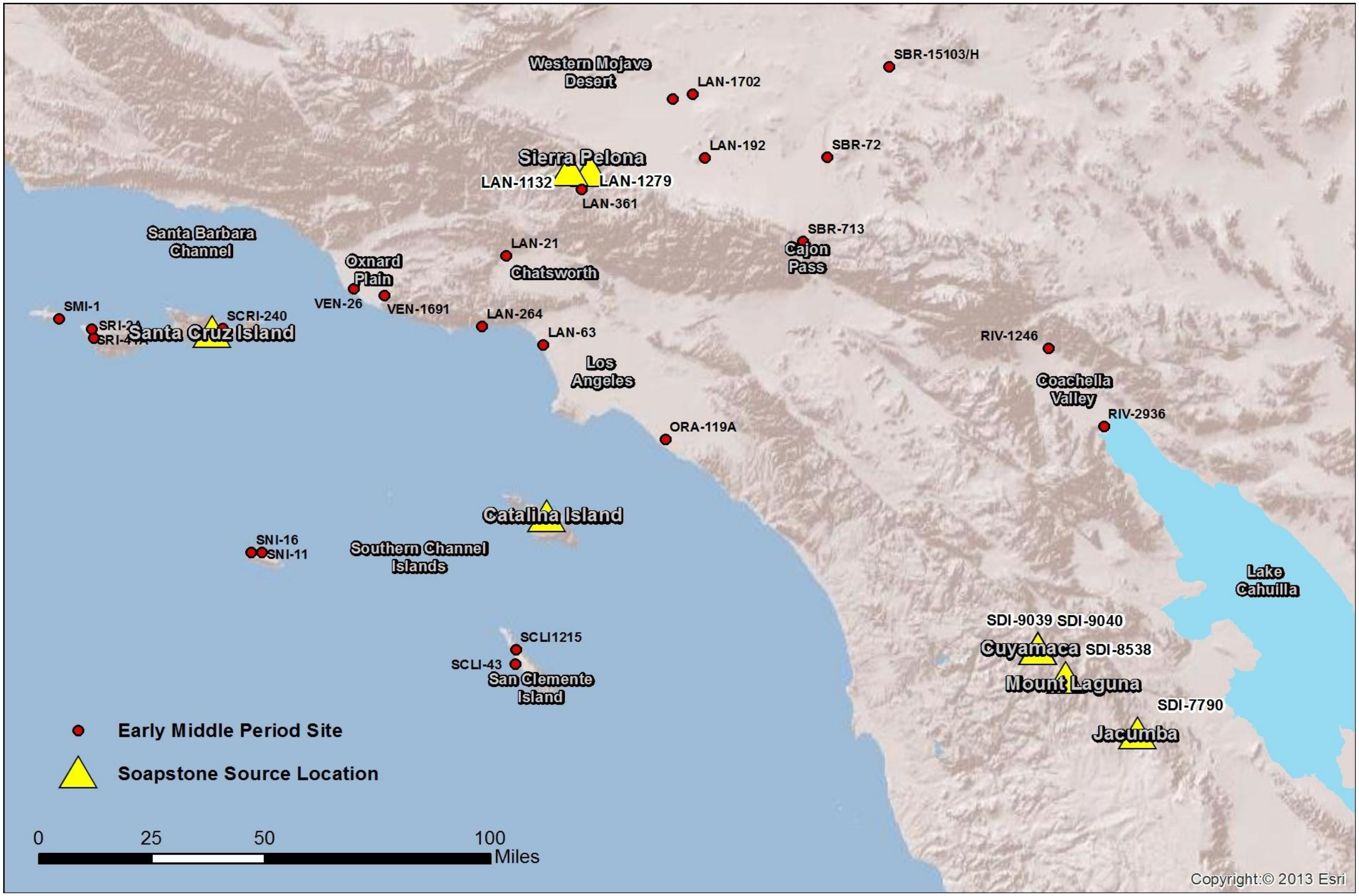

Figure 2-1. Southern California soapstone source locations and early Middle period sites discussed in the study

Others have since attempted soapstone sourcing using optical mineralogy and atomic absorption (Turnbaugh and Keifer 1979; Turnbaugh et al. 1984), petrographic thin-section analysis, scanning electron microscopy analysis (SEM) [Ownby et al. 2004; Santi et al. 2005] sometimes coupled with energy dispersive spectrometry (EDS), X-ray fluorescence (XRF) [Romani 1980], X-ray diffraction (XRD) [Buttler 1984; Kohl et al. 1979; Santi et al. 2005], and strontium isotope analysis (Bray 1994; Jones et al. 2007).

Table 2-2. Quantitative data obtained from source materials and artifacts

Site	**Other Names**	**Loc.**	**Sample Type**	**# of samples**	**Equip.**
LAN-1232		SPM/LA	Raw	100	Quad
LAN-1279		SPM/LA	Raw	50	Quad
N/A	Mount McDill	SPM/LA	Raw	25	Quad
Unknown[1]	Two Harbors	CAT/LA	Raw	20	TOF
Unknown[1]	Airport	CAT/LA	Raw	18	TOF
Unknown[1]	Eagles Nest	CAT/LA	Raw	20	TOF
Unknown[1]	Empire Landing	CAT/LA	Raw	20	TOF
Unknown[1]	SW of Airport	CAT/LA	Raw	17	TOF
N/A	Central Valley	SCI/SB	Raw	25	TOF
SDi-9039	Gwendolyn Quarry	CM/SD	Raw	25	Quad
SDi-9040	World View Quarry	CM/SD	Raw	25	Quad
SDi-8538	Soapstone Ridge	ML/SD	Raw	50	Quad
SDi-7790	Jacumba Valley Quarry	JV/SD	Raw	25	Quad
RIV-1246[2]	Two Bunch Palms	DHS/R	Stone bead	32	Quad
RIV-2936	Buried Locus	LQ/R	Stone bead	4	Quad
LAN-21[2]	Walker Cairn	SFV/LA	Stone bead	52	TOF
SBR-211, -2600, -2614		RM/SBR	Stone bead	3	TOF
VEN-1691		SMM/V	Stone bead	5	Quad
Various[1]	San Clemente Island	SCLI/SD	Misc.	63	TOF
SCLI-1215, -1487, -126[4]	Nursery, Airfield, N/A	SCLI/SD	Misc.	35	TOF
Various[1]	San Nicolas Island	SNI/LA	Misc.	8	TOF

SPM = Sierra Pelona Mountains; LA = Los Angeles; CAT = Catalina Island; SCI = Santa Cruz Island; SB = Santa Barbara; CM = Cuyamaca Mountains; SD = San Diego; ML = Mount Laguna; JV = Jacumba Valley; DHS = Desert Hot Springs; R = Riverside; LQ = La Quinta; SFV = San Fernando Valley; RM = Red Mountain Archaeological District; SBR = San Bernardino; SMM = Santa Monica Mountains; V = Ventura; SCLI = San Clemente Island; San Nicolas Island; Quad = Quadrapole LA-ICP-MS; TOF = Time-of-Flight LA-ICP-MS. [1]Clark (2009) [2]Eddy (2007a); [3]Eddy (2009); [4]Tupa (2009)

The goal of source characterization studies like these is to identify the chemical *fingerprint* or *signature* of each soapstone source that can be used to provenience artifacts. Fingerprinting requires each source to have a unique, consistent, and identifiable composition with differences in composition among sources greater than the variation within a single source and beyond analytical error (Moffatt and Buttler 1986:102). This idea was first developed by Weigand et al. (1977:24-29) and is known as the provenience postulate.

Most recently, archaeometric analysis of island and mainland southern California soapstone source locations and artifacts has benefited from advancements in Laser Ablation Inductively-Coupled Plasma Mass-Spectrometry (LA-ICP-MS) [Clark 2009; Eddy 2007a, 2008; Tupa 2009]. LA-ICP-MS is similar to Instrumental Neutron Activation Analysis (INAA), in that it detects low concentrations of trace elements, which is vital to source characterization analyses. Unlike INAA, LA-ICP-MS does not result in the total destruction of the artifact (see Figure 2-2). In sample preparation for INAA analysis artifacts are often pulverized; the ensuing powder placed into a non-contaminated vial for further analysis. Although the powder is not destroyed during analysis, integrity of the artifact is lost. However, INAA remains a highly sought after analytical technique for trace element analysis due to its accuracy, precision, and sensitivity (Truncer et al. 1998:24).

A pilot LA-ICP-MS study by Eddy (2007a:24-25) focused on identifying chemical variance among visually distinct sets of stone beads recovered from Two Bunch Palms (RIV-1246; see Eddy 2007b) in Desert Hot Springs. A twenty-five percent sample of the 130 stone beads recovered from the site were submitted to the Institute for Integrated Research in Materials, Environment, and Society (IIRMES) at California State University, Long Beach for chemical composition analysis. The majority was found in association with early Middle period deposits and is analyzed further in this study.

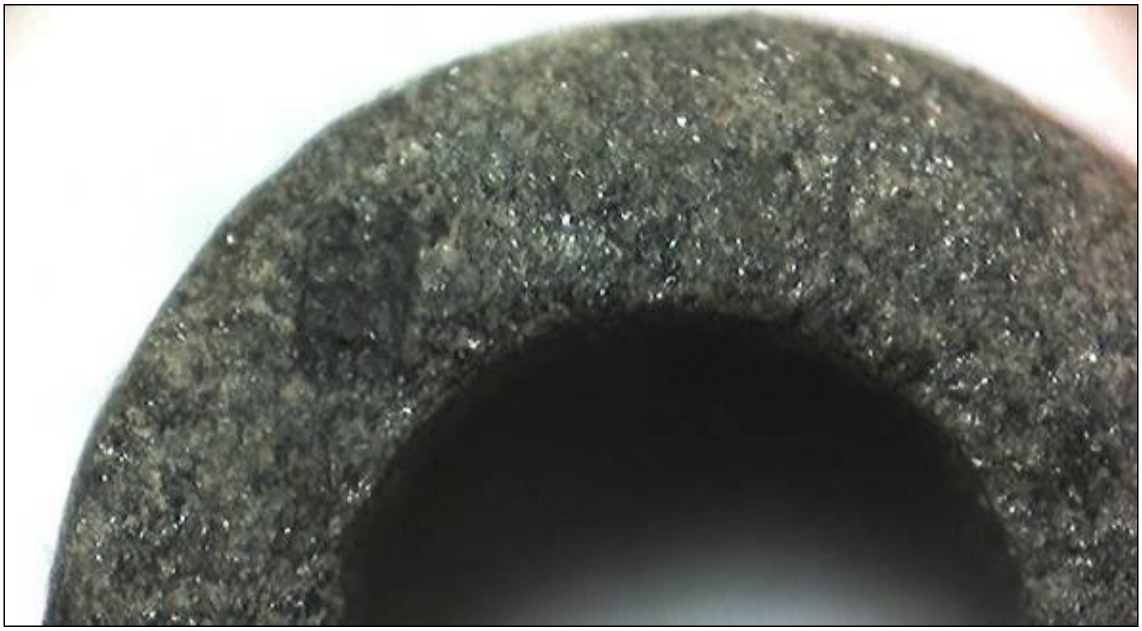

Figure 2-2. Close-up of chlorite schist disc bead from RIV-1246 after laser ablation. Note ablation scar in upper left portion of bead measuring 0.5 mm.

Visual analysis of stone beads from RIV-1246 indicated the presence of three distinct types based on apparent mineral content, color, and grain size. However, the mineral composition of these artifacts could not be verified at that time. Regardless, the chemical composition of dark gray/black stone beads were similar to green schist beads, and the group as a whole was easily distinguished from the medium to light gray schist beads on bivariate plots of lanthanum and nickel as well as chromium and nickel (see Eddy 2007a: Figures 2 and 3). The pilot study identified eleven trace elements that could be used to differentiate stone bead groups present at Two Bunch Palms made up of transition metals (Ni, Cr, Sc, and V), rare earth elements (La and Ce), alkali and alkaline earth metals (Ba, Rb, and Sr), and actinoids (Th and U) [Eddy 2007a:25].

A more comprehensive study of the stone beads was carried out the following year (see Eddy 2009). Source samples of greenstone, phyllite, and possibly chlorite schist collected from the Central Valley of Santa Cruz Island, specifically Cañada Islay and Cañada del Medio, as well as limited numbers of Sierra Pelona soapstone source samples were analyzed by LA-ICP-MS and compared to chemical compositions of stone beads recovered from Two Bunch Palms, the Chatsworth Walker Cairn Site (LAN-21) in the San Fernando Valley, and the interior of Santa Cruz Island (SCRI-194).

Compositional discriminant analysis produced intriguing results for Santa Cruz Island Schist, Sierra Pelona soapstone, and three stone bead groups. Chemical data was screened to identify elements that potentially contributed to intergroup discrimination. Twenty-two of the 45 elements measured (Mg, Al, Si, Ca, Sc, Ti, V, Cr, Mn, Fe, Ni, Co, Cu, Zn, Zr, La, Ce, Nd, Sm, Dy, Er, Pb) were used in subsequent multivariate statistical analyses.

Bivariate plots of canonical discriminant functions (Eddy 2009:Table 1) calculated for the two source groups and three stone bead groups indicated good to excellent source group differentiation at the 95% confidence level with all groups plotted. Clear separation was demonstrated between Santa Cruz Island Schist and Sierra Pelona soapstone source groups and two of the three unknown source stone bead groups (Eddy 2009:Fig. 8). The separation between Santa Cruz Island and Sierra Pelona was tentative due to the underrepresented sample Sierra Pelona schist, but suggested potential for chemical distinction between the two source locations. None of the stone beads analyzed during the study could be sourced to Santa Cruz Island or the Sierra Pelona.

To test the strength of source and stone bead group chemical discrimination, a posterior classification of the five groups was carried out based on Mahalanobis distances measured from group centroids assuming non-homogeneous variance-covariance matrices (Truncer et al.1998:34) and cross-validation (Baxter 1994a and 1994b:201-204) of the 22 elements. A classification success rate of 90-100% was achieved for all five groups indicating strong group membership and high degrees of intergroup variability (Eddy 2009:75).

One of the most significant discoveries was the high degree of overlap and shared elliptical orientation between Chatsworth Walker Cairn and Two Bunch Palms chlorite schist disc beads. This was significant because the stone beads were recovered from Middle period sites more than 130 miles apart. The results suggested that the artifacts originated from a common geologic formation, perhaps even the same source (Eddy 2009:74). However, posterior classification tests successfully predicted group membership of Chatsworth Walker Cairn and Two Bunch Palms with near 100% accuracy, suggesting the chemical composition of the beads may be chemically distinct. The significance of this distinction was not understood at that time and will be explored further in this study.

In the wake of Eddy's (2009) research, two thesis projects were completed on southern California soapstone sourcing with an emphasis on southern Channel Island soapstone sources and artifacts (Clark 2009 and Tupa 2009). Clark (2009) conducted LA-ICP-MS analysis of 132 raw samples collected from soapstone quarries and source locations on Catalina Island (Table 2-3) and the Worldview Soapstone Quarry (SDI-9040) at Cuyamaca Rancho State Park. Included in Clark's (2009) research were eight soapstone artifacts from San Nicolas Island and 58 soapstone artifacts from San Clemente Island collections. Using source data for Catalina Island and Cuyamaca provided by Clark (2009), Tupa (2009) attempted to source 41 additional soapstone artifacts from three different sites on San Clemente Island (i.e., the Nursery Site [SCLI-1215], the Airfield Site [SCLI-1487], and the Ledge Site [SCLI-126]).

Table 2-3. Catalina Island source locations sampled by Clark (2009)

Location	Type	Number of Samples	Grain Size
Airport in the Sky	Quarry	21	Coarse
Streambed SW of Airport	Float	22	Coarse
Little Springs Canyon	Float	3	Fine
Eagles Nest	Quarry	20	Coarse
Empire Landing	Quarry	20	Coarse
Cottonwood Springs	Float	4	Fine
SE of Two Harbors	Quarry	20	Coarse
Streambed (unknown)	Float	3	Fine
Parson's Landing	Float	2	Fine

The methods Clark (2009) used during attribute analysis of raw soapstone were not provided. Clark (2009:27), like Romani (1982:170) classified Cuyamaca soapstone as coarse-grained soapstone while others had previously described it as fine-grained (e.g., Polk 1972:7) or talc-schist (Parkman 1983:146). Polk (1972:7-8) even distinguished fine-grained Cuyamaca soapstone from the medium- to coarse-grained soapstone at Mount Laguna and Jacumba. This grain-size assignment is troubling in light of Clark's results, which are presented in terms of coarse-grained and fine-grained source samples and artifacts and provides little more than a summary discussion that focuses on subtle differences in the chemical composition of specific artifacts. It is plausible that the variation identified among individual artifacts may represent mineralogical and chemical variability of soapstone sources on Catalina Island or unknown sources on the mainland;

however, it is most likely that the distinctions simply reflect chemical variability, which was not captured during Clark's (2009) study.

Clark (2009) makes several points worth noting. First, Cuyamaca samples contain consistently higher concentrations of As than Catalina Island source samples, suggesting As element is a good discriminator between the two sources. Second, fine-grained artifacts trend toward slightly lower concentrations of V, Cr, Mn, Ni, and Co than coarse-grained artifacts (Clark 2009:35), but given the questionable methods of soapstone attribute analysis and grain size classification this tentative pattern cannot be accepted. Third, chemical composition analysis of trace elements Sb, Ni, Co, Cu, Zn, As, and Sn using Mahalanobis distance based comparisons showed a clear separation between Catalina (coarse and fine-grained) and San Diego groups. Finally, soapstone artifacts from San Clemente and San Nicolas Islands did not originate from the Cuyamaca source.

While not reported in the body of the thesis, canonical discriminant coefficient analysis and posterior classification results presented in Appendix A successfully distinguished among the five soapstone deposits on Catalina Island (see Figure 2-3) at a rate of 85 to100 percent (see Clark 2009:Table 12). The results of this analysis suggest Catalina Island soapstone source characterization may be possible at the quarry-specific level. I attempt to replicate the results of this analysis and validate the potential for intrasource discrimination of Catalina Island soapstone in this thesis.

Concurrent with Clark's (2009) research, Tupa (2009) conducted LA-ICP-MS of 41 soapstone artifacts from San Clemente Island and compared the chemical compositions to Catalina and Cuyamaca using Clark's (2009) data. Tupa focused on principal component analysis (PCA) and cluster analysis rather than Mahalanobis distance based comparisons to provenience soapstone artifacts. Cluster analysis, or data segmentation, provided a means for dividing artifact and source samples into subsets based on compositional similarity. Hierarchical dendrograms were then produced that illustrated the compositional similarity of San Clemente Island soapstone artifacts to Catalina Island source samples. Artifact samples were dispersed throughout the branches containing Catalina Island soapstone source samples, which Tupa (2009:32, 36) interpreted as evidence that San Clemente Island steatite originated from Catalina Island.

Calibrated data sets produced during LA-ICP-MS analysis were transformed using eigenvector methods to measure the magnitude of variance within the dataset (Davis 1986). PCA scores for each source group and San Clemente Island artifacts were plotted on bivariate plots and the amounts of each element represented as a vector line, making it easy to determine which elements contributed to group discrimination. The plot graphically depicted higher levels of As in the Cuyamaca samples and confirmed Clark's (2009) significant observation. Further, Sb was also found to have higher concentrations in Cuyamaca than Catalina source samples and San Clemente Island artifacts. Tupa (2009:33) arrived at the same conclusion as Clark (2009), arguing that the San Clemente Island soapstone artifacts did not come from Cuyamaca, and that Catalina was the most likely source.

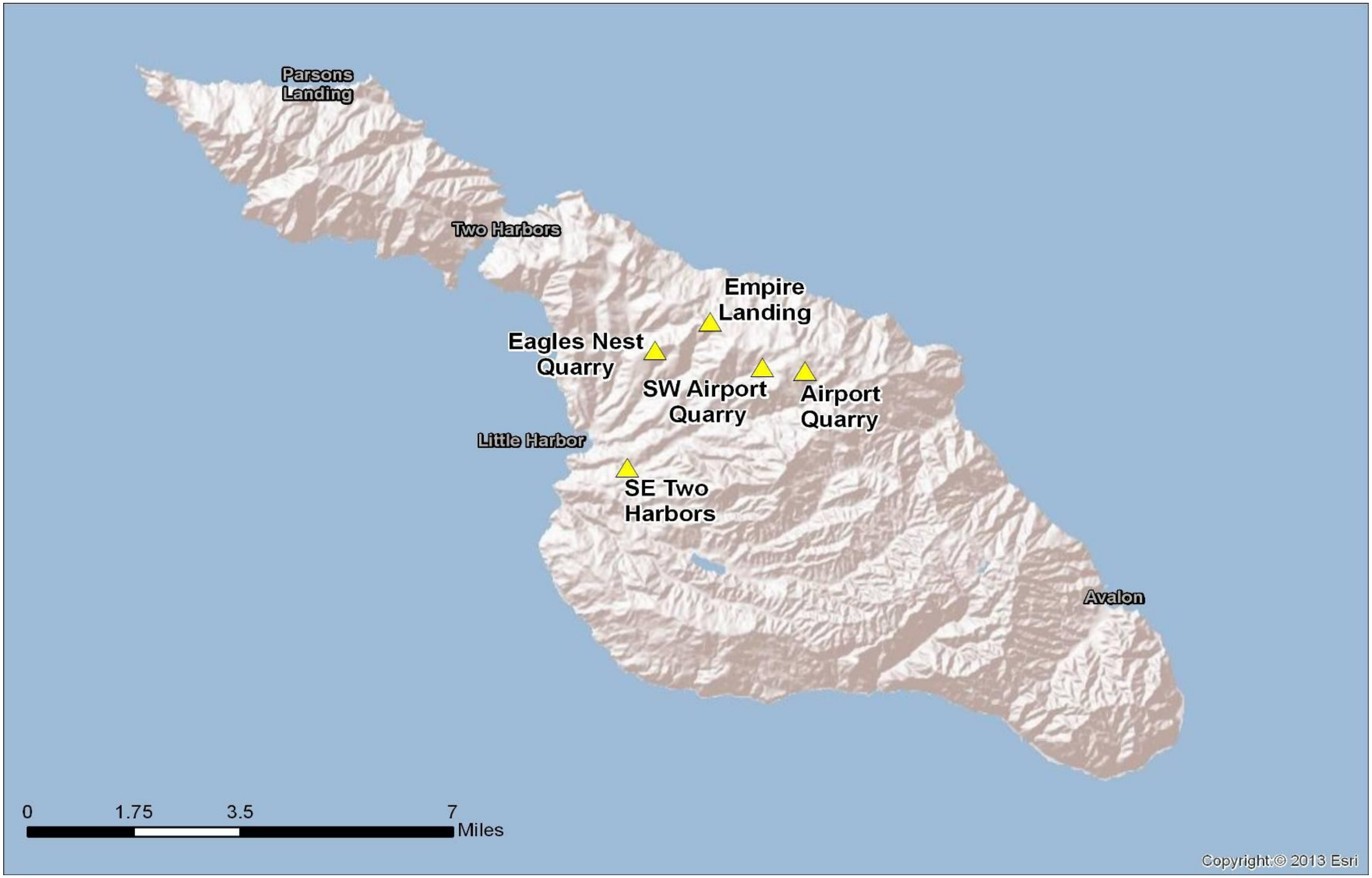

Figure. 2-3. Catalina Island Soapstone quarries and source locations analyzed by Clark (2009)

Tupa (2009:40) also claimed to have verified that transition metals were effective in differentiating soapstone source samples in California as they were in eastern United States (e.g., Truncer et al. 1998). This claim is based on a single bivariate plot of As versus Co (see Tupa 2009:35, Figure 7), which showed good in-group cohesion and inter-group differentiation at the 90 percent confidence level. Such two element plots are useful in the identification of potential element discriminators but do not provide a means of source discrimination (e.g., see Eddy 2007a). The biplot is overshadowed by Clark's (2009: Table 11) Mahalanobis distance-analysis, which combined transition metals (Ni, Co, Cu, and Zn) with metalloids (Sb and As) and post-transitional metals (Sn) to discriminate Catalina and Cuyamaca groups.

The evidence demonstrated by Clark (2009), Eddy (2007a and 2009) and Tupa (2009) show great promise for soapstone chemical sourcing using LA-ICP-MS; however, the results must be carefully scrutinized (see Tupa 2009:47). As argued by Moffat and Butler (1986:103), assigning provenience to artifacts should be considered tentative until all other alternative source locations are analyzed and ruled out. Toward this effort, the current research will characterize soapstone from Sierra Pelona, Cuyamaca, Mount Laguna, and Jacumba source locations and will attempt to replicate the results of the previous analyses using previous and newly generated datasets.

Qualitative Data Methods

Qualitative data was derived from archaeological, ethnographic, geologic, and archaeometric literature, and was generated during field and lab research. The purpose of the research was explore stone bead use and distribution during the Middle period and develop a model of Prehispanic reciprocal exchange networks to explain the underlying motivations for creating, maintaining, and rejecting social relationships. That model was previously discussed as the mutual interdependence and power and force model. The current discussion of stone beads will assess spatial distribution patterns of stone to shell bead frequencies from more than 20 early Middle period habitation and mortuary sites while also considering the available mortuary data to argue that the temporal and spatial patterns associated with stone bead distribution and use are consistent with an early Middle period stone bead mutual interdependence obligatory gifting and reciprocal exchange network. The meaning of stone beads as a stylistic variant to *Olivella* shell beads is discussed, in which style is considered an important factor in social relations that communicated information about social and personal identity (Raab and Howard 2002:595; Weissner 1983:256).

Stone beads from several Middle and Late period archaeological sites (see Table 2-4) were also subjected to comparative analysis. Stone beads were typed according to Romani's (1980) stone bead typology developed for LAN-21, based partially on unpublished results of XRF analysis on stone beads recovered from LAN-361 in Agua Dulce (King et al. 1974). Mineralogical composition was determined by visual comparison with LAN-21 chlorite schist, chlorite talc schist, and talc schist beads. Additional effort was made to identify stylistic variation within stone beads through attribute pattern recognition.

Table 2-4. Soapstone source locations and Middle period sites analyzed in this study

Site #	Other Name	Location	Period	Site Type
LAN-1132[1]	Sierra Pelona Soapstone Quarry	Sierra Pelona Lookout	Unknown	Quarry
LAN-1279[2]	Sierra Pelona Steatite Cupule Site	Mount McDill	Unknown	Quarry
SDI-7790[4]	Jacumba Quarry	Jacumba Valley	Unknown	Quarry
SDI-8538[5]	Soapstone Ridge	Mount Laguna	Unknown	Source
SDI-9039[6]	Gwendolyn Site	Cuyamaca Mountains	Unknown	Quarry
SDI-9040[7]	World View Site	Cuyamaca Mountains	Unknown	Quarry
SBR-72 (Loci 1, 3) [8]	Oro Grande	Upper Mojave River	Early Middle*	Habitation
SBR-72 (Loci 2,4-10) [8]	Oro Grande	Upper Mojave River	Late Middle	Habitation
SBR-713[9]	Ridge Site	San Bernardino Mountains	Early Middle	Habitation
RIV-1246[10]	Two Bunch Palms	Desert Hot Springs	Early Middle	Habitation
RIV-2642[11]	Desert Dunes	Desert Hot Springs	Late Middle	Habitation
RIV-2936[12]	Buried Locus	La Quinta	Early Middle	Habitation
LAN-21[13]	Chatsworth Walker Cairn	Chatsworth	Early Middle	Cemetery
LAN-63[14]	Del Rey Site	Marina Del Rey	Early Middle	Habitation
LAN-264[15]	Malibu Site, *Humaliwo*	Malibu	Early Middle	Habitation
LAN-361[16]	Vasquez Rocks Cemetery	Agua Dulce	Early Middle	Cemetery
SCLI-43[17]	Eel Point C	San Clemente Island	Early Middle	Cemetery
VEN-1691[18]	Guadalasca Ranch	Oxnard Plain	Early Middle	Habitation

[1] Romani et al. (1983); [2] Wessel and Anderson (1985); [3] Campbell, personal communication (2008); [4] Shackley (1980a): [5] Shackley (1980b), Berryman and Roder (2002); [6] Parkman and Foster (1981); [7] Parkman (1981), Mealey and Brodie (2005); [8] Rector et al. (1983); [9] Basgall and True (1985); [10] Eddy (2007b); [11] Dahdul et al. (2009); [12] Love et al. (2000b); [13] Romani (1980); [14] Scalise (1994), Altschul et al. (2005); [15] Gibson (1975); [16] King (1974b), Romani (1980); [17] Rigby (2000); [18] Delaney-Rivera and Kinkella 2007 *Based on bead chronology (King 1983:81-86)

Background research was also carried out on Prehispanic soapstone quarries and source locations in southern California to gain a better understanding of the nature of the deposits, how materials were procured, and the kinds of artifacts that were produced. Field surveys were carried out at six soapstone quarries and source locations to document evidence of Prehispanic quarrying (see Table 2-3 and Figure 2-1). Modified and unmodified soapstone samples were collected from the surface of these sites and typologies were developed. Samples were then prepared for LA-ICP-MS analysis. Background research on soapstone quarries, field survey results, and soapstone typologies are provided in Appendix B.

Stone Beads of the Middle Period

The sequence of changes that occurred to stone beads during the Early/Middle period transition is poorly understood, but it appears that chlorite schist disc beads replaced small serpentine-jadeite beads sometime during the early Middle period (King 1990:119, 133). What is clear is that chlorite schist disc beads and chlorite talc schist beads dominated bead assemblages in areas southeast of the Santa Barbara Channel and as I will show, were most frequently distributed through a stone bead exchange network during the early Middle period.

King (1983:80, 1990:133) had originally associated the nexus of stone bead use during the Middle period with territories occupied historically by Uto-Aztecan speaking peoples east of the Santa Barbara Channel, although chlorite schist beads and evidence of stone bead manufacture was reported at the Malibu site (LAN-264; Gibson 1975; Berger and Libbey 1965:7) in historic Chumash territory. The Uto-Aztecan area spanned the Tehachapi Mountains, the San Gabriel and San Bernardino Mountains, the western Mojave Desert, and the Upper Mojave River [see Figure 2-4]. King (1990) did not implicate other Uto-Aztecan territories to the south and southeast (i.e., southern Channel Islands, Los Angeles, Orange and Riverside counties) in the nexus of stone bead use, although he did state the use of chlorite schist disc beads extended as far south as Aliso Creek in Orange County (King 1983:80).

More recently, chlorite schist disc bead dominated assemblages were reported at Eel Point Site C (SCLI-43C) an early Middle period mortuary site on San Clemente Island (Rigby 2000), and from an early Middle period habitation site at RIV-1246 in Desert Hot Springs, Coachella Valley (Eddy 2007b; King 1995; Love et al 2000a). A search of the archaeological literature resulted in the identification of five additional early Middle period sites (LAN-21, LAN-63, LAN-361, SBR-72, and SBR-713) that also contained higher frequencies of stone to *Olivella* shell beads. The stone bead dominated assemblages at these eight early Middle period sites contrasted with *Olivella* shell bead dominated assemblages at fifteen other sites examined in southern California.

The 23 early Middle period habitation and mortuary sites identified during the study represented the northern and southern Channel Islands, Santa Barbara and south-central coast, San Fernando Valley, San Bernardino Mountains, Mojave Desert, and Coachella Valley (see Table 2-5). Spatial and attribute date for each site was added to

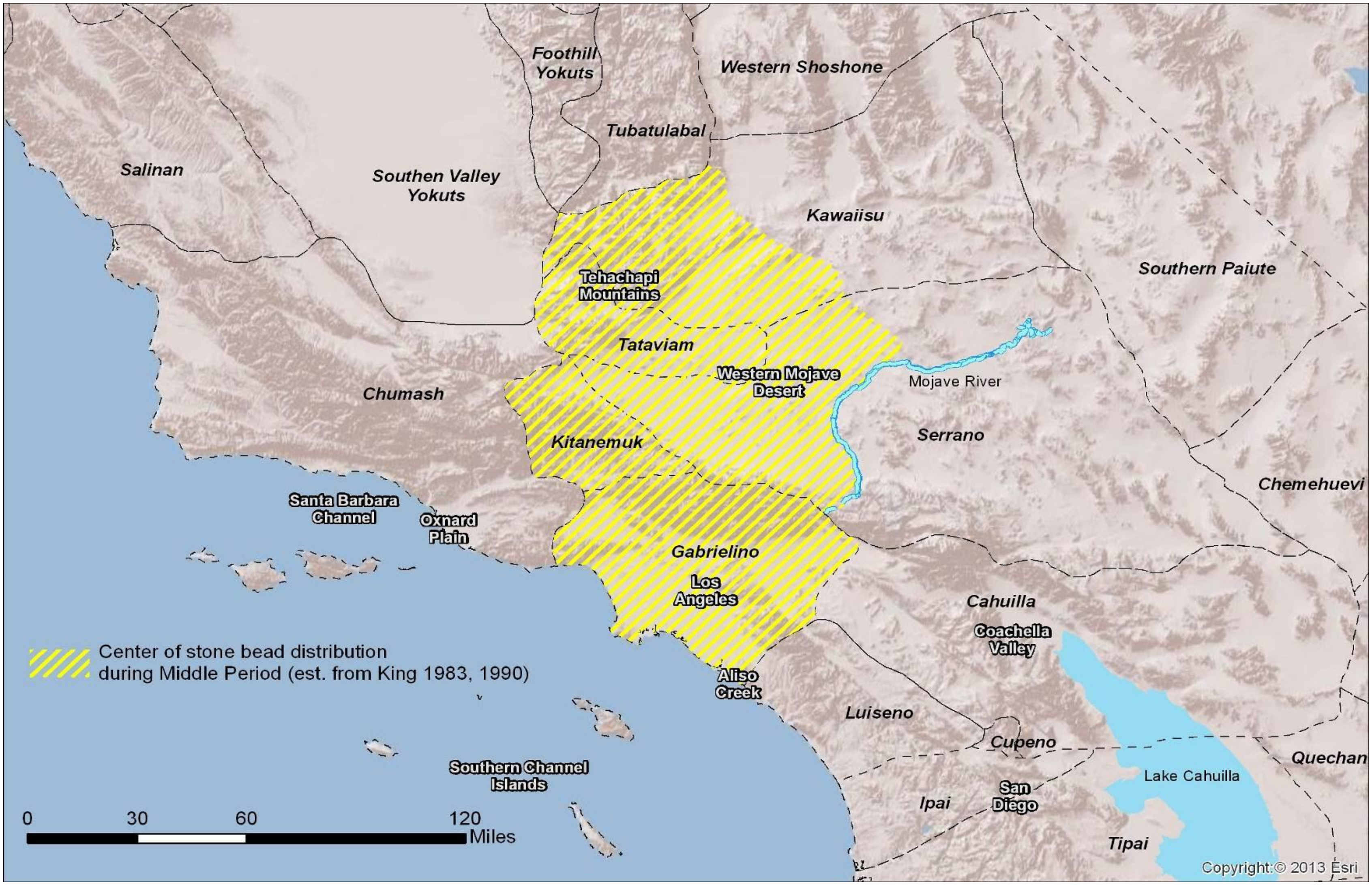

Figure. 2-4. Hypothetical nexus of stone bead distribution during the early Middle Period based on King (1983 and 1990)

Table 2-5. Early Middle period sites included in GIS spatial analysis to explore relationship between stone and *Olivella* shell bead distributions

Site	Type	Location	Stone Beads	*Olivella* Beads	Ratio of Stone to *Olivella*	% Stone
SBR-72[1] (Loci 1, 3)	Habitation	LMR	28	19	1.5 to 1	59.6
SBR-713[2]	Habitation	SBM	56	0	--	100.00
SBR-15103/H[3]	Mortuary	UMR/H	0	256	--	0.00
RIV-1246	Habitation	DHS	123	3	41:1	97.60
RIV-2936[4]	Habitation	LQ	5	31*	1:6	13.80
LAN-21[5]	Mortuary	SFV	221	0	--	100.00
LAN-63[6]	Habitation	MDR	415	4	104:1	99.00
LAN-192[7]	Mortuary	WMD	0	3000	--	0.00
LAN-264[8]	Habitation	M	221	59	4:1	79.00
LAN-361[9]	Mortuary	AD	1457	?	?	>50
LAN-1296[10]	Mortuary	WMD	3	16	1:5	16.00
LAN-1702[11]	Habitation	WMD	absent	present	--	0.00
ORA-119A[6]	Habitation	NB	12	110	1:9	10.00
SCLI-43[12]	Mortuary	SCLI	1548	1296	1.2:1	53.80
SCLI-1215[6]	Habitation	SCLI	30	6400	1:213	0.50
SCRI-240[6]	Habitation	SCRI	0	516	--	0.00
SMI-1[6]	Habitation	SMI	3	33	1:11	8.00
SNI-11[6]	Habitation	SNI	0	16	--	0.00
SNI-16[6]	Habitation	SNI	2	489	1:245	0.40
SRI-2A[6]	Habitation	SRI	57	60243	1:1057	0.09
SRI-41A[6]	Habitation	SRI	13	11439	1:880	0.11
VEN-26[6]	Habitation	V	14	3623	1:259	0.38
VEN-1691[13]	Habitation	V	12	44	1:4	21.00

[1]King (1983); [2]Basgall and True (1985); [3]Eddy and McDougall (2012); [4]Love et al. (2000a); [5]Romani (1980); [6]Scalise (1994); [7]King (2002), Price et al 2009; [8]Gibson (1975); [9]King (1974b), Romani (1980); [10]King (1979); [11]Doyle (1997); [12]Rigby (2000); [13]Covello (n.d.). LMR = lower Mojave River; SBM = San Bernardino Mountains; UMR = upper Mojave River; H = Hinkley DHS = Desert Hot Springs; LQ = La Quinta; SFV = San Fernando Valley; MDR = Marina Del Rey; M = Malibu; AD = Agua Dulce; SCLI = San Clemente Island; V = Ventura; WMD = western Mojave Desert; SNI = San Nicolas Island; NB = Newport Bay; SM = San Miguel Island; SRI = Santa Rosa Island; SCRI = Santa Cruz Island;

a geographic information system (GIS) database and spatial analysis was carried out to explore the relationship between stone bead and *Olivella* shell bead frequency distributions. To reduce the magnitude of sites with tens of thousands of beads compared to others with less than a hundred, I calculated the percentage of stone beads represented in the bead assemblage by dividing the number of stone beads by the total number of stone and *Olivella* shell beads. The distribution of stone bead percentages was analyzed spatially using a kernel density tool, which projected the density of stone beads within a 20 km radius of each site (see Figure 2-5).

The spatial analysis provides a visual representation of the distribution of stone and shell bead site densities during the early Middle period and clearly depicts a nexus of stone bead use, which I believe represent the boundaries of an early Middle period stone bead mutual interdependence obligatory gifting and reciprocal exchange network, hereafter referred to as the Early Middle Period Stone Bead Interdependence Network. The Network lies within historic Uto-Aztecan territory as King (1990; see Figure 2-6) predicted, but the influence is further south than he originally estimated while evidence of chlorite schist disc bead use directly east of the Santa Barbara Channel is lacking. As it is shown, the extent of the Early Middle Period Stone Bead Interdependence Network extends from the southern Channel Islands, northeast to Malibu, and across the San Gabriel and San Bernardino Mountains, up the Mojave River to Oro Grande, and as far east the Desert Hot Springs in the Coachella Valley (see Figure 2-6).

A distinct boundary emerges at the interface between the San Gabriel and San Bernardino Mountains and Mojave Desert. To the south, stone beads dominate bead assemblages in the Santa Clarita Valley west to the Los Angeles coastline and east to the Coachella Valley. To the north, *Olivella* shell beads dominate the burial assemblages at Lovejoy Springs (LAN-192; Price et al. 2007; King 2002) near the foothills of the San Gabriel Mountains and at Hinkley (SBR-15103/H; Eddy and McDougall 2012) to the northeast along the east bend of the Mojave River. The boundary between the San Gabriel/San Bernardino Mountains is not absolute, as a small contingent of chlorite schist beads recovered from an early Middle period cremation on the southern shoreline of Rosamond Lake (LAN-1296) can attest. In other areas the distribution of stone and *Olivella* shell beads overlap significantly as demonstrated by stone bead frequencies that exceed 10 percent at sites in the Oxnard Plain (VEN-1691), coastal Orange County (ORA-119A), and along the northwest shoreline of Lake Cahuilla (RIV-2936) [see Table 2-4].

It is clear that the distribution of stone beads and *Olivella* shell beads had very distinct trajectories in southern California during the early Middle period. This would support the assumption that stone beads were stylistic variants that relayed important information regarding social identity. According to King (1990:134) chlorite schist beads were used in politicoeconomic exchanges in the Santa Barbara Channel during the early Middle period, and were often found in association with shell beads in high status burials during a time when beads were relatively rare in mortuary contexts. This may indicate a society where wealth and influence over reciprocal exchange relationships was already controlled by a few individuals (e.g., Gamble et al 2001).

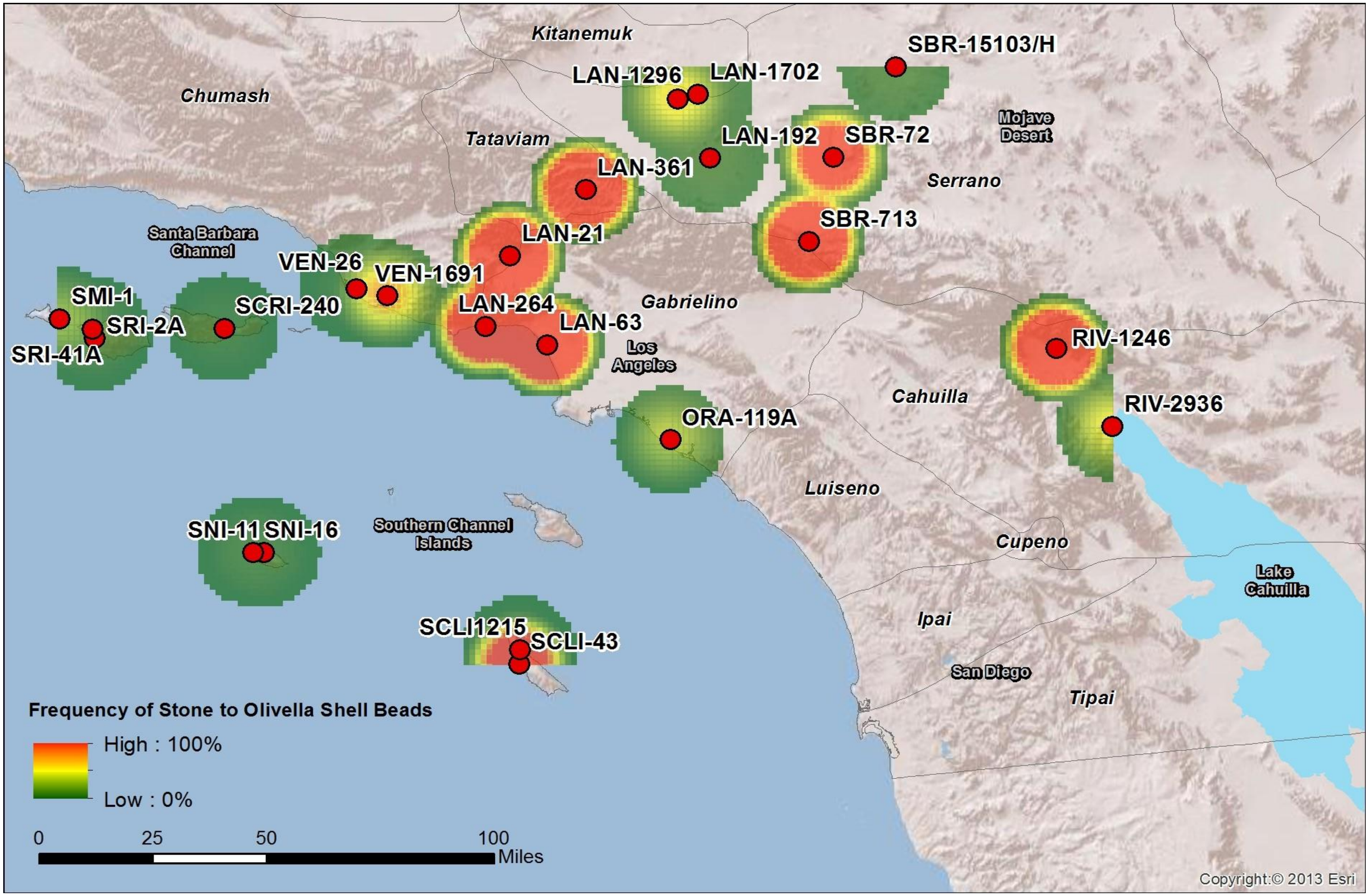

Figure. 2-5. GIS spatial analysis depicting densities of stone to *Olivella* shell beads at early Middle period habitation and mortuary sites

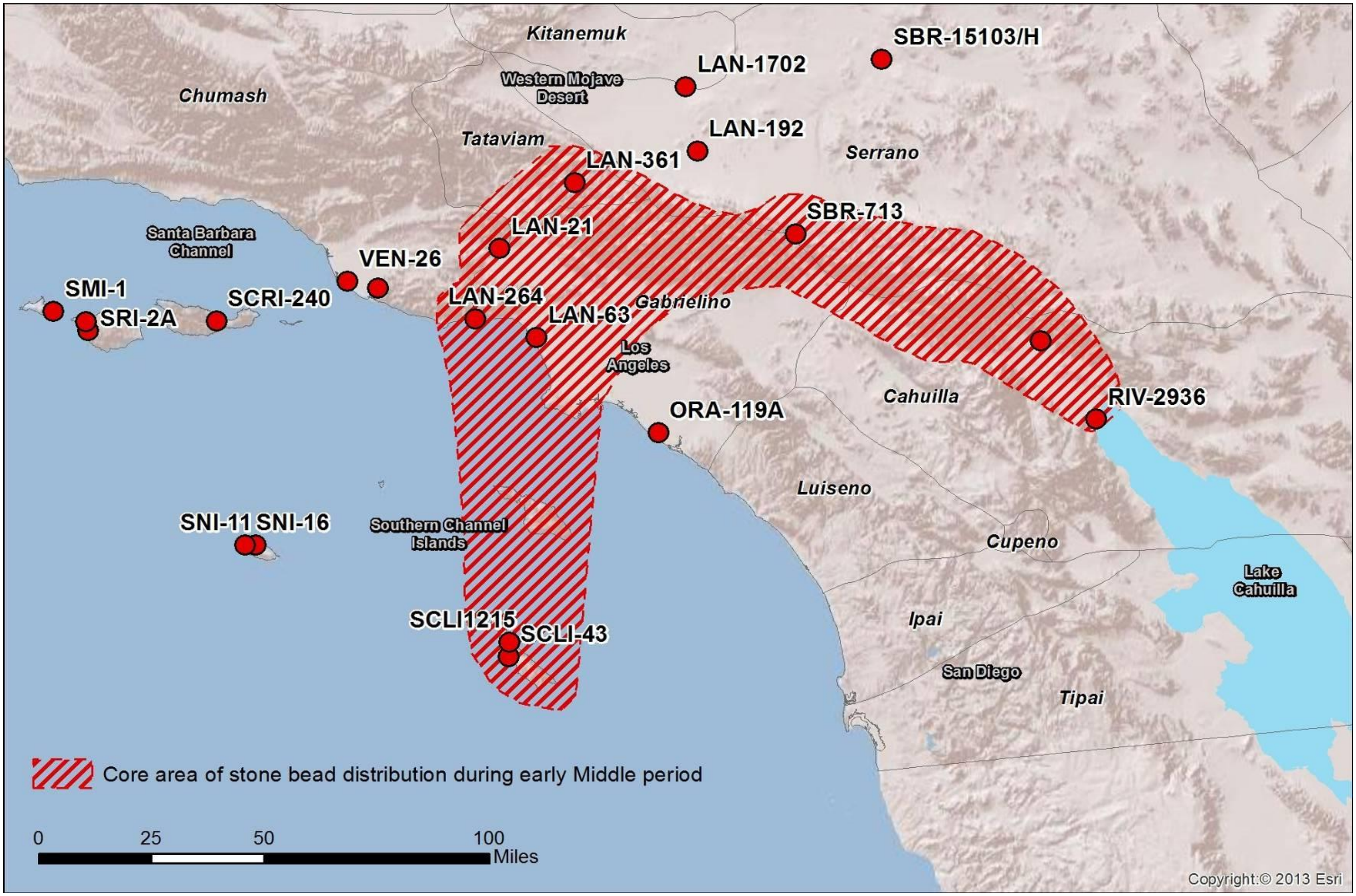

Figure. 2-6. The Early Middle Period Stone Bead Interdependence Network

The mortuary evidence provided by King (1974a:81-83; 1990:100, 153) suggests stone beads communicated information regarding political and economic status and wealth among the leadership in the Santa Barbara Channel, who strung stone beads alongside shell beads, perhaps demonstrating their partnership with and intent to fulfill gifting and reciprocal exchange obligations with those I the nexus of the stone bead exchange network. However, I previously discussed the difficulty in distinguishing among the various leadership roles (e.g., politicoeconomic, ceremonial, and spiritual) in an egalitarianesque society that practiced mutual interdependence, and I question the association. A similar issue is presented in the analysis of mortuary data at LAN-361, which lies within the nexus of early Middle period stone bead may provide additional insight into the distribution of stone beads, other items of wealth, power and influence, as well as utilitarian objects in an early Middle period cemetery[3]. Garza's (2012:102-104; see also King et al. 1974) interpreted that the cemetery was designated for managers or people of status based on a skewed demographic profile, combined with the presence of exotic or high status objects in juvenile burials that was interpreted as potential evidence of a ranked society where individuals with ascribed status were given differential treatment in burial.

I have already discussed problems with using children and infant burials as an index for identifying social complexity and have made a point that social complexity among hunter-gatherers is not measured by the presence or absence of ranked societies. Rather, mutual interdependence obligatory gifting and reciprocal exchange networks are in their own right complex social systems that required negation of myriad personal, small-group, and large-group relationships, resulted in the creation and transformation of multiple social identities that were communicated through stylistic variants. Efforts were made to assert egalitarianism through craft production that ensured the continuation of mutually interdependent relationships and reproduced partnership and large groups social identities and protected positions of leadership, power, and influence. I believe the evidence recently presented by Garza (2012) from adult burials laden with stone beads, in light of what we know about Cahuilla mortuary patterns and coupled with the geospatial distribution of stone beads, demonstrates that individuals at Agua Dulce held leadership positions of power and influence within the Early Middle Period Stone Bead Exchange Network.

By the early to late Middle period transition, stone beads began to phase out of use and were eventually replaced by shell beads during the Late period (King 1990:134; Romani 1980:271). However, differentiation of stone bead types occurred during this time and was believed to have coincided with the growth of a secular economy operating independent of the political economy. Stone beads, as well as other personal adornments such as *Megathura crenulata* ornaments, red ochre, and abalone ornaments, in general were available to a wide cross-section of the population by the late Middle Period suggesting their use was no longer restricted to individuals of political status (King 1990:144). What this explanation fails to address are the factors leading to and the underlying motivations for the creation of new exchange relationships during the late Middle and Late periods that effectively erased the boundary between early Middle period stone and shell bead exchange networks.

Stone Bead Comparative Analysis

After documenting supporting evidence that stone beads were a stylistic variant that communicated information regarding social identity, an effort was made to tease out additional stylistic variation within the stone bead group. Comparative analysis of stone beads from five of the eight sites identified in the nexus of early Middle period stone bead use (LAN-21, SBR-72, SBR-713, RIV-1246, and SCLI-43) was carried out using Romani's (1980) stone bead typology developed for LAN-21, based partially on unpublished results of XRF analysis on stone beads recovered from LAN-361 in Agua Dulce (King et al. 1974). Romani divided stone beads into two major stylistic groups (i.e., disc beads and globular/tube/barrel beads) and further subdivided them by mineralogical composition (i.e., chlorite talc schist, chlorite schist, and talc schist) and color. The stone bead typology is provided in Table 2-6.

Comparative analysis of collections from the remaining three sites (LAN-63, LAN-264, and LAN-361) could not be completed due to access restrictions but the information from the archaeological literature is summarized. Summaries are also provided for two late Middle period site components containing an admixture of stone and shell beads.

Stone beads from two additional early Middle period sites on the Oxnard Plain (VEN-1691) and the northwest shoreline of Lake Cahuilla (RIV-2936) were also analyzed as were three stone beads recovered from the Red Mountain Archaeological District in north-central Mojave Desert. The Oxnard Plain and northwest shoreline of Lake Cahuilla were areas where shell and stone bead distribution overlapped during the early Middle period, and the current evidence indicates these sites were strongly influenced by exchange networks in the Santa Barbara Channel and Gulf of California, respectively. A similar situation may exist at ORA-119A that will require additional research beyond the scope of this thesis, while at LAN-1296, the dataset is limited to a single cremation and the results have never been published. Regardless of whether or not the stone beads recovered from these sites are linked to the Early Middle Period Stone Bead Interdependence Network or represent local stone bead crafting, these sites are critical to understanding the mechanisms of the southern stone bead exchange network and motivations for creating, maintaining, or rejected reciprocal exchange relationships.

In some cases subtypes of a mineralogical group were combined into a single analytical group. For instance, chlorite schist subtypes B2, B3, and B4 were combined into a light to medium gray group based on King's (1983) classification of visually similar stone beads from SBR-72 and the previous results of chemical composition analysis (Eddy 2007a and 2009). In addition, all chlorite talc schist disc beads were combined into a single analytical group. Combining subtypes into broader analytical units based on mineralogy was justified on the grounds that minute color difference was a consequence of raw lithic material properties and not evidence of stylistic variation.

Table 2-6. Stone bead typology (Romani 1980:263)

I. Stone Disc Beads

Type A: Chlorite talc schist (attains high polish, not grainy in texture, hard)

- A1 Black
- A2 Blue black
- A3 Light blue/black

Type B: Chlorite schist (light to dark green gray/silver, grainy texture, medium hard)

- B1 Gray black
- B2 Gray/green
- B3 Light gray/green
- B4 Medium gray/green with pinkish exterior

Type C: Talc schist (mottled browns, attains high polish, very soft)

- C1 Mottle brown
- C2 Boney white

Type D: Light gray unidentifiable material (very soft, dull finish, possible siltstone)

II. Globular / Tube / Barrel Beads (chlorite talc schist)

Type E: Blue black

- E1 Tube (short, stout)
- E2 Barrel

Type F: Chlorite talc schist

- F1 Tube (short, stout, mottle gray/ green/ brown)

Type G: Talc schist

- G1 Globular (mottle browns)

Rather, stylistic variation was best represented at the mineralogical level among chlorite schist, chlorite talc schist, and talc schist groups. The groupings also simplified efforts to calculate the range, mean, and standard deviation for maximum diameter, thickness, and perforation and identify potentially significant patterns (see below).

The one exception to this line of reasoning was Romani's (1980) Type B1 gray black chlorite schist beads. This subgroup was kept separate from other chlorite schist groups due to its noticeably dark color, but more importantly because of the potential association between the size and age of Type B1 beads recognized by King (1990:134) and Basgall and True (1985:5.54). These studies suggest that early Middle period Type B1 beads are generally smaller (4.1 mm average diameter at SBR-713; see Basgall and True 1985:5.54) than their larger (5.6 mm average diameter) late Middle period counterparts. King (1990:134) also recognized this pattern and has argued that the diameter of chlorite schist disc beads increased over time.

The following discussion presents information on all eight sites identified within the Early Middle Period Stone Bead Interdependence Network. Additional site discussions are provided for those sites on the periphery demonstrating influence from the stone bead exchange network (i.e., RIV-2936 and VEN 1691), as wells as late Middle period (RIV-2642, SBR-72 [Locus 2, 4-10] and Late period sites (SBR-211, 2600, 2614) containing stone beads that were analyzed by LA-ICP-MS.

The Early Middle Period Stone Bead Interdependence Network

Chatsworth Walker Cairn (LAN-21)

The Chatsworth Walker Cairn site contains large burnt cairn features with burnt and non-burnt human remains (Walker in 1939) perhaps associated with an elaborate California Mourning Ceremony (Angeles Funerary Complex; Sutton 2011) to commemorate the deaths that occurred in previous years (Walker 1951). Many of the artifacts recovered from the cairn features were broken and showed signs of burning, and were likely scattered over the cairn, possibly as some type of offering (Walker 1951:99).

A total of 221 stone beads were recovered from the vicinity of Cairn A, of which 32 were identified as Types A1-A3 (see Figure 2-7), 175 were identified as Types B1-B4 (see Figure 2-8 and Figure 2-9), six were identified as Types C1-C2, and 7 were identified as Types E, F, and G. One additional bead was identified as a potential siltstone. A number of chlorite schist disc beads (Type B) appear to be covered in a pinkish material, possibly ochre. A total of 52 stone beads recovered from presumed Middle period deposits at Chatsworth Walker Cairn were subjected to LA-ICP-MS analysis (Eddy 2009). These included 32 chlorite schist beads, 14 chlorite talc schist beads, and 6 talc schist beads.

The following size ranges are represented in the chlorite schist and chlorite talc schist disc bead assemblage:

Figure 2-7. Type A2 chlorite talc schist disc bead from LAN-21 (179-1214) 4.3 mm diameter

Figure 2-8. Type B-1 chlorite schist disc bead from LAN-21 (179-1176) 5.2 mm diameter

Figure 2-9. Type B-3 chlorite schist disc bead from LAN-21 (179-1149) 4.5 mm diameter

Black Chlorite Talc Schist (Type A1-A2; N=29)

Maximum Diameter	Range: 3.8-5.6 mm	Mean: 4.5 mm	sd: 0.4 mm
Thickness	Range: 1.0-2.2 mm	Mean: 1.7 mm	sd. 0.3 mm
Hole Diameter	Range: 1.7-2.6 mm	Mean: 2.2 mm	sd. 0.3 mm

Dark Gray Chlorite Schist (Type B1; N=32)

Maximum Diameter	Range: 3.1-8.6 mm	Mean: 4.6 mm	sd: 1.0 mm
Thickness	Range: 1.0-5.2 mm	Mean: 1.9 mm	sd. 0.7 mm
Hole Diameter	Range: 1.7-3.3 mm	Mean: 2.2 mm	sd. 0.5 mm

Light to Medium Gray Chlorite Schist (Type B2-B4; N=142)

Maximum Diameter	Range: 3.2-5.6 mm	Mean: 4.3 mm	sd: 0.5 mm
Thickness	Range: 1.0-3.2 mm	Mean: 1.8 mm	sd. 0.4 mm
Hole Diameter	Range: 1.3-2.8 mm	Mean: 2.2 mm	sd. 0.3 mm

Chlorite schist disc beads from LAN-21 were compared to beads from LAN-361 (Agua Dulce) leading Romani (1980:270-271) to suggest that the beads were more indicative of the Middle period. Specifically, the chlorite schist disc beads were dated to the early Middle period based on King's (1974b) chronology for LAN-361 (see Romani 1980:270).

Oro Grande: Loci 1 and 3 (SBR-72)

The Oro Grande site is situated along the Upper Mojave River near a major trade route that connected southern California to the lower Colorado River and greater Southwest region (King 1983:86). The site was occupied during the late Middle and Late periods according (Rector et al. 1983), although King (1983) proposed an early Middle period occupation for Loci 1 and 3 based on shell and stone bead seriation despite a firm late Middle period radiocarbon date at Locus 3 (A.D. 860-1050; Rector et al. 1983:28).

A total of 36 chlorite schist disc beads were recovered from the sites various loci, of which 28 were recovered from Locus 1 and 3. A light greenish-gray stone bead and schist with garnet inclusion pendant were also recovered from Locus 3. King (1983) divided chlorite schist disc beads into black schist (Romani's 1980 Type B1) and light gray schist with quartz (Type B2), the latter of which was similar to the chlorite schist disc beads recovered from the Malibu Site (LAN-264) [King 1983; also see Gibson 1975]. Type B3-B4 beads were thicker and had larger perforations than the Type B1 beads (King 1983:81). All chlorite schist disc beads recovered from Oro Grande contained muscovite inclusions. The following size ranges are represented:

Dark Gray Chlorite Schist (Type B1; N=15)

Maximum Diameter	Range: 4.3-5.7 mm	Mean: 5.0 mm	sd: 0.6 mm
Thickness	Range: 0.8-1.3 mm	Mean: 1.0 mm	sd. 0.2 mm
Hole Diameter	Range: 1.4-1.7 mm	Mean: 1.5 mm	sd. 0.1 mm

Light Gray Chlorite Schist (Type B3-B4; N=13)

Maximum Diameter	Range: 4.2-4.5 mm	Mean: 4.4 mm	sd: 1.0 mm
Thickness	Range: 0.8-2.1 mm	Mean: 1.5 mm	sd. 0.4 mm
Hole Diameter	Range: 1.7-2.0 mm	Mean: 1.8 mm	sd. 0.1 mm

King (1983:81) suggests that Type B2 beads were more common in early Middle period contexts while use of the Type B2 appears to increase toward the end of Middle period, although both were likely used contemporaneously. Chlorite schist disc beads were the most common bead type used during the early Middle period in the area of Oro Grande, or were second only to *Olivella* saucers.

The Ridge Site (SBR-713)

The Ridge Site (SBR-713), situated within the Crowder Canyon Archaeological District in the Cajon Pass of the San Bernardino Mountains, contains three spatially and temporally discrete occupation areas in the southern portion of the site. The southern occupation area, which did not contain any shell or stone bead artifacts, was radiocarbon dated between cal. 470-40 B.C (Basgall and True 1985:5.9). The middle and northern occupation areas, where all chlorite schist disc beads were recovered, were radiocarbon dated cal. 60 B.C. to A.D. 560 and A.D. 840-960, respectively.

A total of 56 gray-black stone disk beads recovered from Middle period deposits were subjected to X-ray fluorescence (XRF) for chemical analysis. It was determined that the stone beads were not steatite because of their low magnesium and complex elemental composition, which suggested they were likely meta-sedimentary (e.g., chlorite-schist) [Basgall and True 1985:5.51]. These stone beads are similar to the Type B1 beads at Oro Grande, LAN-21, and Two Bunch Palms (RIV-1246). Basgall and True (1985:5.51) provide the following size ranges for the site as a whole:

Dark Gray Chlorite Schist (Type B1; N=15)			
Maximum Diameter	Range: 3.2-6.5 mm	Mean: 4.8 mm	sd: 1.1 mm
Thickness	Range: 0.7-2.7 mm	Mean: 1.2 mm	sd. 0.4 mm
Hole Diameter	Range: 1.1-3.1 mm	Mean: 2.0 mm	sd. 0.5 mm

Type B1 beads recovered from the northern portion of the site dating to the late Middle period, were generally larger than those recovered from early Middle period deposits. Average diameter of Type B1 beads from early Middle period contexts were noticeably smaller (4.1 mm) than those recovered from the late Middle period deposits (5.6 mm). Basgall and True (1985:5.54) argued that differences in mean diameters and perforation size between the two periods of occupation was statistically significant and likely represented two distinct bead groups. Although no stone or shell beads were recovered from the older southern occupation area, a single chlorite schist disc bead was recovered from the nearby Sayles Site Locus D (SBR-421-D), which was radiocarbon dated between approximately 850 and 230 B.C., also falling within the early Middle period. Shell beads were not recovered from either the Ridge or Sayles site.

Two Bunch Palms (RIV-1246)

A stratified early Middle period deposit at Two Bunch Palms site (RIV-1246) in Desert Hot Springs, radiocarbon dated between 70 B.C. and A.D. 500, contained the remains of an earthen house floor that yielded variable densities of lithics, ground stone, *Haliotis* shell, faunal, worked bone, and stone beads and ornaments (Eddy 2007b). The house floor was discovered two meters below ground surface and an intact fire hearth dated the floor between cal 30 B.C. and A.D. 130 (Beta 225746). A total of 41 stone beads were recovered from the surface of the floor. In addition, two abalone shell disc beads, a single stone bead, and a fragment of a limpet ring were recovered from the loosely compacted sandy midden soil directly beneath the house floor. Only three *Olivella* saucer beads were reported from Middle period deposits at Locus A, and none were found in association with house floor. Middle period components at Locus A produced 121 of the 130 stone beads recovered from the Two Bunch Palms site.

As a result of comparative analysis 73 stone beads recovered from Locus A were classified as Type A, including 70 black (Type A1), 1 blue black (Type A2), and 2 medium to dark green (Type A4), which was not previously identified at LAN-21. Forty five additional disc beads were classified as Type B3, including 8 light gray (Type B3) and 36 dark gray (Type B1; Figure 2-10) beads similar beads to those recovered from SBR-72, SBR-713, and LAN-21. Five additional beads were classified as Type C (talc schist) and one bead was identified as calcite.

All stone beads analyzed were drilled conically and biconically, polished on the edges and around the exterior, and occasionally displayed indentations presumably grooved into the soft stone by the string (i.e., use wear). Sand particles were encased within the perforation of many beads, and unidentified white, pinkish-orange to reddish-brown powder-like substance, likely ochre, were noted on the exterior of almost every bead. These substances varied in consistency from a thin film to a thick, almost paint-like coating. Evidence of a similar coating was present on stone disc beads collected from the Chatsworth Walker Cairn site.

Stone beads from Two Bunch Palms include both disc and globular shapes. The majority of chlorite schist and chlorite talc schist disc beads from the Two Bunch Palms Hot Springs Site could be classified as thin discs (Type A1after Bennyhoff 1967). Thin discs have a diameter between 3 to 5 mm, a thickness of 1 to 3 mm, and a perforation that ranges between 1 and 2 mm (Bennyhoff 1967:42). Only six of the beads measured greater than 4.6 mm in diameter. The following size ranges are represented:

Figure 2-10. Type B-1 chlorite schist disc bead from RIV-1246 (8009-3) 3.7 mm in diameter

Dark Gray Chlorite Schist (Type B1)

Maximum Diameter	Range: 3.2-4.3 mm	Mean: 3.7 mm	sd: 0.3 mm
Thickness	Range: 0.7-2.5 mm	Mean: 1.5 mm	sd. 0.3 mm
Hole Diameter	Range: 1.2-2.0 mm	Mean: 1.5 mm	sd. 0.1 mm

Light Gray Chlorite Schist (Type B3)

Maximum Diameter	Range: 3.6-3.9 mm	Mean: 4.1 mm	sd: 0.2 mm
Thickness	Range: 1.6-1.7 mm	Mean: 1.6 mm	sd. 0.1 mm
Hole Diameter	Range: 1.2-1.3 mm	Mean: 1.25 mm	sd. 0.1 mm

Chlorite Talc Schist (Type A1, A2, and A4)

Maximum Diameter	Range: 3.2-5.1 mm	Mean: 3.9 mm	sd: 0.4 mm
Thickness	Range: 0.8-2.1 mm	Mean: 1.3 mm	sd. 0.3 mm
Hole Diameter	Range: 0.5-2.0 mm	Mean: 1.4 mm	sd. 0.2 mm

A total of 32 stone beads recovered from early Middle period deposits at Two Bunch Palms were subjected to LA-ICP-MS analysis (Eddy 2009). These included 23 chlorite schist beads, 7 chlorite talc schist beads, 1 talc schist beads, and 1 calcite bead.

Eel Point C (SCLI-43)

The most impressive stone bead lot reported in the southern Channel Islands was recovered from an early Middle period cemetery at Eel Point C on San Clemente Island (Scalise 1994; Rigby 2000). In total, 1,570 stone beads were recovered from burial lots or nearby sandy midden deposits found in association with human, dog, and fox burials. It is of interest to note that fox burials contained stone beads, some with as many beads as human burials (Rigby 2000). Rigby (2000:42, 45) concluded that the distribution of beads in burial lots was not indicative of status differentiation, but rather the scattering burial offerings as part of the mortuary custom. This activity may account for the absence of necklaces or bracelets in the deposit (Rigby 2000:37).

The stone bead assemblage contained 1,547 round thick chlorite schist beads and twenty-three other bead types identified as either steatite or serpentine. Two types of chlorite schist disc beads were identified by Rigby (2000:40; Table 23.1) in addition to brown talc beads. The first (Type 28) is described as a round thin disc with edges ground exhibiting gray muscovite, black colors with gray predominating. The second (Type 29) is described as a gray cylinder. Overall, stone beads represented more than 50% of the entire Eel Point C bead assemblage, which included only 19.2 % *Olivella biplicata* shell beads (Rigby 2000:Table 23.1). Size ranges of chlorite schist disc beads were not provided (Rigby 2000).

Rigby (2000) suggests that Type 28 chlorite schist disc beads recovered from Eel Point were similar to those described at Malibu (LAN-264), Rincon (SBa-1; King 1973), and Paradise Cove (LAN-222; Gibson 1975), although the Eel Point C beads were exceedingly thin (Rigby 2000:47). The similarities in chlorite schist disc beads noted between Malibu and San Clemente indicated to Rigby (2000:50) clear evidence of an exchange network between the southern islands and the mainland spanning the last 3000 years. Many of the beads recovered from Eel Point C exhibited hematite staining; a pinkish substance that could be rubbed off with the finger, while other beads were painted red by a mixture of ocher and oil or grease (Rigby 2000:37). Similar pinkish staining was noted on chlorite schist disc beads at LAN-21 and RIV-1246.

Del Rey Site (LAN-63)

The Del Rey Site (LAN-63), situated within the Ballona Wetlands near Centinela Creek in Marina Del Rey, exhibited strong influences from Mojave Desert cultural practices as highlighted by a preference of stone over shell beads, a paucity of shellfish faunal remains, and cremation mortuary practices (Altschul et al. 2005:291-292). According to Scalise (1994:161) shell beads accounted for less than 1% of the bead assemblage, which is dominated by stone. Similar patterns were noted at other Middle period sites located along Ballona (LAN-54) and Centinela creeks (LAN-60, -193, and -2768), along the bluff-top (LAN-59, -61, -64, and -206) and lagoon edge (LAN-62) in the Ballona Wetlands. The authors credit these influences to desert migration, or multiple migrations that occurred over an extended period of time during the Middle period (Althschul et al. 2005:292).

LAN-63 contained least 415 stone beads, all recovered from Middle period deposits, that were previously classified as slate, serpentine, and talc schist (Scalise 1994:163; Van Horn 1987). Slate is recognized as a material rarely seen in other stone bead collections (Scalise 1994:161); however, it may be a misclassification of chlorite schist. Unfortunately the collection was not available for visual analysis and the material type of these beads could not be confirmed. Slate, or chlorite schist, accounted for 364 of the 415 stone beads, or 87.7% of the entire assemblage. Forty serpentine beads (chlorite talc schist?) and 11 talc schist beads were also reported, along with four listed as “other.” Size ranges of stone beads were not provided by Scalise (1994).

While bead material types could not be confirmed due to access restrictions to the collection, the patterns represented at the Del Rey site and others in the Ballona Wetlands are similar to those identified at LAN-21, RIV-1246, SBR-72, and SBR-713. These patterns are also reflected in early Middle period deposits reported at LAN-64 and LAN-361.

Malibu Site (LAN-264)

The Malibu site, otherwise known as the historic village site of *Humaliwo* (LAN-264), is situated along the coast near the modern day city of Malibu approximately 20 miles northwest of Marina Del Rey. The site was occupied historically by the Chumash, who were middlemen in complex island-mainland exchange networks (Gibson 1975:110). While the identity of the Malibu site’s early Middle period occupants is unknown, they too appear to have operated as middle men negotiating multiple reciprocal exchange networks, as suggested by the presence of stone and shell beads.

At least 236 stone beads were recovered from Middle period deposits at the Malibu Site, of which 221 were classified as greenish gray chlorite schist disc beads. The remaining 15 were classified as steatite (or talc schist) disc beads are associated with Late Middle period deposits (see Gibson 1975: 118). Chlorite schist disc beads accounted for 79% of the early Middle period bead assemblage at the Malibu site, which also included *Olivella biplicata* spire-lopped, obliquely-ground spire, and ground dorsal saucer beads.[4]

Chlorite schist disc beads recovered from early Middle period deposits ranged from 3.9 to 5.0 mm in diameter and were 1.0 mm thick with a perforation measuring between 1.0 to 1.2 mm (Gibson 1975:113). Chlorite schist disc beads recovered from late Middle period deposits ranged from 3.2-4.8 mm in diameter, 1.0 to 2.8 mm in width, and with a perforation between 1.2 and 1.8 mm (Gibson 1975:117). Early Middle period disc beads were generally thinner than samples recovered from later Middle period deposits. The metric data from LAN-264 supports King's (1990:134) observation that chlorite schist disc bead perforations tend to increase over time, but shows relative consistency between bead diameters from early Middle and late Middle period contexts. It is possible that bead diameter differences are more apparent in the dark gray (Type B1) chlorite schist beads than the light gray (Type B3-B4)

Vasquez Rocks Cemetery (LAN-361)

The Middle period Vasquez Rocks Cemetery (LAN-361) in the Santa Clarita Valley is part of the Agua Dulce Village complex (King et al. 1974; Garza 2012) occupied during the Middle, Late and historic periods. Mortuary data was recently evaluated by Garza (2012) and I discussed the results in light of the evidence of an Early Middle Period Stone Bead Interdependence Network.

At least 1,457 chlorite schist disc beads were recovered from Middle period deposits at LAN-361. Steatite beads are also reported (King et al. 1974) but no further information was provided. According to Romani (1980:263, Table 24) stone beads from LAN-361 were classified as chlorite talc schist, chlorite schist, and talc schist based on the unpublished XRF results.

Chlorite schist disc beads from LAN-361 were divided into two groups based on relative hardness and further subdivided into three chronological phases (King 1974b: Figure 6). King does not differentiate between chlorite schist and chlorite talc schist beads in his typology. During the first phase (1000 B.C. to 400 B.C) hard chlorite schist disc beads were small and thin with small- to moderate-sized perforations. In the second phase (400 B.C. to A.D. 100) beads were either very thin flat discs or thicker discs with small to moderate sized perforations. By the third phase (A.D. 100 to A.D. 750) larger perforations and thicker disc beads were more prevalent. Size ranges of chlorite schist disc beads were not provided by King et al. (1974) although Romani (1980:253) reports an average diameter of 4.11 mm for 63 chlorite schist disc beads recovered from back dirt at LAN-361.

Burial lots containing chlorite schist and chlorite talc schist disc beads were often associated with *Haliotis* shell fragments, and one OGR shell bead (King 1990; Porcasi 1998) was reported. Shell beads are present at other sites in Agua Dulce village complex but may be associated with Late period occupations. A reexamination of bead assemblages in the Agua Dulce Village complex is crucial to addressing questions regarding the emergence of *Olivella* shell bead reciprocal exchange relationships in what is considered a core area of the Early Middle Period Stone Bead Interdependence Network.

King (1971:34) has argued that the exchange of larger chlorite schist disc beads (over 4.6 mm) likely occurred between a political leader and local villagers, or among villagers, whereas smaller chlorite schist beads (under 4.6 mm) were exchanged between political leaders of different villages. However, this contrasts with statements made later (King 1990:134) that size differences were related to age. This was partially based on the distribution of smaller chlorite schist disc beads in presumed elite burial lots at the LAN-324 (Elderberry Canyon Cemetery site) and LAN-361. Unfortunately LAN-361 was heavily damaged by looters and many of the artifacts recovered lack provenience (King et al. 1974; Garza 2012:63). As a result, interpretations of social hierarchy based on the burial lots at the Vasquez Rocks Cemetery site were partially compromised.

Sites on the Margin

The Buried Locus (RIV-2936)

The Buried Locus of RIV-2936 is situated within a kilometer of the northwest shoreline of Ancient Lake Cahuilla and shares several striking similarities, and one important distinction, with RIV-1246. Archaeological investigations at the Occupation Level 1 of the Buried Locus uncovered a house floor feature of similar composition and age as the feature described at RIV-1246 (Love et al. 2000b:11). Radiocarbon dates placed the occupation of the Buried Locus between A.D. 250 and A.D. 600 (Love et al. 2000b:71) spanning the early to late Middle period transition and overlapping with the early Middle period occupation at RIV-1246.

Three stone beads were recovered from the floor feature and two additional stone beads, one large green chlorite-schist drilled pendant, and one pendant of fuchsite-muscovite schist with minor quartz grains were recovered from other occupation areas. One of the five stone beads is dark gray to black, highly polished extremely fine-grained bead likely composed of chlorite talc schist (Type A1 disc bead; see Figure 2-11). The bead measured 5.7 mm in diameter and was 2.1 mm thick with a 4.8 mm maximum perforation. The other four beads share optical similarities with the dark gray chlorite schist Type B1 but are not an exact match (see Figure 2-12). All five beads were analyzed by LA-ICP-MS. Love et al. (2000b:50) suggested the stone beads originated from soapstone deposits on Santa Catalina Island, or from one of several talc bearing regions on the southern California mainland (see Quinn 1997:4). The following size ranges are represented in the chlorite schist and disc beads:

Dark Chlorite Schist (Type B1)

Maximum Diameter	Range: 4.0-4.4 mm	Mean: 4.3 mm	sd: 0.2 mm
Thickness	Range: 0.8-1.0 mm	Mean: 1.0 mm	sd. 0.1 mm
Hole Diameter	Range: 1.5-1.5 mm	Mean: 1.5 mm	sd. 0.0 mm

While shell beads were not recovered from the floor feature at the Buried Locus, *Haliotis*, limpet, *Olivella*, and *Opalia* beads and ornaments were found elsewhere in the deposit. Surprisingly, *Olivella dama* beads from the Sea of Cortez dominated the bead assemblage, accounting for 45 percent of the total assemblage. Other shell present on site indicated some influence from the Pacific coast, although it is not clear if the material

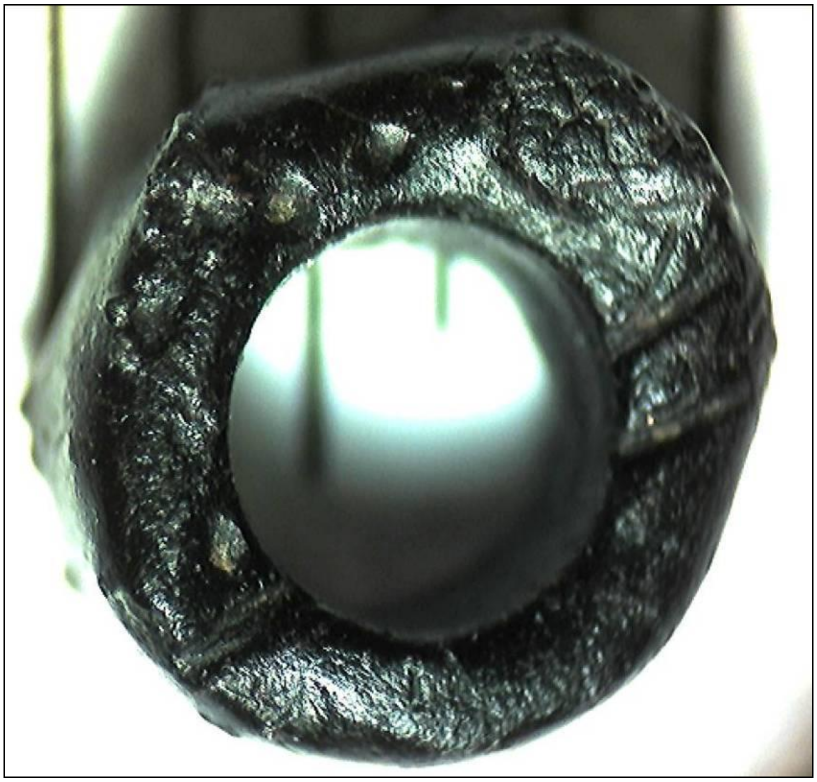

Figure 2-11. Type A1 chlorite talc schist bead from RIV-2936 (0108) maximum diameter 5.7 mm

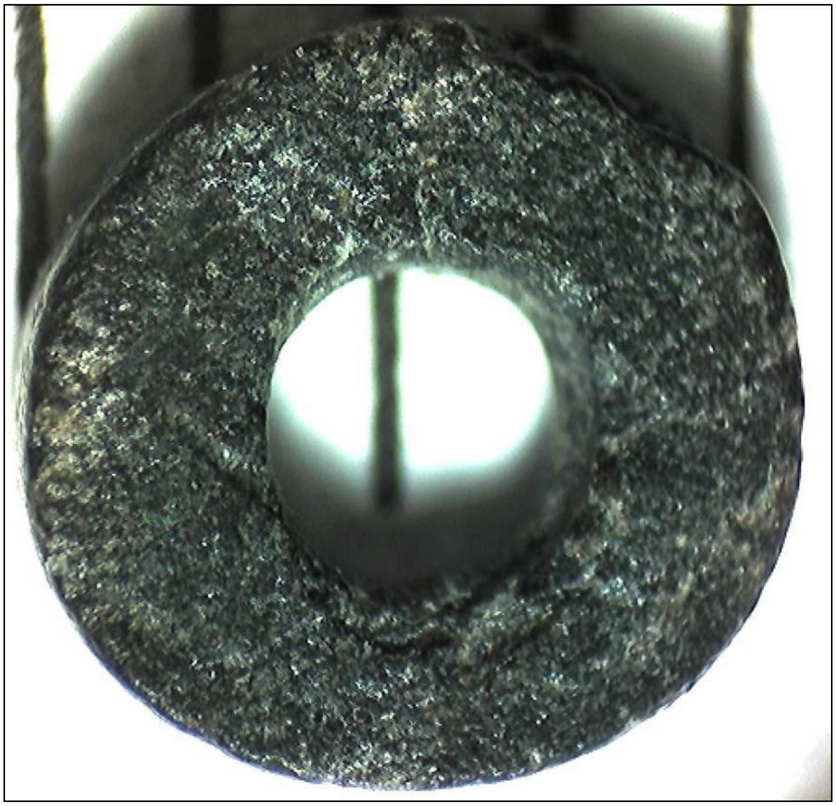

Figure 2-12. Type B1 chlorite schist disc bead from RIV-2936 (1476) 4.0 mm diameter

originated in the Santa Barbara Channel or southern coastal areas of Los Angeles, Orange, or San Diego. The occupants of the Buried Locus were apparently negotiating exchange relationships with at least two established networks; one emanating from the lower Colorado River delta that would eventually lead to the spread ceramic technology into the Coachella Valley during the Middle/Late period transition, and the other identified as the Early Middle Period Stone Bead Interdependence Network. Based on the bead assemblage alone, it would appear that occupants of the Buried Locus were primarily influenced by the lower Colorado River exchange network, suggesting that the presence of stone beads in the early Middle period deposit may indicate the creation of a new mutual interdependence relationship and expansion of the Network's sphere of influence.

VEN-1691

VEN-1691 is located on the Oxnard Plain within historic Chumash territory approximately one-mile southeast of Calleguas Creek and 25 miles northwest of the Malibu site. The site is interpreted as an early Middle period village site that may have been occupied year round (Delaney-Rivera and Kinkella 2007; Perry and Delaney-Rivera 2011). The site has so far produced 11stone beads and one stone bead blank along with 44 *Olivella biplicata* shell beads (Covello n.d.). It is believed that the site is situated on the periphery of the Early Middle Period Stone Bead Interdependence Network.

Six of the stone beads and the partially drilled bead blank are classified as Type A1 chlorite talc schist (see Figures 2-13 and 2-14) based on visual comparative analysis to stone beads from LAN-21. Four beads are classified as chlorite schist, one of which is oval in shape and may be a pendant fragment (see Figure 2-15). Finally, one fine-grained red bead, possibly argillite, was recovered (Covello n.d.). Four Type A1 beads and 1 chlorite schist bead were analyzed by LA-ICP-MS.

Chlorite Talc Schist (Type A1)

Maximum Diameter	Range: 4.2-8.0 mm	Mean: 5.7 mm	sd: 2.0 mm
Thickness	Range: 1.3-3.5 mm	Mean: 2.5 mm	sd. 1.1 mm
Hole Diameter	Range: 2.2-3.3 mm	Mean: 2.7 mm	sd. 0.6 mm

Inhabitants of the VEN-1691 were involved in exchange relationships with mainland communities to the east, north, and south and were connected to these areas by a network of natural travel corridors (Perry and Delaney-Rivera 2011:105). Large settlements like VEN-1691on the Oxnard Plain were socioeconomic and political nodes along these travel corridors that were "strategically placed to maximize access to essential resources and to facilitate contact with local groups within and beyond" their territory (Perry and Delaney-Rivera 2011:108). The presence of drills and a partially drilled chlorite talc schist bead blank suggest shell and stone bead manufacture occurred on site, but the extent of this production is not clear. Chlorite talc schist disc beads account for 21 percent of the total bead assemblage so far recovered and the beads are irregular in shape and appear to be larger than most Type A beads associated with the early Middle period. Two possibilities emerge: first inhabitants of VEN-1691 were

Figure 2-13. Type A1 chlorite talc schist disc bead from VEN-1691 (U3L2) 4 mm diameter

Figure 2-14. Type A1 chlorite talc schist bead from VEN-1691 (U6L2) 5 mm diameter

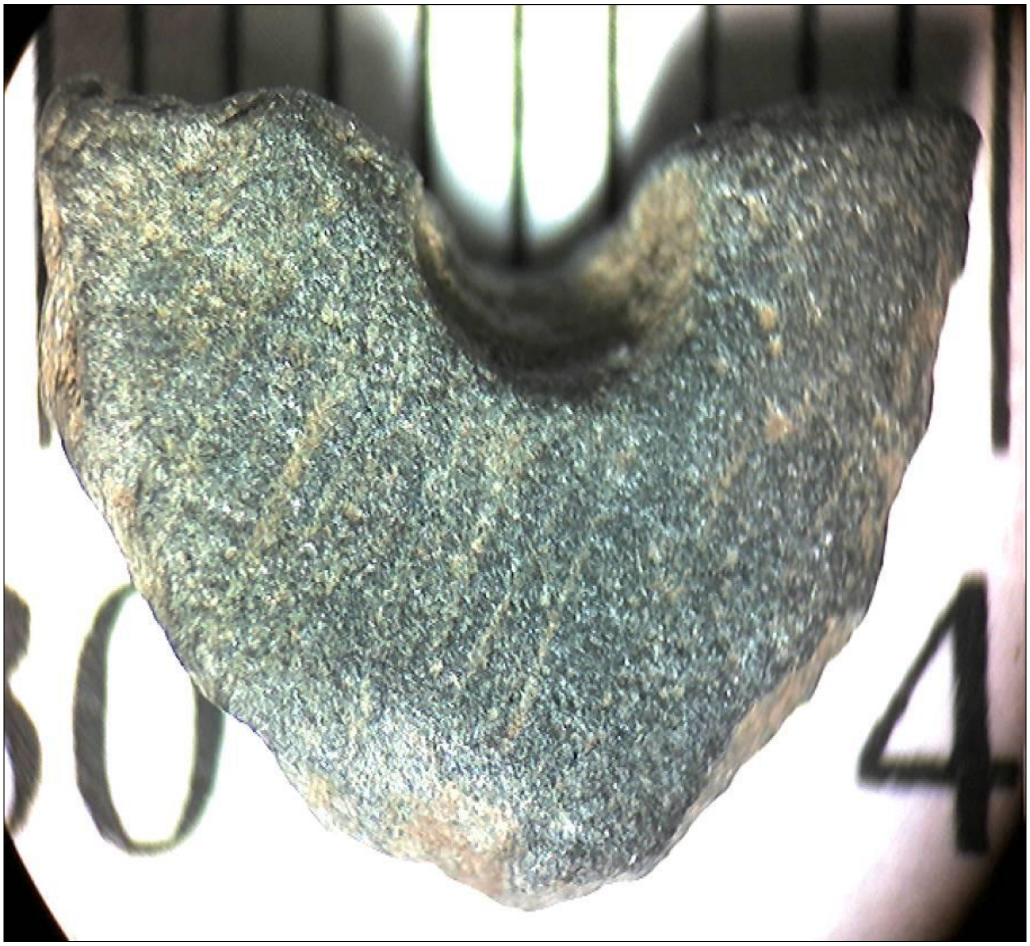

Figure 2-15. Chlorite talc schist bead from VEN-1691 (U7L5) 10 mm wide

entering mutual interdependence relationships with groups in the nexus of the Early Middle Period Stone Bead Interdependence Network, thus providing additional evidence for the expansion of the Network's sphere of influence; or, the irregularities in size and shape and the evidence of stone bead production indicate the inhabitants of VEN-1691 were engaging in local stone bead craft production that was not directly associated with the Early Middle Period Stone Bead Interdependence Network to the south and east.

Late Middle Period and Late Period Sites

Desert Dunes (RIV-2642)

Situated in Desert Hot Springs approximately two miles south of RIV-1246, the Desert Dunes site (RIV-2642) contains the remains of a large clay-lined living floor feature buried a meter below ground surface and containing numerous fire hearth features and artifacts (Dahdul et al. 2009). The floor feature was radiocarbon dated to the terminal Middle period (A.D. 890 and A.D. 1160; Dahdul et al. 2009:96), and is coeval with radiocarbon dated deposits at Oro Grande (SBR-72).

More than 100 shell and stone beads and ornaments were recovered from the site. *Olivella* sp. shell beads accounted for 60 percent of the bead assemblage, which also contained Haliotis, Clam, and *Dentalia* shell beads. Shell from the Gulf of California was not as prevalent as it was at Oro Grande, accounting for only 14 percent of shell beads. A total of 13 stone disc beads were also recovered, accounting for 27 percent of the entire bead assemblage. Unfortunately, no attempt was made to describe the mineralogy of the stone beads or measure bead thickness (Dahdul et al. 2009:85 Table 16) arguably the most critical metric. The collection was not available for comparative analysis due to access restrictions. The following size ranges are represented in stone bead assemblage:

Stone Beads

Maximum Diameter	Range: 3.0-6.5 mm	Mean: 5.2 mm	sd: 1.2 mm
Hole Diameter	Range: 1.0-2.0 mm	Mean: 1.3 mm	sd. 0.3 mm

Oro Grande: Loci 2, and 4-10 (SBR-72)

The Oro Grande site contained additional loci that are associated with a terminal late Middle period occupation (A.D. 840-1300). A total of five chlorite schist disc beads (4 dark gray and 1 light gray) were recovered from these loci, which contained higher frequencies and greater diversity of shell beads. Combined, these eight loci produced 120 shell beads that included *Olivella biplicata* saucers, *Olivella dama*, and *Dentalium*, among others. The shell bead and ornament assemblage was dominated by *Olivella biplicata* saucers, which accounted for 70% of the entire shell assemblage. The size range of the five dark chlorite schist disc beads is provided below.

Dark Gray Chlorite Schist (Type B1)

Maximum Diameter	Range: 3.8-5.2 mm	Mean: 4.2 mm	sd: 0.7 mm
Thickness	Range: 1.0-1.2 mm	Mean: 1.1 mm	sd. 0.1 mm
Hole Diameter	Range: 1.3-1.5 mm	Mean: 1.4 mm	sd. 0.1 mm

Red Mountain Archaeological District (SBR-211, -2600, and -2614)

Three stone beads were recovered from sites SBR-211, -2600, and -2614 within the Red Mountain Archaeological District at. At SBR-2600, the single stone bead was recovered from Unit 2 in association with a large number of shell beads and polished bone beads, and a Cottonwood Triangular point (Allen in press). At SBR-211, a single stone bead was recovered from Unit 2 in association with several shell beads and a fire hearth feature radiocarbon dated to approximately A.D. 1000 (Allen in press). At SBR-2614, a single stone bead was recovered from the surface of the site in association with ceramics and other Late period artifacts. All three stone beads recovered from the Red Mountain Archaeological District were subjected to LA-ICP-MS analysis.

Visual comparative analysis with stone beads recovered from LAN-21 indicates that two of the beads are likely chlorite talc schist, while the other is talc schist. The talc schist bead has a diameter of 5.3 mm with a thickness of 2.4 mm and a maximum perforation of 2.0 mm. The size range for the two chlorite talc schist disc beads is provided below. Due to the limited sample size, mean and standard deviation were not calculated.

Chlorite Talc Schist (Type A1)	
Maximum Diameter	Range: 4.2-4.8 mm
Thickness	Range: 1.3-1.9 mm
Hole Diameter	Range: 1.7-2.0 mm

Discussion

Comparative analysis of stone bead assemblages from nine sites as well as information gathered from the existing archaeological literature indicate that chlorite schist and chlorite talc schist were the most common material used in the production of stone beads during the Middle period. Subtypes identified based on Romani's (1980) typology were regrouped into four major categories for comparative analysis that will also serve as the basis for grouping beads during chemical analysis: 1) dark gray chlorite schist; 2) light to medium gray chlorite schist; 3) chlorite talc schist; and 4) talc schist. Beads groups were further examined to identify trait patterns that may reflect stylistic variation and thus communicate different sets of information about social and/or personal identity. The most obvious stylistic variation is mineralogical composition. Chlorite schist, chlorite talc schist, and talc schist beads vary in terms of color, grain size and softness and are easily distinguished from one another visually. How these styles varied in terms of the information they communicated is more difficult ascertain.

Another potential form of stylistic variation is in the size of stone beads. Most archaeologists associate small/large bead sizes with specific time periods (King 1990; Basgall and True 1985). However, the possibility that size was used to communicate specific information cannot be overlooked. An example of this is drawn from the Alejo Patencio, a Cahuilla informant who told William Duncan Strong (1929:96) that large and small beads were used by the Cahuilla but the small ones were more valuable. The most intriguing evidence of potential stylistic variation was found in the decisively smaller diameters of Type B1 beads at RIV-1246 compared to all other early Middle period sites (see Table 2-7).

Table 2-7. Early Middle period chlorite schist/chlorite talc schist disc bead metrics

Early Middle Period	**Bead metrics (mean diameter/thickness/perforation)**					
Type[1]	**SBR-72**	**RIV-1246**	**LAN-21**[2]	**SBR-713**	**RIV-2936**	**Type Mean**
A1-A4		3.9/1.3/1.4	4.5/1.7/2.2			4.2/1.5/1.8
B1	5.0/1.0/1.5	3.7/1.5/1.5	4.6/1.9/2.2	4.8/1.2/2.0	4.3/1.0/1.5	4.5/1.3/1.7
B3	4.4/1.5/1.8	4.1/1.6/1.25	4.3/1.8/2.2			4.3/1.6/1.8

[1] Based on Romani (1980); Type B1 = dark gray chlorite schist; Types B3 = light gray chlorite schist; Type A = chlorite talc schist

Summary

This chapter described the general methodological framework, discussed quantitative methods relating to soapstone source characterization and provenience analysis using LA-ICP-MS that built upon previous soapstone source characterization studies, and identified important research topics pertaining to southern California soapstone sources and stone beads that will be addressed through chemical composition analysis. Qualitative research methods and results were also presented that document efforts to explore soapstone procurement and quarrying activity (see Appendix B), identify stylistic variation, unravel the sociopolitical, economic, and ceremonial symbology of stone beads in early Middle period society, and interpret the spatial distribution of stone beads relative to shell beads and our understanding of hunter-gatherer mutual interdependence relationships.

Evidence that supports an Early Middle Period Stone Bead Interdependence Network that was distinct from and operated parallel to the Santa Barbara shell bead exchange network came from geospatial analysis, which examined the distribution of shell and stone bead frequencies during the early Middle period and clearly shows a nexus of stone bead use extending from the southern Channel Islands northeast to Malibu and across the San Gabriel and San Bernardino Mountains, up the Mojave River to Oro Grande, and as far east the Desert Hot Springs in the Coachella Valley. The existence of boundaries and the virtual absence of shell beads within the nexus may reflect efforts to reject the use of *Olivella* shell beads, thus elevating the status of stone beads used as important mediums of exchange that symbolized group and individual social identity as well as an intention to fulfill obligations.

The existence of boundaries and the unequal distribution of stone beads in adult burials provide further support that leaders who held power and influence were negotiating mutual interdependence relationships on behalf of small-groups in the Early Middle Period Stone Bead Interdependence Network. What remains unclear are the roles associated with leaders. The popular idea over the past several decades is to associate evidence of leadership in mortuary data with positions of politicoeconomic influence (Gamble et al. 2001; Garza 2012; King 1974a and 1990). The Cahuilla example demonstrates power and influence was held by leaders in politicoeconomic, ceremonial, and religious roles, and it is possible that others obtained positions of leadership through craft. What is clear from the mutual interdependence model is that leaders attained status and were recognized for their ability to negotiate cooperative relationships. How we, as modern day Western Civilization influenced practitioners of archaeology, classify the roles associated with these leadership positions may actually take away from the simplistic complexity of the truth: leaders negotiated mutual interdependence relationships on behalf of their group.

Moving ahead, efforts will be made in Chapters 3 and 4 to identify soapstone source locations for materials used to craft stone beads and explore the relationship among beads of similar mineralogical composition. Both lines of inquiry are crucial to reconstructing the Early Middle Period Stone Bead Interdependence Network. For instance identifying the source of raw materials used in the production of stone beads can inform on the social dynamics of stone bead industries and lead to questions such as, were stone beads produced *en masse* by craft specialists for regional distribution through the hands of leaders? What does this tell us about the mode of production? Or, conversely, were stone beads produced at the local level on an intermittent basis over multiple regions, reflected in high degrees of variability in size and shape of beads as well as multiple mineralogical and chemical composition groups representing myriad source locations? Exploring the chemical relationship among beads, especially beads of similar mineralogical composition, speaks directly to questions of social dynamics, especially regional versus local modes of production. The thesis will conclude with a discussion that ties the results of the various analyses together and assess the results in light of the theoretical model of mutual interdependence and power and force.

CHAPTER 3

SOAPSTONE SOURCE CHARACTERIZATION

Methods

LA-ICP-MS analysis of soapstone source materials and artifacts was conducted at the Institute for Integrated Research in Materials, Environment, and Society (IIRMES) at California State University, Long Beach by the author under the direct supervision of Dr. Hector Neff. Data calibration was carried out by Dr. Neff before the data was submitted to the author for processing and statistical analysis.

Sample Preparation and Analysis

All samples collected from quarry sites and geologic deposits were first subjected to attribute analysis (See Appendix B) and catalogued for material reference. Samples were prepared for LA-ICP-MS analysis by removing a small fragment (no more than 1 cm) of stone from each sample. The removal was necessary to expose the non-weathered interior of the sample and ensure that the sample would fit within the Laser Ablation sample chamber. Removal was carried out using a hand-held rotary saw affixed with a diamond-edged blade. All raw source materials subjected to LA-ICP-MS analysis consisted of hand samples without cultural modification. Stone beads and ornaments were selected for LA-ICP-MS by random sampling and were cleaned with water, if necessary, to remove soil or sediment stains. Care was made not to remove ochre.

Source materials and artifacts were affixed to a microscope slide using a common household plastic epoxy along with a set of standards used to calibrate the raw chemical data. Once samples were placed into the laser cell (or chamber), a video camera inside the chamber that produced a digital image of the sample onto a computer screen was adjusted to magnify the sample and identify areas for laser ablation. A raster pattern or single line, typically smaller than 1,000 x 1,000 microns, was superimposed over the targeted area. The laser operated at 60% Power using a 100-micron-wide beam at 20Hz, with the laser scan speed set at 70 microns per second. The laser passed over the raster once to ablate any surface contaminations and allow for the sample uptake and argon gas plasma to become stable following introduction of the ablated material (Tabares et al. 2005:22). Each sample was ablated twice for the purpose of averaging the chemical concentrations during statistical analysis.

LA-ICP-MS Analysis

After the material is ablated, is transported from the ablation chamber via argon gas into the inductively coupled plasma mass spectrometry torch. The ignited particulates are passed through a series of filters and ion optics before reaching the electrostatic analyzer and magnet (Speakman and Neff 2005:2). Individual ions are then counted, providing a raw quantitative account of the materials chemical composition.

Raw data measurements represent elemental concentration of the sample as well as variability in instrument sensitivity and operation. The raw data were processed and standardized by correcting the data for background noise and isotope abundance (see Gratuze et al. 2001). Raw data was calibrated against external standards, or sampled materials with known elemental compositions, to determine relative accuracy and signal intensity and deduce sample element concentrations. Standards used to calibrate soapstone raw materials and soapstone artifacts included glass (sm610, sm612, sm614, BrillD) and Ohio Red Clay. Standards were analyzed several times during each sample set (i.e., one microscope slide of raw materials and/or artifacts). Standards, including a blank run without any materials ablated, were run at the beginning and end of each set and again after every ten samples/artifacts were analyzed.

LA-ICP-MS analysis produced a substantial chemical composition dataset of soapstone source materials and artifacts that provide the basis for source characterization and provenience analysis. Source characterization analysis of source materials mirrored methods documented by Truncer et al. (1998), who successfully differentiated among soapstone samples from a number of quarries in the eastern United States using INAA.

Each source sample produced a compositional readout of 45 elements including Na, Mg, Al, Si, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Ni, Co, Cu, Zn, As, Rb, Sr, Y, Zr, Nb, Sn, Sb, Cs, Ba, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Ta, Pb, Th, and U. Elements included transition metals and rare earth elements, which were previously determined to be good intersource discriminators of soapstone (Truncer et al. 1998; Clark 2009: Table 11; Eddy 2007a, 2008). Magnesium (Mg) was monitored at mass-25 to avoid detector saturation and Silicon (Si) was monitored at mass-30 and used as an internal standard (Neff 2008). For the current study, intersource discrimination was achieved by comparing current datasets against previously generated datasets provided by Clark (2009), Eddy (2007a and 2009) and Tupa (2009).

Data Processing: Removal of Outliers

Quantitative data derived from LA-ICP-MS analysis and calibrated against the chemical composition of know standards were further scrutinized through multivariate statistical analyses. Data was first screened holistically to identify trace elements that registered at or near the LA-ICP-MS detection limits (i.e., parts per billion) and these elements were removed from the dataset. As stated above, each source sample and artifact was analyzed twice, producing two distinct sets of data for each sample. Average concentrations of each element were calculated for all samples. The averaged data sets were used during all remaining stages of statistical analysis.

Source materials were placed into groups based on source or quarry location. Artifacts were organized by site and groped by mineralogical/chemical subgroups. Geometric means and standard deviations were calculated for elements within each source material and artifact group. Calculating geometric means simplified group data analysis and assisted efforts to identify elements whose concentration varied among groups and could be used to chemically distinguish groups from one another. Screening of the data also revealed potential outliers that might skew the characterization of the group. However, it was unclear whether these potential outliers were within the range of variability of a specific element represented in the group or were true statistical outliers. Therefore, each potential outlier identified during the screening process was tested.

For source groups, all potential outliers noted in the averaged concentrations (i.e., combined concentrations from the two sets of data generated for each sample) were highlighted in their respective tables. Both sets of chemical composition data generated for each individual samples was reviewed to determine if the potential outlier was attributable to one of the sample runs or if the pattern was repeated. The sample mean of the element was compared to the mean for the whole group. The sample with a potential outlier was temporarily removed from the group and the group mean was recalculated and the two group means for the specific element (with potential outlier and without potential outlier) were then compared. If the anomaly had a strong influence (i.e., >=10%) it was classified as a likely outlier. Once a likely outlier was identified, the un-averaged concentrations for the group were scanned to identify other samples exhibiting the outlier. Identification of similar element concentrations in several un-averaged samples was interpreted as evidence of a high degree of variation for the specific element and thus consistent with the character of the group. In this case the potential outlier was not corrected. Conversely, failure to identify similar element concentrations in the group indicated the potential outlier was a true outlier, and the data for that specific element was corrected.

True source group outliers were corrected using the Winsorized technique adapted from Drennan (2004). First, standard deviations from the mean were calculated for the averaged data sets for each group. An index of spread based on the set of deviations from the mean was created. Deviations from the mean were squared to rid the data set of positive and negative signs. The sum of the squared deviations, or sum of squares, was calculated and divided by the number of samples in the batch minus one. The equation for variance is:

$$s^2 = \frac{\Sigma(x - \bar{x})^2}{n -1}$$

where

s^2 is the variance of x;
$\bar{x}$ is the mean of x;
n is the number in the batch of x.

The square root of the variance was then calculated, resulting in the standard deviation of the group. The equation for standard deviation is:

$$s = \sqrt{s^2} = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n -1}}$$

The result is a standard deviation of an element concentration in parts per million (ppm) for the group. Calculating variance and standard deviation of groups with true outliers showed a high degree of spread within the group, resulting from one or two true outliers. To balance the strong influence of the outlier, the group mean and standard deviation increase in value, causing the majority of samples in the group to be far above or below the group mean. To correct the skewed data set caused by the outlier(s) a trimmed standard deviation was calculated.

Calculation of the trimmed standard deviation requires that the sample size of the group be retained. Instead of reducing the size of the group by removing the outliers, outliers are substituted by element concentrations that are next in line for trimming. Typically, a 5% trimmed standard deviation was calculated, whereas the single highest and single lowest element concentrations for those elements containing true outliers were replaced with the next highest and next lowest element concentrations. The new batch of element concentrations for the group results in a Winsorized batch. The trimmed standard deviation is derived from the Winsorized variance using the following equation:

$$s_r = \frac{\sqrt{}\,(n-1)\,s^2_w}{n_r - 1}$$

where

s_r is the trimmed standard deviation;
n is the number in the untrimmed group;
s^2_w is the variance of the Winsorized batch;
n_r is the number in the trimmed batch.

Comparison of the untrimmed to trimmed standard deviations calculated for groups shows the incredible effect true outliers had on group element concentrations. The results of the Winsorized technique effectively corrected data sets from outlier influence and tightened group element concentration means and standard deviations, which strengthened group cohesion and improved efforts to distinguish source groups from one another.

Data Processing: Identifying Discriminant Elements

Winsorized batches of source groups were analyzed through GAUSS statistical software developed by Hector Neff for archaeometric analysis of data derived from the Missouri University Research Reactor (MURR). GAUSS is a matrix programming language and statistical package for IBM-compatible personal computers. Scatter plots were generated using Gauss graphics functions permitting the display of different combinations and subsets of variables for inspection and confidence ellipses calculated for subgroups.

First, raw data was scanned in tabular form to remove zero values from the source group. Zero values represent concentrations of a specific element that was either absent from the sample or fell below the detection limits. If a high number of samples within a group contained zero values of a single element, the element was removed from the data set and not included in the statistical analysis. Remaining zero values were then substituted using the Mahalanobis distance metric, which attempts to minimize the distance between the sample with missing data and the centroid of the group dataset.

The Winsorized data sets were then analyzed in GAUSS after converting the raw element concentrations from ppm to base 10 log values thus normalizing element concentrations and reducing the magnitude of major elements on the sample (Truncer et. al. 1998:34). Any remaining missing values (i.e., sample element concentrations that registered no value) were then substituted using a Mahalanobis distance minimization procedure (See Sayre 1975).

Next bivariate plots were created to explore differences and similarities in element concentrations among the various groups. Bivariate plots compared two elements from two to several source groups, drawing ellipses around the group with 90% confidence of group membership. Hundreds of bivariate plots were scanned to identify elements whose concentrations varied among groups, resulting in a subset of elements that could be used to distinguish soapstone source locations from one another.

Multivariate Statistical Analysis: Source Characterization

Canonical discriminant analysis was carried out using element discriminators to assess the strength of group separation and bivariate plots of canonical discriminant functions were examined at the 90% confidence level. Wilks' lambda class separation, which measures the strength of separation from group centers and is calculated as a number between 0 and 1 with smaller (closer to 0) values indicating well separated groups, and F and P-tests of significance were completed. F and P values were calculated to test the null hypothesis that the canonical correlations were not significant. A minimum P value of 0.05 was accepted as significant, indicating that there was a 95 percent certainty that group separation did not occur by chance.

If group separation was statistically significant, posterior classification based on Mahalanobis distances from group centroids assuming non-homogenous variance-covariance matrices, using cross-validation (Baxter 1994a and 1994b:201-204; Truncer et al. 1998:34) was completed. Cross-validation assesses how the results of a statistical analysis will measure against independent data sets. Non-homogenous variance-covariance matrices were assumed when groups were not equally distributed in multivariate space with respect to their size and shape. Jackknife probabilities of group membership for each sample were computed. This cross-validation technique removes the sample from the group it belongs to when calculating the probability of group membership. Samples near the center of the group are not affected, while samples at the edge of the group will likely result in reduced probabilities of group membership. The resulting classification rate for correctly predicting group membership is assessed to determine the validity of the sourcing protocol.

Results

LA-ICP-MS analysis of soapstone source materials representing Sierra Pelona Schist and Julian Schist generated a rich geochemical database for quantitative analysis.

Following data collection and calibration, statistical analysis was completed to characterize and differentiate soapstone source locations at the regional and/or quarry-specific level.

My initial attempt at southern California soapstone source characterization failed to identify a universal set of elements that could distinguish among source locations similar to methods employed in obsidian sourcing. Soapstone varies greatly in its mineralogical composition and chemistry. Several general varieties of soapstone were analyzed as part of the current research, which included talc-schist, greenstone/phyllite, chlorite schist, and serpentine. Jacumba schist was also analyzed, which contains a variety of minerals including pyrocene, amphibole, chlorite, chryosite, variety asbestos, biotite, and vermiculite.

Distinguishing mineralogical types was an important first step in the source characterization process due to the variability represented in soapstone and other soft stones used in the production of stone beads and ornaments. Therefore, the first tier of the source characterization protocol was to distinguish among the various mineralogical types (Kohl et al. 1979:136; Jones et al. 2007). The second tier of the source characterization protocol focused on regional (i.e., geologic formation) characterization of talc schist. Talc schist was represented at soapstone source locations included in this analysis with the exception of Santa Cruz Island and Jacumba. Finally the third tier of the protocol attempted intrasource characterization of Sierra Pelona, Julian Schist, and Catalina Island Schist Formations at the quarry-specific level.

Identifying Discriminant Elements

After removing/replacing zero values and converting all chemical concentrations to log base 10, hundreds of bivariate plots were scanned to identify elements that contributed to group differentiation at all three tiers of the source characterization protocol. At the mineralogical level, Santa Cruz Island schist showed clear separation from other groups in concentrations of Mg, Ni, and Sr. Mg concentrations in Santa Cruz Island schist were far below all other groups and are likely due to the absence of sheet silicate minerals in the samples collected by Eddy (2009). Santa Cruz Island schist and chlorite schist both exhibited high concentrations of Ti that distinguished them from all other groups. Aside from Ti, chlorite schist and serpentine exhibited similar chemical concentrations. Both exhibited low levels of Si that clearly distinguished these from other mineralogical groups. The bivariate plots comparing Cr to Ca, Cr to V, and Cr to Cu displayed the best group differentiation for all five groups (see Figure 3-1).

Surprisingly, talc schist and Jacumba schist exhibited similar concentrations in a number of elements. This was not expected due to the mineralogical composition of Jacumba schist. Santa Cruz Island schist, which exhibited the greatest degree of separation, was removed and bivariate plots of the four remaining groups were analyzed. Afterwards, Jacumba schist displayed good separation and contained higher concentrations of Ca, V, and Cu. For all other elements, ellipses drawn at the 90 percent confidence interval for talc schist and Jacumba schist displayed a high degree of overlap. A clear separation between chlorite schist and serpentine, with chlorite schist

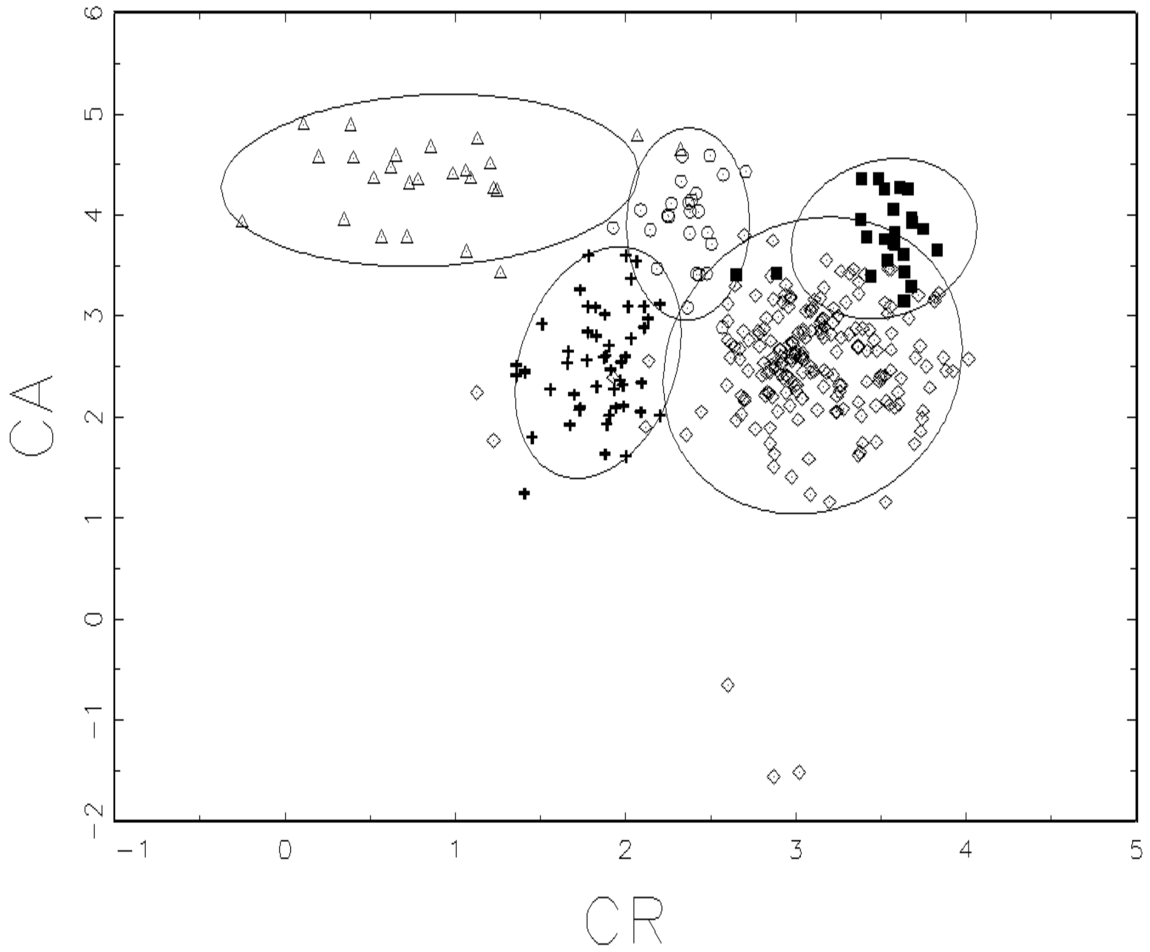

Figure 3-1. Group separation on bivariate plot (Chromium versus Calcium): Talc schist (open diamond), Santa Cruz Island schist (open triangle), Serpentine (plus sign), chlorite schist (open circle), Jacumba schist (closed square). Ellipses indicate 90% confidence level for group membership.

containing higher concentrations of Ti and Mn (Figure 3-2), was also noted. Once again, high levels of Al in chlorite schist and serpentine clearly distinguished these groups from talc schist and Jacumba schist, whereas talc schist and Jacumba schist were clearly distinguished by high levels of Si.

A set of 11 elements were identified as potential discriminators to differentiate the various mineralogical types of soapstone and serpentine (see Table 3-1). These included a mixture of alkali earth metals, metalloids, and several transition metals.

The second tier of the source characterization protocol focused on differentiating among talc schist from the Sierra Pelona Mountains, San Diego, and Catalina, as well as Jacumba schist. Although the mineralogical composition of Catalina soapstone was not reported by Clark (2009), it was assumed that the majority of samples analyzed consisted of talc schist or at least contained moderate concentrations of talc. No further analysis of serpentine, Santa Cruz Island Schist, or chlorite schist was performed due to the limited number of samples represented.

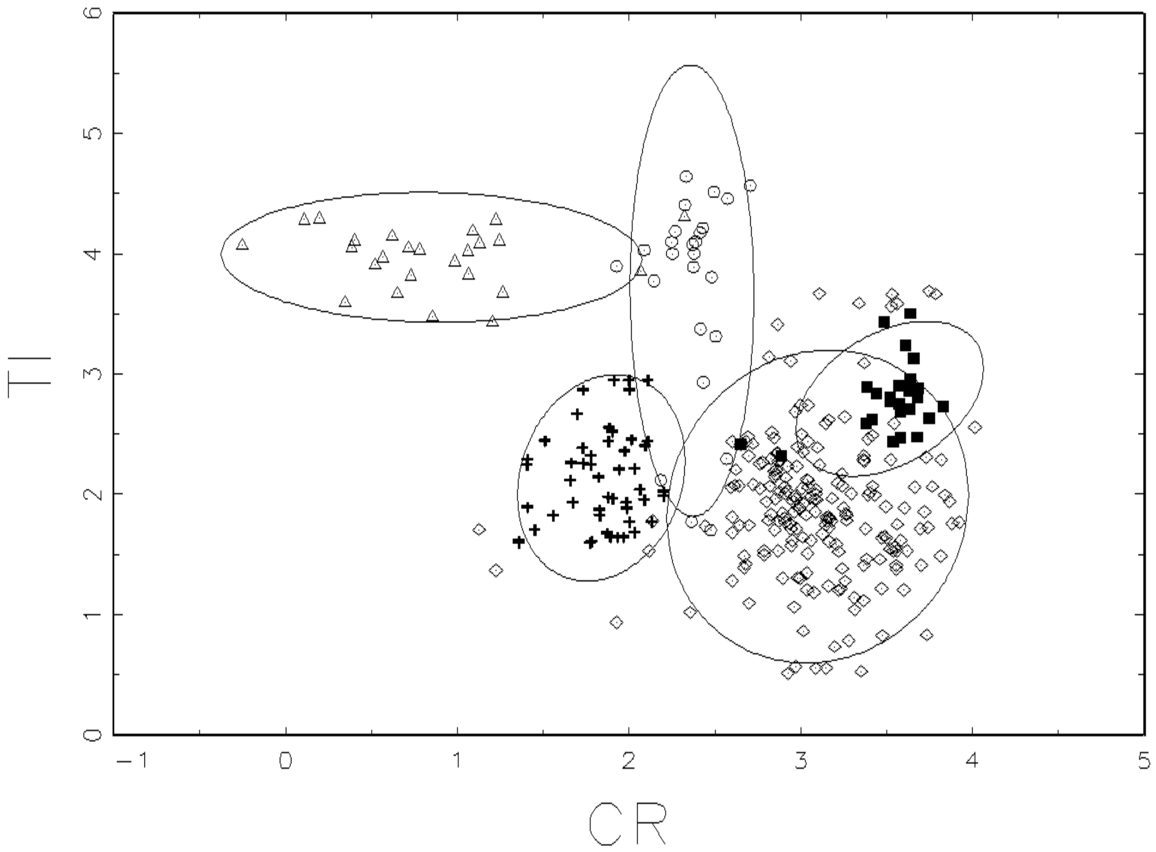

Figure 3-2. Group separation on bivariate plot (Chromium versus Titanium): Talc schist (open diamond), Santa Cruz Island schist (open triangle), Serpentine (plus sign), chlorite schist (open circle), Jacumba schist (closed square). Ellipses indicate 90% confidence level for group membership.

First, I attempted to replicate Clark's (2009:63-65) Catalina Island source characterization results utilizing seven elements (i.e., Ni, Co, Cu, Zn, As, Sn, and Sb). Mahalanobis distance calculation and posterior classification of Catalina Island and Cuyamaca soapstone presented by Clark (2009) resulted in successful classification to the source of origin. During the current thesis research, the strength of the model to accurately predict group membership was tested with the addition of talc schist samples from Mount Laguna and Sierra Pelona. Mount Laguna soapstone was paired with Cuyamaca soapstone as both originated from the Julian Schist Formation.

Canonical discriminant analysis utilizing the seven elements was completed and discriminant functions were calculated for Cuyamaca/Mount Laguna, Sierra Pelona, and Catalina (see Table A-3 in Appendix A). Wilks' lambda class separation and F and P tests of significance were completed to assess the significance of compositional differences among talc schist bearing regions. The Wilks' lambda calculation registered 0.0879, indicating very strong group separation. F value approximation was calculated at 96.9562 with a P value of 0.0000, and thus the degree of separation among Catalina Island, Cuyamaca/Mount Laguna, and Sierra Pelona source groups utilizing the seven elements was statistically significant.

Table 3-1. Eleven elements used to differentiate mineralogical types

Symbol	Element	Group	Concentration
Mg	Magnesium	Alkali Earth Metal	Major (>1%)
Al	Aluminum	Other Metal	Major (>1%)
Si	Silicon	Metalloid	Major (>1%)
Ca	Calcium	Alkali Earth Metal	Trace (<0.1%)
Ti	Titanium	Transition Metal	Trace (<0.1%)
V	Vanadium	Transition Metal	Trace (<0.1%)
Cr	Chromium	Transition Metal	Major (>1%)
Mn	Manganese	Transition Metal	Trace (<0.1%)
Ni	Nickel	Transition Metal	Minor (<1%)
Cu	Copper	Transition Metal	Trace (<0.1%)
Sr	Strontium	Alkali Earth Metal	Trace (<0.1%)

Mahalanobis distance calculation and posterior classification using cross-validation and the 7 elements successfully classified samples to their region of origin at a rate of 91 percent (see Table 3-2), with high classification rates for Catalina and Cuyamaca/Mount Laguna, thus verifying Clark's (2009) results. Unfortunately, nearly one-third of all Sierra Pelona source samples were incorrectly classified Cuyamaca/ Mount Laguna. It was determined that the seven elements used by Clark (2009) to distinguish Catalina from Cuyamaca was inadequate for southern California talc schist regional characterization (also see Table A-4 in Appendix A).

Table 3-2. Successful classification of Catalina, Sierra Pelona, and Cuyamaca/Mount Laguna

From	Cat	LA	SD	Total	%
Cat	94	0	1	95	99
SP	1	78	21	100	78
C/ML	0	5	95	100	95
Mean % Correct					91

Cat – Catalina Island
SP–Sierra Pelona (LAN-1132 and LAN-1279)
C/ML – Cuyamaca,/Mount Laguna (SDI-9039, SDI-9040/SDI-8538)

A more focused analysis of the chemical composition of Sierra Pelona and Cuyamaca/Mount Laguna, both fine-grained talc schist, was necessary to distinguish between the two sources at the regional level. The analysis attempted to identify elements that clearly separated Cuyamaca/Mount Laguna from Sierra Pelona while also providing a universal model that could distinguish among all regional source groups. Again, hundreds of bivariate plots were scanned, this time resulting in the identification of 12 elements that could be used to differentiate between Cuyamaca/ Mount Laguna, Sierra Pelona, Catalina, and Jacumba (see Table 3-3).

After successfully distinguishing mineralogical types and demonstrating regional talc schist characterization the third tier of the source characterization protocol attempted to differentiate among talc schist quarries and source locations within the Julian Schist, Sierra Pelona Schist, and Catalina Schist Formations. Truncer et al. (1998) successfully differentiated soapstone at the regional level in the Eastern United States, but achieved only moderate success sourcing materials to a specific quarry. Similar results were anticipated during the current analysis.

Table 3-3. Twelve elements used to differentiate Sierra Pelona, Cuyamaca/Mount Laguna, Catalina, and Jacumba

Symbol	Element	Group	Concentration
Mg	Magnesium	Alkali Earth Metal	Major (>1%)
Fe	Iron	Transition Metal	Major (>1%)
K	Potassium	Alkali Metal	Minor (<1%)
Ti	Titanium	Transition Metal	Trace (<0.1%)
V	Vanadium	Transition Metal	Trace (<0.1%)
Cr	Chromium	Transition Metal	Trace (<0.1%)
Mn	Manganese	Transition Metal	Trace (<0.1%)
Ni	Nickel	Transition Metal	Trace (<0.1%)
Zn	Zinc	Transition Metal	Trace (<0.1%)
As	Arsenic	Metalloid	Trace (<0.1%)
Ba	Barium	Alkali Earth Metal	Trace (<0.1%)
Tm	Thulium	Rare Earth Element	Trace (<0.1%)

First I explored chemical distinctions within the Julian Schist Formation, which I expected to find among the three subregional sources locations Cuyamaca, Mount Laguna, and Jacumba, but did not anticipate at the quarry-specific level within the Cuyamaca source. Although Cuyamaca and Mount Laguna talc schist source locations were situated in relatively close proximity to one another compared to the Jacumba source, I identified distinct physical differences (i.e., grain size, color, weathering, and overall quality) in soapstone between the two sites that I assumed would correlate with chemical differences. Efforts were therefore made to identify element discriminators to distinguish Cuyamaca from Mount Laguna. Nine discriminatory elements were identified (see Table 3-4).

Table 3-4. Nine elements used to differentiate Cuyamaca and Mount Laguna talc schist

Symbol	Element	Group	Concentration
Ni	Nickel	Transition Metal	Trace (<0.1%)
Co	Cobalt	Transition Metal	Trace (<0.1%)
Tb	Terbium	Rare Earth Element	Trace (<0.1%)
Ho	Holmium	Rare Earth Element	Trace (<0.1%)
Tm	Thulium	Rare Earth Element	Trace (<0.1%)
Lu	Lutetium	Rare Earth Element	Trace (<0.1%)
Hf	Hafnium	Transition Metal	Trace (<0.1%)
Er	Erbium	Rare Earth Element	Trace (<0.1%)
Gd	Gadolinium	Rare Earth Element	Trace (<0.1%)

In the second phase of Julian Schist intrasource analysis I attempted to distinguish among Cuyamaca, Mount Laguna, and Jacumba subregions. Again I compared log base 10 concentrations and scanned hundreds of bivariate plots resulting in the identification of three additional elements (Ti, V, and Cr) that could be used (see Table 3-5).

Table 3-5. Twelve elements used to differentiate Cuyamaca, Mount Laguna, and Jacumba

Symbol	Element	Group	Concentration
Ti	Titanium	Transition Metal	Trace (<0.1%)
V	Vanadium	Transition Metal	Trace (<0.1%)
Cr	Chromium	Transition Metal	Trace (<0.1%)
Ni	Nickel	Transition Metal	Trace (<0.1%)
Co	Cobalt	Transition Metal	Trace (<0.1%)
Tb	Terbium	Rare Earth Element	Trace (<0.1%)
Ho	Holmium	Rare Earth Element	Trace (<0.1%)
Tm	Thulium	Rare Earth Element	Trace (<0.1%)
Lu	Lutetium	Rare Earth Element	Trace (<0.1%)
Hf	Hafnium	Transition Metal	Trace (<0.1%)
Er	Erbium	Rare Earth Element	Trace (<0.1%)
Gd	Gadolinium	Rare Earth Element	Trace (<0.1%)

In the third phase of analysis I attempted to distinguish between the two Cuyamaca quarries (SDI-9039 and SDI-9040). The quarries are separated by no more than 300 meters but do exhibit subtle differences in the color (see Appendix B). SDI-9039 talc schist is predominately white to gray compared to the pink to reddish hue of SDI-9040 talc schist. The reddish coloring is most likely attributed to chemical weathering (i.e., oxidization). The level of oxidation noted in SDI-9040 talc schist samples was expected to correspond with higher concentrations of Fe. Not surprisingly, Fe was included among the nine elements that differentiated SDI-9039 from SDI-9040 (see Table 3-6).

Table 3-6. Nine elements used to differentiate Cuyamaca talc schist

Symbol	Element	Group	Concentration
Fe	Iron	Transition Metal	Major (>1%)
K	Potassium	Alkali Metal	Minor (<1%)
Cu	Copper	Transition Metal	Trace (<0.1%)
Zn	Zinc	Transition Metal	Trace (<0.1%)
Zr	Zirconium	Transition Metal	Trace (<0.1%)
Co	Cobalt	Transition Metal	Trace (<0.1%)
Gd	Gadolinium	Rare Earth Element	Trace (<0.1%)
Ho	Holmium	Rare Earth Element	Trace (<0.1%)
Th	Thorium	Rare Earth Element	Trace (<0.1%)

Sierra Pelona intrasource characterization attempted to distinguish among various types of talc schist soapstone, as well as between LAN-1279 and LAN-1132. As mentioned in Chapter 2 (also see Appendix B), seventeen macroscopically distinct varieties of soapstone were typed from Prehispanic quarries, source locations and commercial mines in the Sierra Pelona Mountains and surrounding area. Three distinct types of talc schist collected from LAN-1279 (Type 5 and 16) and LAN-1132 (Type 16 and 17) that shared similar physical qualities to soapstone artifacts reported in the area were analyzed by LA-ICP-MS. The three types are described in Appendix B as Type 5 (gray with shades of blue), Type 16 (mottled pink to white), and Type 17 (mottled brown). The first stage of Sierra Pelona intrasource characterization assessed chemical variability among the three talc schist types. Seven elements, which consisted of an alkali earth metal and alkali metal, as well as transition metals and rare earth elements, were used to distinguish among the four types (see Table 3-7).

Table 3-7. Seven elements used to differentiate Sierra Pelona talc schist Types, 5, 16, and 17

Symbol	Element	Group	Concentration
Mg	Magnesium	Alkali Earth Metal	Major (>1%)
K	Potassium	Alkali Metal	Minor (<1%)
Ti	Titanium	Transition Metal	Trace (<0.1%)
Ni	Nickel	Transition Metal	Trace (<0.1%)
Cu	Copper	Transition Metal	Trace (<0.1%)
Gd	Gadolinium	Rare Earth Element	Trace (<0.1%)
Tb	Terbium	Rare Earth Element	Trace (<0.1%)

The second stage of Sierra Pelona intrasource characterization attempted to differentiate between talc schist Type 16 present at the Prehispanic quarry (LAN-1279) and source location (LAN-1132). On the outset, chemical distinction was not anticipated due to the relatively close distance between the two sites and the wide degree of macroscopic variability and presumed chemical variability within the Sierra Pelona talc schist source. Six elements, consisting of an alkali earth metal, transition metals, metalloids, and an actinoid, were used to distinguish Sierra Pelona talc schist Type 16 (see Table 3-8).

Table 3-8. Six elements used to differentiate Sierra Pelona talc schist Type 16 from LAN-1279 and LAN-1132

Symbol	Element	Group	Concentration
Mg	Magnesium	Alkali Earth Metal	Major (>1%)
Fe	Iron	Transition Metal	Major (<1%)
Cu	Copper	Transition Metal	Trace (<0.1%)
As	Arsenic	Metalloid	Trace (<0.1%)
Sb	Antimony	Metalloid	Trace (<0.1%)
U	Uranium	Actinoid	Trace (<0.1%)

In the final stage of Sierra Pelona intrasource analysis, all talc schist samples from LAN-1279 were compared to LAN-1132. Six elements, consisting of alkali earth metals, metalloids, and rare earth elements, were used to distinguish the two talc source locations (see Table 3-9).

Table 3-9. Six elements used to differentiate LAN-1279 and LAN-1132

Symbol	Element	Group	Concentration
Mg	Magnesium	Alkali Earth Metal	Major (>1%)
Ca	Calcium	Alkali Earth Metal	Major (>1%)
As	Arsenic	Metalloid	Trace (<0.1%)
Sb	Antimony	Metalloid	Trace (<0.1%)
La	Lanthanum	Rare Earth Element	Trace (<0.1%)
Gd	Gadolinium	Rare Earth Element	Trace (<0.1%)

Catalina Island soapstone intrasource characterization attempted to replicate the results presented in Appendix A of Clark's (2009) thesis, which analysis successfully classified the five Catalina Island source groups at rates of 85 to 100 percent (see Clark 2009: Table 12). Unfortunately details of the canonical discriminant analysis, Mahalanobis distance calculation and posterior classification were not provided by Clark and it's unclear which elements were used to distinguish among the five soapstone quarries or source locations (Airport, SW of Airport, Eagles Nest, Empire Landing, and Two Harbors). The results of the analysis indicate that the degree of separation among quarries and source locations was statistically significant.

A scan of hundreds of bivariate plots of various element combinations depicting the five quarry/source locations failed to identify any clear element discriminators. Several elements (Cu, Rb, Hf, and Ta) displayed a minor degree of variation between two quarry locations, but the majority of source groups were plotted one on top of one other. It appears that the chemical composition of Catalina Island soapstone, at least from quarries represented in the existing database, is indistinguishable.

In the absence of a set of elements to discriminate the five Catalina Island quarries, canonical discriminant coefficient analysis was carried out utilizing 43 of the 45 elements. Sodium (Na) and scandium were not included due to potential high error rates (Neff 2010, personal communication).

Multivariate Statistical Analysis

Utilizing the elements identified above, canonical discriminant analysis, tests of significance and Mahalanobis distance classification and posterior classification multivariate statistical analysis was carried. In the first tier of the source characterization protocol, attempts were made to distinguish among five mineralogical types (i.e., chlorite schist, Jacumba schist, Santa Cruz Island schist, serpentine, and talc schist). Talc schist samples were them differentiated by geologic formation (region), followed by attempts to characterize talc schist within each region to the quarry or source location specific level.

Characterization of Mineralogical Types

In the first tier of the source characterization protocol, canonical discriminant analysis utilized 11 elements to distinguish among mineralogical groups (refer to Table 3-1 above). The resulting discriminant function coefficients (see Table A-1 in Appendix A) were observed on bivariate plots indicating a high degree of separation among all five mineralogical groups at the 90 percent confidence level (see Figures 3-3 and 3-4). Santa Cruz Island schist displayed the greatest degree of separation from all other groups, which was not surprising after the results of thin-section analysis identified these materials as phyllite and greenstone with no trace of sheet silicates (e.g., chlorite). Despite minor overlaps, the degree of separation among the five mineralogical groups was strong.

Wilks' lambda class separation and F and P tests of significance were completed to determine whether the degree of separation measured among the five mineralogical groups was statistically significant. Wilks' lambda measures the strength of separation from group centers and is calculated as a number between 0 and 1, with values closer to zero indicating well separated groups. The Wilks' lambda calculation of 0.0017 for the five mineralogical groups confirmed strong group separation displayed on the bivariate plots. F and P values were also calculated to test the null hypothesis that canonical correlations were not significant. A minimum P value of 0.05 was accepted as significant, indicating that there was 95 percent certainty that group separation did not occur by chance. The F value approximation was calculated at 116.113 with a P value of 0.0000, and thus the null hypothesis was rejected. The degree of separation among the five mineralogical groups is statistically significant.

Mahalanobis distance calculation and posterior classification utilizing 11 elements clearly distinguished among the five groups with a successful classification rate of 99 percent (see Table 3-10; also see Table A-2 in Appendix A). Of the 200 talc schist source samples, only three were mistakenly classified. Multivariate statistical analysis demonstrated successful mineralogical type differentiation utilizing 11 element discriminators.

Table 3-10. Summary of classification success for mineralogical types utilizing eleven elements

From	TS	SCIS	CS	Serp	JS	Total	%
TS	197	1	0	0	2	200	98.5
SCIS	0	25	0	0	0	25	100
CS	0	0	25	0	0	25	100
Serp	0	0	0	50	0	50	100
JS	0	0	0	0	25	25	100
Mean % Correct							99

TS – Talc-schist
SCIS – Santa Cruz Island Schist
CS – Chlorite schist (Dibblee mapped geologic source)
Serp – Serpentine

Characterization of Regional Talc Schist Groups

The second tier of the source characterization protocol focused on differentiating among talc schist from the Sierra Pelona Mountains, San Diego, and Catalina, as well as Jacumba schist. After verifying that the seven elements proposed by Clark (2009) could

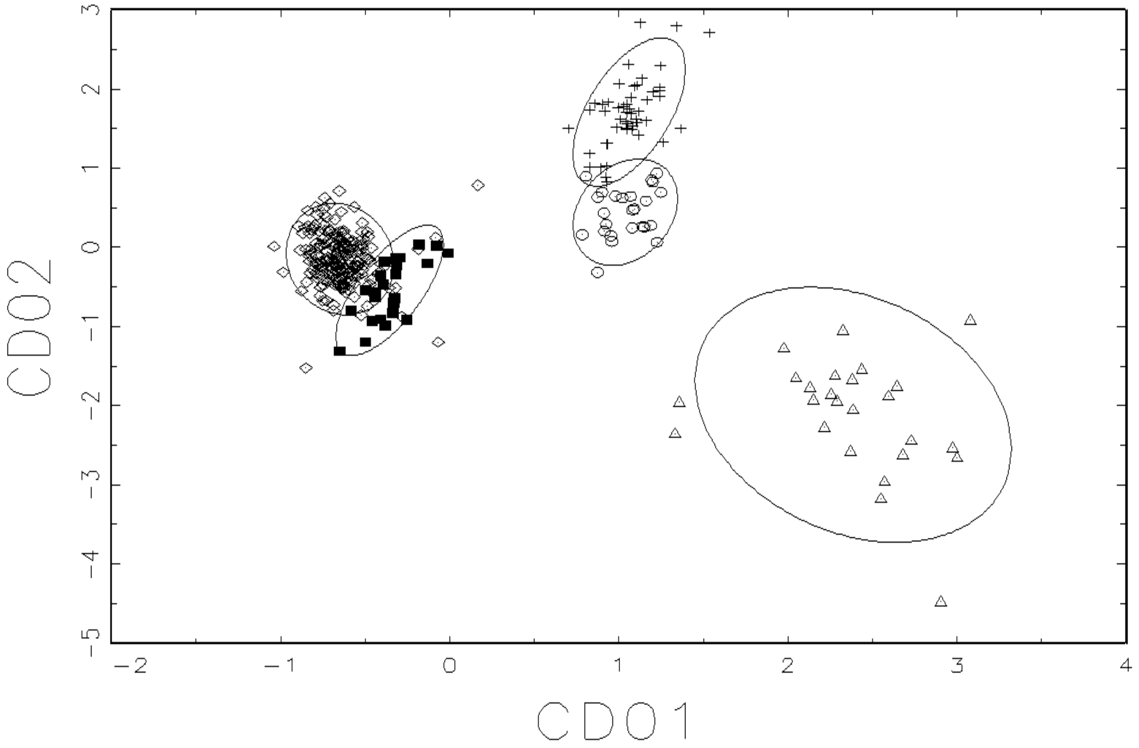

Figure 3-3. Group separation on bivariate plot (discriminant functions 1 and 2) chlorite schist (open circle), Jacumba schist (closed square), Santa Cruz Island schist (open triangle), serpentine (plus sign), and talc schist (open diamond). Ellipses indicate 90% confidence level for group membership.

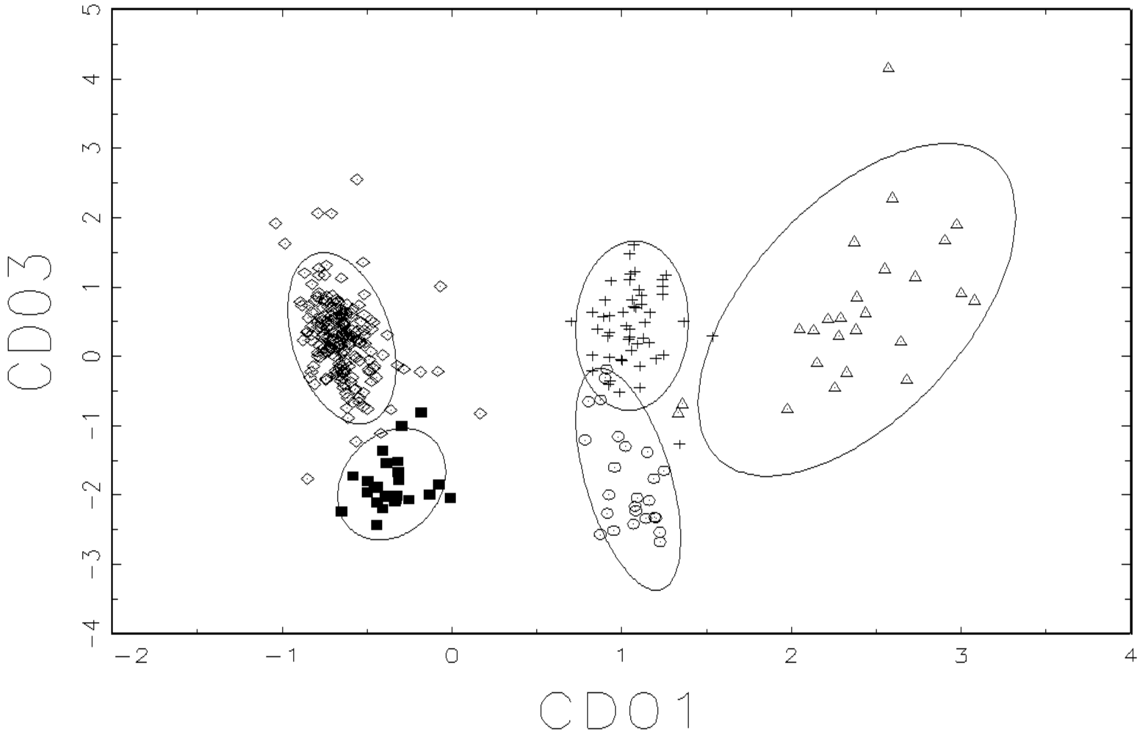

Figure 3-4. Group separation on bivariate plot (discriminant functions 1 and 3) chlorite schist (open circle), Jacumba schist (closed square), Santa Cruz Island schist (open triangle), serpentine (plus sign), and talc schist (open diamond). Ellipses indicate 90% confidence level for group membership.

not satisfactorily discriminate among the regional source groups a set of 12 element discriminators were identified (refer to Table 3-2 above).

Canonical discriminant analysis and Mahalanobis distance calculations were completed and canonical coefficients were calculated (see Table A-7 in Appendix A). Wilks' lambda class separation and F and P tests of significance were also completed. The Wilks' lambda calculation for Cuyamaca/Mount Laguna and Sierra Pelona talc schist and Catalina Island soapstone measured at 0.0397, indicating strong group separation. F values were calculated at 94.0868 with a P value of 0.0000, thus the degree of separation (see Figure 3-5) among the three groups is statistically significant.

Mahalanobis distance calculation and posterior classification using cross-validation of the three regional source groups and 12 elements accurately predicted group membership at a rate of 98 percent (see Table 3-11; also see Table A-8 in Appendix A). Five of the Sierra Pelona samples were incorrectly classified as Cuyamaca/Mount Laguna talc schist while one sample was misidentified as Catalina Island soapstone, for a successful classification rate of 94 percent. This was a major improvement compared to the seven element model, which accurately classified Sierra Pelona soapstone at a rate of 78 percent.

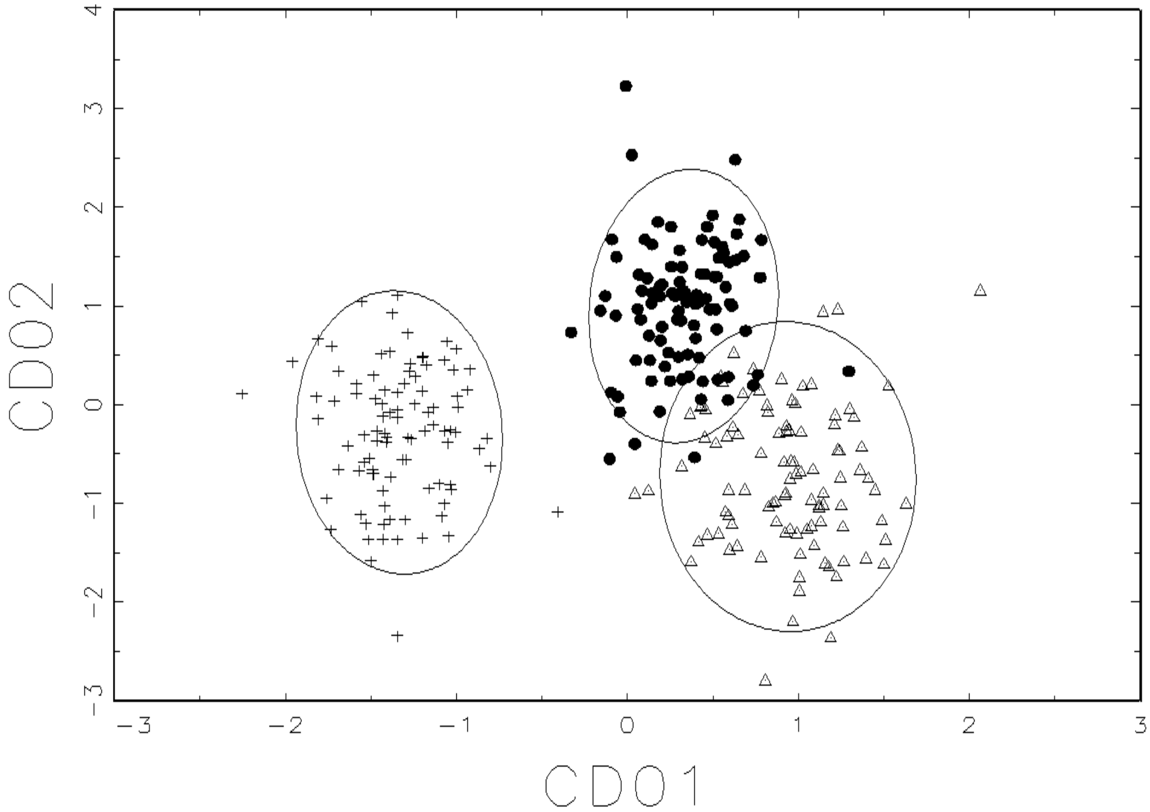

Figure 3-5. Group separation on bivariate plot (discriminant functions 1 and 2) of Sierra Pelona (solid circle), Cuyamaca/Mount Laguna (open triangle), and Catalina (plus sign; Clark 2009). Ellipses indicate 90% confidence level for group membership.

Table 3-11. Summary of classification success for Sierra Pelona, Cuyamaca/Mount Laguna, and Catalina utilizing twelve elements

From	LA	SD	CAT	Total	%
SP	94	5	1	100	94
C/ML	0	100	0	100	100
CAT	0	0	95	95	100
Mean % Correct					98

SP–Sierra Pelona (LAN-1132 and LAN-1279)
C/ML – Cuyamaca/Mount Laguna (SDI-9039, SDI-9040/SDI-8538)
Cat – Catalina Island (Clark 2009)

Canonical discriminant analysis was also carried out to compare San Diego and Los Angeles talc schist, Catalina Island soapstone, and Jacumba schist, utilizing the 12 elements. Discriminant functions were calculated (see Table A-9 in Appendix A) and Wilks' lambda class separation and F and P tests of significance were completed. The Wilks' lambda calculation for measured at 0.0230, indicating strong group separation. F values were calculated at 64.7064 with a P value of 0.0000, and thus the degree of separation among the four groups is statistically significant.

Analysis of bivariate plots showing all four groups depicted Catalina Island with the greatest degree of separation from all other groups (Figure 3-6). Sierra Pelona and Cuyamaca/Mount Laguna talc schist grouped tightly together along with Jacumba schist. To examine the degree of separation among these Sierra Pelona, Cuyamaca/Mount Laguna, and Jacumba, bivariate plots were re-generated without Catalina Island soapstone. The results indicate a strong degree of separation between Jacumba and Sierra Pelona and Cuyamaca/Mount Laguna, with a moderate degree of overlap between Cuyamaca/Mount Laguna and Sierra Pelona source groups (Figures 3-7).

Mahalanobis distance calculation and posterior classification using cross-validation of all four source groups and 12 elements accurately predicted group membership at a rate of 91 percent for Sierra Pelona, 99 percent for Cuyamaca/Mount Laguna, 100 percent for Catalina, and 96 percent for Jacumba (see Table 3-12; also see Table A-10 in Appendix A).

Table 3-12. Summary of classification success for Sierra Pelona, Cuyamaca/Mount Laguna, Catalina, and Jacumba

From	LA	SD	CAT	JS	Total	%
SP	91	3	0	6	100	91
C/ML	0	99	0	1	100	99
CAT	0	0	95	0	95	100
JS	1	0	0	24	25	96
Mean % Correct						97

SP–Sierra Pelona (LAN-1132 and LAN-1279)
C/ML – Cuyamaca/Mount Laguna (SDI-9039, SDI-9040/SDI-8538)
Cat – Catalina Island soapstone (Clark 2009)
JS – Jacumba schist (SDI-7790)

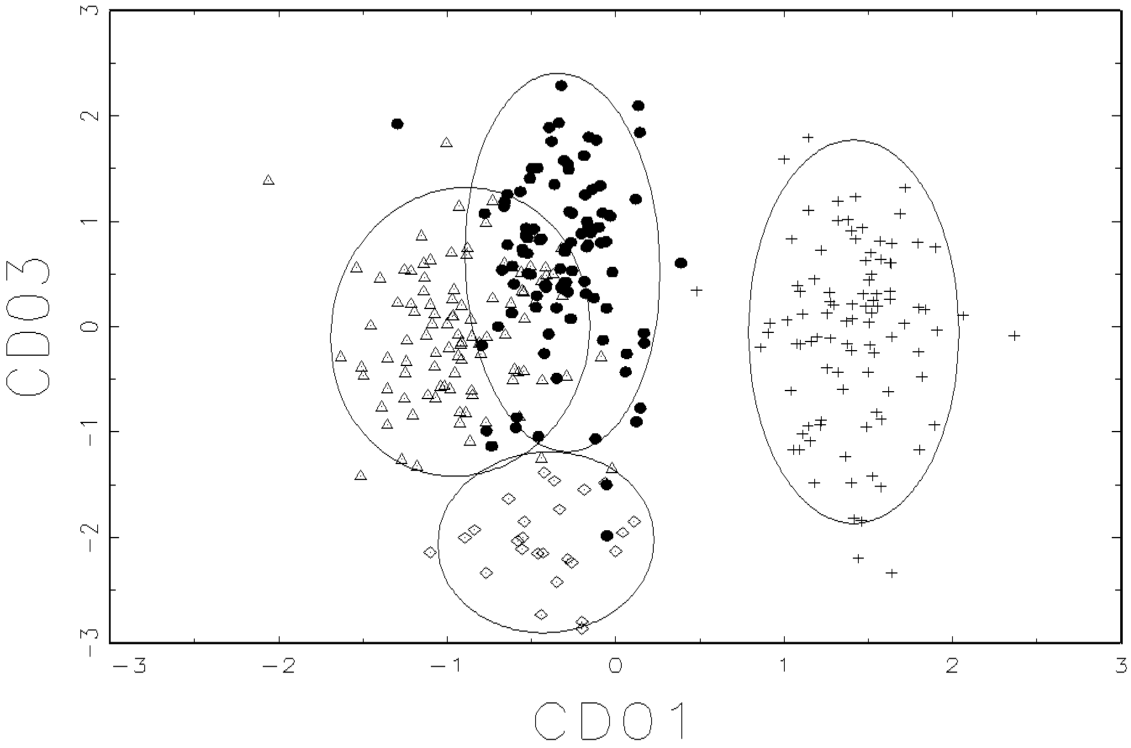

Figure 3-6. Group separation on bivariate plot (discriminant functions 1 and 3) of Sierra Pelona (solid circle), Cuyamaca/Mount Laguna (open triangle), Catalina Island soapstone (plus sign; Clark 2009), and Jacumba (open diamond). Ellipses indicate 90% confidence level for group membership.

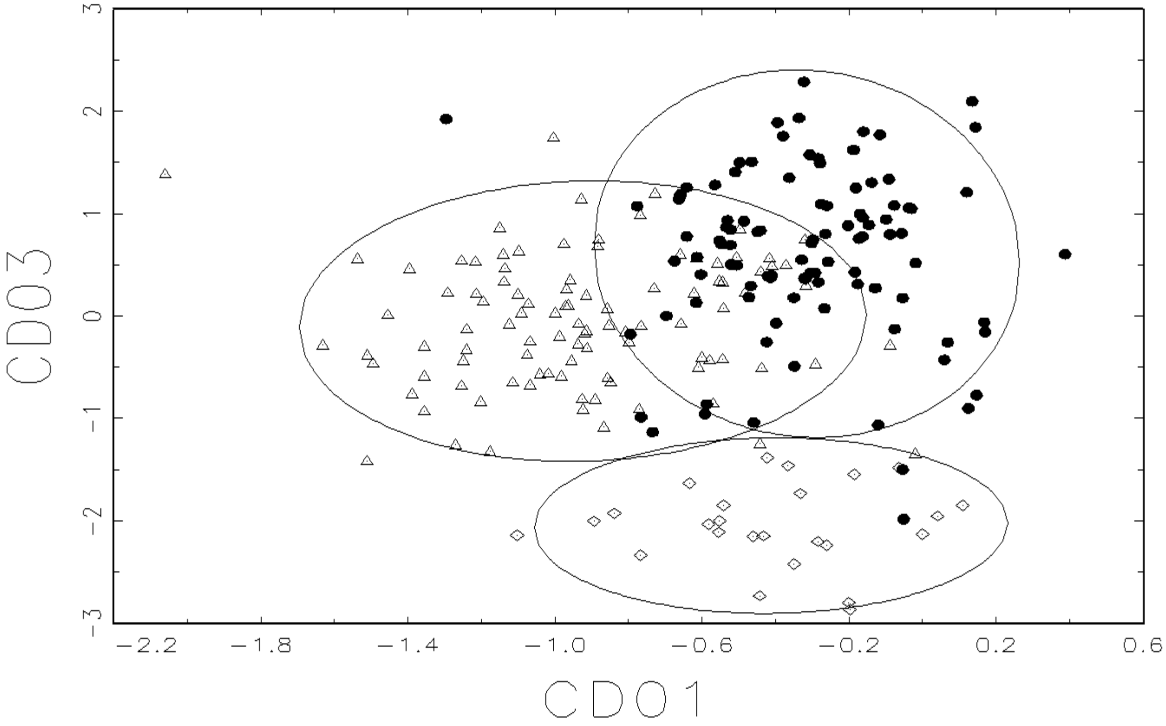

Figure 3-7. Group separation on bivariate plot (discriminant functions 1 and 3) of Sierra Pelona (solid circle), Cuyamaca/Mount Laguna (open triangle), and Jacumba (open diamond). Ellipses indicate 90% confidence level for group membership.

The importance of these results cannot be understated. Utilizing 12 discriminatory elements, Mahalanobis distance calculation and posterior classification with cross-validation successfully distinguished among Cuyamaca/Mount Laguna, Sierra Pelona, Catalina, and Jacumba with more than 90 percent accuracy (see Figure 3-6 above). Despite the distinct mineralogy of Jacumba soapstone it demonstrated greater similarity with Sierra Pelona and Cuyamaca/Mount Laguna than all three mainland source groups did with Catalina. The analysis also documents clear separation between Sierra Pelona and Cuyamaca/Mount Laguna, both of which are composed of optically similar fine-grained talc schist (Figure 3-8). To further explore fine-grained talc schist source group differentiation, a third round of canonical discriminant analysis and Mahalanobis distance calculation and posterior classification utilizing the same 12 elements was carried out to compare Sierra Pelona to Cuyamaca/Mount Laguna.

Canonical discriminant functions were calculated (see Table A-5 in Appendix A) and Wilks' lambda class separation and F and P tests of significance were completed to determine whether the compositional difference between Sierra Pelona and Cuyamaca/Mount Laguna was significant. The Wilks' lambda calculation for the five soapstone/schist groups was 0.2590, indicating relatively strong group separation.

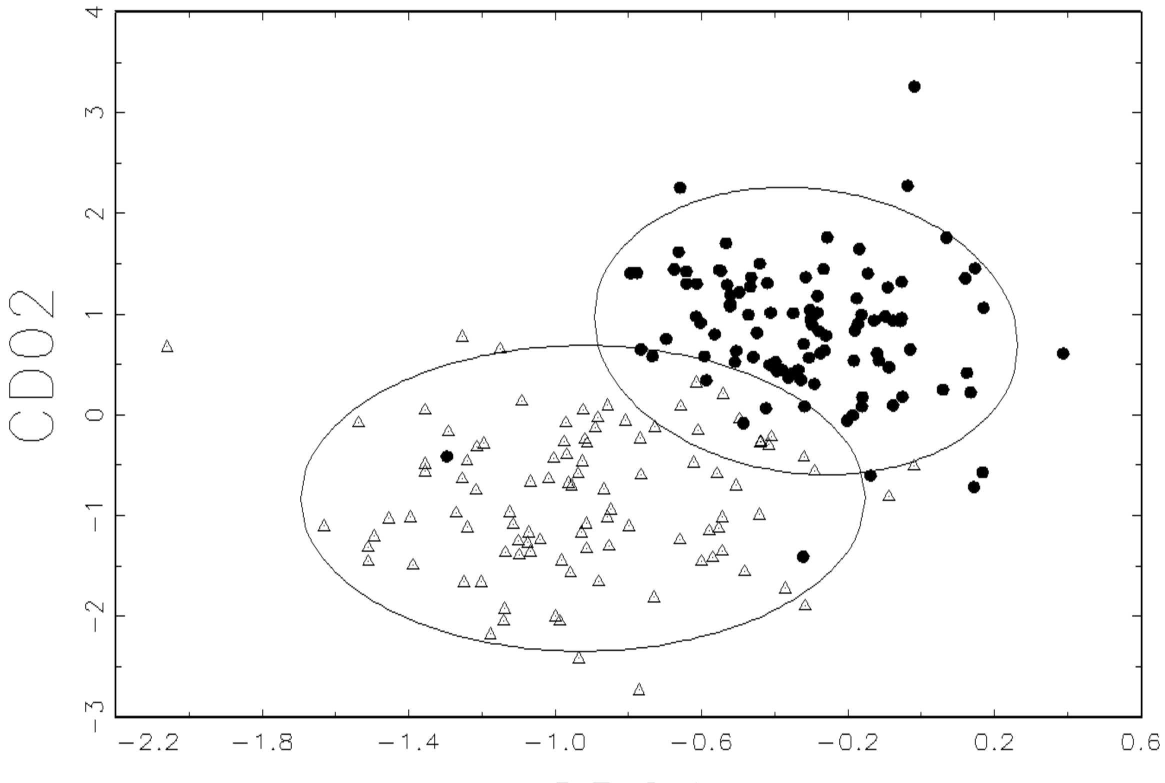

Figure 3-8. Group separation on bivariate plot (discriminant functions 1 and 2) of Sierra Pelona (solid circle), and Cuyamaca/Mount Laguna (open triangle). Ellipses indicate 90% confidence level for group membership.

F and P values were calculated to test the null hypothesis that the canonical correlations were not significant. The F value approximation was calculated at 44.518 with a P value of 0.0000, and thus the null hypothesis was rejected. The degree of separation between Sierra Pelona and Cuyamaca/Mount Laguna talc schist groups is statistically significant.

Mahalanobis distance calculation and posterior classification using cross-validation successfully classified talc schist to its region of origin at a rate of 95 percent for Sierra Pelona and 100 percent for Cuyamaca/Mount Laguna (see Table 3-13; also see Table A-6 in Appendix A). Unfortunately, the degree of separation between the two fine-grained talc schist source groups cannot be graphically depicted on biplots as only one set of discriminant coefficients were produced.

Table 3-13. Summary of classification success for Sierra Pelona and Cuyamaca/Mount Laguna

From	LA	SD	Total	%
LA	95	5	100	95
SD	0	100	100	100
Mean % Correct				98

LA – Los Angeles (Sierra Pelona)
SD – San Diego (Cuyamaca, Mount Laguna)

At this point it is important to consider the probabilities of group membership generated during Mahalanobis distance calculation and posterior classification. Thirty one percent of source samples from Sierra Pelona and approximately 12 percent of samples from Cuyamaca/Mount Laguna were closer to the centroid of the opposite group than 5 percent or more of true group members and several samples were closer to the centroid of the opposite group than 50 percent of true group members. This demonstrates that the maximum distance from Sierra Pelona and Cuyamaca/Mount Laguna source group centroids, or the full range of compositional variability measured in 12 elements, overlap on the outer margins, which is visually depicted in a bivariate plot of canonical discriminant coefficients (see Figure 3-8 above). Despite the nominal degree of overlap, the separation measured from the centroids of Sierra Pelona and Cuyamaca/Mount Laguna is statistically significant, and the two fine-grained talc schist source groups are effectively characterized.

The results of the regional characterization analysis demonstrate that all four source groups can be successfully distinguished using 12 discriminatory elements, and that the degree of separation between any and all regional source groups is statistically significant. The results are further strengthened by the differentiation of Sierra Pelona and Cuyamaca/Mount Laguna fine-grained talc schist source groups, which are optically similar. Future source characterization studies will determine if the 12 elements used to distinguish among the four regional source groups are effective at discriminating other regional talc schist source groups in California, such as the Sierra Nevada Mountains.

Intrasource Characterization: Julian Schist

After successfully distinguishing among Sierra Pelona, Cuyamaca/Mount Laguna, Catalina, and Jacumba, efforts were made to further characterize the individual quarries and source locations within the Julian Schist Formation. Both mineralogical and talc schist regional source characterization analyses clearly demonstrated the separation of Jacumba from all other groups. As previously stated, this was the result of a vastly different mineralogical, and consequently, chemical composition. Thus, the initial focus of Julian Schist intrasource characterization analysis was to differentiate Cuyamaca talc schist from Mount Laguna talc schist.

Nine discriminatory elements were used to distinguish Cuyamaca and Mount Laguna (refer to Table 3-4 above). Mahalanobis distance calculation and posterior classification resulted in successful classification of Cuyamaca and Mount Laguna at a rate of 93 percent (see Table 3-14; also see Table A-12 in Appendix A). Canonical coefficients were calculated and Wilks' lambda class separation and F and P tests of significance were completed (see Table A-11 in Appendix A). The Wilks' lambda calculation for Cuyamaca and Mount Laguna measured at 0.2441, indicating moderate to strong group separation. F value approximation was 30.9620 and a P value was calculated at 0.0000, thus the degree of separation between the Cuyamaca and Mount Laguna talc schist is statistically significant. Again, the degree of separation between the talc schist source groups cannot be graphically depicted on biplots as only one set of discriminant coefficients were produced.

Table 3-14. Summary of classification success for Cuyamaca and Mount Laguna talc schist

From	CUY	MTLAG	Total	%
CUY	47	3	50	94
MTLAG	4	46	50	92
Mean % Correct				93.0

CUY – Cuyamaca (SDI-9039 and -9040)
MTLAG – Mount Laguna (SDI-8538)

Following the successful characterization of Cuyamaca and Mount Laguna, Mahalanobis distance calculation and posterior classification was carried out with the addition of Jacumba, resulting in the successful classification of these source groups at a rate of 92 percent (see Table 3-15; also see Table A-14 in Appendix A). Canonical coefficients were calculated (see Table A-13 in Appendix A) and Wilks' lambda class separation and F and P tests of significance were completed. The Wilks' lambda for Cuyamaca, Mount Laguna, and Jacumba was calculated at 0.0423, indicating strong group separation. F value approximation was calculated at 35.7169 with a P value of 0.0000. Thus, the degree of separation measured between Cuyamaca, Mount Laguna, and Jacumba centroids, which are depicted in Figures 3-9 and 3-10, is also statistically significant.

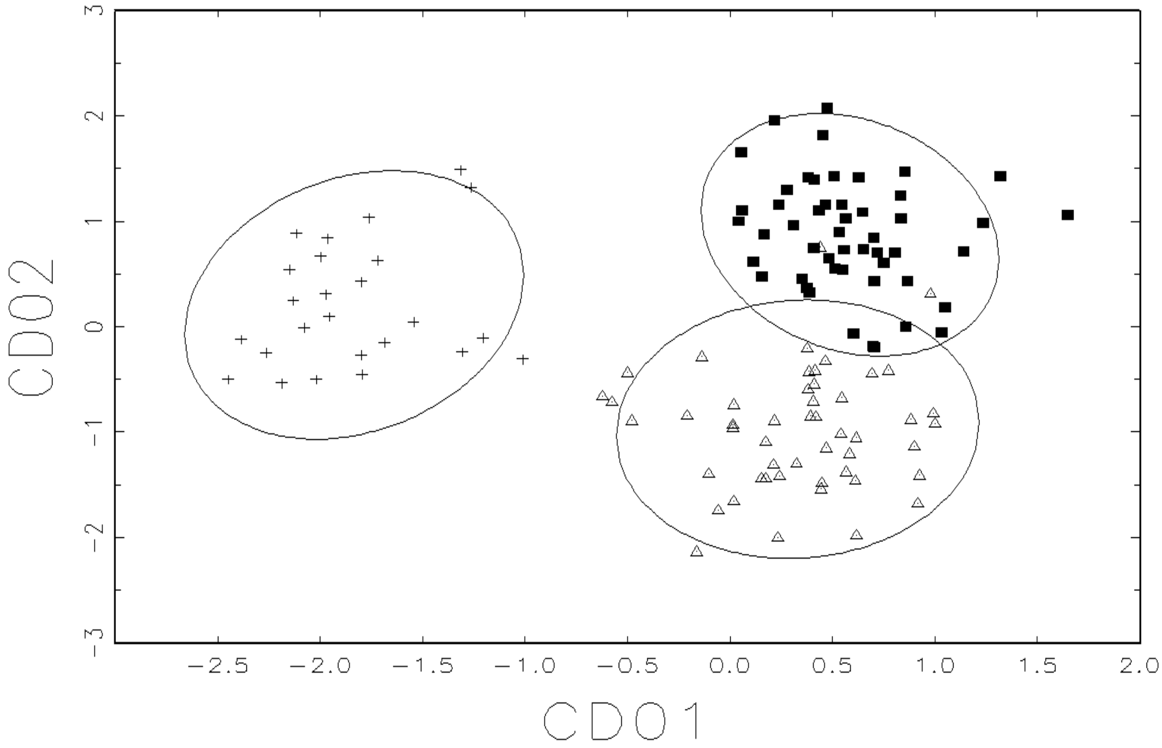

Figure 3-9. Group separation on bivariate plot (discriminant functions 1 and 2) of Cuyamaca talc schist (solid square), Mount Laguna talc schist (open triangle), and Jacumba schist (plus sign). Ellipses indicate 90% confidence level for group membership.

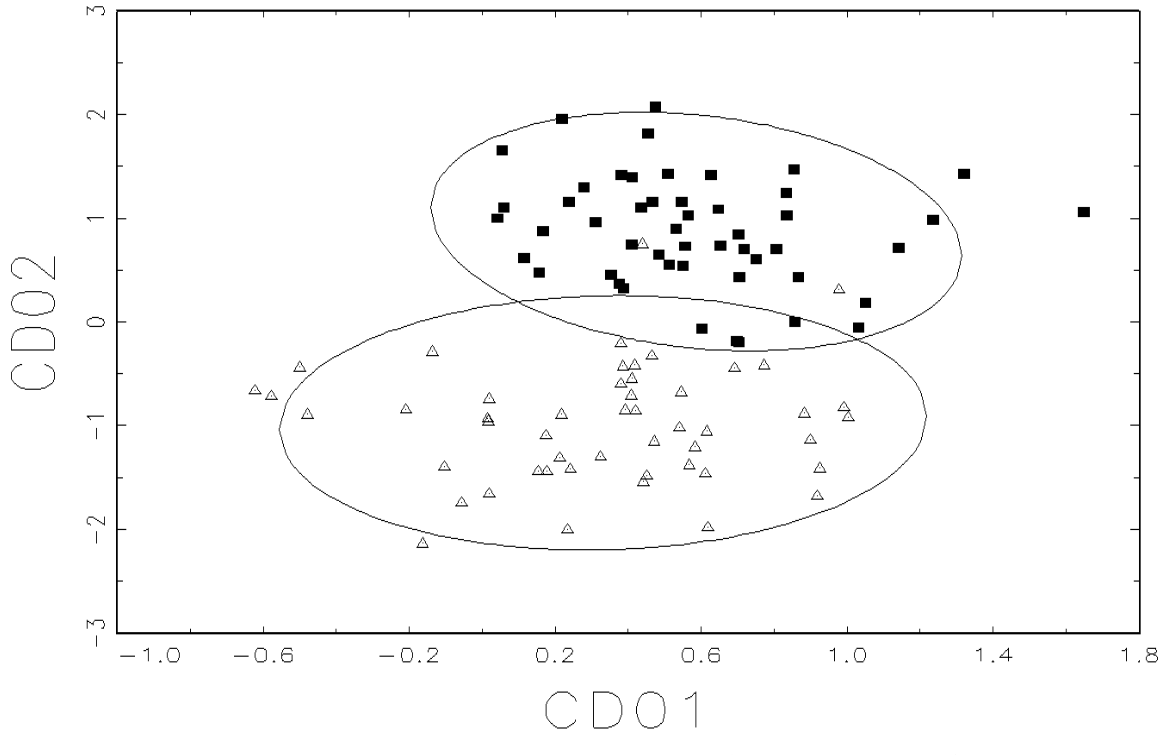

Figure 3-10. Group separation on bivariate plot (discriminant functions 1 and 2) of Cuyamaca talc schist (solid square) and Mount Laguna talc schist (open triangle). Ellipses indicate 90% confidence level for group membership.

Table 3-15. Summary of classification success for Cuyamaca, Mount Laguna, and Jacumba

From	CUY	MTLAG	JAC	Total	%
CUY	46	3	1	50	92
MTLAG	4	44	2	50	88
JAC	0	0	25	25	100
Mean % Correct					92

CUY – Cuyamaca (SDI-9039 and -9040)
MTLAG – Mount Laguna (SDI-8538)
JAC – Jacumba Valley (SDI-7790)

With the three main source locations within the Julian Schist formation successfully characterized, the next step was to attempt quarry-specific characterization within the Cuyamaca source group. Nine elements were used to differentiate SDI-9039 to SDI-9040 (refer to Table 3-6 above). Mahalanobis distance calculation and posterior classification correctly classified SDI-9039 and SDI-9040 at a rate of 94 percent (see Table 3-16; also see Table A-16 in Appendix A). Canonical coefficients were calculated and Wilks' lambda class separation and F and P tests of significance were completed (see Table A-15 in Appendix A). The Wilks' lambda calculation for the SDI-9039 and SDI-9040 measured at 0.1131, indicating strong group separation. F value approximation was calculated at 34.8526 with a P value of 0.0000, thus, the degree of separation noted within the Cuyamaca source is statistically significant. Surprisingly, Cuyamaca talc schist can be characterized at the quarry-specific level.

Table 3-16. Summary of classification success for Cuyamaca quarry sites

From	SDI-9039	SDI-9040	Total	%
SDI-9039	22	3	25	88
SDI-9040	0	25	25	100
Mean % Correct				94.0

While the results of the Julian Schist intrasource characterization were highly successfully, probabilities of group membership generated during Mahalanobis distance calculation and posterior classification must again be considered. Forty six percent of samples from Mount Laguna and 36 percent of samples from Cuyamaca were closer to the centroid of the opposite group than 5 percent or more of true group members and several samples were closer to the centroid than 50 percent of true group members. This demonstrates that the maximum distance from Cuyamaca and Mount Laguna source group centroids, or the full range of compositional variability measured in 9 elements, overlap on the outer margins as visually depicted in a bivariate plot of canonical discriminant coefficients (see Figure 3-10 above). Despite the moderate degree of overlap, the separation measured from the centroids of Cuyamaca and Mount Laguna is statistically significant, and the two Julian Schist intrasource groups are effectively characterized.

Surprisingly, only 28 percent of SDI-9040 samples and 24 percent of SDI-9039 samples were closer to the centroid of the opposite group than 5 percent or more of true group members with none of the samples registering higher than 29 percent of true group members. The nominal overlap does not influence the degree of separation measured between SDI-9039 and SDI-9049, and the two Cuyamaca quarries are also effectively characterized.

Intrasource Characterization: Sierra Pelona Schist

During Sierra Pelona Schist intrasource characterization I first attempted to distinguish among the various Sierra Pelona talc schist types analyzed by LA-ICP-MS, (i.e., Types 5, 16, and 17; see Appendix B). The purpose of the analysis was to explore the range of variability within the Sierra Pelona regional source group and determine if visually distinct types of talc schist could be distinguished chemically. Seven elements were used to discriminate among the four Sierra Pelona types (refer to Table 3-7 above). Mahalanobis distance calculation and posterior classification successfully classified the three talc schist types at a rate of 88 percent (see Table 3-17; also see Table A-18 in Appendix A). Canonical coefficients were calculated (see Table A-17 in Appendix A) and Wilks' lambda class separation and F and P tests of significance were completed. The Wilks' lambda calculation for the four types measured at 0.0993, indicating strong group separation. F value approximation was calculated at 28.2506 with a P value of 0.0000 thus, the degree of separation noted among Sierra Pelona talc schist Types 5, 16, and 17 is statistically significant.

Table 3-17. Summary of classification success for Sierra Pelona types

From	SP5	SP16	SP17	Total	%
SP5	21	1	3	25	84
SP16	2	43	5	50	86
SP17	1	0	24	25	96
Mean % Correct					88

SP5 = Sierra Pelona Type 5 (LAN-1279)
SP16 = Sierra Pelona Type 16 (LAN-1132, and -1279)
SP17 = Sierra Pelona Type 17 (LAN-1132)

The results indicate that visually distinct types of Sierra Pelona talc schist can be distinguished. While variation within the Sierra Pelona Schist Formation is great, it does not diminish from the strength of source group membership at the regional level as demonstrated by the degree of separation from Catalina Schist and Julian Schist Formations. LA-ICP-MS analysis of other Sierra Pelona talc schist types is needed to characterize the full range of variability within the source and hopefully improve our ability to distinguish the Sierra Pelona talc schist at the regional and quarry-specific level.

Next I attempted to distinguish between Prehispanic quarry site LAN-1279 and source location LAN-1132 by comparing Sierra Pelona talc schist Type 16 found at both sites. On the outset, chemical differentiation was not anticipated due to the visual similarities of the Type 16 talc schist and the relatively close distance between the two sites. However, Cuyamaca intrasource characterization had already demonstrated that source characterization to the quarry-specific level was possible, even when quarries were separated by no more than 300 meters.

A total of six elements were used to discriminate Sierra Pelona talc schist Type 16 (refer to Table 3-8 above). Mahalanobis distance calculation and posterior classification successfully classified the LAN-1279 and LAN-1132 Type 16 talc schist at a rate of 96 percent (see Table 3-18; also see Table A-20 in Appendix A). Canonical coefficients were calculated (see Table A-19 in Appendix A) and Wilks' lambda class separation and F and P tests of significance were completed. The Wilks' lambda calculation for the two Sierra Pelona quarries measured at 0.3796, indicating moderate to strong group separation. F value approximation was calculated at 11.7132 with a P value of 0.0000, thus, the degree of separation noted between talc schist type 16 from LAN-1132 and LAN-1279 is statistically significant.

Table 3-18. Summary of classification success for LAN-1132 Type 16 and LAN-1279 Type 16

From	LAN-1132	LAN-1279	Total	%
LAN-1132	24	1	25	96
LAN-1279	1	24	25	96
Mean % Correct				96.0

Finally, all talc schist samples analyzed by LA-ICP-MS from LAN-1279 (i.e., Type 5 and 16) and LAN-1132 (i.e., Types 16 and 17) were compared. Six elements were used to differentiate talc schist from the two source locations (refer to Table 3-9 above). Mahalanobis distance calculation and posterior classification successfully classified LAN-1279 and LAN-1132 at a rate of 92 percent (see Table 3-19; also see Table A-22 in Appendix A). Canonical coefficients were calculated and Wilks' lambda class separation and F and P tests of significance were completed (see Table A-21 in Appendix A). The Wilks' lambda calculation for the two Sierra Pelona quarries measured at 0.3604, indicating moderate to strong group separation. F value approximation was calculated at 27.5049 with a P value of 0.0000, thus, the degree of separation noted between LAN-1132 and LAN-1279 is statistically significant.

Table 3-19. Summary of classification success for LAN-1132 and LAN-1279

From	LAN-1132	LAN-1279	Total	%
LAN-1132	42	8	50	84
LAN-1279	0	50	50	100
Mean % Correct				92.0

The results of Sierra Pelona intrasource characterization analysis demonstrated that statistically significant group separation exists among three types of talc schist identified within the regional source. The results demonstrate that the there is potential for distinguishing soapstone to the quarry-specific level, but not without consideration. There is a high degree of variability within the Sierra Pelona source that may blur distinctions between quarries. More research is needed to fully characterize LAN-1279 and LAN-1132 (see Appendix B), as well as other potential Prehispanic quarry and source locations in the Sierra Pelona source, before we can begin to address the question of quarry-specific characterization.

Intrasource Characterization: Catalina Schist

Intrasource characterization of Catalina Island soapstone attempted to replicate Clark's (2009) previous results. Forty three elements were used to distinguish among the five soapstone quarries or source locations. Canonical coefficients were calculated and Wilks' lambda class separation and F and P tests of significance were completed (see Table A-23 in Appendix A). The Wilks' lambda calculation for the five Catalina Island soapstone quarries measured at 0.0081, indicating strong group separation (see Figure 3-11). F value approximation was calculated at 2.6458 with a P value of 0.0000, thus, the degree of separation noted among the five Catalina Island quarries is statistically significant.

Mahalanobis distance calculation and posterior classification utilizing the four sets of canonical coefficients correctly differentiated among the five Catalina Island soapstone groups at a rate of 91 percent (see Table 3-20; also see Table A-24 in

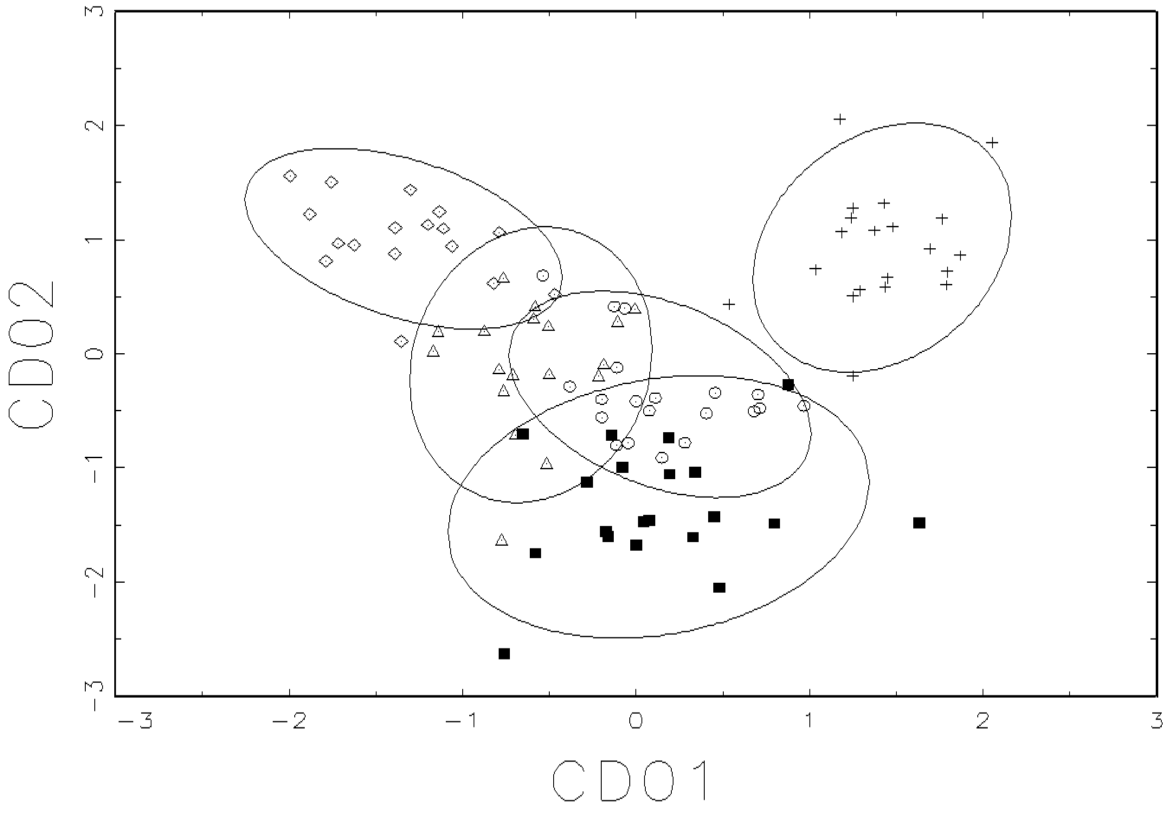

Figure 3-11. Group separation on bivariate plot (discriminant functions 1 and 2) of Two Harbors (open circle), Airport (open triangle), Eagles Nest (closed square), Empire Landing (plus sign), and Southwest of Airport (open diamond). Ellipses indicate 90% confidence level for group membership.

Appendix A). This is slightly less than the 92.8 percent rate of success achieved for the five groups utilizing all 45 elements (Clark 2009: Table 12).

Table 3-20. Summary of classification success for Catalina source groups

From	Two Harbors	Airport	Eagles Nest	Empire Landing	SW of Airport	Total	%
Two Harbors	19	1	0	0	0	20	95.0
Airport	1	15	2	0	0	18	83.3
Eagles Nest	1	0	19	0	0	20	95.0
Empire Landing	0	0	2	18	0	20	90.0
SW of Airport	0	2	0	0	15	17	88.2
Mean % Correct							91

The results of Catalina Schist intrasource characterization confirm Clark's (2009) results. Using 43 of the 45 elements resulted in statistically significant separation among the five Catalina Island soapstone source groups. However, the lack of identifiable discriminators and the relative consistency of element compositions indicate that the five soapstone quarries/source locations share a high degree of chemical similarity. Additional work is needed first to classify the full range of mineralogical, macroscopic, and chemical variability at the five quarry/source locations sampled by Clark (2009) followed by intense characterization analysis of the islands 70 plus soapstone quarries. While characterization at the quarry-specific level is highly improbable, distinct chemical signatures may exist for specific quarry areas (for instance Two Harbors compared to Airport in the Sky), the identification of which would greatly assist efforts to reconstruct diachronic patterns of both coarse-grained and fine-grained soapstone production and distribution.

Testing the Source Characterization Protocol

To test the validity of the source characterization protocol fifty-five samples of soapstone representing the five mineralogical types (i.e., chlorite schist, Jacumba Schist, Santa Cruz Island Schist, serpentine, and talc schist) and six Prehispanic soapstone quarries or source locations (i.e., LAN-1132, LAN-1279, SDI-7790, SDI-8538, SDI-9039, and SDI-9040) were analyzed again by LA-ICP-MS (see Table 3-21). Samples were converted to log base 10 but zero values were not substituted in order to treat each sample as an unknown. A Mahalanobis distance calculation was completed without geographic proximity data (i.e., UTMs), which incorporates distance between source and artifact deposit in its provenience calculation, to compare these samples to established source groups based on variance-covariance matrix of element compositions.

Table 3-21. Source samples used to test the source characterization protocol

Label	Mineralogical Type	Regional Provenience	Quarry/Source
Unk-1	Serpentine	Los Angeles	LAN-1132
Unk-2	Serpentine	Los Angeles	LAN-1132
Unk-3	Serpentine	Los Angeles	LAN-1132
Unk-4	Serpentine	Los Angeles	LAN-1132
Unk-5	Talc Schist	Los Angeles	LAN-1132
Unk-6	Talc Schist	Los Angeles	LAN-1132
Unk-7	Talc Schist	Los Angeles	LAN-1132
Unk-8	Talc Schist	Los Angeles	LAN-1132
Unk-9	Chlorite Schist	Los Angeles	Dibblee Source
Unk-10	Chlorite Schist	Los Angeles	Dibblee Source
Unk-11	Talc Schist	San Diego	SDI-8538
Unk-12	Talc Schist	San Diego	SDI-8538
Unk-13	Talc Schist	San Diego	SDI-8538
Unk-14	Talc Schist	San Diego	SDI-8538
Unk-15	Jacumba Schist	San Diego	SDI-7790
Unk-16	Jacumba Schist	San Diego	SDI-7790
Unk-17	Talc Schist	San Diego	SDI-9039
Unk-18	Talc Schist	San Diego	SDI-9039
Unk-19	Talc Schist	San Diego	SDI-9040
Unk-20	Talc Schist	San Diego	SDI-9040
Unk-21	Santa Cruz Island Schist	Santa Barbara Channel	Central Valley
Unk-22	Santa Cruz Island Schist	Santa Barbara Channel	Central Valley
Unk-23	Talc Schist	Los Angeles	LAN-1279
Unk-24	Talc Schist	Los Angeles	LAN-1279
Unk-25	Talc Schist	Los Angeles	LAN-1279
Unk-26	Talc Schist	Los Angeles	LAN-1279

The first tier of the sourcing protocol attempted to distinguish mineralogical types using the 11 elements previously identified. A Mahalanobis distance calculation was carried out and group membership of the source samples was projected against the five known mineralogical types groups. Mineralogical group membership was accurately predicted for all 26 samples (see Table 3-22; also see Table A-25 in Appendix A).

Talc Schist Regional Characterization

After classifying source samples to their respective mineralogical groups, all talc schist samples were compared to Sierra Pelona, Mount Laguna/Cuyamaca, and Catalina Island soapstone utilizing the 12 elements previously identified. A Mahalanobis distance calculation and posterior classification successfully classified source samples at rate of 94 percent (see Table 3-23; also see Table A-26 in Appendix A). None of the samples were projected into the Catalina Island talc schist source group. This is a significant discovery and further supports the results of the source characterization analysis, which clearly distinguished Catalina Island, Sierra Pelona, and Cuyamaca/Mount Laguna soapstone at the regional level.

Table 3-22. Summary of classification success to mineralogical type

		Predicted Group					
		Serp	**TS**	**CS**	**SCIS**	**JS**	**% Correctly Classified**
Actual Group	**Serp**	4	0	0	0	0	100
	TS	0	16	0	0	0	100
	CS	0	0	2	0	0	100
	SCIS	**0**	**0**	**0**	2	0	100
	JS	**0**	**0**	**0**	0	2	100
Mean % Correct							100

TS – Talc-schist
SCIS – Santa Cruz Island schist
CS – Chlorite schist (Dibblee mapped geologic source)
Serp – Serpentine
JS – Jacumba schist

The one Sierra Pelona sample incorrectly classified as Cuyamaca/Mount Laguna was closer to the centroid then 52.7 percent of true group members but was also closer than 49.5 percent of Sierra Pelona true group members. The results of the analysis for this sample (Unk-23) were rejected as the probability of group membership was nearly equidistant between Cuyamaca/Mount Laguna and Sierra Pelona. The sample was not subjected to any further analysis.

Table 3-23. Summary of classification success to talc schist regional group

		Predicted Group			
		Sierra Pelona	**Cuyamaca/ Mount Laguna**	**Catalina Island**	**% Correctly Classified**
Actual Group	**Sierra Pelona**	7	1	0	87.5
	Cuyamaca/ Mount Laguna	0	8	0	100
Mean % Correct					94

<u>Julian Schist Intrasource Characterization</u>

The fifteen talc schist source samples accurately classified to their region of origin were further analyzed to determine intrasource provenience. Eight of the samples accurately classified as Cuyamaca/Mount Laguna were compared to Cuyamaca and Mount Laguna source groups using the nine elements previously identified. Mahalanobis distance calculation and posterior classification accurately predicted group membership for the source samples a rate of 75 percent (see Table 3-24; also see Table A-27 in Appendix A). Two samples originating from Cuyamaca (Unk-17 and Unk-18) were incorrectly classified as Mount Laguna. All four source samples originating from Mount Laguna were correctly classified.

Table 3-24. Summary of classification success to Cuyamaca and Mount Laguna

		Predicted Group		
		Cuyamaca	**Mount Laguna**	**% Correctly Classified**
Actual Group	**Cuyamaca**	2	2	50
	Mount Laguna	0	4	100
Mean % Correct				75

A second test was completed, this time utilizing the 12 elements that distinguished among Cuyamaca, Mount Laguna, and Jacumba (see Table 3-25; also see Table A-28 in Appendix A). The results showed slight improvement with only Unk-17 incorrectly classified to Mount Laguna. None of the samples were classified as Jacumba.

Table 3-25. Summary of classification success to Cuyamaca, Jacumba, and Mount Laguna

		Predicted Group			
		Cuyamaca	**Jacumba**	**Mount Laguna**	**% Correctly Classified**
Actual Group	**Cuyamaca**	3	0	1	75
	Mount Laguna	0	0	4	100
Mean % Correct					87.5

Finally, an attempt was made to accurately classify two Cuyamaca source samples at the quarry-specific level. Mahalanobis distance calculation and posterior classification using the nine elements that previously distinguished SDI-9039 from SDI-9040 accurately predicted group membership for the two SDI-9040 samples but incorrectly classified the source sample from SDI-9039 as SDI-9040 (see Table 3-26; also see Table A-29 in Appendix A).

Table 3-26. Summary of classification success to Cuyamaca quarries

		Predicted Group		
		SDI-9039	**SDI-9040**	**% Correctly Classified**
Actual Group	SDI-9039	0	1	0
	SDI-9040	0	2	100
Mean % Correct				50

Sierra Pelona Intrasource Characterization

Seven of the fifteen source samples accurately classified as Sierra Pelona talc schist were compared to LAN-1279 and LAN-1132 using the six elements previously identified. Mahalanobis distance calculation successfully classified the source samples at a rate of 45.5 percent (see Table 3-27; also see Table A-30 in Appendix A). The results indicate intrasource characterization to the quarry-specific level does not translate into the successful provenience of unknowns specimens.

Table 3-27. Summary of classification success to Sierra Pelona quarries

		Predicted Group		
		LAN-1132	**LAN-1279**	**% Correctly Classified**
Actual Group	**LAN-1132**	1	3	25
	LAN-1279	1	2	66
Mean % Correct				45.5

Summary

The source characterization analysis of southern California soapstone was highly successful in distinguishing among various mineralogical and talc schist source groups. Given the variability in soapstone composition, an important first step was the identification of major mineralogical constituents. Mineralogical groups sampled during the analysis included talc schist, chlorite schist, and serpentine, as well as Jacumba schist and an amalgamation of phyllite and greenstone from Santa Cruz Island. The degree of separation among the five mineralogical groups utilizing a set of 11 elements was statistically significant and Mahalanobis distance calculation and posterior classification successfully classified mineralogical source groups at a rate of 99 percent.

The most significant outcome of the analysis was the successful characterization of Sierra Pelona talc schist, Cuyamaca/Mount Laguna talc schist, and Catalina Island soapstone. Statistically significant separation among these regional source groups was achieved through canonical discriminant analysis utilizing 12 elements (Mg, Fe, K, Ti, V, Cr, Mn, Ni, Zn, As, Ba, and Tm). The results were complimented by the successful classification of source samples at rate of 98 percent. The lack of mineralogical control for the five Catalina Island soapstone quarry or source locations sampled by Clark (2009) was a problem, but it was assumed that the soapstone consisted either of talc schist or contained moderate quantities of talc. This assumption is supported by the observation of high quantities of Mg and Si in the majority of Catalina source samples, a trait consistent with talc (i.e., hydrous magnesium silicate).

The regional characterization model is further supported by successful classification of Sierra Pelona and Cuyamaca/Mount Laguna fine-grained talc schist at a rate of 98 percent. However, a minor degree of overlap on the outer margins of these source groups resulted in inaccurate classifications of Sierra Pelona to Cuyamaca/Mount Laguna. Employing geographical proximity data (i.e., UTMs) in sourcing models may increase the ability of the model to accurately predict membership. When using the current database, samples that result in relatively equal probabilities of group membership to the two talc schist source groups will be rejected, unless geographic proximity can be sown to support classification to one source over the other.

Intrasource characterization of Julian Schist identified a statistically significant separation among Cuyamaca, Mount Laguna, and Jacumba, and source groups were successfully classified at a rate of 92 percent. Jacumba clearly differentiated from Cuyamaca/Mount Laguna, which wasn't surprising given its mineralogical composition. Cuyamaca and Mount Laguna were more difficult to distinguish due to a moderate degree of overlap on the outer margins of the group resulting in inaccurate classifications for both groups. Again, samples displaying relatively equal probabilities of membership to other source groups were rejected. Visual and thin-section analysis will assist in soapstone provenience studies, as the Mount Laguna talc schist differs from Cuyamaca in grain size (i.e., medium) and mineralogy (e.g., chlorite).

Quarry-specific characterization within the Cuyamaca source was also achieved by the successful classification of SDI-9039 and SDI-9040 at a rate of 94 percent. However, a moderate degree of overlap between the two quarries was identified resulting in inaccurate classifications, as was expected given the short distance between the two locations (i.e., approximately 300 m). While the ability to distinguish between the two quarries is interesting from a geochemical perspective, it does little to assist in archaeological reconstructions of hunter-gatherer procurement strategies, craft production, and material exchange networks. Both locations were likely exploited for talc schist simultaneously and probably represent a single quarry. Separation of the Stonewall quarry into two distinct sites is a consequence of standard archaeological recordation practices, which have little bearing on how the site was understood from the Native perspective. With that said, the ability to differentiate between the two Cuyamaca quarries may prove useful as a model to distinguish other Prehispanic soapstone quarries or source locations that may exist in the Cuyamaca Mountains.

Sierra Pelona schist intrasource characterization demonstrated statistically significant group separation among three major types of talc schist (Type 5, 16, and 17) identified at LAN-1132 and LAN-1279. Macroscopic variability coincided with chemical variability, and yet, the Sierra Pelona regional source group retained strong group cohesion that distinguished it from other regional source groups albeit with minor overlap on the outer margins of Cuyamaca/Mount Laguna. Quarry-specific source characterization was attempted by comparing Sierra Pelona talc schist Type 16 from LAN-1132 and LAN-1279, resulting in a successful classification rate of 96 percent, indicating that a degree of chemical variability existed within the specific type based on location. Finally, all talc schist samples analyzed from LAN-1132 and LAN-1279 were compared and the two intrasource groups were successfully classified at a rate of 92 percent. Moderate to high degrees of overlap were noted between the two groups, resulting in inaccurate classifications. The feasibility of quarry-specific characterization of the two source locations within the Sierra Pelona Formation is questionable, as only three of the 17 known types of soapstone were analyzed.

Catalina Island intrasource characterization replicated Clark's (2009: Appendix A, Table 15) results. All five quarries or source locations were successfully classified at a mean rate of 91 percent using 43 of 45 elements analyzed. However, the lack of identifiable discriminators and the relative consistency of element concentrations indicate that the five soapstone quarries/source locations share a very similar chemistry. Additional work is needed first to classify the full range of mineralogical, macroscopic, and chemical variability at the five quarry/source locations sampled by Clark (2009) followed by intense characterization analysis of the islands 70 plus soapstone quarries. While characterization of each individual quarry (i.e., micro-quarry level) is highly improbable I am encouraged at the prospect of dividing the island quarry areas each exhibiting a distinct chemical signature. The ability to source soapstone artifacts to a specific quarry area on Catalina Island would greatly assist efforts to reconstruct diachronic patterns of fine-grained and coarse-grained soapstone procurement, production, and distribution patterns.

Finally, the source characterization protocol was tested to explore its strengths and weaknesses. Mineralogical classification accurately projected 100 percent of source samples into their respective mineralogical type. While highly successful, the database does not represent the mineralogical type's full range of chemical variability and some, for instance serpentine, were represented by as few as 25 samples. The protocol for non-talc schist groups is limited to the sources analyzed until the database can be supplemented with additional sources of similar mineralogical composition. Talc schist identification has broader implications as the database includes 300 samples from three major regions. However, the full range of talc schist chemical variability in southern California is not represented in the existing database and future studies will undoubtedly improve the accuracy and applicability of the mineralogical sourcing protocol.

The test further demonstrates the strength of the talc schist regional characterization protocol, with successful classification of "unknown" talc schist samples to their region of origin at a mean rate of 94 percent. Inaccurate classification of Sierra Pelona talc schist to Cuyamaca/Mount Laguna talc schist identified was realized and further emphasizes the need to reject samples that result in relatively equal probabilities of group membership to both regions. The model may be improved by incorporating geographic proximity data. None of the samples were projected into the Catalina regional group, and probabilities of group membership did not exceed 0.03 percent, confirming that Catalina Island, as represented in the samples analyzed by Clark (2009), is chemically distinct from mainland sources.

Intrasource provenience tests of the Julian Schist source characterization protocol resulted in a mean successful classification rate of 87.5 percent. Inaccurate classification of Cuyamaca talc schist to Mount Laguna talc schist was demonstrated, while all source samples from Mount Laguna were successfully classified. Samples bearing relatively equal probabilities of membership to both groups should be rejected, or supplemented by visual and/or thin section analysis to determine grain size and mineralogical content.

Cuyamaca quarry-specific provenience analysis of samples to SDI-9039 and SDI-9040 resulted in a mean successful classification rate of 50 percent, while Sierra Pelona quarry specific analysis resulted in a mean rate of 45.5 percent. Overall the test exposed the weakness of the model to accurately provenience samples to the quarry specific level within the Cuyamaca and Sierra Pelona source groups.

CHAPTER 4

PROVENIENCE AND COMPARATIVE ANALYSIS

Provenience Analysis

After demonstrating the efficacy of the talc schist source characterization protocol to accurately classify samples to their region and, in some cases, quarry of origin an attempt was made to provenience 95 stone beads from early Middle and Late period sites in Los Angeles, Ventura, San Bernardino, and Riverside counties analyzed by LA-ICP-MS analysis during the current thesis research, as well as soapstone artifacts from the southern Channel Islands analyzed by Clark (2009) and Tupa (2009). Sample preparation and methods of LA-ICP-MS analysis followed those described in Chapter 3. Methods of data processing and multivariate statistical analysis are described below. Stone bead and soapstone artifact provenience analysis mirrored methods developed by Truncer et al. (1998).

Stone bead comparative analysis was also conducted to explore the relationship among the stone beads. Efforts were made to identify stone bead groups based on mineralogy and chemical composition, and characterization analysis was completed using methods similar to source characterization. Non-grouped stone beads were then projected against established stone bead groups using multivariate statistical analysis described below.

Methods: Data Processing and Multivariate Statistics

Raw element concentrations provided in ppm for stone beads and soapstone artifacts were converted to base 10 log values, thus normalizing element concentrations and reducing the magnitude of major elements on the sample (Truncer et. al. 1998:34). Missing values were not substituted for the stone bead samples and Winsorized batch calculations were not completed.

Artifacts were then compared to mineralogical groups talc schist, chlorite schist, serpentine, Jacumba schist, or Santa Cruz Island schist. Mahalanobis distance calculations were projected against mineralogical groups and probabilities of group membership were calculated. Artifacts identified as talc schist were subsequently compared to Sierra Pelona, Cuyamaca/Mount Laguna, and Catalina Island regional source groups. Geographic proximity data (i.e., UTMs) was not incorporated during the provenience analysis to ensure the results relied principally on the strength of source characterization. Again, Hector Neff calibrated the raw data and all statistical analyses were completed using GAUSS statistical software developed by Hector Neff for archaeometric analysis of data derived from the Missouri University Research Reactor (MURR).

Results: Stone Bead Provenience Analysis

Ninety five stone beads identified as chlorite schist, chlorite talc schist, or talc schist during visual attribute analysis and analyzed by LA-ICP-MS were compared to known mineralogical groups. Interestingly, all beads visually identified as chlorite schist from LAN-21, RIV-1246, and VEN-1691 registered probabilities of membership to the Santa Cruz Island Schist group, the majority of which were between 1 and 5 percent. It is possible that these beads were crafted from metamorphic rock originating from Santa Cruz Island. Another possibility is that the chlorite schist used to craft the beads has a similar chemistry to the greenstone and mica schist represented in the Santa Cruz Island group. The relationship between the chlorite schist beads and Santa Cruz Island Schist will be explored further as part of the stone bead comparative analysis.

Seven stone beads with probabilities greater than 5 percent were projected into the talc schist group (see Table 4-1; also see Table A-31 in Appendix A). These included three beads visually identified as talc schist from LAN-21 (Sample 179-1141 and -1229) and SBR-211 (Sample 860). Four beads visually classified as chlorite talc schist from LAN-21 (Samples 179-1197, -1214, - and -1232) and VEN-1691 (Sample U6L2) were also projected into the talc schist group. One additional talc schist bead from LAN-21 (Sample 179-1141) registered a probability of group membership to the talc schist group greater than 3 percent with zero probabilities of membership to the other mineralogical groups. While falling below the 5 percent threshold set for the analysis, the results were accepted. Had the bead demonstrated probability of group membership to any other group it would have been rejected.

Table 4-1. Summary results of stone bead mineralogical group sourcing

		Predicted Group based on probability ≥ 5%						
		Serp	**TS**	**CS**	**SCIS**	**JS**	**Unk**	**Total**
Site and Bead Type*	**LAN-21 (B1-B4)**	0	0	0	0	0	32	**32**
	LAN-21 (A1-A3)	0	3	0	0	0	11	**14**
	LAN-21 (C/G)	0	3	0	0	0	3	**6**
	RIV-1246 (B1-B4)	0	0	0	0	0	23	**23**
	RIV-1246 (A1-A4)	0	0	0	0	0	7	**7**
	RIV-1246 (G)	0	0	0	0	0	1	**1**
	RIV-2936 (A1)	0	0	0	0	0	4	**4**
	VEN-1691 (CS)	0	0	0	0	0	1	**1**
	VEN-1691 (A1)	0	1	0	0	0	3	**4**
	SBR-211 (C3)	0	1	0	0	0	0	**1**
	SBR-2600 (A1)	0	0	0	0	0	1	**1**
	SBR-2614/H (A1)	0	0	0	0	0	1	**1**
	Totals	**0**	**8**	**0**	**0**	**0**	**87**	**95**

*after Romani (1980); A1-A3 = black to blue black non-grained chlorite talc schist disc bead; B1-B4 = dark to light gray grainy chlorite schist disc bead; G = talc schist globular bead; C3 = light green talc schist disc bead; CS = irregular shaped chlorite schist pendant or bead fragment; Serp = serpentine; TS = talc schist; CS = chlorite schist; SCIS = Santa Cruz Island Schist; JS = Jacumba Schist; Unk = Unknown

It is unclear why four of the eight talc schist beads registered zero probability of membership to the talc schist mineralogical group. I can foresee three possible scenarios. First, the beads were inaccurately classified as talc schist. This seems unlikely due to the physical properties of these beads (i.e., color, luster, hardness), which are consistent with talc. Another possibility is that the chemical composition of the samples was not accurately measured during LA-ICP-MS analysis. Again this seems highly unlikely due to the constant measurement of standards during the analysis, which were used to calibrate the data, and the relatively consistent measurement of elements within the source samples that resulted in successful source characterization at the regional and quarry-specific levels. A more satisfying explanation is that the full range of chemical variability within the talc schist mineralogical group is not represented in the database. This is the most likely scenario given the number of samples in the talc schist database, which for instance does not include Clark's (2009) Catalina Island data.

Following the results the mineralogical analysis, all 95 stone beads were projected against Sierra Pelona, Cuyamaca/Mount Laguna, and Catalina Island regional source groups utilizing the 12 discriminatory elements (see Table 4-2; also see Table A-32 in Appendix A). The purpose of running all samples through the second tier of analysis was compare all stone beads to Catalina Island, which as previously discussed was not included in the talc schist mineralogical groups, and if stone beads classified as talc schist in the first tier of analysis could be sourced to a specific region.

Table 4-2. Summary results of stone bead regional talc schist sourcing

		Predicted Group based on probability $\geq$ 1%				
		CAT	**SP**	**C/MtLag**	**Unk**	**Total**
Site and Bead Type*	**LAN-21 (B1-B4)**	0	0	0	32	**32**
	LAN-21 (A1-A3)	0	0	3	11	**14**
	LAN-21 (C/G)	0	3	0	3	**6**
	RIV-1246 (B1-B4)	0	0	0	23	**23**
	RIV-1246 (A1-A4)	0	0	0	7	**7**
	RIV-1246 (G)	0	0	0	1	**1**
	RIV-2936 (A1)	0	0	0	4	**4**
	VEN-1691 (CS)	0	0	0	1	**1**
	VEN-1691 (A1)	1	0	0	3	**4**
	SBR-211 (C3)	0	1	0	0	**1**
	SBR-2600 (A1)	0	0	0	1	**1**
	SBR-2614/H (A1)	0	0	0	1	**1**
	Totals	**1**	**4**	**3**	**90**	**95**

Five stone beads were regionally sourced, although the results must be verified as other talc schist regional sources, such as the Sierra Nevada Mountains, are characterized. Four beads were sourced to Sierra Pelona including three from LAN-21 visually identified as talc schist. Sample 179-1141 registered a probability of group membership to Sierra Pelona greater than 1.4 percent and Sample 179-1229 was sourced with 41 percent of true group members further from the group centroid, which was far greater than the 5.2 percent calculated for Cuyamaca/Mount Laguna. A third talc schist bead was sourced to Sierra Pelona with a probability of group membership greater than 13 percent. However, the bead was not successfully classified to the talc schist mineralogical group during the first tier of analysis. This was partly the consequence of lower concentrations of Al and higher concentrations of Sr in the artifact, both of which were used to differentiate mineralogical groups. The analysis demonstrates that the mineralogical classification of unknowns is not definitive and visually identified talc schist artifacts that fail to be classified as talc schist should still be projected against regional source groups.

One additional talc schist disc bead recovered from CA-SBR-211 (Sample 860) was sourced to Sierra Pelona with 66 percent of true group members calculated further from the group centroid than the artifact, which was far greater than the 33.6 percent for Cuyamaca/Mount Laguna. The fifth stone bead was a visually classified chlorite talc schist bead from VEN-1691 (Sample U6L2) that was sourced to Catalina Island with 15 percent of true group members calculated further from the group centroid than the artifact. This was far greater than the 3.7 percent of true group members for Sierra Pelona and 5.3 percent of true group members for Cuyamaca/Mount Laguna (see Table A-32 in Appendix A).

None of the other Type A beads from LAN-21, including the three that were previously projected into the talc schist mineralogical group, could be sourced to a specific region. Three Type A chlorite talc schist beads registered probabilities of group membership to Cuyamaca/Mount Laguna greater than 2 percent. Unfortunately, nothing resembling black chlorite talc schist is present within the Cuyamaca/Mount Laguna source and the results likely demonstrate a degree of overlap between talc schist and chlorite talc schist, which reinforces the need to identify the mineralogical composition of both source material and artifact. The results also demonstrate a need to develop a source characterization protocols for other mineralogical types of soapstone (e.g., chlorite schist and chlorite talc schist) as well as serpentine.

The tendency for chlorite talc schist to be classified as talc schist at the mineralogical and regional level is problematic. Taking the information regarding the nature of soapstone deposits at Cuyamaca/Mount Laguna into consideration, the three chlorite talc schist bead projected into the regional source group were rejected. Similarly, the chlorite talc schist bead from VEN-1691 projected into the Catalina source group is highly suspicious, but the possibility that chlorite talc schist is represented in the Catalina source group prepared by Clark (2009) cannot be dismissed since the mineralogical type and physical attributes of the soapstone included in the regional source group were not documented. Despite this possibility, it is more likely that the chemical composition of the chlorite talc schist used to craft the bead from VEN-1691 simply overlaps with Catalina Island soapstone and that its source of origin, like all chlorite talc schist beads analyzed, is unknown.

Results: Soapstone Artifact Provenience

Following stone bead provenience analysis, an attempt was made to validate the results of Clark’s (2009) and Tupa’s (2009) San Nicolas Island and San Clemente Island soapstone artifact studies. Preliminary results, based on principal component analysis and bivariate plot review (Tupa 2009:38), as well as Mahalanobis distance calculation (Clark 2009:72-73), indicated that the majority of artifacts analyzed from the southern Channel Islands likely originated from Catalina Island. At the time, results were based on the comparison of artifacts to Catalina Island and Cuyamaca source samples.

Comparison of soapstone artifacts to mineralogical types resulted in low probabilities of membership for the majority of San Clemente Island soapstone artifacts with any of the five types (see Table 4-3; also see Table A-33 in Appendix A). Twelve of the 92 artifacts from San Clemente Island were closer to the group centroid of talc schist then at least 1 percent of true group members, while 7 of 8 artifacts from San Nicolas Island failed to register probabilities greater than 0.3 percent. Surprisingly, a stone bead (JC 7) from San Nicolas Island and soapstone debitage (JC 63) from San Clemente Island registered probabilities of group membership to Santa Cruz Island Schist greater than 5 percent. This pattern was first identified among chlorite schist disc beads from LAN-21, RIV-1246, and VEN-161, the majority of which registered probabilities of membership to Santa Cruz Island between 1 and 5 percent. The possibility that phyllite or greenstone from Santa Cruz Island was used to craft the artifacts cannot be dismissed but seems highly unlikely. The most logical explanation is that the chemical composition of chlorite schist used to craft the beads overlaps with Santa Cruz Island phyllite/greenstone as measured by the 11 elements used to distinguish mineralogical types. Identification and chemical characterization of chlorite schist from Santa Cruz Island, Catalina, the Sierra Pelona Mountains and elsewhere will clarify the issue.

Table 4-3. Summary results of soapstone artifact mineralogical group sourcing

		Predicted Group based on probability ≥ 1%						
		Serp	**TS**	**CS**	**SCIS**	**JS**	**Unk**	**Total**
Location	**San Clemente Island (Clark 2009)**	0	6	0	1	0	50	**57**
	San Clemente Island (Tupa 2009)	0	6	0	0	0	29	**35**
	San Nicolas Island (Clark 2009)	0	0	0	1	0	7	**8**
	Totals	**0**	**12**	**0**	**2**	**0**	**86**	**100**

The soapstone artifacts from San Clemente and San Nicolas were then compared to Catalina, Sierra Pelona, and Cuyamaca/Mount Laguna regional source groups. Of the 100 soapstone artifacts from San Clemente and San Nicolas Island analyzed by Clark (2009) and Tupa (2009), 68 were sourced to Catalina Island based on probabilities of group membership greater than 1 percent while the overwhelming majority of these (83%) were closer to the group centroid of Catalina than 10 percent of true group members (see Table 4-4). A probability threshold of 1 percent was used to source artifacts when the probabilities of membership to other regional groups were negligible (i.e., <0.01%) or nonexistent (see Table A-34 in Appendix A). Artifacts sourced to Catalina Island included miscellaneous ground stone fragments, ground stone vessel rim fragments, debitage, a plaque, and the tip of an effigy (see Clark 2009:60; Tupa 2009).

Table 4-4. Summary results of soapstone artifact regional talc schist sourcing

		Predicted Group based on probability ≥ 1%				
		SP	**Cat**	**C/ML**	**Unk**	**Total**
Location	**San Clemente Island (Clark 2009)**	0	47	0	10	**57**
	San Clemente Island (Tupa 2009)	0	16	0	19	**35**
	San Nicolas Island (Clark 2009)	0	5	0	3	**8**
	Totals	**0**	**68**	**0**	**32**	**100**

Thirty-two artifacts were not sourced to a specific region, of which 28 registered less than 1 percent probability of membership to Catalina, Sierra Pelona, and/or Cuyamaca/Mount Laguna source groups. Of these, 10 registered zero probability of membership to any of the three regions. One artifact (TU 15) registered more than 2 percent probability of membership to Sierra Pelona, but the results were rejected because of it also demonstrated probabilities of membership to both Catalina and Cuyamaca/Mount Laguna. Similar findings resulted in the rejection of two additional San Clemente Island artifacts (TU 7 and TU10). The remaining artifact (TU 34) registered probabilities of group membership to Catalina and Sierra Pelona greater than 5 percent, and thus could not be sourced to either region. None of the stone beads (i.e., JC 7, 10, 19, and 23) could be sourced to Catalina, Sierra Pelona, or Cuyamaca/Mount Laguna. Other artifacts that were not sourced included groundstone fragments, a possible effigy, debitage, an ornament tip, and a pigment pot. The most logical point of origin for these larger artifacts would be Catalina, and it is likely that these artifacts originated from there, but represent distinct chemical subgroups not currently represented in the Catalina Island regional source. If this proves true, it would result in the identification of at least one chemically distinct subregion or quarry on Catalina.

The stone bead from San Nicolas Island (JC 7) and the soapstone debitage from San Clemente (JC 63) projected as Santa Cruz Island Schist during the first tier of analysis registered zero probability of group membership to any talc schist region. Similar results were reported among chlorite schist beads from LAN-21, RIV-1246, and VEN-1691.

Stone Bead Comparative Analysis

Stone bead comparative analysis was carried out explore relationships among the various stone beads representing Middle and Late period deposits in southern California. The majority of beads were crafted from chlorite schist and chlorite talc schist, which were not adequately represented in the mineralogical source database and were excluded from the talc schist regional database. This included efforts to replicate Eddy's (2009) results demonstrating chemical similarity between RIV-1246 and LAN-21 chlorite schist beads. Additional analyses that were carried out included comparisons of chlorite schist to chlorite talc schist beads, and tests to explore the relationship between chlorite schist beads and Santa Cruz Island Schist identified during the mineralogical sourcing protocol.

RIV-1246 and LAN-21 Chlorite Schist Beads

First, efforts were made to validate the chemical similarities between chlorite schist disc beads recovered from LAN-21 and RIV-1246. Previous comparative analysis suggested that these two bead groups shared a common geologic origin.

> The high degree of overlap and shared elliptical orientation between chlorite schist stone beads recovered from Sites LAn-21 and RIV-1246…suggests the artifacts shared geologic affinity. In other words, the sheet silicate lithic used in bead production likely originated from a common geologic formation, such as the Sierra Pelona Schist or Catalina Island Schist formations…Despite an apparent geologic affinity, stone beads group membership for LAn-21 and RIV-1246A was consistently distinguished with nearly 100% accuracy. The significance of this distinction has not yet been fully realized [Eddy 2009:74-75].

Stone beads from LAN-21 and RIV-1246 consisted of black chlorite talc schist (Type A1) and dark and light chlorite schist (Type B1, B3, and B4), and talc schist (Type G) bead groups. Review of chemical composition data in tabular form did not result in any clear chemical distinctions among Romani's (1980) chlorite schist subtypes. This may suggest that the dark gray (Type B1) and light to medium gray (Type B2-B4) chlorite schist disc bead subtypes, which appear to have temporal significance, originated from the same regional source group if not the same source location. The chemical similarities among chlorite schist beads prompted the creation of a single chlorite schist unknown source bead group representing LAN-21 and RIV-1246 chlorite schist beads. Only 14 chlorite talc schist beads were analyzed form LAN-21 but at least three distinct chemical subgroups may be represented. The chlorite talc schist beads were not portioned into distinct chemical subgroups do to the limited number of samples represented in the group. Following creation of these unknown source stone bead mineralogical groups, the data was again reviewed to identify and remove any elements exhibiting a high number of zero values. Remaining zero values were then substituted using the Mahalanobis distance metric and bivariate plots were scanned to identify potential element discriminators. After converting the raw element concentrations provided in ppm to base 10 log values, remaining missing values were substituted using a Mahalanobis distance minimization procedure.

To assess the strength of the relationship between the RIV-1246 and LAN-21 chlorite schist beads, a posterior classification based on Mahalanobis distances from group centroids assuming non-homogenous variance-covariance matrices (Baxter 1994a and 1994b:201-204; Truncer et al. 1998:34) was completed utilizing 11 elements that differentiated mineralogical types. Jackknife probabilities of group membership for each sample were computed. A mean successful classification rate of 60 percent was achieved for LAN-21 and RIV-1246 (see Table 4-5). Twenty-eight of 32 stone beads from LAN-21 were successfully classified while 4 beads registered probabilities of less than 1 percent and were rejected (see Table A-35 in Appendix A). Only 5 of the 23 chlorite schist stone beads from RIV-1246 were successfully classified. The 15 samples that were rejected all registered high probabilities of group membership to both LAN-21 and RIV-1246 indicating a moderate to high degree overlap between group centroids, which supported Eddy's (2009) findings, at least at the mineralogical level. However, canonical discriminate analysis indicated that the degree of separation between the two group centroids was statistically significant (see Table A-36 in Appendix A).

Table 4-5. Summary of classification success for LAN-21 and RIV-1246 chlorite schist bead utilizing 11 elements

		Predicted Group based on probability $\geq$ 1%			
		LAN-21	**RIV-1246**	**Rejected**	**Total**
Location	**LAN-21**	28	0	4	**32**
	RIV-1246	3	5	15	**23**
	Totals	**32**	**5**	**18**	**55**

The results of the analysis were further scrutinized by Mahalanobis distance calculation and posterior classification utilizing 12 elements that differentiated soapstone at the regional level. The mean successful classification rate for stone beads increased to 76 percent while RIV-1246 beads continued to register a high probability of group membership with LAN-21 (see Table 4-6; also see Table A-37 in Appendix A). Again, canonical discriminate analysis indicated that the degree of separation between the two group centroids was statistically significant (see Table A-38 in Appendix A).

Table 4-6. Summary of classification success for LAN-21 and RIV-1246 chlorite schist beads utilizing 12 elements

		Predicted Group based on probability $\geq$ 1%			
		LAN-21	**RIV-1246**	**Rejected**	**Total**
Location	**LAN-21**	29	0	3	**32**
	RIV-1246	1	13	9	**23**
	Totals	**30**	**16**	**12**	**55**

Analysis of bivariate plots indicates tight group membership for RIV-1246, compared to LAN-21 at the 90 percent confidence level (see Figure 4-1). In nearly all biplots, RIV-1246 is plotted within the ellipse of LAN-21 (see Figure 4-2), indicating that chemical composition of RIV-1246 chlorite schist beads falls completely within the range of variability of LAN-21 beads. As illustrated in Table A-37 in Appendix A, stone beads from LAN-21 did not register probabilities of group membership with RIV-1246 greater than 2.5 percent; while stone beads from RIV-1246 registered high probabilities of group membership with LAN-21. These results were expected due to the demonstrated strength

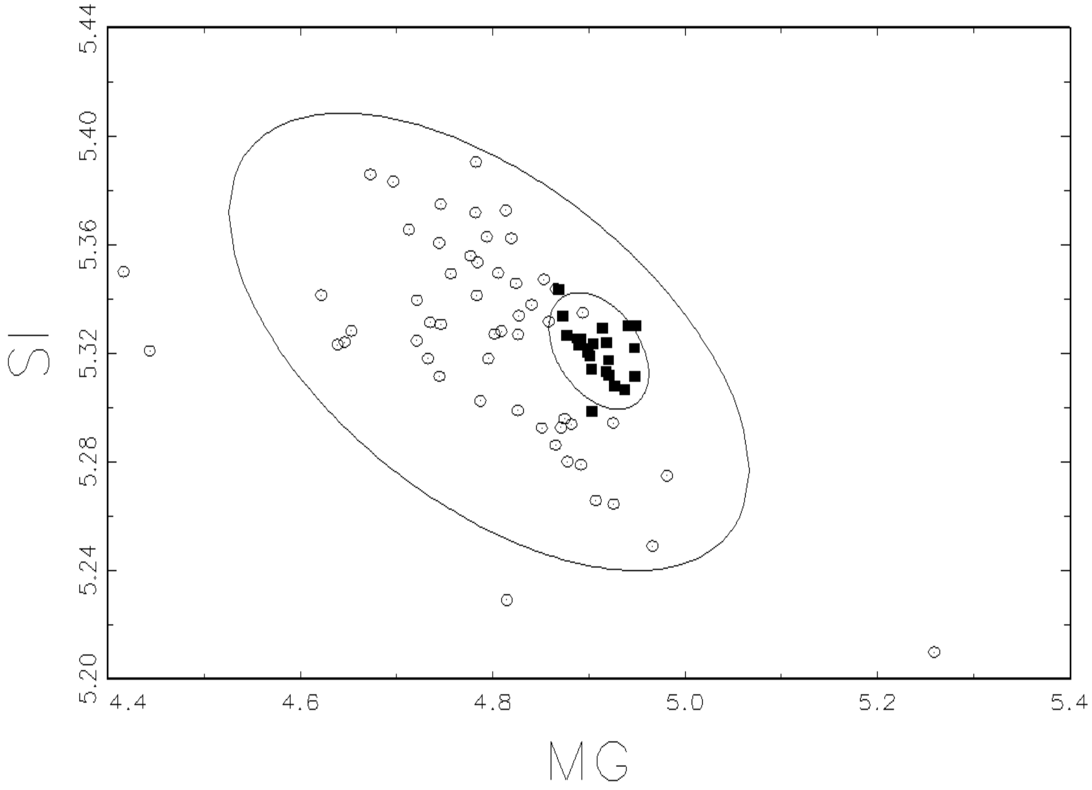

Figure 4-1. Bivariate plot (Magnesium versus Silica) depicting RIV-1246 (closed square) chlorite schist bead group encompassed by LAN-21 chlorite schist bead group (open circle). Ellipses indicate 90% confidence level for group membership.

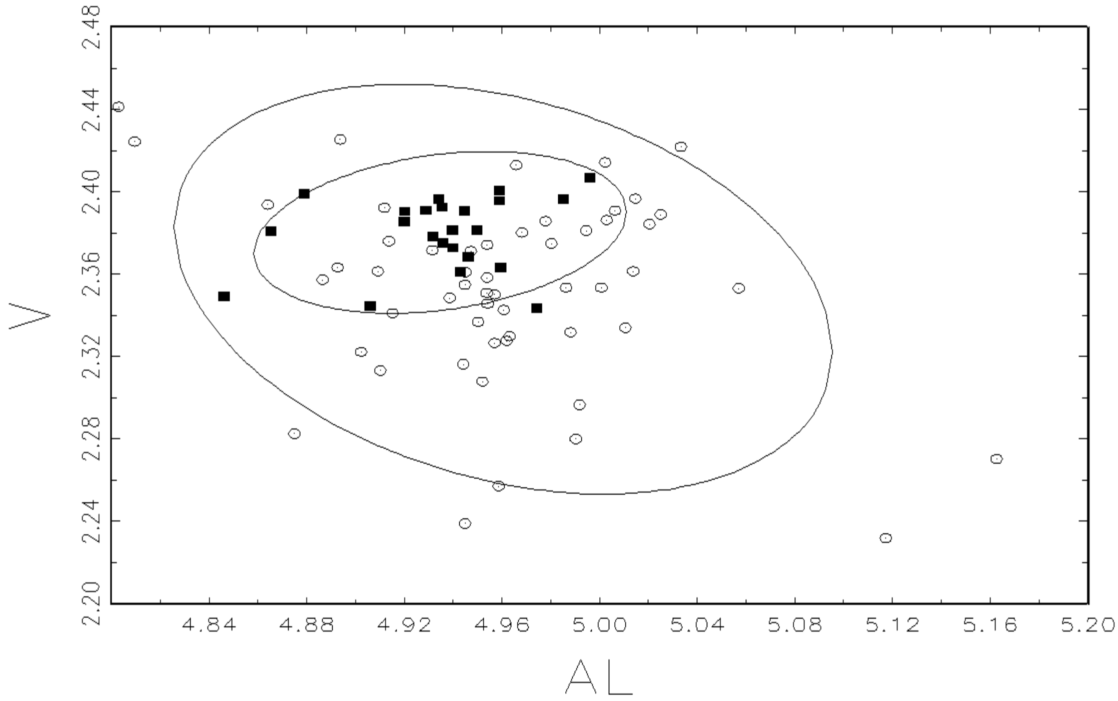

Figure 4-2. Bivariate plot (Aluminum versus Vanadium) RIV-1246 (closed square) chlorite schist bead group encompassed by LAN-21 chlorite schist bead group (open circle). Ellipses indicate 90% confidence level for group membership.

of RIV-1246 bead group membership, its limited range of chemical variability, and the fact that concentrations of RIV-1246 almost always fell within the range of variability for LAN-21. In other words, the probability of classifying stone beads from RIV-1246 as LAN-21 beads at the 90 percent confidence level was virtually equal to the probability of the beads being classified to their own group. Conversely, LAN-21 beads encompassed RIV-1246 and demonstrated a wider degree of chemical variability and thus probability of LAN-21 beads being projected into the comparatively tight RIV-1246 group was low. The results indicate that chlorite schist, as a mineralogical subgroup of soapstone, possesses a relatively uniform chemical composition across various sources or the chlorite schist used to craft beads from LAN-21 and RIV-1246 represents an unknown regional or source location specific source group.

Chlorite Schist and Chlorite Talc Schist Beads

Next, chlorite talc schist beads from LAN-21 were compared to LAN-21 and RIV-1246 chlorite schist beads. Utilizing 11 elements that differentiated mineralogical types Mahalanobis distance calculation and posterior classification successfully distinguished among the three groups at a mean rate of 63 percent (see Table 4-7). Again RIV-1246 chlorite schist beads all registered probabilities of group membership with LAN-21 chlorite schist beads (see Table A-39 in Appendix A). None of the chlorite talc schist beads registered probabilities of group membership to either LAN-21 or RIV-1246. It is of interest to note that two of the LAN-21 chlorite schist beads were projected into the chlorite talc schist group with approximately 8 percent probability. Also, while none of the RIV-1246 chlorite schist beads were projected into the chlorite talc schist group, probabilities of group membership ranged between 2.5 and 11 percent. Canonical discriminate analysis confirms that the degree of separation between chlorite talc schist and the two chlorite schist bead group centroids was statistically significant (see Table A-40 in Appendix A), but the analysis also suggests there is a relatively moderate degree of overlap in the chemical composition of chlorite schist and chlorite talc schist, at least when measured by the 11 elements.

Table 4-7. Summary of classification success for LAN-21 chlorite talc schist beads and LAN-21 and RIV-1246 chlorite schist beads utilizing 11 elements

		Predicted Group based on probability ≥ 1%				
		LAN-21 CS	**LAN-21 CTS**	**RIV-1246**	**Rejected**	**Total**
Location	**LAN-21 CS**	25	2	0	5	**32**
	LAN-21 CTS	0	14	0	0	**14**
	RIV-1246	8	0	5	10	**23**
	Totals	**33**	**16**	**5**	**15**	**70**

To further explore the relationship between chlorite talc schist and chlorite schist, Mahalanobis distance calculation and posterior classification utilizing the 12 elements that differentiated soapstone at the regional level was carried out. A mean successful classification rate of 70 percent (see Table 4-8) was achieved, although chlorite schist beads from LAN-21 and RIV-1246 were again projected into the LAN-21 chlorite talc schist bead group (see Table A-41 in Appendix A). The results demonstrate a fairly moderate degree of overlap between the two mineralogical subtypes although a biplot of canonical discriminant coefficients generated for the three bead groups displays relatively good separation (see Figure 4-3). The degree of separation again was proven statistically significant (see Table A-42 in Appendix A).

Table 4-8. Summary of classification success for LAN-21 chlorite talc schist beads and LAN-21 and RIV-1246 chlorite schist beads utilizing 12 elements

		Predicted Group based on probability ≥ 1%				
		LAN-21 CS	**LAN-21 CTS**	**RIV-1246**	**Rejected**	**Total**
Location	**LAN-21 CS**	25	3	0	4	**32**
	LAN-21 CTS	0	14	0	0	**14**
	RIV-1246	1	6	10	6	**23**
	Totals	**27**	**17**	**10**	**16**	**70**

Several conclusions are drawn from the chemical similarity demonstrated between chlorite schist and chlorite talc schist utilizing the models for mineralogical and talc schist regional characterization. First, a shared chemistry is expected, to a point, because chlorite is the major mineral component of both bead groups. It is also important to recognize that the chlorite talc schist bead group is composed of only14 samples, which is not a statistically valid sample size (see Truncer et al. 1998:25). Further, the chlorite talc schist group may actually represent three distinct chemical subgroups and the range of variability currently represented in the group is so great that it encompasses Catalina Island on the majority of bivariate plots examined. Finally, the source characterization protocol that distinguishes talc schist at the regional level does not necessarily apply to non-talc schist soapstone subtypes. Simply stated, an all encompassing soapstone sourcing protocol does not seem possible and source characterization must be developed for each specific mineralogical subtype. As a result, bivariate plots were reviewed to identify elements that could distinguish chlorite schist from chlorite talc schist. Twelve elements were identified that resulted in a high degree of separation between chlorite schist and chlorite talc schist groups (see Table 4-9).

Mahalanobis distance calculation and posterior classification utilizing these elements resulted in a mean successful classification rate of 87 percent (see Table 4-10). The ability to accurately predict RIV-1246 group membership contributed greatly to the significantly improved mean classification rate. Chlorite schist continued to register moderate probabilities of group membership to chlorite talc schist while chlorite talc schist registered zero probability of membership to chlorite schist (see Table A-43 in Appendix A). Group separation achieved in Mahalanobis calculations (see Figures 4-4 and 4-5) was again proven statistically significant (see Tables A-44 and A-45 in Appendix A); however, separation between LAN-21 and RIV-1246 chlorite schist groups simply reflects the tightly clustered grouping of RIV-1246 beads and its existence completely within the range of variability of LAN-21 beads.

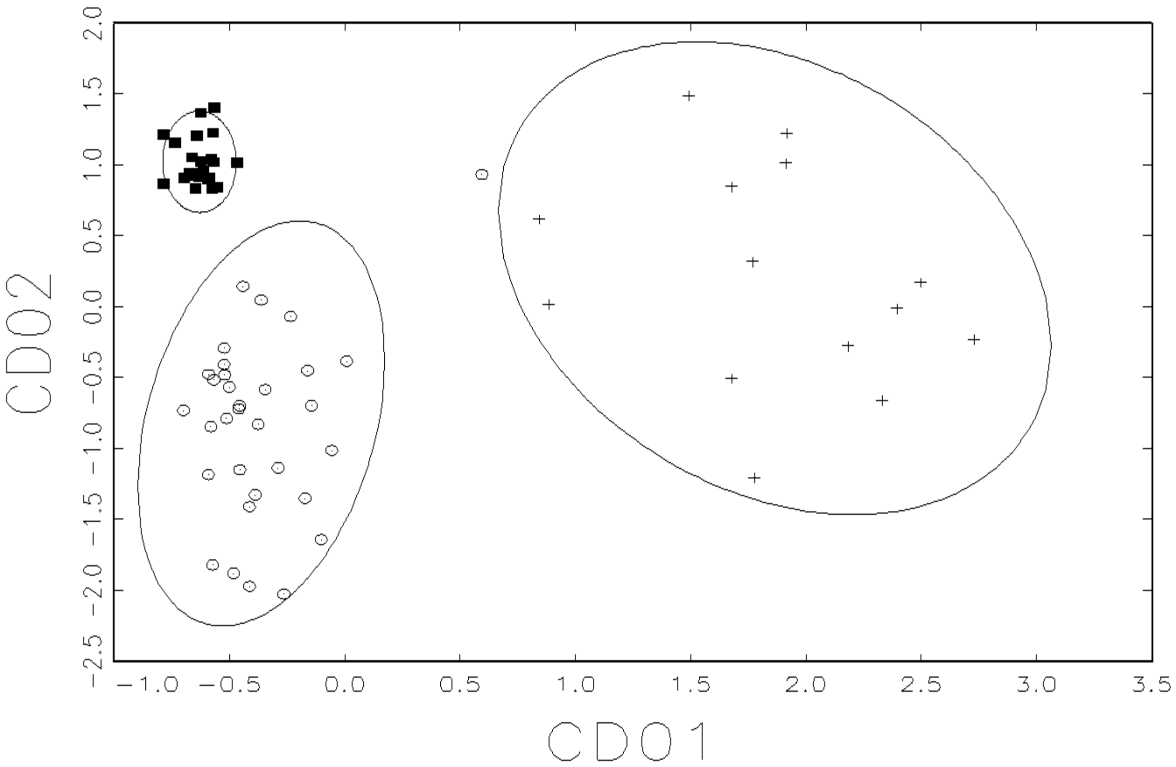

Figure 4-3. Group separation on bivariate plot (discriminant functions 1 and 2 based on 11 elements) depicting RIV-1246 chlorite schist (closed square) LAN-21 chlorite schist (open circle) and LAN-21 chlorite talc schist (plus sign). Ellipses indicate 90% confidence level for group membership.

Table 4-9. Twelve elements used to differentiate chlorite schist and chlorite talc schist bead groups

Symbol	Element	Group	Concentration
Ca	Calcium	Alkaline Earth Metal	Minor (<1%)
Ti	Titanium	Transition Metal	Trace (<0.1%)
V	Vanadium	Transition Metal	Trace (<0.1%)
Zn	Zinc	Transition Metal	Trace (<0.1%)
Sr	Strontium	Alkali Earth Metal	Trace (<0.1%)
Y	Yttrium	Rare Earth Element	Trace (<0.1%)
Zr	Zirconium	Transition Metal	Trace (<0.1%)
Ba	Barium	Alkali Earth Metal	Trace (<0.1%)
La	Lanthanum	Rare Earth Element	Trace (<0.1%)
Ce	Cerium	Rare Earth Element	Trace (<0.1%)
Pr	Praseodymium	Rare Earth Element	Trace (<0.1%)
Th	Thorium	Actinoid	Trace (<0.1%)

Three chlorite schist beads from LAN-21 and a bead from RIV-1246 were misclassified as chlorite talc schist. The three LAN-21 beads consisted of a Type B1 (blue black) schist bead, a Type B2 (gray/green) bead, and a Type B3 (light gray/green) bead that was covered in ochre. Several additional beads registered relatively equal probabilities of membership to both chlorite schist and chlorite talc schist, and the results were rejected. Beads from each of the three chlorite schist subtypes identified by Romani (1980) were misclassified as chlorite talc schist, and thus no clear patterning in terms of mineralogy or color could explain why these beads measured closer to the chlorite talc schist group centroid than to chlorite schist.

Table 4-10. Summary of classification success for LAN-21 chlorite talc schist beads and LAN-21 and RIV-1246 chlorite schist beads utilizing 12 elements

		Predicted Group based on probability ≥ 1%				
		LAN-21 CS	**LAN-21 CTS**	**RIV-1246**	**Rejected**	**Total**
Location	**LAN-21 CS**	26	3	0	3	**32**
	LAN-21 CTS	0	14	0	0	**14**
	RIV-1246	1	0	20	2	**23**
	Totals	**29**	**17**	**20**	**22**	**69**

One possibility is if chlorite schist grades into chlorite talc schist at the same source location. Another explanation may relate to the presence of ochre on several of the misclassified beads. Recent source characterization analysis of ochre indicates a wide variety of trace elements are present in the iron oxide mineral (Popelka-Filcoff et al. 2007), which can be used to successfully distinguish ochre sources from various locations. It is possible that trace element concentrations of the misclassified artifacts represent a mixture of ochre and chlorite, although efforts were made during LA-ICP-MS analysis to ablate all contaminants from the surface before data was passed through the torch and measured in the mass spectrometer. However, contamination may have occurred in rare circumstances when ochre penetrated deep into the pores and fissures of the bead beneath the depth of the initial ablation.

The most likely explanation relates to the nature of the chlorite talc schist bead group itself. As previously discussed, the group contains a non-statistically valid number of samples and may represent at least three distinct chemical subgroups. As a result, the group exhibits a wide range of variability that extends into the centroids of the chlorite schist bead group and the Catalina, Sierra Pelona, and Cuyamaca/Mount Laguna talc schist groups. Therefore, chlorite talc schist beads from LAN-21, unlike chlorite schist beads, do not represent an established chemical source group, but like the talc schist groups composed of samples from two regions, the group is considered a viable mineralogical group for comparative studies.

The overlap between chlorite schist and chlorite talc schist documented in the analysis should not overshadow what is otherwise evidence of strong group cohesion among the chlorite schist bead group and its distinction from chlorite talc schist, which

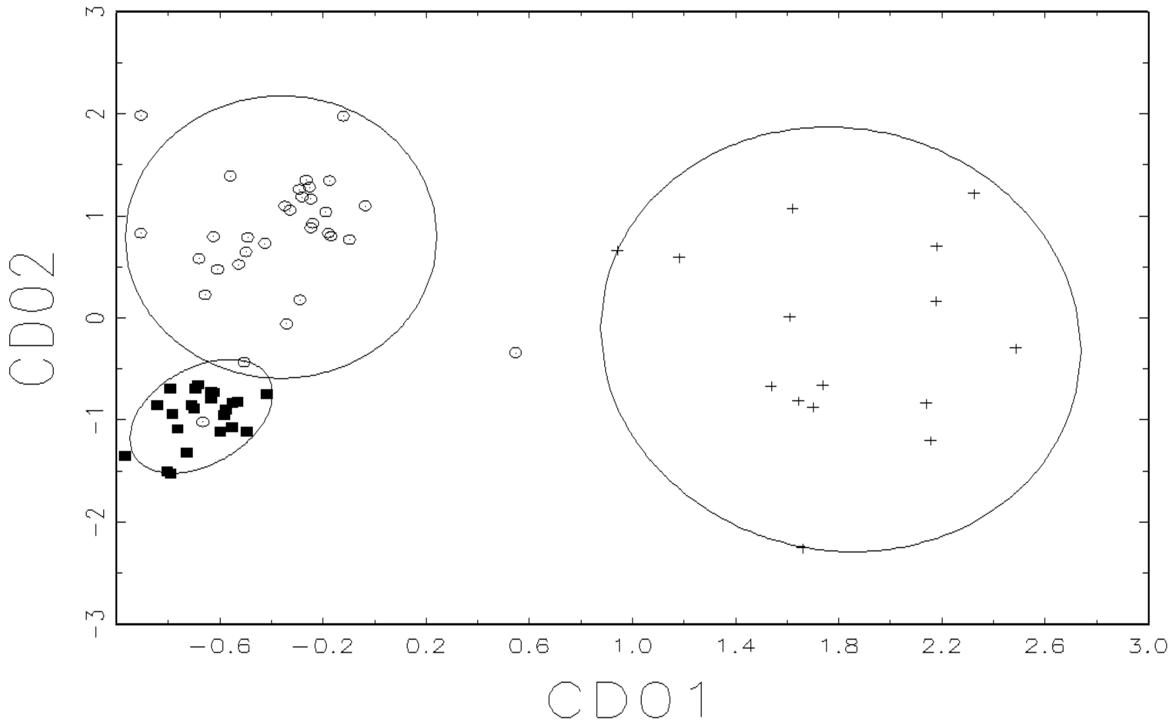

Figure 4-4. Group separation on bivariate plot (discriminant functions 1 and 2 based on 12 new elements) depicting RIV-1246 chlorite schist (closed square) LAN-21 chlorite schist (open circle) and LAN-21 chlorite talc schist (plus sign). Ellipses indicate 90% confidence level for group membership.

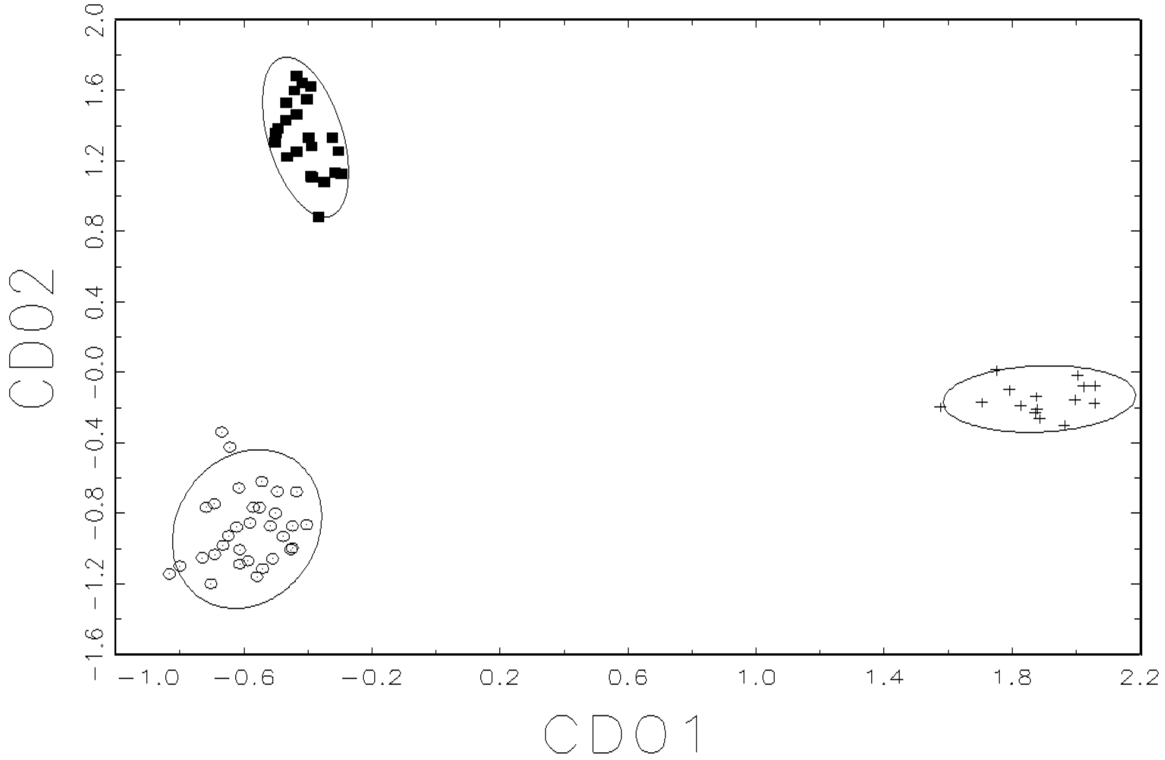

Figure 4-5. Group separation on bivariate plot (discriminant functions 1 and 2 based on 43 elements) depicting RIV-1246 chlorite schist (closed square) LAN-21 chlorite schist (open circle) and LAN-21 chlorite talc schist (plus sign). Ellipses indicate 90% confidence level for group membership.

provides some much needed validation to Romani's (1980) LAN-21 macroscopic mineralogical typology based on comparative analysis of beads from LAN-361 analyzed by XRF. Further, the analysis has demonstrated that the chemical composition of LAN-21 and RIV-1246 chlorite schist beads, regardless of their classified subtype based on color, are virtually indistinguishable from one another and are therefore combined into a single chlorite schist bead group for comparative analysis. It is tempting to declare that the beads originate from a single quarry, but without established source groups to compare them with it is not prudent to make such a definitive statement. What is clear is that the chlorite schist used to craft beads from LAN-21 and RIV-1246 represents either a source specific characterization or the relatively homogeneous composition of chlorite schist in general. Unfortunately, the magnitude of discoveries made regarding the relationship of chlorite schist and chlorite talc schist beads cannot fully be realized without identifying the source location(s) where the material was procured. Only source characterization analysis of chlorite schist and chlorite talc schist deposits can clarify the issue. Until then, the established chlorite schist bead group may only represent a distinct mineralogical group with source specific implications.

Efforts were made to explore relationships between unsourced non-talc schist stone beads from RIV-1246, VEN-1691, San Clemente and San Nicolas Islands (Clark 2009), and the Red Mountain Archaeological District with chlorite schist and chlorite talc schist bead groups. Table 4-11 lists the artifacts mineralogical type based on visual comparative analysis. Beads analyzed by Clark (2009) from San Clemente and San Nicolas Island were not available for visual analysis. Beads previously sourced to Sierra Pelona or Catalina from VEN-1691 and SBR-211 were also included in the analysis in an effort to cross-check the results of provenience analysis and find evidence that wither supported or conflicted with the previous results.

Table 4-11. Unprovenienced stone bead mineralogical identification based on visual comparative analysis

Site	Group name	Number of Beads	Type
RIV-1246	1246_2	7	Chlorite talc schist
RIV-2936	2936	4	Chlorite talc schist
VEN-1691	1691	4	Chlorite talc schist
SBR-2600, -2614	Red	2	Chlorite talc schist
SCLI-43, -1524 SNI-11, -56	Clark	5	Unknown

Prior to the analysis, 11 samples within the chlorite schist bead group that registered negligible probabilities (i.e., <1 percent) of membership to the chlorite schist group or were projected into the chlorite talc schist bead group were removed from the dataset leaving only those samples representing the core group membership. After demonstrating that the chlorite talc schist group was not an established chemical source group, but rather represented at least three distinct chemical subgroups, careful consideration was given to determinations of group membership during Mahalanobis projections. First, it was important to show a strong relationship between beads and the chlorite talc schist group at the mineralogical level as measured by 11 elements. Next, the unsourced beads were projected against the two bead groups and the three talc schist source groups (i.e., Catalina, Sierra Pelona, and Cuyamaca/Mount Laguna) and a threshold cut-off value of 10 percent associated with negligible (<0.1 percent) or zero probability of membership to other groups was accepted as evidence of a potential chlorite talc schist membership (see Table 4-12; also see Table A-48 in Appendix A).

Table 4-12. Summary classification for VEN-1691, RIV-1246, Red Mountain, and San Clemente/San Nicolas Island beads utilizing 11 elements

		Predicted Group based on probability ≥ 10%						
		CS	**CTS**	**CAT**	**SP**	**C/ML**	**Rejected**	**Total**
Location	**VEN-1691**	1	3	0	0	0	1	**5**
	RIV-2936	0	4	0	0	0	0	**4**
	RIV-1246	0	6	0	0	0	1	**7**
	SBR-211, -2600, -2614	0	1	0	0	0	2	**3**
	SCLI-43	0	1	0	0	0	0	**1**
	SCLI-1524	0	0	0	0	0	2	**2**
	SNI-11	0	1	0	0	0	0	**1**
	SNI-56	0	1	0	0	0	0	**1**
	Totals	**1**	**17**	**0**	**0**	**0**	**6**	**24**

CS = chlorite schist; CTS = chlorite talc schist; CAT = Catalina; SP = Sierra Pelona; C/ML = Cuyamaca/Mount Laguna

Surprisingly, 17 of 24 beads analyzed fit the criteria for potential association with chlorite talc schist. These included 14 of the 17 beads visually typed as chlorite talc schist. The other three beads were from San Nicolas Island and Eel Point (SCLI-43) on San Clemente Island. Several samples, including 2614-241 from the Red Mountain Archaeological District, were rejected because they did not register probabilities greater than 10 percent, even though they had zero probability of membership to any other group. Only one bead was projected into the chlorite schist bead group (Sample 1691-U7L5), which was visually identified as an irregular-shaped chlorite schist bead from VEN-1691. The bead registered a probability of group membership greater than 75 percent. All other beads registered zero probability of group membership with chlorite schist.

Finally, two beads were rejected because they registered high probabilities of group membership to multiple groups. One was recovered from the Red Mountain Archaeological District (Sample 211-860) and was previously sourced to Sierra Pelona regional source group. In the current analysis, the bead showed high probabilities of group membership with all three talc schist regions indicating a strong talc schist character. The other bead (Sample 1691-U6L2), representing a visually identified chlorite talc schist bead from VEN-1691 previously sourced to Catalina Island, registered high probability of group membership to both chlorite talc schist and Cuyamaca/Mount Laguna talc schist, while its probability of membership to Catalina registered less than 1 percent. The evidence conflicts with the provenience analysis and strongly suggests that the bead did not originate from Catalina Island. The results demonstrate just how the need for additional research to identify and characterize chlorite schist and chlorite talc schist sources.

All of the stone beads were then projected against the two bead groups utilizing the 12 elements that distinguished chlorite schist from chlorite talc schist (see Table 4-13; also see Table A-49 in Appendix A). Two stone beads from San Clemente Island (SCLI-1524) could not be sourced to either chlorite schist or chlorite talc schist due to low probabilities of group membership. The stone bead previously sourced to Sierra Pelona (Sample 211-860) was also rejected due to low probability of membership. This is a positive result and solidifies the distinction of chlorite schist and chlorite talc schist from talc schist regional groups and provides strong evidence that supports the artifact's provenience to the Sierra Pelona regional source.

Table 4-13. Summary of classification for VEN-1691, RIV-1246, Red Mountain, and San Clemente/San Nicolas Island beads utilizing 12 elements

		Predicted Group based on probability ≥ 1%			
		CS	**CTS**	**Unk**	**Total**
Location	**VEN-1691**	1	4	0	**5**
	RIV-2936	0	4	0	**4**
	RIV-1246	0	6	1	**7**
	SBR-211, -2600, -2614	0	2	1	**3**
	SCLI-43	0	1	0	**1**
	SCLI-1524	0	0	2	**2**
	SNI-11	0	1	0	**1**
	SNI-56	0	1	0	**1**
	Totals	**1**	**19**	**4**	**24**

CS = chlorite schist; CTS = chlorite talc schist; CAT = Catalina; SP = Sierra Pelona; C/ML = Cuyamaca/Mount Laguna

Mahalanobis calculations projected twenty stone beads into the chlorite schist and chlorite talc schist bead groups. The stone bead from VEN-1691 previously projected into the chlorite schist bead group again registered high probability of group membership, confirming its association with an established chlorite schist chemical group. The 17 stone beads considered potential members of the chlorite talc schist in the previous calculation again registered high probabilities of group membership, between 5 and 56 percent, while also registering zero probability of membership to chlorite schist. Three of these beads originated from San Nicolas Island and from Eel Point (SCLI-43), but were not visually inspected by the author. Until visual analysis can be completed, the results are considered tentative. The remaining 14 beads were visually identified as chlorite talc schist based on comparative analysis to beads from LAN-21. Based on the available evidence, I accept the chemical compositional analysis as evidence that these beads are associated with a general chlorite talc schist mineralogical group.

Two additional beads were classified as chlorite talc schist during the analysis, both of which were previously rejected. Sample 2614-241 was rejected because its probability of group membership to chlorite talc schist registered 2.6 percent, far below the 10 percent cut off value, even though it had zero probability of membership to any other group. Based on its composition of the 12 trace elements, the artifact registered a probability of group membership greater than 18 percent. The other bead (Sample 1691-U6L2) was previously sourced to Catalina Island but failed to register even a moderate probability of membership to the island source in the previous calculation, instead exhibiting similarities with Cuyamaca/Mount Laguna talc schist and chlorite talc schist. The current calculation resulted in a probability of group membership to chlorite talc schist greater than 50 percent. In light of the evidence, these artifacts are also placed within a general chlorite talc schist mineralogical group.

Chlorite Schist and Santa Cruz Island Schist

After completing the stone bead comparative studies and demonstrating the validity of the chlorite schist bead chemical group and utility of the general chlorite talc schist group, I attempted to explore the relationship between chlorite schist beads and the metamorphic rock represented in Eddy's (2009) Santa Cruz Island Schist database. Measurements of 11 major, minor, and trace elements based on Mahalanobis calculations from group centroids registered probabilities of chlorite schist bead membership to the Santa Cruz Island Schist group.

Chlorite schist deposits do exist on the island (Romani 1982; Eddy 2009) and given Santa Cruz Island's involvement in shell bead manufacture the possibility that the local metamorphic material was also utilized in stone bead craft production is not out of the question. Unfortunately, Eddy (2009) misidentified phyllite and greenstone and other types of metamorphic rock as chlorite schist during a previous study. Thin-section analysis has since demonstrated that the majority of materials are likely quartz epidote (greenstone) and/or muscovite mica schist. This is further supported by at least two distinct chemical groups, one characterized by higher concentrations of Ca typical of epidote, and the other with higher concentrations of K and BA typical of muscovite, represented in the Santa Cruz Island database.

Source Characterization analysis of Santa Cruz Island Schist demonstrates that the metamorphic material has a definite chemical signature that distinguishes it from all other source groups analyzed. This signature may one day translate into source specific characterization of chlorite schist, but the validity of the distinction is questionable due to the presence of at least two distinct mineralogical types that exhibit different chemical compositions. Rather than dismissing the Santa Cruz Island database outright on these grounds, an attempt was made to further assess the relationship between the chemical composition of chlorite schist artifacts and Santa Cruz Island Schist.

Bivariate plots were reviewed to identify potential element discriminators. It was clear that element concentrations in the Santa Cruz Island group, much like the chlorite talc schist group, contained a high degree of variability that encompassed the chlorite schist bead group as was evident among the 12 elements that distinguished chlorite schist from chlorite talc schist. A total of five elements (Cr, Ni, As, Cs, and U) were identified that clearly distinguished chlorite schist from Santa Cruz Island Schist. Mahalanobis distance calculation and posterior classification utilizing the five elements resulted in a mean successful classification rate of 93 percent based on a minimum of 5 percent probability of group membership (see Table 4-14; also see Table A-46 in Appendix A) and the separation between groups was statistically significant (see Table A-47 in Appendix A).

Table 4-14. Summary of classification success for chlorite schist bead group and Santa Cruz Island Schist source group utilizing 5 elements

		Predicted Group based on probability $\geq$ 5%			
		Chlorite Schist	**Santa Cruz Island Schist**	**Rejected**	**Total**
Location	**Chlorite Schist**	41	0	3	**44**
	Santa Cruz Island Schist	0	23	2	**25**
	Totals	**41**	**23**	**5**	**69**

The chlorite schist bead group contains a distinct trace element composition that distinguishes it from the mineralogically diverse Santa Cruz Island Schist. While the beads did not originate from greenstone or mica schist deposits on Santa Cruz Island, the signature of the islands chlorite schist deposits is unknown and thus the possibility that the chlorite schist beads originated from there cannot be ruled out. However, in light of geospatial distribution patterns reflected in the Early Middle Period Stone Bead Interdependence Network, the most likely source for chlorite schist would be the Sierra Pelona Mountains, Catalina Island, or unknown sources in the Los Angeles. The analysis demonstrates that Santa Cruz Island metamorphic rock has a trace element signature but it is not clear if that signature is exhibited in the chlorite schist. Chlorite schist may have been used to craft beads and other artifacts on Santa Cruz, but these products would likely not be associated with the Early Middle Period Stone Bead Interdependence Network. Therefore, efforts should be made to identify and characterize Santa Cruz Island chlorite schist. Finally, the utility of the current Santa Cruz Island metamorphic group is fully realized in this analysis and the group, as a whole, should be discarded from future provenience studies until a Santa Cruz Island chlorite schist chemical group is established.

Talc Schist Bead Comparative Analysis

A similar level of comparative analysis could not be conducted for talc schist beads due to the limited number of samples in the database, which was composed of four non-provenienced talc schist beads from LAN-21 and 1 talc schist bead from RIV-1246. Still, bivariate plots of elements were analyzed to assess the relationship between the five talc schist beads. Three of the four beads from LAN-21 tended to cluster, whereas one bead from LAN-21 and the bead from RIV-1246 demonstrated clear separation on a number of element combinations (see Figure 4-6). The results may indicate the use of several different talc schist sources to craft the stone beads, or a wider range of variability within a single source. Additional analysis is needed to characterize the full range of variability within the Sierra Pelona and Catalina Island regional source groups.

Summary

This chapter documented efforts to provenience 95 stone beads from seven sites in southern California visually identified as chlorite schist, chlorite talc schist, and talc schist, as well as five unidentified stone beads and 100 soapstone artifacts from San Clemente Island and San Nicolas Island analyzed by Clark (2009) and Tupa (2009). Stone bead comparative analysis was also completed to explore the relationship between LAN-21 and RIV-1246 chlorite schist beads, between chlorite schist beads and chlorite talc schist beads, between chlorite schist beads and Santa Cruz Island metamorphic, and among all non-talc schist beads analyzed.

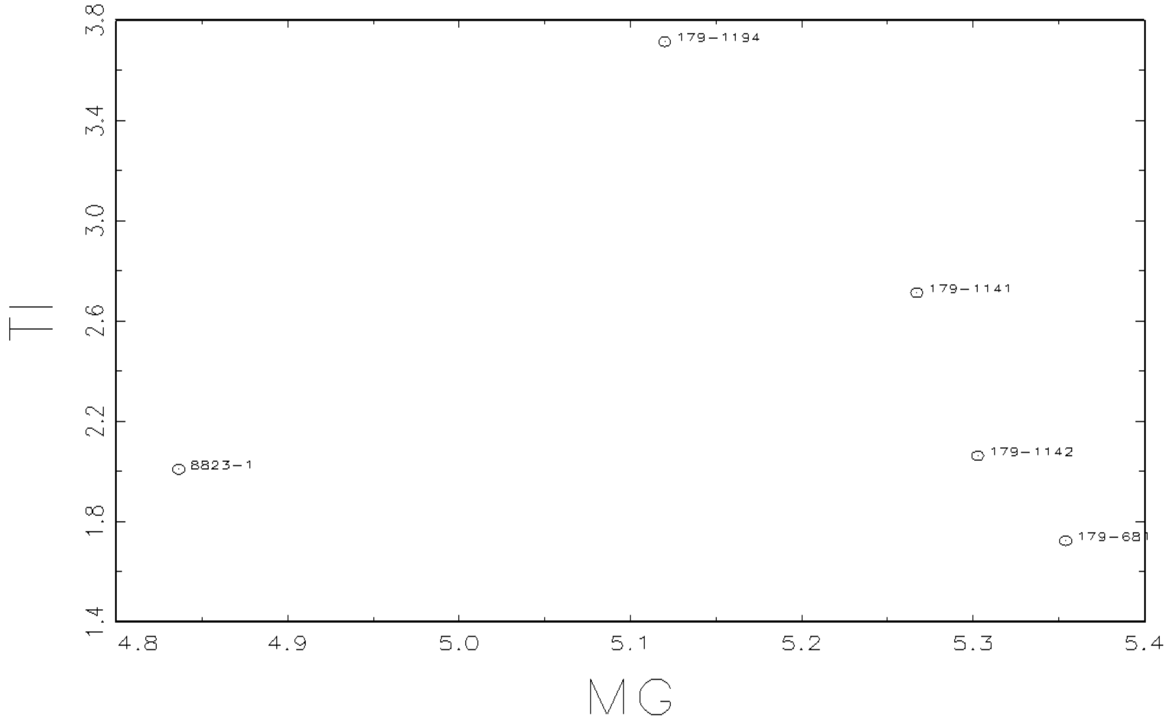

Figure 4-6. Bivariate plot (Magnesium versus Titanium) depicting non-provenienced talc schist beads from LAN-21 (179) and RIV-1246 (8823-1). Ellipses indicate 90% confidence level for group membership.

Several important discoveries were made during the stone bead provenience and comparative analyses. First, Sierra Pelona talc schist is identified as the regional source for four stone beads, three of which are associated with Middle period deposits at LAN-21 in Chatsworth, while one additional bead is associated with a Late Period deposit at SBR-211 in the north-central Mojave Desert. Catalina Island soapstone was implicated as the regional source for one visually identified chlorite talc schist disc bead from VEN-1691, but comparative analysis revealed a moderate degree of overlap in the chemical composition of chlorite talc schist and talc schist mineralogical groups resulting in misclassifications. Trace element analysis showed clear separation between the chlorite talc schist bead and Catalina Island soapstone, while confirming its association with a general chlorite talc schist bead group. Similarities in the chemical compositions, as measured in concentrations of the 11 elements used to distinguish mineralogical types and the 12 elements used to differentiate talc schist regional groups, demonstrates the need to identify the mineralogy of artifacts prior to chemical sourcing. Source characterization protocols, like the one demonstrated for talc schist, must be developed for each mineralogical subtype of soapstone, beginning with chlorite schist and chlorite talc schist.

None of the 100 stone beads analyzed, excluding the misclassified chlorite talc schist bead from VEN-1691, registered probabilities of group membership to Catalina Island greater 0.1 percent. This includes the four unsourced talc schist beads, which also registered zero probability of membership to Sierra Pelona and Cuyamaca/Mount Laguna. These unknown source talc schist beads may have originated from a region not currently characterized, such as the Sierra Nevada Mountains, or may reflect a distinct chemical group within the three known regions not currently represented in the database. This is a strong possibility for both Catalina and Sierra Pelona as both regional sources contain a wide variety of soapstone subtypes.

The results also confirmed Clark (2009) and Tupa's (2009) suspicion that the soapstone artifacts on San Clemente and San Nicolas islands originated from Catalina Island. Of the 100 southern Channel Island soapstone artifacts analyzed, 68 were confidently sourced to Catalina Island. These artifacts consisted of fragments of groundstone, miscellaneous debitage, a plaque, and the tip of an effigy. The remaining 32 artifacts that could not be sourced to any of the three regional groups also consisted of ground stone fragments, debitage, a possible effigy, as well as the tip of an ornament, and a pigment pot. Ten of these artifacts registered zero probability of membership to any of the three regional groups, perhaps indicating the existence of a distinct chemical group within the Catalina, Sierra Pelona, or Cuyamaca/Mount Laguna regions. Twenty-eight artifacts registered probabilities of group membership of less than 1 percent to Catalina, Sierra Pelona, or Cuyamaca/Mount Laguna. The remaining artifacts registered high probabilities of membership to multiple groups and could not be sourced.

The analysis also verified the chemical similarity among LAN-21 and RIV-1246 chlorite schist beads identified by Eddy (2009). The relationship between LAN-21 and RIV-1246 chlorite schist reflects either consistency within the mineralogical group or source-specific characterization. Further research is necessary to identify and characterize chlorite schist deposits to determine if the material can be distinguished as successfully as talc schist.

A similar conclusion is drawn from chlorite talc schist, which was chemically from chlorite schist. However, the group contains only 14 samples, is not considered statistically valid, and at least three distinct chemical subgroups are represented within the group. As a result, the group exhibits a wide range of variability that extends into the centroids of the chlorite schist bead group and the Catalina, Sierra Pelona, and

Cuyamaca/Mount Laguna talc schist groups. Therefore, chlorite talc schist beads from LAN-21, unlike chlorite schist beads, do not represent an established chemical source group but are considered a viable mineralogical group for comparative studies.

Efforts were made to explore potential relationships between unsourced non-talc schist stone beads from RIV-1246, VEN-1691, San Clemente and San Nicolas Islands (Clark 2009), and the Red Mountain Archaeological District and the chlorite schist and chlorite talc schist beads. Chlorite schist beads from LAN-21 and RIV-1246 were combined into a single chlorite schist bead group representing an established chemical group while the 14 chlorite talc schist beads were treated as a general mineralogical group composed of at least three distinct chemical subgroups. Non-talc schist stone beads were then projected against the chlorite schist and chlorite talc schist groups as well as Catalina Island, Sierra Pelona, and Cuyamaca/Mount Laguna talc schist regional source groups.

Of the 24 beads analyzed, 19 were identified as members of the chlorite talc schist group while sharing little to no similarity with the talc schist regional groups. The results were encouraging because 16 of the 19 beads were visually identified as chlorite talc schist prior to the analysis. The three additional beads were analyzed by Clark (2009) and were their mineralogy was not reported. Beads projected into the chlorite talc schist mineralogical group included the bead from Eel Point (SCLI-43), two beads from San Nicolas Island, six of seven beads from RIV-1246, four of five beads from VEN-1691, two of three beads from the Red Mountain Archaeological District, and all four beads from RIV-2936. One additional bead from VEN-1691 visually identified as chlorite schist was projected into the chlorite schist group with a high probability of membership. Three additional beads from RIV-2936 and SCLI-1525 shared similarities with chlorite talc schist but could not be confirmed. The analysis also generated supporting evidence that strengthened the provenience of a talc schist bead from the Red Mountain Archaeological District (211-860) to the Sierra Pelona regional source. The bead continued to demonstrate a strong relationship with talc schist and was clearly distinguished from chlorite talc schist and chlorite schist.

The chlorite schist bead group was also compared to Santa Cruz Island Schist to explore why chlorite schist beads registered probabilities of group membership with the Santa Cruz Island group when measured by the 11 elements used to distinguish mineralogical types. Chlorite schist beads from LAN-21 and RIV-1246, as well as others, were projected into the Santa Cruz Island Schist group with probabilities ranging between 1 and 5 percent. This was due to a wide range of chemical variability within the Santa Cruz Island group, which was a direct consequence of the mineralogical variability (i.e., epidote quartz greenstone and mica schist) represented in the Santa Cruz Island group. Despite the wide range of variability, the chlorite schist bead group was clearly distinguished from Santa Cruz Island Schist by concentrations of five trace elements, but this does not dismiss Santa Cruz Island as a possible source location of the chlorite schist utilized in the production of beads and other artifacts. The geospatial distribution of chlorite schist beads demonstrates that the island source group is not the likely source of chlorite schist beads circulated within the Early Middle Period Stone Bead Interdependence Network.

The current Santa Cruz Island metamorphic group has limited utility in future sourcing studies. It does not represent an established chemical group and is composed of at least two distinct mineralogical types that exhibit distinct chemical signatures. However, the group does possess a rather unique island metamorphic signature that separates it from all other source groups analyzed. Efforts must be made to determine if this signature is represented in chlorite schist deposits located on the island. Source characterization of Santa Cruz Island chlorite schist will provide important information that may confirm if the island was a utilized, or will prove that distinct regional chemical signatures exist within the chlorite schist mineralogical group, thus strengthening the probability that the beads from LAN-21 and RIV-1246, while not originating from Santa Cruz Island, are associated with a distinct regional source group.

One final note, the provenience and stone bead comparative analysis demonstrates the weakness of mineralogical subtype chemical protocol to identify talc schist. Mineralogical identification by visual analysis should suffice when determining whether or not an artifact is composed of talc schist. Finally, the analysis has demonstrated that a general soapstone sourcing protocol is not possible and that separate source characterization protocols are needed for chlorite schist, chlorite talc schist, and other types of stone crafted into beads.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This thesis explored the spatial distribution and use of stone beads during the early Middle period within the context of a mutual interdependence obligatory gifting and reciprocal exchange network. It was argued that small-scale groups voluntarily entered into and maintained mutual interdependence obligatory gifting and reciprocal exchange *relationships* out of a need for social interaction that reinforced small-scale identities, created a new partnership identity, and provided opportunities to transform social identities through displays of talents, skills, and craft. As the process of creating and maintaining relationships continued, an organic large-scale mutually interdependent obligatory gifting and reciprocal exchange *network* emerged that resulted either in the creation of a new large-scale group identity and establishment of institutions, norms, and rules to regulate mutual interdependence, or as was the case with the Early Middle Period Stone Bead Interdependence Network, the failure to establish social mechanisms that lead to the dissolution of the network and absorption of small-groups into the institutions of competing networks.

Drawing the Cahuilla Indians who document an important history of mutual interdependence and the use of power and force, and utilizing the aspects of the mutual interdependence and power and force model that are visible in the archaeological record, I identified an early Middle period stone bead mutual interdependence obligatory gifting and reciprocal exchange network. The following discussion provides a much needed cross-cultural comparison of the Early Middle Period Stone Bead Interdependence Network with the Late period Cahuilla mutual interdependence network.

The Cahuilla are an example of a large-scale society that forged a linguistically and culturally defined group identity (*ˀiviˀlyyˀatum*; Bean 1972:85), while also maintaining social identities associated with membership in moieties, sibs, lineages, households and families, as well as individual identities achieved through skill and craft (Bean 1972:86-102). The Cahuilla maintained an institution of ceremonialism that regulated mutual interdependence, set rules to govern ritual behavior including mandatory participation and contribution of goods and/or resource to the communal pot intended for redistribution, and recognized leaders in various positions that used power and force to assert egalitarianism and enforce rules. Ceremonies were also the most important venue for obligatory gifting and reciprocal exchange while also providing opportunities for the reproduction, creation, and transformation of social identities.

The Late period Cahuilla model of mutual interdependence obligatory gifting and reciprocal exchange network demonstrates the successful adaptation of an emerging large-scale network. Unfortunately, the model does not reveal how small-scale mutual interdependence relationships blossom into large-scale networks, the processes by which institutions were established in order to regulate mutual interdependence, or the how social identity transformed when small-scale groups accepted the institutions of a large-scale network.

Compared to the Cahuilla Indians at the time of Spanish contact, the Early Middle Period Stone Bead Interdependence Network, as inferred from temporal, geospatial, and mortuary data, represents an emerging large-scale mutual interdependence network composed of an unknown number of small groups. During the early Middle period stone beads (i.e., chlorite schist and chlorite talc schist beads) represented a stylistic variant selected by those in the Network over *Olivella* shell beads. Stone beads communicated important information about social and personal identities (Raab and Howard 2002:595; Weissner 1983:256) and although no distinct patterns emerged in the geospatial distribution or frequency of distinct stone beads types (i.e., chlorite schist, chlorite talc schist, and talc schist beads) the possibility that other stylistic variants existed and communicated different sets of information and/or represented small group identities must not be overlooked.

Chlorite schist and chlorite talc schist beads were likely crafted for the purpose of gifting and exchange between leaders within a mutual interdependence system where achieved status and positions associated with power had emerged prior to the development of the Early Middle Period Stone Bead Interdependence Network. This is demonstrated by mortuary patterns from LAN-361 in Agua Dulce and the Santa Barbara Channel. I agree with King et al. (1974) that the presence of a dedicated cemetery and differential distribution of wealth items and other symbols of status in adult burials are indicative of a complex hunter-gatherer society where leaders possessed power and influence. I do not believe the data supports the claim by McIntyre (1990) that ranked societies (i.e., hereditary) developed in Agua Dulce during the Middle period, and I disagree with the conclusions drawn by Garza (2012) that support this interpretation based on juvenile burials. As previously discussed, lavish burial goods associated with infants and children may represent offerings or investments unrelated to the child's social status, reflecting rather the emotional saliency of an individual or group over the death (Green 1999).

Comparisons to Late period Cahuilla cemeteries help prove the point that dedicated cemeteries and differential distribution of wealth items and other symbols of status in adult burials can reflect power and influence, but that the specificity of the role or position the individual held in society (e.g., politicoeconomic, ceremonial, and spiritual) is difficult to distinguish. The Cahuilla attained positions of great power and influence and yet maintained an egalitarianesque mutual interdependence obligatory gifting and reciprocal exchange network. It is my opinion that social complexity manifests in large-scale mutual interdependence networks and we need not invoke ranked societies or ascribed status in discussions of complex hunter-gatherers.

If we assume leadership positions that held power and influence existed in the nexus of the Early Middle Period Stone Bead Interdependence Network prior to the appearance of chlorite schist and chlorite talc schist disc beads, the most common type of stone beads circulated in the Network, then we also assume that leadership positions were developed *in situ* from engagements in previous mutual interdependence relationships. I argue here that the Early Middle Period Stone Bead Interdependence Network was a direct relative of the Early period *Olivella* Grooved Rectangular (OGR) bead interaction sphere (Howard and Raab 1993) in the southern Channel Islands and adjacent south-central coastal mainland between approximately 4000 B.C. and 3000 B.C., which also extended into northern Nevada and central Oregon. Vellanoweth (1995) and Raab and Howard (2002:593) have argued that OGR beads were transported through a cultural interaction sphere linked to the Takic language community who inhabited the southern California coast at that time. As I previously stated, it is my belief based on an understanding of mutual interdependence that the boundaries of OGR bead distribution reflect a small-scale or emerging large-scale mutual interdependence gifting and reciprocal exchange network that may or may not have been associated with a specific language family, but likely involved small-scale groups that shared similar social, political, and spiritual beliefs.

Several outstanding issues must be worked out before a direct link between the Early period OGR bead network and the Early Middle Period Stone Bead Interdependence Network can be established. First, we need to explore reasons why OGR beads fell out of use. Is there evidence of social disruption in the form of population increase perhaps migration of outside groups into the area that resulted in increased competition, restricted access to resources, and other factors leading to increased pressure on the leadership to maintain the OGR bead network? Or did the OGR bead network collapse as the result of a failure to establish institutions that regulated obligatory gifting and reciprocal exchange relationships? I suggest that after OGR beads fell out of use perhaps associated with the loss of access to *Olivella* shell or connections to the southern Channel Islands, small groups continued to maintain mutual interdependence relationships even in the absence of recognizable stylistic variants symbolizing group identity. Obviously, much can be learned from studying the 2,000 year gap between the OGR bead network and the Early Middle Period Stone Bead Interdependence Network.

It seems clear that social groups had recognized positions of leadership imbued with power prior to the early Middle period. Individuals had probably attained social status and wealth as craftsmen and women, hunters, cooks, singers, runners, dancers, etc., taking advantage of opportunities to create and transform their social identity. Leaders who negotiated mutual interdependence relationships likely attained their positions because they were good communicators and capable of organizing individuals in a coordinated effort to successfully complete a task. At some point, leaders were singled out and recognized for the power or influence, and I assume that stylistic variants such as chlorite schist and chlorite talc schist disc beads that communicated information regarding group identity and symbolized a commitment to fulfill obligatory gifting or reciprocal exchange responsibilities were typically associated with group leaders.

I can trace the history of the Early Middle Period Stone Bead Interdependence Network from approximately 1000 B.C., to A.D. 400 over a territory that extended from the southern Channel Islands to Del Rey and Malibu, east to San Fernando and Santa

Clarita valleys and along the Transverse Ranges to the Cajon Pass and upper Mojave River, and further east to Desert Hot Springs in the Coachella Valley. This forms the nexus of stone bead use during the early Middle period. Links between these areas were strengthened as a result of chemical composition analysis, which demonstrated that chlorite schist beads from the Chatsworth Walker Cairn site (LAN-21) and the Two Bunch Palms site (RIV-1246) originated from the same regional source. While the possibility that the chemical similarities noted among these beads is a reflection of relative chemical homogeneity within the chlorite schist subtype cannot be ruled out, it is highly unlikely due to the identification of a handful of chlorite schist beads that fell outside the range of variability demonstrated in the established chlorite schist chemical bead group.

Evidence for out-of-network interaction between small-scale groups associated with the stone bead exchange network and others, most notably neighbors to the north associated with the Santa Barbara Channel shell bead exchange network, was identified during geospatial analysis and implicated by bead assemblages in these areas containing more than 10 percent stone beads. Sites representing two of these overlapping areas, ORA-119a (Newport Beach) and LAN-1296 (Rosamond Lake) were not available for comparative or chemical analysis. However, King's (1979) description of chlorite schist beads from LAN-1296 is consistent with the small, thin discs characteristic of the Early Middle Period Stone Bead Interdependence Network. Collections were analyzed from VEN-1691 on the Oxnard Plain and RIV-2936 near the northwest shoreline of Lake Cahuilla and provide interesting insight into the Early Middle Period Stone Bead Interdependence Network and aspects of stone bead production.

A total of six stone beads were analyzed from VEN-1691, of which five were classified as chlorite talc schist and one chlorite schist. Chemical compositional analysis verified mineralogical classifications and identified the chlorite schist bead as originating from the same source as the LAN-21 and RIV-1246 beads. Due to the high degree of chemical variability represented in chlorite talc schist and the lack of source characterization datasets I was unable to link the VEN-1691 chlorite talc schist beads to any other site in the Early Middle Period Stone Bead Interdependence Network. The chlorite schist bead on the other hand, suggests a direct link between the materials used to craft chlorite schist stone beads recovered from Chatsworth and Desert Hot Springs to those used at VEN-1691. The location of this unknown source remains elusive.

Despite a direct chemical link between chlorite schist beads, several inconsistencies were identified in the VEN-1691 stone bead assemblage. First, the chlorite schist bead was not a disc bead, but rather an asymmetrical shaped fragment that may have been a bead blank or pendant of some kind broke during manufacture. This bead form was not identified in stone bead assemblages associated with the nexus of the Early Middle Period Stone Bead Interdependence Network. Second, the chlorite talc schist beads were also, for the most part, irregularly-shaped and larger than most of the small, thin chlorite schist disc beads widely distributed throughout the Network. Evidence that chlorite schist stone bead manufacture was indicated by the presence of a bead blank and lithic drill, which may also have been used to craft shell beads.

Overall, the stone bead assemblage at VEN-1691has a distinct character that distinguishes it from sites within the Early Middle Period Stone Bead Interdependence Network. I am under the impression that VEN-1691 represents local or domestic stone bead crafting for gifting or exchange, which I differentiate from a potential semi-regional chlorite schist and chlorite talc schist bead industry associated with the Network. I base this idea on the relative uniformity of design, shape and materials exhibited in chlorite schist and chlorite talc schist beads. It will be important to determine whether or not the chlorite schist and chlorite talc schist at VEN-1691 was acquired from the same quarry or source location as the materials used to craft stone beads circulated in the Network, or if there multiple deposits were available within the same geologic formation (e.g., Sierra Pelona?) that allowed both groups to access raw materials without conflict. The current evidence does seem to support the existence of mutual interdependence relationships between the Network and those occupying the Oxnard Plain. I hope to use chemical composition analysis to further explore the connections between local production for distribution in the Santa Barbara Channel versus the potential semi-regional production of chlorite schist and chlorite talc schist beads, and whether one or the other, or perhaps both, account for the distribution of early Middle period stone beads in the Channel.

I assume that the evidence for established out-of-network mutual interdependence relationships during the early Middle period would manifest in roughly equivalent frequencies of stone and *Olivella* shell beads on either side of the boundary, with frequencies of stone or shell increasing as one moved closer to the respective centers. While small-groups may have branched out-of-network to create mutual interdependence relationships with others on a case by case basis (e.g., LAN-1296), the available body of evidence highlighted in this research appears to reflect a concerted effort to resist gifting and exchange relationships with competing groups, specifically those involved in the Santa Barbara shell bead exchange network. I interpret the distinct boundary along the San Gabriel/San Bernardino Mountains and Mojave Desert, as well as a potential boundary at the Santa Monica Mountains, as interfaces between stone and shell bead networks. Efforts to resist shell bead gifting and exchange relationships indicate that stone beads were on an equal footing with *Olivella* shell beads, but symbolized the maintenance of existing interdependence relationships that were of the highest value. It is therefore possible to infer that stone beads were powerful symbolic mediums that communicated information regarding social identity and status, and that maintaining mutual interdependence relationships within the stone bead exchange network were more important, at that time, than all other viable alternatives.

Based on all available evidence I consider the Early Middle Period Stone Bead Interdependence Network to be an emerging large-scale network managed by individual leaders. Unlike the Cahuilla, the Early Middle Period Stone Bead Interdependence Network did not succeed. During the late Middle period, small groups entered into exchange relationships with neighboring groups to the north possibly resulting from competitive pressure placed on bordering groups associated with the growing Santa Barbara Channel shell bead economy. Evidence of this is inferred from high frequencies of *Olivella* shell beads at late Middle period deposits at Agua Dulce (King et al. 1974;

Garza 2012), Oro Grande (King 1983), and Desert Dunes in Desert Hot Springs (Dahdul et al. 2009), sites previously located in the nexus of the Early Middle Period Stone Bead Interdependence Network.

As relationships with groups from competitive networks increased, new social identities were created and transformed and new symbols of status, wealth, and identity were adopted. Sometime during or after the Transitional Period in the Santa Barbara Channel (A.D. 1150-1300), which Arnold (1987, 1991, 1992a, 2001a, and 2001c) identifies as a period of punctuated chaos leading to the emergence of a simple chiefdom and organized control of labor resulting in craft specialization and the intensification of shell bead production, the Network's main symbol of social identity (i.e., stone beads) was replaced by *Olivella* shell beads.

What motivated members of the early Middle period mutual interdependence obligatory gifting and reciprocal exchange network to enter into exchange relationships with groups tied to the Santa Barbara Channel? Were these not the same people who rejected shell beads from groups in the Santa Barbara Channel during the early Middle period? Was this not also a period, much like the Transitional Period, when shell bead and ornament production diversified and intensified (Moratto 1984:145; Braje et al. 2007:748)? What changed in the social landscape of the Early Middle Period Stone Bead Interdependence Network that led to its eventual absorption into a pan-southern California shell bead economy centered in the Santa Barbara Channel? Did the collapse have anything to do with changes in broad regional exchange networks, like obsidian, that once permeated all mutual interdependence networks?

Returning to the mutual interdependence and power and force model, I originally hypothesized that large-scale networks that did not develop institutions to regulate mutual interdependence inevitably collapsed and were absorbed into the institutions of competing networks. Conversely, small-scale mutual interdependence relationships did not require regulation because groups were motivated to participate and fulfill a need for social interaction and opportunities to reproduce, create, and transform social identities. The model as currently described lacks an explanatory device for how groups managed the transition from small-scale relationships to large-scale networks (i.e., emerging or transitional large-scale networks), or how long a large-scale network could survive without developing institutions to regulate mutual interdependence.

The research carried out on the stone bead exchange network provides explanations that improve our understanding of these complex social processes. First, it has highlighted the importance of leaders in transitional or emergent large-scale networks who negotiated mutual interdependence relationships and managed individual members of the group to ensure participation and cooperation in obligatory gifting and reciprocal exchange. I believe that *managers* of mutual interdependence, regardless of their association with politicoeconomic, ceremonial, religious, or other positions, influenced their small-group members to cooperate in the maintenance of existing relationships and wielded power and force, when necessary, to reject requests for new relationships and punish those who failed to meet their obligations. In the transitional or emergent large-scale Early Middle Period Stone Bead Interdependence Network, managers were able to use power and force to reject shell beads in favor of stone beads that symbolized group identity and a commitment to maintain existing relationships, thus assuring the continuation of the Network, opportunities for social interaction, all while solidifying power to ensure that symbols of status, identity, and power remained symbols of status, identity, and power.

As time passed, participating groups increased within the Early Middle Period Stone Bead Interdependence Network increased as they did in competing networks (e.g., Santa Barbara Channel shell bead), and the incentives for participating in mutual interdependence diminished while pathways to leadership positions, status, and notoriety became more difficult. Managers were less effective in persuading members to participate, individual contributions to the communal contributions languished and the gift suffered, and groups failed to meet their obligations. In the absence of an established institution, rules, and norms to regulate mutual interdependence the transitional or emergent large-scale group identity was abandoned and small-scale groups were absorbed by or sought out new opportunities with competitive networks to engage in social interaction. I believe major opportunities were provided by the development of a shell bead monetary economy and its expansion during the Transitional Period. A monetary economy allowed small-scale groups and individual members to purchase goods, subsistence resources, and possibly services, without establishing a perpetual interdependence network. Other groups like the Cahuilla, who established institutions to regulate mutual interdependence, were able to maintain their obligatory gifting and reciprocal exchange network while also participating in the shell bead economy. Engaging in the shell bead economy did not transform Cahuilla social identity, but rather the Cahuilla transformed the meaning of shell beads to conform to their identity through the use of *money beads* in obligatory gifting between *Nets* prior to, during, and following a ceremony.

Conclusions

The mutual interdependence and power and force model developed from systems theory approaches to the study of California Native American groups and the Interdependent Hypothesis with its roots in evolutionary anthropology is an effective explanatory device for modeling the underlying motivations for the creation, maintenance, and rejection of social relationships associated with obligatory gifting and reciprocal exchange among hunter-gatherers. During the early Middle period, an emergent large-scale stone bead mutual interdependence obligatory gifting and reciprocal exchange network developed following the appearance of chlorite schist and chlorite talc schist beads. Leadership positions and achieved status were already in place among the small-scale groups participating in the Early Middle Period Stone Bead Interdependence Network, suggesting involvement in previous small or large scale mutual interdependence relationships during the Early period. Based on similar geographic distribution and medium of exchange (i.e., bead) it is hypothesized that the Early Middle Period Stone Bead Interdependence Network was a relative of the Early period *Olivella* Grooved Rectangular (OGR) bead interaction sphere that was itself a small-scale or transitional mutual interdependence gifting and reciprocal exchange network that involved small-scale groups sharing similar social, political, and spiritual beliefs.

The research has demonstrated the important role of managers in the negotiation of mutual interdependence relationships and persuasion of their members to cooperation in obligatory gifting and reciprocal exchange within the context of a transitional or emergent large-scale network. Manager's also wielded power and force to reject requests for new relationships and enforce cooperation but became less effective as the network grew and incentives for participation and pathways to gain reputation diminished. In the absence of an established institution, rules, and norms to regulate mutual interdependence, sometime during the late Middle period, the stone bead gifting and exchange network large-group identity was abandoned and small-scale groups were absorbed by or sought out new opportunities with competitive networks to engage in social interaction. A major opportunity was provided in the form of a shell bead monetary economy that expanded during the Transitional Period, allowing small-scale groups and individuals to trade for good and resource without establishing perpetual interdependence relationships.

Although the majority of early Middle period stone beads were crafted from chlorite schist and chlorite talc schist, fine- to medium-grained talc schist was the most common soapstone material found at nearly every soapstone quarry and source location studied. None of the chlorite schist or chlorite talc schist artifacts could be provenienced to a known source; however, chemical composition analysis of chlorite schist stone beads from LAN-21 and RIV-1246 demonstrate that these two bead groups share an identical chemistry and are from the same regional source, which strengthens the association among sites within the Early Middle Period Stone Bead Interdependence Network. The chemical data also coincides with relative uniformity of design, shape and materials used in the Early Middle Period Stone Bead Interdependence Network, which I interpret as evidence of a semi-regional chlorite schist and chlorite talc schist bead industry.

A single chlorite schist bead from VEN-1691 was also sourced to the LAN-21/RIV-1246 bead group but the bead does not resemble any currently known type of bead within the nexus of stone bead distribution, and may actually represent a locally manufactured stone bead crafted from materials that were collected from the same regional source as the beads from LAN-21 and RIV-1246. The evidence for local production is further supported by the presence of a chlorite talc schist bead blank, lithic drills, and irregularities in the size and shape of chlorite talc schist beads. Similar evidence was also reported at the Malibu site (LAN-264), but production there focused on light to medium gray chlorite schist possibly procured from a bluish chlorite schist outcrop nearby at Point Dume (Romani 1982:168). This too may represent localized production.

The scale of localized stone bead production is not known, but it is possible that the presence of stone beads in the Santa Barbara Channel may reflect localized production or a separate stone bead industry that is not directly associated with the Early Middle Period Stone Bead Interdependence Network. Chemical analysis of stone bead artifacts from the Santa Barbara Channel including the northern Channel Islands would go a long way to answering this question. In addition, areas where chlorite schist and chlorite talc schist were procured as well as stone bead craft production areas need to be identified in order gain a better appreciation for the modes of production in hunter-gatherer societies engaged in mutual interdependence networks. The difficulty is in the identification of stone bead production areas. In the absence of bead blanks, direct evidence of stone bead production is illusive. Unlike shell beads, stone bead production may leave no visible detritus as the manufacturing process most likely involved grinding soft stones into shape rather than chipping or breaking. Soil chemistry studies of living floors, a method used in combination with paleoethnobotanical, macroartifact and architectural studies to identify work areas in Mesoamerica (Robin 2003), may assist in the identification of stone bead production areas or workshops in southern California.

Further examination of efforts to expand the Early Middle Period Stone Bead Interdependence Network's sphere of influence may reveal information about the character of small groups and decisions that factor into forging interdependence relationships. The data from RIV-2936 may prove telling in this regard. The site likely represents the occupation of a small group from a competitive network associated with the lower Colorado River Delta who interacted with a small group associated with the Early Middle Period Stone Bead Interdependence Network occupying Two Bunch Palms (RIV-1246). Much can be learned from a study of these two sites. For instance we might ask; what were the motivations for interaction? Was it friendly or hostile? Did it lead to the creation of a mutual interdependence? What do the beads recovered from the two sites tell us about the individuals who negotiated the exchange?

Another important topic to explore is why certain objects, such as beads, become stylistic variants while others like obsidian did not. While efforts were being made to enforce boundaries and reject the advances of networks with different stylistic variants, obsidian from the Owens Valley, most notably from the Coso source, was being exchanged throughout southern California and permeated multiple interdependence networks. How did the exchange of materials not recognized as a stylistic variant compliment or conflict with gifting or reciprocal exchange in interdependence networks? We are just beginning to scratch the surface of the mechanisms and underlying motivations for exchange in hunter-gatherer society. I believe the social complexity associated with the creation and maintenance of mutual interdependence relationships provides an appropriate measure of the complexity represented in these and other forms of hunter-gatherer social interaction. With so much left to be done it is an exciting time to be an archaeologist.

A side bar to the research of hunter-gatherer social interaction was the development of a talc schist sourcing protocol that successfully characterized talc schist soapstone from Catalina Island, Sierra Pelona, Cuyamaca/Mount Laguna, and Jacumba. The sourcing protocol was used to identify the source of four talc schist stone beads, three from LAN-21 and one from SBR-211, to Sierra Pelona, thus confirming what many archaeologists have long suspected. The protocol also verified the results of Clark (2009) and Tupa (2009) and successfully sourced 68 of 100 soapstone artifacts from San

Clemente and San Nicolas islands to Catalina. The analysis also demonstrated a high degree of chemical similarity among the Catalina Island soapstone samples analyzed by Clark (2009). There is a good possibility that Catalina soapstone can be differentiated into chemical groups, perhaps representing quarry areas or subregions of the island. Evidence of chemical variability within the Catalina regional source is inferred from the 32 soapstone artifacts recovered from San Clemente and San Nicolas islands that exhibited distinct chemical compositions. The most obvious source of these artifacts was Catalina Island and these artifacts may have originated from a quarry area that has not been characterized.

With a means of sourcing talc schist soapstone in place, archaeologists can begin to retrace distribution patterns of various artifact types crafted from this unique material. However, the success of the source characterization and provenience analysis is matched by the need for additional research. Intensive source characterization studies to identify the full range of chemical variability in the Catalina and Sierra Pelona regional source groups may reveal chemically distinct quarry areas or individual quarries that allow us to explore diachronic change in soapstone economic systems. We must also develop source characterization protocols for other soapstone types, most urgently chlorite schist and chlorite talc schist, which will be used to source stone beads and other artifacts associated with the Early Middle Period Stone Bead Interdependence Network. Once we have these protocols in place the exciting work begins of unraveling social mechanisms behind the procurement and production of stone beads. It really is an exciting time to be an archaeologist.

REFERENCES CITED

Alcorn, D. C.
1996 *Juniper Flats Archaeology: An Area of Critical Environmental Concern in the Western Mojave Desert*. McGraw-Hill College Custom Series, San Francisco.

Allen, M. W.
2007 Final Report of the Red Mountain Archaeological Project: An Assistance Agreement between the California Bureau of Land Management and the Cal Poly Pomona Foundation, 2003-2006. Agreement BAA-03-0007.
In press In the Shadows of the Sierra Nevada: The Archaeology of Two Landscapes in the Western Mojave Desert. Maturango Museum Press, Ridgecrest, CA.

Allen, R. O., A. H, Luckenbach, and C. G. Holland
1975 The Application of Instrumental Neutron Activation Analysis to a Study of Prehistoric Steatite Artifacts and Source Materials. *Archaeometry* 17(1):69-83.

Altschul, J., R. Ciolek-Torello, D. Grenda, H. Homburg, S. Benaron, and A. Stoll
2005 Ballona Archaeology: A Decade of Multidisciplinary Research. In, *Proceedings of the Society for California Archaeology* 18:283-301.

Arnold, J. E.
1983 Chumash Economic Specialization: An Analysis of the Quarries and Bladelet Production Villages of the Channel Islands, California. Unpublished Ph.D. dissertation, University of California, Santa Barbara.
1987 *Craft Specialization in the Prehistoric Channel Islands, California*. University of California Press, Berkeley.
1991 Transformation of a Regional Economy: Sociopolitical Evolution and the Production of Valuables in Southern California. *Antiquity* 65:953-962.
1992a Complex Hunter-Gatherer-Fishers of Prehistoric California: Chiefs, Specialists, and Maritime Adaptations of the Chumash Islands. *American Antiquity* 57:60-84.
1992b Cultural Disruption and the Political Economy in Channel Islands Prehistory. In *Essays on the Prehistory of Maritime California,* edited by Terry L. Jones, pp. 129-144.
1995 Transportation Innovation and Social Complexity among Maritime Hunter Gatherer Societies. *American Anthropologist*, 97:733-747.
2000 The Origins of Hierarchy and the Nature of Hierarchical Structures in Prehistoric California. In *Hierarchies in Action: Cui Bono?*, edited by M.W. Diehl. Center for Archaeological Investigations Occasional Paper 27, Southern Illinois University.

Arnold, J. E. (continued)

2001a Social Evolution and the Political Economy in the Northern Channel Islands. In *The Origins of the Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by J.E. Arnold, pp. 287-296. University of Utah Press, Salt Lake City.

2001b The Chumash in World and Regional Perspectives. In *The Origins of the Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by J. E. Arnold, pp. 1-19. University of Utah Press, Salt Lake City.

2012 Detecting Apprentices and Innovators in the Archaeological Record: The Shell Bead-Making Industry of the Channel Island. *Journal of Archaeological Method and Theory* 19:269-305.

Arnold, J. E. (editor)

2001c *The Origins of the Pacific Coast Chiefdom: The Chumash of the Channel Islands*. University of Utah Press, Salt Lake City.

Arnold, J. E., and T. M. Green

2002 Mortuary Ambiguity: The Ventureño Chumash Case. *American Antiquity* 67(4):760-771.

Basgall, M. E and D. True

1985 Archaeological investigations in Crowder Canyon, 1973-1984: Excavations at Sites SBr-421B, SBr-421C, SBr-421D, and SBR-713. Report of file, Archaeological Information Center, San Bernardino County Museum, Redlands, California.

Baugh, T. G., and J. E. Ericson (editors)

1994 Prehistoric Exchange Systems in North America. Plenum Press, New York.

Barrows, D. P.

1900 *Ethno-Botany of the Coahuilla Indians of Southern California*. University of Chicago Press, Chicago, Illinois

Baxter, M.

1994a Stepwise Discriminant Analysis in Archaeometry: A Critique. *Journal of Archaeological Science* 21: 659-66.

1994b *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press, Edinburgh.

Bean, L. J.

1972 *Mukat's People: The Cahuilla Indians of Southern California*. University of California Press.

Bean, L. J., and T. C. Blackburn (editors)

1976 Native Californians A Theoretical Perspective. Ballena Press, California.

Bean, L. J., and K. Saubel

1972 *Temalpakh (From The Earth); Cahuilla Indian Knowledge And Usage Of Plants*. Malki Museum Press, Banning, California.

Bennyhoff, J. A.

1967 A Typology of Shell and Stone Beads from Central California. Manuscript on file, California State Parks and Recreation Archaeological Resources Archive.

Bennyhoff, J. A., and R. E. Hughes

1987 Shell Bead and Ornament Exchange Networks between California and the Western Great Basin. *Anthropological Papers of the American Museum of National History* 64(2):79-175.

Berger, R., and W. F. Libby

1965 UCLA Radiocarbon Dates V. *Radiocarbon* 8:467-497.

Berryman, S., and S. Roder

2003 Evaluation Report for Soapstone Ridge. Report on file, Cleveland National Forest, San Diego.

Blackburn, T.

1974 Ceremonial Integration and Social Interaction in Aboriginal California. In ‘*Antap California Indian Political and Economic Organization*, edited by L.J. Bean and T.F. King, pp. 93-110. Ballena Press Anthropological Papers No. 2. Ramona, California.

Blake, W.

1856 Geological Report. In *Routes of Explorations in California for a Railroad Routes to Connect with Routes Near the 35th and 32nd Parallels of North Latitude*, by Lt. R. S. Williamson, Corps of Topographical Engineers, Volume V of Reports of Explorations and Surveys to Ascertain The Most Practicable And Economical Route For a Railroad from the Mississippi River to the Pacific Ocean, Made Under the Direction of the Secretary Of War in 1853–1855. Beverly Tucker, Printer, Washington, D.C.

Braje, T. J., D. J. Kennett, J. M. Erlandson, and B. J. Culleton

2007 Human Impacts on Nearshore Shellfish Taxa: A 7,000 Year Record from Santa Rosa Island, California. *American Antiquity* 72(4):735-756.

Braun, D. P.

1984 Burial Practices, Material Remains, and the Anthropological Record. *Reviews in Anthropology* 10-11:185–196.

Bray, I. S. J.
1994 Geochemical Methods for Provenance Studies of Steatite. Unpublished Ph.D. thesis, University of Glasgow.

Brown, J. A.
1971 The Dimensions of Status in the Burials at Spiro. In *Approaches to the Social Dimensions of Mortuary Practices*, edited by J. A. Brown, pp. 92-112. Memoirs 25. Society for American Archaeology, Washington D.C.

Brumfiel, E. M., and T. Earle
1987 Specialization, Exchange, and Complex Societies: An Introduction. In *Specialization, Exchange, and Complex Societies*, edited by E. Brumfiel and T. Earle, pp. 1-9. Cambridge: Cambridge University Press.

Butler, S. J.
1984 The Steatite Industry in Norse Shetland. Unpublished Ph.D. thesis, University of Liverpool.

Carballo, David M.
2012 Households in Ancient Mesoamerica: Domestic Social Organization, Status, Economies, and Ritual. In *The Oxford Handbook of Mesoamerican Archaeology*, edited by D. L. Nichols and C. A. Pool, pp. 684-696. Oxford University Press.

Chapman, R. W., and K. Randsborg
1981 Approaches to the Archaeology of Death. In *The Archaeology of Death*, edited by R. W. Chapman, I. Kinnes, and K. Randsborg, pp. 1-24. Cambridge University Press, Cambridge.

Chase-Dunn, C., and T. D. Hall
1997 *Rise and Demise: Comparing World-Systems.* Westview Press, Boulder, Colorado

Chase-Dunn, C., and H. M. Mann
1998 *The Wintu & Their Neighbors: A Very Small World-System in Northern California*. University of Arizona Press, Tucson.

Cherryholmes, C. H.
1992 Notes on pragmatism and scientific realism. *Educational Researcher*, 14: 13-17.

Clark, J. E.
1996 Craft Specialization and the Olmec Civilization. In *Craft Specialization and Social Evolution: In Memory of V. Gordon Childe*. Edited by Bernard Wailes, pp. 187-200, The University Museum of Archaeology and Anthropology University of Pennsylvania, Philadelphia.

Clark, J. E., and W. Parry

1990 Craft Specialization and Cultural Complexity. *Research in Economic Anthropology* 12:289-346.

Clark, J. P.

2009 Chronological and Geographical Dimensions of the Soapstone Trade Among the Southern California Channel Islands. Unpublished Master's Thesis, Department of Anthropology, California State University, Northridge.

Clark, J. P., and M. Blake

1994 The Power and Prestige: Competitive Generosity and the Emergence of Rank Societies in Lower Mesoamerica. In *Factional Competition and Political Development in the New World*, edited by E. Brumfiel and J. Fox, pp. 17-30. Cambridge University Press, Cambridge.

Costin, C. L.

1991 Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production. In *Archaeological Method and Theory, Volume 3;* edited by M.B. Schiffer, pp. 1-56. University of Arizona Press.

1998 Introduction: Craft and Social Identity. In *Craft and Social Identity*, edited by C. L. Costin and R. P. Wright, pp. 3-18. Archaeological Papers of the American Anthropological Association No. 8.

2010 Hybrid Objects, Hybrid Social Identities: Style and Social Structure in the Late Horizon Andes. In *Identity Crisis: Archaeological Perspectives in Social Identity, Proceedings of the 42 (2010) Annual Chacmool Archaeology Conference, University of Calgary, Calgary, Alberta*, edited by N.L. Amundsen-Meyer, E. Pickering, and S. Pickering, pp. 211-221.

Costin, C. L., and R. P. Wright (editors)

1998 *Craft and Social Identity*. Archaeological Papers of the American Anthropological Association No. 8.

Covello, M.

n.d. *Preliminary Analysis of Shell, Stone, and Bone Beads from CA-VEN-1691. In* Preliminary Results of the 2010 and 2011 Field Seasons at CA-VEN-24 and CA-VEN-1691, edited by A. Kinkella. Report prepared for the Rancho Guadalasca Management, on file Department of Anthropology, California State University, Channel Islands.

Creswell, J. W.

2003 *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (2nd edition). Sage Publications, Thousand Oaks, California.

Cultural Systems Research, Inc. (CSRI)

1995 *Archaeological, Ethnographic, and Ethnohistoric Investigations at Tahquitz Canyon, Palm Springs, California*. Prepared for Riverside County Flood Control and Water Conservation District. Menlo Park, California.

Dahdul, M.

2002 *Beads and Ornaments from the Coachella Valley.* A thesis presented to the faculty of California State University, Fullerton, in partial fulfillment of the requirements for the Degree Master of Arts in Anthropology.

Dahdul, M., J. D. Goodman, Z. X. Hruby, and H. M. Quinn

2009 Final Report of Results and Findings: Archaeological Investigations at Locus 1, Site RIV-2642, near the City of Desert Hot Springs, Riverside County, California. Report on file, Eastern Information Center, University of California, Riverside.

Davis, J. C.

1986 *Statistics and Data Analysis in Geology. John Wiley and Sons, New York, New York.*

Delaney-Rivera, C., and A. Kinkella

2007 Preliminary Results of the 2005 and 2006 Field Seasons at CA-VEN-1691. Report prepared for the Rancho Guadalasca Management, on file Department of Anthropology, California State University, Channel Islands.

Doyle, K.

1997 Data from CA-LAN-1702 and Regional Implications. In *Proceedings of the Society for California Archaeology* Volume 10, edited by J. Reed, G. Greenway, and K. McCormick, pp.140-147.

Drennan, R. D.

2004 *Statistics for Archaeologists: A Commonsense Approach.* Springer, New York, New York.

Durkheim, E.

1933 *The Division of Labor in Society.* The Free Press, New York.

Earle, T. K.

1977 A Reappraisal of Redistribution: Complex Hawaiian Chiefdoms. In *Exchange Systems in Prehistory,* edited by T. K. Earle and J. E. Ericson, pp. 213-232. Academic Press, San Francisco, California.

2010 Exchange Systems in Prehistory. In, *Trade and Exchange: Archaeological Studies from History and Prehistory*, C.D. Dillon and C.L. White (eds.), pp. 205-217. Springer, New York.

Earle, T. K., J. E. Ericson

1977 *Exchange Systems in Prehistory*. Academic Press, San Francisco, California.

Eddy, J. J.

2006 Craft and Social Identity in Prehistoric Cahuilla Society. Unpublished manuscript in possession of author.

2007a Chemical Composition Analysis of Soft Stone Beads in the Greater Southern California Area Using LA-ICP-TOFMS. In *Institute for Integrated Research in Materials, Environment, and Society Annual Report* 2006-2007, A.Z. Mason (ed.), pp. 24-25. California State University, Long Beach.

2007b The Pre-ceramic period at Two Bunch Palms. Presented at End of Archaic Symposium, February 2007, Anza Borrego State Park.

2008 The Cahuilla Indians: An Ethnological and Archaeological Literature Review. *Coachella Valley Archaeological Society Occasional Papers* No. 4, pp. 43-54.

2009 Source Characterization of Santa Cruz Island Chlorite Schist and its Role in Stone Bead and Ornament Exchange Networks. In *Proceedings of the Seventh California Islands Symposium, Oxnard, California, February 5-8, 2008,* C.C. Damiani and D.K. Garcelon (eds.), pp. 67-79. Institute for Wildlife Research, Arcata, California.

Eddy, J. J., and D. McDougall

2012 Archaeological Evaluation Report: CA-SBR-15103/H, State Route 58 Hinkley Expressway Project Near Hinkley, San Bernardino County, California. Applied Earthworks, Hemet. Prepared for the California Department of Transportation, District 8.

Engels, F.

1972 [1884] *The Origin of the Family, Private Property, and the State*. International Publishing, New York.

Ericson, J. E.

1977 Egalitarian Exchange Systems in California: A Preliminary View. In *Exchange Systems in Prehistory*, T.K. Earle and J.E. Ericson (eds.), pp. 109-126. Academic Press, San Francisco, California.

Flad, R. K., and Z. X. Hruby

2007 “Specialized” Production in Archaeological Contexts: Rethinking Specialization, the Social Value of Products, and the Practice of Production. In *Rethinking Craft Specialization in Complex Societies: Archaeological Analyses of the Social Meaning of Production*, edited by Z.X. Hruby and R.K. Flad. Archaeological Papers of the American Anthropological Association 17, pp. 1-19

Gamble, L. H.

2002 Archaeological Evidence for the Origin of the Plank Canoe in North America. *American Antiquity* 67(2):301-315.

2005 Culture and Climate: Reconsidering the Effect of Paleoclimatic Variability among Southern California Hunter-Gatherer Societies. *World Archaeology* 37(1):92-108.

Gamble, L. H., P. L. Walker, and G. S. Russell

2001 An Integrative Approach to Mortuary Analysis: Social and Symbolic Dimensions of Chumash Burial Practices. *American Antiquity* 66(2):185-212.

2002 Further Considerations on the Emergence of Chumash Chiefdoms. *American Antiquity* 67(4):772-777.

Gary, G. L.

1942 Commercial Minerals of California: Talc. State of California Department of Natural Resources, Division of Mines. Series 1942.

Garza, S. C.

2012 Social Complexity at Vasquez Rocks: A Bioarchaeological Study of Middle Period Cemetery. Unpublished Master's thesis, Department of Anthropology, California State University, Northridge.

Gibson, R. O.

1975 The Beads of *Humaliwo*. *Journal of California Anthropology* 2(1):110-119. Malki Museum, Banning.

Giddens, A.

1984 *The Constitution of Society: Outline of the Theory of Structuration*. University of California Press, Berkeley.

Graesch, A. P.

2004 Specialized Bead Making Among Island Chumash Households: Community Labor Organization During the Historic Period. In *Foundations of Chumash Complexity*, edited by J.E. Arnold, pp. 133-171. Cotsen Institute of Archaeology, University of California, Los Angeles.

Gratuze. B., M. Blet-Lemarquand, and J. N. Barrandon

2001 Mass Spectrometry with Laser Sampling: A New Tool to Characterize Archaeological Materials. *Journal of Radioanalytical and Nuclear Chemistry* 247:645-656.

Green, T. M.
1999 Spanish Missions and Native Religion: Contact, Conflict, and Convergence. Unpublished Ph.D. Dissertation, Institute of Archaeology, University of California, Los Angeles.

Hayden, B.
2001 Richman, Poorman, Beggarman, Chief: The Dynamics of Social Inequality. In *Archaeology at the Millennium: A Sourcebook,* edited by G. Feinman and D. Price, pp. 231-272. Kluwer Academic Press, New York, New York.

Hirth, K.
2009 Craft Production, Household Diversification, and Domestic Economy in Prehispanic Mesoamerica. In *Craft Production and Domestic Economy in Ancient Mesoamerica*, edited by K. G. Hirth, pp. 3-32. Archaeological Papers of the American Anthropological Association, Number 19.

Hodder, I.
1982 *Symbols in Action*. Cambridge University Press, Cambridge.

Holland, C. G., S. E. Pennell, and R. O. Allen
1981 Geographical Distribution of Soapstone Artifacts from 21 Aboriginal Quarries in the Eastern US. *Quarterly Bulleting Archaeological Society of Virginia* 35:200-208.

Hooper, L.
1920 The Cahuilla Indians. *University of California Publications in American Archaeology and Ethnology* 16:316–380. University of California, Berkeley, California.

Howard, V.
2002 Santa Catalina Soapstone Vessels: Production Dynamics. *Proceedings of the Fifth California Islands Symposium: 29 March to 1 April 1999,* D.R. Brown , K.L. Mitchell, and H.W. Chaney (eds.), pp. 598-606. Santa Barbra Museum of Natural History.

Howard, W. J, and L. M. Raab
1993 *Olivella* Grooved Rectangular Beads as Evidence of an Early Period Southern Channel Islands Interaction Sphere. *Pacific Coast Archaeological Society Quarterly* 29:1-11

Hudson, T., and T. C. Blackburn
1986 *The Material Culture of the Chumash Interaction Sphere, Volume IV: Ceremonial Paraphernalia, Games and Amusements*. Ballena Press. Ramona, California.

Hudson, T., and T. C. Blackburn (continued)

1987 *The Material Culture of the Chumash Interaction Sphere, Volume V: Manufacturing Processes, Metrology, and Trade*. Ballena Press. Ramona, California.

Jenkins, D. L., and J. M. Erlandson

1994 *Olivella* Grooved Rectangular Beads from a Middle Holocene Site in the Fort Rock Valley, Northern Great Basin. *Journal of California and Great Basin Anthropology* 19:296-302.

Johnson, B. L.

1941 Marketing Talc, Pyrophillite, and Ground Soapstone. *California Journal of Mines and Geology, Report XXXVII of State Mineralogists* 37(2):332-229.

Jones, T. J., G. M. Brown, L. M. Raab, J. L. McVickar, W. G. Spaulding, D. J. Kennett, A. York, and L. Walker

1999 Environmental Imperatives Reconsidered: Demographic Crises in Western North American During the Medieval Climatic Anomaly. *Current Anthropology* 40(2):137-170.

Jones, R. A.,

1986 *Emile Durkheim: An Introduction to Four Major Works.* Sage Publications, Inc., Beverly Hills, California.

Jones, R. E., V. Kilikoglou, V. Olive, Y. Bassiakos, R. Ellam, I. S. J. Bray, and D. C. W. Sanderson

2007 A New Protocol for the Chemical Characterisation of Steatite – Two Case Studies in Europe: the Shetland Islands and Crete. *Journal of Archaeological Science* 34(2):626-641.

Joyce, R. A.

2005 Archaeology of Body. *Annual Review of Anthropology* 34:139-158.

Kelly, R. L.

1995 The Foraging Spectrum; Diversity in Hunter-Gatherer Lifeways. Smithsonian Institution Press, Washington.

Kennett, D. J., and J. P. Kennett

2000 Competitive and Cooperative Responses to Climate Instability in Coastal Southern California. *American Antiquity* 65:379-395.

King, C. D.

1971 Chumash Inter-village Economic Exchange. The Indian Historian 4(1):30-43.

1973 Notes on Burial Lots from Santa Cruz Island, Recorded at the Lowie Museum, Berkeley. Unpublished Manuscript.

King, C. D. (continued)

1974a The Explanation of Difference and Similarities Among Beads Used in Prehistoric and Early Historic California, In '*Antap, California Indian Political and Economic Organization*, edited by L. J. Bean and T. F. King. Ballena Press Anthropological Papers 2. Ballena Press, Ramona.

1974b Additional Appendices: Archaeological Report Related to the Interpretation of Archaeological Resources at Vasquez Rocks County Park. On file, Department of Anthropology, California State University, Northridge.

1976 Chumash Inter-Village Economic Exchange. In *Native Californians: A Theoretical Retrospective*, edited by L. J. Bean and T. C. Blackburn, pp. 289-319. Ballena Press, Ramona.

1979 Preliminary Bead Analysis, CA-LAN-828. Letter on file, Edwards Air Force Base.

1983 Beads and Selected Ornaments. In, *Archaeological Studies at Oro Grande, Mojave Desert, California*, edited by C. H. Rector, J. D. Swenson, and P. J. Wilke, pp. 68-87. San Bernardino County Museum Association, Redlands, California.

1990 Evolution of Chumash Society: A Comparative Study of Artifacts Used for Social System Maintenance in the Santa Barbara Channel Region Before A.D. 1804. (Revision of 1982 dissertation). In, *Evolution of North American Indians* [series], edited by D. H. Thomas. Garland Publishing, Inc., New York.

1995 Beads and Ornaments from Excavations at Tahquitz Canyon (RIV-45). In, Archaeological, Ethnographic, and Ethnohistoric Investigations at Tahquitz Canyon, Palm Springs, California, Volume I, Part I, edited by L.J. Bean, pp. 1-77. Report on file, Eastern Information Center, University of California, Riverside.

2002 Beads from LAN-192, Lovejoy Springs. Topanga Anthropological Consultants, Topanga, California. Prepared for Fowler Archaeology Museum.

Kohl, P. L., G. Harbottle, and E. V. Sayre

1979 Physical and Chemical Analyses of Soft Stone Vessels from Southwest Asia. *Archaeometry* 21(2):131-159.

Kroeber, A. L.

1908 Ethnography of the Cahuilla Indians. *University of California Publications in American Archaeology and Ethnology* 8(2):29-68.

Lee, R. B., and I. DeVore (editors)

1968 *Man the Hunter*. Aldine Publishing Company, Chicago, Illinois.

Love, B., H. M. Quinn, T. A. Wake, and M. Dahdul

2001 *Final Report on Archaeological Monitoring and Cremation Remains Recovered at Indian Wells Country Club East Course*. CRM TECH Contract No. 577/684, Submitted to the City of Indian Wells. On file, Eastern Information Center, University of California, Riverside.

Love, B., H. M. Quinn, T. A. Wake, and M. Hogan

2000a Final Report on Archaeological Testing at Site RIV-2936, Hotel 111 Project, Highway 111 and Adams Street, City of La Quinta, Riverside County, California. Report on file, Eastern Information Center, University of California, Riverside.

Love, B., H. M. Quinn, T. A. Wake, W. G. Teeter, M. Hogan, and K. J.W. Bouscaren

2000b Final Report on Data Recovery at the Buried Locus of RIV-2936: La Quinta Corporate Centre Project; La Quinta, Riverside County, California. Report on file, Eastern Information Center, University of California, Riverside.

Luckenbach, A. H., C. G. Holland, and R. O. Allen

1975 Soapstone Artifacts: Tracing Prehistoric Trade Patterns in Virginia. *Science* 187:57-58.

McCafferty, G., and S. McCafferty

2009 Crafting the Body Beautiful: Performing Social Identity at Santa Isabel, Nicaragua. In *Mesoamerican Figurines: Small-Scale Indices of Large-Scale Social Phenomena*, edited by NC.T. Halperin, K.A. Faust, R. Taube, and A. Giguet, pp. 183-204. University Press of Florida, Gainesville.

2010 Bling and Things: Ornamentation and Identity in Pacific Nicaragua. In *Identity Crisis: Archaeological Perspectives in Social Identity, Proceedings of the 42 (2010) Annual Chacmool Archaeology Conference, University of Calgary, Calgary, Alberta*, edited by N.L. Amundsen-Meyer, E. Pickering, and S. Pickering, pp. 243-252.

McFarland, S.L.

2000 Changes in Obsidian Exchange in Southern California. Unpublished Master's thesis, Department of Anthropology, San Diego State University.

McIntyre, M. J.

1990 Cultural Resources of the Upper Santa Clara River Valley, Los Angeles and Ventura Counties, California. In *Archaeological and Ethnohistory of Antelope Valley and Vicinity*, edited by B. Love and W. H. DeWitt, pp. 1-20. Antelope Valley Archaeological Society Occasional Paper No. 2.

Mealey, M., and N. Brodie

2005 Site Record for CA-SDI-9040. Record on file South Coastal Information Center, San Diego State University, San Diego.

Mirro, V., and D. McDougall

2012 Emergency Phase III Data Recovery Excavations at CA-RIV-5211/H: A Late Prehistoric Cemetery in the Coachella Valley, California. Report on file, Eastern Information Center, University of California, Riverside.

Moffat, D., and S. J. Buttler

1986 Rare Earth Element Distribution Patterns in Shetland Steatite – Consequences for Artifact Provenancing Studies. *Archaeometry* 28(1):101-115.

Mohr, A., and L. L. Sample

1967 The Sacred Bundle Complex Among the Chumash. *Proceedings of the American Philosophical Society* 3:38-45.

Moratto, M. J.

1984 *California Archaeology*. Academic Press, San Francisco, California.

Morgan, L. H.

1965 [1881] *Houses and House-Life of the American Aborigines*. University of Chicago Press, Chicago.

Narotzky, S.

2007 The Project in Model: Reciprocity, Social Capital, and the Politics of Ethnographic Realism. *Current Anthropology* 48(3):403-424.

Nesse, W. D.

2000 *Introduction to Mineralogy*. Oxford University Press, New York.

O'Shea, J. M.

1984 *Mortuary Variability: An Archaeological Investigation*. Academic Press, Orlando, Florida.

Ownby, M. F., C. L. Ownby, and E. J. Miksa

2004 Use of Scanning Electron Microscope to Characterize Schist as a Temper in Hohokam Pottery. *Journal of Archaeological Science* 31:31-38.

Parkman, E. B.

1981 Rock Art of the Cuyamacas. Paper presented at the Annual Rock Art Symposium of the San Diego Museum of Man, November 1981. San Diego.

1983 Soapstone for the Cosmos: Archaeological Discoveries in the Cuyamaca Mountains. *Journal of California and Great Basin Anthropology* 5:140-153.

Parkman, E. B., and D. G. Foster

1981 Site Record for CA-SDI-9039. On file South Coastal Information Center, San Diego State University.

Patencio, F.

1943 *Stories and Legends of the Palm Springs Indians*. The Times Mirror Co., Los Angeles, California.

Patton, M. Q.

1990 *Qualitative evaluation and research methods* (2nd edition). Sage Publications, Newbury Park, California.

Pearson, M. P.

1982 Mortuary practices, society, and ideology: an ethnoarchaeological study. In *Symbolic and Structural Archaeology*, edited by Ian Hodder, pp. 99–113. Cambridge University Press, Cambridge.

1999 *The Archaeology of Death and Burial*. Texas A&M University, College Station, Texas.

Peebles, S.

1971 Moundville and Surrounding Sites: Some Structural Considerations of Mortuary Practices. In *Approaches to the Social Dimensions of Mortuary Practices*, edited by J. A. Brown, pp. 69-91. Memoirs 25. Society for American Archaeology, Washington D.C.

Peelo, S.

2011 Pottery-Making in Spanish California: Creating Multi-Scalar Social Identity through Daily Practice. *American Antiquity* 76(4):642-666.

Pennell, S.E.

1977 Application of Radioanalytical techniques to Archaeological Problems. Unpublished Master's thesis, Department of Chemistry, University of Virginia.

Perry, J., and Delaney-Rivera, C.

2011 Interactions and Interiors of the Coastal Chumash: Perspectives from the Santa Cruz Island and the Oxnard Plain. *California Archaeology* 3(1):103-126.

Polk, M. R.

1972 Manufacture and Use of Steatite Objects by the Digueño. *Pacific Coast Archaeological Society Quarterly* 8(3):5-26.

Polanyi, K.

1944 *The Great Transformation*. Rinehart, New York.

1957 The economy as instituted process. In, *Trade and market in the early empires*, K. Polanyi, C. Arensberg, and H. Pearson (eds.), pp. 243-70. New York: Free Press.

Popelka-Filcoff, R. S., J. D. Robertson, M. D. Glascock, and Ch. Descantes

2007 Trace element characterization of ochre from geological sources. *Journal of Radioanalytical and Nuclear Chemistry* 272(2):17-27.

Price, B. A., A. C. Gold, B. S. Tejada, D. E. Earle., S. Griset, J. B. Llyod, M. Baloian, N. Valiente, V. Popper, and L. Anderson

2009 The Archaeology of CA-LAN-192: Lovejoy Springs and Western Mojave Desert Prehistory. Applied Earthworks, Fresno, California. Prepared for the County of Los Angeles Department of Public Works.

Price, T. D., and J. A. Brown (editors)

1985 *Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity*. Academic Press, San Diego, California.

Quinn, H. M.

1997 Observations on the Cahuilla Indians…Past and Present. *Coachella Valley Archaeological Society Occasional Papers* No. 1.

Raab, L. M., and W. J. Howard

2002 Modeling Cultural Connections Between the Southern Channel Islands and Western United States: The Middle Holocene Distribution of *Olivella* Grooved Rectangular Beads. *Proceedings of the Fifth California Islands Symposium: 29 March to 1 April, 1999,* D.R. Brown, K.L. Mitchell, and H.W. Chaney (eds.), pp. 590-597. Santa Barbara Museum of Natural History.

Ramon, D., and E. Elliott

2000 *Wayta' Yawa' "Always Believe."* Malki Museum Press, Banning, California.

Rector, C. H., J. D. Swenson, and P. J. Wilke

1983 Archaeological Studies at Oro Grande Mojave Desert, California. San Bernardino County Museum Association, Redlands.

Rick, T. C., J. Erlandson, R. Villanoweth, and T. Braje

2005 From Pleistocene Mariners to Complex Hunter-Gatherers: The Archaeology of California Channel Islands. *Journal of World Prehistory* 10:169-228.

Rigby, J. W.

2000 Beads, Pendants, and Other Shell Artifacts from Eel Point C, San Clemente Island. *Pacific Coast Archaeological Society Quarterly* 36(3):35-55.

Robin, C.

2003 New Directions in Classic Maya Household Archaeology. *Journal of Archaeological Research* 11(4):307-356.

Robinson, D. W.

2010 Land Use, Land Ideology: An Integrated Geographic Information Systems Analysis of Rock Art Within South-Central California. *American Antiquity* 75(4):792-818.

Rogers, M., R. O. Allen, C. Nagle, and W. Fitzhugh.

1983 The Utilization of Rare Earth Element Concentrations for the Characterization of Soapstone Quarries. *Archaeometry* 25(2):186-195.

Romani, G.

1980 Stone Beads. In, An Archaeological Assessment of the Walker Cairn Site (4-LAN-21), Chatsworth, California, edited by L. J. Tartaglia, pp. 251-272. Report on file, South-Central Coastal Information Center, California State University, Fullerton.

1982 In Search of Soapstone. Unpublished MA Thesis, Department of Anthropology, California State University, Northridge.

Romani, J., G. Romani, B. Neumann, and C. King

1983 Site Record: LAN-1132. Record on file, South Central Coastal Information Center, California State University, Fullerton.

Santi, P, F. Antonelli, and A. Renzulli

2005 Provenance of Medieval *Pietra Ollare* Artefacts Found in Archaeological Sites of Central-Eastern Italy: Insights into the Alpine Soapstone Trade. *Archaeometry* 47(2):253-264.

Sassaman, K. E.

1993 *Early Pottery in the Southwest Tradition and Innovation in Cooking Technology*. University of Alabama Press, Tuscaloosa, Alabama.

1995 Cultural Diversity Among the Mid-Holocene Societies. In *Native American Interactions: Multiscalar Analyses and Interpretations in the Eastern Woodlands,* edited by M. S. Nassaney and K. S. Sassaman, pp. 174-204. University of Tennessee Press, Knoxville, Tennessee.

1998 Crafting Cultural Identity in Hunter-Gather Economies. In *Craft and Social Identity,* edited by C. L. Costin and R. P. Wright, pp. 93-108. Archaeological Papers of the American Anthropological Association No. 8.

Sassaman, K. E.(contined)

1999 A Southeastern Perspective on Soapstone Vessel Technology in the Northeast. In *The Archaeological Northeast*, edited by M.A. Levine, K. Sassaman, and M, Nassaney, pp. 75-96. Bergin and Garvey, Westport, Connecticut.

2004 Complex Hunter-Gatherers in Evolution and History: A North American Perspective. *Journal of Archaeological Research* 12:227-280.

Sayre, E. V.

1975 Brookhaven procedures for statistical analyses of multivariate archaeometric data. Brookhaven National Laboratory Report, BNL-23128, New York.

Scalise, J. L.

1994 San Clemente Island's Social and Economic Exchange Networks: A Diachronic View of Interaction Among the Maritime Adapted Southern and Northern Channel Islands, California, Parts I and II. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

Shackley, S.

1980a Site Record: SDI-7790. Record on file, Bureau of Land Management, El Centro Field Office.

1980b Site Record: SDI-8538. Record on file, Cleveland National Forest, San Diego.

Shanks, M., and C. Tilley

1982 Ideology, Symbolic Power and Ritual Communication: A Reinterpretation of Neolithic Burial Practices. In *Symbolic and Structural Archaeology*, edited by I. Hodder, pp. 129-154. Cambridge University Press, Cambridge.

Sheets, Payson

2000 Provisioning the Ceren Household: The Vertical Economy, Village Economy, and Household Economy in the Southeastern Maya Periphery. *Ancient Mesoamerica* 11:217-230.

Speakman, R. J., and H. Neff

2000 The Applications of Laser Ablation-ICP-MS to the Study of Archaeological Materials – An Introduction. In Laser Ablation-ICP-MS in Archaeological Research, edited by R. J. Speakman and H. Neff, pp. 1-16, University of New Mexico Press, Albuquerque.

Stine, S.
1994 Extreme and Persistent Drought in California and Patagonia During Medieval Time. *Nature* 369:546-549.

Strong, W. D.
1929 *Aboriginal Society in Southern California*. Malki Museum Press, California.

Sutton, M. Q.
2011 The Del Rey Tradition and Its Place in the Prehistory of Southern California. *Pacific Coast Archaeological Society Quarterly*, 44(2):1-54.

Sutton, M., M. Basgall, J. Gardner, and M. Allen
2007 Advances in Understanding Mojave Desert Prehistory. In, California Prehistory: Colonization, Culture, and Complexity, T. L. Jones and K. A. Karr (eds,), pp 229-246. Altamira Press, New York.

Tabares, A., M. Love, R. Speakmen, H. Neff , and M.Glascock
2005 Straight from the Source: Obsidian Prismatic Blades at El Ujuxte, Guatemala. *In* Speakmen, R, and Neff, H. (eds.) Laser Ablation-ICP-MS in Archaeological Research, pp 17-28. University of New Mexico Press, Albuquerque.

Tashakkori, A., and C. Teddle
1998 *Mixed Methodology: Combining qualitative and quantitative approaches*. Sage Publications, Thousand Oaks, California.

Tomasello, M., A. P. Melis, C. Tennie, E. Wyman, and E. Herrmann
2012 Two Key Steps in the Evolution of Human Cooperation: The Interdependence Hypothesis. *Current Anthropology* 53(6):673-692.

Tupa, A. L.
2009 San Clemente Island Steatite Sourcing. Unpublished Master's Thesis, Department of Anthropology, California State University, Long Beach.

Truncer, J., M. Glascock, and H. Neff
1998 Steatite Source Characterization in Eastern North America: New Results Using Instrumental Neutron Activation Analysis. *Archaeometry* 40: 23-44.

Turnbaugh, W. A., and T. H. Keifer
1979 Chemical Variation in Selected Soapstone Quarries of Southern New England. *Man in the Northeast* 18:32-47.

Turnbaugh, W. A., S. P. Turnbaugh, and T. H. Keifer

1984 Characterization of Selected Soapstone Sources in Southern New England. In *Prehistoric Quarries and Lithic Production*, J.E. Ericson and B.A. Purdy (eds.), pp. 129-138. Cambridge University Press, Cambridge.

Van Horn, D. M.

1987 Excavations at the Del Rey Site (LAN-63) and the Bluff Site (LAN-64) in the City of Los Angeles. Archaeological Associates Limited, Sun City, California.

Vellanoweth, R. L.

1995 New Evidence from San Nicolas Island Concerning the Distribution and Manufacture of *Olivella* Grooved Rectangular Beads. *Pacific Coast Archaeological Society Quarterly* 31:13-22.

Wailes, B. (editor)

1996 *Craft Specialization and Social Evolution: In Memory of V. Gordon Childe*. The University Museum of Archaeology and Anthropology University of Pennsylvania, Philadelphia.

Walker, E.F.

1939 Field Catalogue from the 1939 Excavation of 4-LAN-21. On file at the Southwest Museum, Los Angeles County, California.

1951 Five Prehistoric Archaeological Sites in Los Angeles County, California. Southwest Museum, Los Angeles County, California.

Wallis, N. J.

2008 Networks of History and Memory: Creating a Nexus of Social Identities in Woodland Period Mounds on the Lower St. Johns River, Florida. *Journal of Social Archaeology* 8(2):236-271.

Weigand, P. C., G. Harbottle, and E. V. Sayre

1977 Turquoise Sources and Source Analysis: Mesoamerica and the Southwestern U.S.A. In *Exchange Systems in Prehistory,* edited by T. K. Earle and J. E. Ericson, pp. 15-34. Academic Press, San Francisco, California.

Weissner, P.

1983 Style and Social Information in Kalahari San Projectile Points. *American Antiquity* 48:253-276.

Wells, R. J.

1975 Talc, Soapstone, and Pyrophillite. *California Bureau of Mines, Mineral Facts and Problems Bulletin* 667.

Wessel, R., and G. Anderson
1985 Site Record: LAN-1132. Record on file, South Central Coastal Information Center, California State University, Fullerton.

Williams, S. L., and E. J. Rosenthal
1993 Soapstone Craft Specialization at the Upper Buffalo Springs Quarry, Santa Catalina Island. *Pacific Coast Archaeological Society Quarterly* 29(3):22-50.

Wlodarski, R. J.
1979 Catalina Island Soapstone Manufacture. *Journal of California and Great Basin Anthropology* 1(2):331-355.

Wolf, E. R.
1982 *Europe and the People Without History*. University of California Press, Berkeley.
1990 Distinguished Lecture: Facing Power. *American Anthropologist* 92:586-596.

Wright, L. A.
1957 Talc and Soapstone. *Mineral Commodities of California, Bulletin* 176:623-634. Division of Mines. San Francisco.

NOTES

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[1] Examples of ritualized gifting in ceremonial context include the *Nukil*, one of the largest ceremonies in Cahuilla society held annually, or bi-annually, to honor the dead. As part of the ritual activity, each lineage/community group would present a gift of crafted items, including shell beads, food and raw materials, to the hosting lineage/community group (Bean 1972:136). The items gifted were collected from all members of the group, who would benefit from the social relationship the gift was either creating or reinforcing (Bean 1972:138). The ritualized act of giving was performed by the lineage/community leader who symbolized group social identity. The leader presented the gift, representing the labor and resources of all members of the group, to the leader of the host lineage/community, who also symbolized group social identity. The end result of this symbolic performance was either the establishment of a new social relation, or exchange alliance, or the reinforcement of an existing alliance. In both cases, the ritual created the opportunity for individuals within these groups to initiate in reciprocal exchange with members of the opposite group. During ethnographic times, shell beads played an integral role in these exchanges.

It was customary among Cahuilla clans to send small strands of shell beads, called *napanaa*, to the leader of another clan when hearing of a death in the clan (Strong 1929:98). The strands would be brought to the leader of the next closest clan by the *Paha*, the ceremonial official, and the strands would be sent to the next closest clan, and so on until the strands of beads reached the Paha at the village of the deceased (Strong 1929:99). At the following *Nukil*, the strands of beads were apparently returned to the clan leaders who sent them. Long strands of shell beads called *witcū* were also exchanged. These long strands were given by the host clan leader to visiting clan leader following the *Nukil*, and a similar piece was returned when the clan hosted a ceremony that the other was invited (Strong 1929:99). Shell beads were received by the Pass Cahuilla who recovered them from the Serrano at Mission Creek, which received them from the Gabrieliño, who in turn received them from Catalina Islanders (*pipīmurum*). The beads were brought across the ocean on tule rafts to the San Fernando people who the distributed them among the inland groups and the smaller beads, referred to as *somitnektcum* were more valuable than larger beads (Strong 1929:96). While the specifics of this ritual exchange appears to have developed among the Pass and Mountain Cahuilla following Spanish arrival and had no recollection among the Desert Cahuilla (Strong 1929:99), the exchange of shell beads in Prehispanic ritual context is inferred from the presence of shell beads in mortuary context recovered from numerous sites throughout the Coachella Valley and surrounding region. The antiquity of the distribution system described by Strong (1929:96) is, unfortunately, not known.

[2] This approach is referred to as the sequential transformative mixed methods strategy (Creswell 2003).

[3] It is of interest to note that the only *Olivella* shell beads reported at LAN-361 by King (1990:111) were classified as *Olivella* grooved rectangular (OGR) beads, which as previously discussed, was a distinct stylistic variant used during the Early period, also in areas occupied historically by Uto-Aztecan speaking peoples.

[4] During the early Middle period, higher frequencies of dorsal ground *Olivella* saucer beads were reported in areas occupied by Takic speaking peoples (i.e., Los Angeles, San Bernardino, and Orange counties) than in the Santa Barbara Channel, and their use likely coincided with chlorite schist disc beads (King 1990:129). While *Olivella* dorsal ground saucer beads were coeval with chlorite schist disc beads and were both recovered from at least one burial near Rosamond Lake (LAN-1296), they appear to have very different distribution patterns. The relationship between dorsal ground saucers and chlorite schist disc beads is worthy of consideration but such an effort is beyond the scope of the current study.

APPENDIX A: MULTIVARIATE STATISTICAL ANALYSIS
(COMPUTER PRINTOUTS)

Table A-1. Tier 1: Canonical Discriminant Analysis Based on Chlorite Schist, Jacumba Schist, Santa Cruz Island Schist, Serpentine, and Talc Schist utilizing 11 elements

```
Discriminant Function Coefficients:

MG       -1.5038  2.8052 -0.1160  0.3186
AL        0.6508  0.8441  0.3496  0.4978
SI       -1.5377 -2.7827  1.5994  2.3404
CA        0.0180  0.0380 -0.1715 -0.0307
TI        0.0506 -0.1244 -0.1749 -0.2051
V         0.3762 -0.7134 -0.3187 -0.0822
CR       -0.8895 -0.1720 -0.2102 -0.1550
MN       -0.1140 -0.2071  0.0162  0.4314
NI       -0.3534 -0.1054  0.0229 -0.0786
CU       -0.0020  0.1055 -0.1898  0.2802
SR       -0.0778 -0.2050  0.1674 -0.0967

Wilk's lambda:     0.0017
    Approx. F:   116.1134
      p-value:     0.0000
```

Table A-2. Tier 1: Mahalanobis distance calculation and posterior classification of Chlorite Schist, Jacumba Schist, Santa Cruz Island Schist, Serpentine, and Talc Schist utilizing 11 elements

```
Date: 11/20/12
File: Tier1_Sourcing_Protocol

Groups are:
       1        CS
       2        JS
       3      SCIS
       4      SERP
       5        TS

Variables used:
        MG         AL         SI         CA         TI          V          CR
        MN         NI         CU         SR

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  CS
           Probabilities:
ID. NO.        CS         JS       SCIS       SERP         TS     From:     Into:
DIBB-1     11.494      0.000      0.000      0.000      0.000         1         1
DIBB-2     88.116      0.000      0.000      0.008      0.000         1         1
DIBB-3      1.961      0.000      0.000      0.008      0.000         1         1
DIBB-4     93.836      0.000      0.000      0.009      0.000         1         1
DIBB-5     86.762      0.000      0.000      0.008      0.000         1         1
DIBB-6     96.042      0.000      0.000      0.001      0.000         1         1
DIBB-7     53.102      0.000      0.000      0.005      0.000         1         1
DIBB-8     98.240      0.000      0.000      0.010      0.000         1         1
DIBB-9     90.005      0.000      0.000      0.004      0.000         1         1
DIBB-10    51.996      0.000      0.002      0.000      0.000         1         1
DIBB-11     6.816      0.000      0.001      0.001      0.000         1         1
DIBB-12     6.999      0.000      0.001      0.004      0.000         1         1
DIBB-13    78.362      0.000      0.002      0.001      0.000         1         1
DIBB-14    30.288      0.000      0.001      0.001      0.000         1         1
DIBB-15    65.362      0.000      0.004      0.005      0.000         1         1
DIBB-16     2.405      0.000      0.001      2.096      0.000         1         1
DIBB-17    79.675      0.000      0.005      0.393      0.000         1         1
DIBB-18    52.239      0.000      0.000      0.000      0.000         1         1
DIBB-19    12.962      0.000      0.000      0.000      0.000         1         1
DIBB-20    39.615      0.000      0.003      0.077      0.000         1         1
DIBB-21     7.411      0.000      0.000      0.431      0.000         1         1
DIBB-22    22.593      0.000      0.000      0.081      0.000         1         1
DIBB-23    42.769      0.000      0.000      0.280      0.000         1         1
DIBB-24    94.265      0.000      0.001      0.281      0.000         1         1
DIBB-25    46.309      0.000      0.001      0.045      0.000         1         1

The following specimens are in the file  JS
           Probabilities:
ID. NO.        CS         JS       SCIS       SERP         TS     From:     Into:
7790-1A     0.000     83.137      0.017      0.000     14.444         2         2
7790-1B     0.000     99.590      0.027      0.000     15.820         2         2
7790-2A     0.000     50.946      0.000      0.000      2.708         2         2
7790-2B     0.000     61.596      0.006      0.000      0.840         2         2
7790-3A     0.000     73.065      0.018      0.000      6.266         2         2
7790-3B     0.000     78.057      0.001      0.000      3.910         2         2
7790-4A     0.000     36.660      0.017      0.000      6.148         2         2
7790-4B     0.000     94.653      0.053      0.000      8.154         2         2
7790-5A     0.000     32.373      0.036      0.000     14.175         2         2
7790-5B     0.000     79.151      0.001      0.000     15.082         2         2
7790-6A     0.000     94.785      0.085      0.000      4.910         2         2
7790-6B     0.000     94.323      0.066      0.000      8.837         2         2
```

```
7790-7A     0.000    62.095     0.001     0.000     1.030         2         2
7790-7B     0.000     2.089     0.009     0.000     1.580         2         2
7790-8A     0.000    35.986     0.000     0.000    10.056         2         2
7790-8B     0.000    70.244     0.020     0.000    15.854         2         2
7790-9A     0.000    15.662     0.109     0.000     2.088         2         2
7790-9B     0.000    72.424     0.001     0.000     1.526         2         2
7790-10A    0.000    18.826     0.026     0.000     0.706         2         2
7790-10B    0.000     2.947     0.000     0.000     0.167         2         2
7790-11     0.000     0.765     0.002     0.000     0.556         2         2
7790-12     0.000    47.770     0.049     0.000     1.746         2         2
7790-13     0.000     4.592     0.001     0.000     0.817         2         2
7790-14     0.000     7.782     0.000     0.000     0.057         2         2
7790-15     0.000    60.936     0.004     0.000     0.175         2         2

The following specimens are in the file  SCIS
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS     From:     Into:
SCRI334-    0.000     0.000    34.919     0.000     0.000         3         3
SCRI194-    0.000     0.000    18.486     0.000     0.000         3         3
SCRICDM-    0.000     0.000    87.166     0.000     0.000         3         3
SCRICDM-    0.000     0.000     2.045     0.000     0.000         3         3
SCRICDM-    0.000     0.000     0.018     0.000     0.000         3         3
SCRICDM-    0.000     0.000    13.996     0.000     0.000         3         3
SCRICI-2    0.000     0.000    31.298     0.000     0.000         3         3
SCRICI-4    0.000     0.000    99.889     0.000     0.000         3         3
SCRICI-6    0.000     0.000    80.563     0.000     0.000         3         3
SCRICI-2    0.000     0.000    62.255     0.000     0.000         3         3
SCRICI-2    0.000     0.000    88.900     0.000     0.000         3         3
SCRICIO-    0.000     0.000     2.915     0.000     0.000         3         3
SCRICI-2    0.000     0.000     0.055     0.000     0.000         3         3
SCRICI-1    0.000     0.000    66.916     0.000     0.000         3         3
SCRICI-1    0.000     0.000    27.028     0.000     0.000         3         3
SCRICI-1    0.000     0.000    55.141     0.000     0.000         3         3
SCRIOPH-    0.000     0.000    11.860     0.000     0.000         3         3
SCRICIO3    0.000     0.000    67.634     0.000     0.000         3         3
SCRICI-9    0.000     0.000    97.646     0.000     0.000         3         3
SCRISRO-    0.000     0.000     2.537     0.000     0.000         3         3
SCRICI-8    0.000     0.000    98.569     0.000     0.000         3         3
SCRICI-2    0.000     0.000    99.938     0.000     0.000         3         3
SCRICI-1    0.000     0.000    33.467     0.000     0.000         3         3
SCRICI-2    0.000     0.000    99.995     0.000     0.000         3         3
SCRICIO2    0.000     0.000    62.616     0.000     0.000         3         3

The following specimens are in the file  SERP
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS     From:     Into:
1132-19A    0.000     0.000     0.000     8.050     0.000         4         4
1132-19B    0.000     0.000     0.000    65.373     0.000         4         4
1132-22A    0.000     0.000     0.000    39.101     0.000         4         4
1132-22B    0.000     0.000     0.000     1.147     0.000         4         4
1132-23A    0.000     0.000     0.000    86.228     0.000         4         4
1132-23B    0.000     0.000     0.000    96.626     0.000         4         4
1132-24A    0.000     0.000     0.000    47.818     0.000         4         4
1132-24B    0.000     0.000     0.000    94.920     0.000         4         4
1132-25A    0.000     0.000     0.000    43.035     0.000         4         4
1132-25B    0.000     0.000     0.000    78.733     0.000         4         4
1132-29A    0.000     0.000     0.000    76.979     0.000         4         4
1132-29B    0.000     0.000     0.000    73.682     0.000         4         4
1132-32A    0.000     0.000     0.000    93.566     0.000         4         4
1132-32B    0.000     0.000     0.000    93.709     0.000         4         4
1132-34     0.000     0.000     0.000    26.597     0.000         4         4
1132-36A    0.000     0.000     0.000    72.545     0.000         4         4
1132-36B    0.000     0.000     0.000     5.913     0.000         4         4
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1132-39A    0.000     0.000     0.000    77.049     0.000         4         4
1132-39B    0.000     0.000     0.000    83.595     0.000         4         4
1132-40A    0.000     0.000     0.000    98.191     0.000         4         4
1132-40B    0.000     0.000     0.000    88.430     0.000         4         4
1132-44A    0.000     0.000     0.000    32.399     0.000         4         4
1132-44B    0.000     0.000     0.000    35.271     0.000         4         4
1132-45A    0.000     0.000     0.000    73.907     0.000         4         4
1132-45B    0.000     0.000     0.000     0.367     0.000         4         4
1132-1      0.000     0.000     0.000    39.503     0.000         4         4
1132-2      0.000     0.000     0.000    65.985     0.000         4         4
1132-3      0.000     0.000     0.000    11.467     0.000         4         4
1132-4      0.000     0.000     0.000     2.623     0.000         4         4
1132-5      0.000     0.000     0.000    65.430     0.000         4         4
1132-6      0.001     0.000     0.000    71.926     0.000         4         4
1132-7      0.000     0.000     0.000    27.759     0.000         4         4
1132-8      0.000     0.000     0.000     6.645     0.000         4         4
1132-9      0.002     0.000     0.000    50.682     0.000         4         4
1132-10     0.000     0.000     0.000    21.268     0.000         4         4
1132-11     0.001     0.000     0.000    87.252     0.000         4         4
1132-12A    0.000     0.000     0.000    64.990     0.000         4         4
1132-12B    0.001     0.000     0.000    55.998     0.000         4         4
1132-13A    0.000     0.000     0.000    84.993     0.000         4         4
1132-13B    0.000     0.000     0.000     0.758     0.000         4         4
1132-14A    0.000     0.000     0.000    54.618     0.000         4         4
1132-14B    0.000     0.000     0.000    96.206     0.000         4         4
1132-15A    0.000     0.000     0.000    89.355     0.000         4         4
1132-15B    0.000     0.000     0.000    72.323     0.000         4         4
1132-16A    0.000     0.000     0.000     2.715     0.000         4         4
1132-16B    0.000     0.000     0.000    22.459     0.000         4         4
1132-17A    0.000     0.001     0.000    68.570     0.000         4         4
1132-17B    0.001     0.000     0.000    59.638     0.000         4         4
1132-18A    0.000     0.000     0.000     8.826     0.000         4         4
1132-18B    0.000     0.001     0.000    18.541     0.000         4         4

The following specimens are in the file  TS
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS     From:     Into:
1279-1A     0.000     0.007     0.000     0.000    91.690         5         5
1279-1B     0.000     0.000     0.000     0.000    22.818         5         5
1279-1C     0.000     0.000     0.000     0.000    50.334         5         5
1279-2A     0.000     0.000     0.000     0.000    29.657         5         5
1279-2B     0.000     0.005     0.000     0.000    66.121         5         5
1279-3A     0.000     0.000     0.000     0.000    10.374         5         5
1279-3B     0.000     0.002     0.000     0.000    10.389         5         5
1279-4A     0.000     0.000     0.000     0.000     2.130         5         5
1279-4B     0.000     0.000     0.000     0.000     4.401         5         5
1279-5A     0.000     0.000     0.000     0.000    41.071         5         5
1279-5B     0.000     0.000     0.000     0.000     0.175         5         5
1279-6A     0.000     0.027     0.000     0.000    98.208         5         5
1279-6B     0.000     0.000     0.000     0.000    64.061         5         5
1279-7A     0.000     0.000     0.000     0.000    11.032         5         5
1279-7B     0.000     0.000     0.000     0.000    20.744         5         5
1279-8A     0.000     0.002     0.000     0.000    99.357         5         5
1279-8B     0.000     0.001     0.000     0.000    95.619         5         5
1279-9A     0.000     0.001     0.000     0.000    94.734         5         5
1279-9B     0.000     0.001     0.000     0.000    88.200         5         5
1279-10A    0.000     0.005     0.000     0.000    92.301         5         5
1279-10B    0.000     0.000     0.000     0.000    93.420         5         5
1279-11A    0.000     0.001     0.000     0.000    64.796         5         5
1279-11B    0.000     0.004     0.000     0.000    96.510         5         5
1279-12A    0.000     0.000     0.000     0.000    29.902         5         5
1279-12B    0.000     0.000     0.000     0.000    30.822         5         5
1279-13A    0.000     0.290     0.000     0.000    96.633         5         5
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1279-13B	0.000	0.004	0.000	0.000	27.349	5	5
1279-13C	0.000	0.000	0.000	0.000	13.381	5	5
1279-14A	0.000	0.367	0.000	0.000	66.900	5	5
1279-14B	0.000	0.000	0.000	0.000	69.320	5	5
1279-14C	0.000	0.695	0.001	0.000	90.941	5	5
1279-15A	0.000	0.007	0.000	0.000	90.011	5	5
1279-15B	0.000	0.037	0.000	0.000	63.547	5	5
1279-15C	0.000	0.024	0.000	0.000	83.789	5	5
1279-16A	0.000	0.003	0.000	0.000	80.897	5	5
1279-16B	0.000	0.004	0.000	0.000	94.465	5	5
1279-16C	0.000	0.010	0.000	0.000	90.511	5	5
1279-16D	0.000	0.208	0.000	0.000	92.399	5	5
1279-17A	0.000	0.026	0.000	0.000	99.460	5	5
1279-17B	0.000	0.327	0.000	0.000	90.465	5	5
1279-17C	0.000	0.009	0.000	0.000	90.607	5	5
1279-18A	0.000	0.170	0.000	0.000	79.340	5	5
1279-18B	0.000	0.020	0.000	0.000	97.672	5	5
1279-18C	0.000	0.015	0.000	0.000	87.761	5	5
1279-19A	0.000	0.000	0.000	0.000	98.527	5	5
1279-19B	0.000	0.005	0.000	0.000	90.382	5	5
1279-19C	0.000	0.001	0.000	0.000	95.652	5	5
1279-17C	0.000	0.075	0.000	0.000	93.394	5	5
1279-20B	0.000	0.017	0.000	0.000	74.589	5	5
1279-20C	0.000	0.006	0.000	0.000	70.480	5	5
1132-98A	0.000	0.030	0.000	0.000	60.936	5	5
1132-98B	0.000	0.018	0.000	0.000	97.964	5	5
1132-99A	0.000	0.001	0.000	0.000	48.171	5	5
1132-99B	0.000	0.002	0.000	0.000	50.427	5	5
1132-100	0.000	0.000	0.000	0.000	92.207	5	5
1132-100	0.000	0.002	0.000	0.000	98.628	5	5
1132-101	0.000	0.002	0.000	0.000	99.818	5	5
1132-101	0.000	0.003	0.000	0.000	99.820	5	5
1132-102	0.000	0.001	0.000	0.000	99.477	5	5
1132-102	0.000	0.001	0.000	0.000	70.701	5	5
1132-103	0.000	0.020	0.000	0.000	78.002	5	5
1132-104	0.000	0.012	0.000	0.000	96.744	5	5
1132-105	0.000	0.000	0.000	0.000	88.555	5	5
1132-106	0.000	0.001	0.000	0.000	62.070	5	5
1132-107	0.000	0.005	0.000	0.000	98.495	5	5
1132-108	0.000	0.001	0.000	0.000	81.206	5	5
1132-109	0.000	0.014	0.000	0.000	88.638	5	5
1132-110	0.000	0.000	0.000	0.000	51.590	5	5
1132-111	0.000	0.005	0.000	0.000	47.397	5	5
1132-112	0.000	0.001	0.000	0.000	98.309	5	5
1132-113	0.000	0.000	0.000	0.000	0.227	5	5
1132-114	0.000	0.003	0.000	0.000	97.478	5	5
1132-115	0.000	0.042	0.000	0.000	67.248	5	5
1132-116	0.000	0.044	0.001	0.000	62.077	5	5
1132-117	0.000	0.000	0.000	0.000	0.000	5	5
1132-118	0.000	0.000	0.000	0.000	30.936	5	5
1132-118	0.000	0.001	0.000	0.000	82.892	5	5
1132-119	0.000	0.020	0.000	0.000	91.549	5	5
1132-119	0.000	0.014	0.002	0.000	74.184	5	5
1132-120	0.000	0.001	0.000	0.000	6.421	5	5
1132-120	0.000	0.000	0.001	0.003	0.015	5	5
1132-121	0.000	0.000	0.000	0.000	28.481	5	5
1132-122	0.000	0.000	0.000	0.000	49.482	5	5
1132-122	0.000	0.002	0.000	0.000	80.525	5	5
1132-123	0.000	0.000	0.000	0.000	0.881	5	5
1132-123	0.000	0.000	0.000	0.000	0.000	5	2
1132-124	0.000	0.011	0.000	0.000	5.483	5	5
1132-125	0.000	0.000	0.000	0.000	82.300	5	5
1132-126	0.000	0.125	0.009	0.000	59.744	5	5

1132-127	0.000	0.000	0.000	0.000	31.481	5	5
1132-127	0.000	0.000	0.000	0.000	74.690	5	5
1132-128	0.000	0.000	0.000	0.000	31.633	5	5
1132-128	0.000	0.000	0.000	0.000	0.432	5	5
1132-129	0.000	0.000	0.000	0.000	12.236	5	5
1132-129	0.000	0.000	0.000	0.000	98.596	5	5
1132-130	0.000	0.007	0.013	0.000	35.113	5	5
1132-130	0.000	0.000	0.000	0.000	13.379	5	5
1132-131	0.000	0.000	0.000	0.000	93.703	5	5
1132-132	0.000	0.000	0.000	0.000	44.364	5	5
1132-133	0.000	0.000	0.000	0.000	93.194	5	5
8538-1A	0.000	0.000	0.000	0.000	43.851	5	5
8538-1B	0.000	0.001	0.000	0.000	82.096	5	5
8538-2A	0.000	0.000	0.000	0.000	97.396	5	5
8538-2B	0.000	0.000	0.000	0.000	45.220	5	5
8538-3A	0.000	0.000	0.000	0.000	62.461	5	5
8538-3B	0.000	0.001	0.000	0.000	81.848	5	5
8538-4A	0.000	0.000	0.000	0.000	38.803	5	5
8538-4B	0.000	0.000	0.000	0.000	92.829	5	5
8538-9A	0.000	0.006	0.000	0.000	98.095	5	5
8538-9B	0.000	0.000	0.000	0.000	65.600	5	5
8538-10	0.000	0.001	0.000	0.000	98.550	5	5
8538-11	0.000	0.001	0.000	0.000	50.350	5	5
8538-12	0.000	0.001	0.000	0.000	63.360	5	5
8538-13	0.000	0.000	0.000	0.000	20.693	5	5
8538-14	0.000	0.005	0.000	0.000	1.720	5	5
8538-15	0.000	0.000	0.000	0.000	2.642	5	5
8538-16	0.000	0.012	0.000	0.000	74.065	5	5
8538-17	0.000	0.026	0.000	0.000	76.473	5	5
8538-18	0.000	0.000	0.000	0.000	10.616	5	5
8538-19	0.000	0.000	0.000	0.000	13.934	5	5
8538-20	0.000	0.001	0.000	0.000	24.108	5	5
8538-21	0.000	0.000	0.000	0.000	39.709	5	5
8538-22	0.000	0.007	0.000	0.000	97.315	5	5
8538-23	0.000	0.000	0.000	0.000	95.437	5	5
8538-24	0.000	0.000	0.000	0.000	91.847	5	5
8583-5A	0.000	0.007	0.000	0.000	93.265	5	5
8583-5B	0.000	0.023	0.000	0.000	77.383	5	5
8583-6A	0.000	0.000	0.000	0.000	74.210	5	5
8583-6B	0.000	0.001	0.000	0.000	2.267	5	5
8583-7A	0.000	0.001	0.000	0.000	67.569	5	5
8583-7B	0.000	0.000	0.000	0.000	80.543	5	5
8583-8A	0.000	1.664	0.000	0.000	51.147	5	5
8583-8B	0.000	0.040	0.000	0.000	73.466	5	5
8583-25A	0.000	0.067	0.000	0.000	62.971	5	5
8583-25B	0.000	0.011	0.000	0.000	36.841	5	5
8583-26A	0.000	0.000	0.000	0.000	80.127	5	5
8583-26B	0.000	0.000	0.000	0.000	91.093	5	5
8583-27A	0.000	0.000	0.000	0.000	38.226	5	5
8583-27B	0.000	0.001	0.000	0.000	82.784	5	5
8583-28A	0.000	0.000	0.000	0.000	98.079	5	5
8583-28B	0.000	0.000	0.000	0.000	92.716	5	5
8583-29A	0.000	0.004	0.000	0.000	92.650	5	5
8538-29B	0.000	0.002	0.000	0.000	72.516	5	5
8583-30A	0.000	0.000	0.000	0.000	74.856	5	5
8583-30B	0.000	0.028	0.000	0.000	21.937	5	5
8538-31A	0.000	0.000	0.000	0.000	97.317	5	5
8538-31B	0.000	0.000	0.000	0.000	98.483	5	5
8538-32	0.000	0.001	0.000	0.000	62.237	5	5
8538-33	0.000	0.001	0.000	0.000	73.490	5	5
8538-34	0.000	0.000	0.000	0.000	60.253	5	5
9039-1	0.000	0.000	0.000	0.000	57.292	5	5
9039-3	0.000	0.000	0.000	0.000	73.516	5	5

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9039-6       0.000     0.000     0.000     0.000     6.581        5         5
9039-12      0.000     0.000     0.000     0.000    46.547        5         5
9039-13      0.000     0.000     0.000     0.000    83.235        5         5
9039-15      0.000     0.005     0.000     0.000    52.604        5         5
9039-16      0.000     0.000     0.000     0.000     6.829        5         5
9039-20      0.000     0.000     0.000     0.000    71.714        5         5
9039-21      0.000     0.000     0.000     0.000    38.279        5         5
9039-23      0.000     0.000     0.000     0.000    90.335        5         5
9039-24      0.000     0.191     0.000     0.000    87.539        5         5
9039-25      0.000     0.001     0.000     0.000    91.097        5         5
9039-28      0.000     0.000     0.000     0.000    53.172        5         5
9039-29      0.000     0.000     0.000     0.000     7.877        5         5
9039-30      0.000     0.002     0.000     0.000    77.928        5         5
9039-32      0.000     0.000     0.000     0.000     0.000        5         3
9039-37      0.000     0.001     0.000     0.000    77.681        5         5
9039-39      0.000     0.000     0.000     0.000    49.517        5         5
9039-40      0.000     0.000     0.000     0.000    47.963        5         5
9039-42      0.000     0.000     0.000     0.000     0.002        5         5
9039-45      0.000     0.000     0.000     0.000    98.258        5         5
9039-46      0.000     0.000     0.000     0.000    90.896        5         5
9039-47      0.000     0.001     0.000     0.000    76.676        5         5
9039-48      0.000     0.000     0.000     0.000    83.649        5         5
9039-50      0.000     0.000     0.000     0.000    43.350        5         5
9040-1       0.000     0.000     0.000     0.000    53.331        5         5
9040-2       0.000     0.000     0.000     0.000    93.109        5         5
9040-3       0.000     0.000     0.000     0.000    56.552        5         5
9040-6       0.000     0.008     0.000     0.000    28.877        5         5
9040-7       0.000     0.000     0.000     0.000    66.613        5         5
9040-8       0.000     0.000     0.000     0.000    42.172        5         5
9040-9       0.000     0.000     0.000     0.000    93.380        5         5
9040-10      0.000     0.004     0.000     0.000    75.625        5         5
9040-13      0.000     0.000     0.000     0.000    95.933        5         5
9040-14      0.000     0.097     0.000     0.000    36.478        5         5
9040-17      0.000     0.000     0.000     0.000    91.241        5         5
9040-20      0.000     0.001     0.000     0.000    40.377        5         5
9040-23      0.000     0.000     0.000     0.000    16.447        5         5
9040-27      0.000     0.000     0.000     0.000    68.169        5         5
9040-28      0.000     0.000     0.000     0.000    71.396        5         5
9040-34      0.000     0.000     0.000     0.000     0.000        5         2
9040-39      0.000     0.000     0.000     0.000    77.692        5         5
9040-40      0.000     0.000     0.000     0.000     0.000        5         5
9040-47      0.000     0.000     0.000     0.000    40.056        5         5
9040-50      0.000     0.000     0.000     0.000     0.000        5         5
9040-51      0.000     0.002     0.001     0.000    78.351        5         5
9040-52      0.000     0.000     0.000     0.000     7.756        5         5
9040-53      0.000     0.000     0.000     0.000    90.530        5         5
9040-54      0.000     0.000     0.000     0.000    94.087        5         5
9040-55      0.000     0.000     0.000     0.000    34.909        5         5


Summary of Classification Success:
                Into:
From:          CS         JS       SCIS       SERP         TS      Total
CS             25          0          0          0          0         25
JS              0         25          0          0          0         25
SCIS            0          0         25          0          0         25
SERP            0          0          0         50          0         50
TS              0          2          1          0        197        200
Total          25         27         26         50        197        325
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Table A-3. Tier 2: Canonical Discriminant Analysis Based on Catalina, Los Angeles, and San Diego soapstone utilizing 7 elements

```
Discriminant Function Coefficients:

NI       -1.8939  0.2347
CO        0.7936 -0.9901
CU       -0.0930 -0.3338
ZN        1.4228 -0.8040
AS        0.1589  0.3030
SN        0.0968 -0.0692
SB       -0.0250  0.0935

Wilk's lambda:     0.0879
    Approx. F:    96.9562
      p-value:     0.0000
```

Table A-4. Tier 1: Mahalanobis distance calculation and posterior classification of Catalina, Los Angeles, and San Diego soapstone utilizing 7 elements (validation of Clark 2009)

```
Date: 12/16/12
File: Tier_2_Clark_Validation

Groups are:
       1       CAT
       2        LA
       3        SD

Variables used:
        NI         CO         CU         ZN         AS         SN         SB

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  CAT
           Probabilities:
ID. NO.       CAT        LA        SD     From:     Into:
G1         86.906     0.822     0.262         1         1
G2         95.901     0.000     0.000         1         1
G3         15.995     0.000     0.009         1         1
G4         86.110     0.104     0.082         1         1
G5         91.177     0.000     0.000         1         1
G6         38.680     0.036     0.036         1         1
G7          4.931     0.040     0.119         1         1
G8         53.133     0.002     0.013         1         1
G9         26.244     0.000     0.000         1         1
G10        76.029     0.000     0.000         1         1
G11        46.642     0.051     0.183         1         1
G12        70.157     0.000     0.000         1         1
G13        93.319     0.000     0.000         1         1
G14        61.400     0.000     0.000         1         1
G15         4.887     0.000     0.000         1         1
G16        79.053     0.000     0.000         1         1
G17        36.904     0.000     0.000         1         1
G18        56.768     0.000     0.000         1         1
G19        99.375     0.172     0.154         1         1
G20        18.021     0.000     0.000         1         1
A2         99.009     0.000     0.001         1         1
A3         54.893     0.024     0.061         1         1
A5         93.908     0.000     0.000         1         1
A6         84.307     0.000     0.000         1         1
A7         78.527     4.923     2.487         1         1
A8         84.001     0.000     0.001         1         1
A9         69.506     0.340     0.365         1         1
A10        75.082     0.000     0.000         1         1
A11        90.359     0.000     0.000         1         1
A12        42.600     0.000     0.000         1         1
A13        42.675     2.646     1.269         1         1
A14        56.934     0.000     0.000         1         1
A15        76.800     0.000     0.000         1         1
A16        99.938     0.000     0.001         1         1
A17         1.606     0.005     0.035         1         1
A18        64.511     0.000     0.000         1         1
A19        50.674     0.000     0.000         1         1
A20        73.371     0.000     0.000         1         1
D1         97.362     0.000     0.000         1         1
D2         83.040     0.001     0.011         1         1
D3         47.312     0.000     0.001         1         1
D4         41.074     0.057     0.596         1         1
D5         62.637     0.313     0.698         1         1
D6         97.244     0.001     0.011         1         1
```

```
D7         90.600     0.403     0.311         1         1
D8         88.384     0.000     0.003         1         1
D9         99.967     0.000     0.001         1         1
D10        99.054     0.000     0.000         1         1
D11        96.236     0.000     0.003         1         1
D12        44.522     0.000     0.001         1         1
D13        92.859     2.895     0.763         1         1
D14         0.012     0.000     0.000         1         1
D15         0.005     0.000     0.000         1         1
D16        96.662     0.000     0.001         1         1
D17        83.289     0.000     0.000         1         1
D18        81.221     0.117     0.187         1         1
D19        81.159     0.067     0.476         1         1
D20        33.099     0.883     2.564         1         1
E1         57.781     0.018     0.016         1         1
E2         73.473     0.000     0.000         1         1
E3         13.683     0.001     0.113         1         1
E4          6.670     0.006     0.001         1         1
E5         95.032     0.000     0.003         1         1
E6         82.902     0.000     0.000         1         1
E7         48.355     0.000     0.000         1         1
E8          3.821     0.000     0.000         1         1
E9         70.407     0.034     0.219         1         1
E10         0.526     0.000     0.000         1         1
E11        20.060     0.000     0.000         1         1
E12         0.388     0.003     0.200         1         1
E13         8.489     0.000     0.000         1         1
E14        28.685     0.000     0.007         1         1
E15         6.033     0.001     0.008         1         1
E16        10.642     0.016     0.035         1         1
E17         0.147     0.036     0.011         1         1
E18        54.463     0.000     0.000         1         1
E19         0.125     0.001     0.134         1         3
E20        79.509     0.000     0.000         1         1
B1         77.183    14.479     2.972         1         1
B2         35.145     0.000     0.000         1         1
B3         89.465     0.000     0.000         1         1
B5         97.330     0.000     0.000         1         1
B6         12.941     0.431     1.918         1         1
B7         32.597     0.000     0.001         1         1
B8         49.566     0.000     0.000         1         1
B10         6.930     0.000     0.000         1         1
B11        92.943     0.239     0.248         1         1
B12        65.015     0.000     0.001         1         1
B14        51.072     0.024     0.249         1         1
B15        91.546     0.011     0.013         1         1
B16        95.523     0.020     0.017         1         1
B17        99.973     0.003     0.005         1         1
B18        90.999     0.000     0.000         1         1
B19         0.018     0.000     0.000         1         1
B20         7.907     0.000     0.000         1         1

The following specimens are in the file  LA
           Probabilities:
ID. NO.       CAT        LA        SD     From:     Into:
1279-1A     0.015     0.888     5.082         2         3
1279-1B    19.312    35.157    17.029         2         2
1279-1C     4.552    85.695    31.680         2         2
1279-2A     1.585    27.785    14.590         2         2
1279-2B     0.631    39.282    25.257         2         2
1279-3A     2.012    67.319    30.797         2         2
1279-3B     6.450     3.587     9.296         2         3
1279-4A     0.491    62.363    23.054         2         2
```

1279-4B	0.065	11.366	7.493	2	2
1279-5A	0.000	9.756	3.026	2	2
1279-5B	0.758	72.537	26.405	2	2
1279-6A	16.994	38.755	25.986	2	2
1279-6B	2.018	60.669	17.824	2	2
1279-7A	1.297	86.687	50.522	2	2
1279-7B	0.872	89.648	62.828	2	2
1279-8A	4.368	95.750	35.052	2	2
1279-8B	0.000	0.000	0.001	2	3
1279-9A	5.238	20.753	25.094	2	3
1279-9B	2.386	48.665	27.875	2	2
1279-10A	0.173	42.724	41.225	2	2
1279-10B	1.228	38.804	36.401	2	2
1279-11A	4.189	93.662	66.781	2	2
1279-11B	7.312	99.814	64.668	2	2
1279-12A	0.304	26.248	26.922	2	3
1279-12B	0.015	6.385	9.121	2	3
1279-13A	3.189	74.721	46.624	2	2
1279-13B	0.177	1.335	5.395	2	3
1279-13C	13.609	97.586	65.001	2	2
1279-14A	0.034	0.322	9.325	2	3
1279-14B	0.187	67.076	61.611	2	2
1279-14C	0.045	47.599	42.369	2	2
1279-15A	0.001	0.001	18.130	2	3
1279-15B	0.576	83.578	43.686	2	2
1279-15C	0.242	94.248	61.748	2	2
1279-16A	1.183	89.364	39.719	2	2
1279-16B	0.523	51.370	11.893	2	2
1279-16C	11.247	99.274	32.373	2	2
1279-16D	0.062	73.709	43.159	2	2
1279-17A	5.753	92.099	53.182	2	2
1279-17B	4.851	92.677	43.542	2	2
1279-17C	3.562	59.441	8.488	2	2
1279-18A	0.268	20.061	26.564	2	3
1279-18B	6.087	71.418	17.753	2	2
1279-18C	2.452	86.129	43.429	2	2
1279-19A	0.205	89.152	87.715	2	2
1279-19B	0.312	53.055	63.118	2	3
1279-19C	14.002	99.026	69.699	2	2
1279-17C	0.098	38.896	29.271	2	2
1279-20B	0.024	50.786	8.432	2	2
1279-20C	0.347	29.871	6.886	2	2
1132-98A	0.095	5.110	5.142	2	3
1132-98B	10.880	99.548	61.878	2	2
1132-99A	5.267	97.239	25.859	2	2
1132-99B	0.000	0.000	0.000	2	3
1132-100	1.887	86.455	53.340	2	2
1132-100	11.281	97.603	72.868	2	2
1132-101	17.161	99.637	49.993	2	2
1132-101	4.927	99.204	47.870	2	2
1132-102	0.687	83.742	24.106	2	2
1132-102	7.996	99.824	39.206	2	2
1132-103	3.401	87.279	26.556	2	2
1132-104	10.544	86.044	11.433	2	2
1132-105	1.988	98.207	32.319	2	2
1132-106	0.953	66.164	61.723	2	2
1132-107	10.866	99.091	56.409	2	2
1132-108	1.613	83.715	51.597	2	2
1132-109	7.186	98.663	61.320	2	2
1132-110	3.119	85.694	29.541	2	2
1132-111	9.739	86.791	23.656	2	2
1132-112	6.618	99.370	77.845	2	2
1132-113	0.000	0.001	66.061	2	3

```
1132-114    3.883    96.159    29.738         2         2
1132-115    4.520    97.411    35.295         2         2
1132-116    1.273    46.247     9.970         2         2
1132-117    0.025     0.397    93.896         2         3
1132-118    1.408    72.502    27.581         2         2
1132-118    0.299     9.895    11.752         2         3
1132-119    0.500    11.437    15.247         2         3
1132-119    0.040    53.056    11.767         2         2
1132-120    0.597    60.807    76.353         2         3
1132-120    0.567    83.712    88.067         2         3
1132-121    7.482    83.075    22.947         2         2
1132-122    0.453    95.047    41.128         2         2
1132-122    5.146    94.785    47.943         2         2
1132-123   18.107    50.396     9.913         2         2
1132-123    7.017    57.971    11.258         2         2
1132-124    0.041     3.993    12.863         2         3
1132-125   13.138    90.302    32.798         2         2
1132-126    5.786    95.617    69.818         2         2
1132-127    0.001    47.665     3.447         2         2
1132-127    0.116    46.647     4.185         2         2
1132-128    7.613    99.447    56.001         2         2
1132-128    1.537    50.814    34.706         2         2
1132-129   15.559     3.257     6.811         2         1
1132-129    9.303    95.529    56.288         2         2
1132-130    0.037     7.465     2.871         2         2
1132-130    0.137    17.381    38.945         2         3
1132-131    0.935    70.228    44.183         2         2
1132-132    0.082    37.776    13.796         2         2
1132-133    1.336    99.252    35.526         2         2

The following specimens are in the file  SD
           Probabilities:
ID. NO.        CAT        LA        SD     From:     Into:
8538-1A     0.000     1.483    40.106         3         3
8538-1B     0.000     1.164    72.400         3         3
8538-2A     4.593    87.394    80.998         3         2
8538-2B     0.060    20.849    92.132         3         3
8538-3A     0.010    13.457    79.570         3         3
8538-3B     0.850    79.143    86.399         3         3
8538-4A     1.183    73.078    30.277         3         2
8538-4B     0.001    19.403    46.546         3         3
8538-9A     0.407    71.998    79.161         3         3
8538-9B     0.039    17.944    86.085         3         3
8538-10     0.000     0.109    23.358         3         3
8538-11     0.004     0.671    93.555         3         3
8538-12     0.000    11.104    52.184         3         3
8538-13     0.018    22.346    91.924         3         3
8538-14     0.000     0.000     0.000         3         3
8538-15     0.422     5.796    46.755         3         3
8538-16     0.000     0.678    35.492         3         3
8538-17     0.000    45.762    45.439         3         2
8538-18     0.000     1.024    96.661         3         3
8538-19     0.039     1.015    51.565         3         3
8538-20     0.000     0.000     3.509         3         3
8538-21     0.154    27.852    86.222         3         3
8538-22     0.000     0.144    66.282         3         3
8538-23     0.043    39.592    83.936         3         3
8538-24     0.030    29.979    47.623         3         3
8583-5A     0.004     1.471    80.633         3         3
8583-5B     0.004     0.416     4.445         3         3
8583-6A     0.402    12.478    81.295         3         3
8583-6B     0.021     2.183     1.400         3         2
8583-7A     0.000     0.000     0.000         3         3
```

8583-7B	1.047	84.209	96.122	3	3
8583-8A	0.000	0.007	1.135	3	3
8583-8B	0.000	0.005	84.331	3	3
8583-25A	0.000	0.350	13.090	3	3
8583-25B	0.000	0.301	31.308	3	3
8583-26A	0.004	1.533	54.107	3	3
8583-26B	0.108	17.255	98.040	3	3
8583-27A	0.000	0.097	45.543	3	3
8583-27B	0.000	0.036	50.149	3	3
8583-28A	0.024	20.851	72.832	3	3
8583-28B	0.016	20.616	72.935	3	3
8583-29A	0.035	7.319	99.525	3	3
8538-29B	0.000	0.184	98.998	3	3
8583-30A	0.908	45.653	45.160	3	2
8583-30B	0.000	0.000	10.115	3	3
8538-31A	0.000	1.389	65.494	3	3
8538-31B	0.000	0.298	80.279	3	3
8538-32	0.000	0.196	59.756	3	3
8538-33	0.000	0.191	53.980	3	3
8538-34	0.000	0.204	51.534	3	3
9039-1	0.002	0.009	12.670	3	3
9039-3	0.000	0.015	44.350	3	3
9039-6	0.005	0.340	45.639	3	3
9039-12	0.000	0.002	41.812	3	3
9039-13	0.000	0.020	61.775	3	3
9039-15	0.017	11.245	96.806	3	3
9039-16	0.000	0.207	85.639	3	3
9039-20	0.003	0.001	2.219	3	3
9039-21	0.000	0.057	40.922	3	3
9039-23	0.005	2.489	88.880	3	3
9039-24	0.000	0.174	32.039	3	3
9039-25	0.000	0.268	91.828	3	3
9039-28	0.000	0.243	59.409	3	3
9039-29	0.000	0.007	39.832	3	3
9039-30	0.000	0.532	80.672	3	3
9039-32	0.000	0.000	1.527	3	3
9039-37	0.000	0.023	68.763	3	3
9039-39	0.000	0.046	46.063	3	3
9039-40	0.320	6.902	67.297	3	3
9039-42	0.004	0.022	29.770	3	3
9039-45	0.003	4.292	87.246	3	3
9039-46	0.000	0.040	31.121	3	3
9039-47	0.057	2.820	59.938	3	3
9039-48	0.000	0.022	49.440	3	3
9039-50	0.022	2.900	78.980	3	3
9040-1	0.000	0.008	71.251	3	3
9040-2	0.005	0.119	93.865	3	3
9040-3	0.000	0.006	34.837	3	3
9040-6	0.000	0.000	66.783	3	3
9040-7	0.000	0.220	89.315	3	3
9040-8	0.001	0.003	72.739	3	3
9040-9	0.000	0.013	90.241	3	3
9040-10	0.000	0.026	92.559	3	3
9040-13	0.002	0.136	60.963	3	3
9040-14	0.000	0.000	20.929	3	3
9040-17	0.000	0.091	93.065	3	3
9040-20	0.005	0.574	99.543	3	3
9040-23	0.000	0.000	0.635	3	3
9040-27	0.002	0.070	66.538	3	3
9040-28	0.001	0.998	90.831	3	3
9040-34	0.000	0.000	0.123	3	3
9040-39	0.003	4.889	95.199	3	3
9040-40	0.003	0.017	32.017	3	3

```
9040-47     0.000     0.000    18.476         3         3
9040-50     0.042     2.838    84.505         3         3
9040-51     0.000     0.000    62.326         3         3
9040-52     0.000     0.000    13.591         3         3
9040-53     0.000     0.003    93.114         3         3
9040-54     0.000     0.001    79.852         3         3
9040-55     0.000     0.000    25.425         3         3


Summary of Classification Success:
                Into:
From:          CAT        LA        SD     Total
CAT             94         0         1        95
LA               1        78        21       100
SD               0         5        95       100
Total           95        83       117       295
```

Table A-5. Tier 2: Canonical Discriminant Analysis Based on Los Angeles and San Diego talc schist soapstone utilizing 12 elements

```
Discriminant Function Coefficients:

NI       -1.6262
TI       -0.1205
V         0.3608
CR       -0.2054
ZN       -0.6754
AS       -0.2107
BA       -0.0781
MN       -0.5821
MG        0.3539
K         0.0624
FE        1.4828
TM        0.0038

Wilk's lambda:     0.2590
    Approx. F:    44.5818
      p-value:     0.0000
```

Table A-6. Tier 2: Mahalanobis distance calculation and posterior classification of Los Angeles and San Diego talc schist soapstone utilizing 12 elements

```
Date: 11/20/12
File: Tier_2_Sourcing_Protocol_PhaseI

Groups are:
       1        LA
       2        SD

Variables used:
        MG         FE          K          TI          V         CR         MN
        NI         ZN         AS          BA         TM

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  LA
           Probabilities:
ID. NO.         LA         SD     From:     Into:
1279-1A     6.053      0.001         1         1
1279-1B    24.050      0.145         1         1
1279-1C    83.015      1.072         1         1
1279-2A    78.060      1.079         1         1
1279-2B    85.657      1.000         1         1
1279-3A    35.154      0.014         1         1
1279-3B    26.257      0.045         1         1
1279-4A    14.880      0.000         1         1
1279-4B    49.961      0.338         1         1
1279-5A    43.001      1.728         1         1
1279-5B     0.590      0.008         1         1
1279-6A    94.613      1.948         1         1
1279-6B    85.598     26.779         1         1
1279-7A    50.590      0.015         1         1
1279-7B    37.760      0.005         1         1
1279-8A    99.769     28.994         1         1
1279-8B     0.000      0.000         1         2
1279-9A    81.238      1.273         1         1
1279-9B    88.095      1.587         1         1
1279-10A   84.956      0.226         1         1
1279-10B   99.102      9.989         1         1
1279-11A   47.735      1.098         1         1
1279-11B   79.665      0.854         1         1
1279-12A   95.871      0.950         1         1
1279-12B   99.357     47.587         1         1
1279-13A   76.179      5.510         1         1
1279-13B   22.798      0.762         1         1
1279-13C   23.391      1.455         1         1
1279-14A   72.934      0.097         1         1
1279-14B   78.057     35.568         1         1
1279-14C   75.955      6.435         1         1
1279-15A    0.015      1.554         1         2
1279-15B   27.445      1.130         1         1
1279-15C   67.585      1.908         1         1
1279-16A   56.580     17.577         1         1
1279-16B   98.810     64.104         1         1
1279-16C   97.324     19.299         1         1
1279-16D   96.025     15.449         1         1
1279-17A   92.042     30.487         1         1
1279-17B   95.331     14.868         1         1
1279-17C   97.301      0.018         1         1
1279-18A   51.408      1.120         1         1
1279-18B   99.460      0.432         1         1
1279-18C   80.756      4.784         1         1
```

```
1279-19A   82.087     5.282         1         1
1279-19B   10.971     0.016         1         1
1279-19C   38.703     0.310         1         1
1279-17C   84.311     2.461         1         1
1279-20B   63.453     0.287         1         1
1279-20C    9.071     0.001         1         1
1132-98A   63.007     0.059         1         1
1132-98B   99.988     1.910         1         1
1132-99A   75.849     0.020         1         1
1132-99B   26.149     0.000         1         1
1132-100   42.403     0.551         1         1
1132-100   81.247    14.703         1         1
1132-101   99.939    11.652         1         1
1132-101   99.970    15.842         1         1
1132-102   99.470    24.236         1         1
1132-102   97.291     2.581         1         1
1132-103   93.365     5.557         1         1
1132-104   94.059     0.496         1         1
1132-105   91.966    30.789         1         1
1132-106   73.656     8.010         1         1
1132-107   98.978    25.380         1         1
1132-108   92.720     0.046         1         1
1132-109    0.000     0.000         1         2
1132-110   87.874     0.838         1         1
1132-111   59.416     0.001         1         1
1132-112   92.256     6.187         1         1
1132-113    0.000     0.000         1         1
1132-114   98.758    41.050         1         1
1132-115    3.098     1.362         1         1
1132-116   88.047     0.086         1         1
1132-117    0.000     0.000         1         1
1132-118   71.685    14.352         1         1
1132-118   55.853     6.603         1         1
1132-119   20.150     5.378         1         1
1132-119   69.287     0.048         1         1
1132-120   24.926     1.446         1         1
1132-120   39.021     1.770         1         1
1132-121   77.274    28.309         1         1
1132-122   59.257     0.633         1         1
1132-122   50.138     3.417         1         1
1132-123    1.954     0.001         1         1
1132-123    0.004     0.000         1         1
1132-124    0.059     1.153         1         2
1132-125   91.876    47.892         1         1
1132-126   43.362     1.997         1         1
1132-127   34.808     0.001         1         1
1132-127   84.244     0.014         1         1
1132-128   44.991     2.851         1         1
1132-128    1.538     1.327         1         1
1132-129    9.952     0.007         1         1
1132-129   94.652    59.068         1         1
1132-130   44.653     0.013         1         1
1132-130   48.777     2.553         1         1
1132-131   48.729    59.007         1         2
1132-132   20.837     5.846         1         1
1132-133   84.455     2.242         1         1

The following specimens are in the file  SD
           Probabilities:
ID. NO.         LA         SD     From:     Into:
8538-1A     0.725    24.667         2         2
8538-1B     0.057    50.437         2         2
8538-2A    34.967    88.439         2         2
```

8538-2B	0.000	30.566	2	2
8538-3A	6.061	13.520	2	2
8538-3B	20.259	79.732	2	2
8538-4A	0.988	54.643	2	2
8538-4B	4.327	37.265	2	2
8538-9A	61.219	95.885	2	2
8538-9B	1.338	18.319	2	2
8538-10	7.314	26.032	2	2
8538-11	0.000	58.019	2	2
8538-12	0.221	57.019	2	2
8538-13	0.000	11.983	2	2
8538-14	0.000	0.275	2	2
8538-15	0.003	21.219	2	2
8538-16	0.000	10.658	2	2
8538-17	9.945	82.880	2	2
8538-18	0.000	16.765	2	2
8538-19	1.354	39.587	2	2
8538-20	0.000	0.005	2	2
8538-21	0.000	40.815	2	2
8538-22	0.017	62.440	2	2
8538-23	40.551	69.769	2	2
8538-24	12.052	67.671	2	2
8583-5A	0.001	72.403	2	2
8583-5B	0.282	8.154	2	2
8583-6A	0.000	17.295	2	2
8583-6B	0.000	43.894	2	2
8583-7A	0.044	77.398	2	2
8583-7B	2.845	31.822	2	2
8583-8A	0.007	58.517	2	2
8583-8B	0.000	88.208	2	2
8583-25A	0.092	25.861	2	2
8583-25B	0.001	11.381	2	2
8583-26A	0.018	61.875	2	2
8583-26B	0.052	19.861	2	2
8583-27A	0.000	50.109	2	2
8583-27B	0.023	90.444	2	2
8583-28A	1.966	97.821	2	2
8583-28B	12.419	95.392	2	2
8583-29A	0.002	98.458	2	2
8538-29B	0.000	42.328	2	2
8583-30A	22.895	62.911	2	2
8583-30B	0.000	12.281	2	2
8538-31A	0.142	79.079	2	2
8538-31B	0.004	1.151	2	2
8538-32	0.013	90.914	2	2
8538-33	0.000	26.389	2	2
8538-34	0.004	30.785	2	2
9039-1	0.162	45.882	2	2
9039-3	0.000	68.151	2	2
9039-6	0.000	19.654	2	2
9039-12	0.000	51.650	2	2
9039-13	0.001	38.834	2	2
9039-15	0.013	74.212	2	2
9039-16	0.000	24.226	2	2
9039-20	0.000	2.885	2	2
9039-21	0.002	89.407	2	2
9039-23	0.015	97.386	2	2
9039-24	0.086	54.070	2	2
9039-25	0.000	6.762	2	2
9039-28	0.203	24.383	2	2
9039-29	0.000	58.887	2	2
9039-30	0.010	74.951	2	2
9039-32	0.000	0.004	2	2

```
9039-37     0.000     4.914         2         2
9039-39     0.000    14.277         2         2
9039-40     4.908    51.790         2         2
9039-42     0.000    20.124         2         2
9039-45     0.173    72.887         2         2
9039-46     0.000    63.231         2         2
9039-47     0.037    65.762         2         2
9039-48     0.071    16.599         2         2
9039-50     0.000    70.877         2         2
9040-1      0.000    75.381         2         2
9040-2      0.002    97.816         2         2
9040-3      0.000    80.714         2         2
9040-6      0.000    37.253         2         2
9040-7      0.005    96.459         2         2
9040-8      0.000    78.141         2         2
9040-9      0.002    99.759         2         2
9040-10     0.000    64.904         2         2
9040-13     0.003    95.705         2         2
9040-14     0.000    52.698         2         2
9040-17     0.006    86.764         2         2
9040-20     0.044    73.275         2         2
9040-23     0.000    31.202         2         2
9040-27     0.562    46.909         2         2
9040-28     0.039    96.195         2         2
9040-34     0.000    74.178         2         2
9040-39    47.329    57.964         2         2
9040-40     2.458    91.970         2         2
9040-47     0.000    88.163         2         2
9040-50     1.773    80.118         2         2
9040-51     0.001    32.773         2         2
9040-52     0.000    68.702         2         2
9040-53     0.000    98.366         2         2
9040-54     0.000     6.947         2         2
9040-55     0.000    30.514         2         2


Summary of Classification Success:
                Into:
From:          LA        SD      Total
LA            95         5        100
SD             0       100        100
Total         95       105        200
```

Table A-7. Tier 2: Canonical Discriminant Analysis Based on Catalina, Los Angeles, and San Diego soapstone utilizing 12 elements

```
Discriminant Function Coefficients:

NI       -0.8537  0.3731
TI        0.0258 -0.1176
V        -0.0876  0.2287
CR        0.1110 -0.0666
ZN        1.0319  0.5855
AS        0.0807 -0.1655
BA       -0.0401 -0.0388
MN       -0.0488 -0.5064
MG        1.8415  1.6967
K        -0.0385  0.0318
FE       -0.2126  0.7259
TM        0.0595  0.1036

Wilk's lambda:     0.0397
    Approx. F:    94.0868
      p-value:     0.0000
```

Table A-8. Tier 2: Mahalanobis distance calculation and posterior classification of Catalina, Los Angeles, and San Diego soapstone utilizing 12 elements

```
Date: 11/17/12
File: Tier_2_Sourcing_Protocol_Phase2

Groups are:
       1        LA
       2        SD
       3       CAT

Variables used:
        NI         TI           V          CR          ZN          AS          BA
        MN         MG           K          FE          TM

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  LA
           Probabilities:
ID. NO.        LA        SD       CAT     From:     Into:
1279-1A     6.053     0.001     0.028         1         1
1279-1B    24.050     0.145     0.005         1         1
1279-1C    83.015     1.072     0.000         1         1
1279-2A    78.060     1.079     0.001         1         1
1279-2B    85.657     1.000     0.000         1         1
1279-3A    35.154     0.014     0.000         1         1
1279-3B    26.257     0.045     0.001         1         1
1279-4A    14.880     0.000     0.000         1         1
1279-4B    49.961     0.338     0.000         1         1
1279-5A    43.001     1.728     0.000         1         1
1279-5B     0.590     0.008     0.000         1         1
1279-6A    94.613     1.948     0.022         1         1
1279-6B    85.598    26.779     0.001         1         1
1279-7A    50.590     0.015     0.000         1         1
1279-7B    37.760     0.005     0.000         1         1
1279-8A    99.769    28.994     0.003         1         1
1279-8B     0.000     0.000     0.000         1         2
1279-9A    81.238     1.273     0.000         1         1
1279-9B    88.095     1.587     0.000         1         1
1279-10A   84.956     0.226     0.000         1         1
1279-10B   99.102     9.989     0.002         1         1
1279-11A   47.735     1.098     0.000         1         1
1279-11B   79.665     0.854     0.000         1         1
1279-12A   95.871     0.950     0.003         1         1
1279-12B   99.357    47.587     0.000         1         1
1279-13A   76.179     5.510     0.008         1         1
1279-13B   22.798     0.762     0.001         1         1
1279-13C   23.391     1.455     0.002         1         1
1279-14A   72.934     0.097     0.000         1         1
1279-14B   78.057    35.568     0.003         1         1
1279-14C   75.955     6.435     0.000         1         1
1279-15A    0.015     1.554     0.000         1         2
1279-15B   27.445     1.130     0.006         1         1
1279-15C   67.585     1.908     0.004         1         1
1279-16A   56.580    17.577     0.006         1         1
1279-16B   98.810    64.104     0.017         1         1
1279-16C   97.324    19.299     0.010         1         1
1279-16D   96.025    15.449     0.000         1         1
1279-17A   92.042    30.487     0.013         1         1
1279-17B   95.331    14.868     0.000         1         1
1279-17C   97.301     0.018     0.003         1         1
1279-18A   51.408     1.120     0.031         1         1
1279-18B   99.460     0.432     0.011         1         1
```

```
1279-18C   80.756     4.784     0.000         1         1
1279-19A   82.087     5.282     0.000         1         1
1279-19B   10.971     0.016     0.000         1         1
1279-19C   38.703     0.310     0.019         1         1
1279-17C   84.311     2.461     0.000         1         1
1279-20B   63.453     0.287     0.000         1         1
1279-20C    9.071     0.001     0.000         1         1
1132-98A   63.007     0.059     0.000         1         1
1132-98B   99.988     1.910     0.027         1         1
1132-99A   75.849     0.020     0.000         1         1
1132-99B   26.149     0.000     0.000         1         1
1132-100   42.403     0.551     0.000         1         1
1132-100   81.247    14.703     0.042         1         1
1132-101   99.939    11.652     0.014         1         1
1132-101   99.970    15.842     0.054         1         1
1132-102   99.470    24.236     0.006         1         1
1132-102   97.291     2.581     0.011         1         1
1132-103   93.365     5.557     0.005         1         1
1132-104   94.059     0.496     0.003         1         1
1132-105   91.966    30.789     0.000         1         1
1132-106   73.656     8.010     0.005         1         1
1132-107   98.978    25.380     0.003         1         1
1132-108   92.720     0.046     0.000         1         1
1132-109    0.000     0.000     0.000         1         2
1132-110   87.874     0.838     0.001         1         1
1132-111   59.416     0.001     0.001         1         1
1132-112   92.256     6.187     0.000         1         1
1132-113    0.000     0.000     0.000         1         1
1132-114   98.758    41.050     0.012         1         1
1132-115    3.098     1.362     0.470         1         1
1132-116   88.047     0.086     0.025         1         1
1132-117    0.000     0.000     0.000         1         1
1132-118   71.685    14.352     0.005         1         1
1132-118   55.853     6.603     0.024         1         1
1132-119   20.150     5.378     0.006         1         1
1132-119   69.287     0.048     0.118         1         1
1132-120   24.926     1.446     0.002         1         1
1132-120   39.021     1.770     0.330         1         1
1132-121   77.274    28.309     0.003         1         1
1132-122   59.257     0.633     0.006         1         1
1132-122   50.138     3.417     0.076         1         1
1132-123    1.954     0.001     0.001         1         1
1132-123    0.004     0.000     0.006         1         3
1132-124    0.059     1.153     0.012         1         2
1132-125   91.876    47.892     0.094         1         1
1132-126   43.362     1.997     0.294         1         1
1132-127   34.808     0.001     0.000         1         1
1132-127   84.244     0.014     0.000         1         1
1132-128   44.991     2.851     0.029         1         1
1132-128    1.538     1.327     0.001         1         1
1132-129    9.952     0.007     4.197         1         1
1132-129   94.652    59.068     0.427         1         1
1132-130   44.653     0.013     0.004         1         1
1132-130   48.777     2.553     0.000         1         1
1132-131   48.729    59.007     0.002         1         2
1132-132   20.837     5.846     0.001         1         1
1132-133   84.455     2.242     0.007         1         1

The following specimens are in the file  SD
           Probabilities:
ID. NO.        LA        SD       CAT     From:     Into:
8538-1A     0.725    24.667     0.000         2         2
8538-1B     0.057    50.437     0.000         2         2
```

8538-2A	34.967	88.439	0.033	2	2
8538-2B	0.000	30.566	0.000	2	2
8538-3A	6.061	13.520	0.000	2	2
8538-3B	20.259	79.732	0.006	2	2
8538-4A	0.988	54.643	0.001	2	2
8538-4B	4.327	37.265	0.000	2	2
8538-9A	61.219	95.885	0.000	2	2
8538-9B	1.338	18.319	0.000	2	2
8538-10	7.314	26.032	0.000	2	2
8538-11	0.000	58.019	0.001	2	2
8538-12	0.221	57.019	0.000	2	2
8538-13	0.000	11.983	0.000	2	2
8538-14	0.000	0.275	0.000	2	2
8538-15	0.003	21.219	0.000	2	2
8538-16	0.000	10.658	0.000	2	2
8538-17	9.945	82.880	0.003	2	2
8538-18	0.000	16.765	0.000	2	2
8538-19	1.354	39.587	0.001	2	2
8538-20	0.000	0.005	0.000	2	2
8538-21	0.000	40.815	0.000	2	2
8538-22	0.017	62.440	0.000	2	2
8538-23	40.551	69.769	0.000	2	2
8538-24	12.052	67.671	0.000	2	2
8583-5A	0.001	72.403	0.000	2	2
8583-5B	0.282	8.154	0.000	2	2
8583-6A	0.000	17.295	0.000	2	2
8583-6B	0.000	43.894	0.000	2	2
8583-7A	0.044	77.398	0.000	2	2
8583-7B	2.845	31.822	0.000	2	2
8583-8A	0.007	58.517	0.000	2	2
8583-8B	0.000	88.208	0.000	2	2
8583-25A	0.092	25.861	0.000	2	2
8583-25B	0.001	11.381	0.000	2	2
8583-26A	0.018	61.875	0.000	2	2
8583-26B	0.052	19.861	0.000	2	2
8583-27A	0.000	50.109	0.000	2	2
8583-27B	0.023	90.444	0.000	2	2
8583-28A	1.966	97.821	0.000	2	2
8583-28B	12.419	95.392	0.000	2	2
8583-29A	0.002	98.458	0.000	2	2
8538-29B	0.000	42.328	0.000	2	2
8583-30A	22.895	62.911	0.000	2	2
8583-30B	0.000	12.281	0.000	2	2
8538-31A	0.142	79.079	0.000	2	2
8538-31B	0.004	1.151	0.000	2	2
8538-32	0.013	90.914	0.000	2	2
8538-33	0.000	26.389	0.000	2	2
8538-34	0.004	30.785	0.000	2	2
9039-1	0.162	45.882	0.003	2	2
9039-3	0.000	68.151	0.000	2	2
9039-6	0.000	19.654	0.012	2	2
9039-12	0.000	51.650	0.000	2	2
9039-13	0.001	38.834	0.000	2	2
9039-15	0.013	74.212	0.000	2	2
9039-16	0.000	24.226	0.000	2	2
9039-20	0.000	2.885	0.002	2	2
9039-21	0.002	89.407	0.000	2	2
9039-23	0.015	97.386	0.000	2	2
9039-24	0.086	54.070	0.000	2	2
9039-25	0.000	6.762	0.000	2	2
9039-28	0.203	24.383	0.000	2	2
9039-29	0.000	58.887	0.000	2	2
9039-30	0.010	74.951	0.000	2	2

```
9039-32      0.000     0.004     0.000         2         2
9039-37      0.000     4.914     0.000         2         2
9039-39      0.000    14.277     0.000         2         2
9039-40      4.908    51.790     0.000         2         2
9039-42      0.000    20.124     0.000         2         2
9039-45      0.173    72.887     0.000         2         2
9039-46      0.000    63.231     0.000         2         2
9039-47      0.037    65.762     0.000         2         2
9039-48      0.071    16.599     0.000         2         2
9039-50      0.000    70.877     0.000         2         2
9040-1       0.000    75.381     0.000         2         2
9040-2       0.002    97.816     0.000         2         2
9040-3       0.000    80.714     0.000         2         2
9040-6       0.000    37.253     0.000         2         2
9040-7       0.005    96.459     0.000         2         2
9040-8       0.000    78.141     0.000         2         2
9040-9       0.002    99.759     0.000         2         2
9040-10      0.000    64.904     0.000         2         2
9040-13      0.003    95.705     0.000         2         2
9040-14      0.000    52.698     0.000         2         2
9040-17      0.006    86.764     0.000         2         2
9040-20      0.044    73.275     0.000         2         2
9040-23      0.000    31.202     0.000         2         2
9040-27      0.562    46.909     0.000         2         2
9040-28      0.039    96.195     0.000         2         2
9040-34      0.000    74.178     0.000         2         2
9040-39     47.329    57.964     0.000         2         2
9040-40      2.458    91.970     0.000         2         2
9040-47      0.000    88.163     0.000         2         2
9040-50      1.773    80.118     0.000         2         2
9040-51      0.001    32.773     0.000         2         2
9040-52      0.000    68.702     0.000         2         2
9040-53      0.000    98.366     0.000         2         2
9040-54      0.000     6.947     0.000         2         2
9040-55      0.000    30.514     0.000         2         2

The following specimens are in the file  CAT
           Probabilities:
ID. NO.         LA        SD       CAT     From:     Into:
G1           0.273     0.000    47.250         3         3
G2           0.000     0.001    87.708         3         3
G3           0.000     0.000     0.305         3         3
G4           0.000     0.000     5.776         3         3
G5           0.000     0.000    18.437         3         3
G6           0.002     0.000    41.790         3         3
G7           0.000     0.002    26.163         3         3
G8           0.000     0.000    31.492         3         3
G9           0.000     0.000    35.767         3         3
G10          0.000     0.000    57.636         3         3
G11          0.145     0.002    78.816         3         3
G12          0.000     0.001    71.368         3         3
G13          0.000     0.003    98.072         3         3
G14          0.000     0.000    56.029         3         3
G15          0.000     0.000    78.708         3         3
G16          0.000     0.002    60.161         3         3
G17          0.000     0.000    65.111         3         3
G18          0.000     0.000    53.090         3         3
G19          0.000     0.000    97.412         3         3
G20          0.000     0.024    78.194         3         3
A2           0.000     0.000    34.625         3         3
A3           0.000     0.000    59.499         3         3
A5           0.000     0.000    99.055         3         3
A6           0.000     0.001    92.620         3         3
```

A7	0.185	0.005	77.385	3	3
A8	0.000	0.000	28.381	3	3
A9	0.000	0.000	45.298	3	3
A10	0.000	0.000	48.290	3	3
A11	0.000	0.000	98.595	3	3
A12	0.000	0.021	87.580	3	3
A13	0.000	0.000	38.930	3	3
A14	0.000	0.000	66.722	3	3
A15	0.000	0.000	96.299	3	3
A16	0.000	0.000	99.860	3	3
A17	0.000	0.000	4.441	3	3
A18	0.000	0.001	91.648	3	3
A19	0.000	0.000	77.230	3	3
A20	0.000	0.000	95.486	3	3
D1	0.000	0.037	70.750	3	3
D2	0.000	0.000	89.176	3	3
D3	0.000	0.006	23.265	3	3
D4	0.000	0.000	0.424	3	3
D5	0.007	0.001	87.370	3	3
D6	0.000	0.000	30.293	3	3
D7	0.000	0.000	68.173	3	3
D8	0.000	0.004	98.643	3	3
D9	0.000	0.000	94.462	3	3
D10	0.000	0.000	97.734	3	3
D11	0.000	0.000	95.676	3	3
D12	0.034	0.022	20.065	3	3
D13	0.012	0.000	95.928	3	3
D14	0.000	0.000	67.909	3	3
D15	0.000	0.000	0.323	3	3
D16	0.000	0.003	94.907	3	3
D17	0.000	0.001	0.443	3	3
D18	0.000	0.000	0.786	3	3
D19	0.003	0.010	86.509	3	3
D20	0.000	0.000	1.406	3	3
E1	0.012	0.000	93.296	3	3
E2	0.000	0.018	86.670	3	3
E3	0.000	0.000	46.141	3	3
E4	0.000	0.000	13.309	3	3
E5	0.000	0.000	41.249	3	3
E6	0.000	0.000	89.769	3	3
E7	0.000	0.004	99.939	3	3
E8	0.000	0.000	1.038	3	3
E9	0.000	0.000	0.022	3	3
E10	0.000	0.000	54.598	3	3
E11	0.000	0.000	4.682	3	3
E12	0.000	0.000	0.010	3	3
E13	0.000	0.000	98.652	3	3
E14	0.000	0.000	13.499	3	3
E15	0.000	0.000	5.349	3	3
E16	0.000	0.002	72.874	3	3
E17	0.000	0.000	1.468	3	3
E18	0.000	0.000	38.989	3	3
E19	0.041	0.001	0.056	3	3
E20	0.000	0.000	98.089	3	3
B1	0.000	0.000	13.545	3	3
B2	0.000	0.000	0.690	3	3
B3	0.000	0.027	97.387	3	3
B5	0.000	0.000	75.542	3	3
B6	0.000	0.000	2.395	3	3
B7	0.000	0.025	94.304	3	3
B8	0.000	0.001	85.883	3	3
B10	0.000	0.002	25.485	3	3
B11	0.001	0.022	99.697	3	3

```
B12          0.000     0.000    73.196         3         3
B14          0.000     0.000    88.310         3         3
B15          0.077     0.000    90.884         3         3
B16          0.000     0.002    42.749         3         3
B17          0.002     0.002    97.203         3         3
B18          0.000     0.000     0.313         3         3
B19          0.000     0.000    92.202         3         3
B20          0.000     0.005    97.221         3         3


Summary of Classification Success:
                Into:
From:          LA        SD       CAT     Total
LA            94         5         1       100
SD             0       100         0       100
CAT            0         0        95        95
Total         94       105        96       295
```

Table A-9. Tier 2: Canonical Discriminant Analysis Based on Catalina, Los Angeles, San Diego, and Jacumba utilizing 12 elements

```
Discriminant Function Coefficients:

NI        0.8474  0.4486 -0.0032
TI       -0.0267 -0.0582 -0.1349
V         0.0715  0.4438 -0.2745
CR       -0.0890 -0.1538  0.1534
ZN       -1.0516  0.4261  0.3637
AS       -0.0741 -0.2001  0.0027
BA        0.0322 -0.0366 -0.0402
MN        0.0562 -0.4218 -0.3110
MG       -2.0541  1.9686  0.1333
K         0.0392 -0.0138  0.0950
FE        0.1731  0.5810  0.4909
TM       -0.0728  0.1587 -0.0649

Wilk's lambda:     0.0230
    Approx. F:    64.7064
      p-value:     0.0000
```

Table A-10. Tier 2: Mahalanobis distance calculation and posterior classification of Catalina, Los Angeles, San Diego, and Jacumba soapstone utilizing 12 elements

```
Date: 11/17/12
File: Tier_2_Sourcing_Protocol_Phase3

Groups are:
       1        LA
       2        SD
       3       CAT
       4        JS

Variables used:
        NI         TI          V         CR         ZN         AS         BA
        MN         MG          K         FE         TM

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  LA
           Probabilities:
ID. NO.        LA        SD       CAT        JS     From:     Into:
1279-1A     6.053     0.001     0.028     0.137         1         1
1279-1B    24.050     0.145     0.005     0.077         1         1
1279-1C    83.015     1.072     0.000     0.119         1         1
1279-2A    78.060     1.079     0.001     0.152         1         1
1279-2B    85.657     1.000     0.000     0.583         1         1
1279-3A    35.154     0.014     0.000     0.052         1         1
1279-3B    26.257     0.045     0.001     0.385         1         1
1279-4A    14.880     0.000     0.000     0.060         1         1
1279-4B    49.961     0.338     0.000     0.142         1         1
1279-5A    43.001     1.728     0.000     0.175         1         1
1279-5B     0.590     0.008     0.000     0.002         1         1
1279-6A    94.613     1.948     0.022     1.945         1         1
1279-6B    85.598    26.779     0.001     0.006         1         1
1279-7A    50.590     0.015     0.000     0.107         1         1
1279-7B    37.760     0.005     0.000     0.161         1         1
1279-8A    99.769    28.994     0.003     0.536         1         1
1279-8B     0.000     0.000     0.000     0.006         1         4
1279-9A    81.238     1.273     0.000     0.131         1         1
1279-9B    88.095     1.587     0.000     0.198         1         1
1279-10A   84.956     0.226     0.000     0.566         1         1
1279-10B   99.102     9.989     0.002     0.118         1         1
1279-11A   47.735     1.098     0.000     0.084         1         1
1279-11B   79.665     0.854     0.000     0.295         1         1
1279-12A   95.871     0.950     0.003     0.336         1         1
1279-12B   99.357    47.587     0.000     0.051         1         1
1279-13A   76.179     5.510     0.008     1.508         1         1
1279-13B   22.798     0.762     0.001     0.034         1         1
1279-13C   23.391     1.455     0.002     0.171         1         1
1279-14A   72.934     0.097     0.000     2.144         1         1
1279-14B   78.057    35.568     0.003     0.216         1         1
1279-14C   75.955     6.435     0.000     4.505         1         1
1279-15A    0.015     1.554     0.000     0.136         1         2
1279-15B   27.445     1.130     0.006     0.795         1         1
1279-15C   67.585     1.908     0.004     0.987         1         1
1279-16A   56.580    17.577     0.006     0.296         1         1
1279-16B   98.810    64.104     0.017     0.417         1         1
1279-16C   97.324    19.299     0.010     1.980         1         1
1279-16D   96.025    15.449     0.000     1.504         1         1
1279-17A   92.042    30.487     0.013     0.316         1         1
1279-17B   95.331    14.868     0.000     0.431         1         1
1279-17C   97.301     0.018     0.003     0.097         1         1
1279-18A   51.408     1.120     0.031     0.417         1         1
```

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1279-18B   99.460     0.432     0.011     1.767         1         1
1279-18C   80.756     4.784     0.000     0.596         1         1
1279-19A   82.087     5.282     0.000     0.331         1         1
1279-19B   10.971     0.016     0.000     0.145         1         1
1279-19C   38.703     0.310     0.019     0.055         1         1
1279-17C   84.311     2.461     0.000     0.167         1         1
1279-20B   63.453     0.287     0.000     0.035         1         1
1279-20C    9.071     0.001     0.000     0.018         1         1
1132-98A   63.007     0.059     0.000     0.137         1         1
1132-98B   99.988     1.910     0.027     1.697         1         1
1132-99A   75.849     0.020     0.000     0.064         1         1
1132-99B   26.149     0.000     0.000     0.078         1         1
1132-100   42.403     0.551     0.000     0.016         1         1
1132-100   81.247    14.703     0.042     0.008         1         1
1132-101   99.939    11.652     0.014     0.137         1         1
1132-101   99.970    15.842     0.054     0.280         1         1
1132-102   99.470    24.236     0.006     0.048         1         1
1132-102   97.291     2.581     0.011     0.012         1         1
1132-103   93.365     5.557     0.005     0.340         1         1
1132-104   94.059     0.496     0.003     0.061         1         1
1132-105   91.966    30.789     0.000     0.006         1         1
1132-106   73.656     8.010     0.005     0.011         1         1
1132-107   98.978    25.380     0.003     0.256         1         1
1132-108   92.720     0.046     0.000     0.053         1         1
1132-109    0.000     0.000     0.000     0.000         1         2
1132-110   87.874     0.838     0.001     0.005         1         1
1132-111   59.416     0.001     0.001     0.016         1         1
1132-112   92.256     6.187     0.000     0.094         1         1
1132-113    0.000     0.000     0.000     0.000         1         4
1132-114   98.758    41.050     0.012     0.026         1         1
1132-115    3.098     1.362     0.470     8.509         1         4
1132-116   88.047     0.086     0.025     0.874         1         1
1132-117    0.000     0.000     0.000     0.000         1         4
1132-118   71.685    14.352     0.005     0.003         1         1
1132-118   55.853     6.603     0.024     0.038         1         1
1132-119   20.150     5.378     0.006    15.055         1         1
1132-119   69.287     0.048     0.118     1.317         1         1
1132-120   24.926     1.446     0.002     0.412         1         1
1132-120   39.021     1.770     0.330     3.048         1         1
1132-121   77.274    28.309     0.003     0.010         1         1
1132-122   59.257     0.633     0.006     0.004         1         1
1132-122   50.138     3.417     0.076     0.617         1         1
1132-123    1.954     0.001     0.001     0.003         1         1
1132-123    0.004     0.000     0.006     0.079         1         4
1132-124    0.059     1.153     0.012     3.153         1         4
1132-125   91.876    47.892     0.094     0.252         1         1
1132-126   43.362     1.997     0.294    23.748         1         1
1132-127   34.808     0.001     0.000     0.004         1         1
1132-127   84.244     0.014     0.000     0.020         1         1
1132-128   44.991     2.851     0.029     0.005         1         1
1132-128    1.538     1.327     0.001     0.000         1         1
1132-129    9.952     0.007     4.197     0.065         1         1
1132-129   94.652    59.068     0.427     0.076         1         1
1132-130   44.653     0.013     0.004     0.616         1         1
1132-130   48.777     2.553     0.000     0.475         1         1
1132-131   48.729    59.007     0.002     0.079         1         2
1132-132   20.837     5.846     0.001     0.006         1         1
1132-133   84.455     2.242     0.007     0.124         1         1

The following specimens are in the file  SD
           Probabilities:
ID. NO.        LA        SD       CAT        JS     From:     Into:
8538-1A     0.725    24.667     0.000     0.010         2         2
```

8538-1B	0.057	50.437	0.000	0.015	2	2
8538-2A	34.967	88.439	0.033	0.710	2	2
8538-2B	0.000	30.566	0.000	0.280	2	2
8538-3A	6.061	13.520	0.000	0.009	2	2
8538-3B	20.259	79.732	0.006	1.349	2	2
8538-4A	0.988	54.643	0.001	0.124	2	2
8538-4B	4.327	37.265	0.000	0.365	2	2
8538-9A	61.219	95.885	0.000	3.125	2	2
8538-9B	1.338	18.319	0.000	0.704	2	2
8538-10	7.314	26.032	0.000	0.196	2	2
8538-11	0.000	58.019	0.001	0.196	2	2
8538-12	0.221	57.019	0.000	0.046	2	2
8538-13	0.000	11.983	0.000	0.366	2	2
8538-14	0.000	0.275	0.000	0.169	2	2
8538-15	0.003	21.219	0.000	0.004	2	2
8538-16	0.000	10.658	0.000	0.024	2	2
8538-17	9.945	82.880	0.003	8.033	2	2
8538-18	0.000	16.765	0.000	0.005	2	2
8538-19	1.354	39.587	0.001	0.035	2	2
8538-20	0.000	0.005	0.000	0.006	2	4
8538-21	0.000	40.815	0.000	0.096	2	2
8538-22	0.017	62.440	0.000	0.129	2	2
8538-23	40.551	69.769	0.000	0.009	2	2
8538-24	12.052	67.671	0.000	0.505	2	2
8583-5A	0.001	72.403	0.000	0.196	2	2
8583-5B	0.282	8.154	0.000	0.924	2	2
8583-6A	0.000	17.295	0.000	0.017	2	2
8583-6B	0.000	43.894	0.000	0.036	2	2
8583-7A	0.044	77.398	0.000	1.838	2	2
8583-7B	2.845	31.822	0.000	0.694	2	2
8583-8A	0.007	58.517	0.000	6.782	2	2
8583-8B	0.000	88.208	0.000	1.550	2	2
8583-25A	0.092	25.861	0.000	0.005	2	2
8583-25B	0.001	11.381	0.000	0.055	2	2
8583-26A	0.018	61.875	0.000	0.510	2	2
8583-26B	0.052	19.861	0.000	0.041	2	2
8583-27A	0.000	50.109	0.000	0.389	2	2
8583-27B	0.023	90.444	0.000	0.562	2	2
8583-28A	1.966	97.821	0.000	0.275	2	2
8583-28B	12.419	95.392	0.000	1.074	2	2
8583-29A	0.002	98.458	0.000	1.361	2	2
8538-29B	0.000	42.328	0.000	0.123	2	2
8583-30A	22.895	62.911	0.000	0.053	2	2
8583-30B	0.000	12.281	0.000	3.492	2	2
8538-31A	0.142	79.079	0.000	0.540	2	2
8538-31B	0.004	1.151	0.000	0.096	2	2
8538-32	0.013	90.914	0.000	2.160	2	2
8538-33	0.000	26.389	0.000	0.281	2	2
8538-34	0.004	30.785	0.000	0.175	2	2
9039-1	0.162	45.882	0.003	0.336	2	2
9039-3	0.000	68.151	0.000	0.062	2	2
9039-6	0.000	19.654	0.012	1.124	2	2
9039-12	0.000	51.650	0.000	0.236	2	2
9039-13	0.001	38.834	0.000	1.441	2	2
9039-15	0.013	74.212	0.000	1.677	2	2
9039-16	0.000	24.226	0.000	0.003	2	2
9039-20	0.000	2.885	0.002	0.279	2	2
9039-21	0.002	89.407	0.000	7.198	2	2
9039-23	0.015	97.386	0.000	0.164	2	2
9039-24	0.086	54.070	0.000	2.193	2	2
9039-25	0.000	6.762	0.000	0.322	2	2
9039-28	0.203	24.383	0.000	0.019	2	2
9039-29	0.000	58.887	0.000	0.044	2	2

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9039-30     0.010    74.951     0.000     0.266         2         2
9039-32     0.000     0.004     0.000     0.004         2         2
9039-37     0.000     4.914     0.000     0.157         2         2
9039-39     0.000    14.277     0.000     0.672         2         2
9039-40     4.908    51.790     0.000     0.005         2         2
9039-42     0.000    20.124     0.000     0.022         2         2
9039-45     0.173    72.887     0.000     0.153         2         2
9039-46     0.000    63.231     0.000     0.076         2         2
9039-47     0.037    65.762     0.000     1.558         2         2
9039-48     0.071    16.599     0.000     0.438         2         2
9039-50     0.000    70.877     0.000     0.041         2         2
9040-1      0.000    75.381     0.000     4.234         2         2
9040-2      0.002    97.816     0.000     0.553         2         2
9040-3      0.000    80.714     0.000     2.399         2         2
9040-6      0.000    37.253     0.000     3.376         2         2
9040-7      0.005    96.459     0.000     0.189         2         2
9040-8      0.000    78.141     0.000     0.171         2         2
9040-9      0.002    99.759     0.000     0.558         2         2
9040-10     0.000    64.904     0.000     5.703         2         2
9040-13     0.003    95.705     0.000     0.522         2         2
9040-14     0.000    52.698     0.000     1.416         2         2
9040-17     0.006    86.764     0.000     0.282         2         2
9040-20     0.044    73.275     0.000     0.155         2         2
9040-23     0.000    31.202     0.000     0.035         2         2
9040-27     0.562    46.909     0.000     0.177         2         2
9040-28     0.039    96.195     0.000     1.003         2         2
9040-34     0.000    74.178     0.000     0.617         2         2
9040-39    47.329    57.964     0.000     0.106         2         2
9040-40     2.458    91.970     0.000     0.197         2         2
9040-47     0.000    88.163     0.000     4.806         2         2
9040-50     1.773    80.118     0.000     0.024         2         2
9040-51     0.001    32.773     0.000     0.312         2         2
9040-52     0.000    68.702     0.000     0.525         2         2
9040-53     0.000    98.366     0.000     0.531         2         2
9040-54     0.000     6.947     0.000     0.035         2         2
9040-55     0.000    30.514     0.000     0.103         2         2

The following specimens are in the file  CAT
           Probabilities:
ID. NO.        LA        SD       CAT        JS     From:     Into:
G1          0.273     0.000    47.250     0.356         3         3
G2          0.000     0.001    87.708     0.005         3         3
G3          0.000     0.000     0.305     0.001         3         3
G4          0.000     0.000     5.776     0.001         3         3
G5          0.000     0.000    18.437     0.001         3         3
G6          0.002     0.000    41.790     0.015         3         3
G7          0.000     0.002    26.163     0.338         3         3
G8          0.000     0.000    31.492     0.001         3         3
G9          0.000     0.000    35.767     0.015         3         3
G10         0.000     0.000    57.636     0.001         3         3
G11         0.145     0.002    78.816     0.089         3         3
G12         0.000     0.001    71.368     0.001         3         3
G13         0.000     0.003    98.072     0.006         3         3
G14         0.000     0.000    56.029     0.001         3         3
G15         0.000     0.000    78.708     0.050         3         3
G16         0.000     0.002    60.161     0.010         3         3
G17         0.000     0.000    65.111     0.002         3         3
G18         0.000     0.000    53.090     0.008         3         3
G19         0.000     0.000    97.412     0.019         3         3
G20         0.000     0.024    78.194     0.012         3         3
A2          0.000     0.000    34.625     0.003         3         3
A3          0.000     0.000    59.499     0.009         3         3
A5          0.000     0.000    99.055     0.021         3         3
```

A6	0.000	0.001	92.620	0.001	3	3
A7	0.185	0.005	77.385	0.008	3	3
A8	0.000	0.000	28.381	0.042	3	3
A9	0.000	0.000	45.298	0.037	3	3
A10	0.000	0.000	48.290	0.001	3	3
A11	0.000	0.000	98.595	0.003	3	3
A12	0.000	0.021	87.580	0.002	3	3
A13	0.000	0.000	38.930	0.003	3	3
A14	0.000	0.000	66.722	0.015	3	3
A15	0.000	0.000	96.299	0.004	3	3
A16	0.000	0.000	99.860	0.030	3	3
A17	0.000	0.000	4.441	0.031	3	3
A18	0.000	0.001	91.648	0.001	3	3
A19	0.000	0.000	77.230	0.001	3	3
A20	0.000	0.000	95.486	0.004	3	3
D1	0.000	0.037	70.750	0.003	3	3
D2	0.000	0.000	89.176	0.001	3	3
D3	0.000	0.006	23.265	0.076	3	3
D4	0.000	0.000	0.424	0.001	3	3
D5	0.007	0.001	87.370	0.459	3	3
D6	0.000	0.000	30.293	1.423	3	3
D7	0.000	0.000	68.173	1.601	3	3
D8	0.000	0.004	98.643	0.016	3	3
D9	0.000	0.000	94.462	0.004	3	3
D10	0.000	0.000	97.734	0.005	3	3
D11	0.000	0.000	95.676	0.005	3	3
D12	0.034	0.022	20.065	0.001	3	3
D13	0.012	0.000	95.928	0.279	3	3
D14	0.000	0.000	67.909	0.014	3	3
D15	0.000	0.000	0.323	0.000	3	3
D16	0.000	0.003	94.907	0.011	3	3
D17	0.000	0.001	0.443	0.006	3	3
D18	0.000	0.000	0.786	0.016	3	3
D19	0.003	0.010	86.509	0.187	3	3
D20	0.000	0.000	1.406	0.003	3	3
E1	0.012	0.000	93.296	0.023	3	3
E2	0.000	0.018	86.670	0.008	3	3
E3	0.000	0.000	46.141	0.011	3	3
E4	0.000	0.000	13.309	0.172	3	3
E5	0.000	0.000	41.249	0.001	3	3
E6	0.000	0.000	89.769	0.021	3	3
E7	0.000	0.004	99.939	0.134	3	3
E8	0.000	0.000	1.038	0.018	3	3
E9	0.000	0.000	0.022	0.000	3	3
E10	0.000	0.000	54.598	0.069	3	3
E11	0.000	0.000	4.682	0.002	3	3
E12	0.000	0.000	0.010	0.001	3	3
E13	0.000	0.000	98.652	0.033	3	3
E14	0.000	0.000	13.499	0.001	3	3
E15	0.000	0.000	5.349	0.037	3	3
E16	0.000	0.002	72.874	0.100	3	3
E17	0.000	0.000	1.468	0.441	3	3
E18	0.000	0.000	38.989	0.001	3	3
E19	0.041	0.001	0.056	0.023	3	3
E20	0.000	0.000	98.089	0.007	3	3
B1	0.000	0.000	13.545	0.005	3	3
B2	0.000	0.000	0.690	0.001	3	3
B3	0.000	0.027	97.387	0.034	3	3
B5	0.000	0.000	75.542	0.000	3	3
B6	0.000	0.000	2.395	0.002	3	3
B7	0.000	0.025	94.304	0.012	3	3
B8	0.000	0.001	85.883	0.001	3	3
B10	0.000	0.002	25.485	0.005	3	3

```
B11         0.001     0.022    99.697     0.110         3         3
B12         0.000     0.000    73.196     0.002         3         3
B14         0.000     0.000    88.310     0.022         3         3
B15         0.077     0.000    90.884     0.011         3         3
B16         0.000     0.002    42.749     0.000         3         3
B17         0.002     0.002    97.203     0.003         3         3
B18         0.000     0.000     0.313     0.031         3         3
B19         0.000     0.000    92.202     0.006         3         3
B20         0.000     0.005    97.221     0.002         3         3

The following specimens are in the file  JS
           Probabilities:
ID. NO.        LA        SD       CAT        JS     From:     Into:
7790-1A    29.903     0.076     0.004    46.887         4         4
7790-1B     7.944     0.282     0.000    86.407         4         4
7790-2A     0.457     0.180     0.072    48.726         4         4
7790-2B    14.551     0.085     0.000    95.160         4         4
7790-3A    11.078     0.006     0.000    73.026         4         4
7790-3B     1.609     0.055     0.051    29.746         4         4
7790-4A     2.060     0.053     0.326    80.968         4         4
7790-4B     8.678     0.028     0.001    63.211         4         4
7790-5A     0.688     0.039     0.014    31.368         4         4
7790-5B     0.042     3.127     0.000    70.632         4         4
7790-6A     0.016     0.011     0.000    72.645         4         4
7790-6B     1.030     0.339     0.002    81.184         4         4
7790-7A     0.000     0.000     0.004     4.634         4         4
7790-7B     1.231     0.029     0.000     9.423         4         4
7790-8A     0.195     1.582     0.003    66.181         4         4
7790-8B     3.714     0.496     0.001    96.342         4         4
7790-9A     0.487     0.001     0.000    22.429         4         4
7790-9B     0.029     0.004     0.000    22.429         4         4
7790-10A    4.597     0.005     0.002    59.595         4         4
7790-10B    0.532     0.131     0.000    80.913         4         4
7790-11     2.365     0.001     0.027     0.569         4         1
7790-12     0.369     0.008     0.000    88.690         4         4
7790-13     0.001     0.265     0.000    21.185         4         4
7790-14     2.937     2.810     0.007     5.999         4         4
7790-15     1.151     0.029     0.000    18.919         4         4


Summary of Classification Success:
                Into:
From:          LA        SD       CAT        JS     Total
LA            91         3         0         6       100
SD             0        99         0         1       100
CAT            0         0        95         0        95
JS             1         0         0        24        25
Total         92       102        95        31       320
```

Table A-11. Tier 3: Canonical Discriminant Analysis Based on Cuyamaca and Mount Laguna talc schist soapstone utilizing 12 elements

```
Discriminant Function Coefficients:

NI       -2.9068
CO       -2.0791
TB        0.1982
HO        0.5725
TM        0.6870
LU        0.1779
HF        0.4162
ER        0.2611
GD        0.0134

Wilk's lambda:     0.2441
    Approx. F:    30.9620
      p-value:     0.0000
```

Table A-12. Tier 3: Mahalanobis distance calculation and posterior classification of Cuyamaca and Mount Laguna talc schist soapstone utilizing 12 elements

```
Date: 11/20/12
File: Tier_3_Sourcing_Protocol_SD_Phase1

Groups are:
       1      CUYA
       2     MTLAG

Variables used:
        NI         CO         TB         HO         TM         LU         HF
        ER         GD

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  CUYA
           Probabilities:
ID. NO.      CUYA     MTLAG     From:     Into:
9039-1     13.304     0.327         1         1
9039-3     99.832     7.229         1         1
9039-6     88.872     0.403         1         1
9039-12     6.326     1.828         1         1
9039-13    77.895     6.296         1         1
9039-15    77.300     8.576         1         1
9039-16    59.352     0.994         1         1
9039-20    89.462     0.574         1         1
9039-21    73.856     0.618         1         1
9039-23    83.019     5.424         1         1
9039-24    66.852     2.967         1         1
9039-25    85.636     1.481         1         1
9039-28    67.069     0.558         1         1
9039-29    84.440     0.266         1         1
9039-30    64.566     5.201         1         1
9039-32     0.395     0.003         1         1
9039-37    43.564     0.354         1         1
9039-39    50.455     0.056         1         1
9039-40    20.097    10.136         1         1
9039-42     0.236     0.000         1         1
9039-45    74.561     9.316         1         1
9039-46    91.594     5.671         1         1
9039-47    54.570     0.326         1         1
9039-48    83.791     4.074         1         1
9039-50    95.410     0.517         1         1
9040-1      7.174    15.506         1         2
9040-2     99.920    28.582         1         1
9040-3     96.987    42.841         1         1
9040-6     57.964     6.215         1         1
9040-7     74.223    16.906         1         1
9040-8      0.149     0.000         1         1
9040-9     99.221    44.495         1         1
9040-10    20.306    15.811         1         1
9040-13    75.446    51.430         1         1
9040-14    28.556     0.343         1         1
9040-17     3.389    53.536         1         2
9040-20    10.467     9.962         1         1
9040-23    15.349     0.005         1         1
9040-27    23.372     6.071         1         1
9040-28    71.188    42.655         1         1
9040-34     0.077     0.000         1         1
9040-39    44.947    19.248         1         1
9040-40    82.526     1.067         1         1
9040-47    66.116     0.217         1         1
```

```
9040-50     3.033     0.718         1         1
9040-51    57.231     8.504         1         1
9040-52    76.802     7.317         1         1
9040-53    51.866    52.935         1         2
9040-54    69.029     1.913         1         1
9040-55    63.646     5.509         1         1

The following specimens are in the file  MTLAG
           Probabilities:
ID. NO.      CUYA     MTLAG     From:     Into:
8538-1A    17.308    51.038         2         2
8538-1B    30.416    55.120         2         2
8538-2A     6.344    96.996         2         2
8538-2B    40.481    81.356         2         2
8538-3A    19.623    93.922         2         2
8538-3B    11.054    47.176         2         2
8538-4A     0.119    36.783         2         2
8538-4B     0.381    62.332         2         2
8538-9A     0.072     4.782         2         2
8538-9B     8.605    73.128         2         2
8538-10     0.078    48.417         2         2
8538-11     0.605     9.650         2         2
8538-12     1.043    54.321         2         2
8538-13    12.036    96.338         2         2
8538-14     1.765    79.618         2         2
8538-15     2.672    68.407         2         2
8538-16     0.018    21.491         2         2
8538-17     0.453    63.874         2         2
8538-18    69.763    44.316         2         1
8538-19     1.131    23.696         2         2
8538-20     0.399    64.983         2         2
8538-21     6.071    62.066         2         2
8538-22     0.211    12.672         2         2
8538-23     1.535    88.811         2         2
8538-24     1.828    97.349         2         2
8583-5A     0.122    19.812         2         2
8583-5B     4.182    72.730         2         2
8583-6A     0.000     0.000         2         1
8583-6B    27.055    83.945         2         2
8583-7A     0.215    93.930         2         2
8583-7B     0.094    56.586         2         2
8583-8A     1.187    22.121         2         2
8583-8B    92.803    21.578         2         1
8583-25A    0.190    19.830         2         2
8583-25B    1.726    57.997         2         2
8583-26A   48.748    95.895         2         2
8583-26B    7.771    37.510         2         2
8583-27A   12.699    88.805         2         2
8583-27B    3.585    94.001         2         2
8583-28A    1.564    99.519         2         2
8583-28B    0.274    82.419         2         2
8583-29A    5.778     2.744         2         1
8538-29B    0.865    59.413         2         2
8583-30A    0.255    26.414         2         2
8583-30B   13.864    97.658         2         2
8538-31A    2.705     2.843         2         2
8538-31B    2.929    86.176         2         2
8538-32    33.721    69.491         2         2
8538-33     2.119    93.841         2         2
8538-34     0.000     0.000         2         2
```

```
Summary of Classification Success:
                Into:
From:         CUYA     MTLAG     Total
CUYA           47         3        50
MTLAG           4        46        50
Total          51        49       100
```

Table A-13. Tier 3: Canonical Discriminant Analysis Based on Cuyamaca, Mount Laguna, and Jacumba soapstone utilizing 12 elements

```
Discriminant Function Coefficients:

TI        -0.0011 -0.0278
V         -0.9984  0.1290
CR        -0.0071 -0.0191
NI        -0.6871 -1.8634
CO        -0.5791 -1.2448
GD        -0.0706  0.0547
TB        -0.0542  0.0930
HO        -0.1312  0.4240
ER         0.2802  0.0769
TM        -0.2183  0.6050
LU         0.1392  0.0869
HF        -0.2175  0.4812

Wilk's lambda:      0.0423
    Approx. F:     35.7169
      p-value:      0.0000
```

Table A-14. Tier 3: Mahalanobis distance calculation and posterior classification of Cuyamaca, Mount Laguna, and Jacumba soapstone utilizing 12 elements

```
Date: 11/20/12
File: Tier_3_Sourcing_Protocol_SD_Phase2


File: Mahl

Groups are:
       1      CUYA
       2   JACUMBA
       3     MTLAG

Variables used:
        AL         SI         CA         TI          V         CR         NI
        CO         CU         AS         GD         TB         DY         HO
        LU         HF

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  CUYA
           Probabilities:
ID. NO.      CUYA   JACUMBA     MTLAG     From:     Into:
9039-1     57.628     0.093     7.001         1         1
9039-3     16.126     0.022    30.398         1         3
9039-6     21.867     0.030     1.838         1         1
9039-12    32.235     0.042    13.843         1         1
9039-13    94.927     0.050    16.548         1         1
9039-15    52.554     9.497    12.210         1         1
9039-16    42.012     0.621     1.458         1         1
9039-20    74.837     0.924     4.709         1         1
9039-21    26.393     0.266     1.471         1         1
9039-23    87.844     0.590    35.152         1         1
9039-24    71.009     0.297    16.710         1         1
9039-25    55.488     0.351    16.560         1         1
9039-28    54.919     0.160     0.027         1         1
9039-29    64.317     0.035     1.572         1         1
9039-30    34.654     0.550    13.131         1         1
9039-32     0.000     0.001     0.000         1         2
9039-37    49.232     0.039     3.634         1         1
9039-39    67.279     0.064     4.019         1         1
9039-40    38.000     0.161     3.390         1         1
9039-42     0.021     0.000     0.000         1         1
9039-45    93.797     0.439    13.028         1         1
9039-46    93.409     0.146     2.584         1         1
9039-47    81.315     0.357     5.553         1         1
9039-48    90.728     0.099     8.311         1         1
9039-50    76.620     0.135     4.932         1         1
9040-1     56.639     0.957    65.457         1         3
9040-2     98.153     0.543    90.767         1         1
9040-3     88.371     2.595    83.790         1         1
9040-6     43.712     8.576    19.377         1         1
9040-7     86.594     1.565    63.508         1         1
9040-8      2.720     0.007     0.002         1         1
9040-9     99.516     0.350    78.627         1         1
9040-10    32.904     4.517    57.437         1         3
9040-13    99.986     0.394    90.275         1         1
9040-14    23.390     0.341    14.355         1         1
9040-17    68.777     0.840    64.531         1         1
9040-20    30.193     3.474     7.701         1         1
9040-23     4.685     0.025     0.072         1         1
9040-27    68.300     0.185    45.410         1         1
```

```
9040-28    89.319     0.416    78.471         1         1
9040-34     2.390     0.005     0.001         1         1
9040-39    53.840     0.279    30.234         1         1
9040-40     1.137     0.003     0.000         1         1
9040-47    49.403     0.351     0.587         1         1
9040-50     0.523     0.011     0.000         1         1
9040-51    25.126     4.618    10.898         1         1
9040-52    35.888     0.082     3.898         1         1
9040-53    98.005     0.391    71.570         1         1
9040-54    96.572     0.042    28.221         1         1
9040-55    67.838     0.061     6.225         1         1

The following specimens are in the file  JACUMBA
           Probabilities:
ID. NO.      CUYA   JACUMBA     MTLAG     From:     Into:
7790-1A     0.000     0.079     0.000         2         2
7790-1B     0.006    97.529     0.178         2         2
7790-2A     0.013    90.775     0.045         2         2
7790-2B     0.000     0.465     0.000         2         2
7790-3A     0.000    67.156     0.000         2         2
7790-3B     0.000    74.500     0.015         2         2
7790-4A     0.015    84.925     0.026         2         2
7790-4B     0.060    35.458     0.094         2         2
7790-5A     0.043    29.557     0.007         2         2
7790-5B     0.226    52.927     0.099         2         2
7790-6A     0.024    99.874     0.009         2         2
7790-6B     0.003     3.045     0.006         2         2
7790-7A     0.000    47.129     0.001         2         2
7790-7B     0.002     6.904     0.003         2         2
7790-8A     0.001    40.385     0.178         2         2
7790-8B     0.177    41.743     0.337         2         2
7790-9A     0.000    27.508     0.000         2         2
7790-9B     0.000    98.061     0.002         2         2
7790-10A    0.000    94.585     0.002         2         2
7790-10B    0.000    21.552     0.001         2         2
7790-11     0.000     7.562     0.028         2         2
7790-12     0.002    75.751     0.001         2         2
7790-13     0.048    19.232     1.124         2         2
7790-14     0.031    57.523     0.887         2         2
7790-15     0.000    28.172     0.001         2         2

The following specimens are in the file  MTLAG
           Probabilities:
ID. NO.      CUYA   JACUMBA     MTLAG     From:     Into:
8538-1A     1.273     0.054    38.232         3         3
8538-1B     9.133     0.388    69.679         3         3
8538-2A    22.204     0.461    99.773         3         3
8538-2B    31.900     0.219    45.896         3         3
8538-3A     9.641     3.774    70.291         3         3
8538-3B    13.297     3.304    62.709         3         3
8538-4A     1.523     0.182    39.651         3         3
8538-4B     2.186     0.629    82.795         3         3
8538-9A     0.419     2.230    20.385         3         3
8538-9B    14.458     0.390    70.565         3         3
8538-10     0.075     1.587    37.447         3         3
8538-11    15.822     5.119     3.134         3         1
8538-12     4.235     0.928    21.241         3         3
8538-13     1.312     1.115    80.689         3         3
8538-14     0.391    20.458    29.553         3         3
8538-15    44.307     1.562    72.716         3         3
8538-16     0.071     0.034    46.337         3         3
8538-17     0.186     1.331    33.485         3         3
8538-18    78.136     0.841    48.932         3         1
```

```
8538-19     0.518     0.532    10.980         3         3
8538-20     0.395     0.340     0.657         3         3
8538-21    18.567     0.046    25.960         3         3
8538-22     1.429     0.034    29.712         3         3
8538-23    13.562     0.381    82.163         3         3
8538-24     7.526     0.189    92.174         3         3
8583-5A    30.704     2.827    71.574         3         3
8583-5B     0.346     5.317     4.490         3         2
8583-6A     0.000     0.668     0.000         3         2
8583-6B     6.900     1.908     7.207         3         3
8583-7A    27.010     1.472    96.972         3         3
8583-7B     1.136     0.380    37.787         3         3
8583-8A     1.893     4.778    23.829         3         3
8583-8B    98.071     1.084    54.630         3         1
8583-25A    1.221     1.153    76.368         3         3
8583-25B    3.211     0.347    25.893         3         3
8583-26A   43.137     0.500    70.409         3         3
8583-26B   84.195     0.129    78.350         3         1
8583-27A    5.644     0.677    48.559         3         3
8583-27B    1.650     0.507    69.346         3         3
8583-28A   28.367     0.511    99.133         3         3
8583-28B    1.369     0.346    94.032         3         3
8583-29A   20.561     4.589    46.197         3         3
8538-29B   47.331     0.075    52.052         3         3
8583-30A    4.793     0.073    62.032         3         3
8583-30B   20.081     9.890    90.958         3         3
8538-31A    2.965     0.388    21.327         3         3
8538-31B    3.055     0.427    94.573         3         3
8538-32    46.704     0.383    61.365         3         3
8538-33    67.019     0.321    84.987         3         3
8538-34     0.842     0.056     9.932         3         3


Summary of Classification Success:
                Into:
From:        CUYA   JACUMBA     MTLAG     Total
CUYA          46         1         3        50
JACUMBA        0        25         0        25
MTLAG          4         2        44        50
Total         50        28        47       125
```

Table A-15. Tier 3: Canonical Discriminant Analysis Based on CA-SDI-9039 and CA-SDI-9040 talc schist soapstone quarries utilizing 9 elements

```
Discriminant Function Coefficients:

K        -0.7561
ZN        0.9559
FE        0.6476
GD       -0.2505
HO       -0.6544
TH       -0.5808
CO       -1.9192
CU       -0.1996
ZR       -0.1509

Wilk's lambda:     0.1131
    Approx. F:    34.8526
      p-value:     0.0000
```

Table A-16. Tier 3: Mahalanobis distance calculation and posterior classification of CA-SDI-9039 and CA-SDI-9040 talc schist soapstone quarries utilizing 9 elements

```
Date: 12/11/12
File: Tier_3_Sourcing_Protocol_SD_Phase3

Groups are:
       1      9039
       2      9040

Variables used:
        ZN          K          FE         GD         HO         TH         CO
        CU         ZR

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  9039
           Probabilities:
ID. NO.      9039      9040     From:     Into:
9039-1     59.466     0.024         1         1
9039-3     11.110     1.253         1         1
9039-6     63.234     0.521         1         1
9039-12    27.779     1.108         1         1
9039-13    28.725     1.111         1         1
9039-15    37.854     4.812         1         1
9039-16    51.347     1.560         1         1
9039-20    43.367     0.025         1         1
9039-21     6.993     3.888         1         1
9039-23    93.702     2.590         1         1
9039-24    20.603     2.464         1         1
9039-25    33.499     5.818         1         1
9039-28    81.061     1.755         1         1
9039-29    49.077     0.159         1         1
9039-30    87.208     1.088         1         1
9039-32     3.008     5.660         1         2
9039-37     5.666    10.529         1         2
9039-39    92.184     0.399         1         1
9039-40    82.533     7.196         1         1
9039-42    84.095     0.121         1         1
9039-45    12.400    21.841         1         2
9039-46    49.227     0.764         1         1
9039-47    42.064     5.969         1         1
9039-48    97.746     0.392         1         1
9039-50    84.909     0.574         1         1

The following specimens are in the file  9040
           Probabilities:
ID. NO.      9039      9040     From:     Into:
9040-1      1.117    48.402         2         2
9040-2      9.076    98.929         2         2
9040-3     19.177    86.194         2         2
9040-6      7.455    96.272         2         2
9040-7      1.586    20.525         2         2
9040-8      4.009    80.458         2         2
9040-9     16.945    91.028         2         2
9040-10     0.479    44.704         2         2
9040-13     4.609    86.074         2         2
9040-14     4.520    30.894         2         2
9040-17     0.519    73.851         2         2
9040-20    29.626    36.462         2         2
9040-23     0.130    45.458         2         2
9040-27     0.273     2.417         2         2
9040-28    12.623    27.372         2         2
```

```
9040-34     0.043    20.413         2         2
9040-39     3.151    93.415         2         2
9040-40     2.607    64.331         2         2
9040-47     0.915    45.439         2         2
9040-50     0.106     1.986         2         2
9040-51     5.534    20.175         2         2
9040-52     0.549    30.824         2         2
9040-53     4.087    89.818         2         2
9040-54     0.017     2.749         2         2
9040-55     0.082    16.566         2         2


Summary of Classification Success:
                Into:
From:        9039      9040     Total
9039          22          3        25
9040           0         25        25
Total         22         28        50
```

Table A-17. Tier 3: Canonical Discriminant Analysis Based on Sierra Pelona Talc Schist Types 5, 16, and 17 utilizing 7 elements

```
Discriminant Function Coefficients:

MG       13.4517 -14.7553
K         0.1388  0.1314
TI        0.0613  0.0537
NI       -0.6933 -0.8366
CU        0.4810  0.5557
GD       -0.4600 -0.4916
TB        0.5414  0.5948

Wilk's lambda:     0.0993
    Approx. F:    28.2506
      p-value:     0.0000
```

Table A-18. Tier 3: Mahalanobis distance calculation and posterior classification Sierra Pelona Talc Schist Types 5, 16, and 17 utilizing 7 elements

```
Date: 12/11/12
File: Tier_3_Sourcing_Protocol_LA_Phase1

Groups are:
       1       SP5
       2      SP16
       3      SP17

Variables used:
        MG          K         TI         NI         CU         GD         TB

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  SP5
           Probabilities:
ID. NO.        SP5      SP16      SP17     From:     Into:
1279-1A    34.030    41.492    23.367         1         2
1279-1B    92.794     0.073     1.163         1         1
1279-1C    63.216     0.004     0.658         1         1
1279-2A    64.247     0.009     0.293         1         1
1279-2B    74.000     0.908     7.244         1         1
1279-3A     6.622     0.000     6.316         1         1
1279-3B    46.635     0.104    10.285         1         1
1279-4A    44.025     0.005     3.947         1         1
1279-4B    47.924     0.004     1.312         1         1
1279-5A     2.145     0.046     8.567         1         3
1279-5B     4.735     0.091     0.008         1         1
1279-6A    20.620    21.330    51.020         1         3
1279-6B    62.379     5.768     1.144         1         1
1279-7A    49.431     0.013     3.053         1         1
1279-7B    17.431     0.010     1.262         1         1
1279-8A    84.267    10.960    27.982         1         1
1279-8B    64.979     1.283     0.198         1         1
1279-9A    33.557    32.715    38.017         1         3
1279-9B    31.675     2.542    20.000         1         1
1279-10A   93.771    41.886    14.347         1         1
1279-10B   76.577     0.561     7.893         1         1
1279-11A   51.757    50.809     1.181         1         1
1279-11B   67.157    54.781     0.848         1         1
1279-12A   80.218     0.473     0.056         1         1
1279-12B   42.705     0.118     0.018         1         1

The following specimens are in the file  SP16
           Probabilities:
ID. NO.        SP5      SP16      SP17     From:     Into:
1279-13A    2.280    73.385     2.357         2         2
1279-13B    0.011     0.582     0.097         2         2
1279-13C   37.033    49.958     3.892         2         2
1279-14A   26.091    85.255     2.434         2         2
1279-14B   15.029    97.710    14.653         2         2
1279-14C    6.998    34.302     1.176         2         2
1279-15A    0.848    76.572     2.126         2         2
1279-15B   11.677    75.270     3.857         2         2
1279-15C    6.522    79.820    11.039         2         2
1279-16A   41.478    95.387    20.194         2         2
1279-16B    9.839    67.439     4.007         2         2
1279-16C   32.952    89.677    10.276         2         2
1279-16D    6.298    53.760    14.586         2         2
1279-17A   19.298    81.532    18.131         2         2
1279-17B   21.878    33.356     7.127         2         2
```

```
1279-17C   22.545    89.808     1.720         2         2
1279-18A    0.125    23.209     1.052         2         2
1279-18B   29.900    81.668     6.430         2         2
1279-18C    2.807    20.692     0.012         2         2
1279-19A   15.843    66.594     0.009         2         2
1279-19B    0.040     0.243     0.000         2         2
1279-19C   11.890    34.370    72.705         2         3
1279-17C    4.155    82.607     0.213         2         2
1279-20B    1.340    46.265     0.116         2         2
1279-20C    0.058     2.407     0.000         2         2
1132-98A   16.847    50.173     0.712         2         2
1132-98B   54.617    92.595    20.079         2         2
1132-99A   30.315    40.945     0.318         2         2
1132-99B   18.914    26.744     0.216         2         2
1132-100    1.529    17.921     0.000         2         2
1132-100   26.826    56.473    14.958         2         2
1132-101   55.421    88.380    12.993         2         2
1132-101   17.725    60.035    67.023         2         3
1132-102   37.654    75.034    72.198         2         2
1132-102   15.287    82.223    13.335         2         2
1132-103   27.449    73.692     4.774         2         2
1132-104   18.905    89.918     0.998         2         2
1132-105   34.002    69.822     2.528         2         2
1132-106    0.154    23.376    15.440         2         2
1132-107   59.360    97.686     9.663         2         2
1132-108   20.143    42.023    11.245         2         2
1132-109   15.735    84.375    37.629         2         2
1132-110   43.673    15.747    10.880         2         1
1132-111   11.922    35.712     3.548         2         2
1132-112   31.627    93.924     0.315         2         2
1132-113    0.045     3.815     0.005         2         2
1132-114   53.528    49.486     6.882         2         1
1132-115    4.139     6.929     8.035         2         3
1132-116    2.599     2.956     4.647         2         3
1132-117    0.013     0.057     1.457         2         3

The following specimens are in the file  SP17
           Probabilities:
ID. NO.       SP5      SP16      SP17     From:     Into:
1132-118    0.267     0.679    86.918         3         3
1132-118   39.791    51.541    86.648         3         3
1132-119   21.705    24.285    54.722         3         3
1132-119    2.891    25.541    52.483         3         3
1132-120    3.347     0.057    18.763         3         3
1132-120    0.194     1.231    74.572         3         3
1132-121   26.797     4.172    47.766         3         3
1132-122    0.360     8.513    32.486         3         3
1132-122    0.025     0.019    22.721         3         3
1132-123    0.040     0.004    12.098         3         3
1132-123    0.152     0.005     4.037         3         3
1132-124    6.951     1.928    61.401         3         3
1132-125   20.080     7.629    89.434         3         3
1132-126    0.195     0.205    32.218         3         3
1132-127   10.552     0.082    25.710         3         3
1132-127    9.080     5.215    37.730         3         3
1132-128    0.979     5.317    96.404         3         3
1132-128    1.123     0.970    30.028         3         3
1132-129    0.703     8.328    31.564         3         3
1132-129   12.927    21.715    97.426         3         3
1132-130    2.980     0.065    75.264         3         3
1132-130    3.373     0.004     2.325         3         1
1132-131   13.891    12.872    96.834         3         3
1132-132    0.440     0.225     3.742         3         3
```

```
1132-133   15.930    37.612    83.540          3          3


Summary of Classification Success:
                Into:
From:          SP5      SP16      SP17     Total
SP5            21         1         3        25
SP16            2        43         5        50
SP17            1         0        24        25
Total          24        44        32       100
```

Table A-19. Tier 3: Canonical Discriminant Analysis Based on Sierra Pelona Talc Schist Type 16 from CA-LAN-1132 and CA-LAN-1279 utilizing 6 elements

```
Discriminant Function Coefficients:

MN        0.2543
FE       -0.6658
CU       -0.4353
AS       -0.8868
SB       -0.3845
U        -0.9671

Wilk's lambda:     0.3796
    Approx. F:    11.7132
      p-value:     0.0000
```

Table A-20. Tier 3: Mahalanobis distance calculation and posterior classification Sierra Pelona Talc Schist Type 16 from CA-LAN-1132 and CA-LAN-1279 utilizing 6 elements

```
Date: 12/12/12
File: Tier_3_Sourcing_Protocol_LA_Phase2

Groups are:
       1      1132
       2      1279

Variables used:
        MN         FE         CU         AS         SB          U

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  1132
           Probabilities:
ID. NO.      1132      1279     From:     Into:
1132-98A    3.939     0.554         1         1
1132-98B   67.635    30.523         1         1
1132-99A   94.087    35.814         1         1
1132-99B    0.878     0.192         1         1
1132-100   82.353    11.572         1         1
1132-100   71.215    18.999         1         1
1132-101   94.338    78.203         1         1
1132-101   86.074    70.862         1         1
1132-102    5.902     5.582         1         1
1132-102   73.176    57.846         1         1
1132-103   95.174    84.452         1         1
1132-104   67.387    64.437         1         1
1132-105   66.409    22.552         1         1
1132-106   27.006    21.127         1         1
1132-107   87.312    82.592         1         1
1132-108   29.876     7.996         1         1
1132-109   19.505    11.224         1         1
1132-110   48.932     2.797         1         1
1132-111   35.938     3.866         1         1
1132-112   99.806    55.040         1         1
1132-113   42.007    12.459         1         1
1132-114   97.748    28.678         1         1
1132-115    0.027     0.036         1         2
1132-116   25.738    11.308         1         1
1132-117   23.587     5.006         1         1

The following specimens are in the file  1279
           Probabilities:
ID. NO.      1132      1279     From:     Into:
1279-13A   46.836    38.934         2         1
1279-13B    0.295     9.170         2         2
1279-13C    6.040    26.483         2         2
1279-14A    0.453    17.436         2         2
1279-14B    3.283    45.077         2         2
1279-14C   11.734    45.915         2         2
1279-15A   17.592    87.916         2         2
1279-15B    0.681    86.510         2         2
1279-15C    6.291    95.362         2         2
1279-16A   26.475    91.385         2         2
1279-16B    7.467    86.706         2         2
1279-16C   18.214    26.836         2         2
1279-16D    5.086    30.141         2         2
1279-17A   56.461    65.745         2         2
1279-17B   46.833    71.143         2         2
1279-17C    4.889    56.962         2         2
```

```
1279-18A    0.081    42.435         2         2
1279-18B    3.445    11.141         2         2
1279-18C   60.127    67.024         2         2
1279-19A    2.845    46.973         2         2
1279-19B    3.715    65.313         2         2
1279-19C    3.178    17.853         2         2
1279-17C   12.474    66.732         2         2
1279-20B    4.532    24.662         2         2
1279-20C    0.251     3.763         2         2


Summary of Classification Success:
                Into:
From:        1132      1279     Total
1132          24         1        25
1279           1        24        25
Total         25        25        50
```

Table A-21. Tier 3: Canonical Discriminant Analysis Based on CA-LAN-1132 and CA-LAN-1279 talc schist soapstone quarries utilizing 6 elements

```
Discriminant Function Coefficients:

MG       -13.7710
CA       -0.1418
AS        0.2621
SB        0.4469
LA       -0.2773
GD        0.5091

Wilk's lambda:     0.3604
    Approx. F:    27.5049
      p-value:     0.0000
```

Table A-22. Tier 3: Mahalanobis distance calculation and posterior classification CA-LAN-1132 and CA-LAN-1279 talc schist soapstone quarries utilizing 6 elements

```
Date: 12/12/12
File: Tier_3_Sourcing_Protocol_LA_Phase3

Groups are:
       1      1132
       2      1279

Variables used:
        MG         CA         AS         SB         LA         GD

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  1132
           Probabilities:
ID. NO.      1132      1279     From:     Into:
1132-98A    4.846     0.096         1         1
1132-98B   91.454    54.049         1         1
1132-99A   93.798    25.906         1         1
1132-99B    4.504     0.032         1         1
1132-100   86.639     0.633         1         1
1132-100   60.427    31.321         1         1
1132-101   46.446    95.351         1         2
1132-101   82.599    15.569         1         1
1132-102   64.188     9.902         1         1
1132-102   90.549    35.646         1         1
1132-103   50.071     2.301         1         1
1132-104   98.858    33.439         1         1
1132-105   95.796    41.928         1         1
1132-106   52.933     9.749         1         1
1132-107   85.230    81.357         1         1
1132-108   90.272    76.143         1         1
1132-109   24.262    20.767         1         1
1132-110   15.100    31.310         1         2
1132-111   90.460     2.440         1         1
1132-112   82.290    91.984         1         2
1132-113   36.198    32.786         1         1
1132-114   86.735    12.419         1         1
1132-115   45.337     2.994         1         1
1132-116   56.060     0.033         1         1
1132-117   58.718    66.546         1         2
1132-118   28.081     0.032         1         1
1132-118   15.410     0.097         1         1
1132-119   77.795    11.306         1         1
1132-119   36.910     0.191         1         1
1132-120   51.479    14.114         1         1
1132-120   29.823     0.019         1         1
1132-121   64.743    14.797         1         1
1132-122   42.603     0.340         1         1
1132-122    2.041     0.004         1         1
1132-123   54.868     0.085         1         1
1132-123   72.097     0.575         1         1
1132-124   21.297     4.951         1         1
1132-125   43.355    44.999         1         2
1132-126    0.044     0.073         1         2
1132-127    0.554     7.852         1         2
1132-127    5.328    42.237         1         2
1132-128   91.889     1.191         1         1
1132-128   70.258     4.875         1         1
1132-129    7.830     0.073         1         1
1132-129   99.710     8.791         1         1
```

```
1132-130   24.240     0.005         1         1
1132-130   14.707    14.226         1         1
1132-131   77.429    52.068         1         1
1132-132   62.167     6.331         1         1
1132-133   72.316    32.205         1         1

The following specimens are in the file  1279
           Probabilities:
ID. NO.      1132      1279     From:     Into:
1279-1A     7.924    70.127         2         2
1279-1B     0.573    18.034         2         2
1279-1C     0.604    36.379         2         2
1279-2A     0.243    44.396         2         2
1279-2B     0.037    29.959         2         2
1279-3A    21.354    90.610         2         2
1279-3B     0.279     2.194         2         2
1279-4A     0.038     6.293         2         2
1279-4B     0.010    27.749         2         2
1279-5A     0.025     0.036         2         2
1279-5B    74.660    79.804         2         2
1279-6A     8.008    69.982         2         2
1279-6B    14.808    30.244         2         2
1279-7A     1.339    11.674         2         2
1279-7B     9.570    84.934         2         2
1279-8A     0.440    23.464         2         2
1279-8B     0.000     0.000         2         2
1279-9A     6.897    69.411         2         2
1279-9B    18.699    89.371         2         2
1279-10A    1.074    14.192         2         2
1279-10B    9.104    34.101         2         2
1279-11A   36.003    98.830         2         2
1279-11B   47.356    98.094         2         2
1279-12A    9.844    61.561         2         2
1279-12B   74.258    77.665         2         2
1279-13A   20.470    78.873         2         2
1279-13B   11.747    50.762         2         2
1279-13C   23.810    94.523         2         2
1279-14A    2.867    56.810         2         2
1279-14B    5.146    69.551         2         2
1279-14C    4.294    48.844         2         2
1279-15A    4.101    60.573         2         2
1279-15B   12.742    49.748         2         2
1279-15C   26.532    46.837         2         2
1279-16A   20.077    96.659         2         2
1279-16B   25.922    93.609         2         2
1279-16C   15.795    67.996         2         2
1279-16D   18.428    63.889         2         2
1279-17A   60.207    79.882         2         2
1279-17B    4.173    63.185         2         2
1279-17C   80.351    84.012         2         2
1279-18A   17.690    61.654         2         2
1279-18B   15.962    41.640         2         2
1279-18C   28.296    75.632         2         2
1279-19A   10.342    49.837         2         2
1279-19B    1.071     3.575         2         2
1279-19C   12.330    38.484         2         2
1279-17C   28.134    93.407         2         2
1279-20B   40.310    54.245         2         2
1279-20C   29.545    86.555         2         2
```

```
Summary of Classification Success:
                Into:
From:        1132      1279     Total
1132          42         8        50
1279           0        50        50
Total         42        58       100
```

Table A-23. Tier 3: Canonical Discriminant Analysis Based on Two Harbors, Airport, Eagles Nest, Empire Landing, and SW of Airport soapstone utilizing 43 elements

```
Discriminant Analysis Based on the Files:      2harb        Air      Eagle
Empire      SWAir

Discriminant Function Coefficients:

Mg       -0.8080  3.2950 -1.3701  1.1622
Al       -1.0539  0.3019  0.2578  0.2535
Si       -2.3161  0.2652 -4.1184  0.9653
K        -0.3549 -0.3302 -0.5722  0.0898
Ca       -0.3127  0.8538  0.1503  0.4178
Ti       -0.9294  0.1650  0.3167  0.5033
V         1.2138 -0.2816 -0.0204 -0.4475
Cr       -0.2372  0.0026 -0.2606 -0.2772
Mn        1.1241 -0.2205 -0.0630 -0.0968
Fe       -2.0704  0.7873 -2.3173  1.3787
Ni        0.4864  0.6752 -0.0698 -1.3509
Co       -2.0655 -0.3226  1.5884  1.1458
Cu        0.3462 -0.3711  0.0449 -0.2862
Zn        0.3779  0.5100  0.2457 -0.2171
As       -0.2883  0.4781 -0.6187  0.4220
Rb        0.4527 -0.0153  0.8116 -0.3881
Sr        0.1696 -0.0698  0.4187  0.2795
Y         0.0555  0.0708  0.1342  0.1486
Zr       -0.0545 -0.2634  0.1326  0.0614
Nb        0.1110  0.1331 -0.0379 -0.2090
Sn        0.2292 -0.4395 -0.1089 -0.4521
Sb        0.1003 -0.3094 -0.0082  0.1587
Cs        0.2456  0.4147 -0.4967  0.2697
Ba        0.0823 -0.0192  0.1139 -0.5395
La        0.1920  0.3680 -0.1949  0.3564
Ce       -0.3336 -0.1137 -0.3350  0.2734
Pr        0.3788 -0.1162 -0.1271 -0.0270
Nd       -0.3475 -0.1828  0.0812  0.0098
Sm       -0.5085  0.0644 -0.0615  0.1295
Eu       -0.4494  0.3886  0.5113 -0.5451
Gd        0.4823  0.1175 -0.3809 -0.0615
Tb        0.0800 -0.2264 -0.2895 -0.2334
Dy       -0.1035 -0.0820  0.4848  0.1347
Ho        0.0908 -0.1456  0.2658 -0.0570
Er        0.1011  0.2252 -0.4234 -0.1897
Tm       -0.3587 -0.7374  0.2223 -0.0992
Yb       -0.1823 -0.1387 -0.3161  0.1446
Lu        0.0576  0.0249  0.1989 -0.0613
Hf        0.4922  0.2801 -0.0245  0.0774
Ta       -0.2730 -0.0170 -0.0830 -0.0639
Pb        0.0663  0.0463 -0.0621  0.0294
Th        0.1216  0.4408 -0.2375  0.1234
U        -0.1225 -0.0335 -0.0680 -0.2333


Wilk's lambda:     0.0081
    Approx. F:     2.6458
      p-value:     0.0000
```

Table A-24. Tier 3: Mahalanobis distance calculation and posterior classification of canonical coefficients for Two Harbors, Airport, Eagles Nest, Empire Landing, and SW of Airport soapstone

```
Date: 12/12/12
File: Tier_3_Sourcing_Protocol_Catalina


MAHALANOBIS DISTANCE CALCULATION AND POSTERIOR CLASSIFICATION
FOR TWO OR MORE GROUPS.

Date: 12/27/12
File: Output

Groups are:
       1   2HARB_C
       2     AIR_C
       3   EAGLE_C
       4  EMPIRE_C
       5   SWAIR_C

Variables used:
      CD01       CD02       CD03       CD04

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  2HARB_C
           Probabilities:
ID. NO.   2HARB_C     AIR_C   EAGLE_C  EMPIRE_C   SWAIR_C     From:     Into:
G1         65.160     4.839    23.258     3.714     0.981         1         1
G2         94.366     3.601    16.534     0.730     0.938         1         1
G3         20.456     3.418     7.972     0.085     0.471         1         1
G4         33.166     0.214     8.536     0.192     0.181         1         1
G5         27.432     0.042     0.914     0.034     0.070         1         1
G6         61.247     0.529    10.169     0.122     0.251         1         1
G7          9.537     0.821     0.548     0.216     2.662         1         1
G8         54.946     0.556     3.279     0.150     0.901         1         1
G9         97.785     0.558    10.352     0.850     0.468         1         1
G10        63.294     1.276    18.734     5.619     0.663         1         1
G11        49.241     8.743     3.181     0.923     7.984         1         1
G12        87.979     1.167     3.654     0.217     1.006         1         1
G13        49.433     0.106     1.917     0.035     0.089         1         1
G14        67.583     0.969    18.429     3.095     0.440         1         1
G15        37.310     0.113     2.374     0.076     0.081         1         1
G16        44.485     2.764    32.116     0.837     0.393         1         1
G17        43.444     0.138     4.221     0.685     0.164         1         1
G18        99.584     1.472     9.732     0.363     0.891         1         1
G19         0.287    50.325     2.490     0.217    46.492         1         2
G20         9.211     0.099     8.316     3.287     0.273         1         1

The following specimens are in the file  AIR_C
           Probabilities:
ID. NO.   2HARB_C     AIR_C   EAGLE_C  EMPIRE_C   SWAIR_C     From:     Into:
A2          2.363    59.011    19.586     0.104    12.989         2         2
A3         11.032    74.357    16.865     0.429     2.586         2         2
A5          1.233    49.032     4.432     0.023     1.195         2         2
A6          9.239    62.166     1.941     0.061    41.491         2         2
A7         10.423    15.590    21.660     0.274    13.517         2         3
A8          0.512    57.727     3.568     0.026     8.516         2         2
A9          0.232    57.287    43.508     0.083     0.464         2         2
A10        12.615    26.803     8.086     1.941     5.395         2         2
A11        18.205    13.931     4.155     0.095     2.449         2         1
A12         0.494    48.695     2.434     0.008     8.311         2         2
A13         0.680    98.136    12.098     0.041     2.452         2         2
```

```
A14         0.001     1.279     3.583     0.005     0.016         2         3
A15         5.303    36.657     5.529     0.669     2.524         2         2
A16         0.390    73.198    39.753     0.065     1.420         2         2
A17        17.498    86.479     6.384     0.149    23.052         2         2
A18         5.421    42.556     6.277     0.266     1.020         2         2
A19         0.371    49.805     3.291     0.007     4.943         2         2
A20         1.003    32.732     2.246     0.065     4.072         2         2

The following specimens are in the file  EAGLE_C
           Probabilities:
ID. NO.   2HARB_C     AIR_C   EAGLE_C  EMPIRE_C   SWAIR_C     From:     Into:
D1          0.509     0.491    91.601     0.724     0.086         3         3
D2          6.240    41.267    42.931     0.510     1.212         3         3
D3          0.000     0.235     8.690     0.004     0.001         3         3
D4          0.022     0.332    80.892     0.758     0.087         3         3
D5          0.053     1.350    99.964     0.355     0.082         3         3
D6          0.985     2.320    78.907     0.230     0.099         3         3
D7          0.010     0.003     2.227     0.396     0.004         3         3
D8          1.668     0.015     0.129     0.138     0.019         3         1
D9          0.240     9.371    92.799     0.589     0.480         3         3
D10         0.224     7.343    51.949     0.098     0.065         3         3
D11         4.999    13.493    72.951     2.065     1.069         3         3
D12         0.085     1.321    88.023     0.422     0.057         3         3
D13         1.260     0.127    22.569    21.991     0.215         3         3
D14         0.001     0.091    16.362     0.020     0.008         3         3
D15         0.004     0.172    48.038     0.139     0.009         3         3
D16         2.765    23.562    24.555     0.087     1.739         3         3
D17         0.019     4.869    89.919     0.136     0.061         3         3
D18         0.006     0.020    30.744     0.504     0.019         3         3
D19         0.002     0.437    33.728     0.110     0.056         3         3
D20         0.015     0.661    97.603     0.169     0.034         3         3

The following specimens are in the file  EMPIRE_C
           Probabilities:
ID. NO.   2HARB_C     AIR_C   EAGLE_C  EMPIRE_C   SWAIR_C     From:     Into:
E1          1.664     0.253     3.188    70.314     0.147         4         4
E2          0.088     0.021     0.727    52.118     0.009         4         4
E3          0.126     0.103     0.387    18.218     0.014         4         4
E4          0.050     0.033     0.450    86.388     0.022         4         4
E5          0.004     0.054     0.039     2.544     0.012         4         4
E6          0.555     0.042     5.965    75.900     0.063         4         4
E7          2.140     0.918     9.530     3.477     0.600         4         3
E8          9.594     0.310    11.486     8.828     0.188         4         3
E9          0.200     0.120     0.983    96.098     0.041         4         4
E10         0.321     0.136     1.095    88.779     0.098         4         4
E11         0.002     0.002     0.065     7.399     0.001         4         4
E12         0.587     0.076     2.927    98.589     0.061         4         4
E13         0.052     0.021     0.643    39.799     0.014         4         4
E14         0.165     0.012     3.695    53.740     0.019         4         4
E15         0.105     0.253     0.471    25.140     0.042         4         4
E16         0.028     0.011     0.539    86.258     0.009         4         4
E17         0.070     0.006     1.611    51.246     0.011         4         4
E18         0.420     0.038     1.337    19.322     0.113         4         4
E19         0.161     0.013     2.133    67.596     0.021         4         4
E20         0.081     0.012     1.282    91.106     0.013         4         4

The following specimens are in the file  SWAIR_C
           Probabilities:
ID. NO.   2HARB_C     AIR_C   EAGLE_C  EMPIRE_C   SWAIR_C     From:     Into:
B1          0.266     1.398     0.099     0.003    60.970         5         5
B2          3.070     3.557     0.112     0.005    20.243         5         5
B3          0.076     0.072     0.007     0.000     3.872         5         5
B5          0.859    16.987     2.526     0.006     4.041         5         2
```

```
B6          0.275     0.554     0.052     0.001    57.935         5         5
B7          0.673     6.621     0.284     0.004    94.072         5         5
B8          0.528     1.544     0.088     0.001    80.787         5         5
B10         0.980     1.910     0.037     0.003    44.431         5         5
B11        14.491    14.219     0.980     0.052    57.263         5         5
B12         4.927    10.680     0.313     0.050    69.273         5         5
B14        11.127    31.915     3.908     0.357    25.769         5         2
B15         2.294     9.509     0.357     0.017    96.649         5         5
B16         0.125     2.585     0.166     0.001    36.506         5         5
B17         0.911     2.127     0.124     0.011    67.417         5         5
B18         0.269     0.875     0.023     0.000    58.401         5         5
B19         0.906     7.695     0.173     0.008    46.643         5         5
B20         0.070     0.384     0.015     0.000    21.957         5         5

Summary of Classification Success:
                Into:
From:     2HARB_C     AIR_C   EAGLE_C  EMPIRE_C   SWAIR_C     Total
2HARB_C       19         1         0         0         0        20
AIR_C          1        15         2         0         0        18
EAGLE_C        1         0        19         0         0        20
EMPIRE_C       0         0         2        18         0        20
SWAIR_C        0         2         0         0        15        17
Total         21        18        23        18        15        95
```

Table A-25. Known Unkown Test: Mahalanobis distance calculation for unknowns projected against Chlorite Schist, Jacumba Schist, Santa Cruz Island Schist, Serpentine, and Talc Schist utilizing 11 elements

```
Date: 12/13/12
File: KnownUnknownTest_Tier1

Reference groups and numbers of specimens:
       1        CS        25
       2        JS        25
       3      SCIS        25
       4      SERP        50
       5        TS       200

Variables used:
        MG         AL         SI         CA         TI           V          CR
        MN         NI         CU         SR


The following specimens are in the file  UNK
           Probabilities:
UNK-1       0.000     0.000     0.000    36.383     0.000         4
UNK-2       0.000     0.000     0.000    79.559     0.000         4
UNK-3       0.000     0.000     0.000    41.126     0.000         4
UNK-4       0.000     0.000     0.000    35.400     0.000         4
UNK-5       0.000     0.000     0.000     0.000    10.721         5
UNK-6       0.000     0.001     0.000     0.000    99.407         5
UNK-7       0.000     0.002     0.000     0.000    22.557         5
UNK-8       0.000     0.000     0.000     0.000    42.951         5
UNK-9      93.744     0.000     0.000     0.001     0.000         1
UNK-10     53.424     0.000     0.001     0.000     0.000         1
UNK-11      0.000     0.000     0.000     0.000    29.325         5
UNK-12      0.000     0.002     0.001     0.000    33.334         5
UNK-13      0.000     0.000     0.000     0.000    86.355         5
UNK-14      0.000     0.000     0.000     0.000    91.528         5
UNK-15      0.000    42.400     0.031     0.000     0.169         2
UNK-16      0.000    50.897     0.139     0.000     2.541         2
UNK-17      0.000     0.000     0.000     0.000    59.200         5
UNK-18      0.000     0.000     0.000     0.000    25.921         5
UNK-19      0.000     0.003     0.000     0.000    81.808         5
UNK-20      0.000     0.000     0.000     0.000    84.301         5
UNK-21      0.000     0.000    80.841     0.000     0.000         3
UNK-22      0.000     0.000     0.149     0.000     0.000         3
UNK-23      0.000     0.004     0.000     0.000    95.456         5
UNK-24      0.000     0.001     0.000     0.000    92.086         5
UNK-25      0.000     0.169     0.000     0.000    76.417         5
UNK-26      0.000     0.071     0.000     0.000    97.781         5


Summary of Probabilities for Specimens in the file  TESTM_

                        Probability Cutoff Values:
Group:       0.01     0.10    1.00    5.00   10.00   20.00  100.00
CS             24       24      24      24      24      24      26
JS             22       23      24      24      24      24      26
SCIS           22       23      25      25      25      25      26
SERP           22       22      22      22      22      22      26
TS              8        8       9      10      10      11      26
```

```
Summary of Best Classification of Projected Specimens:
                Into:
From:          CS        JS      SCIS      SERP        TS     Total
Unk            2         2         2         4        16        26
Total          2         2         2         4        16        26
```

Table A-26. Known Unkown Test: Mahalanobis distance calculation for unknown talc schist projected against Catalina, Los Angeles, and San Diego soapstone utilizing 12 elements

```
Date: 12/12/12
File: KnownUnknownTest_Tier2

Reference groups and numbers of specimens:
       1        LA       100
       2        SD       100
       3       CAT        95

Variables used:
        MG         FE          K         TI           V         CR          MN
        NI         ZN         AS         BA         TM


The following specimens are in the file  UNKTS
           Probabilities:
ID. NO.       LA        SD        Cat   BEST GP.
UNK-5      32.677     2.185     0.000         1
UNK-6      72.492     6.939     0.000         1
UNK-7      92.007    38.881     0.013         1
UNK-8      27.535     4.402     0.012         1
UNK-11      0.009    12.371     0.000         2
UNK-12      2.146    60.275     0.000         2
UNK-13      0.626    91.491     0.003         2
UNK-14     12.100    79.448     0.000         2
UNK-17      0.000    47.238     0.000         2
UNK-18      0.096    52.924     0.000         2
UNK-19      0.000    55.209     0.000         2
UNK-20      0.000    88.336     0.000         2
UNK-23     49.540    52.671     0.030         2
UNK-24     95.713     0.242     0.008         1
UNK-25     67.849     0.059     0.000         1
UNK-26     99.908    12.390     0.004         1


Summary of Probabilities for Specimens in the file  TESTR_

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
LA              4       5       6       7       7       8      16
SD              0       1       2       4       5       7      16
CAT            13      16      16      16      16      16      16


Summary of Best Classification of Projected Specimens:
                Into:
From:          LA        SD       CAT     Total
Unk            7         9         0        16
Total          7         9         0        16
```

Table A-27. Known Unkown Test: Mahalanobis distance calculation for unknown San Diego talc schist projected against Cuyamaca and Mount Laguna talc schist soapstone utilizing 9 elements

```
Date: 12/13/12
File: KnownUnknownTest_Tier3_SD_Phase1

Reference groups and numbers of specimens:
       1      CUYA        50
       2     MTLAG        50

Variables used:
        NI         CO         TB         HO         TM         LU         HF
        ER         GD


The following specimens are in the file  UNK_SD
           Probabilities:
ID. NO.      CUYA     MTLAG  BEST GP.
UNK-11      7.017    61.495         2
UNK-12      0.806    13.211         2
UNK-13     21.969    72.881         2
UNK-14      4.409    35.999         2
UNK-17     17.968    42.092         2
UNK-18     37.507    42.684         2
UNK-19     78.071    29.114         1
UNK-20     66.880     0.252         1

Summary of Probabilities for Specimens in the file  UNK_SD

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CUYA            0       0       1       2       3       4       8
MTLAG           0       0       1       1       1       2       8


Summary of Best Classification of Projected Specimens:
                Into:
From:        CUYA     MTLAG     Total
UNK_SD         2         6         8
Total          2         6         8
```

Table A-28. Known Unkown Test: Mahalanobis distance calculation for unknown San Diego talc schist projected against Cuyamaca, Mount Laguna, and Jacumba soapstone utilizing 12 elements

```
Date: 12/13/12
File: KnownUnknownTest_Tier3_SD_Phase2

Reference groups and numbers of specimens:
       1      CUYA        50
       2     MTLAG        50
       3   JACUMBA        25

Variables used:
        TI          V         CR         NI         CO         TB         HO
        TM         LU         HF         ER         GD


The following specimens are in the file  UNK_SD
           Probabilities:
ID. NO.      CUYA   JACUMBA     MTLAG   BEST GP.
UNK-11     10.879     0.398    79.520         3
UNK-12      0.291     3.427    21.361         3
UNK-13     35.205     0.175    82.534         3
UNK-14      3.810     1.827    79.618         3
UNK-17     27.333     4.914    62.349         3
UNK-18     64.187     0.939    63.504         1
UNK-19     86.778     4.699    40.734         1
UNK-20     56.617     0.080     0.460         1


Summary of Probabilities for Specimens in the file  TESTSD_

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CUYA            0       0       1       2       2       3       8
JACUMBA         0       1       4       8       8       8       8
MTLAG           0       0       1       1       1       1       8


Summary of Best Classification of Projected Specimens:
                Into:
From:        CUYA   JACUMBA     MTLAG     Total
Unk_SD         3         0         5         8
Total          3         0         5         8
```

Table A-29. Known Unkown Test: Mahalanobis distance calculation for Cuyamaca talc schist projected against CA-SDI-9039 and CA-SDI-9040 talc schist soapstone quarries utilizing 9 elements

```
Date: 12/13/12
File: KnownUnknownTest_Tier3_SD_Phase3

Reference groups and numbers of specimens:
       1      9039        25
       2      9040        25

Variables used:
        FE          K          CU          ZN          ZR          CO          GD
        HO          TH


The following specimens are in the file  UNK_CUY
           Probabilities:
ID. NO.      9039      9040  BEST GP.
UNK-18      5.369    15.702         2
UNK-19      1.214    69.191         2
UNK-20      0.271    93.647         2


Summary of Probabilities for Specimens in the file  UNK_CUY

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
9039            0       0       1       2       3       3       3
9040            0       0       0       0       0       1       3


Summary of Best Classification of Projected Specimens:
               Into:
From:        9039      9040     Total
Unk_Cuy        0         3         3
Total          0         3         3
```

Table A-30. Known Unkown Test: Mahalanobis distance calculation for Los Angeles talc schist projected against CA-LAN-1132 and CA-LAN-1279 talc schist soapstone quarries utilizing 6 elements

```
Date: 12/13/12
File: KnownUnknownTest_Tier3_LA

Reference groups and numbers of specimens:
       1      1132        50
       2      1279        50

Variables used:
        MG         FE         CU         AS         SB          U


The following specimens are in the file  UNK_LA
           Probabilities:
ID. NO.      1132      1279  BEST GP.
UNK-6      90.835    70.297         1
UNK-7      10.876    76.502         2
UNK-8       2.641    32.559         2
UNK-23      2.203     5.120         2
UNK-24     65.656    38.561         1
UNK-25      0.351    80.245         2
UNK-26     32.296    82.458         2


Summary of Probabilities for Specimens in the file  UNK_LA

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
1132            0       0       1       3       3       4       7
1279            0       0       0       0       1       1       7


Summary of Best Classification of Projected Specimens:
                Into:
From:        1132      1279     Total
UNK_LA         2         5         7
Total          2         5         7
```

Table A-31. Artifact Proveneince Analysis: Mahalanobis distance calculation for stone beads projected against Chlorite schist, Jacumba schist, Santa Cruz Island Schist, Serpentine, and Talc Schist utilizing 11 elements

```
Date: 12/28/12
File: Stone_Bead_Proveneince_Analysis_Tier_1

Reference groups and numbers of specimens:
       1        CS        25
       2        JS        25
       3      SCIS        25
       4      SERP        50
       5        TS       200

Variables used:
        MG         AL         SI         CA         TI          V          CR
        MN         NI         CU         SR


The following specimens are in the file  21_CS_
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
179-1166    0.000     0.000     0.351     0.000     0.000         3
179-1173    0.001     0.000     0.616     0.000     0.000         3
179-1176    0.001     0.000     0.827     0.000     0.000         3
179-1221    0.001     0.000     0.731     0.000     0.000         3
179-1143    0.000     0.000     0.083     0.020     0.000         3
179-1219    0.006     0.000     0.583     0.000     0.000         3
179-1157    0.000     0.000     0.318     0.000     0.000         3
179-1174    0.000     0.000     0.090     0.000     0.000         3
179-1225    0.000     0.000     1.470     0.000     0.000         3
179-1224    0.001     0.000     0.869     0.000     0.000         3
179-1227    0.001     0.000     1.414     0.000     0.000         3
179-1131    0.000     0.000     0.649     0.000     0.000         3
179-1140    0.000     0.000     1.260     0.000     0.000         3
179-1199    0.003     0.000     2.613     0.000     0.000         3
179-1127    0.000     0.000     1.082     0.000     0.000         3
179-1212    0.000     0.000     1.890     0.000     0.000         3
179-1198    0.001     0.000     1.239     0.000     0.000         3
179-1132    0.000     0.000     1.357     0.000     0.000         3
179-1139    0.000     0.000     0.525     0.000     0.000         3
179-1159    0.002     0.000     2.231     0.000     0.000         3
179-1130    0.001     0.000     1.740     0.000     0.000         3
179-1206    0.000     0.000     0.743     0.000     0.000         3
179-1192    0.000     0.000     2.413     0.000     0.000         3
179-1158    0.000     0.000     1.406     0.000     0.000         3
179-1162    0.000     0.000     0.298     0.000     0.000         3
179-1175    0.000     0.000     0.446     0.000     0.000         3
179-1217    0.000     0.000     3.635     0.000     0.000         3
179-1149    0.008     0.000     1.847     0.000     0.000         3
179-1210    0.000     0.000     0.051     0.000     0.000         3
179-1228    0.000     0.000     0.482     0.000     0.000         3
179-1188    0.000     0.000     1.561     0.000     0.000         3
179-1216    0.000     0.000     3.160     0.000     0.000         3

The following specimens are in the file  21CTS_
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
179-1123    0.001     0.000     0.016     0.000     0.000         3
179-1135    0.001     0.000     0.002     0.015     0.000         4
179-1136    0.000     0.000     0.023     0.000     0.000         3
179-1145    0.000     0.000     0.000     0.000     0.239         5
179-1148    0.000     0.000     0.000     0.000     0.015         5
179-1165    0.000     0.000     0.000     0.000     0.035         5
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179-1186    0.000     0.000     0.000     0.000     0.000         5
179-1187    0.000     0.000     0.000     0.000     0.000         2
179-1197    0.000     0.000     0.000     0.000    19.015         5
179-1203    0.000     0.000     0.000     0.000     0.681         5
179-1214    0.000     0.000     0.000     0.000    35.378         5
179-1215    0.000     0.000     0.000     0.000     0.001         5
179-1232    0.000     0.000     0.000     0.000    16.825         5
179-670     0.000     0.000     0.002     0.000     0.000         3

The following specimens are in the file  21TS_
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
179-1141    0.000     0.002     0.000     0.000    18.450         5
179-1142    0.000     0.000     0.000     0.000     3.211         5
179-1144    0.000     0.000     0.000     0.000     0.001         5
179-1194    0.044     0.000     0.028     0.000     0.000         1
179-681     0.000     0.000     0.000     0.000     0.000         5
179-1229    0.000     0.000     0.000     0.000    81.387         5

The following specimens are in the file  1246_CS
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
8006-23     0.003     0.000     1.840     0.000     0.000         3
8006-2      0.003     0.000     2.046     0.000     0.000         3
7901-2      0.005     0.000     2.834     0.000     0.000         3
8738-2      0.002     0.000     2.557     0.000     0.000         3
8006-3      0.001     0.000     1.767     0.000     0.000         3
8009-3      0.004     0.000     1.728     0.000     0.000         3
8738-6      0.002     0.000     1.308     0.000     0.000         3
8738-5      0.001     0.000     1.852     0.000     0.000         3
8738-1      0.008     0.000     3.020     0.000     0.000         3
8006-15     0.002     0.000     2.589     0.000     0.000         3
7653_       0.001     0.000     2.154     0.000     0.000         3
7598-1      0.001     0.000     0.954     0.000     0.000         3
7598-3      0.001     0.000     1.638     0.000     0.000         3
7641-3      0.019     0.000     2.381     0.000     0.000         3
7641-4      0.017     0.000     1.837     0.000     0.000         3
8840-2      0.007     0.000     3.506     0.000     0.000         3
4725_       0.004     0.000     1.657     0.000     0.000         3
8340_       0.007     0.000     1.951     0.000     0.000         3
4529-2      0.004     0.000     1.125     0.000     0.000         3
4639-2      0.001     0.000     1.389     0.000     0.000         3
9094_       0.000     0.000     0.682     0.000     0.000         3
8163_       0.000     0.000     1.714     0.000     0.000         3
8840-1      0.000     0.000     4.436     0.000     0.000         3

The following specimens are in the file  1246_CTS
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
7901-3      0.000     0.000     0.000     0.000     0.000         1
8944_       0.001     0.000     0.007     0.001     0.000         3
9176_       0.002     0.000     0.007     0.000     0.000         3
7883_       0.002     0.000     0.009     0.000     0.000         3
8240_       0.000     0.000     0.006     0.000     0.000         3
8006-14     0.000     0.000     0.032     0.000     0.000         3
8785_       0.000     0.000     0.034     0.000     0.000         3


The following specimens are in the file  1246_TS
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
8823-1      0.000     0.000     0.000     0.000     0.000         3
The following specimens are in the file  1691
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           Probabilities:
ID. NO.         CS        JS      SCIS      SERP        TS  BEST GP.
1691-U3L2   0.000     0.000     0.000     0.000     2.656         5
1691-U6L2   0.000     0.000     0.000     0.000    71.616         5
1691-U7L3   0.000     0.000     0.000     0.000     0.000         5
1691-U7L5   0.003     0.000     1.061     0.000     0.000         3
1691-U8L2   0.000     0.000     0.000     0.000     0.000         2

The following specimens are in the file  2936
           Probabilities:
ID. NO.         CS        JS      SCIS      SERP        TS  BEST GP.
444-108     0.000     0.000     0.000     0.000     0.000         2
444-1460    0.000     0.000     0.211     0.000     0.000         3
444-1460    0.001     0.000     0.011     0.000     0.000         3
444-1476    0.000     0.000     0.026     0.000     0.000         3

The following specimens are in the file  REDMTN
           Probabilities:
ID. NO.         CS        JS      SCIS      SERP        TS  BEST GP.
211-860     0.000     0.000     0.000     0.000    85.929         5
2600-317    0.001     0.000     0.005     0.000     0.000         3
2614-241    0.000     0.000     0.000     0.000     0.014         5

Summary of Probabilities for Specimens in the file  21_CS_

                        Probability Cutoff Values:
Group:        0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              32      32      32      32      32      32      32
JS              32      32      32      32      32      32      32
SCIS             0       3      16      32      32      32      32
SERP            31      32      32      32      32      32      32
TS              32      32      32      32      32      32      32

Summary of Probabilities for Specimens in the file  21CTS_

                        Probability Cutoff Values:
Group:        0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              15      15      15      15      15      15      15
JS              15      15      15      15      15      15      15
SCIS            13      15      15      15      15      15      15
SERP            14      15      15      15      15      15      15
TS               7       9      11      11      11      13      15

Summary of Probabilities for Specimens in the file  21TS_

                        Probability Cutoff Values:
Group:        0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS               4       5       5       5       5       5       5
JS               5       5       5       5       5       5       5
SCIS             4       5       5       5       5       5       5
SERP             5       5       5       5       5       5       5
TS               3       3       3       4       4       5       5

Summary of Probabilities for Specimens in the file  1246_CS

                        Probability Cutoff Values:
Group:        0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              21      23      23      23      23      23      23
JS              23      23      23      23      23      23      23
SCIS             0       0       2      23      23      23      23
SERP            23      23      23      23      23      23      23
TS              23      23      23      23      23      23      23
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Summary of Probabilities for Specimens in the file  1246_CTS

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              7       7       7       7       7       7       7
JS              7       7       7       7       7       7       7
SCIS            5       7       7       7       7       7       7
SERP            7       7       7       7       7       7       7
TS              7       7       7       7       7       7       7

Summary of Probabilities for Specimens in the file  1246_TS

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              1       1       1       1       1       1       1
JS              1       1       1       1       1       1       1
SCIS            1       1       1       1       1       1       1
SERP            1       1       1       1       1       1       1
TS              1       1       1       1       1       1       1

Summary of Probabilities for Specimens in the file  1691_

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              5       5       5       5       5       5       5
JS              5       5       5       5       5       5       5
SCIS            4       4       4       5       5       5       5
SERP            5       5       5       5       5       5       5
TS              3       3       3       4       4       4       5

Summary of Probabilities for Specimens in the file  2936

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              4       4       4       4       4       4       4
JS              4       4       4       4       4       4       4
SCIS            1       3       4       4       4       4       4
SERP            4       4       4       4       4       4       4
TS              4       4       4       4       4       4       4

Summary of Probabilities for Specimens in the file  REDMTN

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              3       3       3       3       3       3       3
JS              3       3       3       3       3       3       3
SCIS            3       3       3       3       3       3       3
SERP            3       3       3       3       3       3       3
TS              1       2       2       2       2       2       3

Summary of Best Classification of Projected Specimens:
                Into:
From:          CS        JS      SCIS      SERP         TS     Total
21_CS_         0         0        32         0          0        32
21CTS_         0         1         3         1         10        15
21TS_          1         0         0         0          4         5
1246_1         0         0        23         0          0        23
1246_2         1         0         6         0          0         7
1691_          0         1         1         0          3         5
2936           0         1         3         0          0         4
REDMTN         0         0         1         0          2         3
Total          2         3        69         1         19        94
```

Table A-32. Artifact Proveneince Analysis: Mahalanobis distance calculation for potential talc schist stone beads projected against Catalina, Los Angeles, and San Diego soapstone utilizing 12 elements

```
Date: 12/28/12
File: Stone_Bead_Proveneince_Analysis_Tier_2all

Reference groups and numbers of specimens:
       1       CAT        95
       2        LA       100
       3        SD       100

Variables used:
        MG         FE          K         TI          V         CR         MN
        NI         ZN         AS         BA         TM


The following specimens are in the file  21_CS
           Probabilities:
ID. NO.        CAT        LA        SD  BEST GP.
179-1166    0.000     0.000     0.000         1
179-1173    0.000     0.000     0.000         1
179-1176    0.000     0.000     0.000         1
179-1221    0.000     0.000     0.000         1
179-1143    0.000     0.000     0.000         1
179-1219    0.000     0.000     0.000         1
179-1157    0.000     0.000     0.000         1
179-1174    0.000     0.000     0.000         1
179-1225    0.000     0.000     0.000         1
179-1224    0.000     0.000     0.000         1
179-1227    0.000     0.000     0.000         1
179-1131    0.000     0.000     0.000         1
179-1140    0.000     0.000     0.000         1
179-1199    0.000     0.000     0.000         1
179-1127    0.000     0.000     0.000         1
179-1212    0.000     0.000     0.000         1
179-1198    0.000     0.000     0.000         1
179-1132    0.000     0.000     0.000         1
179-1139    0.000     0.000     0.000         1
179-1159    0.000     0.000     0.000         1
179-1130    0.000     0.000     0.000         1
179-1206    0.000     0.000     0.000         1
179-1192    0.000     0.000     0.000         1
179-1158    0.000     0.000     0.000         1
179-1162    0.000     0.000     0.000         1
179-1175    0.000     0.000     0.000         1
179-1217    0.000     0.000     0.000         1
179-1149    0.000     0.000     0.000         1
179-1210    0.000     0.000     0.000         1
179-1228    0.000     0.000     0.000         1
179-1188    0.000     0.000     0.000         1
179-1216    0.000     0.000     0.000         1

The following specimens are in the file  21CTS
           Probabilities:
ID. NO.        CAT        LA        SD  BEST GP.
179-1123    0.000     0.000     0.000         1
179-1135    0.000     0.000     0.000         3
179-1136    0.000     0.000     0.000         1
179-1145    0.029     0.000     0.002         1
179-1148    0.135     0.130     2.935         3
179-1165    0.111     0.000     0.000         1
179-1186    0.000     0.000     0.000         3
179-1187    0.415     0.000     0.000         1
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179-1197    0.071     0.115     2.711         3
179-1203    0.002     0.000     0.000         1
179-1214    0.383     0.369     4.563         3
179-1215    0.000     0.000     0.000         1
179-1232    0.055     0.000     0.625         3
179-670     0.000     0.000     0.000         1

The following specimens are in the file  21TS
           Probabilities:
ID. NO.        CAT        LA        SD  BEST GP.
179-1141    0.001     1.480     0.011         2
179-1142    0.075     0.067     0.002         1
179-1144    0.004    13.981     0.199         2
179-1194    0.000     0.000     0.000         3
179-681     0.000     0.000     0.000         2
179-1229    0.003    41.136     5.158         2

The following specimens are in the file  1246_CS
           Probabilities:
ID. NO.        CAT        LA        SD  BEST GP.
8006-23     0.001     0.000     0.000         1
8006-2      0.000     0.000     0.000         1
7901-2      0.003     0.000     0.000         1
8738-2      0.003     0.000     0.000         1
8006-3      0.000     0.000     0.000         1
8009-3      0.001     0.000     0.000         1
8738-6      0.002     0.000     0.000         1
8738-5      0.000     0.000     0.000         1
8738-1      0.000     0.000     0.000         1
8006-15     0.002     0.000     0.000         1
7653_       0.008     0.000     0.000         1
7598-1      0.003     0.000     0.000         1
7598-3      0.015     0.000     0.000         1
7641-3      0.006     0.000     0.000         1
7641-4      0.003     0.000     0.000         1
8840-2      0.003     0.000     0.000         1
4725_       0.000     0.000     0.000         1
8340_       0.000     0.000     0.000         1
4529-2      0.000     0.000     0.000         1
4639-2      0.000     0.000     0.000         1
9094_       0.001     0.000     0.000         1
8163_       0.000     0.000     0.000         1
8840-1      0.006     0.000     0.000         1

The following specimens are in the file  1246_CTS
           Probabilities:
ID. NO.        CAT        LA        SD  BEST GP.
7901-3      0.000     0.000     0.000         3
8944_       0.000     0.000     0.000         3
9176_       0.000     0.000     0.000         3
7883_       0.000     0.000     0.000         2
8240_       0.000     0.000     0.000         2
8006-14     0.000     0.000     0.000         3
8785_       0.000     0.000     0.000         3


The following specimens are in the file  1246_TS
           Probabilities:
ID. NO.         LA        SD       CAT  BEST GP.
8823-1      0.000     0.000     0.000         3
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The following specimens are in the file  1691_
           Probabilities:
ID. NO.       CAT        LA        SD  BEST GP.
1691-U3L2   0.004     0.000     0.000         1
1691-U6L2  15.495     3.728     5.321         1
1691-U7L3   0.314     0.000     0.000         1
1691-U7L5   0.000     0.000     0.000         1
1691-U8L2   0.000     0.000     0.000         1

The following specimens are in the file  2936
           Probabilities:
ID. NO.       CAT        LA        SD  BEST GP.
444-108     0.083     0.000     0.000         1
444-1460    0.000     0.000     0.000         2
444-1460    0.000     0.000     0.000         2
444-1476    0.000     0.000     0.000         2

The following specimens are in the file  RED_
           Probabilities:
ID. NO.       CAT        LA        SD  BEST GP.
211-860     0.009    66.014    33.659         2
2600-317    0.000     0.000     0.000         1
2614-241    0.006     0.001     0.000         1

Summary of Probabilities for Specimens in the file  21_CS

                         Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT            32      32      32      32      32      32      32
LA             32      32      32      32      32      32      32
SD             32      32      32      32      32      32      32

Summary of Probabilities for Specimens in the file  21CTS

                         Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT             8      11      15      15      15      15      15
LA             11      11      14      14      14      14      15
SD             10      10      11      14      15      15      15

Summary of Probabilities for Specimens in the file  21TS_

                         Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT             4       5       5       5       5       5       5
LA              2       3       3       4       4       5       5
SD              3       4       5       5       5       5       5

Summary of Probabilities for Specimens in the file  1246_CS

                         Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT            22      23      23      23      23      23      23
LA             23      23      23      23      23      23      23
SD             23      23      23      23      23      23      23

Summary of Probabilities for Specimens in the file  1246_CTS

                         Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT             7       7       7       7       7       7       7
LA              7       7       7       7       7       7       7
SD              7       7       7       7       7       7       7
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Summary of Probabilities for Specimens in the file  1246_TS

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
LA             1       1       1       1       1       1       1
SD             1       1       1       1       1       1       1
CAT            1       1       1       1       1       1       1

Summary of Probabilities for Specimens in the file  1691_

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT            3       3       4       4       4       5       5
LA             4       4       4       5       5       5       5
SD             4       4       4       4       5       5       5

Summary of Probabilities for Specimens in the file  2936

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT            3       4       4       4       4       4       4
LA             4       4       4       4       4       4       4
SD             4       4       4       4       4       4       4

Summary of Probabilities for Specimens in the file  RED_

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT            3       3       3       3       3       3       3
LA             2       2       2       2       2       2       3
SD             2       2       2       2       2       2       3


Summary of Best Classification of Projected Specimens:
                Into:
From:         CAT        LA        SD     Total
21_CS_        32          0         0        32
21CTS_         8          1         6        15
21TS_          1          3         1         5
1246_1        23          0         0        23
1246_2         0          2         5         7
1691_          5          0         0         5
2936           1          3         0         4
RED_           2          1         0         3
Total         72         10        12        94
```

Table A-33. Artifact Proveneince Analysis: Mahalanobis distance calculation for soapstone artifacts projected against Chlorite schist, Jacumba schist, Santa Cruz Island Schist, Serpentine, and Talc Schist utilizing 11 elements

```
Date: 12/16/12
File: Soapstone_Proveneince_Analysis_Tier_1

Reference groups and numbers of specimens:
       1        CS        25
       2        JS        25
       3      SCIS        25
       4      SERP        50
       5        TS       200

Variables used:
        MG         AL         SI         CA         TI           V         CR
        MN         NI         CU         SR


The following specimens are in the file  CLARK_SCLEM
           Probabilities:
ID. NO.        CS        JS      SCIS      SERP        TS  BEST GP.
JC9         0.000     0.000     0.000     0.000     0.000         5
JC10        0.001     0.000     0.013     0.004     0.000         3
JC11        0.000     0.000     0.125     0.000     0.000         3
JC12        0.000     0.000     0.000     0.000     0.000         3
JC13        0.000     0.000     0.000     0.000     0.000         3
JC14        0.000     0.000     0.000     0.000     2.200         5
JC15        0.000     0.000     0.017     0.000     0.000         3
JC16        0.000     0.000     0.033     0.000     0.000         3
JC18        0.000     0.000     0.000     0.000     0.018         5
JC19        0.000     0.000     0.000     0.000     0.000         3
JC20        0.039     0.000     0.000     0.035     0.000         1
JC21        0.000     0.000     0.002     0.001     0.005         5
JC22        0.000     0.000     0.000     0.000     0.000         2
JC23        0.000     0.000     0.000     0.000     0.000         4
JC24        0.000     0.000     0.000     0.000     0.000         5
JC25        0.000     0.000     0.000     0.000     0.630         5
JC26        0.000     0.000     0.000     0.000     0.001         5
JC27        0.000     0.000     0.000     0.000     0.000         2
JC28        0.000     0.000     0.000     0.000     0.184         5
JC29        0.000     0.000     0.000     0.000     0.034         5
JC30        0.000     0.000     0.000     0.000     0.704         5
JC31        0.000     0.000     0.000     0.000     0.000         5
JC32        0.000     0.000     0.000     0.000     2.448         5
JC33        0.000     0.000     0.000     0.000     0.970         5
JC34        0.000     0.000     0.000     0.000     0.013         5
JC35        0.000     0.000     0.000     0.000     0.098         5
JC36        0.000     0.000     0.000     0.000     1.581         5
JC37        0.000     0.000     0.000     0.000     0.114         5
JC38        0.000     0.000     0.000     0.000     0.068         5
JC39        0.000     0.000     0.000     0.000     0.030         5
JC40        0.000     0.000     0.000     0.000     0.000         5
JC41        0.000     0.000     0.000     0.000     0.053         5
JC42        0.000     0.000     0.000     0.000     0.000         5
JC43        0.000     0.000     0.000     0.000     0.017         5
JC44        0.000     0.000     0.000     0.000     0.000         5
JC45        0.000     0.000     0.000     0.000     0.000         5
JC46        0.000     0.000     0.000     0.000     0.001         5
JC47        0.000     0.000     0.000     0.000     0.000         5
JC48        0.000     0.000     0.000     0.000     0.000         3
JC49        0.000     0.000     0.000     0.000     0.000         5
JC50        0.000     0.000     0.001     0.000     0.000         3
```

```
JC51         0.000     0.000     0.000     0.000     0.001         5
JC52         0.000     0.000     0.000     0.000     0.037         5
JC53         0.000     0.000     0.000     0.000     0.023         5
JC54         0.000     0.000     0.000     0.000     0.011         5
JC55         0.000     0.000     0.000     0.000     1.374         5
JC56         0.000     0.000     0.000     0.000     0.306         5
JC57         0.000     0.000     0.000     0.000     0.075         5
JC58         0.000     0.000     0.000     0.000     0.003         5
JC59         0.000     0.000     0.000     0.000     1.717         5
JC60         0.000     0.000     0.000     0.000     0.000         5
JC61         0.000     0.000     0.000     0.000     2.676         5
JC62         0.000     0.000     0.000     0.000     0.430         5
JC63         0.000     0.000     9.030     0.000     0.000         3
JC64         0.000     0.000     0.000     0.000     0.000         3
JC65         0.000     0.000     0.000     0.000     0.000         5
JC66         0.000     0.000     0.000     0.000     0.159         5

The following specimens are in the file  SCLEM_T
           Probabilities:
ID. NO.         CS        JS      SCIS      SERP        TS  BEST GP.
TU1          0.000     0.000     0.000     0.000     0.000         5
TU2          0.000     0.000     0.000     0.000     0.000         2
TU3          0.000     0.000     0.037     0.000     0.000         3
TU4          0.000     0.001     0.000     0.000     0.001         2
TU5          0.000     0.000     0.000     0.000     0.000         5
TU6          0.000     0.000     0.000     0.000     0.025         5
TU7          0.000     0.000     0.000     0.000     1.189         5
TU8          0.000     0.006     0.000     0.000     2.048         5
TU9          0.000     0.000     0.000     0.000     0.174         5
TU10         0.000     0.000     0.000     0.000    12.329         5
TU11         0.000     0.000     0.000     0.000     0.029         5
TU12         0.000     0.000     0.000     0.000     0.061         5
TU13         0.000     0.000     0.000     0.000     0.000         5
TU14         0.000     0.000     0.000     0.000     0.006         5
TU15         0.000     0.000     0.000     0.000     0.020         5
TU16         0.000     0.000     0.000     0.000     0.426         5
TU17         0.000     0.000     0.000     0.000     0.000         5
TU18         0.000     0.000     0.000     0.000     0.000         2
TU19         0.000     0.000     0.000     0.000     0.145         5
TU20         0.000     0.000     0.000     0.000     0.000         2
TU21         0.000     0.000     0.000     0.000     0.642         5
TU22         0.000     0.000     0.000     0.000     0.000         5
TU23         0.000     0.000     0.000     0.000     3.226         5
TU24         0.000     0.000     0.000     0.000     0.000         5
TU25         0.000     0.000     0.000     0.000     0.000         3
TU26         0.000     0.008     0.000     0.000     4.611         5
TU27         0.000     0.000     0.000     0.000     0.110         5
TU28         0.000     0.000     0.000     0.000     0.205         5
TU29         0.000     0.000     0.000     0.000     0.000         5
TU30         0.000     0.004     0.000     0.000     0.097         5
TU31         0.000     0.000     0.000     0.000     0.002         5
TU32         0.000     0.000     0.000     0.000     0.014         5
TU33         0.000     0.000     0.000     0.000     0.055         5
TU34         0.000     0.000     0.000     0.000     6.187         5
TU35         0.000     0.000     0.000     0.000     0.000         5

The following specimens are in the file  SNI
           Probabilities:
ID. NO.         CS        JS      SCIS      SERP        TS  BEST GP.
JC1          0.000     0.000     0.000     0.000     0.286         5
JC2          0.000     0.000     0.000     0.000     0.020         5
JC3          0.000     0.000     0.000     0.004     0.216         5
JC4          0.000     0.000     0.000     0.000     0.022         5
```

```
JC5         0.000     0.000     0.018     0.000     0.000         3
JC6         0.000     0.000     0.011     0.000     0.000         3
JC7         0.000     0.000     7.329     0.000     0.000         3
JC8         0.000     0.000     0.000     0.000     0.000         5


Summary of Probabilities for Specimens in the file  SCLEM_C

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS             56      57      57      57      57      57      57
JS             57      57      57      57      57      57      57
SCIS           52      55      56      56      57      57      57
SERP           56      57      57      57      57      57      57
TS             31      43      51      57      57      57      57

Summary of Probabilities for Specimens in the file  SCLEM_T

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS             35      35      35      35      35      35      35
JS             35      35      35      35      35      35      35
SCIS           34      35      35      35      35      35      35
SERP           35      35      35      35      35      35      35
TS             16      23      29      33      34      35      35

Summary of Probabilities for Specimens in the file  SNI

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS              8       8       8       8       8       8       8
JS              8       8       8       8       8       8       8
SCIS            5       7       7       7       8       8       8
SERP            8       8       8       8       8       8       8
TS              4       6       8       8       8       8       8


Summary of Best Classification of Projected Specimens:
                Into:
From:          CS        JS      SCIS      SERP        TS     Total
SCLEM_C        1         2        11         1        42        57
SCLEM_T        0         4         2         0        29        35
SNI            0         0         3         0         5         8
Total          1         6        16         1        76       100
```

Table A-34. Artifact Proveneince Analysis: Mahalanobis distance calculation for San Clemente and San Nicolas Island artifacts projected against Catalina, Los Angeles, and San Diego soapstone utilizing 12 elements

```
Date:12/16/12
File:Results_Tier2

Reference groups and numbers of specimens:
       1       CAT        95
       2        LA       100
       3        SD       100

Variables used:
        MG         FE          K         TI           V         CR          MN
        NI         ZN         AS         BA         TM


The following specimens are in the file  CAT_ART
           Probabilities:
ID. NO.       CAT        LA        SD  BEST GP.
JC9        31.889     0.004     0.001         1
JC10        0.000     0.003     0.003         3
JC11       71.688     0.000     0.000         1
JC12        0.001     0.000     0.017         3
JC13        0.000     0.000     0.000         1
JC14       80.701     0.107     0.025         1
JC15        0.000     0.000     0.000         1
JC16        0.080     0.000     0.000         1
JC18       32.974     0.078     0.000         1
JC19        0.000     0.000     0.000         1
JC20        0.000     0.000     0.000         1
JC21       57.921     0.144     0.005         1
JC22        1.472     0.000     0.000         1
JC23        0.000     0.000     0.000         2
JC24       57.292     0.000     0.000         1
JC25       88.369     0.001     0.001         1
JC26       72.617     0.000     0.000         1
JC27        0.798     0.000     0.000         1
JC28       34.170     0.000     0.002         1
JC29       35.275     0.000     0.002         1
JC30       82.192     0.979     0.388         1
JC31       20.663     0.000     0.001         1
JC32       74.185     0.021     0.003         1
JC33       91.274     0.003     0.039         1
JC34       41.337     0.000     0.005         1
JC35       90.779     0.000     0.013         1
JC36        3.186     0.000     0.000         1
JC37        6.839     0.000     0.002         1
JC38       31.736     0.000     0.001         1
JC39       69.267     0.000     0.002         1
JC40       54.942     0.000     0.000         1
JC41       90.104     0.000     0.000         1
JC42       94.426     0.000     0.000         1
JC43       94.949     0.001     0.008         1
JC44       16.142     0.000     0.000         1
JC45       15.689     0.000     0.000         1
JC46       92.799     0.000     0.000         1
JC47       18.943     0.000     0.005         1
JC48        1.983     0.000     0.000         1
JC49       87.088     0.000     0.001         1
JC50       32.122     0.000     0.000         1
JC51       93.888     0.001     0.003         1
JC52        6.044     0.001     0.020         1
JC53        8.953     0.000     0.000         1
```

```
JC54       93.266     0.001     0.004         1
JC55       72.398     0.000     0.000         1
JC56       98.287     0.000     0.011         1
JC57       88.612     0.000     0.000         1
JC58       90.082     0.000     0.000         1
JC59       98.791     0.000     0.000         1
JC60        5.213     0.000     0.000         1
JC61       99.500     0.000     0.001         1
JC62        4.030     0.383     0.000         1
JC63        0.000     0.000     0.000         1
JC64       32.538     0.000     0.000         1
JC65        2.119     0.000     0.000         1
JC66       92.630     0.000     0.057         1

The following specimens are in the file  SCLEM_T
           Probabilities:
ID. NO.       CAT        LA        SD  BEST GP.
TU1        29.550     0.006     0.003         1
TU2         0.001     0.000     0.000         1
TU3         0.000     0.000     0.000         1
TU4         0.534     0.000     0.001         1
TU5         0.558     0.000     0.001         1
TU6         0.027     0.424     0.000         2
TU7         0.085     1.576     0.000         2
TU8         2.718     0.002     0.004         1
TU9         0.018     0.002     0.020         3
TU10        1.540     0.657     0.001         1
TU11       12.336     0.000     0.000         1
TU12       35.961     0.000     0.000         1
TU13        0.860     0.000     0.000         1
TU14        0.020     0.000     0.000         1
TU15        0.109     2.089     0.304         2
TU16       42.503     0.001     0.001         1
TU17       60.036     0.000     0.000         1
TU18        0.176     0.000     0.000         1
TU19       15.933     0.172     0.105         1
TU20        0.000     0.000     0.000         1
TU21        0.130     0.015     0.000         1
TU22       13.535     0.000     0.020         1
TU23       60.712     0.005     0.001         1
TU24       51.749     0.000     0.000         1
TU25        0.000     0.000     0.000         1
TU26       15.285     0.101     0.109         1
TU27        0.260     0.000     0.000         1
TU28       35.136     0.001     0.009         1
TU29        5.085     0.000     0.000         1
TU30        0.317     0.073     0.003         1
TU31       13.217     0.018     0.000         1
TU32       73.381     0.003     0.004         1
TU33       71.009     0.000     0.000         1
TU34        8.830     5.462     0.112         1
TU35        0.002     0.000     0.001         1

The following specimens are in the file  SNI_
           Probabilities:
ID. NO.       CAT        LA        SD  BEST GP.
JC1         5.505     0.416     0.001         1
JC2         4.572     0.000     0.000         1
JC3         2.190     0.187     0.018         1
JC4         4.472     0.000     0.089         1
JC5         0.000     0.000     0.000         1
JC6         0.109     0.056     0.000         1
JC7         0.000     0.000     0.000         1
```

```
JC8        24.078     0.000     0.000         1


Summary of Probabilities for Specimens in the file  SCLEM_C

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT             8       9      10      15      19      22      57
LA             51      53      57      57      57      57      57
SD             49      56      57      57      57      57      57

Summary of Probabilities for Specimens in the file  SCLEM_T

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT             5       9      17      19      21      26      35
LA             25      28      32      34      35      35      35
SD             29      31      35      35      35      35      35

Summary of Probabilities for Specimens in the file  SNI_

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CAT             2       2       3       6       7       7       8
LA              5       6       8       8       8       8       8
SD              6       8       8       8       8       8       8


Summary of Best Classification of Projected Specimens:
                Into:
From:         CAT        LA        SD     Total
SCLEM_C       54         1         2        57
SCLEM_T       31         3         1        35
SNI_           8         0         0         8
Total         93         4         3       100
```

Table A-35. Stone Bead Comparative Analysis: Mahalanobis distance calculation and posterior classification of CA-LAN-21 and CA-RIV-1246 chlorite schist stone beads utilizing 11 elements

```
Date: 12/16/12
File: LAN-21CS_vs_RIV-1246CS_Test1

Groups are:
       1    21_CS
       2    1246_1

Variables used:
        MG         AL         SI         CA         TI          V          CR
        MN         NI         CU         SR

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  21_CS
           Probabilities:
ID. NO.    21_CS_    1246_1     From:     Into:
179-1166    9.508     0.000         1         1
179-1173   87.257     0.000         1         1
179-1176   97.427     0.023         1         1
179-1221   63.220     0.001         1         1
179-1143    0.000     0.000         1         1
179-1219   83.395     0.000         1         1
179-1157    0.571     0.001         1         1
179-1174   23.735     0.000         1         1
179-1225   16.461     0.004         1         1
179-1224   79.564     0.001         1         1
179-1227   91.964     3.530         1         1
179-1131   94.045     1.025         1         1
179-1140   98.744     1.734         1         1
179-1199   84.362     0.999         1         1
179-1127   86.524     0.654         1         1
179-1212   89.712     2.392         1         1
179-1198   99.080     0.107         1         1
179-1132    2.051     0.000         1         1
179-1139   34.534     0.000         1         1
179-1159   80.040     0.001         1         1
179-1130   97.895     3.143         1         1
179-1206    0.000     0.000         1         1
179-1192   33.037     0.036         1         1
179-1158   37.050     0.000         1         1
179-1162   19.078     0.000         1         1
179-1175   92.178     0.001         1         1
179-1217   34.619     0.000         1         1
179-1149   94.355     0.007         1         1
179-1210    0.081     0.000         1         1
179-1228   92.397     0.001         1         1
179-1188   36.122     0.000         1         1
179-1216   75.358     0.002         1         1

The following specimens are in the file  1246_CS
           Probabilities:
ID. NO.    21_CS_    1246_1     From:     Into:
8006-23    55.504    95.284         2         2
8006-2     69.589    67.934         2         1
7901-2     73.030    43.360         2         1
8738-2     87.545    73.526         2         1
8006-3     75.870    85.357         2         2
8009-3     39.233    42.182         2         2
8738-6     80.374    77.109         2         1
8738-5     75.855    18.922         2         1
```

```
8738-1     48.831    60.398         2         2
8006-15    76.434    61.485         2         1
7653_      58.308    79.749         2         2
7598-1     38.731    43.485         2         2
7598-3     36.944    86.964         2         2
7641-3     62.810    98.227         2         2
7641-4     31.689    30.384         2         1
8840-2     68.702    63.393         2         1
4725_      62.561    54.653         2         1
8340_      61.875    17.233         2         1
4529-2     67.790    58.576         2         1
4639-2     96.233    26.495         2         1
9094_      30.025     0.791         2         1
8163_      37.617     3.034         2         1
8840-1     39.440     0.652         2         1


Summary of Classification Success:
               Into:
From:      21_CS    1246_1     Total
21_CS_        32         0        32
1246_1        15         8        23
Total         47         8        55
```

Table A-36. Stone Bead Comparative Analysis: Canonical Discriminant Analysis Based on CA-LAN-21 and CA-RIV-1246 chlorite schist disc beads utilizing 11 elements

```
Discriminant Function Coefficients:

MG       -1.8156
AL       -0.7817
SI       -0.3833
CA        0.1758
TI       -0.4194
V         0.7149
CR        0.0119
MN        0.1373
NI        0.0826
CU       -0.0467
SR       -0.3140

Wilk's lambda:     0.2799
    Approx. F:    15.2028
      p-value:     0.0000
```

Table A-37. Stone Bead Comparative Analysis: Mahalanobis distance calculation and posterior classification of CA-LAN-21 and CA-RIV-1246 chlorite schist stone beads utilizing 12 elements

```
Date: 12/17/12
File: LAN-21CS_vs_RIV-1246CS_Test2

Groups are:
       1    21_CS
       2    1246_1

Variables used:
        MG         FE          K         TI          V         CR          MN
        NI         ZN         AS         BA         TM

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  21_CS
           Probabilities:
179-1166    5.541     0.000         1         1
179-1173    5.465     0.000         1         1
179-1176   95.753     0.000         1         1
179-1221   92.297     0.000         1         1
179-1143    0.000     0.000         1         2
179-1219   91.902     0.000         1         1
179-1157    0.821     0.000         1         1
179-1174   29.508     0.000         1         1
179-1225   58.261     0.000         1         1
179-1224   69.501     0.000         1         1
179-1227   98.657     0.000         1         1
179-1131   96.219     0.000         1         1
179-1140   29.558     0.000         1         1
179-1199   89.870     0.000         1         1
179-1127   77.601     0.000         1         1
179-1212   75.763     0.000         1         1
179-1198   85.455     0.000         1         1
179-1132   22.642     0.000         1         1
179-1139   44.783     0.000         1         1
179-1159   85.400     0.000         1         1
179-1130   99.400     0.000         1         1
179-1206    0.176     0.000         1         1
179-1192   94.948     0.000         1         1
179-1158   51.196     0.000         1         1
179-1162   10.554     0.000         1         1
179-1175   64.902     0.000         1         1
179-1217   43.461     0.000         1         1
179-1149   19.569     0.000         1         1
179-1210    2.394     0.000         1         1
179-1228   83.312     0.000         1         1
179-1188   52.682     0.000         1         1
179-1216   72.511     0.000         1         1

The following specimens are in the file  1246_CS
           Probabilities:
ID. NO.     21_CS    1246_1     From:     Into:
8006-23    46.181    96.375         2         2
8006-2     48.604    53.532         2         2
7901-2     44.852    41.873         2         1
8738-2     30.955    87.716         2         2
8006-3     51.955    90.867         2         2
8009-3     45.018    63.047         2         2
8738-6     54.915    96.380         2         2
8738-5     34.161    30.132         2         1
8738-1     39.839    49.070         2         2
```

```
8006-15    19.387    93.141         2         2
7653_      12.854    79.222         2         2
7598-1     14.457    19.771         2         2
7598-3      6.034    83.486         2         2
7641-3      9.706    89.748         2         2
7641-4     10.543    68.868         2         2
8840-2     12.120    84.086         2         2
4725_       0.015     0.855         2         2
8340_       0.054     2.985         2         2
4529-2      0.073     4.689         2         2
4639-2      0.052    11.448         2         2
9094_      15.780     7.851         2         1
8163_      20.434    17.755         2         1
8840-1     44.575     1.862         2         1


Summary of Classification Success:
                Into:
From:        21_CS    1246_1     Total
21_CS          31         1        32
1246_1          5        18        23
Total          36        19        55
```

Table A-38. Stone Bead Comparative Analysis: Canonical Discriminant Analysis Based on CA-LAN-21 and CA-RIV-1246 chlorite schist disc beads utilizing 12 elements

```
Discriminant Analysis Based on the Files: 21_CS      21CTS     1246_CS

Discriminant Function Coefficients:

MG        0.7708  0.6277
FE        0.8841 -0.6957
K        -0.5896  0.1973
TI       -0.1830 -0.0983
V        -0.8376  0.2177
CR        0.8663 -0.2469
MN       -0.1593  0.5076
NI       -0.9401  0.3775
ZN       -0.5126 -0.4678
AS        0.1505 -0.0262
BA       -0.1385  0.0593
TM        0.1872 -0.1077

Wilk's lambda:     0.0337
    Approx. F:    20.7565
      p-value:     0.0000
```

Table A-39. Stone Bead Comparative Analysis: Mahalanobis distance calculation and posterior classification of CA-LAN-21 chlorite talc schist and CA-LAN-21 and CA-RIV-1246 chlorite schist stone beads utilizing 11 elements

```
Date:  4/05/13
File: CS_CTS

Groups are:
       1     21_CS
       2     21CTS
       3    1246_1

Variables used:
MG         AL         SI         CA         TI          V         CR
MN         NI         CU         SR

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  21_CS
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
179-1166    9.508    12.382     0.000         1         2
179-1173   87.257    10.530     0.000         1         1
179-1176   97.427     9.849     0.023         1         1
179-1221   63.220    10.587     0.001         1         1
179-1143    0.000     8.502     0.000         1         2
179-1219   83.395    11.365     0.000         1         1
179-1157    0.571     8.963     0.001         1         2
179-1174   23.735    10.271     0.000         1         1
179-1225   16.461     9.491     0.004         1         1
179-1224   79.564    10.525     0.001         1         1
179-1227   91.964     2.688     3.530         1         1
179-1131   94.045     2.038     1.025         1         1
179-1140   98.744     3.381     1.734         1         1
179-1199   84.362     4.132     0.999         1         1
179-1127   86.524     4.864     0.654         1         1
179-1212   89.712     2.313     2.392         1         1
179-1198   99.080     3.537     0.107         1         1
179-1132    2.051     1.040     0.000         1         1
179-1139   34.534     1.406     0.000         1         1
179-1159   80.040     3.523     0.001         1         1
179-1130   97.895     2.271     3.143         1         1
179-1206    0.000     1.938     0.000         1         2
179-1192   33.037     1.162     0.036         1         1
179-1158   37.050     1.320     0.000         1         1
179-1162   19.078     1.168     0.000         1         1
179-1175   92.178     1.369     0.001         1         1
179-1217   34.619     1.168     0.000         1         1
179-1149   94.355     3.001     0.007         1         1
179-1210    0.081     0.539     0.000         1         2
179-1228   92.397     1.422     0.001         1         1
179-1188   36.122     1.284     0.000         1         1
179-1216   75.358     1.678     0.002         1         1

The following specimens are in the file  21CTS
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
179-1123    0.000    56.017     0.000         2         2
179-1135    0.000    36.160     0.000         2         2
179-1136    0.000     9.369     0.000         2         2
179-1145    0.000    97.229     0.000         2         2
179-1148    0.000    49.676     0.000         2         2
179-1165    0.000    60.391     0.000         2         2
```

```
179-1186    0.000   70.439    0.000         2         2
179-1187    0.000   24.705    0.000         2         2
179-1197    0.000   44.385    0.000         2         2
179-1203    0.000   37.612    0.000         2         2
179-1214    0.000   93.537    0.000         2         2
179-1215    0.000   30.924    0.000         2         2
179-1232    0.000   81.317    0.000         2         2
179-670     0.000    8.013    0.000         2         2

The following specimens are in the file  1246_1
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
8006-23    55.504     3.425    95.284         3         3
8006-2     69.589     4.898    67.934         3         1
7901-2     73.030     3.290    43.360         3         1
8738-2     87.545     2.935    73.526         3         1
8006-3     75.870     9.049    85.357         3         3
8009-3     39.233     4.126    42.182         3         3
8738-6     80.374    10.673    77.109         3         1
8738-5     75.855     6.636    18.922         3         1
8738-1     48.831     2.891    60.398         3         3
8006-15    76.434     4.041    61.485         3         1
7653_      58.308     8.925    79.749         3         3
7598-1     38.731    11.540    43.485         3         3
7598-3     36.944    11.473    86.964         3         3
7641-3     62.810     3.727    98.227         3         3
7641-4     31.689     5.975    30.384         3         1
8840-2     68.702     3.626    63.393         3         1
4725_      62.561     3.403    54.653         3         1
8340_      61.875     3.006    17.233         3         1
4529-2     67.790    13.885    58.576         3         1
4639-2     96.233     7.580    26.495         3         1
9094_      30.025     6.342     0.791         3         1
8163_      37.617     6.331     3.034         3         1
8840-1     39.440     3.879     0.652         3         1

Summary of Classification Success:
                Into:
From:        21_CS     21CTS    1246_1     Total
21_CS          27         5         0        32
21CTS           0        14         0        14
1246_1         15         0         8        23
Total          42        19         8        69
```

Table A-40. Artifact Proveneince Analysis: Canonical Discriminant Analysis Based on CA-LAN-21 chlorite schist and CA-RIV-1246 chlorite schist beads utilizing 12 elements

```
Discriminant Analysis Based on the Files:      21_CS     1246_1

Discriminant Function Coefficients:

MG       -0.9870
FE       -0.1652
K         0.0661
TI       -0.0285
V         0.1941
CR       -0.0165
MN        0.0896
NI        0.1608
ZN       -0.1605
AS        0.0085
BA        0.0125
TM       -0.0331

Wilk's lambda:     0.1166
    Approx. F:    26.5263
      p-value:     0.0000
```

Table A-41. Stone Bead Comparative Analysis: Mahalanobis distance calculation and posterior classification of CA-LAN-21 chlorite talc schist and CA-LAN-21 and CA-RIV-1246 chlorite schist stone beads utilizing 12 elements

```
Date:  4/05/13
File: CS_CTS_12_elements

Groups are:
       1     21_CS
       2     21CTS
       3    1246_1

Variables used:
MG         FE          K         TI          V         CR         MN
NI         ZN         AS         BA         TM

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  21_CS
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
179-1166    5.541    17.456     0.000         1         2
179-1173    5.465    41.994     0.000         1         2
179-1176   95.753     7.571     0.000         1         1
179-1221   92.297     7.276     0.000         1         1
179-1143    0.000     4.896     0.000         1         2
179-1219   91.902    25.342     0.000         1         1
179-1157    0.821     3.262     0.000         1         2
179-1174   29.508     4.694     0.000         1         1
179-1225   58.261     4.953     0.000         1         1
179-1224   69.501     3.770     0.000         1         1
179-1227   98.657     4.164     0.000         1         1
179-1131   96.219     8.023     0.000         1         1
179-1140   29.558    31.235     0.000         1         2
179-1199   89.870     3.750     0.000         1         1
179-1127   77.601     1.776     0.000         1         1
179-1212   75.763    19.418     0.000         1         1
179-1198   85.455     3.838     0.000         1         1
179-1132   22.642     2.391     0.000         1         1
179-1139   44.783     0.530     0.000         1         1
179-1159   85.400     2.198     0.000         1         1
179-1130   99.400     1.212     0.000         1         1
179-1206    0.176     2.506     0.000         1         2
179-1192   94.948     2.355     0.000         1         1
179-1158   51.196     1.457     0.000         1         1
179-1162   10.554     2.523     0.000         1         1
179-1175   64.902     0.594     0.000         1         1
179-1217   43.461     0.520     0.000         1         1
179-1149   19.569     1.164     0.000         1         1
179-1210    2.394     0.407     0.000         1         1
179-1228   83.312     1.127     0.000         1         1
179-1188   52.682     1.049     0.000         1         1
179-1216   72.511     7.985     0.000         1         1

The following specimens are in the file  21CTS
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
179-1123    0.000    63.356     0.000         2         2
179-1135    0.000    71.947     0.000         2         2
179-1136    0.000    15.183     0.000         2         2
179-1145    0.000    27.373     0.000         2         2
179-1148    0.000    98.416     0.000         2         2
179-1165    0.000     3.031     0.000         2         2
```

```
179-1186    0.000    32.250     0.000         2         2
179-1187    0.000     5.566     0.000         2         2
179-1197    0.000    43.631     0.000         2         2
179-1203    0.000    42.899     0.000         2         2
179-1214    0.000    59.076     0.000         2         2
179-1215    0.000    28.032     0.000         2         2
179-1232    0.000    97.717     0.000         2         2
179-670     0.000     3.442     0.000         2         2

The following specimens are in the file  1246_1
           Probabilities:
ID. NO.      21_CS     21CTS    1246_1     From:     Into:
8006-23    46.181    51.348    96.375         3         3
8006-2     48.604    67.473    53.532         3         2
7901-2     44.852    10.678    41.873         3         1
8738-2     30.955     5.087    87.716         3         3
8006-3     51.955    84.336    90.867         3         3
8009-3     45.018    27.949    63.047         3         3
8738-6     54.915    39.824    96.380         3         3
8738-5     34.161    60.377    30.132         3         2
8738-1     39.839    38.415    49.070         3         3
8006-15    19.387    65.434    93.141         3         3
7653_      12.854     7.267    79.222         3         3
7598-1     14.457    22.405    19.771         3         2
7598-3      6.034    18.327    83.486         3         3
7641-3      9.706     6.378    89.748         3         3
7641-4     10.543    18.287    68.868         3         3
8840-2     12.120    11.525    84.086         3         3
4725_       0.015    10.990     0.855         3         2
8340_       0.054    10.941     2.985         3         2
4529-2      0.073    20.725     4.689         3         2
4639-2      0.052    17.722    11.448         3         2
9094_      15.780    37.726     7.851         3         2
8163_      20.434     3.083    17.755         3         1
8840-1     44.575    59.674     1.862         3         2

Summary of Classification Success:
                Into:
From:        21_CS     21CTS    1246_1     Total
21_CS          26         6         0        32
21CTS           0        14         0        14
1246_1          2         9        12        23
Total          28        29        12        69
```

Table A-42. Artifact Proveneince Analysis: Canonical Discriminant Analysis Based on CA-LAN-21 chlorite talc schist and CA-RIV-1246 and LAN-21 chlorite schist beads utilizing 12 elements

```
Discriminant Analysis Based on the Files:  21_CS      21CTS     1246_CS

Discriminant Function Coefficients:

MG        0.7684  1.0555
FE        0.2108 -0.6601
K        -1.8894  0.4375
TI       -0.4106 -0.1293
V        -1.0112  0.1719
CR        1.3917 -0.2833
MN       -0.5474  0.7728
NI       -1.5022  0.4616
ZN       -0.1374 -0.8541
AS        0.2491 -0.0270
BA       -0.1903  0.0666
TM        0.2258 -0.1224

Wilk's lambda:     0.0282
    Approx. F:    22.7180
      p-value:     0.0000
```

Table A-43. Stone Bead Comparative Analysis: Mahalanobis distance calculation and posterior classification of CA-LAN-21 chlorite talc schist and CA-LAN-21 and CA-RIV-1246 chlorite schist stone beads utilizing 12 elements

```
Date:  4/06/13
File: CTS_CS_12newelements

Groups are:
       1     21_CS
       2     21CTS
       3    1246_1

Variables used:
CA         TI    V          ZN         SR          Y         ZR          BA
LA         CE         PR         TH

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  21_CS
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
179-1166   90.081     3.223     0.000         1         1
179-1173   96.743     3.841     0.000         1         1
179-1176   89.599     7.078     0.000         1         1
179-1221   92.945     5.333     0.000         1         1
179-1143    0.000    33.706     0.000         1         2
179-1219    2.878     6.390     0.000         1         2
179-1157    9.383     9.778     0.006         1         2
179-1174   59.843     3.925     0.000         1         1
179-1225   38.699     4.314     0.000         1         1
179-1224   11.201     3.756     0.000         1         1
179-1227   55.224     1.947     0.000         1         1
179-1131   95.802     2.348     0.005         1         1
179-1140   92.464     1.997     0.000         1         1
179-1199   88.304     2.748     0.019         1         1
179-1127    0.710     5.142     0.268         1         2
179-1212   50.240     2.012     0.007         1         1
179-1198   51.971     1.987     0.000         1         1
179-1132    0.222     1.791     0.000         1         2
179-1139   48.349     2.149     0.000         1         1
179-1159   96.787     1.645     0.000         1         1
179-1130   95.743     2.358     0.000         1         1
179-1206    0.000     1.389     0.000         1         2
179-1192   77.064     1.607     0.000         1         1
179-1158    6.322     1.035     0.000         1         1
179-1162   74.654     1.986     0.000         1         1
179-1175   94.038     2.071     0.000         1         1
179-1217   69.983     1.479     0.000         1         1
179-1149   72.225     2.140     0.000         1         1
179-1210    5.913     1.952     0.000         1         1
179-1228   95.522     2.054     0.000         1         1
179-1188   80.242     1.317     0.000         1         1
179-1216   94.825     1.798     0.000         1         1

The following specimens are in the file  21CTS
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
179-1123    0.000    90.336     0.000         2         2
179-1135    0.006    60.027     0.000         2         2
179-1136    0.000    65.368     0.000         2         2
179-1145    0.000    81.627     0.000         2         2
179-1148    0.000    87.675     0.000         2         2
179-1165    0.000    85.245     0.000         2         2
```

```
179-1186    0.000     0.621     0.000         2         2
179-1187    0.000     8.283     0.000         2         2
179-1197    0.000    35.974     0.000         2         2
179-1203    0.000    46.195     0.000         2         2
179-1214    0.000    80.752     0.000         2         2
179-1215    0.000     1.719     0.000         2         2
179-1232    0.000    48.234     0.000         2         2
179-670     0.000    26.545     0.000         2         2

The following specimens are in the file  1246_1
           Probabilities:
ID. NO.     21_CS     21CTS    1246_1     From:     Into:
8006-23     8.315     3.560    94.311         3         3
8006-2      4.945     4.306    21.968         3         3
7901-2      2.214     3.207    26.305         3         3
8738-2      3.978     3.029    55.648         3         3
8006-3      0.312     3.233     0.843         3         2
8009-3      6.592     2.826    48.365         3         3
8738-6      4.879     3.401    33.789         3         3
8738-5      8.810     3.541     6.417         3         1
8738-1      1.548     2.809    58.410         3         3
8006-15    10.625     5.329    78.325         3         3
7653_       7.305     4.990    84.711         3         3
7598-1     17.356     6.266    89.840         3         3
7598-3      2.543     5.988    52.188         3         3
7641-3      8.653     5.661    99.454         3         3
7641-4     26.620     8.011    71.230         3         3
8840-2      4.320     5.414    87.349         3         3
4725_       0.000     1.532    46.558         3         3
8340_       0.000     1.735    54.396         3         3
4529-2      0.000     1.856    39.613         3         3
4639-2      0.000     1.685    13.564         3         3
9094_      15.562     3.751     2.022         3         1
8163_       4.879     3.654    37.222         3         3
8840-1      9.282     4.147    51.110         3         3

Summary of Classification Success:
                Into:
From:       21_CS     21CTS    1246_1     Total
21_CS        26         6         0        32
21CTS         0        14         0        14
1246_1        2         1        20        23
Total        28        21        20        69
```

Table A-44. Stone Bead Comparative Analysis: Canonical Discriminant Analysis Based on CA-LAN-21 chlorite talc schist and CA-RIV-1246 and LAN-21 chlorite schist beads utilizing 12 elements

```
Discriminant Analysis Based on the Files:  21_CS      21CTS     1246_CS

Discriminant Function Coefficients:

CA       -0.6388 -0.7633
TI        0.2044  0.4455
V        -0.7614 -0.4861
ZN        0.1265  0.4809
SR       -0.1004  0.4288
Y         0.5609 -0.0019
ZR        0.0063 -0.0234
BA       -0.1263 -0.0625
LA       -0.7676 -0.2097
CE        0.0023 -0.0305
PR        0.6143  0.2575
TH        0.0831  0.0699

Wilk's lambda:     0.0303
    Approx. F:    22.1431
      p-value:     0.0000
```

Table A-45. Stone Bead Comparative Analysis: Canonical Discriminant Analysis Based on CA-LAN-21 chlorite talc schist and CA-RIV-1246 and LAN-21 chlorite schist beads utilizing 43 elements

```
Discriminant Analysis Based on the Files:   21_CS      21CTS     1246_1

Discriminant Function Coefficients:

MG       -1.1329 -0.2814
AL       -0.8015 -0.0128
SI       -6.0829 -0.6553
K        -0.3146 -0.0485
CA        0.2089  1.0015
TI       -0.3853 -0.4589
V         0.3227  0.6423
CR       -0.1341 -0.2711
MN        0.1841 -0.1433
FE       -1.4371 -1.0270
NI        0.1082  0.5389
CO        0.1559  0.1719
CU       -0.0200 -0.0017
ZN       -0.4557 -0.5105
AS       -0.0212 -0.0909
RB        0.0551  0.0105
SR       -0.3895 -0.5735
Y         0.5630 -0.0243
ZR       -0.0726  0.0241
NB       -0.1015  0.1650
SN       -0.1933  0.1228
SB       -0.0411  0.0786
CS       -0.1598 -0.2067
BA       -0.0341  0.1275
LA       -0.7589  0.0649
CE        0.0511  0.1587
PR        0.4526 -0.1053
ND        0.0778 -0.1995
SM        0.2308 -0.0252
EU        0.0588  0.2625
GD       -0.0378 -0.1720
TB        0.0953 -0.0377
DY        0.2041 -0.0275
HO       -0.4380 -0.3169
ER       -0.0380 -0.0021
TM        0.1648  0.2253
YB       -0.2216 -0.3174
LU       -0.0174 -0.1475
HF        0.1647  0.1128
TA        0.2277  0.0974
PB        0.1639 -0.1716
TH       -0.1335  0.0981
U        -0.1636  0.0652

Wilk's lambda:     0.0004
    Approx. F:    29.9899
      p-value:     0.0000
```

Table A-46. Stone Bead Comparative Analysis: Mahalanobis distance calculation and posterior classification of Chlorite Schist Bead Group and Santa Cruz Island Schist utilizing 5 elements

```
Date:  4/08/13
File: SCIS_CSResults_2

Groups are:
       1   CS_BEAD
       2      SCIS

Variables used:
        Cr         Ni         As         Cs          U

Probabilities are jackknifed for specimens included in each group.

The following specimens are in the file  CS_BEAD
           Probabilities:
ID. NO.   CS_BEAD      SCIS     From:     Into:
179-1166   19.817     0.001         1         1
179-1173   13.891     0.001         1         1
179-1176   20.041     0.003         1         1
179-1221   39.221     0.002         1         1
179-1174   41.411     0.001         1         1
179-1227   78.213     0.000         1         1
179-1131   66.446     0.000         1         1
179-1140   13.267     0.000         1         1
179-1199   74.665     0.000         1         1
179-1212   32.776     0.000         1         1
179-1198   81.708     0.000         1         1
179-1139   26.233     0.000         1         1
179-1159   32.576     0.000         1         1
179-1130   60.966     0.000         1         1
179-1192    0.118     0.000         1         1
179-1162    0.001     0.000         1         1
179-1175    1.546     0.000         1         1
179-1217    6.470     0.000         1         1
179-1149    7.288     0.000         1         1
179-1228   59.059     0.000         1         1
179-1188   42.230     0.000         1         1
179-1216    9.619     0.000         1         1
8006-23    78.807     0.001         1         1
7901-2     91.438     0.001         1         1
8738-2     53.529     0.001         1         1
8006-3     67.697     0.000         1         1
8009-3     86.227     0.001         1         1
8738-6     89.610     0.001         1         1
8738-5     78.633     0.001         1         1
8738-1     81.924     0.001         1         1
8006-15    97.450     0.001         1         1
7653_      84.190     0.001         1         1
7598-1     78.483     0.001         1         1
7598-3     99.255     0.000         1         1
7641-3     81.754     0.000         1         1
7641-4     95.413     0.001         1         1
8840-2     93.544     0.001         1         1
4725_      47.680     0.001         1         1
8340_      93.186     0.001         1         1
4529-2     96.578     0.001         1         1
4639-2     91.749     0.001         1         1
9094_      66.265     0.001         1         1
8163_      11.037     0.001         1         1
8840-1     92.949     0.001         1         1
```

```
The following specimens are in the file  SCIS
           Probabilities:
ID. NO.   CS_BEAD       SCIS     From:     Into:
SCRI334-    0.000    56.482         2         2
SCRI194-    0.000    93.132         2         2
SCRICDM-    0.000    23.479         2         2
SCRICDM-    0.000     1.010         2         2
SCRICDM-    0.000     5.081         2         2
SCRICDM-    0.000     0.330         2         2
SCRICI-2    0.000     5.139         2         2
SCRICI-4    0.000    64.112         2         2
SCRICI-6    0.000    70.833         2         2
SCRICI-2    0.000    55.241         2         2
SCRICI-2    0.000    94.382         2         2
SCRICIO-    0.000    93.176         2         2
SCRICI-2    0.000     5.900         2         2
SCRICI-1    0.000    93.468         2         2
SCRICI-1    0.000    36.605         2         2
SCRICI-1    0.000    77.961         2         2
SCRIOPH-    0.000    26.502         2         2
SCRICIO3    0.000    21.312         2         2
SCRICI-9    0.000    85.046         2         2
SCRISRO-    0.000    93.280         2         2
SCRICI-8    0.000    42.846         2         2
SCRICI-2    0.000    92.392         2         2
SCRICI-1    0.000    78.757         2         2
SCRICI-2    0.000    87.192         2         2
SCRICIO2    0.000    64.444         2         2


Summary of Classification Success:
                Into:
From:     CS_BEAD      SCIS     Total
CS_BEAD       44         0        44
SCIS           0        25        25
Total         44        25        69
```

Table A-47. Stone Bead Comparative Analysis: Canonical Discriminant Analysis Based on Chlorite Schist Bead Group and Santa Cruz Island Schist utilizing 5 elements

```
Discriminant Analysis Based on the Files:    CS_bead       SCIS

Discriminant Function Coefficients:

Cr       -0.2491
Ni        0.1706
As       -0.0110
Cs        0.0366
U         0.1083

Wilk's lambda:     0.0227
    Approx. F:   541.5916
      p-value:     0.0000
```

Table A-48. Stone Bead Comparative Analysis: Mahalanobis distance calculation for stone beads from VEN-1691, RIV-1246, San Clemente Island, San Nicolas Island, and Red Mountain Archaeological District projected against Chlorite schist and Chlorite talc schist bead groups and Catalina, Sierra Pelona, and Cuyamaca/Mount Laguna talc schist regional groups utilizing 11 elements

```
Date: 4/08/13
File:Results_1

Reference groups and numbers of specimens:
       1   CS_BEAD        44
       2  CTS_BEAD        14
       3       CAT        95
       4        SD       100
       5        LA       100

Variables used:
MG         AL         SI         CA         TI           V         CR
MN         NI         CU         SR


The following specimens are in the file  1246_2
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD       CAT        SD        LA  BEST GP.
7901-3      0.000     6.101     0.000     0.000     0.000         2
8944_       0.000    35.593     0.000     0.000     0.000         2
9176_       0.000    27.163     0.000     0.000     0.000         2
7883_       0.000    78.069     0.000     0.000     0.000         2
8240_       0.000    82.154     0.000     0.000     0.000         2
8006-14     0.000    80.154     0.000     0.000     0.000         2
8785_       0.000    40.080     0.000     0.000     0.000         2

The following specimens are in the file  1691_
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD       CAT        SD        LA  BEST GP.
1691-U3L2    0.000    45.607     0.000     0.000     0.000         2
1691-U6L2    0.000    28.603     0.135    26.346     1.656         2
1691-U7L3    0.000    20.843     0.183     0.000     0.000         2
1691-U7L5   78.722     6.738     0.001     0.000     0.000         1
1691-U8L2    0.000    11.558     0.026     0.000     0.000         2

The following specimens are in the file  2936
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD       CAT        SD        LA  BEST GP.
444-108     0.000    12.776     0.000     0.000     0.000         2
444-1460    0.000    45.949     0.000     0.000     0.000         2
444-1460    0.000    51.311     0.000     0.000     0.000         2
444-1476    0.000    25.278     0.000     0.000     0.000         2

The following specimens are in the file  CLARK
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD       CAT        SD        LA  BEST GP.
JC1         0.000    14.090     1.644     0.000     0.139         2
JC7         0.000    16.026     0.000     0.000     0.000         2
JC10        0.000    10.015     0.224     0.000     0.000         2
JC19        0.000     0.005     0.000     0.000     0.000         2
JC23        0.000     3.965     0.000     0.000     0.000         2

The following specimens are in the file  RED
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD       CAT        SD        LA  BEST GP.
211-860     0.000     1.340    23.705    48.250    26.510         4
2600-317    0.000    37.927     0.000     0.000     0.000         2
2614-241    0.000     2.631     0.005     0.000     0.002         2
```

```
Summary of Probabilities for Specimens in the file  1246_2

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         7       7       7       7       7       7       7
CTS_BEAD        0       0       0       0       1       1       7
CAT             7       7       7       7       7       7       7
SD              7       7       7       7       7       7       7
LA              7       7       7       7       7       7       7

Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         4       4       4       4       4       4       5
CTS_BEAD        0       0       0       0       1       2       5
CAT             2       3       5       5       5       5       5
SD              4       4       4       4       4       4       5
LA              4       4       4       5       5       5       5

Summary of Probabilities for Specimens in the file  2936

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         4       4       4       4       4       4       4
CTS_BEAD        0       0       0       0       0       1       4
CAT             4       4       4       4       4       4       4
SD              4       4       4       4       4       4       4
LA              4       4       4       4       4       4       4

Summary of Probabilities for Specimens in the file  CLARK

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         5       5       5       5       5       5       5
CTS_BEAD        1       1       1       2       2       5       5
CAT             3       3       4       5       5       5       5
SD              5       5       5       5       5       5       5
LA              4       4       5       5       5       5       5

Summary of Probabilities for Specimens in the file  RED

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         3       3       3       3       3       3       3
CTS_BEAD        0       0       0       2       2       2       3
CAT             2       2       2       2       2       2       3
SD              2       2       2       2       2       2       3
LA              2       2       2       2       2       2       3


Summary of Best Classification of Projected Specimens:
                Into:
From:     CS_BEAD  CTS_BEAD       CAT        SD        LA     Total
1246_2         0         7         0         0         0         7
1691_          1         4         0         0         0         5
2936           0         4         0         0         0         4
CLARK          0         5         0         0         0         5
RED            0         2         0         1         0         3
Total          1        22         0         1         0        24
```

Table A-49. Stone Bead Comparative Analysis: Mahalanobis distance calculation for stone beads from VEN-1691, RIV-1246, and the Red Mountain Archaeological District projected against Chlorite schist and Chlorite talc schist bead groups utilizing 12 elements

```
Date: 4/08/13
File:4.8.13_Results3

Reference groups and numbers of specimens:
       1   CS_BEAD        44
       2  CTS_BEAD        14

Variables used:
CA         TI           V         ZN         SR           Y         ZR
BA         LA          CE         PR         TH


The following specimens are in the file  1246_2
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD  BEST GP.
7901-3      0.000     1.191         2
8944_       0.000     5.976         2
9176_       0.000     9.781         2
7883_       0.000    12.120         2
8240_       0.000    55.879         2
8006-14     0.000    55.896         2
8785_       0.000    16.015         2

The following specimens are in the file  2936
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD  BEST GP.
444-108     0.000    27.231         2
444-1460    0.000     5.637         2
444-1460    0.000     6.160         2
444-1476    0.000    15.813         2

The following specimens are in the file  1691_
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD  BEST GP.
1691-U3L2   0.000    10.086         2
1691-U6L2   0.000    53.549         2
1691-U7L3   0.000    27.677         2
1691-U7L5  16.221     5.803         1
1691-U8L2   0.000    12.548         2

The following specimens are in the file  CLARK
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD  BEST GP.
JC1         0.000    18.089         2
JC7         0.000    19.829         2
JC10        0.000     7.226         2
JC19        0.000     4.394         2
JC23        0.000     2.845         2

The following specimens are in the file  RED
           Probabilities:
ID. NO.   CS_BEAD  CTS_BEAD  BEST GP.
211-860     0.000     4.343         2
2600-317    0.000    19.584         2
2614-241    0.000    18.442         2
```

```
Summary of Probabilities for Specimens in the file  1246_2

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         7       7       7       7       7       7       7
CTS_BEAD        0       0       0       1       3       5       7

Summary of Probabilities for Specimens in the file  2936

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         4       4       4       4       4       4       4
CTS_BEAD        0       0       0       0       2       3       4

      Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         4       4       4       4       4       5       5
CTS_BEAD        0       0       0       0       1       3       5
Summary of Probabilities for Specimens in the file  CLARK

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         5       5       5       5       5       5       5
CTS_BEAD        0       0       0       2       3       5       5

Summary of Probabilities for Specimens in the file  RED

                        Probability Cutoff Values:
Group:       0.01    0.10    1.00    5.00   10.00   20.00  100.00
CS_BEAD         3       3       3       3       3       3       3
CTS_BEAD        0       0       0       1       1       3       3


Summary of Best Classification of Projected Specimens:
                Into:
From:     CS_BEAD  CTS_BEAD     Total
1246_2        0         7         7
2936          0         4         4
1691_         1         4         5
CLARK         0         5         5
RED           0         3         3
Total         1        23        24
```

APPENDIX B: SOAPSTONE QUARRIES: BACKGROUND RESEARCH, FIELD SURVEY RESULTS, AND TYPOLOGY

SOAPSTONE QUARRIES AND SOURCE LOCATIONS

Archaeological research into southern California soapstone quarries dates back more than 125 years to the earliest studies of Catalina Island soapstone olla and stone bowl quarrying and production (Schumacher 1879). Nearly a century later, Heizer and Treganza (1944:307-308) published Mines and Quarries of the Indians of California, which identified mainland soapstone quarries in southern, central, and northern California, which included Catalina Island and Jacumba in San Diego County. The current study focuses on Prehispanic soapstone quarries in the Sierra Pelona Mountains and San Diego. For a discussion of Prehispanic soapstone and quarries on Catalina Island Schist refer to Clark (2009), Howard (2002), Murdoch and Webb 1956:320; Schumacher (1879), Williams and Rosenthal (1993), and Wlodarski (1979). For details regarding Santa Cruz Island metamorphic (i.e., greenstone, chlorite schist, phyllite) refer to Eddy (2009).

Soapstone Quarries in San Diego

The Peninsular Ranges of interior of San Diego County contains one of the largest deposits of soapstone on mainland southern California. Soapstone is found within the Julian Schist Formation, a series of metamorphosed sedimentary rocks applied to almost all ancient metasedimentary rocks within the Peninsular Ranges Batholith, which extends between the Transverse Ranges and the 28th parallel in Baja California (Walawender 2000:9; Walawender et al. 2003:177). Soapstone outcrops at various grades in the Cuyamaca Mountains (SDI-9039 and -9040), near Boiling Springs at Mount Laguna (SDI-8538), and in the Jacumba Valley (SDI-7790) [see Figure C-1].

The Jacumba soapstone source (SDI-7790), located near the mouth of Carrizo Gorge was identified as a quarry or procurement area associated with Tipai groups in Imperial Valley (Gifford 1931). Treganza (1942:157) visited the site and recorded a cache of five soapstone plates near the foot of the deposit in 1940. It was later described as an open deposit exposed on the side of a hill where initial stages of production occurred to verify that the stone did not contain internal flaws (Heizer and Treganza 1944:308). The soapstone was described as reddish in color and not easily worked (Parkman 1983:148; Polk 1972:7). Polk also reported a variety of Jacumba soapstone that was similar to Stonewall Peak soapstone at Cuyamaca Rancho State Park. The site was officially recorded into the California Historical Resources Information System (CHRIS) in 1980 by Steven Shackley, who reported that the quarry was destroyed as a result of commercial mining activities.

Historical research indicates that vermiculite was mined from the Jacumba source in the 1950s, known as the Circle Groups Deposit (Weber 1963:280) destroying any evidence of Prehispanic quarrying or artifact production. The Circle Group comprised eight lode claims in the hills surrounding the Jacumba soapstone source and claims were first made in 1938, the same year Treganza recorded a Jacumba soapstone artifact cache. The mine was abandoned by March of 1957 (Weber 1963:280).

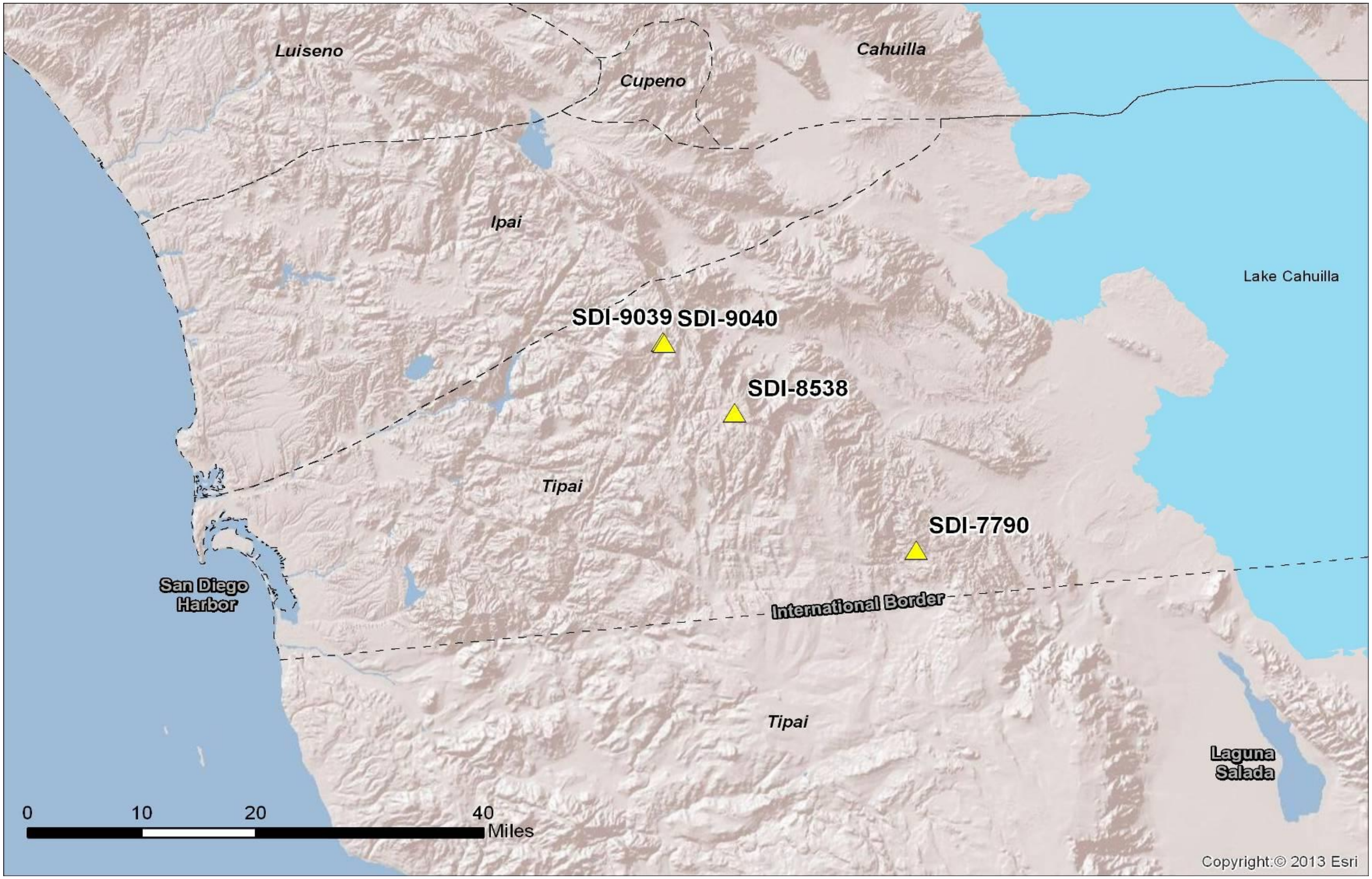

Figure C-1. San Diego soapstone quarries and source locations

San Diego soapstone sources were further explored in the early 1970s and 1980s by Polk (1972) and Parkman (1983). Polk (1972:7-8) identified two additional Digueño soapstone quarries/sources at Stonewall Peak in Cuyamaca Rancho State Park and the Boiling Springs area of Mount Laguna. Parkman (1983) revisited the Stonewall Peak location and identified two distinct quarried areas, which were recorded as the Gwendolyn Site (SDI-9039) and the World View Site (SDI-9040).

The Boiling Springs soapstone deposit on Mount Laguna was identified as an ethnographic soapstone source by a Diegueño informant (Polk 1972:8). The coarse-grained weathered soapstone was collected in fragments from the talus slopes by occupants of the Mason Valley and Vallecito villages, which were connected to the Mount Laguna soapstone source by two trails. Shackley (1980b) officially recorded the Mount Laguna source (SDI-8538) and reported evidence of aboriginal quarrying and bedrock milling. The site was described as a procurement or extraction area roughly 25 by 15 m containing by a mixture of soapstone and gneiss boulders with evidence of Prehispanic pecking scars at the northeast end of the site and bedrock milling slicks (Graham 1981:56). The site was revisited in 2002 and no evidence of aboriginal quarrying could be found (Berryman and Roder 2003:1).

Further west, the Cuyamaca soapstone source one of the best documented soapstone localities in southern California. Malcolm Rogers (n.d.) first noted the existence of a soapstone quarry near Stonewall Peak in his site record from the ethnographic village site *Ahhakweahmac* (Rensch 1950:8). The village site contained numerous fragments and nodules likely obtained from the Stonewall source. True (1961:8; 1966:251, Map 16; 1970:43) never located the soapstone source during his inventory of Cuyamaca Rancho State Park, but also noted its existence. Polk (1972:7) was the first to identify the Stonewall Peak soapstone source and describe the soapstone as fine-grained and light greenish gray in appearance. Despite locating the soapstone source, no evidence of quarrying activity was recorded by Polk (Parkman 1983:141).

A cultural resources inventory of Cuyamaca Rancho State Park resulted in the first documented evidence of aboriginal quarrying at the Stonewall Peak soapstone source (Parkman et al. 1981). Two quarry locations were identified at the Stonewall Peak location, recorded as the Gwendolyn site (SDI-9039) and World View site (SDI-9040).

The Gwendolyn site contains approximately 50 soapstone boulders spread over a 50 square meter area, which is bisected by an unimproved fire road constructed in the 1930s (Parkman 1983:141). Parkman (1983:146) identified the soapstone at the Stonewall Peak source as talc schist, which was quite distinct from other (i.e., Mount Laguna, Jacumba) soapstone deposits in the region. Curiously, the Stonewall Peak soapstone was characterized as a micaceous-schist macroscopically similar to outcrops on Santa Catalina Island by Romani (1982:170; see also Clark 2009:27).

Two types of aboriginal quarrying activities were identified at the Gwendolyn Site. The first (Type 1) involved carving out and removing oval-shaped blanks, similar to quarrying techniques employed on Catalina Island (Meighan and Johnson 1957; Parkman 1983:142; Schumacher 1879; Wlodarski 1979). In several cases blanks were still attached to the boulder. These blanks were interpreted as preform warming stones, which were recovered throughout San Diego County (Parkman 1983:147). The second technique (Type 2) included drilling successive holes in a line to detach a portion of the rock from a boulder. Cross-hatched petroglyphs were also recorded, similar to designs incorporated onto arrowshaft straighteners in the Cuyamaca region (Parkman 1983:142). Quarry tools included quartzite and felsites hammers and pick-like tools.

The World View site (SDI-9040) was recorded approximately 300 meters east of the Gwendolyn site. The site consists of a cluster of soapstone boulders with numerous cupule and scratched petroglyphs, and two mortars one of which was interpreted as a detached quarry blank (Parkman 1983:143). Quarry activity was indicated by one boulder containing successive drilled holes. No quarry tools or other evidence of quarrying activity was identified at this location, although a possible trail shrine was found. Parkman suggests that the majority of the soapstone outcrop was destroyed during construction of the unimproved fire road.

Resurvey of the site occurred in 2005 as part of the cultural resource assessment for portions of the Cedar Fire Burn Area within Cuyamaca Rancho State Park (Farmer 2005). In addition to the features described by Parkman (1981), Farmer (2005) reported evidence of aboriginal and historic quarried boulders, as well as a possible cupule boulder. While no damage occurred to the site as a result of the fire, Farmer suggests heat may have altered the color of some soapstone to pink.

Results of Fieldwork: San Diego Soapstone Quarries and Source Locations

SDI-9039

A reconnaissance survey and surface collection was carried out and soapstone samples were collected within the boundaries of the Gwendolyn site (SDI-9039) under a California State Parks Permit #08-07, on August 15, 2008. The purpose of the survey was to identify previously recorded features and evidence of aboriginal quarrying activity, and locate adequate samples of soapstone for LA-ICP-MS analysis.

SDI-9039 was surveyed to explore techniques of Prehispanic soapstone quarrying (see Appendix C). Four previously identified features were revisited and Type 1 quarry scars described by Parkman (1983) were observed, including a partially carved-out artifact blank (Figure C-2). In addition, several soapstone boulders exhibiting potential Prehispanic quarry rock hammer strike marks were examined (see Figure C-3). A sample of 25 soapstone fragments was collected from the surface near one of the potentially quarried boulders. The fragments either consisted of detritus associated with Prehispanic soapstone boulder percussion quarrying, or possibly spall from the boulder that broke off during the 2005 Cedar fire.

Figure C-2. Feature 3 at SDI-9039. Partially carved-out blank measuring approximately 20 cm

Figure C-3. Feature 3a exhibiting possible rock hammer quarry scars at SDI-9040

The four previously identified features were revisited. Features 2 and 3 were situated close to the edge of the road cut slope above the fire road. Both features were in good condition and exhibited the Type 1 quarry scars described by Parkman (1983) that were similar to those recorded on Catalina Island. Feature 2 retained a partially carved-out artifact blank, whereas Feature 3 had eroded down slope toward the fire road with the culturally modified surface dirt side down (Figure C-4).

Figure C-4. Feature 3 at SDI-9039 eroding down slope toward fire road

Feature 4, lying adjacent to the fire road, consisted of a highly weathered red soapstone boulder with a suspicious cross-hatch rock art panel and cupules. A smaller cross-hatch pattern was also noted but was not engraved into boulder but lightly scratched. Cupule size and depth was measured and found to be consistent with rock hammer (pick end) strikes (Figure C-5). Soapstone boulders adjacent to the feature also displayed rock hammer scars. Natural pits similar in size and depth to the cupules were also noted on surface of Feature 4. The petroglyph elements, while similar to crosshatch patterns found on arrowshaft straighteners in San Diego County, and cupules were most likely the result of modern or historic quarrying activity (see Clarke 1948, 1951).

During the survey several soapstone boulders that exhibited potential Prehispanic quarry marks were examined. A sample of 25 soapstone fragments was collected from the surface near one of the potentially quarried boulders. The fragments either consisted of detritus associated with Prehispanic soapstone boulder percussion quarrying, or possibly spall from the boulder that broke off during the 2005 Cedar fire.

A thin-section of SDI-9039 soapstone was viewed by Dr. Allen Smith. SDI-9039 soapstone is weathered pink to red (see Figure C-6). Hardness, as measured on the Mohs scale, is less than 2.5. The soapstone is fine-grained, thin-bedded, parallel schistocity

Figure C-5. Feature 4 at SDI-9039 showing rock hammer pick strikes and scratches

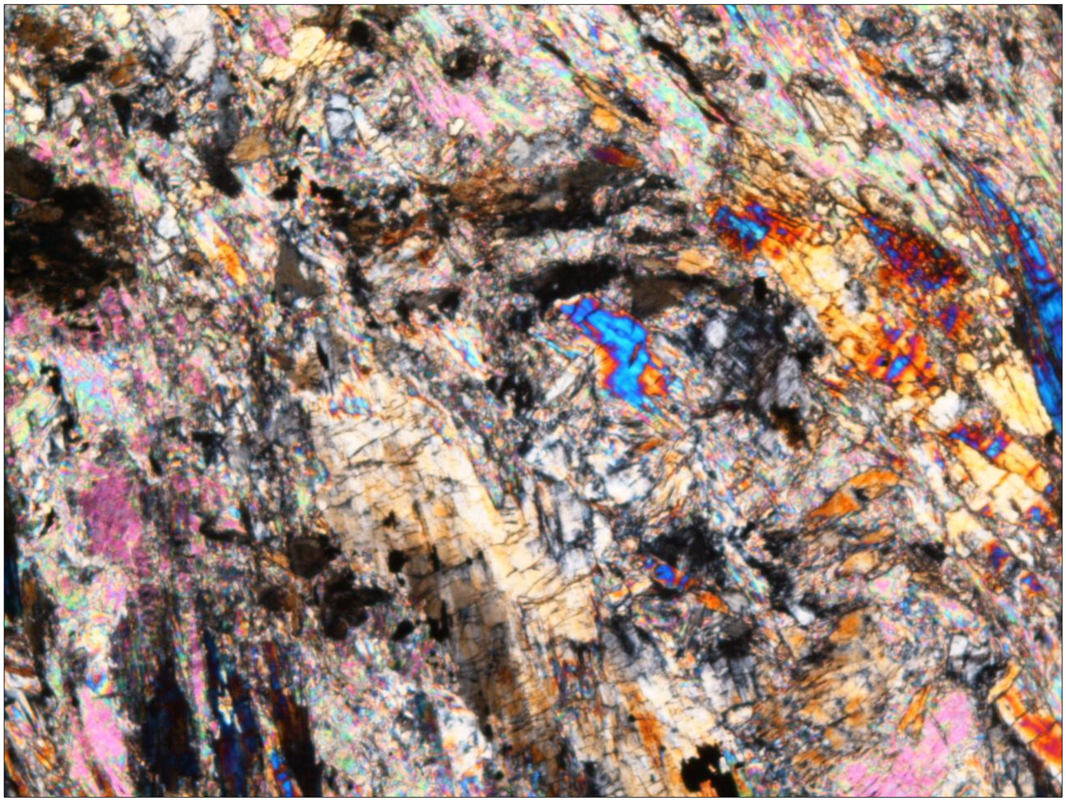

Figure C-6. Thin-section of SDI-9039 Soapstone (Talc, anthophyllite, iron oxide).

exhibiting a vitreous to greasy luster and massive crystal habit. Talc schist with anthophyllite and higher iron oxide content. Classified as Cuyamaca Type 2, this soapstone is similar in appearance to Sierra Pelona Soapstone Type 16.

SDi-9040

A reconnaissance survey and surface collection was carried out and soapstone samples were collected within the boundaries of the World View Site (SDI-9040) under a California State Parks Permit #08-07, on August 15, 2008. The site is situated several hundred meters from SDi-9039 along the unimproved fire road. The area was surveyed for evidence of aboriginal quarrying and the previously recorded quarry area identified by

Farmer (2005) was revisited. This feature area was found to consist of several small soapstone boulders exposed in outcrop measuring approximately 2 x 0.5 meters. Potential Prehispanic quarry scars were noted on several boulders. Chunks and fragments of soapstone were noted down slope but none appeared culturally modified. The area appears is likely the result of naturally eroding soapstone laden soils. A sample of 25 soapstone fragments was collected from this area.

Previously recorded Features 3a and 3b exhibited potential evidence of aboriginal quarrying including stone on stone strike marks. Both boulders were of high quality fine-grained talc schist. A moderately dense concentration of soapstone fragments were noted on the surface between the two features. A sample of 25 specimens was collected from the surface of this location. Some of the soapstone fragments appeared black or burned at first glance, likely resulting from the 2005 Cedar Fire.

A quick reconnaissance survey of the Stonewall Creek down slope from the site identified one piece of soapstone in the trail next to creek. It is possible that soapstone may have been collected as float from the stream bed by the native inhabitants.

Thin-section analysis of SDI-9040 soapstone was conducted Dr. Allen Smith. SDI-9040 soapstone is white to light green and non-weathered (see Figure C-7). Hardness, as measured on the Mohs scale, is less than 2.5. The soapstone is fine-grained, thin-bedded, parallel schistocity exhibiting a vitreous to greasy luster and massive crystal habit. Talc schist with anthophyllite and possible garnet inclusions. This soapstone was classified as Cuyamaca Type 1, and is similar in appearance to Sierra Pelona Soapstone Type 4. Comparative analysis of soapstone from SDI-9039 and SDI-9040 indicated a distinct difference in color, likely resulting from the chemical weathering of soapstone at SDI-9039. All other physical attributes of the stone are identical.

SDI-8835

SDI-8538 (Mount Laguna) was surveyed by the author on June 3, 2008, with the assistance of Andrew Pigniolo and Cleveland National Forest Archaeologist Susan Roder. The field survey and surface collection were authorized by the Cleveland National Forest. Site SDI-8538 was originally recorded as a soapstone quarry and

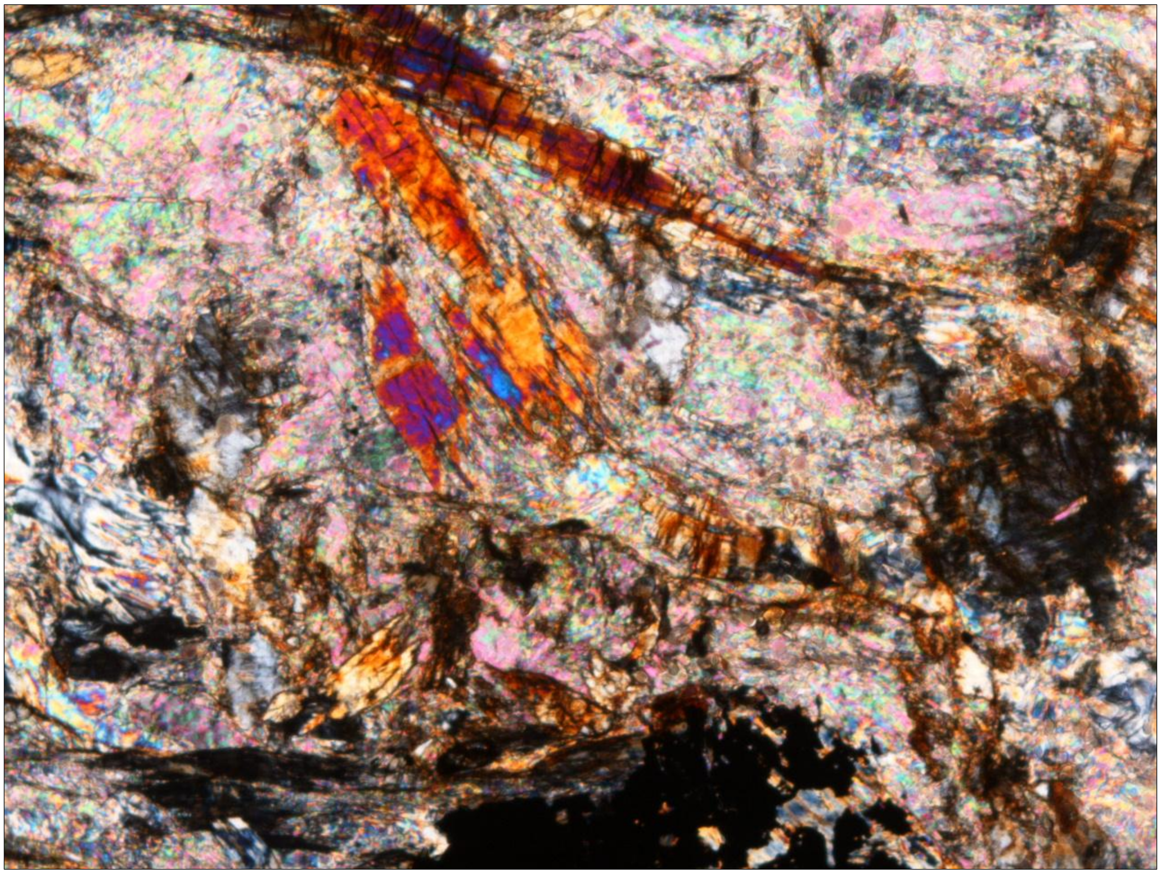

Figure C-7. Thin-section of SDI-9040 Soapstone (Talc, anthophyllite).

milling feature complex. During the field survey all three previously recorded bedrock milling features were identified and one additional soapstone boulder milling feature containing a single slick was recorded. A single rim etched ceramic sherd was the only artifact noted on site.

No rock hammer scars were noted on soapstone boulders and the site lacked quarry tools, production areas, and finished and unfinished soapstone artifacts. Most of the soapstone boulders and cobbles were highly weathered and friable and of a poorer quality than soapstone deposits in Cuyamaca. Small cobbles of higher quality soapstone were noted along the talus slopes (Figure C-8). These materials were likely collected from the site as implicated in the ethnographic data (see Polk 1972:8) and transported to nearby habitation sites where they were crafted into tools and objects. The site is not interpreted as a quarry, but rather a source location. The presence of a Prehispanic ceramic sherd and reports of aboriginal trails leading to the site further suggest the site was an important source of soapstone for Native Americans in the region.

A sample of soapstone representing the full range of macroscopic variability on site was collected from the surface site within the small soapstone cluster near a coffeeberry tree and from the hillside talus slope where higher quality soapstone was discovered. Approximately 50 unmodified hand sized cobbles and smaller fragments

Figure C-8. Talus slope at SDI-8538

were recovered from the surface of the site representing two optically distinguishable types of soapstone.

Mount Laguna soapstone was classified by color, hardness on Mohs scale, luster, level of schistocity, and mineral composition and grain size. Two types were identified, the major difference being the level of hardness believed to correspond to the concentration of talc. Thin-sections of SDI-8538 soapstone types were viewed by Dr. Allen Smith (see Figures C-9 and C-10).

Type 1 is a mottled white, gray and red. Typically lighter in color than Type 2, chemical weathering (red) is noticeably less. Red streaks occur within rocks interior. Hardness is less than 2.5 and the type has a vitreous to greasy luster. Massive crystal habit, medium to coarse-grained. The type is considered aggregate, with low schistocity. Talc schist with chlorite.

Type 2 is gray and red in color. Gray varies in samples from light to dark foundation. Samples have a general red tinge, likely iron oxide weathering. Red streaks occur within rocks interior. Hardness varies from less than 2.5 (Thumbnail scratch) to greater than 3. Slightly greasy luster noted on some samples, others appear dull. Massive crystal habit, medium to coarse-grained. The type is considered aggregate, with low schistocity. Talc schist with chlorite.

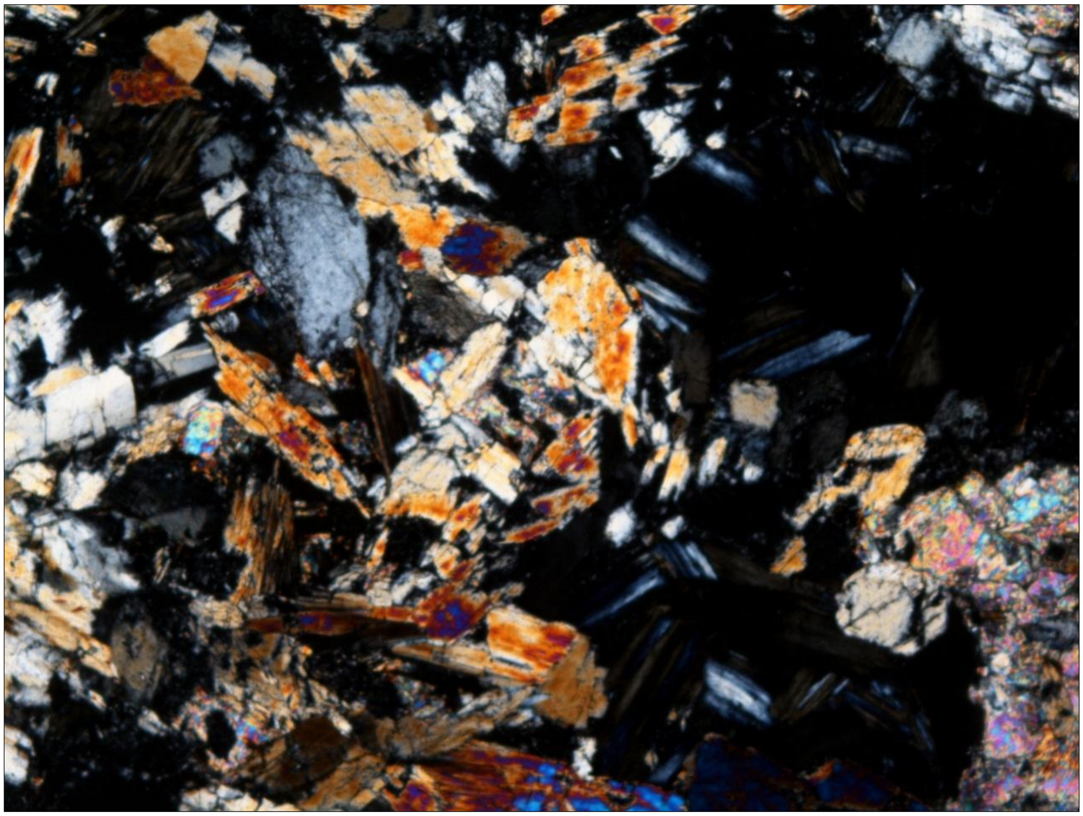

Figure C-9. Thin-section of SDI-8538 Soapstone Type 1 (Talc, chlorite, coarse-grained).

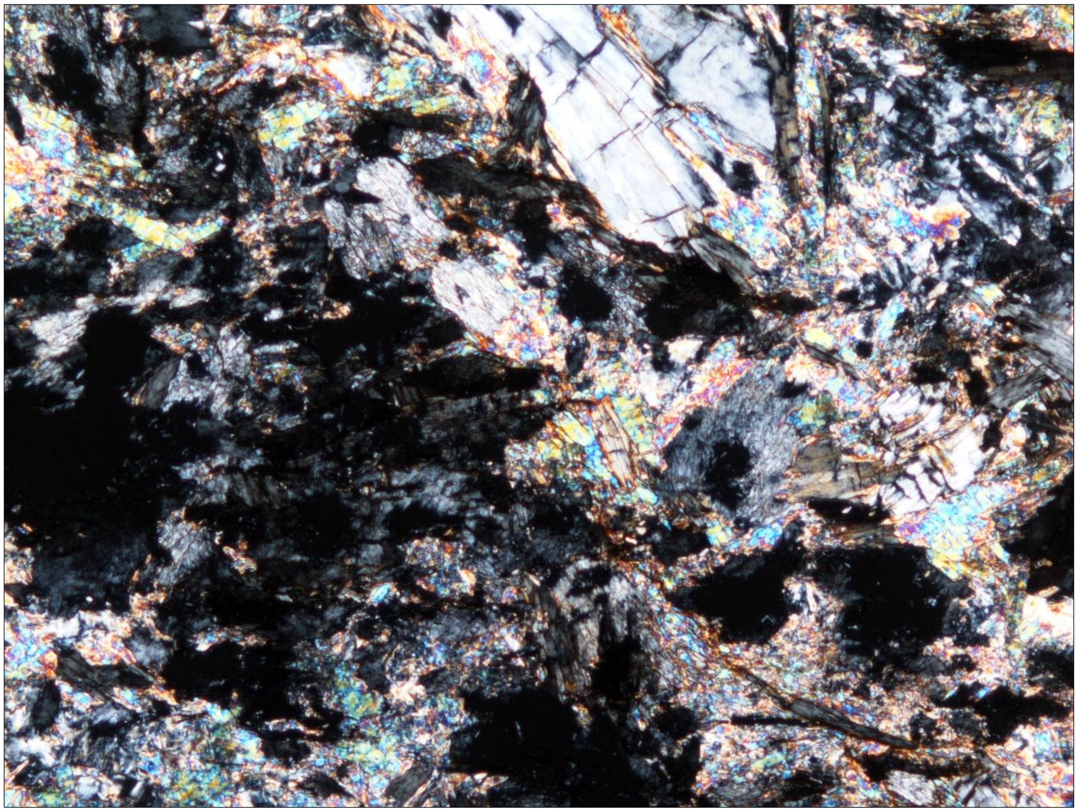

Figure C-10. Thin-section of SDI-8538 Soapstone Type 2 (Talc, chlorite, coarse-grained).

SDI-7790

SDi-7790 was visited by the author on June 4, 2008, with the assistance of Andrew Pigniolo. The field survey and surface collection of geologic samples was authorized by the Bureau of Land Management, El Centro Field Office, under United States Department of Interior Permit for Archaeological Investigations # 08-20 and Fieldwork Authorization 670-08-079.

Field efforts focused on several small hills documented as an ethnographically known location of Tipai (Kumeyaay) soapstone procurement and quarry area (Shackley 1980a). The quarry was reportedly destroyed due to extensive mining (Shackley 1980).

During the investigation, no evidence of Prehispanic soapstone quarrying (i.e., quarry tools, production loci, finished and unfinished artifacts, rock hammer strike marks on boulders) was noted. The area was heavily disturbed as a result of vermiculite mining and numerous prospect pits were noted on the southern hills and a large mine was present to the north, where the majority of raw, unmodified Jacumba steatite/ soapstone cobbles were identified (Figure C-11). Approximately 25 raw, unmodified cobbles of Jacumba soapstone were collected from the site, the majority of which were found in a dirt road on the southern-facing slope of the large hill.

Approximately 25 raw, unmodified cobbles of Jacumba soapstone were collected from the site, the majority of which were found in a dirt road on the southern-facing slope of the large hill.

Figure C-11. Soapstone cobbles at SDI-7790

Thin-sections of SDI-7790 soapstone types were viewed by Dr. Allen Smith (see Figure C-12). The Jacumba soapstone is highly weathered, coarse-grained, red on the exterior and gray-pink on the interior. It exhibits a greasy luster, massive crystal habit, and low schistocity. Talc, amphibolites (anthophyllite), chlorite and vermiculite schist.

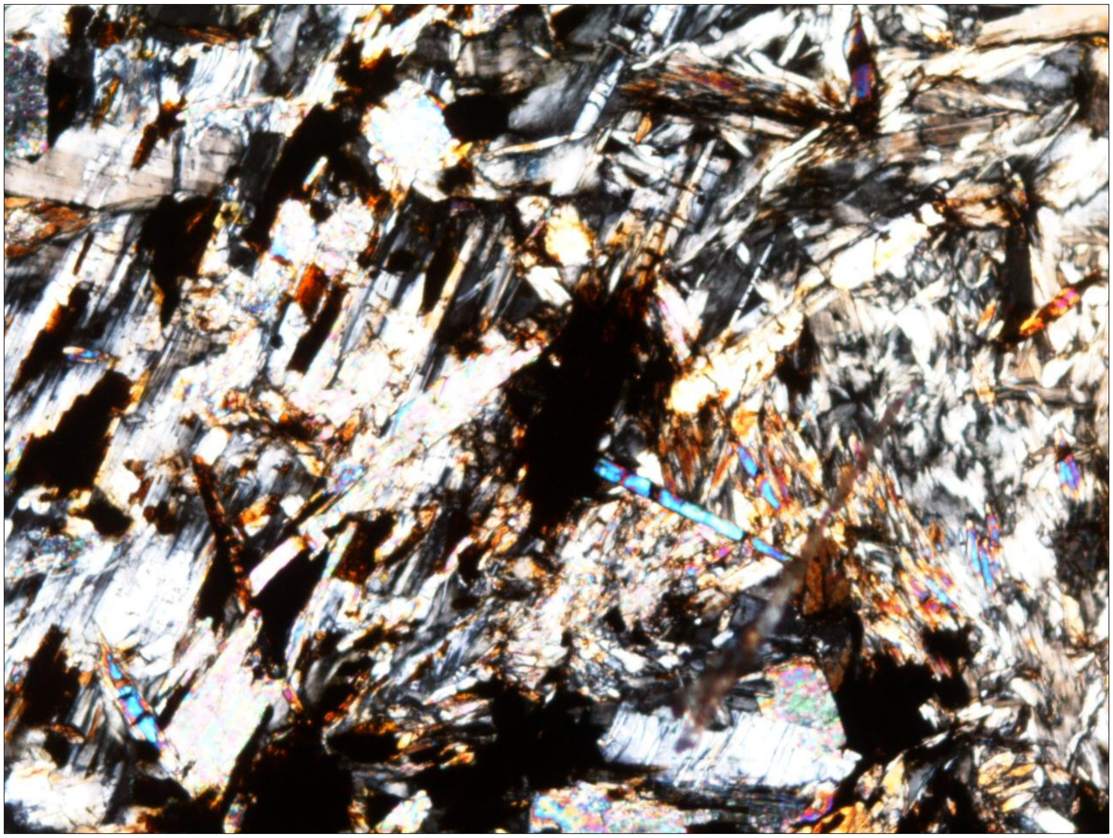

Figure C-12. Thin-section of SDI-7790 Soapstone (Talc, anthophyllite, chlorite, vermiculite).

Other Sources

Other minor soapstone sources in the San Diego area include a deposit of phyllitic schist that was quarried by occupants of the Cuyamaca Reservoir site and crafted into pendants (Parkman 1983:147), low-grade soapstone deposits near Valley Center (Warren, True and Eudey 1961:16; O'Neill 1983), Rincon (O'Neil 1983), and Julian (A. Pignolo, personal communication), soapstone deposits or float along the San Dieguito River (Robinson 2001:640), and a harder, dark-green soapstone at the rim of the desert overlooking Mason Valley (Parkman 1983:146). A small outcrop of talc-bearing rock similar to deposits at Stonewall Peak in Cuyamaca Rancho State Park is located one-mile north of Inspiration Point in Julian (Germinario 1993:113). Soapstone has even been reported as far east as the Ogilby Mountains in Imperial County (Melhouse 1928:94).

Sierra Pelona Soapstone Quarries

The Sierra Pelona Mountains, situated at the edge of the western Mojave Desert between the modern day cities of Palmdale and Santa Clarita, contain one of the richest deposits of fine-grained soapstone in southern California second only to well-known deposits on Santa Catalina Island. Soapstone is found within the Sierra Pelona Schist, a metamorphic rock formation identified throughout the western Transverse Mountain Range along the San Andreas Fault from the Sierra Pelona Mountains to the Cajon Pass. Prototypical Sierra Pelona Schist consists of hard surfaced highly foliated fine to medium-grained muscovite mica, albite feldspar, and quartz schist, and in places variable amounts of chlorite and some actinolite, bluish gray weathering greenish-brown easily identifiable by its vitreous luster and high schistocity (Dibblee 1997). Discrete deposits of soapstone outcrop from or are embedded within thin layers between Pelona Schist bedrock.

Several geologic and mineralogical descriptions of Sierra Pelona soapstone document a wide range of mineralogical type, ranging from high grade black and green steatite to lower grade blue-gray talc and green-gray chlorite schist (Dibblee 1967:7, 1997; Gay and Hoffman 1954; Romani 1982:168-169; Landberg 1980; Farmer 1988; and Rosenthal and Williams 1992:221). Dibblee (1997) describes Pelona soapstone as a greenish-gray metaserpentine, fine to coarse-grained actinolite, massive and aphantic, with talc that forms in lenticular bodies. Romani (1982:169) reported numerous talc, chlorite, and serpentine dikes ranging from several centimeters to seven meters thick and covering an area several meters to over 250 meters in length.

Evidence of Prehispanic soapstone quarrying was first documented at the Sierra Pelona Mountains in 1933 by Richard Van Valkenburgh. A soapstone quarry near Newhall Pass was identified and later reported in an article by Woodward (1937:1):

> The deposit contains a thin vein of the beautiful, pale green, jade-like steatite used by the Canalino in making some of their nicest ornaments. This outcrop is located in the Sierra Pelona Range, Ventura County, at an elevation of about 5,000 feet, and when investigated by Richard Van Valkenburgh for the Los Angeles County Museum, during an archaeological reconnaissance in 1933 the deposit, now being operated commercially by a Mr. McCain, was said to have indicated aboriginal working. An old Indian village site located at the base of the hill was found to contain many fragments of worked steatite vessels of the same type of mineral as that of the ledge high in the mountain.

Van Valkenburgh provided additional information on the quarry's location, which he labeled Newhall Site #24 in his field notes, identifying the location of some 26 springs within a 1/2 mile radius of the quarry. Finished and unfinished soapstone artifacts were reported in the area of the deposit, which ran north to south 600 feet with an average width of 200 feet. The soapstone reportedly varied in color and was similar to soapstone found in Santa Clara, Calleguas, Santa Rosa, and Simi Valleys, and the Ventura and Santa Barbara Coast. The owner of the deposit was identified as Mr. William A. McCain, who had located the deposit in 1931.

The actual location of the quarry was lost until Landberg (1980) attempted to trace Valkenburgh's paper trail. While searching through Harrington's field notes, Landberg (1980) located a map drawn by Norton Allen after Van Valkenburgh entitled Old Indian Villages in the Newhall Region (see Figure C-13). The map depicts a soapstone quarry near Mount McDill at an elevation of 5,180 feet with an Indian village site near the base of the mountain. According to Landberg's research, McCain and partner F.D. Maxwell filed two claims totaling 40 acres for the Stralite Place Claim near Mount McDill on November 16, 1931.

Despite discrepancies noted in place names on the Allen map (that is, the location of Sears Ranch) and an article published by Arthur Perkins, which identified the location of the quarry as Chico Lopez Mountain (aka Sierra Pelona Lookout), Landberg (1980:24) concluded that the most likely location of Van Valkenburgh's aboriginal quarry was near or within the McCain claims on Mount McDill.

In the years following Landberg's article, two potential soapstone quarry sites were recorded in the Sierra Pelona Mountains (see Figure C-14). Romani et al. 1983 described Site LAN-1132 as a large exposure of various grades of chlorite talc schist likely utilized by indigenous groups. Although no evidence of Prehispanic quarrying activity was noted, cupules were found carved into the soapstone suggesting some form of ritual or ceremonial affiliation. The site is situated along a firebreak near Sierra Pelona Lookout, aka Chico Lopez Mountain, at an elevation of 4,750 feet, near numerous natural springs. Romani and others identified the site as Van Valkenburgh's soapstone quarry.

Several years later, Wessel and Anderson (1985) recorded site LAN-1279 on a broad ridge finger along the south face of Sierra Pelona, below Mount McDill at an elevation of 4,460 feet. The site was recorded as several loci of cupule and pit and groove rock art on talc-schist bedrock, with boulder mortars. The recorders noted that the site had been severely impacted by recent mining activity and was situated near numerous springs.

Results of Fieldwork: Sierra Pelona Quarries and Source Locations

In addition to the two previously recorded soapstone quarries (i.e., LAN-1132 and -1279), several raw soapstone locations were investigated, including a source on the ridge of Mount McDill mapped previously by Dibblee (1997), float material recovered from Spade Canyon, a prospect pit that uncovered a vein of soapstone in Leona Valley, and Katz Talc Mine near Boiling Point, Agua Dulce Canyon, Soapstone cobbles and boulders were occasionally broken open with a rock hammer to inspect the interior of the rock for signs of weathering and investigate internal mineral composition.

LAN-1132

LAN-1132 was surveyed at reconnaissance-level on August 21, 2008 with the assistance of Angeles National Forest Archaeologist Kelly Brasket. The survey fieldwork and surface collection of geologic samples was authorized by the Angeles National Forest under Archaeological Resources Protection Act Permit # SCM9034CRI. The site is located on a forest road atop the Sierra Pelona Ridge near Willow Spring. The

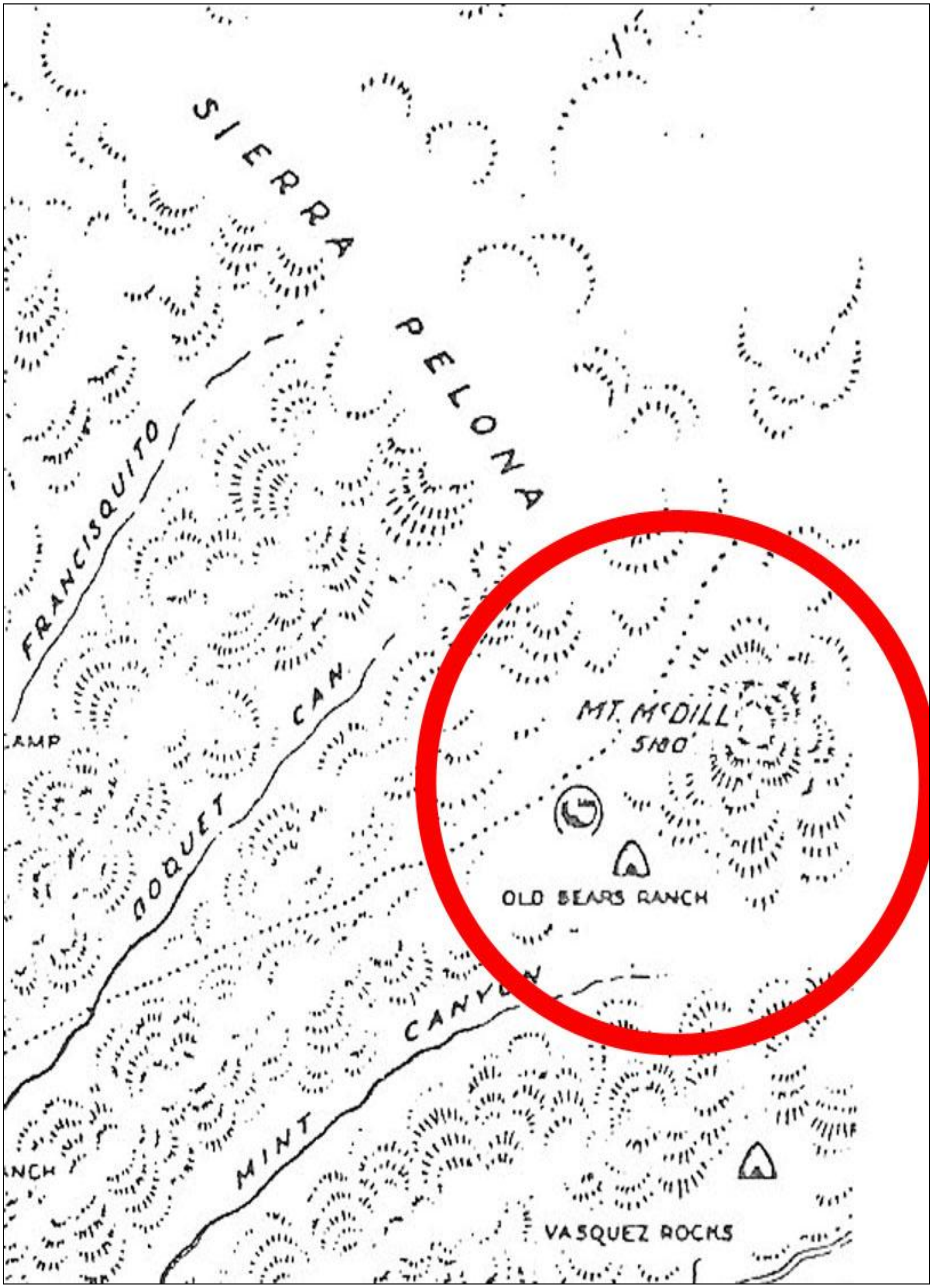

Figure C-13. Reproduction of portion of Harrington's photocopy of a map by Norton Allen after Van Valkenburgh of old Indian villages in the Newhall Region (originally printed in Landberg 1980:28). Map depicts location of Indian village and soapstone quarry near Mount McDill between Mint Canyon and Bouquet Canyon.

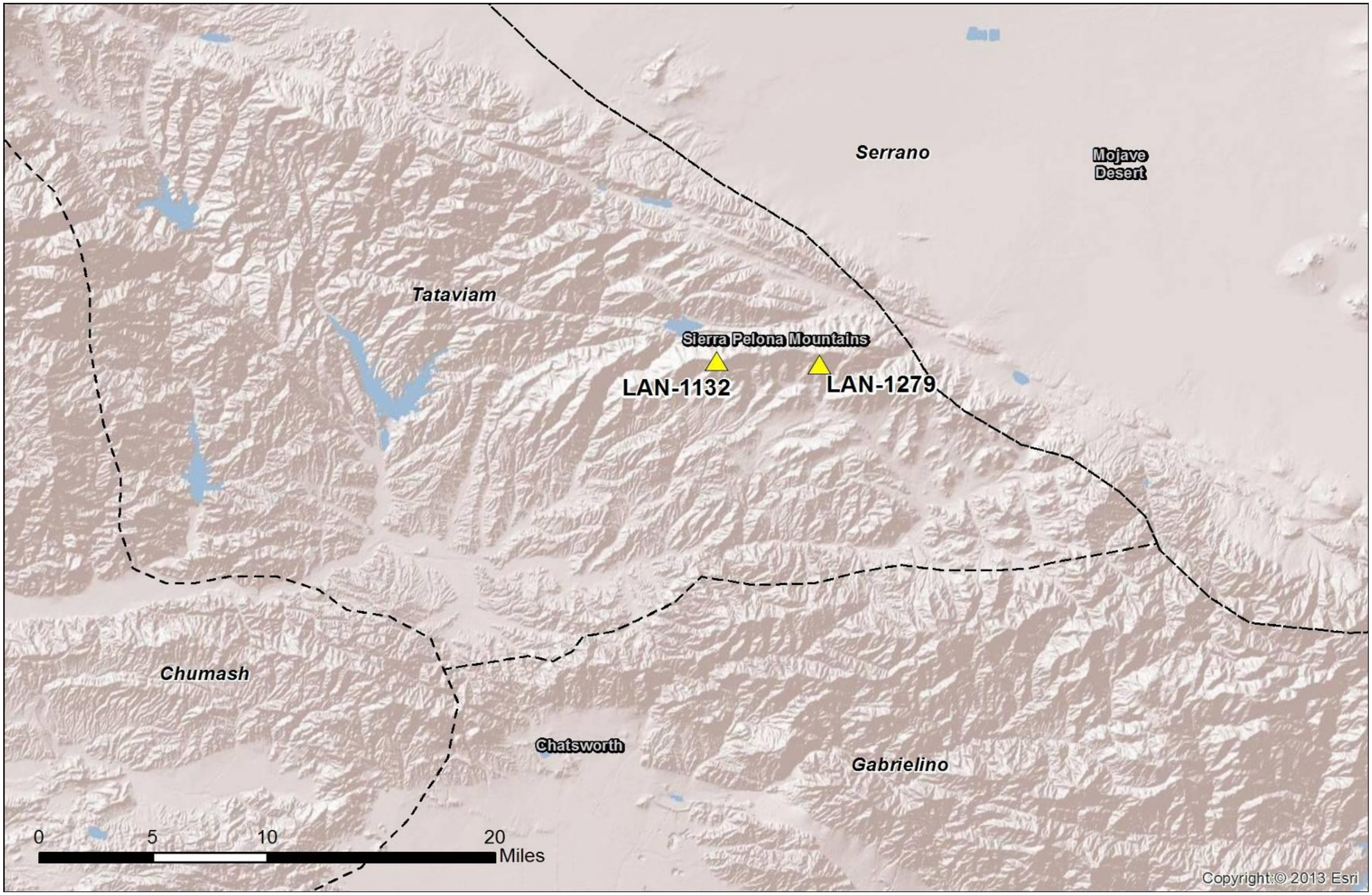

Figure C-14. Soapstone quarries and source locations in the Sierra Pelona Mountains purpose of the survey was to locate soapstone deposits, find evidence of Prehispanic quarrying activity, and determine the range of macroscopic variability within the soapstone. Once the range of variability was determined, a representative sample of unmodified soapstone cobbles was collected from the surface of the site for analysis.

During the survey it was noted that the site was heavily damaged by the construction of a fire road, OHV activity, mining, and rock hounding (Figure C-15). Deep bulldozer impact scars were noted on soapstone boulders that likely occurred when the fire road was originally cut. Masonry saw marks, likely from local rock hounds, were also noted on soapstone boulders (Figure C-16). The site also appears to have been mined, as a number of prospect pits and trenches were noted in the immediate vicinity.

Figure C-15. Overview of CA-LAN-1132 from northeast edge of the site. View to the southwest.

Despite impacts to the integrity of the site, a number of features previously recorded within the site boundaries were identified. Features included a number of cupules ground into the soapstone boulders, as well as pit and groove rock art (Figure C-17). No artifacts were noted on the surface of the site. Evidence of Prehispanic quarrying, if present, was likely destroyed by site impacts. Conversely, high quality raw soapstone cobbles were abundant on the surface of the site, suggesting soapstone may have been collected rather than quarried on site.

The site contained an array of macroscopically distinct soapstone. At least seven main varieties were noted, and surface collections of at least 20-25 samples of each variety were made. Outcropping boulders or exposed deposits of the soapstone varieties was present near the seven collection points. Soapstone on site included black-green, bluish green/gray, silver-white, greenish-blue-white, gray-green, green-white, and gray

Figure C-16. Feature 6 at CA-LAN-1132 with modern rock hammer, saw cut scars

Figure C-17. Feature 3 at CA-LAN-1132 with cupules and modern scarification from bulldozer

varieties. Weathering was noted in numerous samples as indicated by iron oxidation, which turned portions of the samples pink to red. Actinolite crystals were noted in some of the sample varieties, most notably the silver-white and gray-green varieties. Garnet was also evident in gray samples collected from the slope of the hill approximately 15 feet below the surface of the site.

LAN-1279

LAn-1279 was surveyed at reconnaissance-level on several occasions between May and September 2008 to identify previously recorded features and locate modified soapstone fragments for collection. The fieldwork and surface collections were authorized by the Santa Monica Mountains Conservancy. The site spread along a small bench and over finger-ridge mid-way up southern-face of Mount McDill in the Sierra Pelona Mountains. The terrain is relatively flat with a moderate degree of surface slope. The eastern portion of the site was heavily disturbed by historic talc mining activity, with impacts noted to the high quality soapstone deposits. Site boundaries are larger than indicated on the site record sketch map. An intensive survey of the site is needed locate all features and artifacts.

Evidence of talc mining was visible on aerial photos and its age was confirmed on the ground (Figure C-18). The site lies within boundary of McCain's talc mine quarry claim and all evidence points to this being Van Valkenburgh's long lost soapstone quarry Research on stone bead distribution patterns and exchange networks in Prehispanic southern California is limited. Efforts to date focus on the development of preliminary typologies and chronologies (e.g., Bennyhoff 1967; Romani 1980; and King 1990) and only King (1983; 1990) has explored the potential underlying economic and political motivations behind stone bead exchange. To date, stone bead research in southern California is skewed toward the Channel Islands and coastal areas between Santa Barbara and San Diego (e.g., Gibson 1988; King 1990; Moriarty 1966; and Scalise 1994, 2000) although research further inland is not unknown (e.g., Alcorn 1996; King 1983; and Basgall and True 1985). These studies pay particular attention to the use of chlorite schist disc beads during the Middle period, although stone beads were crafted from a variety of stone including soapstone (i.e., chlorite schist, talc schist) serpentine, magnesite, fluorite, calcite, argillite, phyllite, amphibolites, shale, jadeite, siltstone, dolomite and obsidian, and other materials.

Evidence of Prehispanic quarrying and soapstone tool/ornament production activity was noted on site. Two quarry tools, consisting of shaped and battered hard hammers, were noted, including one that was embedded in the soil adjacent to a number of cupules and mortars. Milky quartz tools and quartz and chert flakes were scattered sparingly throughout the site, possibly used in soapstone artifact production. Other activity areas in vicinity of production loci is highly likely, given the presence of mortars, cupules, and rock art, which often signifies habitation or ceremonial activities. LAN-1279 was a major source of high-grade Sierra Pelona soapstone with evidence of Prehispanic quarrying and ceremonial/ritual activity in the form of cupules and pit and groove petroglyphs (Figure C-19).

Figure C-18. Evidence of open pit talc mining at CA-LAN-1279

Figure C-19. Pit and groove petroglyph at LAN-1279

A total of 10 artifacts were collected from the surface of the site. These included soapstone pebble exhibiting etch marks; preform donut stone; modified soapstone cobble with notched sides; modified soapstone cobble with evidence of grinding; soapstone comal preform with notched side; partially sawed soapstone fragment; three pendant preforms/blanks; and perforated comal fragments (Figures C-20 to C-21). In addition, we collected a representative sample of 10-15 pieces of unmodified soapstone pebbles, accounting for the range of macroscopic variability noted in the material. Soapstone on site and noted at the quarry included off-white, brown, yellow-brown, gray-green, dark gray, light-green, pink-red, and red varieties.

Figure C-20. Pendant performs at LAN-1279

Mark Campbell Site

The soapstone deposit was previously identified by Mark Campbell (personal communication, 2008). It is located south of S Avenue overlooking Leona Valley, approximately 5-6 miles east of site LAN-1279, and contains a bedrock milling feature and cupules on a metamorphic boulder. Scattered pieces of soapstone were noted around the feature, but none exhibited modification. The loose soapstone granules eroded down slope from a talc prospect pit several meters wide and more than a meter deep. Investigation of the pit resulted in the identification of talc bearing Pelona Schist deposits composed of several macroscopically distinct varieties of soapstone (e.g., white and mottled brown; greenish white; and dark gray). The soapstone consisted of friable, fractured, thin-bedded, platy talc-rich rock, likely talc schist. Geologic samples of all three macroscopically distinct varieties were collected from the prospect pit.

Figure C-21. Broken comal at CA-LAN-1279

Katz Mine

The Katz talc mine is located near the foot of the southern facing slope of the Sierra Pelona Mountains, southwest of Mount McDill, near Boiling Point in Agua Dulce Canyon. This was a large commercial mining operation that exploited two talc bearing deposits on either side of Agua Dulce Canyon. Evidence of mining operations included quarry and possible blast scaring on the bedrock, structural debris, and trash scatters. Loose cobbles of soapstone litter the mine site.

The soapstone deposit is one of the most extensive and richest in terms of material quality, composition, and variety, rivaled only perhaps by deposits identified at LAN-1279. The deposit is several or more meters thick in some areas, with large boulders of soapstone dotting the landscape throughout the mine. Material was massive and of highest quality, ranging from white-to-blue talc rich soapstone, to white mottled brown, dark gray, and dark green almost black talc chlorite schist or serpentine (Figure C-22). The green/black talc chlorite schist/serpentine was only found at one other site (LAN-1132) investigated by the author in the Sierra Pelona Mountains and shares striking visual resemblance to material used to produce some of the beads identified at RIV-1246 and

Figure C-22. Soapstone deposits at the Katz Mine near Boiling Point.

the Chatsworth Walker Cairn Site, among others. The material resembles the black stone used to produce sucking tubes reported in southern California. No evidence of Prehispanic quarrying was noted, although the canyon would have provided a favorable setting for a seasonal habitation.

Mount McDill Fire Road

A review of geologic maps for the Sierra Pelona Mountains resulted in the identification of one previously mapped soapstone location that was accessible during field research. The source was located along a fire road cut into Mount McDill (Dibblee 1997) and consisted of a sparse scatter of green chlorite schist cobbles. Cut bank exposures were examined to identify in situ soapstone deposits, but none were found. Given the relative thinness and size of the cobbles, the bedrock deposit is likely composed of thin lenticular veins embedded within the Sierra Pelona Schist. The material collected from this location was considered quality toolstone by the author and appears to be unique to this specific area, as macroscopically similar soapstone was not identified at either of the two Prehispanic quarries. Similar materials may exist on the Lazy T Ranch in Leona Valley.

Spade Canyon

Spade Canyon: Geologic maps indicated one additional soapstone deposit exposed on the side of the mountain, which was not accessible by motor vehicle. Spade Canyon traversed along the edge of the mountain and it was believed soapstone float, possibly originating from this deposit, were present as float. A reconnaissance survey of Spade Canyon wash resulted in the identification of several large cobbles of water worn soapstone. No evidence of soapstone production was noted on in the immediate area; however, a large cupule rock was identified several hundred meters from where the soapstone was collected (Figure C-23). Survey around the cupule feature failed to identify any additional cultural features or artifacts. Discovery of the cupule boulder was reported to the Angeles National Forest.

Figure C-23. Isolate cupule boulder on terrace, Spade Canyon.

Lytle Creek

Lytle Creek is located at the eastern edge of the San Gabriel near the mouth of Cajon Creek. A small pocket of soapstone was identified in a dirt road cut along a hill mapped as Pelona Schist in the Lytle Creek area at the eastern terminus of the Angeles Mountains. Soapstone outcrops or exposures in bedrock were not identified during the reconnaissance survey, but such deposits may exist in the area.

Other Sources

Source locations ranging from bedrock outcrops to float materials are reported in the Santa Fe Hills (see Bissell 1989), Ritter Ranch (LAN-953 and 959) near Palmdale, and the Leona Valley. Sutton (1988:45) described the Leona Valley area, just west of Palmdale, as a major source of soapstone and soapstone artifacts. The Lazy T site complex in the Leona Valley contains many finished, broken, and partially manufactured soapstone artifacts (Robinson 1980). This is apparently the same soapstone source reported by Farmer (1988).

Sierra Pelona Soapstone Typology

The samples of soapstone recovered from the Sierra Pelona region were classified by color, hardness on Mohs scale, luster, level of schistocity, and mineral composition and grain size. The typology contains includes talc-schist, serpentine, chlorite schist, and others with a total of seventeen visual types identified. Thin-sections of several Sierra Pelona soapstone types were viewed by Dr. Allen Smith, Department of Geological Sciences, California State University, San Bernardino, and mineralogical composition of Sierra Pelona Types 1, 3, 5, and 13 were described (see Figures C-24 to C-27).

Sierra Pelona Soapstone Typology

Type	Color	Hard	Luster	Structure	Grain	Min.
1	Green to blue gray slightly weathered to orange/red	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit, parallel schistocity	Fine	Chlorite
2	White to light green, weathered yellow/orange to pink	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit, parallel schistocity, slightly fibrous appearance on surface	Fine	Talc
3	Black to dark green	3	Greasy to waxy	Thin-bedded, massive crystal habit, parallel schistocity	Fine	Serpentine magnetite
4	Mottled white, blue gray Weathered pink	>2.5	Vitreous	Thin-bedded, massive crystal habit, parallel schistocity , similar in appearance to Cuyamaca Soapstone Type 1	Med.	Talc Chlorite Garnet

Sierra Pelona Soapstone Typology

Type	Color	Hard	Luster	Structure	Grain	Min.
5	Gray with shades of blue weathered brown	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit with parallel and bending schistocity	Fine	Talc Chlorite Actinolite Garnet
6	White, weathered rust	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit, parallel schistocity	Fine	Talc Actinolite
7	Mottled brow exterior; Cleavage mottled brown to white and light green	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit, parallel schistocity	Fine	Talc Chlorite
8	Dark green to gray, portions where asbestos present mottled white to brown	2.5-4	Vitreous to greasy luster on schistose exterior surfaces, dull to vitreous luster on granular surfaces	Portions thin-bedded, massive crystal habit, parallel to bending schistocity. Other portions granular	Fine	Chlorite Talc/ Serpentine
9	Light gray to shade of green slightly weathered brown	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit, parallel schistocity	Fine	Talc
10	Mottled gray to white weathered red	>2.5	Vitreous	Thin-bedded, massive to granular crystal habit, parallel schistocity	Fine	Talc Chlorite
11	Dark gray, charcoal weathered rust	>2.5	Greasy	Thin-bedded, massive crystal habit, parallel to bending schistocity	Fine	Talc

Sierra Pelona Soapstone Typology

Type	Color	Hard	Luster	Structure	Grain	Min.
12	Moderate shade of green weathered rust	>2.5	Vitreous to greasy	Thin bedded, massive to granular crystal habit, parallel schistocity	Fine	Talc Chlorite
13	Charcoal Gray to dark blue	3	Waxy to lacking	thin-bedded, massive crystal habit, parallel schistocity	Fine	Chlorite-talc to serpentine
14	Mottled green to white heavily weathered brown to rust	>2.5	Vitreous to greasy	Thin to medium bedded, massive crystal habit, parallel to bending schistocity	Med./ coarse	Talc Actinolite
15	Blue-green weathered brown to rust	>2.5	Greasy	Thin bedded, massive to granular crystal habit, parallel to bending schistocity	Fine	Talc Chlorite
16	Mottled pink to white weathered rust	>2.5	Vitreous to greasy	Thin-bedded, massive crystal habit, parallel and bending schistocity resembles Cuyamaca Soapstone Type 2	Fine	Talc Garnet
17	Mottled brown weathered rust	>2.5	Vitreous to greasy	Thin-bedded, massive to granular crystal habit, parallel to bending schistocity	Fine	Talc Garnet

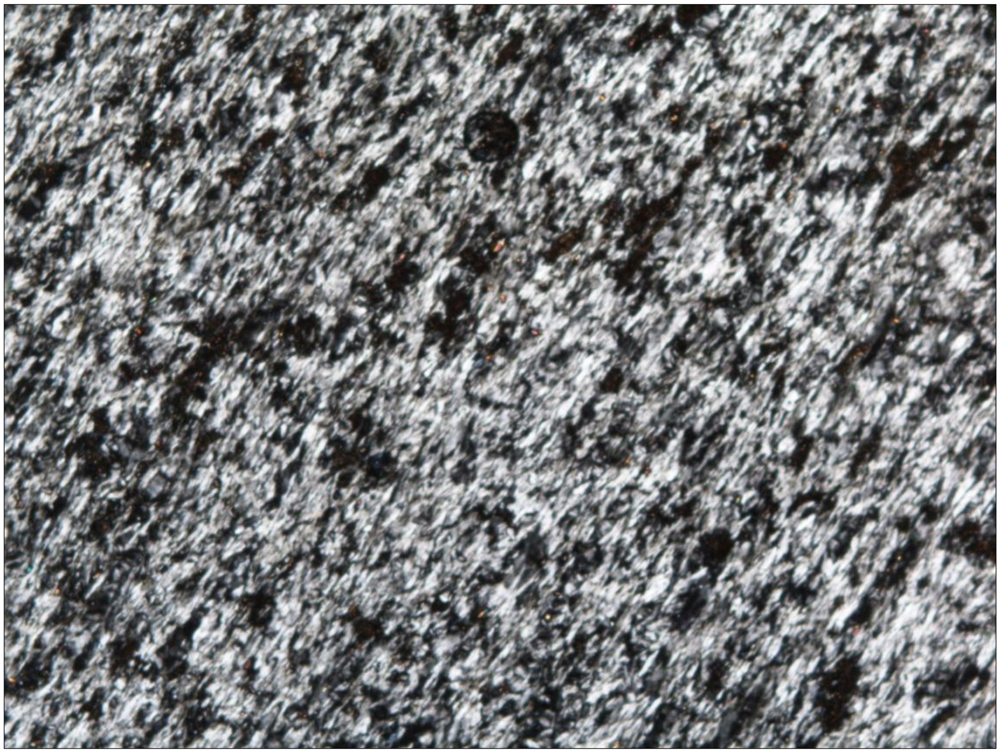

Figure C-24. Thin-section of Sierra Pelona Soapstone Type 1 (Chlorite).

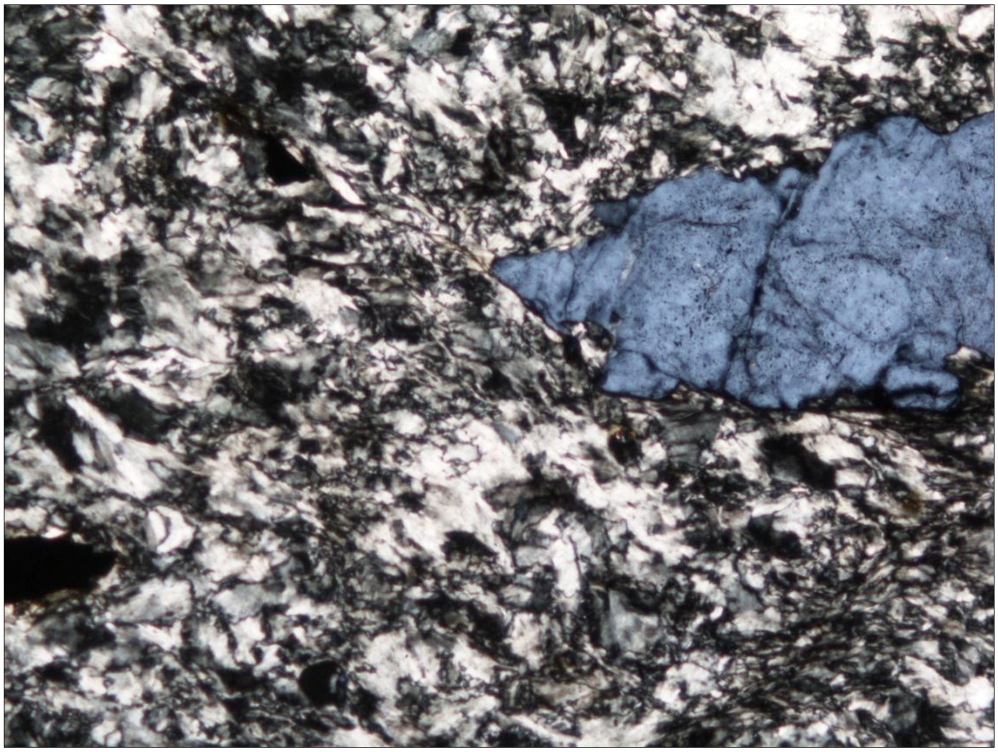

Figure C-25. Thin-section of Sierra Pelona Soapstone Type 3 (Serpentine with Magnetite).

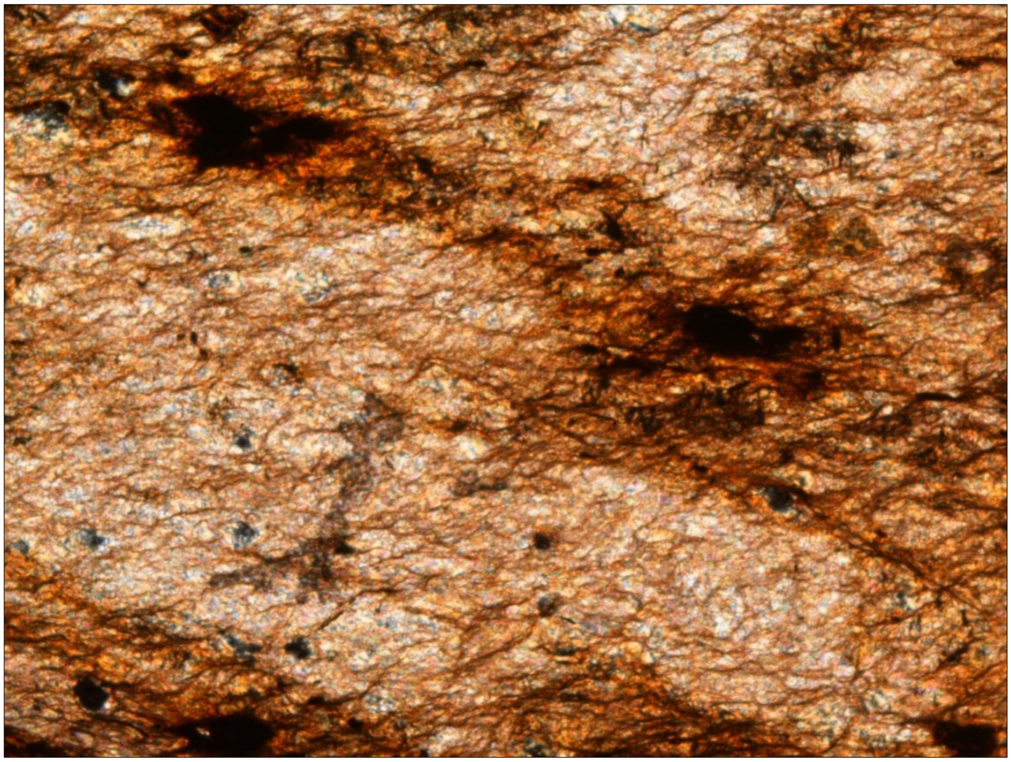

Figure C-26. Thin-section of Sierra Pelona Soapstone Type 5 (Talc with chlorite inclusions).

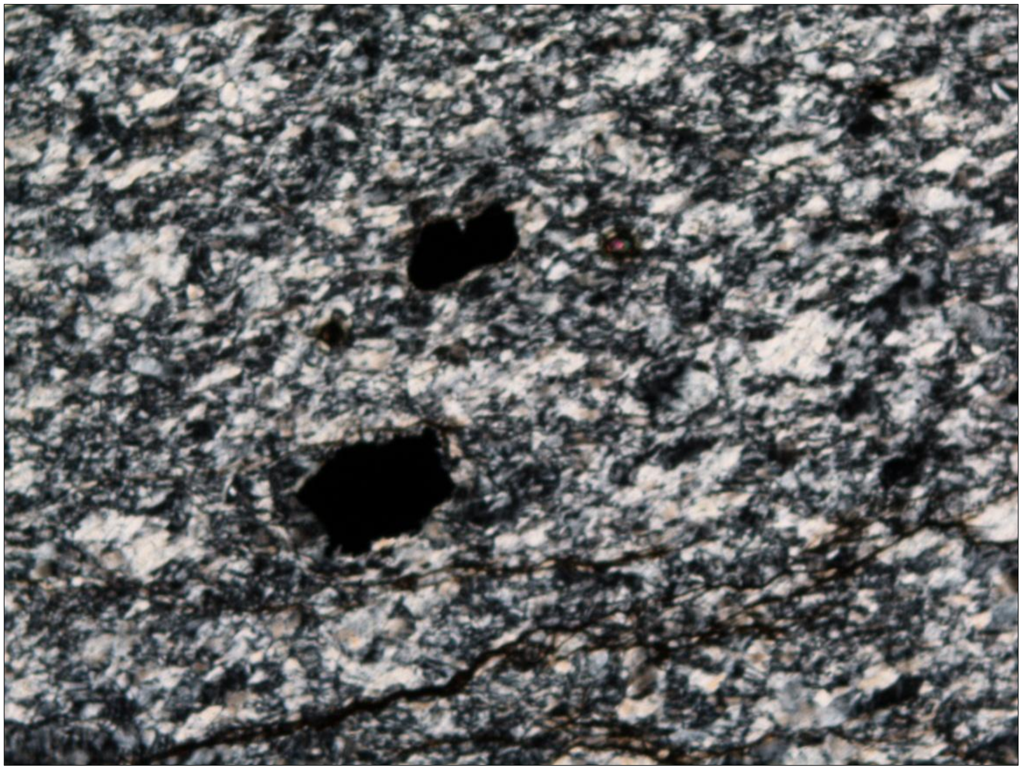

Figure C-27. Thin-section of Sierra Pelona Soapstone Type 13 (Talc, Chlorite, Serpentine).

Additional Soapstone Sources in Southern California

Additional soapstone sources were identified in the archaeological literature in the Mojave Desert and Inland Valley. A reported soapstone deposit is located on Goat Hill in the Mojave Desert north of Joshua Tree National Forest (Robinson 2001a:640). No further information could be found on this deposit. A soapstone source is also reported in the north hills of Diamond Valley near Hemet. The source was discovered within serpentinized bodies at RIV-4631H, a historic magnesite mine (Robinson 2001a:641). The material is described as poor grade highly siliceous chlorite schist, dark in color, slightly gritty as opposed to the typical soapstone texture (Robinson 2001b:94). Robinson (2001a:641) suggests that mining activity destroyed higher quality deposits of soapstone available to Prehispanic peoples. Soapstone items recovered from the Diamond Valley, with the exception of stone disc beads and pendants, shared similar physical characteristics and were of the same quality.

Soapstone cobbles were recovered from road cut into Sierra Pelona Schist in the Lytle Creek area near the Cajon Pass. No evidence of aboriginal quarrying or procurement of soapstone form this area has been reported. Finally, numerous soapstone deposits are reported outside of southern California in the San Joaquin Valley, Santa Barbara Valley, and Sierra Nevada Mountains.

REFERENCES CITED

Alcorn, D. C.
1996 *Juniper Flats Archaeology: An Area of Critical Environmental Concern in the Western Mojave Desert*. McGraw-Hill College Custom Series, San Francisco.

Basgall, M. E and D. True
1985 Archaeological investigations in Crowder Canyon, 1973-1984: Excavations at Sites SBr-421B, SBr-421C, SBr-421D, and SBR-713. Report of file, Archaeological Information Center, San Bernardino County Museum, Redlands, California.

Bennyhoff, J. A.
1967 A Typology of Shell and Stone Beads from Central California. Manuscript on file, California State Parks and Recreation Archaeological Resources Archive.

Berryman, S., and S. Roder
2003 Evaluation Report for Soapstone Ridge. Report on file, Cleveland National Forest, San Diego.

Bissell, R.
1989 Cultural Reconnaissance of the Santa Fe Hills Project Area, 808 Acres near Palmdale, Los Angeles County, California. University of California Publications in Anthropology No 18.

Clark, J. M.
1948 *The Cuyamaca Story: A Record in Pictures of San Diego's City-County School Camp*. Prepared for the San Diego City-County Camp Commission under direction of the School Camp Steering Committee through the generosity of the Rosenberg Foundation of San Francisco.
1951 *Public School Camping California's Pilot Project in Outdoor Education*. Stanford University Press, Stanford, California..

Clark, J. P.
2009 Chronological and Geographical Dimensions of the Soapstone Trade Among the Southern California Channel Islands. Unpublished Master's Thesis, Department of Anthropology, California State University, Northridge.

Dibblee, T. W., Jr.
1967 Areal geology of the Western Mojave Desert, California. U.S. Geological Survey Professional Paper 522.

Dibblee, T. W., Jr. (continued)

1997 *Geologic Map of the Sleepy Valley and Ritter Ridge Quadrangles, Los Angeles, California.* Dibblee Geological Foundation Map #DF-66.

Eddy, J. J.

2009 Source Characterization of Santa Cruz Island Chlorite Schist and its Role in Stone Bead and Ornament Exchange Networks. In *Proceedings of the Seventh California Islands Symposium, Oxnard, California, February 5-8, 2008,* C.C. Damiani and D.K. Garcelon (eds.), pp. 67-79. Institute for Wildlife Research , Arcata, California.

Gay, T. E., and S. R. Hoffman

1954 Mines and mineral deposits of Los Angeles County, California. *California Journal of Mines and Geology* 50(3&4):502-503, 365.

Farmer, M. F

1988 Participation in Southern California Archaeology. Notes of Malcolm F. Farmer (includes notes and maps of R.F. Valkenburgh, 1933).

Farmer, S.

2005 Site Record: SDI-9040. Record on file, South Coastal Information Center, San Diego State University.

Gay, T. E., and S. R. Hoffman

1954 Mines and mineral deposits of Los Angeles County, California. *California Journal of Mines and Geology* 50(3&4):502-503, 365.

Germinairo, M.

1993 The Early Mesozoic Julian Schist, Julian, California. *Geologic Society of America, Special Paper,* 279.

Gibson, R. O.

1988 An Analysis of Shell Artifacts and Stone Beads from SLO-7 and SLO-8, Diablo Canyon, San Luis Obispo County, California. In, *Archaeological Investigations at SLO-7 and SLO-8, Diablo Canyon, San Luis Obispo County, California*. Archives in California Prehistory No. 28, Coyote Press.

Gifford, E. W.

1931 The Kamia of Imperial Valley. *Bureau of American Ethnology, Bulletin* 97.

Graham, William R.

1981 A Cultural Resource Survey of the Laguna Mountain Recreation Area, San Diego County, California. Archaeological Systems Management, San Diego.

Heizer, R. F., and A. E. Treganza

1944 Mines and Quarries of the Indians of California. *California Journal of Mines and Geology* 40(3):285-359.

Howard, V.

2002 Santa Catalina Soapstone Vessels: Production Dynamics. *Proceedings of the Fifth California Islands Symposium: 29 March to 1 April 1999,* D.R. Brown , K.L. Mitchell, and H.W. Chaney (eds.), pp. 598-606. Santa Barbra Museum of Natural History.

King, C.

1983 Beads and Selected Ornaments. In, *Archaeological Studies at Oro Grande, Mojave Desert, California*, edited by C. H. Rector, J. D. Swenson, and P. J. Wilke, pp. 68-87. San Bernardino County Museum Association, Redlands, California.

1990 Evolution of Chumash Society: A Comparative Study of Artifacts Used for Social System Maintenance in the Santa Barbara Channel Region Before A.D. 1804. (Revision of 1982 dissertation). In, *Evolution of North American Indians* [series], David Hurst Thomas, ed. Garland Publishing, Inc., New York.

Landberg, L. C. W.

1980 Relocation of an Aboriginal Steatite Quarry Reported by Richard F. Van Valkenburgh to be in the Sierra Pelona Range, Los Angeles County, California. In, *Inland Chumash Archaeological Investigations*, edited by D.S. Whitley, E. L. McCann, and C. W. Clewlow, pp. 13-42. Institute of Archaeology, University of California, Los Angeles, Monograph XV.

Meighan, C. W, and K. L. Johnson.

1957 Isle of Mines: Catalina's Ancient Indian Quarries. Pacific Discovery 10(2):24-29.

Melhouse, J.

1928 Andalusite in California. *Engineering and Mining Journal, 120:91-94.*

Moriarty, J. R., III

1966 Cultural phase divisions suggested by typological change coordinated with stratigraphically controlled radiocarbon dating in San Diego. *The Anthropological Journal of Canada 4(4):20-30.*

Murdoch, J., and R.W. Webb

1956 Minerals of California: California Division of Mines Bulletin 173, pp 3-452.

Parkman, E. B.

1981 Rock Art of the Cuyamacas. Paper presented at the Annual Rock Art Symposium of the San Diego Museum of Man, November 1981. San Diego.

1983 Soapstone for the Cosmos: Archaeological Discoveries in the Cuyamaca Mountains. *Journal of California and Great Basin Anthropology* 5:140-153.

Parkman, E. B., et al.

1981 A Cultural Resources Inventory and Management Plan for Prescribed Burning at Cuyamaca Rancho State Park, San Diego County, California. Vol. II. California Department of Parks and Recreation, Sacramento.

Polk, M. R.

1972 Manufacture and Use of Steatite Objects by the Digueño. *Pacific Coast Archaeological Society Quarterly* 8(3):5-26.

Rensch, H. E.

1950 The Indian Place Names of Rancho Cuyamaca. Manuscript on file at the California Department of Parks and Recreation, Sacramento.

Robinson, M. C.

2001a The Lithic Assemblage From RIV-4930, Locus E. In *Metropolitan Water District of Southern California, Eastside Reservoir Project, Final Report of Archaeological Investigations, Volume V: Technical Studies,* edited by S. K. Goldberg. Applied Earthworks, Inc., Hemet, California. Report on file, Eastern Information Center, University of California, Riverside.

2001b Stone Ornaments, Unusual Groundstone, and Manuports. In *Metropolitan Water District of Southern California, Eastside Reservoir Project, Final Report of Archaeological Investigations, Volume V: Technical Studies,* edited by S. K. Goldberg. Applied Earthworks, Inc., Hemet, California. Report on file, Eastern Information Center, University of California, Riverside.

Rogers, M. A.

n.d. Archaeological Field Notes for the Western Area. Manuscript on file at the Curatorial Department, San Diego Museum of Man, San Diego.

Romani, G.

1980 Stone Beads. In, An Archaeological Assessment of the Walker Cairn Site (4-LAN-21), Chatsworth, California, edited by L. J. Tartaglia, pp. 251-272. Report on file, South-Central Coastal Information Center, California State University, Fullerton.

1982 In Search of Soapstone. Unpublished MA Thesis, Department of Anthropology, California State University, Northridge.

Rosenthal, J. and S. L. Williams

1992 Some Southern California Soapstone Sources. *Proceedings of the Society for California Archaeology* 5:219-227.

Scalise, J. L.

1994 San Clemente Island's Social and Economic Exchange Networks: A Diachronic View of Interaction Among the Maritime Adapted Southern and Northern Channel Islands, California, Parts I and II. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

2000 The Ledge Site Bead Typology, San Clemente Island. Pacific Coast Archaeological Society Quarterly 36(4):48-58.

Schumacher, P.

1879 The Method and Manufacture of Soapstone Pots. Washington D.C.: Report Upon United Sates Geographical Surveys West of the 100th Meridian, No. 7:117-121.

Shackley, S.

1980a Site Record: SDI-7790. Record on file, Bureau of Land Management, El Centro Field Office.

1980b Site Record: SDI-8538. Record on file, Cleveland National Forest, San Diego.

Sutton, M. Q.

1988 An Introduction to the Archaeology of the Western Mojave Desert, California. Coyote Press Archives of California Prehistory No. 14.

True, D.L.

1961 Archaeological Survey of Cuyamaca Rancho State Park, San Diego County, California. Manuscript on file at the California Department of Parks and Recreation, Sacramento.

1966 Archaeological Differentiation of Shoshonean and Yuman Speaking Groups in Southern California. Ph.D. dissertation, University of California, Los Angeles.

Walawender, M. J.

2000 The Peninsular Ranges: A Geologic Guide to San Diego's Back Country. Kendall Hunt Publishing Company. Dubuque, Iowa.

Walawender, M. J., G. H. Girty, M. R. Lombardi, D. Kimbrough, M. S. Girty, and C. Anderson

2004 A Synthesis of Recent Work in the Peninsular Ranges Batholith. In *Geology of the Elsinore Fault Zone San Diego Region*, edited by M.L. Murbach and M.W. Hart. San Diego Association of Geologists and South Coast Geological Society, Volume 31.

Warren, C. N., D. L. True, and A. A. Eudey

1961 Early Gathering Complexes of Western San Diego County: Results and Interpretations of an Archaeological Survey. *University of California Archaeological Survey Annual Report*, 1960-1961. Los Angeles.

Weber, F. H.

1963 Geology and Mineral Resources of San Diego County, California. California Division of Mines and Geology County Report 3.

Williams, S. L., and E. J. Rosenthal

1993 Soapstone Craft Specialization at the Upper Buffalo Springs Quarry, Santa Catalina Island. *Pacific Coast Archaeological Society Quarterly* 29(3):22-50.

Wlodarski, R. J.

1979 Catalina Island Soapstone Manufacture. *Journal of California and Great Basin Anthropology* 1(2):331-355.

Woodward, A.

1937 Fluorite Beads in California. *Southern California Academy of Sciences, Bulletin* 37 (Part 1):1-6.

Treganza, A.E.

1942 An Archaeological Reconnaissance of Northeastern Baja California and Southeastern California. *American Antiquity* 8(2):152-163.

APPENDIX C: LA-ICP-MS CALIBRATED DATA TABLES

Table 1a. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 5 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1279-1a3.D	Sierra Pelona Type 5	Talc-schist	0.00	197254.27	18530.70	261734.94	49.28	33.09	0.00	41.55	42.24	3519.64	284.49	48634.62	1516.83	72.31	5.45	83.98	0.00
1279-1a4.D	Sierra Pelona Type 5	Talc-schist	0.00	201418.56	52907.66	202087.41	498.65	738.33	31.22	132.57	131.70	11197.40	507.56	78291.78	1428.85	85.77	17.24	102.62	0.00
1279-1b.D	Sierra Pelona Type 5	Talc-schist	72424.73	246460.64	8554.56	200067.08	465.56	0.00	0.00	10.83	16.72	1632.34	216.40	30062.47	2088.63	58.67	0.00	132.52	0.00
1279-1b2.D	Sierra Pelona Type 5	Talc-schist	575.01	191267.51	7836.09	286144.92	180.51	0.00	12.71	0.00	18.18	1515.22	195.40	34395.46	1895.29	46.93	5.28	145.02	0.00
1279-1c.D	Sierra Pelona Type 5	Talc-schist	49293.60	261335.99	8855.25	202152.44	909.98	0.00	0.00	48.46	21.99	1730.62	217.47	30369.23	2257.76	69.82	0.00	177.68	4.51
1279-1c2.D	Sierra Pelona Type 5	Talc-schist	0.00	191379.48	9399.32	284276.48	0.00	319.24	4.35	0.00	19.12	1749.18	177.11	35042.88	1969.24	59.31	8.10	195.04	0.86
1279-2a.D	Sierra Pelona Type 5	Talc-schist	46725.78	258824.31	17189.60	194672.59	579.93	0.00	3.04	0.00	41.87	3882.39	290.37	34140.44	2030.93	69.76	2.36	150.21	0.00
1279-2a2.D	Sierra Pelona Type 5	Talc-schist	0.00	194381.57	3189.80	287748.31	0.00	82.65	2.96	51.12	4.71	767.46	153.48	36024.76	1764.17	48.91	0.00	151.44	5.90
1279-2b.D	Sierra Pelona Type 5	Talc-schist	59378.89	243234.32	10705.87	205642.52	1359.67	0.00	1.05	22.49	31.27	2800.43	240.39	32847.86	2051.51	69.44	31.91	174.13	6.50
1279-2b2.D	Sierra Pelona Type 5	Talc-schist	3791.27	193732.81	17762.92	262291.84	222.99	263.43	11.31	50.64	63.51	4291.35	242.94	47557.60	2040.81	58.86	28.98	191.34	28.95
1279-3a.D	Sierra Pelona Type 5	Talc-schist	80426.58	241338.67	11062.74	193602.63	2209.73	0.00	12.08	1881.45	18.54	1401.84	417.15	31419.93	1767.55	72.75	1.76	175.88	0.00
1279-3a2.D	Sierra Pelona Type 5	Talc-schist	5022.49	181175.75	9590.78	275998.92	404.46	562.72	7.88	7363.12	17.20	1161.94	702.64	45403.12	1724.79	55.68	2.39	177.43	5.31
1279-3b.D	Sierra Pelona Type 5	Talc-schist	62013.18	245555.18	30083.75	172966.59	1369.11	0.00	15.83	43.35	83.39	5010.61	360.28	47261.04	3146.04	105.59	69.60	225.42	94.11
1279-3b2.D	Sierra Pelona Type 5	Talc-schist	2568.45	194484.25	39329.13	232147.79	292.19	192.41	14.43	62.36	83.37	6034.02	345.72	62308.23	2278.41	68.48	42.49	200.43	12.81
1279-4a.D	Sierra Pelona Type 5	Talc-schist	57307.43	266243.60	32219.33	161584.17	1383.65	0.00	2.38	0.00	67.62	5408.25	380.27	42616.20	2230.72	88.23	0.00	225.99	0.00
1279-4a2.D	Sierra Pelona Type 5	Talc-schist	3824.15	196060.10	36408.42	238171.98	204.84	144.43	11.18	13.51	80.36	5431.51	373.40	55209.01	2005.88	88.42	0.00	190.43	5.72
1279-4b.D	Sierra Pelona Type 5	Talc-schist	54508.76	260024.01	12149.58	196490.68	918.50	0.00	2.13	0.00	32.41	2175.54	270.86	30546.19	2336.04	80.73	0.00	168.81	0.00
1279-4b2.D	Sierra Pelona Type 5	Talc-schist	718.91	188882.59	672.83	296069.79	301.51	77.32	0.00	30.43	1.32	210.74	152.98	32696.36	1969.27	80.07	1.78	191.58	10.24
1279-5a.D	Sierra Pelona Type 5	Talc-schist	60262.92	255046.45	4900.15	202793.88	1494.05	0.00	8.37	22.38	15.55	798.19	256.81	32566.60	1694.25	69.08	0.00	152.72	0.00
1279-5a2.D	Sierra Pelona Type 5	Talc-schist	1137.80	182461.46	2047.35	294325.57	92.37	3559.54	1.59	40.35	8.17	426.82	196.96	36708.93	1635.16	64.72	0.00	203.82	0.81
1279-5b.D	Sierra Pelona Type 5	Talc-schist	0.00	179865.06	238.93	302249.26	107.09	68.32	1.98	0.00	1.76	94.95	150.42	35650.38	1775.36	83.60	0.00	185.18	0.00
1279-5b2.D	Sierra Pelona Type 5	Talc-schist	0.00	184453.77	284.04	297856.54	111.58	423.50	6.27	17.23	0.00	73.95	150.89	36384.75	1925.47	76.71	4.62	158.70	3.45
1279-6a.D	Sierra Pelona Type 5	Talc-schist	0.00	200230.72	9127.51	276852.61	0.00	467.66	2.51	0.00	12.06	1857.57	233.50	36224.07	1673.97	59.31	6.25	185.09	0.00
1279-6a2.D	Sierra Pelona Type 5	Talc-schist	0.00	182376.74	28322.51	254973.82	4191.02	878.86	6.87	112.92	115.14	5441.13	376.41	55673.16	2216.95	72.73	30.87	156.24	13.31
1279-6b.D	Sierra Pelona Type 5	Talc-schist	4665.82	196728.86	2742.13	283505.47	386.43	656.91	2.27	18.60	3.63	530.50	171.22	35207.26	1769.94	54.05	0.00	164.67	0.00
1279-6b2.D	Sierra Pelona Type 5	Talc-schist	0.00	190545.27	2049.30	293960.04	135.02	86.32	0.29	30.44	2.30	404.41	164.71	32567.38	2135.29	77.04	4.08	187.23	0.00
1279-7a.D	Sierra Pelona Type 5	Talc-schist	2882.82	215499.07	21118.02	242495.17	322.04	0.00	7.92	336.83	37.87	3840.24	294.00	48972.00	1725.11	77.83	5.79	197.08	0.00
1279-7a2.D	Sierra Pelona Type 5	Talc-schist	0.00	191913.46	15669.41	260136.63	146.75	28.66	4.36	6950.02	30.69	2913.46	895.81	52296.07	1920.13	84.20	12.20	217.25	13.68
1279-7b.D	Sierra Pelona Type 5	Talc-schist	2349.77	203662.41	29496.89	234518.33	80.66	0.00	7.61	3851.25	57.82	5018.22	646.48	58583.26	1681.14	82.38	17.60	201.55	0.00
1279-7b2.D	Sierra Pelona Type 5	Talc-schist	0.00	191426.84	35969.36	233917.63	324.33	229.03	9.57	5891.54	59.38	6138.18	841.73	62810.66	1998.54	82.91	18.94	253.42	19.72
1279-8a.D	Sierra Pelona Type 5	Talc-schist	8055.45	200096.83	11902.81	266025.23	568.21	742.92	4.58	133.79	18.29	1816.92	264.49	40386.69	1700.57	72.92	0.00	179.56	0.00
1279-8a2.D	Sierra Pelona Type 5	Talc-schist	9452.88	203690.43	11996.45	261636.88	481.80	476.25	0.00	0.00	27.63	1873.65	222.47	41790.22	1730.06	80.75	19.09	156.12	0.00
1279-8b.D	Sierra Pelona Type 5	Talc-schist	0.00	196979.58	42069.85	233286.22	150.29	740.71	16.13	0.01	77.36	5540.85	387.91	57097.11	1824.29	86.72	0.00	177.76	0.00
1279-8b2.D	Sierra Pelona Type 5	Talc-schist	0.00	190295.38	12789.48	280427.30	134.30	182.48	1.85	67.59	23.12	1703.57	209.41	37739.72	1681.78	79.84	12.08	221.98	0.00
1279-9a.D	Sierra Pelona Type 5	Talc-schist	11850.61	201177.73	10658.41	261797.30	855.58	620.74	0.00	0.00	29.73	2592.19	212.09	42344.77	2185.52	50.84	7.11	221.61	25.27
1279-9a2.D	Sierra Pelona Type 5	Talc-schist	2132.89	184229.10	6969.01	288399.47	268.41	393.79	1.50	26.03	14.69	2042.15	195.21	37036.78	2695.91	58.74	22.10	218.75	0.00
1279-9b.D	Sierra Pelona Type 5	Talc-schist	3955.46	202790.50	18922.09	252970.81	589.36	0.00	2.08	0.00	49.84	5712.70	273.89	47327.04	2585.62	83.92	17.21	274.00	0.00
1279-9b2.D	Sierra Pelona Type 5	Talc-schist	1560.72	193891.41	19557.62	261024.53	285.92	639.89	13.43	0.00	46.24	5947.92	276.26	46300.81	2732.60	81.67	5.40	232.38	14.53
1279-10a.D	Sierra Pelona Type 5	Talc-schist	1318.03	210569.01	72422.69	174262.84	377.72	189.58	16.98	93.87	146.06	14986.90	579.44	78937.55	1488.05	93.27	5.70	183.94	0.00
1279-10aa2.D	Sierra Pelona Type 5	Talc-schist	2694.75	188944.73	845.13	294730.43	186.21	389.77	0.00	20.61	2.55	201.16	162.48	32523.81	1734.50	73.17	21.19	212.05	0.00
1279-10b.D	Sierra Pelona Type 5	Talc-schist	5232.19	190302.87	18280.29	260095.16	780.36	158.60	6.41	20.56	33.95	4417.41	244.86	52522.96	1873.93	97.04	5.86	163.90	0.00
1279-10b2.D	Sierra Pelona Type 5	Talc-schist	0.00	200957.80	15688.98	262647.51	38.54	109.90	8.52	133.75	25.44	3611.07	248.85	46110.31	1798.97	86.39	0.00	217.69	10.95
1279-11a.D	Sierra Pelona Type 5	Talc-schist	3354.68	202573.39	8164.04	270924.40	0.00	206.12	0.83	10.68	10.47	1460.41	192.20	40876.36	1969.17	71.57	10.87	221.74	0.00
1279-11a2.D	Sierra Pelona Type 5	Talc-schist	0.00	191706.57	17439.60	268831.72	7.02	0.00	5.49	47.18	30.06	3384.33	218.94	45729.21	1896.84	73.75	6.80	191.11	0.00
1279-11b.D	Sierra Pelona Type 5	Talc-schist	881.76	201539.82	10114.42	269977.09	0.00	122.48	0.00	63.43	20.19	1664.87	175.22	43286.36	1784.01	61.57	3.01	167.40	0.00
1279-11b2.D	Sierra Pelona Type 5	Talc-schist	0.00	198381.98	39625.58	230742.40	194.71	123.42	4.78	19.76	87.20	5947.63	381.81	62669.76	1733.50	95.78	25.17	203.64	0.00

Table 1a. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 5 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1279-12a.D	Sierra Pelona Type 5	Talc-schist	2891.37	200349.76	36643.29	229601.72	217.75	107.66	4.35	55.76	64.27	5835.47	340.63	63827.84	1403.46	79.54	0.00	165.93	0.00
1279-12a2.D	Sierra Pelona Type 5	Talc-schist	0.00	191773.49	25003.57	258175.21	65.20	0.00	8.26	48.21	50.55	4128.30	308.44	51144.37	1430.79	76.60	1.81	131.59	5.00
1279-12b.D	Sierra Pelona Type 5	Talc-schist	593.32	195147.55	5491.52	281942.70	275.38	311.07	0.00	40.27	11.95	1000.98	185.31	39829.97	1365.85	61.74	0.00	172.99	0.00
1279-12b2.D	Sierra Pelona Type 5	Talc-schist	0.00	190264.08	4747.65	289275.07	83.61	90.70	0.59	0.00	5.82	983.54	185.14	36350.58	1529.09	75.60	0.73	169.45	4.52

Table 1b. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 5 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1279-1a3.D	Sierra Pelona Type 5	Talc-schist	2.31	1.77	0.75	0.95	0.40	3.18	1.81	0.09	1.99	0.00	0.00	0.00	0.00	0.93	0.00	2.94	0.13	0.00	0.00	0.00	0.10	0.00	0.00	0.32	0.00	0.00	0.00	0.00
1279-1a4.D	Sierra Pelona Type 5	Talc-schist	0.65	0.74	0.68	0.00	0.00	2.33	4.41	0.00	1.11	0.24	0.33	0.32	3.05	0.00	0.45	0.31	0.20	0.21	0.49	0.83	0.43	0.82	0.00	0.34	0.00	11.26	0.39	0.00
1279-1b.D	Sierra Pelona Type 5	Talc-schist	1.63	0.23	0.06	0.00	0.00	0.00	0.00	0.23	2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09
1279-1b2.D	Sierra Pelona Type 5	Talc-schist	0.00	0.78	0.25	0.37	0.29	1.69	2.33	0.00	0.00	0.00	0.10	0.00	0.00	1.54	0.00	0.00	0.00	0.00	0.73	0.16	0.06	0.00	0.70	0.00	0.30	1.30	0.11	0.87
1279-1c.D	Sierra Pelona Type 5	Talc-schist	0.90	0.45	0.28	0.15	0.18	0.00	0.00	0.00	0.24	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.14	0.06	0.00
1279-1c2.D	Sierra Pelona Type 5	Talc-schist	0.43	0.00	0.59	0.00	0.00	1.61	3.23	0.00	0.96	0.00	0.21	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.32	0.97	0.35	0.00	0.00	0.00	0.04	0.00	0.00	0.43
1279-2a.D	Sierra Pelona Type 5	Talc-schist	1.08	1.19	0.21	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.36	0.00	0.00	0.00	0.10	0.00	6.00	0.17	0.06
1279-2a2.D	Sierra Pelona Type 5	Talc-schist	0.00	0.00	0.25	0.00	0.19	2.32	0.50	0.00	0.47	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.31	0.11	0.19	0.19	0.00	0.00	0.00	0.28	0.00	0.00
1279-2b.D	Sierra Pelona Type 5	Talc-schist	1.72	1.23	0.00	0.00	0.19	0.00	0.00	0.00	5.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.04	0.51	0.00	7.36	0.00	0.18
1279-2b2.D	Sierra Pelona Type 5	Talc-schist	0.12	0.00	0.28	0.00	0.29	2.15	0.42	0.00	0.66	0.17	0.00	0.00	0.00	0.42	0.67	0.00	0.00	0.00	0.13	0.09	0.35	0.00	0.00	0.00	0.00	19.00	0.18	0.00
1279-3a.D	Sierra Pelona Type 5	Talc-schist	0.11	0.08	0.00	0.00	0.95	0.00	0.00	0.00	1.86	0.00	0.00	0.00	0.45	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.81	0.61	0.00
1279-3a2.D	Sierra Pelona Type 5	Talc-schist	0.18	0.64	0.10	0.51	3.76	0.46	2.74	0.00	0.60	0.00	0.17	0.00	0.00	0.00	0.67	1.14	0.00	0.00	0.00	0.40	0.24	0.00	0.00	0.00	0.54	1.76	0.46	0.36
1279-3b.D	Sierra Pelona Type 5	Talc-schist	1.30	1.92	1.92	0.56	0.00	0.00	27.52	0.00	4.70	0.21	0.54	0.00	0.00	0.00	0.00	0.44	0.00	0.14	0.00	1.72	0.00	0.36	0.00	0.12	0.00	45.88	0.07	0.07
1279-3b2.D	Sierra Pelona Type 5	Talc-schist	0.38	2.54	0.81	0.00	0.44	0.76	0.75	0.16	4.95	0.31	0.73	0.00	0.00	1.11	0.48	0.40	0.00	0.52	0.21	0.00	0.10	0.87	0.00	0.00	0.10	19.27	0.45	0.00
1279-4a.D	Sierra Pelona Type 5	Talc-schist	0.93	0.42	0.24	0.18	0.00	0.00	0.22	0.00	1.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	5.76	0.62	0.00
1279-4a2.D	Sierra Pelona Type 5	Talc-schist	0.42	1.38	0.24	0.55	0.04	0.59	0.00	0.32	2.46	0.00	0.00	0.00	0.00	0.97	0.52	0.00	0.00	1.14	0.00	0.93	0.48	1.69	0.18	0.00	0.19	2.44	0.35	0.00
1279-4b.D	Sierra Pelona Type 5	Talc-schist	0.00	0.05	0.22	0.82	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.38	0.00	0.32	0.00	0.00	0.00	14.37	0.06	0.42
1279-4b2.D	Sierra Pelona Type 5	Talc-schist	0.40	0.00	0.15	0.00	0.00	1.71	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06
1279-5a.D	Sierra Pelona Type 5	Talc-schist	0.07	0.59	0.00	0.00	0.04	0.00	0.00	0.00	2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	1.13	0.30	0.18
1279-5a2.D	Sierra Pelona Type 5	Talc-schist	0.00	1.08	0.00	0.00	0.18	35.53	700.17	0.00	3.21	0.00	0.46	0.00	0.34	0.24	0.13	0.00	0.00	0.00	0.46	1.13	0.55	0.00	0.00	0.00	0.34	1.35	0.49	0.00
1279-5b.D	Sierra Pelona Type 5	Talc-schist	1.42	1.21	0.00	0.00	0.00	1.38	1.68	0.10	2.16	0.00	0.00	0.08	0.49	1.86	0.53	0.00	0.00	0.00	0.05	1.65	0.73	1.25	0.00	0.98	0.21	0.00	0.48	0.84
1279-5b2.D	Sierra Pelona Type 5	Talc-schist	0.00	1.29	2.64	0.00	0.00	1.30	2.60	0.38	0.67	0.00	0.40	0.00	0.00	1.11	0.43	1.49	0.00	0.16	0.00	0.00	0.65	0.00	0.00	0.54	0.04	0.00	0.00	0.00
1279-6a.D	Sierra Pelona Type 5	Talc-schist	1.24	1.41	0.00	0.00	0.00	0.00	2.74	0.30	1.81	0.18	0.11	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	1.94	0.63	0.19	0.09	1.00	0.00	0.00	0.22	0.00
1279-6a2.D	Sierra Pelona Type 5	Talc-schist	47.67	1.49	0.14	0.39	0.03	1.80	24.16	14.20	4.28	0.46	2.35	0.05	0.60	0.21	0.00	1.15	0.03	0.86	0.00	0.54	0.06	0.17	0.00	0.21	0.10	55.29	0.00	5.10
1279-6b.D	Sierra Pelona Type 5	Talc-schist	0.82	0.61	0.13	0.00	0.00	0.00	1.81	0.62	0.70	0.03	0.10	0.22	1.01	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	2.40	0.33	0.58
1279-6b2.D	Sierra Pelona Type 5	Talc-schist	0.00	0.57	0.16	0.15	0.00	0.46	1.07	0.34	0.45	0.00	0.29	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.08	0.21	0.22	0.98	0.48	0.47	0.00	3.19	0.42	0.00
1279-7a.D	Sierra Pelona Type 5	Talc-schist	0.54	0.74	0.14	5.27	0.00	0.24	1.86	0.56	2.16	0.92	0.49	0.00	0.00	0.60	0.00	1.86	0.00	0.72	0.11	0.53	0.44	1.59	0.00	0.69	0.29	4.66	0.20	0.33
1279-7a2.D	Sierra Pelona Type 5	Talc-schist	0.39	0.38	0.77	73.78	3.52	0.00	0.15	0.14	1.63	0.46	0.23	0.00	1.03	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	1.42	0.00	12.19	0.28	0.28
1279-7b.D	Sierra Pelona Type 5	Talc-schist	1.55	0.93	0.00	16.18	2.06	0.00	0.49	0.00	6.23	0.00	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.17	1.33	0.35	13.41	0.45	0.44
1279-7b2.D	Sierra Pelona Type 5	Talc-schist	0.39	0.94	0.39	29.41	2.78	0.68	1.37	0.54	1.92	0.07	0.10	0.00	0.34	1.94	0.76	0.87	0.00	0.00	0.00	0.00	0.00	0.98	0.13	0.00	0.00	12.69	0.83	0.00
1279-8a.D	Sierra Pelona Type 5	Talc-schist	0.97	2.47	0.00	1.33	0.00	0.00	0.00	0.00	6.40	0.05	0.00	0.00	0.97	0.00	0.18	0.00	0.00	1.01	0.56	2.22	0.72	0.00	0.00	0.97	0.00	4.99	1.42	0.46
1279-8a2.D	Sierra Pelona Type 5	Talc-schist	1.39	1.41	0.00	0.00	0.00	0.00	0.84	0.12	1.71	0.00	0.00	0.28	0.00	0.00	0.00	5.12	0.00	0.00	0.00	1.22	0.12	3.21	0.00	2.67	0.00	0.00	1.00	0.33
1279-8b.D	Sierra Pelona Type 5	Talc-schist	0.84	4.88	0.10	0.39	0.00	0.59	2.16	0.00	5.54	0.00	0.29	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.76	0.00	0.00	0.14	12.31	0.36	0.37
1279-8b2.D	Sierra Pelona Type 5	Talc-schist	1.33	0.60	0.00	0.00	0.05	2.33	2.13	0.00	1.32	0.25	0.21	0.00	0.44	0.00	0.81	2.79	0.00	0.00	0.00	0.78	0.18	0.75	0.28	0.00	0.05	2.70	0.18	0.00
1279-9a.D	Sierra Pelona Type 5	Talc-schist	0.42	1.36	0.42	0.00	0.45	0.90	0.94	0.00	3.10	0.00	0.06	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.58	0.41	0.33	0.00	1.28	0.13	0.00	0.00	1.09
1279-9a2.D	Sierra Pelona Type 5	Talc-schist	0.00	1.13	0.40	0.00	0.19	1.57	3.92	0.46	1.52	0.00	0.39	0.00	0.00	1.25	0.00	1.50	0.00	0.00	0.00	0.00	0.25	3.02	0.37	0.00	0.06	2.73	0.47	0.00
1279-9b.D	Sierra Pelona Type 5	Talc-schist	1.71	0.59	0.00	0.13	0.12	0.00	4.28	0.00	9.16	0.00	0.05	0.34	1.03	0.53	0.00	0.00	0.00	0.00	0.00	2.04	0.11	1.84	0.00	1.03	0.00	2.85	6.50	0.10
1279-9b2.D	Sierra Pelona Type 5	Talc-schist	0.62	1.81	0.00	0.00	0.00	2.55	0.00	0.86	2.12	0.31	0.36	0.00	0.00	2.33	0.81	0.00	0.05	0.00	0.00	0.33	0.23	1.56	0.00	0.00	0.06	2.53	0.44	0.00
1279-10a.D	Sierra Pelona Type 5	Talc-schist	0.68	1.62	0.00	0.00	0.00	0.24	0.00	0.00	2.13	0.03	0.00	0.33	0.00	0.00	0.00	1.43	0.00	0.00	0.00	0.00	0.22	0.87	0.00	0.23	0.00	0.00	0.07	0.45
1279-10aa2.D	Sierra Pelona Type 5	Talc-schist	0.53	0.39	0.11	0.00	0.34	0.93	0.21	0.09	1.41	0.09	0.31	0.00	0.00	2.32	0.00	0.00	0.00	0.00	0.72	1.11	0.20	0.27	0.00	1.28	0.25	1.44	0.38	0.00
1279-10b.D	Sierra Pelona Type 5	Talc-schist	0.00	1.03	0.00	0.00	0.00	0.70	2.50	0.07	9.44	0.20	0.00	0.00	0.00	1.38	0.00	0.00	0.00	0.00	0.00	1.04	0.43	0.00	0.00	2.73	0.00	29.60	0.26	0.66
1279-10b2.D	Sierra Pelona Type 5	Talc-schist	1.66	0.37	0.85	0.00	0.00	2.35	4.61	1.09	6.28	0.00	0.40	0.00	0.00	0.72	1.04	7.30	0.00	3.13	0.54	0.00	0.00	1.21	1.24	0.77	0.00	5.42	0.00	0.29
1279-11a.D	Sierra Pelona Type 5	Talc-schist	0.31	0.00	0.00	0.00	0.00	1.33	1.94	0.00	0.70	0.10	0.00	0.03	0.72	0.00	0.00	0.00	0.17	1.34	0.26	0.32	0.75	0.19	0.09	1.66	0.00	2.12	0.00	0.90
1279-11a2.D	Sierra Pelona Type 5	Talc-schist	0.46	0.19	0.04	0.00	0.00	0.24	2.38	0.00	0.00	0.34	0.27	0.00	0.00	0.00	0.00	1.55	0.00	1.62	0.00	0.00	0.53	1.04	0.00	0.00	0.00	6.15	0.29	0.45
1279-11b.D	Sierra Pelona Type 5	Talc-schist	1.36	0.00	0.44	0.00	0.00	1.32	2.25	0.18	1.16	0.24	0.17	0.00	0.00	0.47	0.00	0.00	0.00	0.44	0.41	0.00	0.07	0.19	0.00	1.41	0.00	6.30	0.40	0.34

Table 1b. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 5 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1279-11b2.D	Sierra Pelona Type 5	Talc-schist	0.00	1.26	0.39	0.08	0.00	0.53	0.86	0.15	0.00	0.45	0.67	0.10	1.82	0.14	1.46	1.20	0.00	0.80	0.13	0.00	0.08	0.23	0.30	0.43	0.00	16.44	0.31	0.00
1279-12a.D	Sierra Pelona Type 5	Talc-schist	0.00	0.47	0.00	0.00	0.00	1.58	0.56	0.28	2.10	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.36	0.28	0.26	0.16	0.31	1.24	0.00	0.00	0.46	0.00
1279-12a2.D	Sierra Pelona Type 5	Talc-schist	0.00	1.11	0.11	0.07	0.00	1.50	0.42	0.25	1.36	0.06	0.00	0.00	0.49	0.00	0.00	1.76	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.00	0.00	1.49	0.13	0.00
1279-12b.D	Sierra Pelona Type 5	Talc-schist	0.00	0.30	0.00	0.00	0.00	1.03	2.14	0.37	1.98	0.00	0.35	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.04	0.71	0.42	1.59	0.08	1.12	0.00	1.00	0.25	0.06
1279-12b2.D	Sierra Pelona Type 5	Talc-schist	0.21	0.00	0.00	0.00	0.00	2.59	1.52	0.00	2.14	0.00	0.15	0.09	0.00	0.13	0.14	0.71	0.00	0.16	0.00	0.00	0.00	0.00	0.10	0.71	0.00	1.19	0.00	0.00

Table 2a. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 16 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1279-13a.D	Sierra Pelona Type 16	Talc-schist	0.00	202409.36	2263.86	281587.52	319.91	188.50	0.00	0.02	15.75	641.95	171.66	37586.49	1079.10	53.85	17.40	97.32	0.00
1279-13a2.D	Sierra Pelona Type 16	Talc-schist	0.00	189684.22	25783.46	251559.70	210.93	967.43	16.06	57.52	90.77	5128.74	379.84	60470.94	1066.54	56.53	66.33	134.37	13.76
1279-13b.D	Sierra Pelona Type 16	Talc-schist	3922.27	188228.71	3079.61	283252.89	1200.67	2678.46	0.00	0.03	16.10	839.47	175.37	41762.19	788.20	40.52	1753.87	68.12	0.00
1279-13b2.D	Sierra Pelona Type 16	Talc-schist	0.00	192306.64	3833.90	280735.90	389.21	289.38	0.00	7.41	21.02	1032.79	223.40	47990.07	828.26	41.76	34.73	175.54	11.53
1279-13c.D	Sierra Pelona Type 16	Talc-schist	268.05	199478.73	505.01	288075.22	86.81	159.96	0.00	27.60	7.13	156.53	151.83	33601.86	1546.93	60.92	14.06	138.00	5.08
1279-13c2.D	Sierra Pelona Type 16	Talc-schist	0.00	193191.20	469.98	294603.53	136.78	0.00	6.00	39.63	2.83	105.03	154.59	31511.36	1606.16	55.25	11.67	143.54	15.41
1279-14a.D	Sierra Pelona Type 16	Talc-schist	0.00	195386.76	25946.66	241165.85	257.36	932.83	7.53	0.00	90.39	5481.92	362.81	68704.85	1193.75	80.99	80.18	164.12	51.14
1279-14a2.D	Sierra Pelona Type 16	Talc-schist	0.00	176372.71	35864.91	221459.65	113.14	1849.59	22.24	61.28	205.47	7593.00	532.54	102512.09	2203.32	177.48	141.57	244.63	177.82
1279-14b.D	Sierra Pelona Type 16	Talc-schist	854.04	193007.00	819.87	284303.41	563.55	103.41	5.22	66.99	11.07	306.74	202.37	45325.48	1314.16	48.49	36.57	145.99	29.61
1279-14b2.D	Sierra Pelona Type 16	Talc-schist	0.00	177654.06	2769.75	292130.84	300.53	185.16	7.18	43.49	23.96	692.92	210.62	49343.77	1319.59	51.30	47.41	126.66	56.86
1279-14c.D	Sierra Pelona Type 16	Talc-schist	0.00	185860.67	31479.49	243862.70	169.24	1516.16	13.18	89.14	93.86	5429.57	390.07	67721.64	1282.94	72.37	90.65	198.45	33.31
1279-14c2.D	Sierra Pelona Type 16	Talc-schist	74.85	190286.10	32613.29	239956.15	181.81	1667.78	16.67	53.41	89.85	5049.90	429.03	67104.81	1256.63	63.38	92.76	187.23	37.37
1279-15a3.D	Sierra Pelona Type 16	Talc-schist	0.00	194802.24	4123.02	270962.17	72.75	33.24	2.36	0.00	33.21	871.92	222.86	59930.67	989.84	48.77	52.94	61.14	34.17
1279-15a4.D	Sierra Pelona Type 16	Talc-schist	0.00	189449.89	6630.52	264505.09	409.87	203.13	3.35	0.00	49.21	1799.79	266.49	71040.62	932.92	58.74	56.00	57.14	52.78
1279-15b.D	Sierra Pelona Type 16	Talc-schist	0.00	175924.79	6419.52	277957.97	958.65	1624.16	11.04	26.82	52.88	1622.22	222.87	64420.23	1629.68	56.93	53.29	204.96	22.03
1279-15b2.D	Sierra Pelona Type 16	Talc-schist	0.00	178663.13	5283.00	280033.43	712.37	1391.42	12.86	85.35	43.33	1169.74	265.01	60392.24	1680.55	72.32	63.00	153.17	35.18
1279-15c.D	Sierra Pelona Type 16	Talc-schist	0.00	166598.67	9241.19	283633.81	1126.04	1552.84	10.29	44.65	61.31	2128.23	280.60	62484.34	1414.76	71.94	66.76	186.55	37.90
1279-15c2.D	Sierra Pelona Type 16	Talc-schist	0.00	184136.93	5163.35	283834.05	275.79	809.21	5.76	21.87	32.50	1206.91	228.55	49918.37	1389.57	53.33	12.82	149.06	15.11
1279-16a.D	Sierra Pelona Type 16	Talc-schist	0.00	188452.39	11875.33	270679.97	438.91	398.07	10.07	104.43	47.88	2795.14	264.50	53904.44	1717.28	58.81	63.02	173.54	20.35
1279-16a2.D	Sierra Pelona Type 16	Talc-schist	0.00	187626.79	4132.37	286614.56	180.55	13.19	5.29	17.08	17.77	912.21	179.36	43555.42	1428.55	59.64	43.98	141.02	28.42
1279-16b.D	Sierra Pelona Type 16	Talc-schist	187.67	188227.64	5285.06	282121.37	279.03	499.96	4.97	50.96	29.72	1345.41	232.22	47648.91	1292.87	54.22	64.49	113.80	27.82
1279-16b2.D	Sierra Pelona Type 16	Talc-schist	0.00	184397.37	1379.96	293700.95	183.84	0.00	6.60	31.76	10.11	434.91	198.29	41530.61	1453.52	59.90	38.25	148.59	8.38
1279-16c.D	Sierra Pelona Type 16	Talc-schist	1483.53	189544.28	3954.67	287851.41	210.25	246.08	4.89	22.05	25.89	876.55	240.67	38556.88	1644.08	67.86	32.49	192.03	8.24
1279-16c2.D	Sierra Pelona Type 16	Talc-schist	0.00	188240.12	5955.47	285056.47	329.95	60.71	14.13	21.98	35.34	1287.93	276.26	42680.01	1624.97	59.69	50.39	124.59	1.82
1279-16d.D	Sierra Pelona Type 16	Talc-schist	627.35	180604.63	11349.65	272410.60	512.65	273.44	5.44	24.50	51.68	2562.37	241.77	61047.27	1528.15	56.32	110.00	161.22	45.76
1279-16d2.D	Sierra Pelona Type 16	Talc-schist	0.00	183740.59	18716.73	262011.22	142.28	172.72	16.98	65.30	76.98	3622.84	384.04	63218.77	1221.81	58.68	66.06	182.43	43.23
1279-17a.D	Sierra Pelona Type 16	Talc-schist	1194.71	186161.62	5812.62	289151.22	565.12	669.02	0.00	79.26	15.15	704.66	172.82	38340.92	1132.85	55.86	12.78	144.38	5.23
1279-17a2.D	Sierra Pelona Type 16	Talc-schist	0.00	194738.95	17694.92	264192.27	357.06	911.94	4.58	45.53	39.10	2253.87	216.15	49201.80	1448.69	52.64	36.29	150.87	0.00
1279-17b.D	Sierra Pelona Type 16	Talc-schist	1093.13	189534.51	13439.25	268477.26	469.38	945.38	0.00	48.50	36.57	1919.35	196.28	53418.73	1645.18	66.16	70.20	151.28	14.10
1279-17b2.D	Sierra Pelona Type 16	Talc-schist	0.00	219836.00	9845.31	259332.09	0.00	359.31	6.26	28.28	44.63	1291.40	187.79	39802.82	1210.40	52.57	31.67	201.53	0.00
1279-17c.D	Sierra Pelona Type 16	Talc-schist	0.00	182883.21	5776.48	288920.31	172.67	229.85	6.23	0.00	21.96	1049.07	169.37	43859.69	1417.08	73.16	49.29	132.63	11.52
1279-17c2.D	Sierra Pelona Type 16	Talc-schist	0.00	193225.99	38419.59	237411.81	229.01	1127.72	14.44	19.98	85.26	5360.44	323.75	60162.36	1463.69	78.65	60.39	145.67	0.00
1279-17c3.D	Sierra Pelona Type 16	Talc-schist	30934.24	178286.62	16968.92	234660.15	0.00	0.00	9.34	0.00	44.65	2545.15	218.41	85070.88	1596.73	58.62	28.68	139.45	1.19
1279-18a.D	Sierra Pelona Type 16	Talc-schist	0.00	194016.64	9614.72	267990.63	0.00	1731.39	3.82	52.03	24.33	2042.68	242.02	54825.18	1218.76	64.81	33.12	175.57	0.00
1279-18a2.D	Sierra Pelona Type 16	Talc-schist	0.00	170854.23	17204.58	277425.74	637.46	545.83	8.52	12.82	49.05	3612.23	334.88	56646.49	1100.02	61.45	40.71	130.73	0.00
1279-18a3.D	Sierra Pelona Type 16	Talc-schist	0.00	171632.70	11944.44	272204.32	3581.34	447.52	10.62	37.54	91.25	3507.85	245.70	66345.32	832.88	75.16	2409.64	74.48	61.47
1279-18a4.D	Sierra Pelona Type 16	Talc-schist	0.00	171149.56	22589.78	252473.13	1220.55	2240.78	32.70	0.00	115.29	5179.61	354.45	82671.39	1056.12	53.46	79.40	67.75	31.50
1279-18b.D	Sierra Pelona Type 16	Talc-schist	0.00	189598.39	32945.79	236949.33	0.00	302.20	5.30	62.56	103.27	6518.63	445.15	71868.99	1469.36	60.48	69.08	179.20	6.24
1279-18b2.D	Sierra Pelona Type 16	Talc-schist	0.00	183800.72	10541.17	281054.74	547.08	176.93	4.12	5.08	38.32	1820.20	257.63	47026.91	1495.25	50.89	37.94	117.20	0.00
1279-18c.D	Sierra Pelona Type 16	Talc-schist	0.00	188643.51	14795.47	265238.04	0.00	16.36	4.24	40.00	57.53	3158.24	289.49	58817.92	1299.61	55.47	66.03	112.42	17.28
1279-18c2.D	Sierra Pelona Type 16	Talc-schist	0.00	185349.50	14529.33	271824.37	64.83	96.64	6.06	46.43	43.60	2784.92	304.08	53557.77	1103.71	46.47	41.32	147.45	10.37
1279-19a.D	Sierra Pelona Type 16	Talc-schist	0.00	193243.97	12902.81	268603.62	37.46	92.58	7.73	65.18	51.36	2108.99	259.70	51593.13	1536.81	86.75	10.40	209.75	64.05
1279-19a2.D	Sierra Pelona Type 16	Talc-schist	0.00	190637.87	13449.93	275833.13	37.35	42.55	5.14	47.64	41.24	2096.54	191.76	43480.89	1416.92	55.83	16.41	153.26	10.64
1279-19a3.D	Sierra Pelona Type 16	Talc-schist	24277.13	182353.09	16937.34	240320.11	0.00	0.00	4.42	41.81	31.24	2935.11	208.13	77802.52	1608.81	51.86	9.26	152.78	9.55
1279-19b.D	Sierra Pelona Type 16	Talc-schist	9433.89	241902.65	30787.37	204368.09	0.00	565.55	10.72	24.92	89.83	5514.89	279.51	55164.55	1254.08	57.38	21.56	130.93	56.02

Table 2a. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 16 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1279-19b2.D	Sierra Pelona Type 16	Talc-schist	0.00	192174.96	21188.70	261004.74	10.23	310.30	11.60	3.21	58.62	3549.16	246.06	51783.82	1513.67	64.75	16.77	177.31	20.51
1279-19b3.D	Sierra Pelona Type 16	Talc-schist	22870.61	198940.19	9838.89	239911.94	0.00	0.00	8.10	43.33	25.81	1743.39	186.75	71131.18	1624.16	50.10	9.59	147.56	5.33
1279-19c.D	Sierra Pelona Type 16	Talc-schist	0.00	189327.61	13807.73	274178.08	0.00	125.55	3.92	14.55	36.64	3036.03	186.77	46018.90	1476.18	54.81	9.26	124.95	20.66
1279-19c2.D	Sierra Pelona Type 16	Talc-schist	0.00	192705.64	27926.87	251445.60	133.56	394.48	6.97	11.33	75.82	5318.04	249.53	54535.24	1561.57	65.61	8.46	176.26	5.12
1279-19c3.D	Sierra Pelona Type 16	Talc-schist	24560.84	183932.17	19431.43	226611.98	12757.45	0.00	12.04	22.43	36.95	3619.45	235.04	81583.09	1491.21	54.85	9.11	139.51	0.79
1279-20a.D	Sierra Pelona Type 16	Talc-schist	0.00	181129.45	12843.91	269182.35	27.28	242.75	9.33	48.19	49.60	2533.93	264.32	64549.61	1237.25	53.86	99.96	177.22	47.85
1279-20a2.D	Sierra Pelona Type 16	Talc-schist	0.00	181226.45	17309.08	265946.54	140.13	517.86	5.93	19.14	65.82	2923.01	303.10	62589.30	1260.37	52.01	104.26	170.31	31.84
1279-20a3.D	Sierra Pelona Type 16	Talc-schist	29406.29	187729.01	26837.26	203122.59	0.00	0.00	11.80	37.56	71.57	4509.32	326.94	107778.38	1230.14	38.29	90.54	175.50	18.48
1279-20b.D	Sierra Pelona Type 16	Talc-schist	0.00	186092.36	9101.18	273556.67	100.92	260.28	6.55	32.88	46.09	2312.63	251.55	57591.52	1111.71	66.30	84.57	116.61	11.31
1279-20b2.D	Sierra Pelona Type 16	Talc-schist	23729.71	184424.71	16635.66	217399.74	0.00	0.00	13.24	0.00	62.47	3606.95	278.43	109980.59	1258.50	45.55	141.63	195.47	31.88
1279-20c.D	Sierra Pelona Type 16	Talc-schist	0.00	184079.58	7083.74	274077.52	0.00	240.14	1.84	0.00	37.20	1609.75	226.29	62555.26	1270.04	51.90	90.85	110.32	39.80
1279-20c2.D	Sierra Pelona Type 16	Talc-schist	29063.68	186470.12	11078.40	238221.38	0.00	0.00	11.53	12.23	28.62	2189.90	239.58	80570.92	1175.50	37.42	50.56	110.70	0.00

Table 2b. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 16 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1279-13a.D	Sierra Pelona Type 16	Talc-schist	0.00	0.25	0.10	0.00	0.00	0.97	0.74	0.00	1.69	0.00	0.58	0.00	1.64	0.00	0.00	1.40	0.00	0.00	0.13	1.11	0.60	0.21	0.30	2.43	0.00	0.00	0.30	0.24
1279-13a2.D	Sierra Pelona Type 16	Talc-schist	0.72	4.10	0.05	0.09	0.27	0.30	0.58	0.51	0.00	0.42	0.83	0.04	0.00	0.00	0.00	4.05	0.00	0.18	0.05	0.27	0.00	0.00	0.00	0.00	0.00	2.73	0.00	0.55
1279-13b.D	Sierra Pelona Type 16	Talc-schist	9.20	6.98	0.00	0.00	0.00	13.61	429.15	5.63	4.17	0.28	0.94	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.30	2.62	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.34
1279-13b2.D	Sierra Pelona Type 16	Talc-schist	0.40	1.37	0.00	0.47	0.00	0.00	0.00	0.00	10.07	1.82	0.70	0.79	0.00	0.00	1.91	4.07	0.00	0.00	0.41	0.00	0.00	4.67	0.19	0.81	0.00	6.86	1.17	0.92
1279-13c.D	Sierra Pelona Type 16	Talc-schist	0.00	0.00	0.00	0.00	0.00	0.00	2.10	0.00	6.54	0.49	0.13	0.00	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.68	0.00	0.00	2.75	0.00	0.00	0.69	1.34
1279-13c2.D	Sierra Pelona Type 16	Talc-schist	0.31	0.30	0.00	0.12	0.00	1.14	0.00	0.00	1.20	0.21	0.32	0.23	0.00	1.36	0.21	2.42	0.63	0.00	0.68	0.00	0.00	0.00	0.29	1.03	0.00	0.87	0.67	0.00
1279-14a.D	Sierra Pelona Type 16	Talc-schist	1.04	7.41	0.31	0.00	0.00	0.41	5.13	0.12	12.40	0.20	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	1.83	0.34	1.06	0.00	1.34	0.08	0.60	0.75	0.23
1279-14a2.D	Sierra Pelona Type 16	Talc-schist	1.26	11.36	2.21	0.00	0.17	0.82	9.80	0.79	49.23	0.62	3.99	0.63	0.00	2.38	0.00	3.24	0.00	0.00	0.94	0.00	0.00	0.23	0.00	1.93	0.00	6.30	0.32	1.01
1279-14b.D	Sierra Pelona Type 16	Talc-schist	0.00	1.35	0.68	0.00	0.50	1.07	4.88	0.04	11.23	1.00	0.64	0.00	1.80	1.50	0.00	0.00	0.00	0.19	0.52	0.95	0.00	1.65	0.11	0.89	0.00	1.33	0.33	1.13
1279-14b2.D	Sierra Pelona Type 16	Talc-schist	0.21	2.62	1.00	0.08	0.00	0.00	3.97	0.00	32.05	0.45	0.22	0.23	1.42	0.00	0.00	3.13	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1279-14c.D	Sierra Pelona Type 16	Talc-schist	0.00	6.71	0.62	0.33	0.00	0.63	3.37	0.60	7.46	0.26	1.22	0.00	2.60	0.00	0.00	1.86	0.00	0.93	0.05	0.28	0.34	0.00	0.29	2.64	0.48	2.34	0.09	0.00
1279-14c2.D	Sierra Pelona Type 16	Talc-schist	0.76	6.43	0.54	2.04	0.30	0.00	5.89	0.00	51.99	0.72	1.29	0.35	0.00	0.43	0.00	3.58	0.04	0.00	0.55	0.91	0.00	0.00	0.00	0.00	0.00	0.66	0.24	0.43
1279-15a3.D	Sierra Pelona Type 16	Talc-schist	0.19	3.06	0.29	0.00	0.00	2.61	2.62	0.35	10.58	1.19	1.74	0.25	0.00	0.00	0.24	3.49	0.13	0.37	0.05	0.00	0.29	0.00	0.00	0.00	0.00	1.84	0.00	0.00
1279-15a4.D	Sierra Pelona Type 16	Talc-schist	0.00	1.34	1.95	0.47	0.00	1.68	1.33	0.10	12.54	1.39	1.78	0.49	0.00	3.15	0.00	0.00	0.20	0.00	0.00	1.17	0.44	0.83	0.00	0.00	0.06	3.24	1.02	0.00
1279-15b.D	Sierra Pelona Type 16	Talc-schist	2.74	12.29	1.37	0.69	0.00	0.00	2.69	0.00	68.74	0.79	1.65	0.44	1.92	1.23	0.00	2.16	0.00	0.00	0.04	1.02	0.39	0.68	0.00	0.98	0.43	3.32	0.08	0.98
1279-15b2.D	Sierra Pelona Type 16	Talc-schist	1.37	13.18	1.63	0.72	0.00	0.53	3.61	0.41	83.51	1.45	2.26	0.50	1.55	0.65	0.00	3.66	0.00	2.67	0.00	0.00	0.44	0.00	0.00	0.27	0.00	1.79	0.07	1.01
1279-15c.D	Sierra Pelona Type 16	Talc-schist	2.59	13.84	0.88	0.00	0.00	0.00	1.76	0.00	92.39	1.38	1.42	0.03	1.45	0.52	0.00	0.91	0.06	1.14	0.17	0.58	0.17	0.00	0.59	1.38	0.39	0.00	0.06	0.25
1279-15c2.D	Sierra Pelona Type 16	Talc-schist	0.23	7.01	0.62	0.07	0.00	0.45	1.59	0.22	63.33	0.49	0.55	0.00	0.00	1.42	0.00	3.44	0.00	2.25	0.55	0.00	0.44	0.00	0.00	1.35	0.00	6.02	0.06	0.98
1279-16a.D	Sierra Pelona Type 16	Talc-schist	0.14	1.94	0.73	0.00	0.08	0.48	2.27	0.00	14.41	0.00	0.40	0.20	1.62	0.81	0.00	0.61	0.20	0.00	0.34	0.65	0.00	0.00	0.00	1.07	0.00	0.00	0.07	0.00
1279-16a2.D	Sierra Pelona Type 16	Talc-schist	0.13	23.29	0.15	0.37	0.25	0.00	2.69	0.65	930.32	0.27	0.40	0.23	0.71	0.84	0.26	0.99	0.00	1.30	0.00	0.00	0.11	0.78	0.00	0.00	0.04	0.00	0.00	0.36
1279-16b.D	Sierra Pelona Type 16	Talc-schist	0.25	2.11	0.26	0.22	0.06	0.00	0.92	0.00	1.68	0.58	0.80	0.00	1.71	0.00	0.00	0.00	0.17	0.12	0.62	0.00	0.00	0.50	0.34	1.12	0.19	0.22	0.06	0.60
1279-16b2.D	Sierra Pelona Type 16	Talc-schist	0.64	1.77	1.08	0.00	0.03	0.00	2.81	0.09	1.68	0.28	0.79	0.10	0.30	0.91	0.00	4.86	0.62	3.30	0.00	0.82	0.22	0.00	0.15	0.00	0.03	0.00	0.00	0.54
1279-16c.D	Sierra Pelona Type 16	Talc-schist	0.00	1.40	0.29	0.00	0.22	0.70	0.00	0.31	3.64	0.00	0.00	0.00	0.88	1.24	0.00	0.59	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.14	1.24	0.06	0.00
1279-16c2.D	Sierra Pelona Type 16	Talc-schist	0.12	1.84	0.34	0.07	0.23	0.00	1.89	0.00	0.70	0.06	0.19	0.00	0.00	0.99	0.00	2.00	0.00	1.20	0.21	0.00	0.31	0.36	0.00	0.23	0.00	0.00	0.31	0.59
1279-16d.D	Sierra Pelona Type 16	Talc-schist	0.00	1.02	1.53	0.45	0.00	1.04	2.13	0.26	5.18	0.29	1.58	0.03	1.36	0.87	0.00	0.00	0.00	1.37	0.12	0.00	0.00	1.04	0.00	0.13	0.00	0.00	0.00	0.00
1279-16d2.D	Sierra Pelona Type 16	Talc-schist	0.51	2.39	1.13	0.00	0.40	0.24	2.39	0.00	6.15	0.33	1.35	0.52	0.36	0.84	0.00	0.60	0.00	0.44	0.00	0.54	0.26	0.00	0.00	0.00	0.00	0.00	0.07	0.07
1279-17a.D	Sierra Pelona Type 16	Talc-schist	0.00	5.17	0.00	0.00	0.23	0.74	0.47	0.11	20.81	0.00	1.70	0.32	2.78	0.00	0.00	0.21	0.14	1.31	0.00	0.00	0.00	0.00	0.00	0.61	0.07	0.00	0.00	0.00
1279-17a2.D	Sierra Pelona Type 16	Talc-schist	0.77	1.75	0.00	0.62	0.00	1.48	2.87	0.00	5.55	0.00	1.06	0.35	0.00	0.00	0.93	4.08	0.00	0.53	0.37	1.96	0.50	0.94	0.00	0.00	0.05	0.00	0.00	0.61
1279-17b.D	Sierra Pelona Type 16	Talc-schist	0.00	2.78	0.66	0.70	0.36	0.57	2.70	0.37	12.82	0.08	1.97	0.00	1.07	0.00	0.00	0.00	0.39	0.84	0.04	0.26	0.22	0.00	0.00	0.98	0.26	0.00	0.39	0.00
1279-17b2.D	Sierra Pelona Type 16	Talc-schist	1.20	1.92	0.18	0.44	0.30	0.58	2.06	0.00	6.15	0.00	1.19	0.54	0.00	1.56	0.00	1.17	0.00	1.20	0.18	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00
1279-17c.D	Sierra Pelona Type 16	Talc-schist	1.04	1.12	0.83	0.10	0.05	0.15	0.00	0.04	11.12	0.76	1.48	0.00	0.00	0.87	0.63	2.11	0.00	2.44	0.00	0.00	0.51	0.00	0.00	0.00	0.23	0.00	0.26	0.17
1279-17c2.D	Sierra Pelona Type 16	Talc-schist	0.15	6.04	1.05	0.60	0.72	0.00	3.88	0.00	21.63	0.16	0.86	0.13	0.00	0.42	0.00	1.62	0.00	0.00	0.44	0.88	0.04	0.00	0.00	0.00	0.00	0.00	0.08	0.25
1279-17c3.D	Sierra Pelona Type 16	Talc-schist	1.34	3.43	1.69	0.97	0.36	0.00	1.28	0.96	20.48	1.25	1.24	0.42	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.09	0.80
1279-18a.D	Sierra Pelona Type 16	Talc-schist	0.00	1.91	1.27	0.00	0.70	0.00	0.00	0.00	10.41	0.00	1.26	0.00	0.00	1.78	0.00	0.00	0.00	1.07	2.36	0.00	0.43	3.65	0.00	0.00	0.14	103.75	0.00	0.00
1279-18a2.D	Sierra Pelona Type 16	Talc-schist	2.37	4.02	0.56	1.39	0.41	8.24	11.29	0.00	11.49	0.00	1.26	0.00	0.00	5.85	0.96	2.24	0.00	3.81	0.00	2.02	0.00	0.00	0.00	0.92	0.00	2.06	0.00	0.81
1279-18a3.D	Sierra Pelona Type 16	Talc-schist	2.26	9.53	2.03	0.48	1.45	4.69	6.72	7.07	35.20	1.00	2.94	0.16	0.00	1.96	0.22	0.00	0.43	0.00	0.49	0.00	0.26	0.00	0.00	0.00	0.00	18.17	0.82	7.46
1279-18a4.D	Sierra Pelona Type 16	Talc-schist	3.77	17.29	1.82	0.39	0.00	1.94	4.79	0.66	61.54	0.51	1.95	0.34	0.00	0.58	0.00	0.00	0.17	0.17	0.00	0.00	0.54	0.69	0.00	0.00	0.24	0.00	0.20	0.00
1279-18b.D	Sierra Pelona Type 16	Talc-schist	0.29	4.55	1.32	0.09	0.50	1.16	1.17	27.67	16.67	0.07	1.19	0.00	0.00	0.74	0.54	0.00	0.00	0.00	0.16	0.34	0.68	0.00	0.00	0.00	0.52	6.98	0.36	0.00
1279-18b2.D	Sierra Pelona Type 16	Talc-schist	0.94	3.39	0.56	0.55	0.27	1.45	7.77	0.00	10.92	0.00	1.10	0.43	0.00	1.25	0.00	2.66	0.00	0.00	0.00	0.00	0.17	0.58	0.00	0.00	0.28	76.77	0.00	0.00
1279-18c.D	Sierra Pelona Type 16	Talc-schist	0.41	1.56	1.38	0.40	0.32	0.59	0.77	0.00	8.00	0.40	1.10	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.18	1.80	0.34	0.13
1279-18c2.D	Sierra Pelona Type 16	Talc-schist	0.40	0.63	0.63	0.00	0.00	0.51	1.49	0.00	3.20	0.14	1.19	0.00	0.37	0.13	1.07	0.62	0.00	0.45	0.00	0.34	0.04	0.00	0.00	1.03	0.12	0.00	0.07	0.00
1279-19a.D	Sierra Pelona Type 16	Talc-schist	0.00	1.98	0.73	0.00	0.93	0.00	1.22	0.00	20.04	1.04	0.29	0.12	0.00	0.26	0.42	0.00	0.00	0.00	0.17	0.00	0.46	0.21	0.00	0.54	0.46	4.36	0.00	0.00
1279-19a2.D	Sierra Pelona Type 16	Talc-schist	0.14	1.75	0.00	0.08	0.12	3.92	1.53	0.04	3.44	0.00	0.65	0.00	0.00	0.00	0.00	1.06	0.00	1.09	0.16	0.12	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.08
1279-19a3.D	Sierra Pelona Type 16	Talc-schist	0.59	1.00	0.61	0.20	0.00	0.86	0.26	0.49	1.67	0.00	0.67	0.04	0.28	0.59	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.07	0.56	0.00	0.22	0.28	0.60
1279-19b.D	Sierra Pelona Type 16	Talc-schist	3.16	3.13	0.78	0.00	0.09	71.98	0.00	0.47	4.98	0.00	0.26	0.00	0.28	0.18	0.30	0.00	0.00	0.00	0.30	0.08	0.44	0.00	0.00	0.39	0.09	11.36	0.05	0.74
1279-19b2.D	Sierra Pelona Type 16	Talc-schist	0.83	3.19	0.56	0.00	0.17	3.66	1.04	0.00	5.75	0.56	0.32	0.38	0.00	0.00	0.00	0.19	0.00	0.00	0.07	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2b. Calibrated LA-ICP-MS data for CA-LAN-1279 Talc schist Type 16 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1279-19b3.D	Sierra Pelona Type 16	Talc-schist	0.00	0.67	0.86	0.00	0.00	0.30	2.19	0.39	3.14	0.11	0.18	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.90	0.00	0.00	0.21	0.58	0.00	0.00	0.06	0.06
1279-19c.D	Sierra Pelona Type 16	Talc-schist	0.74	1.17	0.27	0.09	0.27	0.91	0.00	0.00	1.62	0.00	0.00	0.00	1.15	0.00	0.41	0.00	0.00	0.00	0.25	0.12	0.20	0.20	0.00	0.53	0.28	0.00	0.00	0.00
1279-19c2.D	Sierra Pelona Type 16	Talc-schist	0.00	0.46	0.00	0.00	0.20	0.27	1.57	0.00	2.03	0.00	0.89	0.19	0.00	0.40	0.00	1.10	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.13	0.00	0.00	0.55
1279-19c3.D	Sierra Pelona Type 16	Talc-schist	0.51	1.26	0.43	0.00	0.00	0.10	3.12	0.29	1.26	0.06	0.13	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06
1279-20a.D	Sierra Pelona Type 16	Talc-schist	0.27	1.83	1.12	0.55	0.00	0.58	0.15	0.00	15.61	0.46	0.38	0.11	0.00	0.22	0.61	0.00	0.00	1.35	0.37	0.10	0.54	0.00	0.00	1.90	0.40	0.25	0.07	0.13
1279-20a2.D	Sierra Pelona Type 16	Talc-schist	0.42	3.39	0.34	0.25	0.04	1.09	2.30	0.04	17.98	0.60	0.53	0.00	0.00	1.74	0.00	2.44	0.04	0.81	0.25	0.36	0.00	1.74	0.49	0.55	0.00	0.00	0.00	0.08
1279-20a3.D	Sierra Pelona Type 16	Talc-schist	0.00	2.64	0.82	0.00	0.00	0.00	2.84	0.39	11.03	0.25	0.09	0.21	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	2.92	0.34	0.00
1279-20b.D	Sierra Pelona Type 16	Talc-schist	0.58	1.14	0.43	0.00	0.34	0.00	1.14	0.00	10.48	0.00	0.61	0.00	0.00	0.72	0.00	0.44	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.25	0.19	0.27	0.00	0.00
1279-20b2.D	Sierra Pelona Type 16	Talc-schist	0.00	2.36	1.40	0.00	0.00	0.11	1.76	0.00	21.25	0.52	0.08	0.00	0.00	0.22	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.23	0.41	0.00	0.00	0.19	0.18
1279-20c.D	Sierra Pelona Type 16	Talc-schist	0.31	0.66	1.09	0.00	0.28	0.13	0.00	0.19	12.16	0.00	0.65	0.00	0.00	1.03	0.00	1.40	0.00	0.00	0.51	0.00	0.87	0.00	0.00	0.00	0.00	0.29	0.00	0.00
1279-20c2.D	Sierra Pelona Type 16	Talc-schist	0.00	0.66	0.21	0.00	0.33	0.11	1.54	0.38	2.24	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.78	0.00	0.00

Table 3a. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 13 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-01a	Sierra Pelona Type 13	Serpentine	72501.88	192475.74	156281.15	72419.00	0.00	0.00	0.00	0.00	81.93	118.98	801.91	91133.71	413.24	54.12	0.00	167.53	11.61
1132-01b	Sierra Pelona Type 13	Serpentine	17321.57	183287.34	113911.49	167876.80	2308.92	1208.50	9.63	97.10	54.55	96.84	548.66	63311.94	251.72	51.07	0.00	85.20	0.00
1132-02a	Sierra Pelona Type 13	Serpentine	42410.87	167088.01	132543.15	139287.13	0.00	0.00	4.02	0.00	54.08	80.41	621.51	80601.58	84.24	64.28	0.00	153.66	12.53
1132-02b	Sierra Pelona Type 13	Serpentine	13981.59	189926.14	110413.09	170143.25	669.17	401.71	9.78	134.50	48.49	54.94	470.16	63084.69	161.73	51.62	3.72	111.24	4.47
1132-03a	Sierra Pelona Type 13	Serpentine	184169.17	203974.52	150581.60	0.00	3526.58	0.00	0.00	0.00	91.79	0.00	704.25	85936.49	112.89	59.63	0.00	187.05	16.34
1132-03b	Sierra Pelona Type 13	Serpentine	14296.79	192861.83	114291.40	159635.68	2515.25	126.09	12.31	101.56	45.11	56.58	497.67	64574.89	138.44	61.13	2.81	4987.57	0.00
1132-04a	Sierra Pelona Type 13	Serpentine	63499.71	163408.05	116558.95	144880.38	0.00	0.00	5.24	0.00	108.09	131.45	569.49	77498.32	375.66	97.02	0.00	156.98	10.88
1132-04b	Sierra Pelona Type 13	Serpentine	14127.77	163320.22	93760.78	206811.54	1478.81	225.81	0.00	181.49	112.63	114.22	388.56	60261.05	264.35	81.27	9.21	52.31	0.00
1132-05a	Sierra Pelona Type 13	Serpentine	60945.12	209792.75	162284.82	57987.19	0.00	0.00	23.70	294.24	54.25	72.65	760.56	95747.85	0.00	73.04	0.00	89.66	49.19
1132-05b	Sierra Pelona Type 13	Serpentine	16296.69	171347.64	104815.74	189594.61	2327.44	248.42	7.70	66.58	35.22	35.02	430.77	59759.74	162.76	61.03	0.00	77.58	0.00
1132-06a	Sierra Pelona Type 13	Serpentine	18437.66	209606.46	149201.78	96149.18	0.00	0.00	0.00	0.00	129.58	52.34	741.76	96279.01	60.60	97.62	0.00	283.81	31.71
1132-06b	Sierra Pelona Type 13	Serpentine	20091.95	193363.22	111761.99	149313.86	0.00	1278.08	1.98	150.46	64.41	82.01	568.08	82351.93	130.85	66.76	0.00	165.52	0.00
1132-07a	Sierra Pelona Type 13	Serpentine	21599.24	199815.98	151851.96	108794.54	0.00	0.00	0.00	885.62	35.49	48.46	689.70	81426.58	143.35	64.22	4.83	99.26	11.73
1132-07b	Sierra Pelona Type 13	Serpentine	12526.39	192721.32	111232.14	160051.46	1317.92	337.14	10.47	52.92	60.11	51.65	521.43	74723.11	117.14	74.25	0.00	139.20	0.00
1132-08a	Sierra Pelona Type 13	Serpentine	54703.69	190352.80	127954.51	116764.56	238.95	0.00	45.75	0.00	75.15	140.77	740.78	80816.57	811.52	50.00	19.48	193.57	23.73
1132-08b	Sierra Pelona Type 13	Serpentine	12525.60	179966.43	105637.61	177312.21	344.38	206.76	1.93	194.95	46.93	177.28	681.77	71319.92	558.59	58.73	0.00	184.12	0.00
1132-09a	Sierra Pelona Type 13	Serpentine	46731.91	142982.26	108163.79	179088.79	2059.92	3388.53	0.00	19.22	105.32	121.66	529.40	72096.30	172.99	67.09	10.96	130.17	0.00
1132-09b	Sierra Pelona Type 13	Serpentine	16945.78	183843.69	99947.92	172514.43	1367.89	3584.19	7.26	201.83	116.88	110.22	441.92	73769.21	150.84	86.45	0.00	100.03	0.00
1132-10a	Sierra Pelona Type 13	Serpentine	48550.46	135164.32	97430.17	157466.89	3980.39	59860.18	16.58	1462.39	86.64	100.79	580.07	67094.63	289.21	74.33	54.11	128.32	5.73
1132-10b	Sierra Pelona Type 13	Serpentine	13377.24	184687.06	101850.66	176234.94	1022.39	1170.38	8.72	18.38	86.20	101.07	439.78	70873.40	287.57	76.00	37.54	124.77	0.00
1132-11a	Sierra Pelona Type 13	Serpentine	13810.04	193281.82	114585.63	152418.57	727.40	0.00	26.52	125.12	102.95	70.28	542.73	80166.99	515.75	88.48	6.19	263.26	0.00
1132-11b	Sierra Pelona Type 13	Serpentine	17384.85	169739.13	95745.13	191699.44	1056.27	2461.30	1.53	154.56	93.50	63.18	441.98	67920.81	290.16	90.34	7.40	75.76	0.00
1132-12a	Sierra Pelona Type 13	Serpentine	4790.50	167699.36	138118.54	149348.63	1586.22	0.00	0.00	0.00	84.23	212.31	874.37	91300.03	70.06	57.90	14.31	140.35	20.52
1132-12c	Sierra Pelona Type 13	Serpentine	27588.65	202513.93	113514.97	142539.38	2752.65	1883.94	0.00	118.33	56.96	59.23	626.32	69717.19	79.50	53.19	13.22	99.01	0.00
1132-12b	Sierra Pelona Type 13	Serpentine	2363.45	186139.31	127058.72	158969.40	503.99	354.88	17.13	525.02	100.84	0.00	791.77	72682.92	36.39	47.04	0.00	115.61	22.40
1132-12b2	Sierra Pelona Type 13	Serpentine	25145.16	177454.16	118029.74	157335.09	1457.31	1309.18	0.00	30.85	63.95	64.87	578.37	74732.64	77.99	47.69	3.93	109.10	0.00
1132-13a	Sierra Pelona Type 13	Serpentine	0.00	200870.76	122284.25	149594.44	836.17	0.00	0.00	74.94	59.18	40.21	655.44	78822.84	181.97	65.45	3.72	140.90	0.00
1132-13a2	Sierra Pelona Type 13	Serpentine	18885.22	189846.36	111838.58	159400.01	1703.38	739.52	0.00	0.00	53.74	77.79	444.47	71840.70	103.23	75.16	1.39	118.66	0.00
1132-13b	Sierra Pelona Type 13	Serpentine	2621.60	130085.13	147800.35	164150.38	52279.98	2314.39	0.00	213.71	73.30	1997.42	412.07	51573.93	127.38	60.47	2968.13	1253.62	6.07
1132-13b2	Sierra Pelona Type 13	Serpentine	23921.91	180057.51	101474.40	175592.22	2044.24	317.74	15.78	0.00	51.73	65.12	400.96	68118.85	74.92	52.03	11.15	102.57	0.00
1132-14a	Sierra Pelona Type 13	Serpentine	0.00	183669.61	128486.16	161175.38	0.00	461.69	11.13	68.12	53.80	5.90	657.50	73332.71	335.55	70.76	0.00	207.59	0.00
1132-14a2	Sierra Pelona Type 13	Serpentine	13522.92	220218.37	115821.19	131648.37	255.34	52.20	0.00	11.70	65.86	16.33	563.32	79617.39	281.56	59.44	3.36	127.77	0.00
1132-14b	Sierra Pelona Type 13	Serpentine	0.00	177078.79	110262.15	184574.58	1534.49	0.00	0.00	48.95	53.78	19.49	629.69	69387.21	213.95	62.40	12.14	161.86	3.48
1132-14b2	Sierra Pelona Type 13	Serpentine	8300.39	199389.41	114299.30	157432.91	215.10	381.30	6.99	85.52	50.45	52.98	508.95	71871.89	156.79	65.54	5.45	111.31	0.00
1132-15a	Sierra Pelona Type 13	Serpentine	2952.87	165350.81	114348.12	189488.38	1629.59	0.00	13.54	339.52	37.53	60.67	612.51	67157.73	75.83	46.26	0.00	149.07	10.73
1132-15a2	Sierra Pelona Type 13	Serpentine	6854.21	205152.94	117959.94	149384.87	358.29	0.00	0.00	80.13	27.81	59.19	593.99	74055.60	92.62	43.06	2.55	104.30	0.00
1132-15b	Sierra Pelona Type 13	Serpentine	4486.05	154913.48	103033.88	211878.83	1625.24	0.00	9.79	233.54	27.46	43.26	545.43	59512.25	127.15	40.12	1.65	71.30	4.74
1132-15b2	Sierra Pelona Type 13	Serpentine	12543.16	191994.21	106868.95	171193.12	209.64	0.00	0.00	132.86	35.81	48.61	506.34	65929.43	64.49	52.06	0.00	97.88	1.76
1132-16a	Sierra Pelona Type 13	Serpentine	16560.35	173254.36	102241.73	183887.76	4642.45	0.00	14.92	203.17	71.45	23.72	540.29	66875.47	66.90	133.09	32.73	200.77	10.84
1132-16a2	Sierra Pelona Type 13	Serpentine	12179.53	198426.34	99823.61	170335.51	0.00	35.33	17.49	150.60	86.67	27.21	482.20	69650.72	105.24	62.24	3.41	73.67	0.00
1132-16b	Sierra Pelona Type 13	Serpentine	8564.55	202722.57	110036.51	150140.38	1015.08	7133.06	32.42	51.58	101.18	45.82	605.17	76914.70	86.95	68.27	10.01	112.59	12.90
1132-16b2	Sierra Pelona Type 13	Serpentine	11513.94	195509.55	97313.71	176204.77	729.95	853.06	12.33	30.21	67.05	75.53	448.27	64968.23	86.65	55.05	17.32	93.50	0.00
1132-17a	Sierra Pelona Type 13	Serpentine	22896.64	194556.97	100478.31	167144.63	0.00	1671.85	25.16	402.98	112.32	109.95	517.38	65433.09	506.19	87.21	26.04	158.27	0.00
1132-17a2	Sierra Pelona Type 13	Serpentine	13611.06	194067.81	104689.43	163089.92	290.62	848.08	6.39	167.74	109.44	97.14	478.39	76224.70	461.37	93.99	30.48	99.38	0.00
1132-17b	Sierra Pelona Type 13	Serpentine	28044.31	174684.24	101670.29	173868.37	3995.30	1912.84	1.54	139.73	118.66	106.69	425.61	68796.61	519.09	74.82	16.76	122.60	0.00

Table 3a. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 13 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-17b2	Sierra Pelona Type 13	Serpentine	12308.25	205275.33	101267.59	160510.20	872.24	2811.01	5.72	190.05	137.46	109.40	421.14	70461.65	344.47	82.48	18.65	125.26	6.75
1132-18a	Sierra Pelona Type 13	Serpentine	17746.35	198369.42	106224.39	159309.59	2245.06	0.00	19.33	38.94	84.04	45.85	505.95	69888.55	897.07	100.31	63.68	178.83	0.00
1132-18a2	Sierra Pelona Type 13	Serpentine	6702.44	184963.44	95611.01	187617.82	535.59	659.07	0.00	43.45	73.29	0.00	383.50	68868.21	548.73	73.04	32.41	147.45	3.91
1132-18b	Sierra Pelona Type 13	Serpentine	9004.34	177576.46	95290.72	191333.67	1414.33	450.52	17.29	2780.21	105.68	40.69	407.69	66076.38	784.05	86.39	50.14	99.86	0.00
1132-18b2	Sierra Pelona Type 13	Serpentine	9853.52	215344.95	110553.39	139579.96	867.02	3248.68	5.14	116.85	71.14	67.49	446.76	79594.27	751.53	84.12	60.61	112.59	0.00

Table 3b. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 13 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-01a	Sierra Pelona Type 13	Serpentine	0.00	0.57	0.00	3.68	0.60	2.19	0.00	0.43	0.00	0.00	0.00	0.45	0.00	0.00	0.00	2.39	0.06	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	3.88	0.76	0.19
1132-01b	Sierra Pelona Type 13	Serpentine	0.00	0.21	4.12	909.53	0.21	1.45	0.00	0.69	0.42	0.00	0.00	0.00	0.00	0.00	0.25	0.63	0.13	0.79	0.10	1.84	0.03	1.58	0.20	21.76	0.00	1.65	0.78	2.62
1132-02a	Sierra Pelona Type 13	Serpentine	0.00	1.43	1.48	149.82	0.29	0.87	0.00	0.00	0.00	0.00	0.04	0.18	0.93	0.00	0.00	2.21	0.04	0.52	0.23	0.00	0.00	0.00	0.40	3.75	0.00	2.79	3.01	2.77
1132-02b	Sierra Pelona Type 13	Serpentine	20.71	2.47	0.87	79.91	0.00	0.77	0.32	0.45	0.77	0.26	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.22	0.31	0.00	0.00	0.15	0.29	2.93	0.00	5.69	2.39	0.67
1132-03a	Sierra Pelona Type 13	Serpentine	0.00	0.40	0.00	5.79	0.00	2.40	0.00	0.00	0.67	4.14	9.64	0.91	1.83	0.00	0.00	2.40	0.00	1.02	0.44	1.25	0.00	0.00	0.00	1.90	0.00	7.90	24.91	0.00
1132-03b	Sierra Pelona Type 13	Serpentine	0.52	0.94	0.86	0.99	0.00	0.14	0.00	0.42	0.26	0.61	1.54	0.15	0.80	0.00	0.00	0.00	0.07	0.00	0.47	0.00	0.32	0.00	0.21	0.65	0.00	2.72	9.69	0.00
1132-04a	Sierra Pelona Type 13	Serpentine	0.00	0.80	0.00	26.57	0.00	1.59	2.78	0.00	2.54	0.17	0.06	0.70	1.22	0.00	0.00	4.16	0.16	0.68	0.06	0.83	0.00	0.28	0.00	0.00	0.00	6.87	0.71	0.72
1132-04b	Sierra Pelona Type 13	Serpentine	0.00	0.06	0.56	64.59	0.19	1.11	0.00	0.24	0.71	0.48	2.00	0.03	0.00	0.00	0.12	0.20	0.31	0.00	0.22	0.82	0.03	0.00	0.40	0.77	0.00	1.54	2.01	1.13
1132-05a	Sierra Pelona Type 13	Serpentine	0.00	0.00	0.00	1.53	0.00	5.83	6.28	0.09	0.67	0.00	0.00	1.05	0.00	0.00	0.63	2.41	0.25	2.38	0.27	0.75	0.17	0.00	0.00	0.00	0.00	4.26	0.00	0.82
1132-05b	Sierra Pelona Type 13	Serpentine	0.00	0.92	0.73	0.00	0.11	1.22	0.39	0.34	0.00	0.00	0.14	0.00	0.00	0.00	0.13	0.00	0.21	0.27	0.39	0.50	0.00	0.00	0.36	0.00	0.00	1.21	0.16	0.00
1132-06a	Sierra Pelona Type 13	Serpentine	0.00	1.86	0.00	1.65	1.09	1.86	1.62	0.07	0.52	0.00	0.46	0.00	0.71	0.00	0.00	2.61	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	8.01	1.25	0.21
1132-06b	Sierra Pelona Type 13	Serpentine	0.56	1.68	0.00	2.64	0.00	0.00	0.69	0.00	1.54	0.32	0.07	0.03	0.00	0.00	0.00	0.00	0.14	0.27	0.00	0.00	0.07	0.00	0.00	0.00	0.00	2.07	0.16	0.05
1132-07a	Sierra Pelona Type 13	Serpentine	0.00	2.01	0.00	70.65	0.20	1.72	2.25	0.43	1.77	0.06	0.00	0.05	0.00	0.00	0.45	1.72	0.00	1.70	0.00	0.18	0.00	0.00	0.00	2.15	0.00	6.54	3.85	1.56
1132-07b	Sierra Pelona Type 13	Serpentine	0.00	1.20	1.19	162.85	0.00	1.35	0.72	0.00	1.11	0.00	0.00	0.22	1.77	0.00	0.14	0.00	0.00	0.56	0.00	0.32	0.00	0.00	0.00	4.16	0.00	2.19	2.29	1.34
1132-08a	Sierra Pelona Type 13	Serpentine	0.00	0.47	0.00	5.84	0.33	0.00	1.82	0.00	3.00	0.00	0.34	0.12	1.06	0.00	0.18	3.63	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.47	0.00	1.06	0.62	0.00
1132-08b	Sierra Pelona Type 13	Serpentine	0.00	2.15	0.16	0.72	0.00	1.74	0.00	0.32	12.02	0.00	0.20	0.00	0.00	0.00	0.13	0.00	0.00	0.26	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.57	0.00	0.00
1132-09a	Sierra Pelona Type 13	Serpentine	0.00	6.28	4.21	13.43	0.09	0.00	1.02	0.08	0.00	0.47	2.87	0.44	2.69	0.00	0.00	1.73	0.00	1.22	0.03	0.89	0.00	0.70	0.13	0.98	0.00	1.39	0.96	0.44
1132-09b	Sierra Pelona Type 13	Serpentine	0.14	6.34	6.66	20.94	0.00	0.75	0.00	0.00	0.89	4.65	11.01	1.79	5.88	0.00	0.19	0.96	0.30	1.75	0.10	0.95	0.15	0.26	0.00	0.23	0.00	0.00	2.83	0.85
1132-10a	Sierra Pelona Type 13	Serpentine	0.00	85.67	39.19	6.73	0.89	0.60	0.00	0.00	2.13	8.32	27.01	5.04	34.93	0.00	1.64	13.99	1.93	11.05	1.51	4.45	0.30	2.84	0.55	0.29	0.00	4.90	14.18	0.48
1132-10b	Sierra Pelona Type 13	Serpentine	0.00	0.84	0.00	0.85	0.15	0.75	0.00	0.00	1.24	0.00	0.05	0.11	0.00	0.00	0.00	0.00	0.10	0.00	0.05	0.07	0.00	0.53	0.12	0.39	0.03	0.17	1.20	0.00
1132-11a	Sierra Pelona Type 13	Serpentine	0.00	2.00	0.00	0.00	0.56	0.00	0.00	0.21	0.99	0.25	0.30	0.00	0.00	0.00	0.83	1.48	0.34	0.00	0.51	0.44	0.00	0.75	0.29	0.00	0.00	0.00	1.38	0.23
1132-11b	Sierra Pelona Type 13	Serpentine	0.58	10.50	2.28	0.08	0.08	49.42	1.06	2.78	3.30	0.24	1.85	0.39	1.87	0.00	0.30	2.03	0.16	0.41	0.28	0.00	0.27	0.00	0.00	0.00	0.14	0.00	0.69	0.74
1132-12a	Sierra Pelona Type 13	Serpentine	0.00	0.24	0.00	4.17	0.92	0.00	0.00	0.24	1.15	0.58	0.46	0.00	0.00	0.00	0.21	10.27	0.00	0.00	1.41	0.34	0.00	5.18	0.13	2.87	0.00	0.00	2.12	0.00
1132-12c	Sierra Pelona Type 13	Serpentine	0.00	1.19	0.06	1.62	0.00	0.00	0.41	0.04	0.48	0.04	0.08	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.35	0.00	0.00	0.56	0.00	0.00	2.45	0.81	0.18
1132-12b	Sierra Pelona Type 13	Serpentine	0.00	0.00	0.00	52.68	2.55	2.67	0.00	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	0.25	0.00	0.00	0.73	0.00	0.00	0.00	0.52	0.00	1.13	1.80	1.65
1132-12b2	Sierra Pelona Type 13	Serpentine	0.00	1.57	0.00	18.31	0.00	0.31	0.42	0.00	0.50	0.22	0.00	0.18	1.61	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.26	0.44	0.10	0.00	0.00	0.28	0.46	0.06
1132-13a	Sierra Pelona Type 13	Serpentine	0.00	0.00	0.21	9.65	0.48	1.91	0.69	0.51	0.89	0.06	2.84	0.00	0.00	0.00	0.33	0.36	0.00	0.71	0.49	0.52	0.00	1.49	0.00	0.37	0.00	0.00	0.92	0.00
1132-13a2	Sierra Pelona Type 13	Serpentine	0.00	0.41	0.05	1.93	0.00	0.22	0.00	0.22	1.47	0.34	0.30	0.23	0.16	0.00	0.00	0.00	0.00	1.38	0.00	0.26	0.36	0.00	0.48	0.00	0.00	0.20	1.24	0.13
1132-13b	Sierra Pelona Type 13	Serpentine	4.03	3.24	0.24	1.23	0.60	0.81	289.71	58.88	1.53	0.52	0.94	0.00	0.00	0.00	0.31	1.01	0.17	0.68	0.49	0.30	0.10	0.00	0.28	0.00	0.00	3.22	0.42	2.22
1132-13b2	Sierra Pelona Type 13	Serpentine	0.37	1.13	0.00	2.00	0.00	1.52	0.00	0.00	1.05	0.00	0.00	0.20	0.00	0.00	0.13	0.00	0.00	1.32	0.00	0.00	0.21	0.00	0.16	0.11	0.00	0.69	0.47	0.05
1132-14a	Sierra Pelona Type 13	Serpentine	0.00	0.35	0.00	4.48	0.26	0.00	1.87	0.92	1.35	0.00	0.43	0.00	0.00	0.00	0.00	2.26	0.16	0.00	1.00	0.48	0.00	0.00	0.00	1.36	0.00	1.47	0.17	0.00
1132-14a2	Sierra Pelona Type 13	Serpentine	0.00	0.21	0.17	0.90	0.00	1.52	0.00	0.20	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.30	0.00	0.00	0.31	0.00	0.00	0.35	0.00	0.51	0.00	0.40
1132-14b	Sierra Pelona Type 13	Serpentine	0.00	0.08	0.00	2.19	0.19	0.00	0.00	0.41	0.58	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.16	0.34	0.00	0.59	0.32	0.00	0.00	1.05	0.24	0.00
1132-14b2	Sierra Pelona Type 13	Serpentine	0.24	0.75	0.00	2.01	0.00	0.56	0.00	0.00	1.38	0.32	0.19	0.00	1.82	0.00	0.42	0.75	0.06	0.25	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.32
1132-15a	Sierra Pelona Type 13	Serpentine	0.00	0.45	0.32	0.50	0.00	0.96	2.76	0.25	0.00	0.03	0.12	0.00	0.00	0.00	0.17	0.18	0.03	0.00	0.31	0.97	0.00	0.15	0.00	0.00	0.00	0.81	0.92	0.00
1132-15a2	Sierra Pelona Type 13	Serpentine	0.00	0.27	0.00	0.17	0.00	0.10	0.00	0.00	0.48	0.24	0.59	0.00	0.15	0.00	0.17	0.00	0.23	0.46	0.00	0.00	0.00	0.45	0.10	0.26	0.03	0.00	0.64	0.13
1132-15b	Sierra Pelona Type 13	Serpentine	0.00	0.51	1.41	0.96	0.21	0.64	0.00	0.45	0.00	0.03	0.00	0.00	0.00	0.00	0.05	0.47	0.00	0.00	0.27	0.08	0.00	0.00	0.28	0.33	0.00	0.72	0.41	0.20
1132-15b2	Sierra Pelona Type 13	Serpentine	0.00	0.05	0.97	214.63	0.15	0.28	0.00	0.00	1.50	0.00	0.36	0.07	0.41	0.00	0.34	0.31	0.10	0.61	0.00	0.15	0.20	0.66	0.09	4.10	0.03	0.34	0.04	1.41
1132-16a	Sierra Pelona Type 13	Serpentine	16.15	1.46	0.00	204.13	0.32	0.97	1.86	0.34	2.02	0.00	1.92	0.10	2.74	0.00	0.37	0.00	0.28	0.16	0.66	0.00	0.00	0.61	0.14	6.32	0.00	7.10	0.87	1.04
1132-16a2	Sierra Pelona Type 13	Serpentine	0.00	1.88	0.12	1.07	0.00	1.59	0.00	0.00	1.28	7.64	13.70	1.15	2.62	0.00	0.05	0.00	0.00	0.00	0.21	0.60	0.10	0.13	0.27	0.00	0.13	0.00	2.79	0.19
1132-16b	Sierra Pelona Type 13	Serpentine	0.00	9.37	3.59	4.18	0.33	0.00	0.00	0.52	2.54	0.38	3.19	0.23	0.00	0.00	0.00	0.00	0.43	0.00	0.27	0.46	0.00	0.00	0.82	1.32	0.00	0.38	0.00	0.00
1132-16b2	Sierra Pelona Type 13	Serpentine	0.09	3.36	0.00	6.00	0.19	1.30	2358.78	0.03	0.85	0.13	0.07	0.00	1.22	0.00	0.00	0.00	0.26	0.78	0.00	0.00	0.07	0.00	0.00	0.00	0.10	0.87	0.00	0.00
1132-17a	Sierra Pelona Type 13	Serpentine	0.00	3.15	1.44	1.31	0.14	0.55	0.00	0.15	0.58	0.00	0.65	0.04	3.17	0.00	0.70	0.87	0.56	0.73	0.81	0.67	0.00	1.70	0.38	0.00	0.00	2.94	0.94	0.00
1132-17a2	Sierra Pelona Type 13	Serpentine	0.00	2.78	1.17	30.12	0.00	0.66	0.00	0.00	1.97	0.37	1.04	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.38	0.33	0.18	0.00	0.16	0.27
1132-17b	Sierra Pelona Type 13	Serpentine	0.00	10.24	7.03	26.11	0.30	1.70	0.00	0.58	2.05	0.35	4.23	0.21	2.19	0.00	0.00	0.30	0.19	3.04	0.00	0.70	0.00	0.25	0.40	1.19	0.00	0.00	0.53	0.58
1132-17b2	Sierra Pelona Type 13	Serpentine	0.26	5.89	3.93	77.75	0.00	0.00	0.00	0.00	0.69	0.73	2.13	0.03	0.00	0.00	0.00	0.40	0.26	1.30	0.27	0.76	0.13	0.00	0.00	2.27	0.00	2.16	0.63	0.83

Table 3b. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 13 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-18a	Sierra Pelona Type 13	Serpentine	0.00	1.41	0.60	0.00	0.00	0.00	0.91	0.22	0.51	0.00	0.16	0.00	0.00	0.00	0.00	0.25	0.16	0.00	0.37	0.00	0.00	0.63	0.52	0.00	0.00	1.99	0.44	0.36
1132-18a2	Sierra Pelona Type 13	Serpentine	0.00	1.21	0.00	0.00	0.00	1.74	0.00	0.03	2.20	0.12	0.06	0.02	0.00	0.00	0.16	0.00	0.06	0.45	0.12	0.00	0.17	0.73	0.23	0.00	0.03	0.00	0.00	0.00
1132-18b	Sierra Pelona Type 13	Serpentine	0.62	0.60	0.61	0.39	0.26	0.82	0.00	0.00	1.15	0.00	0.25	0.00	0.00	0.00	0.00	2.34	0.00	0.00	0.21	0.00	0.21	0.00	0.44	0.26	0.00	0.88	0.00	0.00
1132-18b2	Sierra Pelona Type 13	Serpentine	0.54	5.30	2.72	22.83	0.00	0.32	0.00	0.00	0.48	0.30	1.49	0.13	0.16	0.00	0.28	0.71	0.00	0.47	0.00	0.00	0.00	0.00	0.17	0.62	0.00	2.33	0.04	0.39

Table 4a. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 3 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-19a	Sierra Pelona Type 3	Serpentine	119247.74	231451.77	122760.48	0.00	4620.05	0.00	51.58	546.94	78.36	106.50	779.66	150201.85	14.24	111.65	10.62	227.65	0.00
1132-19a2	Sierra Pelona Type 3	Serpentine	12838.61	192949.16	106016.84	140467.81	1570.31	1015.78	4.01	117.17	52.01	53.10	453.70	109585.95	130.48	41.93	32.03	158.59	2.92
1132-19b	Sierra Pelona Type 3	Serpentine	96171.59	192292.94	99401.39	82042.97	5003.97	0.00	0.00	0.00	41.86	148.46	648.16	126009.29	43.10	124.23	40.18	112.37	0.00
1132-19b2	Sierra Pelona Type 3	Serpentine	11733.98	188845.21	107634.77	140822.18	798.91	0.00	13.80	88.44	33.65	37.28	485.72	114439.47	127.62	32.76	0.00	177.20	2.64
1132-22a	Sierra Pelona Type 3	Serpentine	86152.66	174580.70	87616.14	123652.19	5115.64	0.00	4.69	116.01	44.01	139.16	454.79	108800.88	184.29	338.58	20.28	132.34	0.00
1132-22a2	Sierra Pelona Type 3	Serpentine	11139.37	192089.12	96714.51	151204.58	1138.10	417.08	11.23	54.66	24.49	53.99	420.24	109293.76	378.15	62.89	6.26	155.63	2.72
1132-22b	Sierra Pelona Type 3	Serpentine	190427.32	203304.05	103048.84	0.00	5915.10	0.00	16.61	0.00	46.77	113.76	610.63	141080.91	283.59	303.58	0.00	390.71	0.00
1132-22b2	Sierra Pelona Type 3	Serpentine	22930.72	204022.83	105120.58	118649.33	2481.73	82.25	4.86	118.37	39.04	88.00	469.81	120618.16	629.20	74.75	0.00	137.33	0.00
1132-23a	Sierra Pelona Type 3	Serpentine	118708.05	195280.95	90779.83	79443.45	5786.65	1867.26	15.56	0.00	51.89	114.35	475.55	114274.22	53.41	115.49	0.00	174.11	0.00
1132-23a2	Sierra Pelona Type 3	Serpentine	3797.31	190456.62	104069.59	149066.09	923.67	220.17	13.03	190.33	43.45	36.83	465.02	111943.43	171.45	53.42	0.00	176.21	0.00
1132-23b	Sierra Pelona Type 3	Serpentine	127425.58	202891.83	97778.93	57186.64	6171.94	0.00	0.00	256.42	58.35	118.26	521.33	122401.71	90.11	133.94	0.00	187.97	0.00
1132-23b2	Sierra Pelona Type 3	Serpentine	19105.77	173978.37	109512.07	142788.16	883.53	0.00	3.08	203.30	49.60	69.82	457.28	118990.07	182.07	60.74	9.07	159.79	6.63
1132-24a	Sierra Pelona Type 3	Serpentine	107745.78	196364.41	82593.67	92733.35	7122.53	0.00	28.62	50.59	76.72	121.29	475.23	114663.75	129.02	244.10	0.00	203.23	0.00
1132-24a2	Sierra Pelona Type 3	Serpentine	23478.62	180820.43	97608.97	140179.14	1298.27	0.00	7.27	134.25	82.57	39.52	430.61	126036.21	540.96	87.49	0.00	113.57	8.04
1132-24b	Sierra Pelona Type 3	Serpentine	104359.78	132899.38	64738.95	175351.81	6287.12	0.00	16.82	0.00	58.94	46.08	415.72	92373.12	132.20	200.92	0.00	140.15	8.79
1132-24b2	Sierra Pelona Type 3	Serpentine	13685.60	169316.59	87119.97	170197.54	449.55	0.00	1.43	113.14	75.79	2.16	409.15	118387.26	449.94	87.57	0.00	152.31	11.43
1132-25a	Sierra Pelona Type 3	Serpentine	98932.48	163047.24	97797.80	112750.11	6028.28	1328.08	19.36	6146.11	66.60	164.45	743.38	103811.13	31.17	163.88	4.65	125.69	0.00
1132-25a2	Sierra Pelona Type 3	Serpentine	7515.38	172627.07	116222.74	146887.70	966.55	209.77	6.70	106.04	46.51	93.09	638.43	116175.49	75.46	56.38	7.89	173.21	9.06
1132-25b	Sierra Pelona Type 3	Serpentine	88711.65	154244.37	91963.99	137458.24	6559.77	678.38	16.48	571.08	43.31	112.88	618.76	101460.81	36.11	149.85	0.00	110.75	0.00
1132-25b2	Sierra Pelona Type 3	Serpentine	1458.80	178915.72	124234.60	133932.18	290.64	128.89	7.42	146.72	56.16	40.13	705.15	124012.61	105.09	57.93	0.00	152.74	5.32
1132-29a	Sierra Pelona Type 3	Serpentine	29403.51	214148.49	112007.12	109500.40	777.25	0.00	38.15	21.49	45.56	89.71	781.00	109375.42	15.64	6.18	0.00	195.71	0.00
1132-29a2	Sierra Pelona Type 3	Serpentine	6347.50	173674.31	117426.78	150961.30	393.00	0.00	1.23	48.62	45.77	81.68	631.78	109281.08	50.23	15.71	0.00	158.89	3.78
1132-29b	Sierra Pelona Type 3	Serpentine	10422.28	174104.40	99883.86	173140.50	955.93	0.00	23.06	0.00	49.03	47.35	606.89	94589.04	23.76	28.76	0.00	130.10	0.00
1132-29b2	Sierra Pelona Type 3	Serpentine	5324.25	174747.80	115756.66	151668.15	970.58	0.00	4.87	96.25	47.59	101.95	699.72	109442.15	73.87	25.26	2.39	150.31	15.70
1132-32a	Sierra Pelona Type 3	Serpentine	24139.87	199350.96	101983.45	124664.37	360.77	439.64	0.00	274.81	36.35	150.79	603.91	121597.45	83.64	152.28	0.00	220.40	0.01
1132-32a2	Sierra Pelona Type 3	Serpentine	9923.05	179738.16	105865.15	150871.54	546.98	0.00	6.77	232.05	30.74	98.09	475.89	113842.13	234.57	58.37	10.62	124.93	9.15
1132-32b	Sierra Pelona Type 3	Serpentine	37187.37	203458.35	98913.09	121478.31	2858.14	107.20	4.18	0.00	52.20	101.55	482.75	112031.29	120.91	252.80	0.00	123.29	0.01
1132-32b2	Sierra Pelona Type 3	Serpentine	16880.70	184765.02	108211.60	141336.72	1158.11	151.87	7.29	153.68	37.68	92.37	448.29	111027.16	303.92	55.85	0.00	93.08	11.64
1132-34a	Sierra Pelona Type 3	Serpentine	20431.54	174179.19	96514.43	166170.40	2471.61	0.00	20.20	312.35	42.13	61.47	672.23	98162.14	47.71	30.00	0.00	171.90	0.00
1132-34b	Sierra Pelona Type 3	Serpentine	15680.66	219170.52	129442.45	120752.31	739.27	0.00	2.64	239.27	55.44	90.43	863.86	76094.34	122.59	28.30	69.50	217.96	12.89
1132-36a	Sierra Pelona Type 3	Serpentine	13508.61	166159.32	89968.92	177419.25	1020.35	595.35	0.00	1861.46	38.62	90.02	631.59	101933.00	38.11	41.27	0.00	138.24	3.36
1132-36a2	Sierra Pelona Type 3	Serpentine	0.00	194424.54	111846.32	140470.64	425.36	0.00	12.40	290.46	34.74	73.78	551.61	113944.07	80.53	43.98	0.00	162.24	14.38
1132-36b	Sierra Pelona Type 3	Serpentine	23384.05	163760.04	90956.33	176764.98	1313.63	670.66	11.60	161.29	21.76	52.91	581.57	99529.50	52.26	82.64	0.00	171.30	0.00
1132-36b2	Sierra Pelona Type 3	Serpentine	16585.29	213080.28	123754.87	130608.77	0.00	1837.98	14.44	193.04	50.83	67.06	684.64	74272.27	129.21	71.43	0.00	94.66	0.00
1132-39a	Sierra Pelona Type 3	Serpentine	22893.16	161634.91	97743.66	174123.24	933.60	0.00	15.48	0.00	30.42	48.76	503.49	98680.70	48.40	165.45	0.00	100.96	0.00
1132-39a2	Sierra Pelona Type 3	Serpentine	10113.23	207948.09	114026.99	149503.56	897.28	0.00	6.94	156.31	36.49	2.47	491.54	72267.14	136.09	40.82	6.75	159.29	0.00
1132-39b	Sierra Pelona Type 3	Serpentine	11259.85	179268.66	96296.35	168961.50	937.85	0.00	0.00	12.33	28.63	56.01	529.02	98243.75	41.01	117.04	0.00	155.05	0.00
1132-39b2	Sierra Pelona Type 3	Serpentine	4451.95	217320.73	116370.83	144044.50	248.63	0.00	15.83	159.05	58.22	38.08	561.19	72177.71	202.32	52.12	0.57	132.42	0.00
1132-40a	Sierra Pelona Type 3	Serpentine	16331.67	171257.81	90596.90	178477.24	1583.80	683.12	10.22	138.95	38.34	38.85	438.75	95297.76	52.63	174.78	0.00	120.77	0.00
1132-40a2	Sierra Pelona Type 3	Serpentine	9449.63	221032.40	111374.95	141931.94	841.70	0.00	7.73	124.37	41.53	52.26	499.84	72489.46	242.56	63.22	2.05	136.35	0.00
1132-40b	Sierra Pelona Type 3	Serpentine	8778.24	193628.92	108233.99	131372.61	619.37	0.00	1.16	254.66	39.48	2.60	477.78	125028.49	158.81	47.65	3.24	128.33	0.00
1132-40b2	Sierra Pelona Type 3	Serpentine	9909.55	201656.10	105635.61	164373.71	611.15	0.00	9.26	134.85	36.95	31.10	459.85	68918.28	117.40	50.68	0.00	99.81	0.00
1132-44a	Sierra Pelona Type 3	Serpentine	13420.31	209730.34	107669.86	114225.49	1010.62	350.58	1.39	1414.47	48.69	93.62	563.03	121801.45	165.00	48.20	0.00	159.82	11.75
1132-44a2	Sierra Pelona Type 3	Serpentine	6862.69	196522.66	107261.11	170190.20	553.68	447.24	4.05	375.01	34.15	106.31	471.75	66055.36	171.75	60.50	0.00	124.40	0.00
1132-44b	Sierra Pelona Type 3	Serpentine	13239.79	189290.58	98497.08	156779.21	236.05	0.00	24.77	28.68	38.60	93.85	441.90	100758.17	79.29	55.60	20.81	130.21	0.00
1132-44b2	Sierra Pelona Type 3	Serpentine	6936.13	202991.65	100830.29	172357.39	415.63	170.66	12.56	54.61	31.58	61.58	420.36	64658.55	60.21	34.43	1.93	166.90	0.00

Table 4a. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 3 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-45a	Sierra Pelona Type 3	Serpentine	9044.39	195121.51	100071.76	145974.64	1005.34	52.06	21.54	274.71	62.71	43.48	494.17	111583.35	68.96	42.05	12.38	92.17	3.73
1132-45a2	Sierra Pelona Type 3	Serpentine	5521.41	184320.42	102784.83	186216.12	442.53	185.18	3.59	211.69	70.89	63.80	439.61	64120.93	76.17	35.33	0.00	64.03	4.49
1132-45b	Sierra Pelona Type 3	Serpentine	131803.61	172868.11	82454.02	96734.29	2227.98	14589.20	13.69	333.41	110.96	4770.05	1511.00	94573.29	110.07	104.08	51.65	242.04	2.93
1132-45b2	Sierra Pelona Type 3	Serpentine	9702.05	219002.74	116490.51	140949.16	298.09	0.00	3.21	219.72	84.78	123.17	494.25	69708.99	92.36	30.75	0.00	141.67	0.00

Table 4b. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 3 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-19a	Sierra Pelona Type 3	Serpentine	3.54	5.22	0.76	5.32	1.37	0.00	1.69	0.35	5.05	0.85	0.00	0.00	4.22	0.00	2.29	2.03	0.00	5.77	0.00	1.97	0.00	0.00	0.80	0.00	0.50	60.20	1.27	2.74
1132-19a2	Sierra Pelona Type 3	Serpentine	0.09	0.49	0.21	3.77	0.51	1.22	0.50	0.10	1.38	0.13	3.33	0.03	0.00	0.00	0.77	0.00	0.00	0.62	0.00	0.00	0.00	0.48	0.12	0.21	0.13	34.34	0.19	0.19
1132-19b	Sierra Pelona Type 3	Serpentine	0.00	2.55	0.00	0.37	0.00	7.24	0.00	0.00	5.00	0.00	0.26	0.00	5.75	0.00	0.00	10.79	0.00	0.00	0.26	1.49	0.13	0.00	0.00	0.00	0.00	0.00	0.96	0.00
1132-19b2	Sierra Pelona Type 3	Serpentine	0.75	0.45	0.00	4.85	0.30	0.22	0.15	0.00	0.07	0.06	0.00	0.22	0.00	0.00	0.12	0.00	0.21	0.34	0.00	0.26	0.29	0.44	0.00	0.38	0.00	0.57	0.09	0.00
1132-22a	Sierra Pelona Type 3	Serpentine	0.00	7.23	1.77	122.17	0.00	2.84	0.00	0.00	10.14	1.63	0.00	0.27	0.00	0.00	0.63	0.00	0.10	3.67	0.00	0.63	0.32	7.55	0.77	3.97	0.32	4.26	7.60	0.48
1132-22a2	Sierra Pelona Type 3	Serpentine	0.60	1.84	0.29	7.59	0.22	0.68	0.77	0.00	2.64	0.37	0.00	0.13	0.00	0.00	0.36	0.00	0.00	1.05	0.58	0.99	0.00	0.15	0.00	0.97	0.00	0.20	1.26	0.00
1132-22b	Sierra Pelona Type 3	Serpentine	0.00	1.73	0.00	0.55	2.07	0.72	1.90	0.00	17.08	0.58	0.00	1.10	0.00	0.00	3.33	0.00	0.00	2.17	0.00	2.22	0.00	0.00	0.00	0.00	0.00	22.63	0.00	0.00
1132-22b2	Sierra Pelona Type 3	Serpentine	0.00	1.00	0.42	176.91	0.00	0.49	0.00	0.00	2.49	0.00	0.27	0.00	0.00	0.00	0.77	0.00	0.00	1.26	0.55	1.37	0.00	0.00	0.56	3.77	0.00	1.28	1.17	1.35
1132-23a	Sierra Pelona Type 3	Serpentine	1.87	4.53	0.89	0.00	2.26	0.00	0.00	1.23	6.83	0.00	0.00	0.10	0.00	0.00	0.69	1.43	0.00	2.25	0.25	3.47	0.00	0.00	0.00	0.00	0.00	3.14	0.00	0.00
1132-23a2	Sierra Pelona Type 3	Serpentine	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.26	2.59	0.29	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.95	0.30	0.10	0.00	0.52	0.00	0.00	0.00	0.23	0.52	0.00
1132-23b	Sierra Pelona Type 3	Serpentine	0.00	6.69	0.00	3.06	0.32	0.00	0.00	0.00	5.74	0.36	0.00	0.29	0.00	0.00	0.00	2.87	0.00	3.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.68	0.00
1132-23b2	Sierra Pelona Type 3	Serpentine	0.00	0.53	0.00	20.91	0.19	2.11	3.91	0.00	1.70	0.21	0.00	0.30	0.17	0.00	0.20	0.41	0.03	0.65	0.35	0.00	0.13	0.83	0.00	0.11	0.00	0.24	0.00	0.25
1132-24a	Sierra Pelona Type 3	Serpentine	0.49	3.24	0.14	3.49	0.51	0.00	0.00	0.00	1.08	0.85	0.76	0.00	0.00	0.00	0.18	2.26	1.36	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	3.71	0.70	0.14
1132-24a2	Sierra Pelona Type 3	Serpentine	0.00	0.74	0.40	2.34	0.00	0.66	0.00	0.00	1.45	0.46	0.00	0.13	0.80	0.00	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.47	0.16	0.10	0.00	1.12	0.49	0.33
1132-24b	Sierra Pelona Type 3	Serpentine	0.40	2.38	0.81	0.66	0.42	2.62	0.77	0.32	5.50	0.39	0.93	0.06	1.93	0.00	1.05	0.00	0.22	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.81	0.11
1132-24b2	Sierra Pelona Type 3	Serpentine	0.00	0.98	0.20	0.00	0.17	0.39	0.16	0.00	3.39	0.26	0.00	0.23	1.41	0.00	0.31	0.00	0.00	1.57	0.00	0.18	0.19	0.77	0.00	0.10	0.00	2.42	0.57	0.23
1132-25a	Sierra Pelona Type 3	Serpentine	2.72	2.02	1.22	1.90	56.99	5.30	0.00	0.00	4.25	36.47	70.41	5.19	22.55	0.00	0.00	6.24	0.00	0.28	0.00	0.00	0.22	0.00	0.00	0.00	5.21	0.00	3.89	0.00
1132-25a2	Sierra Pelona Type 3	Serpentine	0.66	0.23	0.65	37.63	0.33	2.57	0.15	0.00	0.78	0.42	0.00	0.17	0.73	0.00	0.18	0.00	0.00	0.57	0.12	0.00	0.12	0.14	0.00	1.38	0.00	1.03	6.73	0.92
1132-25b	Sierra Pelona Type 3	Serpentine	0.40	2.33	0.34	17.52	4.51	1.43	0.00	0.00	2.26	0.69	0.00	0.00	0.38	0.00	0.15	0.00	0.00	0.29	0.00	0.88	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.33
1132-25b2	Sierra Pelona Type 3	Serpentine	0.76	0.21	0.00	1.00	0.98	1.92	0.41	0.12	0.46	0.17	0.03	0.02	1.22	0.00	0.16	0.66	0.19	0.10	0.39	0.16	0.05	0.00	0.00	0.42	0.00	1.33	0.08	0.44
1132-29a	Sierra Pelona Type 3	Serpentine	0.00	1.30	0.00	2.27	1.29	0.30	0.00	0.58	2.56	0.00	0.00	0.00	1.19	0.00	0.00	0.48	0.23	0.00	0.00	0.70	0.00	0.00	0.38	1.71	0.08	2.62	0.12	0.00
1132-29a2	Sierra Pelona Type 3	Serpentine	0.30	0.31	0.26	2.97	0.83	0.11	0.14	0.00	1.10	0.22	0.03	0.07	0.67	0.00	0.27	0.33	0.00	0.52	0.17	0.15	0.16	0.00	0.20	0.59	0.00	0.95	0.25	0.36
1132-29b	Sierra Pelona Type 3	Serpentine	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.05	1.94	0.69	0.05	0.00	0.00	0.00	0.21	0.00	0.25	1.60	0.00	1.08	0.00	0.00	0.00	0.00	0.05	1.74	0.24	0.00
1132-29b2	Sierra Pelona Type 3	Serpentine	0.30	0.41	0.34	35.80	0.00	0.78	0.00	0.00	2.11	0.16	5.15	0.07	0.00	0.00	0.16	0.00	0.00	0.72	0.00	0.00	0.00	1.18	0.26	0.75	0.16	0.00	0.24	0.28
1132-32a	Sierra Pelona Type 3	Serpentine	2.67	1.57	0.35	4.03	0.85	5.62	4.30	0.00	0.72	0.39	1.19	0.26	0.00	0.00	0.00	0.00	0.08	0.00	0.57	2.06	0.08	0.79	0.00	0.24	0.00	3.62	2.71	0.00
1132-32a2	Sierra Pelona Type 3	Serpentine	0.83	1.50	1.88	61.81	0.00	0.37	1.05	0.00	0.64	0.79	0.76	0.00	0.74	0.00	0.06	0.00	0.09	0.00	0.00	0.00	0.18	0.44	0.14	3.99	0.00	0.21	12.52	1.90
1132-32b	Sierra Pelona Type 3	Serpentine	0.00	4.34	0.00	0.55	0.26	0.00	0.48	0.00	3.08	0.87	0.10	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.30	3.63	0.47	4.80	0.00	0.00	0.09	0.63	1.87	0.00
1132-32b2	Sierra Pelona Type 3	Serpentine	0.54	1.86	4.95	1135.93	0.09	0.93	0.80	0.00	1.61	0.20	0.03	0.24	0.80	0.00	0.06	1.17	0.00	1.35	0.33	0.18	0.19	1.10	0.31	26.07	0.13	0.67	1.56	3.00
1132-34a	Sierra Pelona Type 3	Serpentine	0.00	3.23	0.81	5.30	1.47	7.28	1.16	0.00	6.04	0.39	0.39	0.13	0.00	0.00	0.90	0.00	0.52	1.17	0.00	2.03	0.53	0.77	0.00	0.00	0.23	0.00	0.81	1.03
1132-34b	Sierra Pelona Type 3	Serpentine	0.11	1.23	0.19	2.15	1.30	39.96	4.10	0.23	1.16	1.24	0.82	0.42	0.00	0.00	0.00	3.58	0.04	0.00	0.42	0.00	0.50	0.72	0.00	0.55	0.23	1.78	0.07	0.20
1132-36a	Sierra Pelona Type 3	Serpentine	0.00	1.82	15.61	2801.26	1.44	3.34	0.00	0.67	1.90	0.54	0.18	0.00	0.30	0.00	0.23	0.00	0.00	0.00	0.18	3.27	0.64	13.01	1.97	85.04	0.53	3.50	9.31	23.24
1132-36a2	Sierra Pelona Type 3	Serpentine	0.00	0.00	0.19	61.01	0.08	0.63	0.46	0.00	0.65	0.12	0.03	0.17	0.00	0.00	0.00	0.74	0.00	1.28	0.31	0.17	0.30	0.00	0.37	3.30	0.06	0.00	0.37	1.21
1132-36b	Sierra Pelona Type 3	Serpentine	0.52	2.05	0.00	13.31	0.54	2.26	0.00	0.34	1.83	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.34	1.36	0.33	0.00	0.16	0.00	0.20	0.00	0.30	0.00
1132-36b2	Sierra Pelona Type 3	Serpentine	0.00	2.53	0.00	2.87	2.20	0.71	0.99	47.83	11.65	0.00	0.20	0.00	0.00	0.00	0.10	0.00	0.00	1.89	0.00	0.30	0.05	0.26	0.00	0.60	0.25	0.65	0.23	0.22
1132-39a	Sierra Pelona Type 3	Serpentine	0.00	0.83	0.38	0.00	0.55	0.57	0.00	0.05	3.03	0.26	0.05	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00
1132-39a2	Sierra Pelona Type 3	Serpentine	0.23	0.22	0.00	0.17	0.42	1.39	0.00	0.00	0.68	0.23	0.20	0.03	1.33	0.00	0.00	2.56	0.00	1.24	0.30	0.00	0.36	2.56	0.04	0.79	0.35	1.69	0.00	0.15
1132-39b	Sierra Pelona Type 3	Serpentine	0.00	0.58	3.34	578.51	0.25	0.00	0.00	0.00	2.10	0.41	0.51	0.00	0.00	0.00	0.53	0.83	0.22	0.00	0.00	0.40	0.00	3.66	0.33	17.81	0.00	0.00	1.30	2.76
1132-39b2	Sierra Pelona Type 3	Serpentine	0.00	0.92	0.21	1.11	0.24	1.08	0.00	0.09	1.33	0.00	0.24	0.18	0.00	0.00	0.06	0.92	0.31	0.23	0.28	0.00	0.15	0.00	0.00	0.00	0.21	0.39	0.32	0.00
1132-40a	Sierra Pelona Type 3	Serpentine	0.00	1.11	0.21	1.07	0.51	0.18	0.00	0.15	1.72	0.80	0.33	0.08	0.00	0.00	0.36	1.98	0.00	0.00	0.00	1.50	0.00	0.00	0.00	0.00	0.05	0.00	0.92	0.35
1132-40a2	Sierra Pelona Type 3	Serpentine	0.95	0.74	0.05	4.57	0.00	1.04	1.81	0.00	1.60	0.33	0.07	0.00	0.74	0.00	0.00	0.00	0.17	0.28	0.11	0.00	0.11	0.95	0.21	0.44	0.00	0.94	0.17	0.38
1132-40b	Sierra Pelona Type 3	Serpentine	0.13	0.00	0.91	1.44	0.34	2.47	1.20	0.15	1.37	0.48	0.19	0.00	0.24	0.00	0.74	2.87	0.00	0.54	0.60	2.10	0.00	0.00	0.51	0.90	0.00	0.00	1.40	0.69
1132-40b2	Sierra Pelona Type 3	Serpentine	0.33	1.05	0.04	2.21	0.00	1.00	0.56	0.00	0.46	0.08	0.06	0.00	0.00	0.00	0.00	0.51	0.00	0.64	0.15	0.00	0.00	1.62	0.03	0.00	0.00	0.36	1.08	0.30
1132-44a	Sierra Pelona Type 3	Serpentine	0.48	0.43	11.88	4470.28	1.05	5.04	0.00	0.00	2.88	2.75	1.38	0.05	0.00	0.00	0.88	0.00	0.28	2.37	0.71	1.50	0.00	3.06	1.96	111.23	0.00	1.82	5.17	11.38
1132-44a2	Sierra Pelona Type 3	Serpentine	0.00	2.23	0.12	1.25	0.39	3.41	0.00	0.00	1.45	0.09	0.96	0.38	2.13	0.00	0.00	0.18	0.00	0.45	0.22	0.00	0.00	0.16	0.00	0.36	0.03	1.94	0.05	0.13
1132-44b	Sierra Pelona Type 3	Serpentine	0.95	0.54	3.68	510.46	1.17	0.36	0.24	0.00	0.32	0.49	0.00	0.12	0.00	0.00	0.56	0.00	0.00	0.55	0.00	2.70	0.19	2.61	0.52	12.19	0.00	0.00	1.85	4.36
1132-44b2	Sierra Pelona Type 3	Serpentine	0.08	2.31	0.00	15.75	0.89	0.97	0.00	0.00	1.35	6.64	0.61	0.03	1.74	0.00	0.07	1.44	0.00	0.52	0.18	0.00	0.00	0.89	0.00	1.03	0.00	0.44	1.72	0.26

Table 4b. Calibrated LA-ICP-MS data for CA-LAN-1132 Serpentine Type 3 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-45a	Sierra Pelona Type 3	Serpentine	0.00	0.00	0.00	2.54	0.42	0.94	1.06	0.00	2.32	0.25	0.00	0.00	0.00	0.00	0.65	0.00	0.00	2.08	0.09	0.00	0.25	1.44	0.00	0.00	0.00	0.00	0.86	0.24
1132-45a2	Sierra Pelona Type 3	Serpentine	0.44	0.00	0.00	5.69	0.00	0.57	0.00	0.00	1.90	0.29	0.00	0.00	0.27	0.00	0.00	0.16	0.12	0.00	0.14	0.00	0.08	0.42	0.00	0.00	0.08	1.03	0.36	0.20
1132-45b	Sierra Pelona Type 3	Serpentine	1.02	26.93	0.10	4.58	2.29	117.19	2903.76	4.17	8.38	0.07	0.54	0.03	0.00	0.00	0.38	0.00	0.36	1.38	0.28	0.10	0.00	0.16	0.20	0.42	0.00	78.29	0.39	4.13
1132-45b2	Sierra Pelona Type 3	Serpentine	0.24	0.90	0.05	1.39	0.52	1.66	0.00	0.03	3.77	0.00	0.00	0.08	0.68	0.00	0.00	1.00	0.15	1.01	0.00	0.00	0.03	0.00	0.27	0.00	0.03	1.72	0.76	0.00

Table 5a. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type16 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-98a	Sierra Pelona Type 16	Talc-schist	14215.18	174878.93	27005.64	250089.81	168.52	2888.01	8.36	0.00	57.15	2096.17	374.04	64698.89	2330.97	115.10	97.00	250.10	19.25
1132-98a2	Sierra Pelona Type 16	Talc-schist	0.00	173737.22	25127.26	266597.09	0.00	2320.52	12.31	0.00	44.88	2026.42	201.25	58890.86	1835.08	90.84	51.53	179.41	0.00
1132-98b	Sierra Pelona Type 16	Talc-schist	9903.01	179234.65	19809.62	266363.84	596.60	918.58	23.43	37.42	60.11	2497.99	228.98	51244.51	1479.66	70.46	15.30	132.27	6.30
1132-98b2	Sierra Pelona Type 16	Talc-schist	0.00	185069.37	35305.00	246032.24	0.00	1196.47	20.43	29.59	102.73	4412.58	384.77	61535.47	1739.07	88.27	22.77	189.93	5.25
1132-99a	Sierra Pelona Type 16	Talc-schist	972.46	185106.10	8056.20	283623.39	151.96	0.00	4.03	6.45	22.63	883.33	205.27	45092.42	2023.49	79.09	30.72	186.24	0.77
1132-99a2	Sierra Pelona Type 16	Talc-schist	0.00	173992.11	8314.44	294751.95	0.00	489.14	0.00	0.00	13.20	800.86	167.81	41672.41	2062.68	85.11	17.82	170.54	4.51
1132-99b	Sierra Pelona Type 16	Talc-schist	1110.86	177566.68	24133.56	266638.10	149.28	988.74	15.84	6.76	65.73	2409.35	250.75	55120.02	2111.17	85.51	40.48	200.61	0.81
1132-99b2	Sierra Pelona Type 16	Talc-schist	0.00	176375.95	19711.67	273482.28	0.00	508.91	0.00	0.00	36.76	2098.52	229.63	54146.87	2104.07	77.97	35.66	220.16	0.00
1132-100a	Sierra Pelona Type 16	Talc-schist	1676.32	170999.77	4470.57	298471.47	28.30	434.73	4.43	0.00	27.74	1230.26	151.61	43383.53	1286.98	62.99	19.31	152.23	3.83
1132-100a2	Sierra Pelona Type 16	Talc-schist	0.00	183133.06	2217.97	295967.44	0.00	47.55	0.00	0.00	8.17	603.14	112.79	38801.89	1254.56	54.65	8.88	136.86	0.00
1132-100b2	Sierra Pelona Type 16	Talc-schist	2693.74	179996.91	14895.26	275963.64	295.24	1567.31	11.03	0.00	45.19	1819.36	190.82	49663.80	1499.68	57.77	19.22	154.63	5.87
1132-100b2	Sierra Pelona Type 16	Talc-schist	8350.05	169900.56	5640.29	295339.98	361.01	299.81	2.62	119.52	5.40	1015.98	153.17	41350.02	1424.37	68.32	8.31	151.62	7.48
1132-101a	Sierra Pelona Type 16	Talc-schist	4801.00	190275.70	8717.04	279276.69	90.75	355.20	3.12	0.00	30.01	1745.46	155.43	40389.36	1702.13	63.70	12.23	100.06	0.00
1132-101a2	Sierra Pelona Type 16	Talc-schist	17223.58	192177.18	10479.83	265588.81	378.17	0.00	9.71	37.94	22.68	1880.51	200.30	44355.99	1734.97	64.57	38.08	210.25	14.50
1132-101b	Sierra Pelona Type 16	Talc-schist	1527.98	179597.38	15351.54	277792.21	332.13	369.40	21.34	0.00	53.33	2931.37	216.34	47824.13	1593.96	68.13	18.59	132.61	4.31
1132-101b2	Sierra Pelona Type 16	Talc-schist	12318.21	187155.46	16533.55	263042.73	606.40	143.53	26.35	85.78	24.16	3357.53	237.07	48898.44	1500.73	62.02	30.47	174.51	13.12
1132-102a	Sierra Pelona Type 16	Talc-schist	5737.81	189360.99	1537.69	290993.19	681.12	414.59	0.00	0.00	0.81	360.31	145.69	33177.19	1913.17	63.35	7.69	187.66	0.00
1132-102a2	Sierra Pelona Type 16	Talc-schist	20349.92	175308.43	14057.02	277287.32	882.11	433.17	11.37	64.75	25.81	1830.71	185.42	38066.59	1617.44	80.56	28.00	155.39	2.70
1132-102b	Sierra Pelona Type 16	Talc-schist	2611.98	155931.80	3672.46	316464.75	502.00	705.50	6.69	0.00	9.30	609.96	132.13	34043.58	1391.30	63.24	2.92	131.70	6.00
1132-102b2	Sierra Pelona Type 16	Talc-schist	2666.23	193478.53	10794.29	273551.26	109.17	669.21	3.19	14.58	8.89	1458.80	197.41	44330.01	1697.91	70.94	57.31	181.26	3.04
1132-103a	Sierra Pelona Type 16	Talc-schist	0.00	161634.43	36043.52	259502.86	0.00	3852.41	14.12	46.51	80.07	2495.77	397.01	66533.21	2066.54	108.17	51.21	204.02	5.43
1132-103b	Sierra Pelona Type 16	Talc-schist	6695.05	188198.18	17307.66	266817.59	217.74	1690.35	8.06	91.89	14.16	1178.22	151.91	47079.59	1856.80	82.66	35.48	195.34	6.39
1132-104a	Sierra Pelona Type 16	Talc-schist	0.00	193779.31	9610.83	276245.91	0.00	254.82	6.77	0.00	34.60	1786.31	182.28	44189.05	1789.76	65.71	22.98	130.50	3.47
1132-104b	Sierra Pelona Type 16	Talc-schist	1745.56	168665.53	18968.04	283424.35	138.19	1064.24	1.86	0.00	37.54	2328.44	178.51	47256.82	1541.05	53.50	45.21	164.37	2.66
1132-105a	Sierra Pelona Type 16	Talc-schist	0.00	182841.21	2873.08	298216.16	0.00	0.00	0.00	0.00	9.16	666.65	141.18	33953.71	2178.84	75.82	11.56	213.87	0.00
1132-105b	Sierra Pelona Type 16	Talc-schist	7038.96	184662.98	1561.70	294721.71	219.15	0.00	0.00	61.66	0.00	273.39	133.86	32670.54	1853.77	66.35	13.33	170.55	0.00
1132-106a	Sierra Pelona Type 16	Talc-schist	15208.07	174564.61	4999.54	288586.16	725.29	72.02	8.62	0.00	24.08	686.26	123.15	41212.79	1022.30	52.32	36.92	110.73	1.47
1132-106b	Sierra Pelona Type 16	Talc-schist	4816.66	177093.97	6006.12	298558.08	512.02	234.72	0.00	0.00	0.00	312.26	128.41	32411.86	821.14	57.57	21.67	152.68	5.46
1132-107a	Sierra Pelona Type 16	Talc-schist	0.00	187802.41	11378.88	275079.35	0.00	0.00	9.00	33.92	42.60	2140.32	210.77	49950.24	2093.64	67.65	26.20	238.03	7.92
1132-107b	Sierra Pelona Type 16	Talc-schist	6042.77	169048.13	3502.83	301478.34	338.36	0.00	8.41	46.02	17.42	790.16	153.18	38638.89	1557.56	71.07	24.87	135.40	8.80
1132-108a	Sierra Pelona Type 16	Talc-schist	0.00	185948.21	5439.71	286160.84	0.00	463.21	2.84	0.00	40.05	1318.46	168.14	44354.66	1585.83	53.54	22.76	189.73	6.55
1132-108b	Sierra Pelona Type 16	Talc-schist	6632.00	186493.52	5897.68	281416.31	0.00	88.52	4.63	7.16	28.94	1130.39	149.30	44770.42	1337.20	67.21	13.61	194.87	6.00
1132-109a	Sierra Pelona Type 16	Talc-schist	0.00	164432.52	4948.68	300929.67	0.00	4337.84	0.00	0.00	23.80	911.59	107.46	44560.09	1588.86	61.22	27.74	159.55	0.00
1132-109b	Sierra Pelona Type 16	Talc-schist	19798.30	178134.35	20460.83	260788.41	821.06	2803.12	23.17	0.00	32.36	2116.86	230.91	49114.51	1424.00	69.20	33.56	197.00	0.00
1132-110a	Sierra Pelona Type 16	Talc-schist	0.00	186121.00	724.33	298720.14	0.00	0.00	2.36	0.00	6.52	165.71	121.86	33074.70	1874.05	50.62	6.66	200.41	0.00
1132-110b	Sierra Pelona Type 16	Talc-schist	4261.83	171360.96	1234.72	306223.95	431.39	132.21	0.46	0.00	3.61	288.04	136.36	33878.29	1644.38	64.99	4.39	143.02	0.00
1132-111a	Sierra Pelona Type 16	Talc-schist	0.00	175263.61	5353.42	291458.63	0.00	515.62	0.00	0.00	64.69	1460.39	113.33	48601.80	1806.97	69.23	36.20	112.65	0.00
1132-111b	Sierra Pelona Type 16	Talc-schist	6393.10	169479.15	13205.01	287378.64	291.40	958.14	2.26	0.00	47.90	1340.87	148.31	44648.65	1530.03	64.22	33.91	171.01	0.00
1132-112a	Sierra Pelona Type 16	Talc-schist	0.00	201715.66	16674.86	262304.97	0.00	237.42	13.52	0.00	35.64	2241.84	197.01	46166.93	1597.15	61.37	19.32	166.72	8.32
1132-112b	Sierra Pelona Type 16	Talc-schist	1727.39	178626.69	7851.81	292737.94	124.81	286.39	4.99	31.62	9.37	1077.79	141.17	38927.45	1177.02	62.97	11.04	149.34	1.76
1132-113a	Sierra Pelona Type 16	Talc-schist	0.00	186752.78	162.63	292981.64	0.00	0.00	0.00	46.20	1.46	18.13	132.09	38650.48	664.35	59.20	3.69	5000.49	14.60
1132-113b	Sierra Pelona Type 16	Talc-schist	0.00	181830.95	204.92	299537.20	90.61	117.02	0.41	0.00	0.00	15.46	119.27	38733.90	548.89	59.42	10.78	113.93	0.00
1132-114a	Sierra Pelona Type 16	Talc-schist	0.00	187256.15	9359.02	283185.86	0.00	831.13	0.00	0.00	17.67	1077.34	165.19	42098.27	1548.37	63.62	25.10	156.51	0.00
1132-114b	Sierra Pelona Type 16	Talc-schist	7237.28	191825.83	9841.40	276368.64	551.23	1395.19	7.81	83.13	15.36	1222.89	161.95	38377.15	1452.24	67.95	5.34	156.74	5.35
1132-115a	Sierra Pelona Type 16	Talc-schist	0.00	156325.93	20486.92	245616.45	0.00	401.12	27.21	26932.86	102.73	2638.14	1585.62	85250.75	1495.90	75.69	53.01	139.11	3.08
1132-115b	Sierra Pelona Type 16	Talc-schist	6329.79	162776.70	31446.21	263847.70	338.34	1064.15	20.15	16.52	89.10	2772.18	274.47	61909.37	1331.15	69.44	58.88	159.32	6.13

Table 5a. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type16 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-116a	Sierra Pelona Type 16	Talc-schist	0.00	176605.95	45254.05	230742.98	0.00	1342.62	24.16	166.71	126.03	6598.95	354.79	77842.19	2421.11	117.97	72.08	242.16	10.77
1132-116b	Sierra Pelona Type 16	Talc-schist	3545.02	161848.08	63627.51	221193.07	373.07	1998.32	33.22	28.56	124.04	7193.21	423.96	80740.36	1808.46	101.62	105.37	162.89	3.18
1132-117b	Sierra Pelona Type 16	Talc-schist	4982.73	175104.63	391.50	306139.20	304.45	173.88	5.46	0.00	0.00	13.36	124.48	31482.60	560.43	46.78	4.49	90.29	7.06

Table 5b. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type 16 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-98a	Sierra Pelona Type 16	Talc-schist	1.56	8.99	1.32	2.42	0.91	3.41	0.00	0.92	35.73	1.82	3.11	0.59	3.01	0.43	0.00	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	0.00	197.33	0.39	0.10
1132-98a2	Sierra Pelona Type 16	Talc-schist	0.86	7.71	2.15	0.48	0.23	0.32	0.22	0.00	20.63	2.09	2.18	0.66	2.16	0.00	0.00	1.37	0.00	1.94	0.00	0.52	0.00	0.00	0.00	0.00	0.18	8.09	1.48	0.20
1132-98b	Sierra Pelona Type 16	Talc-schist	0.13	2.42	0.26	28.68	0.10	0.86	1.48	0.22	7.18	0.18	0.05	0.00	0.98	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.45	0.00	12.00	0.16	0.00
1132-98b2	Sierra Pelona Type 16	Talc-schist	0.55	4.25	0.32	6.09	0.37	0.00	1.56	0.00	13.17	0.46	0.56	0.12	0.46	0.00	0.00	0.88	0.00	0.34	0.11	0.50	0.00	0.00	0.20	0.35	0.23	38.16	0.26	0.13
1132-99a	Sierra Pelona Type 16	Talc-schist	0.23	1.53	0.41	0.25	0.09	0.74	0.42	0.09	5.35	0.16	0.41	0.00	0.85	0.00	0.00	0.52	0.00	0.51	0.00	0.25	0.20	0.43	0.15	0.51	0.00	3.84	0.00	0.04
1132-99a2	Sierra Pelona Type 16	Talc-schist	0.00	3.16	0.49	0.13	0.19	0.00	0.36	0.13	5.59	0.50	0.03	0.06	0.92	0.34	0.60	0.75	0.00	0.87	0.00	0.14	0.00	0.00	0.00	0.00	0.10	0.16	0.00	0.34
1132-99b	Sierra Pelona Type 16	Talc-schist	1.07	3.99	1.24	8.93	0.09	0.00	0.22	0.00	15.19	1.45	0.19	0.02	0.00	0.33	0.00	0.54	0.00	0.18	0.05	0.13	0.07	0.45	0.16	0.00	0.00	0.00	0.00	0.00
1132-99b2	Sierra Pelona Type 16	Talc-schist	0.27	5.17	1.12	0.60	0.15	0.00	0.00	0.00	15.36	1.61	0.68	0.02	1.07	0.39	0.16	0.52	0.03	1.00	0.00	0.66	0.22	0.00	0.00	0.17	0.11	0.00	0.00	0.22
1132-100a	Sierra Pelona Type 16	Talc-schist	0.00	0.76	0.12	0.00	0.08	0.95	0.82	0.29	4.31	0.46	0.62	0.10	0.00	0.26	0.00	0.00	0.00	0.09	0.00	0.14	0.00	0.36	0.00	0.00	0.00	1.78	0.23	0.00
1132-100a2	Sierra Pelona Type 16	Talc-schist	0.00	1.08	0.20	0.38	0.19	0.00	0.00	0.00	2.84	0.00	0.00	0.10	0.00	0.00	0.22	0.15	0.00	0.66	0.00	0.70	0.14	0.00	0.11	0.00	0.19	1.44	0.00	0.18
1132-100b2	Sierra Pelona Type 16	Talc-schist	0.38	3.86	0.24	0.11	0.03	4.50	42.91	0.08	10.19	1.86	1.52	0.18	1.94	0.53	0.00	0.00	0.00	0.43	0.00	0.64	0.00	1.09	0.13	0.43	0.00	4.22	0.30	0.21
1132-100b2	Sierra Pelona Type 16	Talc-schist	0.13	2.20	0.44	0.65	0.10	0.00	1.98	0.00	2.73	0.38	0.56	0.60	0.00	0.00	0.10	0.00	0.03	0.43	0.00	0.00	0.00	0.27	0.13	0.00	0.00	0.54	0.00	0.00
1132-101a	Sierra Pelona Type 16	Talc-schist	0.87	1.40	0.00	0.00	0.23	1.14	0.98	0.37	4.10	0.46	0.63	0.00	1.31	0.00	0.25	2.81	0.00	1.06	0.00	0.98	0.10	0.00	0.16	0.00	0.00	1.37	0.44	0.00
1132-101a2	Sierra Pelona Type 16	Talc-schist	0.41	2.35	0.00	0.00	0.17	0.16	0.63	0.00	7.75	0.35	0.18	0.42	0.00	0.00	0.17	0.00	0.38	0.69	0.00	0.52	0.00	0.00	0.00	0.77	0.00	0.00	0.33	0.26
1132-101b	Sierra Pelona Type 16	Talc-schist	0.13	1.88	0.46	0.00	0.17	0.09	0.47	0.05	5.96	0.33	0.45	0.06	0.94	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.24	0.23	0.29	0.00	0.00	0.00	0.00
1132-101b2	Sierra Pelona Type 16	Talc-schist	0.92	4.06	0.00	1.36	0.45	0.42	0.57	0.00	9.74	0.24	0.40	0.44	0.00	0.00	0.00	0.00	0.19	1.86	0.00	0.47	0.08	0.00	0.00	0.46	0.00	0.77	0.30	0.23
1132-102a	Sierra Pelona Type 16	Talc-schist	0.85	0.05	0.00	0.00	0.19	0.31	0.00	0.06	2.53	0.31	0.23	0.00	1.06	0.98	0.00	0.00	0.03	0.00	0.00	0.48	0.00	0.27	0.00	0.00	0.00	1.48	0.00	0.00
1132-102a2	Sierra Pelona Type 16	Talc-schist	0.42	3.07	0.00	0.00	0.41	0.32	0.43	0.03	9.41	0.12	0.12	0.18	0.00	0.00	0.00	0.00	0.03	0.70	0.21	0.00	0.18	0.30	0.07	0.00	0.00	0.00	0.04	0.00
1132-102b	Sierra Pelona Type 16	Talc-schist	0.50	0.22	0.00	0.42	0.17	0.45	0.00	0.00	2.24	0.28	0.20	0.00	0.40	0.17	0.00	0.00	0.02	1.52	0.00	1.26	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00
1132-102b2	Sierra Pelona Type 16	Talc-schist	0.00	3.67	0.63	0.27	0.38	0.00	1.77	0.24	13.20	0.00	0.07	0.03	1.09	0.00	0.00	0.00	0.03	1.05	0.17	0.40	0.00	0.33	0.23	0.00	0.07	0.00	0.00	0.00
1132-103a	Sierra Pelona Type 16	Talc-schist	0.30	17.22	2.86	0.00	0.33	0.45	0.00	0.26	32.12	5.29	7.17	0.72	3.36	0.59	0.77	1.26	0.00	1.61	0.00	0.59	0.00	0.00	0.00	0.62	0.00	48.58	0.91	0.00
1132-103b	Sierra Pelona Type 16	Talc-schist	0.20	7.95	0.79	0.78	0.00	0.00	0.00	0.04	16.29	0.93	0.78	0.48	0.00	0.00	0.00	0.00	0.00	1.33	0.38	0.00	0.00	0.00	0.39	1.24	0.00	41.71	0.19	0.00
1132-104a	Sierra Pelona Type 16	Talc-schist	0.19	1.29	1.45	0.00	0.43	0.10	0.50	0.00	4.55	0.47	0.14	0.09	0.00	0.19	0.20	0.00	0.10	0.21	0.05	0.08	0.00	0.40	0.00	0.40	0.13	0.69	0.17	0.45
1132-104b	Sierra Pelona Type 16	Talc-schist	1.22	4.16	0.63	0.08	0.00	0.10	1.54	0.00	15.87	1.00	0.84	0.38	1.59	0.00	0.11	0.00	0.25	1.15	0.03	1.05	0.06	0.00	0.34	0.00	0.12	0.00	0.00	0.00
1132-105a	Sierra Pelona Type 16	Talc-schist	0.18	0.95	0.00	0.00	0.40	0.00	1.42	0.05	0.35	0.29	0.23	0.22	0.14	0.71	0.09	0.00	0.00	0.00	0.00	0.07	0.00	0.13	0.06	0.00	0.07	1.31	0.00	0.27
1132-105b	Sierra Pelona Type 16	Talc-schist	0.13	0.42	0.38	0.00	0.00	0.91	0.41	0.00	2.16	0.00	0.23	0.07	0.00	0.00	0.11	0.00	0.25	0.67	0.37	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
1132-106a	Sierra Pelona Type 16	Talc-schist	0.00	1.09	2.07	0.00	0.36	1.06	2.96	0.09	2.30	1.52	0.77	0.35	0.85	0.16	0.25	0.41	0.13	0.88	0.00	0.96	0.00	0.00	0.21	0.00	0.00	0.00	0.07	0.03
1132-106b	Sierra Pelona Type 16	Talc-schist	0.12	1.06	0.35	0.07	0.00	0.00	0.00	0.00	4.23	0.10	0.11	0.20	0.28	0.37	0.00	0.00	0.07	1.62	0.03	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.38
1132-107a	Sierra Pelona Type 16	Talc-schist	0.22	1.67	1.22	0.33	0.24	1.87	1.99	0.32	7.15	0.72	0.78	0.11	0.16	0.00	0.11	1.28	0.00	1.41	0.42	0.43	0.00	0.00	0.42	0.00	0.15	1.18	0.28	0.32
1132-107b	Sierra Pelona Type 16	Talc-schist	0.00	0.65	0.07	0.35	0.23	0.09	1.65	0.00	2.38	0.05	0.16	0.11	0.57	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.16	0.00	0.12	0.00	0.00	0.00	0.12	0.00
1132-108a	Sierra Pelona Type 16	Talc-schist	0.41	0.92	1.92	0.00	0.36	0.00	3.14	0.21	5.88	0.59	0.93	0.00	0.54	0.47	0.62	0.61	0.00	1.04	0.00	0.29	0.00	0.50	0.31	0.70	0.10	0.00	0.31	0.05
1132-108b	Sierra Pelona Type 16	Talc-schist	0.00	1.49	0.91	0.43	0.00	0.00	0.32	0.13	4.80	0.17	0.00	0.43	0.73	0.00	0.00	0.00	0.00	0.00	0.07	0.19	0.20	0.00	0.00	0.40	0.20	0.43	0.00	0.00
1132-109a	Sierra Pelona Type 16	Talc-schist	0.00	1.10	1.57	0.99	0.24	1.49	4.29	0.29	4.44	0.80	0.99	0.24	0.25	1.94	0.00	1.94	0.00	0.36	0.27	0.00	0.00	0.68	0.00	0.68	0.04	3.56	0.57	0.07
1132-109b	Sierra Pelona Type 16	Talc-schist	0.12	9.45	0.94	0.43	0.63	0.00	1.07	0.11	19.09	1.06	1.65	0.05	1.21	0.00	0.00	0.32	0.16	0.00	0.57	0.65	0.00	0.56	0.00	0.99	0.00	0.72	0.00	0.00
1132-110a	Sierra Pelona Type 16	Talc-schist	0.20	0.00	0.40	0.00	0.15	0.51	1.04	0.23	1.03	0.26	0.20	0.00	1.05	0.79	0.31	1.52	0.00	1.51	0.11	0.08	0.00	0.69	0.13	0.08	0.14	1.45	0.26	0.00
1132-110b	Sierra Pelona Type 16	Talc-schist	0.00	0.00	0.27	0.00	0.26	0.00	1.73	0.12	1.66	0.00	0.15	0.00	0.65	0.00	0.06	1.91	0.32	0.47	0.18	0.00	0.06	0.89	0.03	0.18	0.06	1.94	0.00	0.17
1132-111a	Sierra Pelona Type 16	Talc-schist	0.00	1.34	2.13	0.00	0.09	0.82	0.60	0.07	3.58	1.30	0.57	0.56	0.52	1.37	0.36	1.37	0.00	1.00	0.00	0.64	0.06	1.45	0.00	0.10	0.00	3.77	0.71	0.00
1132-111b	Sierra Pelona Type 16	Talc-schist	0.85	3.91	0.49	0.69	0.04	0.00	0.00	0.23	7.47	0.62	0.81	0.48	1.27	0.00	0.00	0.00	0.31	0.00	0.24	0.00	0.00	0.29	0.00	0.00	0.00	0.38	0.00	0.09
1132-112a	Sierra Pelona Type 16	Talc-schist	0.00	3.96	0.00	0.86	0.17	1.96	0.30	0.20	9.13	0.69	0.43	0.17	0.00	0.00	0.24	0.00	0.00	0.74	0.06	0.27	0.00	0.16	0.00	0.67	0.03	25.22	0.00	0.00
1132-112b	Sierra Pelona Type 16	Talc-schist	0.00	2.28	0.19	0.00	0.00	0.21	1.42	0.00	16.25	0.15	0.45	0.18	0.00	0.00	0.16	0.00	0.14	0.00	0.06	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.40	0.00
1132-113a	Sierra Pelona Type 16	Talc-schist	0.57	0.35	0.17	0.32	0.08	0.00	1.33	0.00	0.28	0.00	0.15	0.13	0.00	0.41	0.39	0.55	0.00	0.82	0.00	0.70	0.17	0.00	0.00	0.00	0.00	0.00	0.36	0.14
1132-113b	Sierra Pelona Type 16	Talc-schist	0.00	0.00	0.24	0.07	0.00	0.19	0.77	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.31	0.00	0.53	0.00	0.00	0.05	0.00	0.04	0.08
1132-114a	Sierra Pelona Type 16	Talc-schist	0.13	3.67	0.00	0.59	0.00	0.20	0.97	0.00	4.62	0.06	0.26	0.02	0.74	0.00	0.05	0.00	0.00	0.11	0.00	0.16	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.13
1132-114b	Sierra Pelona Type 16	Talc-schist	0.00	3.49	0.00	0.08	0.00	0.00	0.29	0.06	6.08	0.69	0.15	0.00	0.00	0.00	0.39	0.00	0.03	0.24	0.06	0.17	0.06	0.89	0.03	0.00	0.24	1.16	0.22	0.00
1132-115a	Sierra Pelona Type 16	Talc-schist	0.48	5.17	1.85	50.30	11.67	0.00	1.12	0.03	11.71	0.77	0.60	0.37	1.75	0.00	0.00	1.08	0.00	1.09	0.15	0.59	0.05	0.00	0.12	1.07	0.55	0.17	0.83	0.27
1132-115b	Sierra Pelona Type 16	Talc-schist	0.40	7.30	0.57	2.60	0.00	1.09	1.48	0.00	12.83	0.75	0.60	0.24	0.28	0.19	0.05	0.00	0.00	0.41	0.16	0.15	0.10	1.28	0.21	0.00	0.05	1.00	0.00	0.00

Table 5b. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type 16 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-116a	Sierra Pelona Type 16	Talc-schist	0.00	5.93	0.83	0.31	0.46	0.00	1.02	0.03	15.58	1.13	0.45	0.23	0.00	0.00	0.50	0.00	0.00	0.58	0.00	0.34	0.00	0.00	0.20	0.35	0.17	0.00	0.09	0.00
1132-116b	Sierra Pelona Type 16	Talc-schist	0.18	9.25	0.38	0.21	0.00	0.94	0.00	0.00	26.14	0.99	0.79	0.21	0.00	0.00	0.05	0.16	0.03	0.21	0.05	0.15	0.16	0.80	0.27	0.32	0.00	0.35	0.00	0.23
1132-117b	Sierra Pelona Type 16	Talc-schist	0.09	0.00	0.36	0.31	0.00	0.00	0.00	0.00	0.73	0.20	0.00	0.00	0.00	0.00	0.07	0.00	0.27	1.56	0.00	0.92	0.00	1.18	0.50	0.00	0.00	0.00	0.41	0.00

Table 6a. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type17 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-118a	Sierra Pelona Type 17	Talc-schist	62582.88	173455.40	12531.72	248392.89	3222.78	0.00	23.53	174.84	10.76	3316.90	272.67	41916.11	2146.39	75.14	22.99	182.49	2.84
1132-118a2	Sierra Pelona Type 17	Talc-schist	25.40	173727.11	456.79	312943.51	935.87	0.00	0.00	60.23	0.00	171.31	123.67	25928.21	1583.77	51.62	5.92	159.08	0.00
1132-118b	Sierra Pelona Type 17	Talc-schist	35760.94	176035.99	29604.27	234904.12	941.20	1888.13	2.45	163.26	33.01	7141.06	573.23	56968.94	2410.42	124.75	33.18	170.41	0.00
1132-118b2	Sierra Pelona Type 17	Talc-schist	8431.21	195103.36	10636.44	277295.92	293.40	0.00	1.71	66.02	2.18	2042.17	246.06	31732.21	1411.88	63.19	19.45	182.58	0.00
1132-119a	Sierra Pelona Type 17	Talc-schist	32809.22	167061.87	29374.01	238567.81	958.58	0.00	21.58	306.14	95.70	5785.49	1407.79	67667.80	2045.26	171.21	42.34	236.47	19.16
1132-119a2	Sierra Pelona Type 17	Talc-schist	6189.82	197868.67	32183.43	239631.13	200.18	1011.71	15.36	98.81	73.41	4963.74	434.94	54073.10	1603.98	86.47	34.30	208.30	2.11
1132-119b	Sierra Pelona Type 17	Talc-schist	43064.49	158596.51	50206.44	207378.41	2655.66	2754.79	31.50	247.75	118.69	7230.93	856.60	82139.18	1986.87	118.31	31.09	168.46	0.00
1132-119b2	Sierra Pelona Type 17	Talc-schist	6364.54	187092.55	36835.46	242072.73	649.95	305.10	27.39	137.05	76.59	5916.60	383.91	56147.95	1414.27	80.50	42.95	147.89	0.00
1132-120a	Sierra Pelona Type 17	Talc-schist	60190.90	174538.19	21980.23	225136.06	2239.12	705.32	11.86	4859.87	40.40	823.15	639.88	62567.34	1369.37	98.38	0.00	165.41	2.57
1132-120a2	Sierra Pelona Type 17	Talc-schist	0.00	216603.93	23722.16	242947.00	884.90	58.04	6.11	261.81	49.27	642.16	276.67	49691.65	1097.06	75.21	14.57	158.71	11.20
1132-120b	Sierra Pelona Type 17	Talc-schist	48101.65	154213.97	84043.71	180310.95	3187.14	2685.60	34.31	80.55	139.07	2720.77	566.75	83707.56	1297.73	63.44	10.10	133.68	0.00
1132-120b2	Sierra Pelona Type 17	Talc-schist	8602.68	186912.37	76452.96	192880.68	859.38	2431.13	30.64	124.76	154.33	2333.57	547.44	76647.18	1384.87	72.82	4.44	214.04	18.69
1132-121a	Sierra Pelona Type 17	Talc-schist	69853.87	216101.76	2195.07	224669.70	3044.67	1630.95	0.00	55.49	0.00	315.39	191.05	36125.54	2715.22	98.14	33.86	216.08	0.00
1132-121b	Sierra Pelona Type 17	Talc-schist	9277.38	176614.99	5680.41	297976.76	681.36	268.45	8.07	81.36	8.44	1029.65	161.54	27784.85	2151.22	82.23	9.41	185.43	7.86
1132-122a	Sierra Pelona Type 17	Talc-schist	48390.11	138527.07	11955.75	284873.15	2683.01	1386.21	17.10	34.60	6.39	2092.41	188.67	42995.55	1653.20	79.39	3.72	187.31	1.69
1132-122a2	Sierra Pelona Type 17	Talc-schist	0.00	179500.43	5140.85	294593.82	835.93	492.19	4.11	0.00	18.05	806.47	182.41	39046.82	1991.77	81.67	13.94	182.43	1.03
1132-122b	Sierra Pelona Type 17	Talc-schist	60785.58	147696.41	13591.69	264070.14	3410.13	90.62	1.52	67.82	49.16	2982.82	223.75	49078.16	1883.80	79.31	32.82	157.57	11.56
1132-122b2	Sierra Pelona Type 17	Talc-schist	5677.29	187828.03	17483.22	266515.61	967.44	400.25	4.01	90.94	55.85	3254.72	237.65	46643.51	2338.84	88.87	16.19	242.71	11.04
1132-123a	Sierra Pelona Type 17	Talc-schist	62568.02	131051.36	13185.89	258319.33	3571.15	0.00	21.80	13231.15	2.26	3075.90	1338.89	58809.43	2430.14	62.77	35.86	127.43	0.00
1132-123a2	Sierra Pelona Type 17	Talc-schist	3862.36	193884.22	15805.67	260085.85	793.66	289.62	5.08	510.12	21.40	3711.18	268.41	51476.45	3451.02	101.91	18.17	256.23	8.17
1132-123b	Sierra Pelona Type 17	Talc-schist	0.00	162120.98	4577.44	257204.01	0.00	0.00	11.03	90.70	140.91	5798.95	237.34	110610.84	3104.60	94.43	25.17	198.57	0.00
1132-123b2	Sierra Pelona Type 17	Talc-schist	6654.46	162664.53	7305.26	254672.27	799.06	392.22	12.44	9149.42	117.13	6432.17	1010.50	91160.53	2744.73	83.85	32.27	234.58	7.38
1132-124a	Sierra Pelona Type 17	Talc-schist	4733.62	191386.29	7664.35	274951.94	897.58	0.00	0.00	0.00	36.04	654.21	253.66	48204.78	1063.06	56.83	13.19	179.24	0.00
1132-124b	Sierra Pelona Type 17	Talc-schist	6825.96	167389.18	37170.86	261973.76	1214.98	4043.89	15.82	0.00	59.19	1090.84	2256.61	46977.10	1731.22	195.36	21.98	146.90	2.38
1132-125a	Sierra Pelona Type 17	Talc-schist	11345.54	184269.80	4484.45	287271.22	0.00	540.26	16.47	184.68	24.08	1312.28	181.01	34630.95	1975.63	73.40	1.23	141.74	0.00
1132-125b	Sierra Pelona Type 17	Talc-schist	12497.45	193742.84	2135.87	280419.67	2113.74	224.19	10.10	0.00	7.75	567.36	204.29	35003.73	2403.11	72.93	9.97	186.86	7.03
1132-126a	Sierra Pelona Type 17	Talc-schist	4995.19	150432.53	31045.52	265759.26	0.00	19531.86	9.13	630.04	94.54	2764.54	661.74	56712.41	962.22	51.11	10.49	103.63	0.00
1132-126b	Sierra Pelona Type 17	Talc-schist	9884.70	174851.85	41080.60	241427.76	1347.52	1647.44	0.00	149.72	144.31	4208.53	410.04	62105.71	1407.11	56.77	34.66	188.74	9.64
1132-127a	Sierra Pelona Type 17	Talc-schist	7863.21	217217.13	44728.40	207637.39	761.52	0.00	0.00	0.00	30.80	13098.67	336.92	53362.36	2251.48	73.91	8.50	170.96	0.00
1132-127a2	Sierra Pelona Type 17	Talc-schist	13535.47	192096.51	30748.45	248665.18	1202.63	743.19	10.23	0.00	42.63	7551.35	263.14	38359.70	2727.81	85.36	15.78	197.18	0.00
1132-127b	Sierra Pelona Type 17	Talc-schist	2955.06	200045.93	31150.99	247612.17	2412.23	0.00	0.00	117.50	25.54	7606.02	243.48	40081.08	2419.77	73.08	1.30	130.29	0.00
1132-127b2	Sierra Pelona Type 17	Talc-schist	23071.23	183815.30	36612.52	238348.98	1000.86	564.63	12.57	0.00	47.05	9126.49	313.50	45594.62	2399.18	79.38	21.53	229.01	1.24
1132-128a	Sierra Pelona Type 17	Talc-schist	16613.43	176370.95	558.83	300959.39	1059.61	0.00	0.00	0.00	0.00	116.22	156.71	24979.86	1614.68	81.09	5.46	148.15	0.00
1132-128a2	Sierra Pelona Type 17	Talc-schist	13161.96	159137.78	1552.60	315078.91	947.73	710.77	0.00	119.54	4.74	158.05	140.28	24563.61	2047.24	59.10	12.15	201.98	0.00
1132-128b	Sierra Pelona Type 17	Talc-schist	10920.07	172375.77	1273.98	305208.76	1740.14	0.00	5.50	108.34	0.66	475.02	207.36	26654.84	1495.20	59.34	0.00	173.31	0.00
1132-128b2	Sierra Pelona Type 17	Talc-schist	10628.10	167514.43	605.71	310785.43	783.55	0.00	0.00	0.00	0.44	81.52	129.48	26369.54	1672.98	75.63	2.97	128.12	10.97
1132-129a	Sierra Pelona Type 17	Talc-schist	0.00	156230.37	47671.57	245492.70	568.91	227.35	23.62	23.27	83.83	9734.06	353.74	75162.01	1167.68	92.62	10.09	93.41	0.00
1132-129a2	Sierra Pelona Type 17	Talc-schist	16829.24	153701.73	1959.35	314146.66	767.65	543.44	0.00	28.24	7.74	342.70	130.14	28741.49	1860.36	73.99	9.29	108.11	4.58
1132-129b	Sierra Pelona Type 17	Talc-schist	9246.03	177911.94	1505.24	297102.86	1275.83	125.58	7.32	232.00	8.09	217.35	159.24	33957.67	1649.26	73.20	6.01	116.54	0.00
1132-129b2	Sierra Pelona Type 17	Talc-schist	12820.17	179663.93	11774.03	276391.55	1057.25	684.75	0.00	31.84	32.61	1958.49	198.09	43722.02	1876.96	84.89	9.24	190.01	9.29
1132-130a	Sierra Pelona Type 17	Talc-schist	15185.91	181067.33	46680.70	217747.47	757.03	5173.56	16.76	6566.81	66.45	4306.95	758.82	65898.97	1685.91	138.13	32.17	122.92	0.00
1132-130a2	Sierra Pelona Type 17	Talc-schist	10341.05	163114.11	33787.00	262987.72	795.06	601.99	21.34	1151.58	79.25	2978.16	463.09	53647.52	1898.39	108.83	24.98	213.84	2.46
1132-130b	Sierra Pelona Type 17	Talc-schist	19597.38	195508.22	19331.19	238222.13	647.02	19735.75	12.35	858.08	25.18	1773.07	555.66	46813.54	1549.57	124.70	0.00	240.07	0.00
1132-130b2	Sierra Pelona Type 17	Talc-schist	6563.70	174504.50	30057.66	256172.88	985.79	3937.35	15.81	6886.25	68.67	2585.52	413.12	49550.33	1760.34	93.14	7.18	228.14	9.85
1132-131a	Sierra Pelona Type 17	Talc-schist	8760.32	199687.39	7422.71	276055.02	1761.86	0.00	19.01	163.05	4.04	1225.19	285.84	31033.90	2092.13	58.92	1.33	193.87	8.72
1132-131b	Sierra Pelona Type 17	Talc-schist	6464.62	165051.30	7991.63	307962.05	255.23	626.37	3.45	36.88	13.30	1221.41	189.29	25838.93	1942.64	71.21	9.28	211.81	13.15

Table 6a. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type17 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1132-132a	Sierra Pelona Type 17	Talc-schist	9999.82	191220.47	8753.46	281735.30	1752.35	0.00	24.97	0.00	6.12	2050.49	182.85	29015.62	1954.61	59.85	0.00	177.46	0.00
1132-132b	Sierra Pelona Type 17	Talc-schist	79810.19	149188.79	6569.04	271314.34	5688.79	413.24	4.56	0.00	12.28	1557.95	171.78	27358.12	1782.20	66.55	8.94	169.88	2.36
1132-133a	Sierra Pelona Type 17	Talc-schist	13871.36	201667.98	6047.09	265326.43	1277.59	223.86	9.39	20.13	23.92	2125.95	309.09	41633.31	1608.97	65.37	11.20	159.53	0.00
1132-133b	Sierra Pelona Type 17	Talc-schist	7645.37	170038.48	4244.64	301405.86	527.93	0.00	0.00	12.43	23.99	1304.34	241.79	34139.91	1799.17	78.73	13.93	162.10	2.41

Table 6b. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type 17 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-118a	Sierra Pelona Type 17	Talc-schist	0.00	0.00	0.12	0.00	0.00	2.63	0.00	0.95	4.78	0.39	0.00	0.22	0.00	0.00	0.45	0.00	0.19	0.00	0.40	0.00	0.19	0.00	0.00	1.62	0.00	1.88	0.00	0.00
1132-118a2	Sierra Pelona Type 17	Talc-schist	0.00	0.37	0.13	0.08	0.00	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.42	0.10	0.00	0.00	0.00	0.75	0.00	0.00	0.05	0.81	0.00	0.24	0.00	0.83	0.15	0.08
1132-118b	Sierra Pelona Type 17	Talc-schist	0.00	1.81	0.12	0.00	0.10	5.90	0.00	0.00	20.16	0.00	3.42	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.17	0.00	586.28	0.00	0.16
1132-118b2	Sierra Pelona Type 17	Talc-schist	0.34	1.09	0.00	0.09	0.56	0.00	0.16	0.06	2.43	0.00	0.29	0.27	1.37	0.11	0.00	0.55	0.00	1.06	0.12	0.00	0.00	1.18	0.27	0.44	0.11	1.27	0.17	0.00
1132-119a	Sierra Pelona Type 17	Talc-schist	0.00	5.93	1.22	0.00	0.00	2.77	0.00	0.10	79.05	1.65	2.47	0.08	1.00	0.48	0.00	0.31	0.05	0.00	0.50	0.00	0.14	0.00	0.00	0.00	0.23	8.74	0.00	0.00
1132-119a2	Sierra Pelona Type 17	Talc-schist	0.00	2.82	0.00	0.25	0.12	0.92	2.19	0.21	9.10	0.00	0.31	0.02	0.14	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.12	0.08	0.00	1.47	0.00	0.07
1132-119b	Sierra Pelona Type 17	Talc-schist	0.00	15.54	1.33	0.00	0.00	1.12	0.00	0.00	66.23	2.84	2.78	0.54	2.36	0.00	0.48	0.00	0.04	0.36	0.09	0.00	0.05	0.00	0.00	0.00	0.21	2.40	0.39	0.72
1132-119b2	Sierra Pelona Type 17	Talc-schist	0.00	3.10	0.00	0.00	0.11	0.00	1.01	0.00	9.13	0.18	0.20	0.00	0.68	0.00	0.00	0.00	0.00	0.94	0.05	0.00	0.11	0.00	0.06	0.08	0.00	0.00	0.23	0.00
1132-120a	Sierra Pelona Type 17	Talc-schist	0.00	3.92	1.71	199.22	2.69	0.00	0.00	0.00	8.28	0.94	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.97	0.00	0.17	1.47	0.00	3.43	0.05	1.70	0.00	0.00
1132-120a2	Sierra Pelona Type 17	Talc-schist	0.61	1.29	0.06	16.68	0.46	0.95	0.97	0.14	5.14	0.59	0.00	0.20	0.18	0.13	0.00	0.00	0.00	1.26	0.22	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.71	0.00
1132-120b	Sierra Pelona Type 17	Talc-schist	0.00	17.01	0.00	0.00	0.00	0.00	0.00	0.00	32.53	0.71	0.52	0.52	1.38	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.13	1.12	0.10	0.00	0.04	0.00	0.13	0.12
1132-120b2	Sierra Pelona Type 17	Talc-schist	0.50	15.71	0.00	0.00	0.39	1.79	0.77	0.03	22.35	0.38	0.47	0.00	0.00	0.00	0.00	0.00	0.06	0.64	0.00	0.00	0.00	0.00	0.00	0.49	0.10	0.00	0.00	0.05
1132-121a	Sierra Pelona Type 17	Talc-schist	0.00	0.00	0.60	0.00	0.00	0.50	0.00	0.13	2.90	0.00	0.00	0.00	0.00	0.00	1.08	0.00	0.00	0.49	0.38	0.00	0.31	0.00	0.00	0.00	0.00	1.79	0.00	0.00
1132-121b	Sierra Pelona Type 17	Talc-schist	0.00	0.66	0.00	0.41	0.05	3.13	1.58	0.00	1.17	0.00	0.32	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.08	0.22	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.37
1132-122a	Sierra Pelona Type 17	Talc-schist	0.00	1.68	0.07	0.00	0.00	1.88	0.00	0.00	5.60	0.00	0.45	0.32	0.00	0.00	0.00	0.74	0.19	0.00	0.00	0.23	0.04	0.00	0.00	0.00	0.00	0.67	0.00	0.20
1132-122a2	Sierra Pelona Type 17	Talc-schist	0.53	1.09	0.20	0.00	0.00	0.62	0.00	0.10	4.50	0.00	0.63	0.11	0.00	0.00	0.00	0.21	0.00	0.40	0.07	0.00	0.00	0.00	0.16	0.51	0.17	0.60	0.24	0.14
1132-122b	Sierra Pelona Type 17	Talc-schist	0.00	0.61	0.51	0.00	0.00	0.61	0.00	0.00	5.82	0.68	0.22	0.25	1.16	0.00	0.13	0.00	0.04	0.89	0.23	0.22	0.00	0.00	0.08	0.00	0.00	2.40	0.00	0.00
1132-122b2	Sierra Pelona Type 17	Talc-schist	0.00	1.53	0.20	0.56	0.00	1.34	2.04	0.10	6.35	0.06	0.48	0.05	0.33	0.00	0.00	0.00	0.32	0.13	0.00	0.00	0.00	0.34	0.15	0.50	0.42	1.74	0.00	0.33
1132-123a	Sierra Pelona Type 17	Talc-schist	0.33	0.80	0.00	0.00	6.20	0.77	0.00	0.00	3.48	0.32	0.00	0.00	0.00	0.10	0.22	0.00	0.00	0.00	0.39	0.00	0.16	0.00	0.00	0.00	0.33	0.55	0.18	0.25
1132-123a2	Sierra Pelona Type 17	Talc-schist	0.00	1.49	0.45	0.17	0.00	0.55	0.00	0.26	3.35	0.06	0.26	0.15	0.60	0.00	0.76	0.19	0.00	0.12	0.12	0.35	0.00	0.00	0.00	0.09	0.00	0.88	0.00	0.47
1132-123b	Sierra Pelona Type 17	Talc-schist	0.00	1.83	0.00	0.00	0.33	0.00	0.19	0.00	1.47	0.00	0.00	0.00	0.00	0.92	0.00	0.00	0.13	0.67	0.00	0.00	0.24	0.00	0.00	0.00	0.23	0.00	0.00	0.18
1132-123b2	Sierra Pelona Type 17	Talc-schist	0.00	0.87	0.41	0.76	2.00	1.09	0.64	0.13	3.02	0.37	0.50	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.06	0.00	0.00	0.28	0.00	0.57	0.13	0.47	0.50	0.50
1132-124a	Sierra Pelona Type 17	Talc-schist	0.00	1.10	0.98	0.00	0.66	0.54	4.01	0.00	12.40	0.24	0.36	0.00	0.53	1.16	0.00	0.00	0.00	1.48	0.00	0.89	0.17	1.01	0.00	0.19	0.00	1.01	0.00	0.00
1132-124b	Sierra Pelona Type 17	Talc-schist	1.62	19.17	1.50	0.00	0.11	1.25	0.62	0.23	87.09	1.74	9.06	0.30	2.60	0.00	0.19	0.00	0.05	0.73	0.11	0.46	0.00	0.54	0.00	0.00	0.03	5.66	0.04	0.33
1132-125a	Sierra Pelona Type 17	Talc-schist	0.00	0.63	0.00	1.18	0.27	0.00	1.62	0.17	1.42	0.00	0.00	0.14	0.00	1.97	0.00	0.00	0.00	0.00	0.08	0.00	0.29	0.41	0.00	1.17	0.00	0.00	0.00	0.22
1132-125b	Sierra Pelona Type 17	Talc-schist	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	1.07	0.09	0.22	0.23	0.00	0.00	0.00	0.00	0.18	0.55	0.19	0.27	0.00	0.00	0.00	0.42	0.00	0.81	0.00	0.20
1132-126a	Sierra Pelona Type 17	Talc-schist	0.32	4.90	2.18	9.00	0.65	0.00	0.00	0.00	13.48	0.00	0.63	0.00	0.00	0.69	0.00	0.00	0.39	0.60	0.00	0.00	0.15	1.99	0.23	0.29	0.34	0.90	0.00	0.00
1132-126b	Sierra Pelona Type 17	Talc-schist	0.00	2.26	0.55	0.25	0.00	1.17	0.00	0.04	10.05	0.00	0.57	0.00	2.26	0.00	0.00	0.00	0.71	0.18	0.00	0.00	0.22	0.00	0.00	0.41	0.13	5.05	0.00	0.06
1132-127a	Sierra Pelona Type 17	Talc-schist	0.00	2.91	0.00	0.00	0.79	0.00	0.00	0.00	5.69	0.00	0.27	0.00	0.00	0.83	0.58	0.00	0.00	1.45	0.00	0.00	0.28	0.40	0.00	0.69	0.00	0.00	0.06	0.00
1132-127a2	Sierra Pelona Type 17	Talc-schist	0.00	3.15	0.00	0.00	0.67	0.99	2.73	0.00	4.61	0.00	0.26	0.00	0.38	0.00	0.00	0.00	0.15	0.00	0.08	0.00	0.19	0.40	0.18	0.00	0.00	0.00	0.00	0.05
1132-127b	Sierra Pelona Type 17	Talc-schist	0.00	2.37	0.00	0.00	0.00	0.35	1.72	0.55	4.91	0.04	0.30	0.00	0.68	0.00	0.00	0.00	0.26	1.21	0.00	0.00	0.66	0.00	0.00	0.25	0.13	2.35	0.31	0.00
1132-127b2	Sierra Pelona Type 17	Talc-schist	0.00	3.98	0.30	0.59	0.00	0.00	3.06	0.00	5.04	0.00	0.33	0.00	2.58	0.45	0.00	0.56	0.25	0.17	0.00	0.13	0.17	0.00	0.30	0.26	0.13	4.46	0.19	0.00
1132-128a	Sierra Pelona Type 17	Talc-schist	0.00	0.00	0.13	0.00	0.47	0.00	0.00	0.00	0.92	0.00	0.00	0.06	0.95	0.75	0.00	0.00	0.00	0.14	0.00	0.00	0.11	0.00	0.08	0.42	0.00	0.65	0.00	0.00
1132-128a2	Sierra Pelona Type 17	Talc-schist	0.71	0.73	0.61	0.00	0.43	0.59	0.00	0.10	3.37	0.00	0.51	0.27	1.00	0.00	0.00	0.00	0.00	1.71	0.03	0.49	0.00	0.00	0.23	0.20	0.00	2.32	0.00	0.14
1132-128b	Sierra Pelona Type 17	Talc-schist	0.00	0.72	0.00	0.00	0.49	0.24	0.00	0.00	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.60	0.00	0.00	0.21	0.00	0.14	0.00	0.03	0.00	0.00	0.00
1132-128b2	Sierra Pelona Type 17	Talc-schist	0.24	1.57	0.00	0.00	0.79	0.61	0.92	0.23	0.78	0.23	0.13	0.00	1.72	0.00	0.00	0.00	0.13	1.22	0.03	0.00	0.13	0.00	0.00	0.00	0.03	0.40	0.00	0.24
1132-129a	Sierra Pelona Type 17	Talc-schist	0.00	2.31	0.00	0.37	0.00	0.21	0.15	0.00	6.38	0.08	0.18	0.17	0.00	0.89	0.19	0.00	0.10	0.00	0.00	0.00	0.08	0.77	0.00	0.00	0.00	0.47	0.00	0.00
1132-129a2	Sierra Pelona Type 17	Talc-schist	0.00	0.37	0.58	0.09	0.08	0.00	0.56	0.00	3.71	0.00	0.36	0.00	0.32	0.11	0.00	0.00	0.00	0.12	0.35	0.00	0.37	0.49	0.00	0.00	0.00	0.73	0.00	0.00
1132-129b	Sierra Pelona Type 17	Talc-schist	0.37	0.31	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.79	0.20	0.00	0.00	0.80	0.00	0.00	0.09	1.43	0.00	0.49	0.03	0.00	0.00	0.08
1132-129b2	Sierra Pelona Type 17	Talc-schist	0.00	2.70	0.15	0.49	0.00	0.00	0.95	0.00	3.01	0.00	0.07	0.00	2.50	0.00	0.06	0.00	0.07	0.42	0.18	0.00	0.00	0.55	0.00	0.00	0.18	1.64	0.00	0.00
1132-130a	Sierra Pelona Type 17	Talc-schist	0.93	5.54	10.31	975.35	2.48	0.00	0.00	0.00	27.80	2.13	6.53	0.88	3.48	1.26	0.47	0.60	0.16	3.96	0.40	2.13	0.52	2.25	0.22	25.66	0.50	4.14	1.01	1.09
1132-130a2	Sierra Pelona Type 17	Talc-schist	0.00	2.72	1.31	96.12	0.65	0.00	0.25	0.25	14.17	0.74	2.27	0.27	1.13	0.00	0.00	0.00	0.22	0.00	0.09	0.58	0.11	0.73	0.00	1.88	0.00	0.98	0.45	0.43
1132-130b	Sierra Pelona Type 17	Talc-schist	0.25	22.54	28.25	5.50	0.31	0.00	2.58	0.26	10.92	2.57	12.29	2.01	15.61	2.88	0.00	7.68	1.22	7.96	0.88	2.34	0.09	4.25	0.29	1.39	0.00	5.50	0.86	0.24
1132-130b2	Sierra Pelona Type 17	Talc-schist	0.00	3.51	4.61	154.88	4.53	1.99	1.01	0.11	8.32	1.86	3.97	0.48	2.27	0.00	0.07	0.00	0.15	1.93	0.34	0.77	0.15	0.97	0.26	5.24	0.11	6.54	0.49	0.79
1132-131a	Sierra Pelona Type 17	Talc-schist	0.32	0.95	0.00	0.86	0.72	0.21	0.30	0.00	2.75	0.00	0.00	0.23	1.41	0.97	0.00	0.00	0.00	0.22	0.00	0.00	0.22	0.55	0.38	0.16	0.32	0.00	0.16	0.31
1132-131b	Sierra Pelona Type 17	Talc-schist	0.00	2.86	0.17	0.00	0.00	0.15	1.47	0.12	1.78	0.00	0.32	0.00	2.48	0.43	0.23	0.53	0.24	0.00	0.21	0.00	0.08	1.06	0.29	0.00	0.00	2.86	0.00	0.17

Table 6b. Calibrated LA-ICP-MS data for CA-LAN-1132 Talc schist Type 17 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1132-132a	Sierra Pelona Type 17	Talc-schist	0.00	1.22	0.05	0.00	0.53	0.00	1.64	0.00	2.27	0.00	0.00	0.00	0.85	1.30	0.00	0.00	0.00	0.66	0.00	0.00	0.20	0.00	0.15	0.29	0.13	0.00	0.00	0.37
1132-132b	Sierra Pelona Type 17	Talc-schist	0.32	1.42	0.19	0.00	0.07	19.09	0.48	0.13	1.51	0.00	0.16	0.17	0.27	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.13	0.00	0.00	13.84	0.20	2.08
1132-133a	Sierra Pelona Type 17	Talc-schist	1.09	2.04	0.00	0.59	0.20	0.73	1.63	0.11	15.56	0.03	0.26	0.00	0.70	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.05	0.00	0.00	0.08	0.00	0.17	0.08	0.15
1132-133b	Sierra Pelona Type 17	Talc-schist	0.07	1.17	0.35	0.23	0.21	0.29	0.00	0.24	10.92	0.13	0.48	0.09	0.00	0.00	0.00	0.00	0.00	0.33	0.03	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.28	0.19

Table 7a. Calibrated LA-ICP-MS data for Dibblee mapped source Chlorite schist Type 1 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
DIBB-1.D	Sierra Pelona Type 1	Chlorite Schist	29873.65	106840.29	96602.69	136199.29	2222.13	42005.44	173.06	51788.91	459.27	148.44	1047.70	103576.09	93.37	39.07	46.88	138.25	15.25
DIBB-1B.D	Sierra Pelona Type 1	Chlorite Schist	7260.52	150215.52	109055.98	111051.91	1588.95	34625.83	17.98	35689.03	399.89	281.46	1145.11	128284.82	173.15	62.49	30.05	90.37	6.44
DIBB-2.D	Sierra Pelona Type 1	Chlorite Schist	0.00	162098.16	124314.28	118548.68	0.00	9226.19	17.20	9908.35	348.18	186.56	1131.93	146600.01	154.78	62.34	35.89	87.90	9.27
DIBB-2B.D	Sierra Pelona Type 1	Chlorite Schist	7891.26	143931.14	106582.48	156209.00	723.10	18588.87	18.92	15220.30	331.64	300.72	1043.06	111231.04	114.66	50.69	47.66	146.46	0.00
DIBB-3.D	Sierra Pelona Type 1	Chlorite Schist	69770.48	146583.63	121446.01	102014.17	1765.45	7135.00	18.73	10029.35	304.64	184.60	1109.72	127918.64	152.35	54.00	20.92	162.64	0.00
DIBB-3B.D	Sierra Pelona Type 1	Chlorite Schist	43591.18	158020.65	118072.68	110677.84	3018.19	6003.79	20.24	5427.95	350.12	289.87	1095.11	136015.91	111.57	50.60	26.18	162.90	7.47
DIBB-4.D	Sierra Pelona Type 1	Chlorite Schist	0.00	154170.12	124977.42	107924.96	0.00	16877.66	30.86	16959.80	289.05	260.80	1137.49	154644.24	217.86	52.62	60.36	185.30	18.70
DIBB-4B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	158779.21	116551.19	133078.11	0.00	15468.93	27.99	12814.76	357.03	257.85	1134.49	129218.64	198.42	73.64	24.14	153.22	14.46
DIBB-5.D	Sierra Pelona Type 1	Chlorite Schist	0.00	153233.30	123616.24	120919.41	0.00	14779.08	37.67	15197.91	385.70	212.21	1072.90	142406.05	219.95	69.79	8.42	111.65	14.21
DIBB-5B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	152905.17	115414.98	134688.17	312.44	11424.48	35.89	8560.50	317.62	256.62	1030.20	143977.95	182.43	55.11	15.76	144.61	0.00
DIBB-6.D	Sierra Pelona Type 1	Chlorite Schist	4045.08	139332.60	107176.89	140782.15	0.00	17456.04	6.68	22091.66	368.23	190.68	1077.98	136047.91	188.78	44.24	22.41	112.73	12.61
DIBB-6B.D	Sierra Pelona Type 1	Chlorite Schist	2885.10	148944.54	114996.45	113969.74	0.00	25382.99	35.19	28564.82	430.05	233.21	1154.68	140172.09	203.49	64.59	22.40	184.97	9.68
DIBB-7.D	Sierra Pelona Type 1	Chlorite Schist	0.00	196866.04	139795.18	91077.87	0.00	1156.99	26.09	3473.20	345.94	225.66	1240.85	142352.50	82.03	55.38	30.54	125.66	14.05
DIBB-7B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	154334.65	110738.16	125137.62	0.00	24745.60	12.27	27021.35	424.18	145.50	1203.13	127883.69	133.56	49.81	53.69	179.20	9.38
DIBB-8.D	Sierra Pelona Type 1	Chlorite Schist	0.00	168921.86	122874.17	134521.70	0.00	3988.85	26.29	4800.52	328.63	180.50	1193.30	127810.44	72.35	60.88	46.52	171.27	12.39
DIBB-8B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	152324.56	113263.93	140654.22	0.00	15319.68	18.07	15142.62	368.88	177.21	1191.39	127292.42	136.11	57.27	38.41	188.72	0.00
DIBB-9.D	Sierra Pelona Type 1	Chlorite Schist	0.00	172546.88	118971.94	126765.94	0.00	7289.89	2.97	10118.62	330.55	144.25	1188.23	131139.36	53.98	42.91	19.91	112.25	8.00
DIBB-9B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	166693.63	129646.33	108960.30	0.00	12622.87	29.01	14731.15	420.32	209.02	1335.13	139139.24	217.68	82.71	39.10	160.26	4.34
DIBB-10.D	Sierra Pelona Type 1	Chlorite Schist	0.00	99041.51	96458.82	164111.53	0.00	31722.25	40.48	47126.57	370.81	431.89	886.71	122402.20	461.89	57.68	37.11	149.53	1.68
DIBB-10B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	139436.33	113811.39	118140.71	0.00	21934.40	39.99	26181.12	475.16	584.10	1247.19	154551.02	574.59	76.93	62.46	175.18	18.59
DIBB-11.D	Sierra Pelona Type 1	Chlorite Schist	0.00	135687.36	117676.03	133246.74	31.74	8045.30	46.88	8092.59	351.25	333.39	1139.99	166483.70	642.91	63.39	37.38	135.13	10.33
DIBB-11B.D	Sierra Pelona Type 1	Chlorite Schist	7214.04	149597.04	120291.54	129413.93	667.24	5258.38	31.65	4626.37	405.68	272.02	1222.27	152097.14	670.82	75.44	39.36	159.63	13.20
DIBB-12.D	Sierra Pelona Type 1	Chlorite Schist	0.00	157902.72	115610.88	141037.17	0.00	6718.99	4.44	8011.06	249.62	90.68	1301.06	133729.56	173.48	65.47	34.50	182.77	5.18
DIBB-12B.D	Sierra Pelona Type 1	Chlorite Schist	5322.58	161215.00	121677.86	125457.42	1233.66	8155.08	18.16	7658.70	277.73	78.79	1529.20	138118.86	214.28	50.04	42.07	224.68	0.00
DIBB-13.D	Sierra Pelona Type 1	Chlorite Schist	22835.24	133074.50	114154.98	149074.61	1508.75	8888.08	5.52	9112.59	278.05	132.52	1232.23	126495.77	188.24	57.08	47.99	154.68	1.29
DIBB-13B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	141853.31	112398.86	155882.35	214.97	13366.39	17.83	12177.30	287.22	112.30	1322.52	122996.41	180.76	64.62	37.01	142.62	0.00
DIBB-14.D	Sierra Pelona Type 1	Chlorite Schist	0.00	136111.54	119682.61	146338.13	0.00	10427.68	22.34	16288.76	315.02	253.78	1183.32	132596.67	105.27	32.86	75.47	129.12	0.00
DIBB-14B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	145050.00	119519.78	141959.03	0.00	11245.52	19.79	16280.97	349.88	282.78	1420.28	127628.34	121.43	64.38	82.87	145.99	3.58
DIBB-15.D	Sierra Pelona Type 1	Chlorite Schist	0.00	137304.71	117513.96	160813.62	0.00	7103.98	1.57	4725.38	229.87	125.76	1149.64	129485.03	106.20	32.65	12.15	173.59	0.00
DIBB-15B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	138504.02	116558.93	159051.60	0.00	7119.65	15.02	7087.98	301.91	153.35	1268.06	128856.54	177.83	57.36	43.55	151.84	0.00
DIBB-16.D	Sierra Pelona Type 1	Chlorite Schist	1710.97	157270.40	109817.02	173900.87	760.54	2451.09	29.33	52.78	262.04	155.88	725.41	104939.73	307.66	72.10	16.78	93.63	12.59
DIBB-16B.D	Sierra Pelona Type 1	Chlorite Schist	4483.64	159137.58	126383.49	157326.57	407.24	3402.87	0.00	207.34	318.57	150.52	895.07	101322.54	435.52	93.97	19.26	191.28	0.00
DIBB-17.D	Sierra Pelona Type 1	Chlorite Schist	0.00	151142.89	108690.13	175126.99	0.00	3932.25	12.00	197.38	282.76	295.83	808.69	111896.32	369.91	76.74	41.42	119.94	1.55
DIBB-17B.D	Sierra Pelona Type 1	Chlorite Schist	38661.84	158741.02	112304.82	142294.54	1359.92	6348.73	31.88	3905.78	388.98	344.08	898.63	102654.88	554.58	106.60	14.71	154.96	6.58
DIBB-18.D	Sierra Pelona Type 1	Chlorite Schist	0.00	123520.31	100078.78	114344.39	176.55	60665.12	11.38	46899.23	291.70	352.91	1082.64	135068.53	517.81	50.17	0.00	187.04	0.00
DIBB-18B.D	Sierra Pelona Type 1	Chlorite Schist	1901.74	132934.26	123432.56	135894.25	292.35	17215.32	15.19	18270.86	286.03	273.12	1403.91	134832.92	925.06	111.52	0.00	300.93	0.00
DIBB-19.D	Sierra Pelona Type 1	Chlorite Schist	0.00	125616.47	115617.58	134908.01	0.00	19398.70	28.02	18588.18	214.67	364.62	1170.24	154912.64	796.83	86.09	6.87	262.16	8.59
DIBB-19B.D	Sierra Pelona Type 1	Chlorite Schist	6082.40	133582.93	124174.40	104588.98	172.69	30521.70	6.63	38721.37	337.38	384.37	1294.90	138927.17	983.45	129.96	8.87	311.75	0.00
DIBB-20.D	Sierra Pelona Type 1	Chlorite Schist	0.00	156497.00	115121.30	164745.82	500.13	1687.91	18.08	181.60	297.33	239.20	824.99	114746.84	172.55	40.78	23.11	140.08	0.00
DIBB-20B.D	Sierra Pelona Type 1	Chlorite Schist	3567.60	152467.77	102609.91	166427.60	0.00	19808.21	24.68	19795.62	423.12	238.44	815.30	89578.31	176.32	72.16	46.24	139.18	11.82
DIBB-21.D	Sierra Pelona Type 1	Chlorite Schist	52295.66	162283.73	107699.67	133419.56	3115.59	3413.75	30.18	25.30	286.68	352.09	837.47	111401.97	192.82	49.51	24.29	113.38	0.00
DIBB-21B.D	Sierra Pelona Type 1	Chlorite Schist	7586.19	161926.49	117821.08	157369.27	353.33	1860.77	16.43	75.24	447.17	246.12	1008.17	108391.71	159.67	76.19	24.57	185.80	0.00
DIBB-22.D	Sierra Pelona Type 1	Chlorite Schist	0.00	202969.78	118531.91	122974.34	0.00	451.40	40.65	362.21	308.86	343.05	773.21	120299.98	206.63	56.80	8.92	102.73	24.82
DIBB-22B.D	Sierra Pelona Type 1	Chlorite Schist	7901.18	187186.04	116174.84	146165.71	255.14	1087.86	60.82	30.95	390.81	399.47	766.44	98857.31	170.41	73.51	4.79	224.18	10.71
DIBB-23.D	Sierra Pelona Type 1	Chlorite Schist	0.00	184965.21	115707.87	144577.12	0.00	1183.95	35.13	54.79	350.35	303.02	725.71	112318.81	157.41	49.22	15.35	101.02	20.66
DIBB-23B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	175126.50	110735.46	170939.31	339.02	1228.82	40.01	62.88	430.72	158.38	864.12	90407.33	146.20	65.47	4.87	129.51	3.64

Table 7a. Calibrated LA-ICP-MS data for Dibblee mapped source Chlorite schist Type 1 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
DIBB-24.D	Sierra Pelona Type 1	Chlorite Schist	0.00	165647.04	108107.92	164259.54	0.00	2260.93	25.04	1354.46	288.49	261.30	940.30	112626.47	84.89	48.21	15.77	115.32	5.07
DIBB-24B.D	Sierra Pelona Type 1	Chlorite Schist	12029.08	176486.28	131978.87	123147.62	576.42	2841.97	16.23	344.61	402.42	281.12	1195.94	118310.90	118.65	67.00	23.70	201.79	0.00
DIBB-25.D	Sierra Pelona Type 1	Chlorite Schist	0.00	179842.46	120358.86	125041.09	0.00	3685.29	17.05	4717.60	330.76	288.25	1062.25	133162.43	108.47	40.12	11.88	67.99	6.11
DIBB-25B.D	Sierra Pelona Type 1	Chlorite Schist	6490.93	171317.46	117137.36	149008.90	472.69	1506.95	23.55	0.05	410.91	234.19	1068.99	112286.86	88.53	68.08	4.97	116.47	0.00

Table 7b. Calibrated LA-ICP-MS data forDibblee mapped source Chlorite schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
DIBB-1.D	Sierra Pelona Type 1	Chlorite Schist	0.99	119.18	110.57	110.05	22.26	5.70	3.65	0.00	38.16	2174.48	3678.26	300.43	860.13	74.71	22.02	42.78	4.00	23.24	4.85	11.27	1.68	10.31	1.57	3.60	1.40	3.79	87.67	2.18
DIBB-1B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	9.72	90.58	112.84	20.42	5.94	0.00	0.44	7.82	10.19	39.70	8.49	42.57	8.71	4.36	13.90	2.06	14.26	3.06	9.59	1.38	6.98	0.79	3.76	1.02	0.75	0.76	0.38
DIBB-2.D	Sierra Pelona Type 1	Chlorite Schist	0.36	3.35	19.91	106.51	4.55	1.63	3.99	0.14	7.23	1.53	7.29	1.66	12.44	2.06	1.04	6.28	0.53	5.14	0.96	3.16	0.20	2.33	0.28	5.42	0.24	0.96	0.37	0.21
DIBB-2B.D	Sierra Pelona Type 1	Chlorite Schist	0.16	4.89	34.58	159.73	7.73	1.92	0.00	0.10	7.04	2.51	11.86	3.21	20.21	6.35	1.34	7.11	1.13	7.27	1.31	4.05	0.42	2.89	0.70	6.11	0.27	0.00	0.30	0.67
DIBB-3.D	Sierra Pelona Type 1	Chlorite Schist	0.98	4.67	20.08	27.44	5.78	1.23	1.89	0.00	6.11	1.57	8.59	1.25	9.74	4.28	1.18	6.43	0.18	4.66	0.42	2.12	0.12	2.76	0.40	0.68	0.03	0.68	0.00	0.38
DIBB-3B.D	Sierra Pelona Type 1	Chlorite Schist	0.94	2.35	15.24	151.76	3.88	0.83	0.84	0.06	4.33	1.33	6.00	1.56	7.49	1.76	1.57	1.87	0.31	4.02	0.69	2.11	0.32	3.69	0.41	2.79	0.14	0.00	0.00	0.26
DIBB-4.D	Sierra Pelona Type 1	Chlorite Schist	1.48	7.97	35.32	148.93	9.05	1.82	148.18	12.99	22.85	3.85	16.07	3.60	16.62	7.19	2.34	7.49	0.52	6.39	1.96	2.63	0.38	4.21	0.67	4.41	0.57	56.31	0.89	1.39
DIBB-4B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	4.15	27.54	148.76	5.78	0.82	0.00	0.42	8.50	2.79	11.78	2.57	12.44	3.79	0.87	5.41	1.05	6.54	1.21	2.19	0.20	2.24	0.95	4.11	0.20	0.00	0.00	0.00
DIBB-5.D	Sierra Pelona Type 1	Chlorite Schist	0.92	5.46	30.21	228.77	4.85	0.59	3.12	0.00	9.35	3.61	16.29	2.70	18.09	3.31	2.28	5.54	0.51	5.02	1.21	1.67	0.30	2.94	0.57	3.38	0.63	0.58	0.00	0.00
DIBB-5B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	3.68	23.55	155.88	3.82	2.27	0.57	0.42	7.88	2.61	10.64	2.59	10.82	2.21	0.59	4.41	0.92	3.47	0.71	3.17	0.03	3.49	0.39	4.34	0.00	0.00	0.70	0.20
DIBB-6.D	Sierra Pelona Type 1	Chlorite Schist	0.35	6.11	37.80	298.87	8.79	1.32	2.03	0.35	12.93	5.65	20.71	3.00	21.02	7.17	2.15	7.67	0.90	6.34	1.49	3.26	0.60	4.00	0.74	8.37	0.89	0.52	0.46	0.60
DIBB-6B.D	Sierra Pelona Type 1	Chlorite Schist	0.15	10.68	58.71	227.97	13.42	3.56	0.26	0.10	15.56	7.83	32.49	5.37	34.80	10.73	2.37	11.86	1.52	9.75	2.49	7.51	0.83	7.22	1.05	4.22	0.76	0.85	0.90	0.93
DIBB-7.D	Sierra Pelona Type 1	Chlorite Schist	3.00	2.92	6.43	42.46	1.64	0.29	1.85	0.00	3.91	2.54	5.52	0.87	4.24	0.00	0.42	0.66	0.00	0.75	0.27	0.33	0.00	1.36	0.00	1.96	0.04	1.04	0.00	0.11
DIBB-7B.D	Sierra Pelona Type 1	Chlorite Schist	0.99	11.52	54.85	494.05	12.56	2.72	1.25	0.10	8.58	3.68	18.29	6.11	23.88	7.95	4.27	9.93	2.51	11.26	2.23	8.07	1.16	7.92	0.51	10.94	0.73	1.93	0.33	0.63
DIBB-8.D	Sierra Pelona Type 1	Chlorite Schist	0.57	2.42	7.14	66.04	1.33	1.04	0.18	0.00	4.24	0.55	4.28	0.27	1.79	1.27	0.62	1.74	0.00	2.52	0.44	0.88	0.00	1.88	0.19	1.73	0.16	0.51	0.00	0.30
DIBB-8B.D	Sierra Pelona Type 1	Chlorite Schist	0.14	4.97	30.81	27.40	6.96	0.55	0.00	0.29	9.81	2.22	14.40	3.31	20.04	4.05	2.01	3.20	0.62	6.66	1.81	4.18	0.45	4.27	0.93	1.48	0.22	2.81	1.02	0.21
DIBB-9.D	Sierra Pelona Type 1	Chlorite Schist	0.10	2.89	16.69	10.18	3.93	0.94	0.49	0.06	6.80	1.09	8.18	1.24	8.97	1.78	1.35	2.97	0.57	2.28	0.58	2.55	0.35	0.15	0.31	0.46	0.38	3.58	0.00	0.09
DIBB-9B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	3.79	30.27	127.74	9.99	1.51	0.70	0.45	4.65	2.42	12.24	3.14	9.53	3.40	1.06	1.45	0.64	5.04	1.31	2.32	0.49	1.29	1.04	4.02	0.00	0.77	0.31	0.97
DIBB-10.D	Sierra Pelona Type 1	Chlorite Schist	0.00	12.49	68.07	84.58	18.40	3.93	1.89	0.00	22.60	4.03	16.56	4.30	25.74	8.87	4.95	8.61	2.28	13.95	2.42	7.09	0.62	6.64	1.26	2.60	1.33	0.67	0.14	0.19
DIBB-10B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	10.37	43.10	221.51	13.45	4.17	0.00	0.00	23.23	2.71	13.64	3.41	17.07	7.51	1.95	8.28	2.27	9.50	2.71	5.35	0.56	7.39	0.73	6.16	0.79	0.44	0.37	0.50
DIBB-11.D	Sierra Pelona Type 1	Chlorite Schist	1.32	6.56	18.33	180.72	3.82	0.50	0.50	0.06	17.20	1.23	5.73	1.88	12.37	2.95	0.00	2.07	1.09	3.98	0.92	1.56	0.32	1.26	0.30	5.70	0.28	0.18	0.10	0.09
DIBB-11B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	4.26	10.63	58.85	2.43	2.17	0.00	0.00	12.22	1.15	2.51	0.90	3.62	2.15	0.92	2.57	0.55	2.30	0.35	1.21	0.13	0.98	0.21	1.21	0.00	0.00	0.23	0.44
DIBB-12.D	Sierra Pelona Type 1	Chlorite Schist	1.07	6.69	13.76	299.43	4.98	0.00	1.36	0.00	7.81	17.23	35.91	4.55	16.63	2.46	0.81	1.10	0.11	3.75	0.31	3.19	0.07	2.58	0.00	2.30	0.00	0.43	3.01	0.21
DIBB-12B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	4.90	17.09	22.25	4.20	0.43	0.00	0.08	6.40	4.62	15.89	2.19	7.71	2.40	0.77	3.27	0.48	1.71	0.39	2.38	0.21	0.00	0.16	0.93	0.00	1.08	1.10	0.38
DIBB-13.D	Sierra Pelona Type 1	Chlorite Schist	0.09	2.68	24.22	29.63	5.90	1.30	2.16	0.00	7.18	1.77	7.54	1.32	9.70	5.51	1.11	4.43	0.84	5.26	0.63	1.70	0.11	3.02	0.20	0.17	0.19	0.80	0.00	0.64
DIBB-13B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	4.55	24.98	63.37	6.06	1.55	0.00	0.00	9.05	1.49	6.75	1.80	10.11	3.30	1.49	4.16	0.79	4.75	0.65	3.53	0.10	5.03	0.41	2.47	0.00	0.16	0.34	0.20
DIBB-14.D	Sierra Pelona Type 1	Chlorite Schist	0.32	6.66	26.80	49.76	9.17	1.55	1.20	0.07	16.36	1.73	5.69	1.95	10.58	3.71	2.03	4.49	0.42	5.19	1.44	2.63	0.33	2.94	0.23	1.83	0.75	0.57	0.31	0.09
DIBB-14B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	8.05	27.49	259.14	9.60	0.42	0.57	0.15	26.86	2.54	8.04	1.96	10.01	3.50	1.38	5.19	0.99	4.44	1.43	3.74	0.88	1.78	0.62	6.95	0.00	0.42	0.87	0.59
DIBB-15.D	Sierra Pelona Type 1	Chlorite Schist	2.14	2.42	6.90	84.52	2.16	1.23	3.07	0.23	7.03	0.61	3.69	0.67	5.73	0.00	0.71	0.70	0.27	1.75	0.00	1.93	0.24	0.78	0.93	3.64	0.00	0.91	0.00	0.00
DIBB-15B.D	Sierra Pelona Type 1	Chlorite Schist	0.36	5.79	13.60	90.88	2.68	0.77	1.91	0.25	8.87	0.64	5.01	0.89	5.95	1.30	0.14	4.87	0.51	0.31	0.66	2.35	0.15	3.16	0.09	3.24	0.00	0.23	0.40	0.18
DIBB-16.D	Sierra Pelona Type 1	Chlorite Schist	0.62	4.76	0.59	0.43	0.00	0.00	0.60	0.23	24.08	0.38	0.00	0.00	2.64	0.00	0.00	0.00	0.00	0.47	0.08	0.00	0.00	0.00	0.55	0.00	0.12	0.00	0.00	0.00
DIBB-16B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	21.32	0.00	0.57	0.00	0.00	1.42	0.41	687.76	0.06	0.62	0.00	0.00	0.38	0.00	0.00	0.00	0.89	0.00	0.00	0.11	2.29	0.64	1.72	0.11	0.00	0.00	0.41
DIBB-17.D	Sierra Pelona Type 1	Chlorite Schist	1.18	11.61	1.28	82.71	0.00	0.26	1.22	0.20	48.03	0.19	0.00	0.08	1.95	0.00	0.36	0.00	0.00	1.22	0.07	0.00	0.00	0.00	0.24	0.83	0.00	0.19	0.00	0.19
DIBB-17B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	15.29	1.71	100.75	0.73	0.76	0.19	0.28	68.09	0.88	1.13	0.10	0.00	0.26	0.29	0.00	0.00	0.00	0.00	1.39	0.08	1.18	0.44	1.65	0.08	0.17	0.46	0.73
DIBB-18.D	Sierra Pelona Type 1	Chlorite Schist	1.18	7.53	108.57	522.18	27.48	4.14	3.19	0.16	8.39	0.95	5.32	1.02	11.51	5.95	3.85	12.33	2.68	13.35	4.23	12.75	0.98	13.76	1.55	15.38	1.26	0.47	0.51	3.18
DIBB-18B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	8.61	35.70	112.85	5.32	3.23	0.24	0.05	10.28	0.62	1.23	0.52	3.28	1.32	0.72	3.44	0.53	5.02	1.20	4.35	1.35	5.93	0.89	3.26	1.14	0.00	1.46	0.77
DIBB-19.D	Sierra Pelona Type 1	Chlorite Schist	0.59	5.53	45.49	211.19	8.65	0.00	0.96	0.22	4.80	0.86	1.77	0.45	4.32	2.94	1.74	5.48	0.47	7.62	2.30	3.17	0.22	6.24	0.35	4.35	0.55	0.43	0.00	1.07
DIBB-19B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	6.15	67.79	224.84	15.91	1.28	0.00	0.14	6.65	0.42	3.44	1.12	9.47	5.39	4.65	13.22	1.52	12.24	1.93	4.18	0.84	9.02	1.17	5.70	0.73	0.20	0.56	1.15
DIBB-20.D	Sierra Pelona Type 1	Chlorite Schist	0.43	6.33	2.34	96.16	0.09	0.00	0.42	0.26	36.62	0.36	0.05	0.11	1.56	0.00	0.00	0.47	0.00	0.11	0.33	0.00	0.00	0.00	0.00	2.47	0.00	0.31	0.00	0.00
DIBB-20B.D	Sierra Pelona Type 1	Chlorite Schist	0.51	20.17	8.62	150.20	5.21	2.58	0.00	0.00	44.67	4.98	8.10	0.49	3.07	0.94	1.02	0.00	0.00	0.00	0.00	0.62	0.69	2.47	0.40	4.24	0.14	0.20	0.83	0.35
DIBB-21.D	Sierra Pelona Type 1	Chlorite Schist	0.87	9.68	1.29	300.68	0.23	0.00	1.36	0.00	43.44	0.47	0.00	0.06	0.35	0.00	0.00	0.00	0.00	0.55	0.52	0.00	0.44	2.22	0.00	11.75	0.00	0.41	0.00	0.20
DIBB-21B.D	Sierra Pelona Type 1	Chlorite Schist	0.50	6.86	3.01	123.43	0.64	0.13	0.00	0.46	35.51	0.84	0.93	0.25	0.53	0.00	0.00	0.00	0.00	1.35	0.00	0.00	0.14	1.38	1.01	2.90	0.00	0.10	0.41	0.74
DIBB-22.D	Sierra Pelona Type 1	Chlorite Schist	0.96	5.33	0.48	13.52	0.00	0.00	0.21	0.08	11.07	0.00	0.22	0.06	1.92	0.25	0.00	0.00	0.40	0.00	0.35	0.00	0.00	0.00	0.26	0.67	0.00	0.00	0.11	0.00
DIBB-22B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	5.36	0.29	19.66	0.66	0.00	1.06	0.22	9.42	0.21	0.21	0.00	0.00	0.00	0.31	0.99	0.00	0.00	0.09	0.75	0.08	0.85	0.10	0.51	0.00	0.06	0.13	0.43
DIBB-23.D	Sierra Pelona Type 1	Chlorite Schist	0.00	3.93	0.00	0.66	0.00	1.04	1.90	0.00	9.13	0.15	0.00	0.18	2.26	0.25	0.26	0.00	0.00	0.00	0.19	0.00	0.00	0.18	0.09	0.00	0.00	0.00	0.11	0.00
DIBB-23B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	3.69	0.29	0.00	0.40	2.17	0.00	0.84	6.26	0.21	0.04	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.29	0.00	0.00	0.00	0.26	0.06

Table 7b. Calibrated LA-ICP-MS data forDibblee mapped source Chlorite schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
DIBB-24.D	Sierra Pelona Type 1	Chlorite Schist	0.21	4.12	3.90	72.28	0.34	0.00	0.00	0.07	14.52	0.78	1.29	0.33	2.03	1.11	0.24	0.00	0.16	1.07	0.10	0.00	0.30	0.17	0.08	1.38	0.00	0.00	0.20	0.00
DIBB-24B.D	Sierra Pelona Type 1	Chlorite Schist	0.15	6.84	0.00	65.29	1.14	0.00	0.00	0.70	22.86	0.46	0.37	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.93	0.10	2.64	1.07	0.00	0.10	0.00	0.78	0.68
DIBB-25.D	Sierra Pelona Type 1	Chlorite Schist	0.51	4.08	7.73	93.65	1.76	0.00	0.23	0.00	12.93	1.89	5.13	1.13	4.49	0.27	0.00	0.00	0.27	3.22	0.29	0.48	0.00	0.20	0.00	2.85	0.00	1.19	0.12	0.00
DIBB-25B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	6.10	2.37	283.48	0.55	0.51	1.10	0.00	14.30	0.00	0.22	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	1.56	0.26	3.10	0.40	7.71	0.00	0.00	0.39	0.44

Table 8a. Calibrated LA-ICP-MS data for Santa Cruz Island Schist in ppm (Na through As)

anid	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
SCRI334-1	SCIS	24563.17	17320.60	118266.91	213979.86	2272.37	69371.69	26.11	6494.88	94.18	0.00	1142.62	99396.83	4.76	3.76	2.46	98.32	1.94
SCRI334-1b	SCIS	41735.53	15031.72	98115.57	256827.94	1222.57	42958.36	28.52	17939.41	79.58	0.00	740.52	62524.90	2.12	3.04	2.58	100.61	3.14
SCRI1194-2	SCIS	31468.00	31567.00	95024.81	226451.17	5387.30	22068.25	37.18	21357.01	147.06	0.00	1600.10	114817.61	7.13	7.21	1.76	79.75	2.43
SCRI1194-2b	SCIS	40289.78	32526.56	87407.93	253545.94	4723.20	14435.56	24.33	17059.14	115.39	0.00	1547.95	88196.98	6.79	6.98	1.71	84.06	1.53
SCRI3CDM-2	SCIS	16883.67	35560.20	88356.51	224537.85	36687.22	66339.41	41.52	11015.30	443.37	136.15	989.04	77998.67	22.83	14.84	19.12	23.72	0.00
SCRI3CDM-2b	SCIS	4400.09	83713.78	61433.49	229330.63	9287.06	55276.54	36.64	3425.64	208.27	97.66	2024.08	104794.04	82.62	55.61	29.10	77.74	0.00
SCRICDM-4	SCIS	5105.71	45523.97	93422.92	222455.50	66564.28	35946.67	33.18	9164.63	250.27	222.11	938.72	79914.14	82.12	20.38	12.34	32.14	0.00
SCRICDM-4b	SCIS	7013.41	42577.20	68006.59	233288.28	47223.07	52692.38	37.35	31959.68	314.29	199.22	914.90	71967.66	95.25	21.41	8.75	33.64	0.00
SCRICDM-6	SCIS	2575.15	6570.30	96235.17	274941.87	67363.05	29147.54	14.67	2343.14	0.41	0.00	387.74	56408.76	2.78	0.85	0.32	42.61	0.15
SCRICDM-6b	SCIS	2003.75	5075.80	86099.10	266795.24	45224.10	65538.64	22.18	3704.58	0.70	0.00	637.42	64926.10	0.63	0.92	0.44	26.81	0.57
SCRICDM-8	SCIS	0.00	38812.31	127983.87	158517.54	2093.15	88633.70	26.37	14821.57	294.54	4.85	1563.80	138140.54	25.76	14.73	1.52	34.94	0.03
SCRICDM-8b	SCIS	0.00	20923.26	118676.22	230318.01	1309.55	65652.46	20.51	7893.97	216.89	0.00	1431.50	95806.36	14.55	8.57	0.91	17.42	0.00
SCRICI-2	SCIS	26444.86	57328.43	115893.63	190583.25	14065.53	5037.79	18.74	9837.06	148.39	7.33	2318.13	137532.90	14.59	16.37	39.01	544.40	0.32
SCRICI-2b	SCIS	35691.66	27541.34	96009.10	267158.53	19290.86	6967.10	30.26	8801.38	133.68	0.00	998.57	71035.36	10.94	5.95	19.59	266.75	1.44
SCRICI-4	SCIS	5946.19	49557.50	99751.00	194561.68	60169.11	25968.41	28.99	13176.74	472.01	20.01	1371.60	110239.18	25.25	25.55	9.93	411.46	0.00
SCRICI-4b	SCIS	16861.22	47475.78	78692.29	241678.78	32179.56	28093.53	32.69	8070.10	307.96	3.04	1292.97	90701.82	22.51	21.66	7.64	304.49	0.21
SCRICI-6	SCIS	0.00	80771.19	101973.07	150326.40	24422.26	16187.84	17.85	4106.70	545.88	19.77	3671.97	198996.33	25.04	70.56	22.90	383.22	0.00
SCRICI-6b	SCIS	0.00	75604.91	79869.53	176513.02	29652.26	18310.90	15.07	21589.96	730.34	15.38	3104.49	168366.38	22.24	60.88	12.77	291.35	0.00
SCRICI-27	SCIS	22172.02	40699.11	88465.72	235382.02	33511.93	44411.38	38.71	2862.01	237.75	8.53	1016.10	79394.84	15.67	13.99	8.81	299.29	0.00
SCRICI-27b	SCIS	12220.56	53959.11	69335.08	239341.84	35942.06	32968.79	36.39	6548.88	326.61	0.46	1257.30	93586.13	23.89	24.63	10.36	379.96	0.00
SCRICI-21	SCIS	39437.18	43827.48	111858.52	216873.60	5934.04	3300.79	11.05	2284.95	36.16	4.46	1450.83	125112.83	11.51	7.09	3.59	821.36	1.05
SCRICI-21b	SCIS	42566.79	10344.13	96813.45	300777.97	5113.28	14642.98	31.61	5632.70	29.55	0.00	393.22	42061.43	0.00	1.44	1.71	172.67	0.00
SCRICIO-2	SCIS	11002.25	51064.21	121773.27	198615.35	1074.89	38533.06	27.31	2666.43	326.28	0.00	1577.64	126956.88	15.01	18.78	15.35	98.98	0.00
SCRICIO-2b	SCIS	13807.07	52048.51	115452.48	213674.67	651.97	25814.19	20.54	2784.93	234.85	0.00	1670.94	121786.76	20.31	21.84	22.16	107.25	0.00
SCRICI-26	SCIS	48161.43	5289.66	81779.57	311750.28	35763.69	1706.19	23.48	1123.26	43.09	0.00	344.76	37453.22	0.00	1.20	4.13	105.49	0.00
SCRICI-26b	SCIS	46772.36	3876.35	93409.17	294361.97	20204.76	3617.22	18.43	8372.59	29.34	0.00	155.03	54693.21	2.99	0.97	47.93	313.85	1.93
SCRICI-14	SCIS	20811.31	66329.84	100972.20	179652.03	746.00	4238.50	11.76	8729.03	431.60	10.39	2864.85	181562.17	17.57	26.64	4.68	146.38	0.00
SCRICI-14b	SCIS	11534.67	81102.30	79657.27	164648.76	1518.66	7804.57	21.34	13627.25	558.78	0.00	3408.89	213114.09	13.39	36.49	4.31	202.36	0.00
SCRICI-12	SCIS	18667.06	33814.95	77986.68	209027.40	25343.02	29948.50	38.35	12322.96	611.46	6.09	1120.12	158587.21	19.40	16.92	14.54	39.42	0.00
SCRICI-12b	SCIS	19081.98	27745.95	78104.04	222122.60	37325.87	29601.99	39.30	15935.29	796.88	2.27	866.22	130866.35	11.17	10.48	11.11	28.29	0.00
SCRICI-15c	SCIS	9148.54	60971.84	108248.96	199785.86	23532.71	19358.29	25.46	3186.60	199.73	6.60	1876.97	130197.84	34.07	32.78	7.38	261.30	0.00
SCRICI-15d	SCIS	13506.17	43434.50	86152.47	212314.30	640.26	26673.35	30.90	13039.15	392.44	0.00	2456.82	154862.87	8.13	20.16	53.61	4335.05	1.05
SCRIOPH-1	SCIS	7993.72	66567.33	129732.45	151646.68	1647.56	8667.40	54.96	9013.09	445.93	1.11	4035.69	190173.80	10.92	27.76	1.43	418.16	0.00
SCRIOPH-1b	SCIS	8293.14	50880.31	164037.05	146463.49	3681.52	8334.06	36.63	14512.90	359.49	0.00	3056.75	164186.95	8.37	16.65	0.74	206.52	0.00
SCRICIO3-1	SCIS	16920.78	24132.37	111383.88	217736.68	39007.52	37177.58	28.03	17752.38	186.01	2.90	1007.49	89808.65	8.28	8.41	11.25	68.69	0.00
SCRICIO3-1b	SCIS	23047.91	18979.63	113898.28	219515.66	40495.00	37546.25	28.74	21805.33	184.50	0.25	764.57	77964.29	6.74	5.72	9.02	30.39	0.00
SCRICI-9	SCIS	7898.58	44357.34	122584.50	175466.94	448.17	50156.60	31.84	17367.55	622.55	5.04	1998.91	141905.21	12.26	24.04	14.85	85.22	0.00
SCRICI-9b	SCIS	15952.12	57292.97	102431.31	183020.62	915.46	23319.15	14.70	8392.02	445.49	0.00	2096.49	171624.80	10.95	34.73	9.21	106.62	0.00
SCRISRO-2	SCIS	35231.02	22373.90	96934.90	267173.20	1020.67	2365.88	16.66	8486.66	59.89	0.00	443.14	97871.65	5.84	3.11	4.46	105.01	0.70
SCRISRO-2b	SCIS	38137.83	20459.67	95764.37	266442.06	1063.64	6229.68	27.56	5054.81	62.38	0.00	431.88	99976.52	4.70	2.74	3.77	75.00	1.17
SCRICI-8	SCIS	14539.27	54795.15	98110.49	210244.93	323.73	15718.98	31.64	11630.66	45.68	0.00	2513.87	145300.24	7.36	1.53	6.37	104.07	0.06
SCRICI-8b	SCIS	16344.88	44363.17	84611.37	228599.42	41677.25	28529.76	41.91	10081.17	373.83	12.11	1200.99	95441.69	19.91	19.35	10.07	324.83	0.37
SCRICI-20	SCIS	40850.06	33855.24	91601.82	248604.60	1516.95	17997.18	17.85	5466.34	41.89	0.00	1158.64	100737.21	6.37	4.73	2.35	681.17	2.62
SCRICI-20b	SCIS	11355.22	43681.85	106948.18	201412.09	48529.62	23212.67	28.73	7792.68	390.21	10.71	1259.78	112815.08	22.63	20.59	7.91	252.94	0.15
SCRICI-18	SCIS	3502.69	46873.83	81864.15	202109.72	503.17	31985.38	39.22	19730.81	463.94	0.00	2672.71	166379.39	9.90	22.64	87.95	5863.74	1.45
SCRICI-18b	SCIS	17957.45	35483.52	88248.94	150396.43	756.82	14118.33	25.32	11316.56	30.28	0.00	1563.80	269303.95	11.66	278.46	88.44	33.30	1.93

Table 8a. Calibrated LA-ICP-MS data for Santa Cruz Island Schist in ppm (Na through As)

anid	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
SCRICI-24	SCIS	6905.34	52476.52	81841.85	218000.00	34613.85	37567.56	47.03	12335.60	377.51	19.41	1565.57	109458.61	26.13	25.48	11.86	380.98	0.23
SCRICI-24b	SCIS	32852.23	45710.54	99524.74	213014.15	1621.99	13092.05	17.93	4993.62	57.27	0.00	1765.48	141448.90	9.10	13.34	4.64	1250.02	2.47
SCRICIO2-2	SCIS	1586.45	29635.57	106638.62	165230.38	25470.93	80661.05	55.54	35890.52	63.32	2.57	1227.46	124131.63	6.88	3.55	1.53	237.44	2.93
SCRICIO2-2b	SCIS	14142.21	8035.26	106546.33	243773.64	3679.11	76022.98	26.71	2404.46	29.41	0.00	696.15	86560.37	4.07	1.19	1.80	32.13	2.44

Table 8b. Calibrated LA-ICP-MS data for Santa Cruz Island Schist in ppm (Rb through U)

anid	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
SCRI334-1	SCIS	0.83	1010.88	46.69	107.77	3.58	1.04	1.44	0.02	65.85	7.24	14.78	2.14	18.36	5.52	1.67	6.70	0.59	6.43	0.93	4.24	0.39	4.03	0.11	4.66	0.18	7.91	69.26	0.09
SCRI334-1b	SCIS	0.70	551.31	53.21	111.25	8.24	1.16	0.99	0.08	51.46	12.28	33.04	4.09	32.29	8.47	1.99	9.22	0.97	8.72	1.40	5.36	0.72	7.06	0.62	4.48	0.60	5.82	30.22	0.12
SCRI1194-2	SCIS	4.92	18.24	152.30	190.28	10.67	1.58	1.02	0.08	100.93	5.08	16.95	1.65	15.00	5.80	1.65	9.73	1.38	18.03	2.52	10.61	1.31	11.77	0.73	7.06	0.52	1.41	17.07	0.19
SCRI1194-2b	SCIS	6.43	27.13	90.21	76.61	8.15	1.77	0.45	0.10	136.42	5.97	21.62	2.20	18.74	6.63	1.52	8.97	1.09	12.80	1.80	6.96	0.74	7.15	0.61	3.34	0.40	2.70	9.45	0.13
SCRI3CDM-2	SCIS	51.50	242.40	15.30	19.73	1.97	0.10	0.33	0.15	476.47	1.95	3.29	0.55	4.59	0.91	0.49	1.67	0.08	2.17	0.36	1.70	0.19	1.73	0.12	1.17	0.00	1.31	6.95	0.02
SCRI3CDM-2b	SCIS	12.64	10.59	2.85	25.67	0.52	0.00	0.00	0.02	95.74	0.15	0.27	0.02	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	1.07	0.00	0.79	0.00	0.01
SCRICDM-4	SCIS	85.26	38.93	25.77	53.59	2.83	0.21	0.26	0.31	1775.28	4.03	8.13	1.28	10.84	2.81	0.89	3.00	0.34	4.35	0.49	2.46	0.25	2.26	0.09	2.20	0.11	1.14	0.05	0.03
SCRICDM-4b	SCIS	82.32	66.75	62.54	126.34	11.20	0.56	0.00	0.26	1831.66	6.58	16.69	2.17	17.37	5.35	1.38	5.65	0.67	7.44	1.14	4.59	0.58	6.25	0.40	3.85	0.54	3.79	0.06	0.05
SCRICDM-6	SCIS	70.64	466.47	54.20	153.06	5.62	0.76	0.21	0.11	6162.09	5.30	9.14	1.42	12.28	3.60	0.78	4.44	0.46	6.06	0.93	4.35	0.49	5.63	0.43	4.93	0.34	6.82	10.01	0.08
SCRICDM-6b	SCIS	51.71	1631.26	125.07	157.31	8.69	1.30	0.11	0.10	5481.20	13.73	36.72	4.62	36.70	10.58	2.26	11.64	1.27	14.16	2.06	8.00	0.84	9.11	0.66	5.37	0.26	6.24	3.92	0.15
SCRICDM-8	SCIS	0.67	1379.22	33.96	430.97	3.71	0.47	0.00	0.00	35.77	4.36	6.60	1.14	9.57	2.48	1.02	3.68	0.28	4.40	0.64	2.88	0.39	4.74	0.39	12.03	0.16	5.97	128.56	0.03
SCRICDM-8b	SCIS	0.33	941.97	21.75	13.68	1.91	0.24	0.00	0.00	36.37	3.51	21.24	1.25	9.97	2.65	0.36	0.46	0.00	2.60	0.54	0.53	0.06	0.24	0.00	0.00	0.00	2.18	365.35	0.00
SCRICI-2	SCIS	5.78	6.09	47.00	46.02	3.97	0.31	0.57	0.01	364.22	0.86	1.69	0.24	1.98	1.43	0.43	2.46	0.36	5.03	0.90	3.75	0.58	3.16	0.24	2.01	0.28	2.57	14.53	0.07
SCRICI-2b	SCIS	11.81	55.27	43.93	90.70	3.27	0.36	0.00	0.00	875.61	7.60	24.50	2.32	19.19	4.81	1.10	4.45	0.55	6.63	0.47	2.47	0.37	1.99	0.28	2.75	0.00	3.53	9.69	0.06
SCRICI-4	SCIS	48.94	57.36	20.33	88.00	2.87	0.20	0.30	0.05	11086.73	4.05	2.87	0.59	3.06	1.45	0.48	0.89	0.12	2.53	0.35	2.16	0.40	3.87	0.28	3.93	0.17	2.05	0.01	0.03
SCRICI-4b	SCIS	28.51	46.59	10.89	22.14	1.85	0.00	0.00	0.00	7171.83	2.17	1.65	0.12	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.12	0.28	0.00	0.00	0.00	1.74	0.00	0.00
SCRICI-6	SCIS	29.72	264.24	17.08	20.16	0.72	0.00	0.00	0.04	410.95	1.17	2.34	0.33	2.27	0.90	0.58	0.69	0.09	1.76	0.23	1.20	0.15	1.36	0.00	0.26	0.00	5.20	0.00	0.02
SCRICI-6b	SCIS	46.27	111.97	23.93	65.49	4.17	0.10	0.00	0.05	758.34	0.59	1.00	0.18	0.04	0.00	0.00	0.00	0.00	1.44	0.32	2.23	0.15	3.17	0.21	2.16	0.21	2.12	0.00	0.00
SCRICI-27	SCIS	21.41	252.70	24.79	11.43	0.62	0.01	0.00	0.04	6954.20	6.32	10.53	1.40	10.79	3.26	0.76	3.14	0.24	3.69	0.36	1.87	0.20	1.41	0.02	0.25	0.00	13.89	0.00	0.02
SCRICI-27b	SCIS	37.48	3.09	7.38	20.87	1.09	0.00	0.00	0.00	11837.42	2.37	0.37	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.01	0.22	0.00	0.07	0.00	9.82	0.00	0.00
SCRICI-21	SCIS	2.08	18.28	12.67	17.28	1.07	0.00	0.00	0.00	458.10	0.78	1.39	0.19	1.02	0.69	0.08	0.01	0.02	1.10	0.21	0.87	0.15	1.13	0.00	0.48	0.00	4.33	0.01	0.04
SCRICI-21b	SCIS	2.10	199.16	80.04	49.27	2.26	0.17	0.00	0.00	728.08	8.77	27.88	3.07	27.06	7.80	2.05	9.61	1.19	11.25	1.26	4.71	0.18	2.43	0.08	1.06	0.00	10.53	37.06	0.24
SCRICIO-2	SCIS	0.36	530.09	16.14	10.93	1.35	0.00	0.49	0.00	4.46	4.51	9.64	1.33	8.89	2.48	0.81	0.58	0.14	0.82	0.20	1.36	0.12	0.51	0.00	0.22	0.00	2.56	2.03	0.03
SCRICIO-2b	SCIS	0.05	306.30	12.31	49.31	1.25	0.17	0.04	0.00	8.05	3.46	7.05	1.01	5.18	1.16	0.00	0.00	0.00	6.62	1.06	2.02	0.00	0.00	0.00	3.22	0.00	3.27	19.90	0.00
SCRICI-26	SCIS	35.78	36.32	44.38	680.89	3.74	0.57	0.08	0.27	1267.09	5.18	15.41	1.51	10.46	2.60	0.32	2.21	0.46	4.43	0.78	3.96	0.48	7.14	1.08	17.21	0.39	8.00	11.95	1.15
SCRICI-26b	SCIS	14.66	40.15	60.32	409.43	13.53	0.87	0.61	0.02	427.10	14.68	32.66	2.48	17.04	3.60	1.01	4.85	0.73	6.20	1.09	4.73	0.94	9.59	1.22	14.90	1.43	8.84	4.69	1.06
SCRICI-14	SCIS	0.15	6.68	15.57	53.11	2.39	0.00	0.07	0.00	3.61	0.04	0.66	0.05	0.00	0.00	0.00	0.00	0.01	0.52	0.22	1.04	0.00	0.44	0.05	2.05	0.00	4.20	3.16	0.00
SCRICI-14b	SCIS	0.58	29.43	25.14	50.74	3.21	0.20	0.00	0.00	34.54	1.13	2.58	0.38	2.08	1.79	0.27	1.74	0.11	2.86	0.55	2.66	0.27	3.98	0.20	1.86	0.07	3.29	0.61	0.04
SCRICI-12	SCIS	35.14	8.77	22.22	66.10	1.95	0.10	0.00	0.01	753.37	0.60	0.93	0.10	0.00	0.00	0.00	0.00	0.02	1.50	0.43	2.73	0.08	1.23	0.01	2.30	0.00	2.81	0.00	0.00
SCRICI-12b	SCIS	59.77	53.95	32.66	70.50	2.24	0.39	0.09	0.00	1533.93	2.02	4.51	0.68	7.72	5.18	2.70	0.93	0.00	3.08	0.45	2.26	0.41	3.78	0.06	2.39	0.13	3.70	0.62	0.03
SCRICI-15c	SCIS	13.39	24.16	6.88	5.68	0.74	0.00	0.00	0.00	3205.21	1.83	2.01	0.29	0.93	0.04	0.21	0.90	0.00	0.62	0.00	0.54	0.08	0.00	0.00	0.00	0.00	1.29	3.20	0.02
SCRICI-15d	SCIS	0.34	680.12	76.71	64.60	4.15	0.67	0.47	0.05	25.97	6.84	16.52	2.14	17.38	4.77	1.54	7.33	0.98	9.31	1.40	6.28	0.67	6.17	0.47	2.84	0.16	15.42	5.04	0.09
SCRIOPH-1	SCIS	1.38	140.08	54.60	41.76	3.23	0.53	0.13	0.00	5.29	10.49	34.58	3.31	26.54	8.48	2.51	10.02	0.91	7.59	0.90	3.86	0.28	3.01	0.05	1.98	0.00	1.50	0.12	0.10
SCRIOPH-1b	SCIS	2.32	36.28	40.26	24.62	4.72	0.41	0.48	0.13	0.66	5.65	16.20	2.09	10.67	1.84	0.75	2.98	0.20	8.00	0.51	2.60	1.17	2.27	0.00	0.00	0.00	0.66	0.00	0.00
SCRICIO3-1	SCIS	47.10	433.47	52.84	142.23	5.76	0.65	0.00	0.15	404.87	6.09	15.43	2.29	18.81	5.91	1.31	5.69	0.70	6.53	1.08	4.45	0.52	6.43	0.45	5.83	0.22	1.29	0.23	0.05
SCRICIO3-1b	SCIS	55.94	280.07	53.19	209.84	8.06	0.70	0.21	0.23	480.75	4.84	12.29	2.01	16.14	5.55	1.21	6.09	0.81	7.87	1.18	4.38	0.59	8.97	0.87	7.72	0.28	1.74	2.49	0.08
SCRICI-9	SCIS	0.11	1120.66	33.89	26.92	2.93	0.23	0.00	0.00	7.44	4.37	10.68	1.63	10.73	3.12	1.10	3.28	0.28	3.50	0.72	2.46	0.12	3.77	0.08	0.43	0.00	4.14	0.05	0.05
SCRICI-9b	SCIS	0.33	529.51	16.40	15.17	1.35	0.00	0.06	0.00	7.09	1.50	3.54	0.65	2.33	1.90	0.54	1.24	0.10	2.26	0.21	1.65	0.20	1.60	0.00	0.54	0.00	2.24	0.00	0.03
SCRISRO-2	SCIS	0.20	42.88	118.00	78.41	6.39	0.97	0.00	0.00	8.11	16.52	41.56	4.50	34.70	8.66	1.97	13.68	1.25	13.05	1.88	7.42	0.81	6.78	0.56	2.91	0.21	1.56	0.18	0.07
SCRISRO-2b	SCIS	0.25	141.90	189.27	71.17	4.02	1.11	0.00	0.00	8.03	27.00	81.11	7.36	62.82	14.38	2.94	20.85	2.27	20.26	2.49	9.44	1.21	9.12	0.69	3.28	0.24	4.09	0.00	0.10
SCRICI-8	SCIS	0.00	21.86	66.78	95.66	4.22	0.55	0.00	0.00	9.01	5.29	16.41	1.92	14.24	5.03	1.36	6.25	0.81	7.98	1.18	5.61	0.57	6.11	0.37	4.09	0.21	1.70	25.81	0.30
SCRICI-8b	SCIS	36.89	66.90	20.04	63.29	2.34	0.34	0.21	0.09	7458.18	2.87	2.84	0.73	1.54	1.56	0.34	1.33	0.35	3.15	0.60	2.26	0.53	2.91	0.21	2.38	0.15	0.95	0.00	0.03
SCRICI-20	SCIS	0.59	91.11	48.14	55.30	2.91	0.29	0.18	0.00	115.45	5.94	15.55	2.04	17.13	5.24	1.13	6.51	0.71	7.31	0.95	4.08	0.50	4.55	0.31	2.58	0.11	11.34	12.98	0.16
SCRICI-20b	SCIS	38.17	243.41	28.06	66.93	1.93	0.30	0.42	0.11	8979.81	5.71	9.87	1.36	12.14	3.49	0.47	3.51	0.29	4.45	0.56	1.49	0.37	4.09	0.39	2.38	0.00	2.65	23.31	0.06
SCRICI-18	SCIS	0.46	866.34	136.65	109.13	6.01	0.52	0.45	0.00	32.45	7.38	15.65	2.26	17.87	6.20	2.46	9.74	1.19	14.04	2.23	8.92	1.08	10.26	0.73	4.36	0.34	20.95	24.00	0.11
SCRICI-18b	SCIS	0.00	19.69	69.05	93.31	4.18	0.36	0.18	0.00	9.95	8.16	21.36	2.64	22.37	8.12	2.16	7.96	0.77	9.87	1.44	4.03	0.96	6.62	0.39	4.98	0.25	3.73	4.55	0.29

Table 8b. Calibrated LA-ICP-MS data for Santa Cruz Island Schist in ppm (Rb through U)

anid	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
SCRICI-24	SCIS	29.21	156.19	24.58	41.76	2.38	0.19	0.27	0.00	6126.46	4.42	10.16	1.09	7.37	2.58	0.81	2.95	0.19	3.00	0.46	2.13	0.24	3.43	0.19	2.09	0.10	1.29	1.64	0.05
SCRICI-24b	SCIS	0.31	135.67	62.84	41.03	2.95	0.77	0.22	0.00	77.25	4.55	13.72	1.68	14.47	6.62	1.27	7.51	0.89	9.70	1.33	4.29	0.82	4.89	0.29	2.97	0.23	4.35	2.38	0.17
SCRICIO2-2	SCIS	15.24	1710.27	219.56	475.71	18.39	1.98	0.86	0.06	5958.68	33.44	96.63	10.17	73.23	21.47	5.95	26.51	2.73	24.11	3.62	15.57	1.87	19.31	1.68	15.34	0.61	14.45	1.66	0.27
SCRICIO2-2b	SCIS	2.01	3251.53	88.74	17.95	1.33	1.55	1.36	0.05	344.51	8.26	17.98	2.55	18.68	4.89	4.06	7.12	0.95	10.42	1.56	6.23	0.75	5.08	0.18	0.73	0.00	25.32	0.00	0.21

Table 9a. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 1 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
9039-1.D	Cuyamaca Type 1	Talc-schist	119340.20	193863.93	6764.56	209524.30	2584.58	3184.10	0.00	0.00	14.86	728.67	226.01	32209.86	831.08	20.69	0.00	0.00	65.53
9039-1b.D	Cuyamaca Type 1	Talc-schist	17096.37	188745.53	3935.77	282777.68	1068.10	0.00	22.68	223.45	6.49	428.58	147.05	33067.62	799.84	57.71	0.00	110.07	0.00
9039-3.D	Cuyamaca Type 1	Talc-schist	71991.15	170209.36	3003.11	258689.95	2096.57	669.89	0.00	201.95	0.00	857.19	364.05	36923.42	486.73	33.00	16.76	92.59	1216.32
9039-3b.D	Cuyamaca Type 1	Talc-schist	13411.87	189132.71	3014.11	280693.72	662.78	0.00	0.00	0.00	16.15	765.37	372.38	39412.72	623.10	36.25	45.11	124.46	1144.57
9039-6.D	Cuyamaca Type 1	Talc-schist	94348.00	151772.34	1040.22	248818.20	3930.27	721.40	0.00	0.00	14.12	418.67	1357.92	54208.88	382.49	27.33	0.00	37.40	0.00
9039-6b.D	Cuyamaca Type 1	Talc-schist	20204.17	181756.96	1839.17	274925.42	518.69	270.48	9.37	233.61	30.63	455.97	1206.79	52029.84	512.98	54.84	39.75	143.76	17.98
9039-12.D	Cuyamaca Type 1	Talc-schist	105885.33	184967.50	6469.70	227812.26	3801.94	1065.71	0.00	206.53	17.38	947.87	349.12	28954.86	310.50	24.24	0.00	0.00	183.32
9039-12b.D	Cuyamaca Type 1	Talc-schist	7517.99	180932.63	1843.72	271678.65	0.00	384.69	2.40	56.37	10.76	1260.60	1735.69	68460.68	439.53	57.51	0.00	162.01	513.65
9039-13.D	Cuyamaca Type 1	Talc-schist	89654.51	162804.79	2084.42	243069.18	3260.43	1158.39	12.47	168.35	2.83	458.73	1194.70	52892.96	378.25	32.93	0.00	82.57	208.75
9039-13b.D	Cuyamaca Type 1	Talc-schist	0.00	203158.78	3316.19	289571.74	0.00	0.00	0.00	72.76	23.52	600.66	167.25	24074.45	678.43	59.44	2.59	150.67	27.46
9039-15.D	Cuyamaca Type 1	Talc-schist	11900.89	184810.02	16140.37	279169.49	440.96	0.00	37.90	195.78	34.52	1098.29	184.19	31587.44	732.20	57.65	0.00	118.07	57.82
9039-15b.D	Cuyamaca Type 1	Talc-schist	8888.55	194322.66	2446.31	291502.88	60.90	0.00	9.46	389.09	22.22	300.88	87.01	24268.19	619.13	41.28	26.43	111.90	0.00
9039-16.D	Cuyamaca Type 1	Talc-schist	14084.49	203260.78	3075.27	280297.62	831.60	0.00	4.31	255.27	0.00	594.12	74.80	24058.40	541.52	35.83	31.12	119.80	188.36
9039-16b.D	Cuyamaca Type 1	Talc-schist	5582.23	193855.74	2594.95	294548.31	815.43	0.00	11.90	396.11	13.36	763.72	28.14	21502.45	610.82	67.05	0.00	110.57	637.53
9039-20.D	Cuyamaca Type 1	Talc-schist	10364.58	189094.97	3946.20	295727.47	642.71	152.69	0.00	290.64	16.11	554.77	109.76	19791.68	723.44	39.38	17.72	0.00	19.17
9039-20b.D	Cuyamaca Type 1	Talc-schist	0.00	199830.99	2615.96	293077.33	0.00	0.00	7.49	71.28	12.19	597.36	83.72	23584.39	859.51	54.54	30.95	87.31	13.11
9039-21.D	Cuyamaca Type 1	Talc-schist	26688.67	191164.84	3165.62	262384.19	1546.48	601.64	17.43	95.55	5.29	591.65	1158.18	50923.75	558.96	57.68	0.00	149.76	0.00
9039-21b.D	Cuyamaca Type 1	Talc-schist	7675.16	191947.41	3643.88	270347.36	177.24	2599.68	23.50	17.85	27.51	1134.71	974.90	54112.96	697.84	50.16	0.00	125.72	62.51
9039-23.D	Cuyamaca Type 1	Talc-schist	17373.68	199479.42	3544.16	278573.74	1228.28	530.41	7.68	117.87	6.53	797.02	167.70	26627.51	421.38	39.76	0.00	81.25	16.65
9039-23b.D	Cuyamaca Type 1	Talc-schist	4723.27	200522.43	3908.91	281870.26	340.94	0.00	0.00	0.00	6.13	825.90	317.77	32774.08	747.05	71.39	23.71	116.67	33.01
9039-24.D	Cuyamaca Type 1	Talc-schist	21279.82	202815.12	6222.12	270213.70	975.71	625.67	16.91	15.91	30.81	1005.77	169.05	27464.35	592.87	27.04	2.90	67.07	514.18
9039-24b.D	Cuyamaca Type 1	Talc-schist	12348.82	199454.40	20732.93	255103.30	779.96	609.94	13.28	113.51	32.82	1897.68	278.53	42197.43	881.79	37.54	30.12	79.49	224.80
9039-25.D	Cuyamaca Type 1	Talc-schist	25828.44	201695.81	9212.01	264721.34	1791.30	0.21	0.00	17.98	18.90	1303.11	252.33	28379.05	548.03	32.52	0.00	43.31	321.93
9039-25b.D	Cuyamaca Type 1	Talc-schist	9645.67	199918.16	3610.45	280987.25	57.17	302.95	0.00	13.87	11.87	869.37	247.25	30156.71	698.69	38.96	0.00	192.15	334.88
9039-28.D	Cuyamaca Type 1	Talc-schist	12016.59	196232.92	19721.66	259455.73	1555.18	0.00	35.29	619.94	7.77	2166.85	264.01	40223.43	995.34	65.24	9.68	141.16	0.00
9039-28b.D	Cuyamaca Type 1	Talc-schist	18369.01	194066.58	3899.24	274778.13	847.81	0.00	0.00	151.96	5.20	625.41	169.98	37513.35	1054.57	57.36	0.00	158.55	0.00
9039-29.D	Cuyamaca Type 1	Talc-schist	86048.72	165739.87	2444.85	263048.43	3112.93	0.00	0.00	484.20	0.00	544.16	92.83	24390.21	532.51	35.09	0.01	57.11	121.68
9039-29b.D	Cuyamaca Type 1	Talc-schist	7992.66	200935.46	1435.25	288846.86	150.66	0.00	9.41	43.00	20.40	505.97	93.45	22517.74	583.90	70.87	4.05	120.20	392.72
9039-30.D	Cuyamaca Type 1	Talc-schist	17085.08	187252.80	29195.52	247824.96	2027.82	0.00	36.44	499.03	16.60	4552.96	458.12	47537.68	812.96	64.67	0.00	144.52	375.10
9039-30b.D	Cuyamaca Type 1	Talc-schist	0.00	208998.23	3750.86	277994.83	1219.94	397.97	2.48	330.17	13.16	1097.67	200.66	31399.52	695.67	55.89	0.00	125.70	366.52
9039-32.D	Cuyamaca Type 1	Talc-schist	17275.16	184984.04	109399.32	145563.24	764.67	159.05	26.71	232.17	321.51	221.28	753.97	102969.37	320.98	73.28	28.00	92.57	0.00
9039-32b.D	Cuyamaca Type 1	Talc-schist	7926.41	178421.91	103240.36	159792.70	599.06	993.22	45.88	318.67	300.12	178.72	704.52	105484.23	329.13	72.00	12.89	141.13	8.38
9039-37.D	Cuyamaca Type 1	Talc-schist	101277.52	152585.59	6747.66	231355.27	3419.78	1961.43	0.00	23.08	8.15	789.45	1769.91	61745.63	465.84	6.09	0.00	110.92	1562.50
9039-37b.D	Cuyamaca Type 1	Talc-schist	0.00	209072.34	3422.33	275796.63	0.00	0.00	21.99	17.20	11.67	781.94	261.06	37264.86	837.24	55.94	0.00	193.15	43.31
9039-39.D	Cuyamaca Type 1	Talc-schist	14018.74	191465.38	1929.76	292057.07	861.22	0.00	14.28	52.31	14.86	544.09	240.15	22229.80	323.40	51.38	0.00	49.50	0.00
9039-39b.D	Cuyamaca Type 1	Talc-schist	13269.66	203956.31	1631.58	282056.99	0.00	321.04	3.87	0.00	20.97	410.47	212.63	24194.30	491.49	41.29	0.00	96.80	51.46
9039-40.D	Cuyamaca Type 1	Talc-schist	19096.95	196716.29	6434.30	274118.37	1109.07	108.16	18.17	100.47	6.12	698.55	173.18	31189.78	894.08	61.92	11.43	159.24	6.16
9039-40b.D	Cuyamaca Type 1	Talc-schist	7146.44	207035.30	4879.93	276724.24	442.42	0.00	0.00	0.00	0.00	707.49	134.72	29480.53	908.33	54.36	3.47	158.34	6.76
9039-42.D	Cuyamaca Type 1	Talc-schist	76201.10	176113.49	1092.25	269181.55	3486.97	0.44	0.00	38.24	0.00	407.03	44.67	14939.21	388.76	43.66	5.55	0.00	0.00
9039-42b.D	Cuyamaca Type 1	Talc-schist	12158.10	207338.87	1879.44	275866.38	1211.61	0.00	19.90	0.00	5.70	389.89	403.96	29554.42	330.49	24.38	20.50	151.76	12.74
9039-45.D	Cuyamaca Type 1	Talc-schist	3435.72	184464.54	3111.35	298929.30	205.56	0.00	0.00	142.23	0.00	730.13	174.58	28301.96	930.75	54.67	3.71	36.76	0.00
9039-45b.D	Cuyamaca Type 1	Talc-schist	6309.36	183882.41	2967.74	292449.36	0.00	0.00	9.49	133.78	11.62	906.57	472.56	35740.29	805.87	53.80	2.65	166.71	84.12
9039-46.D	Cuyamaca Type 1	Talc-schist	81242.93	177373.25	6312.94	248240.65	4185.99	0.00	9.68	287.36	14.51	1073.02	272.88	30665.79	623.34	43.66	0.00	83.80	354.18
9039-46b.D	Cuyamaca Type 1	Talc-schist	2658.63	211949.49	4934.90	272340.17	0.00	0.00	9.43	203.03	0.96	844.74	306.26	32366.43	853.16	68.53	0.00	151.30	1411.20
9039-47.D	Cuyamaca Type 1	Talc-schist	20327.67	194773.36	2679.02	253777.70	2043.43	678.08	9.82	64.56	10.74	936.24	1160.27	65507.33	511.30	53.19	11.81	116.84	0.00
9039-47b.D	Cuyamaca Type 1	Talc-schist	5006.84	206618.49	3209.35	283548.81	58.80	0.00	8.37	147.45	7.68	728.33	249.79	24082.76	743.98	66.90	17.52	148.40	15.46

Table 9a. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 1 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
9039-48.D	Cuyamaca Type 1	Talc-schist	74838.63	184731.39	2732.29	254773.82	2140.66	185.78	5.33	264.05	13.34	385.80	126.36	25856.84	733.27	38.01	0.00	105.91	0.00
9039-48b.D	Cuyamaca Type 1	Talc-schist	7615.42	195889.19	3376.44	284876.67	413.62	0.00	4.97	253.11	7.11	507.14	194.22	31574.61	1032.63	54.23	0.00	50.42	0.00
9039-50.D	Cuyamaca Type 1	Talc-schist	13769.09	187765.74	2088.39	293506.37	243.75	0.00	5.44	102.33	0.00	649.09	223.43	24463.58	600.03	59.99	16.81	109.38	2.09
9039-50b.D	Cuyamaca Type 1	Talc-schist	8508.78	205346.17	3729.39	279334.96	550.81	0.00	5.07	0.00	0.00	1101.58	352.42	27398.39	546.60	53.14	8.50	84.59	26.02

Table 9b. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
9039-1.D	Cuyamaca Type 1	Talc-schist	9.42	6.42	2.99	5.64	0.00	7.49	11.60	0.00	5.60	0.00	0.00	0.85	0.00	8.10	1.36	0.00	3.55	0.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.27	0.00
9039-1b.D	Cuyamaca Type 1	Talc-schist	0.00	0.53	2.47	0.00	0.00	4.66	13.47	0.00	2.30	1.39	2.22	0.00	0.00	0.00	3.67	6.96	0.00	0.00	3.05	0.00	0.82	0.00	0.48	0.00	2.08	0.00	2.36	1.13
9039-3.D	Cuyamaca Type 1	Talc-schist	3.39	1.47	2.12	0.31	0.00	4.49	64.90	0.00	256.33	0.62	0.24	0.00	0.00	1.32	1.56	5.11	0.58	0.49	1.17	0.39	0.63	0.00	0.00	0.00	0.00	4.75	2.90	0.00
9039-3b.D	Cuyamaca Type 1	Talc-schist	0.51	2.88	0.76	0.00	0.00	2.26	54.85	0.00	126.25	0.40	0.41	0.11	7.41	0.00	1.99	0.00	0.00	0.00	0.00	2.87	0.00	0.00	0.33	0.00	0.85	0.00	3.20	0.00
9039-6.D	Cuyamaca Type 1	Talc-schist	1.66	0.68	1.23	0.00	0.00	2.20	1.22	0.00	3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.70	2.90	0.14	0.00	0.00	0.00	0.00	0.00	1.20	0.00
9039-6b.D	Cuyamaca Type 1	Talc-schist	1.34	0.00	4.17	0.00	0.36	0.00	0.00	0.00	0.41	1.58	1.61	0.00	0.00	0.00	5.85	0.00	0.00	0.00	0.39	0.00	1.09	0.00	0.00	0.00	0.37	2.85	2.78	1.00
9039-12.D	Cuyamaca Type 1	Talc-schist	1.72	0.50	1.69	1.71	0.00	4.87	3.62	0.21	134.94	0.00	0.00	0.00	0.00	0.00	1.59	0.58	0.46	0.00	0.93	0.31	0.30	0.00	0.00	0.00	0.00	5.30	0.18	0.00
9039-12b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.00	0.79	0.00	0.00	0.84	0.00	222.30	0.00	2.25	1.40	0.00	0.00	0.00	0.00	0.00	0.00	1.23	0.00	0.00	0.00	1.15	0.00	0.00	0.00	0.75	1.01
9039-13.D	Cuyamaca Type 1	Talc-schist	2.60	0.41	1.59	1.79	0.00	1.32	2.95	0.00	3.37	0.08	0.00	0.40	4.98	2.01	1.30	0.47	0.38	0.00	0.00	2.25	0.00	0.00	0.41	0.00	0.00	0.00	0.43	0.00
9039-13b.D	Cuyamaca Type 1	Talc-schist	0.00	0.56	0.00	0.00	1.27	0.00	7.14	0.00	1.03	1.31	1.46	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.54	0.94	0.00	0.00	4.66	0.00
9039-15.D	Cuyamaca Type 1	Talc-schist	2.60	4.00	0.17	1.62	0.00	7.42	6.06	0.00	8.37	0.44	0.00	0.00	0.00	0.00	3.86	0.81	0.83	0.00	0.00	5.20	0.00	2.37	1.43	0.94	0.00	0.00	0.00	2.75
9039-15b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.00	0.78	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	0.00	0.00	0.00	0.00	1.61	2.83	0.97	0.00	1.59	0.00	0.00	0.00	0.00	0.00
9039-16.D	Cuyamaca Type 1	Talc-schist	7.83	6.37	2.48	0.00	0.00	0.00	11.59	2.15	2.67	0.23	0.00	0.00	0.00	0.00	6.16	6.48	0.88	0.00	0.00	0.00	0.00	1.26	0.00	4.49	0.00	0.00	2.21	4.38
9039-16b.D	Cuyamaca Type 1	Talc-schist	3.31	3.31	0.00	3.94	0.00	0.00	5.20	1.49	31.39	0.70	0.00	1.35	7.85	0.00	0.00	0.00	0.00	0.00	0.51	0.00	1.72	0.00	2.00	2.99	0.00	0.00	0.00	0.00
9039-20.D	Cuyamaca Type 1	Talc-schist	6.61	6.19	2.45	0.00	0.00	0.00	1.32	0.00	28.81	0.16	0.00	0.00	0.00	2.22	1.96	11.52	2.10	0.00	1.64	4.72	0.00	0.00	2.73	2.04	0.00	0.00	0.00	2.39
9039-20b.D	Cuyamaca Type 1	Talc-schist	3.36	0.62	0.00	2.31	0.00	0.00	0.00	0.00	3.11	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.62	7.15	1.05	0.00	0.00	7.38	0.60	0.00	0.00	0.00	3.45	0.00
9039-21.D	Cuyamaca Type 1	Talc-schist	2.17	0.00	2.04	0.00	0.00	0.00	9.10	0.00	6.83	0.00	0.61	0.25	5.92	0.00	0.83	4.36	1.18	0.66	0.00	3.72	0.66	0.00	0.77	0.00	0.00	0.00	2.67	2.95
9039-21b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.22	7.03	0.00	3.98	1.82	0.00	5.85	0.00	3.20	1.05	0.00	0.69	0.00	7.15	0.00	0.00	0.44	6.30	0.87	0.00	3.26	0.00	1.26	0.00	1.18	0.00
9039-23.D	Cuyamaca Type 1	Talc-schist	2.46	1.00	0.49	1.54	0.00	0.00	3.44	0.00	32.64	0.42	0.00	0.00	0.75	0.00	1.22	0.77	0.00	0.00	0.57	2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.79	1.04
9039-23b.D	Cuyamaca Type 1	Talc-schist	0.94	0.00	1.01	0.28	1.03	0.00	0.00	0.00	16.31	0.28	0.80	0.00	0.00	6.93	0.00	1.60	0.00	0.00	1.77	5.06	0.87	0.00	1.17	0.00	0.00	5.43	0.26	0.00
9039-24.D	Cuyamaca Type 1	Talc-schist	2.84	1.69	1.39	0.29	0.00	0.00	4.33	0.00	3.29	0.00	0.00	0.00	0.00	0.00	4.37	3.63	0.25	0.00	0.00	2.32	0.00	0.00	0.64	0.00	0.00	0.00	0.74	1.96
9039-24b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	2.69	0.00	0.00	2.66	4.03	0.66	30.44	1.74	1.13	0.00	5.23	0.00	6.45	5.55	0.46	0.00	0.00	0.48	0.33	0.00	0.00	1.57	0.33	0.00	0.00	0.00
9039-25.D	Cuyamaca Type 1	Talc-schist	1.46	0.00	0.00	0.98	0.00	0.00	0.00	0.00	223.97	0.45	0.58	0.00	0.00	0.00	0.78	0.00	0.56	0.00	0.30	2.62	0.92	10.34	0.00	0.00	0.59	0.00	0.00	1.66
9039-25b.D	Cuyamaca Type 1	Talc-schist	0.55	0.61	0.50	6.10	0.30	2.06	0.00	1.68	131.82	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	2.93	0.00	3.59	2.53	0.00	0.00	3.78	0.92	0.00
9039-28.D	Cuyamaca Type 1	Talc-schist	8.16	0.00	0.00	0.00	0.73	0.00	12.09	0.00	23.92	0.00	0.36	0.00	0.00	0.00	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.99	0.00	0.00	0.00
9039-28b.D	Cuyamaca Type 1	Talc-schist	2.39	0.00	1.84	6.33	0.00	6.77	3.09	0.00	8.29	2.12	0.68	0.00	3.95	0.00	0.00	8.11	0.00	0.00	0.00	0.00	0.00	0.00	9.80	0.00	3.57	0.00	2.01	0.00
9039-29.D	Cuyamaca Type 1	Talc-schist	5.17	3.11	0.00	2.12	0.00	2.02	7.87	0.00	14.78	0.86	0.00	0.00	0.00	6.54	1.10	0.00	1.95	0.00	1.92	0.38	0.00	0.00	1.24	0.00	0.88	0.00	0.00	0.00
9039-29b.D	Cuyamaca Type 1	Talc-schist	2.82	0.00	0.17	3.64	0.00	5.32	0.00	0.00	0.00	0.00	0.64	0.00	0.00	2.77	0.00	0.00	0.00	7.19	2.11	2.02	0.00	0.00	0.20	1.63	0.00	0.00	0.00	0.00
9039-30.D	Cuyamaca Type 1	Talc-schist	6.81	0.00	0.97	4.74	0.00	0.00	2.72	0.17	167.21	0.83	0.00	1.60	0.00	1.14	3.18	11.86	0.93	0.00	0.67	2.92	0.00	0.00	0.00	1.05	0.00	0.00	0.00	3.08
9039-30b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.00	0.00	2.84	7.94	9.54	0.00	115.22	0.00	1.55	0.16	8.73	0.00	0.00	0.00	0.00	6.98	0.00	0.00	1.02	2.02	0.24	0.00	0.00	0.00	0.00	0.00
9039-32.D	Cuyamaca Type 1	Talc-schist	0.00	2.76	0.00	0.88	1.28	3.46	14.00	0.00	4.30	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.92	0.91	0.63	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.39
9039-32b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.55	1.05	1.64	1.13	0.00	0.00	8.28	0.00	2.03	0.89	5.91	0.00	0.00	6.07	0.00	1.27	0.00	6.41	0.00	9.81	1.06	0.00	0.00	12.40	0.00	0.00
9039-37.D	Cuyamaca Type 1	Talc-schist	1.23	0.84	1.43	0.25	0.00	0.00	1.82	0.00	546.45	0.50	1.16	0.00	0.00	0.00	1.96	0.00	0.46	0.00	0.93	2.15	0.10	1.08	0.00	0.00	0.00	3.79	0.89	0.56
9039-37b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.00	1.45	0.00	0.00	13.06	0.00	2.85	0.17	0.00	0.71	0.00	2.32	1.24	2.08	0.00	2.06	4.12	0.00	1.27	7.17	1.06	0.00	1.26	0.00	0.00	0.00
9039-39.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.00	0.00	0.00	6.29	7.23	0.36	1.18	0.00	2.60	0.00	1.88	0.61	3.15	0.00	0.00	0.00	3.36	1.56	1.77	0.00	1.65	1.68	0.00	8.30	0.00	0.00
9039-39b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.89	1.70	0.95	3.28	4.48	0.00	52.98	1.03	2.63	0.00	0.00	0.00	0.00	7.86	0.00	0.00	0.72	9.33	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00
9039-40.D	Cuyamaca Type 1	Talc-schist	1.07	1.50	1.43	0.00	0.00	1.41	0.00	0.00	3.57	0.14	0.00	0.00	3.09	0.00	3.63	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00
9039-40b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.15	3.68	0.53	0.00	0.00	0.00	0.67	1.43	1.92	0.48	3.18	0.47	0.00	1.64	0.00	0.00	0.90	0.00	0.00	4.75	2.92	0.00	0.00	0.00	1.89	0.50
9039-42.D	Cuyamaca Type 1	Talc-schist	5.30	1.95	0.00	5.29	0.19	0.00	6.02	0.35	0.40	0.00	0.00	0.00	0.00	6.43	0.00	0.00	1.69	0.00	0.00	1.53	0.00	0.00	0.00	0.00	0.00	3.77	2.07	0.93
9039-42b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	1.77	0.00	0.00	0.00	10.34	0.36	6.85	0.00	0.89	0.00	0.00	0.00	0.00	8.14	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.33
9039-45.D	Cuyamaca Type 1	Talc-schist	5.61	0.72	2.17	0.00	0.00	0.00	6.91	0.00	0.38	0.00	1.30	0.54	0.00	0.00	0.29	0.00	0.63	0.00	0.69	0.00	0.00	0.00	1.23	3.21	0.00	0.00	1.58	1.25
9039-45b.D	Cuyamaca Type 1	Talc-schist	0.00	0.19	0.00	0.00	0.00	0.00	0.66	0.32	24.94	0.15	0.30	0.61	3.34	0.00	0.00	0.00	0.00	1.78	0.32	0.00	0.47	9.29	0.00	0.96	0.16	0.00	0.00	2.39
9039-46.D	Cuyamaca Type 1	Talc-schist	1.39	1.33	1.33	0.00	0.00	0.00	3.09	0.00	112.10	0.79	0.00	0.00	0.00	0.00	0.00	4.62	0.32	0.00	0.35	4.54	0.00	0.00	0.00	3.71	1.03	2.58	1.82	0.21
9039-46b.D	Cuyamaca Type 1	Talc-schist	0.00	2.62	0.00	1.56	0.00	0.00	0.00	0.00	891.83	0.00	0.74	0.00	4.15	0.00	0.00	6.67	0.35	0.00	0.80	0.56	0.00	5.77	0.68	0.00	1.36	0.00	1.48	0.00
9039-47.D	Cuyamaca Type 1	Talc-schist	1.75	3.31	1.88	1.96	0.00	8.98	10.26	0.00	1.22	1.25	0.00	0.00	0.95	4.92	0.00	0.98	1.67	0.00	1.82	0.00	0.00	0.00	2.17	1.13	0.00	0.00	0.34	0.66
9039-47b.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.72	2.76	0.00	0.00	3.66	0.00	2.71	2.47	0.33	0.95	0.00	0.00	2.94	19.74	0.00	0.00	0.00	0.00	0.52	0.00	1.81	0.00	0.00	0.00	0.00	0.00

Table 9b. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
9039-48.D	Cuyamaca Type 1	Talc-schist	2.31	4.02	0.68	0.00	0.35	0.00	0.00	0.22	0.00	0.00	0.00	0.17	6.39	0.00	0.00	3.04	0.87	0.00	0.00	1.60	0.00	0.00	0.00	0.68	0.32	0.00	2.04	0.00
9039-48b.D	Cuyamaca Type 1	Talc-schist	0.00	2.77	0.00	0.00	0.00	3.98	0.00	0.00	4.14	0.20	0.00	1.77	15.31	3.94	0.00	0.00	0.00	0.00	1.69	0.00	1.44	8.11	2.15	3.75	0.00	0.00	0.00	0.00
9039-50.D	Cuyamaca Type 1	Talc-schist	0.00	0.00	0.48	1.23	0.00	0.00	3.64	0.00	10.25	0.71	0.44	0.00	1.57	0.00	2.11	1.67	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	1.35
9039-50b.D	Cuyamaca Type 1	Talc-schist	2.02	0.00	0.78	2.08	0.00	0.96	0.00	0.00	15.43	0.00	1.44	0.50	0.00	0.00	0.00	15.45	0.00	0.00	0.00	0.00	0.00	0.00	1.26	0.00	0.00	3.50	2.55	0.00

Table 10a. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 2 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
9040-1.D	Cuyamaca Type 2	Talc-schist	0.00	188690.63	6357.52	279575.07	0.00	393.45	1.25	143.62	19.69	1199.69	1099.68	50015.20	456.42	54.76	0.00	130.34	0.00
9040-1b.D	Cuyamaca Type 2	Talc-schist	0.00	189158.09	2219.48	281028.28	135.45	152.64	4.25	41.63	16.03	1837.93	767.93	52555.73	508.32	46.11	2.72	217.30	18.21
9040-2.D	Cuyamaca Type 2	Talc-schist	0.00	196129.74	3096.19	292832.52	39.54	174.64	0.00	154.38	13.33	895.90	165.02	27172.27	537.00	38.90	4.59	188.32	3.66
9040-2b.D	Cuyamaca Type 2	Talc-schist	0.00	191711.37	5800.34	280490.20	130.55	87.36	7.18	39.72	7.99	951.06	665.61	46873.06	490.61	44.77	1.11	121.92	5.21
9040-3.D	Cuyamaca Type 2	Talc-schist	0.00	167613.48	12383.29	267657.28	0.00	1680.60	4.75	107.66	24.04	1751.62	2766.93	80702.69	510.16	60.79	0.00	208.74	0.00
9040-3b.D	Cuyamaca Type 2	Talc-schist	0.00	183180.50	2404.87	277766.68	0.00	598.16	2.62	74.15	4.90	666.48	1676.06	63966.71	617.89	49.34	4.50	211.01	3.24
9040-6.D	Cuyamaca Type 2	Talc-schist	0.00	190040.02	1121.88	285060.75	23.32	209.74	4.00	114.84	5.25	265.49	1447.85	48099.69	346.09	31.66	4.13	113.55	7.68
9040-6b.D	Cuyamaca Type 2	Talc-schist	0.00	188671.20	37800.59	229973.28	259.16	2528.40	18.99	87.20	60.80	3678.47	1824.88	77098.31	331.14	35.42	2.59	181.90	12.13
9040-7.D	Cuyamaca Type 2	Talc-schist	0.00	201970.53	2852.51	288134.06	184.94	316.17	4.83	123.93	13.57	835.16	127.17	27679.49	505.24	65.82	0.00	114.46	30.43
9040-7b.D	Cuyamaca Type 2	Talc-schist	0.00	188688.37	6998.40	291130.08	286.73	444.43	3.57	10.11	20.61	1315.21	127.64	32459.41	565.10	46.12	5.19	162.95	22.09
9040-8.D	Cuyamaca Type 2	Talc-schist	0.00	197837.67	4289.65	289218.89	435.47	0.00	0.00	143.05	16.06	1505.61	323.82	28089.66	572.24	32.65	0.67	152.53	1.23
9040-8b.D	Cuyamaca Type 2	Talc-schist	0.00	151962.40	744.44	259867.37	138.05	1039.27	5.03	0.00	6.25	324.22	3454.15	127559.98	292.76	31.74	4.83	159.05	5.94
9040-9.D	Cuyamaca Type 2	Talc-schist	0.00	197068.24	2184.34	289628.97	204.79	380.61	2.07	106.55	13.22	602.41	234.03	32147.54	462.32	42.62	0.00	121.00	19.34
9040-9b.D	Cuyamaca Type 2	Talc-schist	0.00	178329.80	4019.42	283507.36	142.44	307.03	7.87	14.94	8.85	692.71	918.91	59922.81	482.87	36.63	3.20	181.40	64.05
9040-10.D	Cuyamaca Type 2	Talc-schist	0.00	184909.14	5224.21	275982.46	403.57	889.56	3.77	119.66	14.14	1010.43	1481.89	60262.30	483.75	31.75	0.00	139.32	13.44
9040-10b.D	Cuyamaca Type 2	Talc-schist	621.98	171940.14	12965.49	257446.47	117.82	1109.69	10.44	33.40	49.33	2532.88	1813.71	90156.40	527.00	44.56	6.66	176.63	169.20
9040-13.D	Cuyamaca Type 2	Talc-schist	0.00	197836.18	4603.15	287221.48	51.80	154.44	5.89	124.66	12.52	943.11	318.53	31570.94	453.72	40.36	0.00	135.98	0.00
9040-13b.D	Cuyamaca Type 2	Talc-schist	0.00	191520.01	1760.73	277103.61	155.94	72.48	6.19	16.23	5.95	618.97	924.63	57510.53	557.67	46.75	0.00	139.74	20.86
9040-14.D	Cuyamaca Type 2	Talc-schist	0.00	180924.48	1065.02	261558.13	151.30	779.85	3.50	89.91	21.66	443.57	2569.90	90785.08	248.70	20.63	82.21	153.84	1137.57
9040-14b.D	Cuyamaca Type 2	Talc-schist	0.00	200540.24	24190.01	249246.75	208.17	932.10	18.11	158.31	74.69	2851.17	300.72	55149.42	366.05	34.37	45.40	121.64	1373.67
9040-17.D	Cuyamaca Type 2	Talc-schist	0.00	194462.75	6326.16	287615.24	0.00	166.46	0.00	189.69	24.63	1029.38	186.25	32381.16	576.54	53.88	3.55	158.50	72.56
9040-17b.D	Cuyamaca Type 2	Talc-schist	0.00	181237.59	1758.62	279250.04	119.98	384.11	4.43	122.07	6.22	369.85	1238.99	65794.90	510.57	39.06	0.83	144.23	23.66
9040-20.D	Cuyamaca Type 2	Talc-schist	0.00	203671.92	10171.30	278298.75	54.27	186.38	1.32	59.60	12.56	1285.75	137.96	30669.66	479.54	30.99	6.81	107.52	0.00
9040-20b.D	Cuyamaca Type 2	Talc-schist	0.00	194438.03	39931.83	239009.61	228.49	1323.00	9.17	138.39	40.37	3654.34	364.79	56606.38	588.91	46.07	1.93	168.86	38.36
9040-23.D	Cuyamaca Type 2	Talc-schist	0.00	187784.51	3275.36	283842.94	237.73	516.41	0.00	123.91	2.76	678.94	1348.94	48367.73	758.88	9.79	0.00	197.40	68.98
9040-23b.D	Cuyamaca Type 2	Talc-schist	1376.04	194209.66	3320.56	278719.28	389.93	0.00	15.86	48.53	0.91	583.62	694.18	48434.76	829.39	21.24	0.00	168.80	48.49
9040-27.D	Cuyamaca Type 2	Talc-schist	0.00	200105.52	3148.87	285759.64	243.33	0.00	2.40	67.47	13.07	666.49	182.20	33379.35	575.49	40.15	3.43	178.85	0.00
9040-27b.D	Cuyamaca Type 2	Talc-schist	0.00	192932.73	3115.19	287052.38	108.53	0.00	5.89	0.00	10.36	556.85	247.16	39864.51	755.91	36.59	0.00	200.79	4.63
9040-28.D	Cuyamaca Type 2	Talc-schist	706.93	193810.35	4087.01	283165.16	234.39	50.94	4.34	85.51	9.54	1024.90	402.31	41682.36	821.81	47.28	27.95	203.55	60.48
9040-28b.D	Cuyamaca Type 2	Talc-schist	0.00	184582.32	4380.63	283298.44	324.34	0.00	3.47	17.34	8.31	858.19	826.67	52331.30	776.36	39.43	4.53	210.46	26.01
9040-34.D	Cuyamaca Type 2	Talc-schist	1966.63	198395.04	1529.85	287773.47	396.21	0.00	10.25	187.75	1.35	408.45	601.98	32386.55	407.76	11.03	8.08	168.65	7.61
9040-34b.D	Cuyamaca Type 2	Talc-schist	0.00	191918.62	1688.73	283643.57	0.00	0.00	2.04	133.03	9.67	428.85	1016.96	47487.89	552.65	12.20	0.00	204.24	28.22
9040-39.D	Cuyamaca Type 2	Talc-schist	0.00	198611.47	5221.86	282526.14	115.81	0.00	5.21	92.21	12.83	398.71	223.88	37145.79	984.80	34.21	8.09	177.09	9.72
9040-39b.D	Cuyamaca Type 2	Talc-schist	0.00	201487.76	4736.03	274696.03	0.00	0.00	5.29	134.21	9.49	385.98	207.17	46122.48	1060.10	42.07	0.00	176.69	77.56
9040-40.D	Cuyamaca Type 2	Talc-schist	299.17	195425.41	7422.90	285620.07	536.49	0.06	2.35	114.67	14.05	721.18	204.79	32566.37	749.22	25.78	1.34	158.56	10.22
9040-40b.D	Cuyamaca Type 2	Talc-schist	0.00	200757.29	7538.50	277069.13	218.52	0.00	0.00	261.27	14.40	762.87	186.86	39311.70	790.88	29.19	0.00	176.40	14.00
9040-47.D	Cuyamaca Type 2	Talc-schist	0.00	181836.04	6265.73	280457.53	248.18	0.06	11.14	115.85	12.96	826.02	2129.99	55917.64	526.05	18.04	1.47	171.00	55.95
9040-47b.D	Cuyamaca Type 2	Talc-schist	0.00	188082.84	36932.71	241671.44	1089.31	969.80	10.98	274.42	38.26	3805.37	713.25	62757.38	756.52	24.27	0.00	207.47	18.95
9040-50.D	Cuyamaca Type 2	Talc-schist	1239.65	205308.88	2849.75	286683.24	295.02	0.06	0.00	58.77	6.42	698.89	110.13	24984.46	845.48	41.51	0.00	176.04	1.03
9040-50b.D	Cuyamaca Type 2	Talc-schist	268.48	202905.94	9791.28	273861.06	81.94	0.00	4.48	112.48	11.31	1390.50	167.09	37919.85	948.75	40.76	0.00	194.77	3.44
9040-51.D	Cuyamaca Type 2	Talc-schist	0.00	190612.54	15989.05	264785.37	2387.22	616.61	4.95	364.43	22.95	2211.97	407.48	53835.89	728.72	29.96	15.05	281.22	91.93
9040-51b.D	Cuyamaca Type 2	Talc-schist	0.00	181014.33	43228.80	238081.24	3092.91	2074.92	5.61	818.80	41.07	4466.57	420.50	64060.28	751.01	43.21	0.00	321.37	35.24
9040-52.D	Cuyamaca Type 2	Talc-schist	0.00	192783.72	3092.22	277264.30	0.00	524.13	3.57	0.00	14.56	804.65	975.75	53458.35	539.93	37.24	0.61	219.85	11.37
9040-52b.D	Cuyamaca Type 2	Talc-schist	0.00	162522.17	3662.11	252178.90	0.00	2392.79	9.37	40.24	9.67	673.65	3973.93	120663.44	342.22	27.62	0.00	264.95	43.17
9040-53.D	Cuyamaca Type 2	Talc-schist	0.00	163429.32	3037.61	286070.95	155.94	929.03	11.19	158.37	11.22	512.60	2504.20	72418.63	463.16	28.20	4.44	186.92	76.19
9040-53b.D	Cuyamaca Type 2	Talc-schist	0.00	203074.72	5867.91	279990.14	108.01	0.00	2.23	69.95	9.67	1099.07	142.77	34574.87	639.76	44.03	0.00	219.26	21.37

Table 10a. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 2 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
9040-54.D	Cuyamaca Type 2	Talc-schist	0.00	190964.00	3457.28	291014.78	12.31	0.00	4.00	74.15	4.53	765.53	251.87	35702.30	533.60	27.02	5.63	220.03	30.40
9040-54b.D	Cuyamaca Type 2	Talc-schist	0.00	200450.62	2605.62	275452.50	0.00	329.68	2.28	158.97	3.96	556.22	712.29	48485.55	548.46	28.66	0.00	184.51	16.08
9040-55.D	Cuyamaca Type 2	Talc-schist	0.00	173759.89	5250.92	270312.56	243.60	293.48	5.94	151.23	30.92	940.85	1526.44	81713.12	565.70	32.40	7.89	229.79	427.83
9040-55b.D	Cuyamaca Type 2	Talc-schist	0.00	155373.38	2566.37	241649.51	0.00	4678.83	17.01	31.23	16.95	485.40	5737.16	142178.66	280.14	31.61	0.00	320.51	193.10

Table 10b. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
9040-1.D	Cuyamaca Type 2	Talc-schist	0.00	1.15	0.00	0.00	0.20	0.00	1.76	0.00	3.21	0.89	0.57	0.38	1.28	2.27	0.00	0.00	0.51	1.34	0.07	1.00	0.76	0.00	0.00	0.92	0.36	0.00	0.00	0.00
9040-1b.D	Cuyamaca Type 2	Talc-schist	0.00	1.56	0.47	0.00	0.26	0.00	3.81	0.33	4.05	0.18	0.45	0.38	0.00	0.00	0.69	0.00	0.10	1.89	0.00	0.15	0.00	0.00	0.18	0.00	0.16	0.00	0.00	0.00
9040-2.D	Cuyamaca Type 2	Talc-schist	0.00	1.49	0.00	0.00	0.18	1.39	3.13	0.12	12.44	0.11	0.62	0.24	0.57	0.00	0.00	1.40	0.00	0.00	0.68	1.60	0.55	0.64	0.00	0.00	0.00	0.00	0.24	0.00
9040-2b.D	Cuyamaca Type 2	Talc-schist	0.00	2.37	0.45	0.00	0.00	0.00	0.00	0.31	6.05	0.26	0.00	0.15	0.00	0.91	0.33	0.00	0.28	0.60	0.10	0.15	0.00	0.81	0.18	0.94	0.00	0.00	0.00	0.00
9040-3.D	Cuyamaca Type 2	Talc-schist	0.35	4.78	0.28	0.00	0.32	0.00	6.70	1.15	19.96	0.60	2.36	0.00	1.22	0.00	1.12	0.00	0.00	0.00	0.00	2.47	0.33	0.00	0.00	0.00	0.20	0.00	0.51	0.00
9040-3b.D	Cuyamaca Type 2	Talc-schist	0.97	1.69	0.85	0.00	0.00	0.14	1.13	0.13	15.64	0.08	0.40	0.21	0.00	0.57	0.31	0.00	0.00	0.56	0.00	0.00	0.23	0.00	0.00	1.17	1.21	0.00	0.00	0.18
9040-6.D	Cuyamaca Type 2	Talc-schist	0.00	0.07	0.00	0.34	0.16	0.00	1.88	0.22	1.40	0.61	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.50	1.44	0.50	1.16	0.68	1.10	0.00	0.00	0.00	0.87
9040-6b.D	Cuyamaca Type 2	Talc-schist	1.93	8.94	0.81	0.00	1.00	1.93	0.40	1.21	153.35	0.43	0.09	0.15	1.34	0.00	0.16	0.00	0.38	0.00	0.20	0.00	0.00	0.00	0.29	0.31	0.26	0.00	0.00	0.00
9040-7.D	Cuyamaca Type 2	Talc-schist	0.59	1.28	0.00	0.00	0.06	2.37	3.40	0.00	5.63	0.00	0.80	0.05	1.23	0.00	0.00	0.00	0.25	0.00	0.74	0.00	0.73	0.00	0.00	0.44	0.21	0.00	0.00	0.00
9040-7b.D	Cuyamaca Type 2	Talc-schist	0.00	2.31	0.00	0.00	0.00	1.32	1.03	0.40	4.92	0.00	0.87	0.00	0.00	0.39	0.21	0.00	0.36	1.27	0.00	0.00	0.00	0.00	1.26	0.00	0.07	2.94	0.00	0.25
9040-8.D	Cuyamaca Type 2	Talc-schist	0.00	1.03	0.00	0.00	0.42	2.21	0.00	0.12	24.73	0.57	0.52	0.15	0.00	2.46	0.64	0.71	0.00	0.00	0.00	1.26	0.00	0.00	0.00	0.41	0.00	2.96	0.00	0.00
9040-8b.D	Cuyamaca Type 2	Talc-schist	0.00	1.02	0.83	0.00	0.45	0.00	6.95	0.22	2.18	0.38	0.00	0.45	2.01	1.14	0.00	0.00	0.00	0.00	0.00	0.76	0.13	0.32	0.00	0.00	0.19	1.31	1.82	0.00
9040-9.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	0.00	0.00	0.39	0.00	3.41	0.11	6.29	0.21	0.37	0.00	0.00	0.38	0.00	0.00	0.21	0.00	0.00	0.83	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
9040-9b.D	Cuyamaca Type 2	Talc-schist	0.07	1.48	0.40	0.00	0.00	0.00	6.43	0.26	9.19	0.13	0.00	0.66	0.00	1.23	0.08	0.00	0.00	0.00	0.00	0.61	0.00	0.26	0.12	0.00	0.26	5.31	0.00	0.88
9040-10.D	Cuyamaca Type 2	Talc-schist	0.00	1.53	0.00	0.00	0.15	1.18	0.00	0.30	5.72	0.57	0.82	0.53	0.97	0.68	0.00	0.00	0.10	0.00	0.05	2.56	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9040-10b.D	Cuyamaca Type 2	Talc-schist	2.16	2.50	0.76	0.00	0.40	2.45	3.59	0.31	7.17	0.58	1.35	0.26	0.62	1.93	0.07	0.00	0.08	0.00	0.00	0.00	0.36	0.00	0.32	0.00	0.33	0.95	0.44	0.09
9040-13.D	Cuyamaca Type 2	Talc-schist	0.48	0.35	0.45	0.00	0.00	0.18	1.85	0.21	2.06	0.40	0.15	0.13	0.00	0.00	1.11	0.00	0.00	1.06	0.27	3.30	0.00	0.00	0.00	1.81	0.17	0.00	0.00	0.00
9040-13b.D	Cuyamaca Type 2	Talc-schist	0.87	1.01	0.24	0.09	0.22	0.00	2.62	0.57	3.19	0.00	0.61	0.00	0.76	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.13	0.00	0.17	1.92	0.00	0.53
9040-14.D	Cuyamaca Type 2	Talc-schist	0.77	4.51	5.78	0.00	0.61	0.47	31.69	0.19	65.15	6.55	3.87	1.01	3.58	0.95	0.00	3.85	0.00	0.56	0.00	2.66	0.43	0.00	0.24	0.64	0.05	0.00	0.00	2.66
9040-14b.D	Cuyamaca Type 2	Talc-schist	0.75	5.38	5.91	0.00	0.16	0.00	36.27	0.28	26.70	6.86	1.59	1.10	6.40	1.45	0.00	0.00	0.14	0.00	0.00	0.00	0.72	0.20	0.66	0.76	0.12	0.28	0.23	4.21
9040-17.D	Cuyamaca Type 2	Talc-schist	0.00	3.59	0.98	0.00	0.10	0.53	4.87	0.63	11.44	0.40	0.41	0.57	0.79	2.99	1.45	0.00	0.80	0.23	0.17	1.44	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.57
9040-17b.D	Cuyamaca Type 2	Talc-schist	0.28	0.55	0.87	0.00	0.60	0.24	3.75	0.27	8.22	0.37	0.50	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.19	0.00	0.20	2.48	0.23	0.08
9040-20.D	Cuyamaca Type 2	Talc-schist	0.00	2.38	0.00	1.12	0.00	0.00	3.63	0.00	4.85	0.60	0.61	0.33	1.17	2.89	1.01	5.23	0.00	5.18	0.95	0.00	0.00	0.00	0.00	1.43	0.00	5.40	0.00	0.00
9040-20b.D	Cuyamaca Type 2	Talc-schist	0.56	9.26	0.92	0.46	0.57	1.99	1.75	0.00	13.21	0.14	0.42	0.24	0.25	2.02	0.82	0.00	0.00	0.63	0.00	0.33	0.22	0.00	0.79	0.00	1.08	4.24	0.00	0.00
9040-23.D	Cuyamaca Type 2	Talc-schist	0.00	0.24	0.38	0.00	0.00	4.69	0.00	0.00	46.77	0.89	0.18	0.08	7.89	0.94	1.54	0.00	0.85	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
9040-23b.D	Cuyamaca Type 2	Talc-schist	1.11	0.00	0.10	0.00	0.00	0.66	1.74	1.33	20.31	0.28	0.65	0.32	0.00	0.00	2.34	0.00	0.00	0.00	0.00	1.32	0.66	0.00	0.78	0.00	1.01	0.77	0.00	0.00
9040-27.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	0.00	0.00	0.14	0.71	3.95	1.57	1.79	0.27	0.55	0.29	0.00	0.71	0.00	0.00	0.07	0.94	0.86	2.38	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.46
9040-27b.D	Cuyamaca Type 2	Talc-schist	0.11	0.24	0.00	0.00	0.18	0.00	5.81	0.13	1.41	0.57	0.31	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.53	0.00	0.14	0.00
9040-28.D	Cuyamaca Type 2	Talc-schist	0.00	2.12	0.00	0.13	0.13	0.00	0.00	0.00	2.80	0.62	0.62	0.27	0.00	0.00	0.12	0.00	0.33	1.98	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
9040-28b.D	Cuyamaca Type 2	Talc-schist	1.95	0.32	0.26	0.00	0.23	0.00	4.20	0.30	4.77	0.66	0.25	0.09	4.59	0.36	0.48	1.29	0.11	0.00	0.31	1.06	0.59	2.67	0.00	2.98	0.54	0.41	0.00	0.00
9040-34.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	0.00	0.47	0.00	2.30	0.00	0.00	6.45	1.61	0.88	0.69	0.00	0.00	0.00	0.00	1.63	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9040-34b.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	0.54	0.00	0.22	0.00	5.48	0.54	12.69	0.77	0.00	0.00	0.32	0.21	0.11	1.48	0.06	0.00	0.93	0.00	0.90	0.34	0.08	0.22	0.28	1.38	0.00	0.00
9040-39.D	Cuyamaca Type 2	Talc-schist	0.00	0.56	0.00	0.00	0.09	2.52	3.68	0.09	7.18	0.00	0.17	0.00	0.66	0.00	0.08	0.00	0.49	0.97	0.54	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.10
9040-39b.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	0.04	0.00	0.08	0.00	4.26	0.13	8.59	0.04	0.00	0.00	0.00	1.63	0.08	0.00	0.00	0.00	0.76	1.28	0.00	0.00	0.64	0.00	0.60	0.32	0.19	0.00
9040-40.D	Cuyamaca Type 2	Talc-schist	0.00	1.41	0.19	0.00	0.00	2.03	0.86	0.19	10.11	0.71	1.26	0.27	0.69	0.00	0.43	0.00	0.90	0.00	0.26	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9040-40b.D	Cuyamaca Type 2	Talc-schist	2.54	0.00	0.00	0.32	0.31	1.32	6.96	0.47	20.13	0.46	0.00	0.00	2.01	0.00	0.00	0.00	0.00	0.00	0.46	0.14	0.00	0.00	0.75	1.06	0.20	2.91	0.75	0.00
9040-47.D	Cuyamaca Type 2	Talc-schist	0.00	0.90	0.31	0.00	0.70	1.87	1.41	0.31	358.62	0.49	0.49	0.55	0.25	0.00	0.84	0.00	0.26	1.12	0.84	0.00	0.00	0.00	0.07	0.93	0.12	0.00	0.00	0.11
9040-47b.D	Cuyamaca Type 2	Talc-schist	5.55	2.81	0.84	0.61	0.29	0.00	3.31	0.53	17.75	1.23	1.17	0.00	3.19	1.83	0.00	0.00	0.00	0.00	0.24	0.00	0.23	2.06	0.39	0.00	0.47	4.62	0.18	0.27
9040-50.D	Cuyamaca Type 2	Talc-schist	0.00	0.26	0.00	0.00	0.30	0.52	0.00	0.00	1.30	0.40	0.00	0.04	0.00	0.00	0.85	0.00	0.58	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9040-50b.D	Cuyamaca Type 2	Talc-schist	0.58	0.00	0.35	0.45	0.36	0.68	1.80	0.00	4.69	0.66	0.00	0.00	3.12	1.24	0.00	0.00	0.37	0.00	0.14	0.00	0.00	0.22	0.00	1.55	0.00	2.71	0.52	0.00
9040-51.D	Cuyamaca Type 2	Talc-schist	12.58	6.50	3.04	1.71	1.03	0.00	22.08	4.04	43.22	1.52	3.47	1.55	0.00	1.07	0.29	0.00	0.50	0.35	0.00	3.38	0.00	0.00	1.55	4.43	0.00	0.00	0.50	0.00
9040-51b.D	Cuyamaca Type 2	Talc-schist	17.86	8.64	1.83	0.00	1.14	0.47	7.81	3.38	37.83	1.81	0.96	0.00	2.13	0.78	0.59	0.00	0.00	0.00	0.27	0.45	0.67	0.76	0.06	0.48	0.21	3.78	0.00	0.00
9040-52.D	Cuyamaca Type 2	Talc-schist	0.24	0.81	0.89	0.00	1.50	0.73	7.92	0.07	8.92	0.42	1.54	1.08	0.00	0.00	1.08	0.00	0.31	0.33	0.00	0.24	0.00	0.00	0.10	0.00	0.43	0.00	0.00	0.32
9040-52b.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	4.22	0.00	0.80	0.00	3.48	0.00	4.20	1.69	0.99	0.00	1.00	3.77	0.00	0.00	0.33	0.00	0.23	1.49	0.80	1.80	0.00	0.00	0.00	1.46	2.25	0.00
9040-53.D	Cuyamaca Type 2	Talc-schist	0.00	1.97	1.45	1.29	0.22	2.17	4.29	0.30	52.60	1.03	1.59	0.78	1.19	0.00	1.53	0.00	0.00	0.00	0.00	1.76	0.00	0.00	0.00	0.00	0.07	0.00	0.13	0.52
9040-53b.D	Cuyamaca Type 2	Talc-schist	0.24	0.00	0.44	1.86	0.09	0.00	4.04	0.00	4.76	0.14	0.00	0.08	0.00	2.23	0.09	0.00	0.15	0.00	0.41	1.15	0.17	3.62	0.47	0.53	0.00	1.13	0.44	0.00

Table 10b. Calibrated LA-ICP-MS data for Cuyamaca Talc schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
9040-54.D	Cuyamaca Type 2	Talc-schist	0.00	1.09	0.21	0.10	0.10	0.00	4.24	0.05	12.61	0.40	0.60	0.34	0.00	0.00	0.19	0.00	0.22	0.00	0.60	0.00	0.00	0.00	0.20	0.00	0.55	1.80	0.00	0.00
9040-54b.D	Cuyamaca Type 2	Talc-schist	0.07	0.00	0.84	0.46	0.00	0.00	4.40	0.36	20.87	0.99	1.48	0.26	0.00	1.26	0.23	0.00	0.00	0.00	0.63	0.40	0.00	0.00	0.05	0.43	0.38	2.76	1.60	0.09
9040-55.D	Cuyamaca Type 2	Talc-schist	1.66	2.40	6.70	2.08	0.75	0.83	28.47	0.35	17.43	3.37	5.84	0.99	4.50	0.34	0.55	0.00	0.00	1.12	0.92	0.00	0.00	0.00	0.33	0.00	0.17	5.17	0.75	0.22
9040-55b.D	Cuyamaca Type 2	Talc-schist	0.00	0.00	6.14	2.55	0.43	0.14	14.42	0.20	7.30	0.89	1.76	0.00	2.71	0.41	0.00	0.00	0.12	0.00	0.52	0.92	0.41	2.01	0.05	0.99	0.37	0.30	1.05	0.43

Table 11a. Calibrated LA-ICP-MS data for Jacumba schist in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
7790-1a.D	Jacumba Red	Anthophyllite talc chlorite schist	44588.39	168428.83	8737.79	263815.25	82.54	9053.40	9.09	513.64	119.12	1808.33	434.41	41997.55	1246.25	70.91	150.23	119.74	13.26
7790-1a2.D	Jacumba Red	Anthophyllite talc chlorite schist	4843.03	187680.27	63190.78	186780.02	389.60	5498.67	14.57	343.00	422.65	9366.33	917.25	94964.15	1351.09	98.73	333.73	202.07	3.70
7790-1b.D	Jacumba Red	Anthophyllite talc chlorite schist	35818.02	172019.64	16207.08	236141.73	0.00	12686.95	30.63	923.08	171.75	3696.10	1252.26	70980.04	1035.10	68.44	152.98	148.31	25.53
7790-1b2.D	Jacumba Red	Anthophyllite talc chlorite schist	627.80	203430.08	41217.77	221825.72	257.25	4062.60	11.77	596.80	258.68	5945.45	853.76	62896.80	951.67	63.33	93.93	141.12	14.95
7790-2a.D	Jacumba Red	Anthophyllite talc chlorite schist	41903.67	183290.09	25962.37	237291.62	0.00	0.00	10.92	203.10	121.06	1142.44	545.90	53136.45	2102.51	44.15	373.01	139.88	1.82
7790-2a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	203448.95	5444.60	281552.19	0.00	5284.41	2.58	210.20	28.05	392.37	219.22	27220.33	1251.49	58.81	112.47	75.81	3.27
7790-2b.D	Jacumba Red	Anthophyllite talc chlorite schist	32706.73	182925.15	85393.01	181918.96	0.00	1177.52	12.41	797.67	428.73	3222.03	469.94	62678.51	1697.83	68.15	317.08	144.36	12.07
7790-2b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	197044.60	53017.55	220390.92	530.31	3756.60	4.67	584.36	242.14	2311.32	732.20	60920.63	1245.58	48.98	275.78	214.39	7.13
7790-3a.D	Jacumba Red	Anthophyllite talc chlorite schist	34405.54	170646.78	37993.06	216177.22	0.00	5698.86	17.17	489.02	412.51	4190.72	1126.25	81162.32	1338.43	86.44	419.07	178.11	0.00
7790-3a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	189102.00	17581.75	258033.04	539.31	5836.34	30.96	695.90	174.09	2410.40	600.48	58780.91	998.69	61.16	224.80	154.33	0.00
7790-3b.D	Jacumba Red	Anthophyllite talc chlorite schist	25601.50	175015.65	21008.61	242609.34	0.00	4108.04	13.78	366.43	249.57	2852.55	823.04	70612.05	1610.42	69.39	398.11	171.00	0.00
7790-3b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	156532.49	22196.01	236516.23	1889.04	6229.93	25.46	219.95	277.28	4784.36	2526.06	115886.48	1738.34	169.37	572.33	290.83	10.02
7790-4a.D	Jacumba Red	Anthophyllite talc chlorite schist	29632.55	191410.80	32632.88	218259.92	0.00	13549.25	15.44	410.60	208.63	1837.72	1078.68	60704.86	1518.19	159.14	147.45	128.29	2.15
7790-4a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	198531.90	33167.50	215788.65	1692.45	4444.07	15.89	369.20	176.76	2975.52	1584.78	89490.01	1349.41	96.60	135.58	105.25	13.08
7790-4b.D	Jacumba Red	Anthophyllite talc chlorite schist	26251.64	183993.75	22628.74	227481.88	0.00	19291.99	10.82	316.44	126.60	1648.93	1080.61	67318.08	984.56	53.77	109.12	144.82	0.00
7790-4b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	208515.26	59579.83	194712.69	393.90	3453.50	21.99	823.93	295.96	5832.55	910.78	73984.29	1053.07	79.67	179.84	86.33	23.87
7790-5a.D	Jacumba Red	Anthophyllite talc chlorite schist	32324.13	191741.91	37260.27	212575.66	0.00	1440.43	5.53	330.40	208.69	4020.69	1248.05	70687.78	619.32	100.53	74.37	98.31	0.00
7790-5a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	187506.33	46258.84	214681.22	692.93	2532.58	15.96	266.63	231.59	5530.82	1676.27	86891.99	943.93	151.94	108.44	121.92	8.50
7790-5b.D	Jacumba Red	Anthophyllite talc chlorite schist	18865.95	212490.21	13051.06	257427.15	0.00	0.00	2.11	477.32	66.93	1312.35	210.93	29477.92	654.33	45.15	29.99	117.30	0.00
7790-5b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	188077.31	25957.97	257378.10	635.19	12256.12	28.35	360.80	199.70	3885.00	503.80	42809.12	848.35	70.23	51.73	120.72	17.68
7790-6a.D	Jacumba Red	Anthophyllite talc chlorite schist	10303.92	168946.49	25155.30	244814.70	452.85	15612.43	40.13	828.98	202.93	3708.83	1012.25	71169.10	680.57	49.96	85.44	213.66	18.66
7790-6a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	182457.89	29264.13	233954.82	616.19	22040.58	51.12	2601.17	320.74	4451.61	1043.68	66541.00	794.64	95.80	83.53	149.64	0.00
7790-6b.D	Jacumba Red	Anthophyllite talc chlorite schist	11457.47	172402.62	21007.46	236067.75	563.00	3472.28	24.97	68.81	234.35	4038.60	1667.11	96018.36	849.30	85.58	122.27	230.74	34.83
7790-6b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	175624.46	43085.87	213595.25	1114.92	15037.62	19.30	1205.53	393.90	5528.68	1593.58	92894.71	940.03	82.80	89.77	110.03	5.82
7790-7a.D	Jacumba Red	Anthophyllite talc chlorite schist	14723.24	169983.77	20440.70	242627.60	577.56	29806.21	36.09	1864.23	324.43	5200.13	982.31	58349.12	773.98	65.43	124.89	92.66	0.00
7790-7a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	180733.37	11155.26	279775.62	660.24	6134.36	4.18	831.22	163.15	3880.71	691.94	43026.43	543.68	63.58	36.89	48.57	12.62
7790-7b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	196192.41	26884.05	244670.03	314.01	2274.55	14.31	354.74	222.00	4802.75	969.71	59875.40	748.89	86.78	109.69	107.76	23.96
7790-7b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	188747.36	17127.28	249322.31	1298.45	3124.33	7.84	6037.72	147.26	3863.34	1219.20	66849.17	694.71	202.08	115.78	152.41	25.32
7790-8a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	163621.77	14370.05	243891.99	202.78	5781.85	20.32	254.53	127.62	3973.87	2177.36	110541.43	1746.29	108.40	241.96	347.84	22.34
7790-8a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	178817.95	19212.83	243414.88	1112.98	7547.21	6.22	725.34	115.51	3639.06	2218.81	85073.41	1278.28	126.40	194.36	159.61	3.12
7790-8b.D	Jacumba Red	Anthophyllite talc chlorite schist	752.44	198871.72	41579.36	218280.07	0.00	2465.15	19.09	289.22	187.29	4306.62	1517.78	75806.03	1159.99	74.24	87.39	182.95	12.42
7790-8b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	187141.30	23573.27	253268.45	0.00	4684.85	18.90	255.10	129.03	2593.46	1089.12	61885.46	997.82	81.26	114.57	141.08	0.00
7790-9a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	156318.87	43402.30	212532.75	945.52	69256.61	56.01	3165.12	520.55	3050.55	1127.59	63742.51	1167.89	76.38	115.13	204.91	1.79
7790-9a2.D	Jacumba Red	Anthophyllite talc chlorite schist	2908.07	196609.39	22828.36	255677.96	99.90	3380.36	19.17	2242.15	186.91	3054.01	394.89	44296.04	1396.28	79.03	113.89	104.24	0.00
7790-9b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	163314.22	16668.64	232897.65	114.37	4939.18	22.52	620.28	257.21	3665.49	2875.40	124510.37	1494.81	103.89	233.71	282.57	1.74
7790-9b2.D	Jacumba Red	Anthophyllite talc chlorite schist	3673.79	165427.59	25811.06	233593.54	0.00	5471.41	3.34	986.95	246.56	3795.99	2273.86	105334.55	1375.17	66.53	292.59	225.03	2.09
7790-10a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	195449.48	44349.27	209370.26	454.10	4803.90	58.03	621.61	448.39	6326.44	990.93	83604.34	2412.16	109.09	523.99	235.40	6.00
7790-10a2.D	Jacumba Red	Anthophyllite talc chlorite schist	1829.17	158608.29	31949.61	225880.80	417.57	4111.23	19.50	447.92	368.70	7200.30	1784.69	115280.58	2413.42	108.63	865.31	314.59	13.14
7790-10b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	179820.15	8933.86	249863.39	827.12	2798.42	12.72	300.37	201.49	3904.96	1326.88	93347.59	1500.73	91.04	361.83	342.13	0.00
7790-10b2.D	Jacumba Red	Anthophyllite talc chlorite schist	1169.83	159480.83	9209.04	254797.04	429.75	5273.61	13.26	1142.73	237.61	4690.88	1963.28	103741.75	1283.68	90.27	389.99	218.26	21.34
7790-11.D	Jacumba Red	Anthophyllite talc chlorite schist	12148.76	175171.10	35207.55	233028.18	506.40	514.91	3.55	1477.85	281.56	5728.29	1084.54	76791.08	1698.01	128.98	535.03	237.74	0.00
7790-11b.D	Jacumba Red	Anthophyllite talc chlorite schist	1736.32	131396.22	22500.88	239950.02	434.61	2295.97	3.89	333.46	357.75	2967.51	965.37	144944.25	2453.11	116.15	1272.62	164.70	129.01
7790-12.D	Jacumba Red	Anthophyllite talc chlorite schist	8227.40	155907.28	28941.50	225055.81	48.72	9946.65	11.59	343.59	220.22	5049.58	2083.36	115738.72	1325.50	91.57	387.92	375.43	4.01
7790-12b.D	Jacumba Red	Anthophyllite talc chlorite schist	3629.10	184426.04	101491.23	171863.60	407.85	26128.08	9.48	948.05	303.43	1574.09	547.02	59314.34	1357.46	48.60	190.56	180.94	0.00
7790-13.D	Jacumba Red	Anthophyllite talc chlorite schist	11109.24	187687.78	7016.05	279658.90	16.96	0.00	3.30	598.17	135.26	4101.52	201.64	36779.65	883.03	86.15	39.05	244.62	25.17
7790-13b.D	Jacumba Red	Anthophyllite talc chlorite schist	581.92	192091.58	26363.38	256519.35	40.06	467.10	9.67	420.00	244.28	4461.54	778.93	49170.64	1071.45	96.33	43.24	167.96	18.17

Table 11a. Calibrated LA-ICP-MS data for Jacumba schist in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
7790-14.D	Jacumba Red	Anthophyllite talc chlorite schist	6600.40	196739.76	19255.43	253744.93	106.68	1213.09	9.51	164.41	51.00	466.02	713.95	55457.96	1095.53	65.51	216.55	149.36	6.59
7790-14b.D	Jacumba Red	Anthophyllite talc chlorite schist	4715.23	186088.10	14645.74	257897.95	330.35	3912.09	7.50	352.73	47.81	430.12	1225.21	65519.76	1493.78	83.31	261.13	156.31	0.00
7790-15.D	Jacumba Red	Anthophyllite talc chlorite schist	5266.75	190477.65	80875.07	182317.06	270.25	19876.35	38.01	870.70	366.83	2618.23	848.61	66997.36	1369.14	141.02	254.50	186.64	42.61
7790-15b.D	Jacumba Red	Anthophyllite talc chlorite schist	7757.84	178978.09	70524.00	202913.92	0.00	26202.45	5.87	699.46	369.42	2245.39	553.45	55870.58	1421.87	77.97	273.90	148.84	20.22

Table 11b. Calibrated LA-ICP-MS data for Jacumba schist in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
7790-1a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	6.99	2.42	7.18	0.94	4.85	4.35	0.94	5.28	0.00	0.00	0.29	1.87	0.00	0.00	2.79	0.00	1.06	0.00	0.00	0.12	0.70	0.14	0.00	1.10	0.00	1.14	0.00
7790-1a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	1.23	0.29	1.39	0.13	1.88	0.00	0.00	0.96	0.00	0.00	1.75	5.13	10.16	0.00	0.00	0.00	2.07	0.00	0.00	0.32	0.00	0.00	4.07	0.00	0.00	0.00	0.61
7790-1b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	10.10	2.61	8.29	0.42	0.00	4.70	0.00	17.07	1.15	0.00	0.60	2.81	0.00	0.00	2.50	1.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	1.43	1.26
7790-1b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	3.55	0.95	11.47	0.31	4.55	0.00	0.00	5.96	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.46	0.00	0.00	0.00	2.42	0.00
7790-2a.D	Jacumba Red	Anthophyllite talc chlorite schist	2.65	2.04	0.93	0.49	0.00	13.28	0.00	0.00	11.66	0.00	0.00	1.01	0.60	1.29	0.00	1.34	0.00	2.03	0.00	0.37	1.56	0.00	0.00	2.91	0.00	12.75	2.40	2.69
7790-2a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	2.33	0.78	0.00	0.00	7.48	3.40	0.00	15.62	0.00	0.00	0.00	0.65	2.37	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.53	0.54
7790-2b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.58	2.21	1.99	0.47	0.86	1.70	0.79	0.00	31.75	1.59	0.10	0.79	0.00	0.00	2.40	0.00	0.00	1.93	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	3.52	0.00
7790-2b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	4.91	0.28	3.48	1.59	0.00	2.64	0.00	16.99	0.00	1.24	0.11	6.36	1.54	2.16	0.00	0.57	0.66	0.00	0.00	0.00	3.25	0.00	0.00	0.00	0.00	0.00	0.00
7790-3a.D	Jacumba Red	Anthophyllite talc chlorite schist	2.52	3.61	4.45	1.11	0.00	0.40	1.88	0.76	13.67	1.38	0.00	0.93	0.00	0.00	0.00	0.00	0.00	5.71	0.00	0.00	0.00	0.00	0.16	0.00	0.39	0.00	2.21	1.51
7790-3a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	4.83	0.32	2.14	0.00	0.00	3.01	1.17	80.05	0.00	1.10	0.64	4.03	4.11	0.00	0.00	0.00	5.30	0.00	0.00	0.00	0.00	0.00	5.59	0.00	2.63	1.32	0.00
7790-3b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.55	5.53	3.15	1.78	0.00	3.56	0.00	0.00	62.22	1.92	2.00	0.91	2.71	0.00	0.38	1.21	0.00	2.75	0.00	0.00	0.32	0.00	0.00	0.00	0.11	2.30	2.56	0.40
7790-3b2.D	Jacumba Red	Anthophyllite talc chlorite schist	1.21	7.59	1.82	2.42	0.00	0.00	7.72	2.04	195.56	3.61	3.45	2.83	0.00	2.08	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00	4.92	0.00	0.00	0.00	0.78
7790-4a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	22.02	1.65	2.90	0.00	0.00	4.93	0.27	44.83	1.45	3.11	0.00	0.00	0.00	0.00	0.00	1.21	3.60	0.00	0.43	0.71	0.00	0.00	0.00	0.41	0.00	1.29	0.00
7790-4a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	3.68	0.48	0.00	2.28	0.00	2.75	0.24	20.88	2.23	2.61	2.92	11.12	0.90	0.00	0.00	0.00	10.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.82	0.00	3.08
7790-4b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	16.49	0.92	4.88	0.00	0.00	0.00	0.00	5.53	0.00	1.15	0.46	0.00	0.42	0.00	7.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.38	2.22
7790-4b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	3.96	0.58	0.00	0.00	7.68	3.90	0.00	0.00	0.00	0.00	0.12	3.76	4.96	0.00	0.00	0.00	0.69	0.17	0.00	0.00	0.00	1.44	0.00	0.00	0.00	1.76	4.36
7790-5a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	2.22	0.59	0.00	1.14	0.00	5.29	0.00	24.37	0.00	0.67	2.21	0.00	0.00	0.00	8.47	0.00	3.86	0.97	0.00	0.46	0.00	0.00	0.00	2.52	0.00	1.38	4.54
7790-5a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	0.18	0.62	0.29	0.00	0.00	1.79	0.79	209.80	0.00	4.16	0.00	0.80	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	9.40	0.00	2.56	0.63	2.00
7790-5b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	1.41	0.90	2.38	0.00	0.00	0.81	0.00	4.90	0.76	0.00	0.80	0.58	1.24	0.00	0.00	0.00	9.84	0.00	1.06	1.51	0.00	0.67	0.00	0.34	7.40	2.75	1.30
7790-5b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	2.87	3.21	2.13	1.82	0.00	5.58	0.49	8.33	0.00	0.00	0.39	7.52	0.00	0.00	0.00	1.67	12.99	1.31	0.00	0.00	0.00	0.00	6.52	0.18	10.65	0.00	0.00
7790-6a.D	Jacumba Red	Anthophyllite talc chlorite schist	1.34	5.89	5.86	6.55	0.00	6.15	4.40	0.00	1.67	0.00	0.00	0.00	10.92	0.58	0.00	0.00	0.00	7.12	0.00	0.00	0.00	0.90	1.01	0.00	0.00	0.00	0.00	0.00
7790-6a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	6.23	4.75	0.30	0.69	7.37	5.51	0.16	0.36	0.50	1.11	0.13	5.77	0.00	0.58	0.00	0.00	3.77	0.00	0.00	0.00	1.75	0.00	0.00	0.18	5.25	1.93	1.37
7790-6b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	2.34	1.95	0.35	0.32	9.18	13.54	0.38	15.29	1.05	0.33	0.28	4.70	0.00	0.00	10.87	0.90	14.35	0.00	0.00	0.00	0.00	0.00	0.00	0.78	9.39	0.00	0.72
7790-6b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	4.28	6.77	2.00	0.00	0.00	8.98	0.00	8.10	0.00	0.21	0.00	12.11	0.00	0.00	0.00	0.44	17.09	0.00	0.00	0.00	0.00	0.00	7.16	1.64	0.00	0.86	2.74
7790-7a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	20.37	17.63	39.78	0.00	12.45	4.45	0.00	0.00	2.54	1.19	4.63	8.50	0.00	0.00	0.00	0.33	20.17	2.21	0.00	0.00	9.11	4.48	0.00	0.00	31.52	5.23	5.23
7790-7a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	4.10	1.37	5.65	0.00	13.70	9.73	1.63	2.58	0.72	0.23	0.00	0.00	0.87	0.00	0.00	2.38	3.27	1.86	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.97
7790-7b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	1.22	2.64	0.00	1.11	0.00	0.00	0.00	11.55	0.00	0.38	1.31	0.00	0.00	0.00	0.00	0.62	3.65	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.83	0.00
7790-7b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	1.53	0.37	0.35	0.00	2.44	2.13	0.00	6.22	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.38	9.62	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00
7790-8a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.22	0.16	1.44	1.81	0.00	0.00	8.20	0.00	63.22	0.26	0.73	1.69	9.05	2.39	0.00	3.22	0.00	3.54	0.00	0.00	0.00	0.00	0.00	0.00	1.44	4.96	1.07	0.00
7790-8a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	10.14	1.59	1.08	0.00	2.26	0.44	0.58	183.48	0.00	1.93	0.00	4.13	4.76	0.00	0.00	0.00	2.70	0.40	0.00	0.00	0.00	0.00	0.00	0.00	3.76	0.00	3.43
7790-8b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	2.11	1.49	0.80	0.00	0.88	2.82	0.00	106.38	0.27	1.76	0.44	2.16	0.00	0.00	0.00	0.00	10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.30	11.28	0.00	0.00
7790-8b2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	0.00	1.77	0.73	2.30	10.52	6.80	0.00	10.04	0.38	2.86	0.00	2.99	0.00	1.74	10.80	0.40	0.00	0.00	0.00	1.07	0.00	2.72	0.70	0.00	1.58	3.31	0.82
7790-9a.D	Jacumba Red	Anthophyllite talc chlorite schist	2.55	35.70	17.15	14.32	0.25	7.10	0.00	0.00	9.52	3.53	9.40	1.76	5.10	0.00	0.00	0.00	0.00	12.33	1.89	1.38	0.00	0.00	0.00	0.00	0.00	3.11	1.68	0.00
7790-9a2.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	2.78	2.26	0.00	0.00	0.00	1.53	0.00	2.66	1.55	0.13	0.54	0.00	3.49	0.00	5.84	0.00	0.00	0.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7790-9b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.68	1.12	2.80	3.94	0.48	50.95	3.70	0.00	43.45	1.05	0.99	0.64	9.19	3.40	0.00	0.00	0.00	11.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.01	1.09	1.63
7790-9b2.D	Jacumba Red	Anthophyllite talc chlorite schist	2.33	3.23	2.65	0.00	0.87	2.79	1.60	0.43	28.09	4.86	1.21	0.78	9.16	0.00	0.74	4.58	0.00	0.00	0.00	0.00	1.06	4.56	0.00	0.00	0.00	0.00	0.00	1.16
7790-10a.D	Jacumba Red	Anthophyllite talc chlorite schist	0.26	3.48	4.43	2.71	0.00	4.94	2.12	0.00	136.47	0.00	1.13	0.24	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	8.08	4.36	0.00
7790-10a2.D	Jacumba Red	Anthophyllite talc chlorite schist	2.93	2.61	1.13	2.79	0.11	3.34	0.48	1.69	58.49	3.39	3.51	0.30	1.90	5.15	0.00	1.37	1.28	4.94	0.00	0.00	0.41	0.00	0.00	0.00	1.79	0.00	2.10	2.60
7790-10b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	3.56	0.90	0.25	0.00	0.83	0.90	1.65	79.56	0.00	0.00	0.21	0.69	0.00	0.00	0.00	0.00	4.64	3.26	0.00	0.00	0.00	0.00	0.00	0.00	8.79	3.16	1.58
7790-10b2.D	Jacumba Red	Anthophyllite talc chlorite schist	1.58	6.60	2.68	47.54	1.84	1.05	1.82	0.00	15.05	2.45	1.68	0.00	18.36	0.00	0.84	1.73	0.00	6.24	0.00	0.00	2.23	0.00	0.44	10.63	0.00	3.80	3.97	0.66
7790-11.D	Jacumba Red	Anthophyllite talc chlorite schist	0.59	1.93	3.57	1.69	0.46	8.00	24.71	0.92	201.14	2.78	9.25	0.00	4.47	0.00	0.00	0.00	2.18	5.87	0.00	0.00	0.00	0.00	1.63	2.48	0.00	5.82	1.46	0.75
7790-11b.D	Jacumba Red	Anthophyllite talc chlorite schist	3.25	10.53	5.35	1.81	0.00	8.66	1.86	0.51	119.64	1.88	8.32	1.69	4.10	0.61	0.00	12.43	0.00	0.00	0.00	0.55	1.23	1.77	0.00	1.72	0.00	11.69	1.36	2.69
7790-12.D	Jacumba Red	Anthophyllite talc chlorite schist	1.04	4.39	6.99	2.72	0.00	1.02	0.00	0.00	84.58	4.79	3.27	0.63	2.39	4.06	0.00	0.94	0.00	9.72	0.00	0.00	0.00	0.00	0.00	5.52	0.00	0.00	1.95	0.00
7790-12b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	14.67	0.59	3.67	0.00	1.32	0.76	0.21	33.71	1.91	5.93	3.02	12.98	0.00	0.00	17.32	1.61	0.00	0.00	0.00	2.36	0.00	2.73	0.00	0.00	26.92	0.00	0.82
7790-13.D	Jacumba Red	Anthophyllite talc chlorite schist	0.54	0.00	1.00	0.00	0.00	0.00	3.11	0.00	1.82	0.00	0.00	0.13	5.82	3.03	0.00	0.00	1.01	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	1.36	2.78
7790-13b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	0.31	0.67	0.00	0.60	1.79	0.52	0.00	28.90	1.30	2.47	0.00	0.68	0.50	0.24	4.42	1.65	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	9.70	0.00	0.00

Table 11b. Calibrated LA-ICP-MS data for Jacumba schist in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
7790-14.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	3.29	0.00	3.22	0.00	1.67	2.44	0.00	3.14	0.00	0.38	1.76	0.00	5.24	0.00	0.00	0.00	1.84	0.00	0.00	0.00	0.00	0.51	0.91	0.00	2.13	0.00	0.00
7790-14b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	0.00	0.88	1.86	2.58	0.00	3.36	0.00	7.49	2.42	0.61	0.90	0.63	0.00	0.00	0.00	0.77	2.75	0.15	0.00	0.00	5.46	0.00	1.33	0.00	0.00	0.00	0.52
7790-15.D	Jacumba Red	Anthophyllite talc chlorite schist	0.37	17.67	1.80	2.78	0.00	0.00	2.10	0.00	83.46	1.05	0.77	0.00	6.19	2.05	0.00	0.00	0.23	5.82	0.00	0.00	0.00	0.00	0.00	1.56	0.00	0.00	0.00	1.88
7790-15b.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	12.50	3.79	2.27	0.00	3.27	0.00	0.00	24.15	1.19	0.59	1.87	10.52	0.00	1.08	0.00	0.00	0.00	0.00	0.42	1.20	4.00	0.00	3.90	0.00	0.00	0.00	0.00

Table 12a. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 1 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
8538-1a2.D	Mount Laguna Type 1	Talc-Schist	0.00	216113.29	4401.64	263740.06	174.82	0.00	6.72	0.00	11.48	1161.63	85.14	45288.19	1014.78	35.65	22.37	97.61	211.31
8538-1a3.D	Mount Laguna Type 1	Talc-Schist	0.00	205214.76	3503.99	277933.35	146.34	34.45	0.00	144.10	9.62	1274.32	117.63	36316.67	1890.29	66.40	35.35	161.57	540.11
8538-1b2.D	Mount Laguna Type 1	Talc-Schist	4878.44	197669.58	8075.46	265565.80	733.17	0.00	0.00	173.61	9.69	1715.33	107.28	52801.56	1056.40	66.96	20.61	152.37	485.28
8538-1b3.D	Mount Laguna Type 1	Talc-Schist	0.00	212229.25	19245.78	262937.91	410.34	280.06	0.00	246.23	33.22	2941.79	100.48	28499.18	1135.91	64.21	28.62	130.93	281.04
8538-2a2.D	Mount Laguna Type 1	Talc-Schist	4277.10	180224.97	4934.94	287128.87	516.15	0.00	4.06	74.70	9.12	952.06	337.53	46791.73	1158.88	73.94	7.39	126.25	0.00
8538-2a3.D	Mount Laguna Type 1	Talc-Schist	0.00	208076.85	2928.43	277343.98	110.46	512.15	1.36	0.00	9.55	807.48	579.42	35378.50	1468.51	54.88	0.00	160.41	11.87
8538-2b2.D	Mount Laguna Type 1	Talc-Schist	0.00	181182.89	3706.23	242225.87	0.00	581.14	0.00	0.00	3.58	1017.15	1931.43	116884.02	988.88	78.89	5.06	210.04	0.00
8538-2b3.D	Mount Laguna Type 1	Talc-Schist	2518.11	164622.88	4981.20	283081.77	109.89	490.03	5.31	0.00	13.59	895.09	1910.81	71048.19	997.58	64.83	0.81	170.05	12.38
8538-3a2.D	Mount Laguna Type 1	Talc-Schist	2847.06	129971.32	2614.58	320366.90	222.34	1607.09	0.00	47.30	6.59	339.60	478.03	59309.40	692.31	47.05	7.01	159.64	0.00
8538-3a3.D	Mount Laguna Type 1	Talc-Schist	1564.19	181841.85	3376.33	296180.35	258.63	172.76	0.00	48.24	7.02	457.04	268.19	36777.08	982.84	63.40	4.36	169.03	2.40
8538-3b2.D	Mount Laguna Type 1	Talc-Schist	0.00	163956.09	3391.25	298617.67	0.00	11616.87	0.00	0.00	6.06	635.26	436.30	43779.71	1273.48	96.03	0.00	139.71	0.00
8538-3b3.D	Mount Laguna Type 1	Talc-Schist	2211.70	176144.30	3413.47	294538.90	584.04	908.65	1.24	0.00	13.55	361.21	728.34	43800.77	1019.45	58.13	17.52	190.19	8.71
8538-4a2.D	Mount Laguna Type 1	Talc-Schist	0.00	209351.13	7989.53	274402.97	0.00	252.51	0.00	0.00	0.00	1059.40	423.15	31088.20	2316.20	69.22	12.12	180.44	0.00
8538-4a3.D	Mount Laguna Type 1	Talc-Schist	1705.42	177265.31	7355.51	285334.30	591.85	552.07	13.16	154.21	10.29	902.87	1157.66	50504.36	1260.94	52.16	5.97	205.33	0.00
8538-4b2.D	Mount Laguna Type 1	Talc-Schist	0.00	201943.02	6910.21	284463.52	0.00	0.00	6.82	0.00	15.87	1152.63	212.97	26551.93	2111.06	67.64	8.49	197.77	0.00
8538-4b3.D	Mount Laguna Type 1	Talc-Schist	0.00	207372.24	4297.94	285352.47	521.61	188.10	0.00	87.55	5.74	907.53	169.46	22433.64	1597.84	48.28	7.46	220.84	0.00
8538-9a2.D	Mount Laguna Type 1	Talc-Schist	0.00	153438.15	7888.52	304268.05	0.00	320.43	7.07	72.55	24.65	1360.69	548.39	51613.02	1247.06	103.28	6.59	170.60	25.27
8538-9a3.D	Mount Laguna Type 1	Talc-Schist	238.19	209389.25	3898.92	281483.90	399.28	97.04	2.57	150.64	10.70	680.54	149.52	26719.79	1386.17	71.10	26.26	196.37	4.50
8538-9b2.D	Mount Laguna Type 1	Talc-Schist	0.00	165866.54	2510.12	315837.81	0.00	468.71	0.00	0.00	14.02	277.57	147.81	28483.92	1284.47	84.66	5.83	169.89	6.38
8538-9b3.D	Mount Laguna Type 1	Talc-Schist	19007.24	182442.44	2031.79	251276.34	2878.94	2188.32	0.00	129.69	20.24	279.77	955.31	83783.77	922.30	76.09	0.72	249.33	11.06
8538-10.D	Mount Laguna Type 1	Talc-Schist	9456.93	179105.89	17719.63	233522.81	0.00	2603.49	0.00	130.81	15.08	1640.64	540.18	102121.39	1933.65	67.27	27.13	228.00	400.95
8538-10B.D	Mount Laguna Type 1	Talc-Schist	0.00	189175.25	14380.79	283847.90	0.00	735.97	12.92	247.61	36.04	3034.25	128.99	29191.47	2122.06	58.87	1.07	149.69	316.19
8538-11.D	Mount Laguna Type 1	Talc-Schist	33414.17	143333.13	8359.10	255716.82	1394.76	1847.55	0.00	0.00	12.08	845.75	1562.71	100150.02	425.40	60.43	0.00	134.31	12.39
8538-11B.D	Mount Laguna Type 1	Talc-Schist	0.00	176135.38	16193.31	259181.49	0.00	1931.53	18.00	105.60	25.11	2072.57	1869.38	78555.89	769.44	63.70	9.59	192.44	16.35
8538-12.D	Mount Laguna Type 1	Talc-Schist	14970.11	165163.07	7192.29	259529.92	1197.55	3008.37	0.00	241.85	1.07	619.71	986.44	88422.89	1118.44	73.21	13.27	210.77	0.00
8538-12B.D	Mount Laguna Type 1	Talc-Schist	0.00	152465.27	7044.58	310007.93	0.00	8167.62	14.43	197.52	15.81	848.44	573.47	37620.45	1602.28	70.45	12.81	164.18	0.00
8538-13.D	Mount Laguna Type 1	Talc-Schist	25387.13	143868.34	10627.79	252847.77	822.72	0.00	0.00	46.07	8.98	4897.41	2241.29	106714.42	928.15	44.92	14.59	251.14	20.27
8538-13B.D	Mount Laguna Type 1	Talc-Schist	0.00	171089.60	3827.28	297751.29	0.00	0.00	0.00	186.59	14.26	321.22	1101.97	46697.87	1530.17	79.91	12.24	224.88	18.05
8538-14.D	Mount Laguna Type 1	Talc-Schist	21726.16	137879.81	22019.61	280968.16	2392.09	839.71	0.00	463.91	8.23	790.08	588.38	62713.38	1294.50	76.36	33.98	274.71	99.74
8538-14B.D	Mount Laguna Type 1	Talc-Schist	0.00	136854.53	12152.85	260207.74	0.00	2266.84	6.87	516.78	80.19	1071.84	3133.23	125173.30	985.24	58.66	39.11	331.40	1203.20
8538-15.D	Mount Laguna Type 1	Talc-Schist	17572.07	186485.10	6229.03	285591.92	876.26	1203.43	6.20	90.69	12.06	941.28	53.72	26769.05	777.96	57.27	0.00	110.35	5.45
8538-15B.D	Mount Laguna Type 1	Talc-Schist	0.00	188541.20	6266.48	303593.86	0.00	0.00	0.00	96.72	17.56	1332.80	61.86	15325.25	906.43	74.24	2.69	109.41	0.00
8538-16.D	Mount Laguna Type 1	Talc-Schist	10744.59	181949.34	4448.84	257467.14	594.24	1510.96	5.67	206.97	6.61	655.40	675.54	82147.71	636.36	35.04	41.43	117.10	326.83
8538-16B.D	Mount Laguna Type 1	Talc-Schist	0.00	156756.97	7215.42	248305.89	714.08	1202.15	0.74	134.46	34.87	1019.50	1360.81	128186.04	1759.16	100.14	77.36	252.21	1699.00
8538-17.D	Mount Laguna Type 1	Talc-Schist	22090.24	162254.35	9344.58	265354.92	1699.41	838.51	10.37	126.33	14.20	504.70	1096.69	75250.63	1217.31	40.04	17.48	163.49	79.34
8538-17B.D	Mount Laguna Type 1	Talc-Schist	0.00	182545.64	34043.20	260618.23	161.67	2025.71	11.72	222.50	59.41	2063.31	668.94	45443.45	1584.58	76.78	18.26	180.32	53.32
8538-18.D	Mount Laguna Type 1	Talc-Schist	31689.20	155003.35	1743.18	304691.08	2017.99	588.75	0.00	106.42	0.63	460.46	61.27	27652.79	521.65	28.19	6.06	105.04	24.17
8538-18B.D	Mount Laguna Type 1	Talc-Schist	1978.85	184964.14	4871.21	303176.43	0.00	334.84	2.32	20.07	12.86	1151.24	91.23	20085.64	692.46	49.37	0.00	140.37	99.89
8538-19.D	Mount Laguna Type 1	Talc-Schist	32562.19	153346.56	36948.06	251094.78	4258.72	1153.28	0.00	943.45	16.74	1052.70	428.76	57611.29	802.31	29.11	42.43	140.49	45.77
8538-19B.D	Mount Laguna Type 1	Talc-Schist	0.00	167327.47	3593.37	302250.29	0.00	199.16	0.00	167.12	3.82	1159.84	897.56	44145.83	1219.60	40.83	3.31	249.41	3.49
8538-20.D	Mount Laguna Type 1	Talc-Schist	5520.79	184045.94	11754.21	256824.83	0.00	0.00	5.11	422.57	160.59	19412.41	290.19	58148.87	648.38	65.03	2.32	1097.94	21.16
8538-20B.D	Mount Laguna Type 1	Talc-Schist	0.00	197335.13	4277.48	296989.25	0.00	447.09	4.13	192.82	18.30	1496.34	53.18	17068.19	798.55	41.99	2.97	96.50	0.00
8538-21.D	Mount Laguna Type 1	Talc-Schist	8999.58	186603.70	3395.30	246186.29	0.00	914.16	2.36	43.46	0.00	511.96	1279.31	97191.33	1266.93	56.71	4.29	184.13	11.74
8538-21B.D	Mount Laguna Type 1	Talc-Schist	154.54	175137.94	1735.11	273487.89	193.28	3060.53	0.86	66.72	0.00	369.93	1919.26	77512.51	1061.88	77.88	1.54	219.45	0.00
8538-22.D	Mount Laguna Type 1	Talc-Schist	2859.45	201993.05	6566.79	270261.98	302.94	52.95	0.00	163.50	12.55	1115.40	196.69	45836.31	1002.85	49.51	21.02	148.20	262.42
8538-22B.D	Mount Laguna Type 1	Talc-Schist	0.00	158113.46	5994.10	277067.95	1.60	2192.59	0.70	54.39	14.51	1336.76	1462.97	86595.67	875.65	91.45	16.36	189.30	432.52

Table 12a. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 1 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
8538-23.D	Mount Laguna Type 1	Talc-Schist	6542.97	186705.97	4883.67	273519.42	739.46	0.00	6.07	222.92	0.00	512.13	229.63	57503.12	1334.91	64.93	3.67	269.99	6.69
8538-23B.D	Mount Laguna Type 1	Talc-Schist	0.00	175374.22	6070.98	298673.17	59.42	546.45	2.53	174.57	11.65	838.62	244.00	36907.38	1805.90	88.30	6.06	223.82	22.37
8538-24.D	Mount Laguna Type 1	Talc-Schist	20417.71	194386.24	9131.33	251741.99	942.50	0.00	0.00	328.68	14.34	1077.69	628.01	61137.56	1465.95	61.15	2.03	245.32	3.70
8538-24B.D	Mount Laguna Type 1	Talc-Schist	0.00	182786.98	5853.98	285651.98	74.12	361.32	0.00	303.05	15.03	944.55	1035.77	47423.10	1600.06	65.92	4.51	234.46	0.00

Table 12b. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
8538-1a2.D	Mount Laguna Type 1	Talc-Schist	2.41	2.04	2.45	0.17	0.46	7.89	7.28	0.00	13.11	1.92	2.20	1.06	5.41	1.01	1.77	1.44	0.14	0.00	0.00	1.46	0.00	0.00	0.50	0.00	0.05	0.70	0.07	0.42
8538-1a3.D	Mount Laguna Type 1	Talc-Schist	1.01	4.59	12.52	0.00	0.84	1.81	38.36	0.00	26.33	4.69	4.53	2.36	9.99	1.19	1.96	1.15	0.70	2.59	0.93	2.86	0.35	1.71	0.17	0.82	0.18	1.24	0.06	0.49
8538-1b2.D	Mount Laguna Type 1	Talc-Schist	1.27	3.61	7.63	0.00	0.39	0.29	27.88	0.00	32.39	6.04	2.82	2.06	8.49	3.13	1.34	2.67	0.61	2.91	0.57	1.23	0.00	1.67	0.00	0.64	0.12	1.53	13.85	7.59
8538-1b3.D	Mount Laguna Type 1	Talc-Schist	4.41	2.10	5.81	0.00	0.40	5.17	17.90	0.03	33.91	5.75	3.69	1.68	8.32	3.46	0.63	0.00	0.17	0.96	0.42	0.31	0.38	3.27	0.00	0.11	0.23	2.95	0.00	0.15
8538-2a2.D	Mount Laguna Type 1	Talc-Schist	0.82	0.18	0.54	0.00	0.14	0.00	0.44	0.00	4.67	0.40	0.09	0.07	0.23	0.61	0.00	0.00	0.31	0.00	0.23	0.26	0.00	0.00	0.00	0.00	0.13	0.89	0.00	0.38
8538-2a3.D	Mount Laguna Type 1	Talc-Schist	0.46	0.19	0.32	0.00	0.25	2.09	2.41	0.00	5.54	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.19	1.70	0.35	0.81	0.00	0.56	0.00	0.05
8538-2b2.D	Mount Laguna Type 1	Talc-Schist	1.50	1.01	1.37	0.00	0.19	0.43	0.00	0.26	2.78	0.00	0.48	0.10	0.00	0.42	0.00	1.07	0.42	0.00	0.00	0.73	0.00	1.84	0.00	1.32	0.30	1.22	0.09	1.22
8538-2b3.D	Mount Laguna Type 1	Talc-Schist	0.83	0.41	0.83	0.00	0.45	1.17	2.09	0.00	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	1.04	0.25	0.74	0.00	0.00	0.00	0.00	0.00	0.36
8538-3a2.D	Mount Laguna Type 1	Talc-Schist	0.35	0.47	0.00	0.00	0.35	1.97	0.00	0.00	1.00	0.00	0.33	0.00	2.07	0.00	0.20	0.00	0.28	0.00	0.00	1.34	0.00	0.57	0.00	0.00	0.60	1.12	0.00	0.00
8538-3a3.D	Mount Laguna Type 1	Talc-Schist	0.46	0.82	0.21	0.83	0.00	0.30	2.43	0.00	4.91	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.08	0.12	0.00	1.34	0.00	0.59	0.04	1.69	0.00	0.06
8538-3b2.D	Mount Laguna Type 1	Talc-Schist	0.00	1.65	2.43	1.55	0.18	0.00	1.66	0.00	7.87	0.63	0.00	0.47	0.66	0.63	0.00	0.00	0.37	0.00	0.07	1.48	0.51	0.00	0.22	0.00	0.30	2.67	0.29	0.09
8538-3b3.D	Mount Laguna Type 1	Talc-Schist	0.59	1.09	1.07	0.00	0.14	1.92	0.00	0.00	3.21	0.00	0.00	0.00	0.89	0.00	0.38	0.00	0.10	0.00	0.07	0.94	0.25	1.21	0.08	0.96	0.03	1.13	0.00	0.15
8538-4a2.D	Mount Laguna Type 1	Talc-Schist	0.00	0.53	0.91	0.87	0.20	3.83	0.00	0.00	5.43	0.00	0.00	0.17	0.00	0.00	0.50	4.00	0.28	0.00	0.00	2.50	0.00	1.44	0.56	0.00	0.34	0.60	0.00	1.11
8538-4a3.D	Mount Laguna Type 1	Talc-Schist	1.87	1.41	0.80	0.22	0.00	2.58	3.02	0.00	6.33	0.00	0.00	0.13	0.00	0.14	0.00	0.00	0.28	0.00	0.33	0.37	0.29	0.00	0.00	0.12	0.00	1.32	0.00	0.06
8538-4b2.D	Mount Laguna Type 1	Talc-Schist	0.00	0.37	1.27	1.22	0.29	4.21	0.00	0.00	5.54	0.00	0.19	0.00	2.58	1.16	0.00	2.18	0.10	1.76	0.00	0.00	0.10	0.51	0.00	0.00	0.24	0.42	0.53	0.78
8538-4b3.D	Mount Laguna Type 1	Talc-Schist	0.30	0.07	0.23	0.00	0.00	2.63	1.32	0.00	3.47	0.08	0.32	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.21	0.21	0.00	1.40	0.20	1.11	0.00	0.42
8538-9a2.D	Mount Laguna Type 1	Talc-Schist	0.43	0.72	1.61	1.42	0.00	1.78	0.61	0.00	5.82	0.31	0.15	0.03	0.00	0.00	0.00	1.21	0.08	0.00	0.20	0.23	0.31	0.39	0.13	0.00	0.00	1.19	0.76	0.38
8538-9a3.D	Mount Laguna Type 1	Talc-Schist	0.78	0.30	0.20	0.39	0.33	0.57	1.90	0.00	2.18	0.07	0.21	0.06	0.00	0.00	0.79	0.00	0.00	0.00	0.00	0.75	0.18	0.18	0.49	0.11	0.17	0.11	0.00	0.00
8538-9b2.D	Mount Laguna Type 1	Talc-Schist	0.00	0.00	0.28	1.88	0.38	1.02	0.00	0.00	0.86	0.00	0.00	0.11	0.00	0.00	0.15	0.83	0.17	0.52	0.00	0.52	0.35	1.79	0.45	0.39	0.00	0.00	0.07	0.31
8538-9b3.D	Mount Laguna Type 1	Talc-Schist	1.17	0.66	1.24	0.00	0.29	0.35	2.80	0.00	0.50	0.08	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.04	0.22	0.10	0.68	0.00	0.39	0.07	0.06
8538-10.D	Mount Laguna Type 1	Talc-Schist	5.24	4.49	2.29	0.00	0.79	0.00	59.86	0.13	114.03	2.27	3.03	1.15	6.48	4.53	0.00	0.00	0.11	1.52	0.00	0.82	0.28	1.68	0.00	0.17	0.00	0.66	0.16	0.94
8538-10B.D	Mount Laguna Type 1	Talc-Schist	3.45	2.32	1.63	0.00	0.81	1.74	34.67	0.87	76.08	1.57	0.44	0.51	0.59	1.69	0.59	0.00	0.11	0.22	0.06	0.00	0.00	0.57	0.45	0.17	0.05	0.00	0.26	0.88
8538-11.D	Mount Laguna Type 1	Talc-Schist	2.02	1.67	0.87	0.00	1.87	0.00	1.72	0.36	8.32	0.00	0.32	0.18	0.27	1.30	0.00	0.28	0.00	0.62	0.00	0.15	0.00	0.00	0.24	0.00	0.20	1960.35	0.46	0.30
8538-11B.D	Mount Laguna Type 1	Talc-Schist	0.31	2.73	1.08	1.72	1.62	0.00	4.42	1.09	11.90	0.11	0.44	0.00	1.17	0.00	0.20	0.00	0.22	1.99	0.06	0.00	0.00	1.71	0.83	0.00	0.48	0.79	1.10	1.20
8538-12.D	Mount Laguna Type 1	Talc-Schist	0.54	2.89	2.33	0.00	0.55	0.00	1.01	0.00	3.76	0.84	1.04	0.35	0.00	0.55	0.00	1.36	0.00	2.21	0.00	1.36	0.00	0.00	0.00	0.00	0.10	0.91	0.60	0.29
8538-12B.D	Mount Laguna Type 1	Talc-Schist	0.00	3.03	1.73	1.93	0.00	2.08	0.00	0.00	87.63	0.18	1.23	0.33	0.00	0.00	0.00	3.66	0.18	0.00	0.24	0.00	0.00	0.00	0.05	0.66	0.38	0.00	0.00	0.32
8538-13.D	Mount Laguna Type 1	Talc-Schist	0.14	2.77	1.45	0.15	0.00	0.00	1.79	0.00	26.49	0.00	0.79	0.00	0.99	0.97	0.15	0.00	0.23	0.46	0.17	0.11	0.00	0.00	0.00	0.00	0.07	0.23	0.00	0.00
8538-13B.D	Mount Laguna Type 1	Talc-Schist	0.28	1.30	0.32	0.61	0.86	1.15	0.00	0.00	18.76	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.59	0.00	1.17	0.00	0.50	0.00	0.73	0.61	1.26	0.00	0.21
8538-14.D	Mount Laguna Type 1	Talc-Schist	5.88	2.72	0.89	0.42	1.02	0.00	4.91	3.76	50.36	0.59	0.58	0.06	2.36	0.38	0.13	0.95	0.28	0.14	0.00	0.00	0.11	0.00	0.00	0.00	0.00	1.90	0.63	0.81
8538-14B.D	Mount Laguna Type 1	Talc-Schist	2.08	9.66	4.69	3.45	2.05	0.00	30.90	0.04	144.07	1.71	3.45	0.15	1.56	0.87	0.26	1.17	0.22	0.00	0.12	0.22	0.30	3.05	0.38	1.21	0.25	13.40	1.08	5.16
8538-15.D	Mount Laguna Type 1	Talc-Schist	0.13	0.00	0.32	0.00	0.14	0.00	1.76	0.00	2.09	0.08	0.16	0.00	0.00	0.14	0.00	0.00	0.15	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.68	0.00	0.00
8538-15B.D	Mount Laguna Type 1	Talc-Schist	1.32	0.28	0.12	0.00	0.05	0.00	0.40	0.08	3.29	0.61	1.12	0.00	0.00	0.00	0.28	0.72	0.31	0.16	0.25	0.35	0.04	1.01	0.00	0.00	0.00	0.58	0.00	0.40
8538-16.D	Mount Laguna Type 1	Talc-Schist	1.11	0.95	0.87	0.00	0.00	0.00	5.28	0.00	17.53	0.43	0.57	0.00	1.96	0.62	0.00	0.56	0.35	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	0.10	0.50
8538-16B.D	Mount Laguna Type 1	Talc-Schist	0.00	1.94	3.77	0.22	0.27	0.46	15.66	0.00	62.07	0.46	1.26	0.26	1.01	0.00	0.00	0.71	0.00	0.00	0.41	1.98	0.00	1.00	0.00	0.00	0.15	1.50	0.78	0.63
8538-17.D	Mount Laguna Type 1	Talc-Schist	0.62	1.14	0.74	0.00	0.76	0.00	1.17	0.00	7.18	0.44	0.14	0.12	0.54	1.14	0.00	0.57	0.14	0.14	0.15	0.32	0.18	0.00	0.00	0.00	0.00	0.21	0.10	0.30
8538-17B.D	Mount Laguna Type 1	Talc-Schist	4.13	4.23	0.87	0.00	0.84	0.16	1.69	0.66	27.70	0.00	0.04	0.07	0.64	0.00	0.00	0.00	0.00	0.00	0.26	0.12	0.00	1.89	0.37	0.00	0.39	0.61	0.19	0.54
8538-18.D	Mount Laguna Type 1	Talc-Schist	0.53	0.52	0.50	0.00	0.00	0.00	1.38	0.00	1.49	0.00	0.30	0.00	2.29	1.60	0.00	0.00	0.06	0.83	0.19	0.44	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.94
8538-18B.D	Mount Laguna Type 1	Talc-Schist	0.00	0.72	0.12	0.00	0.28	0.00	1.68	0.00	8.44	0.63	0.36	0.00	0.00	0.70	0.00	1.73	0.00	0.00	0.17	1.10	0.00	0.00	0.28	0.00	0.08	0.00	0.06	0.42
8538-19.D	Mount Laguna Type 1	Talc-Schist	22.85	6.92	1.22	0.83	4.65	0.00	1.93	15.50	62.48	0.00	0.85	0.15	1.07	0.15	0.00	0.00	0.08	0.17	0.00	0.12	0.00	0.00	0.00	0.00	0.56	2.24	0.62	1.79
8538-19B.D	Mount Laguna Type 1	Talc-Schist	0.00	1.21	0.15	1.66	0.00	0.00	0.00	0.10	5.98	0.00	0.24	0.63	0.00	0.00	0.35	0.00	0.00	0.00	0.20	0.00	0.00	1.24	0.11	0.00	0.09	1.29	0.00	1.06
8538-20.D	Mount Laguna Type 1	Talc-Schist	1.03	0.46	0.10	0.00	0.87	0.00	2.22	0.00	5.88	0.00	0.00	0.00	2.06	1.15	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.56	0.06	0.00	0.49	0.16	0.08	0.32
8538-20B.D	Mount Laguna Type 1	Talc-Schist	0.00	0.46	0.13	0.00	0.18	0.52	0.45	0.00	1.73	0.00	0.00	0.00	0.23	0.15	0.16	2.38	0.00	0.18	0.09	0.65	0.00	2.01	0.00	0.13	0.00	0.64	0.07	0.19
8538-21.D	Mount Laguna Type 1	Talc-Schist	0.64	0.86	1.69	0.53	0.00	0.72	2.56	0.22	5.63	0.00	0.30	0.09	0.27	1.07	0.00	0.00	0.15	0.81	0.27	0.31	0.00	0.00	0.53	0.00	0.05	1.03	0.00	0.44
8538-21B.D	Mount Laguna Type 1	Talc-Schist	0.35	0.96	3.27	2.06	0.92	0.00	3.72	0.00	2.19	0.26	0.49	0.00	0.00	0.00	0.16	0.00	0.00	0.00	1.41	0.94	0.00	2.54	0.00	0.40	0.17	0.40	0.07	0.20
8538-22.D	Mount Laguna Type 1	Talc-Schist	1.68	2.10	1.28	0.00	0.61	0.00	20.47	0.00	12.74	1.61	1.67	0.58	0.00	1.07	0.00	1.14	0.27	0.61	0.04	0.70	0.00	0.79	0.04	0.12	0.27	6.34	0.17	0.56
8538-22B.D	Mount Laguna Type 1	Talc-Schist	1.42	5.36	3.89	0.63	0.75	0.44	26.15	0.82	21.41	1.86	2.49	0.60	4.40	1.64	1.07	1.57	0.22	1.68	1.00	1.43	0.04	2.83	0.00	0.00	0.00	0.76	0.06	0.70

Table 12b. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 1 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
8538-23.D	Mount Laguna Type 1	Talc-Schist	0.00	0.74	0.69	0.00	0.55	0.00	0.00	0.00	8.86	0.04	0.17	0.07	0.70	0.61	0.00	0.78	0.39	0.00	0.14	0.00	0.00	0.45	0.00	0.00	0.30	1.14	0.00	0.25
8538-23B.D	Mount Laguna Type 1	Talc-Schist	3.77	1.26	0.67	1.26	0.30	0.00	0.00	0.81	11.52	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.09	0.40	0.00	2.50	0.10	0.00	0.34	0.39	0.00	0.71
8538-24.D	Mount Laguna Type 1	Talc-Schist	1.51	0.00	0.42	0.50	0.15	0.34	0.49	0.00	5.72	0.00	0.19	0.49	0.00	1.68	0.18	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.43	1.26	0.00	0.00
8538-24B.D	Mount Laguna Type 1	Talc-Schist	0.00	0.94	0.53	0.75	0.54	0.00	2.72	0.18	5.23	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.37	0.13	0.00	2.03	0.00	0.39	0.08	0.91	0.00	0.32

Table 13a. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 2 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
8538-5a2.D	Mount Laguna Type 2	Talc-Schist	20355.42	169561.65	4884.70	247278.40	63.11	1741.76	0.00	91.04	14.28	667.49	2517.24	100772.49	662.47	64.60	3.40	234.49	12.15
8538-5a3.D	Mount Laguna Type 2	Talc-Schist	0.00	200373.01	9662.54	281193.83	211.81	956.05	6.74	193.53	16.22	934.81	360.76	29503.26	794.57	70.95	2.07	228.07	10.23
8538-5a4.D	Mount Laguna Type 2	Talc-Schist	5209.12	173804.63	23992.49	269388.30	501.01	932.35	4.93	449.26	28.95	2163.73	1158.37	51181.46	1109.10	78.40	16.09	235.22	10.11
8538-5b2.D	Mount Laguna Type 2	Talc-Schist	13525.16	187432.80	8862.67	278186.74	0.00	187.31	0.00	2168.29	15.67	824.92	541.78	35366.71	1322.68	69.06	10.98	158.54	3.92
8538-5b3.D	Mount Laguna Type 2	Talc-Schist	0.00	190773.36	40209.09	235734.15	655.23	3805.34	12.53	929.79	47.31	2865.38	1368.34	61196.17	600.31	93.08	33.40	355.13	9.01
8538-5b4.D	Mount Laguna Type 2	Talc-Schist	7665.57	183841.83	39924.98	256935.60	2720.42	2442.46	4.92	603.51	42.16	3310.47	239.18	30723.68	1412.69	85.18	13.67	260.80	2.02
8538-6a2.D	Mount Laguna Type 2	Talc-Schist	11349.29	192717.66	4306.03	297050.25	0.00	0.00	0.00	0.00	10.39	744.37	33.07	13173.87	705.48	36.55	12.37	58.41	0.00
8538-6a3.D	Mount Laguna Type 2	Talc-Schist	0.00	209651.98	4884.15	290317.16	126.75	127.91	14.18	215.60	0.00	765.68	75.54	13164.56	437.06	41.99	14.59	144.31	0.00
8538-6a4.D	Mount Laguna Type 2	Talc-Schist	4323.57	196752.25	4334.51	295103.81	308.71	0.00	4.54	95.44	13.83	745.61	162.39	17267.38	861.81	50.98	9.87	111.86	20.10
8538-6b2.D	Mount Laguna Type 2	Talc-Schist	14094.23	201800.89	4880.21	286315.83	0.00	0.00	0.00	180.67	9.45	1153.72	130.36	14503.17	821.57	39.67	8.44	103.57	0.00
8538-6b3.D	Mount Laguna Type 2	Talc-Schist	0.00	207569.17	3439.45	291937.73	966.52	745.22	8.75	114.28	0.00	848.73	42.79	13658.06	525.13	43.21	11.65	120.89	0.00
8538-6b4.D	Mount Laguna Type 2	Talc-Schist	2774.43	199782.90	5295.43	294736.74	0.00	376.89	3.19	44.71	13.15	1330.77	41.54	12403.00	857.70	56.42	1821.28	101.39	10.46
8538-7a2.D	Mount Laguna Type 2	Talc-Schist	17035.31	202522.03	8919.59	265329.54	0.00	634.45	16.23	344.39	10.80	617.09	692.82	35523.86	1327.80	63.59	2.86	230.79	1.02
8538-7a3.D	Mount Laguna Type 2	Talc-Schist	0.00	187855.85	2118.98	295609.42	693.43	1295.81	0.88	226.17	4.74	265.90	776.67	32049.17	699.30	59.59	0.80	189.77	3.99
8538-7a4.D	Mount Laguna Type 2	Talc-Schist	0.00	174399.73	6284.71	284401.94	0.00	184.89	6.52	328.76	17.37	591.74	1718.20	58497.54	1268.09	73.18	8.50	315.98	16.03
8538-7b2.D	Mount Laguna Type 2	Talc-Schist	14034.94	202707.24	4469.61	270776.68	0.00	0.00	9.72	100.19	10.48	481.83	491.50	37062.57	1471.78	67.68	8.32	117.78	4.45
8538-7b3.D	Mount Laguna Type 2	Talc-Schist	7478.23	213050.04	2796.11	279800.49	0.00	1168.04	0.00	232.46	29.68	366.33	132.11	19701.65	779.32	63.38	2.36	164.57	23.75
8538-7b4.D	Mount Laguna Type 2	Talc-Schist	0.00	191475.05	3904.25	300186.68	0.00	0.00	7.12	24.91	9.03	389.59	147.06	20500.05	1499.75	52.91	4.30	197.97	8.75
8538-8a2.D	Mount Laguna Type 2	Talc-Schist	5880.11	199512.98	4849.74	243192.57	0.00	758.16	0.00	104.89	13.17	936.71	1519.42	87201.10	460.74	57.42	27.45	240.58	517.96
8538-8a3.D	Mount Laguna Type 2	Talc-Schist	896.05	185429.99	6072.41	253474.33	0.00	344.46	6.62	72.00	10.42	826.79	1597.50	91483.29	258.01	31.23	18.81	195.73	941.41
8538-8a4.D	Mount Laguna Type 2	Talc-Schist	813.56	172621.20	32113.34	245510.81	1008.02	213.08	11.28	268.59	142.53	3428.98	1246.04	71174.80	2696.18	43.36	215.57	230.05	6973.87
8538-8b2.D	Mount Laguna Type 2	Talc-Schist	5358.17	185017.38	4169.65	267328.95	0.00	934.59	0.80	38.21	10.00	793.54	1413.45	69967.67	429.20	39.40	2.38	138.26	174.31
8538-8b3.D	Mount Laguna Type 2	Talc-Schist	1845.17	216423.45	21768.20	246354.53	0.00	0.00	1.31	154.17	39.30	2732.24	774.72	44523.09	352.09	37.12	16.07	141.41	145.82
8538-8b4.D	Mount Laguna Type 2	Talc-Schist	329.43	174208.87	5229.04	283349.83	210.69	1099.74	2.74	0.00	14.76	717.22	1345.48	61800.88	451.61	37.20	0.66	188.57	40.41
8538-25a2.D	Mount Laguna Type 2	Talc-Schist	4359.29	197716.98	4973.89	266538.80	0.00	724.16	0.00	200.44	13.62	645.01	401.50	56762.18	771.78	43.33	91.13	148.48	558.93
8538-25a3.D	Mount Laguna Type 2	Talc-Schist	1223.88	189160.84	6979.76	269023.89	0.00	457.26	2.20	211.64	21.53	895.35	139.67	62998.30	497.68	46.16	141.50	154.55	1256.51
8538-25a4.D	Mount Laguna Type 2	Talc-Schist	1300.03	179098.39	16314.71	273802.72	399.56	152.25	3.58	255.82	41.57	1550.56	145.25	54564.24	740.19	46.80	75.24	196.31	771.56
8538-25b2.D	Mount Laguna Type 2	Talc-Schist	10717.44	185313.00	6490.49	269257.20	0.00	490.56	13.09	3798.66	12.07	770.37	561.99	54696.06	660.12	47.49	56.19	155.44	782.98
8538-25b3.D	Mount Laguna Type 2	Talc-Schist	4083.38	196685.45	3064.48	272062.44	351.26	1185.69	1.42	221.27	8.97	554.34	785.50	51002.39	395.50	44.79	59.35	157.81	1172.81
8538-25b4.D	Mount Laguna Type 2	Talc-Schist	0.00	183080.52	4186.28	294588.98	151.07	588.98	4.62	155.25	15.82	635.70	453.70	36907.09	741.65	51.12	26.09	121.06	658.76
8538-26a2.D	Mount Laguna Type 2	Talc-Schist	205304.44	121371.02	2207.06	221456.69	0.00	764.95	0.00	214.74	16.60	519.01	343.77	27666.83	852.14	43.82	30.06	170.65	0.00
8538-26a3.D	Mount Laguna Type 2	Talc-Schist	0.00	203066.28	2993.25	283455.53	0.00	206.75	7.95	111.14	4.17	793.30	526.40	32964.63	586.44	54.50	9.41	279.58	1.71
8538-26a4.D	Mount Laguna Type 2	Talc-Schist	2096.41	182155.85	3316.91	298217.35	0.00	0.00	0.00	154.19	19.53	840.60	318.00	32645.30	1060.99	51.72	7.68	207.95	5.31
8538-26b2.D	Mount Laguna Type 2	Talc-Schist	8739.20	184298.55	3328.43	292866.81	1066.84	97.30	0.00	45.53	0.00	677.28	297.94	31229.47	1133.05	57.54	0.00	144.88	0.00
8538-26b3.D	Mount Laguna Type 2	Talc-Schist	20722.64	195951.49	2711.73	274488.06	1726.38	0.00	13.30	62.00	6.98	866.62	422.82	34398.52	514.06	47.70	15.75	219.45	14.39
8538-26b4.D	Mount Laguna Type 2	Talc-Schist	1481.87	184605.17	2260.60	296745.14	79.84	0.00	0.00	71.17	14.50	680.76	482.15	33891.08	1027.40	32.64	4.96	144.01	17.17
8538-27a2.D	Mount Laguna Type 2	Talc-Schist	0.00	191234.27	6127.63	299585.56	0.00	0.00	0.00	208.84	16.77	1350.73	46.24	17891.35	1266.28	46.95	0.00	103.75	53.09
8538-27a3.D	Mount Laguna Type 2	Talc-Schist	14230.29	214706.97	15633.87	256887.13	1143.29	166.02	11.17	327.24	61.44	3416.17	118.35	25257.76	714.39	58.22	3.02	160.92	299.81
8538-27a4.D	Mount Laguna Type 2	Talc-Schist	1555.64	220694.87	11309.15	264231.94	415.17	0.00	4.44	327.46	47.59	2645.34	100.18	26206.68	1305.90	42.44	6.08	131.50	202.70
8538-27b2.D	Mount Laguna Type 2	Talc-Schist	1180.22	197600.91	7819.23	280442.27	470.61	514.97	2.14	294.39	37.24	1284.75	252.23	34229.68	1326.21	53.25	0.00	202.07	266.81
8538-27b3.D	Mount Laguna Type 2	Talc-Schist	0.00	200014.56	2947.98	293137.33	0.00	0.00	6.80	306.58	10.72	748.35	64.89	22033.66	754.84	67.21	14.50	141.92	405.16
8538-27b4.D	Mount Laguna Type 2	Talc-Schist	1131.04	195199.00	6221.84	290974.61	590.15	314.81	6.48	215.37	32.67	1267.25	111.59	23624.14	1492.50	46.52	5.00	157.05	311.69
8538-28a2.D	Mount Laguna Type 2	Talc-Schist	0.00	176662.32	4819.48	302980.30	176.86	0.00	0.00	296.30	8.39	870.65	334.94	31192.90	1431.02	54.67	0.00	218.14	0.86
8538-28a3.D	Mount Laguna Type 2	Talc-Schist	0.00	198936.75	4541.56	278815.00	0.00	602.58	10.13	62.99	2.03	755.74	1034.74	41624.20	849.60	72.49	8.23	225.30	16.29
8538-28a4.D	Mount Laguna Type 2	Talc-Schist	2002.07	185875.14	3833.54	295151.74	406.19	347.55	4.55	218.51	12.48	648.47	306.40	31382.77	1510.60	67.83	4.68	207.04	0.00
8538-28b2.D	Mount Laguna Type 2	Talc-Schist	0.00	174735.16	4016.47	306139.32	169.68	114.10	1.42	284.46	5.71	582.38	140.33	29988.48	1606.19	67.34	3.20	226.06	6.17

Table 13a. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 2 in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
8538-28b3.D	Mount Laguna Type 2	Talc-Schist	315.46	197248.31	6388.16	284205.91	0.00	0.00	1.16	233.26	16.60	785.78	566.02	33180.44	1317.62	55.61	4.84	249.97	18.13
8538-28b4.D	Mount Laguna Type 2	Talc-Schist	5841.66	197405.92	6444.09	282119.60	798.15	356.77	0.00	138.02	17.78	808.81	297.20	29858.00	1682.66	60.77	0.00	231.15	22.89
8538-29a2.D	Mount Laguna Type 2	Talc-Schist	0.00	179839.78	6584.69	307312.40	394.64	0.00	7.81	78.16	8.37	1099.99	155.96	19482.82	674.06	53.09	0.70	104.84	6.78
8538-29a3.D	Mount Laguna Type 2	Talc-Schist	0.00	213241.73	2898.82	287831.22	0.00	0.00	0.00	96.41	4.80	802.03	51.80	15529.62	637.46	46.49	2.33	139.26	10.93
8538-29a4.D	Mount Laguna Type 2	Talc-Schist	10744.65	210524.64	12887.26	256957.83	1169.17	2135.34	2.61	96.28	29.99	1821.48	546.47	36837.44	668.15	45.22	10.74	147.19	30.19
8538-29b2.D	Mount Laguna Type 2	Talc-Schist	183.77	217144.13	2294.85	278941.44	0.00	0.00	5.22	131.21	10.27	887.80	259.14	24580.39	559.05	34.77	13.62	113.56	99.51
8538-29b3.D	Mount Laguna Type 2	Talc-Schist	6809.04	178934.42	2429.12	277483.73	1449.48	2434.17	14.87	43.90	9.99	919.08	1157.43	60127.14	545.75	43.49	0.00	203.32	84.72
8538-30a.D	Mount Laguna Type 2	Talc-Schist	0.00	186921.90	4341.38	297590.40	8.85	315.55	0.00	531.49	6.32	461.17	510.66	27539.65	1736.91	63.26	0.00	217.05	0.00
8538-30a2.D	Mount Laguna Type 2	Talc-Schist	3171.77	202288.13	3058.89	284062.51	103.63	0.00	0.00	236.44	2.62	527.95	409.72	29491.08	1510.05	42.87	5.72	222.80	10.73
8538-30a3.D	Mount Laguna Type 2	Talc-Schist	7152.51	195086.54	3732.30	286584.18	1087.27	0.00	1.71	50.63	4.25	445.01	326.07	28880.68	1667.07	48.30	7.06	175.32	0.00
8538-30b.D	Mount Laguna Type 2	Talc-Schist	0.00	196643.55	8822.84	273497.71	828.98	60.06	6.70	335.59	11.97	728.58	1113.47	45631.66	1312.13	55.64	0.00	261.12	4.16
8538-30b2.D	Mount Laguna Type 2	Talc-Schist	0.00	193390.51	4961.79	273052.48	0.00	142.84	10.19	390.20	15.79	511.48	1774.26	55392.36	1161.54	49.75	7.09	243.19	29.87
8538-30b3.D	Mount Laguna Type 2	Talc-Schist	0.00	173312.66	26202.44	256877.16	580.36	1090.74	1.57	928.66	87.33	1750.71	2054.14	70073.39	1460.78	80.06	43.68	825.89	109.19
8538-31a.D	Mount Laguna Type 2	Talc-Schist	0.00	193716.42	2931.81	289026.74	100.86	0.00	7.92	41.35	5.96	846.47	476.88	35444.25	864.06	57.33	2.43	336.71	6.68
8538-31a2.D	Mount Laguna Type 2	Talc-Schist	434.34	197253.09	4247.34	285072.79	0.00	0.00	8.44	121.20	10.06	1062.57	312.58	34276.32	1768.87	69.68	4.40	208.95	52.23
8538-31b.D	Mount Laguna Type 2	Talc-Schist	0.00	184495.15	2783.30	294952.89	0.00	1129.99	0.00	67.09	16.42	696.52	244.88	36629.95	883.94	64.10	3.28	311.32	161.45
8538-31b2.D	Mount Laguna Type 2	Talc-Schist	1028.07	197208.50	3091.02	284266.58	6.59	0.00	0.00	225.07	8.97	728.33	245.50	36908.38	1495.41	66.78	8.72	227.93	183.80
8538-32.D	Mount Laguna Type 2	Talc-Schist	0.00	215584.18	12521.00	266875.79	344.72	711.99	19.81	258.57	29.79	943.55	213.75	29908.15	539.74	37.66	0.00	159.11	90.21
8538-32B.D	Mount Laguna Type 2	Talc-Schist	0.00	216362.02	5282.83	272120.66	0.00	0.00	0.00	82.04	15.53	946.04	240.74	31430.32	883.40	49.89	2.38	114.66	283.56
8538-33.D	Mount Laguna Type 2	Talc-Schist	6954.18	208719.14	2262.54	283135.71	739.32	0.00	0.00	119.04	8.81	463.62	450.16	21346.29	536.23	52.86	7.33	160.46	78.00
8538-33B.D	Mount Laguna Type 2	Talc-Schist	0.00	223087.66	3670.47	275116.58	0.00	155.21	3.32	159.06	15.06	944.19	372.59	21167.16	768.60	59.59	10.40	114.15	112.59
8538-34.D	Mount Laguna Type 2	Talc-Schist	27877.42	175698.47	2627.84	270091.79	2647.32	0.00	0.00	98.03	2.26	579.02	1519.79	55767.90	828.04	54.36	2.31	290.76	117.80
8538-34B.D	Mount Laguna Type 2	Talc-Schist	0.00	223915.44	2760.90	273451.97	0.00	0.00	4.68	269.00	8.38	623.79	139.58	23502.04	1759.97	68.60	3.66	246.01	130.45

Table 13b. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 2 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
8538-5a2.D	Mount Laguna Type 2	Talc-Schist	0.56	1.07	2.42	0.97	0.59	0.81	1.76	0.12	24.26	0.46	1.19	0.39	1.00	0.85	0.00	0.29	0.15	0.50	0.21	0.15	0.00	1.04	0.00	0.62	0.00	0.79	0.47	0.00
8538-5a3.D	Mount Laguna Type 2	Talc-Schist	0.37	2.33	0.42	1.04	0.43	0.39	0.70	0.00	12.96	0.07	0.07	0.09	0.00	0.00	0.00	0.00	0.24	0.42	0.03	0.00	0.03	0.00	0.00	0.11	0.24	0.00	0.00	0.10
8538-5a4.D	Mount Laguna Type 2	Talc-Schist	0.72	4.21	0.72	0.00	0.57	3.36	1.61	0.27	52.65	0.53	2.82	0.00	0.63	0.00	0.00	0.69	0.07	0.00	0.04	0.00	0.00	0.61	0.00	0.00	0.12	1.13	0.75	0.06
8538-5b2.D	Mount Laguna Type 2	Talc-Schist	1.74	4.09	1.03	0.31	22.08	31.92	0.49	0.21	75.83	0.44	0.58	0.26	0.00	0.00	0.60	0.00	0.19	0.00	0.10	0.00	0.05	0.00	0.00	0.00	0.77	0.00	0.45	0.00
8538-5b3.D	Mount Laguna Type 2	Talc-Schist	2.77	11.75	1.30	2.56	1.63	0.58	1.54	0.06	77.99	0.23	1.04	0.22	0.46	0.00	0.00	0.52	0.09	0.61	0.15	0.00	0.21	0.31	0.21	0.00	0.39	1.97	0.49	0.27
8538-5b4.D	Mount Laguna Type 2	Talc-Schist	1.98	5.89	0.41	0.00	0.48	4.22	0.80	0.65	80.06	0.00	0.91	0.16	0.00	0.00	0.43	0.00	0.00	0.75	0.66	0.00	0.00	0.61	0.04	0.00	0.00	3.83	0.17	0.42
8538-6a2.D	Mount Laguna Type 2	Talc-Schist	1.73	0.62	0.34	0.39	0.00	0.54	1.52	0.00	2.25	0.26	0.33	0.09	0.00	0.62	0.11	2.13	0.00	0.37	0.00	0.00	0.06	0.00	0.00	0.56	0.00	0.19	0.00	0.00
8538-6a3.D	Mount Laguna Type 2	Talc-Schist	0.00	1.30	0.24	0.46	0.00	1.03	0.78	0.00	2.72	0.00	0.22	0.28	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.11	0.00	0.00	0.46
8538-6a4.D	Mount Laguna Type 2	Talc-Schist	1.19	0.22	0.00	0.00	0.11	1.13	0.00	0.38	3.73	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00	0.00	0.30	0.00	0.00	1.13	0.00	0.13	0.00	0.25	0.58	0.33
8538-6b2.D	Mount Laguna Type 2	Talc-Schist	0.54	0.75	0.05	0.00	0.00	0.78	1.55	0.15	0.81	0.03	0.00	0.00	0.31	0.00	0.22	0.00	0.00	0.00	0.00	0.38	0.13	0.00	0.00	0.77	0.00	0.00	0.19	0.00
8538-6b3.D	Mount Laguna Type 2	Talc-Schist	42.43	0.17	0.14	0.27	0.06	0.00	93.75	0.00	2.77	0.42	0.08	0.33	0.00	0.00	0.00	0.26	0.13	0.00	0.00	0.00	0.31	0.00	0.00	0.14	0.00	0.00	0.00	0.13
8538-6b4.D	Mount Laguna Type 2	Talc-Schist	0.70	0.00	1.33	0.00	0.00	0.94	0.00	0.00	1.84	0.29	0.39	0.30	1.36	0.00	0.75	0.00	0.29	0.58	0.15	0.00	0.00	1.32	0.00	0.46	0.05	0.29	0.08	0.00
8538-7a2.D	Mount Laguna Type 2	Talc-Schist	1.64	1.23	0.45	0.00	0.00	0.79	0.00	0.00	12.26	0.09	0.29	0.15	1.57	0.64	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	1.78	0.00	0.00
8538-7a3.D	Mount Laguna Type 2	Talc-Schist	0.00	0.76	0.49	0.24	0.06	0.15	0.00	0.00	11.93	0.23	0.54	0.10	0.00	0.56	0.07	0.00	0.35	0.81	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.44	0.18	0.00
8538-7a4.D	Mount Laguna Type 2	Talc-Schist	0.00	0.51	3.25	0.00	0.00	0.69	0.00	0.00	20.02	0.00	0.00	0.26	0.00	0.00	0.69	0.00	0.36	1.19	0.18	0.00	0.00	0.97	0.00	0.94	0.19	3.22	0.64	0.86
8538-7b2.D	Mount Laguna Type 2	Talc-Schist	0.79	2.13	1.52	0.30	0.45	0.49	0.00	0.13	18.03	0.00	0.00	0.14	2.74	0.31	0.33	1.07	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.28	8.35	0.43	0.07
8538-7b3.D	Mount Laguna Type 2	Talc-Schist	0.00	0.70	0.00	0.18	0.09	0.00	1.33	0.00	14.86	0.00	0.00	0.00	2.27	1.59	0.48	1.11	0.00	1.54	0.00	0.38	0.00	2.96	0.07	0.38	0.00	7.84	0.00	0.00
8538-7b4.D	Mount Laguna Type 2	Talc-Schist	0.00	0.00	0.15	0.00	0.14	3.58	4.07	0.06	12.58	0.33	0.99	0.14	2.72	0.00	1.25	1.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.08	0.26
8538-8a2.D	Mount Laguna Type 2	Talc-Schist	0.21	1.98	2.14	0.56	0.68	2.79	72.25	0.00	50.87	0.19	2.00	0.27	2.01	0.00	0.51	2.36	0.06	0.12	0.00	0.18	0.06	0.30	0.00	0.00	0.17	0.90	0.00	1.63
8538-8a3.D	Mount Laguna Type 2	Talc-Schist	0.00	2.95	1.28	0.59	0.51	2.16	100.76	0.00	102.15	0.45	2.61	0.07	1.07	0.00	0.00	0.24	0.24	1.36	0.00	0.00	0.17	0.00	0.54	1.79	0.00	2.03	0.56	1.27
8538-8a4.D	Mount Laguna Type 2	Talc-Schist	3.62	3.73	1.31	0.00	1.57	46.66	98.81	1.09	104.59	0.83	1.39	1.17	0.58	0.62	0.40	0.00	0.27	0.96	0.11	0.00	0.00	0.00	0.12	0.97	0.00	1771.76	0.37	3.14
8538-8b2.D	Mount Laguna Type 2	Talc-Schist	0.72	1.51	1.70	0.34	0.11	0.85	6.06	0.08	52.32	0.13	0.29	0.00	1.57	0.71	0.00	0.61	0.00	0.00	0.44	0.64	0.22	0.27	0.00	1.30	0.00	0.00	0.41	0.04
8538-8b3.D	Mount Laguna Type 2	Talc-Schist	1.73	1.10	0.63	0.28	0.76	0.13	1.74	0.00	43.59	0.23	0.36	0.11	0.51	0.00	0.00	0.00	0.13	0.00	0.00	0.59	0.13	0.17	0.35	0.60	0.07	1.25	0.25	0.40
8538-8b4.D	Mount Laguna Type 2	Talc-Schist	0.40	0.36	1.14	0.00	0.53	1.13	1.34	0.00	14.02	0.42	0.25	0.11	1.63	0.00	0.96	0.26	0.08	0.83	0.21	0.00	0.12	1.59	0.00	0.00	0.00	0.00	0.71	0.00
8538-25a2.D	Mount Laguna Type 2	Talc-Schist	0.20	1.48	1.18	0.00	0.88	1.28	2.21	0.00	35.24	0.61	0.60	0.21	0.55	0.00	0.20	1.93	0.00	0.55	0.06	0.50	0.06	0.57	0.00	0.17	0.11	0.86	0.26	0.00
8538-25a3.D	Mount Laguna Type 2	Talc-Schist	0.00	7.51	2.39	2.42	0.34	0.55	4.09	0.00	78.35	1.07	1.24	0.65	1.86	1.30	0.11	2.77	0.64	3.16	0.00	1.16	0.00	0.00	0.29	0.51	0.00	6.76	0.21	1.18
8538-25a4.D	Mount Laguna Type 2	Talc-Schist	1.10	7.28	2.15	0.68	0.66	0.38	1.40	0.03	95.28	0.39	0.73	0.26	2.74	0.00	0.75	0.00	0.26	0.00	0.00	0.20	0.00	0.00	0.20	0.00	0.00	8.05	0.76	0.68
8538-25b2.D	Mount Laguna Type 2	Talc-Schist	0.00	2.09	2.78	0.37	12.60	0.31	2.02	0.00	48.35	0.58	0.69	0.27	1.72	0.97	0.00	1.01	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.36	0.98	0.00	0.00	0.46
8538-25b3.D	Mount Laguna Type 2	Talc-Schist	0.00	3.07	2.16	0.91	0.05	0.14	2.27	0.00	286.94	0.96	0.68	0.18	0.92	1.17	0.00	0.21	0.07	1.17	0.00	0.22	0.36	0.00	0.13	0.22	0.00	1.75	0.16	1.10
8538-25b4.D	Mount Laguna Type 2	Talc-Schist	0.61	1.97	2.07	0.00	0.32	1.48	2.26	0.30	43.35	0.34	0.86	0.26	1.18	0.15	1.13	0.78	0.59	0.17	0.13	0.00	0.00	1.61	0.00	0.00	0.00	0.00	0.46	0.00
8538-26a2.D	Mount Laguna Type 2	Talc-Schist	0.00	1.30	0.45	0.27	0.12	0.30	0.00	0.08	6.16	0.15	0.00	0.06	0.21	0.00	0.22	0.00	0.08	0.80	0.00	0.61	0.33	0.21	0.24	0.00	0.08	0.00	0.00	0.81
8538-26a3.D	Mount Laguna Type 2	Talc-Schist	0.00	0.37	0.00	0.00	0.07	0.00	2.64	0.00	7.47	0.00	0.35	0.00	1.29	0.00	0.58	0.29	0.48	2.04	0.00	0.30	0.00	0.00	0.18	1.23	0.00	0.00	0.00	0.31
8538-26a4.D	Mount Laguna Type 2	Talc-Schist	1.63	0.00	0.00	0.00	0.18	0.00	1.71	0.14	10.28	0.09	0.19	0.24	2.74	0.00	0.36	1.12	0.00	0.00	0.24	0.00	0.41	0.00	0.32	0.00	0.00	0.00	0.35	0.14
8538-26b2.D	Mount Laguna Type 2	Talc-Schist	0.00	2.49	0.36	0.51	0.00	0.00	0.00	0.00	20.31	0.29	0.21	0.00	2.79	0.52	0.41	0.00	0.00	0.00	0.00	1.17	0.00	0.40	0.00	0.00	0.31	0.00	0.00	0.00
8538-26b3.D	Mount Laguna Type 2	Talc-Schist	0.88	0.62	0.00	0.23	0.34	0.00	0.00	0.00	9.43	0.91	0.42	0.56	0.43	0.00	0.32	4.43	0.32	4.78	1.46	0.00	0.00	0.00	0.29	1.03	0.00	1.36	0.38	0.00
8538-26b4.D	Mount Laguna Type 2	Talc-Schist	0.00	1.21	0.00	0.00	0.00	1.79	1.97	0.00	291.92	0.00	0.00	0.51	1.21	0.00	0.00	0.00	0.07	2.17	0.00	0.65	0.07	0.00	0.00	1.14	0.37	0.00	0.34	0.00
8538-27a2.D	Mount Laguna Type 2	Talc-Schist	0.84	1.43	1.74	0.00	0.00	1.62	19.74	0.00	11.44	1.24	0.78	0.41	0.23	0.00	0.24	0.00	0.17	0.00	0.00	0.40	0.00	0.23	0.15	0.00	0.00	0.00	0.00	0.00
8538-27a3.D	Mount Laguna Type 2	Talc-Schist	1.06	3.29	1.94	0.57	1.04	0.00	48.79	0.00	25.38	1.39	3.55	0.40	1.45	0.15	0.62	2.13	0.08	2.29	0.00	0.00	0.16	0.00	0.05	1.72	0.00	1.96	0.90	0.25
8538-27a4.D	Mount Laguna Type 2	Talc-Schist	0.23	0.25	1.27	0.72	0.30	0.00	37.42	0.00	21.35	1.41	1.56	0.08	2.22	0.00	0.53	2.22	0.00	0.57	0.14	0.67	0.05	0.48	0.11	0.00	0.32	4.60	0.49	0.43
8538-27b2.D	Mount Laguna Type 2	Talc-Schist	0.21	2.84	0.93	1.48	0.39	1.33	81.36	0.00	29.76	1.69	1.55	0.57	1.17	0.91	0.00	0.00	0.00	1.98	0.00	0.96	0.00	0.23	0.05	0.00	0.00	0.00	0.69	0.00
8538-27b3.D	Mount Laguna Type 2	Talc-Schist	0.23	3.35	1.57	0.12	0.64	0.00	95.67	0.09	25.69	2.50	2.51	0.64	1.99	0.16	0.33	0.00	0.00	1.40	0.00	0.26	0.00	0.00	0.25	0.26	0.00	0.23	0.00	0.26
8538-27b4.D	Mount Laguna Type 2	Talc-Schist	0.51	1.36	4.32	0.00	0.46	1.20	67.49	0.00	20.34	2.36	2.92	1.04	4.59	0.00	1.17	0.00	0.15	0.63	0.36	0.00	0.00	0.00	0.12	0.00	0.35	0.00	0.38	0.31
8538-28a2.D	Mount Laguna Type 2	Talc-Schist	0.84	1.06	0.98	0.97	0.68	0.65	0.00	0.00	17.03	0.11	0.08	0.14	0.15	0.20	0.00	0.00	0.12	0.59	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00
8538-28a3.D	Mount Laguna Type 2	Talc-Schist	1.34	1.08	0.27	0.92	0.35	0.00	0.00	0.00	13.48	0.11	0.62	0.00	0.56	0.00	0.00	2.36	0.21	0.59	0.00	0.00	0.00	0.19	0.21	0.45	0.07	0.99	0.16	0.45
8538-28a4.D	Mount Laguna Type 2	Talc-Schist	0.53	0.45	0.29	0.00	0.00	0.28	0.56	0.00	7.85	0.00	0.21	0.30	0.00	0.00	0.27	0.00	0.03	1.02	0.00	0.00	0.24	0.00	0.25	0.00	0.32	1.65	0.48	0.11
8538-28b2.D	Mount Laguna Type 2	Talc-Schist	0.00	0.00	0.52	0.59	0.00	0.66	1.83	0.00	6.19	0.17	0.08	0.09	0.47	0.40	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.18	0.17

Table 13b. Calibrated LA-ICP-MS data for Mount Laguna Talc schist Type 2 in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
8538-28b3.D	Mount Laguna Type 2	Talc-Schist	0.17	1.04	0.14	1.09	0.00	0.00	2.18	0.00	11.99	0.24	0.34	0.08	0.00	1.44	0.33	0.00	0.00	0.56	0.21	0.00	0.10	0.00	0.12	1.22	0.30	1.38	0.15	0.00
8538-28b4.D	Mount Laguna Type 2	Talc-Schist	1.46	0.85	0.10	0.00	0.14	0.00	0.95	0.00	20.77	0.00	0.44	0.19	2.53	0.00	0.42	0.00	0.00	0.00	0.56	0.53	0.32	0.00	0.17	0.11	0.11	0.00	0.49	0.00
8538-29a2.D	Mount Laguna Type 2	Talc-Schist	0.00	1.07	0.68	0.00	0.00	0.49	0.00	0.06	7.98	0.00	0.34	0.15	0.00	0.88	0.29	0.00	0.20	0.00	0.00	0.10	0.00	0.00	0.00	0.20	0.07	0.00	0.00	0.00
8538-29a3.D	Mount Laguna Type 2	Talc-Schist	0.66	1.48	0.00	0.35	0.09	0.13	4.57	0.03	5.86	0.29	0.00	0.19	0.00	0.00	0.32	0.00	0.03	1.34	0.00	0.00	0.55	0.00	0.00	0.59	0.00	0.44	0.15	0.00
8538-29a4.D	Mount Laguna Type 2	Talc-Schist	2.85	1.39	0.34	0.00	0.59	0.97	3.20	0.38	21.29	0.08	0.49	0.42	1.96	0.00	0.16	0.00	0.00	0.84	0.04	0.59	0.12	0.00	0.09	0.00	0.36	0.00	0.43	0.00
8538-29b2.D	Mount Laguna Type 2	Talc-Schist	0.00	1.17	0.00	0.61	0.61	0.00	4.10	0.00	23.92	0.50	0.23	0.16	0.80	0.54	0.00	0.23	0.00	1.25	0.00	0.44	0.04	0.40	0.13	0.23	0.19	0.00	0.17	0.29
8538-29b3.D	Mount Laguna Type 2	Talc-Schist	0.70	1.08	2.30	1.69	0.30	0.00	5.58	0.14	10.03	0.19	1.20	0.24	0.25	0.00	0.00	2.24	0.41	2.87	0.14	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.21	0.00
8538-30a.D	Mount Laguna Type 2	Talc-Schist	0.00	0.28	0.00	0.33	0.14	0.73	0.00	0.00	3.87	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.99	0.00	1.67	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
8538-30a2.D	Mount Laguna Type 2	Talc-Schist	0.27	0.48	0.00	0.29	0.85	0.00	0.00	0.17	4.79	0.00	0.21	0.00	0.00	0.00	0.31	0.00	0.00	0.44	0.22	0.31	0.05	0.00	0.00	0.32	0.16	0.00	0.73	0.00
8538-30a3.D	Mount Laguna Type 2	Talc-Schist	0.00	0.48	0.00	0.00	0.00	0.00	1.96	0.00	2.36	0.00	0.32	0.64	2.00	0.00	0.00	1.29	0.16	0.66	0.00	0.00	0.16	0.00	0.00	0.16	0.05	0.00	0.56	0.17
8538-30b.D	Mount Laguna Type 2	Talc-Schist	0.00	0.63	1.56	0.93	0.55	1.39	0.48	0.18	6.81	0.09	0.66	0.81	1.71	0.32	0.25	0.56	0.19	0.00	0.00	0.00	0.29	0.00	0.39	0.86	0.00	0.00	0.00	0.00
8538-30b2.D	Mount Laguna Type 2	Talc-Schist	1.74	1.35	1.32	0.53	0.13	0.20	2.66	0.26	3.28	0.15	0.20	0.00	0.00	1.06	0.00	0.00	0.05	2.03	0.20	1.13	0.24	0.00	0.00	0.30	0.00	4.70	0.08	0.00
8538-30b3.D	Mount Laguna Type 2	Talc-Schist	1.23	2.90	3.11	4.86	6.38	0.00	99.78	0.45	40.27	2.19	3.52	1.01	0.00	0.00	0.38	1.18	0.24	0.20	0.35	0.00	0.24	0.00	0.00	0.74	0.63	34.26	2.58	2.87
8538-31a.D	Mount Laguna Type 2	Talc-Schist	0.00	0.61	0.00	1.71	0.17	0.00	0.82	0.08	3.22	0.15	0.46	0.37	0.00	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.12	0.00	0.42	0.00
8538-31a2.D	Mount Laguna Type 2	Talc-Schist	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.41	0.37	0.16	0.00	0.00	0.29	0.40	0.00	0.12	1.68	0.42	0.00	0.00	0.00	0.00	0.99	0.00	0.56	0.31	0.00
8538-31b.D	Mount Laguna Type 2	Talc-Schist	0.00	0.86	1.11	0.00	0.68	0.88	9.64	0.00	7.70	0.37	0.00	0.08	0.17	0.00	0.00	0.00	0.00	0.93	0.00	0.59	0.10	0.33	0.00	0.00	0.10	3.20	0.24	0.49
8538-31b2.D	Mount Laguna Type 2	Talc-Schist	0.46	0.94	0.13	0.00	0.57	0.61	6.56	0.16	9.36	0.27	0.30	0.03	1.28	1.52	0.00	0.00	0.09	0.25	0.00	0.00	0.03	0.00	0.10	0.37	0.15	1.24	0.00	0.00
8538-32.D	Mount Laguna Type 2	Talc-Schist	2.90	2.67	0.21	1.02	0.70	0.64	7.18	0.00	25.99	0.06	0.19	0.64	0.00	0.00	0.00	0.58	0.17	0.68	0.00	0.41	0.30	0.00	0.16	0.00	0.23	0.00	0.25	0.61
8538-32B.D	Mount Laguna Type 2	Talc-Schist	1.34	1.63	0.33	0.54	0.00	23.38	10.40	0.00	39.97	0.43	0.20	0.00	0.00	0.00	0.45	0.00	0.00	3.83	0.20	0.19	0.03	0.00	0.11	0.20	0.00	0.00	0.86	0.35
8538-33.D	Mount Laguna Type 2	Talc-Schist	0.00	0.50	0.10	1.41	0.32	0.00	10.45	0.27	37.73	0.57	0.38	0.25	0.50	0.00	0.00	0.57	0.16	0.00	0.03	0.00	0.00	0.00	0.00	0.30	0.16	0.00	0.05	0.40
8538-33B.D	Mount Laguna Type 2	Talc-Schist	0.16	0.76	0.05	0.00	0.00	0.13	7.65	0.00	57.13	0.23	0.00	0.08	0.00	0.69	0.00	0.00	0.00	1.86	0.07	0.00	0.10	1.35	0.19	0.39	0.00	0.44	0.25	0.34
8538-34.D	Mount Laguna Type 2	Talc-Schist	0.00	1.88	1.06	0.69	0.26	0.00	12.82	0.00	20.04	0.22	0.00	0.16	0.19	0.00	0.00	0.00	0.04	0.46	0.04	0.00	0.04	0.00	0.09	0.00	0.00	0.00	0.74	0.34
8538-34B.D	Mount Laguna Type 2	Talc-Schist	0.52	0.31	0.00	0.18	0.45	0.00	9.92	0.25	25.48	0.03	0.00	0.25	0.00	0.97	0.20	0.62	0.03	0.00	0.00	0.00	0.17	0.00	0.00	0.21	0.10	0.00	0.00	0.00

Table 14a. Calibrated LA-ICP-MS data for Known Unknowns in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
UNK-1A.D	Sierra Pelona Type 13	Serpentine	0.00	212794.89	103454.86	166259.84	0.00	126.76	10.47	155.82	54.62	71.44	458.92	65322.37	128.28	71.17	1.81	115.19	3.93
UNK-1B.D	Sierra Pelona Type 13	Serpentine	88.79	215354.21	112917.23	156022.16	167.13	93.94	5.68	85.46	57.47	67.37	518.58	65387.20	98.54	70.68	1.72	103.61	0.00
UNK-1C.D	Sierra Pelona Type 13	Serpentine	2321.41	213915.45	105668.80	163092.86	381.53	357.93	12.54	66.09	48.85	87.39	433.46	63543.33	139.77	61.78	0.00	134.45	0.00
UNK-2A.D	Sierra Pelona Type 13	Serpentine	0.00	214189.05	105488.04	166116.24	0.00	0.00	8.90	55.62	58.03	62.94	488.88	61694.48	224.00	67.20	0.00	132.51	0.00
UNK-2B.D	Sierra Pelona Type 13	Serpentine	0.00	216597.03	111657.58	155658.06	150.79	342.99	5.28	81.04	60.09	43.95	524.06	65902.35	236.53	47.08	11.08	111.33	5.78
UNK-3A.D	Sierra Pelona Type 3	Serpentine	0.00	206654.91	114542.19	159844.29	0.00	0.00	10.27	110.70	50.07	78.96	705.28	67630.60	141.56	49.59	0.89	146.64	7.70
UNK-3B.D	Sierra Pelona Type 3	Serpentine	284.40	208551.62	128470.52	142703.43	38.64	0.00	7.79	705.19	49.29	77.87	794.48	71612.13	100.75	52.05	2.53	180.30	7.04
UNK-4A.D	Sierra Pelona Type 3	Serpentine	0.00	219203.08	106278.55	157782.00	0.00	0.00	13.75	28.00	32.64	71.49	444.96	67037.56	515.27	90.47	0.94	142.93	16.36
UNK-4B.D	Sierra Pelona Type 3	Serpentine	0.00	208943.62	108114.67	163690.55	209.00	204.33	5.62	174.05	46.14	46.41	436.03	67175.11	588.93	65.56	10.20	135.54	0.00
UNK-5A.D	Sierra Pelona Type 16	Talc-schist	0.00	189560.30	3296.91	292529.52	0.00	221.24	4.29	0.00	17.19	660.13	150.74	34383.43	1669.36	63.72	1.89	174.49	2.05
UNK-5B.D	Sierra Pelona Type 16	Talc-schist	0.00	187547.79	2376.62	296716.48	20.25	109.24	0.00	0.00	6.28	564.67	145.03	31964.60	1601.02	62.54	4.38	150.01	0.94
UNK-6A.D	Sierra Pelona Type 16	Talc-schist	0.00	181756.39	7386.53	286012.44	0.00	771.14	10.26	0.00	31.72	1515.76	184.51	46345.57	1586.18	72.19	16.48	176.28	6.32
UNK-6B.D	Sierra Pelona Type 16	Talc-schist	0.00	180914.17	2080.74	299196.13	54.18	481.96	2.09	54.92	1.04	246.09	148.37	36159.80	1632.17	55.96	9.60	158.64	0.00
UNK-7A.D	Sierra Pelona Type 17	Talc-schist	0.00	194696.93	24020.20	258924.09	0.00	859.85	7.87	0.00	43.43	808.12	292.26	50555.61	1351.85	72.41	3.68	177.05	2.00
UNK-7B.D	Sierra Pelona Type 17	Talc-schist	4452.66	182860.42	20248.04	267919.29	477.81	780.28	8.96	275.16	46.45	638.62	277.44	51461.44	1124.63	56.64	6.06	149.09	7.02
UNK-8A.D	Sierra Pelona Type 17	Talc-schist	0.00	194286.80	10597.51	281535.63	0.00	286.44	18.13	0.00	18.97	2197.21	211.45	33448.02	2288.49	81.10	0.00	159.89	0.00
UNK-8B.D	Sierra Pelona Type 17	Talc-schist	6196.58	188472.88	1615.37	292816.10	237.08	221.53	5.61	27.68	5.37	520.98	166.64	31091.33	2153.68	73.59	1.90	137.92	6.59
UNK-9A.D	Sierra Pelona Type 1	Chlorite Schist	0.00	155346.59	113889.09	145212.52	0.00	12608.01	23.58	14045.54	372.15	283.97	1147.44	119871.34	152.07	58.36	29.00	218.13	7.16
UNK-9B.D	Sierra Pelona Type 1	Chlorite Schist	2591.03	134732.68	103506.23	141475.45	218.52	30952.04	22.11	36144.36	370.56	230.37	1048.09	116546.30	135.90	52.90	32.90	129.98	16.03
UNK-10A.D	Sierra Pelona Type 1	Chlorite Schist	0.00	135898.01	107627.59	145706.73	0.00	18794.86	25.93	24839.58	397.49	283.22	1031.94	130997.35	190.52	77.65	8.17	175.04	1.77
UNK-10B.D	Sierra Pelona Type 1	Chlorite Schist	2700.47	135183.47	104846.32	139275.01	126.50	23691.43	38.04	28482.95	380.33	256.57	1016.77	133642.22	172.27	72.56	7.08	172.84	0.00
UNK-11A.D	Mount Laguna Type 1	Talc-schist	0.00	195099.72	1898.03	297583.84	0.00	0.00	5.98	67.08	11.55	639.17	325.01	22460.86	1423.35	71.15	0.46	144.27	15.48
UNK-11B.D	Mount Laguna Type 1	Talc-schist	3170.84	189912.01	7528.87	291079.76	239.33	222.36	4.22	64.82	10.54	1284.55	269.27	26783.90	1408.57	71.05	0.00	155.22	2.21
UNK-12A.D	Mount Laguna Type 1	Talc-schist	0.00	190121.85	10536.04	284503.26	0.00	0.00	9.69	353.68	9.34	647.59	552.79	35204.38	1844.50	75.98	0.00	334.78	20.53
UNK-12B.D	Mount Laguna Type 1	Talc-schist	861.55	185403.56	57563.39	230589.69	927.41	1549.22	0.00	516.17	58.40	2074.52	658.33	54504.72	1567.83	85.58	35.54	333.18	17.40
UNK-13A.D	Mount Laguna Type 2	Talc-schist	34600.72	172672.36	2566.95	279968.32	0.00	636.71	3.63	221.68	9.90	562.73	949.77	40300.91	1067.60	44.73	10.11	169.16	4.03
UNK-13B.D	Mount Laguna Type 2	Talc-schist	2099.55	174009.07	2857.13	299740.92	0.00	190.62	5.23	160.49	5.51	670.68	796.20	39996.38	992.02	50.68	18.38	181.74	2.73
UNK-14A.D	Mount Laguna Type 2	Talc-schist	0.00	197928.81	3024.52	286076.10	192.43	522.07	4.17	162.23	13.45	782.97	201.70	33619.11	1747.18	80.58	9.04	301.21	61.29
UNK-14B.D	Mount Laguna Type 2	Talc-schist	763.52	186735.89	3304.91	292651.76	0.00	452.77	0.00	38.71	19.90	709.88	291.16	36295.91	1499.01	76.06	1.59	254.24	58.34
UNK-15A.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	198938.86	63193.76	203858.07	0.00	2280.89	11.40	532.65	338.08	2661.03	662.25	70791.98	1921.77	72.83	494.73	173.48	0.00
UNK-15B.D	Jacumba Red	Anthophyllite talc chlorite schist	579.74	194974.78	64112.53	209764.21	172.70	4110.95	8.95	570.30	341.97	2838.87	1524.00	61539.97	1718.85	154.11	566.95	243.45	0.00
UNK-16A.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	203582.92	47704.98	223418.04	0.00	2779.42	25.91	1350.32	362.32	7982.21	639.89	50958.44	850.33	109.76	113.71	122.90	0.00
UNK-16B.D	Jacumba Red	Anthophyllite talc chlorite schist	742.56	185735.72	30272.04	248315.48	436.37	3069.10	19.54	2243.92	281.87	5781.10	997.50	57200.23	598.86	148.88	126.15	170.79	0.00
UNK-17A.D	Cuyamaca Type 1	Talc-schist	0.00	194645.70	2297.26	287154.14	0.00	350.77	8.00	162.83	8.35	474.66	650.27	38119.23	701.15	51.83	0.00	126.54	14.80
UNK-17B.D	Cuyamaca Type 1	Talc-schist	1013.92	192109.57	5596.07	289872.69	279.83	573.21	1.83	194.32	24.32	871.96	123.55	30438.45	746.43	54.91	2.39	129.40	646.61
UNK-18A.D	Cuyamaca Type 1	Talc-schist	0.00	190965.06	6226.21	295514.62	6.16	0.00	3.27	42.42	8.49	806.63	94.76	25145.33	1006.11	45.08	0.42	138.27	0.00
UNK-18B.D	Cuyamaca Type 1	Talc-schist	95.17	187121.03	3920.32	291886.48	238.93	225.69	5.77	97.16	6.52	503.06	537.77	37595.71	704.86	53.52	0.00	163.30	4.45
UNK-19A.D	Cuyamaca Type 2	Talc-schist	0.00	192004.65	13889.86	269786.56	13.12	238.18	4.27	95.47	34.29	1898.79	646.34	50505.21	613.53	37.23	2.22	284.61	23.12
UNK-19B.D	Cuyamaca Type 2	Talc-schist	1833.77	171359.57	17036.08	262301.90	102.11	783.20	8.01	96.77	44.26	2280.21	1683.34	77938.18	402.70	46.78	5.30	192.96	28.20
UNK-20A.D	Cuyamaca Type 2	Talc-schist	0.00	188751.42	2793.83	293203.42	0.00	887.94	4.34	243.58	7.84	734.71	429.54	34658.46	560.90	14.64	3.87	243.85	0.00
UNK-20B.D	Cuyamaca Type 2	Talc-schist	1502.37	176227.35	2135.93	281304.73	298.49	1335.13	4.17	124.56	3.21	435.69	1779.31	64970.36	417.73	23.33	0.00	192.97	18.42
UNK-21A.D	SCICS	SCIS	23423.05	40367.00	94865.41	238321.23	27533.68	37112.20	36.28	8388.47	284.48	21.42	1018.83	73731.91	13.40	23.52	30.59	310.24	0.00
UNK-21B.D	SCICS	SCIS	28089.81	42696.93	88401.86	247567.52	20529.41	32372.88	36.85	8370.86	259.35	26.97	1002.38	73050.87	19.25	26.21	21.59	300.12	0.00
UNK-22A.D	SCICS	SCIS	11952.81	28669.67	86679.24	233920.85	584.37	77141.17	37.57	10021.27	465.19	2.57	1749.98	99085.77	0.00	22.80	44.93	141.51	7.66
UNK-22B.D	SCICS	SCIS	8451.54	37956.25	75254.96	172378.28	464.30	144347.61	53.37	10624.86	515.91	1.51	1805.62	132203.74	1.62	26.85	29.53	181.37	14.22
UNK-23A.D	Sierra Pelona Type 5	Talc-schist	0.00	190626.14	9686.60	282729.17	0.00	61.87	13.69	115.80	38.15	2133.24	195.71	37693.30	1717.15	63.01	104.65	142.93	0.00

Table 14a. Calibrated LA-ICP-MS data for Known Unknowns in ppm (Na through As)

anid	Classification	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
UNK-23B.D	Sierra Pelona Type 5	Talc-schist	4328.21	184404.13	558.78	299023.43	938.28	275.10	0.00	106.54	0.00	170.92	139.82	29941.01	1492.20	46.17	0.00	132.14	0.00
UNK-24A.D	Sierra Pelona Type 5	Talc-schist	0.00	191688.06	9756.08	279172.74	0.00	301.90	6.90	80.86	29.56	2894.69	214.18	40055.96	2508.56	65.86	13.82	175.58	13.46
UNK-24B.D	Sierra Pelona Type 5	Talc-schist	1488.91	189985.05	26996.40	253763.76	328.83	105.96	15.53	0.00	85.70	7889.34	305.34	50861.46	2197.21	81.31	17.27	200.15	0.00
UNK-24C.D	Sierra Pelona Type 5	Talc-schist	737.71	192477.02	29348.56	246821.76	322.96	207.22	15.80	22.08	82.08	8881.78	312.13	54518.95	2539.31	99.77	16.81	172.79	7.60
UNK-24D.D	Sierra Pelona Type 5	Talc-schist	832.53	191657.84	15370.39	268664.12	361.83	321.88	17.09	41.16	41.85	4530.35	218.54	45816.27	2294.48	81.73	0.43	176.52	5.91
UNK-25A.D	Sierra Pelona Type 16	Talc-schist	0.00	180762.24	32413.51	244580.66	277.05	1748.55	19.26	24.13	98.24	5503.19	452.90	70743.92	1385.06	67.87	120.44	140.14	56.85
UNK-25B.D	Sierra Pelona Type 16	Talc-schist	0.00	184129.64	29155.56	243075.05	0.00	1027.85	21.22	11.96	136.53	6561.29	447.37	73390.11	1230.35	90.79	126.87	189.56	65.17
UNK-26A.D	Sierra Pelona Type 16	Talc-schist	0.00	183036.41	9294.40	281259.85	0.00	227.12	1.06	32.76	31.89	1897.40	253.38	49656.34	1428.01	56.75	57.55	131.65	5.00
UNK-26B.D	Sierra Pelona Type 16	Talc-schist	0.00	179288.49	9502.80	282154.06	264.23	400.76	5.53	25.61	34.33	1763.94	234.36	52191.12	1311.06	56.97	79.19	166.45	15.76

Table 14b. Calibrated LA-ICP-MS data for Known Unknowns in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
UNK-1A.D	Sierra Pelona Type 13	Serpentine	0.69	2.58	1.64	5.89	0.00	0.00	0.00	0.00	1.56	59.58	103.06	9.15	32.51	1.63	0.00	8.97	0.00	0.00	0.21	0.00	0.16	1.93	0.77	0.00	0.28	8.71	188.85	2.15
UNK-1B.D	Sierra Pelona Type 13	Serpentine	1.57	1.89	0.98	2.66	0.12	0.00	0.00	0.58	0.19	0.20	0.40	0.00	1.89	0.00	0.00	1.64	0.30	0.00	0.00	1.51	0.00	0.00	0.43	0.00	0.14	0.00	2.41	0.00
UNK-1C.D	Sierra Pelona Type 13	Serpentine	0.39	2.16	0.00	6.77	0.46	0.17	0.00	0.67	1.56	0.40	0.68	0.00	0.00	0.00	0.00	1.34	0.00	0.23	0.12	0.00	0.55	0.00	0.14	0.00	0.00	0.00	1.31	0.00
UNK-2A.D	Sierra Pelona Type 13	Serpentine	1.58	1.04	0.59	2.80	0.00	0.00	0.00	0.16	1.12	0.00	0.00	0.30	1.86	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	3.49	0.30	0.19	0.00	4.79	0.48	0.49
UNK-2B.D	Sierra Pelona Type 13	Serpentine	0.56	1.34	0.55	1.33	0.00	0.00	0.00	0.18	2.42	0.13	0.00	0.40	1.58	0.32	0.00	2.35	0.14	0.00	0.00	1.33	0.00	1.83	0.00	0.00	0.45	7.80	2.40	0.09
UNK-3A.D	Sierra Pelona Type 3	Serpentine	0.00	0.29	0.00	0.80	0.00	0.00	0.00	0.00	0.38	0.00	9.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.16	0.00	0.81	0.51	0.00	0.00	2.60	0.62	0.63
UNK-3B.D	Sierra Pelona Type 3	Serpentine	1.68	1.22	0.14	1.04	2.22	0.00	0.37	0.25	0.74	0.00	0.08	0.00	1.03	0.57	0.00	1.07	0.04	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.32	0.00	0.00	0.00
UNK-4A.D	Sierra Pelona Type 3	Serpentine	1.96	2.06	0.21	66.23	0.00	0.00	0.00	0.00	2.43	0.23	0.09	0.00	0.00	0.00	0.00	3.91	0.00	0.00	1.11	0.00	0.00	0.86	0.54	2.28	0.00	1.18	2.19	0.22
UNK-4B.D	Sierra Pelona Type 3	Serpentine	0.81	2.94	0.14	2.28	0.00	0.42	0.00	0.33	3.90	0.00	0.08	0.00	0.00	1.16	0.15	0.00	0.00	0.35	0.09	0.14	0.59	0.24	0.00	0.00	0.41	0.34	0.34	0.60
UNK-5A.D	Sierra Pelona Type 16	Talc-schist	0.54	0.57	0.11	0.00	0.00	0.00	0.00	0.05	2.65	0.42	0.00	0.00	1.69	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.87	0.81	0.00	0.06	3.57	0.00	1.12
UNK-5B.D	Sierra Pelona Type 16	Talc-schist	0.27	0.00	0.00	0.00	0.15	0.00	1.77	0.00	0.00	0.00	0.00	0.40	0.00	0.73	0.00	3.78	0.05	0.00	0.23	0.00	0.00	0.00	0.00	1.11	0.46	0.00	0.11	0.00
UNK-6A.D	Sierra Pelona Type 16	Talc-schist	1.29	1.48	0.33	0.00	0.00	0.00	0.00	0.00	2.71	0.91	0.19	0.00	2.72	0.00	0.00	2.17	0.00	0.00	0.00	0.00	0.75	0.00	0.55	0.00	0.18	7.73	0.00	0.23
UNK-6B.D	Sierra Pelona Type 16	Talc-schist	0.00	0.62	0.00	0.00	0.29	3.14	4.11	0.00	2.07	0.00	0.00	0.47	0.00	0.00	0.32	0.73	0.06	0.00	0.00	0.00	0.13	1.37	0.00	2.15	0.80	1.91	0.12	0.36
UNK-7A.D	Sierra Pelona Type 17	Talc-schist	0.17	3.85	1.15	93.84	0.00	0.31	0.00	0.00	8.11	0.05	0.00	0.00	0.00	0.00	0.00	2.06	0.00	0.00	0.00	0.51	0.00	3.08	0.13	1.20	0.00	5.01	1.71	1.31
UNK-7B.D	Sierra Pelona Type 17	Talc-schist	0.67	3.52	0.00	3.82	0.00	0.84	0.00	0.04	5.37	0.04	0.00	0.07	2.46	0.31	0.00	1.57	0.30	0.00	0.29	1.37	0.00	1.47	0.00	1.54	0.00	0.00	0.96	0.00
UNK-8A.D	Sierra Pelona Type 17	Talc-schist	1.31	2.19	0.00	0.52	0.00	0.26	0.00	0.00	3.29	0.04	0.15	0.00	0.59	0.83	0.00	0.74	0.00	0.00	0.00	0.70	0.41	2.57	0.76	0.43	0.00	0.96	0.36	0.91
UNK-8B.D	Sierra Pelona Type 17	Talc-schist	0.35	0.62	0.39	0.00	0.28	1.05	3.45	0.04	2.78	0.00	0.00	0.00	1.15	0.00	0.79	0.98	0.00	0.00	0.73	0.77	0.00	0.00	0.00	1.45	0.36	0.00	0.08	0.00
UNK-9A.D	Sierra Pelona Type 1	Chlorite Schist	0.75	4.43	30.09	143.00	6.80	1.10	0.00	0.03	5.81	2.18	11.40	2.12	9.59	3.08	2.87	6.54	0.41	5.21	0.70	0.85	0.27	4.62	0.19	3.07	0.61	0.28	0.46	0.78
UNK-9B.D	Sierra Pelona Type 1	Chlorite Schist	0.43	9.06	74.81	433.34	16.86	3.70	1.21	0.17	7.92	5.31	28.43	5.52	36.40	12.05	3.71	15.94	2.08	13.65	3.12	10.12	0.30	5.65	0.57	14.97	1.26	6.74	0.94	1.20
UNK-10A.D	Sierra Pelona Type 1	Chlorite Schist	0.15	8.74	50.56	457.19	12.06	3.29	0.00	0.00	14.94	3.83	26.34	4.39	24.39	9.11	1.46	11.24	0.43	5.70	2.21	8.26	0.92	9.21	0.47	15.37	1.16	3.77	0.95	0.78
UNK-10B.D	Sierra Pelona Type 1	Chlorite Schist	0.00	6.35	54.69	330.07	13.11	2.58	0.00	0.00	13.30	5.53	23.92	4.99	29.43	9.43	1.72	6.56	1.61	4.93	1.87	7.53	0.46	7.38	0.67	7.47	1.20	0.00	0.22	0.07
UNK-11A.D	Mount Laguna Type 1	Talc-schist	1.44	0.06	1.26	0.57	0.17	0.00	0.00	0.00	9.84	0.42	0.17	0.00	1.82	0.00	0.50	0.00	0.00	0.00	0.73	0.15	0.15	0.99	0.24	0.00	0.05	1.81	0.00	0.68
UNK-11B.D	Mount Laguna Type 1	Talc-schist	0.35	0.52	0.13	0.56	0.60	0.26	1.73	0.00	7.33	0.04	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.82	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00
UNK-12A.D	Mount Laguna Type 1	Talc-schist	0.00	5.21	0.43	0.00	0.19	0.00	0.84	0.00	69.09	0.00	2.40	0.00	1.00	0.00	0.00	5.00	0.40	0.00	0.00	0.33	0.00	0.00	0.00	3.06	0.99	12.00	0.00	2.35
UNK-12B.D	Mount Laguna Type 1	Talc-schist	4.43	7.67	0.06	0.78	0.17	0.74	0.00	0.61	103.86	0.27	0.00	0.26	1.08	0.00	0.10	2.06	0.00	0.00	1.28	0.72	0.00	0.00	0.07	0.00	0.25	0.00	0.57	0.34
UNK-13A.D	Mount Laguna Type 2	Talc-schist	0.00	0.52	0.00	0.25	0.56	0.00	0.99	0.40	7.53	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.19	1.93	0.00	0.60	0.00	0.47	0.00	1.64
UNK-13B.D	Mount Laguna Type 2	Talc-schist	0.00	0.13	0.05	1.09	0.00	0.98	2.14	0.25	4.75	1.39	0.00	0.31	2.87	2.14	0.00	4.28	0.15	0.00	0.00	0.32	0.00	0.00	0.44	0.36	0.11	0.00	0.51	0.30
UNK-14A.D	Mount Laguna Type 2	Talc-schist	0.19	0.00	0.00	0.88	0.00	0.00	5.78	0.26	3.37	0.69	0.00	0.00	3.70	0.00	0.00	2.63	0.00	0.00	0.40	0.00	0.00	1.72	0.00	0.18	0.29	4.63	0.00	1.01
UNK-14B.D	Mount Laguna Type 2	Talc-schist	0.00	0.72	0.18	0.78	0.00	3.32	2.41	0.00	3.65	0.00	0.10	0.18	0.00	0.00	0.00	0.69	0.17	0.00	0.38	1.08	0.24	1.93	0.00	1.62	0.00	0.00	0.00	0.00
UNK-15A.D	Jacumba Red	Anthophyllite talc chlorite schist	3.19	1.79	2.65	1.65	0.75	1.46	0.00	0.28	16.55	1.58	1.14	0.09	1.13	0.00	0.00	0.00	0.00	0.48	0.55	0.00	0.31	0.00	0.00	0.00	0.31	2.25	0.00	1.80
UNK-15B.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	4.65	0.00	0.66	0.00	3.23	3.75	0.28	273.44	1.18	3.45	1.57	0.00	0.00	0.00	0.00	0.15	0.00	0.05	0.00	0.43	0.00	0.13	0.00	0.00	7.17	0.88	0.00
UNK-16A.D	Jacumba Red	Anthophyllite talc chlorite schist	1.02	0.64	0.00	0.60	0.82	0.00	0.00	0.63	13.15	0.40	0.26	0.00	0.00	0.00	0.26	5.38	0.00	0.00	1.16	1.17	0.00	2.35	0.00	0.00	0.24	64.89	0.00	0.46
UNK-16B.D	Jacumba Red	Anthophyllite talc chlorite schist	0.00	3.95	0.62	0.00	0.57	2.11	4.50	0.00	1.52	0.69	0.00	0.06	1.08	0.00	0.54	0.00	0.00	2.79	0.25	1.42	0.00	1.65	0.00	0.00	0.08	4.02	2.54	0.00
UNK-17A.D	Cuyamaca Type 1	Talc-schist	2.14	0.60	1.02	0.18	0.16	0.00	0.00	0.21	1.66	0.73	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.14	0.33	0.00	0.00	0.00	0.00	25.96	0.00	0.09
UNK-17B.D	Cuyamaca Type 1	Talc-schist	0.25	8.01	1.15	0.27	0.18	1.01	3.90	0.96	282.24	0.85	0.00	0.68	0.67	0.00	0.00	0.00	0.00	0.58	0.66	0.00	0.10	0.51	0.48	0.00	0.45	1.06	20.62	0.85
UNK-18A.D	Cuyamaca Type 1	Talc-schist	0.15	0.79	0.00	0.35	0.31	0.00	0.00	0.45	1.06	0.00	0.00	0.00	0.00	0.00	0.00	1.55	0.16	0.00	0.49	0.00	0.58	1.80	0.00	0.00	0.00	0.00	0.00	0.09
UNK-18B.D	Cuyamaca Type 1	Talc-schist	0.09	1.37	0.61	0.00	0.92	1.06	0.20	0.00	4.35	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.27	0.00	0.21	0.54	0.13	0.00	1.31	2.61	2.04	0.00
UNK-19A.D	Cuyamaca Type 2	Talc-schist	1.72	2.74	0.19	0.37	0.33	0.00	0.00	0.13	5.26	0.74	0.89	0.00	1.33	0.00	0.00	1.65	0.26	0.00	0.05	0.00	0.72	0.00	0.00	1.94	0.00	0.00	0.36	0.47
UNK-19B.D	Cuyamaca Type 2	Talc-schist	0.00	2.54	0.82	0.00	0.33	1.24	2.29	0.41	2.15	0.32	0.00	0.24	0.00	0.00	0.47	0.00	0.00	0.00	0.05	0.00	0.00	1.94	0.00	0.16	0.52	0.00	0.97	0.62
UNK-20A.D	Cuyamaca Type 2	Talc-schist	0.00	0.35	0.00	0.69	0.00	0.00	0.00	0.00	8.40	0.61	0.10	0.00	2.75	0.00	0.00	1.37	0.00	0.00	0.53	1.97	0.30	2.98	0.29	0.00	0.00	0.00	0.00	0.35
UNK-20B.D	Cuyamaca Type 2	Talc-schist	0.25	0.41	1.99	0.09	0.18	1.95	4.04	0.00	21.27	0.44	1.24	0.63	0.00	0.00	0.17	0.00	0.00	0.00	0.05	0.30	0.21	0.00	0.37	0.00	0.00	0.00	1.05	0.00
UNK-21A.D	SCICS	SCIS	39.34	97.77	23.14	294.88	1.39	0.39	0.68	0.15	3742.36	3.64	9.62	1.09	8.24	2.94	1.25	1.50	0.27	1.64	0.70	3.88	0.21	0.67	0.10	0.27	0.38	6.63	0.00	0.55
UNK-21B.D	SCICS	SCIS	31.72	60.80	17.23	65.37	3.00	1.65	1.14	0.30	2655.32	1.64	5.67	2.05	5.27	0.97	0.00	1.44	0.12	0.50	1.02	2.82	0.44	4.46	1.15	1.57	0.57	5.28	0.89	0.25
UNK-22A.D	SCICS	SCIS	2.31	486.73	38.06	91.53	3.12	1.37	0.40	0.09	11.81	7.01	14.47	1.78	18.14	5.00	2.28	3.51	0.78	1.92	1.74	4.83	0.44	1.82	0.00	2.56	0.35	12.18	20.04	1.19
UNK-22B.D	SCICS	SCIS	0.07	416.38	38.10	128.47	3.03	3.45	0.16	0.08	13.32	6.93	13.27	2.32	18.71	4.92	0.44	7.29	0.70	5.93	1.57	1.29	0.00	4.95	0.42	4.46	0.75	12.87	182.62	0.08
UNK-23A.D	Sierra Pelona Type 5	Talc-schist	2.21	1.25	4.44	1.17	0.00	0.00	0.00	1.10	2.47	0.40	0.00	0.34	0.00	1.93	0.00	1.80	0.00	0.00	2.21	0.00	0.00	0.00	1.07	0.00	0.00	1.14	0.00	3.68

Table 14b. Calibrated LA-ICP-MS data for Known Unknowns in ppm (Rb through U)

anid	Classification	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
UNK-23B.D	Sierra Pelona Type 5	Talc-schist	0.00	2.84	0.00	0.34	0.00	3.89	0.71	0.00	0.00	0.33	0.00	1.24	4.28	0.00	0.00	6.34	0.00	0.00	0.00	1.12	0.00	1.96	0.00	0.00	1.34	15.00	1.77	0.00
UNK-24A.D	Sierra Pelona Type 5	Talc-schist	1.52	0.75	0.00	0.38	0.40	0.00	3.61	0.00	1.41	0.39	0.00	0.33	1.57	0.00	0.16	0.59	0.00	0.00	0.82	0.00	0.00	1.83	0.00	0.00	0.00	7.78	0.00	0.00
UNK-24B.D	Sierra Pelona Type 5	Talc-schist	0.89	1.63	0.00	0.00	0.61	1.57	2.75	0.00	1.49	0.34	0.08	0.67	0.66	0.00	0.33	0.00	0.00	0.19	0.35	0.00	0.00	1.00	0.00	0.00	1.03	3.15	0.46	0.09
UNK-24C.D	Sierra Pelona Type 5	Talc-schist	0.00	1.76	0.00	0.00	0.31	1.67	0.38	0.22	7.17	0.35	0.05	0.00	0.00	0.00	0.09	1.17	0.00	0.00	0.62	1.22	1.43	2.61	0.63	0.00	0.68	0.00	0.76	0.00
UNK-24D.D	Sierra Pelona Type 5	Talc-schist	0.00	2.65	0.00	0.00	0.23	0.47	1.99	0.60	27.50	0.09	0.00	0.04	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	1.08	0.00	0.00	0.00	1.90	0.20	0.00
UNK-25A.D	Sierra Pelona Type 16	Talc-schist	0.65	10.75	1.83	1.02	0.00	0.41	2.52	0.16	139.78	0.50	0.76	0.10	3.02	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00
UNK-25B.D	Sierra Pelona Type 16	Talc-schist	0.00	6.21	0.71	0.00	0.36	0.14	4.85	0.20	2.45	0.55	0.85	0.00	0.00	0.00	0.00	4.73	0.39	0.18	0.00	0.00	0.14	2.35	0.00	0.00	0.00	3.64	0.69	0.00
UNK-26A.D	Sierra Pelona Type 16	Talc-schist	1.74	1.76	0.00	0.17	0.12	0.00	1.39	0.00	9.60	0.00	0.88	0.00	0.59	0.00	0.14	1.53	0.44	0.67	0.18	0.13	0.00	0.00	0.20	0.00	0.56	0.00	0.00	0.40
UNK-26B.D	Sierra Pelona Type 16	Talc-schist	0.00	1.75	0.08	0.16	0.18	1.38	2.55	0.00	5.62	1.67	0.71	0.00	1.99	0.00	0.21	0.97	0.04	0.00	0.52	0.00	0.22	2.16	0.10	1.10	0.13	1.52	0.47	0.16

Table 15a. Calibrated LA-ICP-MS data for CA-RIV-1246 Stone Beads in ppm (NA through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
8006-23	CA-RIV-1246	Chlorite-Schist	9483.11	72418.27	83802.54	211164.67	41712.03	19825.91	34.93	4748.28	245.37	702.62	1545.67	115151.82	455.94	50.49	70.20	186.50	2.96
8006-23b	CA-RIV-1246	Chlorite-Schist	8192.22	87469.71	92233.20	201044.34	33813.72	12605.89	33.74	5092.50	246.63	748.60	1645.68	114373.47	487.30	54.68	76.90	209.99	3.43
8006-2	CA-RIV-1246	Chlorite-Schist	9588.32	73597.30	79185.26	213112.70	40450.70	19534.01	32.91	4993.08	236.75	711.30	1546.66	117871.97	443.10	51.71	41.53	198.44	2.23
8006-2b	CA-RIV-1246	Chlorite-Schist	7707.58	85591.78	93266.68	203796.90	34601.34	12864.95	33.91	4055.15	237.80	697.53	1412.01	111241.56	465.94	50.55	38.28	202.13	2.03
7901-2	CA-RIV-1246	Talc-Chlorite Schist	8619.21	71522.44	78343.39	219043.85	38862.20	23603.61	39.57	6120.38	239.63	661.70	1513.87	109568.79	438.54	48.74	71.07	173.92	6.92
7901-2b	CA-RIV-1246	Talc-Chlorite Schist	7933.93	86884.33	95733.74	200408.58	33832.13	19927.25	42.24	5535.19	241.87	746.61	1466.35	103722.26	487.62	47.05	73.43	185.70	2.42
8738-2	CA-RIV-1246	Chlorite-Schist	9367.49	69394.27	76700.15	221714.07	40148.49	22539.39	36.17	7534.42	237.97	722.62	1528.99	107669.54	423.96	46.11	73.41	164.17	6.86
8738-2b	CA-RIV-1246	Chlorite-Schist	7834.38	86267.44	93016.97	201253.08	33769.91	19196.13	38.11	5250.22	254.21	741.51	1533.16	107970.50	481.22	50.03	79.40	186.51	5.82
7901-3	CA-RIV-1246	Talc-Chlorite Schist	1739.20	189747.51	102186.31	169559.06	5583.58	327.24	62.38	264.36	508.03	294.93	253.27	81783.56	143.17	39.10	63.12	90.87	0.00
7901-3b	CA-RIV-1246	Talc-Chlorite Schist	1542.09	226836.68	109292.88	148192.87	1194.27	10.20	56.82	121.14	424.32	281.97	190.46	65963.02	112.05	32.96	61.17	97.81	0.00
8006-3	CA-RIV-1246	Chlorite-Schist	8246.99	70685.21	79208.47	218707.15	40095.52	19201.96	31.70	5080.64	239.64	705.68	1495.60	114600.50	429.54	55.05	8.22	168.36	1.28
8006-3b	CA-RIV-1246	Chlorite-Schist	7276.97	87779.64	91627.28	199363.25	32972.15	18582.78	32.28	7586.63	238.44	727.20	1533.28	109645.29	461.57	53.68	11.14	184.32	2.55
8009-3	CA-RIV-1246	Talc-Chlorite Schist	8026.55	74918.21	82723.87	208661.78	41082.72	20769.73	34.98	5641.04	263.33	722.59	1732.58	116922.12	456.37	58.80	41.37	192.86	4.55
8009-3b	CA-RIV-1246	Talc-Chlorite Schist	7072.12	85061.93	115434.50	189200.54	32587.16	19451.83	34.68	5125.29	247.09	741.67	1540.83	99683.60	472.55	50.60	45.78	211.70	3.56
8738-6	CA-RIV-1246	Chlorite-Schist	8543.25	72646.05	84620.55	217443.74	42379.86	10251.90	32.22	5390.40	236.08	654.17	1408.38	113607.33	429.83	49.90	7.59	165.86	2.41
8738-6b	CA-RIV-1246	Chlorite-Schist	6796.85	87779.13	89484.24	203683.60	32466.94	18681.03	32.50	5609.94	235.84	726.74	1504.80	109625.22	478.90	54.01	10.18	188.53	3.57
8738-5	CA-RIV-1246	Chlorite-Schist	8748.92	69106.02	85036.35	219602.16	41403.39	21597.04	34.62	7600.51	225.10	590.68	1352.54	100970.27	426.50	43.03	10.00	148.16	1.38
8738-5b	CA-RIV-1246	Chlorite-Schist	8042.50	80087.27	90314.85	211768.19	30435.22	23576.79	33.30	7169.66	234.32	587.29	1398.32	99315.30	404.89	42.00	5.72	168.72	2.53
8738-1	CA-RIV-1246	Chlorite-Schist	8679.65	70661.14	82956.28	219583.29	41777.92	22810.94	37.41	4273.73	227.92	614.13	1409.58	104263.81	402.60	47.23	52.96	166.09	3.39
8738-1b	CA-RIV-1246	Chlorite-Schist	8172.78	83663.07	99188.45	203621.04	34323.89	19809.91	35.47	4421.32	233.69	677.12	1353.15	99223.80	437.40	49.29	73.00	192.36	3.58
8006-15	CA-RIV-1246	Chlorite-Schist	9447.67	74084.61	77629.51	219515.87	37991.75	18689.13	33.49	5296.13	241.74	684.18	1671.52	112304.69	450.82	53.08	51.54	186.79	2.91
8006-15b	CA-RIV-1246	Chlorite-Schist	8422.33	89939.94	88787.65	207252.57	32282.71	21233.83	32.31	4291.37	249.84	419.46	1448.53	103107.54	477.90	48.75	49.67	177.10	3.11
7653	CA-RIV-1246	Chlorite-Schist	9833.69	73332.59	78546.68	216438.61	39021.99	22428.64	35.96	6299.70	238.24	657.53	1504.08	110727.81	417.82	52.07	10.34	161.71	9.73
7653b	CA-RIV-1246	Chlorite-Schist	8498.80	92387.59	87773.06	205213.48	29193.73	20424.62	35.78	5269.08	247.82	381.26	1627.03	106784.34	486.13	53.57	9.26	174.15	1.78
8944	CA-RIV-1246	Talc-Chlorite Schist	1297.62	182850.41	98516.76	157619.43	1493.84	2594.25	19.69	3226.10	159.89	72.13	1973.02	109531.20	178.10	47.47	23.77	153.34	0.00
8944b	CA-RIV-1246	Talc-Chlorite Schist	0.00	222395.31	108623.91	134111.83	0.00	2092.00	16.88	3427.72	127.97	9.59	1661.23	88723.64	149.57	39.50	19.98	151.47	0.00
9176	CA-RIV-1246	Talc-Chlorite Schist	373.08	170447.68	93740.34	152745.48	302.86	12341.02	34.25	16360.80	378.90	234.78	1765.06	114125.12	139.03	45.65	28.36	237.81	0.00
9176b	CA-RIV-1246	Talc-Chlorite Schist	0.00	198719.63	95077.47	135812.46	0.00	5981.91	32.83	9156.37	359.67	108.72	1650.91	120492.15	166.86	46.42	24.05	267.42	0.00
7598-1	CA-RIV-1246	Chlorite-Schist	7440.79	79105.52	87158.34	207574.67	39346.25	15584.59	31.95	4508.61	240.33	827.81	1665.42	116344.92	484.53	55.85	5.87	173.11	0.69
7598-1b	CA-RIV-1246	Chlorite-Schist	5436.20	98241.36	85244.24	202244.03	31055.72	13360.47	31.17	5003.07	253.65	450.70	1574.28	116295.89	534.91	56.69	6.07	175.16	2.40
7883	CA-RIV-1246	Talc-Chlorite Schist	403.64	174788.98	107806.48	150604.61	255.07	7206.58	18.60	11283.12	177.66	61.64	1990.00	105063.98	128.97	37.01	22.94	163.06	0.00
7883b	CA-RIV-1246	Talc-Chlorite Schist	0.00	218778.60	103831.17	130315.94	0.00	1167.38	17.80	5687.85	176.77	13.92	1997.01	102732.84	150.01	34.42	30.98	158.90	0.03
7598-3	CA-RIV-1246	Chlorite-Schist	7014.69	76262.03	97721.18	204167.24	38794.18	19386.76	30.39	4729.12	235.24	778.39	1683.55	107855.42	445.45	58.67	8.95	164.86	3.39
7598-3b	CA-RIV-1246	Chlorite-Schist	5060.69	96714.87	84225.86	200958.29	29552.48	17881.97	28.54	5719.42	262.22	437.54	1791.68	117435.86	509.97	65.69	9.49	174.35	5.47
7641-3	CA-RIV-1246	Chlorite-Schist	7123.76	74991.60	88846.79	208144.02	38685.17	20361.12	36.77	4247.61	250.32	728.99	1448.44	114884.20	453.24	49.89	60.73	184.34	7.91
7641-3b	CA-RIV-1246	Chlorite-Schist	5809.48	91530.08	93097.84	201973.34	32281.06	17422.70	38.17	5483.34	252.58	423.22	1398.13	108274.81	508.38	49.14	70.86	198.53	6.50
7641-4	CA-RIV-1246	Chlorite-Schist	7398.69	77212.39	95604.16	206744.30	40721.68	12624.67	32.32	3796.27	244.95	764.89	1484.06	111525.43	479.12	54.37	46.14	194.80	7.78
7641-4b	CA-RIV-1246	Chlorite-Schist	9185.53	88380.80	97605.85	204769.07	31056.77	19508.74	36.56	4117.35	253.69	385.96	1505.10	99073.13	470.46	49.68	32.66	183.84	2.74
8840-2	CA-RIV-1246	Chlorite-Schist	7725.27	73866.91	84800.01	213744.96	39197.78	21511.52	33.86	5683.86	243.49	706.64	1560.30	109293.03	441.51	47.75	64.44	190.52	5.47
8840-2b	CA-RIV-1246	Chlorite-Schist	5593.19	92607.63	87026.21	201668.47	30521.27	23983.26	35.71	5536.41	254.99	393.24	1445.70	110718.70	487.20	50.01	69.05	192.29	4.98
4725	CA-RIV-1246	Chlorite-Schist	9464.11	73090.51	84013.11	223517.34	34321.97	15551.47	31.87	4887.29	247.25	615.91	1571.48	105463.55	421.01	53.62	60.43	202.70	5.72
4725b	CA-RIV-1246	Chlorite-Schist	8417.12	81947.00	92645.64	197384.36	29713.26	9883.83	29.30	3542.52	219.82	327.13	1488.90	94276.84	431.81	49.43	68.10	200.04	5.64
8240	CA-RIV-1246	Talc-Chlorite Schist	420.98	178642.67	102694.05	151330.07	0.00	10315.04	17.99	12168.78	141.33	66.71	1885.20	102292.43	340.94	50.36	33.64	178.91	0.00
8240b	CA-RIV-1246	Talc-Chlorite Schist	0.00	211718.31	106246.61	137997.13	0.00	872.89	15.80	1016.32	128.83	155.76	1950.44	101772.03	349.73	51.12	44.42	162.13	0.00
4513	CA-RIV-1246	Talc-Schist	0.00	179001.94	99934.04	155747.32	4517.13	4562.04	9.31	1501.65	206.17	316.45	2250.67	112397.49	346.43	46.84	32.67	206.31	0.00
4513b	CA-RIV-1246	Talc-Schist	0.00	184658.75	108294.84	137605.44	1039.03	11531.64	6.86	9852.46	178.86	233.15	1886.74	96036.24	311.88	40.82	33.63	172.05	0.00

Table 15a. Calibrated LA-ICP-MS data for CA-RIV-1246 Stone Beads in ppm (NA through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
8340	CA-RIV-1246	Chlorite-Schist	9086.92	72181.32	85144.05	228196.27	34716.96	14409.80	27.85	4251.58	223.69	622.31	1433.93	100142.71	414.99	50.35	58.84	180.62	4.99
8340b	CA-RIV-1246	Chlorite-Schist	7857.76	78371.71	103307.54	196184.52	26028.10	13697.61	25.50	3878.32	217.37	385.89	1330.49	95078.08	400.00	49.23	71.30	190.08	4.99
4529-2	CA-RIV-1246	Chlorite-Schist	7301.77	79955.83	74344.08	221988.55	34460.66	10308.52	27.91	3773.68	249.78	772.09	1614.61	120767.37	501.05	53.32	11.98	209.05	3.12
4529-2b	CA-RIV-1246	Chlorite-Schist	7082.06	88863.47	103800.48	184548.21	24104.59	10790.34	25.05	5134.23	231.41	453.89	1431.61	105293.57	463.86	49.01	21.90	213.61	2.45
4639-2	CA-RIV-1246	Chlorite-Schist	8994.01	73632.15	83744.97	225092.28	33859.57	15357.09	32.65	5022.48	236.57	661.62	1450.26	103664.12	424.74	51.20	18.29	232.73	1.74
4639-2b	CA-RIV-1246	Chlorite-Schist	8652.91	74095.91	77330.60	216021.40	28684.53	12257.18	28.28	5535.26	205.77	308.81	1292.69	92835.07	397.67	45.76	17.15	193.80	5.37
8006-14	CA-RIV-1246	Talc-Chlorite Schist	3242.09	159861.83	86737.06	136372.47	1948.87	7695.55	43.88	10096.10	344.68	202.37	2416.81	167135.12	126.92	66.03	31.79	357.33	0.00
8006-14b	CA-RIV-1246	Talc-Chlorite Schist	1837.27	173851.29	80228.77	126570.54	1178.45	11559.96	38.74	13091.45	323.18	261.28	2367.63	168922.04	156.00	66.10	35.99	361.53	0.19
9094	CA-RIV-1246	Chlorite-Schist	8956.56	84407.10	73230.53	213632.21	31661.17	19926.89	35.18	3665.91	260.02	820.91	3403.67	119162.65	475.70	232.70	33.84	226.34	3.03
9094b	CA-RIV-1246	Chlorite-Schist	7356.26	92822.00	78124.97	206139.84	35692.34	21814.90	33.21	5058.29	241.14	741.84	1629.54	111018.63	445.63	62.89	27.15	191.81	2.68
8163	CA-RIV-1246	Chlorite-Schist	10054.01	86776.04	62733.62	219524.81	31808.06	22598.21	31.70	4023.67	230.03	801.19	2147.60	119043.71	466.51	56.14	27.14	171.31	0.47
8163b	CA-RIV-1246	Chlorite-Schist	11070.89	87647.30	77569.96	208149.41	38504.21	24342.33	32.07	4384.89	217.08	663.59	1821.24	106988.09	397.12	52.43	26.84	193.62	0.97
8785	CA-RIV-1246	Talc-Chlorite Schist	3142.74	170163.29	91919.21	136004.28	10326.78	8069.63	113.10	9947.84	493.20	436.82	2276.51	141569.28	76.23	60.28	38.78	177.75	0.00
8785b	CA-RIV-1246	Talc-Chlorite Schist	3743.51	193864.79	94552.64	127729.38	10626.10	5219.12	39.72	6796.58	554.53	459.84	2235.15	128691.49	104.54	58.70	50.64	192.25	2.52
8840-1	CA-RIV-1246	Chlorite-Schist	9332.08	84158.35	66295.85	222407.91	31717.55	22797.39	33.01	4510.54	242.95	704.18	1612.27	113522.69	460.78	53.13	68.05	176.79	2.96
8840-1b	CA-RIV-1246	Chlorite-Schist	9561.14	93651.29	80372.63	205308.58	32612.01	22175.33	36.07	4562.45	237.94	661.95	1378.37	109334.54	446.38	49.19	68.29	182.84	4.21
8823-1	CA-RIV-1246	Talc-Schist	0.00	64499.24	73226.05	247800.02	66274.90	593.83	7.66	64.40	153.99	73513.83	350.83	22243.15	620.09	24.53	9.36	50.13	0.00
8823-1b	CA-RIV-1246	Talc-Schist	1384.82	72687.84	87083.93	215618.88	85653.06	740.36	5.82	138.84	138.88	74224.61	369.19	24141.10	657.06	29.02	23.14	94.61	0.00

Table 15b. Calibrated LA-ICP-MS data for CA-RIV-1246 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
8006-23	CA-RIV-1246	Chlorite-Schist	82.27	99.18	19.05	70.13	8.49	1.86	2.49	4.23	703.16	14.57	30.08	3.50	14.27	3.14	0.78	2.87	0.44	3.33	0.67	1.91	0.33	2.38	0.30	2.65	0.52	5.49	5.60	1.98
8006-23b	CA-RIV-1246	Chlorite-Schist	83.99	78.15	16.50	147.31	8.76	1.74	2.61	3.44	2770.61	11.09	30.10	2.73	10.84	2.52	0.74	2.62	0.43	2.60	0.54	1.97	0.27	2.17	0.36	4.22	0.66	9.38	6.89	2.01
8006-2	CA-RIV-1246	Chlorite-Schist	81.63	102.56	18.59	86.15	8.73	2.00	1.42	3.50	797.35	14.97	29.74	3.41	13.44	3.13	0.90	2.75	0.48	3.43	0.67	1.73	0.36	2.36	0.38	3.35	0.63	4.97	5.67	2.17
8006-2b	CA-RIV-1246	Chlorite-Schist	87.88	88.91	18.04	649.98	8.26	1.90	1.27	3.46	3332.00	12.37	28.41	3.15	12.86	3.17	0.63	2.73	0.44	3.04	0.71	2.19	0.28	2.15	0.36	15.98	0.61	8.38	6.58	3.12
7901-2	CA-RIV-1246	Talc-Chlorite Schist	73.29	89.94	29.52	99.93	11.55	2.09	1.15	3.01	725.49	17.99	37.40	4.39	18.18	4.01	1.09	4.25	0.69	4.87	0.96	3.17	0.51	3.59	0.50	3.69	0.71	4.90	7.19	2.26
7901-2b	CA-RIV-1246	Talc-Chlorite Schist	82.60	89.54	23.05	126.64	11.06	1.95	1.03	3.29	3257.55	28.53	54.89	5.61	20.97	4.23	0.93	3.88	0.58	4.11	0.72	2.45	0.35	2.08	0.49	4.03	0.89	5.34	6.30	2.11
8738-2	CA-RIV-1246	Chlorite-Schist	80.59	117.22	24.91	96.19	10.65	3.26	0.97	3.45	844.91	12.07	29.00	3.18	13.87	3.55	0.92	3.58	0.57	4.37	0.86	2.66	0.45	3.05	0.36	3.38	0.61	4.97	5.80	2.06
8738-2b	CA-RIV-1246	Chlorite-Schist	82.57	99.70	18.35	63.94	12.27	1.90	0.97	3.14	3243.16	17.19	43.02	3.88	14.53	3.29	0.90	2.84	0.47	3.63	0.67	2.06	0.30	1.75	0.29	2.06	0.79	6.71	6.93	1.96
7901-3	CA-RIV-1246	Talc-Chlorite Schist	2.91	2.21	0.14	0.55	0.08	1.17	0.47	0.09	2.86	0.14	0.61	0.03	0.36	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00	0.68	0.04	0.03
7901-3b	CA-RIV-1246	Talc-Chlorite Schist	0.43	3.25	0.00	0.00	0.00	1.88	1.80	0.00	0.00	1.21	3.63	0.29	0.88	0.31	0.06	0.00	0.09	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	2.52	0.00	0.00
8006-3	CA-RIV-1246	Chlorite-Schist	80.92	91.01	19.28	233.62	8.35	2.21	1.20	3.20	817.14	12.66	27.35	3.15	12.36	2.91	0.68	2.96	0.46	3.28	0.67	1.91	0.30	2.79	0.42	7.71	0.53	3.96	13.76	3.12
8006-3b	CA-RIV-1246	Chlorite-Schist	82.83	84.66	23.18	124.43	13.07	2.24	0.60	2.89	3733.87	14.40	33.75	3.74	14.55	3.53	0.93	3.56	0.64	3.90	0.78	2.70	0.37	2.92	0.50	3.96	0.96	6.81	6.13	2.32
8009-3	CA-RIV-1246	Talc-Chlorite Schist	83.21	108.86	21.94	65.55	9.62	2.23	1.34	3.51	864.86	38.62	81.62	7.87	30.87	4.98	1.11	4.09	0.63	4.10	0.80	2.34	0.41	2.98	0.35	2.60	0.63	5.70	10.10	2.05
8009-3b	CA-RIV-1246	Talc-Chlorite Schist	83.74	103.68	21.96	90.69	10.82	1.88	1.41	3.15	2863.83	18.27	36.35	4.38	16.07	4.00	0.85	3.53	0.69	4.27	0.84	2.56	0.30	2.23	0.29	2.98	0.84	9.42	7.36	2.31
8738-6	CA-RIV-1246	Chlorite-Schist	82.21	69.73	19.76	63.23	11.00	2.07	0.73	3.24	778.23	17.00	36.62	4.16	16.76	3.51	0.85	3.09	0.58	3.46	0.66	2.04	0.38	2.59	0.30	2.42	0.85	3.25	6.49	1.89
8738-6b	CA-RIV-1246	Chlorite-Schist	87.76	77.78	18.16	67.55	9.30	2.02	0.59	3.21	3135.05	24.79	48.40	4.70	17.61	3.55	0.85	2.99	0.42	2.79	0.58	2.15	0.31	1.91	0.32	2.36	0.54	5.98	5.21	1.95
8738-5	CA-RIV-1246	Chlorite-Schist	74.34	126.89	27.73	57.70	9.17	2.68	0.56	2.48	786.99	24.85	50.04	5.23	20.90	4.45	1.01	4.74	0.61	5.15	0.97	2.91	0.44	2.92	0.38	2.33	0.62	4.32	5.95	1.88
8738-5b	CA-RIV-1246	Chlorite-Schist	75.68	120.95	23.55	228.24	12.84	2.36	0.86	2.91	3301.05	17.43	41.03	4.36	17.33	3.83	0.87	3.76	0.56	3.35	0.80	2.88	0.43	3.62	0.60	6.82	0.78	5.01	4.01	2.88
8738-1	CA-RIV-1246	Chlorite-Schist	78.05	110.81	20.45	57.35	7.69	1.40	0.76	2.98	775.72	35.39	66.19	6.95	26.72	5.00	1.14	4.51	0.61	3.86	0.69	1.78	0.38	2.67	0.29	2.32	0.49	3.52	7.24	1.67
8738-1b	CA-RIV-1246	Chlorite-Schist	86.27	98.07	17.19	61.79	7.74	1.36	0.20	3.92	3218.42	16.63	36.80	4.16	17.01	3.68	0.98	2.77	0.51	2.75	0.56	1.50	0.18	1.79	0.22	1.84	0.45	5.74	6.71	2.00
8006-15	CA-RIV-1246	Chlorite-Schist	79.99	89.78	21.44	80.31	8.74	1.96	0.87	3.09	872.05	13.12	28.91	3.25	12.81	3.30	0.77	2.82	0.53	3.56	0.75	2.34	0.40	2.68	0.44	3.04	0.60	4.69	6.50	2.07
8006-15b	CA-RIV-1246	Chlorite-Schist	85.63	116.89	18.59	78.19	8.49	1.49	0.92	3.03	0.00	18.65	45.06	4.75	21.03	3.83	0.83	3.31	0.52	2.58	0.68	2.02	0.26	2.42	0.21	2.39	0.68	9.38	6.76	2.25
7653	CA-RIV-1246	Chlorite-Schist	83.99	94.40	24.27	55.18	10.01	1.66	0.67	3.46	970.44	12.12	26.15	3.14	12.99	3.18	0.90	3.97	0.56	4.21	0.89	2.74	0.43	3.01	0.34	2.16	0.64	5.94	6.12	1.80
7653b	CA-RIV-1246	Chlorite-Schist	76.64	90.04	19.30	70.86	8.07	1.71	0.92	2.61	0.00	16.55	37.27	3.65	13.41	3.09	0.69	2.59	0.53	3.08	0.75	2.31	0.34	2.30	0.29	1.86	0.53	6.66	5.07	1.92
8944	CA-RIV-1246	Talc-Chlorite Schist	0.52	6.22	10.36	39.46	5.28	1.04	0.39	0.00	1.40	0.67	3.25	0.43	2.54	1.62	0.35	1.66	0.35	2.72	0.42	1.21	0.15	1.02	0.14	1.31	0.32	0.47	1.09	0.46
8944b	CA-RIV-1246	Talc-Chlorite Schist	0.00	0.00	9.76	59.63	4.66	0.97	0.32	0.00	0.00	0.00	0.00	0.09	0.59	1.16	0.28	1.55	0.28	1.49	0.54	1.06	0.10	0.39	0.00	1.66	0.39	0.13	2.18	0.68
9176	CA-RIV-1246	Talc-Chlorite Schist	0.23	7.15	40.14	94.00	5.03	2.06	0.15	0.01	2.29	0.69	8.30	1.85	11.90	5.33	1.89	6.55	1.12	9.00	1.67	4.73	0.63	4.70	0.47	3.08	0.25	1.09	0.17	0.20
9176b	CA-RIV-1246	Talc-Chlorite Schist	0.00	0.75	20.94	37.79	1.95	1.56	0.31	0.00	0.00	0.00	3.06	0.92	6.56	3.06	1.12	3.66	0.63	4.26	0.87	2.44	0.31	1.65	0.11	0.92	0.08	0.46	0.00	0.00
7598-1	CA-RIV-1246	Chlorite-Schist	83.39	73.44	18.80	66.49	8.45	1.86	0.38	3.40	915.20	14.98	34.41	3.63	14.52	3.41	0.70	2.87	0.49	3.54	0.62	2.16	0.36	2.45	0.28	2.24	0.65	2.35	5.67	1.90
7598-1b	CA-RIV-1246	Chlorite-Schist	89.90	66.05	15.45	57.87	8.00	1.69	0.53	3.28	0.00	12.05	28.49	3.05	12.00	2.69	0.60	2.18	0.43	2.38	0.57	1.48	0.30	1.82	0.20	1.81	0.64	3.99	4.69	1.86
7883	CA-RIV-1246	Talc-Chlorite Schist	0.19	12.08	18.31	43.27	11.46	3.02	0.00	0.00	2.02	0.20	3.29	0.48	3.65	2.71	0.79	3.43	0.58	4.93	0.76	2.20	0.29	1.66	0.16	1.38	0.77	0.47	1.01	0.65
7883b	CA-RIV-1246	Talc-Chlorite Schist	0.00	0.00	9.98	102.39	3.91	1.31	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.52	0.06	0.84	0.37	0.68	0.59	0.53	0.17	1.66	0.41	3.15	0.23	2.01	3.62	1.50
7598-3	CA-RIV-1246	Chlorite-Schist	80.92	88.81	17.74	58.58	9.84	2.43	1.98	3.28	777.14	15.49	35.18	3.74	13.89	2.54	0.78	2.69	0.40	3.17	0.61	2.11	0.28	2.52	0.26	2.08	0.61	3.56	5.25	2.08
7598-3b	CA-RIV-1246	Chlorite-Schist	88.11	81.57	16.49	80.43	10.41	2.21	0.78	3.29	0.00	15.72	41.38	4.08	15.14	3.00	0.77	2.68	0.41	2.47	0.58	1.67	0.27	1.92	0.24	2.17	0.57	6.13	5.07	2.65
7641-3	CA-RIV-1246	Chlorite-Schist	76.27	90.79	19.35	61.40	7.80	1.37	0.73	3.20	766.41	19.55	42.39	4.51	17.43	3.70	0.84	3.51	0.46	3.49	0.66	2.03	0.33	2.63	0.25	2.14	0.56	6.02	6.52	1.99
7641-3b	CA-RIV-1246	Chlorite-Schist	89.44	84.42	18.23	95.17	10.15	1.42	0.50	3.26	0.00	12.76	29.05	3.14	12.50	3.15	0.71	3.08	0.49	2.67	0.68	1.81	0.22	2.29	0.22	2.74	0.64	8.24	5.30	2.25
7641-4	CA-RIV-1246	Chlorite-Schist	79.10	61.26	15.09	74.04	6.83	1.65	0.42	2.95	819.97	9.05	20.62	2.29	9.60	2.11	0.60	2.28	0.30	2.64	0.47	1.80	0.25	2.11	0.30	2.35	0.40	6.88	4.78	1.71
7641-4b	CA-RIV-1246	Chlorite-Schist	87.84	85.74	19.77	223.07	6.64	2.03	1.11	3.02	0.00	15.06	34.14	3.52	15.16	3.28	0.75	2.61	0.51	3.00	0.76	2.06	0.29	2.70	0.41	5.26	0.35	9.44	5.37	2.42
8840-2	CA-RIV-1246	Chlorite-Schist	77.96	80.24	20.35	111.56	10.47	2.07	0.60	3.37	713.90	15.18	33.75	3.78	14.61	3.37	0.92	3.51	0.52	3.66	0.80	2.04	0.35	2.78	0.28	3.86	0.65	4.60	5.62	1.96
8840-2b	CA-RIV-1246	Chlorite-Schist	83.52	94.81	21.33	71.77	8.45	1.54	0.81	3.52	0.00	18.04	40.21	4.09	17.00	3.39	0.94	3.57	0.55	3.28	0.83	2.14	0.37	2.20	0.22	2.26	0.51	5.94	5.85	2.24
4725	CA-RIV-1246	Chlorite-Schist	85.23	100.65	23.12	40.04	7.90	1.92	0.96	2.80	1340.75	16.58	36.81	4.16	16.00	3.93	0.93	4.08	0.54	4.25	0.81	2.56	0.39	2.39	0.26	1.48	0.57	14.78	5.45	1.52
4725b	CA-RIV-1246	Chlorite-Schist	78.66	82.31	16.44	40.89	6.23	1.83	1.66	2.56	53962.88	16.36	36.51	4.04	14.29	2.78	0.58	2.53	0.35	2.70	0.57	1.63	0.21	1.64	0.26	1.56	0.37	14.79	5.01	1.35
8240	CA-RIV-1246	Talc-Chlorite Schist	0.00	8.84	19.03	41.71	28.86	1.98	0.28	0.13	0.00	0.48	4.97	1.06	6.60	3.40	0.69	3.51	0.73	5.41	1.03	2.48	0.27	2.45	0.20	1.35	1.47	1.58	7.15	0.83
8240b	CA-RIV-1246	Talc-Chlorite Schist	0.00	2.18	3.51	64.29	1.96	0.86	0.73	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.15	0.12	0.45	0.09	0.77	0.07	2.32	0.00	2.61	0.93	0.68
4513	CA-RIV-1246	Talc-Schist	1.12	103.60	5.91	27.17	3.17	1.04	0.27	0.01	562.70	2.46	10.55	0.71	2.63	1.17	0.16	1.24	0.15	1.37	0.18	0.72	0.08	0.53	0.12	0.94	0.22	3.59	1.33	0.38
4513b	CA-RIV-1246	Talc-Schist	0.00	105.49	16.36	35.68	14.42	1.92	0.79	0.00	16974.27	1.47	7.87	0.87	5.07	2.61	0.68	2.96	0.55	3.83	0.63	1.68	0.19	1.24	0.14	1.70	0.66	3.37	1.35	0.40

Table 15b. Calibrated LA-ICP-MS data for CA-RIV-1246 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
8340	CA-RIV-1246	Chlorite-Schist	86.94	100.70	21.11	60.96	8.60	2.12	0.91	2.79	1285.54	12.94	28.91	2.95	11.94	2.97	0.69	3.10	0.46	3.91	0.72	2.26	0.36	2.66	0.36	2.08	0.59	7.03	4.70	1.70
8340b	CA-RIV-1246	Chlorite-Schist	76.13	90.52	19.92	74.08	7.01	1.98	2.85	3.17	41980.35	18.48	43.62	4.59	16.08	3.42	0.82	2.80	0.64	3.57	0.74	2.24	0.28	2.20	0.18	2.02	0.55	5.91	7.40	2.25
4529-2	CA-RIV-1246	Chlorite-Schist	92.75	58.91	15.97	54.76	9.24	2.78	0.55	3.20	1275.98	12.08	30.52	2.96	11.13	2.42	0.56	2.54	0.37	2.85	0.49	1.83	0.25	1.86	0.28	1.85	0.64	14.60	4.80	1.75
4529-2b	CA-RIV-1246	Chlorite-Schist	70.58	66.23	16.30	94.56	8.74	2.49	1.24	2.55	39309.68	14.34	37.20	3.52	11.98	2.34	0.45	2.17	0.35	2.52	0.75	1.79	0.14	2.31	0.08	2.96	0.59	11.44	4.71	1.86
4639-2	CA-RIV-1246	Chlorite-Schist	84.99	92.92	21.57	244.98	9.06	2.58	0.62	3.48	1272.04	14.14	33.26	3.65	12.83	3.44	0.85	3.31	0.57	4.13	0.80	2.50	0.38	3.92	0.57	7.23	0.64	19.60	5.00	2.49
4639-2b	CA-RIV-1246	Chlorite-Schist	85.49	69.99	15.38	63.51	8.81	2.41	0.92	2.72	52930.51	9.39	23.57	2.58	9.67	2.29	0.61	2.28	0.39	2.59	0.56	1.92	0.24	2.26	0.26	2.05	0.63	25.25	4.54	1.58
8006-14	CA-RIV-1246	Talc-Chlorite Schist	1.55	5.47	31.50	177.24	3.31	1.88	0.94	0.16	3.60	0.66	5.19	1.24	7.66	3.83	1.45	4.41	0.70	5.40	1.13	3.59	0.62	4.33	0.55	4.76	0.18	0.91	0.38	0.52
8006-14b	CA-RIV-1246	Talc-Chlorite Schist	1.05	11.12	36.61	112.48	3.73	2.27	0.23	0.05	6.58	0.75	5.95	1.63	9.54	4.38	1.64	5.62	0.90	6.61	1.30	4.11	0.56	3.82	0.53	3.29	0.26	1.34	0.12	0.29
9094	CA-RIV-1246	Chlorite-Schist	71.83	108.56	18.55	131.53	11.01	1.73	1.28	3.86	977.05	15.38	56.67	3.45	13.25	3.07	0.78	2.82	0.39	3.32	0.53	1.90	0.31	2.84	0.29	3.60	0.51	19.52	6.03	2.29
9094b	CA-RIV-1246	Chlorite-Schist	79.42	101.66	20.17	58.97	8.37	1.92	0.82	3.21	939.82	17.12	41.42	4.05	15.86	3.51	0.79	3.79	0.48	3.56	0.66	2.36	0.25	1.85	0.29	1.79	0.47	7.62	8.56	1.91
8163	CA-RIV-1246	Chlorite-Schist	78.11	91.24	17.70	64.68	8.26	1.99	0.68	3.70	828.99	13.78	35.38	3.31	13.53	3.15	0.73	2.96	0.44	3.08	0.64	1.65	0.27	2.07	0.24	1.88	0.55	9.83	5.17	2.10
8163b	CA-RIV-1246	Chlorite-Schist	80.97	104.89	16.16	103.73	8.60	2.38	0.65	3.23	1128.35	13.24	30.37	3.25	12.04	2.62	0.63	2.44	0.30	2.87	0.57	2.03	0.21	2.29	0.38	3.02	0.52	8.08	6.92	1.83
8785	CA-RIV-1246	Talc-Chlorite Schist	6.45	18.44	35.55	177.01	5.00	1.27	0.29	0.21	12.04	1.32	3.67	0.71	5.71	3.26	1.41	4.96	0.97	7.93	1.42	4.34	0.63	4.16	0.38	4.44	0.22	1.56	0.31	0.25
8785b	CA-RIV-1246	Talc-Chlorite Schist	7.54	23.79	21.87	117.53	3.27	1.06	0.47	0.21	18.56	2.04	5.83	0.84	4.76	2.34	0.96	3.39	0.59	4.58	0.94	2.56	0.32	2.30	0.27	3.08	0.16	3.90	0.91	0.35
8840-1	CA-RIV-1246	Chlorite-Schist	73.61	92.00	18.42	112.18	8.72	1.63	0.55	3.06	920.25	15.24	34.72	3.71	13.55	2.99	0.76	2.98	0.50	3.35	0.66	1.95	0.33	2.48	0.30	3.33	0.56	5.56	5.38	2.04
8840-1b	CA-RIV-1246	Chlorite-Schist	67.76	93.93	18.63	88.82	8.28	1.92	1.58	2.78	1021.53	14.76	29.70	3.61	13.99	3.23	0.85	3.01	0.44	3.74	0.67	1.89	0.27	2.06	0.22	2.75	0.57	6.26	4.55	1.91
8823-1	CA-RIV-1246	Talc-Schist	299.28	5.96	0.74	1.07	0.23	0.70	0.74	11.13	1771.10	1.19	0.63	0.10	0.00	0.09	0.05	0.00	0.00	0.00	0.00	0.22	0.00	0.16	0.00	0.00	0.15	0.25	0.67	0.13
8823-1b	CA-RIV-1246	Talc-Schist	264.74	7.54	0.65	1.39	0.31	1.32	2.07	10.79	1537.74	1.21	0.76	0.16	0.00	0.07	0.07	0.00	0.00	0.43	0.00	0.03	0.00	0.00	0.00	0.00	0.10	1.74	0.76	0.11

Table 16a. Calibrated LA-ICP-MS data for CA-RIV-2936 Stone Beads in ppm (Na through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
444-0108	CA-RIV-2936	Talc-Chlorite-Schist	0.00	146399.48	801.48	297868.26	5159.92	0.00	0.11	0.00	4.30	145.32	715.61	69279.81	8583.74	195.82	7.52	168.36	2.41
444-0108b	CA-RIV-2936	Talc-Chlorite-Schist	0.00	220772.77	203.53	274720.76	0.00	0.00	0.00	72.26	22.89	26.26	870.81	26201.53	4518.62	224.55	0.00	287.14	14.46
444-1460A	CA-RIV-2936	Talc-Chlorite-Schist	1653.80	161020.81	93816.37	168342.77	0.00	8138.86	16.38	6768.13	180.73	108.86	2366.48	115706.43	386.02	50.44	27.54	120.74	0.71
444-1460Ab	CA-RIV-2936	Talc-Chlorite-Schist	0.00	207595.57	106035.21	141516.30	92.03	2620.65	28.16	1003.57	202.09	103.06	1633.59	99962.28	350.50	52.76	42.83	128.30	0.00
444-1460B	CA-RIV-2936	Talc-Chlorite-Schist	819.08	172451.74	110809.87	157731.19	0.00	759.25	16.56	385.06	134.81	99.34	2227.83	111144.44	806.51	62.59	35.47	139.17	0.81
444-1460Bb	CA-RIV-2936	Talc-Chlorite-Schist	829.22	203686.21	109662.64	137291.94	0.00	3521.64	28.35	5001.62	152.39	103.99	1626.70	99541.70	679.58	73.60	52.51	230.49	0.00
444-1476	CA-RIV-2936	Talc-Chlorite-Schist	2096.72	169129.13	97548.52	167445.99	0.00	953.75	20.46	357.93	154.10	76.36	2294.75	116511.99	961.06	70.23	12.39	118.01	1.32
444-1476b	CA-RIV-2936	Talc-Chlorite-Schist	4701.83	193937.10	103667.18	138373.93	342.03	8246.92	37.82	12299.55	150.53	99.06	1600.56	99325.40	627.00	70.55	33.76	163.63	6.26

Table 16b. Calibrated LA-ICP-MS data for CA-RIV-2936 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
444-0108	CA-RIV-2936	Talc-Chlorite-Schist	1.27	2.86	2.90	0.05	0.10	0.32	0.52	0.13	8.57	0.00	0.53	0.03	0.53	0.25	0.05	0.00	0.05	0.11	0.06	0.00	0.11	0.10	0.07	0.01	0.08	1.34	0.00	0.18
444-0108b	CA-RIV-2936	Talc-Chlorite-Schist	0.00	18.50	2.08	5.37	0.11	0.00	0.00	0.00	5.43	0.83	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.15	0.00	0.22
444-1460A	CA-RIV-2936	Talc-Chlorite-Schist	0.00	49.36	10.73	31.26	8.37	1.22	0.42	0.02	3.34	0.79	3.03	0.61	3.18	1.82	0.46	2.20	0.51	2.86	0.45	1.06	0.18	1.32	0.13	0.91	0.58	0.89	0.96	0.42
444-1460Ab	CA-RIV-2936	Talc-Chlorite-Schist	0.00	20.71	6.17	172.83	1.49	0.00	0.57	0.00	0.00	0.36	0.35	0.23	0.75	0.00	0.00	0.07	0.05	0.94	0.39	0.85	0.19	2.30	0.29	6.86	0.06	0.43	0.00	1.68
444-1460B	CA-RIV-2936	Talc-Chlorite-Schist	0.00	2.12	3.36	96.80	0.32	0.51	0.40	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.21	0.07	1.00	0.26	3.00	0.04	0.88	1.03	0.90
444-1460Bb	CA-RIV-2936	Talc-Chlorite-Schist	0.67	10.46	10.44	58.37	5.40	0.96	0.82	0.03	0.00	0.00	0.89	0.25	0.44	0.90	0.18	1.34	0.20	1.93	0.51	0.78	0.21	0.50	0.38	2.93	0.38	2.02	0.00	0.93
444-1476	CA-RIV-2936	Talc-Chlorite-Schist	0.00	4.15	1.74	16.75	0.61	0.30	0.77	0.09	0.00	0.06	0.47	0.08	0.42	0.20	0.03	0.36	0.04	0.37	0.07	0.00	0.00	0.01	0.02	0.53	0.07	0.86	0.52	0.19
444-1476b	CA-RIV-2936	Talc-Chlorite-Schist	0.00	6.41	40.02	892.88	12.85	2.57	2.10	0.41	0.00	0.49	2.75	0.67	4.53	3.12	0.79	3.89	0.78	5.93	1.52	7.40	1.15	11.75	2.41	34.37	1.36	1.31	4.69	7.23

Table 17a. Calibrated LA-ICP-MS data for CA-LAN-21 Stone Beads in ppm (Na through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
VS-179-1227	CA-LAN-21	Chlorite-Schist	0.00	77943.27	103426.43	190026.66	25922.37	23472.45	46.63	8650.81	249.25	583.05	1916.26	127305.34	462.74	72.77	54.79	369.50	0.00
VS-179-1227b	CA-LAN-21	Chlorite-Schist	1805.71	60512.04	88556.65	235483.88	27077.52	24900.18	56.48	10290.88	235.06	482.96	1336.04	93684.97	400.68	52.07	45.77	318.95	0.00
VS-179-1131	CA-LAN-21	Chlorite-Schist	1111.98	67045.49	103188.18	212304.47	24374.88	18364.05	41.61	6469.19	229.81	548.49	1686.85	114959.63	425.83	55.81	73.56	319.47	0.00
VS-179-1131b	CA-LAN-21	Chlorite-Schist	11120.06	51621.89	100175.14	232060.66	27462.11	17087.82	39.09	6947.53	225.65	541.48	1408.29	96591.64	345.63	46.68	36.45	218.00	6.86
VS-179-1140	CA-LAN-21	Chlorite-Schist	4030.95	62434.04	95018.22	207991.40	35832.43	24176.97	51.18	10539.07	243.06	613.63	1771.09	114843.36	367.54	45.55	21.69	374.07	0.00
VS-179-1140b	CA-LAN-21	Chlorite-Schist	6826.70	59821.52	89971.25	226961.49	36760.75	19913.72	41.76	7153.86	221.65	832.16	982.91	101117.27	382.64	46.41	19.56	341.96	4.94
VS-179-1199	CA-LAN-21	Chlorite-Schist	9065.54	74969.81	96860.38	197664.81	20103.59	22654.84	53.37	7042.31	225.66	615.72	1222.25	127569.26	377.42	54.62	25.15	227.34	0.00
VS-179-1199b	CA-LAN-21	Chlorite-Schist	3870.18	73403.60	88048.13	220704.63	22667.04	19722.29	46.69	7192.08	226.42	808.25	1090.88	112387.75	414.57	51.09	21.91	229.65	10.44
VS-179-1127	CA-LAN-21	Chlorite-Schist	1444.33	63336.32	98737.75	212335.82	22025.17	20874.30	52.82	6601.90	240.51	407.55	2177.03	121609.74	309.39	57.10	13.11	191.72	0.00
VS-179-1127b	CA-LAN-21	Chlorite-Schist	6702.50	71305.89	88115.67	222437.42	21330.49	20094.42	44.45	7967.89	229.57	683.06	1272.59	109486.65	387.01	49.73	15.59	209.41	0.00
VS-179-1212	CA-LAN-21	Chlorite-Schist	186.36	66731.98	101451.07	221690.12	25243.83	20008.05	49.23	7238.39	245.93	409.69	1146.92	102129.95	389.56	54.48	51.56	293.68	0.00
VS-179-1212b	CA-LAN-21	Chlorite-Schist	7314.07	55694.30	98127.67	237147.78	28556.72	21298.56	36.69	6371.20	197.99	488.23	928.69	86250.60	377.50	44.69	39.10	247.82	5.12
VS-179-1198	CA-LAN-21	Chlorite-Schist	0.00	66999.56	104800.39	199020.22	35497.86	17058.80	44.81	7944.88	242.24	605.13	1041.89	124343.55	450.74	51.67	38.76	502.15	0.00
VS-179-1198b	CA-LAN-21	Chlorite-Schist	16315.83	64425.81	89919.26	212889.35	34965.54	16437.30	32.72	6747.78	228.21	619.98	900.04	113657.63	463.52	52.32	31.29	385.81	18.48
VS-179-1132	CA-LAN-21	Chlorite-Schist	0.00	55720.50	91601.77	214139.48	26203.89	46272.15	59.03	5054.39	212.60	579.81	634.74	114377.31	522.94	37.20	71.51	305.25	0.00
VS-179-1132b	CA-LAN-21	Chlorite-Schist	9808.14	57047.20	86810.48	223553.02	28861.28	39387.01	55.02	5872.31	223.10	740.68	824.54	99377.63	566.10	36.80	65.82	270.38	8.66
VS-179-1139	CA-LAN-21	Chlorite-Schist	4128.26	44962.67	100516.77	212928.22	28940.81	18010.18	39.04	10201.04	259.54	704.17	964.78	132703.08	452.09	67.08	64.17	310.52	4.20
VS-179-1139b	CA-LAN-21	Chlorite-Schist	12975.65	41849.91	92929.06	219505.26	26595.25	21632.97	41.88	11636.98	240.02	583.25	1023.80	125204.39	445.43	44.30	55.92	326.88	23.26
VS-179-1159	CA-LAN-21	Chlorite-Schist	0.00	80751.46	78296.47	184363.83	30320.76	29950.96	60.18	10588.77	266.31	746.92	1388.95	153343.82	495.32	62.02	34.34	530.77	1.80
VS-179-1159b	CA-LAN-21	Chlorite-Schist	3042.47	74290.35	81632.16	196153.48	36672.86	23529.97	48.22	8306.50	246.78	803.55	1131.54	140321.61	478.11	56.55	33.09	399.86	27.91
VS-179-1130	CA-LAN-21	Chlorite-Schist	1733.92	60727.59	91338.23	219426.36	33795.86	19239.90	44.75	7596.02	220.11	635.92	1664.87	116191.65	380.42	224.07	70.90	335.85	14.56
VS-179-1130b	CA-LAN-21	Chlorite-Schist	18182.77	67183.58	82249.72	215709.33	28166.50	16925.45	46.75	6121.42	219.27	664.98	880.92	120710.36	421.97	44.92	48.14	350.18	27.56
VS-179-1206	CA-LAN-21	Chlorite-Schist	10422.63	92473.06	63504.03	177346.46	17915.08	38336.71	55.84	9016.15	276.19	829.31	1560.52	156437.97	415.25	62.00	51.16	392.19	7.47
VS-179-1206b	CA-LAN-21	Chlorite-Schist	7192.86	95700.64	64476.38	188283.78	19264.89	27128.56	48.03	13345.80	265.68	883.74	1698.68	147149.85	472.98	71.02	24.21	375.21	21.87
VS-179-1192	CA-LAN-21	Chlorite-Schist	0.00	78259.49	81129.92	216240.46	18930.22	24215.34	44.46	6244.69	229.79	907.63	1446.00	124794.52	433.86	59.39	227.83	433.77	16.41
VS-179-1192b	CA-LAN-21	Chlorite-Schist	8393.60	84168.37	73112.88	196903.96	15668.09	36591.58	57.70	12873.07	247.63	713.59	1985.54	132112.04	486.64	72.71	258.80	446.57	14.69
VS-179-1158	CA-LAN-21	Chlorite-Schist	0.00	52625.21	90910.97	218536.05	24191.35	46799.07	45.30	6461.09	180.76	451.15	2274.64	111376.42	361.72	46.81	72.78	528.51	24.21
VS-179-1158b	CA-LAN-21	Chlorite-Schist	19249.25	70958.50	76995.63	196079.21	15280.64	53264.49	62.46	12282.80	227.66	913.84	1969.08	117472.97	426.75	52.33	45.95	571.59	22.26
VS-179-1162	CA-LAN-21	Chlorite-Schist	9986.84	55541.79	97284.46	204873.41	16974.78	24444.20	44.68	9291.92	214.68	722.38	819.46	135499.07	748.63	39.37	149.00	383.99	0.00
VS-179-1162b	CA-LAN-21	Chlorite-Schist	9738.59	54327.03	92417.29	214515.61	17236.49	29330.20	63.20	13519.84	258.82	826.42	681.34	119358.88	741.71	33.77	115.13	389.62	5.65
VS-179-1175	CA-LAN-21	Chlorite-Schist	0.00	44248.65	114012.90	210895.00	34310.30	20347.37	39.80	10075.91	225.50	451.20	1856.02	115670.21	267.43	59.53	63.18	331.62	37.70
VS-179-1175b	CA-LAN-21	Chlorite-Schist	16455.93	47065.95	88049.23	243114.90	35352.24	21767.15	32.74	6731.46	173.37	408.05	1382.18	85450.78	283.77	47.15	19.29	218.34	22.90
VS-179-1217	CA-LAN-21	Chlorite-Schist	2051.10	43502.59	97762.93	210457.23	30042.99	50042.10	41.52	7718.89	190.57	377.73	1185.68	114087.27	268.29	42.44	41.42	449.78	46.97
VS-179-1217b	CA-LAN-21	Chlorite-Schist	13040.66	49684.45	81304.86	241737.06	24995.86	30643.06	45.22	8205.59	205.72	579.84	571.31	95481.07	370.27	34.48	25.87	307.43	25.07
VS-179-1149	CA-LAN-21	Chlorite-Schist	4975.66	73333.07	89910.49	193231.02	47728.85	23245.01	51.75	5940.55	236.72	671.33	1126.61	126565.34	444.55	54.97	64.21	464.50	59.51
VS-179-1149b	CA-LAN-21	Chlorite-Schist	9092.06	76177.90	85393.09	196662.12	49469.86	18229.26	41.80	7201.65	235.33	682.83	1116.09	122800.32	474.79	54.35	28.99	255.14	14.80
VS-179-1210	CA-LAN-21	Chlorite-Schist	2864.00	27742.12	145442.37	209366.40	25700.62	14154.27	39.90	5681.50	186.35	278.92	1243.22	112415.11	225.99	36.08	54.87	293.36	1.62
VS-179-1210b	CA-LAN-21	Chlorite-Schist	8874.31	26067.01	130964.04	223933.43	29465.17	13730.39	34.24	6962.65	170.57	277.08	1748.05	101148.94	216.77	45.07	60.65	287.71	32.03
VS-179-1228	CA-LAN-21	Chlorite-Schist	0.00	54022.46	105922.31	208003.52	36368.57	18704.06	39.02	7487.87	244.89	501.44	1414.84	122795.10	357.64	65.76	74.38	362.47	10.86
VS-179-1228b	CA-LAN-21	Chlorite-Schist	5613.84	52572.97	100662.36	211165.65	38765.83	17556.23	38.33	10072.40	243.31	516.98	2093.91	116504.83	378.89	74.45	87.83	351.31	22.74
VS-179-1188	CA-LAN-21	Chlorite-Schist	9070.26	65239.04	89908.92	169432.27	16509.88	36356.62	49.47	9819.43	224.29	633.93	2123.56	175362.30	467.11	76.83	82.86	586.79	48.59
VS-179-1188b	CA-LAN-21	Chlorite-Schist	6282.66	75439.43	79853.84	190545.95	16232.55	36148.99	45.60	10752.52	210.03	723.28	1626.27	148212.84	482.34	60.09	75.83	526.67	0.07
VS-179-1216	CA-LAN-21	Chlorite-Schist	10878.66	72124.40	74976.24	214607.29	37132.54	28279.54	59.35	7124.60	191.71	747.04	1329.28	112860.78	390.44	56.43	98.12	399.01	6.87
VS-179-1216b	CA-LAN-21	Chlorite-Schist	12760.90	84225.80	78096.23	183801.99	41292.83	26465.81	54.41	10761.40	230.84	890.92	1444.34	132599.41	465.68	60.69	112.15	421.38	9.68

Table 17b. Calibrated LA-ICP-MS data for CA-LAN-21 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
VS-179-1227	CA-LAN-21	Chlorite-Schist	126.35	117.57	40.77	58.31	11.13	4.89	3.90	4.74	1534.34	29.78	94.61	6.91	26.63	6.46	2.34	8.19	1.06	8.47	1.41	3.69	0.27	4.49	0.48	2.38	0.98	29.72	8.90	3.03
VS-179-1227b	CA-LAN-21	Chlorite-Schist	125.63	179.14	79.88	81.68	24.55	8.63	2.70	6.23	1670.96	42.77	94.70	10.09	41.47	7.91	2.16	11.76	2.32	14.52	3.57	9.27	1.77	9.18	0.95	3.55	1.65	32.43	9.12	3.48
VS-179-1131	CA-LAN-21	Chlorite-Schist	103.05	140.52	33.70	93.54	10.73	3.58	2.00	3.69	1674.63	31.81	68.57	6.35	27.07	6.88	0.95	5.98	0.78	6.03	0.98	2.20	0.54	4.14	0.37	3.94	0.64	39.39	14.48	3.36
VS-179-1131b	CA-LAN-21	Chlorite-Schist	132.82	165.97	26.42	57.30	14.95	3.09	1.12	5.80	1414.73	37.37	85.25	6.87	27.84	6.88	0.90	4.44	0.62	5.43	0.91	3.41	0.33	2.85	0.27	3.09	1.07	24.41	14.90	3.65
VS-179-1140	CA-LAN-21	Chlorite-Schist	111.07	143.95	62.62	204.59	14.94	2.60	3.10	4.45	1200.98	23.92	45.05	6.46	26.54	7.40	1.53	9.87	1.61	12.99	2.34	5.80	1.04	5.89	1.08	8.76	0.87	24.62	11.88	3.41
VS-179-1140b	CA-LAN-21	Chlorite-Schist	117.04	197.28	51.26	52.28	11.33	2.36	1.62	4.90	1530.91	100.04	151.43	16.96	64.41	13.89	3.02	13.20	1.66	10.34	2.03	5.20	0.66	3.87	0.69	2.92	0.94	25.71	30.85	5.01
VS-179-1199	CA-LAN-21	Chlorite-Schist	87.80	196.60	34.08	121.76	9.54	1.39	1.28	3.40	1946.88	44.32	70.04	7.40	30.39	5.95	1.12	6.29	0.98	5.59	0.99	3.46	0.27	4.77	0.56	5.45	0.58	16.00	11.68	3.89
VS-179-1199b	CA-LAN-21	Chlorite-Schist	97.14	152.54	30.99	109.31	9.83	2.77	0.00	4.79	1452.50	16.32	33.59	3.28	16.47	4.09	1.24	5.37	0.75	5.88	1.46	4.06	0.70	3.73	0.70	5.55	0.89	11.24	6.73	2.22
VS-179-1127	CA-LAN-21	Chlorite-Schist	123.17	150.43	45.41	2628.97	14.72	3.26	1.53	5.15	1573.95	30.90	78.09	6.72	25.37	7.14	1.00	7.44	1.00	6.35	1.34	5.41	1.28	15.86	3.55	74.85	1.00	27.55	13.33	6.60
VS-179-1127b	CA-LAN-21	Chlorite-Schist	110.24	145.94	32.66	125.57	9.28	2.30	0.71	4.34	1200.50	22.79	35.54	5.19	22.43	3.96	0.87	4.21	0.78	5.53	1.25	4.78	0.63	3.51	0.59	5.22	0.71	15.51	8.78	2.76
VS-179-1212	CA-LAN-21	Chlorite-Schist	120.02	118.92	26.74	48.55	12.53	1.95	0.02	4.98	1541.03	27.51	69.44	7.16	22.22	6.88	0.28	3.91	0.55	4.07	1.02	2.90	0.27	2.03	1.29	1.64	0.85	19.14	11.67	2.86
VS-179-1212b	CA-LAN-21	Chlorite-Schist	132.44	189.69	23.33	65.68	10.17	3.55	0.00	3.91	2030.44	25.20	56.85	6.23	23.26	4.71	0.86	3.95	0.41	4.79	1.22	2.79	0.82	3.16	0.27	3.78	0.75	24.97	10.00	2.92
VS-179-1198	CA-LAN-21	Chlorite-Schist	123.65	113.18	39.28	157.60	12.91	3.29	0.78	5.23	1743.36	32.32	36.22	7.83	25.09	5.00	1.05	6.46	0.89	6.61	0.79	2.97	0.46	2.89	0.80	5.85	1.22	25.65	9.18	4.44
VS-179-1198b	CA-LAN-21	Chlorite-Schist	121.77	121.29	27.85	102.05	11.69	3.74	1.20	5.44	1693.65	30.40	31.47	6.02	26.36	5.79	1.08	4.75	1.11	6.18	0.94	3.09	0.42	3.00	0.76	5.63	0.73	20.65	7.46	3.99
VS-179-1132	CA-LAN-21	Chlorite-Schist	102.85	320.35	164.04	96.18	8.11	3.33	3.63	5.40	2306.59	172.61	83.47	30.86	121.26	30.89	5.75	26.74	4.10	26.67	5.28	13.73	2.05	12.63	2.32	3.84	0.61	31.12	10.35	62.26
VS-179-1132b	CA-LAN-21	Chlorite-Schist	116.34	247.50	134.43	78.71	10.12	2.88	1.54	5.26	2045.01	128.79	91.09	25.54	115.62	22.48	4.55	26.25	3.46	24.24	4.75	12.48	1.48	11.93	2.06	4.64	1.01	25.65	16.56	37.96
VS-179-1139	CA-LAN-21	Chlorite-Schist	132.46	116.09	50.99	77.38	14.40	4.21	2.30	4.52	1900.15	34.22	106.82	7.70	31.06	7.01	1.54	7.66	1.23	7.96	1.37	4.95	0.78	5.30	0.56	3.09	1.18	72.86	12.45	7.50
VS-179-1139b	CA-LAN-21	Chlorite-Schist	109.60	143.85	68.88	122.73	14.91	5.85	5.08	4.18	1515.84	36.09	97.72	8.09	33.14	9.63	1.87	11.20	1.52	9.44	2.53	8.32	1.35	7.05	0.74	5.69	1.29	96.35	12.45	8.84
VS-179-1159	CA-LAN-21	Chlorite-Schist	60.59	173.41	62.65	160.33	16.09	3.33	0.78	1.55	1705.81	32.38	66.38	8.61	30.00	9.08	2.32	8.00	1.38	12.72	2.29	6.97	0.91	7.00	0.76	7.17	1.12	29.13	22.81	6.61
VS-179-1159b	CA-LAN-21	Chlorite-Schist	75.32	149.34	31.68	96.39	11.28	5.03	1.49	2.93	1338.15	21.46	42.49	4.65	17.46	4.82	0.94	5.61	0.73	5.04	0.75	2.79	0.73	4.76	0.46	4.95	1.03	23.55	10.99	5.13
VS-179-1130	CA-LAN-21	Chlorite-Schist	106.43	144.04	45.24	225.10	12.32	4.29	3.68	4.87	1782.05	28.05	37.33	5.69	25.05	5.46	1.80	7.35	1.12	8.83	1.53	3.51	0.35	5.20	0.67	9.03	0.97	34.96	8.70	5.25
VS-179-1130b	CA-LAN-21	Chlorite-Schist	101.54	128.43	34.80	68.41	9.48	2.96	1.19	4.76	1619.48	26.22	35.68	5.55	21.64	5.39	1.38	6.18	0.84	4.58	1.17	4.74	0.56	3.68	0.29	3.05	0.90	25.55	7.71	4.22
VS-179-1206	CA-LAN-21	Chlorite-Schist	38.32	1020.99	47.42	657.14	13.16	3.88	2.43	0.51	9762.97	73.38	139.36	15.44	47.42	9.60	1.94	7.59	1.25	8.37	1.54	6.42	0.82	9.15	1.53	24.91	1.17	18.15	16.99	6.54
VS-179-1206b	CA-LAN-21	Chlorite-Schist	42.26	380.53	47.96	86.11	23.67	3.93	2.29	1.12	5538.36	28.82	75.22	8.02	29.73	8.15	2.24	7.30	1.54	7.46	1.88	5.10	0.90	5.56	0.71	3.76	1.47	14.12	9.90	4.08
VS-179-1192	CA-LAN-21	Chlorite-Schist	45.80	193.52	33.36	191.75	9.70	1.78	1.58	0.89	1876.81	21.96	48.47	5.95	21.26	5.36	0.85	6.26	1.08	6.24	1.23	3.79	0.62	4.38	0.66	7.76	0.61	18.20	11.71	4.25
VS-179-1192b	CA-LAN-21	Chlorite-Schist	40.54	194.93	49.55	195.30	15.48	1.97	0.35	0.72	1680.76	22.98	52.91	5.24	20.24	7.07	0.96	8.37	1.25	7.99	2.67	7.59	1.01	6.99	1.26	8.07	1.49	13.99	24.41	5.27
VS-179-1158	CA-LAN-21	Chlorite-Schist	87.12	259.36	43.90	42.73	9.97	6.08	3.39	1.85	1571.74	47.90	79.86	10.08	36.21	8.13	2.14	8.29	1.32	6.79	1.75	4.06	0.48	3.40	0.32	2.29	0.57	61.05	11.74	6.52
VS-179-1158b	CA-LAN-21	Chlorite-Schist	52.71	207.32	56.62	52.65	13.79	3.52	1.06	0.69	1423.27	324.80	374.17	58.72	248.21	39.10	7.49	23.38	2.92	13.21	2.41	6.38	0.91	7.82	0.54	2.54	1.53	51.44	33.02	6.90
VS-179-1162	CA-LAN-21	Chlorite-Schist	119.75	172.35	40.91	240.38	14.62	5.51	2.44	7.28	2045.84	26.89	41.98	7.13	23.31	6.18	1.29	6.19	1.27	3.69	1.80	4.18	0.48	9.38	0.76	8.77	1.26	296.76	8.93	4.79
VS-179-1162b	CA-LAN-21	Chlorite-Schist	126.00	160.44	42.62	408.79	11.31	4.77	1.01	6.34	1871.07	26.46	44.37	6.09	24.68	6.10	1.86	8.64	1.25	11.21	1.47	5.88	0.85	7.75	0.53	19.16	0.67	48.00	7.43	5.06
VS-179-1175	CA-LAN-21	Chlorite-Schist	141.71	187.54	39.67	65.57	29.16	2.84	3.07	4.97	1619.53	53.29	101.31	11.52	40.16	6.81	2.07	6.72	1.41	5.81	1.49	3.68	0.47	3.88	0.29	3.57	2.33	31.49	20.64	7.88
VS-179-1175b	CA-LAN-21	Chlorite-Schist	118.94	183.69	33.33	135.08	11.94	2.40	0.28	5.32	1612.76	24.59	59.41	5.74	21.88	5.56	1.06	6.13	0.73	4.95	1.52	3.04	0.77	4.29	0.57	5.20	0.88	17.21	9.38	5.92
VS-179-1217	CA-LAN-21	Chlorite-Schist	126.15	357.37	74.76	81.24	18.25	2.82	2.52	4.92	2090.21	96.76	137.42	17.28	69.72	15.16	2.94	14.73	2.82	13.48	2.79	6.89	0.73	8.18	1.00	3.49	1.37	33.69	16.91	12.37
VS-179-1217b	CA-LAN-21	Chlorite-Schist	108.05	196.16	39.14	89.24	10.49	3.38	0.00	5.04	1489.07	36.06	50.84	7.29	27.58	8.13	1.58	8.46	0.99	4.52	1.25	4.35	0.91	3.35	0.56	3.28	0.79	21.73	9.10	5.21
VS-179-1149	CA-LAN-21	Chlorite-Schist	125.32	134.69	25.98	91.77	9.00	8.58	49.77	4.22	1522.41	16.78	24.77	4.24	16.15	3.57	1.12	3.67	0.68	4.82	0.99	3.08	0.25	2.93	0.36	4.38	0.72	162.01	7.62	3.77
VS-179-1149b	CA-LAN-21	Chlorite-Schist	125.31	123.73	27.54	78.51	8.13	2.67	0.29	2.95	1251.88	28.58	33.75	4.38	17.20	5.43	0.91	4.27	0.63	4.52	0.80	3.59	0.60	3.57	0.26	3.12	0.64	15.29	8.96	3.23
VS-179-1210	CA-LAN-21	Chlorite-Schist	134.39	164.66	34.37	63.77	16.09	5.13	3.34	5.48	1367.96	80.67	158.78	16.68	62.62	9.88	1.96	8.85	0.92	7.24	1.19	3.13	0.43	3.36	0.44	3.25	1.56	26.37	28.77	5.85
VS-179-1210b	CA-LAN-21	Chlorite-Schist	163.18	151.59	32.52	45.10	20.44	4.34	5.43	5.56	1593.51	63.34	133.74	12.56	42.59	9.75	0.87	7.20	1.19	4.10	1.22	3.43	0.37	2.60	0.34	1.74	2.00	37.48	23.05	5.73
VS-179-1228	CA-LAN-21	Chlorite-Schist	122.32	137.84	34.53	77.44	14.10	24.16	1.63	4.81	1329.80	38.75	91.30	8.85	37.33	6.04	1.28	6.61	0.84	5.68	1.38	3.40	0.57	3.25	0.27	3.50	0.98	73.41	15.28	4.76
VS-179-1228b	CA-LAN-21	Chlorite-Schist	133.85	129.63	49.82	108.14	18.89	16.82	1.82	5.64	1563.73	41.75	101.32	9.28	33.74	6.29	1.00	6.15	1.14	10.37	2.09	5.37	0.75	5.32	0.52	5.30	1.13	85.49	14.96	4.79
VS-179-1188	CA-LAN-21	Chlorite-Schist	86.09	244.08	51.48	143.93	25.49	6.61	6.66	3.66	1476.08	80.13	119.89	15.99	62.68	11.48	1.69	10.07	1.67	9.06	2.23	3.78	1.00	3.69	1.13	4.93	1.49	30.55	17.01	6.36
VS-179-1188b	CA-LAN-21	Chlorite-Schist	62.93	192.52	38.74	52.57	16.62	5.18	1.45	1.59	1230.71	38.29	97.30	8.25	31.35	7.76	1.25	6.99	1.26	2.93	1.40	4.03	0.33	2.96	0.46	2.47	1.40	29.80	13.28	4.83
VS-179-1216	CA-LAN-21	Chlorite-Schist	92.31	205.96	48.50	169.27	13.08	4.30	1.69	0.80	1159.76	39.78	52.46	8.47	37.00	8.86	1.59	9.61	1.15	8.14	2.12	5.65	0.98	5.48	1.03	7.11	1.18	40.03	11.45	4.49
VS-179-1216b	CA-LAN-21	Chlorite-Schist	84.35	152.28	39.22	98.03	16.05	5.75	1.10	2.03	1467.68	21.64	32.68	5.46	20.46	4.91	1.00	6.31	0.93	7.25	1.51	3.85	0.53	4.41	0.78	4.13	1.16	34.50	10.74	4.05

Table 18a. Calibrated LA-ICP-MS data for CA-LAN-21 Stone Beads in ppm (Na through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
VS-179-1141	CA-LAN-21	Talc-Schist	0.00	181773.92	9328.99	283377.17	0.00	0.00	4.30	835.67	45.68	632.87	261.56	48768.63	1023.19	29.38	27.55	144.68	0.00
VS-179-1141b	CA-LAN-21	Talc-Schist	384.38	188190.25	2727.92	278414.89	558.39	1110.61	5.42	194.74	6.04	0.00	211.89	56873.67	1298.84	36.82	15.15	143.59	0.98
VS-179-1142	CA-LAN-21	Talc-Schist	0.00	213445.74	1330.07	267438.64	0.00	0.00	6.71	82.22	22.95	411.47	293.30	47524.10	1137.46	61.04	4.52	125.41	0.00
VS-179-1142b	CA-LAN-21	Talc-Schist	6664.06	188128.48	1495.53	274303.34	0.00	1691.05	6.21	148.18	7.02	8.74	263.98	58855.05	1047.10	44.31	28.94	149.70	0.00
VS-179-1144	CA-LAN-21	Talc-Schist	0.00	210303.76	300.07	274835.54	0.00	0.00	5.61	37.09	22.83	447.31	264.80	41420.95	1275.90	48.06	10.33	147.35	0.00
VS-179-1144b	CA-LAN-21	Talc-Schist	3012.68	194052.97	197.06	279770.10	0.00	771.93	7.48	20.85	2.20	19.24	250.87	49876.83	1283.88	44.98	17.71	165.66	0.00
VS-179-1194	CA-LAN-21	Talc-Schist	0.00	134915.14	127898.68	149784.32	3484.54	16505.72	43.40	5085.24	220.36	285.08	1596.15	120450.08	327.00	41.53	23.86	574.92	0.00
VS-179-1194b	CA-LAN-21	Talc-Schist	0.00	128784.50	123258.05	149812.01	6147.34	16420.66	39.91	5266.45	195.65	123.62	1091.19	132074.90	364.13	29.24	33.10	556.77	0.00
VS-179-681	CA-LAN-21	Talc-Schist	0.00	239878.96	751.80	221999.60	0.00	0.00	9.32	41.93	38.01	249.82	655.40	85266.83	1188.75	78.59	16.33	203.06	0.00
VS-179-681b	CA-LAN-21	Talc-Schist	2700.05	212080.35	852.34	234388.51	295.00	1571.13	13.02	63.50	19.90	41.82	606.98	94870.53	1075.49	68.73	24.60	179.29	0.00

Table 18b. Calibrated LA-ICP-MS data for CA-LAN-21 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
VS-179-1141	CA-LAN-21	Talc-Schist	0.00	27.22	6.47	7.23	4.01	1.99	0.84	0.00	43.61	9.27	12.72	1.34	6.23	0.08	0.00	0.10	0.00	0.69	0.39	0.35	0.02	0.00	0.00	0.00	0.25	1.00	3.47	1.44
VS-179-1141b	CA-LAN-21	Talc-Schist	3.74	7.23	1.86	2.31	1.16	2.70	1.76	0.22	15.34	2.69	7.41	0.00	2.00	0.31	0.00	0.00	0.00	0.00	0.03	0.23	0.00	0.07	0.00	0.00	0.00	1.51	1.27	0.42
VS-179-1142	CA-LAN-21	Talc-Schist	0.00	16.56	4.55	3.73	0.23	2.08	0.00	0.00	30.31	8.44	5.07	1.10	7.45	0.82	0.00	0.73	0.06	3.12	0.35	0.00	0.09	0.00	0.00	0.00	0.01	1.20	0.69	0.88
VS-179-1142b	CA-LAN-21	Talc-Schist	1.62	18.74	9.65	1.02	0.21	2.55	1.23	0.02	32.25	14.25	6.71	1.82	11.40	1.55	0.22	0.81	0.21	2.30	0.36	0.43	0.00	0.10	0.00	0.00	0.01	2.24	0.67	1.11
VS-179-1144	CA-LAN-21	Talc-Schist	0.00	6.76	0.11	1.03	0.00	1.42	0.67	0.00	8.58	0.64	1.72	0.00	0.41	0.00	0.00	0.00	0.00	0.08	0.03	0.07	0.00	0.00	0.00	0.00	0.00	1.16	0.15	0.14
VS-179-1144b	CA-LAN-21	Talc-Schist	0.05	4.18	1.05	0.09	0.00	2.12	1.83	0.00	8.68	0.77	2.22	0.00	0.07	0.53	0.00	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	1.47	0.21	0.41
VS-179-1194	CA-LAN-21	Talc-Schist	15.47	136.61	34.92	200.68	11.81	2.64	0.29	0.00	624.32	14.95	45.52	3.64	17.75	4.74	0.67	6.72	0.93	6.50	1.40	3.94	0.59	4.16	0.95	8.14	1.28	1.71	8.02	3.72
VS-179-1194b	CA-LAN-21	Talc-Schist	16.73	91.06	26.22	215.61	5.39	2.38	0.97	0.42	583.06	7.83	15.86	1.52	9.89	2.60	0.60	3.64	0.80	5.22	1.01	3.46	0.55	5.34	0.87	10.66	0.50	2.24	5.32	2.85
VS-179-681	CA-LAN-21	Talc-Schist	0.00	31.39	7.03	5.15	0.52	3.51	0.00	0.00	82.49	8.87	11.22	1.47	7.33	1.42	0.14	1.13	0.17	0.82	0.19	0.43	0.00	0.23	0.00	0.00	0.00	4.38	1.54	1.21
VS-179-681b	CA-LAN-21	Talc-Schist	0.02	25.09	5.37	4.66	0.42	3.15	1.38	0.00	78.77	7.54	7.57	1.30	7.20	1.52	0.23	0.66	0.11	0.77	0.18	0.84	0.00	0.21	0.03	0.00	0.00	4.02	1.38	0.86

Table 19a. Calibrated LA-ICP-MS data for CA-LAN-21 Stone Beads in ppm (Na through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
179-1123	CA-LAN-21	Chlorite-Talc-Schist	2309.27	158156.06	97864.87	141820.40	2983.41	4436.92	46.15	8140.87	183.60	180.38	1750.16	152781.46	218.49	21.55	29.06	169.77	2.82
179-1123B	CA-LAN-21	Chlorite-Talc-Schist	2718.16	186159.21	99079.40	133263.70	2940.20	7159.69	61.05	19213.58	199.27	203.60	1881.69	115374.69	239.10	17.68	26.83	128.34	7.46
179-1135	CA-LAN-21	Chlorite-Talc-Schist	0.00	182209.02	85123.44	152905.36	0.00	3369.86	0.00	8413.57	265.26	94.33	1293.98	131290.25	83.10	22.78	21.57	164.85	0.00
179-1135B	CA-LAN-21	Chlorite-Talc-Schist	2391.81	216488.81	102031.86	122620.04	3183.37	4135.46	60.67	5033.93	167.14	287.71	1180.90	112599.42	258.82	21.73	47.31	160.87	10.89
179-1136	CA-LAN-21	Chlorite-Talc-Schist	0.00	116987.31	68132.71	153801.59	993.05	2042.13	0.00	4249.92	65.43	3.92	1736.77	233085.04	33.38	33.53	0.00	177.08	0.00
179-1136B	CA-LAN-21	Chlorite-Talc-Schist	772.37	154972.67	82618.09	132291.76	2421.84	21534.49	30.06	540.03	67.57	99.89	1773.23	185379.03	127.25	30.43	3.70	134.88	3.86
179-1143	CA-LAN-21	Chlorite-Schist	0.00	116075.27	59621.87	237024.28	2464.44	1615.67	0.00	1669.22	126.15	0.00	959.82	123780.09	279.85	28.66	0.00	119.01	0.00
179-1143B	CA-LAN-21	Chlorite-Schist	2024.10	213271.55	94799.98	133482.75	5136.66	2884.10	21.86	2031.66	175.12	145.58	913.08	113433.63	445.48	35.04	10.77	127.24	3.02
179-1145	CA-LAN-21	Chlorite-Talc-Schist	1813.23	172264.79	808.48	276375.36	0.00	1464.20	79.76	54.99	1.75	221.35	142.38	77767.52	3396.41	29.57	34.39	133.33	9.27
179-1145B	CA-LAN-21	Chlorite-Talc-Schist	4118.74	183057.26	251.65	278655.34	5352.24	1345.96	105.54	67.48	2.42	154.15	138.30	56440.06	2996.27	33.50	26.55	104.76	8.94
179-1148	CA-LAN-21	Chlorite-Talc-Schist	1303.29	177324.47	165.53	289219.10	2413.87	1783.36	89.31	36.65	4.29	281.18	154.41	52701.65	2142.66	28.87	55.45	134.61	13.79
179-1148B	CA-LAN-21	Chlorite-Talc-Schist	3570.26	183809.03	472.19	286745.62	5696.76	1579.04	83.58	71.88	6.79	435.32	153.97	43804.19	1996.01	29.13	29.62	76.37	12.43
179-1157	CA-LAN-21	Chlorite-Schist	2140.99	65374.70	61808.93	217980.37	14047.48	7439.83	0.00	3087.97	210.26	788.02	1369.54	186852.87	434.73	40.72	0.00	196.00	0.00
179-1157B	CA-LAN-21	Chlorite-Schist	11093.79	73499.81	90937.44	214654.43	22674.52	7833.93	41.23	3196.92	170.13	465.83	878.90	128660.17	380.48	32.99	4.93	148.45	5.53
179-1165	CA-LAN-21	Chlorite-Talc-Schist	0.00	110641.42	0.00	328858.92	2444.29	949.90	15.78	12.12	4.41	75.63	95.28	74052.52	1396.70	15.55	11.63	81.71	0.52
179-1165B	CA-LAN-21	Chlorite-Talc-Schist	2505.85	167055.46	707.37	292973.95	9141.57	1260.97	58.75	42.83	4.28	177.09	110.10	53055.35	1208.32	15.67	30.15	94.15	11.40
179-1166	CA-LAN-21	Chlorite-Schist	7262.55	79084.44	95848.69	204093.89	22509.39	8249.56	12.45	5485.33	160.18	477.38	1151.51	131278.17	506.49	31.75	0.00	248.14	3.76
179-1166B	CA-LAN-21	Chlorite-Schist	7517.32	75891.16	89666.96	202514.28	20949.42	13266.45	36.92	5937.80	175.99	453.25	2996.06	139115.90	540.10	93.22	27.65	337.43	3.95
179-1173	CA-LAN-21	Chlorite-Schist	5948.21	70286.01	97665.99	210390.86	20777.17	8677.13	0.58	6480.05	158.77	522.49	637.48	131431.45	473.12	25.73	11.44	287.66	1.54
179-1173B	CA-LAN-21	Chlorite-Schist	7230.79	73248.37	85542.88	215856.35	20079.63	12348.97	23.11	5512.12	167.53	376.15	666.79	133025.20	451.32	28.83	14.13	277.19	3.30
179-1174	CA-LAN-21	Chlorite-Schist	4844.14	73625.57	97464.43	194794.14	31528.56	8977.97	0.59	6308.19	182.99	575.40	477.62	142990.02	485.29	26.34	11.74	261.75	0.22
179-1174B	CA-LAN-21	Chlorite-Schist	7000.05	71159.44	94480.22	198524.98	29866.86	9977.83	27.32	8772.83	182.51	479.59	507.08	139817.82	511.82	28.27	27.33	274.75	5.88
179-1176	CA-LAN-21	Chlorite-Schist	4707.08	70643.27	89408.36	216894.81	24262.81	7880.41	6.40	4976.31	170.00	452.06	1141.28	132841.35	389.98	34.70	7.88	173.18	1.64
179-1176B	CA-LAN-21	Chlorite-Schist	5724.89	69052.35	80695.67	223527.98	21872.56	8002.32	23.37	4955.81	171.11	377.22	1129.96	137346.85	349.33	39.33	1.43	188.17	4.15
179-1186	CA-LAN-21	Chlorite-Talc-Schist	2109.88	170175.04	325.51	281993.75	1496.35	1877.36	88.48	35.78	2.14	277.31	103.22	67797.97	6242.13	47.12	46.39	265.93	16.38
179-1186B	CA-LAN-21	Chlorite-Talc-Schist	6503.31	187508.29	103.63	270484.93	7312.47	1841.66	121.77	39.85	1.03	296.05	98.49	57073.07	5411.11	44.16	0.00	129.98	16.81
179-1187	CA-LAN-21	Chlorite-Talc-Schist	0.00	114131.25	911.33	204944.57	638.63	669.87	0.00	45.70	41.34	2135.22	2276.26	244997.60	5908.20	2562.15	0.00	275.62	0.73
179-1187B	CA-LAN-21	Chlorite-Talc-Schist	1199.88	140604.17	3062.31	247859.75	2655.94	791.40	3.34	130.55	47.70	2424.64	1819.31	145241.61	5888.08	1707.62	0.00	248.24	2.57
179-1197	CA-LAN-21	Chlorite-Talc-Schist	0.00	169953.58	1647.70	282659.48	7801.09	2125.23	96.36	108.01	7.84	518.07	247.54	65426.76	1605.64	52.88	42.12	139.52	17.44
179-1197B	CA-LAN-21	Chlorite-Talc-Schist	6019.64	182598.37	838.06	276144.45	9495.50	2009.10	109.82	75.29	4.65	260.55	421.95	54813.22	1506.30	96.62	26.62	93.23	17.81
179-1203	CA-LAN-21	Chlorite-Talc-Schist	14949.84	171497.74	749.93	260404.20	1870.09	1313.19	57.94	45.27	5.31	147.64	277.47	89684.63	2345.15	126.58	29.17	93.17	5.42
179-1203B	CA-LAN-21	Chlorite-Talc-Schist	18598.79	191444.22	1110.90	247581.43	13096.08	1499.25	95.58	122.93	7.75	187.37	364.84	71958.26	2232.58	165.03	0.99	86.35	11.37
179-1214	CA-LAN-21	Chlorite-Talc-Schist	2851.35	177415.74	1483.36	289749.30	1280.33	1963.32	98.06	54.98	4.65	279.36	123.39	50037.68	1413.44	35.32	56.44	108.53	15.61
179-1214B	CA-LAN-21	Chlorite-Talc-Schist	4829.85	172883.18	1587.69	290264.38	7295.08	1668.22	79.49	64.46	5.48	703.25	111.22	47443.94	1383.21	26.26	8.18	81.84	7.79
179-1215	CA-LAN-21	Chlorite-Talc-Schist	4978.26	167765.81	1251.00	265436.32	13635.06	2652.52	136.49	73.38	10.11	448.97	106.20	79852.15	6510.78	83.70	64.85	262.36	22.41
179-1215B	CA-LAN-21	Chlorite-Talc-Schist	2059.39	143758.73	0.00	290666.75	20044.83	818.90	25.81	28.16	3.85	0.00	88.62	71095.84	7065.45	56.89	0.00	159.29	0.00
179-1219	CA-LAN-21	Chlorite-Schist	5236.87	70330.71	90171.87	219742.73	21625.64	8433.28	7.62	6176.60	170.00	487.13	779.99	126178.20	550.26	28.76	12.21	281.34	1.82
179-1219B	CA-LAN-21	Chlorite-Schist	6850.18	73447.83	88840.39	213880.14	22244.03	9077.89	22.53	5377.57	186.53	462.85	1036.03	132386.20	583.78	29.19	10.57	319.21	3.62
179-1221	CA-LAN-21	Chlorite-Schist	8210.52	71450.99	94509.28	198008.79	38063.83	6775.12	0.70	5076.08	165.95	467.97	961.20	139437.92	366.97	37.27	27.65	217.75	4.20
179-1221B	CA-LAN-21	Chlorite-Schist	8087.45	68242.44	83368.68	201100.10	31204.96	6624.13	19.51	4698.72	176.37	451.30	722.48	159876.83	403.21	32.07	15.17	225.09	2.21
179-1224	CA-LAN-21	Chlorite-Schist	6661.50	65578.57	85281.58	211109.26	24933.45	8578.66	32.07	5562.49	180.08	410.05	1283.94	147590.60	376.84	39.28	3.44	262.78	2.62
179-1224B	CA-LAN-21	Chlorite-Schist	8960.53	80380.28	87528.72	196452.63	22951.93	11263.61	46.83	7834.48	165.56	448.01	678.86	145228.21	416.05	33.81	7.34	194.43	5.75
179-1225	CA-LAN-21	Chlorite-Schist	4496.95	53847.81	58838.46	240581.05	16712.99	8681.28	0.00	3992.91	165.49	359.60	866.08	164648.39	306.38	32.77	0.00	229.16	0.00
179-1225B	CA-LAN-21	Chlorite-Schist	4480.58	73416.14	89156.77	206543.58	25673.79	8703.24	39.90	7770.97	168.53	422.28	762.86	140775.46	336.63	37.59	13.18	300.98	6.75
179-1232	CA-LAN-21	Chlorite-Talc-Schist	6449.82	173767.82	1891.67	276439.28	249.59	2359.57	103.77	88.79	5.71	267.23	303.78	69555.93	2512.43	19.58	50.12	109.25	14.81
179-1232B	CA-LAN-21	Chlorite-Talc-Schist	7182.63	181575.50	595.82	279907.36	12095.29	1673.51	165.28	71.33	2.83	199.02	303.95	47544.72	2022.36	18.95	27.54	96.45	15.51

Table 19b. Calibrated LA-ICP-MS data for CA-LAN-21 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
179-1123	CA-LAN-21	Chlorite-Talc-Schist	3.21	13.70	10.81	140.09	6.63	0.89	0.00	0.00	23.81	5.08	4.38	1.23	6.48	2.14	0.23	0.05	0.21	1.84	0.24	1.19	0.00	0.21	0.00	3.23	0.48	15.08	0.40	1.03
179-1123B	CA-LAN-21	Chlorite-Talc-Schist	3.72	12.12	17.81	146.92	10.22	1.22	0.00	0.03	63.44	2.55	4.07	0.62	5.60	4.27	0.53	5.57	0.51	7.22	0.92	2.92	0.08	2.31	0.12	6.63	0.78	15.86	1.11	1.67
179-1135	CA-LAN-21	Chlorite-Talc-Schist	0.00	7.18	13.39	38.36	14.46	2.56	0.00	0.00	15.66	0.54	9.59	0.74	5.55	2.89	0.00	1.79	0.00	1.80	0.13	0.89	0.00	0.00	0.00	0.00	1.30	22.50	1.66	0.52
179-1135B	CA-LAN-21	Chlorite-Talc-Schist	4.08	13.78	6.97	35.97	12.26	0.47	0.00	0.00	34.39	1.10	5.22	0.00	3.04	0.08	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	1.01	21.90	4.23	0.62
179-1136	CA-LAN-21	Chlorite-Talc-Schist	2.47	3.93	4.62	229.21	1.51	1.12	0.00	0.00	6.98	0.13	3.02	0.06	0.00	0.24	0.00	0.00	0.00	0.00	0.15	0.57	0.00	1.84	0.11	6.12	0.00	5.97	3.00	1.30
179-1136B	CA-LAN-21	Chlorite-Talc-Schist	3.19	26.38	14.23	48.68	0.15	0.34	0.00	0.00	7.59	2.26	10.98	0.99	4.73	0.85	0.45	1.43	0.00	1.80	0.56	0.70	0.00	0.00	0.00	2.55	0.00	4.93	0.73	0.46
179-1143	CA-LAN-21	Chlorite-Schist	3.25	6.70	1.76	22.25	1.59	0.74	0.00	0.00	36.60	0.87	4.12	0.25	1.07	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	5.61	0.63	0.34
179-1143B	CA-LAN-21	Chlorite-Schist	4.77	9.02	2.37	36.77	3.11	0.00	0.00	0.00	18.27	1.00	5.91	0.20	1.37	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.97	1.25	0.46
179-1145	CA-LAN-21	Chlorite-Talc-Schist	1.31	1.91	0.00	9.22	0.00	0.22	0.00	0.04	4.64	1.78	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.97	0.00	0.00
179-1145B	CA-LAN-21	Chlorite-Talc-Schist	5.25	2.25	0.29	4.24	0.00	0.00	0.00	0.32	2.76	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.23	0.04	0.00
179-1148	CA-LAN-21	Chlorite-Talc-Schist	1.71	2.41	1.15	8.46	0.25	6.42	0.00	0.00	1.86	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.37	0.00	0.00
179-1148B	CA-LAN-21	Chlorite-Talc-Schist	3.20	1.04	0.00	4.33	0.00	0.00	0.00	0.10	2.27	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	2.89	0.00	0.01
179-1157	CA-LAN-21	Chlorite-Schist	52.34	30.44	6.93	34.80	1.70	0.81	0.03	1.14	640.18	18.10	33.30	3.94	20.18	3.52	0.66	4.45	0.37	2.27	0.30	0.87	0.00	0.62	0.00	0.89	0.01	12.73	0.26	0.71
179-1157B	CA-LAN-21	Chlorite-Schist	55.78	38.18	7.88	60.74	3.51	0.06	0.00	1.31	617.46	11.58	31.56	1.93	7.84	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.14	1.00	0.98
179-1165	CA-LAN-21	Chlorite-Talc-Schist	0.00	0.75	0.17	0.31	0.00	0.28	0.00	0.00	1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.82	0.00	0.00
179-1165B	CA-LAN-21	Chlorite-Talc-Schist	3.35	2.70	0.00	3.88	0.00	0.43	0.00	0.00	4.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.77	0.00	0.06
179-1166	CA-LAN-21	Chlorite-Schist	62.94	53.55	11.07	69.82	4.90	1.10	0.00	1.47	1083.70	26.53	60.65	5.69	24.96	2.99	0.31	2.48	0.27	2.28	0.23	0.48	0.00	0.00	0.00	0.82	0.09	19.38	1.46	1.80
179-1166B	CA-LAN-21	Chlorite-Schist	59.22	60.98	10.61	78.76	4.92	0.80	0.00	1.88	1012.77	19.94	74.08	4.11	15.38	1.85	0.06	0.10	0.00	0.82	0.00	0.40	0.00	0.00	0.00	0.05	0.17	49.42	2.94	1.79
179-1173	CA-LAN-21	Chlorite-Schist	56.43	51.62	11.94	136.06	4.87	0.84	0.01	1.37	816.50	19.70	36.09	4.37	17.27	3.13	0.93	2.09	0.39	2.83	0.51	1.49	0.03	0.72	0.10	3.56	0.47	13.09	1.42	1.74
179-1173B	CA-LAN-21	Chlorite-Schist	56.51	57.09	11.17	66.73	4.77	0.83	0.10	1.16	670.37	20.61	44.17	4.39	19.97	3.78	0.46	1.73	0.19	2.81	0.33	0.00	0.00	0.19	0.00	2.72	0.48	14.13	3.48	1.84
179-1174	CA-LAN-21	Chlorite-Schist	60.94	51.41	13.01	122.37	5.09	1.20	0.00	1.51	1011.75	21.99	49.03	4.75	20.17	2.87	0.68	2.10	0.09	1.56	0.34	1.51	0.00	0.00	0.00	1.36	0.31	12.53	1.10	2.40
179-1174B	CA-LAN-21	Chlorite-Schist	61.54	51.72	13.31	63.26	6.33	0.48	0.00	1.61	954.18	19.37	39.35	4.51	17.76	2.10	0.61	3.11	0.00	3.44	0.34	1.02	0.00	0.00	0.00	0.63	0.44	12.24	2.81	2.07
179-1176	CA-LAN-21	Chlorite-Schist	68.57	43.19	7.81	65.91	4.43	0.95	0.04	1.83	703.62	14.00	39.38	3.13	13.91	2.27	0.58	2.16	0.34	2.74	0.41	1.12	0.00	0.65	0.10	1.19	0.45	10.80	0.89	1.20
179-1176B	CA-LAN-21	Chlorite-Schist	57.39	41.40	8.79	78.76	4.15	1.17	0.14	1.29	615.83	13.18	74.89	2.99	11.03	2.81	0.33	3.78	0.19	2.48	0.37	1.58	0.21	2.09	0.06	2.61	0.62	16.51	2.60	1.48
179-1186	CA-LAN-21	Chlorite-Talc-Schist	2.53	2.47	0.94	10.00	0.00	0.23	0.09	0.18	3.98	0.00	1.34	0.06	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.06	0.00
179-1186B	CA-LAN-21	Chlorite-Talc-Schist	5.70	2.86	0.21	5.08	0.00	0.05	0.00	0.41	4.95	1.36	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.04	0.00	0.30
179-1187	CA-LAN-21	Chlorite-Talc-Schist	1.84	6.75	2.49	0.00	0.00	0.67	0.09	0.00	106.23	5.31	116.78	1.04	2.61	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.31	0.18	1.51
179-1187B	CA-LAN-21	Chlorite-Talc-Schist	4.27	9.10	2.87	0.00	0.19	0.28	0.06	0.00	108.29	8.96	28.01	1.92	6.31	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.53	0.86	1.97
179-1197	CA-LAN-21	Chlorite-Talc-Schist	5.50	5.80	8.08	12.12	0.04	0.20	0.08	0.16	15.21	9.69	23.77	1.82	6.92	0.43	0.00	0.00	0.24	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	6.28	0.21	0.41
179-1197B	CA-LAN-21	Chlorite-Talc-Schist	5.31	5.59	7.02	6.45	0.00	0.12	0.00	0.16	20.33	9.77	49.03	1.23	3.02	0.02	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.34	0.38	0.58
179-1203	CA-LAN-21	Chlorite-Talc-Schist	2.66	3.81	0.13	7.34	0.08	0.22	0.01	0.22	8.31	2.10	3.42	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.26	0.25	0.22
179-1203B	CA-LAN-21	Chlorite-Talc-Schist	12.63	8.93	2.42	4.91	0.34	0.00	0.26	0.81	26.26	6.95	52.46	1.02	3.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.91	0.86	0.47
179-1214	CA-LAN-21	Chlorite-Talc-Schist	3.18	3.05	1.65	9.22	0.05	0.45	0.16	0.23	4.22	0.55	4.11	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.57	0.00	0.00
179-1214B	CA-LAN-21	Chlorite-Talc-Schist	5.52	2.42	0.04	2.47	0.00	0.45	0.16	0.22	5.67	0.08	0.49	0.00	0.00	1.06	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	9.42	0.00	0.10
179-1215	CA-LAN-21	Chlorite-Talc-Schist	10.53	4.52	3.97	17.21	0.45	0.00	0.11	0.37	10.61	1.66	2.07	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.29	0.02	0.15
179-1215B	CA-LAN-21	Chlorite-Talc-Schist	9.26	1.88	0.00	0.00	0.00	0.32	0.20	0.05	9.21	1.08	4.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.58	0.09	0.12
179-1219	CA-LAN-21	Chlorite-Schist	61.75	41.65	13.78	1621.27	5.98	0.75	0.06	1.30	862.33	15.13	37.71	3.94	16.52	2.38	0.58	2.51	0.30	3.14	0.46	2.52	0.24	7.70	1.45	30.23	0.71	9.79	0.90	2.68
179-1219B	CA-LAN-21	Chlorite-Schist	63.01	47.64	9.29	78.52	4.93	1.08	0.02	1.42	996.44	16.53	56.78	3.93	15.80	2.41	1.10	0.79	0.24	2.61	0.65	1.78	0.00	0.77	0.00	1.05	0.57	17.44	2.82	1.89
179-1221	CA-LAN-21	Chlorite-Schist	65.83	45.13	10.26	72.14	3.87	1.01	0.08	1.42	894.37	17.09	41.57	3.66	16.24	3.90	0.94	1.64	0.10	2.31	0.39	1.80	0.06	1.79	0.10	1.74	0.45	10.47	0.95	1.60
179-1221B	CA-LAN-21	Chlorite-Schist	63.62	39.67	8.72	76.20	4.45	1.01	0.08	1.56	961.64	17.92	34.58	3.92	17.40	3.47	0.83	2.93	0.62	2.41	0.40	0.93	0.20	1.25	0.00	2.22	0.30	12.61	3.20	1.68
179-1224	CA-LAN-21	Chlorite-Schist	65.84	98.42	10.11	61.63	5.61	1.50	0.06	1.49	2191.31	27.67	63.27	3.78	14.78	2.24	0.00	1.50	0.31	2.59	0.28	0.04	0.00	0.00	0.00	0.83	0.36	27.90	1.16	1.76
179-1224B	CA-LAN-21	Chlorite-Schist	50.90	60.65	15.96	101.57	5.58	0.52	0.00	1.12	956.34	21.10	38.43	3.14	12.94	0.77	0.00	0.00	0.00	1.57	0.09	0.00	0.00	0.00	0.00	0.58	0.00	14.53	3.25	1.96
179-1225	CA-LAN-21	Chlorite-Schist	70.19	34.06	8.68	34.94	2.19	1.65	0.11	1.16	515.87	53.68	105.84	6.80	25.16	3.52	0.84	9.68	0.31	2.43	0.32	0.91	0.10	1.29	0.08	0.65	0.22	17.72	0.96	1.07
179-1225B	CA-LAN-21	Chlorite-Schist	70.77	42.99	11.34	57.03	6.86	0.79	0.00	1.51	592.98	21.84	53.92	4.20	16.74	1.47	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.33	20.18	3.07	1.42
179-1232	CA-LAN-21	Chlorite-Talc-Schist	3.01	2.63	0.62	12.92	0.47	0.00	0.12	0.19	4.16	2.57	5.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.12	0.00	0.02
179-1232B	CA-LAN-21	Chlorite-Talc-Schist	8.63	1.73	0.00	4.94	0.00	0.00	0.00	0.43	2.45	0.09	1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.26	0.00	0.00

Table 20a. Calibrated LA-ICP-MS data for Red Mountain Archaeological District Stone Beads in ppm (Na through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
211-860	CA-SBD-211	Talc-Schist	2547.22	166347.33	11725.84	271550.75	405.89	1071.85	61.34	63.04	25.91	10878.53	197.01	64293.11	5086.88	86.52	28.33	108.55	7.13
211-860B	CA-SBD-211	Talc-Schist	1174.73	201527.25	6322.09	270778.55	2775.75	1698.62	111.00	110.59	13.54	3153.90	159.49	39128.52	4183.76	85.64	52.86	105.25	16.92
2600-317	CA-SBD-2600	Chlorite-Talc-Schist	1057.01	166285.90	89879.25	109395.73	0.00	1955.89	65.08	3182.64	152.28	267.73	1595.02	212284.28	2687.45	78.92	46.07	181.14	6.89
2600-317B	CA-SBD-2600	Chlorite-Talc-Schist	2177.87	199649.47	95301.88	110668.77	2241.37	4008.86	94.50	7394.72	147.31	196.98	1712.64	154879.41	2385.18	82.97	67.30	171.00	12.33
2614-241	CA-SBD-2614	Chlorite-Talc-Schist	0.00	175747.55	472.90	288461.85	0.00	1609.50	87.71	34.06	2.66	402.45	205.32	55357.65	5693.59	109.09	38.11	92.30	10.99
2614-241B	CA-SBD-2614	Chlorite-Talc-Schist	291.07	196241.48	0.00	284282.74	4464.24	1728.77	132.46	31.49	0.00	202.97	166.75	35879.12	4223.33	90.16	37.48	68.23	13.86

Table 21b. Calibrated LA-ICP-MS data for Red Mountain Archaeological District Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
211-860	CA-SBD-211	Talc-Schist	0.99	1.92	0.00	10.00	0.00	0.08	0.03	0.00	3.46	1.00	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.00	0.00
211-860B	CA-SBD-211	Talc-Schist	2.88	2.49	0.00	4.83	0.00	0.00	0.00	0.16	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00
2600-317	CA-SBD-2600	Chlorite-Talc-Schist	0.31	3.30	4.25	55.82	2.80	0.00	0.00	0.01	1.17	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.20	0.30
2600-317B	CA-SBD-2600	Chlorite-Talc-Schist	2.56	6.74	8.83	23.27	4.60	0.08	0.00	0.12	22.90	0.00	2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.74	0.24	0.22
2614-241	CA-SBD-2614	Chlorite-Talc-Schist	0.44	2.62	0.31	6.04	0.00	0.00	0.05	0.02	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.00	0.00
2614-241B	CA-SBD-2614	Chlorite-Talc-Schist	4.18	3.98	0.00	3.55	0.00	0.00	0.31	0.14	2.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.94	0.00	0.00

Table 22a. Calibrated LA-ICP-MS data for CA-VEN-1691 Stone Beads in ppm (Na through As)

anid	Site #	Material	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Co	Cu	Zn	As
1691-U3L2	CA-VEN-1691	Unknown	278.18	140780.48	926.72	321315.43	3253.70	0.00	0.64	0.00	1.47	186.45	313.34	49868.97	345.64	7.58	5.95	37.57	1.58
1691-U3L2b	CA-VEN-1691	Unknown	0.00	193342.94	2726.63	275077.27	0.00	0.00	0.00	182.29	21.74	0.00	468.56	58666.90	129.99	20.44	11.57	60.96	8.47
1691-U6L2	CA-VEN-1691	Unknown	0.00	138643.46	4538.23	315821.13	10359.00	0.00	0.00	61.84	12.62	982.87	464.80	47899.52	1474.65	24.72	19.24	109.25	3.76
1691-U6L2b	CA-VEN-1691	Unknown	0.00	199958.30	0.00	273213.99	0.00	0.00	0.00	35.44	18.21	0.00	473.85	56750.20	1047.43	42.55	0.00	106.59	0.00
1691-U7L3	CA-VEN-1691	Unknown	0.00	159177.74	2666.88	302896.57	4538.88	0.00	0.04	22.46	3.96	79.37	335.44	49995.01	3623.20	67.99	8.44	117.57	3.44
1691-U7L3b	CA-VEN-1691	Unknown	0.00	204379.68	936.66	274124.49	0.00	0.00	0.00	37.48	12.43	0.00	382.09	47590.98	2668.14	33.40	0.93	203.06	11.64
1691-U7L5	CA-VEN-1691	Unknown	4554.28	71660.86	96129.95	221750.46	52341.08	0.00	22.60	2785.29	218.58	486.21	1687.96	101266.98	434.26	54.46	42.44	254.37	7.16
1691-U8L2	CA-VEN-1691	Unknown	6300.60	146339.35	14118.13	285932.70	27201.01	0.00	0.00	126.68	19.88	99.27	2536.00	47661.97	3282.68	116.73	52.49	260.59	5.25
1691-U8L2b	CA-VEN-1691	Unknown	0.00	226561.45	3911.71	249011.61	0.00	0.00	0.00	277.45	37.96	0.00	580.06	54214.50	3236.93	126.09	20.42	294.96	0.00
1691-U7L5	CA-VEN-1691	Unknown	8232.67	70070.77	92130.61	198219.48	22238.57	8128.66	68.87	6350.27	224.86	1119.39	893.35	153731.75	625.55	40.02	27.97	208.06	6.34
1691-U7L5b	CA-VEN-1691	Unknown	7465.76	81947.61	95142.23	201217.40	24259.76	7745.26	85.40	5767.76	197.47	659.91	973.84	132021.08	565.31	40.35	32.84	184.72	6.85
1691-U7L5.D	CA-VEN-1691	Unknown	9582.39	73052.37	88697.01	235265.93	20673.72	15332.08	25.19	4094.42	216.65	552.70	1570.02	94381.04	331.21	47.26	26.08	174.12	0.00
1691-U7L5B.D	CA-VEN-1691	Unknown	6539.35	78431.84	93965.72	221592.46	21336.57	16570.37	28.75	6701.29	216.09	531.12	1501.60	99855.72	378.98	41.51	28.61	211.60	3.39

Table 22b. Calibrated LA-ICP-MS data for CA-VEN-1691 Stone Beads in ppm (Rb through U)

anid	Site #	Material	Rb	Sr	Y	Zr	Nb	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Pb	Th	U
1691-U3L2	CA-VEN-1691	Unknown	0.89	0.42	0.28	0.00	0.13	0.12	0.39	0.17	2.36	0.03	0.58	0.01	0.25	0.30	0.10	0.13	0.00	0.13	0.00	0.00	0.01	0.00	0.03	0.00	0.04	0.48	0.00	0.05
1691-U3L2b	CA-VEN-1691	Unknown	0.12	29.46	2.36	3.71	0.48	1.62	0.20	0.00	25.20	1.56	3.49	0.00	0.78	0.00	0.00	0.00	0.00	0.55	0.08	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.26
1691-U6L2	CA-VEN-1691	Unknown	4.86	6.68	1.49	2.40	0.37	0.67	0.73	0.26	13.21	0.97	3.81	0.41	1.47	0.70	0.16	0.43	0.13	0.42	0.16	0.02	0.08	0.12	0.05	0.41	0.08	2.25	0.00	0.14
1691-U6L2b	CA-VEN-1691	Unknown	0.00	3.08	1.22	3.51	0.00	0.00	0.00	0.00	4.71	0.57	0.50	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1691-U7L3	CA-VEN-1691	Unknown	1.95	4.96	0.11	0.65	0.38	2.14	1.49	0.13	9.32	0.20	1.12	0.06	0.09	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.04	0.00	0.03
1691-U7L3b	CA-VEN-1691	Unknown	0.00	7.34	1.17	1.49	0.10	2.02	0.30	0.00	7.14	0.66	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
1691-U7L5	CA-VEN-1691	Unknown	67.64	66.03	21.15	66.51	8.59	1.47	1.19	2.55	900.14	13.45	29.04	3.24	14.17	2.91	0.57	3.55	0.46	3.76	0.67	1.78	0.18	2.00	0.25	1.86	0.51	8.18	5.24	1.53
1691-U8L2	CA-VEN-1691	Unknown	10.55	78.48	2.51	14.31	0.98	1.12	0.56	0.41	91.94	3.05	18.52	0.66	2.66	0.72	0.07	0.32	0.01	0.72	0.10	0.14	0.01	0.32	0.01	0.20	0.14	5.05	0.45	0.40
1691-U8L2b	CA-VEN-1691	Unknown	0.00	82.93	5.47	18.95	0.51	0.84	0.31	0.00	57.01	2.99	7.85	0.00	1.50	0.37	0.00	0.00	0.00	0.70	0.00	0.14	0.00	0.00	0.00	1.78	0.00	3.66	0.00	0.00
1691-U7L5	CA-VEN-1691	Unknown	74.26	38.93	16.09	107.33	8.57	0.85	0.03	1.84	396.65	21.05	49.55	4.04	15.87	2.16	0.22	0.42	0.00	2.09	0.10	1.48	0.00	0.00	0.00	0.00	0.00	5.65	3.79	1.73
1691-U7L5b	CA-VEN-1691	Unknown	65.14	41.02	17.94	51.14	7.87	0.15	0.00	1.68	516.19	20.98	42.56	4.24	19.62	3.40	0.00	0.96	0.00	2.22	0.00	0.25	0.00	0.00	0.00	1.79	0.00	9.21	1.82	1.52
1691-U7L5.D	CA-VEN-1691	Unknown	72.27	72.80	15.55	472.89	6.52	2.40	2.67	3.29	1049.44	17.21	21.92	1.78	8.34	2.12	3.49	0.00	0.00	3.75	3.11	4.44	0.00	5.67	0.00	24.39	1.07	12.65	3.76	0.74
1691-U7L5B.D	CA-VEN-1691	Unknown	78.12	71.34	17.96	95.86	6.12	3.40	0.00	3.38	1339.18	11.98	26.30	3.58	13.03	0.68	1.11	3.07	0.40	4.14	1.16	0.89	0.04	0.00	0.00	3.67	0.24	21.59	5.44	2.29