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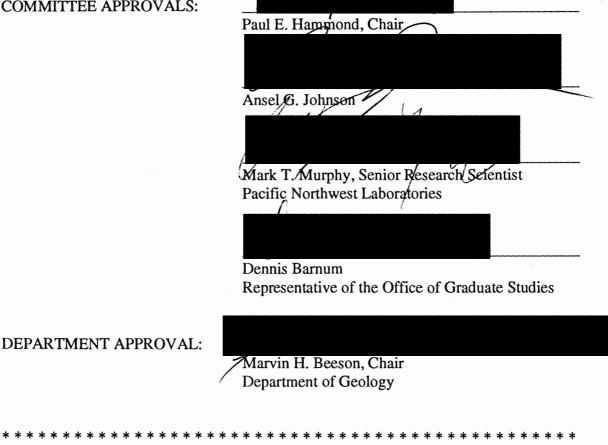
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THESIS APPROVAL

The abstract and thesis of John Frederick King for the Master of Science in Geology were presented May 24, 1994, and accepted by the thesis committee and the department.

COMMITTEE APPROVALS:

by



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ABSTRACT

An abstract of the thesis of John Frederick King for the Master of Science in Geology presented May 24, 1994.

Title: Magmatic Evolution and Eruptive History of the Granitic Bumping Lake Pluton, Washington: Source of the Bumping River and Cash Prairie Tuffs.

The 25 Ma Bumping Lake pluton ranges in composition from quartz diorite to granite with the granitic facies comprising approximately 90% of the pluton's surface area. The granite may be classified as calcalkaline, peraluminous and I-type with some S-type characteristics. A late-stage, mafic-poor facies fills cooling related extensional fractures. The pluton was passively emplaced into the Ohanapecosh Formation at a shallow level in the crust. Contact relationships vary from sharp where the contact is vertical to gradational at the roof of the pluton. Where gradational, stoped xenoliths from the roof of the pluton increase in size, angularity and retain more of their primary textures as the contact is approached. Spacial trends in major and trace elements support the interpretation that xenoliths were stoped and assimilated into the melt. The predicted Rayleigh number for the pluton when molten is 10⁷ and the predicted Reynolds number is approximately 10⁻⁹. Based on these values, the magma of the pluton probably did not convect, and if it did, convection was weak and not a significant process.

Based on variations in Eu/Eu* and Sr values, plagioclase fractionation was an important process in the petrogenesis of the pluton. Additionally, fractionation of accessory minerals rich in light rare-earth elements (LREE) resulted in successive depletion of LREE with progressive differentiation. Two separate regions of the pluton are highly differentiated as indicated by high SiO₂ values, high Rb/Zr ratios, and low Zr and TiO₂ values.

Mapping by the author indicates that the pluton projects beneath the Mount Aix caldera. Dates of three tuffs derived from the caldera are equivalent to the pluton, and two of these tuffs are chemically indistinguishable from the granite facies of the pluton. This implies that the Bumping Lake pluton represents the chilled remains of the magma chamber that fed the Mount Aix caldera.

MAGMATIC EVOLUTION AND ERUPTIVE HISTORY OF THE GRANITIC BUMPING LAKE PLUTON, WASHINGTON: SOURCE OF THE BUMPING RIVER AND CASH PRAIRIE TUFFS

by

JOHN FREDERICK KING

A thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE in GEOLOGY

Portland State University 1994

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INTRODUCTION

Attempts to model high-silica magma chambers have traditionally relied on stratigraphic studies of material erupted from the chambers rather than studies of the chambers themselves (e.g., Williams, 1942; Katsui, 1963; Smith, 1966; Hildreth, 1979; Fridrich and Mahood, 1987; Bacon and Druitt, 1988; Whitney, 1988). These studies are meaningful, but are limited in that they can only provide information about the chamber at a few instants throughout the life of the chamber. Additional or at least more conclusive information might be retrieved from the system if the magma chamber *and* its eruptive products are studied.

It is uncommon for both a crystallized magma chamber and its eruptive products to be exposed in sufficient detail to permit an investigation relating the two. A magma chamber is usually exposed only after the pile of volcanic material above is eroded away, which is self-defeating because an associated volcanic pile is the best evidence that a pluton was also a magma chamber. Without an association of volcanic material, it is unlikely that a crystallized magma chamber could be distinguished from an intrusion with no associated vent.

Mapping by Abbott (1953), Campbell (1987), and the author (Hammond and others, 1993) shows that the Bumping Lake pluton is a large granitic body exposed within 400 m of the Mount Aix caldera. One zircon fission-track date of the pluton of 24.7±0.6 Ma is reported by Clayton (1983). K-Ar and zircon fission-track dates of quartz-bearing tuffs from the caldera fill complex range from 27.6 ± 1.4 Ma (Schreiber, 1981) to 26.3 ± 1.3 Ma (Vance and others, 1987). The above relationships indicate that the pluton may be the crystallized remains of the magma chamber that once fed the Mount Aix caldera.

OBJECTIVES

The primary purpose of this research is to substantiate the existence of a cogenetic relationship between the Bumping Lake pluton and the Mount Aix caldera. To this end, physical features, petrography and chemistry of the pluton are described in detail and compared to the caldera and its eruptive products. Establishment of the pluton as a volcanic source allows the pluton to be viewed as a complex and dynamic system. Having this knowledge allows a more thorough understanding of the magmatic processes that an active magma chamber can be subject to.

METHODS OF STUDY

The problem of relating a plutonic body to alleged eruptive products should be attacked on multiple fronts so that one method can be used to support or deny interpretations based on another method. In this study, field relationships provide the foundation for the rest of the study. Only when the field work is complete and understood do chemical and petrographic data have meaning. For this study, all analyses were performed at Washington State University's GeoAnalytical Lab. Of 154 total samples from the pluton, 138 were analyzed by XRF (Appendix B). Representative samples of this group were analyzed by ICP-MS (Appendix C). Twelve samples were examined petrographically. Additionally, 47 samples of three tuffs were analyzed by XRF, and representative samples from each tuff were also analyzed by ICP-MS. Thin sections of each tuff were examined and compared to the thin sections of the pluton.

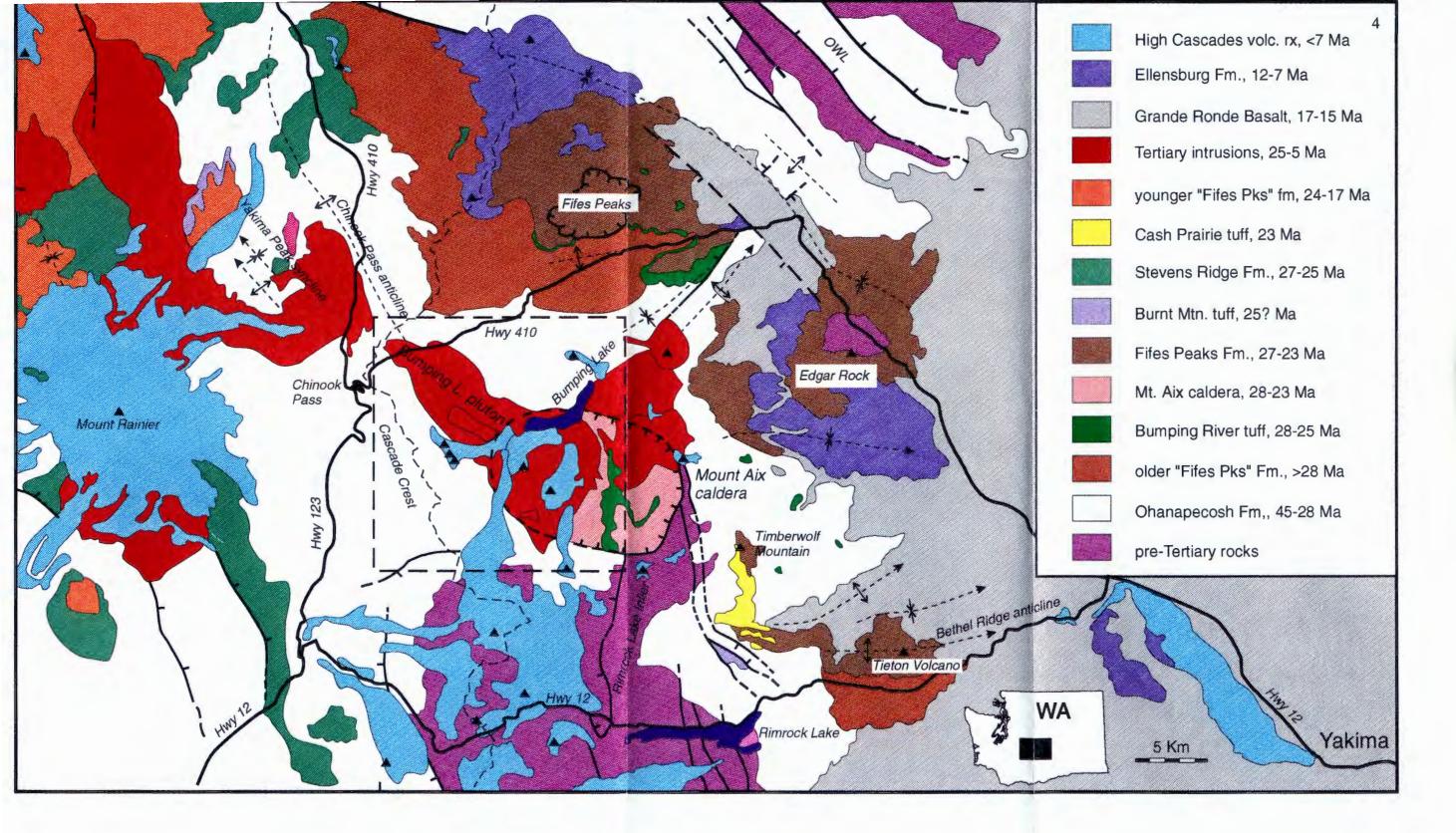


Figure 1. Geologic setting of the Bumping Lake pluton. Dashed box represents the area shown in Figure 2.

GEOLOGIC SETTING

The Cascade Range is a 1100 km long continental arc that has been active since its inception at about 42 Ma (Atwater, 1970; Duncan and Kulm, 1989). Early in the margin's history, the convergence rate was relatively rapid and steep (Riddihough, 1984). Although the convergence rate has varied throughout the life of the margin, on average, the convergence rate and the subduction angle has been decreasing (Riddihough, 1984). Over time, continued volcanism in the arc increased the local heat flow gradient, which allowed large felsic bodies to ascend to shallow levels in the continental crust. Some of these bodies vented to the surface and produced about 20 quartz-bearing tuffs that are widely scattered through the Cascade Range and vary in age from 36-18 Ma (Paul E. Hammond, pers. commun., 1994). The granitic Bumping Lake pluton and its associated vent, the Mount Aix caldera, are an example of one of these tuff-producing intrusive/volcanic systems (Figure 1).

RIMROCK LAKE INLIER

The Rimrock Lake inlier is composed of five pre-Tertiary units separated along vertical tectonic contacts or shear faults, which do not extend into younger units (Schasse, 1987; Walsh and others, 1987). The inlier is about 25 by 40 km in outcrop and to the south, reaches within two kilometers of the Bumping Lake pluton. Pre-arc sedimentary rocks sporadically overlie the inlier. The strata are thinner in the vicinity of the pluton than to the east and west, which indicates that the inlier formed a structural high in the early Tertiary. The present structural and topographic high is just south of Rimrock Lake. From there the structural high dips gently to the north and projects beneath the Bumping Lake pluton. To the east of the pluton, it is truncated by the caldera margin fault of the Mount Aix caldera.

The upper Jurassic to lower Cretaceous Russell Ranch Formation is one of the five units within the inlier and consists primarily of metasedimentary rocks that show turbidite characteristics of the flysch facies (Schasse, 1987). The Lookout Formation is older than 157 Ma and consists chiefly of black graphitic garnet-mica schist and amphibolite, minor metatonalite, metagranodiorite, and metagabbro (Walsh and others, 1987; Schasse, 1987). Foliated metaplutonic rock of Indian Creek is late Jurassic to early Cretaceous in age and consists of two north-striking belts of predominantly tonalite, minor gabbro, diorite, amphibolite, and schist (Miller, 1989). North of Edgar Rock, Walsh and others (1987) and Schasse (1987) describe the occurrence of dark green greenstones and dikes that may be early Tertiary in age. Walsh and others (1987) and Schasse (1987) also describe a Mesozoic unit weakly associated with the Russell Ranch Formation that is chiefly cataclastic amphibolite, with minor phyllite, greenstone, schist, gneiss, metasandstone, and ultramafite.

OHANAPECOSH FORMATION

In all cases, rocks of the Oligocene Ohanapecosh Formation constitute the intrusive host. Radiometric dates on tuffs throughout the formation range from 28±2.9 to 36.4±3.6 Ma (Schasse, 1987; Vance and others, 1987). The Ohanapecosh Formation is a thick sequence of intermediate composition lithic breccias, lava flows, and lithic-lapilli tuffs, volcaniclastic siltstone, sandstone, and conglomerate (Fiske and others, 1963; Winters, 1984; Schasse, 1987; Vance and others, 1987).

Although intrusive relations range from gradational to relatively sharp, in all cases rocks of the Ohanapecosh constitute the intrusive host. Where gradational, the intrusion filled fractures in the host rock and then solidified so that fragments of the host rock can be visually pieced back together. Near the intrusive contact, textures and compositions of the xenoliths closely resemble those found in Ohanapecosh rocks. As distance from the contact increases, xenolithic textures become less varied and their size and frequency decrease. Typically this transition takes place over a distance of approximately 200 vertical meters. Based on this size, frequency, textural, and compositional evidence, these xenoliths are interpreted to be stoped country rock rather than parental melt. Light-colored reaction rims surround many xenoliths near Chinook Pass, but are absent around enclaves found on Miners Ridge. Sharp intrusive contacts are less common, but can be found on American Ridge and to the west on a ridge south of Cougar Lake. At these locations, xenoliths are absent and the distance over which the pluton grades into the host rock is typically about two meters.

A NW-SE trending anticline in the Ohanapecosh Formation probably existed prior to emplacement of the pluton since no deformation is apparent in the pluton. The anticlinal axis is parallel to the long axis of the pluton and may have influenced the location of the intrusion. Lack of faulting or structurally disturbed beds in the Ohanapecosh Formation surrounding the pluton suggests it was emplaced without deforming its host. The extent to which the country rock is metamorphosed is surprisingly low and is on the order of 10 to 100 meters.

Wildcat Creek Beds

Wildcat Creek beds are well-bedded, andesitic and dacitic volcaniclastic rocks (Swanson, 1978; Schreiber, 1981) that have been dated at 32.2 ± 3.3 and 31.8 ± 2.2 Ma (Vance and others, 1987). Vance and others (1987) have also suggested a correlation between these beds and the upper Ohanapecosh Formation, and for this reason the Wildcat Creek beds are not distinguished from the Ohanapecosh Formation in Figure 1.

FIFES PEAKS FORMATION

The Fifes Peaks Formation is a thick accumulation of basaltic andesite, andesite, rhyolite flows, tuffs, breccias, and laharic deposits (Schasse, 1987; Hammond and Hooper, 1991) that lies to the north of the Bumping Lake pluton. Fission-track ages on tuffs associated with Fifes Peaks lavas range from 22 to 26 Ma (Vance and others, 1987), while K-Ar dates range from 17 to 25 Ma (Hartman, 1973), which places this formation in the lower Miocene. Fifes Peaks volcano-caldera is a medium-sized stratovolcano composed chiefly of mafic andesite with a complex history of caldera formation and filling processes (Brunstad and Hammond, 1992).

COLUMBIA RIVER BASALT

Four to five flows of Grande Ronde Basalt, a formation of the Columbia River Basalt Group, occur to the east of the Bumping Lake pluton and lap on to the units described above (see Figure 1). These flows are aphyric to sparsely plagioclase-phyric tholeiitic flood lavas aged between 15.6 and 16.5 Ma (Watkins and Baksi, 1974; Lux, 1981; Long and Duncan, 1983; Schasse, 1987). Locally, the flows are interbedded with feldspathic sandstone or Ellensburg volcanic sedimentary rocks (Hammond and Hooper, 1991).

YOUNG INTRUSIONS AND FLOWS

Young porphyritic intrusive rocks with andesitic to dacitic geochemical signatures commonly cut the pluton in the Miners Ridge area. A rhyolite porphyry intrusion cuts the pluton at American Ridge in the northern region.

Two 140,000-730,000 yr. (Abbott, 1953; Clayton, 1983; Simmons and others, 1983; Schasse, 1987) andesite flows, referred to as andesite of Deep Creek, vented through Miners Ridge (Figure 2). The vent of the southern flow of the Deep Creek andesite forms a dome located directly south of Granite Lake. The lava flowed into the Deep Creek valley and continued for approximately three kilometers down the valley toward Bumping Lake. Since remnants of the flow can be found over 100 m up the north slope of Pear Butte Ridge, the flow probably existed before the Hayden Creek glaciation of the Deep Creek valley. The northern flow vented near the crest of Miners Ridge and flowed down its northern slope. This flow terminates at the shore of Bumping Lake, and

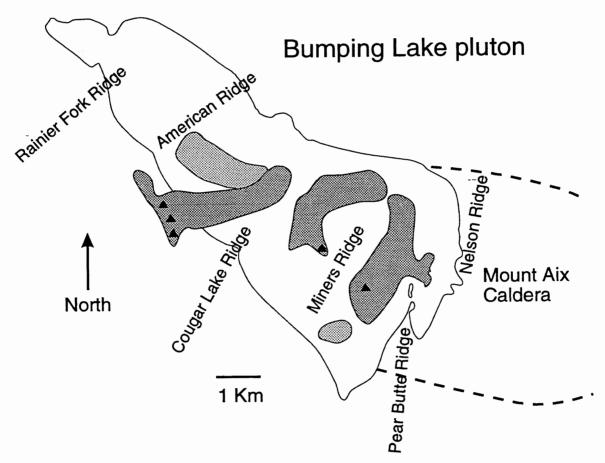


Figure 2. Simplified geologic map of the Bumping Lake pluton. Triangles represent Quaternary vents, and dark gray units represent lava flows from these vents. Light gray units are intrusions younger than the Bumping Lake pluton. For a detailed map on a topographic base, refer to Figure 3.

has reversed magnetic polarity (Abbott, 1953; Clayton, 1983), which places it older than

about 780 ka.

REGIONAL STRUCTURES

A regional eastward homocline occurs between the Rimrock Lake inlier and Fifes

Peaks (Figure 1). Arc strata and Columbia River basalt flows are deformed and exposed

in this 20-35°E-dipping homocline (Hammond, 1989).

A set of northwest-striking folds enters the area from the northwest. One of these folds, the Chinook Pass anticline, is 15 km wide with 500 m amplitude. The fold axis of this anticline is terminated by the Bumping Lake pluton, which is elongated in the direction of the anticline. The eastern flank of this anticline is part of the regional eastward homocline described above. To the west, the Chinook Pass anticline is flanked by the shallow Yakima Peak syncline, which deforms rocks of similar age.

A set of southwest-striking folds less developed than the northwest-striking folds occur in the region also. These folds occur west of the Olympic-Wallowa lineament (OWL) and plunge northeast, roughly normal to the OWL. Strata as young as the Columbia River basalts are deformed by these folds. The Bethel Ridge anticline stretches west to east north of Tieton volcano (Swanson, 1966, 1978). A syncline lies to the north of the Bethel Ridge anticline that starts between the Mount Aix caldera and Edgar Rock volcano and extends south of the anticline located south of the Bumping River. A narrow syncline paralleled by a fault extends southeasterly along the Bumping River, possibly to the Mount Aix caldera.

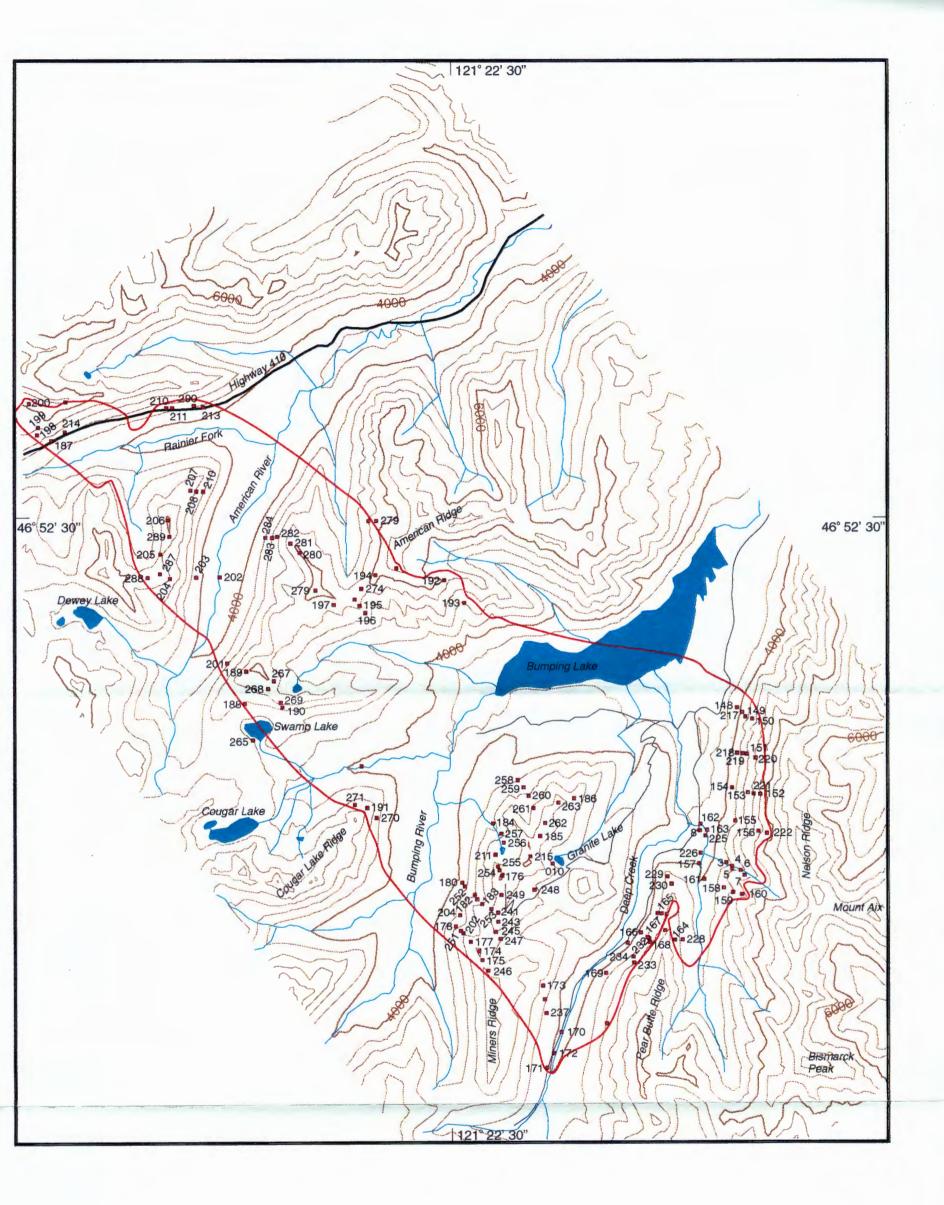
CHARACTERISTICS OF THE PLUTON

The shallowly emplaced, predominantly granitic Bumping Lake pluton (BLP) is located approximately 35 km east of Mount Rainier. It extends 16 km from the Mount Aix caldera in the southeast to 1.5 km east of Chinook Pass in the northwest (see Figure 1). At its maximum, the pluton has a width of eight kilometers across Bumping Lake. The area of the pluton is about 120 km^2 , which surpasses the minimum size requirement to be considered a batholith (Bates and Jackson, 1986). Only one date of the pluton has been reported: a zircon fission-track date of 24.7±0.6 Ma, which was obtained from the granite facies on Miners Ridge (Clayton, 1983). The Bumping Lake pluton is significant because it is one of only two large, epizonal, granitic intrusions presently exposed in the Cascade Range. The other is the 48 Ma Golden Horn batholith in the North Cascades (Tabor and others, 1968).

DISTRIBUTION OF ROCK TYPES IN THE PLUTON

Approximately 90% of the pluton's outcrop expression is granite, 9% granodiorite to quartz diorite, and the remaining 1% is a fine-grained, mafic-poor granite that occurs in dike and sill swarms cutting the granite.

Transitions from granite to granodiorite to quartz diorite are texturally and mineralogically gradational. In outcrop, granodiorite and quartz diorite occur only in two isolated areas, the first in the northwest at Highway 410 and the second in the southeast



EXPLANATION

Sample location
Intrusive contact
Roads
Contour interval 400 feet

1 Mile 1 Kilometer

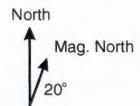


Figure 3. Sample location map. Samples analyzed by XRF and ICP-MS are represented by red squares. Refer to Appendices A and B for UTM coordinates and chemistry of samples.

on Nelson Ridge. The pluton lacks a continuous mafic rim typically found in zoned plutons (e.g., Pankhurst, 1979; Stephens and Halliday, 1979; Fourcade and Allegre, 1981; Stephens, 1992). Trends in major and trace element chemistry with respect to SiO₂ show no significant compositional gap between quartz diorite, granodiorite, and granite (see Figures 5-11).

Petrography

Textures in the granite facies range from coarse-grained and porphyritic (quartz phenocrysts up to one cm) to medium-grained and equigranular; myrmekite is common through the range of textures. Essential minerals include quartz, plagioclase, K-feldspar, and biotite. Granodiorite may be distinguished from granite only by its lower K-feldspar content. Quartz diorite is almost exclusively limited to Nelson Ridge, and is characterized by its medium gray color, abundance of plagioclase, and lack of quartz. The fine-grained granite is white and commonly has 3-5 mm quartz phenocrysts. In general, the granite of the Bumping Lake pluton is texturally distinct from the fine- to medium-grained, equigranular texture common in the Tatoosh-White River pluton (Fiske and others, 1963; Murphy and Marsh, 1993), Spirit Lake pluton (Evarts and others, 1987), and Snoqualmie batholith (Erikson, 1969). Alignment of minerals is absent except near the intrusive contact where the pluton fills fractures in xenoliths.

Granite

Although textures in the granite facies vary widely, mineral content varies little. Five thin sections from the granite facies were examined in thin section and represent the spectrum of textural characteristics. Sample 160 (sample locations shown in Figure 3) has 30% quartz, 30-35% plagioclase, 20-30% K-feldspar, 5% biotite, and 1% opaque minerals (Table I summarizes the modal abundances of the facies). The quartz is generally one millimeter in size, but occurs also as phenocrysts up to three millimeters. A myrmekitic texture occurs when quartz shares a crystal face with K-feldspar. The K-feld-spar fills pore spaces between sub- and euhedral quartz and plagioclase indicating it crystallized late in the cooling history. Biotite is also a late-stage mineral and is most commonly associated with K-feldspar.

TABLE I

Facies	Phenocrysts	Groundmass	Accessories
Fine granite	Plagioclase	Quartz, plagioclase, K-feldspar	
Granite	Quartz, plagioclase	Quartz, plagioclase, K-feldspar, biotite	Zircon, apatite, opaques
Granodiorite	Plagioclase	Quartz, plagioclase, K-feldspar, biotite, hornblende	Zircon, apatite, opaques
Quartz diorite	Plagioclase	Quartz, plagioclase, hornblende	Apatite, opaques

SUMMARY OF PETROGRAPHIC DESCRIPTIONS

Sample 161 has 30% quartz, 45% plagioclase, 20% K-feldspar, 5% biotite, and <1% opaque minerals. Quartz is anhedral, 3-4 mm in size with incipient, poorly developed myrmekite when adjacent to K-feldspar. Plagioclase is strongly concentrically zoned in many grains such that the microscope stage rotates up to 55° as the extinction front passes from the core to the rim of the crystal. Most grains show albite twinning, are anhedral, and about three millimeters in size. K-feldspar usually occurs in late-stage crystallization and less commonly as one millimeter, euhedral inclusions in quartz. Anhedral biotite occurs randomly. Part of a xenolith is included in the thin section. The xenolith is made up of 70% plagioclase and 30% biotite. No unusual textures or minerals occur at the granite-xenolith contact, nor do grain sizes change with distance from the contact.

Sample 178 is characterized by its large crystal sizes. The sample is made up of 35% quartz, 25% plagioclase, 30% K-feldspar, and 5-10% biotite. Opaque minerals make up much less than 1%. Quartz grains can be ~10 mm as phenocrysts, but are usually about five millimeters in size. Myrmekite is absent between quartz and K-feldspar. K-feldspar is averages five millimeters in size, anhedral, and commonly coarsely perthitic. Plagioclase is 4-6 mm, usually albite twinned, and occasionally concentrically zoned. Biotite is 3-4 mm and associated with K-feldspar. Small (<1 mm) zircon grains are common inclusions in biotite.

Sample 210 is comprised of 35% quartz, 35% plagioclase, 25% K-feldspar, 5% biotite, and trace opaques and zircon. Myrmekite, whose origin is uncertain but believed to be secondary (Best, 1982), is absent from this sample. K-feldspar is anhedral and late-stage. The crystals are perthitic and associated with biotite. Plagioclase ranges from anhedral to euhedral, and may be albite twinned and/or concentrically zoned. Biotite is also late-stage, and contains zircon inclusions.

Sample 207 has the most striking texture of all the thin sections. The sample is comprised of 30% quartz, 35% plagioclase, 25% K-feldspar, 5% biotite, 2-3% hornblende, and trace opaque minerals. Three distinct grain sizes exist in this sample: the smallest is about 0.1 mm, the middle size is about one millimeter, and the largest crystals are average five millimeters. Plagioclase of the 0.1 mm size class are abundant and scattered evenly throughout the sample, but are not optically aligned. Glomerocrysts have been formed by the aggregation of the one millimeter plagioclase, which are concentrically zoned and contain inclusions of the 0.1 mm plagioclase. Plagioclase phenocrysts are five millimeters in size and are albite twinned with no inclusions. Quartz occurs in two forms: i) as five millimeter crystals with an inclusion free core measuring 1-2 mm in diameter and a two millimeter thick inclusion rich rim where the inclusions comprise about 50% of the volume, and ii) as 3-4 mm poikilitic crystals with abundant plagioclase inclusions (i.e., they have no pure quartz core). This implies that the small plagioclase laths were introduced into the melt after quartz had begun crystallizing. Poikilitic K-feldspar is mostly in the one millimeter size range with 0.1 mm inclusions of plagioclase and biotite. The K-feldspar is anhedral and perthitic. Some of the K-feldspar is surrounded by a thin reaction rim of plagioclase. Biotite is anhedral and occurs mostly in the 0.1 mm size range, but reaches up to 0.7 mm. It is associated with K-feldspar and opaque minerals. Hornblende occurs exclusively in the 0.1 mm size class, and is partly to wholly replaced by biotite.

Fine Granite

The fine granite facies is characterized by its fine grain size and lack of both biotite and hornblende. Sample 195 has 45% quartz, 45% K-feldspar, 10% plagioclase, and trace opaques and zircon. Quartz is subhedral and ranges from 0.1-0.5 mm in size, but is generally 0.3-0.4 mm. K-feldspar ranges from 0.3-1.0 mm and is anhedral. Plagioclase occurs both as ~0.5 mm albite twinned crystals and 3-4 mm phenocrysts.

Granodiorite

Although not as abundant as granite, textures in the granodiorite facies also vary considerably. Sample 206 was taken from an outcrop near sample 207 and has a texture that is gradational between sample 207 and the granite described above. Its mineralogy consists of 20% quartz, 60% plagioclase, 15% K-feldspar, 3% biotite, 3% hornblende, and trace opaques. Anhedral quartz is commonly 1-2 mm in size, and occurs as 0.2 mm interstitial grains associated with K-feldspar. The mineral forms rare 3-4 mm phenocrysts, and where these occur, they have inclusions of K-feldspar. These inclusions fill fractures in the quartz instead of being euhedral in form. Generally, K-feldspar is not as coarsely perthitic as sample 207, and is less common. K-feldspar is associated with quartz, and is usually 1-2 mm in size, but also occurs as 0.1 mm interstitial grains. Biotite and hornblende commonly are found as inclusions. Plagioclase occurs in two distinct sizes. The smaller sized crystals are needle-like, 0.1-0.2 mm laths which make up the bulk of the groundmass. The larger sized crystals are concentrically zoned and are 3-4 mm in size. All plagioclase phenocrysts have a 0.1-0.2 mm thick plagioclase rim that is not optically aligned with the rest of the phenocryst and truncates albite twins. Biotite is less abundant than in sample 207. It is approximately 0.5 mm in size and interstitial. Hornblende in this sample is not being replaced by biotite as in sample 207, and is also about 0.5 mm in size and interstitial.

Sample 166 has 35% quartz, 55% plagioclase, 5% K-feldspar, 5% hornblende, <1% biotite, and <1% opaque minerals. 90% of the quartz occurs as 0.5-1 mm subhedral grains. The remaining 10% of the quartz is 2-3 mm phenocrysts associated with K-feld-spar. These grain boundaries have an incipient myrmekitic texture. K-feldspar occurs as intergranular, late-stage, anhedral grains. The crystals are <0.5 mm and uncommon where the sample is dominated by plagioclase. Plagioclase occurs as sub- to euhedral two millimeters phenocrysts that are free of inclusions. The crystals are concentrically zoned and/or albite twinned. Hornblende is intergranular, anhedral, and late-stage. The crystals average 0.5 mm in size and are associated with plagioclase and quartz. A possible explanation for the difference in textures in this facies is that the range in texture is a result of the complex cooling history of a long-lived, periodically tapped magma body.

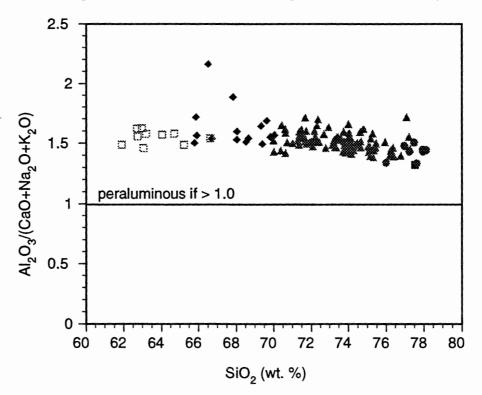
Quartz Diorite

Quartz diorite is characterized by its lack of K-feldspar and relatively low quartz content. Sample 156, for example, is 80% plagioclase, 8-10% quartz, 8-10% biotite, 1-3% hornblende, with trace opaque minerals. Plagioclase occurs both as five millimeter sub- to euhedral phenocrysts, but more commonly as an- to subhedral 2-3 mm groundmass. Concentric zoning is common as is albite twinning. Occasionally, the crystal is embayed and filled with biotite. Biotite is anhedral an interstitial. Secondary alteration has replaced some biotite rims with chlorite. Quartz is also anhedral and interstitial. Hornblende occurs associated with biotite and is late forming.

CLASSIFICATION

Representative samples from the different facies are plotted using the IUGS classification scheme. The results show that the main facies is a true granite. The pluton is also peraluminous (Figure 4) although minerals common in peraluminous granites such as muscovite, cordierite, and alusite, sillimanite, and garnet are absent.

Because the Bumping Lake pluton is located in the Cascade arc, it would be expected to be an I-type granitoid. However, the pluton straddles the boundaries between the I-type and S-type granitoids (Table II). The pluton has characteristics of both granitoid types, indicating that the source rocks are both igneous and sedimentary. The source



<u>Figure 4.</u> Al₂O₃/(CaO+Na₂O+K₂O) vs. SiO₂. Because all facies of the pluton have A/CNK values >1, they are defined as peraluminous. Aphanite shown as closed squares, fine granite as closed circles, granite as closed triangles, granodiorite and closed diamonds, and quartz diorite as open squares.

region for most I-type granites is the deep crust (Clarke, 1992), which is likely heterogeneous (Miller and others, 1987). Southeast of the pluton, the pre-Tertiary basement, taken as a whole, is a tectonic melange of metasedimentary and metavolcanic rocks (Miller, 1985), which projects beneath the study area. A similar phenomenon exists in the Criffell pluton, Scotland, where the pluton has both I- and S-type characteristics with a basement of metavolcanics and metasediments (Stephens, 1992).

TABLE II

COMPARISON OF BUMPING LAKE PLUTON AND I- AND S-TYPE GRANITOIDS. DEFINITIONS AFTER CHAPPELL AND WHITE (1984), CHAPPELL AND WHITE (1992), AND NORMAN AND OTHERS (1992).

I-type	S-type	Bumping Lake pluton
relatively high sodium, Na2O normally >3.2% in felsic varieties, decreasing to >2.2% in more mafic types	relatively low sodium, Na2O normally < 3.2% with approx. 5% K2O, decreasing to < 2.2% in rocks with approx. 2% K2O	average weight percent Na2O is 3.93
Mol Al2O3(Na2O + K2O + CaO) < 1.1	Mol Al2O3(Na2O + K2O + CaO) > 1.1	1.51 wt. % A/NKC and 1.18 cation %
CIPW normative diopside or < 1% normative corun- dum	>1% normative corundum	normative corundum ranges from 0 to 4.9% and averages 0.53%
broad spectrum of composi- tions from felsic to mafic	relatively restricted in composition to high SiO2 types	weight percent SiO2 ranges from 62.9 to 78.1
regular inter-element vari- ations within plutons; linear or near-linear variation dia- grams	variation diagrams more irregular	linear to near-linear variation diagrams
hornblende common in more mafic rocks, and gen- erally present in felsic varieties	hornblende absent, muscovite common, biotite common and up to 35% of rock	hornblende common in quartz diorite, but absent in granite
apatite inclusions common in biotite and hornblende	apatite occurs in larger discrete crystals	apatite uncommon, but exist as inclusions in biotite

CONVECTION

In some magma chambers, viscosity has been shown to be an important process that effects a wide range of physical processes such as magma withdrawal (Spera and others, 1986), melt transport phenomena (Petford and others, 1993), chemical fractionation (Spera and others, 1982), and chemical zonation (Marsh, 1989). It is the purpose of this section to demonstrate that viscosity plays a fundamental role in determining whether convection can be initiated and maintained in a siliceous magma chamber.

Viscosity is defined as the ratio of shear stress to strain rate. A good approximation for a melt's viscosity may be obtained from major element chemical data using a BASIC program by McBirney and Murase (1984). Using this program, the log of the effective viscosity of the Bumping Lake pluton at 900°C with one millimeter quartz phenocrysts is 10.196 Poise, which is used below in the calculation of the Rayleigh number.

A magma chamber will cool by conduction until the difference in temperature between the part of the chamber that is dissipating heat (assumed to be the chamber roof) and the part of the chamber that is hottest (assumed to be the floor where basalt is injected) reaches a critical value. Assuming Rayleigh-Benard convection, once this critical temperature difference is reached, convection begins. A critical value of the Rayleigh number, Ra_c, corresponds to the onset of convection, which typically ranges from 500-2000 (Marsh, 1989). The Rayleigh number is defined as,

$$Ra = \frac{\alpha g \Delta T l^3}{\eta K}$$

where α is the coefficient of thermal expansion, g is gravitational acceleration, ΔT is the temperature difference, l is length, η is kinematic viscosity, and K is thermal diffusivity. For a given magma chamber, the melt composition has a large effect on Ra_c because rhyolitic melts are 5-10 orders of magnitude more viscous than basaltic melts. Magmas with values of Ra $\sim 10^{15}$ - 10^{20} convect vigorously (Spera, 1980), while magmas with values of Ra $\sim 10^4$ probably do not convect at all (Marsh, 1989).

Simplifying the emplacement process of the Bumping Lake pluton by assuming thermal homogeneity at the time of emplacement allows an approximation of a possible post-emplacement evolutionary path. Immediately following emplacement, the pluton cooled by conduction until the thermal difference between the top and bottom of the pluton reached Ra_c. Because a temperature difference of only 1°C would have been required for the initiation of convection, the magma probably began to convect immediately after emplacement. Ignoring the increase in viscosity due to crystallization and assuming the base of the chamber had a temperature of about 1200°C (based on temperatures of molten basalt) and the top of the chamber had a temperature of about 850°C (based on Hildreth, 1980), Ra reached a maximum of about 10⁷. This value falls below the range of vigorous convection described by Spera (1980), and suggests that convection in the Bumping Lake pluton, although existent, was weak. If an increase in viscosity with crystallization is factored in, Ra will decrease and therefore decrease the likelihood that the melt convected.

This interpretation can be verified by calculating the Reynolds number, Re, of the magma, which is a measure of a liquid's turbulence and is defined as,

$$\operatorname{Re} = \frac{\rho v l}{\eta}$$

where ρ is density, ν is velocity, l is the length of the chamber, and η is the viscosity of the fluid. Less viscous melts such as basalt and basaltic andesite have large

Reynolds numbers and as a result can convect turbulently. Compared to mafic melts, felsic melts are slightly less dense and have viscosities generally 10^5 to 10^{10} times greater and therefore lower velocities. Using the parameters calculated for the Rayleigh number, the Re value for the Bumping Lake pluton is on order of 10^{-9} . Based on this value, convection could not have been turbulent and, as the Rayleigh number indicates, was more likely weak.

PETROGENESIS

Although commonly used in petrogenetic interpretation, variation diagrams have a number of shortcomings. As stated by Clarke (1992) these are: i) major elements suffer from the problem of closure, which make correlations between two elements appear better than they actually are (Chayes, 1960); ii) because variation diagrams are restricted in the number of variables that they show, each diagram must be considered as a small part of the whole, and many diagrams must be considered together to draw any conclusions about evolutionary history; and iii) perfect linear correlations are not always attributable to one cause, and deviations from a trend, although perhaps not understood, are nevertheless significant. However, when used in conjunction with field and petrologic data, variation diagrams can be a powerful tool. The approach of combining field, petrologic, and chemical data to make conclusions about petrogenesis is used in this study of the Bumping Lake pluton.

Strontium is strongly partitioned into plagioclase, and the Sr-CaO diagram confirms plagioclase fractionation (Figure 5). The correlation between Ba and Sr (Figure 6) demontrates the relationship of K-feldspar and plagioclase fractionation. An increase in Ba from the quartz diorite facies to the granite facies indicates that K-feldspar is not being removed with plagiocalse during the early stages of fractionation. A decrease in Ba from the granite facies to the highly fractionated fine granite facies indicates that K-feldspar is being fractionated in these facies. Petrography supports this fractionation history.

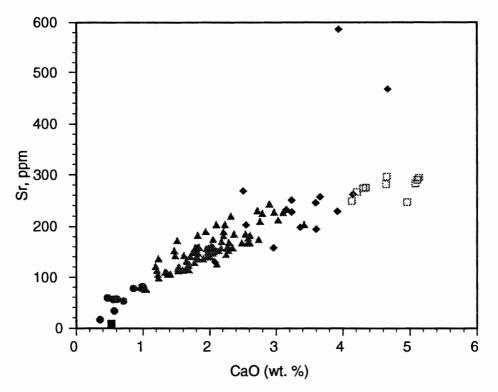


Figure 5. Sr vs. CaO. Sr is strongly partitioned into plagioclase, so a decrease in Sr with decreasing CaO indicates that plagioclase fractionation played an important role in the differentiation history of the pluton. Aphanite shown as closed squares, fine granite as closed circles, granite as closed triangles, granodiorite as closed diamonds, and quartz diorite as open squares.

K-feldspar grains are anhedral and therefore formed late in the crystallization sequence. The CaO-Na₂O-K₂O diagram suggests control of chemical evolution in the pluton by removal of plagioclase (Figure 7).

Zirconium is closely tied with differentiation and in the Bumping Lake pluton, decreases regularly in concentration as SiO₂ increases (Figure 8). TiO₂ shows a strong positive correlation with Zr (Figure 9), indicating that it also decreases with differentiation. Phosphorus is tied up principally in apatite and monazite, minerals that also appear to decrease modally with differentiation. P₂O₅ shows a very strong correlation with dif-

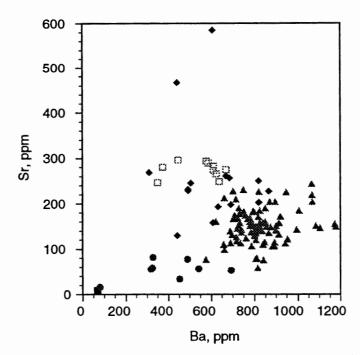


Figure 6. Sr vs. Ba. If K-feldspar continuously fractionated with plagioclase, then a linear correlation between Ba and Sr would exist. Here, Ba increases and then decreases as fractionation progresses. Symbols as in Figure 5.

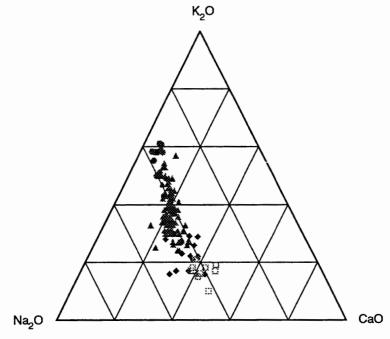


Figure 7. CNK ternary diagram. Shows that as differentiation progressed, the melt became progressively depleted in CaO and enriched in K₂O. This indicates the removal of plagioclase, and agrees with the pattern shown in Figure 5. Symbols as in Figure 5.

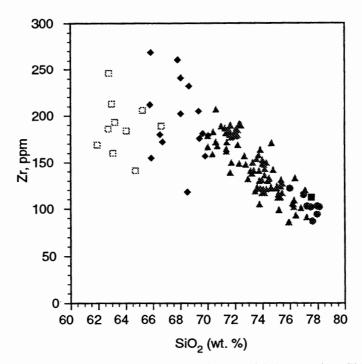


Figure 8. Zr vs. SiO₂. Plot showing a decrease in Zr with increasing SiO₂. The scatter shown in the granodiorite and quartz diorite may be attributed to assimilation of host rocks. Symbols as in Figure 5.

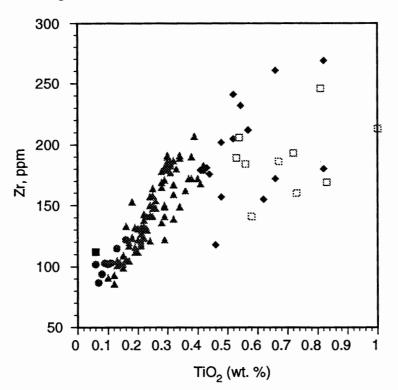


Figure 9. Zr vs. TiO₂. TiO₂ increases as Zr increases, which indicates that it decreases with differentiation. Symbols as in Figure 5.

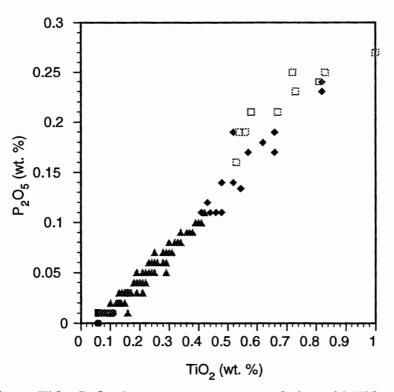


Figure 10. P₂O₅ vs. TiO₂. P₂O₅ shows a very strong correlation with TiO₂, which agrees with the observation that the accessory minerals apatite and monazite decreased modally with differentiation. Symbols as in Figure 5.

ferentiation (Figure 10), suggesting that its concentration is closely tied to crystal-liquid fractionation processes.

The plot that defines the pluton as peraluminous (Figure 4) also shows a slight decrease in excess alumina with differentiation. When SiO₂ is replaced with CaO on the x-axis (Figure 11) the trend remains, which indicates the presence of hydrous fluid phases and/or assimilation (Halliday and others, 1981). These possibilities may be further tested using K/Rb ratios. High K/Rb ratios are typical of magmatic processes and lower ratios can only be reached by fluid interaction effects (Clarke, 1992). A plot of K₂0 vs. Rb (Figure 12) shows only high ratios, which indicates that assimilation, not fluid interaction, is responsible for the alumina trend. Evidence for assimilation is present in the field

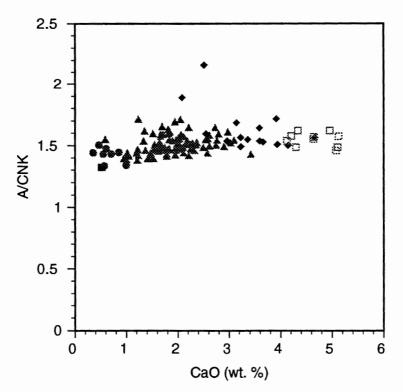


Figure 11. A/CNK vs. CaO. The slight decrease in excess alumina with decreasing CaO indicates assimilation. Vertical axis as in Figure 4. Symbols as in Figure 5.

as well. Near the intrusive contacts on Nelson Ridge and Highway 410, the pluton crystallized as it actively stoped pieces of country rock. Xenoliths of country rock are large and angular near the contact, but become smaller and more rounded with increasing depth (in some cases over 200 m) into the pluton. Assimilation of country rock may have been more or less continuous throughout the three million year life of the pluton (see Relationship to the Mount Aix caldera, below), and would be expected to effect the chemistry of the pluton.

Rare earth element (REE) patterns in the Bumping Lake pluton (Figure 13) are similar to those of other volcanic arc granites (Pearce and others, 1984). The slope of the chondrite-normalized REE patterns changes from negative in the light rare earth elements (LREE) to nearly flat in the heavy rare earth elements (HREE). As differentiation pro-

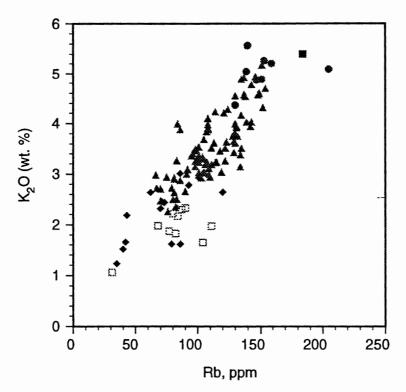


Figure 12. K₂O vs. Rb. High K/Rb ratios as shown here are achieved only by magmatic processes, which indicates that fluid interaction effects were minimal. Symbols as in Figure 5.

gressed in the pluton, LREE were depleted, a negative europium anomaly became more pronounced, and HREE showed no significant change. These trends are similar to those observed by Miller and Mittlefehldt (1982), who concluded that fractionation of LREErich accessories (e.g., allanite or monazite) is responsible for LREE depletion in highly felsic magmas. Accessory minerals tend to decrease in abundance with differentiation in the rocks of the Bumping Lake pluton, which supports the chemical evidence that fractionation of LREE-rich accessories occurred. Fractionation of feldspars is implied by the decrease in Eu/Eu* (observed Eu divided by Eu value predicted by drawing a straight line between the Sm and Gd values), which supports the evidence drawn from the variation diagrams in the previous section.

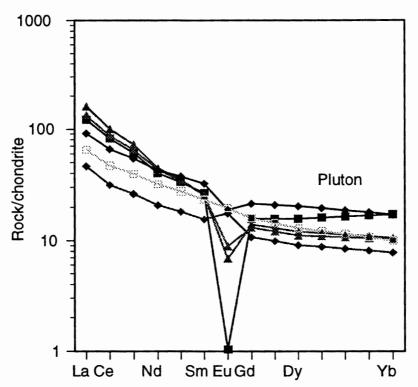


Figure 13. REE spider diagram for pluton samples. Note increase in Eu/Eu* value with differentiation. Symbols as in Figure 4. Normalization values after Nakamura (1974).

LATE-STAGE, HIGHLY FRACTIONATED LIQUIDS

In modeling externally cooled, crustal magma chambers, researchers have developed a framework for the fractionation of late stage, felsic magmas (e.g., Chen and Turner, 1980; Turner and Gustafson, 1981; Sparks and others, 1985; Nilson and others, 1985; Turner and Campbell, 1986). Field evidence has also been found in granitic plutons for these highly fractionated magmas (e.g., Boden, 1989; Mahood and Cornejo, 1992). The chemistry of the fine-grained granite facies of the Bumping Lake pluton indicates that it was a highly fractionated melt (Figures 5-11). This facies has the highest Si0₂, K₂O, and Rb content; the highest Rb/Zr, and Rb/Sr ratios; and the lowest TiO₂, MgO, P₂O₅, Zr, CaO, and Sr content, all of which indicate evolved composition.

In the field, the fine grained granite cuts the coarse grained granite and granodiorite, and occurs both as 10-30 cm thick tabular bodies and pods ranging from <1 to \sim 20 m but averaging 1-2 m in diameter. It is unknown whether these pods are discrete bodies or whether they extend some depth into the pluton. On Cougar Lake ridge, the bodies are tabular, horizontal, and spaced at ~25 m intervals. A sharp and even contact indicates that the fine granite was emplaced into the coarse granite when the coarse granite had cooled to the point of being brittle. The fine granite probably originated from deep within the pluton where temperatures were still high enough for the melt to be near the liquidus. The melt rose into the coarse granite and filled extensional fractures that existed as a result of cooling contraction, eruptive drawdown, fresh input of magma, faulting, or vapor saturation (Mahood and Cornejo, 1992). On Miners Ridge and Nelson Ridge, however, the fine granite occurs in irregularly shaped pods, which suggests that the host rock was ductile at the time it was intruded. Fine granites distributed throughout the pluton are chemically indistinguishable and were therefore emplaced at or near the same time. The differing contact relationships suggest that the pluton was molten in its southeastern extremity and mostly solid in the northwest at the time of emplacement. The pluton was more active physically and/or thermally for a longer period of time in the southeast.

SPACIAL VARIATIONS IN CHEMISTRY

Extensive sampling of the pluton revealed some consistent spacial chemical trends. Near the margins of the pluton, weight percent SiO₂ decreases with increasing elevation, and, therefore, with depth into the pluton (Figures 14 and 15), which is consistent

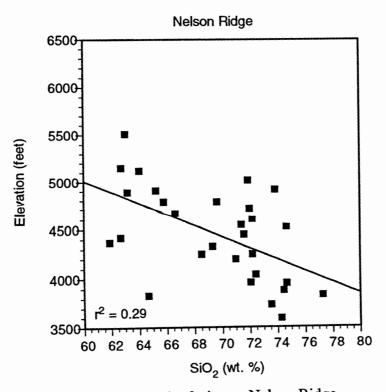


Figure 14. Elevation vs. SiO₂ in the granite facies on Nelson Ridge.

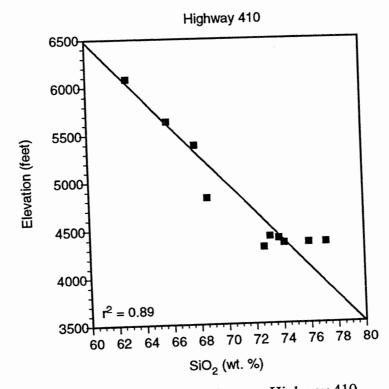


Figure 15. Elevation vs. SiO₂ in the granite facies near Highway 410.

with the interpretation that andesitic xenoliths were stoped and assimilated into the melt. Samples from Pear Butte Ridge show a weak positive correlation, but because of its low r^2 value (Table III), the correlation is probably not significant. Similarly, samples from American Ridge (Figure 16), Miners Ridge (Figure 17), and Rainier Fork Ridge have such low r^2 values that a variation in SiO₂ with respect to elevation does not exist. Since the intrusive contacts near these five locations are nearly vertical, the plutonic rock there probably represents a deeper level in the pluton where the effects of assimilation are not noticeable .

TABLE III

SUMMARY OF REGRESSION DATA FROM ELEVATION VS. SiO2 CHARTS

Location	Slope of best fit line	r ² value
American Ridge	5.58	0.0665
Highway 410	-6.68	0.89
Miners Ridge	-2.70	0.0062
Nelson Ridge	-5.80	0.29
Pear Butte Ridge	2.79	0.074
Rainier Fork Ridge	2.74	0.013

The regions of the pluton that show neither a consistent increase nor decrease in SiO₂ with elevation may indicate that i) the magma in that part of the chamber was disrupted, possibly by an eruption through a ring fault at the caldera margin; ii) the coarse granite facies did not undergo density stratification, a conclusion similar to Hildreth's (1981) of the Bishop Tuff magma chamber; iii) these areas have undergone varying degrees of silicification due to local mineralization. The third possibility may be ruled out on the basis that the abundance of mobile elements in samples taken from these regions

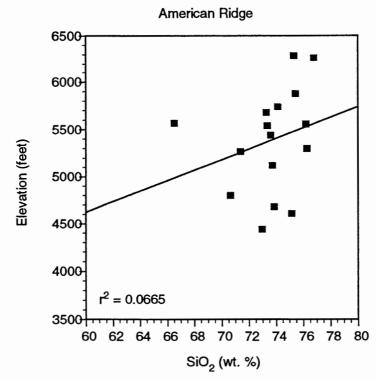


Figure 16. Elevation vs. SiO₂ in the granite facies on American Ridge.

are similar to samples from elsewhere in the pluton. It is likely that a combination of i) and ii) is responsible for the distribution pattern of SiO₂.

A useful diagram for the interpretation of spacial variations in chemistry is a contour diagram. In this diagram, contour lines connect areas with equal concentrations of a given element. In an SiO₂ contour diagram (Figure 18), the two areas of the pluton with granodiorite (Nelson Ridge and Highway 410) are represented by low SiO₂ values. Note the areas of relatively low SiO₂ to the north and south of American Ridge and the "high" at Miners Ridge. These areas correspond well with the spacial variation of Zr (Figure 19). Areas low in SiO₂ lows are high in Zr highs, and SiO₂ highs are Zr lows, which agrees with the trends defined in the Harker variation diagrams (see Figures 8-11). Figures 18 and 19 show that samples taken from Miners Ridge are highly differentiated.

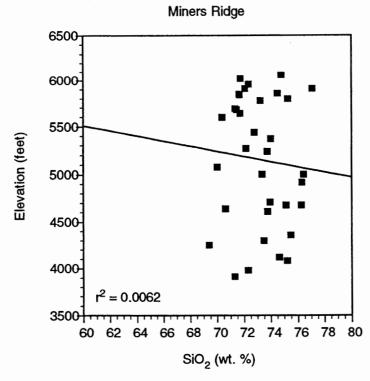


Figure 17. Elevation vs. SiO₂ in the granite facies on Miners Ridge.

Generally, as differentiation progresses, Zr decreases and Rb increases; therefore, the Rb/Zr ratio should vary systematically. In the case of the Bumping Lake pluton, the variation is not linear, and a two component plot is of little use. When Rb/Zr is plotted as a contour diagram, however, an interpretation is more straight forward (Figure 20). A high Rb/Zr ratio occurs on Miners Ridge at the same location as the Zr low and SiO₂ high, and two areas of low Rb/Zr also match the Zr and SiO₂ plots.

These irregularities may indicate different levels in the pluton. The less differentiated areas over American Ridge may represent a lower level in the pluton, which agrees with earlier interpretation of the significance of relatively highly differentiated rocks in this area. Conversely, the highly differentiated area over Miners Ridge may represent a relatively high level of the pluton.

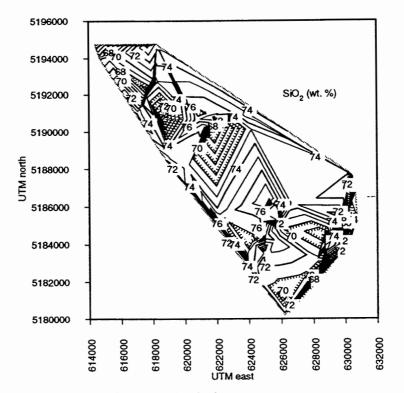


Figure 18. SiO2 contour map of the granite facies.

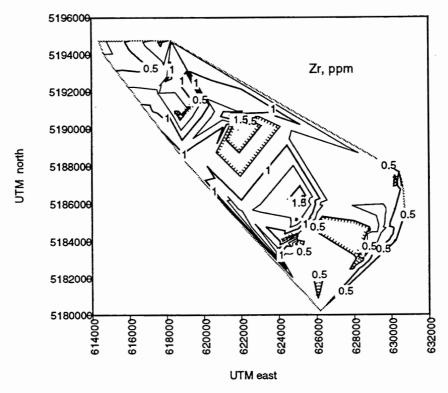


Figure 19. Zr contour map of the granite facies.

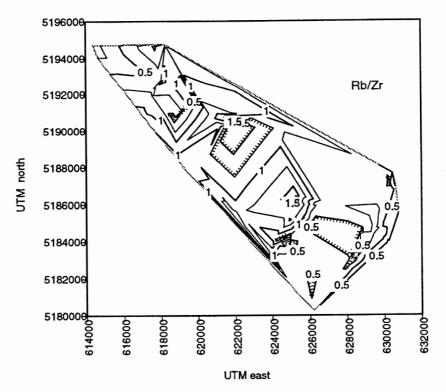


Figure 20. Rb/Zr contour map of the granite facies.

MINERALIZATION

Alteration due to the young andesite porphyry intrusion on Miners Ridge likely produced a zone of copper mineralization in the granite facies of Miners Ridge. Alteration in the BLP associated with the rhyolite intrusion on American Ridge was dated at 6.3 ± 0.2 Ma (Armstrong and others, 1976) by K-Ar.

RELATIONSHIP TO MOUNT AIX CALDERA

The roof of the pluton at its southeast margin is flat, found half way up the western slope of Nelson Ridge, and possibly directly underlies collapse breccia from the caldera. This contact indicates that the pluton projects southeast beneath the Mount Aix caldera. The 28 Ma Bumping River tuff-north (BRTn), 25 Ma Bumping River tuff-east (BRTe), and 25 Ma Cash Prairie tuffs (CPT) (dates from Schreiber, 1981; Vance and others, 1987) are interpreted based on field criteria (Paul E. Hammond, pers. commun., 1994) to have been derived from the caldera. Because these tuffs are quartz-bearing and have a high wt. % SiO₂, their source must also have been highly siliceous. Paul. E. Hammond (pers. commun., 1994) estimates that the cumulative volume of the three tuffs erupted from the Mount Aix caldera exceeds 100 km³, which suggests that an individual eruption was approximately as large as the caldera-forming eruption of Mt. Mazama, Oregon. A caldera typically empties about 10% of its chamber during an eruption (Smith, 1979); therefore, in addition to being highly siliceous, the Mount Aix caldera source must have had a large volume. In the region surrounding the caldera, the Bumping Lake pluton is an obvious and immediate suspect for being the source because it is large, predominantly granitic, a similar age, and is exposed directly beneath the caldera. The Bumping Lake pluton is the only realistic source because no other large, granitic, Oligocene pluton is known within 100 km of the caldera. Establishing a strong chemical and petrologic relationship between the pluton and the tuffs would clinch the argument.

CHEMICAL RELATIONSHIP

Because a three million year hiatus exists between the eruption of two of the three tuffs, a trace element that is effected by differentiation may chemically distinguish the tuffs. Zr is such an element in that it generally decreases with differentiation, and in this case clearly distinguishes the tuffs from each other. When Zr is plotted against SiO₂ (Figure 21), Zr appears to follow a normal differentiation trend within and between BRTn and CPT. These two tuffs fall directly on the fields defined by the pluton. BRTe has unusually high Zr for its SiO₂ values, which may indicate that it represents the least

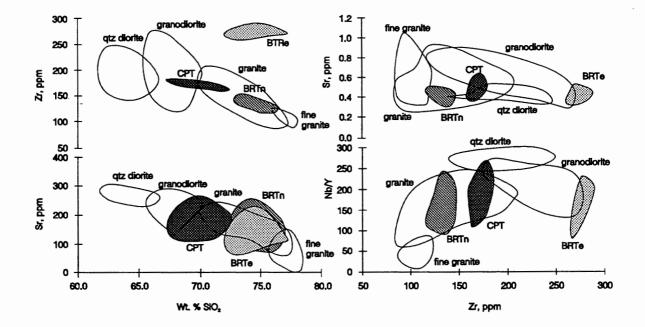


Figure 21. Chemistry of the Bumping River (BRTn and BRTe) and Cash Prairie tuffs (CPT). For comparison, facies from the pluton are also represented. Circles represent a field in which all samples of a particular facies or tuff plot.

differentiated, least evolved, and therefore oldest composition of the magma. BRTn and CPT match plutonic samples with more than just their Zr and SiO₂ values.

The chemistry of a tuff represents a "snapshot" of a magma chamber's chemistry, so tuffs such as BRTn, BRTe, and CPT may be compared with the pluton by defining a tuff in terms of a mean with a compositional range of two standard deviations. This approach does not suffer from the problems associated with two component variation diagrams because every major and minor element is considered. When the BRTn, BRTe, and CPT are compared to the pluton in this manner, 10 granite samples match BRTn and seven granite and two granodiorite samples match CPT with a 95% confidence interval (Table IV). The BRTe has no equivalent granite sample, but a plutonic equivalent may exist at depth.

TABLE IV

	BRTn 2o	BRTn -20	BRTe 2o	BRTe -2σ	CPT 2o	<u>CPT -2</u> σ
SiO2	76.89	72.65	78.90	71.05	73.69	67.29
A12O3	14.86	12.90	14.60	13.57	16.78	14.19
TiO2	0.30	0.15	0.52	0.27	0.69	0.34
FeO*	3.20	1.77	4.67	0.00	5.37	1.95
MnO	0.10	0.00	0.10	0.00	0.13	0.00
CaO	4.71	1.00	4.01	2.16	3.93	1.78
MgO	0.73	0.00	1.04	0.00	1.39	0.16
K2O	4.55	1.20	2.91	0.92	3.93	1.80
Na2O	4.29	0.67	3.99	1.69	4.76	1.64
P2O5	0.05	0.01	0.10	0.00	0.14	0.05
Ni	14	6	14	8	19	5
Cr	12	0	11	0	18	2
Sc	11	0	18	2	17	7
V	33	0	145	0	83	32
Ba	983	310	862	74	976	486
Rb	136	29	78	35	146	54
Sr	350	0	275	16	263	93
Zr	151	117	292	254	182	155
Y	34.5	21.2	52.1	30.8	34.9	21.7
Nb	14	8	22	14	16	11
Ga	20	12	24	13	21	14
Cu	18	7	16	2	26	15
Zn	66	51	137	0	79	30
Pb	13	6	16	1	15	9
La	45	8	39	26	36	14
Ce	77	27	96	67	76	33
Th	11	6	14	7	14	10

STATISTICAL CHEMICAL DATA OF THE TUFFS

Based on the LREE patterns (Figure 22), BRTe is the least differentiated, but Eu/Eu* for this tuff is similar to the others. Its pattern stands slightly apart from BRTn

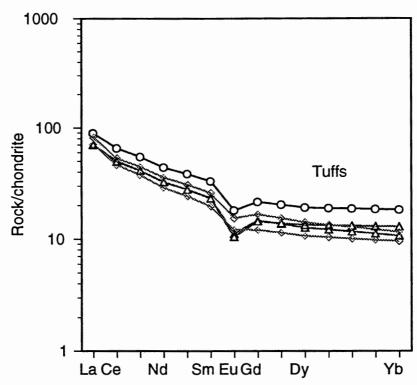


Figure 22. REE spider plot for the tuff samples. BRTn shown as open circles, BRTe as open triangles, and CPT as open diamonds. Normalization values after Nakamura (1974).

and CPT, but still falls within the range defined by the granitic rocks. CPT has the most variation in its REE values and has the lowest Eu/Eu*, which suggests that it was derived from the least differentiated magma. Most importantly, the patterns defined by the tuffs mimic those of the pluton (compare Figures 13 and 22), which provides support that the tuffs and the pluton share a cogenetic relationship.

PETROLOGIC RELATIONSHIP

The Cash Prairie tuff, Bumping River tuff-north, and the Bumping River tuff-east contain quartz and plagioclase phenocrysts, although in slightly varying abundances and sizes. This implies that, when erupted, the magma in the part of the chamber that was tapped contained phenocrysts of quartz and plagioclase in a molten matrix. It is difficult to tie this observation directly with the plutonic samples because the pluton represent the end product of a chemically and physically dynamic system. However, it is important to note that the granitic samples also contain phenocrysts of quartz and plagioclase only. Although this relationship is far from a convincing argument to support a cogenetic relationship between the tuffs and the pluton, it is important nonetheless because it is not inconsistent with this interpretation.

IMPLICATIONS

Field, chemical, and petrographic relationships between the Mount Aix derived tuffs and the Bumping Lake pluton indicate that the pluton is the chilled remains of the magma chamber genetically related to the caldera. Establishing this genetic link between eruptive products and source is as rare as it is significant. Typically, researchers must rely on eruptive products alone as a means to model magma chamber processes because the magma chamber is not exposed. Hildreth (1979) states that, "Much of the magmatic record may either be obliterated or rendered ambiguous in granitic rocks themselves." With this statement in mind, the significance of the Bumping Lake pluton with the signature of *two* eruptions preserved at the surface becomes clear. Based on dates of BRTn and CPT, the magma chamber must have been active at least three million years during the period 28 to 25 Ma. Clasts of BRTn occur in CPT and BRTn has an older date, so the eruption that produced BRTn must have preceded that of CPT. It is significant that a chemical match of the older BRTn can be found in the pluton even though the chamber erupted at least once more to produce the CPT. Therefore, the processes occurring in the pluton after eruption of BRTn were not sufficiently vigorous to homogenize the melt, which eliminates the possibility of vigorous convection. Instead, the chamber was disturbed only enough to mingle the chemistry of the BRTntype magma with a subsequent magma (the difference between mingling and mixing may be thought of in terms of the difference between marbling cake batter and putting a blender in it). This independent line of reasoning concurs with the main conclusion of the section on rheology: convection could not have been turbulent but, if present, was more likely weak.

The vent for the BRTn eruption is located near Bismarck Peak (Hammond and Cole, 1992), so one might hope that the BRTn-type granite is located in the pluton near the vent. However, the BRTn-type granite samples are scattered throughout the pluton (Figure 23). With the exception of one sample, CPT-type samples cluster in the eastern part of the pluton on Nelson Ridge. The BRTn-type samples are scattered as a result of activity prior to the eruption of CPT, and to an extent, the eruption of CPT itself. Because the BRTn-type samples are found interspersed with samples that have no known extrusive equivalent, the BRTn-type magma probably mingled with one or more later batches of magma before the eruption of CPT. Also, because the distribution of CPT-type plutonic samples is confined to the southern part of the pluton, little to no convective or eruptive activity followed the eruption of CPT. Instead, the pluton probably crystallized without interruption.

Evidence that significant crystallization did not occur between the eruption of BRTn and CPT is: i) the BRTn-type granite is texturally and modally identical to the CPT-type samples; ii) BRTn-type granite is widely scattered throughout the pluton; iii) smooth chemical gradients exist in the pluton between BRTn-type granite and CPT-type granite. Internal diffusion, a process that requires a liquid phase for a high diffusion coefficient (Hanson, 1978; Hildreth, 1981), may be responsible for these smooth gradients.

The tuff that doesn't match any samples in the pluton, BRTe, has much more Zr relative to SiO₂ than BRTn and CPT. The chemistry of BRTe indicates that it is much less differentiated than the other tuffs. Therefore, BRTe probably erupted before both BRTn and CPT. Age dates indicate that BRTe erupted after BRTn, but before CPT. If

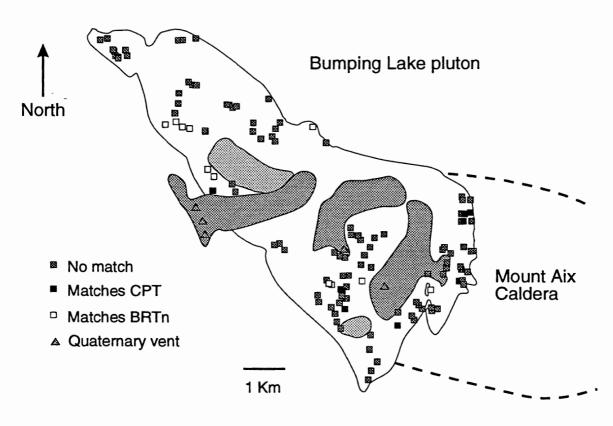


Figure 23 Location of granite samples that chemically match tuffs from the Mount Aix caldera.

these dates are accurate, then one must explain why the chemistry of both the BRTn and CPT were clearly preserved in the pluton, while the chemistry of BRTe was not. Assuming the dates are accurate, I propose that the chemistry of BRTe is preserved either beneath the caldera fill that covers the pluton in the southeast or at a deeper level in the pluton to the northwest of the caldera. In order to solve the apparent discrepancy between the chemistry and age date, a new date of BRTe should be obtained.

The vent that produced the older BRTn is preserved near Bismarck Peak. This vent is characterized by breccia margins and vertical flow structures shown by clast alignments (Paul E. Hammond, pers. commun., 1994). A sample taken from the region of vertical flow structures chemically matches the BRTn statistical population with a confidence interval of 67%. The CPT is younger than the BRTn, and since the BRTn vent is preserved, one would hope that the CPT vent would also be preserved. No other vents have been identified within the caldera margin east of the pluton. However, the caldera margin extends westward over the pluton, and the CPT may have vented in this area. Because all but one CPT-type granite samples are found in the eastern part of the pluton on Nelson ridge, the eruption that produced the CPT probably vented in this area. If this is the case, then the extrusive expression of this vent has been destroyed by erosion and by a younger intrusion of porphyritic andesite.

A possible eruptive history of the Bumping Lake pluton and Mount Aix caldera is as follows. At some point during its differentiation history, the granitic intrusion vented to the surface (possibly driven by injection of hot basalt at depth), which produced the BRTn (Figure 24a). The magma at that point was the BRTn-type magma, and had a

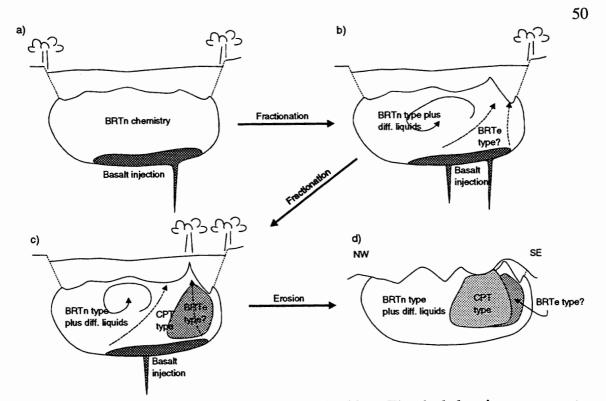


Figure 24 Schematic evolution of the pluton and caldera. The shaded regions are meant to represent regions dominated by BRTe-type magma, and CPT-type magma rather than regions composed entirely of that magma type. See text for discussion.

chemical signature identical to BRTn. Over time, fractionation continued, but the BRTntype magma was preserved in the intrusion. A second eruption produced the BRTe. This eruption may have been localized in the southeastern region of the caldera. The chamber to the northwest was probably physically disturbed by the event causing the BRTn-type magma to mingle with more fractionated magma (Figure 24b). This process was repeated with the eruption of the CPT (Figure 24c). After eruption of CPT, the intrusion crystallized and erosion exposed the complex approximately to the extent shown in Figure 24d.

FURTHER WORK

Because of the size of the pluton and the complexity of its relationship to surrounding rocks, this study was not able to cope with every aspect of the pluton. Listed below are several of the most imporant and interesting of the questions this study raised.

1) Complete isotope work on flows from vents that cut through the Bumping Lake pluton to determine if BLP extends vertically with depth or if the pluton is tabular. If the plutons extends vertically, what is the contribution of the pluton to the chemical signature of the flows in terms of contamination and assimilation? If the pluton is tabular, then the additional information about the shape of the pluton could be used in convection models.

2) Complete isotope work on the pluton to determine source material and to verify crustal contamination.

3) Study in detail the relationship between the stoped xenoliths near the intrusive contacts, the pluton, and the host rock. Exploring the effect of assimilation on the chemistry of the pluton, and the effect of assimilating xenoliths into the pluton would be a meaningful contribution to understanding magma chamber processes.

4) Fluid inclusion work could be done on quartz phenocrysts in the tuffs and quartz from the chemically matching granite to support the link between source rock and eruptive product.

CONCLUSIONS

The source of the Bumping Lake pluton is a heterogeneous region of metasedimentary and metavolcanic rocks. Room was probably made in the shallow crust by a _ transtensional stress regime. Stoping of the host rock occurred in the upper level of the pluton, but its contribution to making room for the pluton was probably minimal. On a small scale, the location of the pluton may have been influenced by an anticline in the host rock and pre-existing structures in the Rimrock Lake inlier.

Granodiorite and quartz diorite formed only at the intrusive contact as a result of assimilation of the host rock. During emplacement, the magma vented at least three times, possibly as a result of injections of fresh, volatile-rich basalt at the base of the chamber. During these tuff-producing eruptions, differentiation processes such as plagioclase and accessory mineral fractionation were constantly acting. The first eruption produced the BRTe: a highly siliceous, relatively undifferentiated tuff. After an unknown period of time, a second eruption produced the highly siliceous, highly fractionated BRTn from a vent near Bismarck Peak. A three million year eruptive hiatus followed, during which the magma may have weakly convected, but not thoroughly mixed. The hiatus was broken by an eruption of the CPT, which is the least siliceous tuff, and is less fractionated than BRTn. The final eruption disrupted the magma chamber so that the BRTn-type magma mingled, but not mixed, with the CPT-type magma. Crystallization ensued and preserved this intermingled structure. During the crystallization process, an extremely fractionated, mafic poor granite filled extensional cooling fractures where the pluton was brittle, and mingled with the pluton where still ductile. Further cooling completely crystallized the pluton.

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APPENDIX A

ANALYTICAL METHODS

A total of 154 samples were collected for this study, 138 of which were chemically analyzed and 12 representative samples were studied petrographically. The samples were chipped at Portland State University, and then sieved using a plastic 0.25 inch mesh. The chips were sorted and only those chips with no weathered surfaces were kept. Samples were brought to Washington State University's GeoAnalytical Laboratory in Pullman, Washington and prepared for X-ray fluorescence (XRF) and inductively coupled plasma - mass spectrometry (ICP-MS) according to the procedure outlined by Hooper and others, 1993, and then analyzed. Because tungsten carbide crushing bowls were used, samples were contaminated with tungsten, cobalt, tantalum, and less than two ppm niobium. Tungsten, cobalt, and tantalum are not analyzed by XRF so contamination of these elements can be ignored. Niobium concentrations may be used because instrumental precision of XRF is not high enough to detect the contamination. However, due to the high precision of the ICP-MS method, niobium and tantalum contamination can be detected, and these elements are therefore ignored.

			XKF KESU		Dida.	Minada Didaa	Miner's Ridge
Area	Copper Creek	American Ridge	American Ridge	Miner's Ridge	American Ridge	Miner's Ridge fine granite	fine granite
Desc.	aphanite	fine granite	fine granite	fine granite	fine granite 195	11ne granice 254	261
Chem #	162	285	194	256 624945	621752	624933	625679
UTM East	629327	619679	622103	5185170	5190409	5184406	5185945
UTM North	5185604	5191800	5190968 76.99	77.24	77.51	77.64	77.97
SiO2	77.54	76.01	12.74	12.84	12.99	12.29	12.62
AI2O3	12.28	12.83	0.125	0.105	0.095	0.070	0.088
TiO2	0.059	0.157	1.07	0.72	0.47	0.78	0.53
FeO*	0.82	1.24	0.018	0.014	0.007	0.011	0.020
MnO	0.011	0.023	0.61	0.71	0.47	0.57	0.86
CaO	0.52	1.00 0.14	0.42	0.10	0.29	0.00	0.03
MgO	0.00	4.88	5.05	5.21	5.27	5.57	4.37
K20	5.40	3.69	2.97	3.05	2.89	3.06	3.51
Na20	3.36 0.006	0.027	0.021	0.012	0.012	0.007	0.010
P2O5		7	9	8	9	8	12
Ni	11 0	2	õ	0	0	0	0
Cr	10	4	8	5	2	4	3
Sc	0	13	0	0	0	0	0
V	67	329	543	692	326	452	490
Ba Rb	184	147	139	159	153	140	130
Sr	9	82	57	53	59	34	78
Zr	112	122	115	103	102	87	103
Zr Y	36	15	37	30	29	16	33
Nb	13.2	10.5	11.6	15.5	16.7	6.5	14.4
Ga	17	12	14	15	14	11	10
Cu	41	15	9	17	16	31	9
Zn	19	21	17	14	11	20	8
Pb	12	. 11	9	9	8	14	7
La	35	25	35	17	24	26	33
Ce	67	51	42	56	47	52	51
Th	35	32	30	29	22	24	30
Area	Miner's Ridge	American Ridge	Granite Lake	Pear Butte Ridge	Miner's Ridge	Pear Butte Ridge	Pear Butte Ridge
Area Desc.	Miner's Ridge fine granite	American Ridge fine granite	Granite Lake granite	Pear Butte Ridge granite	Miner's Ridge granite	granite	granite
Desc.	fine granite	•			granite 183	granite 234	granite 167
Desc. Chem #	•	fine granite	granite	granite	granite 183 624824	granite 234 627945	granite 167 628370
Desc. Chem # UTM East	fine granite 258	fine granite 274	granite 10	granite 164	granite 183 624824 5183707	granite 234 627945 5182618	granite 167 628370 5183037
Desc. Chem #	fine granite 258 625261	fine granite 274 621867	granite 10 626110	granite 164 628903 5182896 70.01	granite 183 624824 5183707 70.37	granite 234 627945 5182618 70.42	granite 167 628370 5183037 70.60
Desc. Chem # UTM East UTM North	fine granite 258 625261 5186479	fine granite 274 621867 5190800	granite 10 626110 5184817	granite 164 628903 5182896 70.01 15.12	granite 183 624824 5183707 70.37 14.85	granite 234 627945 5182618 70.42 15.51	granite 167 628370 5183037 70.60 15.72
Desc. Chem # UTM East UTM North SiO2	fine granite 258 625261 5186479 77.98	fine granite 274 621967 5190800 78.13	granite 10 626110 5184817 70.00	granite 164 628903 5182896 70.01 15.12 0.321	granite 183 624824 5183707 70.37 14.85 0.317	granite 234 627945 5182618 70.42 15.51 0.419	granite 167 628370 5183037 70.60 15.72 0.396
Desc. Chem # UTM East UTM North SiO2 Al2O3	fine granite 258 625261 5186479 77.98 12.62	fine granite 274 621867 5190800 78.13 12.60	granite 10 626110 5184817 70.00 15.45	granite 164 628903 5182896 70.01 15.12 0.321 3.36	granite 183 624824 5183707 70.37 14.85 0.317 2.92	granite 234 627945 5182618 70.42 15.51 0.419 3.46	granite 167 628370 5183037 70.60 15.72 0.396 2.66
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2	fine granite 258 625261 5186479 77.98 12.62 0.078	fine granite 274 621867 5190800 78.13 12.60 0.064	granite 10 626110 5184817 70.00 15.45 0.420	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO*	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97
Desc. Chem # UTM East UTM North SiO2 At2O3 TiO2 FeO* MnO	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74
Desc. Chem # UTM East UTM North SiO2 AI2O3 TiO2 FeO* MnO CaO	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35
Desc. Chem # UTM East UTM North SiO2 AI2O3 TiO2 FeO* MnO CaO MgO	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.000 5.10 3.27	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.006 5.10 3.27 0.004	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5
Desc. Chem # UTM East UTM North SiO2 At2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 00	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4
Desc. Chem # UTM East UTM North SiO2 AI2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 0 6	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 4.11
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 0 6 8	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 35	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8 8 13	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 30	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 4.11 24
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 8	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.000 5.10 3.27 0.004 11 4 5 0 0 79	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 35 661	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8 8 13 895	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 9 22 769	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 3 3.0 7 4 9 3.0 749	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701
Desc. Chem # UTM East UTM North SiO2 AI2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 0 79 205	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 5 661 70	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8 8 13 895 67	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 9 22 769 105	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 30 749 83	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 21 24 21 24 201 82
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 3.20 6 8 3.20 151 56	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 0 79 205 17	granite 10 626110 5184817 70:00 15:45 0.420 3:10 0:040 3:03 0.72 2:47 4:65 0.110 7 7 7 7 35 661 70 213	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 9 22 769 105 167	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 30 749 83 231	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228
Desc. Chem # UTM East UTM North SiO2 At2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 79 205 17 102	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 35 661 70 70 213 179	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204 167	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 300 749 83 231 183	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 79 205 17 102 24	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 35 661 70 213 179 21	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8 13 895 67 204 167 204	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 300 749 83 231 183 14	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 79 205 17 102 24 8.7	granite 10 626110 5184817 70.00 15.45 0.420 3.03 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 35 661 70 213 179 21 10.3	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.064 6 6 8 13 895 67 204 167 20 9.1	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27 10.1	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 30 749 83 231 183 14 10.2	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14 6.8
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.088 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0 12	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.000 5.10 3.27 0.004 11 4 5 0 0.004 11 4 5 0 0.004 11 4 5 0 0.004 11 4 5 0 0.004 11 4 5 0 0.004 11 4 5 0.004 11 4 5 7 8.13 12.60 0.064 0.006 0.000000	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 35 661 70 213 179 21 10.3	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8 8 13 895 67 204 167 204 167 200 9.1	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 9 22 769 105 167 159 27 10.1	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 3 30 749 83 231 183 14 10.2 15	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 11 24 701 82 228 172 14 6.8 17
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 200 21.0 12	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.000 5.10 3.27 0.004 11 4 5 0 0 79 205 17 102 24 8.7 12 14	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 7 35 661 70 213 179 21 10.3 19 32	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 8 8 13 895 67 204 167 20 9.1 15 206	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 9 22 769 105 167 159 27 10.1 19 42	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 30 749 83 231 183 14 10.2 15 106	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 11 24 701 82 228 172 14 6.8 17 119
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu Zn	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0 12 10 10 6	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 79 205 17 102 24 8.7 12 14 26	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 7 5 661 70 213 179 21 10.3 19 21 10.3	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204 167 20 9.1 15 206 45	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27 10.1 19 42 33	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 30 749 83 231 183 14 10.2 15 106 40	granite 167 628370 5183037 70.60 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14 6.8 17 119 61
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu Zn Pb	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0 12 10 6 8	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 79 205 17 102 24 8.7 12 14 26 8	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 35 661 70 213 179 21 10.3 19 32 46 7	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204 167 20 9.1 15 206 45	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27 10.1 19 423 33 7	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 300 749 83 231 183 14 10.2 15 106 640 8	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14 6.8 17 119 61 13
Desc. Chem # UTM East UTM North SiO2 At2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu Zn Pb La	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0 12 10 6 8 3320 151 56 94 20 21.0 12 10 6 8 35	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 0 79 205 17 102 24 8.7 12 14 26 8 12	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 35 661 70 213 179 21 10.3 19 32 46 7 40	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204 167 200 9.1 15 206 45 15	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27 10.1 19 42 33 7 13	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 300 749 83 231 183 14 10.2 15 106 40 8 8	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14 6.8 177 119 61 13 28
Desc. Chem # UTM East UTM North SiO2 Al2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu Zn Pb La Ce	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0 12 10 6 8 35	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 79 205 17 102 24 8.7 12 14 26 8 8 12 29	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 35 661 70 213 179 21 10.3 19 32 46 7 40 5 40 7 7 10.3 19 32 40 7 40 7 7 7 10.3 10.3 10.3 1	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204 167 20 9.1 15 206 45 15	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27 10.1 19 42 33 7 34 9	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 300 749 83 231 183 14 10.2 15 106 40 8 8 24	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14 6.8 17 119 61 13
Desc. Chem # UTM East UTM North SiO2 At2O3 TiO2 FeO* MnO CaO MgO K2O Na2O P2O5 Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu Zn Pb La	fine granite 258 625261 5186479 77.98 12.62 0.078 0.48 0.008 0.55 0.00 4.89 3.38 0.008 10 0 6 8 320 151 56 94 20 21.0 12 10 6 8 3320 151 56 94 20 21.0 12 10 6 8 35	fine granite 274 621867 5190800 78.13 12.60 0.064 0.46 0.006 0.36 0.00 5.10 3.27 0.004 11 4 5 0 0 79 205 17 102 24 8.7 12 14 26 8 12	granite 10 626110 5184817 70.00 15.45 0.420 3.10 0.040 3.03 0.72 2.47 4.65 0.110 7 7 7 35 661 70 213 179 21 10.3 19 32 46 7 40	granite 164 628903 5182896 70.01 15.12 0.321 3.36 0.043 3.42 0.50 2.72 4.43 0.084 6 6 6 8 13 895 67 204 167 200 9.1 15 206 45 15	granite 183 624824 5183707 70.37 14.85 0.317 2.92 0.045 2.57 1.11 3.05 4.70 0.077 6 4 9 22 769 105 167 159 27 10.1 19 42 33 7 13	granite 234 627945 5182618 70.42 15.51 0.419 3.46 0.036 2.72 0.63 2.51 4.18 0.106 7 6 13 300 749 83 231 183 14 10.2 15 106 40 8 8	granite 167 628370 5183037 70.60 15.72 0.396 2.66 0.038 2.97 0.74 2.35 4.42 0.099 5 4 11 24 701 82 228 172 14 6.8 177 119 61 13 28 43

Miner's Ridge	American Ridge	Pear Butte Ridge	Nelson Ridge	Deep Creek	Miner's Ridge	Pear Butte Ridge	American Ridge
granite	granite	granite	granite	granite	granite	granite 166	granite 188
173	284	169	154 630109	170 626370	245 624855	628200	619127
626012 5181896	619806 5191764	627279 5182177	5186787	5180677	5183164	5183177	5188122
70.62	70.63	70.71	71.00	71.28	71.34	71.36	71.36
15.10	14.76	14.87	15.03	14.59	15.09	15.25	15.09
0.372	0.391	0.414	0.344	0.320	0.302	0.362	0.281
3.20	3.09	3.37	3.03	3.51	2.56	2.76	2.53
0.070	0.056	0.056	0.040	0.059	0.047	0.038	0.047
2.61	2.21	2.74	2.61	2.28	2.49	2.79	2.01
1.03	0.57	0.60	0.45	0.58	0.44	0.59	0.97 3.75
2.50	3.49	2.92	3.00	3.19	3.00 4.65	2.72 4.05	3.90
4.41	4.70	4.22 0.101	4.41 0.082	4.12 0.077	0.069	0.090	0.059
0.092	0.099	6	6	6	7	3	4
6 5	0	2	3	6	6	2	0
13	7	13	7	11	6	10	11
19	37	19	21	17	20	24	14
750	799	709	702	726	723	947	687
80	98	103	109	106	91	79	132
183	182	175	167	153	168	226	140
172	207	168	189	187	182	162 13	165 24
26	22	22	29	25 9.3	28 12.1	8.8	10.9
9.3	12.2 17	10.2 18	11.4 21	9.3 19	16	16	18
17 13	28	55	126	7	36	57	36
44	39	47	46	71	38	40	27
13	13	13	9	23	10	8	7
25	54	31	19	30	17	34	35
67	71	57	63	62	50	24	78
11	19	12	13	11	13	8	15
Noleon Dideo	Minora Bidge	Nelson Ridge	Pear Butte Bidge	Miner's Ridge	Miner's Bidge	Miner's Ridge	Miner's Ridge
Nelson Ridge	Miners Ridge granite	Nelson Ridge aranite	Pear Butte Ridge granite	Miner's Ridge granite	Miner's Ridge granite	Miner's Ridge granite	Miner's Ridge granite
granite	granite	granite	Pear Butte Ridge granite 165	Miner's Ridge granite 246	Miner's Ridge granite 249	•	-
granite 5	•	•	granite	granite	granite	granite	granite
granite	granite 174	granite 219	granite 165	granite 246	granite 249	granite 175 624624 5182354	granite 215 625667 5184890
granite 5 630143	granite 174 624533	granite 219 630333	granite 165 628667 5183768 71.64	granite 246 624758 5182024 71.66	granite 249 624994 5183897 71.67	granite 175 624624 5182354 71.73	granite 215 625667 5184890 71.74
granite 5 630143 5184682	granite 174 624533 5182683	granite 219 630333 5187140 71.61 15.08	granite 165 628667 5183768 71.64 14.99	granite 246 624758 5182024 71.66 14.97	granite 249 624994 5183897 71.67 15.41	granite 175 624624 5182354 71.73 14.74	granite 215 625667 5184890 71.74 15.33
granite 5 630143 5184682 71.42 14.95 0.380	granite 174 624533 5182683 71.47 14.86 0.314	granite 219 630333 5187140 71.61 15.08 0.331	granite 165 628667 5183768 71.64 14.99 0.321	granite 246 624758 5182024 71.66 14.97 0.307	granite 249 624994 5183897 71.67 15.41 0.382	granite 175 624624 5182354 71.73 14.74 0.313	granite 215 625667 5184890 71.74 15.33 0.285
granite 5 630143 5184682 71.42 14.95 0.380 2.70	granite 174 624533 5182683 71.47 14.86 0.314 3.19	granite 219 630333 5187140 71.61 15.08 0.331 2.72	granite 165 628667 5183768 71.64 14.99 0.321 0.321 2.77	granite 246 624758 5182024 71.66 14.97 0.307 2.64	granite 249 624994 5183897 71.67 15.41 0.382 3.01	granite 175 624624 5182354 71.73 14.74 0.313 3.02	granite 215 625667 5184890 71.74 15.33 0.285 1.84
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 2.66 4.44 0.080 9	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.088 3.12 4.28 0.068 8 4 10	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 5 9 23	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 7	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 8 4 10 13	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 6
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 24 714	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 43 1064
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 8 36 820 81	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 5 9 23 731 90	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 5 5 5 5 5 6 5 5 6 5	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838 135	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 43 1064 95
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731 90 178	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 5 5 5 4 4 714 66 210	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838 838 135	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 6 43 1064 95 244
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.68 0.44 2.68 0.44 2.68 0.44 2.68 0.44 2.68 0.44 2.68 0.44 2.68 0.44 2.68 0.44 2.59 0.90 2.31 0.90 2.58 0.90 2.58 0.44 2.58 0.44 2.58 0.44 2.58 0.44 2.58 0.44 0.99 0.90 0.90 0.90 0.90 0.90 0.90	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 5 5 24 71 66 210 139	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 7 1 3 838 135 157 183	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 794	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 6 4.3 1064 95 244 150
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185 27	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731 99 23 731 90 178 180 25	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 24 714 66 210 139 8	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 0.050 1.98 0.40 0.071 7 1 7 1 7 1 3 838 135 157 183 27	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 794	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 6 43 1064 95 244
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13 7.3	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 849 114 159 185 27 12.1	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.0800 9 5 9 23 731 90 178 180 25 14.2	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 24 714 66 210 139 8 5,7	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838 135 157 183 27 11.6	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22 11.5	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 794	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 4.3 1064 95 244 150 5
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13 7.3 15	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185 27 12.1 18	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731 90 178 180 25 14.2 15	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 24 714 66 210 139 8	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 0.050 1.98 0.40 0.071 7 1 7 1 7 1 3 838 135 157 183 27	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 794 109 183 177 25 9.3	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 4.3 1064 95 244 150 5 3.6
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13 7.3 15 109	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185 27 12.1 18 10	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.0800 9 5 9 23 731 90 178 180 25 14.2	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 5 24 714 66 210 139 8 8 5.7	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 3 838 135 157 183 27 11.6 20	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22 11.5 21	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 177 25 9.3 18	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 43 1064 95 244 150 5 5 5 3.6 16
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13 3,7.3 15 109 26	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185 27 12.1 18	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731 90 178 180 25 14.2 15 50	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 5 5 5 5 24 714 66 210 139 8 8 7,14 32	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838 135 157 183 27 11.6 20 96	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22 11.5 21 112 36 11	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 177 25 9.3 18 19 29 5	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 6 43 1064 95 244 150 5 3.6 16 21 31 8
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13 7.3 15 109	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185 27 12.1 18 5 27 12.1 18 5 27 12.1 18 5 27 12.1 18 5 27 12.1 18 5 27 12.1 18 5 27 12.1 18 5 27 12.1 18 5 27 1.4 7 1.4 7 5 19 6 3 10 10 10 10 10 10 10 10 10 10 10 10 10	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731 90 178 180 25 14.2 15 50 36	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.96 3.95 0.075 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838 838 135 157 183 27 11.6 20 96 45	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22 11.5 21 112 36 11 27	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 177 25 9.3 18 19 29 5 5	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 6 6 6 43 1064 95 244 150 5 3.6 16 21 31 8 9
granite 5 630143 5184682 71.42 14.95 0.380 2.70 0.030 3.10 0.74 2.64 3.95 0.090 6 5 8 36 820 81 227 172 13 7.3 15 109 26 7	granite 174 624533 5182683 71.47 14.86 0.314 3.19 0.043 1.84 0.83 3.23 4.15 0.072 7 5 12 19 849 114 159 185 27 12.1 18 10 10 10 12 19 19 19 19 19 19 19 19 19 19 19 19 19	granite 219 630333 5187140 71.61 15.08 0.331 2.72 0.042 2.58 0.44 2.66 4.44 0.080 9 5 9 23 731 90 178 180 25 14.2 15 50 0.36 7	granite 165 628667 5183768 71.64 14.99 0.321 2.77 0.039 2.76 0.46 2.98 3.95 0.075 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 7 4 4 714 66 210 139 8 5.7 14 32 2 42 5	granite 246 624758 5182024 71.66 14.97 0.307 2.64 0.050 1.98 0.40 3.52 4.40 0.071 7 1 7 1 3 838 135 157 183 27 11.6 20 96 45 13	granite 249 624994 5183897 71.67 15.41 0.382 3.01 0.050 2.05 0.39 2.71 4.25 0.091 9 4 4 4 31 756 70 175 190 22 11.5 21 112 36 11	granite 175 624624 5182354 71.73 14.74 0.313 3.02 0.040 1.82 0.88 3.12 4.28 0.066 8 4 10 13 794 109 183 177 25 9.3 18 19 29 5	granite 215 625667 5184890 71.74 15.33 0.285 1.84 0.031 2.90 0.45 3.36 4.00 0.061 5 6 6 6 6 43 1064 95 244 150 5 3.6 16 21 31 8

Nelson Ridge	Nelson Ridge	Miner's Ridge	Nelson Ridge	Miner's Ridge	Nelson Ridge	Nelson Ridge	Deep Creek
granite	granite	granite	granite	granite	granite	granite	granite
220	153	241	148	247	149	160	172
630588	630321	624909	630145	624994	630309	630079	626182
5187104	5186811	5183661	5187750	5182933	5187683	5184165	5180244
71.90	71.99	72.08	72.08	72.16	72.20	72.21	72.30
14.77	14.84	14.65	14.41	14.86	14.68	14.80	14.37
0.294	0.277	0.301	0.301	0.286	0.314	0.282	0.300
2.72	2.53	2.77	2.92	2.91	2.87	2.69 0.028	3.00 0.050
0.039	0.040	0.042	0.054	0.039	0.037	2.54	2.00
2.35	2.27	2.14	2.25	1.51	2.03 0.37	0.38	0.36
0.39	0.45	0.39	0.38	0.38 3.04	3.15	2.94	3.24
3.03	3.02	3.34 4.22	3.19 4.34	4.75	4.27	4.06	4.30
4.43	4.52 0.063	4.22 0.081	0.069	0.066	0.071	0.074	0.068
0.068 9	6	10	6	11	5	6	7
9 4	0	3	5	3	3	2	4
9	6	8	8	6	9	7	13
13	ő	15	18	11	16	18	9
733	777	900	719	920	791	824	740
101	104	104	111	119	134	75	101
158	161	152	145	172	152	185	143
181	178	179	186	180	185	169	191
30	29	29	30	31	31	26	31
12.9	10.5	12.3	11.1	12.8	11.6	10.9	13.0
17	17	17	18	18	16	17	16
82	40	30	22	33	167	65	15
39	45	42	30	30	32	36	37
9	12	7	5	6	7	9	10
18	33	28	30	21	24	42	28
54	58	55	65	53	52	60	78
12	9	13	13	12	11	11	12
					A	11	Minorda Distan
Pear Butte Ridge	Miner's Ridge	Nelson Ridge	Hwy 410	Miner's Ridge	American Ridge	Hwy 410	Miner's Ridge
granite	granite	granite	granite	granite	granite	granite	granite
granite 233	granite 243	granite 217	granite 213	granite 186	granite 192	granite 290	granite 263
granite 233 628030	granite 243 624970	granite 217 630194	granite 213 618279	granite 186 626673	granite 192 624152	granite 290 618152	granite 263 626273
granite 233 628030 5182424	granite 243 624970 5183364	granite 217 630194 5187689	granite 213 618279 5194750	granite 186 626673 5186171	granite 192 624152 5190134	granite 290 618152 5194770	granite 263 626273 5186055
granite 233 628030 5182424 72.30	granite 243 624970 5183364 72.35	granite 217 630194 5187689 72.42	granite 213 618279 5194750 72.68	granite 186 626673 5186171 72.78	granite 192 624152 5190134 72.94	granite 290 618152 5194770 73.14	granite 263 626273 5186055 73.23
granite 233 628030 5182424 72.30 15.02	granite 243 624970 5183364 72.35 15.14	granite 217 630194 5187689 72.42 14.50	granite 213 618279 5194750 72.68 14.69	granite 186 626673 5186171 72.78 14.51	granite 192 624152 5190134 72.94 15.02	granite 290 618152 5194770 73.14 14.34	granite 263 626273 5186055 73.23 14.83
granite 233 628030 5182424 72.30 15.02 0.339	granite 243 624970 5183364 72.35 15.14 0.339	granite 217 630194 5187689 72.42 14.50 0.303	granite 213 618279 5194750 72.68 14.69 0.244	granite 186 626673 5186171 72.78 14.51 0.256	granite 192 624152 5190134 72.94 15.02 0.192	granite 290 618152 5194770 73.14 14.34 0.241	granite 263 626273 5186055 73.23 14.83 0.217
granite 233 628030 5182424 72.30 15.02 0.339 2.62	granite 243 624970 5183364 72.35 15.14 0.339 2.67	granite 217 630194 5187689 72.42 14.50 0.303 2.71	granite 213 618279 5194750 72.68 14.69 0.244 2.37	granite 186 626673 5186171 72.78 14.51 0.256 1.55	granite 192 624152 5190134 72.94 15.02 0.192 1.83	granite 290 618152 5194770 73.14 14.34 0.241 2.23	granite 263 626273 5186055 73.23 14.83 0.217 1.67
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48 2.87	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48 2.87 4.04	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98	granite 186 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052	granite 186 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26	granite 263 626273 5186057 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.73 1.81 0.74 3.37 4.03 0.046 6	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 0.30 3.39 4.26 0.053 14	granite 263 626273 5186057 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9
granite 233 628030 5182424 72:30 15:02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1
granite 233 628030 5182424 72:30 15:02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 11 31	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 1	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 1 1 1 31 849	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 779	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10	granite 192 624152 5190134 72.94 15.02 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 11 31 849 86	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 779 115	granite 186 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 0 839	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 8 13 854	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 5 5
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 11 31 849 86 190	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 779	granite 186 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065 100	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134	granite 263 626273 5186057 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 1005 99
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 11 31 849 86 190 149	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 1 7 7 11 779 115 152	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065 100 220	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 5 1005 99 185 138 138
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 11 31 849 86 190	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 779 115 152 157	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065 100 220 148	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158 132	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 1005 99 185 138 138 15 8.7
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 11 31 849 86 6190 149	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191 27	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190 28	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 77 11 779 115 152 157 19	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 100 1065 100 220 148 8	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158 132 15 7.7 7.7	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141 27 10.8 16	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 5 1005 99 185 138 138 15 8.7 17
granite 233 628030 5182424 72:30 15:02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 11 31 849 86 190 149 14 9,3	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191 27 12.2	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190 28 14.8	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 11 77 11 779 115 152 157 19 8.5	granite 186 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065 100 220 148 8 8 4.6 17 10	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158 132 15 7.7 7,7 7 7	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141 27 10.8 16 7	granite 263 626273 5186057 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 5 1005 99 185 138 15 8.7 17 32
granite 233 628030 5182424 72.30 15.02 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191 27 12.2 19	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190 28 14.8 16	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 11 7 7 11 779 115 152 157 19 8.5 15 14 23	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065 100 220 148 8 4.6 17 100 120 148 148 148 100 170 170 170 170 170 170 170	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158 132 15 7.7 17 7 28	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141 27 10.8 16 7 21	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 1005 99 185 138 15
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 9 11 11 31 849 86 190 149 14 9 3 3 16 49	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191 27 12.2 19 14	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190 28 14.8 16 52	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 779 115 152 157 19 8.5 15 15 14 23 8	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 111 100 1065 100 220 148 8 4.6 17 100 120 148 8 4.6 17 100 100 100 100 100 100 100	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158 132 15 7.7 17 7 28 9	granite 2990 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141 27 10.8 16 7 7 21 7	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 0.005 99 185 138 15 8.7 7 7 32 15 8
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 11 31 849 86 190 149 14 9.3 16 49 40	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191 27 12.2 19 14 51	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190 28 14.8 16 52 40	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 11 7 7 11 779 115 152 157 19 8.5 15 14 23	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 11 10 1065 100 220 148 8 4.6 17 100 120 148 148 148 100 170 170 170 170 170 170 170	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.07 4.03 0.046 6 4 10 0 839 101 158 132 15 7.7 17 7 28 9 20	granite 290 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141 27 10.8 16 7 7 21 7 36	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 1005 99 185 138 15 8.7 17 32 15 8 7 15 8 22
granite 233 628030 5182424 72.30 0.339 2.62 0.033 2.21 0.48 2.87 4.04 0.093 9 9 9 9 11 31 849 86 190 149 14 9.3 16 49 40 9	granite 243 624970 5183364 72.35 15.14 0.339 2.67 0.044 1.94 0.45 2.26 4.73 0.081 11 7 6 20 728 76 190 191 27 12.2 19 12,2 19 14 51 17	granite 217 630194 5187689 72.42 14.50 0.303 2.71 0.050 2.26 0.35 2.94 4.40 0.070 10 3 9 14 791 110 157 190 28 14.8 16 52 40 9	granite 213 618279 5194750 72.68 14.69 0.244 2.37 0.032 2.11 0.61 3.24 3.98 0.052 5 1 7 7 11 779 115 152 157 19 8.5 15 15 14 23 8	granite 196 626673 5186171 72.78 14.51 0.256 1.55 0.023 2.32 0.87 3.25 4.37 0.059 5 3 111 100 1065 100 220 148 8 4.6 17 100 120 148 8 4.6 17 100 100 100 100 100 100 100	granite 192 624152 5190134 72.94 15.02 0.192 1.83 0.031 1.81 0.74 3.37 4.03 0.046 6 4 10 0 839 101 158 132 15 7.7 17 7 28 9	granite 2990 618152 5194770 73.14 14.34 0.241 2.23 0.036 2.00 0.30 3.39 4.26 0.053 14 12 8 13 854 134 150 141 27 10.8 16 7 7 21 7	granite 263 626273 5186055 73.23 14.83 0.217 1.67 0.019 2.37 0.27 3.47 3.89 0.046 9 1 5 5 1005 99 185 138 15 8.7 17 32 15 8

American Didae	Minodo Didao	American Ridge	Miner's Ridge	Copper Creek	American Ridge	American Ridge
American Ridge	Miner's Ridge granite	granite	granite	granite	granite	granite
granite 269	253	189	178	163	190	283
620091	624873	619079	623818	629630	620139	619927
5188067	5183552	5188671	5183323	5185488	5188073	5191752
73.28	73.35	73.36	73.46	73.55	73.59	73.72
14.12	14.43	14.28	14.32	14.47	14.29	13.85
0.244	0.233	0.247	0.207	0.263	0.220	0.247
2.24	1.87	2.03	1.90	1.70	1.79	2.04
0.042	0.039	0.031	0.031	0.022	0.036	0.038
1.83	1.80	1.97	1.83	2.17	1.90	1.78
0.38	0.18	0.74	0.79	0.45	0.76	0.38
3.75	3.79	3.62	3.66	3.26	3.52	3.98
4.04	4.26	3.65	3.76	4.05	3.85	3.90
0.051	0.049	0.052	0.047	0.059	0.043	0.060
9	11	7	8	8	6	9
1	4	4	2	1	1	2
5	2	10	9	11	7	4
23	22	8	3	25	9	10
866	836	826	806	824	784	823
128	129	130	129	122	122	108
136	140	140	136	158	137	151
150	141	141	119	154	123	158
19	35	30	18	20	21	16
10.8	11.8	11.2	9.2	8.8	9.1	13.2
16	17	16	14	16	15	14
9	17	46	25	19	11	37
26	47	28	23	26	21	34
6	9	9	9	9	7	11
19	131	42	13	11	33	38
20	245	89	51	33	55	57
18	30	16	18	14	20	19
			Annal an Diday	Minoda Didae	Deleter Ek, Didao	Dainier Ek Didee
Miner's Ridge	Hwy 410	Nelson Ridge	American Ridge	Miner's Ridge	Rainier Fk. Ridge	Rainier Fk Ridge
granite	granite	granite	granite	granite	granite	granite
granite 259	granite 210	granite 158	granite 201	granite 182	granite 203	granite 205
granite 259 625303	granite 210 617545	granite 158 630242	granite 201 618879	granite 182 624436	granite 203 618121	granite 205 617412
granite 259 625303 5186230	granite 210 617545 5194677	granite 158 630242 5184018	granite 201 618879 5189030	granite 182 624436 5183945	granite 203 618121 5190768	granite 205 617412 5191451
granite 259 625303 5186230 73.76	granite 210 617545 5194677 73.77	granite 158 630242 5184018 73.84	granite 201 618879 5189030 73.84	granite 182 624436 5183945 73.94	granite 203 618121 5190768 73.95	granite 205 617412 5191451 73.99
granite 259 625303 5186230 73.76 14.71	granite 210 617545 5194677 73.77 13.97	granite 158 630242 5184018 73.84 13.81	granite 201 618879 5189030 73.84 14.08	granite 182 624436 5183945 73.94 14.09	granite 203 618121 5190768 73.95 13.83	granite 205 617412 5191451 73.99 13.96
granite 259 625303 5186230 73.76 14.71 0.175	granite 210 617545 5194677 73.77 13.97 0.225	granite 158 630242 5184018 73.84 13.81 0.253	granite 201 618879 5189030 73.84 14.08 0.204	granite 182 624436 5183945 73.94 14.09 0.208	granite 203 618121 5190768 73.95 13.83 0.230	granite 205 617412 5191451 73.99 13.96 0.293
granite 259 625303 5186230 73.76 14.71 0.175 1.44	granite 210 617545 5194677 73.77 13.97 0.225 2.04	granite 158 630242 5184018 73.84 13.81 0.253 2.14	granite 201 618879 5189030 73.84 14.08 0.204 1.81	granite 182 624436 5183945 73.94 14.09 0.208 1.66	granite 203 618121 5190768 73.95 13.83 0.230 1.93	granite 205 617412 5191451 73.99 13.96 0.293 1.82
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037	granite 205 617412 5191451 73.96 0.293 1.82 0.021
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64	granite 203 618121 5190768 73.95 13.83 0.230 1.93	granite 205 617412 5191451 73.99 13.96 0.293 1.82
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0	granite 205 617412 5191451 73.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 3 11 870	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7 18	granite 158 630242 5184018 73.84 13.81 0.255 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 11	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 0.33 0	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 1 6
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 4 3 3 11 870 98	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 3 7 18 816	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 3 11 1173	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 3 0 3 0 800	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 3 11 870	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7 18 816 123	granite 158 630242 5184018 73.84 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 3 11 1173 86	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.036 1.68 4.03 3.69 0.044 6 3 9 9 7 7 761 143	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3.81 3.89 0.056 8 0 3.31 3.89 0.056 8 0 3.31 3.89 0.056 8 0 3.31 3.89 0.056 8 0.33 0.230 1.93 3.81 3.89 0.056 8 0.331 3.89 0.056 8 0.331 3.89 0.056 8 0.331 3.81 3.81 3.83 3.81 3.81 3.81 3.81	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 870 98 204	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 816 816 123 140	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3.88 3.86 1173 86 156	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 61 143 124	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 3 0 0 800 130	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 87 98 204 105	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 82 0.049 4 3 7 18 816 123 140 130	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 11 117 3.81 0.253 2.14 0.029 1.95 0.17 3.86 0.067 7 0 3 11 117 3.81 0.253 2.14 0.029 1.95 0.17 3.84 0.057 7 0.3 11 115 156 156 156	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 61 143 124 122	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 3 0 800 130 129 131	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 870 98 204 105 8	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7 18 816 123 140 130 20	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 11 117 3.81 3.81 3.86 156 156 164 17	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 761 143 124 122 23	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 0 0.056 8 0 3 0 0 800 129 131 23	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 870 98 204 105 8 5.4	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7 18 816 123 140 130 20 8.6	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 11 11 1173 86 156 154 17 5.3	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 761 143 124 122 23 11.0	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26 10.8	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 0 800 130 129 131 23 12.4	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19 21
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 3 11 870 98 204 105 8 8 5.4	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 82 7 18 816 123 140 130 20 8.6 16	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 3.86 0.067 7 0 3 3 11 1173 86 156 164 17 5.3 14	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 4.03 3.69 0.044 6 3 9 7 7 761 143 124 122 23 11.0 15	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26 10.8 14	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 3 0 0 56 8 0 3 129 131 23 12.4 14 14 120 25	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19 21 17
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 4 3.25 4.25 0.035 8 4 4 3.31 11 870 98 204 105 8 8 5.4 14 24	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7 18 816 123 140 130 20 8.6 16 10	granite 158 630242 5184018 73.84 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 3.86 0.067 7 0 3 3 11 1173 86 156 164 17 5.3 14 55	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 9 7 7 761 143 124 122 23 11.0 15 10	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26 10.8 14 9	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3.89 0.056 8 0 3.89 0.056 8 0 3.89 0.056 8 0 3.89 0.056 8 0 3.89 0.056 8 0 3.20 130 130 129 131 23 12.4 14 20 25 7	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19 21 17 10.3
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 870 98 204 105 8 5.4 14 24 17	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 7 18 816 123 140 130 20 8.6 16 10 24	granite 158 630242 5184018 73.84 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3.88 3.86 0.067 7 0 3.88 3.86 0.067 7 0 3.88 3.86 0.067 7 0 3.88 3.86 0.067 7 5.3 11	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 761 143 124 122 23 11.0 15 10 22 8 31	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26 10.8 14 9 28 10 62	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 3 0 5 80 130 129 131 23 12.4 14 20 25 7 26	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19 21 17 6 6 46
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 870 98 204 105 8 5.4 14 24 17 9	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 8 0.049 4 3 7 18 816 123 140 130 20 8.6 16 10 24 11	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 0 3 11 1173 86 156 166 166 166 166 166 166 166 166 156 3 8 8 8 8 8 8 30 31	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 761 143 124 122 23 11.0 15 10 22 8 31 70	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26 10.8 14 9 28 10 8 4 10 8 14 9 28 10 6 28 10 10 6 29	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 0 800 130 129 131 23 12.4 14 20 25 7 7 26 39	granite 205 617412 5191451 73.99 13.96 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19 21 17 10.3
granite 259 625303 5186230 73.76 14.71 0.175 1.44 0.020 2.23 0.14 3.25 4.25 0.035 8 4 3 11 870 98 204 105 8 5.4 14 24 105 8 5.4 14 29 16	granite 210 617545 5194677 73.77 13.97 0.225 2.04 0.032 1.95 0.50 3.64 3.82 0.049 4 3 816 123 140 130 20 8.6 16 10 24 11 20	granite 158 630242 5184018 73.84 13.81 0.253 2.14 0.029 1.95 0.17 3.88 3.86 0.067 7 0 3 11 117 3.86 156 164 17 5.3 14 55 38 8 8 30	granite 201 618879 5189030 73.84 14.08 0.204 1.81 0.036 1.68 0.58 4.03 3.69 0.044 6 3 9 7 7 761 143 124 122 23 11.0 15 10 22 8 31	granite 182 624436 5183945 73.94 14.09 0.208 1.66 0.030 1.64 0.83 4.00 3.56 0.040 7 4 3 6 847 130 116 117 26 10.8 14 9 28 10 62	granite 203 618121 5190768 73.95 13.83 0.230 1.93 0.037 1.77 0.49 3.81 3.89 0.056 8 0 3 3 0 5 80 130 129 131 23 12.4 14 20 25 7 26	granite 205 617412 5191451 73.99 0.293 1.82 0.021 2.00 0.60 3.43 3.84 0.047 7 1 6 17 821 129 148 149 17 10.3 19 21 17 6 46

					Rainier Fk Ridge	Copper Creek	Rainier Fk Ridge
Miners Ridge	Rainier Fk Ridge	Pear Butte Ridge granite	American Ridge granite	Hwy 410 granite	granite	granite	granite
granite	granite 204	230	granite 197	91	287	8	289
248 625727	617655	628703	621236	617673	617503	629317	617594
5184145	5190860	5184485	5190262	5194667	5190982	5185571	5191897
73.74	74.04	74.12	74.13	74.15	74.17	74.27	74.28
13.81	14.28	14.69	13.44	13.54	13.94	13.69	14.02
0.291	0.211	0.250	0.282	0.211	0.222	0.240	0.247
3.08	1.66	1.07	2.01	2.08	1.99	1.98	1.58
0.034	0.021	0.020	0.040	0.036	0.017	0.020	0.025
1.66	2.06	2.18	1.47	1.78	1.74	2.11	2.05
0.33	0.73	0.27	0.68	0.36	0.24	0.27	0.27
3.09	3.46	3.25	4.57	4.28	3.92	3.54	3.52
3.92	3.48	4.10	3.30	3.52	3.71	3.84	3.96
0.052	0.047	0.050	0.064	0.042	0.045	0.050	0.049
8	6	10	6	9	8	9	9
3	7	4	0	0	5	2	2
4	6	16	6	5	6	5	9
10	8	4	20	15	18	0	17
696	808	818	1083	913	874	716	850
92	118	107	137	124	131	101	111
132	150	171	152	158	149	127	160
141	121	148	136	117	143	121	150
24	19	20	9	8	23	21	18
13.7	7.9	10.4	6.9	5.8	9.3	18.4	10.6
16	14	15	13	12	16	10	15
7	23	16	25	24	28	32	13
27	17	20	42	28	15	20	17
12	9	8	11	9	5	4	11
50	27	35	14	26	46	57	49
81	64	61	46	33	88	65	85
14	13	17	20	19	20	16	15
				0	Nalaan Didaa	Minada Didaa	Rear Butto Bidge
Miner's Ridge	Copper Creek	Miner's Ridge	Miner's Ridge	Copper Cr	Nelson Ridge	Miner's Ridge	Pear Butte Ridge
granite	granite	granite	granite	granite	granite	granite	granite
granite 177	granite 226	granite 262	granite 180	granite 161	granite 150	granite 176	granite 168
granite 177 624279	granite 226 629527	granite 262 626036	granite 180 624139	granite 161 629345	granite 150 630430	granite 176 625030	granite 168 628491
granite 177 624279 5182976	granite 226 629527 5184957	granite 262 626036 5185697	granite 180 624139 5184183	granite 161 629345 5184476	granite 150 630430 5187677	granite 176 625030 5184421	granite 168 628491 5182945
granite 177 624279 5182976 74.00	granite 226 629527 5184957 74.46	granite 262 626036 5185697 74.50	granite 180 624139 5184183 74.61	granite 161 629345 5184476 74.65	granite 150 630430 5187677 74.65	granite 176 625030 5184421 74.78	granite 168 628491 5182945 75.05
granite 177 624279 5182976 74.00 14.16	granite 226 629527 5184957 74.46 14.09	granite 262 626036 5185697 74.50 14.19	granite 180 624139 5184183 74.61 14.28	granite 161 629345 5184476 74.65 14.20	granite 150 630430 5187677 74.65 13.37	granite 176 625030 5184421 74.78 14.05	granite 168 628491 5182945 75.05 13.95
granite 177 624279 5182976 74.00 14.16 0.184	granite 226 629527 5184957 74.46 14.09 0.215	granite 262 626036 5185697 74.50 14.19 0.209	granite 180 624139 5184183 74.61 14.28 0.179	granite 161 629345 5184476 74.65 14.20 0.203	granite 150 630430 5187677 74.65 13.37 0.287	granite 176 625030 5184421 74.78 14.05 0.236	granite 168 628491 5182945 75.05 13.95 0.179
granite 177 624279 5182976 74.00 14.16 0.184 2.17	granite 226 629527 5184957 74.46 14.09 0.215 1.57	granite 262 626036 5185697 74.50 14.19 0.209 1.22	granite 180 624139 5184183 74.61 14.28 0.179 1.16	granite 161 629345 5184476 74.65 14.20 0.203 1.39	granite 150 630430 5187677 74.65 13.37 0.287 2.11	granite 176 625030 5184421 74.78 14.05 0.236 1.87	granite 168 628491 5182945 75.05 13.95
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028	granite 176 625030 5184421 74.78 14.05 0.236	granite 168 628491 5182945 75.05 13.95 0.179 1.01
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29	granite 150 630430 5187677 74.65 13.37 0.287 2.11	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 3 11 0
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 9 5 7	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5	granite 150 630430 5187677 74.65 13.37 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 10	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 110 0
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 7	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 26	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 4 7 9	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 1 0.068 5 1 0.068 5 3.27 3.89 0.068 5 1 0.068 5 3.27 3.89 0.068 5 3.27 3.89 0.068 5 3.27 3.89 0.068 5 3.27 3.89 0.068 5 3.27 3.89 0.068 5 3.27 3.89 0.0068 5 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.0068 5.11 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89 0.007 3.27 3.89	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107	granite 168 628491 5182945 75.05 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 1103 84
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 7 10 829	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 3 26 1067	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 1 0 0 0 1178 83 150	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.63 0.035 9 3.63 0.035 9 3 11 0 0 1103 84 147
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 7 10 829 113	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 3 6 5 3 26 1067 108	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122	granite 150 630430 5187677 74.65 13.37 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 100 0 1178 83 150 171	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 1103 84 147 124
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81 115	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 10 829 113 147	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 3 26 1067 108 204	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 96 169 122 16	granite 150 630430 5187677 74.65 13.37 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 10 0 1178 83 150 171 12	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142 18	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.63 0.035 9 3 11 0 1103 84 147 124 27
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 1 5 0 892 81 115 153	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 10 829 113 147 133	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 26 1067 108 204 132	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15 9.2	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122 16 8.5	granite 150 630430 5187677 74.65 13.37 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 10 0 1178 83 150 171 12 6.2	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142 18 9.3	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 1103 84 147 124 27 6.9
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granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81 115 153 27 10.5	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 10 829 113 147 133 20 8.7	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 26 1067 108 204 132 8 4.8	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15 9.2 14 11	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122 16 8.5 15 33	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 1 0 0 0 1178 83 150 171 12 2 6.2 2 13	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142 18 9.3 15 18	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3.63 0.035 9 3.11 0 1103 84 147 124 27 6.9 15 61
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81 115 153 27 10.5 17	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 7 10 829 113 147 133 20 8.7 14	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 3 26 1067 108 204 132 8 4.8 11 9 9 16	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15 9.2 14 11 33	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122 16 8.5 15 33 23	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 1 0 0 0 1178 83 150 171 12 6.2 13 22 25	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142 18 9.3 15 18	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3.63 0.035 9 3.11 0 1103 84 147 124 27 6.9 15 61 39
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granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81 115 153 27 10.5 17 73 39	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 7 10 829 113 147 133 20 8.7 14 8.7 14 8.7	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 26 1067 108 204 132 8 4.8 11 9 16 7 26	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15 9.2 14 11 33 13 18	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122 16 8.5 15 33 23 5 59	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 100 0 1178 83 150 171 12 6.2 13 225 8 18	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142 18 9.3 15 18 8 20 7 16	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 1103 84 147 124 27 6.9 15 61 39 9 2 3 9
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81 115 153 27 10.5 17 73 39 6	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 10 829 513 147 133 20 8.7 14 8 16 5 5 16 48	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 26 1067 108 204 132 8 4.8 11 9 16 7 26 32	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15 9.2 14 11 33 13 18 44	granite 161 629345 5194476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122 16 8.5 15 33 23 5 59 92	granite 150 6304300 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 10 0 1178 83 150 171 12 6.2 13 22 25 8 18 18 18 19 19 19 10 10 10 10 10 10 10 10 10 10	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 3 6 7 657 107 110 142 18 8 9.3 15 18 20 7 16 46	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 1103 84 147 124 27 6.9 15 61 39 9 42 63
granite 177 624279 5182976 74.00 14.16 0.184 2.17 0.041 1.69 0.84 2.92 3.94 0.042 5 1 5 0 892 81 115 153 27 10.5 17 73 39 6 29	granite 226 629527 5184957 74.46 14.09 0.215 1.57 0.020 2.04 0.20 3.62 3.75 0.045 9 5 7 10 829 113 147 133 20 8.7 14 8 8 16 5 16	granite 262 626036 5185697 74.50 14.19 0.209 1.22 0.021 2.10 0.27 3.91 3.54 0.043 6 5 3 26 1067 108 204 132 8 4.8 11 9 16 7 26	granite 180 624139 5184183 74.61 14.28 0.179 1.16 0.032 1.71 0.74 3.69 3.57 0.040 7 4 7 9 799 105 141 123 15 9.2 14 11 33 13 18	granite 161 629345 5184476 74.65 14.20 0.203 1.39 0.015 2.29 0.13 3.15 3.94 0.042 7 6 5 0 779 98 169 122 16 8.5 15 33 23 5 59	granite 150 630430 5187677 74.65 13.37 0.287 2.11 0.028 1.97 0.35 3.27 3.89 0.068 5 1 100 0 1178 83 150 171 12 6.2 13 225 8 18	granite 176 625030 5184421 74.78 14.05 0.236 1.87 0.027 1.35 0.30 3.84 3.49 0.055 8 3 6 7 657 107 110 142 18 9.3 15 18 8 20 7 16	granite 168 628491 5182945 75.05 13.95 0.179 1.01 0.023 1.83 0.30 3.99 3.63 0.035 9 3 11 0 1103 84 147 124 27 6.9 15 61 39 9 2

		XR	F RESULT	S		
Cougar Lk Ridge	Miners Ridge	Cougar Lk Ridge	Miner's Ridge	Miner's Ridge	American Ridge	Rainier Fk R.
granite	granite	granite	granite	granite	granite	granite
191	251	270	179	255	281	208
622024	623897	622218	623848	624921	620855	618200 5192750
5185744	5183158	5185570	5183561	5184418	5190968 75.31	75.33
74.34	75.13	75.15	75.19	75.27 13.88	13.05	13.11
13.65	13.49	13.29	13.55	0.183	0.190	0.217
0.213	0.200	0.193	0.151 1.32	1.63	1.70	1.58
1.76	1.72	1.54 0.043	0.028	0.019	0.031	0.021
0.031	0.025 1.22	1.52	1.33	1.66	1.21	1.19
1.60 0.79	0.21	0.21	0.90	0.17	0.25	0.59
3.95	4.32	4.03	4.17	3.41	4.70	5.18
3.63	3.64	3.98	3.31	3.73	3.52	2.74
0.042	0.038	0.040	0.034	0.044	0.031	0.041
7	9	11	6	8	10	4
2	3	2	3	4	3	2
13	0	4	5	7	7	5
8	0	5	0	15	2	16
689	882	718	839	802	736	953
142	152	139	135	96	154	151
114	106	118	110	133	114	122
130	112	116	99	124	112	124
16	16	20	16	20	11	6
11.3	12.0	11.8	6.5	9.5	7.6	5.6
14	13	15	12	15	12	14
24	20	8	23	54	26	15
26	22	22	16	30	30	22
6	6	8	9	7	16	6
18	11	30	19	27	22 44	13 22
27	32	57	51	57 15	23	22
22	19	23	14	15	23	22
Deinier Ek Dideo	Minora Bidao	Huny 410	American Bidge	Miner's Bidge	Cougar L. Bidge	Miner's Ridge
Rainier Fk Ridge	Miner's Ridge	Hwy 410 granite	American Ridge granite	Miner's Ridge granite	Cougar L. Ridge granite	Miner's Ridge granite
granite	granite	granite	granite	granite	granite	Miner's Ridge granite 260
granite 209	granite 252	granite 212	granite 282	granite 184	• •	granite
granite 209 618333	granite 252 624255	granite 212 617673	granite 282 620115	granite	granite 271	granite 260
granite 209 618333 5192707	granite 252 624255 5184091	granite 212	granite 282	granite 184 624770	granite 271 621739	granite 260 625448
granite 209 618333 5192707 75.06	granite 252 624255 5184091 75.45	granite 212 617673 5194671	granite 282 620115 5191733	granite 184 624770 5185561	granite 271 621739 5185721	granite 260 625448 5186127
granite 209 618333 5192707 75.06 13.25	granite 252 624255 5184091	granite 212 617673 5194671 75.93	granite 282 620115 5191733 76.18	granite 184 624770 5185561 76.24	granite 271 621739 5185721 76.26	granite 260 625448 5186127 76.30
granite 209 618333 5192707 75.06	granite 252 624255 5184091 75.45 13.85	granite 212 617673 5194671 75.93 13.59	granite 282 620115 5191733 76.18 13.22	granite 184 624770 5185561 76.24 13.06	granite 271 621739 5185721 76.26 13.05	granite 260 625448 5186127 76.30 13.03
granite 209 618333 5192707 75.06 13.25 0.288	granite 252 624255 5184091 75.45 13.85 0.207	granite 212 617673 5194671 75.93 13.59 0.115	granite 282 620115 5191733 76.18 13.22 0.161	granite 184 624770 5185561 76.24 13.06 0.134	granite 271 621739 5185721 76.26 13.05 0.150	granite 260 625448 5186127 76.30 13.03 0.151
granite 209 618333 5192707 75.06 13.25 0.288 1.78	granite 252 624255 5184091 75.45 13.85 0.207 1.00	granite 212 617673 5194671 75.93 13.59 0.115 1.09	granite 282 620115 5191733 76.18 13.22 0.161 0.76	granite 184 624770 5185561 76.24 13.06 0.134 1.10	granite 271 621739 5185721 76.26 13.05 0.150 1.23	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55	granite 184 624770 5185551 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43	granite 260 625448 5186127 76:30 0.151 1.21 0.017 1.05 0.08 4.60 3.54
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.322 4.23 3.58 0.050	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025	granite 260 625448 5186127 76.30 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9	granite 212 617673 5194671 75.93 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10	granite 184 624770 5185561 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 6 4 0	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 0 2	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 4 0 0 0	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 100 3 9 0	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 0 2.02 0.16 2.90 4.34 0.028 9 2 0 0 2 622	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 0 0 806	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 787	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 3.22 0.027	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 8 4 4 660	granite 260 625448 5186127 76:30 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899 114	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 0 2.02 0.16 2.90 4.34 0.028 9 2 2 0 0 2 81	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 4 0 0 0 806 108	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 9 0 787 130	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 8 4 4 660 138	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149
granite 209 618333 5192707 75.06 0.288 1.78 0.027 1.48 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899 114 142	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 4.34 0.028 9 2 0 2 622 81 161	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 806 108 120	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 0 787 130	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 4 660 138 99	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 12 899 114 142 122	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0.024 6 4 0 0 0.024 6 4 0 0 0 806 108 120 86	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 787 130 107 106	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 4 660 138 8 99 102	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 12 899 114 142 122 8	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127 18	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 0 806 100 806 120 86 11	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 787 130 107 106 21	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105 17	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 3.0.025 10 3 8 4 4 660 138 8 4 99 102 12	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3.58 0.050 7 2 3 12 899 114 142 122 899 114	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127 18 9,3	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 0 806 108 120 86 11 120	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 787 130 107 106 21 10.0	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105 17 11.6	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 4 660 138 99 9102 12 5.9	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899 114 142 122 899 114 142 122 899	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 0 2 622 81 161 127 18 9,3 13	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 806 108 120 806 108 120 806 111 6.1	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 787 130 107 106 21 10.0 11	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 3.27 0.027 9 4 3 12 575 143 77 105 17 11.6 14	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 8 4 660 138 99 102 12 12 5.9 14	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2 15
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3.58 0.050 7 2 3 3 12 899 114 142 122 899 114 142 122 899 114	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 4.34 0.028 9 2 0 0 2 81 161 127 18 9.3 13 23	granite 212 617673 5194671 75.93 13.59 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 4 0 0 806 108 120 806 108 120 86 111 6.1 13 7	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 9 0 787 130 107 106 21 10.0 11 56	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 3.27 0.027 9 4 3 12 575 143 77 105 17 11.6 14 3	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 8 4 4 660 138 99 102 12 5.9 14 30	granite 260 625448 5186127 76.30 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2 15 15
granite 209 618333 5192707 75.06 0.288 1.78 0.027 1.48 0.027 1.48 0.325 4.23 3.58 0.050 7 2 3 3 12 899 114 142 122 899 114 142 122 899 114 142 122 899 114 142 122 899 114	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127 18 9,3 13 23 37	granite 212 617673 5194671 75.93 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 806 108 120 866 11 6.1 1 3.3 7 18	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 0 787 130 107 106 21 10.06 21 10.00 111 566 17	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105 17 11.6 14 3 16	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 4 660 138 99 102 12 5.9 14 30 15	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2 15 15
granite 209 618333 5192707 75.06 0.288 1.78 0.027 1.48 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899 114 142 122 899 114 142 122 88 6.8 15 18 20 6	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127 18 9,3 13 13 23 37 10	granite 212 617673 5194671 75.93 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 4 0 0 806 108 120 86 111 6.1 13 7 7 18 6	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 0 787 130 107 106 21 10.0 117 106 17	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105 17 11.6 14 3 16 8	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 4 660 138 99 102 12 5.9 14 300 15 7	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2 15 15 19 8
granite 209 618333 5192707 75.06 13.25 0.288 1.78 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899 9114 142 122 8 8 6.8 15 18 20 6 5	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127 18 9.3 13 23 37 10 19	granite 212 617673 5194671 75.93 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 0 0 806 108 120 86 11 6.1 13 7 18 6 0 0	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 787 130 107 106 21 10.0 11 56 6 17 11 9	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105 17 111.6 14 3 16 8 32	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 6 600 138 99 102 12 5.9 14 302 15 7 28	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2 15 15 15 15 15 19 8 104
granite 209 618333 5192707 75.06 0.288 1.78 0.027 1.48 0.027 1.48 0.32 4.23 3.58 0.050 7 2 3 3 12 899 114 142 122 899 114 142 122 88 6.8 15 18 20 6	granite 252 624255 5184091 75.45 13.85 0.207 1.00 0.050 2.02 0.16 2.90 4.34 0.028 9 2 0 2 622 81 161 127 18 9,3 13 13 23 37 10	granite 212 617673 5194671 75.93 0.115 1.09 0.021 1.54 0.20 4.10 3.38 0.024 6 4 4 0 0 806 108 120 86 111 6.1 13 7 7 18 6	granite 282 620115 5191733 76.18 13.22 0.161 0.76 0.018 1.41 0.16 4.55 3.51 0.033 10 3 9 0 0 787 130 107 106 21 10.0 117 106 17	granite 184 624770 5185561 76.24 13.06 0.134 1.10 0.016 1.02 0.36 4.78 3.27 0.027 9 4 3 12 575 143 77 105 17 11.6 14 3 16 8	granite 271 621739 5185721 76.26 13.05 0.150 1.23 0.017 1.23 0.017 1.23 0.07 4.54 3.43 0.025 10 3 8 4 4 660 138 99 102 12 5.9 14 300 15 7	granite 260 625448 5186127 76.30 13.03 0.151 1.21 0.017 1.05 0.08 4.60 3.54 0.024 9 1 5 2 841 149 76 109 31 10.2 15 15 19 8

		АКГ	KESULIS			
Pear Butte Ridge	American Ridge	American Ridge	Miner's Ridge	Hwy 410	Copper Creek	Nelson Ridge
granite	granite	granite	granite	granite	granite	granodiorite
231	193	280	185	211	157	159
628727	623691	620830	625861	617673	629467	630200
		5190679	5185293	5194671	5184726	5184116
5183733	5190982				77.27	65.78
75.36	75.43	76.78	77.09	77.20		
13.80	13.47	12.70	13.20	12.96	12.86	16.43
0.197	0.174	0.133	0.165	0.100	0.138	0.567
1.04	1.56	1.13	1.08	0.87	0.68	5.13
	0.022	0.011	0.026	0.015	0.014	0.067
0.014				0.59	1.61	4.15
1.65	1.52	0.95	1.23			
0.10	0.12	0.12	0.70	0.48	0.16	0.94
4.21	3.95	4.94	3.30	4.93	3.88	2.44
3.59	3.73	3.21	3.17	2.84	3.35	4.34
0.037	0.032	0.027	0.027	0.017	0.026	0.167
	9	9	9	10	10	5
9			0	1	2	7
4	1	0			5	14
17	8	5	12	2		
6	7	9	3	0	8	47
912	942	810	740	815	995	668
121	131	146	104	137	109	73
	113	80	137	58	143	262
133				91	103	212
131	117	101	120			
24	28	21	13	22	10	20
9.5	10.0	9.6	5.8	6.3	4.3	9.1
16	14	9	11	12	12	21
57	21	33	15	43	26	40
39	14	12	18	25	13	53
			4	12	4	9
8	9	10			38	9
45	39	86	29	27		
51	59	141	26	76	52	56
20	16	22	23	27	17	6
Dainiar Ek Didaa	Ninere Bidge	Hwy 410	Rainier Fork Ridge	Pear Butte Ridge	Nelson Ridge	Hwy 410
Rainier Fk Ridge	Miner's Ridge	Hwy 410	Rainier Fork Ridge	Pear Butte Ridge	Nelson Ridge	Hwy 410 granodiorite
granite	granite	granodiorite	granodiorite	granodiorite	granodiorite	granodiorite
-	granite 257	granodiorite 198	granodiorite 202	granodiorite 229	granodiorite 218	granodiorite 214
granite	granite	granodiorite	granodiorite	granodiorite	granodiorite 218 630212	granodiorite 214 615230
granite 288	granite 257	granodiorite 198	granodiorite 202	granodiorite 229	granodiorite 218	granodiorite 214
granite 288 616964 5190933	granite 257 624903 5185291	granodiorite 198 614685 5194006	granodiorite 202 618721	granodiorite 229 628691	granodiorite 218 630212	granodiorite 214 615230
granite 288 616964 5190933 76.36	granite 257 624903 5185291 76.42	granodiorite 198 614685 5194006 67.82	granodiorite 202 618721 5190665 68.03	granodiorite 229 628691 5184545 68.03	granodiorite 218 630212 5187134 68.52	granodiorite 214 615230 5194037 68.64
granite 288 616964 5190933 76.36 13.68	granite 257 624903 5185291 76.42 12.96	granodiorite 198 614685 5194006 67.82 16.48	granodiorite 202 618721 5190665 68.03 15.79	granodiorite 229 628691 5184545 68.03 15.92	granodiorite 218 630212 5187134 68.52 16.04	granodiorite 214 615230 5194037 68.64 15.18
granite 288 616964 5190933 76.36 13.68 0.162	granite 257 624903 5185291 76.42 12.96 0.123	granodiorite 198 614685 5194006 67.82 16.48 0.660	granodiorite 202 618721 5190665 68.03 15.79 0.518	granodiorite 229 628691 5184545 68.03 15.92 0.484	granodiorite 218 630212 5187134 68.52 16.04 0.462	granodiorite 214 615230 5194037 68.64 15.18 0.545
granite 288 616964 5190933 76.36 13.68	granite 257 624903 5185291 76.42 12.96 0.123 1.10	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17
granite 288 616964 5190933 76.36 13.68 0.162	granite 257 624903 5185291 76.42 12.96 0.123	granodiorite 198 614685 5194006 67.82 16.48 0.660	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083
granite 288 616964 5190933 76.36 13.68 0.162 0.41	granite 257 624903 5185291 76.42 12.96 0.123 1.10	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0.007	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 7 30 819	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 2.33 4.40 0.136 7 5 200 43 684	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893 148	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43 684 83	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.33 684 83 684	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893 148	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.3 683 683 833 683 257 202	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893 148 106 133	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.33 684 83 684	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203 241 24	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.3 684 83 684 83 257 202 19	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22 10.7	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 23 10.3	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203 241 24 16.6	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43 684 83 257 202 19 11.1	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7.8	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3
granite 288 616964 5190933 76.36 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22 10.7 17	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 10.3 15	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 3 7 7 30 819 101 203 241 1 24 16.6 20	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 2.33 4.40 0.136 7 5 200 43 684 83 257 200 19 11.1	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7.8 16	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17
granite 288 616964 5190933 76.36 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22 10.7 17	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 4 6 806 135 79 93 23 10.3 15 6	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15 5	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 7 30 819 101 203 241 241 24 6 6 20 107	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43 684 83 257 202 19 11.1 16 62	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7,8 16 27	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12
granite 288 616964 5190933 76.36 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22 10.7 17	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 10.3 15	granodiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 4.41 0.189 5 3 3 7 7 30 819 101 203 241 24 16.6 20 0 107 33	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.40 0.136 7 5 20 4.40 0.136 884 83 257 202 19 11.1 16 62 42	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7.8 16 27 53	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12 53
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893 148 106 133 22 10.7 17 0 7	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 4 6 806 135 79 93 23 10.3 15 6	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15 5	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 7 30 819 101 203 241 241 24 6 6 20 107	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43 684 83 257 202 19 11.1 16 62	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7,8 16 27	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12 53 8
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22 10.7 17 17 0 5	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 10.3 15 6 14 9	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15 5 59 14	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 4.41 0.189 5 3 3 7 7 30 819 101 203 241 24 16.6 20 0 107 33	granodiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.40 0.136 7 5 20 4.40 0.136 884 83 257 202 19 11.1 16 62 42	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7.8 16 27 53	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12 53
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893 148 106 133 22 10.7 17 17 0 5 21	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 10.3 15 6 14 9 24	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15 5 59 14 15	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203 241 241 24 16.6 20 107 33 8 3	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43 684 83 257 202 43 683 257 202 19 11.1 16 62 242 7 19	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7.8 16 27 53 12	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12 53 8 8 32
granite 288 616964 5190933 76.36 13.68 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 893 148 106 133 22 0 893 148 106 133 22 10.7 17 17 0 5 21	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 10.3 15 6 14 9 24 60	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 322 441 71 130 261 46 12.9 15 5 59 14 15 61	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203 241 24 16.6 20 107 33 8 8 34 34	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 4.3 684 83 257 202 43 683 257 202 19 11.1 16 62 2 42 7 7 19 39	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 5866 118 10 7.8 16 27 53 12 21 48	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12 53 8 8 32 79
granite 288 616964 5190933 76.36 0.162 0.41 0.009 1.37 0.01 4.57 3.42 0.007 11 3 2 0 0 893 148 106 133 22 10.7 17 17 0 5 21	granite 257 624903 5185291 76.42 12.96 0.123 1.10 0.016 1.00 0.04 4.89 3.42 0.018 10 2 4 6 806 135 79 93 23 10.3 15 6 14 9 24	granddiorite 198 614685 5194006 67.82 16.48 0.660 3.99 0.105 2.08 2.06 2.45 4.20 0.170 10 4 15 32 441 71 130 261 46 12.9 15 5 59 14 15	granodiorite 202 618721 5190665 68.03 15.79 0.518 4.34 0.046 2.55 1.21 2.93 4.41 0.189 5 3 7 30 819 101 203 241 241 24 16.6 20 107 33 8 3	grancdiorite 229 628691 5184545 68.03 15.92 0.484 4.02 0.057 3.66 0.95 2.33 4.40 0.136 7 5 20 43 684 83 257 202 43 683 257 202 19 11.1 16 62 242 7 19	granodiorite 218 630212 5187134 68.52 16.04 0.462 2.92 0.054 3.94 1.28 2.19 4.50 0.109 18 16 10 57 607 43 586 118 10 7.8 16 27 53 12	granodiorite 214 615230 5194037 68.64 15.18 0.545 4.17 0.083 2.96 1.39 2.64 4.26 0.134 8 7 13 32 608 62 158 232 40 14.3 17 12 53 8 8 32

	D D. H. Didae	American Didaa	Pear Butte Ridge	Rainier Fork Ridge	Rainier Fork Ridge	Nelson Ridge
Hwy 410	Pear Butte Ridge	American Ridge granodiorite	granodiorite	granodiorite	granodiorite	quartz diorite
granodiorite 199	granodiorite 228	granodionie 196	232	206	207	155
614679	629055	621848	628455	617582	617988	630206
5194201	5182933	5190250	5182970	5192299	5192848	5185665
65.84	65.89	66.52	70.05	66.70	69.82	61.89
16.60	16.73	17.27	15.83	15.87	15.05	16.67
0.823	0.625	0.824	0.413	0.660	0.480	0.829
5.06	4.42	4.90	2.81	4.72	3.32	6.91
0.111	0.073	0.072	0.051	0.085	0.074	0.164
3.92	4.67	2.51	3.23	3.60	3.36	5.11
1.67	1.39	2.19	0.64	1.46	1.46	2.06
1.52	1.66	1.24	2.32	2.65	2.78	2.17
4.22	4.37	4.23	4.55	4.06	3.56	3.94
0.234	0.185	0.242	0.113	0.186	0.105	0.246
10	8	5	8	4	6	3
10	11	1	6	5	7	13
20	15	14	18	13	11	19 90
56	58	63	35	60	33 691	585
492	442	309	819	632	93	84
40	42	35	70	120 194	198	290
229	468	269	251 179	172	157	169
269	155	180 23	179	35	22	29
29	14 12.6	13.2	9.9	9.4	9.2	12.0
13.6	20	23	9.9 15	17	17	21
21 5	80	56	59	19	10	32
70	91	58	55	49	31	107
9	10	6	11	2	4	13
10	6	12	9	0	27	36
71	30	69	52	34	24	60
5	5	12	8	7	11	8
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Nelson Ridge	Miner's Ridge	Nelson Ridge	Nelson Ridge	Nelson Ridge	Copper Creek	Nelson Ridge
Nelson Ridge granodiorite	Miner's Ridge granodiorite	Nelson Ridge granodiorite	Nelson Ridge quartz diorite	Nelson Ridge quartz diorite	Copper Creek quartz diorite	Nelson Ridge quartz diorite
Nelson Ridge granodiorite 3	-	-	•	•		quartz diorite 221
granodiorite	granodiorite	granodiorite	quartz diorite	quartz diorite	quartz diorite 223 629467	quartz diorite 221 630533
granodiorite 3	granodiorite 237	granodiorite 6	quartz diorite 7	quartz diorite 152 630636 5186738	quartz diorite 223 629467 5184726	quartz diorite 221 630533 5186787
granodiorite 3 630063	granodiorite 237 626042	granodiorite 6 630381	quartz diorite 7 630413 5184556 63.18	quartz diorite 152 630636 5186738 64.04	quartz diorite 223 629467 5184726 64.68	quartz diorite 221 630533 5186787 65.22
granodiorite 3 630063 5184794	granodiorite 237 626042 5181158	granodiorite 6 630381 5184587 69.64 16.11	quartz diorite 7 630413 5184556 63.18 17.38	quartz diorite 152 630636 5186738 64.04 17.53	quartz diorite 223 629467 5184726 64.68 17.31	quartz diorite 221 630533 5186787 65.22 16.89
granodiorite 3 630063 5184794 69.32	granodiorite 237 626042 5181158 69.39 15.32 0.444	granodiorite 6 630381 5184587 69.64 16.11 0.430	quartz diorite 7 630413 5184556 63.18 17.38 0.720	quartz diorite 152 630636 5186738 64.04 17.53 0.561	quartz diorite 223 629467 5184726 64.68 17.31 0.580	quartz diorite 221 630533 5186787 65.22 16.89 0.544
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13	quartz diorite 152 630636 5186738 64.04 17.53 0.551 5.54 0.100 4.65	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 6	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 7	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 5 13	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 2 17 20	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 886	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 2 17 20 445	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 9 9
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 866	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 8 3 12 38 493 86	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 1.62 4.39 0.140 6 6 12 55 506 79 246	granodiorite 237 626642 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 132 866 86 86 86	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 9 9
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 86 86 228 176	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 181	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 866 866 8228 176 21	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 232 181 16	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296 184	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 9 610 90 274 206
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18 9.4	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 86 86 86 228 176 21 10.0	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 181 16 9.2	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27 9.8	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296 184 27	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141 34	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274 206 30
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18 9.4 16	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 866 866 8228 176 21	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 232 181 16	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296 184 27 10.6	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 25 623 87 266 141 34 13.6	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274 206 30 14.5
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18 9.4 16 29	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 86 228 176 21 10.0 18	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 181 16 9.2 20	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27 9.8 21	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 2 17 7 20 445 82 296 184 27 10.6	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141 34 34 13.6 20	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274 206 30 14.5 18
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18 9.4 16	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 86 228 176 21 10.0 18	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 1.62 4.78 0.120 8 3 1.22 8 3 8 4.93 86 2.32 1.81 1.6 9.2 2.0 337	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27 9.8 21 18	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 2 17 20 445 82 296 184 27 10.6 19 27	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141 34 13.6 20 70	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 9 610 90 274 206 30 14.5 18 57 56 3
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18 9.4 16 29 37	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 13 2866 86 86 228 176 21 1000 18 16 50	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 181 16 9.22 20 337 37	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27 9.8 21 18 63	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296 184 27 10.6 19 27 67	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141 34 13.6 20 70 89	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.061 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274 206 30 14.5 18 57 56
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 12 55 506 79 246 205 18 9.4 16 29 37 3	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 3.23 0.76 3.01 4.02 0.111 7 7 7 11 3.23 0.76 3.01 4.02 0.111 7 7 7 11 10.0 18 16 50 12	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 181 16 9.2 20 337 37 5	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27 9.8 21 18 63 6	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296 184 27 10.6 19 27 67 67	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141 34 623 87 266 141 34 5 20 70 89	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274 206 30 14.5 18 57 56 3 29 64
granodiorite 3 630063 5184794 69.32 15.77 0.520 3.60 0.040 3.59 0.99 1.62 4.39 0.140 6 6 6 12 55 506 79 246 205 18 9.4 16 29 37 3 33	granodiorite 237 626042 5181158 69.39 15.32 0.444 3.64 0.071 3.23 0.76 3.01 4.02 0.111 7 7 7 11 32 866 86 228 176 21 10.0 18 16 50 12	granodiorite 6 630381 5184587 69.64 16.11 0.430 3.42 0.040 3.15 0.69 1.62 4.78 0.120 8 3 12 38 493 86 232 181 16 9.2 20 337 37 5 43	quartz diorite 7 630413 5184556 63.18 17.38 0.720 6.04 0.110 5.13 1.29 1.87 4.03 0.250 5 6 17 79 576 77 294 193 27 9.8 21 18 63 6 41	quartz diorite 152 630636 5186738 64.04 17.53 0.561 5.54 0.100 4.65 0.86 1.83 4.69 0.194 3 2 17 20 445 82 296 184 27 10.6 19 27 67 67 6	quartz diorite 223 629467 5184726 64.68 17.31 0.580 5.38 0.092 4.21 0.77 2.30 4.46 0.209 4 5 13 25 623 87 266 141 13,6 20 70 89 16 32	quartz diorite 221 630533 5186787 65.22 16.89 0.544 5.02 0.081 4.30 0.68 2.33 4.74 0.187 10 13 9 9 9 610 90 274 206 30 14.5 18 57 56 3 3 29

		х	RF RESU	LTS			
Nelson Ridge	Nelson Ridge	Hwy 410	Nelson Ridge	Pear Butte Ridge	Hwy 410	Swamp Lake Trail	Swamp Lake
guartz diorite	guartz diorite	guartz diorite	quartz diorite	andesite	andesite	basaltic andesite	basaltic andesite
4	156	. 200	222	227	276	264	265
630127	630582	614406	630733	628697	614073	620915	619370
5184698	5185506	5194732	5185476	5182951	5194570	5187424	5187273
62.69	62.73	62.96	63.04	62.42	62.27	56.85	56.65
18.60	17.32	16.90	17.52	16.53	15.50	17.64	17.56
0.670	0.809	1.001	0.728	1.081	1.229	1.106	1.095
4.68	6.25	6.29	5.09	6.80	7.33	6.97	6.93
0.060	0.077	0.145	0.111	0.088	0.175	0.119	0.123
4.34	4.64	4.96	5.08	4.40	4.95	7.24	7.19
1.62	1.41	2.01	1.27	2.27	1.66	4.82	5.27
1.97	1.65	1.06	2.22	2.04	1.58	1.12	1.13
5.16	4.87	4.40	4.71	4.22	4.92	3.96	3.86
0.210	0.238	0.273	0.229	0.159	0.386	0.183	0.189
7	1	4	6	7	2	53	64
8	4	2	2	12	2	107	129
14	17	19	16	20	26	24	23
70	51	72	54	203	58	138	153
668	372	349	610	257	388	267	273
111	104	31	80	181	49	26	26
275	281	247	283	202	228	466	466
186	246	213	160	120	202	129	126
21	27	39	29	40	46	19	19
11.1	10.2	15.1	12.4	12.6	15.7	8.7	9.0
22	21	21	20	21	19	15	17
15	89	28	22	10	12	24	27
48	62	80	59	59	71	62	70
4	11	6	11	7	7	3	7
25	29	20	41	24	24	6	21
65	35	59	45	64	65	38	17
12	6	1	8	10	5	3	6

Nelson Ridge	American Ridge	Copper Creek	American Ridge
quartz diorite	rhyolite	dacite	dacite of Toh
151	267	225	279
630412	619927	629624	621879
5187116	5188818	5185421	5192388
66.62	75.26	68.48	66.26
16.71	13.38	16.11	18.62
0.534	0.189	0.457	0.691
4.22	1.61	2.94	3.92
0.085	0.031	0.054	0.083
4.13	1.50	3.95	2.90
0.81	0.20	1.20	0.72
1.98	4.00	2.19	1.44
4.75	3.79	4.51	5.31
0.156	0.037	0.108	0.052
5	9	17	14
2	5	14	10
14	3	10	17
22	15	45	75
637	783	613	468
68	130	44	45
249	108	587	239
189	121	118	282
26	20	10	51
10.1	9.8	9.6	20.4
21	15	17	20
54	18	31	19
53	19	49	483
7	8	11	16
29	20	7	37
43	16	31	78
9	19	5	10

APPENDIX C

ICP-MS RESULTS

Description	aphanite	granite	granodiorite	granodiorite	qtz diorite	xenolith							
Chemical #	93162	93008	93010	93154	93182	93185	93188	93201	93206	93159	93214	93152	93187
Rb	168.41	100.92	66.23	105.06	124.79	97.37	125.19	136.15	115.44	67.38	56.39	76.38	31.42
Y	33.64	22.42	19.96	28.02	26.54	11.83	22.23	22.20	35.94	19.11	39.77	24.89	22.08
Nb	10.36	8.87	110.90	11.93	11.04	5.79	11.36	12.24	11.20	9.62	15.50	10.41	8.25
Cs	2.87	3.19	2.36	4.29	3.26	4.79	4.28	3.83	5.40	4.47	1.38	6.93	3.52
Ва	64.00	719.00	609.00	666.00	772.00	0.69	648.00	717.00	628.00	597.00	589.00	430.00	239.00
La	39.95	44.03	29.17	35.20	52.86	21.69	44.01	34.14	17.31	15.32	30.05	21.45	12.32
Ce	71.05	75.24	51.02	61.56	86.56	31.22	73.50	56.47	35.19	27.42	57.18	40.73	23.62
Pr	7.02	7.66	5.33	6.53	8.35	3.13	7.44	5.57	4.64	3.12	6.55	4.76	2.84
Nd	25.31	27.24	20.12	24.52	28.11	11.00	26.86	19.31	20.19	13.20	26.99	20.25	12.45
Pm	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
Sm	5.45	5.22	4.33	5.18	5.26	2.19	5.11	3.93	5.40	3.18	6.62	4.75	3.26
Eu	0.08	0.69	0.98	0.97	0.53	0.62	0.71	0.54	1.16	1.36	1.47	1.52	1.10
Gd	4.37	3.62	3.47	4.41	3.89	2.01	3.79	3.10	5.40	2.97	5.97	4.41	3.40
Тъ	0.81	0.66	0.61	0.78	0.66	0.30	0.61	0.54	0.95	0.50	1.08	0.74	0.60
Dy	5.42	3.82	3.59	4.84	4.14	1.87	3.69	3.44	6.12	3.14	7.03	4.44	3.77
Но	1.14	0.77	0.73	0.98	0.82	0.38	0.71	0.71	1.22	0.64	1.45	0.90	0.79
Er	3.64	2.21	1.96	2.74	2.49	1.04	2.10	2.11	3.57	1.91	4.10	2.41	2.24
Tm	0.56	0.32	0.29	0.41	0.36	0.15	0.30	0.32	0.49	0.27	0.58	0.34	0.31
Yb	3.81	2.28	1.78	2.59	2.34	0.94	1.99	2.18	3.01	1.73	3.79	2.21	1.92
Ĺu	0.61	0.36	0.28	0.42	0.39	0.15	0.33	0.35	0.47	0.30	0.59	0.35	0.31
Hf	3.68	2.92	3.32	3.57	2.86	2.40	2.82	2.52	3.42	4.36	4.82	3.67	2.58
РЬ	14.16	7.86	6.99	10.90	11.09	5.85	7.79	9.14	3.97	8.82	10.28	6.61	10.71
Th	31.81	13.40	9.66	11.27	17.82	18.70	13.99	17.87	8.80	5.36	7.08	6.38	3.59
U	6.92	1.79	1.64	2.24	3.55	4.09	2.27	2.89	1.66	1.26	1.65	1.15	0.90