CHEMICAL COMPOSITION OF STRATA OF THE MEADE PEAK PHOSPHATIC SHALE MEMBER OF THE PERMIAN PHOSPHORIA FORMATION

Channel-composited and Individual Rock Samples of Measured Section J and Their Relationship to Measured Sections A and B, Central Part of Rasmussen Ridge, Caribou County, Idaho

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ABSTRACT

This study, one in a series, reports bulk chemical composition of rock samples collected from a core, referred to as Measured Section J, drilled at a site that subsequently was developed into the Enoch Valley phosphate mine in southeastern Idaho. The core is continuous and cuts through the entire thickness of the Meade Peak Phosphatic Shale Member of the Phosphoria Formation. The steeply dipping Meade Peak extends from 182 to 495 feet below the ground surface, which is the greatest below-ground depth of rock that has been sampled to date. The core was drilled before the start of mining, and the rocks consequently have not been exposed to the atmosphere or surficial weathering processes or fractured as a result of mining as are the rocks from other described sections. Hence, this section of the Meade Peak in the core is the least altered section of this member sampled in this series of studies. The channel-sampled rocks from Section J form a set of contiguous intervals across the entire thickness of the Meade Peak. These channel samples characterize—in ascending order—the lower phosphate ore, interlayered middle waste shale, upper phosphate ore, and upper waste shale units of the member. The Section J channel-sample suite includes 3 composite samples of the uppermost 7 feet of the Grandeur Tongue of the Permian Park City Formation, a dolomitic unit that directly underlies the Meade Peak. It also includes an analysis of a 0.1 foot section of chert directly overlying the Meade Peak. The concentrations of the chemical elements in the channel samples are compared with those of Measured Sections A and B that were obtained from the same mine. In addition to the channel samples, 85 rock samples were selected from the core to address specific geochemical questions that resulted from examination of the core. For example, several of these samples correspond to cored rock that had unusual concentrations of various elements that were determined using a hand-held, x-ray fluorescence instrument. Other individual samples consist of several samples taken within a short interval of the core that leads to an abrupt change in lithology. Overall, the rocks from Measured Section J exhibit the least alteration from interaction with ground water compared with rocks from any of the measured sections that have been described in our previous studies.

INTRODUCTION

Background

U.S. Geological Survey (USGS) geologists have studied the Permian Phosphoria Formation in southeastern Idaho and the Western U.S. Phosphate Field throughout much of the twentieth century. In response to a request by the U.S. Bureau of Land Management (BLM), a new series of resource and geoenvironmental studies was initiated by the USGS in 1998. Present studies involve many scientific disciplines within the USGS and consist of: (1) integrated, multidisciplinary research directed toward resource and reserve estimations of phosphate in selected 7.5-minute quadrangles; (2) elemental residence, mineralogical and petrochemical characteristics; (3) mobilization and reaction pathways, transport, and disposition of potentially toxic trace elements associated with the occurrence, development, and use of phosphate rock; (4) geophysical signatures; and (5) improving the understanding of depositional origin.

To carry out these studies, the USGS has formed cooperative research relationships with: two Federal agencies, BLM and the U.S. Forest Service (USFS), which are responsible for land management and resource conservation on public lands; and with five private companies currently leasing or developing phosphate resources in southeastern Idaho. The companies are Agrium U.S. Inc. (Rasmussen Ridge mine), Astaris LLC (Dry Valley mine), Rhodia Inc. (Wooley Valley mine-inactive), J.R. Simplot Company (Smoky Canyon mine), and Monsanto Co. (Enoch Valley mine). Because raw data acquired during the project will require time to interpret, the data are released in open-file reports for prompt availability to other workers. The open-file reports associated with this series of resource and geoenvironmental studies are submitted to each of the Federal and industry collaborators for technical comment; however, the USGS is solely responsible for the data contained in the reports.

Location and General Geology

The location of Measured Section J is shown in figure 1. The location lies in southeastern Idaho, approximately 15 miles northeast of Soda Springs, in a region that has had extensive phosphate mining over the past several decades and currently has four active phosphate mines. Service (1966) provided an evaluation of the western phosphate industry in Idaho and a brief description of the mining history, ore occurrence, and geology. More detailed discussion of the Phosphoria Formation in the Western Phosphate Field is given by McKelvey and others (1959). Cressman and Swanson (1964) discussed detailed stratigraphy and petrology of these same rock units in nearby southwestern Montana. Gulbrandsen and Krier (1980) discussed general aspects of the large and rich phosphorus resources in the Phosphoria Formation in the vicinity of Soda Springs. Gulbrandsen (1966, 1975, and 1979) summarized bulk chemical compositional data for various lithologies of the phosphatic intervals in the Phosphoria Formation.

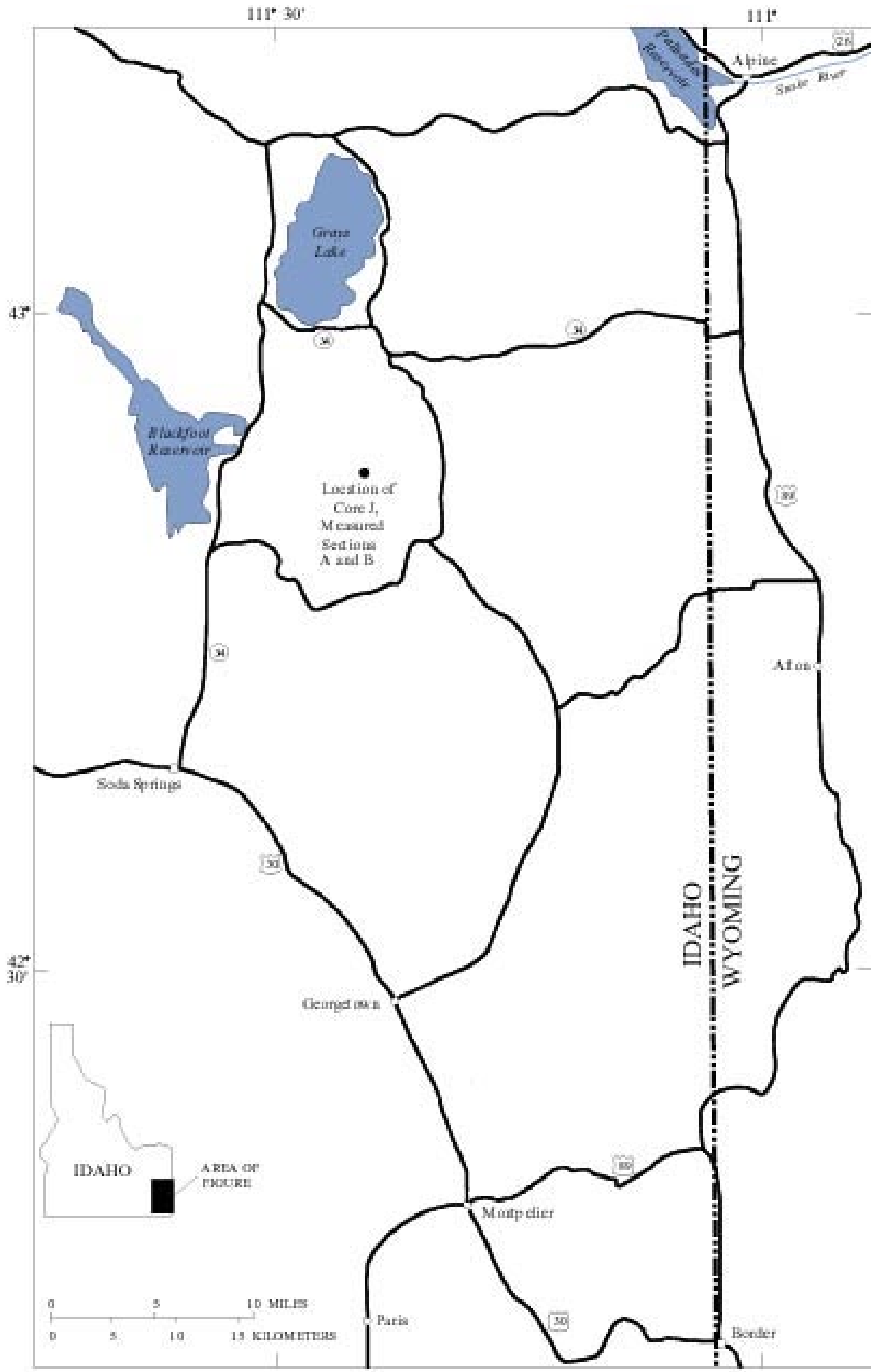

Figure 1. Index map of southeastern Idaho showing location of Core J and Measured Sections A and B.

Correlation with Measured Sections

The Phosphoria Formation in the vicinity of the measured sections consists of three members, which in ascending order are the Meade Peak Phosphatic Shale, the Rex Chert, and the informally named cherty shale (McKelvey and others, 1959; Montgomery and Cheney, 1967; Brittenham, 1976; Oberlindacher, 1990). The measured sections of this report focus on the Meade Peak Phosphatic Shale Member. The Meade Peak unconformably overlies the Grandeur Tongue of the Permian Park City Formation, and the cherty shale member of the Phosphoria is overlain by the Triassic Dinwoody Formation.

In this report we provide the analytical information for the rock sequences that we sampled from a core that was drilled at a site that later became the Enoch Valley mine. In our terminology, we refer to the core as the Measured Section J, also listed in our descriptive publications as wpsJ for western phosphate measured section (or core) J. Similar stratigraphic sections of the Phosphoria Formation were measured and described by the USGS at the Enoch Valley phosphate mine in southeastern Idaho (Tysdal and others, 1999). Samples were then collected from the same measured section such that descriptions directly correlate with the samples. These brief descriptions of the measured strata from which the samples discussed in this report were collected are being prepared for publication (Grauch, Tysdal, and others, in preparation). The two reports are best used together in a complementary fashion to obtain both descriptive and analytical information about the rock sections.

Some informal bed names (for example, Cap Rock) used at the Enoch Valley mine are included in the data tables. The more general unit names (A, B, C, D) applied to these strata in southeastern Idaho by Hale (1967, p. 152) are not included here. Instead, the informal terms lower ore, middle waste, upper ore, and upper waste (shale and chert) zones are noted in the data tables and on the graphs of the concentration data for Section J and Sections A and B. Contacts of units within the ore zones were picked by mine personnel; for Measured Sections A and B, unit contacts within the middle and upper waste zones generally were picked by USGS personnel and correspond to intervals of consistent lithology as described in the field. English units of measurement are used throughout this report to facilitate direct correspondence with units in the extensive historical literature on the Phosphoria and with current industry usage.

In our previous work at each operating mine, we measured, described, and sampled a pair of sections that are spatially close, but at different depths below the pre-mining land surface (Tysdal and others, 1999, 2000a, 2000b, 2000c; analytical data reported by Herring and others 1999, 2000a, 2000b, and 2000c). This enables evaluation and comparison of important effects of alteration from water reaction or other processes on rock geochemistry. The Meade Peak interval in Section J, in which beds dip 45 to 60 degrees, extends from about 200 to 500 feet downhole. These rocks extend to a greater depth below the pre-mining surface than any of the sections measured within mines. The two previously-described sequences from this same mine, Sections A and B, were much closer to the pre-mining ground surface. Section A is about 40 feet and Section B is about 120 feet below the pre-mining surface. These sections were measured along surfaces exposed by mining equipment. Measurements of bed and unit thickness in the measured sections and in the core are true thickness of the strata at the sample sites; the thicknesses and depths are corrected for apparent thickening due to dip of the strata in the core and at the exposed sections at the mines. The section was measured to provide stratigraphic positioning of selected rock units that were sampled for chemical and mineralogical analysis. No detailed descriptions were made of the strata in the sections. Stratigraphic units of the middle waste, for example, are shown mainly as mudstone, although interbeds of other rock types also exist in the middle waste.

In addition to differences in their depth below pre-mining surface, the rocks of Measured Section J were cored prior to the start of mining, whereas rocks from all other measured sections have been sampled from active mine exposures. Hence, the rocks from

Section J have not been disturbed or exposed by mining. Because current mining of the Meade Peak commonly involves blasting, the absence of the mining means that the rocks in Section J have not been fractured by blasting and subsequently exposed to subaerial weathering. All of these considerations contribute to the nature of the samples from Section J as being the deepest and least altered of any sections sampled to date in our studies.

Strata in the vicinity of the core and Measured Sections A and B dip approximately 55 degrees westward, on the fore limb of a major anticline. The Meade Peak section in the drill core log is listed as having a dip of approximately 55 degrees, with a range from 45 to 60 degrees as a result of minor folding. In Section B, mudstone between the two phosphorite sequences of these lower strata contain a thickened, poorly exposed zone that is interpreted to host a low-angle thrust fault. The fault is about parallel to bedding, and served to repeat nearly the entire lower ore zone, although the Fish-scale bed, the lowermost bed of the Meade Peak, is not repeated. The two sections and the core differ in thickness, chiefly because of likely thickening by faulting of the lower ore zone of Section B.

METHODS

Sampling

The core was shipped to the laboratories of the USGS in Denver, Colorado for description and sampling. The samples within the measured sections that were obtained for geochemical and petrological analysis were scraped or chiseled in a consistent manner along a channel across each entire interval of uniform lithology. When possible, a sawed split of consistent shape was taken from the core throughout the entire interval. This provided a single representative sample of the entire interval. The choice of sampling intervals is intended to characterize strata of more or less uniform lithology and of a broad thickness that can be handled by typical mine equipment should the results of our analyses suggest that separate handling of such zones would be advantageous. Within these broad intervals, we sampled thinner intervals, sometimes as thin as one foot or occasionally less, where we noted a lithology different or distinct from the thick interval as a whole. Thicknesses and boundaries of the chosen intervals are noted in table 1.

About 0.5 to 1 kg of rock was collected for each channel-sample interval. The bulk samples were crushed and ground in our laboratories and then shipped to the analytical contractor for analysis.

Individual samples for which we have reported chemical analyses in table 2 were taken from Section J for various special interests. For the most part, they were sampled from the core over stratigraphic intervals of only a few cm. As such, they may differ lithologically, geochemically, or mineralogically from the larger channel-sampled interval from which they were taken and for which the chemistry is reported in table 1. In some cases, locations for the individual samples were guided by the results of hand-held x-ray fluorescence (XRF) spectrometry analyses (Grauch and others, in preparation). These analyses were obtained every 3 inches along the entire core—about 1100 measurement locations for the entire core. The spectrometer produces a semi-quantitative analysis of a surface of about 2 cm^2 and has a detection limit ranging between about 20 and 150 ppm for As, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Rb, Se, Sr, Zn, and Zr. The gamma rays from this spectrometer penetrate less than 1 mm into the sample. Only the surface or very near surface is analyzed. Consequently, it is possible that the specific pieces of core that were removed for this detailed sampling may have only surficial enrichments of some of the detectable trace elements and that these surface concentrations do not mimic the composition of the bulk individual sample. Based on these XRF analyses, sampling intervals of anomalously enriched trace element concentrations were identified for detailed sampling as individual samples.

In other cases, three suites of the individual samples were chosen to address the geochemical occurrence and change of organic carbon-rich zones within the dolostone of the Middle Waste Shale unit. Typically, these zones occur over about 3 to 4 feet of core depth. Each zone base begins with the appearance of tiny stringers of thin organic carbon seams or carbon-rich areas within the dolostone. Stratigraphically upward, the seams thicken and the carbon-rich material increases in concentration and culminates with a carbon seam that is several cm thick. This thick carbon seam seems to signal an abrupt change in lithology. Directly overlying the carbon seam, the dolostone becomes visibly pure, with little or no subsequent carbon-rich material. XRF analysis of these zones indicates that trace element concentrations increase as the carbon seams become more abundant within the dolostone. The intent of sampling these three zones was to examine the composition of the carbon-rich material and determine if the material contributes abundant trace elements to the dolostone.

Rock Sample Preparation

Rock samples from Measured Section J were disaggregated in a mechanical jaw crusher, and then a representative split was ground in a ceramic plate grinder to <100 mesh (<0.15 mm). Representative splits of the latter material were provided to various collaborators and to the contract laboratory for analysis. All splits were obtained with a riffle splitter to ensure similarity with the whole sample. Splits of about 50 g in size were sent to the contract laboratory, where they were prepared for analysis. A set of similar-size splits for all samples was archived by USGS.

The samples were submitted to the contract laboratory in a randomized sequence. This eliminated systematic error from sources such as instrumental drift.

Analysis

Samples were analyzed for 40 major, minor, and trace elements using acid digestion in conjunction with inductively coupled plasma-atomic emission spectrometry (ICP-AES). For the 40-element analysis (referred to as ICP-40), a split was dissolved using a low-temperature (<150º C) digestion with concentrated hydrochloric, hydrofluoric, nitric, and perchloric acids (Briggs, 1996; Jackson and others, 1987). The analytical contractor has modified this procedure to shorten the digestion time (P. Lamothe, USGS, oral communication, 2000). The acidic sample solution was taken to dryness and the residue was dissolved with 1 ml of aqua regia and then diluted to 10.0 g with 1% (volume/volume) nitric acid.

Another split of the sample was fused in lithium metaborate then analyzed by ICP-AES after acid dissolution of the fusion mixture. This technique, referred to as ICP-16, provides analysis of all major elements, including Si, and a few minor and trace elements, 16 in all. Most importantly, this is the only analytical technique of those used that measures Si concentrations in these siliceous, phosphatic shale samples. Although the Meade Peak Phosphatic Shale Member is known mostly for its phosphorite content, it also contains minor to significant amounts of siliceous components, which occur in aluminosilicate minerals, quartz, and biogenic silica. Si measurement is not possible using the 4-acid digestion ICP-40 technique because the Si is lost as a volatile fluoride compound during digestion. Analysis of major elements using the fusion technique also provides a compositional check on the concentrations of these same elements as measured by acid digestion. Ti and Cr were analyzed using both ICP techniques, and the concentration data for both techniques are included in the analytical tables. However, the fusion technique is superior to acid digestion because of its ability to more completely digest resistant minerals that might contain those elements.

Se analysis was performed using hydride generation followed by atomic absorption (AA) spectroscopy. Se is not reported using either of the ICP techniques, as it generally is volatilized and lost during sample preparation. The hydride/AA technique also is used for the analysis of As and Sb. For the analysis of As, the hydride analytical technique is considered to be more sensitive than the acid digestion ICP-AES analytical technique. Most Tl analyses were performed using hydride generation followed by atomic absorption spectroscopy. However, a few measurements of Tl concentrations on the phosphatic check standards and several samples from Section A and B were made using ICP-MS.

Total S and total C were measured using combustion in oxygen followed by infrared measurement of the evolved CO_2 and SO_2. For the other forms of carbon, carbonate carbon was measured as evolved CO_2 after acidification of the sample, and organic carbon was calculated as the difference between total and carbonate carbon. The compilations by Arbogast (1996) and Baedecker (1987) include additional discussions about the various types of analytical methodology used in this study.

Ferrous iron was measured using titration on 11 of the individual samples. No duplicate samples or standards accompanied this set of samples. The technique uses a three-acid digestion, eliminating the oxidizing nitric acid from the above acid digestion technique, followed by titration with potassium dichromate using sodium diphenylanime sulphonate indicator. The compilations by Arbogast (1996) and Baedecker (1987) include a discussion about the typical accuracy and precision of this methodology.

Energy-dispersive x-ray analysis (EDXRF) was performed in our laboratories. The methodology has been described by Siems (2000). Ground (< 100 mesh), 5 g splits of the samples were pressed into pellets in mylar cups and covered with prolene film. The analysis, which is non-destructive, was conducted using a Spectro X-lab 2000 X-ray Spectrometer. By using selected secondary and polarizing targets, a greater peak-to-background ratio for the various peaks is obtained than when using direct tube excitation. These same samples also were analyzed using a hand-held x-ray fluorescence spectrometer (Grauch and others, in preparation).

Finally, splits of the channel and individual samples have been analyzed using X-ray diffraction (XRD) to determine mineralogy (Knudsen and Gunter, in preparation). The techniques were described by Knudsen and others (2000). In this report, XRD data are included that provide a measure of the abundance, with minimum detection presence estimated to be between 1 and 3 percent, of the dominant phosphate mineral, carbonate fluorapatite (CFA). The CFA is determined using a Rietveld analysis of the diffraction data using Siroquant software. This technique measures only the phosphate associated with CFA, the common sedimentary form of apatite in these rocks. As such, the technique provides a minimum estimate of total phosphate because it is possible that small amounts of phosphate occur in other mineral forms or in forms that are not detected by this method or that the CFA has a slightly different stochiometry than that assumed in the data analysis. For example, phosphate in organic compounds, amorphous forms (nondiffracting phases), or in minerals other than CFA, such as aluminophosphate minerals (which in small amounts have been noted in scanning electron microscope studies of these rocks) would be excluded from this x-ray analysis.

RESULTS

Analytical results of the rock analyses of the channel samples and of the 85 additional individual samples are listed in tables 1 and 2, respectively. In the tables, the interval base and top footages are specified relative to the stratigraphic base of the Meade Peak Phosphatic Shale Member of the Phosphoria Formation. This base is defined specifically as the base of the Fish-scale stratum, a bioclastic, marker-unit phosphorite. Footage numbers increase upward through the measured sections. The channel samples from Section J, taken as a whole, represent the Meade Peak section in its entirety as a series of contiguous intervals from the uppermost Grandeur Tongue through and including the Upper Waste unit within the Phosphoria Formation. The upper-most channel sample is taken through a 0.1-foot interval of the Rex Chert directly overlying the Meade Peak.

The data tables include listings of the concentrations of the major rock-forming elements as oxides as well as elements. Column headers for the oxides have “Ox” added to the chemical symbol of the various elements. The oxide concentrations are calculated from the elemental concentrations using standard stoichiometric conversions of the major element concentrations that were determined using the ICP-16 fusion technique. In the tables, the calculated oxide concentration is listed in the column adjacent to the reported concentration for each major element. In addition, there is a column that lists the sum of the calculated major element oxides. However, this sum does not include the contributions from oxides of carbon, sulfur, or nitrogen. For example, it excludes nitrogen contained in buddingtonite (an ammonium-bearing mineral isostructural and in solid solution with orthoclase). Elements are listed alphabetically by chemical symbol for each of the various analytical techniques: individual elements (As, Hg, Sb, Se, and Tl), carbon forms, sulfur, ICP-16 (fusion digestion), ICP-40 (acid digestion), and EDXRF.

The ICP-AES technique provides analysis of Bi and Sn. However, because an inconsistent bias in the Bi and Sn data presently exists for the analytical contractor (P. Lamothe, USGS, oral communication, 2000), the concentration data for these two elements have been eliminated from the original analytical data set. Sr concentrations are determined in both the ICP-40 and ICP-16 techniques (see below), and the data from both techniques have been reported. The two techniques agree well; the R^2 between them is >0.99. Both ICP techniques also measure Mn and have comparable accuracy and precision. However, the ICP-40 technique is considered to be superior to the ICP-16 technique because it has a much lower detection limit, 4 parts per million (ppm) compared to 100 ppm. This lower detection limit is important in analyzing some samples and a few of the check standards with low Mn concentrations. Nevertheless, analytical data for both procedures are included in the data tables.

Several elements have been eliminated from the data sets because of consistent measurement of concentrations at, below, or very near the detection limit. The ICP-40 technique measures Au above 8 ppm, Be above 1 ppm, Ta above 40 ppm, and U above 100 ppm; however, either none of the channel samples had concentrations above these detection limits or the very few samples that did were so close to the detection limit that they were not considered significant. In the set of 85 individual rock samples from the core, the same elements have been eliminated from the data, with the exception of U concentrations measured using the ICP-40 technique, which had some concentrations well above the detection limit. The same consideration applies to Nb measured with the ICP-16 technique and for Bi, Ga, and Ge in the EDXRF analyses of both sets of samples; these elements have been removed from the data sets. The channel samples also have been purged of the EDXRF analyses of Br, Cs, and Ge for the same reasons, but the set of individual samples indicates a few analyses of at least three times the LDL concentration for each of these elements, so the analyses have been retained in the case of the individual samples. For the channel and individual samples, the data set produced using the EDXRF technique has been purged of W analyses, mostly due to an interference in its energy spectrum. Some interference, noted as “inf” in the table, occurs for Ge. For Sn, only about one-half of the EDXRF analyses of the channel samples are qualified as below detection limit of 2 ppm. It is tempting to believe that, for the non-qualified concentrations, some useful data on Sn have been generated to offset the removal of this element from the ICP-40 data set. However, of the non-qualified concentrations of Sn in the channel samples as measured by EDXRF, only one value exceeds twice the lower detection limit. All remaining non-qualified values are so close to the detection limit that they are statistically not significant and should be disregarded. Nonetheless, there is still some limited useful information in the data. With the LDL for Sn of the EDXRF technique at 2 ppm and, as noted above, disregarding concentrations up to about twice this level, it is clear, with a single exception, that no Sn concentrations exist in the channel samples above about 4 ppm. For the individual samples, Sn is likewise mostly low, but 31 of the 89 samples are above the LDL. This set averages 15 ppm Sn, and there is a single high of 313 ppm. Clearly, localized enrichments of Sn can occur in these rocks, but these are infrequent and occur over interval thicknesses of only a few tens of centimeters. The average concentration over intervals typical of the channel samples is but a few ppm or lower.

The concentration data in tables 1 and 2 are listed as reported by the contract laboratory. The data have neither been changed statistically nor has there been any replacement of any qualified values of concentration. Qualified values of concentration result because the analytical detection signal for an element is at or less than a specified lower detection limit (LDL) that is not statistically different from zero. Qualified values are listed in the data tables with "<" preceding the LDL. We have not included replacement values for these qualified concentrations, which is typically done for most traditional data summarization and analysis (for example, see Cohen, 1959).

As an estimated measure of analytical accuracy, various analytical standard rock samples were included with the set of channel and individual samples from Measured Section J that were submitted to the contract laboratory. The reported analyses of these standards are included in table 3. We include analysis of three carefully prepared check standards of phosphatic shale (POW-1, POW-2, and POI-1) that are used as ongoing monitors of analytical accuracy for this project (Herring and Wilson, 2001). These standards are finely ground (<200 mesh) splits of composite channel samples of two sections of middle waste shale and one of ore from Section B, which is described by Tysdal and others (1999) and for which analytical data are reported by Herring and others (1999). The preparation and use of these standards are intended to provide better analytical quality control for the project, especially because the standards have similar mineralogy and composition to the typical rocks being analyzed within the project. Table 3 also includes the concentrations obtained with the check standard splits that accompanied the samples for analysis, the mean concentration values of past seven replicated analyses, and the relative standard difference between those standards and the means. Analyzed standards also include SARL-1 and SARM-1, which are routinely submitted with rock samples as a part of the quality control monitoring of the contract laboratory. Table 3 lists the individual analyses of these two replicated standards, the mean of their replicated analyses, the accepted concentration values, and the relative standard difference (calculated in percent) between those mean concentrations and the accepted values.

As a measure of analytical precision, the analytical sample set analyzed by the analytical contractor includes 12 replicated sample pairs, 9 from the channel sample suite and 3 from the individual sample suite. These samples are identified in the data tables as duplicates. The listings in table 3 summarize for each element the average relative standard difference and average relative standard deviation of up to 12 duplicated pairs of samples. This summary only reports statistical comparisons for duplicated sample pairs without any qualified concentration data for individual elements.

The abbreviations for analytical techniques in the column headings of tables 1, 2, and 3 for analytical methodology are defined as follows:

Hydride: hydride generation followed by atomic absorption spectrometry.
CVAA: cold vapor atomic absorption spectrometry.
Fusion AA: fusion followed by graphite furnace atomic absorption spectrometry.
Combustion (carbon): combustion in an oxygen atmosphere using an automated carbon analyzer; evolved carbon dioxide gas is measured using a solid-state infrared detector.

Combustion (sulfur): combustion in an oxygen atmosphere using an automated sulfur analyzer; evolved sulfur dioxide gas is measured using an infrared detector.
Acidification: acidification followed by measurement of evolved carbon dioxide gas using coulometric titration.
Titration: ferrous iron titrated with potassium dichromate following acid digestion.
ICP-16: inductively-coupled plasma spectrometry, fusion digestion.
ICP-40: inductively-coupled plasma spectrometry, acid digestion.
EDXRF: energy-dispersive x-ray fluorescence analysis.

The CFA abundance data, determined from XRD analysis, are listed in tables 1 and 2 next to the percent P_2O_5 (oxide) concentrations. The correlation between the percentages of P_2O_5 and the CFA abundance has its greatest scatter at higher P_2O_5 concentrations. Furthermore, the scatter indicates that the XRD analysis underestimates the P_2O_5 concentration, which would indeed be the case if some P_2O_5 occurs in forms other than CFA or for other reasons mentioned previously. Minor amounts of other phosphatic minerals have been noted in scanning electron microscope studies of these rocks, but the presence of these minerals is not sufficient to be detectable using XRD analysis. For the channel samples, the linear correlation for all analyzed samples has $R^2 = 0.90$, whereas if the zero value peak height data are excluded, the R^2, using a power fit, increases to 0.94. Perhaps coincidentally, the three channel samples (wpsj sample numbers: 156C, 159C, and 162C) with the greatest departure from the generally well correlated relationship between P_2O_5 and the CFA abundance occur spatially close to one another in the upper ore zone. Otherwise, these samples do not exhibit any particular compositional dissimilarity from nearby samples (table 1).

Concentrations of various elements in the channel samples of Measured Section J through the Meade Peak Phosphatic Shale Member are graphed in figure 2. The few "less-than" concentrations for some elements as listed in the data tables are not included in the graphing. The figure includes a brief key to the general geology of major intervals within each section: Grandeur Dolostone, lower waste, lower ore, middle waste shale, upper ore, upper waste, and Rex Chert. The figure includes the concentration data from three channel samples of the underlying Grandeur Tongue dolostone and the single sample from the overlying Rex Chert Member of the Phosphoria Formation. The concentrations of many of the trace elements are scaled logarithmically to enhance visible differences at their lower concentrations. This scaling permits tracking of fine detail at lower concentrations. Unfortunately, it also de-emphasizes some of the large and significant changes in concentration. These are especially notable between the dolostone of the Grandeur Tongue and the basal few feet of the Meade Peak, including the Fish-scale layer. Concentration changes for As, Se, and Zn are three orders of magnitude, while the increases for Hg, Tl, Cr, Ba, Cd, Cu, Mo, and U are two orders of magnitude. Only Mn, with its affinity for carbonate minerals, shows a decrease in concentrations in the lowermost Meade Peak compared to the Grandeur.

COMPARISON OF EDXRF AND ICP ANALYTICAL TECHNIQUES FOR VARIOUS TRACE ELEMENTS

A comparison between the concentrations reported using the EDXRF technique and other analytical techniques is shown in figure 3. The EDXRF data arbitrarily are graphed as the dependent variable on each of the figures. A one-to-one line on each of the figures represents the location where data points would lie if both techniques reported the same number. The entire set of channel and individual samples was compared after averaging duplicate sample concentrations for all techniques. This set contains 168 sample pairs, and the number of non-qualified (usable) sample pairs is reported in parentheses after the element name. Also, the degree of scatter is indicated using R^2, which ranges from 0.77 to 0.99 and generally is better than 0.95.

In general, there is very good agreement between the EDXRF technique and the other analytical techniques. For As, a pair of outlier concentrations toward the low end of the analytical determinations produces a negligible effect on the scatter. For Se, another pair of outlier concentrations has a slightly greater effect. For Sb, the EDXRF consistently reports a slightly greater concentration value than that of the hydride technique. For Cr, the opposite is true at the lower end of the detection range. Sr and Y values are well correlated and symmetrical about the 1:1 line. Zr concentrations show only a few departures at the low end of the detection limit and this has negligible effect on the scatter. Ag exhibits the highest degree of scatter and a consistent bias for the EDXRF values to be higher than the ICP technique. Ba concentrations are well correlated and symmetrical about the 1:1 line. Cd concentrations, with the exception of a single outlier, are well correlated, but show a slight bias in elevated concentrations using the EDXRF technique. Ce concentrations have an increasing degree of scatter around values at the lower end of the analytical range. Cu concentrations are well correlated and symmetrical about the 1:1 line at higher concentrations, but a few concentrations at the lower end of the analytical range indicate a higher analytical bias with the ICP-40 technique. These few concentrations, however, are not sufficiently deviant to lower the strong correlation coefficient of 0.98. La concentrations show a few departures with a slightly higher concentration bias with the EDXRF technique at the lower end of the measured range. Mo concentrations are similar but with the bias toward higher concentrations using the ICP-40 technique. For both La and Mo, these departures from the 1:1 relationship occur near detection limits of the techniques and do not alter the observation of excellent comparison between the techniques in general. For Nd, there is scatter toward the lower end of the detected concentration range and a systematic bias toward higher concentrations as measured by ICP-40. Ni concentrations are well correlated and symmetrical about the 1:1 line. Pb concentrations exhibit scatter toward the lower end of the concentration range and a systematic bias toward higher concentrations as measured by ICP-40. V values are well correlated, with the exception of a single outlier, but their symmetry about the 1:1 line suggests a slight bias toward higher concentrations using the ICP-40 technique. Zn concentrations are well correlated and symmetrical about the 1:1 line.

CORRELATIONS OF ELEMENT CONCENTRATIONS BETWEEN CHANNEL-SAMPLED INTERVALS AND INDIVIDUAL SAMPLES

Individual rock samples from an interval of the core commonly have element concentrations equal to or greater than those of the channel-sampled interval that includes them (fig. 2). Only infrequently are the concentrations in the individual rock samples less than those in the channel-sampled interval. In part this reflects the compositional heterogeneity through the interval. However, it also reflects an intentional bias that results because many of the individual samples were selected because of their extremely high concentrations of several trace elements as detected using the hand-held x-ray fluorescence spectrometer. In turn, the enriched element concentrations in these individual samples are often less than those determined using x-ray fluorescence spectrometer measurements on fracture surfaces of the same samples. This strongly suggests that at least some of the forms of the element are easily mobilized and can be deposited onto fracture surfaces.

ELEMENT CONCENTRATIONS IN CHANNEL SAMPLED INTERVALS OF SECTION J COMPARED WITH MEASURED SECTIONS A AND B

Element concentrations in the Measured Section J are distinctly different from those in Measured Sections A and B (fig. 4). The less altered nature of Section J, relative to Section B and highly altered Section A, is exemplified by higher concentrations of many trace elements, particularly those that are geochemically mobile given their resident minerals and conditions of alteration. For example, Se concentrations in Section J and Section B (fig. 4, p. 28) are fairly consistently greater than those in Section A and reflect the greater extent of weathering in Section A, the closest of the three measured sections to the pre-mined ground surface. Other elements that are enriched in Section J, which is the deepest, least altered of the three sections, include Tl (at the base of the section), Mo, and Zn (fig. 4, p. 29, 31, 33). Also, carbonate minerals, organic carbon, and total sulfur are greatly enriched in Section J compared to the other two sections. Some elements show the opposite behavior and have higher concentrations in Section A, the most altered of the sections. For example, Al, Fe, Cr, and Zr generally exhibit considerable enrichment in Section A, and Hg, Sb, Ti, Ba, and silica have a lesser degree of enrichment (figs. 4 and 5). Phosphate and elements associated with it, like La and Y, are also enriched in Section A (fig. 5). This may simply reflect the removal of carbonate minerals and organic carbon from the altered Section A and consequent relative enrichment of the phosphate. Uranium, which also associates with phosphate minerals, does not show the same correlation, suggesting that additional processes may govern the mobility of U in the rocks.

Figure 4 also shows concentration trends of some of the trace elements. For example, the enrichment of V at the top of the Middle Waste and just into the Upper Ore Zone, the “Vanadiferous Zone” that was discussed by McKelvey and others (1959), is clearly evident in Section J. Several other elements, especially Cd, Mo, Ni, and Zn also are enriched in this zone.

Direct comparisons of element concentrations in similar strata of the various stratigraphic zones of the Meade Peak are not easily done using the data in figure 4. A difficulty arises because the measured sections are not of exactly the same true stratigraphic thickness due to structurally caused thickening, thinning, and removal of some strata as well as dissolution of carbonate beds. Hence, the concentration data of one section of the Meade Peak, for example in Section J, cannot be overlaid with the same footage samples in Sections A or B. In order to facilitate a better comparison of element concentrations in these zones, the concentration data have been recalculated as average concentrations, weighted by interval length of the samples, for each entire zone of Section J and of Sections A and B. These weighted average concentrations for the Lower Waste, Lower Ore, Middle Waste, Upper Ore, and Upper Waste zones are shown on figure 5 using different symbols for Section J, Section A, and Section B.

INDIVIDUAL ROCK SAMPLES—OBSERVATIONS AND DISCUSSION

Individual rock samples commonly were selected using the hand-held x-ray fluorescence spectrometer measurements as a guide to the occurrence of unusually high concentrations of some elements relative to the typical rock in an interval. The concentration data in figure 2 indicate this enrichment on a local level among the individual samples and the channel sample that encompasses them. Commonly these enrichments are between a factor of 2 and 10, and occasionally they are greater. Clearly there are fine-scale differences in concentrations within intervals analyzed as channel samples.

As for the chemical changes in sections of the core that showed upward increasing presence of organic carbon over intervals of a few feet, the transition is sharp into visually pure dolostone after the last and, generally, thickest carbon seam. Additionally, this pattern is repeated over several cycles throughout the Middle Waste section. For example, one of these intervals occurs from 80 to 85 feet in Section J. At 80 feet the carbonate is relatively pure and carbonate carbon constitutes 11 percent of the sample, a high value for rocks of the core on average. This value drops precipitously over the next few feet of overlying rock to values around 2 to 3 percent and then at 85 feet increases back to a high value of 12 percent. Organic carbon has the opposite behavior. At 80 feet it is at a relatively low concentration of about 2 percent. Over the overlying next few feet, it increases progressively to 15 percent, a relatively high concentration for the rocks of the core. At 85 feet it drops to 1 percent. Trace elements that mimic the enrichment of the organic carbon in this interval are Hg, Se, Tl, Mo, Ni, Cr, Cu, and Zn (table 2 and fig. 2).

Table 2 includes Fe^{+2} analyses for 11 samples. Those samples measured for Fe^{+2} are identified in the first few columns of table 2, and the analytical data, including percentages of Fe^{+2} to total Fe, are grouped in the data table within the columns of major element analysis by fusion. While the number of samples is small, the percentage of Fe^{+2} to total Fe nonetheless ranges from nearly none to 100 percent. On average, Fe^{+2} is about 20 percent of total Fe. If all of the Fe^{+2} is present as pyrite, then it would require only about 10 percent of the total S in the sample. Based on field examination, electron microscopy, and XRD analysis, pyrite clearly occurs in these samples, but the amounts are uncertain. XRD analysis of these samples indicates an average pyrite content of about 4 percent, about a factor of 10 greater than can be explained by the average Fe^{+2} content.

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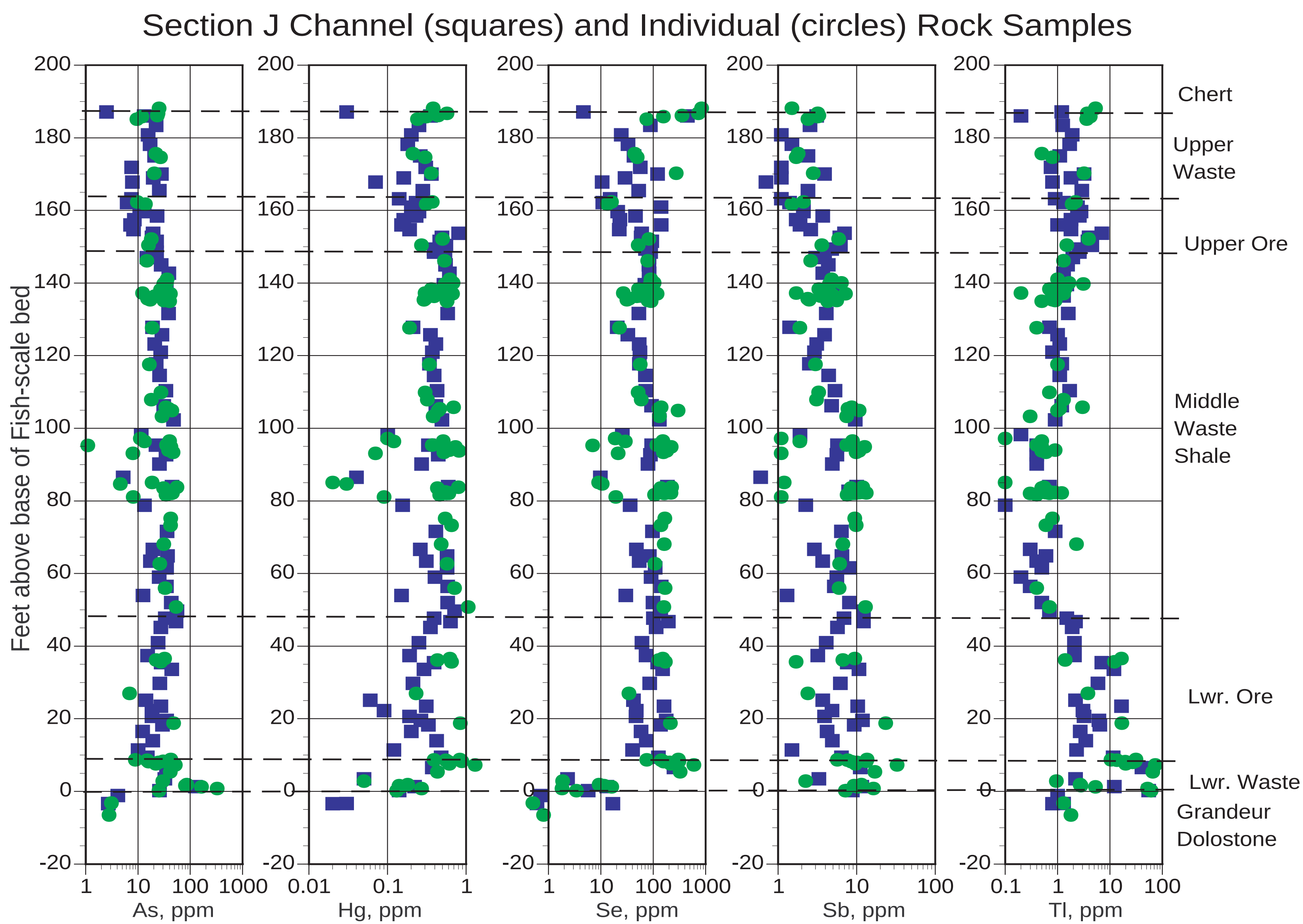
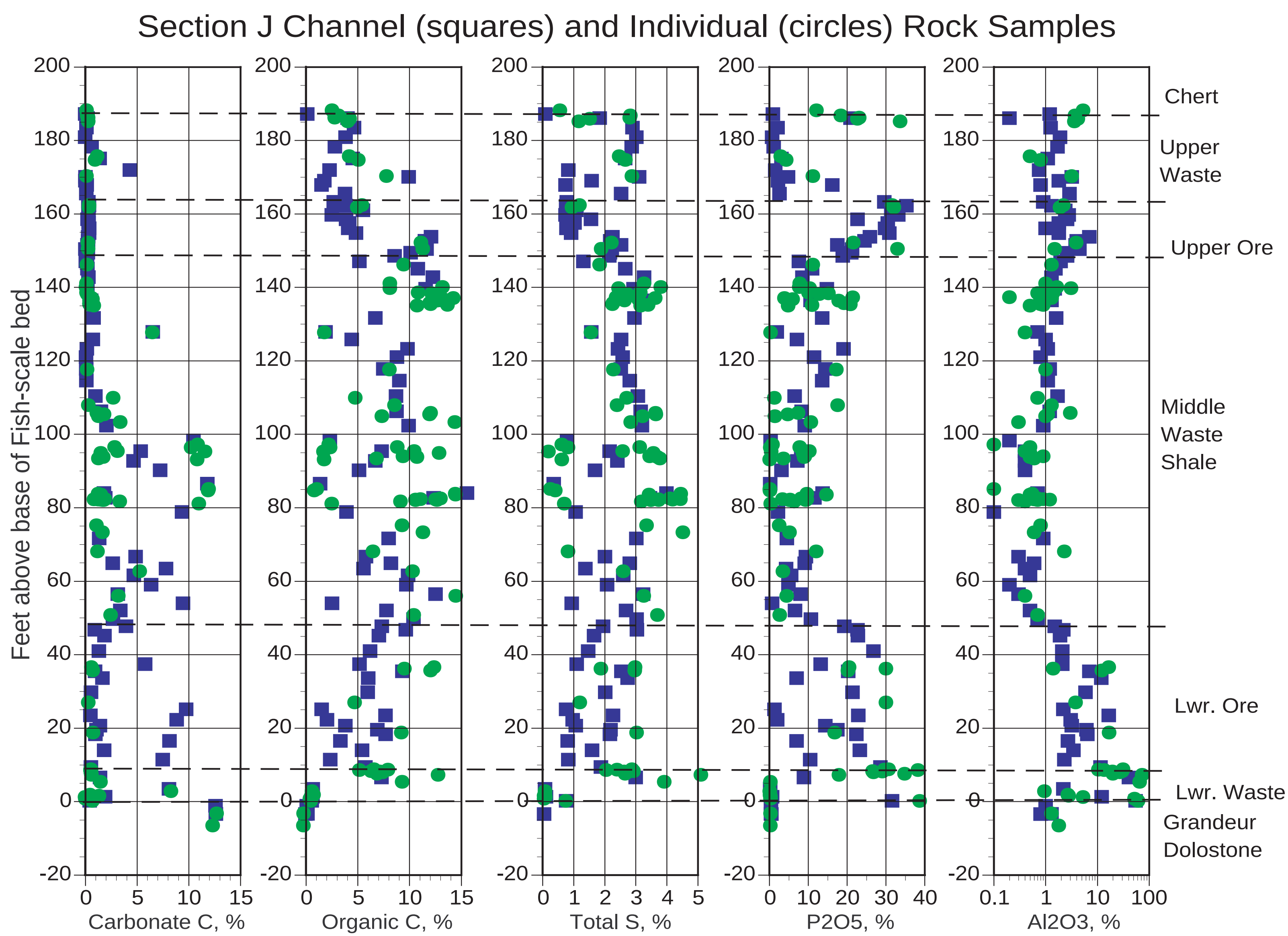


Figure 2; Page 20


Section J Channel (squares) and Individual (circles) Rock Samples
Feet above base of Fish-scale bed
Carbonate C, %
Organic C, %
Total S, %
P2O5, %
Al2O3, %
Chert
Upper Waste
Upper Ore
Middle Waste Shale
Lwr. Ore
Lwr. Waste
Grandeur Dolostone

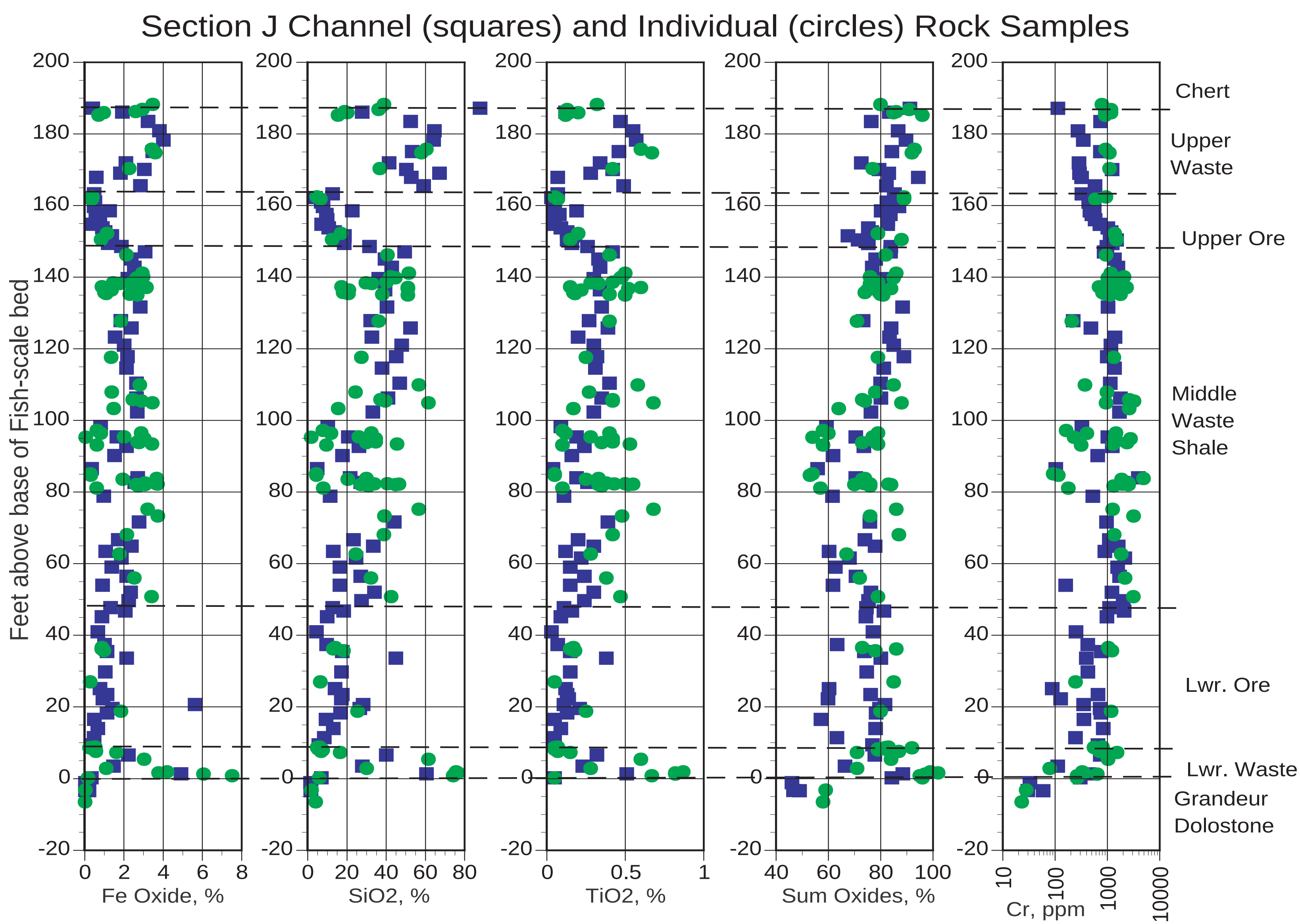
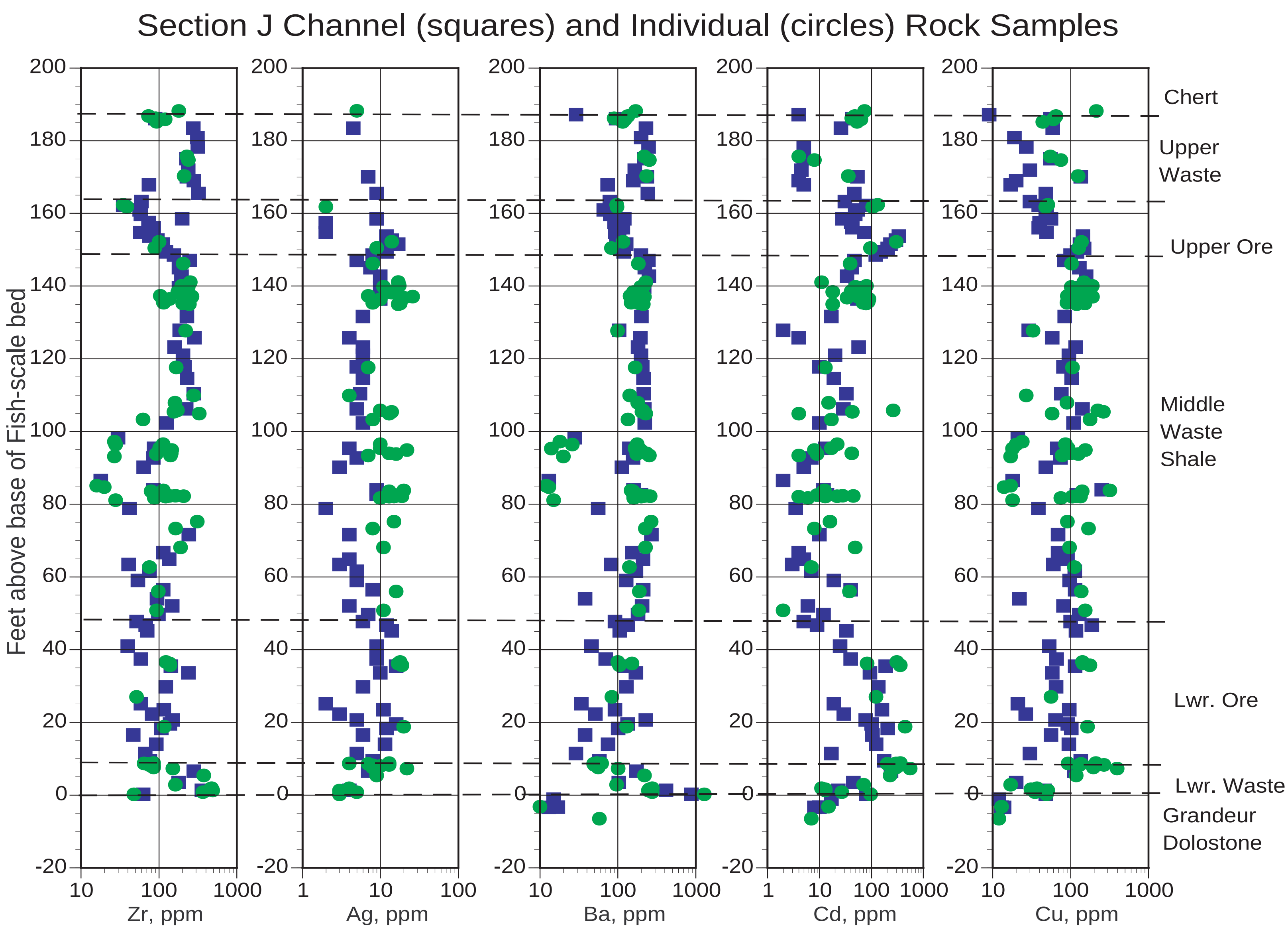
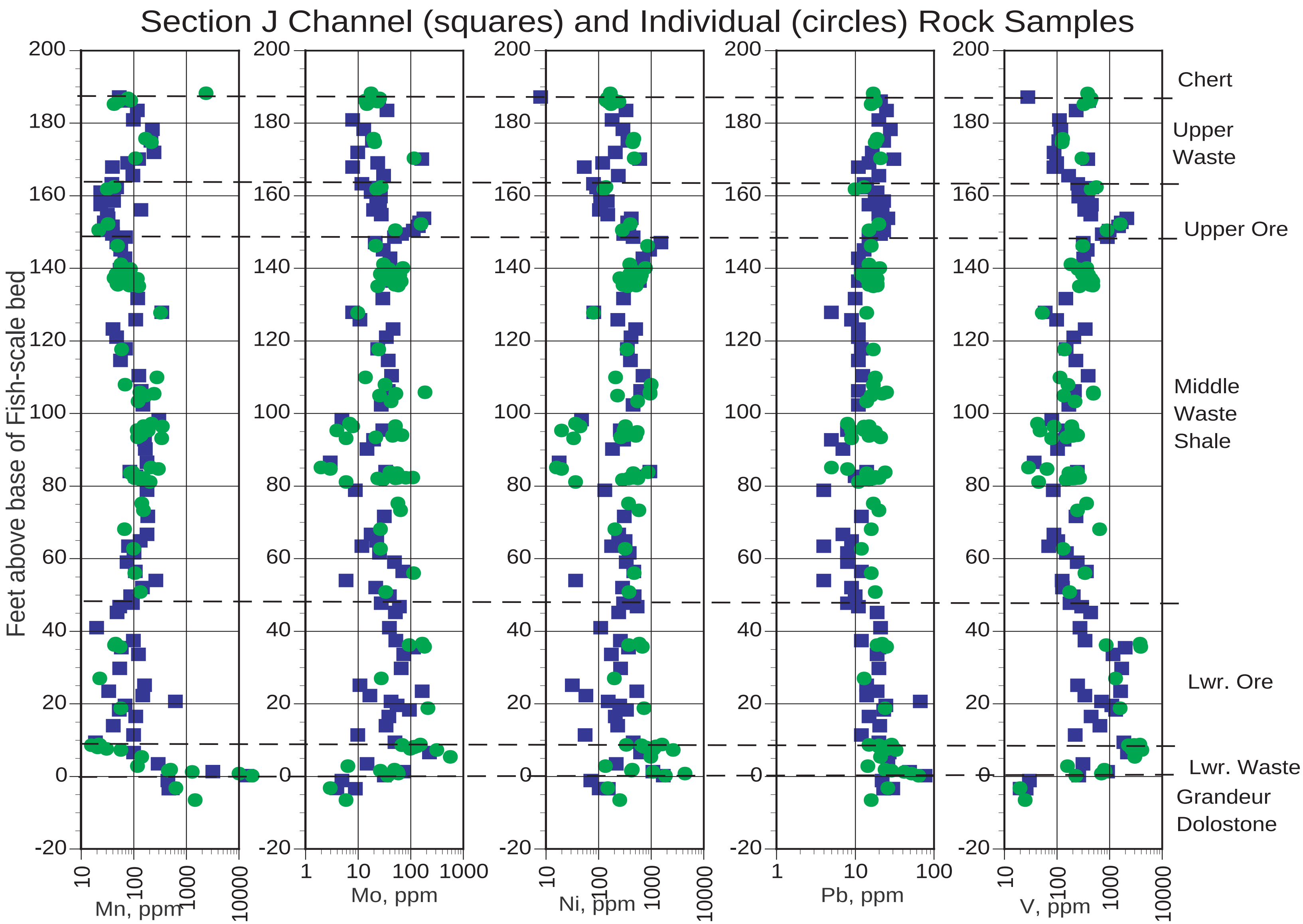
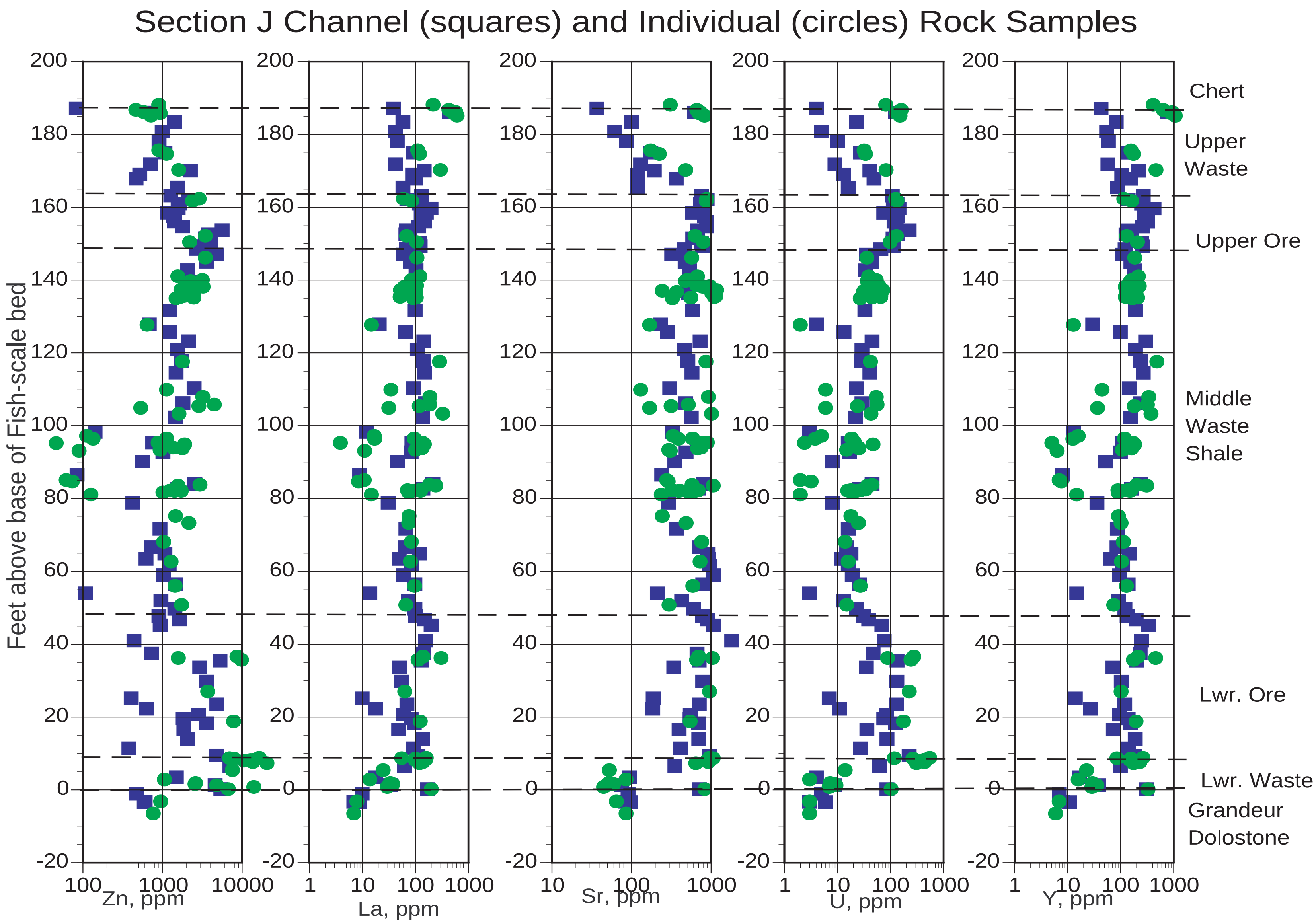
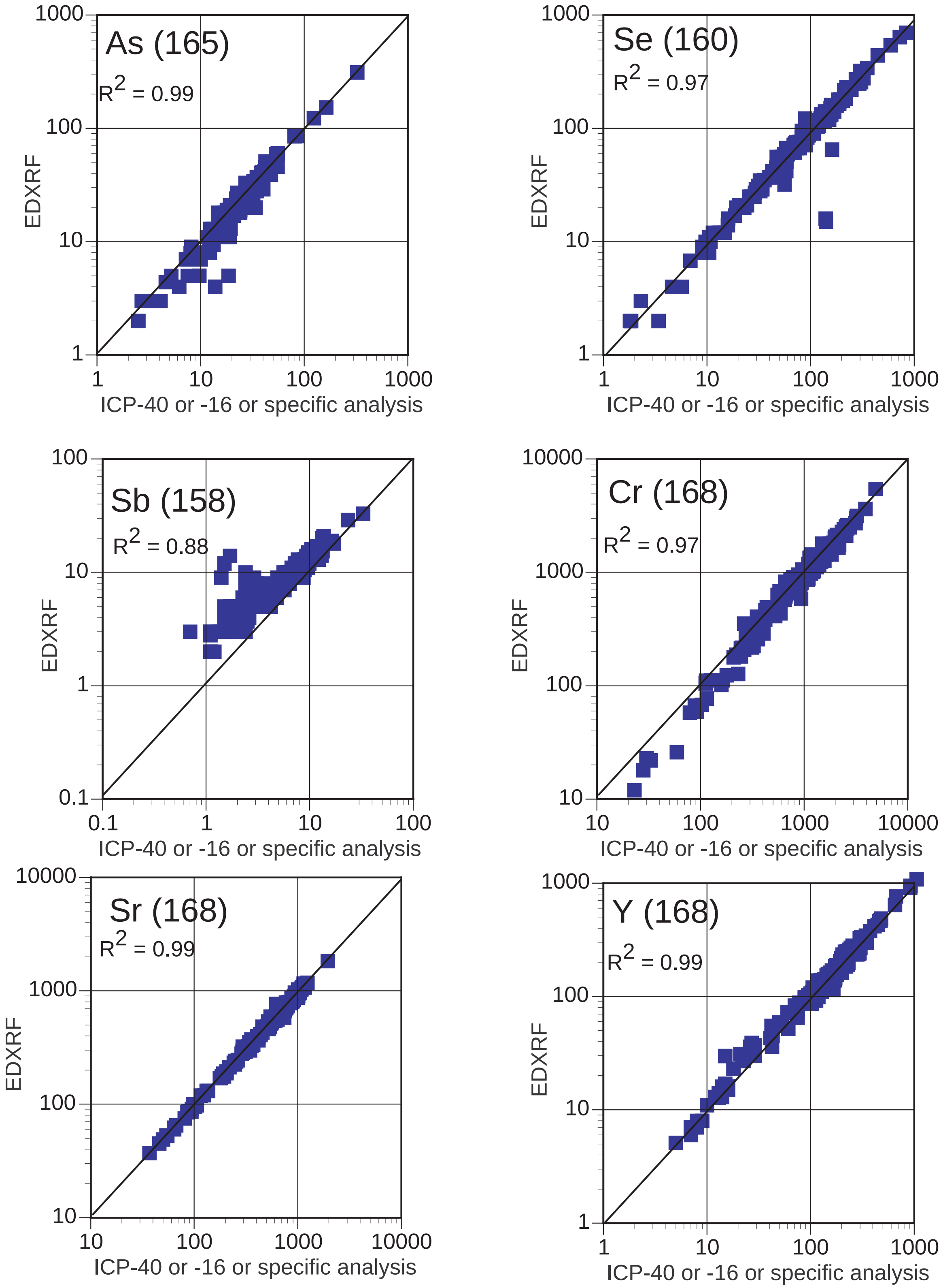


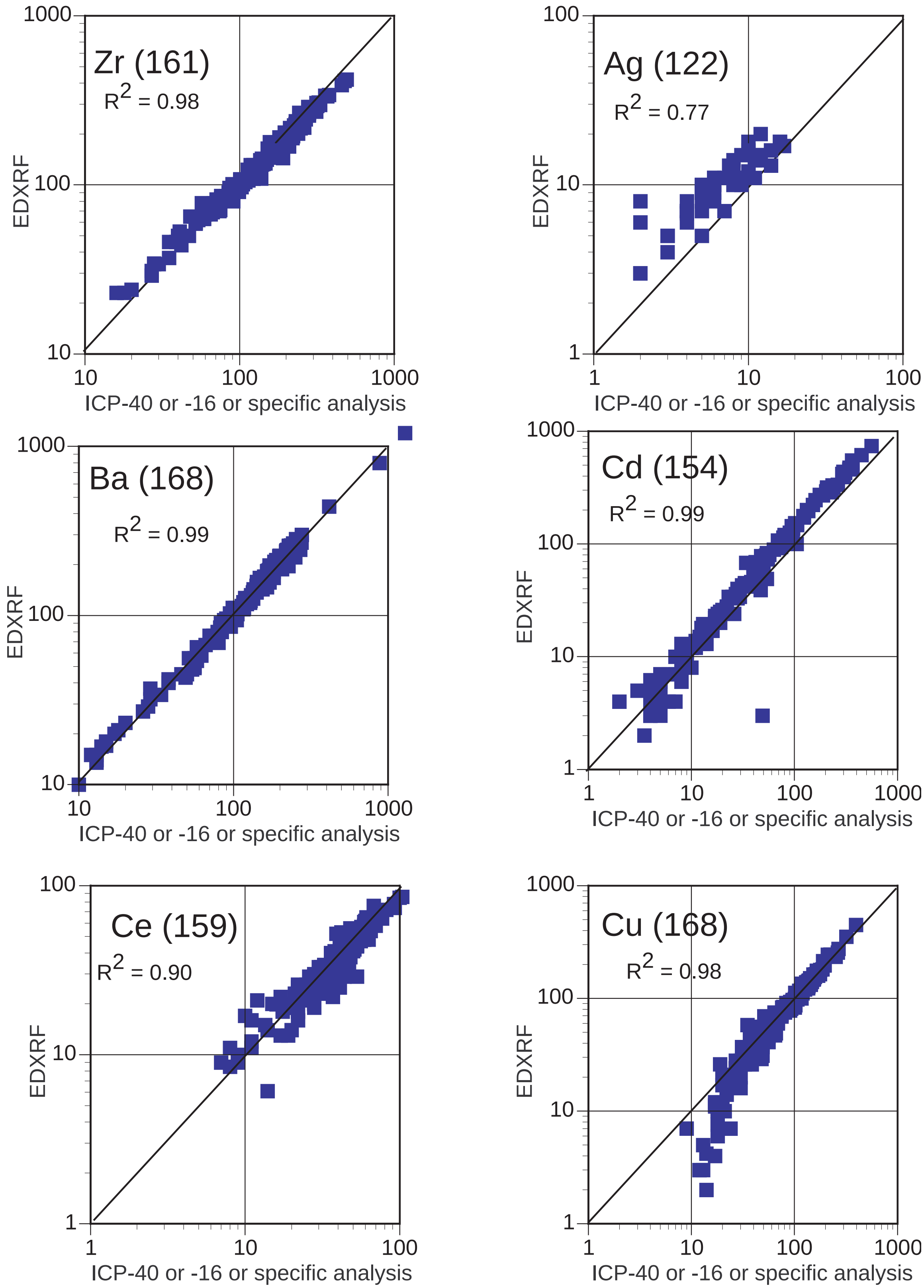
Figure 2; Page 22

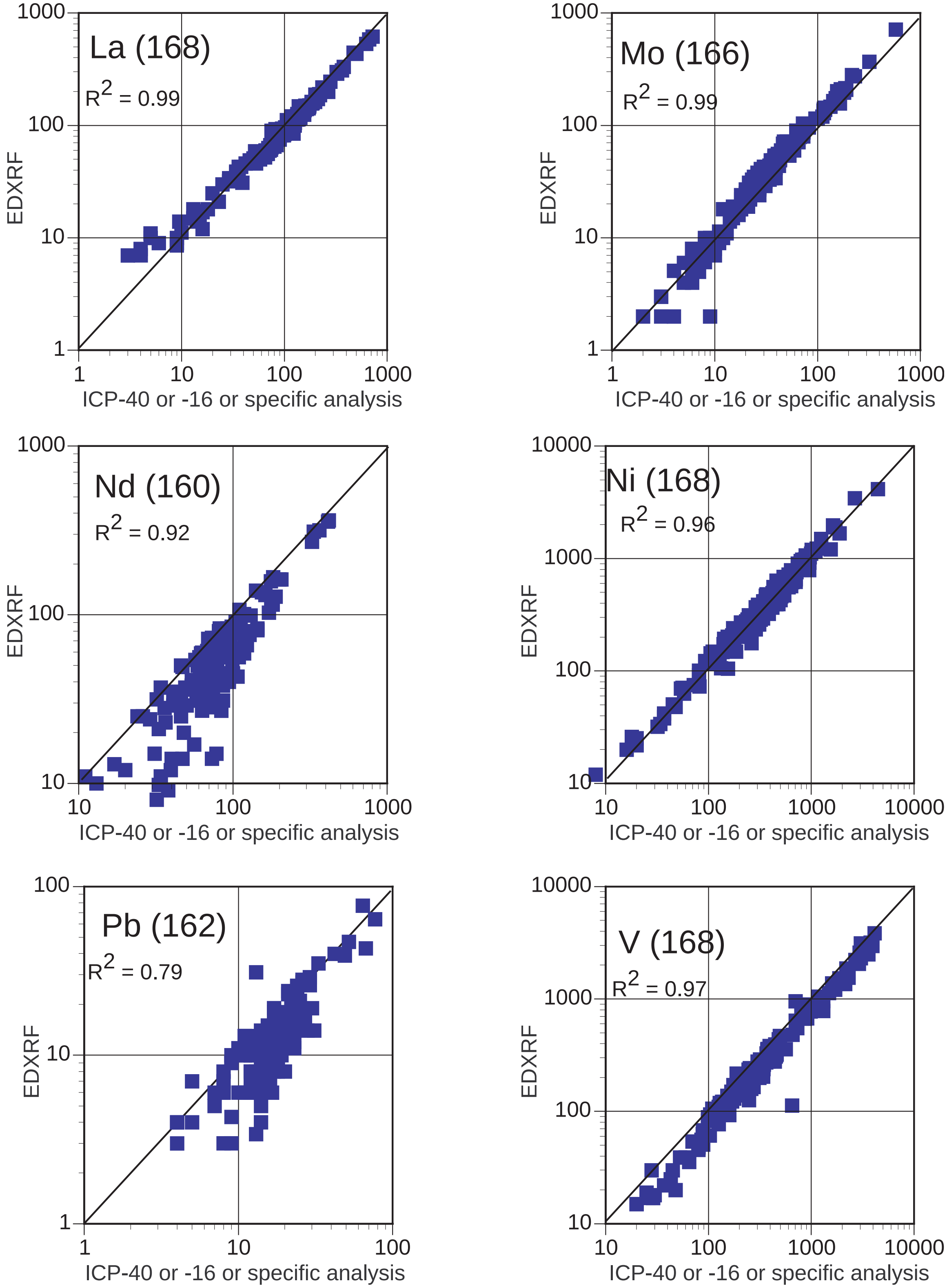

Section J Channel (squares) and Individual (circles) Rock Samples
Feet above base of Fish-scale bed
Zr, ppm
Ag, ppm
Ba, ppm
Cd, ppm
Cu, ppm
Chert
Upper Waste
Upper Ore
Middle Waste Shale
Lwr. Ore
Lwr. Waste
Grandeur Dolostone

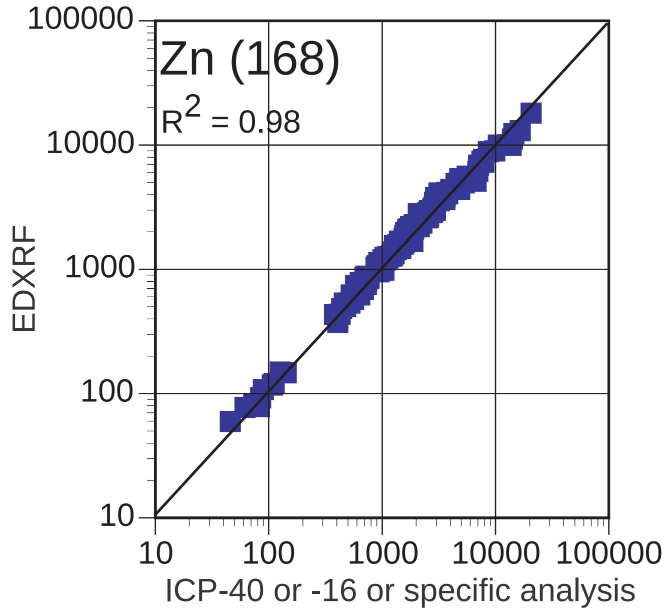

Section J Channel (squares) and Individual (circles) Rock Samples
Feet above base of Fish-scale bed
Mn, ppm
Mo, ppm
Ni, ppm
Pb, ppm
V, ppm
Chert
Upper Waste
Upper Ore
Middle Waste Shale
Lwr. Ore
Lwr. Waste
Grandeur Dolostone


Section J Channel (squares) and Individual (circles) Rock Samples
Feet above base of Fish-scale bed
200
180
160
140
120
100
80
60
40
20
0
-20
100
1000
10000
Zn, ppm
1
10
100
1000
La, ppm
10
100
1000
Sr, ppm
1
10
100
1000
U, ppm
1
10
100
1000
Y, ppm
Chert
Upper Waste
Upper Ore
Middle Waste Shale
Lwr. Ore
Lwr. Waste
Grandeur Dolostone


As (165)
R^2 = 0.99
Se (160)
R^2 = 0.97
Sb (158)
R^2 = 0.88
Cr (168)
R^2 = 0.97
Sr (168)
R^2 = 0.99
Y (168)
R^2 = 0.99
EDXRF
ICP-40 or -16 or specific analysis
0.1
1
10
100
1000
10000


Zr (161)
R^2 = 0.98
EDXRF
1000
100
10
10
100
1000
ICP-40 or -16 or specific analysis
Ag (122)
R^2 = 0.77
EDXRF
100
10
1
1
10
100
ICP-40 or -16 or specific analysis
Ba (168)
R^2 = 0.99
EDXRF
1000
100
10
10
100
1000
ICP-40 or -16 or specific analysis
Cd (154)
R^2 = 0.99
EDXRF
1000
100
10
1
1
10
100
1000
ICP-40 or -16 or specific analysis
Ce (159)
R^2 = 0.90
EDXRF
100
10
1
1
10
100
ICP-40 or -16 or specific analysis
Cu (168)
R^2 = 0.98
EDXRF
1000
100
10
1
1
10
100
1000
ICP-40 or -16 or specific analysis


La (168)
R2 = 0.99
Mo (166)
R2 = 0.99
Nd (160)
R2 = 0.92
Ni (168)
R2 = 0.96
Pb (162)
R2 = 0.79
V (168)
R2 = 0.97
EDXRF
ICP-40 or -16 or specific analysis
1
10
100
1000
10000


Zn (168)
R^2 = 0.98
100000
10000
1000
100
10
EDXRF
10
100
1000
10000
100000
ICP-40 or -16 or specific analysis

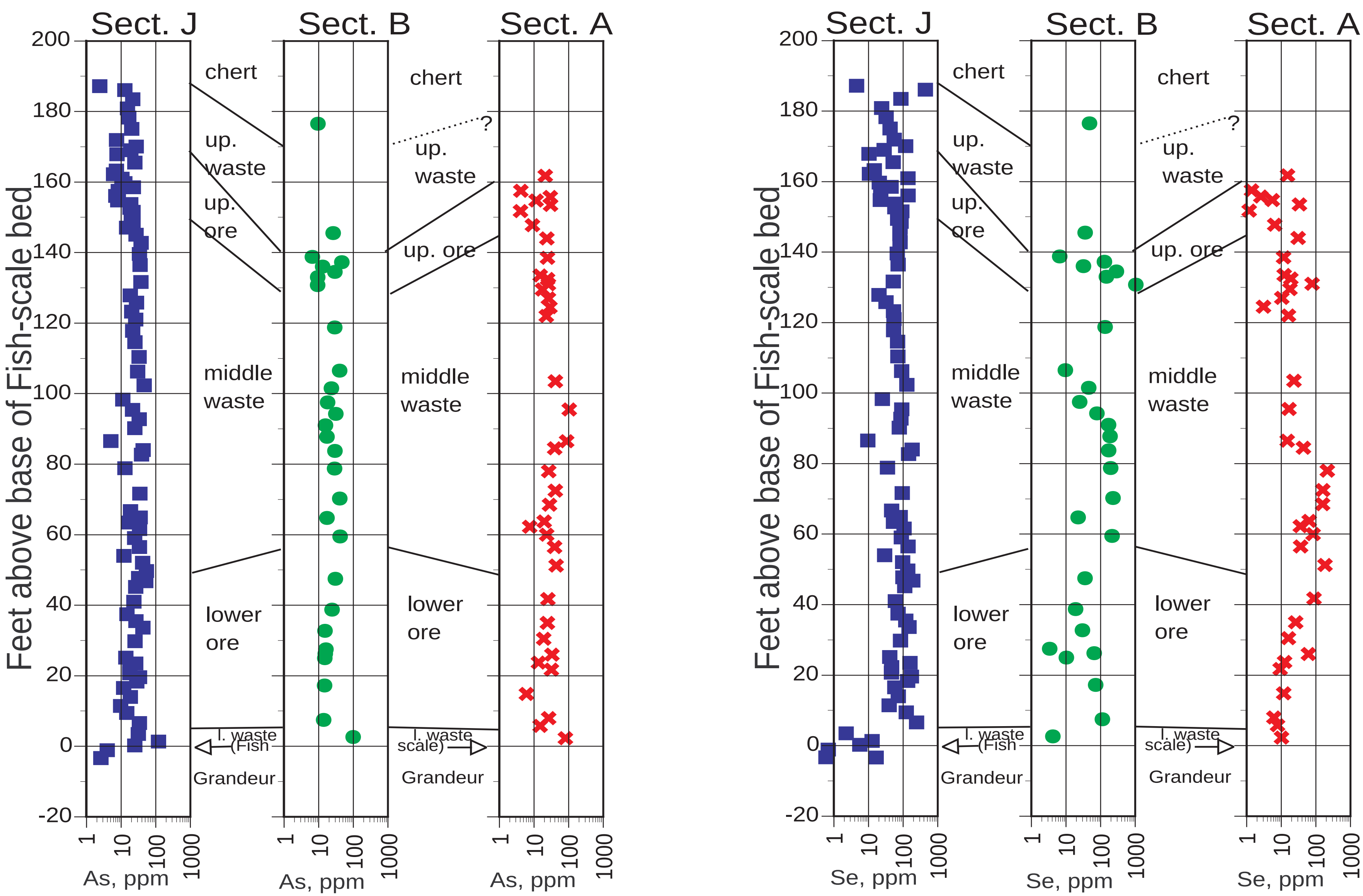


Figure 4; Page30

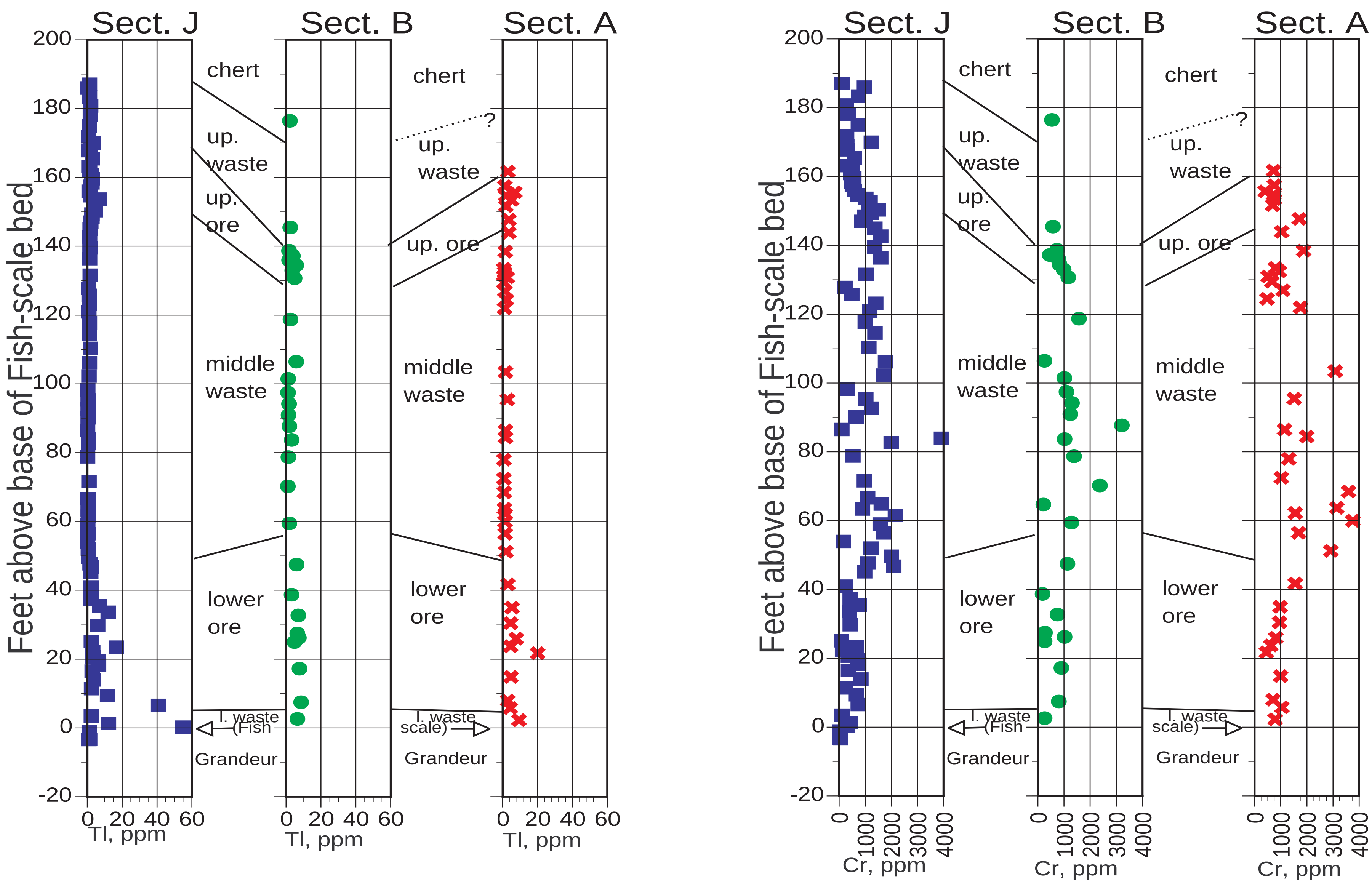


Figure 4; Page31

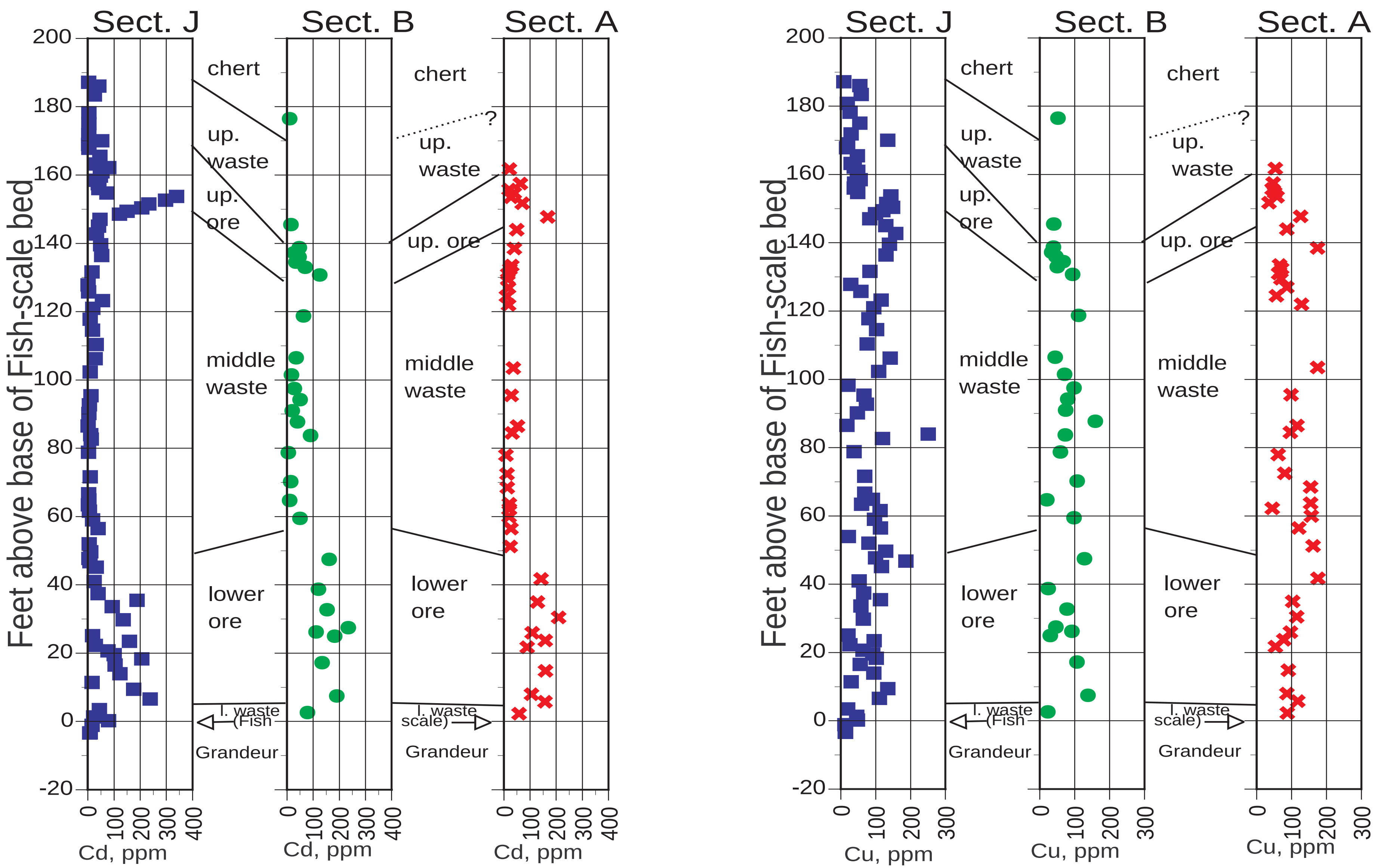


Figure 4; Page32

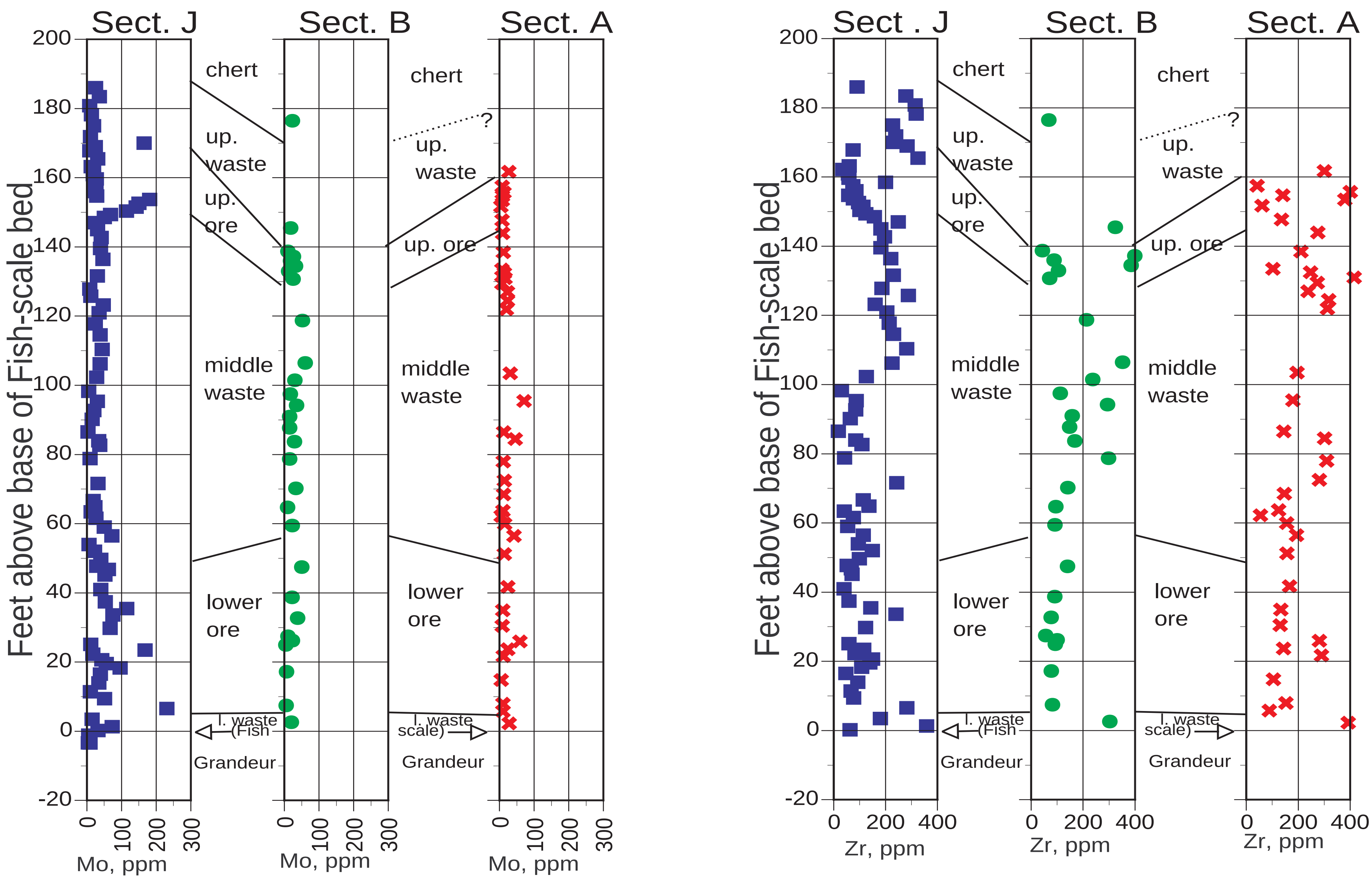


Figure 4; Page33

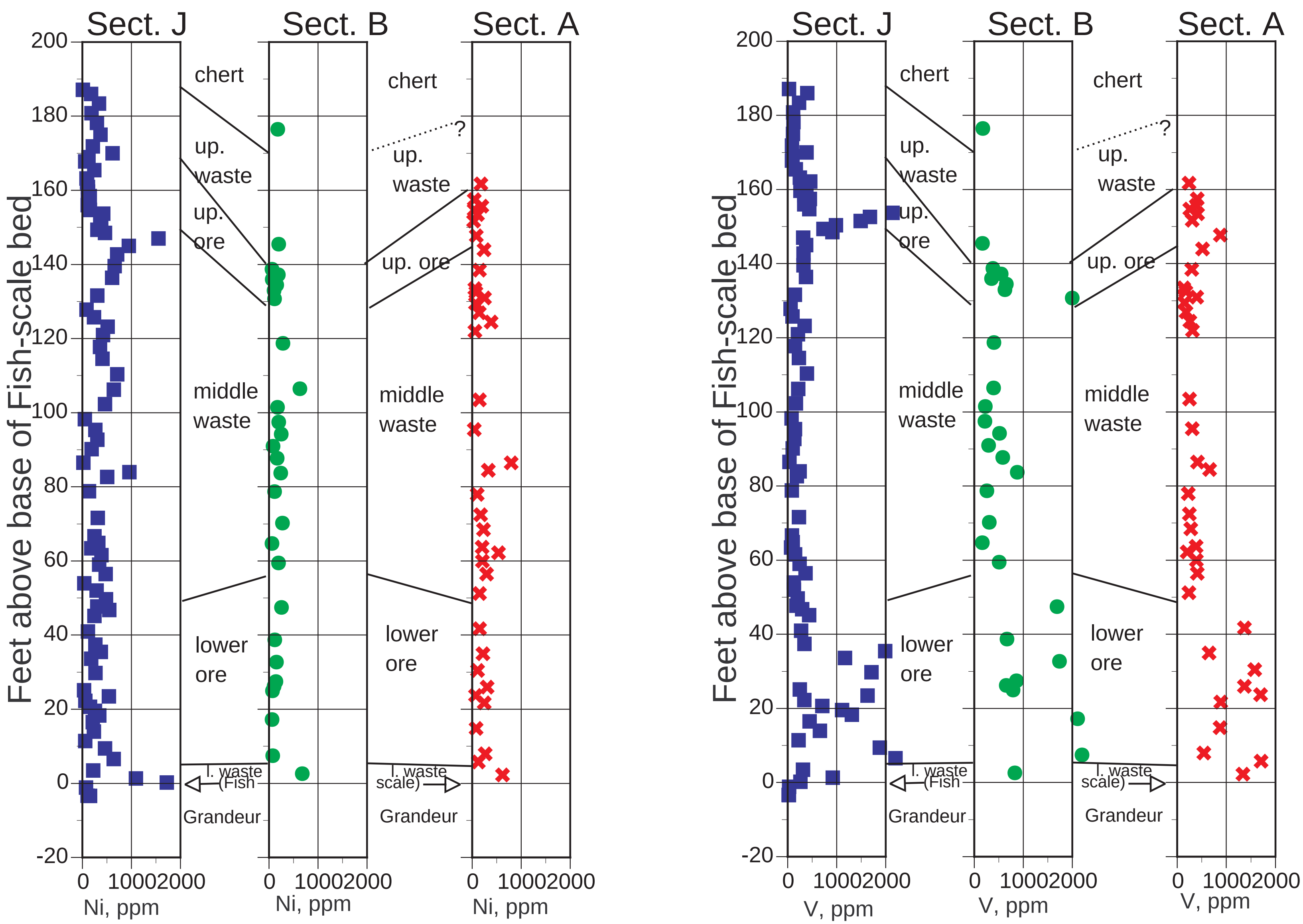


Figure 4; Page34

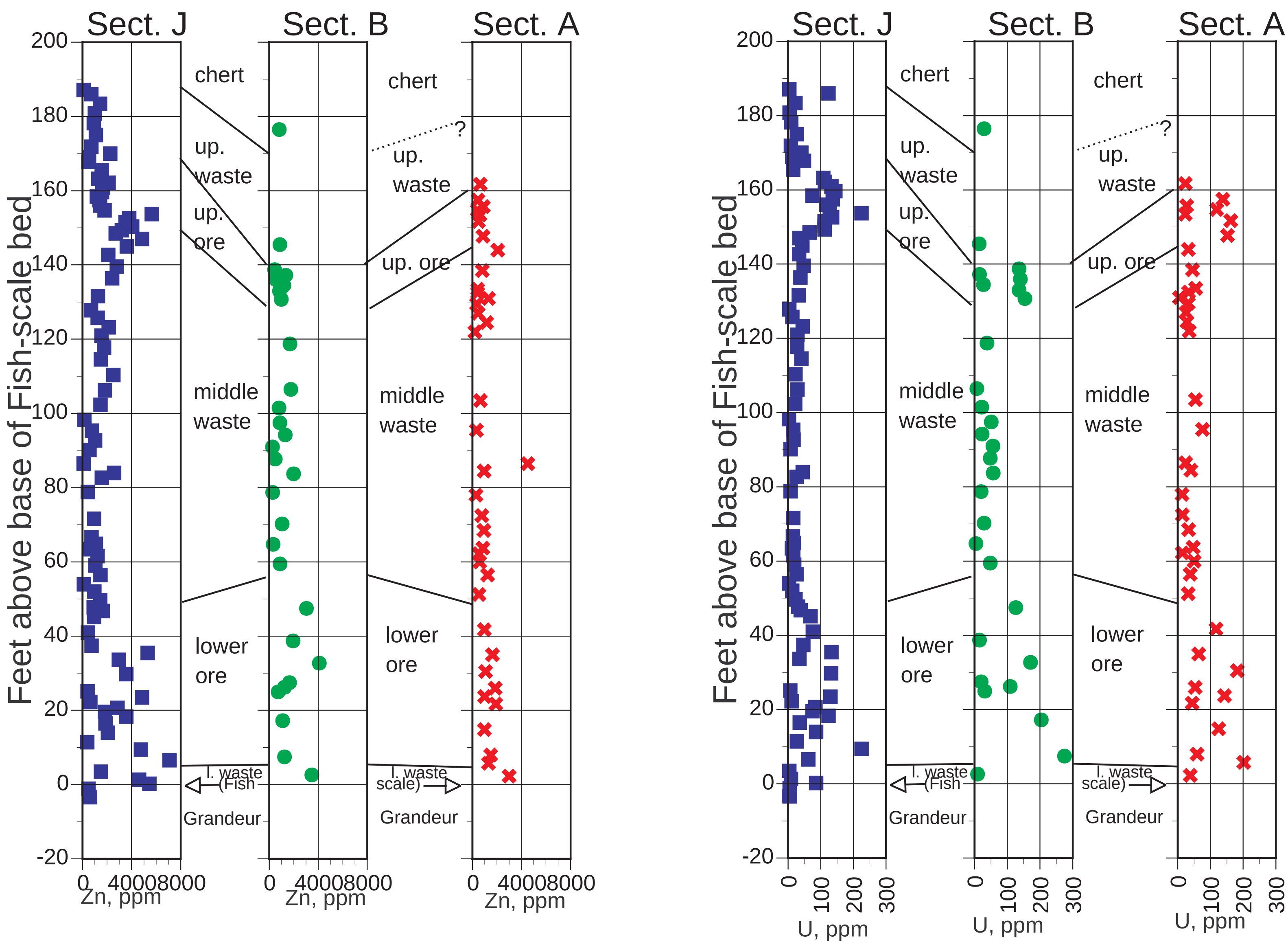


Figure 4; Page35

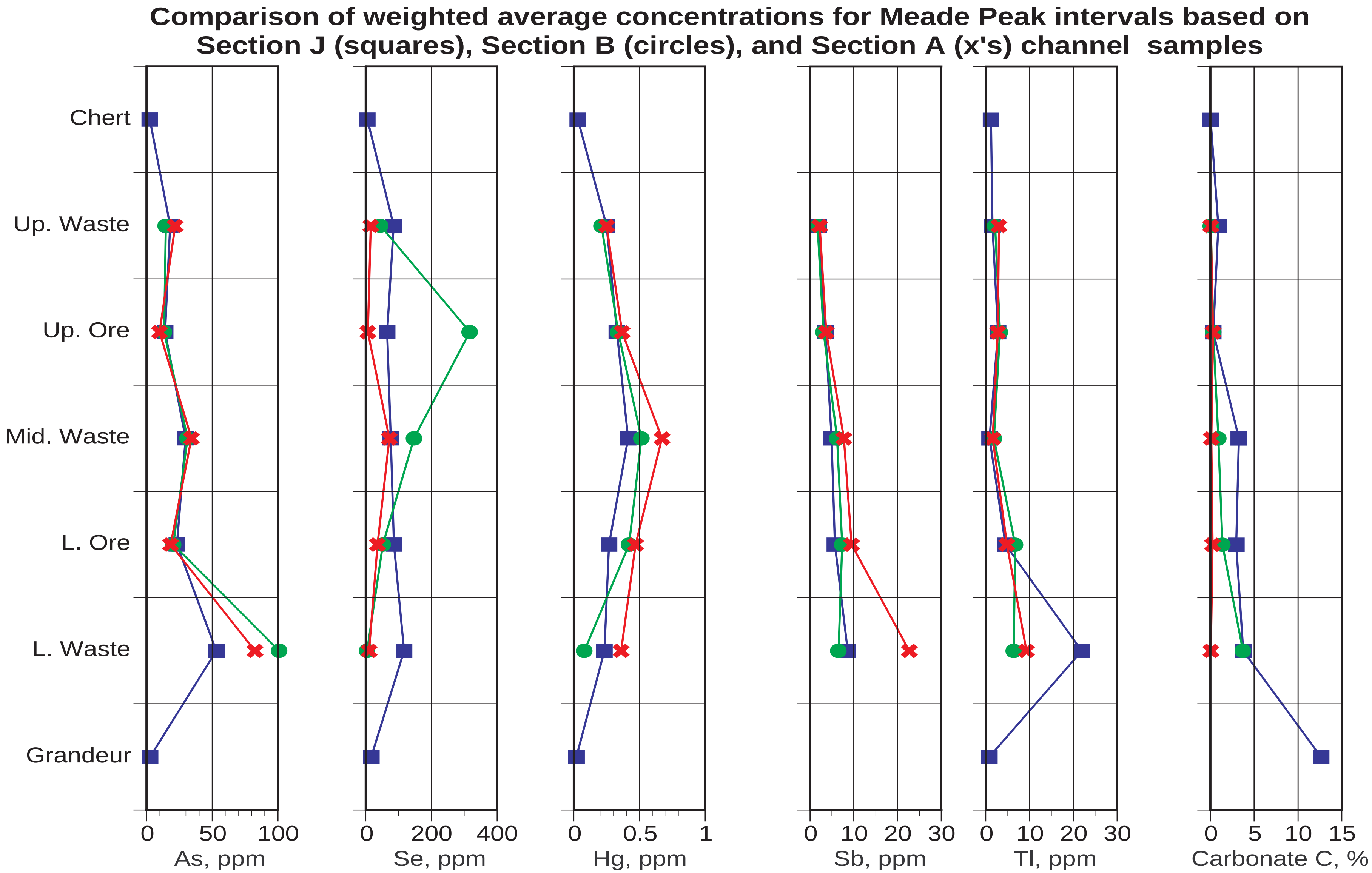
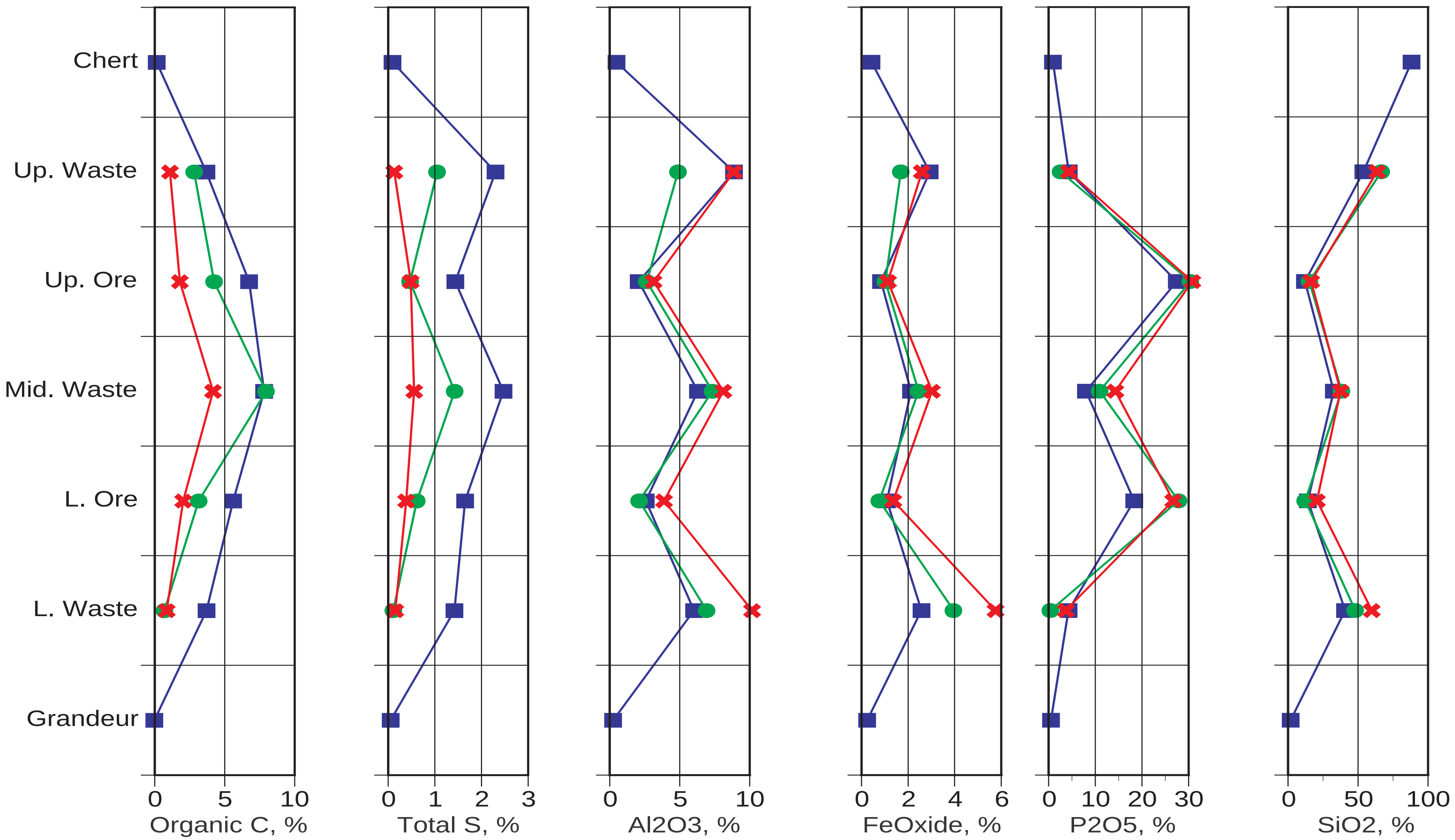
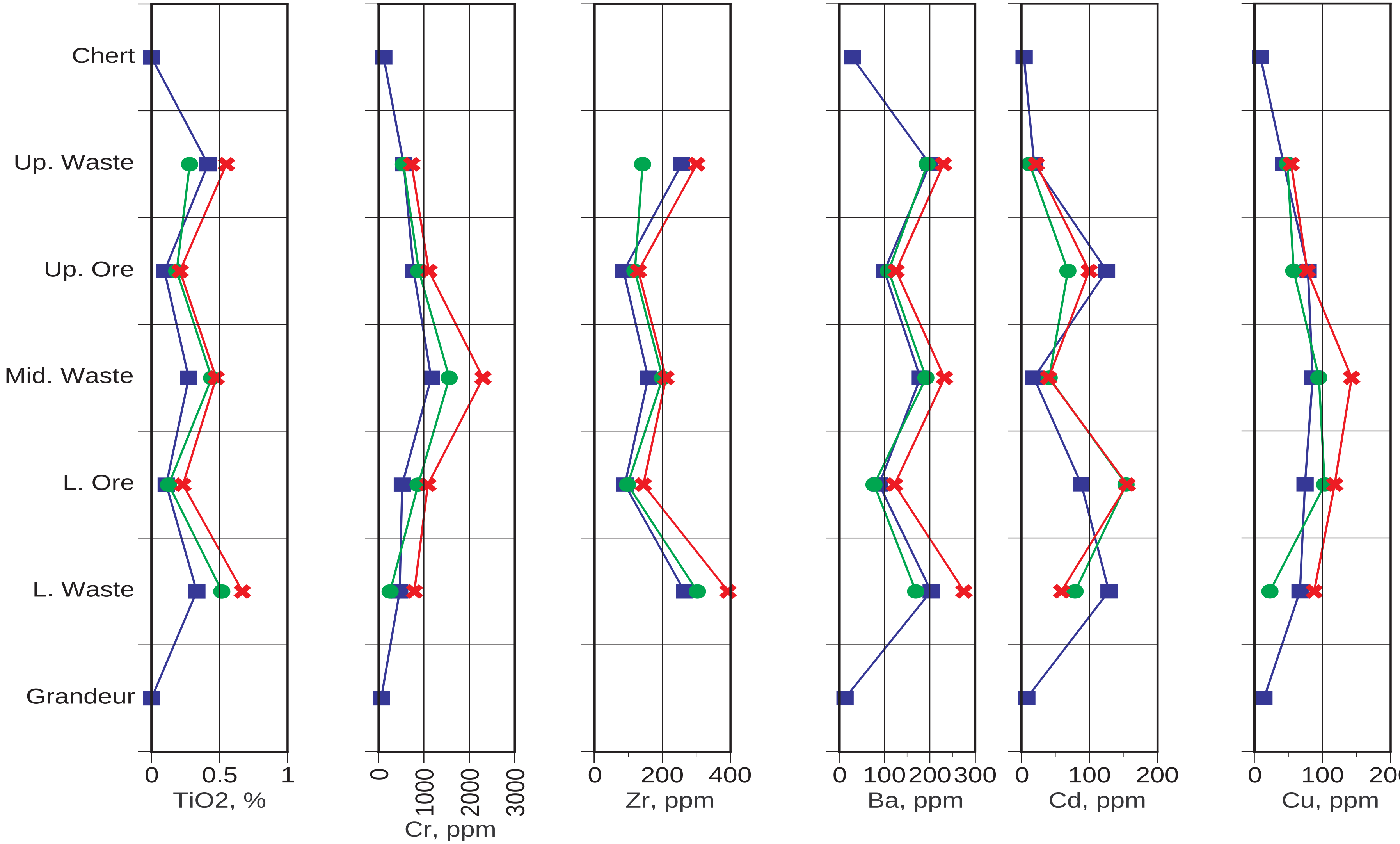


Figure 5; Page 36

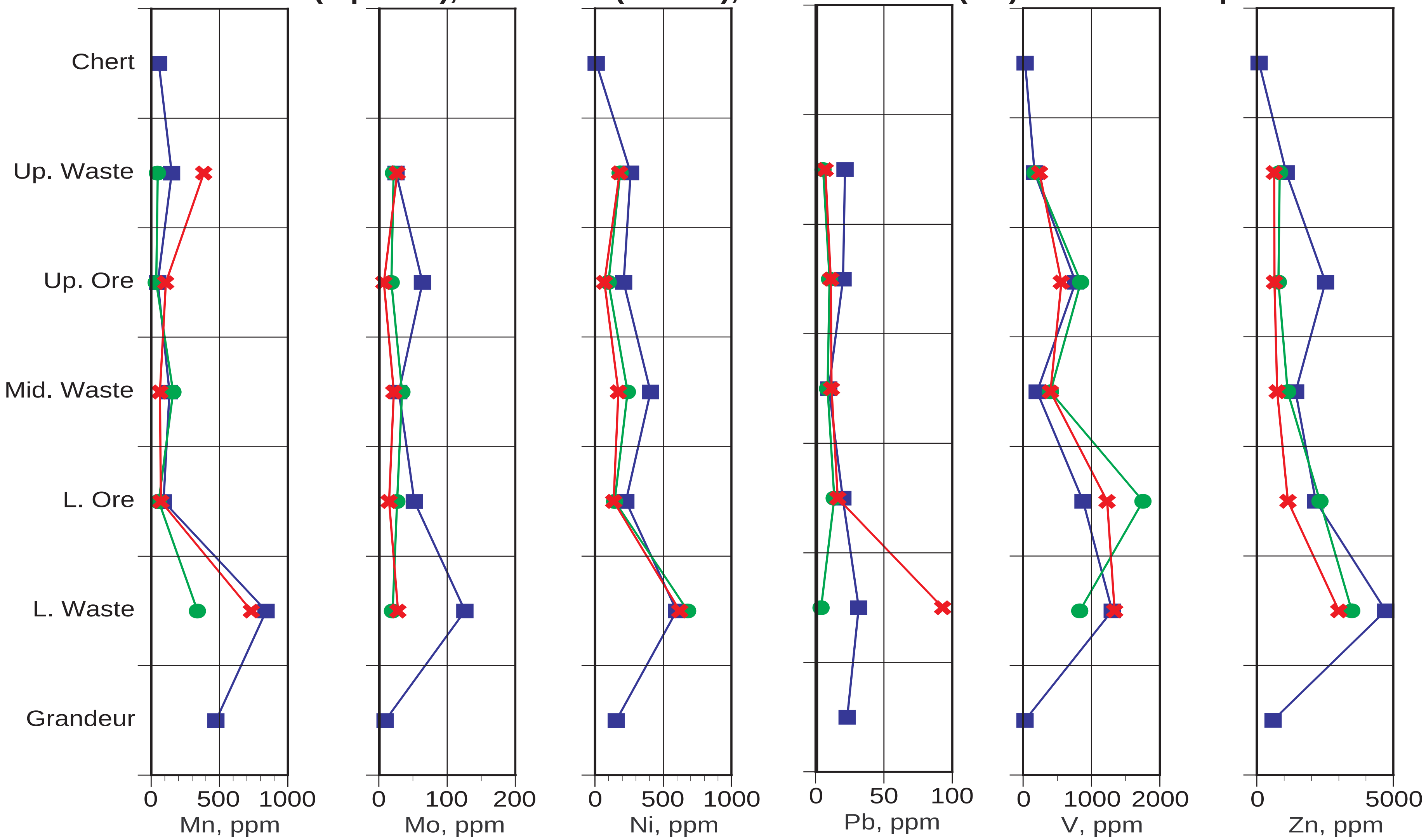
Comparison of weighted average concentrations for Meade Peak intervals based on Section J (squares), Section B (circles), and Section A (x's) channel samples

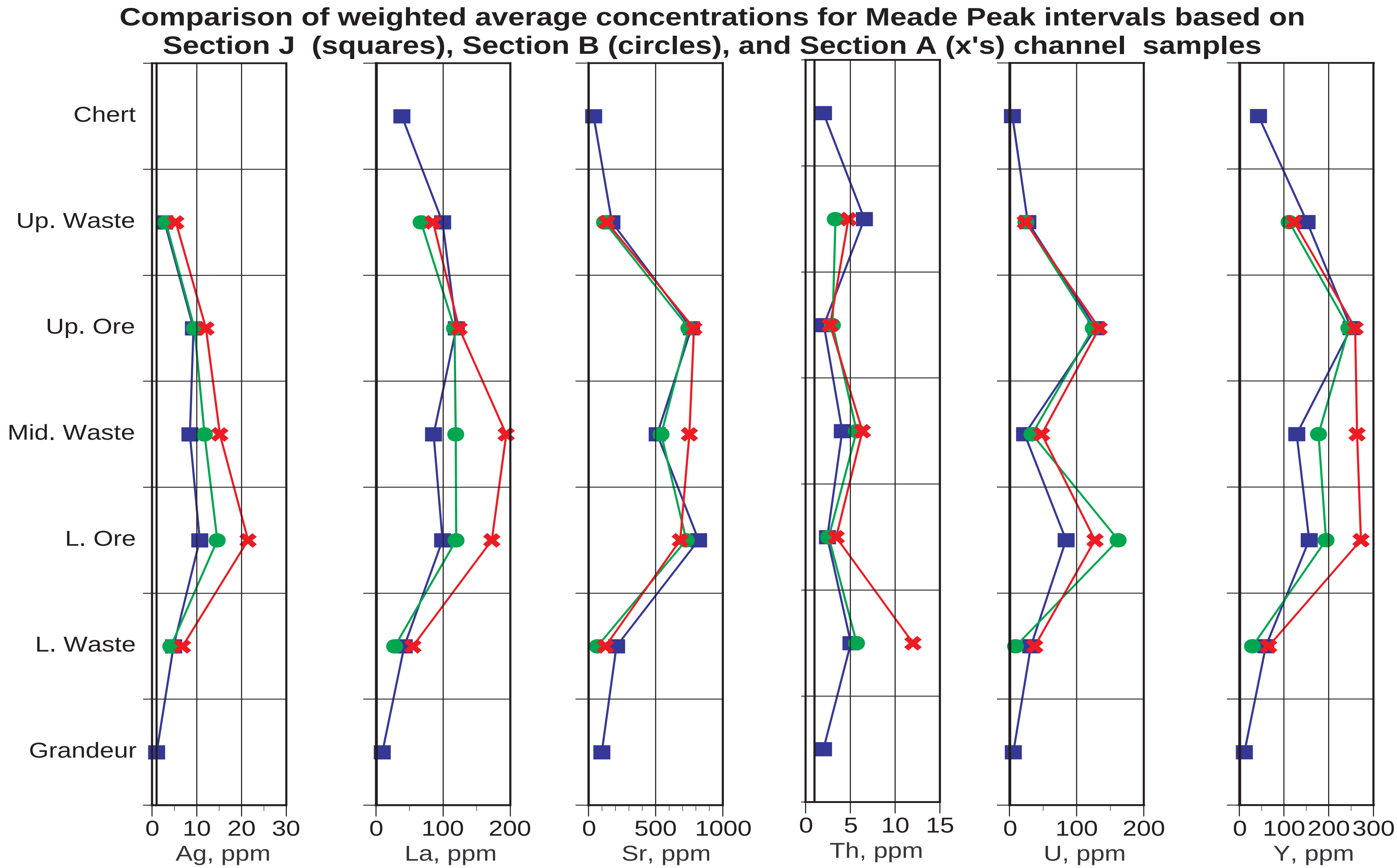


Comparison of weighted average concentrations for Meade Peak intervals based on Section J (squares), Section B (circles), and Section A (x's) channel samples



Comparison of weighted average concentrations for Meade Peak intervals based on Section J (squares), Section B (circles), and Section A (x's) channel samples




Comparison of weighted average concentrations for Meade Peak intervals based on
Section J (squares), Section B (circles), and Section A (x's) channel samples
Chert
Up. Waste
Up. Ore
Mid. Waste
L. Ore
L. Waste
Grandeur
0 10 20 30
Ag, ppm
0 100 200
La, ppm
0 500 1000
Sr, ppm
0 5 10 15
Th, ppm
0 100 200
U, ppm
0 100 200 300
Y, ppm

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Lab No.	Comments	Interval base, true ft above base of Fish-scale Bed	Interval top, true ft above base of Fish-scale Bed	True Thickness, ft	Interval midpoint, ft	Monsanto Core down-hole depth, interval base, ft	Monsanto Core down-hole depth, interval top, ft	Monsanto Core, interval apparent thickness, ft	Monsanto sample number	As, ppm, hydride	Hg, ppm, CVAA	Sb, ppm, hydride	Se, ppm, hydride	Tl, ppm, fusion-AA
wpsJ-05C			Grandeur Tongue	C-166364		-6.7	0.0	6.7	-3.35	-500.0	-493.0	7.0		2.7	0.02	<0.6	16.9	0.8
wpsJ-03C		dolostone	Grandeur Tongue	C-166410	sub-interval of sample wpsJ-05C	-4.4	-2.2	2.2	-3.30					2.7	0.03	<0.6	0.6	1.3
wpsJ-01C			Grandeur Tongue	C-166409	sub-interval of sample wpsJ-05C	-2.2	0.0	2.2	-1.10	-493.0	-489.5	3.5		4.1	<0.02	<0.6	0.7	1.0
wpsJ0.5C		phosphorite	Fish-scale bed	C-166417		0.0	0.5	0.5	0.25	-489.5	-488.7	0.8		25.6	0.14	8.8	5.7	54.8
wpsJ002C		dolostone, weathered	Footwall siltstone	C-166413		0.5	2.2	1.7	1.35	-488.7	-486.0	2.7		124.0	0.22	11.6	12.9	12.1
wpsJ003C		dolostone	Footwall siltstone	C-166386		2.2	4.8	2.6	3.50	-486.0	-482.0	4.0		32.4	0.05	3.3	2.3	2.2
wpsJ006C		siltstone	Footwall siltstone	C-166403		4.8	8.4	3.6	6.60	-482.0	-476.0	6.0	5273	34.8	0.37	11.1	248.0	40.8
wpsJ008C		phosphorite	A Bed Ore	C-166370		8.4	10.5	2.1	9.45	-476.0	-473.0	3.0	5276	15.0	0.48	6.4	125.0	11.5
wpsJ011C		mudstone	Cap Rock	C-166416		10.5	12.4	1.9	11.45	-473.0	-470.0	3.0	5277	10.0	0.12	1.5	40.1	2.3
wpsJ014C		phosphorite	B Bed Ore	C-166411		12.4	15.6	3.2	14.00	-470.0	-465.0	5.0	5278	23.6	0.43	5.0	67.4	3.5
wpsJ014X		phosphorite	B Bed Ore	C-166389	duplicate of previous sample	12.4	15.6	3.2	14.00					14.5	0.41	4.8	79.5	3.4
wpsJ017C		dolostone	B Bed Ore	C-166414		15.6	17.5	1.9	16.55	-465.0	-462.0	3.0	5279	12.2	0.20	4.2	58.3	2.7
wpsJ018C		phosphorite	B Bed Ore	C-166391		17.5	19.2	1.7	18.35	-462.0	-459.3	2.7	5280	29.2	0.33	9.3	137.0	6.4
wpsJ020C		mudstone	Lower Waste	C-166369		19.2	20.0	0.8	19.60	-459.3	-458.1	1.2	5281	34.6	0.26	11.6	187.0	5.9
wpsJ020X		mudstone	Lower Waste	C-166385	duplicate of previous sample	19.2	20.0	0.8	19.60					35.5	0.27	12.1	165.0	6.4
wpsJ021C		mudstone	Lower Waste	C-166418		20.0	21.4	1.4	20.70	-458.1	-455.9	2.2	5282	18.4	0.19	3.9	46.7	3.2
wpsJ022C		siltstone, calcareous	Lower Waste	C-166412		21.4	23.2	1.8	22.30	-455.9	-453.1	2.8	5283	18.1	0.09	4.7	53.0	2.9
wpsJ022X		siltstone, calcareous	Lower Waste	C-166394	duplicate of previous sample	21.4	23.2	1.8	22.30					18.7	0.09	5.0	41.4	3.2
wpsJ023C		phosphorite	B Bed Ore	C-166383		23.2	23.8	0.6	23.50	-453.1	-452.2	0.9	5284	27.2	0.31	10.3	160.0	16.6
wpsJ025C		siltstone, calcareous	Lower Waste	C-166395		23.8	26.5			-452.2	-448.0	4.2	5285, 5286	14.1	0.06	3.7	41.7	2.2
wpsJ031C		phosphorite	B Bed Ore	C-166420		26.5	33.1			-448.0	-437.7	10.3	5286, 5287	26.0	0.21	6.2	85.2	5.9
wpsJ034C		siltstone, calcareous	False Cap	C-166398		33.1	34.2	1.1	33.65	-437.7	-436.0	1.7	5288	43.9	0.29	10.7	150.0	11.9
wpsJ035C		phosphorite	C Bed Ore	C-166366		34.2	36.8	2.6	35.50	-436.0	-432.0	4.0	5289	27.6	0.39	7.6	121.0	7.0
wpsJ037C		phosphorite	C Bed Ore	C-166399		36.8	38.1	1.3	37.45	-432.0	-430.0	2.0	5290	15.2	0.19	3.2	72.6	2.1
wpsJ040C		phosphorite	C Bed Ore	C-166382		38.1	43.9	5.8	41.00	-430.0	-421.0	9.0	5291	24.1	0.25	4.1	60.6	2.1
wpsJ045C		phosphorite	C Bed Ore	C-166402	Hot Streak	43.9	46.5	2.6	45.20	-421.0	-417.0	4.0	5292	27.2	0.35	5.7	113.0	1.9
wpsJ047C		phosphorite	C Bed Ore	C-154211	Hot Streak	46.5	47.1	0.6	46.80	-417.0	-416.0	1.0	5293	53.0	0.63	12.2	193.0	2.2
wpsJ048C		siltstone	C Bed Ore	C-154223	Hot Streak	47.1	48.4	1.3	47.75	-416.0	-414.0	2.0	5294	33.1	0.39	6.9	100.0	1.5
wpsJ050C	Middle Waste	mudstone		C-154239		48.4	51.0	2.6	49.70	-414.0	-410.0	4.0		55.3	0.71	12.2	138.0	0.7
wpsJ052C	Middle Waste	mudstone		C-154217		51.0	53.1	2.1	52.05	-410.0	-406.8	3.2		43.0	0.58	8.1	98.4	0.5
wpsJ054C	Middle Waste	mudstone		C-154231		53.1	54.9	1.8	54.00	-406.8	-404.0	2.8		12.4	0.15	1.3	29.7	<0.1
wpsJ057C	Middle Waste	mudstone		C-154228		54.9	58.1	3.2	56.50	-404.0	-399.0	5.0		34.8	0.58	5.2	141.0	0.3
wpsJ059C	Middle Waste	mudstone		C-154225		58.1	60.0	1.9	59.05	-399.0	-396.0	3.0		25.3	0.40	5.6	90.3	0.2
wpsJ061C	Middle Waste	mudstone		C-154209		60.0	63.2	3.2	61.60	-396.0	-391.0	5.0		35.0	0.57	8.1	108.0	0.5
wpsJ063C	Middle Waste	mudstone		C-154243		63.2	63.7	0.5	63.45	-391.0	-388.0	3.0		17.2	0.31	3.7	53.5	0.4
wpsJ065C	Middle Waste	mudstone		C-154224		63.7	66.1	2.4	64.90	-388.0	-384.7	3.3		36.5	0.57	6.5	83.6	0.6
wpsJ067C	Middle Waste	siltstone		C-154220		66.1	67.3	1.2	66.70	-384.7	-379.0	5.7		19.2	0.26	2.9	47.3	0.3
wpsJ070C	Middle Waste	mudstone		C-154207		67.3	76.0	8.7	71.65	-379.0	-371.0	8.0		35.8	0.41	6.4	95.8	0.9
wpsJ079C	Middle Waste	dolostone		C-154230		76.0	81.7	5.7	78.85	-371.0	-363.0	8.0		11.8	0.16	2.0	35.4	0.1
wpsJ079X	Middle Waste	dolostone		C-154237	duplicate of previous sample	76.0	81.7	5.7	78.85					14.7	0.15	2.5	36.4	0.1
wpsJ083C	Middle Waste	dolostone		C-154219		81.7	83.7	2.0	82.70	-362.0	-359.0			40.0	0.50	7.9	146.0	0.7
wpsJ084C	Middle Waste	carbon seam		C-154226		83.7	84.3	0.6	84.00	-359.0	-357.6	1.4		44.5	0.59	10.0	185.0	0.7
wpsJ086C	Middle Waste	dolostone		C-154215		84.3	88.8	4.5	86.55	-357.6	-349.0	8.6		5.2	0.04	0.6	9.7	<0.1
wpsJ091C	Middle Waste	mudstone		C-154241		88.8	91.6	2.8	90.20	-349.0	-346.6	2.4		25.6	0.27	4.9	78.8	0.4
wpsJ092C	Middle Waste	mudstone		C-154246		91.6	93.9	2.3	92.75	-346.6	-343.0	3.6		34.2	0.44	5.6	87.7	0.4
wpsJ095C	Middle Waste	mudstone		C-154234		93.9	96.9	3.0	95.40	-343.0	-338.3	4.7		22.0	0.33	5.7	92.6	0.4
wpsJ098C	Middle Waste	dolostone		C-154229		96.9	99.7	2.8	98.30	-338.3	-334.0	4.3		11.5	0.10	1.9	25.5	0.2
wpsJ102C	Middle Waste	mudstone		C-154212		99.7	105.0	5.3	102.35	-334.0	-325.8	8.2		47.6	0.49	9.6	130.0	0.9
wpsJ106C	Middle Waste	mudstone		C-154233		105.0	107.5	2.5	106.25	-325.8	-319.0	6.8		30.9	0.41	4.8	92.1	1.2
wpsJ111C	Middle Waste	phosphorite		C-154244		107.5	113.3	5.8	110.40	-319.0	-314.0	5.0		35.6	0.42	5.5	78.9	1.8

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	C, %, combustion	CO2, %, acidification	Carbonate C, %, acidification	Organic C, %, difference	S, %, combustion	Al, %, ICP-16	AlOx, %, ICP-16	Ca, %, ICP 16	CaOx, %, ICP-16	Fe, %, ICP 16	FeOx, %, ICP-16	K, %, ICP-16	KOx, %, ICP-16	Mg, %, ICP-16	MgOx, %, ICP-16	Na, %, ICP 16	NaOx, %, ICP-16	P, %, ICP-16	POx, %, ICP-16
wpsJ-05C			Grandeur Tongue	12.60	46.30	12.64	-0.04	0.05	0.12	0.23	19.0	26.6	0.17	0.24	0.04	0.05	11.80	19.56	0.06	0.08	0.2	0.5
wpsJ-03C		dolostone	Grandeur Tongue	12.80	46.30	12.64	0.16	<0.05	0.08	0.15	18.1	25.3	0.04	0.06	0.03	0.04	11.50	19.07	0.05	0.07	0.2	0.4
wpsJ-01C			Grandeur Tongue	12.70	46.20	12.61	0.09	<0.05	0.09	0.17	17.8	24.9	0.04	0.06	0.03	0.04	11.30	18.74	0.05	0.07	0.2	0.4
wpsJ0.5C		phosphorite	Fish-scale bed	1.02	1.65	0.45	0.57	0.76	0.57	1.08	30.6	42.8	0.25	0.36	0.28	0.34	0.16	0.27	0.47	0.63	13.8	31.6
wpsJ002C		dolostone, weathered	Footwall siltstone	2.59	7.10	1.94	0.65	0.11	5	9.45	4.1	5.7	3.45	4.93	2.31	2.78	2.16	3.58	0.12	0.16	0.3	0.7
wpsJ003C		dolostone	Footwall siltstone	8.78	29.70	8.11	0.67	0.08	2.06	3.89	13.6	19.0	1.04	1.49	0.98	1.18	7.31	12.12	0.18	0.24	0.1	0.2
wpsJ006C		siltstone	Footwall siltstone	8.76	5.30	1.45	7.31	3.00	3.14	5.93	11.5	16.1	1.57	2.25	1.60	1.93	1.06	1.76	0.29	0.39	3.9	8.9
wpsJ008C		phosphorite	A Bed Ore	6.33	2.08	0.57	5.76	1.88	0.53	1.00	28.3	39.6	0.30	0.43	0.28	0.34	0.18	0.30	0.57	0.77	12.5	28.6
wpsJ011C		mudstone	Cap Rock	9.87	27.50	7.51	2.36	0.83	0.61	1.15	22.5	31.5	0.35	0.50	0.30	0.36	6.23	10.33	0.20	0.27	4.6	10.5
wpsJ014C		phosphorite	B Bed Ore	7.30	6.85	1.87	5.43	1.58	1.18	2.23	25.0	35.0	0.51	0.73	0.62	0.75	1.50	2.49	0.36	0.49	10.2	23.4
wpsJ014X		phosphorite	B Bed Ore	7.27	6.69	1.83	5.44	1.61	1.18	2.23	25.0	35.0	0.46	0.66	0.62	0.75	1.41	2.34	0.36	0.49	10.1	23.1
wpsJ017C		dolostone	B Bed Ore	11.50	29.90	8.16	3.34	0.81	1.26	2.38	18.9	26.4	0.36	0.51	0.81	0.98	6.10	10.11	0.21	0.28	3.0	7.0
wpsJ018C		phosphorite	B Bed Ore	8.71	3.66	1.00	7.71	2.17	1.63	3.08	22.7	31.8	0.81	1.16	1.08	1.30	0.68	1.13	0.32	0.43	9.8	22.4
wpsJ020C		mudstone	Lower Waste	7.94	4.02	1.10	6.84	2.20	2.42	4.57	17.7	24.8	1.02	1.46	1.53	1.84	0.75	1.24	0.47	0.63	7.5	17.1
wpsJ020X		mudstone	Lower Waste	8.10	4.10	1.12	6.98	2.18	2.52	4.76	18.5	25.9	0.98	1.40	1.55	1.87	0.70	1.16	0.47	0.63	7.9	18.0
wpsJ021C		mudstone	Lower Waste	5.26	5.29	1.44	3.82	1.07	3.56	6.72	16.3	22.8	3.95	5.65	0.99	1.19	1.03	1.71	0.45	0.61	6.3	14.4
wpsJ022C		siltstone, calcareous	Lower Waste	10.90	32.50	8.87	2.03	0.99	1.62	3.06	16.2	22.7	0.66	0.94	0.93	1.12	7.05	11.69	0.56	0.75	0.9	2.0
wpsJ022X		siltstone, calcareous	Lower Waste	10.90	32.40	8.84	2.06	0.95	1.64	3.10	16.3	22.8	0.67	0.96	0.89	1.07	7.17	11.89	0.55	0.74	0.9	2.1
wpsJ023C		phosphorite	B Bed Ore	8.22	1.90	0.52	7.70	2.27	1.45	2.74	21.1	29.5	0.81	1.16	0.92	1.11	0.33	0.55	0.26	0.35	10.0	22.9
wpsJ025C		siltstone, calcareous	Lower Waste	11.30	35.80	9.77	1.53	0.76	1.38	2.61	19.3	27.0	0.56	0.80	0.81	0.98	7.73	12.82	0.49	0.66	0.6	1.3
wpsJ031C		phosphorite	B Bed Ore	6.56	2.13	0.58	5.98	2.02	1.55	2.93	21.2	29.7	0.75	1.07	0.90	1.08	0.29	0.48	0.40	0.54	9.3	21.4
wpsJ034C		siltstone, calcareous	False Cap	7.71	6.16	1.68	6.03	2.74	3.51	6.63	9.7	13.6	1.51	2.16	1.86	2.24	1.09	1.81	0.84	1.13	3.1	7.0
wpsJ035C		phosphorite	C Bed Ore	10.30	3.54	0.97	9.33	2.54	1.58	2.98	20.9	29.2	0.81	1.16	0.92	1.11	0.40	0.66	0.36	0.49	8.8	20.3
wpsJ037C		phosphorite	C Bed Ore	11.00	21.30	5.81	5.19	1.10	0.95	1.79	21.0	29.4	0.72	1.03	0.52	0.63	4.28	7.10	0.29	0.39	5.8	13.2
wpsJ040C		phosphorite	C Bed Ore	7.55	4.91	1.34	6.21	1.47	0.4	0.76	31.1	43.5	0.48	0.69	0.21	0.25	0.04	0.07	0.28	0.38	11.7	26.8
wpsJ045C		phosphorite	C Bed Ore	8.94	6.87	1.88	7.06	1.66	1.2	2.27	24.9	34.8	0.63	0.90	0.68	0.82	1.24	2.06	0.37	0.50	10.0	22.8
wpsJ047C		phosphorite	C Bed Ore	10.60	3.43	0.94	9.66	3.04	2.47	4.67	21.7	30.4	1.46	2.09	1.18	1.42	0.49	0.81	0.47	0.63	9.9	22.7
wpsJ048C		siltstone	C Bed Ore	11.30	14.50	3.96	7.34	1.95	1.64	3.10	22.5	31.5	0.94	1.34	0.77	0.93	2.97	4.92	0.40	0.54	8.4	19.3
wpsJ050C	Middle Waste	mudstone		13.10	9.89	2.70	10.40	3.03	3.6	6.80	17.0	23.8	1.58	2.26	1.60	1.93	0.82	1.36	0.52	0.70	4.7	10.7
wpsJ052C	Middle Waste	mudstone		11.20	12.50	3.41	7.79	2.69	3.93	7.42	13.2	18.5	1.65	2.36	1.51	1.82	2.36	3.91	0.82	1.11	2.9	6.6
wpsJ054C	Middle Waste	mudstone		12.00	34.70	9.47	2.53	0.94	1.64	3.10	18.4	25.7	0.65	0.93	0.49	0.59	7.96	13.20	0.63	0.85	0.3	0.7
wpsJ057C	Middle Waste	mudstone		15.70	11.60	3.17	12.53	3.24	3.74	7.06	15.6	21.8	1.51	2.16	1.42	1.71	1.07	1.77	0.44	0.59	3.5	8.0
wpsJ059C	Middle Waste	mudstone		16.10	23.40	6.39	9.71	2.08	2.14	4.04	23.0	32.2	0.98	1.40	0.91	1.10	1.21	2.01	0.21	0.28	2.2	4.9
wpsJ061C	Middle Waste	mudstone		14.60	17.30	4.72	9.88	2.60	3.09	5.84	18.6	26.0	1.32	1.89	1.30	1.57	1.07	1.77	0.27	0.36	2.5	5.6
wpsJ063C	Middle Waste	mudstone		13.40	28.70	7.83	5.57	1.38	1.75	3.31	24.9	34.8	0.76	1.09	0.72	0.87	1.49	2.47	0.16	0.22	1.9	4.3
wpsJ065C	Middle Waste	mudstone		10.90	9.82	2.68	8.22	2.81	3.66	6.91	15.3	21.4	1.68	2.40	1.50	1.81	0.98	1.62	0.57	0.77	4.0	9.1
wpsJ067C	Middle Waste	siltstone		10.70	17.90	4.89	5.81	2.01	2.44	4.61	20.6	28.8	1.21	1.73	1.01	1.22	2.33	3.86	0.48	0.65	4.1	9.4
wpsJ070C	Middle Waste	mudstone		9.37	5.03	1.37	8.00	3.02	4.87	9.20	7.0	9.8	1.95	2.79	1.88	2.27	0.88	1.46	0.88	1.19	2.0	4.5
wpsJ079C	Middle Waste	dolostone		13.50	34.20	9.33	4.17	1.08	1.65	3.12	20.3	28.4	0.66	0.94	0.71	0.86	8.20	13.60	0.14	0.19	1.0	2.2
wpsJ079X	Middle Waste	dolostone		13.10	34.50	9.42	3.68	1.05	1.72	3.25	20.4	28.5	0.72	1.03	0.75	0.90	8.64	14.33	0.14	0.19	1.0	2.2
wpsJ083C	Middle Waste	dolostone		14.30	7.19	1.96	12.34	3.46	3.58	6.76	15.3	21.4	1.80	2.57	1.56	1.88	0.85	1.41	0.35	0.47	5.1	11.6
wpsJ084C	Middle Waste	carbon seam		17.40	6.72	1.83	15.57	3.99	2.81	5.31	17.2	24.1	1.90	2.72	1.13	1.36	0.66	1.09	0.24	0.32	6.0	13.7
wpsJ086C	Middle Waste	dolostone		13.20	43.30	11.82	1.38	0.36	0.71	1.34	22.8	31.9	0.26	0.37	0.31	0.37	10.00	16.58	0.06	0.08	0.1	0.2
wpsJ091C	Middle Waste	mudstone		12.40	26.60	7.26	5.14	1.69	2.56	4.84	16.3	22.8	1.08	1.54	1.08	1.30	5.89	9.77	0.24	0.32	1.4	3.1
wpsJ092C	Middle Waste	mudstone		11.40	17.20	4.69	6.71	2.41	3.46	6.54	16.5	23.1	1.50	2.15	1.54	1.86	3.48	5.77	0.29	0.39	3.2	7.2
wpsJ095C	Middle Waste	mudstone		12.70	19.70	5.38	7.32	2.16	2.47	4.67	20.7	29.0	1.16	1.66	1.05	1.27	2.51	4.16	0.31	0.42	3.6	8.2
wpsJ098C	Middle Waste	dolostone		12.80	38.40	10.48	2.32	0.79	1.37	2.59	22.0	30.8	0.58	0.83	0.60	0.72	8.02	13.30	0.14	0.19	0.2	0.3
wpsJ102C	Middle Waste	mudstone		12.00	7.60	2.07	9.93	3.20	4.09	7.73	13.6	19.0	1.89	2.70	1.76	2.12	0.89	1.48	0.38	0.51	4.0	9.1
wpsJ106C	Middle Waste	mudstone		10.30	5.63	1.54	8.76	3.16	3.86	7.29	11.7	16.4	1.86	2.66	1.61	1.94	0.75	1.24	0.63	0.85	3.6	8.3
wpsJ111C	Middle Waste	phosphorite		9.68	3.72	1.02	8.66	3.10	4.23	7.99	8.1	11.4	1.90	2.72	1.66	2.00	0.94	1.56	0.67	0.90	2.7	6.3

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Apatite (CFA), %, XRD	Si, %, ICP-16	SiOx, %, ICP-16	Ti, %, ICP-16	TiOx, %, ICP-16	Sum Oxides, %	Ba, ppm, ICP-16	Cr, ppm, ICP-16	Mn, ppm, ICP-16	Sr, ppm, ICP-16	Y, ppm, ICP-16	Zr, ppm, ICP-16	Al, %, ICP-40	Ca, %, ICP 40	Fe, %, ICP 40	K, %, ICP-40	Mg, %, ICP-40	Na, %, ICP 40	P, %, ICP-40	Ti, %, ICP-40
wpsJ-05C			Grandeur Tongue	1	0.8	1.8	<0.01		49.0	16	59	427	106	10	<10	0.1	18.7	0.20	0.04	11.50	0.05	0.22	0.01
wpsJ-03C		dolostone	Grandeur Tongue	0.1	0.8	1.7	<0.01		46.7	16	30	555	86	<10	<10	0.1	19.3	0.03	0.03	12.10	0.05	0.17	0.01
wpsJ-01C			Grandeur Tongue	1	0.8	1.6	<0.01		46.1	15	33	471	95	<10	<10	0.1	19.3	0.04	0.03	12.40	0.05	0.20	0.01
wpsJ0.5C		phosphorite	Fish-scale bed	83	3.3	7.1	0.04	0.05	84.3	965	302	14190	760	301	63	0.6	29.0	0.21	0.28	0.15	0.51	14.10	0.02
wpsJ002C		dolostone, weathered	Footwall siltstone	1	28.4	60.7	0.38	0.51	88.5	452	436	3270	81	34	358	4.8	3.9	3.18	2.10	1.99	0.11	0.27	0.26
wpsJ003C		dolostone	Footwall siltstone	0	13.1	28.0	0.17	0.23	66.4	109	112	281	102	18	180	2.2	13.2	1.03	1.06	7.10	0.19	0.07	0.13
wpsJ006C		siltstone	Footwall siltstone	25	18.8	40.2	0.24	0.32	77.8	177	730	103	362	95	282	3.1	10.7	1.52	1.60	0.99	0.31	3.80	0.15
wpsJ008C		phosphorite	A Bed Ore	86	2.7	5.8	0.03	0.04	76.9	61	659	<100	1030	186	77	0.5	27.6	0.28	0.29	0.17	0.58	12.80	0.03
wpsJ011C		mudstone	Cap Rock	29	4.0	8.6	0.04	0.05	63.3	31	245	102	434	136	67	0.6	21.1	0.34	0.29	6.01	0.22	4.63	0.02
wpsJ014C		phosphorite	B Bed Ore	65	6.2	13.3	0.07	0.09	78.4	80	835	<100	767	186	97	1.3	24.3	0.49	0.68	1.45	0.39	10.30	0.04
wpsJ014X		phosphorite	B Bed Ore		6.2	13.2	0.07	0.09	77.8	81	830	<100	779	172	89	1.1	23.1	0.44	0.59	1.36	0.35	9.26	0.04
wpsJ017C		dolostone	B Bed Ore	15	4.4	9.5	0.04	0.05	57.2	43	355	115	410	68	47	1.2	17.5	0.35	0.77	6.02	0.21	2.85	0.03
wpsJ018C		phosphorite	B Bed Ore	60	7.9	16.9	0.10	0.13	78.3	108	750	<100	759	150	108	1.7	21.9	0.79	1.09	0.63	0.33	9.69	0.05
wpsJ020C		mudstone	Lower Waste	49	12.1	25.9	0.15	0.20	77.7	141	715	<100	589	129	140	2.6	18.6	1.05	1.61	0.78	0.49	7.79	0.06
wpsJ020X		mudstone	Lower Waste		12.9	27.6	0.16	0.22	81.5	144	735	<100	598	129	139	2.4	16.6	0.92	1.47	0.71	0.44	7.22	0.07
wpsJ021C		mudstone	Lower Waste	38	13.3	28.4	0.08	0.11	81.7	251	351	599	595	95	150	3.6	14.9	3.84	0.96	0.94	0.45	5.81	0.06
wpsJ022C		siltstone, calcareous	Lower Waste	5	8.1	17.3	0.10	0.13	59.6	50	126	150	188	22	82	1.7	16.7	0.71	0.97	7.23	0.56	0.94	0.06
wpsJ022X		siltstone, calcareous	Lower Waste		8.1	17.4	0.11	0.15	60.2	52	129	144	194	23	82	1.7	16.1	0.69	0.98	7.26	0.56	0.90	0.07
wpsJ023C		phosphorite	B Bed Ore	69	8.3	17.8	0.10	0.13	76.2	106	661	<100	709	109	116	1.4	21.0	0.75	0.85	0.32	0.25	9.82	0.05
wpsJ025C		siltstone, calcareous	Lower Waste	1	6.6	14.1	0.09	0.12	60.3	35	88	159	205	13	59	1.4	19.3	0.57	0.83	7.79	0.50	0.58	0.05
wpsJ031C		phosphorite	B Bed Ore	63	8.2	17.4	0.11	0.15	74.7	122	423	<100	769	96	123	1.7	21.6	0.79	0.98	0.30	0.41	10.20	0.05
wpsJ034C		siltstone, calcareous	False Cap	18	21.1	45.1	0.28	0.38	80.1	204	395	129	351	66	240	3.3	9.0	1.47	1.83	1.07	0.82	3.03	0.14
wpsJ035C		phosphorite	C Bed Ore	54	8.3	17.8	0.11	0.15	73.8	124	763	<100	760	201	143	1.7	21.3	0.81	0.96	0.39	0.38	9.44	0.05
wpsJ037C		phosphorite	C Bed Ore	34	4.6	9.8	0.05	0.07	63.4	83	421	<100	699	217	59	0.9	19.5	0.69	0.50	4.21	0.28	5.45	0.04
wpsJ040C		phosphorite	C Bed Ore	78	2.1	4.6	0.02	0.03	77.1	50	251	<100	1950	242	40	0.4	30.7	0.44	0.23	0.05	0.29	11.90	0.01
wpsJ045C		phosphorite	C Bed Ore	60	4.7	10.1	0.07	0.09	74.4	109	979	<100	1100	309	71	1.3	24.3	0.64	0.67	1.24	0.40	10.60	0.04
wpsJ047C		phosphorite	C Bed Ore	58	8.7	18.5	0.12	0.16	81.3	128	2090	<100	931	235	68	2.6	20.1	1.47	1.21	0.51	0.50	9.41	0.08
wpsJ048C		siltstone	C Bed Ore	46	6.0	12.9	0.08	0.11	74.6	97	1100	100	849	168	52	1.8	21.6	0.93	0.80	3.17	0.43	7.80	0.04
wpsJ050C	Middle Waste	mudstone		26	12.9	27.6	0.18	0.24	75.4	189	2000	<100	642	147	99	3.9	16.3	1.64	1.63	0.83	0.56	4.30	0.12
wpsJ052C	Middle Waste	mudstone		15	16.0	34.2	0.22	0.30	76.3	199	1220	149	455	113	149	4.1	12.8	1.80	1.59	2.51	0.88	2.85	0.13
wpsJ054C	Middle Waste	mudstone		3	7.8	16.6	0.11	0.15	61.8	39	159	263	219	17	95	1.7	17.5	0.68	0.53	8.36	0.66	0.28	0.06
wpsJ057C	Middle Waste	mudstone		28	12.7	27.2	0.18	0.24	70.6	199	1710	113	810	163	114	3.8	15.4	1.65	1.53	1.15	0.49	3.44	0.14
wpsJ059C	Middle Waste	mudstone		10	7.8	16.6	0.11	0.15	62.7	122	1570	<100	1110	106	54	2.3	21.3	1.03	0.96	1.28	0.23	2.05	0.08
wpsJ061C	Middle Waste	mudstone		14	11.6	24.8	0.16	0.22	68.1	163	2150	108	1000	129	76	3.4	17.4	1.41	1.39	1.12	0.30	2.37	0.12
wpsJ063C	Middle Waste	mudstone		11	6.2	13.2	0.09	0.12	60.3	90	894	<100	980	79	41	1.8	22.8	0.73	0.73	1.46	0.17	1.75	0.06
wpsJ065C	Middle Waste	mudstone		20	15.7	33.6	0.22	0.30	77.9	213	1610	141	962	176	136	3.9	14.6	1.75	1.55	1.01	0.61	3.68	0.11
wpsJ067C	Middle Waste	siltstone		17	11.0	23.5	0.15	0.20	74.0	146	1090	187	748	106	114	2.7	18.9	1.27	1.06	2.47	0.52	3.82	0.11
wpsJ070C	Middle Waste	mudstone		11	20.7	44.3	0.29	0.39	75.9	259	961	183	357	98	243	5.1	7.5	2.12	1.99	0.94	0.94	2.07	0.21
wpsJ079C	Middle Waste	dolostone		5	5.4	11.5	0.08	0.11	61.0	55	523	172	301	41	37	1.7	18.9	0.72	0.75	8.62	0.15	0.95	0.06
wpsJ079X	Middle Waste	dolostone			5.4	11.6	0.08	0.11	62.2	56	530	174	304	42	47	1.9	20.3	0.76	0.81	9.20	0.16	0.99	0.07
wpsJ083C	Middle Waste	dolostone		33	12.7	27.2	0.19	0.26	73.6	194	1990	121	724	195	109	3.9	14.5	1.88	1.63	0.89	0.38	4.79	0.13
wpsJ084C	Middle Waste	carbon seam		41	10.2	21.8	0.14	0.19	70.5	150	3910	<100	829	288	85	3.1	16.5	2.06	1.21	0.71	0.25	5.81	0.10
wpsJ086C	Middle Waste	dolostone		2	2.3	5.0	0.03	0.04	55.9	16	103	170	250	<10	18	0.7	21.6	0.27	0.33	10.50	0.06	0.09	0.03
wpsJ091C	Middle Waste	mudstone		5	8.4	17.9	0.12	0.16	61.8	106	652	160	341	58	64	2.7	16.4	1.14	1.14	6.16	0.26	1.42	0.10
wpsJ092C	Middle Waste	mudstone		17	12.3	26.3	0.18	0.24	73.6	171	1240	176	516	120	85	3.8	15.3	1.54	1.58	3.71	0.30	2.91	0.12
wpsJ095C	Middle Waste	mudstone		19	9.8	20.9	0.14	0.19	70.5	144	1020	180	718	131	87	2.6	18.8	1.18	1.06	2.61	0.32	3.29	0.08
wpsJ098C	Middle Waste	dolostone		1	4.9	10.4	0.07	0.09	59.3	32	325	301	360	14	30	1.5	20.6	0.59	0.64	8.66	0.15	0.13	0.06
wpsJ102C	Middle Waste	mudstone		26	15.6	33.4	0.22	0.30	76.3	213	1700	156	593	185	126	4.3	12.6	1.93	1.79	0.93	0.40	3.85	0.15
wpsJ106C	Middle Waste	mudstone		19	19.2	41.1	0.26	0.35	80.1	223	1770	148	508	284	225	4.2	11.1	1.93	1.60	0.77	0.65	3.45	0.15
wpsJ111C	Middle Waste	phosphorite		15	22.5	48.1	0.31	0.42	81.3	223	1150	131	330	182	290	4.3	7.6	1.84	1.58	0.90	0.66	2.53	0.17

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Ag, ppm, ICP-40	As, ppm, ICP-40	Ba, ppm, ICP-40	Cd, ppm, ICP-40	Ce, ppm, ICP-40	Co, ppm, ICP-40	Cr, ppm, ICP-40	Cu, ppm, ICP-40	Eu, ppm, ICP-40	Ga, ppm, ICP-40	Ho, ppm, ICP-40	La, ppm, ICP-40	Li, ppm, ICP-40	Mn, ppm, ICP-40	Mo, ppm, ICP-40	Nb, ppm, ICP-40	Nd, ppm, ICP-40	Ni, ppm, ICP-40	Pb, ppm, ICP-40
wpsJ-05C			Grandeur Tongue	<2	<10	13	8	<5	2	49	14	<2	34	<4	6	<2	473	9	<4	25	155	23
wpsJ-03C		dolostone	Grandeur Tongue	<2	<10	17	10	<5	<2	22	13	<2	16	<4	4	<2	549	4	<4	37	104	30
wpsJ-01C			Grandeur Tongue	<2	<10	15	17	<5	<2	26	12	<2	6	<4	5	<2	453	5	<4	39	72	22
wpsJ0.5C		phosphorite	Fish-scale bed	<2	<10	882	80	35	3	277	48	6	<4	5	212	6	14460	32	<4	181	1720	77
wpsJ002C		dolostone, weathered	Footwall siltstone	4	115	416	23	51	20	429	46	<2	16	5	29	25	3240	73	<4	41	1090	49
wpsJ003C		dolostone	Footwall siltstone	<2	28	103	45	31	4	104	20	<2	21	<4	13	10	296	15	<4	40	219	26
wpsJ006C		siltstone	Footwall siltstone	7	24	174	239	50	5	746	111	<2	19	<4	70	31	101	231	<4	66	637	27
wpsJ008C		phosphorite	A Bed Ore	8	<10	58	176	28	<2	673	135	<2	8	<4	134	12	19	51	<4	100	460	20
wpsJ011C		mudstone	Cap Rock	5	<10	29	17	25	<2	254	30	<2	6	<4	106	5	101	10	<4	74	56	12
wpsJ014C		phosphorite	B Bed Ore	11	<10	77	126	33	3	878	95	2	7	<4	159	15	42	36	<4	109	239	20
wpsJ014X		phosphorite	B Bed Ore	12	<10	73	121	33	<2	833	95	3	8	<4	145	14	41	33	<4	90	227	21
wpsJ017C		dolostone	B Bed Ore	6	<10	38	105	10	<2	323	56	<2	7	<4	46	5	111	39	<4	48	210	15
wpsJ018C		phosphorite	B Bed Ore	12	19	101	207	36	2	763	102	<2	12	<4	109	11	54	96	<4	84	343	23
wpsJ020C		mudstone	Lower Waste	17	25	141	107	25	3	777	95	2	13	<4	102	12	73	59	<4	65	266	29
wpsJ020X		mudstone	Lower Waste	15	18	126	96	40	4	670	89	2	11	<4	93	11	66	53	<4	66	244	20
wpsJ021C		mudstone	Lower Waste	5	<10	229	78	50	2	340	64	<2	18	<4	66	11	630	43	10	61	154	67
wpsJ022C		siltstone, calcareous	Lower Waste	4	16	52	30	21	3	128	27	<2	8	<4	19	4	152	17	<4	33	58	14
wpsJ022X		siltstone, calcareous	Lower Waste	2	<10	51	29	14	3	143	26	<2	5	<4	17	3	150	17	<4	46	58	14
wpsJ023C		phosphorite	B Bed Ore	11	<10	92	160	23	3	630	96	<2	8	<4	78	10	34	168	<4	71	539	19
wpsJ025C		siltstone, calcareous	Lower Waste	2	<10	34	19	11	2	76	21	<2	<4	<4	9	3	163	11	<4	36	32	14
wpsJ031C		phosphorite	B Bed Ore	6	18	129	136	37	5	459	65	<2	12	<4	69	8	55	67	<4	72	265	20
wpsJ034C		siltstone, calcareous	False Cap	10	37	171	94	50	5	326	58	<2	14	<4	50	8	125	75	<4	46	177	19
wpsJ035C		phosphorite	C Bed Ore	16	15	122	189	38	4	784	114	3	10	<4	151	14	59	115	<4	107	375	20
wpsJ037C		phosphorite	C Bed Ore	9	<10	70	40	33	2	456	66	3	7	<4	156	6	100	53	<4	121	263	12
wpsJ040C		phosphorite	C Bed Ore	9	<10	46	25	28	2	264	53	4	<4	<4	185	4	20	40	<4	144	111	21
wpsJ045C		phosphorite	C Bed Ore	14	14	106	33	45	2	898	117	5	7	5	247	12	49	52	<4	171	244	19
wpsJ047C		phosphorite	C Bed Ore	12	29	134	9	39	3	1910	187	4	12	<4	175	25	55	62	<4	103	547	11
wpsJ048C		siltstone	C Bed Ore	6	<10	92	5	23	3	892	100	2	<4	<4	123	11	96	28	<4	78	302	8
wpsJ050C	Middle Waste	mudstone		7	22	182	12	34	6	1720	129	3	12	<4	115	24	89	40	5	79	480	10
wpsJ052C	Middle Waste	mudstone		4	<10	205	6	42	4	1110	81	3	10	<4	90	17	149	22	<4	61	289	9
wpsJ054C	Middle Waste	mudstone		<2	<10	38	<2	15	<2	129	22	<2	<4	<4	14	3	268	6	<4	17	37	4
wpsJ057C	Middle Waste	mudstone		8	31	212	40	41	6	1570	114	3	12	<4	118	24	109	72	5	73	473	12
wpsJ059C	Middle Waste	mudstone		5	<10	128	19	23	3	1360	97	<2	7	<4	74	20	76	50	<4	46	340	8
wpsJ061C	Middle Waste	mudstone		5	21	171	7	30	6	2090	113	2	10	<4	96	26	103	26	<4	70	387	8
wpsJ063C	Middle Waste	mudstone		3	<10	82	3	21	<2	741	60	<2	<4	<4	58	11	81	12	<4	50	179	4
wpsJ065C	Middle Waste	mudstone		4	14	211	5	46	6	1470	91	3	12	<4	142	21	135	23	<4	95	323	9
wpsJ067C	Middle Waste	siltstone		<2	<10	154	4	32	2	876	69	2	6	<4	80	14	182	18	<4	59	244	7
wpsJ070C	Middle Waste	mudstone		4	33	270	10	61	7	986	69	2	15	<4	84	19	188	32	8	63	312	12
wpsJ079C	Middle Waste	dolostone		<2	<10	55	4	13	<2	451	37	<2	19	<4	37	9	177	9	<4	37	129	<4
wpsJ079X	Middle Waste	dolostone		2	<10	57	3	14	3	510	40	<2	21	<4	41	10	187	9	<4	36	137	4
wpsJ083C	Middle Waste	dolostone		9	23	199	14	44	5	1680	120	3	13	4	158	31	112	37	<4	96	504	10
wpsJ084C	Middle Waste	carbon seam		9	21	159	12	47	4	3700	251	6	13	5	256	47	86	34	<4	154	957	14
wpsJ086C	Middle Waste	dolostone		<2	<10	13	2	<5	<2	99	18	<2	<4	<4	9	2	182	3	<4	11	18	<4
wpsJ091C	Middle Waste	mudstone		3	<10	113	5	25	5	538	48	<2	<4	<4	53	12	169	15	<4	42	186	7
wpsJ092C	Middle Waste	mudstone		5	11	157	7	37	4	1110	74	2	7	<4	100	22	163	20	<4	70	303	5
wpsJ095C	Middle Waste	mudstone		4	12	141	13	31	<2	874	67	<2	<4	<4	101	16	165	30	<4	60	262	8
wpsJ098C	Middle Waste	dolostone		<2	13	28	<2	9	<2	297	21	<2	<4	<4	16	3	305	5	<4	20	48	<4
wpsJ102C	Middle Waste	mudstone		6	31	222	10	49	7	1290	109	3	14	<4	158	27	152	28	7	89	459	11
wpsJ106C	Middle Waste	mudstone		5	14	219	29	62	8	1420	142	4	13	7	184	26	141	38	5	118	639	11
wpsJ111C	Middle Waste	phosphorite		6	24	197	29	57	8	908	72	3	11	<4	90	18	118	41	5	71	682	13

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Sc, ppm, ICP-40	Sr, ppm, ICP-40	Th, ppm, ICP-40	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40	**Ag ppm, EDXRF**	**As ppm, EDXRF**	**Ba ppm, EDXRF**	**Cd ppm, EDXRF**	**Ce ppm, EDXRF**	**Cr ppm, EDXRF**	**Cu ppm, EDXRF**	**La ppm, EDXRF**	**Mo ppm, EDXRF**	**Nb ppm, EDXRF**	**Nd ppm, EDXRF**	**Ni ppm, EDXRF**
wpsJ-05C			Grandeur Tongue	<2	105	<6	26	10	<1	594	<1	<2	15	13	4	26	2	9	2	<2	<7	105
wpsJ-03C		dolostone	Grandeur Tongue	<2	93	<6	20	8	<1	609	<1	3	20	12	<3	23	5	7	2	<2	<7	116
wpsJ-01C			Grandeur Tongue	<2	103	<6	30	7	<1	477	<1	3	17	20	<3	22	3	10	4	<2	<7	75
wpsJ0.5C		phosphorite	Fish-scale bed	<2	778	8	260	300	12	5450	5	25	798	120	33	299	31	172	39	4	115	1900
wpsJ002C		dolostone, weathered	Footwall siltstone	9	76	13	920	27	3	4610	5	123	441	34	45	494	56	34	87	12	29	1160
wpsJ003C		dolostone	Footwall siltstone	3	105	7	313	15	1	1500	2	34	111	56	25	105	17	18	15	6	14	248
wpsJ006C		siltstone	Footwall siltstone	6	357	15	2200	88	6	7090	7	30	181	317	41	805	117	63	274	8	49	788
wpsJ008C		phosphorite	A Bed Ore	<2	982	9	1880	173	8	4760	10	13	54	273	19	829	133	113	66	3	45	637
wpsJ011C		mudstone	Cap Rock	<2	436	8	223	130	5	381	7	7	32	22	24	214	20	92	8	3	36	71
wpsJ014C		phosphorite	B Bed Ore	4	791	<6	675	185	8	2110												
wpsJ014X		phosphorite	B Bed Ore	3	748	7	642	168	7	2030	15	11	76	175	26	788	85	138	40	4	61	277
wpsJ017C		dolostone	B Bed Ore	<2	374	<6	448	60	3	1870	9	9	40	100	17	286	41	49	34	3	20	262
wpsJ018C		phosphorite	B Bed Ore	4	743	8	1310	143	7	3570	15	30	103	302	32	721	87	96	115	6	27	411
wpsJ020C		mudstone	Lower Waste	4	593	8	1160	131	6	1890												
wpsJ020X		mudstone	Lower Waste	<2	543	9	1060	120	6	1770	18	36	137	153	34	655	85	84	68	5	35	299
wpsJ021C		mudstone	Lower Waste	3	567	17	707	88	5	2850	5	17	234	114	42	407	75	60	49	14	32	202
wpsJ022C		siltstone, calcareous	Lower Waste	<2	206	6	347	23	1	651												
wpsJ022X		siltstone, calcareous	Lower Waste	<2	206	9	334	22	1	620	4	17	56	34	18	112	18	18	16	4	12	63
wpsJ023C		phosphorite	B Bed Ore	<2	692	6	1630	105	5	4850	11	25	90	245	23	694	97	70	210	4	45	688
wpsJ025C		siltstone, calcareous	Lower Waste	<2	220	9	248	13	<1	407	3	13	34	20	11	67	10	10	9	4	<7	32
wpsJ031C		phosphorite	B Bed Ore	3	818	6	1710	95	5	3570	8	26	122	196	22	466	56	56	79	5	33	300
wpsJ034C		siltstone, calcareous	False Cap	5	327	14	1170	62	4	2960	12	46	198	144	46	363	65	51	95	10	32	225
wpsJ035C		phosphorite	C Bed Ore	3	770	12	1990	198	10	5310	18	27	117	270	31	771	115	130	141	5	43	448
wpsJ037C		phosphorite	C Bed Ore	3	660	<6	343	204	9	734	11	17	76	63	27	385	49	145	54	3	80	177
wpsJ040C		phosphorite	C Bed Ore	<2	2000	11	275	234	10	441	11	19	45	34	30	217	46	157	50	3	83	144
wpsJ045C		phosphorite	C Bed Ore	5	1130	<6	439	309	14	940	16	27	102	45	34	1030	100	200	59	4	103	288
wpsJ047C		phosphorite	C Bed Ore	4	919	<6	296	232	9	1650	20	47	126	9	34	1830	181	151	90	6	78	471
wpsJ048C		siltstone	C Bed Ore	3	812	<6	178	165	7	908	11	31	88	4	24	886	91	102	41	4	49	260
wpsJ050C	Middle Waste	mudstone		9	639	<6	205	145	7	1440	11	46	181	13	33	1650	128	99	54	7	51	394
wpsJ052C	Middle Waste	mudstone		8	464	<6	128	113	5	962	6	40	194	4	37	1010	75	75	29	8	47	235
wpsJ054C	Middle Waste	mudstone		2	222	<6	126	16	1	108	3	13	42	<1	20	102	14	14	8	5	13	39
wpsJ057C	Middle Waste	mudstone		8	847	6	365	171	7	1460	12	32	199	52	33	1520	107	99	104	7	52	405
wpsJ059C	Middle Waste	mudstone		6	1090	<6	244	106	4	1040	10	23	119	25	21	1270	91	61	72	5	25	294
wpsJ061C	Middle Waste	mudstone		8	994	6	152	128	6	1220	9	28	157	7	33	1660	105	85	38	6	39	323
wpsJ063C	Middle Waste	mudstone		3	879	<6	70	75	3	625	5	17	85	5	23	692	51	50	18	4	29	160
wpsJ065C	Middle Waste	mudstone		9	967	8	104	173	7	1080	7	34	206	3	45	1430	89	120	33	8	71	287
wpsJ067C	Middle Waste	siltstone		5	741	<6	88	103	5	728	4	21	143	3	30	861	60	65	24	6	41	202
wpsJ070C	Middle Waste	mudstone		11	389	9	231	98	5	936	7	33	245	12	54	972	62	67	40	12	49	260
wpsJ079C	Middle Waste	dolostone		4	308	<6	83	41	2	414												
wpsJ079X	Middle Waste	dolostone		4	327	<6	88	44	2	440	3	12	56	2	15	413	26	31	10	4	23	106
wpsJ083C	Middle Waste	dolostone		10	724	7	188	199	8	1570	11	33	197	13	43	2070	119	140	49	7	70	428
wpsJ084C	Middle Waste	carbon seam		10	830	7	245	297	12	2570	15	44	149	14	45	3630	234	216	44	6	136	791
wpsJ086C	Middle Waste	dolostone		<2	257	<6	37	9	<1	85	<1	5	14	<1	8	68	6	9	3	<2	11	26
wpsJ091C	Middle Waste	mudstone		5	363	<6	103	61	3	562	5	23	114	4	26	574	41	46	19	6	35	149
wpsJ092C	Middle Waste	mudstone		9	498	<6	137	116	5	1020	8	30	167	4	30	1030	71	84	27	6	50	265
wpsJ095C	Middle Waste	mudstone		6	681	7	150	126	5	759	8	24	137	18	30	874	64	87	43	6	51	236
wpsJ098C	Middle Waste	dolostone		3	346	<6	80	14	<1	143	1	11	29	<1	9	227	10	12	6	3	12	48
wpsJ102C	Middle Waste	mudstone		11	569	8	169	179	8	1460	9	39	209	8	43	1510	103	137	35	9	80	393
wpsJ106C	Middle Waste	mudstone		10	495	7	216	283	11	1820	9	32	218	39	58	1630	151	157	52	9	101	570
wpsJ111C	Middle Waste	phosphorite		9	308	9	380	169	8	2390												

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Pb ppm, EDXRF	Rb ppm, EDXRF	Sb ppm, EDXRF	Se ppm, EDXRF	Sn ppm, EDXRF	Sr ppm, EDXRF	Th ppm, EDXRF	U ppm, EDXRF	V ppm, EDXRF	Y ppm, EDXRF	Zn ppm, EDXRF	Zr ppm, EDXRF
wpsJ-05C			Grandeur Tongue	20	<2	<2	<1	<2	98	<2	6	17	11	633	16
wpsJ-03C		dolostone	Grandeur Tongue	19	<2	<2	<1	<2	85	<2	3	15	8	659	13
wpsJ-01C			Grandeur Tongue	15	<2	<2	<1	<2	91	<2	5	18	7	504	14
wpsJ0.5C		phosphorite	Fish-scale bed	64	7	13	4	2	721	<2	86	181	312	5370	70
wpsJ002C		dolostone, weathered	Footwall siltstone	39	74	14	12	3	75	8	9	894	39	4610	337
wpsJ003C		dolostone	Footwall siltstone	19	29	6	3	<2	95	<2	4	199	17	1640	172
wpsJ006C		siltstone	Footwall siltstone	17	59	13	219	3	353	6	62	1870	99	6930	276
wpsJ008C		phosphorite	A Bed Ore	16	4	10	122	3	953	<2	225	1530	186	4980	84
wpsJ011C		mudstone	Cap Rock	6	8	3	37	<2	415	<2	27	139	140	434	69
wpsJ014C		phosphorite	B Bed Ore												
wpsJ014X		phosphorite	B Bed Ore	14	19	7	67	3	705	<2	86	481	189	2270	98
wpsJ017C		dolostone	B Bed Ore	8	15	5	42	<2	398	<2	36	330	73	1680	50
wpsJ018C		phosphorite	B Bed Ore	15	23	14	117	3	702	2	124	961	153	3680	106
wpsJ020C		mudstone	Lower Waste												
wpsJ020X		mudstone	Lower Waste	15	35	17	158	<2	547	2	75	799	139	1950	143
wpsJ021C		mudstone	Lower Waste	43	25	6	45	6	550	12	84	642	96	3000	141
wpsJ022C		siltstone, calcareous	Lower Waste												
wpsJ022X		siltstone, calcareous	Lower Waste	6	15	7	56	<2	186	<2	11	204	27	626	86
wpsJ023C		phosphorite	B Bed Ore	13	20	14	140	<2	713	<2	130	1270	120	5400	112
wpsJ025C		siltstone, calcareous	Lower Waste	4	11	5	37	<2	188	<2	7	126	14	375	67
wpsJ031C		phosphorite	B Bed Ore	13	22	9	86	3	789	<2	132	1210	103	3660	129
wpsJ034C		siltstone, calcareous	False Cap	14	48	15	142	2	342	3	35	1050	72	3010	227
wpsJ035C		phosphorite	C Bed Ore	15	23	12	118	3	711	<2	133	1510	202	5000	133
wpsJ037C		phosphorite	C Bed Ore	6	13	5	71	2	670	<2	47	238	234	815	63
wpsJ040C		phosphorite	C Bed Ore	12	4	6	60	<2	1830	<2	76	165	248	489	50
wpsJ045C		phosphorite	C Bed Ore	10	21	7	109	<2	1080	3	69	296	334	1070	82
wpsJ047C		phosphorite	C Bed Ore	10	46	16	180	2	901	<2	39	212	197	1780	78
wpsJ048C		siltstone	C Bed Ore	6	27	9	100	<2	780	<2	31	130	133	987	60
wpsJ050C	Middle Waste	mudstone		11	62	13	141	2	603	3	23	166	121	1580	91
wpsJ052C	Middle Waste	mudstone		9	56	10	97	2	430	4	13	102	92	980	142
wpsJ054C	Middle Waste	mudstone		3	17	3	29	<2	212	<2	3	77	15	118	95
wpsJ057C	Middle Waste	mudstone		10	61	9	138	<2	791	<2	26	273	139	1510	112
wpsJ059C	Middle Waste	mudstone		6	38	9	94	<2	1080	<2	19	156	95	1100	62
wpsJ061C	Middle Waste	mudstone		8	57	10	107	<2	968	<2	16	108	110	1300	86
wpsJ063C	Middle Waste	mudstone		4	28	6	56	<2	940	<2	12	54	65	726	53
wpsJ065C	Middle Waste	mudstone		9	62	10	88	2	912	5	18	94	145	1200	140
wpsJ067C	Middle Waste	siltstone		6	40	9	44	3	718	<2	15	56	86	765	118
wpsJ070C	Middle Waste	mudstone		13	73	8	87	3	372	8	16	196	87	962	267
wpsJ079C	Middle Waste	dolostone													
wpsJ079X	Middle Waste	dolostone		4	28	6	35	<2	294	<2	8	56	36	439	44
wpsJ083C	Middle Waste	dolostone		11	70	12	137	<2	701	4	26	217	162	1650	104
wpsJ084C	Middle Waste	carbon seam		14	53	13	179	<2	797	2	45	193	241	2640	90
wpsJ086C	Middle Waste	dolostone		<3	11	<2	10	<2	241	<2	<2	22	8	93	23
wpsJ091C	Middle Waste	mudstone		5	43	7	67	<2	352	<2	8	61	52	574	71
wpsJ092C	Middle Waste	mudstone		7	64	10	88	<2	487	<2	17	105	99	1080	90
wpsJ095C	Middle Waste	mudstone		7	43	8	91	2	686	<2	16	107	110	860	86
wpsJ098C	Middle Waste	dolostone		<3	23	3	25	<2	329	<2	3	48	13	148	34
wpsJ102C	Middle Waste	mudstone		10	74	11	129	2	565	4	22	126	155	1480	124
wpsJ106C	Middle Waste	mudstone		13	67	7	95	<2	483	7	29	176	235	1990	225
wpsJ111C	Middle Waste	phosphorite													

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Lab No.	Comments	Interval base, true ft above base of Fish-scale Bed	Interval top, true ft above base of Fish-scale Bed	True Thickness, ft	Interval midpoint, ft	Monsanto Core down-hole depth, interval base, ft	Monsanto Core down-hole depth, interval top, ft	Monsanto Core, interval apparent thickness, ft	Monsanto sample number	As, ppm, hydride	Hg, ppm, CVAA	Sb, ppm, hydride	Se, ppm, hydride	Tl, ppm, fusion-AA
wpsJ111X	Middle Waste	phosphorite		C-154213	duplicate of previous sample	107.5	113.3	5.8	110.40					32.4	0.43	5.1	64.3	1.6
wpsJ114C	Middle Waste	mudstone		C-154218		113.3	115.9	2.6	114.60	-314.0	-304.0	10.0		25.8	0.39	4.4	70.3	1.1
wpsJ117C	Middle Waste	mudstone		C-154216		115.9	119.7	3.8	117.80					22.2	0.34	2.5	54.0	1.2
wpsJ121C	Middle Waste	mudstone		C-154232		119.7	122.3	2.6	121.00	-304.0	-295.0	9.0		27.1	0.37	2.9	55.4	0.8
wpsJ123C	Middle Waste	mudstone		C-154221		122.3	124.2	1.9	123.25					20.8	0.41	3.1	53.6	1.1
wpsJ125C	Middle Waste	mudstone		C-154227		124.2	127.4	3.2	125.80	-295.0	-287.0	8.0		28.6	0.35	3.9	32.5	1.0
wpsJ128C	Middle Waste	siltstone		C-154236		127.4	128.3	0.9	127.85					18.9	0.21	1.4	20.4	0.7
wpsJ131C	Middle Waste	siltstone		C-154242		128.3	135.0	6.7	131.65	-287.0	-277.0	10.0		38.3	0.58	4.1	52.8	1.6
wpsJ136C	Middle Waste	mudstone		C-154245		135.0	137.9	2.9	136.45					36.2	0.57	4.3	72.9	1.3
wpsJ140C	Middle Waste	mudstone		C-154210		137.9	141.3	3.4	139.60	-277.0	-267.0	10.0		34.7	0.52	4.9	68.8	1.5
wpsJ143C	Middle Waste	siltstone		C-154214		141.3	144.2	2.9	142.75	-267.0	-262.0	5.0		38.7	0.61	3.7	82.9	1.3
wpsJ145C	Middle Waste	siltstone		C-154208		144.2	145.9	1.7	145.05	-262.0	-259.0	3.0		31.3	0.54	4.9	87.2	1.4
wpsJ145X	Middle Waste	siltstone		C-154238	duplicate of previous sample	144.2	145.9	1.7	145.05					24.0	0.55	3.8	77.2	1.7
wpsJ147C	Middle Waste	mudstone		C-154235		145.9	148.2	2.3	147.05	-259.0	-254.4	4.6		9.7	0.52	2.1	73.5	1.7
wpsJ147X	Middle Waste	mudstone		C-154240	duplicate of previous sample	145.9	148.2	2.3	147.05					19.8	0.55	3.9	91.5	2.2
wpsJ148C	Middle Waste	siltstone		C-154222		148.2	148.9	0.7	148.55	-254.4	-253.0	1.4		22.6	0.39	3.9	88.6	2.6
wpsJ149C		phosphorite	D Bed Ore zone	C-166390	D-1 Ore	148.9	149.9	1.0	149.40	-253.0	-251.0	2.0	5296	20.2	0.39	4.8	70.6	2.6
wpsJ150C		phosphorite	D Bed Ore zone	C-166407	D-1 Ore	149.9	150.9	1.0	150.40	-251.0	-249.0	2.0	5297	21.6	0.55	6.2	75.0	4.5
wpsJ151C		phosphorite	D Bed Ore zone	C-166406	D-1 Ore	150.9	152.2	1.3	151.55	-249.0	-246.4	2.6	5298	22.6	0.46	6.2	93.0	3.8
wpsJ153C		phosphorite	D Bed Ore zone	C-166387	D-1 Ore	152.2	153.1	0.9	152.65	-246.4	-244.6	1.8	5299	18.5	0.49	6.1	58.4	4.0
wpsJ154C		phosphorite	D Bed Ore zone	C-166419	D-1 Ore	153.1	154.4	1.3	153.75	-244.6	-242.0	2.6	5300	19.4	0.80	7.0	59.7	7.0
wpsJ155C		phosphorite	D Bed Ore zone	C-166388	D-1 Ore	154.4	155.1	0.7	154.75	-242.0	-240.7	1.3	5301	8.2	0.19	2.6	22.3	1.8
wpsJ156C		phosphorite	D Bed Ore zone	C-166365	D-2 Ore	155.1	157.0	1.9	156.05	-238.9	-237.0	1.9	5302, 5303	7.2	0.15	1.9	141.0	1.0
wpsJ158C		phosphorite	D Bed Ore zone	C-166374	Buckshot	157.0	158.0	1.0	157.50	-237.0	-235.0	2.0	5304	8.5	0.16	1.7	22.9	1.8
wpsJ159C		phosphorite	D Bed Ore zone	C-166371	D-3 Ore	158.0	159.0	1.0	158.50	-235.0	-232.0	3.0	5305	23.1	0.23	3.7	45.5	2.6
wpsJ160C		phosphorite	D Bed Ore zone	C-166401	D-3 Ore	159.0	160.4	1.4	159.70	-232.0	-229.2	2.8	5306	13.1	0.25	2.1	20.8	2.8
wpsJ161C		phosphorite	D Bed Ore zone	C-166392	D-3 Ore	160.4	161.5	1.1	160.95	-229.2	-227.0	2.2	5307	10.8	0.20	2.1	140.0	2.4
wpsJ162C		phosphorite	D Bed Ore zone	C-166381	waste	161.5	162.9	1.4	162.20	-227.0	-224.2	2.8	5308	6.2	0.23	1.4	10.8	1.3
wpsJ163C		phosphorite	D Bed Ore zone	C-166415	D-3 Ore	162.9	163.6	0.7	163.25	-224.2	-223.0	1.2	5309	7.5	0.14	1.1	14.9	0.9
wpsJ164C		mudstone	Upper Waste	C-166400		163.6	167.4	3.8	165.50	-218.0	-216.4	1.6		25.5	0.28	2.4	52.3	2.9
wpsJ168C		phosphorite	Upper Waste	C-166368		167.4	168.3	0.9	167.85	-216.4	-214.8	1.6		7.8	0.07	0.7	10.5	0.8
wpsJ169C		siltstone	Upper Waste	C-166397		168.3	169.7	1.4	169.00	-214.8	-212.3	2.5		19.5	0.16	1.1	28.7	1.8
wpsJ170C		mudstone	Upper Waste	C-166393		169.7	170.4	0.7	170.05	-212.3	-211.0	1.3		27.9	0.36	3.9	120.0	3.2
wpsJ172C		mudstone	Upper Waste	C-166405		170.4	173.4	3.0	171.90	-210.0	-205.8	4.2		8.1	0.31	1.1	77.5	0.7
wpsJ172X		mudstone	Upper Waste	C-166373	duplicate of previous sample	170.4	173.4	3.0	171.90					7.0	0.30	1.1	34.7	0.8
wpsJ175C		mudstone	Upper Waste	C-166384		173.4	176.7	3.3	175.05	-205.8	-200.0	5.8		20.7	0.26	2.4	42.6	1.1
wpsJ177C		mudstone	Upper Waste	C-166396		176.7	179.8	3.1	178.25	-200.0	-194.6	5.4		17.0	0.18	1.5	32.7	1.7
wpsj181C		mudstone	Upper Waste	C-166375		179.8	181.9	2.1	180.85	-194.6	-191.0	3.6		15.6	0.20	1.1	24.3	1.9
wpsJ184C		mudstone	Upper Waste	C-166408		181.9	185.0	3.1	183.45	-191.0	-185.6	5.4		23.9	0.25	2.8	94.4	2.4
wpsJ184X		mudstone	Upper Waste	C-166372	duplicate of previous sample	181.9	185.0	3.1	183.45					20.4	0.25	2.3	80.4	0.1
wpsJ186C		phosphorite	Upper Waste	C-166367		185.0	187.1	2.1	186.05	-185.6	-182.0	3.6	5310	13.1	0.35	3.1	445.0	0.2
wpsJ187C		chert	Rex Chert	C-166404		187.1	187.2	0.1	187.15	-182.0	-181.8	0.2		2.5	0.03	<0.6	4.6	1.2

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	C, %, combustion	CO2, %, acidification	Carbonate C, %, acidification	Organic C, %, difference	S, %, combustion	Al, %, ICP-16	AlOx, %, ICP-16	Ca, %, ICP 16	CaOx, %, ICP-16	Fe, %, ICP 16	FeOx, %, ICP-16	K, %, ICP-16	KOx, %, ICP-16	Mg, %, ICP-16	MgOx, %, ICP-16	Na, %, ICP 16	NaOx, %, ICP-16	P, %, ICP-16	POx, %, ICP-16
wpsJ111X	Middle Waste	phosphorite		9.75	3.64	0.99	8.76	3.04	4.05	7.65	7.9	11.1	1.82	2.60	1.59	1.92	0.90	1.49	0.64	0.86	3.0	6.8
wpsJ114C	Middle Waste	mudstone		9.16	0.47	0.13	9.03	2.81	3.31	6.25	13.0	18.2	1.50	2.15	1.27	1.53	0.15	0.25	0.60	0.81	6.0	13.6
wpsJ117C	Middle Waste	mudstone		7.60	0.44	0.12	7.48	2.52	3.37	6.37	12.6	17.6	1.54	2.20	1.28	1.54	0.13	0.22	0.65	0.88	6.3	14.4
wpsJ121C	Middle Waste	mudstone		8.90	0.36	0.10	8.80	2.58	3.35	6.33	10.1	14.1	1.42	2.03	1.32	1.59	0.15	0.25	0.55	0.74	5.0	11.5
wpsJ123C	Middle Waste	mudstone		10.00	0.65	0.18	9.82	2.43	2.31	4.36	16.8	23.5	1.10	1.57	0.89	1.07	0.18	0.30	0.27	0.36	8.3	19.1
wpsJ125C	Middle Waste	mudstone		5.19	2.77	0.76	4.43	2.53	3.8	7.18	7.3	10.2	1.68	2.40	1.45	1.75	0.72	1.19	0.85	1.15	3.1	7.1
wpsJ128C	Middle Waste	siltstone		8.45	24.00	6.55	1.90	1.57	2.77	5.23	13.4	18.7	1.30	1.86	0.88	1.06	6.46	10.71	0.86	1.16	0.8	1.9
wpsJ131C	Middle Waste	siltstone		7.54	3.05	0.83	6.71	2.96	3.63	6.86	14.4	20.1	1.99	2.85	1.48	1.78	0.71	1.18	0.70	0.94	6.0	13.6
wpsJ136C	Middle Waste	mudstone		13.00	2.21	0.60	12.40	3.27	3.84	7.25	11.2	15.7	1.80	2.57	1.61	1.94	0.72	1.19	0.52	0.70	4.6	10.6
wpsJ140C	Middle Waste	mudstone		11.80	0.84	0.23	11.57	2.93	3.37	6.37	13.1	18.3	1.55	2.22	1.37	1.65	0.32	0.53	0.43	0.58	6.5	14.8
wpsJ143C	Middle Waste	siltstone		12.60	1.22	0.33	12.27	3.27	4.25	8.03	7.9	11.1	1.78	2.55	1.58	1.90	0.53	0.88	0.48	0.65	3.7	8.5
wpsJ145C	Middle Waste	siltstone		11.20	0.97	0.26	10.94	2.68	4.27	8.07	9.0	12.5	1.64	2.35	1.47	1.77	0.44	0.73	0.33	0.44	4.2	9.6
wpsJ145X	Middle Waste	siltstone		10.90	0.78	0.21	10.69	2.65	4.09	7.73	11.0	15.4	1.70	2.43	1.53	1.84	0.40	0.66	0.36	0.49	5.4	12.3
wpsJ147C	Middle Waste	mudstone		4.90	0.24	0.07	4.83	0.95	5.45	10.30	5.8	8.2	2.12	3.03	1.67	2.01	0.39	0.65	0.40	0.54	2.7	6.2
wpsJ147X	Middle Waste	mudstone		5.60	0.34	0.09	5.51	1.68	5.16	9.75	8.1	11.3	2.22	3.17	1.85	2.23	0.38	0.63	0.36	0.49	3.9	9.0
wpsJ148C	Middle Waste	siltstone		8.77	0.74	0.20	8.57	2.15	3.05	5.76	16.6	23.2	1.32	1.89	1.15	1.39	0.26	0.43	0.29	0.39	8.3	18.9
wpsJ149C		phosphorite	D Bed Ore zone	10.40	1.03	0.28	10.12	2.17	1.88	3.55	20.6	28.8	0.85	1.22	0.77	0.93	0.18	0.30	0.23	0.31	9.2	21.1
wpsJ150C		phosphorite	D Bed Ore zone	11.70	0.13	0.04	11.66	2.23	1.57	2.97	20.9	29.2	0.85	1.22	0.63	0.76	0.17	0.28	0.17	0.23	9.3	21.3
wpsJ151C		phosphorite	D Bed Ore zone	11.80	0.88	0.24	11.56	2.53	2.01	3.80	17.2	24.1	0.98	1.40	0.90	1.08	0.20	0.33	0.23	0.31	7.6	17.5
wpsJ153C		phosphorite	D Bed Ore zone	11.80	1.09	0.30	11.50	2.18	1.55	2.93	23.4	32.7	0.74	1.06	0.63	0.76	0.19	0.32	0.19	0.26	10.7	24.5
wpsJ154C		phosphorite	D Bed Ore zone	12.40	1.14	0.31	12.09	2.25	1.17	2.21	24.5	34.3	0.64	0.92	0.46	0.55	0.16	0.27	0.16	0.22	11.3	25.9
wpsJ155C		phosphorite	D Bed Ore zone	5.24	1.45	0.40	4.84	0.92	0.68	1.28	30.0	42.0	0.31	0.44	0.22	0.27	0.11	0.18	0.14	0.19	13.5	30.9
wpsJ156C		phosphorite	D Bed Ore zone	4.50	1.49	0.41	4.09	0.77	0.79	1.49	28.4	39.7	0.55	0.79	0.23	0.28	0.10	0.17	0.21	0.28	13.0	29.8
wpsJ158C		phosphorite	D Bed Ore zone	4.54	1.30	0.35	4.19	1.03	0.81	1.53	29.0	40.6	0.41	0.59	0.26	0.31	0.10	0.17	0.19	0.26	13.3	30.5
wpsJ159C		phosphorite	D Bed Ore zone	4.13	0.90	0.25	3.88	1.56	1.84	3.48	20.1	28.1	0.90	1.29	0.67	0.81	0.12	0.20	0.40	0.54	9.9	22.7
wpsJ160C		phosphorite	D Bed Ore zone	2.84	1.25	0.34	2.50	0.74	0.59	1.11	31.1	43.5	0.35	0.50	0.20	0.24	0.08	0.13	0.17	0.23	14.5	33.2
wpsJ161C		phosphorite	D Bed Ore zone	5.85	1.23	0.34	5.51	1.09	0.57	1.08	29.8	41.7	0.38	0.54	0.18	0.22	0.07	0.12	0.17	0.23	13.7	31.4
wpsJ162C		phosphorite	D Bed Ore zone	4.26	1.43	0.39	3.87	0.76	0.31	0.59	31.7	44.3	0.30	0.43	0.11	0.13	0.07	0.12	0.13	0.18	15.4	35.3
wpsJ163C		phosphorite	D Bed Ore zone	3.02	1.22	0.33	2.69	0.78	0.72	1.36	28.8	40.3	0.35	0.50	0.25	0.30	0.08	0.13	0.14	0.19	12.9	29.6
wpsJ164C		mudstone	Upper Waste	3.91	0.48	0.13	3.78	2.53	5.06	9.56	2.6	3.7	2.00	2.86	1.83	2.21	0.39	0.65	0.69	0.93	1.1	2.6
wpsJ168C		phosphorite	Upper Waste	1.68	0.62	0.17	1.51	0.74	0.86	1.62	15.1	21.1	0.43	0.61	0.27	0.33	0.70	1.16	0.18	0.24	7.1	16.2
wpsJ169C		siltstone	Upper Waste	1.82	0.14	0.04	1.78	1.58	3.27	6.18	2.2	3.1	1.29	1.84	1.06	1.28	0.19	0.32	0.43	0.58	0.9	2.2
wpsJ170C		mudstone	Upper Waste	9.98	0.20	0.05	9.93	3.11	5.51	10.41	4.6	6.4	2.14	3.06	1.98	2.39	0.47	0.78	0.49	0.66	2.1	4.8
wpsJ172C		mudstone	Upper Waste	6.64	15.90	4.34	2.30	0.82	3.76	7.10	7.9	11.1	1.48	2.12	1.28	1.54	3.88	6.43	0.55	0.74	0.7	1.5
wpsJ172X		mudstone	Upper Waste	6.61	15.90	4.34	2.27	0.84	3.66	6.91	7.9	11.0	1.49	2.13	1.26	1.52	4.05	6.71	0.50	0.67	0.7	1.5
wpsJ175C		mudstone	Upper Waste	5.95	5.21	1.42	4.53	2.66	5.42	10.24	5.4	7.6	2.44	3.49	2.08	2.51	1.58	2.62	0.58	0.78	1.4	3.1
wpsJ177C		mudstone	Upper Waste	3.44	2.36	0.64	2.80	2.87	6.02	11.37	2.3	3.2	2.82	4.03	2.24	2.70	0.87	1.44	0.67	0.90	0.5	1.1
wpsj181C		mudstone	Upper Waste	3.85	0.09	0.02	3.83	3.02	5.79	10.94	0.7	1.0	2.68	3.83	2.91	3.51	0.39	0.65	0.58	0.78	0.3	0.7
wpsJ184C		mudstone	Upper Waste	4.89	0.94	0.26	4.63	2.86	5.78	10.92	2.1	2.9	2.19	3.13	2.02	2.43	0.49	0.81	0.32	0.43	0.9	2.2
wpsJ184X		mudstone	Upper Waste	4.70	0.10	0.03	4.67	2.93	6.08	11.49	2.0	2.9	2.35	3.36	2.17	2.61	0.47	0.78	0.35	0.47	0.9	2.1
wpsJ186C		phosphorite	Upper Waste	4.27	0.90	0.25	4.02	1.84	1.74	3.29	19.8	27.7	1.36	1.94	0.63	0.76	0.22	0.36	0.19	0.26	9.1	20.9
wpsJ187C		chert	Rex Chert	0.15	0.06	0.02	0.13	0.09	0.25	0.47	0.8	1.1	0.30	0.43	0.04	0.05	0.02	0.03	0.03	0.04	0.4	0.9

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Apatite (CFA), %, XRD	Si, %, ICP-16	SiOx, %, ICP-16	Ti, %, ICP-16	TiOx, %, ICP-16	Sum Oxides, %	Ba, ppm, ICP-16	Cr, ppm, ICP-16	Mn, ppm, ICP-16	Sr, ppm, ICP-16	Y, ppm, ICP-16	Zr, ppm, ICP-16	Al, %, ICP-40	Ca, %, ICP 40	Fe, %, ICP 40	K, %, ICP-40	Mg, %, ICP-40	Na, %, ICP 40	P, %, ICP-40	Ti, %, ICP-40
wpsJ111X	Middle Waste	phosphorite			21.5	46.0	0.29	0.39	78.8	215	1120	137	322	178	273	4.4	7.8	1.96	1.67	0.96	0.69	2.77	0.19
wpsJ114C	Middle Waste	mudstone		36	17.8	38.1	0.23	0.31	81.2	213	1370	<100	588	312	231	3.5	11.8	1.57	1.32	0.16	0.62	5.74	0.13
wpsJ117C	Middle Waste	mudstone		32	21.2	45.3	0.24	0.32	88.9	207	996	<100	551	295	214	3.5	11.6	1.56	1.28	0.14	0.65	5.82	0.14
wpsJ121C	Middle Waste	mudstone		28	22.5	48.1	0.22	0.30	85.0	200	1170	<100	471	226	205	3.6	9.8	1.49	1.29	0.16	0.56	4.60	0.13
wpsJ123C	Middle Waste	mudstone		52	15.4	32.9	0.15	0.20	83.4	179	1400	<100	750	354	160	2.5	15.8	1.13	0.92	0.19	0.28	7.87	0.07
wpsJ125C	Middle Waste	mudstone		9	24.6	52.6	0.29	0.39	84.0	182	484	118	293	116	288	4.1	7.4	1.78	1.48	0.78	0.89	3.00	0.16
wpsJ128C	Middle Waste	siltstone		4	15.1	32.3	0.20	0.27	73.3	104	222	339	241	30	186	3.0	13.3	1.40	0.94	6.61	0.96	0.83	0.12
wpsJ131C	Middle Waste	siltstone		33	19.0	40.6	0.26	0.35	88.4	219	1030	128	637	238	230	3.8	13.2	1.97	1.44	0.72	0.71	5.79	0.12
wpsJ136C	Middle Waste	mudstone		29	18.5	39.6	0.25	0.34	79.8	224	1590	<100	556	172	220	3.9	10.2	1.75	1.52	0.70	0.52	4.50	0.15
wpsJ140C	Middle Waste	mudstone		40	17.0	36.4	0.22	0.30	81.1	206	1360	<100	702	221	182	3.6	12.3	1.61	1.39	0.33	0.45	5.93	0.13
wpsJ143C	Middle Waste	siltstone		25	20.1	43.0	0.25	0.34	76.8	229	1590	<100	517	212	196	4.5	8.0	1.93	1.66	0.55	0.50	3.59	0.16
wpsJ145C	Middle Waste	siltstone		35	18.4	39.4	0.24	0.32	75.2	216	1370	<100	447	179	188	4.5	9.0	1.81	1.62	0.48	0.37	4.11	0.15
wpsJ145X	Middle Waste	siltstone			18.6	39.8	0.25	0.34	81.0	220	1360	<100	494	185	176	4.2	10.1	1.68	1.46	0.39	0.35	4.71	0.17
wpsJ147C	Middle Waste	mudstone		25	23.2	49.6	0.32	0.43	80.9	233	846	<100	257	103	255	5.8	5.7	2.21	1.77	0.40	0.44	2.44	0.25
wpsJ147X	Middle Waste	mudstone			23.2	49.6	0.31	0.42	86.6	252	889	<100	331	129	243	5.6	8.1	2.26	1.82	0.39	0.36	3.65	0.22
wpsJ148C	Middle Waste	siltstone		39	14.8	31.7	0.19	0.26	83.9	181	980	<100	523	145	157	3.3	15.8	1.36	1.21	0.28	0.31	7.82	0.11
wpsJ149C		phosphorite	D Bed Ore zone	62	8.8	18.8	0.12	0.16	75.3	128	1240	<100	829	251	124	2.0	19.9	0.84	0.81	0.17	0.24	9.14	0.05
wpsJ150C		phosphorite	D Bed Ore zone	70	7.2	15.3	0.10	0.13	71.4	101	1500	<100	718	218	101	1.7	20.0	0.80	0.67	0.18	0.18	9.19	0.05
wpsJ151C		phosphorite	D Bed Ore zone	62	8.8	18.9	0.13	0.18	67.5	119	1130	<100	547	140	113	2.2	17.0	0.99	0.87	0.21	0.23	8.27	0.06
wpsJ153C		phosphorite	D Bed Ore zone	76	6.5	13.9	0.10	0.13	76.6	111	1180	<100	747	129	96	1.6	21.6	0.72	0.64	0.18	0.18	10.30	0.05
wpsJ154C		phosphorite	D Bed Ore zone	80	5.1	10.9	0.07	0.09	75.3	92	1020	<100	726	136	76	1.3	24.8	0.63	0.50	0.15	0.16	11.70	0.05
wpsJ155C		phosphorite	D Bed Ore zone	92	3.4	7.3	0.04	0.05	82.7	98	720	<100	936	248	58	0.7	28.4	0.29	0.24	0.10	0.14	13.40	0.03
wpsJ156C		phosphorite	D Bed Ore zone	90	4.7	10.1	0.04	0.05	82.7	123	583	138	918	310	86	0.8	28.2	0.51	0.25	0.10	0.21	13.30	0.02
wpsJ158C		phosphorite	D Bed Ore zone	83	4.5	9.7	0.06	0.08	83.7	105	505	<100	919	280	74	0.8	27.3	0.38	0.28	0.09	0.19	13.00	0.04
wpsJ159C		phosphorite	D Bed Ore zone	55	10.7	22.9	0.14	0.19	80.2	115	464	<100	608	325	200	2.0	20.6	0.96	0.64	0.13	0.42	9.86	0.06
wpsJ160C		phosphorite	D Bed Ore zone	81	3.8	8.0	0.04	0.05	87.0	77	560	<100	901	408	59	0.6	31.8	0.35	0.21	0.07	0.18	16.00	0.02
wpsJ161C		phosphorite	D Bed Ore zone	92	3.3	7.1	0.04	0.05	82.4	71	440	<100	783	235	57	0.6	28.2	0.36	0.19	0.07	0.18	13.50	0.02
wpsJ162C		phosphorite	D Bed Ore zone	92	1.9	4.1	0.02	0.03	85.2	99	495	<100	993	142	35	0.3	30.0	0.29	0.12	0.07	0.13	14.60	0.01
wpsJ163C		phosphorite	D Bed Ore zone	85	6.0	12.9	0.05	0.07	85.3	84	325	<100	800	257	60	0.7	27.1	0.33	0.27	0.08	0.15	13.10	0.03
wpsJ164C		mudstone	Upper Waste	7	27.7	59.3	0.36	0.49	82.2	246	580	101	124	82	325	5.0	2.7	2.03	1.78	0.39	0.70	1.12	0.25
wpsJ168C		phosphorite	Upper Waste	44	24.8	53.0	0.05	0.07	94.4	81	321	<100	417	157	75	0.9	15.1	0.39	0.28	0.07	0.16	6.90	0.02
wpsJ169C		siltstone	Upper Waste	6	31.5	67.4	0.21	0.28	83.1	143	293	<100	116	99	283	3.5	2.4	1.43	1.13	0.21	0.47	1.04	0.13
wpsJ170C		mudstone	Upper Waste	15	23.6	50.5	0.31	0.42	79.4	249	1230	128	205	214	230	5.5	4.5	2.19	1.83	0.44	0.47	1.97	0.23
wpsJ172C		mudstone	Upper Waste	2	19.3	41.3	0.25	0.34	72.2	155	280	253	127	54	234	3.9	8.1	1.54	1.33	4.08	0.54	0.70	0.18
wpsJ172X		mudstone	Upper Waste		19.7	42.1	0.26	0.35	73.0	168	293	232	137	58	244	3.8	8.1	1.53	1.32	4.01	0.53	0.70	0.18
wpsJ175C		mudstone	Upper Waste	10	25.0	53.5	0.34	0.46	84.3	243	734	228	185	125	227	5.2	5.1	2.29	1.89	1.47	0.54	1.31	0.21
wpsJ177C		mudstone	Upper Waste	3	30.1	64.4	0.42	0.57	89.7	252	346	237	92	55	318	5.9	2.3	2.77	2.06	0.81	0.64	0.43	0.29
wpsj181C		mudstone	Upper Waste	3	30.3	64.8	0.41	0.55	86.7	218	274	109	64	52	314	5.4	0.7	2.52	1.75	0.36	0.55	0.28	0.24
wpsJ184C		mudstone	Upper Waste	8	23.4	50.1	0.32	0.43	73.3	198	712	125	95	66	254	6.2	2.2	2.42	2.11	0.48	0.35	0.96	0.23
wpsJ184X		mudstone	Upper Waste		25.9	55.4	0.37	0.50	79.6	237	769	128	100	78	302	6.2	2.2	2.41	2.07	0.47	0.34	0.95	0.28
wpsJ186C		phosphorite	Upper Waste	61	13.1	28.0	0.09	0.12	83.3	108	965	<100	665	774	90	1.7	18.4	1.27	0.61	0.21	0.16	8.76	0.06
wpsJ187C		chert	Rex Chert	2	41.2	88.1	<0.01		91.2	26	113	<100	37	39	<10	0.2	0.9	0.30	0.05	0.02	0.04	0.41	0.01

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Ag, ppm, ICP-40	As, ppm, ICP-40	Ba, ppm, ICP-40	Cd, ppm, ICP-40	Ce, ppm, ICP-40	Co, ppm, ICP-40	Cr, ppm, ICP-40	Cu, ppm, ICP-40	Eu, ppm, ICP-40	Ga, ppm, ICP-40	Ho, ppm, ICP-40	La, ppm, ICP-40	Li, ppm, ICP-40	Mn, ppm, ICP-40	Mo, ppm, ICP-40	Nb, ppm, ICP-40	Nd, ppm, ICP-40	Ni, ppm, ICP-40	Pb, ppm, ICP-40
wpsJ111X	Middle Waste	phosphorite		5	20	234	37	56	10	1050	80	3	9	<4	100	20	136	47	7	71	736	12
wpsJ114C	Middle Waste	mudstone		6	18	214	19	59	5	1170	103	4	12	5	160	21	57	38	5	104	408	11
wpsJ117C	Middle Waste	mudstone		5	11	206	10	56	4	813	81	4	11	<4	172	16	71	24	5	104	357	12
wpsJ121C	Middle Waste	mudstone		6	<10	199	20	46	6	982	95	3	12	<4	117	23	48	35	<4	81	419	11
wpsJ123C	Middle Waste	mudstone		6	15	182	57	41	5	1290	116	4	12	5	174	24	41	47	5	104	513	11
wpsJ125C	Middle Waste	mudstone		4	<10	195	4	61	8	419	58	3	8	<4	75	10	111	11	5	65	235	9
wpsJ128C	Middle Waste	siltstone		<2	26	104	2	31	4	205	29	<2	<4	<4	23	4	348	8	<4	29	82	5
wpsJ131C	Middle Waste	siltstone		6	24	201	17	53	6	802	84	3	10	<4	126	16	121	30	<4	89	302	10
wpsJ136C	Middle Waste	mudstone		10	17	206	54	41	7	1270	130	2	12	<4	81	28	89	46	5	54	604	11
wpsJ140C	Middle Waste	mudstone		10	32	218	50	43	6	1240	140	3	11	<4	110	26	56	39	<4	68	656	12
wpsJ143C	Middle Waste	siltstone		10	14	251	34	48	8	1330	158	3	14	<4	116	33	69	41	5	80	707	11
wpsJ145C	Middle Waste	siltstone		9	<10	237	37	46	8	1250	137	3	13	<4	96	33	62	29	5	63	952	12
wpsJ145X	Middle Waste	siltstone		6	<10	208	47	44	11	1150	122	2	13	<4	92	30	53	32	6	58	938	14
wpsJ147C	Middle Waste	mudstone		4	<10	242	37	50	12	682	78	2	16	4	60	28	44	15	8	43	1770	16
wpsJ147X	Middle Waste	mudstone		6	<10	252	58	57	12	792	89	2	17	<4	71	29	53	28	9	51	1330	15
wpsJ148C	Middle Waste	siltstone		8	<10	198	122	42	7	892	100	<2	12	<4	80	22	71	50	<4	54	459	15
wpsJ149C		phosphorite	D Bed Ore zone	12	18	119	151	38	4	1270	121	3	8	<4	143	16	40	68	<4	93	304	21
wpsJ150C		phosphorite	D Bed Ore zone	11	<10	102	207	34	4	1560	149	3	8	<4	133	16	26	114	<4	104	368	23
wpsJ151C		phosphorite	D Bed Ore zone	17	14	128	234	30	4	1270	132	2	13	<4	90	21	40	142	4	76	381	22
wpsJ153C		phosphorite	D Bed Ore zone	14	<10	104	298	21	3	1240	144	<2	10	<4	74	18	28	150	<4	65	362	21
wpsJ154C		phosphorite	D Bed Ore zone	12	<10	96	340	22	3	1090	144	<2	11	<4	83	15	33	181	<4	74	423	26
wpsJ155C		phosphorite	D Bed Ore zone	2	<10	93	74	26	3	653	49	3	5	<4	143	7	32	28	<4	94	151	20
wpsJ156C		phosphorite	D Bed Ore zone	<2	<10	116	43	32	3	577	39	3	8	5	174	6	139	20	<4	128	105	22
wpsJ158C		phosphorite	D Bed Ore zone	2	<10	91	41	36	<2	441	40	3	6	<4	148	7	24	26	5	105	111	15
wpsJ159C		phosphorite	D Bed Ore zone	9	12	121	28	47	4	542	56	5	7	6	184	9	42	23	<4	144	148	23
wpsJ160C		phosphorite	D Bed Ore zone	<2	<10	80	49	46	3	600	48	6	5	7	267	6	24	27	<4	177	112	18
wpsJ161C		phosphorite	D Bed Ore zone	<2	<10	66	55	29	3	437	49	3	5	<4	142	5	24	18	<4	123	110	19
wpsJ162C		phosphorite	D Bed Ore zone	<2	<10	87	81	19	<2	456	39	<2	<4	<4	77	5	48	19	<4	63	93	14
wpsJ163C		phosphorite	D Bed Ore zone	<2	<10	79	31	31	<2	317	30	3	<4	<4	149	6	39	12	<4	100	81	13
wpsJ164C		mudstone	Upper Waste	9	22	243	47	61	8	518	48	<2	16	<4	52	24	98	31	11	65	240	20
wpsJ168C		phosphorite	Upper Waste	<2	<10	74	5	22	2	279	17	3	<4	<4	116	7	40	8	<4	96	54	11
wpsJ169C		siltstone	Upper Waste	<2	12	158	4	45	4	303	20	3	9	<4	75	13	78	24	5	82	121	15
wpsJ170C		mudstone	Upper Waste	7	<10	236	54	74	7	1310	135	4	18	<4	138	36	126	165	6	112	613	31
wpsJ172C		mudstone	Upper Waste	<2	<10	162	5	45	4	308	32	2	12	<4	37	16	249	10	6	49	211	17
wpsJ172X		mudstone	Upper Waste	<2	<10	168	4	42	4	241	28	<2	9	<4	39	16	245	10	<4	49	210	16
wpsJ175C		mudstone	Upper Waste	<2	14	220	5	54	8	704	55	3	18	<4	82	27	216	19	10	69	366	23
wpsJ177C		mudstone	Upper Waste	<2	12	248	5	61	9	327	27	3	17	<4	42	20	230	13	17	59	294	28
wpsj181C		mudstone	Upper Waste	<2	11	199	<2	68	9	230	19	3	16	<4	36	18	100	8	13	57	183	20
wpsJ184C		mudstone	Upper Waste	4	11	233	25	60	8	824	60	2	22	<4	52	30	129	38	13	45	345	25
wpsJ184X		mudstone	Upper Waste	5	14	226	27	58	8	784	58	3	18	<4	52	28	109	34	15	47	327	25
wpsJ186C		phosphorite	Upper Waste	<2	<10	95	43	82	3	948	55	12	10	13	471	27	68	25	<4	334	174	21
wpsJ187C		chert	Rex Chert	<2	<10	29	4	11	4	123	9	<2	<4	<4	34	12	54	<2	<4	34	8	<4

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Sc, ppm, ICP-40	Sr, ppm, ICP-40	Th, ppm, ICP-40	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40	**Ag ppm, EDXRF**	**As ppm, EDXRF**	**Ba ppm, EDXRF**	**Cd ppm, EDXRF**	**Ce ppm, EDXRF**	**Cr ppm, EDXRF**	**Cu ppm, EDXRF**	**La ppm, EDXRF**	**Mo ppm, EDXRF**	**Nb ppm, EDXRF**	**Nd ppm, EDXRF**	**Ni ppm, EDXRF**
wpsJ111X	Middle Waste	phosphorite		9	327	10	407	176	9	2630	10	28	223	44	57	1060	83	94	60	10	53	656
wpsJ114C	Middle Waste	mudstone		9	555	9	230	303	12	1490	10	24	217	25	58	1340	109	150	54	9	81	392
wpsJ117C	Middle Waste	mudstone		7	527	<6	150	292	12	1750	9	21	188	12	47	945	79	142	35	7	87	342
wpsJ121C	Middle Waste	mudstone		8	467	6	210	229	10	1540	11	22	207	26	50	1090	94	110	49	7	73	367
wpsJ123C	Middle Waste	mudstone		7	742	<6	346	349	15	2130	11	17	167	80	35	1290	116	146	72	7	91	463
wpsJ125C	Middle Waste	mudstone		8	303	7	99	119	6	1230	6.8	27.9	189.8	4.5	58.5	469.5	60.5	65.1	11.4	11.1	51.4	209.7
wpsJ128C	Middle Waste	siltstone		5	244	<6	60	29	2	686	2	19	103	<1	33	188	18	21	9	7	24	73
wpsJ131C	Middle Waste	siltstone		8	595	6	148	226	10	1250	10	33	198	23	44	926	87	100	41	9	65	268
wpsJ136C	Middle Waste	mudstone		9	508	8	374	162	8	2410	18	32	218	83	41	1490	139	79	69	9	36	557
wpsJ140C	Middle Waste	mudstone		9	693	7	323	217	10	2790	12	30	208	56	47	1430	140	100	49	7	52	618
wpsJ143C	Middle Waste	siltstone		10	538	7	324	220	10	2090	16	33	221	68	43	1570	155	104	56	10	69	622
wpsJ145C	Middle Waste	siltstone		10	465	8	332	182	8	3590												
wpsJ145X	Middle Waste	siltstone		9	452	10	423	177	8	3620	13	26	216	69	41	1340	133	82	43	10	56	883
wpsJ147C	Middle Waste	mudstone		11	257	8	285	102	6	5330												
wpsJ147X	Middle Waste	mudstone		11	335	12	350	129	7	4350	10	18	241	78	51	860	91	60	31	12	49	1210
wpsJ148C	Middle Waste	siltstone		4	524	<6	913	147	7	2700	14	27	207	177	40	966	96	68	69	10	38	495
wpsJ149C		phosphorite	D Bed Ore zone	5	823	9	731	245	11	3200	14	18	127	222	33	1400	123	124	81	5	74	389
wpsJ150C		phosphorite	D Bed Ore zone	5	754	9	986	215	10	4040	14	21	102	317	25	1795	146	122	136	5	63	482
wpsJ151C		phosphorite	D Bed Ore zone	5	586	12	1490	147	7	3500	17	22	127	331	25	1340	123	80	165	6	47	466
wpsJ153C		phosphorite	D Bed Ore zone	3	711	9	1680	120	6	3800	13	18	104	437	19	1440	133	67	175	5	37	469
wpsJ154C		phosphorite	D Bed Ore zone	2	774	12	2140	140	7	5640	14	13	86	459	18	1050	132	69	196	5	36	485
wpsJ155C		phosphorite	D Bed Ore zone	3	909	8	442	236	11	1790	8	7	87	101	21	695	39	117	34	3	61	191
wpsJ156C		phosphorite	D Bed Ore zone	3	908	6	339	299	14	1420	5	7	109	62	24	545	33	149	25	5	76	144
wpsJ158C		phosphorite	D Bed Ore zone	3	847	10	454	255	12	1380	6	7	95	62	29	488	34	130	32	3	63	141
wpsJ159C		phosphorite	D Bed Ore zone	5	617	13	341	311	15	1160	10	22	119	40	49	471	48	162	26	6	81	179
wpsJ160C		phosphorite	D Bed Ore zone	5	940	7	261	445	20	1580	6	12	69	66	39	519	35	199	28	<2	120	144
wpsJ161C		phosphorite	D Bed Ore zone	<2	762	12	382	224	9	1660	8	8	67	81	28	455	31	120	22	12	66	149
wpsJ162C		phosphorite	D Bed Ore zone	<2	934	11	461	129	5	2120	4	4	94	102	13	482	31	70	21	2	27	123
wpsJ163C		phosphorite	D Bed Ore zone	3	784	<6	249	245	10	1280	4	5	80	43	28	295	16	131	10	4	58	101
wpsJ164C		mudstone	Upper Waste	9	121	10	167	78	5	1560	6	27	267	39	56	681	53	59	29	12	43	287
wpsJ168C		phosphorite	Upper Waste	<2	402	<6	88	150	6	468	1	7	76	7	25	263	11	101	10	3	79	70
wpsJ169C		siltstone	Upper Waste	5	123	8	99	100	5	522	2	19	170	5	52	338	21	90	26	8	83	128
wpsJ170C		mudstone	Upper Waste	10	200	12	386	198	10	2250	5	30	260	49	69	1350	141	148	157	10	97	696
wpsJ172C		mudstone	Upper Waste	6	137	10	89	53	3	706												
wpsJ172X		mudstone	Upper Waste	5	136	<6	88	53	3	717	1	7	183	5	40	270	28	43	9	9	37	238
wpsJ175C		mudstone	Upper Waste	9	173	9	109	118	7	1080	2	19	240	6	55	740	53	93	19	12	72	416
wpsJ177C		mudstone	Upper Waste	10	89	14	119	50	4	910	2	18	258	5	65	330	28	46	11	14	50	312
wpsj181C		mudstone	Upper Waste	9	58	10	112	42	3	996	<1	16	226	3	76	267	26	43	7	14	54	217
wpsJ184C		mudstone	Upper Waste	10	97	7	233	71	5	1400												
wpsJ184X		mudstone	Upper Waste	10	98	13	233	70	5	1440	3	21	259	24	61	869	63	59	34	12	50	378
wpsJ186C		phosphorite	Upper Waste	7	622	<6	401	669	31	707	4	13	103	67	72	1060	62	444	31	3	311	241
wpsJ187C		chert	Rex Chert	<2	40	<6	28	41	2	83	<1	2	37	3	16	111	7	39	2	<2	37	12

Section J (wpsJ) Channel Sample Geochemistry

WUSP Sample	Unit	Lithology	Unit within or adjacent to Meade Peak Member	Pb ppm, EDXRF	Rb ppm, EDXRF	Sb ppm, EDXRF	Se ppm, EDXRF	Sn ppm, EDXRF	Sr ppm, EDXRF	Th ppm, EDXRF	U ppm, EDXRF	V ppm, EDXRF	Y ppm, EDXRF	Zn ppm, EDXRF	Zr ppm, EDXRF
wpsJ111X	Middle Waste	phosphorite		12	62	8	74	<2	304	7	23	382	146	2620	266
wpsJ114C	Middle Waste	mudstone		13	52	7	72	<2	578	6	41	190	268	1680	238
wpsJ117C	Middle Waste	mudstone		10	49	6	52	2	513	4	28	121	238	1820	206
wpsJ121C	Middle Waste	mudstone		10	53	7	59	2	462	6	29	168	191	1610	198
wpsJ123C	Middle Waste	mudstone		13	41	5	53	3	731	3	45	261	299	2220	155
wpsJ125C	Middle Waste	mudstone		10	52.1	7.6	34.6	2.5	285.2	7.4	13.3	82.4	99	1290	288.7
wpsJ128C	Middle Waste	siltstone		4	29	3	21	<2	232	<2	4	39	30	696	183
wpsJ131C	Middle Waste	siltstone		11	52	6	54	<2	587	5	33	116	191	1320	229
wpsJ136C	Middle Waste	mudstone		13	63	6	75	2	525	3	38	357	141	2660	189
wpsJ140C	Middle Waste	mudstone		11	55	9	71	<2	669	5	48	275	185	2900	182
wpsJ143C	Middle Waste	siltstone		11	63	7	84	<2	537	3	34	278	184	2820	204
wpsJ145C	Middle Waste	siltstone													
wpsJ145X	Middle Waste	siltstone		10	63	7	83	<2	474	3	44	360	157	3890	187
wpsJ147C	Middle Waste	mudstone													
wpsJ147X	Middle Waste	mudstone		15	74	5	95	<2	322	7	35	290	108	4420	239
wpsJ148C	Middle Waste	siltstone		12	59	8	122	3	462	4	66	673	122	2880	179
wpsJ149C		phosphorite	D Bed Ore zone	12	27	6	61	3	783	<2	112	551	257	3590	126
wpsJ150C		phosphorite	D Bed Ore zone	14	25	9	72	3	756	<2	112	775	248	4430	107
wpsJ151C		phosphorite	D Bed Ore zone	16	33	9	83	2	592	<2	112	1130	158	3710	123
wpsJ153C		phosphorite	D Bed Ore zone	14	22	10	67	2	673	<2	135	1290	127	4090	97
wpsJ154C		phosphorite	D Bed Ore zone	16	13	10	59	3	678	<2	225	1360	140	5670	83
wpsJ155C		phosphorite	D Bed Ore zone	8	6	4	21	3	888	<2	128	278	258	1950	63
wpsJ156C		phosphorite	D Bed Ore zone	13	6	5	15	<2	887	<2	117	223	326	1590	84
wpsJ158C		phosphorite	D Bed Ore zone	11	6	4	20	<2	835	<2	137	313	280	1590	80
wpsJ159C		phosphorite	D Bed Ore zone	11	22	5	42	2	591	<2	75	252	326	1280	187
wpsJ160C		phosphorite	D Bed Ore zone	9	4	4	21	2	809	<2	145	159	428	1680	67
wpsJ161C		phosphorite	D Bed Ore zone	13	5	4	16	<2	741	3	133	278	251	1920	78
wpsJ162C		phosphorite	D Bed Ore zone	5	<2	9	10	<2	896	<2	113	321	139	2500	37
wpsJ163C		phosphorite	D Bed Ore zone	7	6	2	12	<2	760	<2	108	161	268	1360	67
wpsJ164C		mudstone	Upper Waste	14	77	10	56	<2	120	8	16	150	88	1720	307
wpsJ168C		phosphorite	Upper Waste	6	8	3	8	<2	366	<2	49	63	153	510	71
wpsJ169C		siltstone	Upper Waste	8	43	3	25	<2	119	6	13	89	106	540	274
wpsJ170C		mudstone	Upper Waste	14	76	5	105	<2	194	9	41	340	218	2380	214
wpsJ172C		mudstone	Upper Waste												
wpsJ172X		mudstone	Upper Waste	6	52	2	32	2	131	5	9	68	58	776	235
wpsJ175C		mudstone	Upper Waste	12	84	3	42	<2	176	4	27	106	138	1210	222
wpsJ177C		mudstone	Upper Waste	14	84	12	28	2	87	7	10	101	59	965	293
wpsj181C		mudstone	Upper Waste	13	79	3	21	2	62	7	5	95	55	1110	305
wpsJ184C		mudstone	Upper Waste												
wpsJ184X		mudstone	Upper Waste	16	92	5	82	<2	100	10	23	206	83	1510	289
wpsJ186C		phosphorite	Upper Waste	14	27	8	440	<2	622	5	124	308	762	869	101
wpsJ187C		chert	Rex Chert	<3	2	<2	4	<2	37	<2	4	30	43	79	13

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Lab No.	Comments	True ft above base of Fish-scale Bed	Monsanto Core down-hole depth, ft	Fe+2 sample	As, ppm, hydride	Hg, ppm, CVAA	Sb, ppm, hydride	Se, ppm, hydride	Tl, ppm, fusion-AA	C, %, combustion	CO2, %, acidification	Carbonate C, %, acidification
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	C-166319		-6.50			2.8	<0.02	<0.6	0.8	1.8	12.1	45.2	12.34
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	C-166311		-3.20			3.1	<0.02	<0.6	0.5	1.3	12.5	46.6	12.72
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	C-166343		0.20			25.2	0.13	7.2	3.4	61	1.19	2.62	0.72
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	C-166312		0.80			325	0.27	16.4	1.8	52.4	0.43	0.14	0.04
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	C-166349		1.26	-487.5		163	0.15	10.3	16	5.3	0.6	0.03	0.01
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	C-166271		1.60		*	80.6	0.14	9.3	11.4	2.8	1.89	5	1.36
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	C-166286		1.89	-486.5		85.5	0.18	11.5	9.2	2.7	1.23	1.8	0.49
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	C-166333		2.85	-485		29.3	0.05	2.3	1.9	1.1	8.83	30.3	8.27
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	C-166281	duplicate of previous sample	2.85			30.2	0.05	2.2	1.8	0.8	8.97	30.6	8.35
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	C-166302		5.40			41.3	0.43	17.1	324	65.8	10.8	5.49	1.5
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	C-166341		7.30			51.5	1.3	32.8	593	73.6	13.4	2.3	0.63
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	C-166308		7.60			21.9	0.61	9.7	213	20	7.47	2.21	0.6
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	C-166296		8.00			24.7	0.61	10.1	205	27.2	8.02	2.18	0.59
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	C-166331		8.20			15.9	0.59	8.6	158	19.6	7.73	2.1	0.57
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	C-166348		8.30			30.3	0.88	13.3	307	30.3	6.86	2.04	0.56
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	C-166332		8.60			14.9	0.55	7.7	142	13.6	5.72	2.02	0.55
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	C-166342		8.70			8.9	0.39	5.7	74.8	10.5	8.47	1.99	0.54
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	C-166321		8.80			42.3	0.83	13.6	300	31.4	7.16	2.14	0.58
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	C-166268		18.80		*	47.8	0.84	23.5	211	16.9	10	2.86	0.78
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	C-166336		27.00			6.9	0.23	2.4	34.1	3.8	5.03	1.16	0.32
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	C-166283		35.70			27.1	0.65	1.7	169	12.2	12.8	2.75	0.75
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	C-166304		36.20			22.2	0.43	6.7	127	1.4	10.2	2.48	0.68
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	C-166280		36.60			32.1	0.62	9.5	151	16.6	13	2.27	0.62
WPSJ50.8K	Middle Waste		mudstone		C-166305		50.80			53.4	1.06	13	158	0.7	12.9	9.07	2.48
WPSJ56.0K	Middle Waste		mudstone		C-166267		56.00		*	32.9	0.71	6	167	0.4	17.7	11.8	3.22
WPSJ62.7K	Middle Waste		mudstone		C-166345		62.70			26	0.57	6.1	107	<0.1	15.6	19.4	5.29
WPSJ68.1K	Middle Waste		mudstone		C-166295		68.10			31	0.48	6.7	161	2.3	7.69	4.44	1.21
WPSJ73.3K	Middle Waste		mudstone		C-166327		73.30			41.8	0.65	9.9	139	0.6	13	6.19	1.69
WPSJ75.2K	Middle Waste		mudstone		C-166269		75.20		*	42.1	0.54	9.5	165	0.8	10.4	4.06	1.11
WPSJ81.1K	Middle Waste	dolostone	dolostone		C-166317		81.10	-363		8.1	0.09	1.1	19.1	<0.1	13.5	40.3	11
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		C-166310		81.70	-362		34.3	0.46	7.6	105	0.4	12.5	12.3	3.36
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		C-166278		82.07	-361.5		43	0.56	8.8	162	0.3	12.4	6.59	1.8
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		C-166351		82.10	-361.4		39.2	0.6	9.6	158	0.7	14.3	6	1.64
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		C-166309		82.20	-361.3		45.4	0.59	13.3	216	1.2	11.9	4.78	1.3
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		C-166299		82.27	-361.2		38.5	0.6	10.8	189	0.6	13.4	3.18	0.87
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		C-166355		82.33	-361.1		43.5	0.54	12.4	204	0.9	13	7.07	1.93
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		C-166340		82.53	-360.8		38.9	0.54	10.4	191	0.7	14.6	5.85	1.6
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		C-166322		83.57	-359.2		30.8	0.43	8.5	138	0.5	16	5.65	1.54
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		C-166274		83.80	-358.8	*	56.6	0.81	12.1	212	0.5	15.7	4.57	1.25
WPSJ83.8KX	Middle Waste		carbon seam		C-166293	duplicate of previous sample	83.80			54.4	0.78	11.9	232	0.6	15.7	4.72	1.29
WPSJ84.7K	Middle Waste	dolostone	dolostone		C-166313		84.70	-357.5		4.6	0.03	<0.6	10.5	<0.1	12.7	43.6	11.9
WPSJ85.1K	Middle Waste	dolostone	dolostone		C-166289		85.10	-356.8		18.6	0.02	1.2	9	0.1	13	43.8	11.95
WPSJ93.13K	Middle Waste	dolostone	mudstone		C-166347		93.13	-344.2		8	0.07	1.1	21.2	<0.1	12.6	39.7	10.84
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		C-166354		93.40	-343.8		46.7	0.52	9.9	155	0.6	8.12	4.78	1.3
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		C-166335		93.80	-343.2		42	0.81	10.8	179	0.5	12.5	6.47	1.77
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		C-166318		94.00	-342.8		38.3	0.61	10.4	161	0.9	11	5.94	1.62
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		C-166284		94.90	-341.4		42.5	0.73	12.7	218	0.5	14.4	5.6	1.53
WPSJ95.3K	Middle Waste	dolostone	mudstone		C-166334		95.30	-340.8		1.1	<0.02	<0.6	6.9	<0.1	13.3	42.5	11.6
WPSJ95.4K	Middle Waste	carbon seam	mudstone		C-166285		95.40	-340.6		35.1	0.37	7.5	116	0.4	13.6	11.5	3.14
WPSJ96.4K	Middle Waste	dolostone	mudstone		C-166352		96.40	-339		13.3	0.12	1.9	29	<0.1	12.6	37.6	10.26
WPSJ96.5K	Middle Waste	carbon seam	mudstone		C-166298		96.50	-338.8		40.1	0.51	8.9	151	0.5	11.7	10.5	2.87
WPSJ97.2K	Middle Waste	dolostone	dolostone		C-166290		97.20	-337.8		11.1	0.1	1.1	18.6	0.1	13.1	39.9	10.89
WPSJ103.3K	Middle Waste		mudstone		C-166330		103.30			28.8	0.38	7.5	130	0.3	17.8	12.5	3.41
WPSJ104.9K	Middle Waste		mudstone		C-166301		104.90			44.3	0.44	10.8	295	1	8.64	4.76	1.3
WPSJ105.4K	Middle Waste		mudstone		C-166316		105.40			38.2	0.46	7.8	127	1.1	13.8	6.78	1.85
WPSJ105.8K	Middle Waste		mudstone		C-166339		105.80			34	0.69	8.7	140	3	13.2	4.21	1.15
WPSJ107.9K	Middle Waste		phosphorite		C-166350		107.90			18	0.32	3.1	58.4	1.3	8.89	1.2	0.33
WPSJ109.9K	Middle Waste		phosphorite		C-166272		109.90		*	27.5	0.3	3.3	51	0.7	7.5	10	2.73
WPSJ117.6K	Middle Waste		mudstone		C-166353		117.60			16.5	0.34	3	55.8	1	8.28	0.78	0.21
WPSJ127.7K	Middle Waste		siltstone		C-166279		127.70			18.7	0.19	1.9	22.4	0.4	8.3	23.9	6.52
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		C-166288		135.00	-278		40.2	0.57	4.3	90	0.5	11.6	3.15	0.86

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Organic C, %, difference	S, %, combustion	Al, %, ICP-16	AlOx, %, ICP-16	Ca, %, ICP-16	CaOx, %, ICP-16	Fe, %, ICP 16	FeOx, %, ICP-16	FeO, %	Fe +2, %	S needed for all Fe+2 as pyrite, %	Residual S if all Fe+2 as pyrite, %	Fe+2, as % total Fe	K, %, ICP-16	KOx, %, ICP-16
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	-0.24	<0.05	0.08	0.15	20.1	28.1	0.03	0.04						0.03	0.04
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	-0.22	<0.05	0.08	0.15	20.5	28.7	0.04	0.06						0.02	0.02
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	0.47	0.75	0.39	0.74	34.5	48.3	0.13	0.19						0.17	0.20
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	0.39	0.05	4.42	8.35	0.55	0.8	5.27	7.54						2.02	2.43
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	0.59	0.09	5.32	10.05	0.6	0.8	4.25	6.08						2.29	2.76
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	0.53	0.05	5.58	10.54	2.73	3.8	2.65	3.79	0.12	0.09	0.05	0.00	4%	2.35	2.83
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	0.74	0.08	5.83	11.01	1.21	1.7	2.95	4.22						2.52	3.04
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	0.56	0.1	1.83	3.46	14.9	20.8	0.77	1.10						0.88	1.06
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	0.62	0.06	2.01	3.80	16.1	22.5	0.79	1.13						0.89	1.07
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	9.3	3.92	4.26	8.05	3.49	4.9	2.13	3.05						1.96	2.36
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	12.77	5.1	1.28	2.42	21.4	29.9	1.15	1.64						0.7	0.84
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	6.87	2.66	0.55	1.04	30.1	42.1	0.41	0.59						0.27	0.33
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	7.43	2.73	0.62	1.17	28.9	40.4	0.4	0.57						0.32	0.39
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	7.16	2.63	0.43	0.81	31	43.4	0.33	0.47						0.22	0.27
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	6.3	2.93	0.45	0.85	31.1	43.5	0.4	0.57						0.22	0.27
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	5.17	2.05	0.34	0.64	32.7	45.7	0.19	0.27						0.16	0.19
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	7.93	2.4	0.4	0.76	31.8	44.5	0.25	0.36						0.21	0.25
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	6.58	2.88	0.49	0.93	30.5	42.7	0.39	0.56						0.25	0.30
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	9.22	3.03	2.17	4.10	20.2	28.3	1.31	1.87	0.26	0.20	0.12	2.91	15%	1.35	1.63
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	4.71	1.2	0.39	0.74	33.5	46.9	0.21	0.30						0.25	0.30
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	12.05	2.97	1.39	2.63	24	33.6	0.7	1.00						0.79	0.95
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	9.52	1.88	1.28	2.42	26.9	37.6	0.62	0.89						0.58	0.70
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	12.38	2.98	1.15	2.17	23.9	33.4	0.63	0.90						0.65	0.78
WPSJ50.8K	Middle Waste		mudstone		10.42	3.7	5.45	10.30	10.1	14.1	2.4	3.43						2.37	2.86
WPSJ56.0K	Middle Waste		mudstone		14.48	3.26	4.1	7.74	14.2	19.9	1.78	2.55	0.39	0.30	0.17	3.09	17%	1.75	2.11
WPSJ62.7K	Middle Waste		mudstone		10.31	2.6	2.74	5.18	20	28.0	1.25	1.79						1.21	1.46
WPSJ68.1K	Middle Waste		mudstone		6.48	0.82	3.59	6.78	15.8	22.1	1.52	2.17						1.38	1.66
WPSJ73.3K	Middle Waste		mudstone		11.31	4.52	4.54	8.58	10.4	14.5	2.62	3.75						1.93	2.33
WPSJ75.2K	Middle Waste		mudstone		9.29	3.35	5.3	10.01	4.97	7.0	2.26	3.23	0.29	0.23	0.13	3.22	10%	2.26	2.72
WPSJ81.1K	Middle Waste	dolostone	dolostone		2.5	0.7	0.95	1.79	21.8	30.5	0.44	0.63						0.4	0.48
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		9.14	3.18	3.78	7.14	17.3	24.2	1.92	2.75						1.64	1.98
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		10.6	3.49	5.43	10.26	10.4	14.5	2.17	3.10						2.28	2.75
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		12.66	3.74	3.42	6.46	14.7	20.6	1.85	2.65						1.48	1.78
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		10.6	4.19	5	9.45	8.78	12.3	2.61	3.73						2.21	2.66
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		12.53	3.74	4.05	7.65	12.5	17.5	2.12	3.03						1.74	2.10
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		11.07	4.44	4.77	9.01	8.37	11.7	2.57	3.68						1.78	2.14
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		13	4.1	3.69	6.97	13.5	18.9	2.16	3.09						1.51	1.82
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		14.46	3.43	2.4	4.53	20.5	28.7	1.37	1.96						1.06	1.28
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		14.45	4.52	3.42	6.46	14.4	20.1	2.61	3.73	0.59	0.46	0.26	4.26	18%	1.37	1.65
WPSJ83.8KX	Middle Waste		carbon seam		14.41	4.38	3.37	6.37	14.8	20.7	2.55	3.65						1.39	1.67
WPSJ84.7K	Middle Waste	dolostone	dolostone		0.8	0.41	0.56	1.06	22.9	32.0	0.23	0.33						0.24	0.29
WPSJ85.1K	Middle Waste	dolostone	dolostone		1.05	0.25	0.58	1.10	23.2	32.5	0.22	0.31						0.24	0.29
WPSJ93.13K	Middle Waste	dolostone	mudstone		1.76	0.62	1.08	2.04	22.4	31.3	0.45	0.64						0.45	0.54
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		6.82	3.78	5.68	10.73	7.11	9.9	2.41	3.45						2.44	2.94
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		10.73	3.7	3.65	6.89	15.1	21.1	1.95	2.79						1.54	1.86
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		9.38	3.45	3.68	6.95	14.5	20.3	1.9	2.72						1.53	1.84
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		12.87	3.57	4.01	7.57	14.2	19.9	2.14	3.06						1.69	2.04
WPSJ95.3K	Middle Waste	dolostone	mudstone		1.7	0.19	0.17	0.32	34.2	47.8	0.05	0.07						0.06	0.07
WPSJ95.4K	Middle Waste	carbon seam	mudstone		10.46	2.58	2.82	5.33	21	29.4	1.42	2.03						1.19	1.43
WPSJ96.4K	Middle Waste	dolostone	mudstone		2.34	0.82	1.52	2.87	22.8	31.9	0.59	0.84						0.69	0.83
WPSJ96.5K	Middle Waste	carbon seam	mudstone		8.83	3.13	3.88	7.33	15.7	22.0	2.03	2.90						1.66	2.00
WPSJ97.2K	Middle Waste	dolostone	dolostone		2.21	0.62	0.91	1.72	23.5	32.9	0.45	0.64						0.41	0.49
WPSJ103.3K	Middle Waste		mudstone		14.39	2.84	1.68	3.17	22	30.8	1.05	1.50						0.69	0.83
WPSJ104.9K	Middle Waste		mudstone		7.34	3.22	4.88	9.22	4.66	6.5	2.43	3.47						1.96	2.36
WPSJ105.4K	Middle Waste		mudstone		11.95	3.65	4.2	7.93	10.6	14.8	2.04	2.92						1.7	2.05
WPSJ105.8K	Middle Waste		mudstone		12.05	3.64	3.51	6.63	11.1	15.5	1.73	2.47						1.42	1.71
WPSJ107.9K	Middle Waste		phosphorite		8.56	2.4	2.03	3.83	20.3	28.4	0.98	1.40						0.78	0.94
WPSJ109.9K	Middle Waste		phosphorite		4.77	2.71	4.12	7.78	6.12	8.6	1.98	2.83	0.17	0.13	0.08	2.63	7%	1.51	1.82
WPSJ117.6K	Middle Waste		mudstone		8.07	2.28	1.97	3.72	19.8	27.7	0.96	1.37						0.74	0.89
WPSJ127.7K	Middle Waste		siltstone		1.78	1.56	2.74	5.18	11.3	15.8	1.3	1.86						0.92	1.11
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		10.74	3.16	4.04	7.63	6.86	9.6	1.89	2.70						1.63	1.96

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Mg, %, ICP-16	MgOx, %, ICP-16	Na, %, ICP 16	NaOx, %, ICP-16	P, %, ICP-16	POx, %, ICP-16	Apatite (CFA), %, XRD	Si, %, ICP-16	SiOx, %, ICP-16	Ti, %, ICP 16	TiOx, %, ICP-16	Sum Oxides, %	Ba, ppm, ICP-16	Cr, ppm, ICP-16	Mn, ppm, ICP-16	Sr, ppm, ICP-16
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	15.3	25.37	0.04	0.05	0.11	0.25	0	2.03	4.3	<0.01		58	63	23	1460	88
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	16.6	27.52	0.02	0.03	0.13	0.30	2	1.05	2.2	<0.01		59	13	28	626	67
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	0.37	0.61	0.48	0.65	16.9	38.72	76	2.84	6.1	0.03	0.05	96	1450	264	17850	904
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	0.37	0.61	0.07	0.09	0.13	0.30	0.2	34.8	74.4	0.4	0.67	95	285	264	9340	46
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	0.48	0.80	0.09	0.12	0.13	0.30	0.1	35.1	75.1	0.49	0.82	97	265	640	1230	50
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	1.75	2.90	0.09	0.12	0.1	0.23	1	35.9	76.8	0.49	0.82	102	273	359	428	64
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	0.94	1.56	0.09	0.12	0.07	0.16	0	35.5	75.9	0.52	0.87	99	306	331	517	55
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	7.15	11.85	0.26	0.35	0.04	0.09	0	13.4	28.7	0.16	0.27	68	104	74	120	90
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	7.81	12.95	0.29	0.39	0.04	0.09		14.9	31.9	0.18	0.30	74	111	84	112	98
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	1.51	2.50	0.17	0.23	0.11	0.25	1	28.9	61.8	0.36	0.60	84	251	1030	150	54
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	0.44	0.73	0.42	0.57	7.82	17.92	0.3	7.84	16.8	0.09	0.15	71	99	1530	<100	712
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	0.24	0.40	0.62	0.84	15.2	34.83	80	3.31	7.1	0.04	0.07	87	61	716	<100	970
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	0.28	0.46	0.6	0.81	11.7	26.81	80	3.71	7.9	0.05	0.08	79	62	826	<100	1010
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	0.21	0.35	0.57	0.77	12.7	29.10	75	2.96	6.3	0.03	0.05	82	55	659	<100	1050
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	0.2	0.33	0.57	0.77	11.6	26.58	89	2.61	5.6	0.03	0.05	79	51	669	<100	1010
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	0.15	0.25	0.59	0.80	16.7	38.27	75	2.5	5.3	0.03	0.05	92	50	579	<100	1040
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	0.15	0.25	0.58	0.78	12.9	29.56	83	2.4	5.1	0.03	0.05	82	64	555	<100	1170
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	0.21	0.35	0.59	0.80	13.4	30.70	82	2.94	6.3	0.04	0.07	83	55	807	<100	1050
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	0.65	1.08	0.29	0.39	7.34	16.82	55	12	25.7	0.15	0.25	80	139	1180	<100	610
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	0.07	0.12	0.21	0.28	13.1	30.02	88	3.13	6.7	0.03	0.05	85	88	246	<100	1010
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	0.45	0.75	0.31	0.42	8.83	20.23	65	8.65	18.5	0.11	0.18	78	112	1220	<100	748
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	0.41	0.68	0.4	0.54	13.1	30.02	80	6.22	13.3	0.09	0.15	86	163	1070	<100	1090
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	0.33	0.55	0.26	0.35	8.96	20.53	73	6.69	14.3	0.1	0.17	73	102	1040	<100	758
WPSJ50.8K	Middle Waste		mudstone		1.01	1.67	0.51	0.69	1.16	2.66	6	20	42.8	0.28	0.47	79	218	3140	140	346
WPSJ56.0K	Middle Waste		mudstone		1.11	1.84	0.46	0.62	1.94	4.45	13	15.2	32.5	0.23	0.38	72	209	2180	110	678
WPSJ62.7K	Middle Waste		mudstone		1.05	1.74	0.23	0.31	1.52	3.48	12	11.6	24.8	0.17	0.28	67	151	1840	<100	795
WPSJ68.1K	Middle Waste		mudstone		1.1	1.82	0.58	0.78	5.26	12.05	43	18.3	39.1	0.25	0.42	87	271	1350	<100	621
WPSJ73.3K	Middle Waste		mudstone		0.76	1.26	0.46	0.62	2.26	5.18	18	18.4	39.4	0.29	0.48	76	243	3170	154	512
WPSJ75.2K	Middle Waste		mudstone		1.04	1.72	0.77	1.04	1.1	2.52	8	26.6	56.9	0.41	0.68	86	286	1260	152	264
WPSJ81.1K	Middle Waste	dolostone	dolostone		8.81	14.61	0.1	0.13	0.15	0.34	1	3.83	8.2	0.06	0.10	57	17	179	197	254
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		0.95	1.58	0.27	0.36	2.78	6.37	19	14.6	31.2	0.21	0.35	76	183	1320	140	560
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		1.06	1.76	0.26	0.35	2.25	5.16	20	21.1	45.1	0.31	0.52	84	249	2550	137	406
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		0.69	1.14	0.22	0.30	4.08	9.35	34	12.8	27.4	0.2	0.33	70	183	2420	101	661
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		1.01	1.67	0.62	0.84	2.32	5.32	16	21.9	46.8	0.33	0.55	83	286	1920	149	437
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		0.75	1.24	0.44	0.59	4.2	9.62	33	16	34.2	0.26	0.43	76	251	1980	103	735
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		1.07	1.77	0.57	0.77	1.47	3.37	10	19.1	40.9	0.3	0.50	74	234	1850	136	333
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		0.73	1.21	0.41	0.55	3.56	8.16	31	15	32.1	0.23	0.38	73	211	2530	112	668
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		0.55	0.91	0.29	0.39	6.41	14.69	50	9.66	20.7	0.15	0.25	73	179	1870	<100	1150
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		0.71	1.18	0.25	0.34	4.08	9.35	35	14.2	30.4	0.2	0.33	74	178	4970	<100	717
WPSJ83.8KX	Middle Waste		carbon seam		0.7	1.16	0.26	0.35	4.33	9.92		14	29.9	0.2	0.33	74	173	4830	<100	763
WPSJ84.7K	Middle Waste	dolostone	dolostone		8.57	14.21	0.05	0.07	0.06	0.14	1	2.19	4.7	0.03	0.05	53	14	115	291	313
WPSJ85.1K	Middle Waste	dolostone	dolostone		8.98	14.89	0.06	0.08	0.05	0.11	1	2.15	4.6	0.03	0.05	54	13	92	208	287
WPSJ93.13K	Middle Waste	dolostone	mudstone		7.97	13.21	0.13	0.18	0.03	0.07	0	4.56	9.8	0.06	0.10	58	22	315	329	331
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		0.94	1.56	0.35	0.47	1.58	3.62	13	21.4	45.8	0.32	0.53	79	275	1290	134	293
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		0.65	1.08	0.19	0.26	3.9	8.94	34	14.1	30.2	0.21	0.35	73	197	2370	132	710
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		0.64	1.06	0.46	0.62	3.98	9.12	34	16.3	34.9	0.25	0.42	78	255	1410	130	774
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		0.76	1.26	0.38	0.51	3.78	8.66	30	16.3	34.9	0.25	0.42	78	236	2770	138	775
WPSJ95.3K	Middle Waste	dolostone	mudstone		1.95	3.23	0.04	0.05	0.2	0.46	1	0.92	2.0	<0.01		54	18	231	185	794
WPSJ95.4K	Middle Waste	carbon seam	mudstone		0.86	1.43	0.37	0.50	4.49	10.29	35	12.3	26.3	0.17	0.28	77	197	1400	130	989
WPSJ96.4K	Middle Waste	dolostone	mudstone		6.4	10.61	0.12	0.16	0.1	0.23	0	5.66	12.1	0.07	0.12	60	29	405	343	417
WPSJ96.5K	Middle Waste	carbon seam	mudstone		1.81	3.00	0.3	0.40	3.41	7.81	27	15.3	32.7	0.24	0.40	79	210	1460	157	668
WPSJ97.2K	Middle Waste	dolostone	dolostone		8.15	13.51	0.12	0.16	0.35	0.80	3	3.75	8.0	0.06	0.10	58	22	163	219	371
WPSJ103.3K	Middle Waste		mudstone		0.77	1.28	0.17	0.23	4.66	10.68	44	7.41	15.8	0.1	0.17	64	149	2610	112	1080
WPSJ104.9K	Middle Waste		mudstone		0.85	1.41	0.85	1.15	0.62	1.42	0	28.9	61.8	0.41	0.68	88	272	944	182	180
WPSJ105.4K	Middle Waste		mudstone		0.86	1.43	0.27	0.36	2.06	4.72	16	18.6	39.8	0.25	0.42	74	212	3230	231	333
WPSJ105.8K	Middle Waste		mudstone		0.82	1.36	0.34	0.46	3.22	7.38	27	17.5	37.4	0.25	0.42	73	223	2620	125	533
WPSJ107.9K	Middle Waste		phosphorite		0.29	0.48	0.37	0.50	7.67	17.58	62	11.5	24.6	0.16	0.27	78	191	981	<100	943
WPSJ109.9K	Middle Waste		phosphorite		2.67	4.43	0.97	1.31	0.56	1.28	3	26.6	56.9	0.35	0.58	85	152	373	257	136
WPSJ117.6K	Middle Waste		mudstone		0.14	0.23	0.33	0.44	7.53	17.25	59	12.9	27.6	0.15	0.25	79	177	1330	<100	870
WPSJ127.7K	Middle Waste		siltstone		5.58	9.25	0.86	1.16	0.13	0.30	0.4	17	36.4	0.24	0.40	71	108	209	318	177
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		0.94	1.56	0.68	0.92	2.11	4.83	18	24	51.3	0.3	0.50	81	224	1110	115	344

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Y, ppm, ICP-16	Zr, ppm, ICP-16	Al, %, ICP-40	Ca, %, ICP-40	Fe, %, ICP 40	K, %, ICP-40	Mg, %, ICP-40	Na, %, ICP 40	P, %, ICP-40	Ti, %, ICP-40	Ag, ppm, ICP-40	As, ppm, ICP-40	Ba, ppm, ICP-40	Cd, ppm, ICP-40	Ce, ppm, ICP-40	Co, ppm, ICP-40	Cr, ppm, ICP-40
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	<10	<10	0.083	20.3	0.02	0.04	16.1	0.044	0.105	0.006	<2	<10	58	7	<5	<2	4
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	<10	<10	0.066	21.5	0.03	0.03	17.5	0.028	0.135	<0.005	<2	<10	10	15	<5	<2	4
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	319	48	0.402	32.9	0.12	0.18	0.347	0.517	17.9	0.017	3	10	1290	97	53	3	192
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	30	369	4.29	0.534	4.85	1.89	0.363	0.061	0.12	0.213	5	302	276	27	45	40	131
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	36	493	5.148	0.564	3.9	2.2	0.479	0.077	0.12	0.276	3	133	247	13	55	21	202
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	25	458	5.209	2.622	2.46	2.25	1.683	0.083	0.085	0.282	4	77	255	13	68	5	97
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	31	478	5.412	1.2	2.65	2.28	0.886	0.077	0.06	0.282	4	77	277	11	64	5	78
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	16	156	2.035	15	0.78	0.92	7.651	0.286	0.025	0.075	<2	15	99	74	20	<2	39
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	17	172	1.969	14.6	0.75	0.91	7.37	0.27	0.03	0.086	<2	18	94	68	25	<2	9
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	24	379	3.823	3.264	2.06	1.87	1.414	0.149	0.095	0.213	9	43	220	230	47	8	611
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	174	152	1.375	21.1	1.13	0.74	0.446	0.446	7.72	0.04	22	38	101	560	34	4	1380
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	228	86	0.511	28.6	0.37	0.28	0.231	0.567	16.5	0.017	8	<10	56	300	24	2	611
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	183	86	0.567	27.9	0.38	0.32	0.259	0.545	11.3	0.035	10	15	56	291	30	<2	711
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	148	77	0.468	30.1	0.3	0.25	0.204	0.594	13.3	0.029	8	<10	56	342	20	<2	594
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	233	79	0.451	29	0.38	0.25	0.193	0.594	12.9	0.023	13	18	50	366	34	2	566
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	151	71	0.325	30.6	0.18	0.18	0.149	0.616	17.4	0.017	7	<10	49	203	22	<2	507
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	86	65	0.407	29.8	0.24	0.23	0.154	0.589	13.7	0.017	4	<10	62	300	7	<2	514
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	256	86	0.495	29.7	0.37	0.27	0.204	0.594	14.4	0.035	13	35	54	362	41	3	697
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	198	118	2.206	19.9	1.21	1.46	0.638	0.292	7.44	0.052	20	33	130	447	44	4	829
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	97	52	0.402	36	0.2	0.26	0.066	0.22	13.6	0.023	<2	<10	84	123	17	2	229
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	175	140	1.375	22.7	0.66	0.79	0.424	0.286	8.54	0.04	19	18	105	361	17	3	1080
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	425	138	1.282	25.8	0.67	0.64	0.402	0.424	14.6	0.017	17	<10	152	83	58	2	1000
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	208	124	1.177	23.5	0.6	0.69	0.336	0.259	8.885	0.046	18	23	100	310	22	3	988
WPSJ50.8K	Middle Waste		mudstone		74	94	5.132	9.606	2.23	2.26	0.968	0.457	1.115	0.132	11	38	186	2	39	6	2710
WPSJ56.0K	Middle Waste		mudstone		130	99	3.878	13.1	1.67	1.77	1.023	0.424	1.88	0.138	16	<10	189	38	44	6	1770
WPSJ62.7K	Middle Waste		mudstone		101	76	2.871	19.4	1.25	1.27	1.029	0.242	1.525	0.086	<2	<10	141	7	26	4	1710
WPSJ68.1K	Middle Waste		mudstone		166	191	3.207	14.2	1.46	1.31	1.018	0.545	4.9	0.075	11	15	227	49	46	3	1140
WPSJ73.3K	Middle Waste		mudstone		94	165	4.587	10.4	2.59	2.03	0.759	0.457	2.295	0.155	8	32	226	8	46	8	1820
WPSJ75.2K	Middle Waste		mudstone		88	313	5.143	4.884	2.13	2.25	1.012	0.704	1.065	0.19	15	30	268	16	70	9	1000
WPSJ81.1K	Middle Waste	dolostone	dolostone		14	28	0.952	20.8	0.41	0.43	8.586	0.105	0.15	0.029	<2	<10	15	<2	11	<2	63
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		85	88	3.564	15.8	1.75	1.65	0.886	0.253	2.71	0.109	10	19	160	6	43	6	1050
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		100	123	4.884	10.1	2.11	2.18	1.007	0.242	2.2	0.155	13	28	200	4	45	7	1840
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		139	92	3.636	14.9	1.86	1.63	0.699	0.226	4.18	0.109	15	19	181	13	39	5	2190
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		101	209	4.813	8.568	2.49	2.09	0.996	0.567	2.21	0.15	19	36	260	22	55	8	1630
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		148	137	3.933	12	2.02	1.74	0.715	0.413	4.115	0.115	14	18	223	45	58	8	1700
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		86	164	4.901	8.712	2.6	1.95	1.133	0.594	1.585	0.127	18	26	227	28	44	8	1600
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		140	123	3.713	13.1	2.06	1.58	0.715	0.413	3.57	0.098	16	21	189	9	41	6	2050
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		293	80	2.332	19.5	1.25	1.07	0.534	0.281	6.36	0.081	13	12	157	12	63	4	1630
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		213	121	3.267	13.4	2.39	1.35	0.644	0.226	3.875	0.098	20	24	147	13	51	6	3500
WPSJ83.8KX	Middle Waste		carbon seam		222	108	3.212	13.8	2.39	1.34	0.649	0.231	4.115	0.086	20	29	149	12	55	6	3890
WPSJ84.7K	Middle Waste	dolostone	dolostone		<10	20	0.589	22.9	0.22	0.27	9.031	0.055	0.055	0.023	<2	<10	13	<2	8	<2	34
WPSJ85.1K	Middle Waste	dolostone	dolostone		<10	16	0.561	22.7	0.21	0.26	9.273	0.061	0.045	0.023	<2	<10	12	<2	9	<2	23
WPSJ93.13K	Middle Waste	dolostone	mudstone		<10	27	1.155	21.4	0.44	0.51	7.821	0.127	0.025	0.04	<2	<10	20	<2	14	<2	302
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		96	142	6.171	7.392	2.42	2.66	0.93	0.363	1.595	0.178	7	29	254	4	39	9	1110
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		148	93	3.707	14.8	1.9	1.6	0.616	0.187	3.8	0.092	16	26	175	9	45	7	1920
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		125	145	3.707	14.3	1.84	1.57	0.633	0.451	4.06	0.104	13	26	233	42	51	7	1190
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		178	147	3.74	13.1	2.02	1.58	0.704	0.33	3.53	0.104	22	24	196	8	45	7	2280
WPSJ95.3K	Middle Waste	dolostone	mudstone		<10	<10	0.149	34.5	0.04	0.07	2.013	0.044	0.19	0.006	<2	<10	14	<2	<5	<2	49
WPSJ95.4K	Middle Waste	carbon seam	mudstone		160	103	2.635	18.9	1.34	1.15	0.792	0.325	4.25	0.069	10	14	166	17	46	5	1140
WPSJ96.4K	Middle Waste	dolostone	mudstone		12	28	1.59	22.6	0.59	0.71	6.716	0.121	0.085	0.04	<2	<10	26	<2	<5	<2	398
WPSJ96.5K	Middle Waste	carbon seam	mudstone		121	114	3.57	14.3	1.84	1.56	1.65	0.259	3.17	0.098	10	26	177	22	48	6	1220
WPSJ97.2K	Middle Waste	dolostone	dolostone		16	27	0.946	22.6	0.43	0.44	8.338	0.121	0.345	0.035	<2	<10	18	<2	9	<2	158
WPSJ103.3K	Middle Waste		mudstone		355	63	1.711	21.1	1.01	0.75	0.765	0.176	4.675	0.063	8	<10	135	17	51	5	2350
WPSJ104.9K	Middle Waste		mudstone		34	332	4.477	4.47	2.21	1.8	0.798	0.809	0.57	0.173	13	35	228	4	36	7	688
WPSJ105.4K	Middle Waste		mudstone		174	157	4.312	10.5	2.03	1.81	0.853	0.264	2.01	0.127	14	23	204	43	45	8	2780
WPSJ105.8K	Middle Waste		mudstone		292	174	3.509	10.7	1.65	1.48	0.803	0.336	3.225	0.104	10	13	209	263	42	7	2350
WPSJ107.9K	Middle Waste		phosphorite		330	162	2.167	20.5	0.94	0.87	0.286	0.38	8.105	0.029	<2	<10	180	15	48	6	897
WPSJ109.9K	Middle Waste		phosphorite		42	281	4.081	5.934	1.87	1.57	2.596	0.935	0.55	0.109	4	19	142	<2	50	7	318
WPSJ117.6K	Middle Waste		mudstone		437	168	2.052	19.6	0.93	0.82	0.138	0.347	7.625	0.023	7	<10	167	13	60	5	1190
WPSJ127.7K	Middle Waste		siltstone		13	222	2.888	11.5	1.31	0.97	5.836	0.891	0.14	0.098	<2	12	99	<2	12	4	92
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		160	248	4.053	6.954	1.89	1.68	0.985	0.666	2.245	0.127	17	23	212	18	59	7	980

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Cu, ppm, ICP-40	Eu, ppm, ICP-40	Ga, ppm, ICP-40	Ho, ppm, ICP-40	La, ppm, ICP-40	Li, ppm, ICP-40	Mn, ppm, ICP-40	Mo, ppm, ICP-40	Nb, ppm, ICP-40	Nd, ppm, ICP-40	Ni, ppm, ICP-40	Pb, ppm, ICP-40	Sc, ppm, ICP-40	Sn, ppm, ICP-40	Sr, ppm, ICP-40	Th, ppm, ICP-40	U, ppm, ICP-40
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	12	<2	8	<4	3	<2	1500	6	<4	32	256	16	<2	<50	94	<6	<100
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	13	<2	<4	<4	4	<2	645	3	<4	33	152	26	<2	<50	71	<6	<100
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	49	5	<4	6	252	5	18170	37	<4	189	1890	64	<2	<50	902	11	<100
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	35	<2	11	<4	25	22	10250	59	6	24	4460	52	9	<50	40	15	<100
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	51	<2	18	<4	33	29	1320	57	6	32	1100	42	9	<50	46	11	<100
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	31	<2	17	<4	34	22	464	27	15	44	428	29	10	<50	59	18	<100
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	37	<2	17	<4	32	23	511	50	9	41	443	24	9	<50	51	12	<100
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	16	<2	6	<4	8	8	123	6	<4	28	141	16	2	<50	92	8	<100
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	18	<2	12	<4	11	7	117	7	<4	34	133	13	<2	<50	91	7	<100
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	118	<2	20	<4	20	41	144	577	9	33	998	21	6	<50	49	12	<100
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	396	3	21	<4	140	26	58	319	<4	109	2660	33	<2	<50	724	13	315
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	196	2	11	<4	165	14	31	100	<4	99	1130	26	<2	<50	933	14	388
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	196	<2	11	<4	138	14	21	117	<4	94	818	21	<2	<50	910	15	326
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	129	<2	11	<4	118	13	20	118	<4	93	719	20	<2	<50	1030	13	283
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	268	2	12	<4	188	14	20	133	<4	118	1250	26	<2	<50	984	14	411
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	136	<2	5	<4	124	10	16	69	<4	86	664	20	<2	<50	1020	<6	244
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	93	<2	9	<4	66	10	23	70	<4	56	341	15	<2	<50	1120	7	<100
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	211	3	12	<4	199	16	22	155	<4	119	1630	29	<2	<50	1010	12	502
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	165	2	18	<4	156	17	58	216	<4	105	740	24	<2	<50	606	<6	<100
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	56	<2	6	<4	75	4	23	28	<4	73	202	13	<2	<50	1030	7	<100
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	177	<2	15	<4	138	18	56	186	<4	82	688	25	<2	<50	706	8	<100
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	145	6	10	9	363	15	44	95	<4	200	379	19	8	<50	1090	<6	<100
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	142	<2	14	<4	164	17	46	169	<4	85	602	22	3	<50	748	9	262
WPSJ50.8K	Middle Waste		mudstone		154	3	21	<4	73	33	136	34	7	68	383	18	10	<50	322	6	<100
WPSJ56.0K	Middle Waste		mudstone		137	3	16	<4	109	28	107	115	<4	88	480	16	9	<50	633	<6	<100
WPSJ62.7K	Middle Waste		mudstone		112	2	14	<4	99	22	101	27	<4	83	324	12	7	<50	801	<6	<100
WPSJ68.1K	Middle Waste		mudstone		97	2	13	<4	123	16	68	27	<4	91	207	16	7	<50	553	6	<100
WPSJ73.3K	Middle Waste		mudstone		170	3	30	<4	85	40	156	65	<4	95	591	20	13	<50	512	7	<100
WPSJ75.2K	Middle Waste		mudstone		91	3	22	<4	85	21	145	58	6	69	376	17	12	<50	257	11	<100
WPSJ81.1K	Middle Waste	dolostone	dolostone		18	<2	11	<4	13	<2	208	6	<4	34	37	11	<2	<50	243	<6	<100
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		75	2	13	<4	86	19	140	30	<4	72	289	15	9	<50	532	<6	<100
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		105	3	17	<4	93	33	125	24	5	82	381	17	11	<50	390	8	<100
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		134	4	20	<4	149	36	108	52	5	92	565	17	10	<50	675	<6	<100
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		116	3	14	<4	102	28	158	57	6	63	415	20	9	<50	416	11	<100
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		122	2	14	<4	134	27	105	82	<4	87	454	19	9	<50	688	12	<100
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		130	2	17	<4	84	30	133	111	4	71	473	19	8	<50	345	12	<100
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		132	3	14	<4	144	33	115	49	<4	84	500	18	9	<50	664	8	<100
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		141	5	11	6	280	22	88	56	<4	159	462	14	5	<50	1100	6	<100
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		323	5	19	4	219	48	96	41	<4	136	886	24	8	<50	676	<6	<100
WPSJ83.8KX	Middle Waste		carbon seam		316	6	19	6	225	47	98	41	6	146	881	24	9	<50	701	10	<100
WPSJ84.7K	Middle Waste	dolostone	dolostone		14	<2	<4	<4	9	2	300	3	<4	38	20	8	<2	<50	306	<6	<100
WPSJ85.1K	Middle Waste	dolostone	dolostone		17	<2	<4	<4	5	2	216	2	<4	36	16	5	<2	<50	292	<6	<100
WPSJ93.13K	Middle Waste	dolostone	mudstone		17	<2	<4	<4	10	<2	347	6	<4	33	34	9	2	<50	325	<6	<100
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		78	3	18	<4	107	22	121	22	6	71	267	21	11	<50	307	12	<100
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		126	3	18	<4	148	36	133	46	<4	104	516	15	10	<50	694	11	<100
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		101	2	14	<4	122	23	141	69	<4	73	353	19	8	<50	752	<6	<100
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		155	4	17	<4	167	40	140	52	<4	98	549	18	10	<50	708	7	<100
WPSJ95.3K	Middle Waste	dolostone	mudstone		18	<2	<4	<4	<2	<2	192	4	<4	48	20	9	<2	<50	825	<6	<100
WPSJ95.4K	Middle Waste	carbon seam	mudstone		93	3	10	<4	148	18	119	52	<4	83	308	13	6	<50	904	12	<100
WPSJ96.4K	Middle Waste	dolostone	mudstone		20	<2	12	<4	16	3	357	8	<4	38	45	13	3	<50	431	6	<100
WPSJ96.5K	Middle Waste	carbon seam	mudstone		86	2	15	<4	112	21	158	52	<4	75	328	15	8	<50	606	10	<100
WPSJ97.2K	Middle Waste	dolostone	dolostone		24	<2	5	<4	16	2	224	7	<4	47	37	8	<2	<50	372	<6	<100
WPSJ103.3K	Middle Waste		mudstone		178	5	11	6	378	27	124	43	<4	176	559	14	5	<50	1060	<6	<100
WPSJ104.9K	Middle Waste		mudstone		58	<2	11	<4	29	13	173	26	7	26	232	16	5	<50	165	10	<100
WPSJ105.4K	Middle Waste		mudstone		264	4	21	4	130	45	249	53	<4	90	967	22	10	<50	333	10	<100
WPSJ105.8K	Middle Waste		mudstone		224	4	20	6	200	37	134	190	7	110	960	25	12	<50	517	10	<100
WPSJ107.9K	Middle Waste		phosphorite		90	4	11	5	218	14	70	33	6	130	1010	17	2	<50	961	8	<100
WPSJ109.9K	Middle Waste		phosphorite		27	<2	8	<4	36	5	282	14	<4	36	213	18	6	<50	135	<6	<100
WPSJ117.6K	Middle Waste		mudstone		106	7	13	9	326	16	60	25	<4	206	352	17	<2	<50	897	<6	<100
WPSJ127.7K	Middle Waste		siltstone		33	<2	10	<4	15	3	331	10	<4	13	81	14	4	<50	180	6	<100
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		120	3	13	4	103	23	127	24	4	62	361	17	10	<50	339	9	<100

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40	Ag ppm, EDXRF	As ppm, EDXRF	Ba ppm, EDXRF	Br ppm, EDXRF	Cd ppm, EDXRF	Ce ppm, EDXRF	Cr ppm, EDXRF	Cs ppm, EDXRF	Cu ppm, EDXRF	Ge ppm, EDXRF	La ppm, EDXRF
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	25	7	<1	770	<1	3	65	<1	10	5	12	<3	3	<2	7
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	20	8	<1	956	<1	3	10	<1	17	5	18	<3	3	<2	8
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	230	344	12	6770	6	21	1200	<1	137	29	208	<3	37	<2	202
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	705	22	3	14149	5	311	270	<1	36	44	354	5	58	inf	30
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	826	26	3	4830	4.2	152.9	264	<1	19.5	52.9	679.2	6.3	69.4	inf	32.9
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	817	21	3	2580	4	85	266	<1	15	59	258	5	37	2	38
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	802	15	3	2620	4.2	85.6	300.2	<1	13.8	59.5	338.1	8.8	43.5	2	34.1
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	162	14	1	1080											
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	157	14	1	1050	<1	29	100	<1	97	22	58	<3	12	<2	14
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	3040	18	3	7610	9	41	243	<1	288	34	960	9	135	3	25
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	4140	185	9	20684	20	48	96	1	740	27	1770	<3	448	9	121
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	2690	227	11	13770	12	21	50	<1	419	22	715	<3	198	2	140
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	3040	181	9	10630	11	20	54	<1	419	23	744	<3	196	3	125
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	3600	156	8	12887	9	15	49	1	476	14	614	<3	130	3	100
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	2910	242	11	14576	13	30	45	<1	486	27	632	<3	275	4	158
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	2310	162	7	7920	8	12	43	<1	293	16	494	<3	123	2	102
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	2960	90	5	7010	7	7	58	<1	404	9	634	<3	81	<2	56
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	3790	269	12	16565	17	51	48	2	551	25	901	<3	244	5	162
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	1600	212	9	7870	22	50	132	<1	615	29	1220	<3	176	5	125
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	1310	107	5	3730	6	<2	80	<1	172	13	182	<3	46	<2	64
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	3940	178	9	9880	18	33	94	<1	464	22	1110	<3	164	<2	114
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	868	460	20	1590	17	21	150	2	116	48	1020	<3	140	<2	309
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	3830	219	11	8690	17	26	97	<1	428	26	1040	<3	149	4	141
WPSJ50.8K	Middle Waste		mudstone		175	75	4	1750	11	59	207	2	4	37	2720	3	147	3	67
WPSJ56.0K	Middle Waste		mudstone		343	133	6	1450	14	31	198	2	46	33	1760	4	128	<2	98
WPSJ62.7K	Middle Waste		mudstone		132	109	5	1290	7	26	150	1	7	29	1440	<3	102	<2	82
WPSJ68.1K	Middle Waste		mudstone		652	166	8	1040	5	30	196	<1	3	41	1420	<3	91	<2	85
WPSJ73.3K	Middle Waste		mudstone		247	103	5	2160	7	43	239	1	8	40	3010	3	159	2	76
WPSJ75.2K	Middle Waste		mudstone		368	91	6	1470	11	39	279	<1	17	58	1130	<3	93	<2	77
WPSJ81.1K	Middle Waste	dolostone	dolostone		45	14	<1	127	1	9	18	<1	<1	12	124	<3	10	<2	15
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		151	89	5	1020	10	32	170	1	7	35	1115	3	72	<2	76
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		196	96	5	1430	11.6	41.1	213	1	6.2	45.5	2110	4.6	101.7	<2	87.1
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		220	153	7	1730	15	37	184	<1	13	36	2400	<3	134	<2	127
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		260	105	5	1260	18.3	45.7	270.8	<1	26.6	50.7	1830	5.4	108.7	<2	96.6
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		270	149	6	1720	16	39	245	<1	62	52	2010	3	122	3	127
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		253	93	4	1340	18	45	239	1	33	45	1760	<3	129	<2	72
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		178	151	7	1650	15	41	213	1	11	43	2540	4	133	2	129
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		170	309	12	1580	14	28	157	<1	15	48	1690	<3	135	<2	245
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		247	217	9	2970											
WPSJ83.8KX	Middle Waste		carbon seam		245	223	10	2980	21	60	167	1	18	45	5450	6	352	5	186
WPSJ84.7K	Middle Waste	dolostone	dolostone		65	8	<1	74	<1	4.4	13.5	<1	<1	8.5	77.3	<3	4.2	<2	8.6
WPSJ85.1K	Middle Waste	dolostone	dolostone		29	7	<1	62	<1	5	15	<1	<1	<3	59	<3	4	<2	11
WPSJ93.13K	Middle Waste	dolostone	mudstone		80	7	<1	90	1	7.9	23.2	<1	<1	6.1	218.3	<3	11.3	<2	11.2
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		153	104	5	939	7	47	283	<1	4	52	1310	5	84	<2	102
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		201	155	7	1790	16.7	45.7	187.1	<1	11.9	39.6	2270	3.5	126.7	2.5	133.9
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		248	136	6	1360	14	39	240	1	54	52	1300	3	99	<2	112
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		193	179	8	1910	19	43	208	<1	10	46	2500	<3	150	<2	149
WPSJ95.3K	Middle Waste	dolostone	mudstone		48	5	<1	46	<1	<2	16.8	<1	<1	6.9	127.3	<3	7.6	<2	3.9
WPSJ95.4K	Middle Waste	carbon seam	mudstone		198	161	7	887	11	29	174	1	22	37	1170	<3	84	<2	136
WPSJ96.4K	Middle Waste	dolostone	mudstone		89	13	<1	135	1.7	9.4	27.1	<1	<1	12.5	289.5	<3	11.9	<2	17.3
WPSJ96.5K	Middle Waste	carbon seam	mudstone		192	119	6	1130	10.6	37.5	172.6	<1	27.9	37.8	1240	<3	80.8	<2	96.5
WPSJ97.2K	Middle Waste	dolostone	dolostone		43	16	<1	112	<1	8	21	<1	<1	10	112	<3	7	<2	17
WPSJ103.3K	Middle Waste		mudstone		222	376	14	1620	10	27	143	1	20	44	2450	<3	179	<2	332
WPSJ104.9K	Middle Waste		mudstone		136	29	2	536	12	44	258	<1	6	40	806	<3	59	<2	32
WPSJ105.4K	Middle Waste		mudstone		497	183	8	2880	14	40	214	<1	53	43	3150	6	255	3	120
WPSJ105.8K	Middle Waste		mudstone		496	306	13	4500	11	34	225	<1	335	53	2600	<3	245	4	188
WPSJ107.9K	Middle Waste		phosphorite		163	343	15	3230	6	18	190	<1	18	56	916	<3	90	<2	190
WPSJ109.9K	Middle Waste		phosphorite		115	43	3	1130	4	24	158	<1	1	45	307	<3	24	<2	35
WPSJ117.6K	Middle Waste		mudstone		140	480	18	1790	7	17	184	1	16	62	1250	<3	110	<2	289
WPSJ127.7K	Middle Waste		siltstone		53	12	<1	644	2	18	111	<1	<1	21	178	<3	26	<2	15
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		269	171	9	1490	15	29	220	1	21	52	1080	<3	111	<2	93

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Mo ppm, EDXRF	Nb ppm, EDXRF	Nd ppm, EDXRF	Ni ppm, EDXRF	Pb ppm, EDXRF	Rb ppm, EDXRF	Sb ppm, EDXRF	Se ppm, EDXRF	Sn ppm, EDXRF	Sr ppm, EDXRF	Th ppm, EDXRF	U ppm, EDXRF	V ppm, EDXRF	Y ppm, EDXRF	Zn ppm, EDXRF
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	4	<2	8	260	13	<2	2	<1	<2	86	<2	3	19	6	856
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	3	<2	<7	157	27	<2	3	<1	<2	65	<2	3	15	7	1120
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	45	<2	128	1680	77	3	12	2	2	838	<2	103	143	331	5160
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	60	12	25	4160	47	69	19	2	2	45	8	7	956	29	11270
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	69.4	13.3	31.5	1160	39.9	89.3	13.8	16	2.5	48.8	8.7	9.4	887.3	36	4910
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	27	14	30	416	26	80	12	12	<2	60	8	9	768	31	2730
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	59.8	14.9	31.2	462.3	25.8	87.1	13.2	8	<2	52.5	9.5	7.3	767.8	29.8	2980
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone															
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	6	5	15	148	8	27	3	2	<2	86	<2	3	93	16	1260
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	713	11	21	1110	23	74	18	277	<2	53	7	14	3130	23	7470
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	369	3	56	3450	35	19	33	541	3	647	3	310	3850	176	18190
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	115	<2	51	1230	28	<2	15	214	2	928	<2	440	2230	232	10000
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	144	<2	40	981	24	3	13	176	<2	897	<2	343	2310	184	10070
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	139	<2	44	760	18	<2	12	131	2	964	<2	301	2500	152	10120
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	147	<2	59	1500	27	<2	20	256	<2	945	<2	443	2060	241	12440
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	87	3	38	668	16	<2	13	120	23	973	<2	265	1550	157	7320
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	83	2	17	418	10	7	9	68	2	1070	<2	118	2590	86	6180
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	202	<2	69	1980	29	<2	21	321	<2	959	<2	549	3180	266	13150
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	281	6	57	905	22	37	29	218	3	549	4	176	1380	197	7730
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	33	2	14	216	31	<2	8	31	<2	963	<2	226	784	103	4200
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	215	3	56	778	18	20	14	140	2	663	2	244	2970	176	9040
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	115	3	162	423	11	21	10	122	<2	1050	<2	88	670	462	1880
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	204	5	61	723	19	18	14	129	<2	703	3	275	2990	215	8900
WPSJ50.8K	Middle Waste		mudstone		33	8	53	402	10	97	14	161	<2	298	4	15	172	75	1990
WPSJ56.0K	Middle Waste		mudstone		129	8	56	494	13	72	8	158	<2	594	4	27	286	130	1600
WPSJ62.7K	Middle Waste		mudstone		29	6	45	346	7	52	9	90	<2	732	<2	16	103	105	1560
WPSJ68.1K	Middle Waste		mudstone		24	8	71	271	7	69	11	65	<2	767	4	14	113	114	994
WPSJ73.3K	Middle Waste		mudstone		71	10	62	601	13	91	12	119	2	489	3	25	218	103	2440
WPSJ75.2K	Middle Waste		mudstone		62	13	56	371	13	88	12	146	3	245	8	18	329	92	1630
WPSJ81.1K	Middle Waste	dolostone	dolostone		<1	3	11	42	<3	16	2	20	<2	238	<2	2	30	15	150
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		35	7	47	307	8	73	10	104	<2	531	4	20	110	91	1200
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		25.2	7.9	69.9	393.2	11.1	100.2	12.4	141	<2	395.5	4.8	16.6	174.5	100.8	1700
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		58	7	83	589	9	78	13	135	<2	644	<2	23	174	152	2080
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		63.1	10.1	59.6	409.2	11.5	85.8	15.4	203.5	<2	407.6	7.5	15.7	222.7	108.6	1390
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		96	8	78	505	12	81	14	165	2	692	6	27	234	158	2130
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		120	10	51	476	13	79	14	178	<2	326	6	18	218	90	1450
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		57	8	67	554	15	74	16	174	<2	638	5	34	145	148	2000
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		69	5	136	482	11	46	11	124	<2	1070	3	37	123	313	1790
WPSJ83.8K	Middle Waste	carbon seam	carbon seam																
WPSJ83.8KX	Middle Waste		carbon seam		50	9	139	1070	19	77	16	231	2	580	5	45	236	203	3820
WPSJ84.7K	Middle Waste	dolostone	dolostone		2	<2	9.1	21.9	<3	10	<2	11	<2	290.2	<2	3.2	35.6	7.7	83.7
WPSJ85.1K	Middle Waste	dolostone	dolostone		2	2	<7	20	<3	9	2	9	<2	279	<2	2	17	7	78
WPSJ93.13K	Middle Waste	dolostone	mudstone		4.9	2	9.8	33.9	4.3	20.2	2.8	20.2	<2	308.7	<2	<2	45.6	6.4	108.6
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		23	10	71	295	15	112	13	136	3	296	7	15	138	109	1140
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		54.1	6.3	91	555.4	9.6	73.9	13.6	159.5	2	682	4.8	25.5	158.2	161.7	2140
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		81	9	73	371	11	66	15	156	<2	753	2	25	183	137	1530
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		59	9	85	587	14	70	15	183	<2	714	5	47	159	185	2190
WPSJ95.3K	Middle Waste	dolostone	mudstone		5.1	2.2	<7	25.3	3	2.3	<2	6.8	<2	760	<2	2.4	20	5.1	60.2
WPSJ95.4K	Middle Waste	carbon seam	mudstone		64	6	61	326	8	47	11	112	<2	901	3	21	142	169	1050
WPSJ96.4K	Middle Waste	dolostone	mudstone		6.1	3.6	<7	50.6	3.4	25.3	3.4	27	<2	391.3	<2	3.8	50.8	12.7	149.1
WPSJ96.5K	Middle Waste	carbon seam	mudstone		58.7	7.6	59.8	340.3	7.1	62.6	10.5	119.6	<2	589.8	3.9	18.6	157.5	119.2	1250
WPSJ97.2K	Middle Waste	dolostone	dolostone		5	3	14	38	3	15	<2	17	<2	335	<2	5	25	16	121
WPSJ103.3K	Middle Waste		mudstone		50	4	158	653	9	36	10	120	<2	1020	<2	43	174	377	2000
WPSJ104.9K	Middle Waste		mudstone		30	12	25	241	13	68	13	247	<2	170	9	6	122	37	627
WPSJ105.4K	Middle Waste		mudstone		54	9	71	1030	16	79	10	133	2	316	6	24	454	182	3210
WPSJ105.8K	Middle Waste		mudstone		208	9	107	922	21	68	9	120	<2	520	6	56	470	321	4940
WPSJ107.9K	Middle Waste		phosphorite		37	5	99	1200	9	32	6	51	<2	929	2	54	131	343	3750
WPSJ109.9K	Middle Waste		phosphorite		14	11	28	224	8	53	6	49	<2	131	7	6	103	45	1280
WPSJ117.6K	Middle Waste		mudstone		27	5	162	419	8	33	7	48	<2	867	6	42	122	487	2230
WPSJ127.7K	Middle Waste		siltstone		7	8	10	92	7	32	5	21	<2	170	<2	2	39	13	793
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		26	9	59	376	11	65	7	71	<2	329	6	27	211	168	1630

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	**Zr ppm, EDXRF**
WPSJ-6.5K	Grandeur Tongue		dolostone	Grandeur Tongue	13
WPSJ-3.2K	Grandeur Tongue		dolostone	Grandeur Tongue	11
WPSJ0.2K	Lower Ore Zone		phosphorite	Fish-scale Bed	65
WPSJ0.8K	Lower Ore Zone		dolostone	Footwall siltstone	334
WPSJ1.26K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	419.5
WPSJ1.6K	Lower Ore Zone		dolostone	Footwall siltstone	389
WPSJ1.89K	Lower Ore Zone	altered dolostone	dolostone	Footwall siltstone	411.9
WPSJ2.85K	Lower Ore Zone	less-altered dolostone	dolostone	Footwall siltstone	
WPSJ2.85KX	Lower Ore Zone		dolostone	Footwall siltstone	145
WPSJ5.4K	Lower Ore Zone		siltstone	Footwall siltstone	340
WPSJ7.3K	Lower Ore Zone		siltstone	Footwall siltstone	164
WPSJ7.6K	Lower Ore Zone		siltstone	Footwall siltstone	92
WPSJ8.0K	Lower Ore Zone		siltstone	Footwall siltstone	91
WPSJ8.2K	Lower Ore Zone		siltstone	Footwall siltstone	81
WPSJ8.3K	Lower Ore Zone		siltstone	Footwall siltstone	83
WPSJ8.6K	Lower Ore Zone		phosphorite	A Bed Ore	73
WPSJ8.7K	Lower Ore Zone		phosphorite	A Bed Ore	67
WPSJ8.8K	Lower Ore Zone		phosphorite	A Bed Ore	96
WPSJ18.8K	Lower Ore Zone		phosphorite	B Bed Ore	131
WPSJ27.0K	Lower Ore Zone		phosphorite	B Bed Ore	59
WPSJ35.7K	Lower Ore Zone		phosphorite	C Bed Ore	132
WPSJ36.2K	Lower Ore Zone		phosphorite	C Bed Ore	109
WPSJ36.6K	Lower Ore Zone		phosphorite	C Bed Ore	127
WPSJ50.8K	Middle Waste		mudstone		93
WPSJ56.0K	Middle Waste		mudstone		99
WPSJ62.7K	Middle Waste		mudstone		83
WPSJ68.1K	Middle Waste		mudstone		144
WPSJ73.3K	Middle Waste		mudstone		157
WPSJ75.2K	Middle Waste		mudstone		271
WPSJ81.1K	Middle Waste	dolostone	dolostone		34
WPSJ81.7K	Middle Waste	carbonaceous dolostone	dolostone		91
WPSJ82.07K	Middle Waste	carbonaceous dolostone	dolostone		108.7
WPSJ82.1K	Middle Waste	carbonaceous mudstone	dolostone		97
WPSJ82.2K	Middle Waste	carbonaceous mudstone	dolostone		168.7
WPSJ82.27K	Middle Waste	carbonaceous mudstone	dolostone		133
WPSJ82.33K	Middle Waste	carbonaceous mudstone	dolostone		163
WPSJ82.53K	Middle Waste	blk carbonaceous mudstone	dolostone		131
WPSJ83.57K	Middle Waste	blk carbonaceous mudstone	dolostone		84
WPSJ83.8K	Middle Waste	carbon seam	carbon seam		
WPSJ83.8KX	Middle Waste		carbon seam		118
WPSJ84.7K	Middle Waste	dolostone	dolostone		24
WPSJ85.1K	Middle Waste	dolostone	dolostone		23
WPSJ93.13K	Middle Waste	dolostone	mudstone		29.1
WPSJ93.4K	Middle Waste	gr carbonaceous mustone	mudstone		140
WPSJ93.8K	Middle Waste	blk carbonaceous mustone	mudstone		98
WPSJ94.0K	Middle Waste	gr carbonaceous mustone	mudstone		139
WPSJ94.9K	Middle Waste	blk carbonaceous mustone	mudstone		134
WPSJ95.3K	Middle Waste	dolostone	mudstone		14.3
WPSJ95.4K	Middle Waste	carbon seam	mudstone		97
WPSJ96.4K	Middle Waste	dolostone	mudstone		34.3
WPSJ96.5K	Middle Waste	carbon seam	mudstone		106.3
WPSJ97.2K	Middle Waste	dolostone	dolostone		31
WPSJ103.3K	Middle Waste		mudstone		70
WPSJ104.9K	Middle Waste		mudstone		297
WPSJ105.4K	Middle Waste		mudstone		146
WPSJ105.8K	Middle Waste		mudstone		163
WPSJ107.9K	Middle Waste		phosphorite		160
WPSJ109.9K	Middle Waste		phosphorite		257
WPSJ117.6K	Middle Waste		mudstone		160
WPSJ127.7K	Middle Waste		siltstone		194
WPSJ135.0K	Middle Waste	blk carbonaceous mudstone	siltstone/mudstone		216

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Lab No.	Comments	True ft above base of Fish-scale Bed	Monsanto Core down-hole depth, ft	Fe+2 sample	As, ppm, hydride	Hg, ppm, CVAA	Sb, ppm, hydride	Se, ppm, hydride	Tl, ppm, fusion-AA	C, %, combustion	CO2, %, acidification	Carbonate C, %, acidification
WPSJ135.2K	Middle Waste		mudstone		C-166344		135.20			31.3	0.57	5.6	78.9	0.9	14.2	1.9	0.52
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		C-166276		135.40	-277.2		17.1	0.29	2.5	31.1	0.8	12.5	1.64	0.45
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		C-166346		135.70	-276.8		15.3	0.3	2.4	34.2	0.8	12.4	1.62	0.44
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		C-166338		136.40	-275.5		20.9	0.39	3.5	48.4	0.8	13.1	1.6	0.44
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		C-166277		136.80	-274.8		36.3	0.59	4.9	84.2	0.8	14	2.64	0.72
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		C-166297		137.10	-274.3		41.4	0.67	7.2	118	1.3	14.9	2.38	0.65
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		C-166314		137.30	-274		12.2	0.3	1.7	26.8	0.2	13	1.57	0.43
WPSJ138.2K	Middle Waste		mudstone		C-166291		138.20			26.9	0.49	4.4	67.2	1.1	12.6	0.82	0.22
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		C-166292		138.40	-272		33.8	0.36	3.3	52.2	0.7	12.4	0.87	0.24
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		C-166323		138.60	-271.7		30.9	0.56	4.1	84	1.4	11	0.54	0.15
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		C-166287		139.80	-269.5		30.9	0.54	4.5	87.4	3.1	8.26	0.51	0.14
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		C-166328		140.10	-269		34.5	0.7	6.6	100	1.7	13.3	0.37	0.1
WPSJ140.1KX	Middle Waste		mudstone		C-166324	duplicate of previous sample	140.10			35.1	0.66	6.2	107	1.6	13.3	0.34	0.09
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		C-166329		141.10	-267.3		35.8	0.62	4.8	90	1	8.26	0.5	0.14
WPSJ146.2K	Middle Waste		mudstone		C-166307		146.20			14.7	0.53	2.6	78.3	1.3	9.64	0.68	0.19
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	C-166306		150.50			15.8	0.27	3.6	51.6	1.5	11.6	1.1	0.3
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	C-166337		152.20			17.9	0.5	5.9	82.6	3.9	11.4	1.04	0.28
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	C-166266		161.80		*	13.8	0.31	1.5	13.3	1.9	5.35	1.38	0.38
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	C-166273		162.40		*	9.7	0.37	2.1	15.9	2.2	5.81	1.44	0.39
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	C-166326		170.30			20.4	0.36	2.8	274	3.2	7.93	0.5	0.14
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	C-166282		174.70			26.8	0.3	1.7	49.2	0.8	6.04	3.54	0.97
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	C-166270		175.70		*	21.8	0.21	1.8	44.1	0.5	5.37	4.32	1.18
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	C-166315		185.20			9.5	0.24	2.4	75.2	3.6	4.35	1.15	0.31
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	C-166325		185.90			11.8	0.31	3.2	156	4.2	4.52	1.05	0.29
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	C-166265		186.20		*	23.3	0.44	3.3	353	4	3.09	1.09	0.3
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	C-166264		186.80		*	24	0.57	3.2	727	3.7	3.36	0.76	0.21
WPSJ188.2K	Rex Chert		chert	Rex Chert	C-166294		188.20			25.2	0.38	1.5	837	5.3	2.68	0.55	0.15

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Organic C, %, difference	S, %, combustion	Al, %, ICP-16	AlOx, %, ICP-16	Ca, %, ICP-16	CaOx, %, ICP-16	Fe, %, ICP 16	FeOx, %, ICP-16	FeO, %	Fe +2, %	S needed for all Fe+2 as pyrite, %	Residual S if all Fe+2 as pyrite, %	Fe+2, as % total Fe	K, %, ICP-16	KOx, %, ICP-16
WPSJ135.2K	Middle Waste		mudstone		13.68	3.4	3.25	6.14	13.2	18.5	1.62	2.32						1.29	1.55
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		12.05	2.25	1.6	3.02	23.9	33.4	0.78	1.12						0.66	0.80
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		11.96	2.27	1.46	2.76	22.3	31.2	0.72	1.03						0.62	0.75
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		12.66	2.64	1.79	3.38	20.7	29.0	0.97	1.39						0.75	0.90
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		13.28	3.09	4.1	7.74	8.31	11.6	1.75	2.50						1.71	2.06
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		14.25	3.63	4.49	8.48	5.42	7.6	2.22	3.17						1.86	2.24
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		12.57	2.37	1.31	2.47	24.4	34.1	0.63	0.90						0.54	0.65
WPSJ138.2K	Middle Waste		mudstone		12.38	2.73	2.74	5.18	14.9	20.8	1.29	1.84						1.08	1.30
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		12.16	2.5	2.27	4.29	17.4	24.3	1.03	1.47						0.91	1.10
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		10.85	3.15	3.52	6.65	11.5	16.1	1.72	2.46						1.41	1.70
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		8.12	2.45	3.99	7.54	11.8	16.5	1.88	2.69						1.57	1.89
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		13.2	3.78	4.02	7.59	8.65	12.1	2.03	2.90						1.61	1.94
WPSJ140.1KX	Middle Waste		mudstone		13.21	3.84	4.26	8.05	8.64	12.1	2.17	3.10						1.73	2.08
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		8.12	3.27	3.97	7.50	8.78	12.3	2.07	2.96						1.65	1.99
WPSJ146.2K	Middle Waste		mudstone		9.45	1.84	3.63	6.86	12.9	18.0	1.5	2.15						1.24	1.49
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	11.3	1.89	1.2	2.27	26.9	37.6	0.6	0.86						0.45	0.54
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	11.12	2.22	1.71	3.23	24.8	34.7	0.81	1.16						0.62	0.75
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	4.97	0.95	0.55	1.04	34.2	47.8	0.27	0.39	0.35	0.27	0.16	0.79	101%	0.18	0.22
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	5.42	1.19	0.48	0.91	36	50.4	0.29	0.41	0.28	0.22	0.12	1.07	75%	0.16	0.19
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	7.79	2.88	3.54	6.69	11.9	16.6	1.6	2.29						1.28	1.54
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	5.07	2.67	5.62	10.62	6.53	9.1	2.53	3.62						2.1	2.53
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	4.19	2.47	6.25	11.81	5.63	7.9	2.41	3.45	0.57	0.44	0.25	2.22	18%	2.12	2.55
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	4.04	1.17	1.19	2.25	30.3	42.4	0.51	0.73						0.37	0.45
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	4.23	1.52	1.81	3.42	25.6	35.8	0.69	0.99						0.63	0.76
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	2.79	2.81	1.55	2.93	26.5	37.1	1.83	2.62	0.64	0.50	0.29	2.52	27%	0.55	0.66
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	3.15	2.83	1.86	3.51	20.3	28.4	2.07	2.96	0.77	0.60	0.34	2.49	29%	0.72	0.87
WPSJ188.2K	Rex Chert		chert	Rex Chert	2.53	0.56	3.35	6.33	11.8	16.5	2.44	3.49						0.99	1.19

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Mg, %, ICP-16	MgOx, %, ICP-16	Na, %, ICP 16	NaOx, %, ICP-16	P, %, ICP-16	POx, %, ICP-16	Apatite (CFA), %, XRD	Si, %, ICP-16	SiOx, %, ICP-16	Ti, %, ICP 16	TiOx, %, ICP-16	Sum Oxides, %	Ba, ppm, ICP-16	Cr, ppm, ICP-16	Mn, ppm, ICP-16	Sr, ppm, ICP-16
WPSJ135.2K	Middle Waste		mudstone		0.61	1.01	0.49	0.66	4.79	10.98	29	17.9	38.3	0.24	0.40	80	212	1780	<100	637
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		0.32	0.53	0.29	0.39	9.1	20.85	60	9.84	21.0	0.11	0.18	81	175	879	<100	1140
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		0.28	0.46	0.24	0.32	8.39	19.22	67	8.56	18.3	0.1	0.17	74	156	807	<100	1140
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		0.35	0.58	0.26	0.35	7.79	17.85	49	9.89	21.2	0.13	0.22	75	168	1140	<100	1010
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		0.89	1.48	0.56	0.75	2.61	5.98	20	24	51.3	0.31	0.52	84	239	1700	108	394
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		0.89	1.48	0.54	0.73	1.69	3.87	14	24	51.3	0.36	0.60	79	248	2320	113	265
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		0.25	0.41	0.26	0.35	9.37	21.47	72	8.19	17.5	0.09	0.15	78	160	692	<100	1240
WPSJ138.2K	Middle Waste		mudstone		0.26	0.43	0.33	0.44	5.61	12.85	47	15.4	32.9	0.2	0.33	76	202	1300	<100	856
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		0.22	0.36	0.38	0.51	6.64	15.21	49	14	29.9	0.17	0.28	78	172	1000	<100	938
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		0.28	0.46	0.38	0.51	4.4	10.08	33	18.9	40.4	0.25	0.42	79	215	1500	<100	671
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		0.3	0.50	0.38	0.51	4.52	10.36	24	21	44.9	0.28	0.47	85	235	1020	<100	536
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		0.33	0.55	0.34	0.46	3.36	7.70	30	19.3	41.3	0.28	0.47	75	222	2000	<100	515
WPSJ140.1KX	Middle Waste		mudstone		0.34	0.56	0.36	0.49	3.36	7.70		20.3	43.4	0.29	0.48	78	235	2150	<100	523
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		0.26	0.43	0.66	0.89	3.41	7.81	23	24.2	51.8	0.3	0.50	86	244	1160	<100	737
WPSJ146.2K	Middle Waste		mudstone		0.31	0.51	0.3	0.40	4.88	11.18	39	19.1	40.9	0.24	0.40	82	206	942	<100	618
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	0.15	0.25	0.17	0.23	14.4	33.00	72	5.93	12.7	0.09	0.15	88	96	1490	<100	873
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	0.21	0.35	0.2	0.27	9.43	21.61	66	8.06	17.2	0.12	0.20	79	120	1380	<100	688
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	0.09	0.15	0.18	0.24	14	32.08	78	3.11	6.7	0.04	0.07	89	113	591	<100	999
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	0.09	0.15	0.14	0.19	13.8	31.62	89	2.28	4.9	0.03	0.05	89	111	936	<100	967
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	0.29	0.48	0.46	0.62	4.89	11.20	36	17.3	37.0	0.25	0.42	77	229	1100	<100	457
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	1.35	2.24	0.58	0.78	1.89	4.33	16	27.2	58.2	0.4	0.67	92	298	1090	217	247
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	1.59	2.64	0.54	0.73	1.28	2.93	9	28.4	60.7	0.36	0.60	93	249	923	181	194
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	0.14	0.23	0.2	0.27	14.7	33.68	76	7.35	15.7	0.07	0.12	96	139	908	<100	890
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	0.2	0.33	0.2	0.27	9.9	22.68	71	9.53	20.4	0.12	0.20	85	131	1170	<100	719
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	0.28	0.46	0.18	0.24	10.1	23.14	71	8.95	19.1	0.07	0.12	86	102	915	<100	759
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	0.33	0.55	0.19	0.26	8.03	18.40	56	17	36.4	0.08	0.13	91	150	1170	<100	733
WPSJ188.2K	Rex Chert		chert	Rex Chert	0.29	0.48	0.09	0.12	5.29	12.12	39	18.3	39.1	0.19	0.32	80	161	785	2320	310

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Y, ppm, ICP-16	Zr, ppm, ICP-16	Al, %, ICP-40	Ca, %, ICP-40	Fe, %, ICP 40	K, %, ICP-40	Mg, %, ICP-40	Na, %, ICP 40	P, %, ICP-40	Ti, %, ICP-40	Ag, ppm, ICP-40	As, ppm, ICP-40	Ba, ppm, ICP-40	Cd, ppm, ICP-40	Ce, ppm, ICP-40	Co, ppm, ICP-40	Cr, ppm, ICP-40
WPSJ135.2K	Middle Waste		mudstone		211	204	3.196	12.3	1.53	1.32	0.583	0.462	4.575	0.092	18	16	190	79	38	6	1600
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		121	116	1.54	21.6	0.7	0.65	0.297	0.264	8.46	0.023	8	<10	148	69	16	4	768
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		111	114	1.529	22.5	0.72	0.66	0.297	0.264	8.925	0.017	<2	<10	165	87	18	4	858
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		118	137	1.881	20.4	0.95	0.79	0.358	0.281	8.07	0.035	10	<10	163	90	22	4	1080
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		197	262	3.856	7.704	1.67	1.59	0.803	0.523	2.485	0.127	20	15	200	34	52	6	1250
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		135	268	4.263	5.322	2.11	1.77	0.864	0.511	1.655	0.155	26	29	220	55	53	7	1820
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		120	105	1.309	23.3	0.6	0.57	0.248	0.253	9.49	0.017	7	<10	144	76	19	2	627
WPSJ138.2K	Middle Waste		mudstone		121	176	2.827	14.8	1.26	1.19	0.264	0.33	5.67	0.063	14	10	191	71	35	6	1120
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		194	177	2.283	16.5	0.99	0.96	0.226	0.369	6.75	0.04	12	11	159	18	40	4	962
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		184	186	3.498	11.2	1.65	1.45	0.286	0.374	4.515	0.109	15	16	202	41	53	6	1280
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		149	239	3.834	11.3	1.75	1.53	0.281	0.336	4.375	0.115	11	17	198	49	54	6	816
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		158	202	4.087	8.862	1.99	1.67	0.325	0.341	3.415	0.138	17	19	212	89	48	8	1760
WPSJ140.1KX	Middle Waste		mudstone		160	193	4.202	8.58	2.08	1.65	0.336	0.336	3.525	0.155	18	21	220	72	54	8	1380
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		207	254	3.949	8.628	1.98	1.6	0.259	0.627	3.435	0.132	17	23	229	11	59	7	978
WPSJ146.2K	Middle Waste		mudstone		180	206	3.647	12.6	1.48	1.3	0.308	0.292	4.855	0.109	8	<10	184	39	51	6	806
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	198	89	1.161	25.5	0.56	0.47	0.149	0.154	15.1	0.023	9	<10	83	96	28	<2	1360
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	127	101	1.7	23.9	0.75	0.66	0.204	0.193	9.22	0.04	14	<10	117	301	18	4	1270
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	161	39	0.523	32.1	0.25	0.2	0.083	0.16	13.7	0.017	2	<10	98	106	14	<2	506
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	113	35	0.457	32.6	0.25	0.17	0.083	0.132	13.2	0.017	<2	<10	97	132	8	<2	463
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	453	212	3.85	12.5	1.72	1.35	0.314	0.484	5.03	0.138	<2	<10	235	36	92	8	1070
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	169	240	5.258	6.162	2.42	1.95	1.265	0.545	1.785	0.207	<2	12	255	8	59	9	814
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	155	230	5.885	5.346	2.19	2	1.441	0.506	1.24	0.219	<2	11	219	4	48	8	473
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	1020	94	1.15	28.4	0.48	0.39	0.132	0.187	15.8	0.023	<2	<10	116	53	104	<2	807
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	891	121	1.909	24.6	0.62	0.67	0.204	0.209	9.99	0.04	<2	<10	124	63	93	3	923
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	875	91	1.551	25.2	1.78	0.61	0.264	0.182	9.83	0.023	<2	11	90	42	100	4	604
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	613	74	1.837	19.6	1.99	0.72	0.308	0.165	7.455	0.017	<2	<10	135	48	77	4	789
WPSJ188.2K	Rex Chert		chert	Rex Chert	336	181	3.443	12.2	2.53	1.06	0.303	0.105	5.42	0.092	5	16	170	74	65	148	596

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Cu, ppm, ICP-40	Eu, ppm, ICP-40	Ga, ppm, ICP-40	Ho, ppm, ICP-40	La, ppm, ICP-40	Li, ppm, ICP-40	Mn, ppm, ICP-40	Mo, ppm, ICP-40	Nb, ppm, ICP-40	Nd, ppm, ICP-40	Ni, ppm, ICP-40	Pb, ppm, ICP-40	Sc, ppm, ICP-40	Sn, ppm, ICP-40	Sr, ppm, ICP-40	Th, ppm, ICP-40	U, ppm, ICP-40
WPSJ135.2K	Middle Waste		mudstone		153	2	13	<4	114	25	84	59	7	82	524	19	9	<50	593	10	<100
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		90	<2	7	<4	65	10	51	51	<4	71	296	15	3	<50	1100	8	<100
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		101	<2	<4	<4	63	11	49	57	<4	62	362	19	3	<50	1160	6	<100
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		107	<2	8	<4	67	14	56	67	<4	58	420	15	4	<50	1040	6	<100
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		138	<2	14	<4	109	27	103	38	7	68	446	17	10	<50	383	12	<100
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		191	2	19	<4	84	34	119	62	9	67	626	19	9	<50	251	7	<100
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		91	<2	7	<4	64	8	43	41	<4	61	257	14	3	<50	1190	<6	<100
WPSJ138.2K	Middle Waste		mudstone		144	<2	11	<4	70	19	50	63	<4	54	660	15	2	<50	837	<6	<100
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		116	<2	7	4	111	15	47	27	<4	69	397	12	6	<50	882	<6	<100
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		161	3	12	4	114	26	63	42	5	75	605	15	8	<50	637	<6	<100
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		102	2	12	<4	92	22	88	39	<4	73	429	18	8	<50	501	7	<100
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		196	3	15	4	99	36	56	71	9	70	784	22	9	<50	531	12	<100
WPSJ140.1KX	Middle Waste		mudstone		184	2	17	<4	100	36	60	74	6	62	795	19	10	<50	510	9	<100
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		148	3	13	5	141	20	58	31	7	94	398	15	10	<50	710	9	<100
WPSJ146.2K	Middle Waste		mudstone		103	2	11	<4	109	20	50	22	11	79	867	16	8	<50	591	10	<100
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	127	2	7	<4	127	13	22	52	<4	91	288	15	4	<50	819	<6	<100
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	138	<2	10	<4	82	20	33	160	<4	66	410	20	3	<50	697	9	<100
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	48	<2	<4	<4	104	6	32	23	<4	86	128	10	<2	<50	940	<6	<100
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	51	<2	7	<4	72	6	43	28	<4	78	140	13	<2	<50	927	<6	<100
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	125	7	17	9	322	25	110	118	8	182	484	21	13	<50	495	<6	<100
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	75	3	19	<4	117	31	220	21	9	72	454	18	11	<50	225	13	<100
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	55	3	16	<4	106	26	171	20	8	81	474	19	8	<50	179	9	<100
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	44	16	8	20	721	10	43	15	<4	418	175	16	7	<50	838	<6	<100
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	60	14	10	17	625	16	52	24	<4	363	247	18	<2	<50	739	<6	<100
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	62	15	11	18	668	50	89	14	<4	413	142	17	<2	<50	750	<6	<100
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	65	12	10	13	502	58	79	26	<4	325	149	17	<2	<50	700	<6	<100
WPSJ188.2K	Rex Chert		chert	Rex Chert	214	6	11	8	234	27	2410	18	<4	162	170	17	18	<50	319	<6	<100

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40	**Ag ppm, EDXRF**	**As ppm, EDXRF**	**Ba ppm, EDXRF**	**Br ppm, EDXRF**	**Cd ppm, EDXRF**	**Ce ppm, EDXRF**	**Cr ppm, EDXRF**	**Cs ppm, EDXRF**	**Cu ppm, EDXRF**	**Ge ppm, EDXRF**	**La ppm, EDXRF**
WPSJ135.2K	Middle Waste		mudstone		484	214	11	2490	18	32	198	2	101	41	1800	<3	163	2	105
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		435	122	5	1690	9.8	15.8	148.9	1.5	107.3	19.9	956.3	<3	84.9	<2	52.2
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		441	121	6	1900	10	11	147	2	109	20	764	<3	83	<2	53
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		481	123	6	2310	13	20	160	2	126	25	1350	<3	98	<2	56
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		350	193	10	1960	18	34	220	2	42	47	1560	<3	144	2	101
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		447	135	7	2540	23	42	241	2	73	49	2280	<3	197	2	75
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		402	128	6	1720	8	8	144	2	107	20	702	<3	78	<2	53
WPSJ138.2K	Middle Waste		mudstone		400	124	6	3260	15	25	200	2	92	30	1330	<3	142	3	63
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		307	204	9	1920	11	20	154	1	24	34	1050	<3	118	<2	105
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		310	194	9	2800	14.3	32.5	209.1	1.1	51.4	43.8	1630	<3	163.9	<2	105.5
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		253	151	7	2270	10	29	224	1	65	56	998	5	112	<2	92
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		360	165	8	3580											
WPSJ140.1KX	Middle Waste		mudstone		381	166	8	2790	18	37	221	3	120	42	2140	3	214	3	85
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		186	224	11	1570	15	36	231	1	12	48	1180	<3	140	<2	123
WPSJ146.2K	Middle Waste		mudstone		312	186	9	3480	8	15	208	1	45	47	838	<3	106	<2	108
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	899	205	9	2210	12	17	90	1	133	20	1490	<3	120	<2	106
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	1610	134	6	3480	14	19	111	1	392	19	1320	<3	134	<2	69
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	451	163	6	2400	5	4	96	<1	147	14	436	<3	29	<2	86
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	566	117	4	2910	6	5	100	2	200	11	584	<3	43	<2	60
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	301	475	20	1610	6	19	247	<1	42	78	1190	<3	126	2	299
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	126	174	8	1130	1	24	283	1	6	58	923	7	69	2	121
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	129	151	8	907	<1	19	239	1	4	52	789	5	56	<2	112
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	328	1060	44	723	4	8	120	2	79	86	779	<3	39	<2	617
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	428	918	39	942	5	11	126	2	89	74	1130	<3	54	<2	532
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	431	925	38	585	5	20	96	<1	65	85	906	<3	58	<2	583
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	449	655	26	466	4	18	139	2	60	64	976	<3	47	<2	434
WPSJ188.2K	Rex Chert		chert	Rex Chert	386	415	19	905	6	24	186	1	94	54	907	5	238	<2	218

Section J (wpsJ) Individual Sample Geochemistry

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Mo ppm, EDXRF	Nb ppm, EDXRF	Nd ppm, EDXRF	Ni ppm, EDXRF	Pb ppm, EDXRF	Rb ppm, EDXRF	Sb ppm, EDXRF	Se ppm, EDXRF	Sn ppm, EDXRF	Sr ppm, EDXRF	Th ppm, EDXRF	U ppm, EDXRF	V ppm, EDXRF	Y ppm, EDXRF	Zn ppm, EDXRF
WPSJ135.2K	Middle Waste		mudstone		64	9	42	573	15	57	9	75	<2	560	4	45	439	210	2840
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		62.5	5.2	28.3	359.5	10.4	23.4	3.7	31.1	<2	1110	<2	65.8	356.1	124.1	2120
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		61	5	31	355	11	21	4	29	<2	1160	<2	66	299	127	2130
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		82	5	31	495	12	28	5	44	<2	1030	<2	57	396	128	2700
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		44	8	61	492	12	65	9	77	<2	373	5	31	284	196	2310
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		72	10	54	668	16	77	9	103	<2	245	6	32	395	142	2880
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		50	5	34	299	12	20	5	25	<2	1180	<2	72	284	132	2030
WPSJ138.2K	Middle Waste		mudstone		75	8	41	779	12	45	7	65	<2	792	3	39	340	124	3780
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		28	5	39	468	8	30	6	45	<2	965	2	61	235	226	2300
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		43.8	8.6	59.1	695.3	12.4	56.1	6.1	77.7	<2	662.7	2.1	48	263.1	204.3	3100
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		42	15	60	560	13	62	7	80	29	480	4	37	243	155	2760
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone																
WPSJ140.1KX	Middle Waste		mudstone		80	9	56	954	14	72	9	102	2	505	4	54	325	162	4160
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		32	10	70	426	11	66	7	76	<2	677	7	39	165	218	1800
WPSJ146.2K	Middle Waste		mudstone		22	10	62	986	11	53	5	76	11	575	6	36	253	186	3980
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	67	5	44	370	10	20	7	50	8	803	<2	99	688	209	2610
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	176	5	36	460	14	26	8	72	8	632	<2	130	1230	131	3930
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	27	5	31	142	6	3	4	12	10	874	<2	133	308	163	2740
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	34	4	15	174	8	5	5	14	2	885	<2	126	358	116	3510
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	138	16	167	553	14	63	6	271	313	483	5	83	278	468	1830
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	19	14	69	467	11	93	4	50	4	225	8	34	110	175	1250
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	22	11	80	499	12	85	5	42	<2	176	8	32	119	158	1080
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	17	4	363	216	12	13	5	69	10	832	5	152	238	1080	891
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	27	3	317	314	13	26	7	151	9	711	6	133	333	909	1140
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	18	4	357	194	18	27	6	341	2	733	5	141	355	946	751
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	26	4	271	169	19	31	6	638	3	667	5	160	332	642	541
WPSJ188.2K	Rex Chert		chert	Rex Chert	18	10	131	208	15	56	5	697	3	309	7	82	343	416	1070

WUSP Sample	Unit	Lithology of Sample	Lithology of channel interval that includes this sample	Unit within or adjacent to Meade Peak Member	Zr ppm, EDXRF
WPSJ135.2K	Middle Waste		mudstone		178
WPSJ135.4K	Middle Waste	blk carbonaceous mudstone	mudstone		115
WPSJ135.7K	Middle Waste	blk carbonaceous mudstone	mudstone		109
WPSJ136.4K	Middle Waste	blk carbonaceous mudstone	mudstone		117
WPSJ136.8K	Middle Waste	carbonaceous dolostone	mudstone		218
WPSJ137.1K	Middle Waste	gr carbonaceous mustone	mudstone		244
WPSJ137.3K	Middle Waste	gr carbonaceous mustone	mudstone		101
WPSJ138.2K	Middle Waste		mudstone		168
WPSJ138.4K	Middle Waste	gr carbonaceous mustone	mudstone		146
WPSJ138.6K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		182
WPSJ139.8K	Middle Waste	gr carbonaceous mustone	mudstone		201
WPSJ140.1K	Middle Waste	gr carbonaceous mustone, rubble	mudstone		
WPSJ140.1KX	Middle Waste		mudstone		183
WPSJ141.1K	Middle Waste	carbonaceous dolostone	mudstone		237
WPSJ146.2K	Middle Waste		mudstone		183
WPSJ150.5K	Upper Ore Zone		phosphorite	D Bed Ore	91
WPSJ152.2K	Upper Ore Zone		phosphorite	D Bed Ore	108
WPSJ161.8K	Upper Ore Zone		phosphorite	D Bed Ore	46
WPSJ162.4K	Upper Ore Zone		phosphorite	D Bed Ore	46
WPSJ170.3K	Upper Waste		mudstone	Upper Waste	217
WPSJ174.7K	Upper Waste		mudstone	Upper Waste	218
WPSJ175.7K	Upper Waste		mudstone	Upper Waste	216
WPSJ185.2K	Upper Waste		phosphorite	Upper Waste	92
WPSJ185.9K	Upper Waste		phosphorite	Upper Waste	121
WPSJ186.2K	Upper Waste		phosphorite	Upper Waste	80
WPSJ186.8K	Upper Waste		phosphorite	Upper Waste	70
WPSJ188.2K	Rex Chert		chert	Rex Chert	191

	Lab No.	As, ppm, hydride	Hg, ppm, CVAA	Sb, ppm, hydride	Se, ppm, hydride	Tl, ppm, fusion-AA	C, %, combustion	CO2, %, acidification	Carbonate C, %, acidification	Organic C, %, difference	S, %, combustion	Al, %, ICP-16	Ca, %, ICP-16	Fe, %, ICP-16	K, %, ICP-16	Mg, %, ICP-16	Na, %, ICP-16
Project Check Standards																	
POW-1	C-166303	11.2	0.22	1.5	51.5	2.5	3.02	0.11	0.03	2.99	1.22	1.95	2.98	0.94	0.51	0.17	0.07
	C-166376	10.5	0.21	1	51.6	2.1	3.11	0.13	0.04	3.07	1.36	2.02	2.63	1.06	0.63	0.18	0.08
	Average	**10.9**	**0.22**	**1.3**	**51.6**	**2.3**	**3.07**	**0.12**	**0.04**	**3.03**	**1.29**	**1.99**	**2.81**	**1.00**	**0.57**	**0.18**	**0.08**
7-Sample Mean		11.1	0.22	1.5	52	2.3	3.07	0.13	0.04	3.04	1.29	2.05	2.91	1.04	0.58	0.19	0.08
7-sample Relative Std. Dev., %		7%	7%	32%	6%	12%	1.3%	9.9%	13.1%	1.2%	3.4%	4.8%	6.2%	12.2%	7.5%	7.8%	6.3%
Relative Std. Diff., %, (sample-mean)		-2%	-2%	-15%	-2%	0%	0%	-8%	-6%	0%	0%	-3%	-4%	-4%	-2%	-10%	-3%
POW-2	C-166300	31.8	0.49	7.4	152	2.5	7.74	4.43	1.21	6.53	0.79	3.44	15.3	1.56	1.33	1.06	0.6
	C-166377	29.8	0.47	6.1	144	2.5	7.71	4.42	1.21	6.5	0.92	3.57	13.7	1.57	1.46	1.05	0.58
	Average	**30.8**	**0.48**	**6.8**	**148**	**2.5**	**7.73**	**4.43**	**1.21**	**6.52**	**0.86**	**3.51**	**14.5**	**1.57**	**1.40**	**1.06**	**0.59**
7-Sample Mean		33.8	0.49	6.9	145	2.6	7.65	4.42	1.21	6.44	0.88	3.51	14.83	1.54	1.37	1.10	0.57
7-sample Relative Std. Dev., %		12%	6%	9%	7%	12%	1.1%	0.6%	0.6%	1.4%	5.9%	2.5%	6.3%	5.6%	5.7%	4.7%	6.0%
Relative Std. Diff., %, (sample-mean)		-9%	-2%	-3%	2%	-4%	1%	0%	0%	1%	-3%	0%	-2%	2%	2%	-4%	4%
POI-1	C-166320	18.4	0.21	1.3	40.8	1.1	3.75	2.49	0.68	3.07	2.7	5.25	3.67	2.4	1.85	0.97	0.55
	C-166378	18	0.22	1.4	43.7	1.3	3.83	2.5	0.68	3.15	2.79	5.62	3.36	2.49	2.09	0.99	0.55
	Average	**18.2**	**0.22**	**1.4**	**42.3**	**1.2**	**3.79**	**2.50**	**0.68**	**3.11**	**2.75**	**5.44**	**3.52**	**2.45**	**1.97**	**0.98**	**0.55**
5-Sample Mean		18.5	0.22	1.9	44	1.4	3.81	2.50	0.68	3.13	2.69	5.75	3.89	2.45	1.96	1.04	0.56
5-sample Relative Std. Dev., %		2%	7%	19%	4%	6%	1.8%	0.3%	0.7%	2.1%	3.4%	2.0%	8.0%	1.9%	3.9%	3.7%	1.3%
Relative Std. Diff., %, (sample-mean)		-2%	-3%	-30%	-5%	-17%	-1%	0%	0%	-1%	2%	-6%	-10%	0%	1%	-5%	-2%
Analyzed Reference Material SARL-1																	
	C-141394	15.5	0.18	4.4	1.0	1.0	1.04	0.38	0.10	0.94	0.08	5.56	0.98	2.63	2.74	0.52	1.42
	C-141396	16.6	0.18	4.3	0.9	1.2	1.07	0.39	0.11	0.96	0.07	5.86	1.03	2.76	2.77	0.52	1.47
	C-141398	15.6	0.18	4.2	0.9	1.0	1.10	0.37	0.10	1.00	0.07	5.77	1.01	2.78	2.78	0.52	1.46
	C-141400	18.5	0.19	4.9	0.9	1.0	1.07	0.40	0.11	0.96	0.07	5.87	1.02	2.77	2.83	0.50	1.49
	C-141417	16.3	0.18	4.6	1.0	1.3	1.09	0.37	0.10	0.99	0.07	6.12	0.96	3.01	3.50	0.58	1.67
Average		16.5	0.18	4.5	0.9	1.1	1.07	0.38	0.10	0.97	0.07	5.84	1.00	2.79	2.92	0.53	1.50
Accepted Value		16.5	0.16	5.1	0.9	1.4	0.97	0.40	0.11	0.86	0.07	5.79	1.06	2.67	2.98	0.55	1.53
Rel. Std. Difference		0%	14%	-12%	4%	-21%	11%	-5%	-5%	13%	3%	1%	-6%	4%	-2%	-4%	-2%
Rel. Std. Deviation		7%	2%	6%	6%	13%	2%	3%	5%	3%	6%	3%	3%	5%	11%	6%	6%
Analyzed Reference Material SARM-1																	
	C-141395	40.2	0.11	6.2	0.4	2.4	0.28	0.07	0.02	0.26	0.13	6.03	0.52	3.21	2.70	0.47	1.12
	C-141397	42.9	0.11	6.3	0.4	2.6	0.31	0.07	0.02	0.29	0.11	6.11	0.53	3.29	2.78	0.46	1.15
	C-141399	42.7	0.11	6.6	0.4	2.7	0.28	0.07	0.02	0.26	0.11	6.43	0.55	3.15	2.83	0.47	1.19
	C-141401	39.7	0.12	6.2	0.4	2.2	0.31	0.07	0.02	0.29	0.11	6.24	0.55	3.32	2.84	0.47	1.15
Average		41.4	0.11	6.3	0.4	2.5	0.30	0.07	0.02	0.28	0.12	6.20	0.54	3.24	2.79	0.47	1.15
Accepted Value		37.0	0.12	5.6	0.3	2.8	0.30	0.07	0.02	0.28	0.13	6.09	0.58	3.22	2.92	0.50	1.19
Rel. Std. Difference		12%	-4%	13%	21%	-12%	-2%	0%	0%	-2%	-12%	2%	-7%	1%	-5%	-7%	-3%
Rel. Std. Deviation		4%	4%	3%	0%	9%	6%	0%	0%	6%	9%	3%	3%	2%	2%	1%	2%
Section J Precision																	
Number of unqualified duplicate pairs (of 12)		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Avg. Rel. Std. Diff.		18%	3%	13%	19%	28%	2%	20%	19%	4%	11%	4%	6%	5%	4%	5%	5%
Avg. Rel. Std. Dev.		13%	2%	10%	13%	19%	2%	14%	13%	3%	8%	3%	4%	3%	3%	3%	4%

Section J: Accuracy and Precision

	P, %, ICP-16	Si, %, ICP-16	Ti, %, ICP-16	Ba, ppm, ICP-16	Cr, ppm, ICP-16	Mn, ppm, ICP-16	Nb, ppm, ICP-16	Sr, ppm, ICP 16	Y, ppm, ICP-16	Zr, ppm, ICP 16	Al, %, ICP-40	Ca, %, ICP-40	Fe, %, ICP-40	K, %, ICP-40	Mg, %, ICP-40	Na, %, ICP-40	P, %, ICP-40	Ti, %, ICP-40	Ag, ppm, ICP-40
Project Check Standards																			
POW-1	1.04	34.8	0.1	163	533	<100	<10	123	113	66	1.91	3.11	1.04	0.57	0.18	0.072	1.15	0.069	<2
	1.23	35.8	0.1	169	577	<100	<10	133	122	66	1.88	2.65	1.02	0.58	0.17	0.071	1.21	0.069	<2
	1.14	**35.3**	**0.1**	**166**	**555**			**128**	**118**	**66**	**1.90**	**2.88**	**1.03**	**0.58**	**0.18**	**0.072**	**1.18**	**0.069**	
7-Sample Mean	1.25	36.3	0.10	168	584			129	119	74	1.87	2.89	1.01	0.56	0.18	0.07	1.24	0.08	
7-sample Relative Std. Dev., %	8.8%	0.0	7.0%	4%	6%			4%	3%	15%	4%	6%	2%	2%	4%	3%	7%	9%	
Relative Std. Diff., %, (sample-mean)	-9%	-3%	1%	-1%	-5%			-1%	-1%	-11%	2%	-1%	2%	2%	-3%	1%	-5%	-11%	
POW-2	5.04	17.5	0.24	261	1280	<100	<10	600	160	190	3.22	14.2	1.46	1.32	1.007	0.55	4.82	0.058	11
	5.36	16.1	0.22	252	1200	<100	11	606	168	181	3.42	13	1.53	1.40	0.99	0.56	5.22	0.092	12
	5.20	**16.8**	**0.23**	**257**	**1240**			**603**	**164**	**186**	**3.32**	**13.6**	**1.50**	**1.36**	**1.00**	**0.56**	**5.02**	**0.075**	
7-Sample Mean	5.55	16.6	0.23	252	1290		*12*	582	165	186	3.32	14.31	1.50	1.37	1.04	0.57	5.43	0.11	9
7-sample Relative Std. Dev., %	7.5%	0.0	6.1%	6%	5%		21%	4%	4%	3%	5%	8%	3%	3%	4%	3%	8%	24%	17%
Relative Std. Diff., %, (sample-mean)	-6%	1%	1%	2%	-4%			4%	-1%	0%	0%	-5%	0%	-1%	-4%	-2%	-8%	-31%	
POI-1	0.97	28.2	0.38	253	498	203	<10	122	82	282	5.484	3.96	2.44	1.92	1.01	0.55	1.01	0.25	<2
	1.06	26.2	0.36	253	474	206	<10	129	86	279	5.638	3.48	2.51	2.02	0.95	0.54	1.04	0.25	<2
	1.02	**27.2**	**0.37**	**253**	**486**			**126**	**84**	**281**	**5.56**	**3.72**	**2.48**	**1.97**	**0.98**	**0.54**	**1.02**	**0.25**	
5-Sample Mean	1.11	26.3	0.39	260	494	210	*14*	127	87	256	5.70	3.89	2.48	2.03	1.04	0.56	1.13	0.27	
5-sample Relative Std. Dev., %	3.5%	0.0	5.2%	3%	2%	7%	0%	2%	4%	11%	5%	6%	1%	3%	5%	3%	5%	6%	
Relative Std. Diff., %, (sample-mean)	-8%	4%	-6%	-3%	-2%			-1%	-4%	10%	-2%	-4%	0%	-3%	-6%	-3%	-9%	-7%	
Analyzed Reference Material SARL-1																			
	0.08	30.6	0.31	891	109	2060	36	142	53	391	5.45	1.04	2.56	2.80	0.50	1.40	0.08	0.27	<2
	0.08	31.6	0.30	980	108	1990	37	146	52	411	5.59	1.03	2.59	2.87	0.50	1.42	0.08	0.26	2
	0.08	31.2	0.30	973	106	2000	40	141	50	401	5.79	1.07	2.66	3.00	0.52	1.49	0.08	0.28	3
	0.08	31.6	0.30	880	109	2050	40	140	51	366	5.43	1.00	2.54	2.81	0.48	1.39	0.07	0.27	2
	0.09	37.2	0.33	969	131	2290	37	149	60	410	5.26	1.03	2.63	2.91	0.53	1.40	0.07	0.29	3
Average	0.08	32.4	0.31	939	113	2078	38	144	53	396	5.50	1.03	2.60	2.88	0.51	1.42	0.08	0.27	3
Accepted Value	0.09	33.6	0.25	879	110	2094	35	158	44	408	5.79	1.06	2.67	2.98	0.55	1.53	0.09	0.25	3
Rel. Std. Difference	-9%	-3%	23%	7%	2%	-1%	9%	-9%	21%	-3%	-5%	-3%	-3%	-3%	-8%	-7%	-15%	9%	-4%
Rel. Std. Deviation	5%	8%	4%	5%	9%	6%	5%	3%	7%	5%	4%	2%	2%	3%	4%	3%	5%	3%	23%
Analyzed Reference Material SARM-1																			
	0.07	30.7	0.36	843	92	5110	41	142	35	359	5.82	0.54	3.02	2.85	0.46	1.11	0.07	0.31	4
	0.07	31.2	0.37	845	93	4980	37	139	34	377	5.99	0.56	3.10	2.93	0.45	1.14	0.07	0.32	3
	0.07	32.5	0.38	791	98	5180	35	143	36	357	5.98	0.55	3.06	2.93	0.44	1.14	0.07	0.31	4
	0.07	31.9	0.38	834	98	5060	41	145	36	396	6.06	0.57	3.15	2.97	0.46	1.16	0.07	0.32	3
Average	0.07	31.6	0.3725	828	95	5083	39	142	35	372	5.96	0.55	3.08	2.92	0.45	1.14	0.07	0.32	4
Accepted Value	0.08	33.5	0.35	764	101	5200	31	156	33	370	6.09	0.58	3.22	2.92	0.5	1.19	0.08	0.35	3
Rel. Std. Difference	-13%	-6%	6%	8%	-6%	-2%	24%	-9%	7%	1%	-2%	-4%	-4%	0%	-9%	-5%	-15%	-10%	13%
Rel. Std. Deviation	0%	2%	3%	3%	3%	2%	8%	2%	3%	5%	2%	2%	2%	2%	2%	2%	0%	1%	16%
Section J Precision																			
Number of unqualified duplicate pairs (of 12)	12	12	12	12	12	6	0	12	12	12	12	12	12	12	12	12	12	12	9
Avg. Rel. Std. Diff.	8%	4%	5%	5%	4%	5%		6%	6%	8%	5%	7%	5%	5%	5%	6%	10%	10%	24%
Avg. Rel. Std. Dev.	5%	3%	4%	4%	3%	3%		4%	5%	6%	3%	5%	3%	3%	4%	4%	7%	7%	17%

	As, ppm, ICP-40	Ba, ppm, ICP 40	Cd, ppm, ICP-40	Ce, ppm, ICP-40	Co, ppm, ICP-40	Cr, ppm, ICP 40	Cu, ppm, ICP 40	Eu, ppm, ICP 40	Ga, ppm, ICP 40	Ho, ppm, ICP-40	La, ppm, ICP 40	Li, ppm, ICP-40	Mn, ppm, ICP-40	Mo, ppm, ICP-40	Nb, ppm, ICP-40	Nd, ppm, ICP-40	Ni, ppm, ICP-40	Pb, ppm, ICP 40	Sc, ppm, ICP 40
Project Check Standards																			
POW-1	<10	169	11	29	3	257	55	2	8	<4	73	17	32	19	<4	61	199	10	4
	<10	160	10	30	3	563	53	2	7	<4	68	18	42	19	<4	60	177	13	4
		165	**11**	**30**	**3**	**410**	**54**	**2**	**8**		**71**	**18**	**37**	**19**		**61**	**188**	**12**	**4**
7-Sample Mean		168	11	23	3	362	55	2	7		69	17	37	21		57	190	9	4
7-sample Relative Std. Dev., %		4%	3%	26%	23%	47%	3%	21%	18%		5%	4%	17%	6%		8%	4%	1	11%
Relative Std. Diff., %, (sample-mean)		**-2%**	**-3%**	**27%**	**-13%**	**13%**	**-3%**	**-13%**	**7%**		**2%**	**1%**	**0%**	**-8%**		**6%**	**-1%**	**28%**	**-7%**
POW-2	16	229	52	47	4	968	95	3	14	<4	121	16	69	28	<4	76	209	17	6
	18	218	49	43	2	1040	99	3	13	<4	121	17	66	27	<4	91	186	21	7
		224	**51**	**45**	**3**	**1004**	**97**	**3**	**14**		**121**	**17**	**68**	**28**		**84**	**198**	**19**	**7**
7-Sample Mean	21	237	51	46	4	1097	101	3	13		121	18	66	30		78	207	16	7
7-sample Relative Std. Dev., %	21%	5%	5%	7%	45%	19%	4%	0%	8%		5%	6%	3%	7%		13%	5%	44%	10%
Relative Std. Diff., %, (sample-mean)		**-6%**	**-2%**	**-2%**	**-22%**	**-8%**	**-4%**	**0%**	**4%**		**0%**	**-7%**	**2%**	**-8%**		**7%**	**-4%**	**19%**	**-11%**
POI-1	15	249	8	54	10	435	36	<2	18	<4	67	22	206	17	9	67	394	20	10
	<10	247	7	46	10	474	35	2	16	<4	61	22	206	18	6	65	378	25	10
		248	**8**	**50**	**10**	**455**	**36**		**17**		**64**	**22**	**206**	**18**	**7.5**	**66**	**386**	**23**	**10**
5-Sample Mean	15	269	8	52	11	421	41	3	16		66	23	199	18	9	53	394	17	11
5-sample Relative Std. Dev., %	36%	6%	9%	8%	8%	34%	8%	22%	15%		4%	6%	5%	0%	33%	13%	4%	32%	4%
Relative Std. Diff., %, (sample-mean)		**-8%**	**-6%**	**-4%**	**-6%**	**8%**	**-13%**		**4%**		**-2%**	**-3%**	**4%**	**-3%**	**-17%**	**24%**	**-2%**	**31%**	**-7%**
Analyzed Reference Material SARL-1																			
	16	860	<2	141	8	107	345	<2	16	<4	72	26	1940	15	35	65	49	590	8
	16	871	<2	147	7	104	360	<2	16	<4	75	26	2040	15	36	70	51	582	8
	15	897	2	157	7	104	375	<2	16	<4	76	27	2080	14	38	70	54	598	8
	15	837	<2	138	6	102	335	<2	17	<4	68	26	1910	14	34	60	50	564	8
	16	905	2	141	9	117	385	<2	16	<4	71	29	2010	14	35	70	51	552	8
Average	16	874	2	145	7	107	360		16		72	27	1996	14	36	67	51	577	8
Accepted Value	17	879	3	150	8	110	370	2	17	2	75	28	2094	13	35	66	52	578	8
Rel. Std. Difference	-5%	-1%	-20%	-3%	-1%	-3%	-3%		-5%		-3%	-4%	-5%	11%	2%	2%	-2%	0%	3%
Rel. Std. Deviation	4%	3%	0%	5%	15%	6%	6%		3%		4%	5%	4%	4%	4%	7%	4%	3%	0%
Analyzed Reference Material SARM-1																			
	36	793	4	121	11	101	316	<2	21	<4	60	29	4860	13	38	50	39	957	9
	32	774	5	111	10	95	313	<2	19	<4	57	29	4980	14	34	54	39	985	8
	37	751	4	112	10	99	308	<2	22	<4	55	28	4990	13	31	48	42	979	8
	33	796	5	127	10	101	325	<2	20	<4	65	30	5090	14	34	54	43	1020	8
Average	35	779	5	118	10	99	316		21		59	29	4980	14	34	52	41	985	8
Accepted Value	37	764	5	120	11	101	320	1	20	2	61	30	5200	12	31	51	41	960	8
Rel. Std. Difference	-7%	2%	-5%	-2%	-7%	-2%	-1%		3%		-3%	-3%	-4%	13%	10%	1%	-1%	3%	-1%
Rel. Std. Deviation	7%	3%	13%	6%	5%	3%	2%		6%		7%	3%	2%	4%	8%	6%	5%	3%	6%
Section J Precision																			
Number of unqualified duplicate pairs (of 12)	6	12	12	12	9	12	12	8	12	1	12	12	12	12	5	12	12	11	9
Avg. Rel. Std. Diff.	20%	6%	17%	14%	9%	23%	8%	22%	20%	40%	9%	8%	8%	11%	24%	10%	6%	10%	9%
Avg. Rel. Std. Dev.	14%	4%	12%	10%	6%	16%	5%	16%	14%	28%	7%	6%	6%	8%	17%	7%	4%	7%	6%

	Sr, ppm, ICP-40	Th, ppm, ICP-40	U, ppm, ICP-40	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40
Project Check Standards							
POW-1	133	<6	<100	184	121	6	812
	126	<6	<100	176	112	6	864
	130			**180**	**117**	**6**	**838**
7-Sample Mean	127			178	119	6	842
7-sample Relative Std. Dev., %	2%			4%	4%	8%	2%
Relative Std. Diff., %, (sample-mean)	2%			1%	-2%	-7%	0%
POW-2	554	9	<100	641	163	8	1030
	564	12	<100	660	160	8	1120
	559	**10.5**		**651**	**162**	**8**	**1075**
7-Sample Mean	563	9		671	169	9	1119
7-sample Relative Std. Dev., %	4%	21%		4%	4%	6%	5%
Relative Std. Diff., %, (sample-mean)	-1%	14%		-3%	-4%	-7%	-4%
POI-1	126	13	<100	154	89	6	1190
	123	7	<100	145	80	5	1290
	125	**10**		**150**	**85**	**5.5**	**1240**
5-Sample Mean	122	10		149	86	6	1308
5-sample Relative Std. Dev., %	2%	19%		4%	6%	8%	4%
Relative Std. Diff., %, (sample-mean)	2%	0%		0%	-2%	-5%	-5%
Analyzed Reference Material SARL-1							
	135	23	<100	123	36	5	407
	139	23	<100	126	36	5	432
	145	23	<100	131	37	5	426
	135	22	<100	120	34	5	411
	153	26	<100	139	44	5	453
Average	141	23		128	37	5	426
Accepted Value	158	19	5	140	44	5	420
Rel. Std. Difference	-11%	23%		-9%	-15%	9%	1%
Rel. Std. Deviation	5%	6%		6%	10%	0%	4%
Analyzed Reference Material SARM-1							
	137	21	<100	68	25	3	956
	141	21	<100	66	24	3	956
	141	19	<100	64	24	3	907
	143	23	<100	67	25	3	946
Average	141	21		66	25	3	941
Accepted Value	156	18	3	66	33	3	888
Rel. Std. Difference	-10%	17%		0%	-26%	-6%	6%
Rel. Std. Deviation	2%	8%		3%	2%	0%	2%
Section J Precision							
Number of unqualified duplicate pairs (of 12)	12	8	0	12	12	12	12
Avg. Rel. Std. Diff.	6%	28%		7%	5%	4%	7%
Avg. Rel. Std. Dev.	4%	20%		5%	4%	3%	5%