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

D. Measured Sections G and H, Sage Creek area of the Webster Range, Caribou County, Idaho

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Table 4. Erratum. Corrected first page of table 3 in Herring and others (2000a) for Sections C and D. A few of the earliest-distributed reports contained data columns transposed relative to the headings for CO_2, carbonate, and total carbon. The correct data to correspond with the column headings are shown. Most distributed paper copies and all electronically-distributed copies of the report contained the correct data.

ABSTRACT

This study, one in a series, reports bulk chemical composition of rocks collected from two exposed, measured stratigraphic sections at the Smoky Canyon phosphate mine in southeastern Idaho. The rock samples from Sections G and H constitute a set of channel-sampled intervals across the entire thickness of the Meade Peak Phosphatic Shale Member of the Phosphoria Formation at two locations exposed during mining. These channel samples characterize—in ascending order—the lower phosphate ore, interlayered middle waste rock, upper phosphate ore, and upper waste units of the member. The rocks from both sections exhibit moderate to substantial alteration from interaction with ground water, which contrasts to previous sampling efforts where the more deeply buried of the two sections at each mine was considerably less altered than the shallower section. The Section H suite includes a composite sample of the uppermost 75 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 2-foot section of chert directly overlying the Meade Peak at the locality of Section H.

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 most 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 the measured sections is shown in figure 1. The sections lie in southeastern Idaho, approximately 25 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.

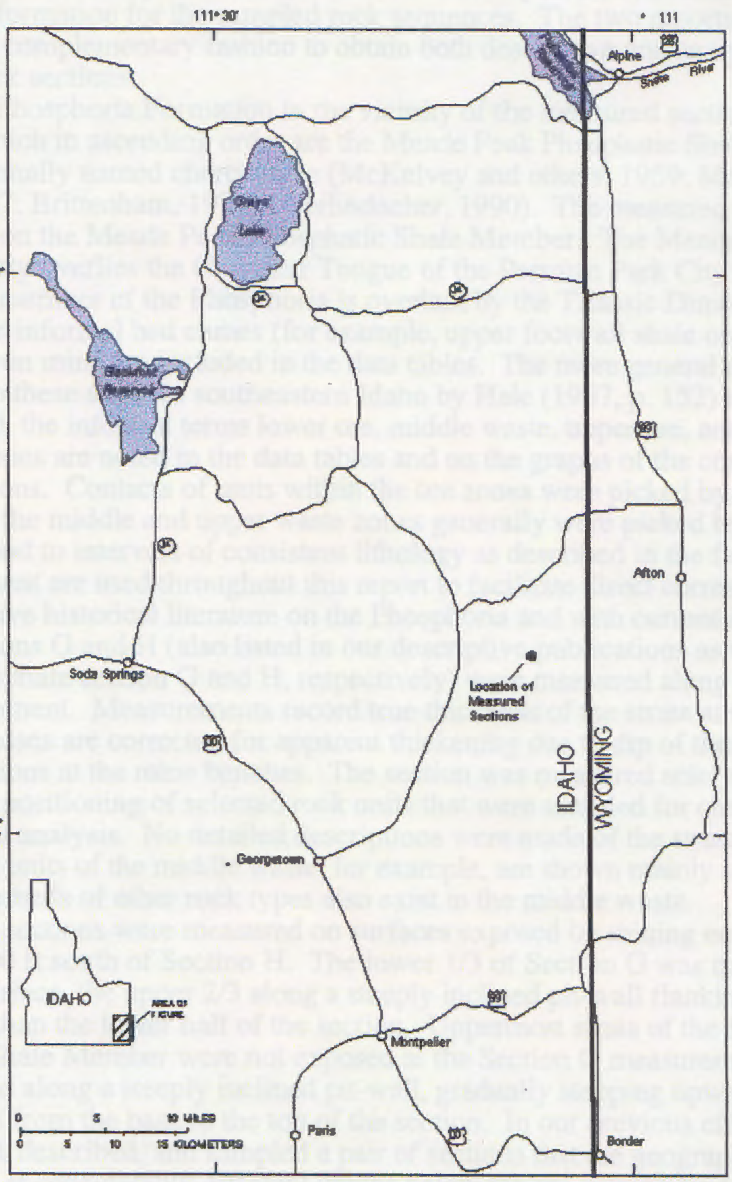

Figure 1. Index map of southeastern Idaho showing location of measured sections from which samples were collected.

Correlation with Measured Sections

Stratigraphic sections of the Phosphoria Formation were measured and described by the USGS at the Smoky Canyon mine in southeastern Idaho. 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 already published (Tysdal and others, 2000c), although no thin section, X-ray, or analytical technique other than gamma-ray spectrometry has been used to augment the field descriptions of the rock units in that publication. In this report we list the analytical information for the sampled rock sequences. The two reports are best used together in a complementary fashion to obtain both descriptive and analytical information about the rock 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.

Some informal bed names (for example, upper footwall shale ore) used at the Smoky Canyon 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 the two sections. Contacts of units within the ore zones were picked by mine personnel; those 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.

Sections G and H (also listed in our descriptive publications as wpsG and wpsH for western phosphate section G and H, respectively) were measured along surfaces exposed by mining equipment. Measurements record true thickness of the strata at the sample site; these thicknesses are corrected for apparent thickening due to dip of the strata at the exposed sections at the mine benches. The section was measured solely 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.

Both sections were measured on surfaces exposed by mining equipment. Section G is about 3,000 ft south of Section H. The lower 1/3 of Section G was measured along a horizontal surface, the upper 2/3 along a steeply inclined pit-wall flanking a cut bench about 25 ft higher than the lower half of the section. Uppermost strata of the Meade Peak Phosphatic Shale Member were not exposed at the Section G measurement site. Section H was measured along a steeply inclined pit-wall, gradually stepping upward across three 30 ft high benches from the base to the top of the section. In our previous efforts at each mine, we measured, described, and sampled a pair of sections that are geographically close together, but at considerably different depths below the pre-mining land surface. This enables evaluation of important effects of alteration from water reaction or other processes on rock geochemistry. Here, however, depths for both sections below the pre-mining surface are closer together than at the previous three mines. The depth below the pre-mining surface of Section G ranges from about 175 ft for the lower part of the section to about 150 ft for the upper part. Depth below the pre-mining surface of Section H ranges from about 50 ft for the lower strata to about 150 ft for upper strata. In addition, the fractured and faulted nature of the rocks in both sections facilitated reaction of the rocks with ground water or with water from surface infiltration. Consequently, rocks from both sections are expected to exhibit moderate to substantial alteration from water.

Strata in the vicinity of the two measured sections dip 20-30 degrees westward, on the back limb of a major anticline. Both sections are cut by local low-angle faults, of unknown displacement, that dip slightly less than to slightly greater than the dip of bedding. These faults caused repetition of strata in some areas, but many caused omission of strata. One such low-angle fault zone cuts through Section G and caused omission of the upper two units of the lower ore zone (Hot Bed and Phosphatic Shale, which combined total 7-10 ft thick; see Tysdal and others, 2000c) and about 25 ft of the lowermost strata of the middle waste (near 35 ft interval, Section G). Middle waste strata between the "? E Bed repeated ?" (near the 85 ft level, Section G; see the figure in Tysdal and others, 2000c) and the upper ore zone of the section are thinner than normal, suggesting omission of strata by an unrecognized fault. In Section H, the Cap Rock units between the lower two lines of correlation (6.5-62 ft interval) are much too thick for a normal sequence in this area. The mudstone strata 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 differ in thickness, chiefly because of likely thinning of the middle waste zone of Section G and thickening of the lower ore zone of Section H by faulting.

METHODS

Field 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. This provides 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 the data tables.

About 0.5 to 1 kg of rock was collected for each sample interval. The bulk samples were shipped to the laboratories of the USGS in Denver, Colorado, for sample preparation.

Rock Sample Preparation

Rock samples were dried in air at ambient temperature. Samples were processed as received after drying. First, they 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.

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 (<150° C) digestion with concentrated hydrochloric, hydrofluoric, nitric, and perchloric acids (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. This technique also provides analysis of Bi and Sn. 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 (see below) techniques, 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 detect and 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 a few of the check standards with low Mn concentrations. Nonetheless, analytical data for both procedures are included in the data tables. The ICP-40 technique measures Au above 8 ppm and Ta above 40 ppm; however, no samples from either of the two sections had concentrations above these detection limits. Consequently, those data have been eliminated from the data files.

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, or 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 H included some analyses done with a graphite furnace AA measurement after fusion of the sample and extraction using an organic solvent.

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.

The element concentration data for Sections G and H include a profile of the equivalent uranium (eU) measurements taken with a GAD-6 gamma-ray spectrometer. Concentrations of eU are given in ppm. This instrument measures gross gamma-ray flux (including cosmic rays) and provides a quantitative measure of K, U, and Th. Abundance of U and Th were determined via detection and counting of gamma rays of specific energy associated with a particular daughter radionuclide of each element, ^{214}Bi with a 1.76 MeV (million electron volt) gamma-ray in the case of U. Calculation of total abundance of U and Th assumes secular equilibrium between the measured daughter nuclide and the parent isotope and all intermediate daughter nuclides for each individual element. Potassium abundance is determined from the measurement of gamma rays associated with the decay of ^{40}K. The spectrometer integrates detection over a 2π geometry of approximately 1/2 m^3 and, because gamma rays are emitted in random directions, has proportionally higher detection likelihood for those gamma rays that are emitted closer to the detector. The calibration equations for the spectrometer assume this geometry on a planar surface and are based on analysis of concrete pads of known composition of the three elements. The calibration coefficients, as well as the constants for subtracted background counts, are a function of latitude, altitude, rock density, and moisture. The coefficients become less reliable as location and rock conditions change from those of the calibration. No gamma spectrometry measurements were made in the highly-altered Section H, although some gamma scintillometry measurements are included across two parts at and near the base of the section.

In Herring and others (2000a) and Tysdal and others (2000a), we discussed the rationale for reporting eU concentration data after normalization of the highest eU concentration to 200 ppm for Sections A and B (Herring and others, 1999; Tysdal and others, 1999). This scaling was done because published reports from the 1970s and earlier on U and eU concentrations in the Meade Peak state that few U concentrations from this member exceed 200 ppm (see Swanson, 1970, and references therein) and we had little independent check on accuracy of the spectrometer data. However, new analytical data obtained as part of our study question these past published relationships. Recently, we re-analyzed a subset of samples using delayed neutron (DN) analysis, which has a precision of better than 3 percent and an accuracy of generally better than 5 percent (McKown and Millard, 1987). The relationship between the two measurement techniques is shown in figure 2 for 70 samples. DN analysis provides a cross check on those U concentration data published by Herring and others (1999) where the concentrations are greater than the lower detection limit of the ICP-40 analytical method, 100 ppm. For a set of 12 samples where ICP-AES measurements are greater than the detection limit of 100 ppm, the DN data average 12 percent less than those of ICP-40 and have a relative standard deviation of 12 percent. Thus, given this relative credibility in the ICP-40 technique as verified by DN analysis, the frequency of U concentrations >100 ppm among the set of all composited stratigraphic samples of the Meade Peak analyzed using ICP-40 can be estimated. For 246 channel samples of Sections A, B, C, D, E, and F as measured by ICP-40 (Herring and others, 1999, 2000a, 2000b), 33 of the U concentrations are >100 ppm, with 30 between 100 and 200 ppm and 3 that are >200 ppm. These channel samples average rock over intervals that range from 1 to 15 feet of true stratigraphic thickness. Clearly, each channel sample will have some U concentrations that are indeed higher, perhaps considerably so, than the interval average. Furthermore, measurement of U concentrations in over 400 samples of the Meade Peak using energy dispersive x-ray fluorescence (EDXRF) show that about 3 percent of the U concentrations are >200 ppm (Siems and Herring, manuscript in preparation). Consequently, we believe that U concentrations in excess of 200 ppm are not as scarce as reported by Swanson (1970, and references therein) and that U concentration measurements from the gamma-ray spectrometers are reasonably accurate and should be reported as measured rather than scaling them against an assumed upper limit value based on older studies.

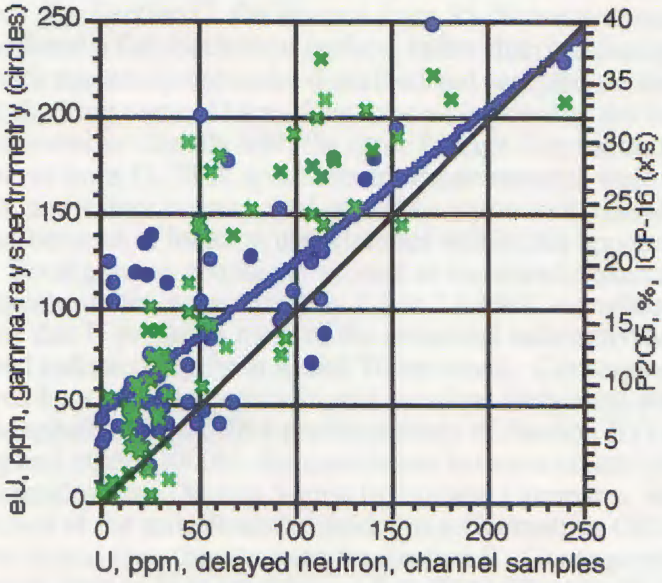

Figure 2. Comparison of measured uranium concentrations by delayed neutron analysis with gamma-ray spectroscopy measurements taken at 1-foot true-thickness station through the same intervals and arithmetically averaged (circles). The 1:1 and least-squares regression lines (heavier line; $R^2 = 0.55$) are shown. Concentrations of P_2O_5 in percent are shown for the same samples (x's).

Previous studies of the Phosphoria Formation maintain that there is a consistent relationship between eU and total U contents and between total U and phosphate contents (McKelvey, 1956). Our measurements indicate considerable scatter in both relationships (fig. 2; Herring and others, 1999; Herring, unpublished data). Measured eU concentrations, even among consecutive 1-foot stratigraphic intervals within a unit of consistent lithologic character, often exhibit considerable variability. We expect that this results from: (1) fine-scale variability in the concentration of U; (2) the effect of the geometry of the dipping rocks; or (3) from lack of secular equilibrium. Scatter in the U to P_2O_5 relationship results from U removal or addition by syndepositional effects and (or) by post-depositional alteration, especially weathering. The U is mostly located in the phosphate mineral lattice as a substitute for Ca; location of the decay (daughter) products is uncertain. For the phosphatic rocks of the Phosphoria Formation, total gamma-ray counts are dominated by decay of U and its various daughter products. K_2O is generally <2 percent in the phosphorite and <3 percent in the middle waste shale; Th concentrations are generally <15 ppm in ore and waste shale (Altschuler and others, 1958; Swanson, 1970; Herring and others, 1999; Herring, unpublished data).

The measurements for eU were obtained on high-resolution, 1-foot (true-thickness) spacing across parts of Section G. These concentration data are graphed in the preliminary report on the stratigraphic descriptions of these sections (Tysdal and others, 2000c). The reported eU concentration for each channel-sampled interval in the data tables was obtained by averaging all measurements taken through that interval at 1-foot spacings. A recalibration of the GAD-6 instrument in April, 2000, indicates that eU concentrations in our previous reports should be reduced by 18 percent, an exactly proportional correction that reduces all concentrations equally. However, we have continued to use the older calibration equations for the data in this report to facilitate comparison with our earlier data. Relative changes among all reported concentrations for a measured section are accurate as depicted. For Section G, the interval from 35-50 feet was measured on the lower bench, which offered a flat, horizontal surface, rather than continuing measurements at 35 feet along with the stratigraphically described and sampled section on the next higher bench, with its flanking vertical face. This interval is possibly thickened by a low-angle fault and may not correlate directly with the same footage interval on the next higher bench. Within the interval from 51-78 ft, spectrometry measurements were made on the lower bench from 51-68 ft, and values were typical of middle waste rock. However, these values are not included because of location uncertainties within this apparently faulted sequence.

Total gamma counts per second as measured across the energy detection spectrum of the spectrometer, approximately 1.5 to 2.6 MeV, correlate with eU with $R^2 > 0.99$. This indicates that U produces most of the measured radioactivity and that the contributions to measured radioactivity from K and Th are small. Consequently, the gross gamma counts measured by a scintillometer also will correlate fairly well with U content and, secondarily, with phosphate content. In a previous study of Section E (Tysdal and others, 2000b; Herring and others 2000b), the correlation between counts per second on the spectrometer and a scintillometer (Mount Sopris Instrument Company, Model SC-132) was $R^2 = 0.82$. For Section H the scintillometer used was a Geometrics GR101A, which has a smaller detector crystal than the one used for Section E. Consequently, the absolute count rate for samples of Section H is notably less than that of Section E. Nonetheless, the scintillometry measurements of Section H are internally consistent from one to another and can be related in relative magnitude to the spectrometry and scintillometry scans of other sections. In Section H, 20 of the channel-sampled intervals had scintillometry measurements taken across their intervals at 1-foot true stratigraphic spacing and arithmetically averaged for the interval (table 2). These samples also were analyzed for U content by EDXRF (Siems and Herring, in preparation). The relationship between these two techniques is

$$U = (cps*0.49)-205, R^2 = 0.79$$

where the U concentration is in ppm and cps represents the counts per second of the Geometrics GR101A scintillometer.

RESULTS

Analytical results of the rock analyses from the more deeply buried but still altered Section G and shallower, also-altered section H are listed in concentration data tables 1 and 2, respectively. The tables include listings of the concentrations of the major rock-forming elements as oxides as well as 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 and sulfur. Elements are listed alphabetically by chemical symbol for each of the analytical techniques: individual elements (As, Hg, Sb, Se, and Tl), carbon forms and sulfur, ICP-16 (fusion digestion), and ICP-40 (acid digestion). Interval base and top footages are specified relative to the stratigraphic base of the Meade Peak Phosphatic Shale Member. This base is defined specifically as the base of the Fish-scale stratum, a bioclastic marker phosphorite unit. Footage numbers increase upward through the measured sections. The samples from both sections represent the Meade Peak in its entirety as a series of contiguous channel samples from the uppermost Grandeur Tongue through and including the Upper Waste unit within the Phosphoria Formation. The upper-most channel sample from Section H (WPSH180C) is a sample through a 2-foot interval of the Rex Chert immediately overlying the Meade Peak.

Table 2 includes chemical composition data for three special samples that were not collected as part of the channel sampling through the Meade Peak. First, there is a composite sample of the Grandeur at the location of Section H obtained by collecting approximately 100 g at 1-foot intervals through the upper 75 of thickness of the Grandeur. Second, a composite bag of randomly collected chips from the Fish-scale unit directly overlying the Grandeur at the location of the Grandeur unit composite sample was included. This was done because the Fish-scale unit of the section had lain exposed as a dipslope mining surface for a couple of years and it was conceivable that composition could have been altered compared to fresher samples of the Fish-scale collected in outcrop as part of channel sampling. Indeed, nearly all element concentrations in these exposed samples of the Fish-scale unit are half or less compared to those same element concentrations in the fresher channel sample of the Fish-scale. Only those trace elements associated with the phosphate, as well as the phosphate concentration itself, exhibit increased concentrations in the weathered composite sample. This suggests that leaching can reduce trace element concentrations from exposed rocks over a time scale of a few years. Third, there is a 2-foot stratigraphic thickness sub-sample taken of the channel sample that directly overlies the Fish-scale unit. This sub-interval was sampled because of its unusually high radiometric emission (see eU data in Tysdal and others, 2000c). Initially, the chemical composition for this interval, based on the data from the analytical contractor, seems little different from the enclosing channel-sampled interval, with a U concentration for both reported as <100 ppm. However, EDXRF analysis of this sub-sampled interval reveals a U concentration of 239 ppm, consistent with the radiometric signature measured in the field using gamma-ray scintillometry. The enclosing channel-sampled interval has a U concentration of 172 ppm using EDXRF analysis. We have no explanation for the apparently much lower U concentration values for these two samples that were reported by the analytical contractor.

The concentration data in tables 1 and 2 are listed as reported by the contract laboratory. The data have neither been manipulated 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 samples from the sections 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 (Wilson and others, in preparation). These standards are finely ground (<200 mesh) splits of composite channel samples of two sections of middle waste rock and one of ore from Section B. This section was described by Tysdal and others (1999) and the analytical data were 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 Sections G and H, the mean concentration values of past five replicated analyses, and the relative standard difference between those standards and the means. Analyzed standards also included 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 in percent between those mean concentrations and the accepted values.

As a measure of analytical precision, the analytical sample set includes 8 replicated sample pairs, 4 from each section. These samples are identified in the data tables for Sections G and H as duplicates. The listings in table 3 summarize for each element the average relative standard difference and average relative standard deviation of up to 8 duplicated pairs of samples. This summary only reports statistical comparisons for duplicated sample pairs without any qualified concentration data for individual elements.

The samples were submitted to the contract laboratory in a randomized sequence. This eliminated systematic error from sources such as, for example, instrumental drift. 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.
ICP-16: inductively-coupled plasma spectrometry, fusion digestion.
ICP-40: inductively-coupled plasma spectrometry, acid digestion.

Concentrations of various elements in the channel samples of the two sections are graphed in figure 3. The few "less-than" concentrations reported for some of these elements have been replaced with their lower detection limits for graphing. The figure includes a brief key to the general geology of major intervals within each section: Lower Ore Zone, Middle Waste, Upper Ore Zone, and Upper Waste. For Section H, the figure includes the data from the Grandeur Tongue limestone, the composited sample of surface-exposed (weathered) Fish-scale chips, and the uraniferous sub-sample within the interval from 0.5 to 6 feet. The sample from the 178 to 180 foot interval is from the Rex Chert Member of the Pshosphoria Formation.

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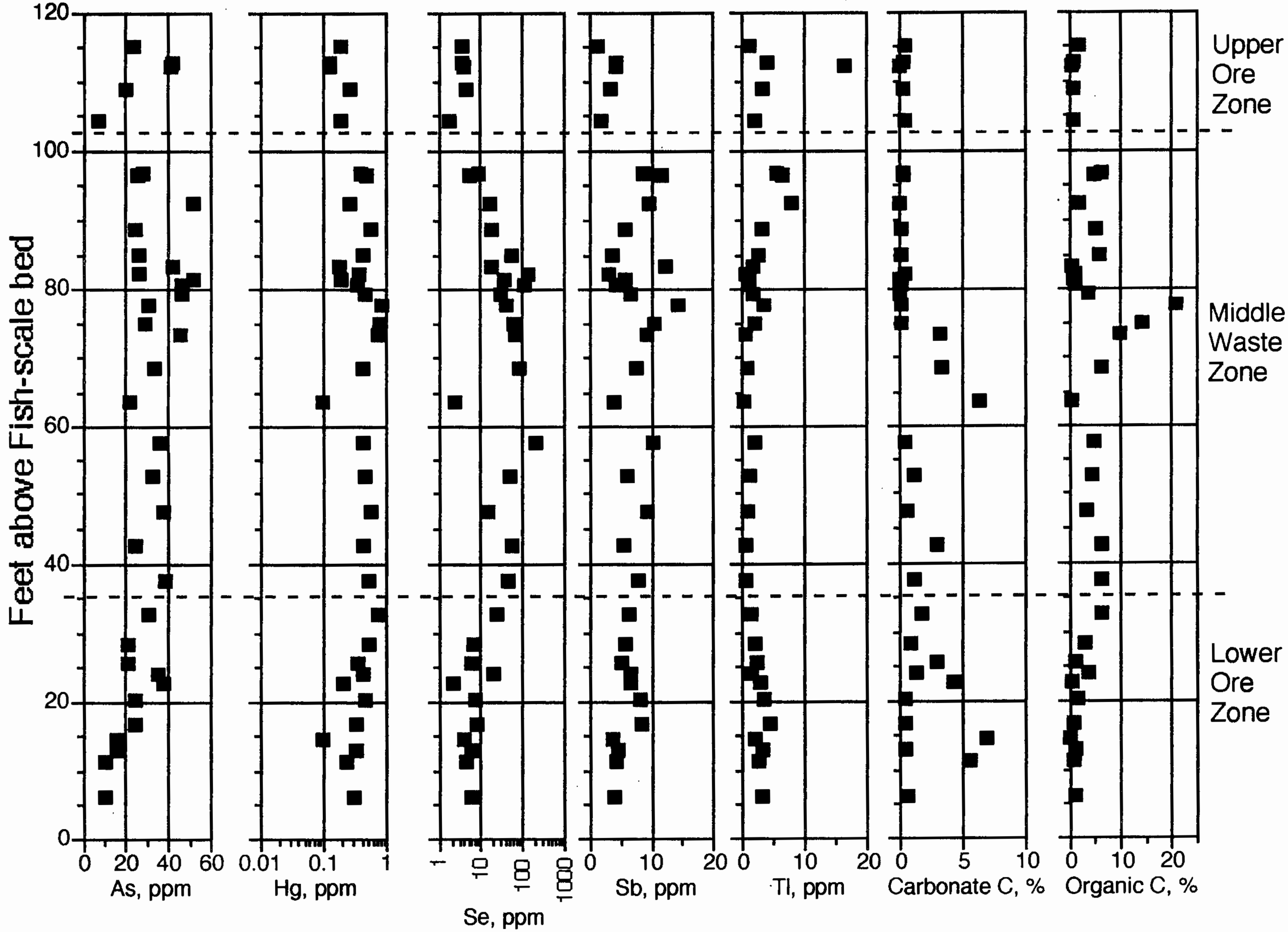
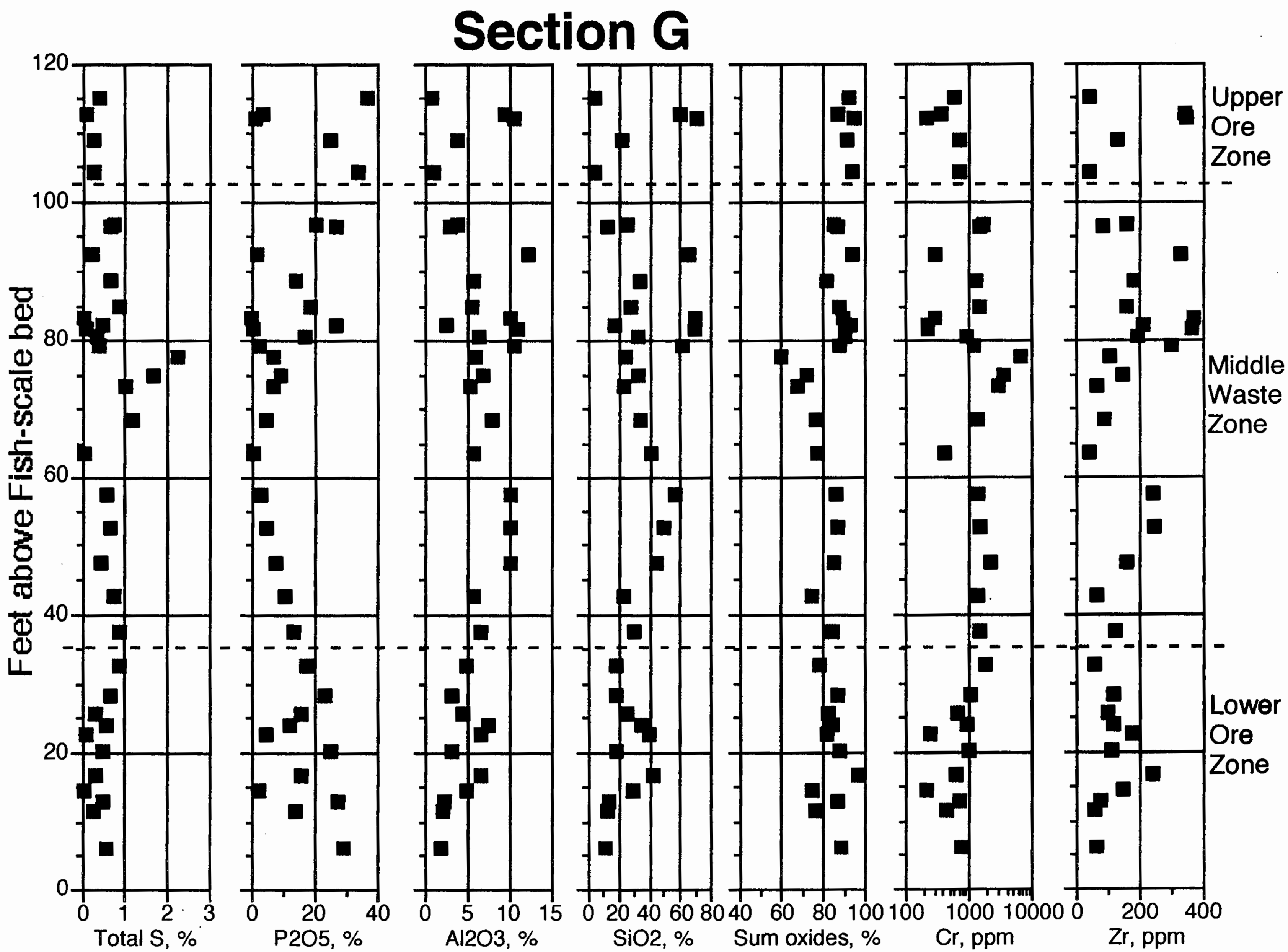
Section G

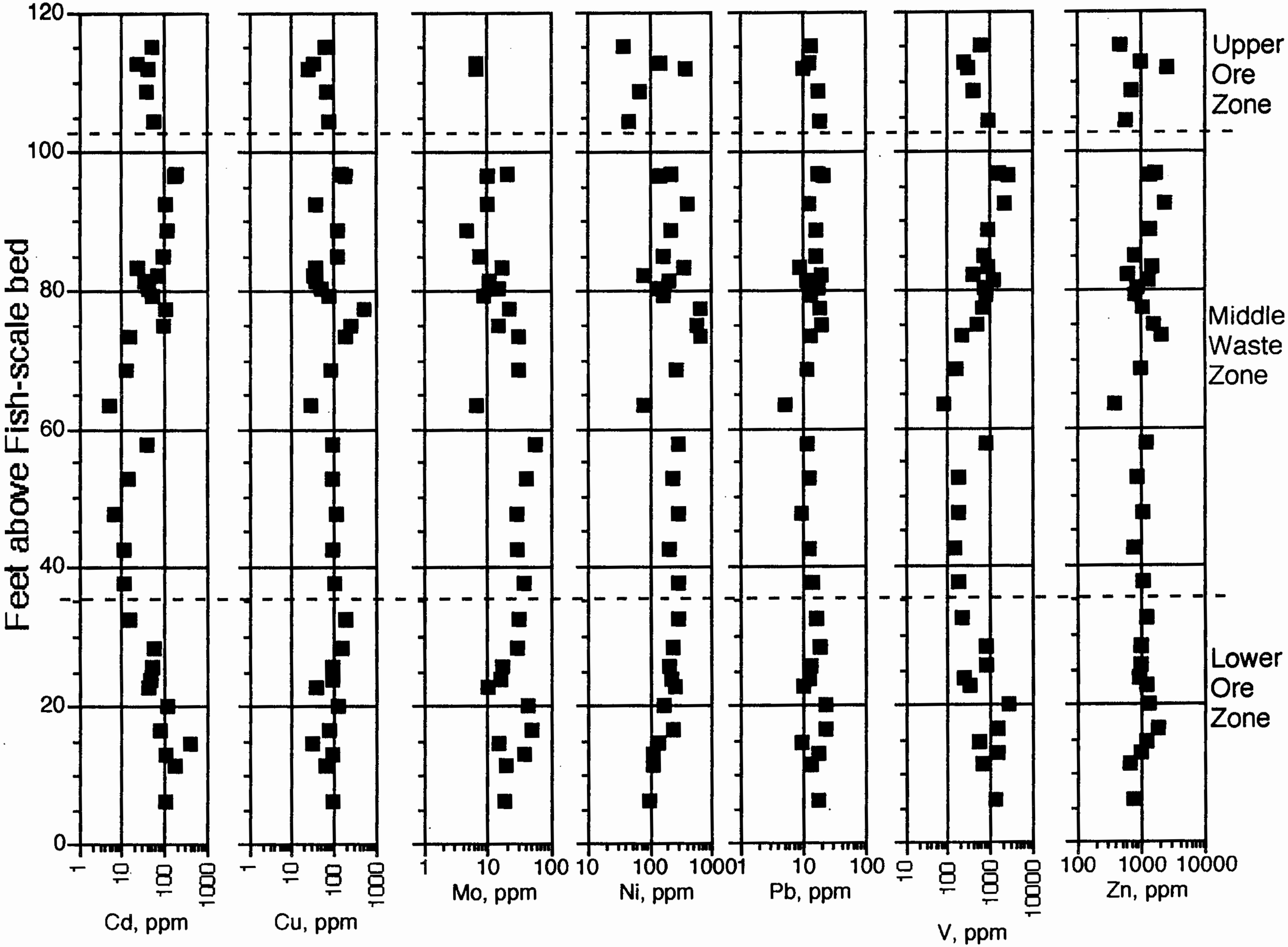


Feet above Fish-scale bed
120
100
80
60
40
20
0
0 20 40 60
As, ppm
0.01 0.1 1
Hg, ppm
1 10 100 1000
Se, ppm
0 10 20
Sb, ppm
0 10 20
Tl, ppm
0 5 10
Carbonate C, %
0 10 20
Organic C, %
Upper Ore Zone
Middle Waste Zone
Lower Ore Zone

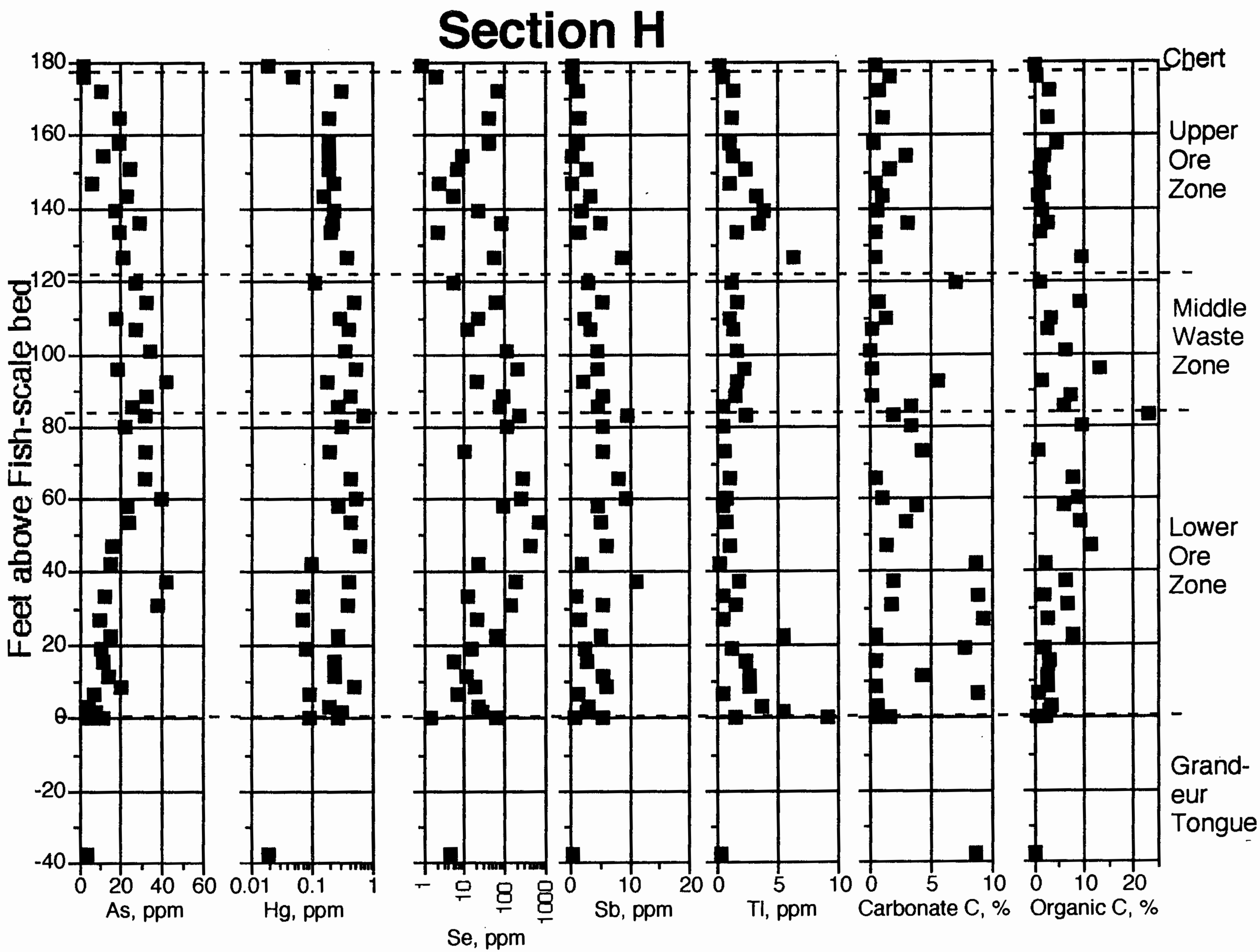


OFR 99-147-D; Figure 3

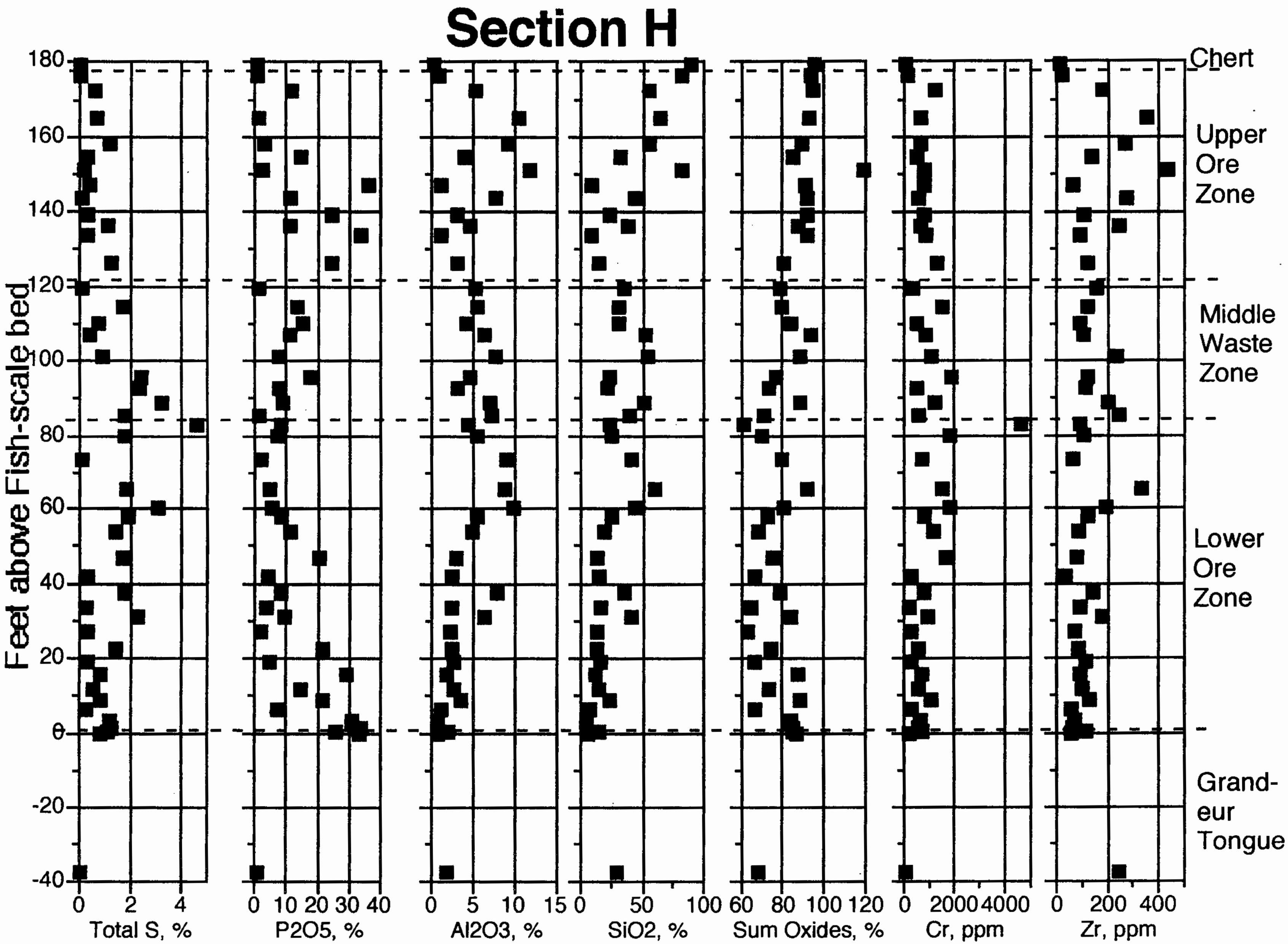
Section G

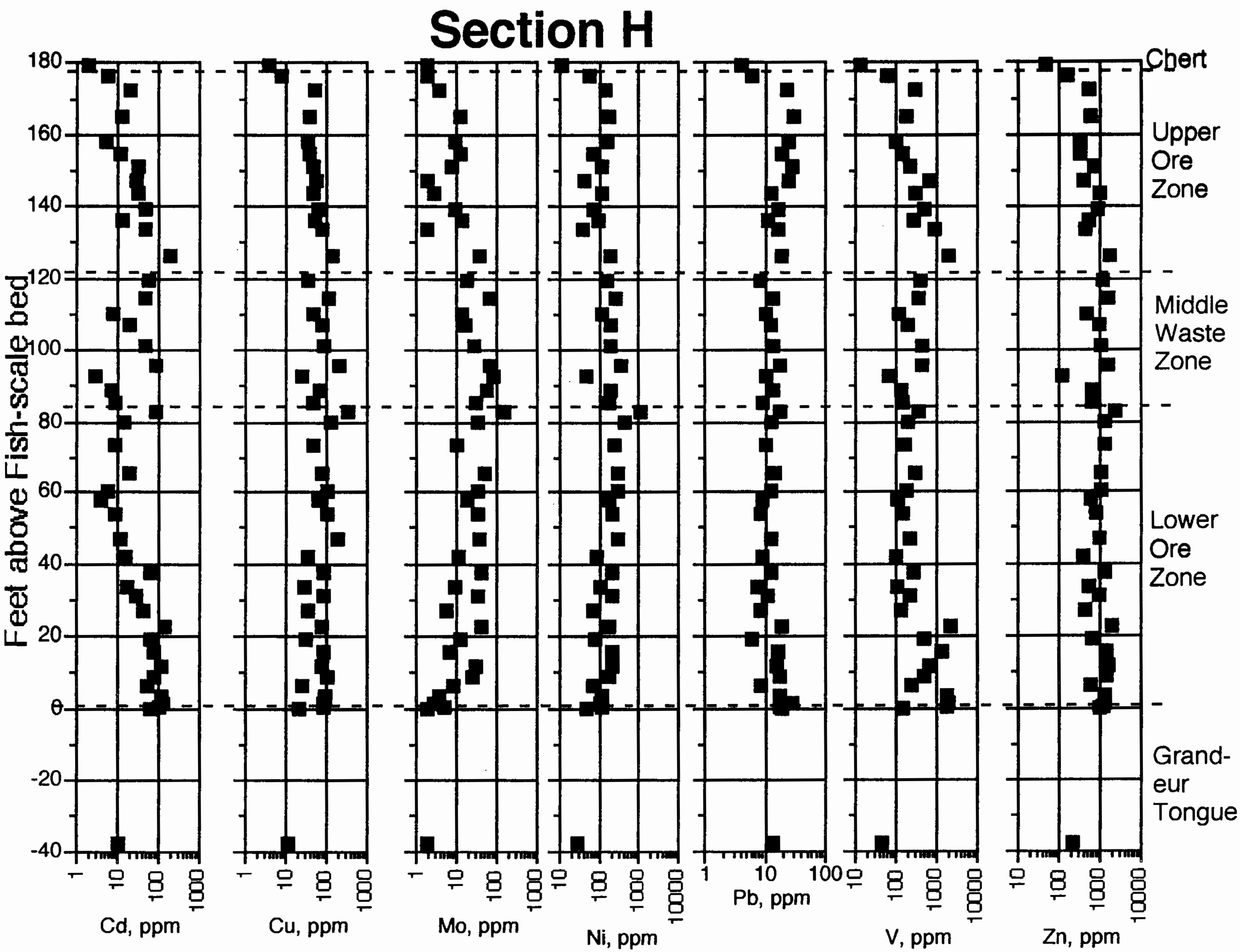


Feet above Fish-scale bed
120
100
80
60
40
20
0
Upper Ore Zone
Middle Waste Zone
Lower Ore Zone
1 10 100 1000
Cd, ppm
1 10 100 1000
Cu, ppm
1 10 100
Mo, ppm
10 100 1000
Ni, ppm
1 10 100
Pb, ppm
10 100 1000 10000
V, ppm
100 1000 10000
Zn, ppm



Section H
Feet above Fish-scale bed
180
160
140
120
100
80
60
40
20
0
-20
-40
0
20
40
60
As, ppm
0.01
0.1
1
Hg, ppm
1
10
100
1000
Se, ppm
0
10
20
Sb, ppm
0
5
10
Tl, ppm
0
5
10
Carbonate C, %
0
10
20
Organic C, %
Chert
Upper Ore Zone
Middle Waste Zone
Lower Ore Zone
Grand-eur Tongue


Section H
Feet above Fish-scale bed
180
160
140
120
100
80
60
40
20
0
-20
-40
0 2 4
Total S, %
0 10 20 30 40
P2O5, %
0 5 10 15
Al2O3, %
0 50 100
SiO2, %
60 80 100 120
Sum Oxides, %
0 2000 4000
Cr, ppm
0 200 400
Zr, ppm
Chert
Upper Ore Zone
Middle Waste Zone
Lower Ore Zone
Grand-eur Tongue


Section H
Feet above Fish-scale bed
180
160
140
120
100
80
60
40
20
0
-20
-40
Cd, ppm
Cu, ppm
Mo, ppm
Ni, ppm
Pb, ppm
V, ppm
Zn, ppm
Chert
Upper Ore Zone
Middle Waste Zone
Lower Ore Zone
Grandeur Tongue

Sample	Unit	Lithology	Unit w/in Meade Peak	Lab No.	Comments	Interval base, ft	Interval top, ft	Thickness, ft	Interval midpoint, ft	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
WPSG008C	Lower Ore Zone	Phosphorite	Main Bed Ore	C-141317		1.5	11.0	9.5	6.25	10.2	0.31	4.2	7	2.9	1.71	2.11	0.58	1.13
WPSG008X	Lower Ore Zone	Phosphorite	Main Bed Ore	C-141320	duplicate of previous sample	1.5	11.0	9.5	6.25	11.5	0.29	4.2	6	3.3	1.73	2.07	0.56	1.17
WPSG011C	Lower Ore Zone		Cap Rock	C-141341		11.0	11.9	0.9	11.45	10.7	0.23	4.3	5	2.7	6.17	20.30	5.54	0.63
WPSG013C	Lower Ore Zone		Cap Rock	C-141345		11.9	14.0	2.1	12.95	15.6	0.33	4.8	7	3.3	1.54	1.74	0.47	1.07
WPSG014C	Lower Ore Zone		Cap Rock	C-141327		14.0	15.0	1.0	14.50	15.5	0.10	3.7	4	2.2	7.04	25.20	6.88	0.16
WPSG016C	Lower Ore Zone		Cap Rock	C-141344		15.0	18.3	3.3	16.65	24.8	0.33	8.5	8	4.4	1.25	1.61	0.44	0.81
WPSG020C	Lower Ore Zone		Low. Footwall Sh Ore	C-141337		18.3	22.0	3.7	20.15	24.9	0.46	8.3	7	3.5	2.04	1.60	0.44	1.60
WPSG023C	Lower Ore Zone		Inner Seam (waste)	C-141328		22.0	23.3	1.3	22.65	37.9	0.21	6.8	2	3.0	4.85	15.70	4.28	0.57
WPSG024C	Lower Ore Zone		Inner Seam (waste)	C-141336		23.3	24.5	1.2	23.90	34.7	0.43	6.7	22	1.6	5.20	4.93	1.35	3.85
WPSG026C	Lower Ore Zone		Inner Seam (waste)	C-141342		24.5	26.8	2.3	25.65	21.1	0.36	5.3	6	2.4	3.95	10.70	2.92	1.03
WPSG028C	Lower Ore Zone		Up. Footwall Sh Ore	C-141314		26.8	30.0	3.2	28.40	20.7	0.54	5.9	7	2.1	3.88	3.42	0.93	2.95
WPSG033C	Lower Ore Zone		False Cap	C-141323		30.0	35.0	5.0	32.50	35.6	0.76	6.1	27	1.5	7.88	6.61	1.80	6.08
WPSG033X	Lower Ore Zone		False Cap	C-141343	duplicate of previous sample	30.0	35.0	5.0	32.50	26.5	0.77	6.8	27	1.4	7.91	6.20	1.69	6.22
WPSG037C	Middle Waste	Dolostone		C-141352		35.0	40.0	5.0	37.50	38.2	0.54	8.0	46	0.7	7.42	4.17	1.14	6.28
WPSG042C	Middle Waste	Dolostone		C-141350		40.0	45.0	5.0	42.50	24.8	0.43	5.5	55	0.7	9.27	10.60	2.89	6.38
WPSG047C	Middle Waste	Dolostone		C-141349		45.0	50.0	5.0	47.50	38.0	0.58	9.3	16	0.8	4.06	2.44	0.67	3.39
WPSG052C	Middle Waste			C-141351		50.0	55.0	5.0	52.50	32.4	0.45	6.2	54	1.1	5.58	4.24	1.16	4.42
WPSG057C	Middle Waste			C-141332		55.0	60.0	5.0	57.50	35.6	0.44	10.2	219	2.2	5.03	1.54	0.42	4.61
WPSG065C	Middle Waste	Dolostone		C-141335		60.0	67.0	7.0	63.50	22.3	0.10	4.2	3	0.3	6.62	22.90	6.25	0.37
WPSG069C	Middle Waste			C-141325		67.0	70.0	3.0	68.50	33.5	0.42	7.7	84	0.8	9.85	12.60	3.44	6.41
WPSG073C	Middle Waste			C-141315		70.0	76.5	6.5	73.25	45.9	0.75	9.3	67	0.6	13.10	11.80	3.22	9.88
WPSG077C	Middle Waste			C-141326	Contains all beds in 70-80' interval, including "E" Bed	70.0	80.0	10.0	75.00	28.6	0.80	10.5	61	2.0	14.50	0.82	0.22	14.28
WPSG078C	Middle Waste	Phosphorite	?"E" Bed?	C-141334		76.5	78.5	2.0	77.50	30.8	0.90	14.8	40	3.3	20.70	0.34	0.09	20.61
WPSG078X	Middle Waste	Phosphorite	?"E" Bed?	C-141321	duplicate of previous sample	76.5	78.5	2.0	77.50	31.3	0.84	13.8	42	3.7	21.00	0.35	0.10	20.90
WPSG079C	Middle Waste			C-141316		78.5	80.0	1.5	79.25	46.6	0.46	6.6	32	1.7	3.63	0.14	0.04	3.59
WPSG080C	Middle Waste			C-141348		80.0	81.0	1.0	80.50	46.5	0.35	4.5	116	1.2	1.22	0.66	0.18	1.04
WPSG082C	Middle Waste			C-141347		81.0	82.0	1.0	81.50	51.3	0.20	6.0	39	1.3	0.70	0.05	0.01	0.69
WPSG825C	Middle Waste			C-141330		82.0	82.5	0.5	82.25	26.0	0.39	3.3	142	0.5	1.42	1.65	0.45	0.97
WPSG083C	Middle Waste			C-141346		82.5	84.0	1.5	83.25	41.9	0.19	12.7	18	1.7	0.46	0.01	<0.003	0.46
WPSG083X	Middle Waste			C-141331	duplicate of previous sample	82.5	84.0	1.5	83.25	41.7	0.18	11.9	19	1.7	0.48	0.02	0.01	0.47
WPSG085C	Middle Waste	Phosphorite	?E Bed repeated?	C-141329		84.0	86.0	2.0	85.00	26.1	0.44	3.7	56	2.6	5.90	0.68	0.19	5.71
WPSG090C	Middle Waste			C-141322		86.0	91.5	5.5	88.75	24.8	0.56	6.0	19	3.2	5.13	0.55	0.15	4.98
WPSG093C	Middle Waste	Dolostone		C-141319		91.5	93.5	2.0	92.50	51.3	0.27	9.8	17	7.9	1.83	0.15	0.04	1.79
WPSG097C	Middle Waste			C-141324		93.5	100.0	6.5	96.75	27.9	0.41	8.8	9	5.6	6.41	1.07	0.29	6.12
WPSG098C	Middle Waste			C-141340	Interval also included within WPSG097C	95.0	98.0	3.0	96.50	25.3	0.50	11.7	6	6.4	5.01	1.21	0.33	4.68
WPSG101C	Middle Waste				sample lost	100.0	102.5	2.5	101.25									
WPSG105C	Upper Ore Zone	Phosphorite	Hangingwall Shale & Lower Rich Bed?	C-141318		102.5	106.0	3.5	104.25	7.3	0.19	2.2	2	2.1	1.27	1.46	0.40	0.87
WPSG110C	Upper Ore Zone		Hangingwall Shale & Lower Rich Bed?	C-141333		106.0	111.5	5.5	108.75	19.9	0.27	3.4	5	3.2	1.12	1.12	0.31	0.81
WPSG1125	Upper Ore Zone			C-141339		111.5	112.5	1.0	112.00	40.9	0.13	4.4	4	16.5	0.28	0.15	0.04	0.24
WPSG113C	Upper Ore Zone	Dolostone		C-141353		112.5	113.0	0.5	112.75	42.2	0.13	4.3	4	4.1	0.90	0.99	0.27	0.63
WPSG115C	Upper Ore Zone	Phosphorite	Upper Rich Bed?	C-141388		113.0	117.0	4.0	115.00	23.5	0.20	1.4	4	1.1	2.22	1.54	0.42	1.80

Section G (wpsG) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	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	Si, %, ICP-16	SiOx, %, ICP-16	Ti, %, ICP-16	TiOx, %, ICP-16
WPSG008C	Lower Ore Zone	Phosphorite	Main Bed Ore	0.56	0.99	1.87	29.9	41.8	0.47	0.67	0.48	0.58	0.13	0.22	0.37	0.50	12.50	28.64	5.1	10.8	0.07	0.12
WPSG008X	Lower Ore Zone	Phosphorite	Main Bed Ore	0.56	1.09	2.06	31.6	44.2	0.47	0.67	0.49	0.59	0.13	0.22	0.41	0.55	13.20	30.25	5.6	11.9	0.07	0.12
WPSG011C	Lower Ore Zone		Cap Rock	0.27	1.09	2.06	31.8	44.5	0.50	0.72	0.56	0.67	0.37	0.61	0.18	0.24	6.06	13.89	6.1	13.1	0.07	0.12
WPSG013C	Lower Ore Zone		Cap Rock	0.50	1.29	2.44	28.7	40.2	0.65	0.93	0.68	0.82	0.19	0.32	0.39	0.53	12.00	27.50	6.5	13.9	0.10	0.17
WPSG014C	Lower Ore Zone		Cap Rock	0.07	2.65	5.01	22.9	32.0	0.96	1.37	1.10	1.33	0.86	1.43	0.47	0.63	0.93	2.13	13.9	29.7	0.21	0.35
WPSG016C	Lower Ore Zone		Cap Rock	0.30	3.60	6.80	17.9	25.0	1.50	2.15	1.62	1.95	0.38	0.63	0.71	0.96	6.97	15.97	19.5	41.7	0.30	0.50
WPSG020C	Lower Ore Zone		Low. Footwall Sh Ore	0.50	1.66	3.14	27.1	37.9	0.67	0.96	0.84	1.01	0.25	0.41	0.36	0.49	10.90	24.98	8.7	18.6	0.13	0.22
WPSG023C	Lower Ore Zone		Inner Seam (waste)	0.11	3.53	6.67	13.7	19.2	1.59	2.27	1.59	1.92	3.07	5.09	0.83	1.12	2.02	4.63	18.5	39.6	0.28	0.47
WPSG024C	Lower Ore Zone		Inner Seam (waste)	0.58	3.99	7.54	15.9	22.2	1.43	2.04	1.95	2.35	1.04	1.72	0.48	0.65	5.28	12.10	16.2	34.7	0.23	0.38
WPSG026C	Lower Ore Zone		Inner Seam (waste)	0.30	2.46	4.65	21.5	30.1	1.06	1.52	1.10	1.33	1.75	2.90	0.44	0.59	6.88	15.76	11.8	25.2	0.16	0.27
WPSG028C	Lower Ore Zone		Up. Footwall Sh Ore	0.65	1.67	3.15	26.5	37.1	0.85	1.22	0.83	1.00	0.55	0.91	0.38	0.51	10.20	23.37	8.8	18.7	0.11	0.18
WPSG033C	Lower Ore Zone		False Cap	0.90	2.62	4.95	22.9	32.0	1.15	1.64	1.23	1.48	0.46	0.76	0.42	0.57	7.50	17.19	8.8	18.9	0.13	0.22
WPSG033X	Lower Ore Zone		False Cap	0.90	2.58	4.87	23.2	32.5	1.09	1.56	1.25	1.51	0.46	0.76	0.39	0.53	7.86	18.01	8.5	18.3	0.12	0.20
WPSG037C	Middle Waste	Dolostone		0.87	3.54	6.69	18.9	26.4	1.90	2.72	1.68	2.02	0.56	0.93	0.62	0.84	5.87	13.45	14.1	30.2	0.23	0.38
WPSG042C	Middle Waste	Dolostone		0.77	3.07	5.80	20.9	29.2	1.41	2.02	1.31	1.58	0.37	0.61	0.39	0.53	4.62	10.59	11.1	23.7	0.18	0.30
WPSG047C	Middle Waste	Dolostone		0.46	5.39	10.18	10.4	14.5	2.58	3.69	2.09	2.52	0.41	0.68	0.69	0.93	3.26	7.47	20.6	44.1	0.35	0.58
WPSG052C	Middle Waste			0.65	5.44	10.28	9.8	13.7	2.33	3.33	2.00	2.41	0.23	0.38	0.98	1.32	2.06	4.72	23.2	49.6	0.39	0.65
WPSG057C	Middle Waste			0.56	5.40	10.20	5.2	7.2	2.48	3.55	2.29	2.76	0.32	0.53	0.98	1.32	1.39	3.19	26.3	56.3	0.43	0.72
WPSG065C	Middle Waste	Dolostone		0.07	3.08	5.82	13.9	19.4	1.21	1.73	1.11	1.34	4.09	6.78	0.25	0.34	0.27	0.62	19.0	40.6	0.17	0.28
WPSG069C	Middle Waste			1.17	4.27	8.07	16.5	23.1	1.94	2.77	1.62	1.95	0.44	0.73	0.55	0.74	1.95	4.47	15.8	33.8	0.25	0.42
WPSG073C	Middle Waste			1.03	2.91	5.50	18.8	26.3	1.99	2.85	1.05	1.27	0.47	0.78	0.37	0.50	3.06	7.01	10.7	22.9	0.17	0.28
WPSG077C	Middle Waste			1.65	3.72	7.03	11.8	16.5	1.86	2.66	1.28	1.54	0.23	0.38	0.62	0.84	4.03	9.23	15.3	32.7	0.26	0.43
WPSG078C	Middle Waste	Phosphorite	?"E" Bed?	2.23	3.32	6.27	10.3	14.4	2.33	3.33	1.16	1.40	0.35	0.58	0.34	0.46	3.15	7.22	11.7	25.0	0.20	0.33
WPSG078X	Middle Waste	Phosphorite	?"E" Bed?	2.20	3.21	6.06	10.4	14.5	2.27	3.25	1.14	1.37	0.37	0.61	0.35	0.47	3.14	7.19	11.7	25.0	0.20	0.33
WPSG079C	Middle Waste			0.41	5.68	10.73	3.2	4.4	2.46	3.52	2.16	2.60	0.15	0.25	1.10	1.48	1.12	2.57	28.6	61.2	0.45	0.75
WPSG080C	Middle Waste			0.36	3.50	6.61	18.9	26.4	2.28	3.26	1.26	1.52	0.11	0.18	0.71	0.96	7.44	17.05	15.6	33.4	0.28	0.47
WPSG082C	Middle Waste			0.09	5.89	11.13	0.6	0.9	2.87	4.10	2.07	2.49	0.05	0.08	1.33	1.79	0.21	0.48	32.1	68.7	0.48	0.80
WPSG825C	Middle Waste			0.50	1.34	2.53	30.3	42.4	0.98	1.40	0.55	0.66	0.05	0.08	0.66	0.89	11.80	27.04	8.1	17.3	0.15	0.25
WPSG083C	Middle Waste			0.06	5.38	10.16	0.5	0.6	2.56	3.66	2.09	2.52	0.04	0.07	1.41	1.90	0.15	0.34	34.3	73.4	0.52	0.87
WPSG083X	Middle Waste			0.06	5.49	10.37	0.4	0.6	2.39	3.42	2.18	2.63	0.04	0.07	1.40	1.89	0.15	0.34	30.4	65.0	0.45	0.75
WPSG085C	Middle Waste	Phosphorite	?E Bed repeated?	0.89	2.93	5.53	20.9	29.2	1.43	2.04	1.11	1.34	0.15	0.25	0.63	0.85	8.25	18.90	13.4	28.7	0.21	0.35
WPSG090C	Middle Waste			0.66	3.15	5.95	15.5	21.7	1.53	2.19	1.20	1.45	0.17	0.28	0.54	0.73	6.18	14.16	16.0	34.2	0.24	0.40
WPSG093C	Middle Waste	Dolostone		0.24	6.59	12.45	2.5	3.6	2.86	4.09	2.30	2.77	0.14	0.23	1.49	2.01	0.74	1.70	30.8	65.9	0.50	0.83
WPSG097C	Middle Waste			0.77	2.07	3.91	22.7	31.8	0.98	1.40	0.97	1.17	0.19	0.32	0.41	0.55	8.82	20.21	11.8	25.2	0.18	0.30
WPSG098C	Middle Waste			0.68	1.64	3.10	28.6	40.0	0.79	1.13	0.57	0.69	0.17	0.28	0.24	0.32	11.70	26.81	6.3	13.5	0.11	0.18
WPSG101C	Middle Waste																					
WPSG105C	Upper Ore Zone	Phosphorite	Hangingwall Shale & Lower Rich Bed?	0.26	0.50	0.94	37.2	52.0	0.25	0.36	0.19	0.23	0.07	0.12	0.15	0.20	14.80	33.91	2.5	5.2	0.04	0.07
WPSG110C	Upper Ore Zone		Hangingwall Shale & Lower Rich Bed?	0.25	2.05	3.87	26.3	36.8	0.88	1.26	0.61	0.74	0.14	0.23	0.42	0.57	10.90	24.98	10.5	22.5	0.16	0.27
WPSG1125	Upper Ore Zone			<0.05	5.64	10.65	1.8	2.5	2.78	3.98	1.74	2.10	0.29	0.48	1.31	1.77	0.62	1.42	32.9	70.4	0.52	0.87
WPSG113C	Upper Ore Zone	Dolostone		0.09	5.05	9.54	4.5	6.3	1.96	2.80	1.44	1.74	0.28	0.46	1.08	1.46	1.58	3.62	27.8	59.5	0.43	0.72
WPSG115C	Upper Ore Zone	Phosphorite	Upper Rich Bed?	0.41	0.47	0.89	35.1	49.1	0.23	0.33	0.17	0.20	0.08	0.13	0.19	0.26	16.00	36.66	2.1	4.4	0.03	0.05

Section G (wpsG) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	Sum Oxides, %	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	As, ppm, ICP-40	Ba, ppm, ICP-40
WPSG008C	Lower Ore Zone	Phosphorite	Main Bed Ore	85.3	98	746	<100	<10	716	130	62	0.98	27.9	0.47	0.52	0.12	0.40	13.60	0.05	3	<10	109
WPSG008X	Lower Ore Zone	Phosphorite	Main Bed Ore	90.5	103	793	<100	<10	743	135	62	0.98	29.0	0.46	0.52	0.13	0.39	13.60	0.04	3	<10	99
WPSG011C	Lower Ore Zone		Cap Rock	75.9	74	441	142	<10	439	68	58	1.13	32.1	0.54	0.61	0.38	0.20	6.52	0.06	4	<10	77
WPSG013C	Lower Ore Zone		Cap Rock	86.8	114	722	<100	<10	660	160	78	1.32	27.9	0.68	0.68	0.18	0.40	12.80	0.06	4	<10	123
WPSG014C	Lower Ore Zone		Cap Rock	74.0	146	214	158	<10	197	37	149	2.52	22.5	0.95	1.19	0.85	0.47	0.99	0.15	<2	17	142
WPSG016C	Lower Ore Zone		Cap Rock	95.7	229	630	135	<10	439	133	238	3.45	17.2	1.48	1.69	0.42	0.64	7.51	0.09	3	17	229
WPSG020C	Lower Ore Zone		Low. Footwall Sh Ore	87.7	147	981	<100	<10	608	173	112	1.71	26.7	0.62	0.86	0.25	0.39	11.70	0.03	5	19	154
WPSG023C	Lower Ore Zone		Inner Seam (waste)	80.9	190	246	299	<10	205	65	174	3.58	13.2	1.47	1.56	2.99	0.75	2.03	0.15	3	36	182
WPSG024C	Lower Ore Zone		Inner Seam (waste)	83.7	205	949	<100	<10	413	199	116	3.85	15.7	1.43	2.13	1.09	0.46	5.78	0.11	5	25	207
WPSG026C	Lower Ore Zone		Inner Seam (waste)	82.3	132	677	189	<10	503	192	100	2.29	20.9	1.00	1.17	1.82	0.40	7.15	0.06	3	11	125
WPSG028C	Lower Ore Zone		Up. Footwall Sh Ore	86.2	141	1030	101	<10	712	467	120	1.70	24.1	0.87	0.91	0.54	0.39	10.60	0.07	5	14	132
WPSG033C	Lower Ore Zone		False Cap	77.8	131	1840	<100	<10	1070	236	60	2.40	22.2	1.06	1.22	0.46	0.38	7.83	0.05	3	18	124
WPSG033X	Lower Ore Zone		False Cap	78.2	117	1730	<100	<10	1080	225	55	2.57	22.2	1.11	1.31	0.46	0.40	8.05	0.06	4	15	122
WPSG037C	Middle Waste	Dolostone		83.6	214	1450	109	11	808	145	125	3.86	17.6	1.75	1.72	0.55	0.58	6.17	0.11	3	22	198
WPSG042C	Middle Waste	Dolostone		74.4	196	1360	<100	<10	1070	139	65	3.03	21.3	1.44	1.34	0.36	0.42	4.95	0.10	2	13	212
WPSG047C	Middle Waste	Dolostone		84.7	260	2170	242	14	574	138	158	5.29	10.3	2.49	2.08	0.40	0.67	3.46	0.21	4	21	236
WPSG052C	Middle Waste			86.4	268	1510	184	13	484	101	248	4.92	9.2	2.21	1.98	0.24	0.95	2.25	0.21	2	13	264
WPSG057C	Middle Waste			85.7	291	1390	160	15	315	89	237	5.63	4.8	2.38	2.26	0.32	0.91	1.40	0.26	5	26	272
WPSG065C	Middle Waste	Dolostone		77.0	101	401	<100	<10	248	29	41	2.93	13.5	1.18	1.17	4.35	0.26	0.29	0.11	<2	16	96
WPSG069C	Middle Waste			76.0	189	1350	101	<10	942	86	89	4.10	16.2	1.91	1.67	0.42	0.52	2.08	0.17	4	24	186
WPSG073C	Middle Waste			67.4	138	2840	<100	<10	1050	188	64	2.98	17.2	2.03	1.13	0.45	0.37	3.22	0.13	9	26	132
WPSG077C	Middle Waste			71.3	197	3530	<100	<10	704	350	147	3.59	11.0	1.86	1.34	0.23	0.63	4.23	0.16	11	11	191
WPSG078C	Middle Waste	Phosphorite	?"E" Bed?	59.0	194	6450	<100	<10	585	422	104	3.15	10.2	2.26	1.12	0.34	0.33	3.39	0.13	12	<10	181
WPSG078X	Middle Waste	Phosphorite	?"E" Bed?	58.9	189	6550	<100	<10	573	411	105	3.16	9.6	2.31	1.16	0.34	0.34	3.40	0.14	11	<10	175
WPSG079C	Middle Waste			87.5	300	1210	<100	14	194	72	300	5.45	3.1	2.44	2.13	0.15	1.04	1.10	0.27	5	33	287
WPSG080C	Middle Waste			89.9	180	922	<100	<10	1010	219	193	3.32	17.6	2.17	1.36	0.11	0.69	7.70	0.08	<2	35	180
WPSG082C	Middle Waste			90.4	232	233	<100	20	83	21	361	5.61	0.6	2.96	2.18	0.05	1.23	0.22	0.23	<2	68	243
WPSG825C	Middle Waste			92.5	108	230	<100	<10	1530	500	213	1.24	27.6	0.96	0.57	0.05	0.62	12.50	0.04	<2	13	101
WPSG083C	Middle Waste			93.5	233	290	388	15	79	17	391	5.54	0.4	2.48	2.03	0.04	1.35	0.16	0.26	<2	42	243
WPSG083X	Middle Waste			85.1	230	294	412	17	69	17	341	5.85	0.4	2.62	2.17	0.04	1.45	0.16	0.25	<2	42	244
WPSG085C	Middle Waste	Phosphorite	?E Bed repeated?	87.2	168	1520	222	<10	958	378	159	2.79	20.2	1.41	1.14	0.15	0.63	8.71	0.07	5	16	173
WPSG090C	Middle Waste			81.1	173	1310	<100	<10	724	236	183	3.24	15.2	1.57	1.30	0.16	0.54	6.52	0.06	5	13	183
WPSG093C	Middle Waste	Dolostone		93.5	335	291	932	18	147	49	329	6.01	2.4	2.71	2.20	0.14	1.41	0.81	0.36	2	56	315
WPSG097C	Middle Waste			84.9	162	1720	<100	<10	803	221	156	2.25	22.5	0.95	0.94	0.18	0.39	9.76	0.06	8	15	152
WPSG098C	Middle Waste			86.1	129	1510	194	<10	718	146	82	1.62	28.0	0.74	0.58	0.18	0.24	12.10	0.05	8	11	140
WPSG101C	Middle Waste																					
WPSG105C	Upper Ore Zone	Phosphorite	Hangingwall Shale & Lower Rich Bed?	93.1	61	700	<100	<10	871	179	42	0.49	33.7	0.24	0.18	0.07	0.16	15.80	0.03	<2	<10	59
WPSG110C	Upper Ore Zone		Hangingwall Shale & Lower Rich Bed?	91.2	125	711	200	<10	653	237	130	1.94	24.2	0.82	0.67	0.14	0.42	11.10	0.06	3	<10	121
WPSG1125	Upper Ore Zone			94.2	309	210	1760	17	95	39	344	5.74	1.7	2.66	1.70	0.28	1.24	0.67	0.30	3	37	296
WPSG113C	Upper Ore Zone	Dolostone		86.1	263	373	495	13	152	70	340	5.04	4.6	2.05	1.56	0.28	1.09	1.64	0.23	2	41	272
WPSG115C	Upper Ore Zone	Phosphorite	Upper Rich Bed?	92.1	65	577	<100	<10	884	209	41	0.43	33.1	0.22	0.16	0.07	0.20	15.40	0.01	<2	<10	61

Section G (wpsG) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	Be, 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	Sr, ppm, ICP-40	Th, ppm, ICP-40
WPSG008C	Lower Ore Zone	Phosphorite	Main Bed Ore	<1	100	18	3	763	92	<2	<4	<4	112	9	35	20	<4	45	99	16	3	714	7
WPSG008X	Lower Ore Zone	Phosphorite	Main Bed Ore	<1	99	17	2	864	93	<2	<4	<4	111	9	38	19	4	44	100	17	2	674	<6
WPSG011C	Lower Ore Zone		Cap Rock	<1	174	13	4	440	63	<2	<4	<4	59	7	144	20	5	25	114	13	<2	465	<6
WPSG013C	Lower Ore Zone		Cap Rock	<1	103	33	3	743	99	2	<4	<4	138	10	37	40	<4	58	115	17	3	666	<6
WPSG014C	Lower Ore Zone		Cap Rock	<1	393	29	5	219	30	<2	6	<4	36	8	158	15	9	20	139	9	4	194	<6
WPSG016C	Lower Ore Zone		Cap Rock	<1	79	56	7	599	74	2	6	<4	116	15	128	52	8	57	240	22	6	428	6
WPSG020C	Lower Ore Zone		Low. Footwall Sh Ore	<1	110	34	4	983	133	2	7	<4	145	14	41	44	<4	69	168	22	<2	621	<6
WPSG023C	Lower Ore Zone		Inner Seam (waste)	<1	43	32	7	232	38	<2	<4	<4	62	10	292	10	4	31	260	10	6	198	<6
WPSG024C	Lower Ore Zone		Inner Seam (waste)	<1	48	47	3	954	92	4	14	<4	195	22	51	17	9	92	227	12	11	410	<6
WPSG026C	Lower Ore Zone		Inner Seam (waste)	<1	49	36	4	641	90	3	12	5	160	11	184	18	<4	80	207	13	6	478	<6
WPSG028C	Lower Ore Zone		Up. Footwall Sh Ore	<1	59	67	3	1010	152	7	5	7	379	13	96	31	7	208	238	18	8	706	7
WPSG033C	Lower Ore Zone		False Cap	<1	15	31	3	1740	184	4	8	<4	212	15	63	31	6	112	297	16	5	991	<6
WPSG033X	Lower Ore Zone		False Cap	<1	15	42	<2	1750	189	5	10	5	223	16	60	32	4	120	302	15	6	1120	7
WPSG037C	Middle Waste	Dolostone		<1	11	44	4	1320	109	3	10	<4	136	15	105	40	10	80	289	14	7	768	<6
WPSG042C	Middle Waste	Dolostone		<1	11	30	<2	1340	93	3	9	<4	133	16	81	30	7	78	204	12	7	1100	<6
WPSG047C	Middle Waste	Dolostone		<1	7	57	5	2160	111	4	14	<4	133	25	236	31	12	88	293	9	13	570	<6
WPSG052C	Middle Waste			1	14	58	5	1380	95	2	14	<4	102	21	173	41	12	64	239	12	11	453	9
WPSG057C	Middle Waste			<1	39	65	5	1370	90	2	17	<4	84	23	144	61	16	63	294	11	13	292	10
WPSG065C	Middle Waste	Dolostone		<1	5	21	3	388	28	<2	4	<4	36	6	86	7	5	26	79	5	8	238	<6
WPSG069C	Middle Waste			<1	12	39	4	1340	81	2	12	<4	88	19	97	32	9	56	273	11	10	954	<6
WPSG073C	Middle Waste			<1	16	43	<2	2910	191	4	10	<4	211	28	65	33	8	109	670	13	9	1040	<6
WPSG077C	Middle Waste			<1	91	73	<2	3110	267	6	13	6	339	28	31	16	5	167	580	19	12	662	<6
WPSG078C	Middle Waste	Phosphorite	?"E" Bed?	<1	94	62	<2	6120	519	7	19	7	394	44	40	23	<4	210	634	17	11	581	13
WPSG078X	Middle Waste	Phosphorite	?"E" Bed?	<1	108	56	<2	6410	518	7	14	7	399	45	24	23	<4	210	643	20	11	543	14
WPSG079C	Middle Waste			<1	50	54	5	1230	78	<2	13	<4	74	17	55	9	13	48	167	13	10	186	10
WPSG080C	Middle Waste			<1	43	51	5	905	50	4	7	5	206	10	81	15	6	107	146	17	6	966	<6
WPSG082C	Middle Waste			<1	36	44	3	215	37	<2	5	<4	27	7	69	11	19	26	214	11	8	82	13
WPSG825C	Middle Waste			<1	67	160	3	210	36	12	<4	12	489	3	34	<2	5	349	80	19	16	1470	12
WPSG083C	Middle Waste			<1	24	48	4	279	41	<2	5	<4	25	7	387	18	14	23	346	9	7	69	15
WPSG083X	Middle Waste			<1	24	56	4	304	35	<2	6	<4	26	7	422	18	17	26	367	8	8	72	13
WPSG085C	Middle Waste	Phosphorite	?E Bed repeated?	<1	92	67	9	1490	127	6	12	7	286	18	213	8	6	172	170	16	9	957	10
WPSG090C	Middle Waste			<1	116	38	4	1370	124	4	10	4	163	19	49	5	7	90	215	16	5	712	7
WPSG093C	Middle Waste	Dolostone		<1	105	65	8	282	38	2	5	<4	47	10	904	10	16	48	396	12	11	138	16
WPSG097C	Middle Waste			<1	193	35	<2	1460	153	3	7	6	132	16	71	21	<4	67	223	17	<2	820	7
WPSG098C	Middle Waste			<1	168	20	<2	1430	192	2	7	<4	103	15	204	10	<4	50	148	21	2	758	7
WPSG101C	Middle Waste																						
WPSG105C	Upper Ore Zone	Phosphorite	Hangingwall Shale & Lower Rich Bed?	<1	55	6	2	681	77	<2	<4	<4	112	6	85	<2	<4	44	48	18	<2	833	6
WPSG110C	Upper Ore Zone		Hangingwall Shale & Lower Rich Bed?	<1	38	36	4	702	69	3	<4	<4	158	10	202	<2	6	76	73	17	4	628	<6
WPSG1125	Upper Ore Zone			<1	43	64	8	216	26	<2	6	<4	34	15	1680	7	15	36	373	10	10	89	12
WPSG113C	Upper Ore Zone	Dolostone		<1	24	48	6	387	34	<2	7	<4	56	15	519	7	14	40	147	12	9	153	9
WPSG115C	Upper Ore Zone	Phosphorite	Upper Rich Bed?	<1	52	18	2	614	62	<2	<4	<4	130	5	47	<2	<4	48	39	13	<2	865	<6

Sample	Unit	Lithology	Unit w/in Meade Peak	U, ppm, ICP-40	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40	eU, ppm
WPSG008C	Lower Ore Zone	Phosphorite	Main Bed Ore	<100	1260	141	7	729	128
WPSG008X	Lower Ore Zone	Phosphorite	Main Bed Ore	<100	1250	137	7	753	
WPSG011C	Lower Ore Zone		Cap Rock	<100	599	74	4	641	130
WPSG013C	Lower Ore Zone		Cap Rock	<100	1420	175	9	989	157
WPSG014C	Lower Ore Zone		Cap Rock	<100	499	38	3	1220	120
WPSG016C	Lower Ore Zone		Cap Rock	<100	1380	139	9	1860	119
WPSG020C	Lower Ore Zone		Low. Footwall Sh Ore	<100	2660	188	11	1260	143
WPSG023C	Lower Ore Zone		Inner Seam (waste)	<100	310	63	4	1250	68
WPSG024C	Lower Ore Zone		Inner Seam (waste)	<100	219	215	11	897	71
WPSG026C	Lower Ore Zone		Inner Seam (waste)	<100	737	194	10	976	62
WPSG028C	Lower Ore Zone		Up. Footwall Sh Ore	<100	754	491	23	982	103
WPSG033C	Lower Ore Zone		False Cap	<100	204	235	11	1180	71
WPSG033X	Lower Ore Zone		False Cap	<100	213	246	12	1160	
WPSG037C	Middle Waste	Dolostone		<100	170	142	8	1060	61
WPSG042C	Middle Waste	Dolostone		<100	138	149	7	736	54
WPSG047C	Middle Waste	Dolostone		<100	162	139	8	1030	48
WPSG052C	Middle Waste			<100	167	97	6	857	46
WPSG057C	Middle Waste			<100	772	85	7	1180	40
WPSG065C	Middle Waste	Dolostone		<100	78	28	2	395	46
WPSG069C	Middle Waste			<100	160	85	5	956	
WPSG073C	Middle Waste			<100	218	204	10	2020	
WPSG077C	Middle Waste			<100	487	359	15	1560	
WPSG078C	Middle Waste	Phosphorite	?"E" Bed?	<100	661	425	18	983	
WPSG078X	Middle Waste	Phosphorite	?"E" Bed?	<100	646	428	17	1150	
WPSG079C	Middle Waste			<100	772	72	5	808	
WPSG080C	Middle Waste			<100	706	228	11	886	
WPSG082C	Middle Waste			<100	1110	21	4	1270	
WPSG825C	Middle Waste			<100	376	511	23	604	
WPSG083C	Middle Waste			<100	840	14	3	1440	
WPSG083X	Middle Waste			<100	883	15	3	1480	
WPSG085C	Middle Waste	Phosphorite	?E Bed repeated?	<100	666	391	18	822	64
WPSG090C	Middle Waste			<100	833	252	14	1370	61
WPSG093C	Middle Waste	Dolostone		<100	2150	47	6	2420	47
WPSG097C	Middle Waste			<100	1570	206	11	1650	142
WPSG098C	Middle Waste			<100	2580	158	11	1350	137
WPSG101C	Middle Waste								209
WPSG105C	Upper Ore Zone	Phosphorite	Hangingwall Shale & Lower Rich Bed?	<100	833	185	9	592	238
WPSG110C	Upper Ore Zone		Hangingwall Shale & Lower Rich Bed?	<100	397	250	13	720	200
WPSG1125	Upper Ore Zone			<100	292	36	4	2540	104
WPSG113C	Upper Ore Zone	Dolostone		<100	239	72	5	1010	82
WPSG115C	Upper Ore Zone	Phosphorite	Upper Rich Bed?	<100	561	200	9	473	147

Section H (wpsH) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	Lab No.	Comments	Interval base, ft	Interval top, ft	Thickness, ft	Interval midpoint, ft	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
WPSH000S	Lower Ore Zone	Phosphorite	Fish-scale Bed	C-141357		0.0	0.5	0.5	0.25	11.6	0.28	5.6	62	9.1	2.78	1.58	0.43	2.35
WPSH003C	Lower Ore Zone	Phosphorite	Main Bed Ore	C-141392		0.5	6.0	5.5	3.25	4.9	0.20	3.1	24	3.6	3.91	2.40	0.66	3.25
WPSH006C	Lower Ore Zone	Dolostone	Cap Rock	C-141385		6.0	7.0	1.0	6.50	7.4	0.09	1.5	7	0.5	9.36	32.00	8.73	0.63
WPSH008C	Lower Ore Zone	Phosphorite	Cap Rock	C-141376		7.0	10.0	3.0	8.50	20.5	0.51	6.2	19	2.6	3.11	1.58	0.43	2.68
WPSH011C	Lower Ore Zone	Limestone	Cap Rock	C-141391		10.0	13.0	3.0	11.50	14.2	0.23	5.7	11	2.6	6.80	15.80	4.31	2.49
WPSH016C	Lower Ore Zone	Phosphorite	Cap Rock	C-141371		13.0	18.0	5.0	15.50	12.3	0.27	3.0	5	2.5	3.49	1.45	0.40	3.09
WPSH016X	Lower Ore Zone	Phosphorite	Cap Rock	C-141366	duplicate of previous sample	13.0	18.0	5.0	15.50	10.1	0.21	3.0	6	2.3	3.47	1.44	0.39	3.08
WPSH019C	Lower Ore Zone	Phosphorite	Cap Rock	C-141389		18.0	20.0	2.0	19.00	10.2	0.08	2.6	16	1.2	9.72	28.50	7.78	1.94
WPSH022C	Lower Ore Zone	Phosphorite	Cap Rock	C-141354		20.0	25.0	5.0	22.50	15.0	0.28	5.2	66	5.4	8.06	1.65	0.45	7.61
WPSH027C	Lower Ore Zone	Dolostone	Cap Rock	C-141365		25.0	29.0	4.0	27.00	9.3	0.07	1.9	21	0.5	11.70	33.80	9.22	2.48
WPSH031C	Lower Ore Zone		Cap Rock	C-141368		29.0	32.5	3.5	30.75	37.3	0.39	5.6	142	1.5	8.47	6.68	1.82	6.65
WPSH034C	Lower Ore Zone	Dolostone	Cap Rock	C-141370		32.5	34.5	2.0	33.50	12.5	0.07	1.1	13	0.4	10.70	32.00	8.73	1.97
WPSH038C	Lower Ore Zone		Cap Rock	C-141355		34.5	40.0	5.5	37.25	42.5	0.40	11.1	183	1.8	7.93	6.75	1.84	6.09
WPSH042C	Lower Ore Zone		Cap Rock	C-141359		40.0	44.0	4.0	42.00	15.4	0.10	2.1	24	0.1	10.80	31.40	8.57	2.23
WPSH047C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	C-141390		44.0	50.0	6.0	47.00	15.3	0.54	6.2	413	1.1	12.30	4.73	1.29	11.01
WPSH047X	Lower Ore Zone	Phosphorite	Low. Footwall Shale	C-141363	duplicate of previous sample	44.0	50.0	6.0	47.00	15.6	0.66	6.2	445	1.0	12.80	5.16	1.41	11.39
WPSH053C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	C-141379		50.0	57.0	7.0	53.50	23.4	0.44	5.4	708	0.7	12.20	10.80	2.95	9.25
WPSH058C	Lower Ore Zone	Dolostone	Inner Seam (waste)	C-141393		57.0	58.5	1.5	57.75	22.7	0.27	4.8	95	0.5	9.85	14.10	3.85	6.00
WPSH060C	Lower Ore Zone	Phosphorite	Up. Footwall Shale	C-141387		58.5	61.5	3.0	60.00	39.9	0.52	9.4	254	0.7	9.88	3.62	0.99	8.89
WPSH066C	Lower Ore Zone		False Cap	C-141374		61.5	69.0	7.5	65.25	32.0	0.43	8.2	296	1.0	8.34	1.76	0.48	7.86
WPSH071C	Lower Ore Zone	Dolostone	False Cap	C-141360		69.0	78.0	9.0	73.50	31.3	0.20	5.5	10	0.6	5.04	15.80	4.31	0.73
WPSH080C	Lower Ore Zone	Phosphorite	Hot Bed Ore	C-141384		78.0	82.0	4.0	80.00	22.1	0.30	5.7	115	0.5	13.10	12.60	3.44	9.66
WPSH083C	Middle Waste			C-141367		82.0	84.0	2.0	83.00	31.5	0.69	9.6	237	2.3	24.80	7.14	1.95	22.85
WPSH0 85C	Middle Waste			C-141380		84.0	87.0	3.0	85.50	25.5	0.27	4.6	75	0.4	9.12	12.40	3.38	5.74
WPSH090C	Middle Waste			C-141377		87.0	90.5	3.5	88.75	32.7	0.44	5.5	95	1.5	7.46	0.51	0.14	7.32
WPSH093C	Middle Waste			C-141358		90.5	94.5	4.0	92.50	41.9	0.18	2.3	21	1.6	7.15	20.60	5.62	1.53
WPSH096C	Middle Waste	Phosphorite	E Bed	C-141381		94.5	97.0	2.5	95.75	18.2	0.52	4.6	211	2.2	13.30	0.71	0.19	13.11
WPSH097C	Middle Waste			C-141386		97.0	105.0	8.0	101.00	31.2	0.36	5.3	96	1.6	5.84	0.28	0.08	5.76
WPSH097X	Middle Waste			C-141372	duplicate of previous sample	97.0	105.0	8.0	101.00	37.0	0.36	4.3	137	1.5	6.51	0.28	0.08	6.43
WPSH107C	Middle Waste			C-141373		105.0	109.0	4.0	107.00	27.4	0.41	3.6	12	1.4	2.75	0.44	0.12	2.63
WPSH110C	Middle Waste			C-141383		109.0	111.0	2.0	110.00	17.4	0.29	2.6	22	1.0	4.49	4.62	1.26	3.23
WPSH115C	Middle Waste			C-141382		111.0	118.0	7.0	114.50	32.7	0.50	5.5	62	1.6	10.00	2.85	0.78	9.22
WPSH119C	Middle Waste	Dolostone		C-141361		118.0	121.0	3.0	119.50	27.2	0.11	3.3	6	1.2	8.14	25.70	7.01	1.13
WPSH125C	Upper Ore Zone	Phosphorite	Hangingwall Shale	C-141378		121.0	132.0	11.0	126.50	19.1	0.39	9.0	58	6.4	9.90	1.42	0.39	9.51
WPSH125X	Upper Ore Zone	Phosphorite	Hangingwall Shale	C-141364	duplicate of previous sample	121.0	132.0	11.0	126.50	23.2	0.38	8.3	56	6.1	9.89	1.44	0.39	9.50
WPSH134C	Upper Ore Zone	Phosphorite	Buckshot Zone	C-141362		132.0	135.5	3.5	133.75	19.1	0.21	1.7	2	1.6	1.65	1.51	0.41	1.24
WPSH136C	Upper Ore Zone		Waste	C-141375		135.5	137.0	1.5	136.25	29.2	0.22	5.2	83	3.3	5.70	11.50	3.14	2.56
WPSH140C	Upper Ore Zone	Phosphorite	Lower Rich Bed	C-141369		137.0	141.5	4.5	139.25	17.6	0.24	2.2	24	3.8	2.07	1.94	0.53	1.54
WPSH143C	Upper Ore Zone		Waste	C-141356		141.5	145.5	4.0	143.50	22.6	0.16	3.4	6	3.2	1.76	3.79	1.03	0.73
WPSH147C	Upper Ore Zone	Phosphorite	Upper Rich Bed	C-141411		145.5	148.5	3.0	147.00	6.3	0.23	0.7	2	1.1	2.11	1.40	0.38	1.73
WPSH151C	Upper Ore Zone			C-141402		148.5	153.0	4.5	150.75	24.2	0.20	2.9	7	2.3	2.92	6.13	1.67	1.25
WPSH155C	Upper Ore Zone	Phosphorite		C-141413		153.0	156.0	3.0	154.50	11.3	0.19	<0.6	10	1.3	4.83	10.80	2.95	1.88
WPSH158C	Upper Ore Zone			C-141405		156.0	159.5	3.5	157.75	19.2	0.20	1.6	40	1.0	4.70	1.37	0.37	4.33
WPSH165C	Upper Ore Zone			C-141403		159.5	170.0	10.5	164.75	19.2	0.19	1.9	41	1.2	3.63	3.94	1.08	2.55
WPSH172C	Upper Ore Zone			C-141416		170.0	174.0	4.0	172.00	10.5	0.30	1.6	69	1.3	3.59	2.68	0.73	2.86
WPSH176C	Upper Ore Zone			C-141414		174.0	178.0	4.0	176.00	1.8	0.05	<0.6	2	0.5	2.07	6.05	1.65	0.42
WPSH180C	Rex Chert	Chert		C-141412		178.0	180.0	2.0		2.1	0.02	<0.6	1	0.1	0.72	1.88	0.51	0.21
Non-channel samples (see text):																		
WPSHU001			Uraniferous (?) sample	C-141410		1	2	1	1.5	7.9	0.30	3.0	27	5.4	3.50	2.25	0.61	2.89
WPSHG001			Grandeur Tongue composite sample near Section H	C-141406		-75	0	75	-37.5	3.2	<0.02	<0.6	5	0.3	8.78	31.70	8.65	0.13
WPSHG002			Fish-scale chips, various locations near above sample	C-141407						4.2	0.09	1.0	2	1.5	2.03	5.80	1.58	0.45

Section H (wpsH) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	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	Si, %, ICP-16	SiOx, %, ICP-16	Ti, %, ICP 16	TiOx, %, ICP-16
WPSH0005	Lower Ore Zone	Phosphorite	Fish-scale Bed	1.12	1.13	2.13	27.7	38.8	0.59	0.84	0.60	0.72	0.18	0.30	0.70	0.94	11.30	25.89	7.0	14.9	0.10	0.17
WPSH003C	Lower Ore Zone	Phosphorite	Main Bed Ore	1.23	0.43	0.81	32.9	46.0	0.25	0.36	0.29	0.35	0.13	0.22	0.70	0.94	13.50	30.93	2.1	4.4	0.03	0.05
WPSH006C	Lower Ore Zone	Dolostone	Cap Rock	0.22	0.64	1.21	25.9	36.2	0.37	0.53	0.34	0.41	6.82	11.31	0.17	0.23	3.19	7.31	4.0	8.5	0.05	0.08
WPSH008C	Lower Ore Zone	Phosphorite	Cap Rock	0.83	1.86	3.51	24.8	34.7	0.81	1.16	1.05	1.27	0.23	0.38	0.51	0.69	9.43	21.61	11.3	24.2	0.14	0.23
WPSH011C	Lower Ore Zone	Limestone	Cap Rock	0.52	1.49	2.81	26.4	36.9	0.61	0.87	0.87	1.05	1.17	1.94	0.26	0.35	6.39	14.64	6.8	14.5	0.09	0.15
WPSH015C	Lower Ore Zone	Phosphorite	Cap Rock	0.82	0.99	1.87	29.2	40.9	0.46	0.66	0.54	0.65	0.13	0.22	0.44	0.59	13.10	30.02	6.2	13.3	0.09	0.15
WPSH015X	Lower Ore Zone	Phosphorite	Cap Rock	0.84	1.03	1.95	28.7	40.2	0.47	0.67	0.53	0.64	0.12	0.20	0.43	0.58	12.70	29.10	5.9	12.6	0.08	0.13
WPSH019C	Lower Ore Zone	Phosphorite	Cap Rock	0.30	1.48	2.80	25.1	35.1	0.61	0.87	0.76	0.92	2.26	3.75	0.37	0.50	2.04	4.67	8.1	17.3	0.12	0.20
WPSH022C	Lower Ore Zone	Phosphorite	Cap Rock	1.42	1.28	2.42	23.5	32.9	0.53	0.76	0.63	0.76	0.23	0.38	0.37	0.50	9.60	22.00	6.6	14.1	0.10	0.17
WPSH027C	Lower Ore Zone	Dolostone	Cap Rock	0.31	1.17	2.21	28.0	39.2	0.43	0.61	0.60	0.72	1.95	3.23	0.16	0.22	0.86	1.97	6.7	14.3	0.08	0.13
WPSH031C	Lower Ore Zone		Cap Rock	2.30	3.40	6.42	13.2	18.5	1.35	1.93	2.01	2.42	1.51	2.50	0.65	0.88	4.29	9.83	19.2	41.1	0.27	0.45
WPSH034C	Lower Ore Zone	Dolostone	Cap Rock	0.26	1.29	2.44	22.9	32.0	0.51	0.73	0.62	0.75	4.30	7.13	0.33	0.44	1.74	3.99	7.9	16.9	0.11	0.18
WPSH038C	Lower Ore Zone		Cap Rock	1.77	4.24	8.01	12.5	17.5	1.57	2.25	1.96	2.36	1.62	2.69	0.56	0.75	3.68	8.43	16.7	35.7	0.26	0.43
WPSH042C	Lower Ore Zone		Cap Rock	0.34	1.28	2.42	21.4	29.9	0.47	0.67	0.68	0.82	7.51	12.45	0.30	0.40	1.86	4.26	6.9	14.7	0.08	0.13
WPSH047C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	1.65	1.67	3.15	25.0	35.0	0.79	1.13	0.86	1.04	0.26	0.43	0.29	0.39	9.33	21.38	5.8	12.4	0.10	0.17
WPSH047X	Lower Ore Zone	Phosphorite	Low. Footwall Shale	1.76	1.52	2.87	24.5	34.3	0.73	1.04	0.87	1.05	0.25	0.41	0.37	0.50	8.90	20.39	7.0	15.0	0.12	0.20
WPSH053C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	1.42	2.55	4.82	19.6	27.4	1.19	1.70	1.38	1.66	0.47	0.78	0.36	0.49	5.01	11.48	9.0	19.2	0.14	0.23
WPSH058C	Lower Ore Zone	Dolostone	Inner Seam (waste)	1.90	2.94	5.55	19.5	27.3	1.35	1.93	1.29	1.55	0.64	1.06	0.49	0.66	3.56	8.16	12.1	25.9	0.19	0.32
WPSH060C	Lower Ore Zone	Phosphorite	Up. Footwall Shale	3.07	5.22	9.86	8.3	11.6	2.35	3.36	2.06	2.48	0.55	0.91	0.77	1.04	2.36	5.41	20.9	44.7	0.34	0.57
WPSH066C	Lower Ore Zone		False Cap	1.87	4.73	8.93	6.4	8.9	2.18	3.12	2.02	2.43	0.29	0.48	1.06	1.43	2.27	5.20	28.3	60.5	0.46	0.77
WPSH071C	Lower Ore Zone	Dolostone	False Cap	0.12	4.80	9.07	11.4	15.9	1.94	2.77	1.82	2.19	3.06	5.07	0.35	0.47	0.97	2.22	19.4	41.5	0.25	0.42
WPSH080C	Lower Ore Zone	Phosphorite	Hot Bed Ore	1.75	2.94	5.55	18.7	26.2	1.36	1.94	1.27	1.53	0.60	0.99	0.53	0.71	3.23	7.40	11.7	25.0	0.19	0.32
WPSH083C	Middle Waste			4.61	2.35	4.44	12.9	18.0	1.48	2.12	1.06	1.28	0.59	0.98	0.41	0.55	3.68	8.43	11.4	24.4	0.18	0.30
WPSH0 85C	Middle Waste			1.79	3.85	7.27	8.0	11.2	1.69	2.42	1.52	1.83	2.64	4.38	0.95	1.28	0.60	1.37	18.8	40.2	0.31	0.52
WPSH090C	Middle Waste			3.27	3.78	7.14	9.5	13.3	1.94	2.77	1.70	2.05	0.14	0.23	1.02	1.37	3.87	8.87	24.3	52.0	0.38	0.63
WPSH093C	Middle Waste			2.38	1.72	3.25	19.7	27.6	1.76	2.52	0.61	0.74	4.30	7.13	0.68	0.92	3.53	8.09	10.6	22.7	0.14	0.23
WPSH096C	Middle Waste	Phosphorite	E Bed	2.47	2.49	4.70	18.3	25.6	1.35	1.93	1.05	1.27	0.23	0.38	0.44	0.59	7.84	17.96	11.3	24.2	0.18	0.30
WPSH097C	Middle Waste			0.83	4.22	7.97	8.6	12.0	1.81	2.59	1.48	1.78	0.15	0.25	0.97	1.31	3.25	7.45	23.1	49.4	0.34	0.57
WPSH097X	Middle Waste			1.02	3.91	7.39	8.4	11.7	1.72	2.46	1.66	2.00	0.14	0.23	1.01	1.36	3.61	8.27	27.6	59.0	0.41	0.68
WPSH107C	Middle Waste			0.43	3.38	6.38	12.1	16.9	1.58	2.26	1.42	1.71	0.14	0.23	0.90	1.21	5.07	11.62	24.6	52.6	0.31	0.52
WPSH110C	Middle Waste			0.77	2.29	4.33	19.6	27.4	1.02	1.46	0.96	1.16	0.82	1.36	0.71	0.96	6.74	15.44	14.8	31.7	0.20	0.33
WPSH115C	Middle Waste			1.71	2.91	5.50	16.6	23.2	1.67	2.39	1.04	1.25	0.50	0.83	0.63	0.85	5.89	13.50	14.8	31.7	0.22	0.37
WPSH119C	Middle Waste	Dolostone		0.14	2.82	5.33	13.8	19.3	1.43	2.04	1.16	1.40	6.56	10.88	0.71	0.96	0.66	1.51	17.0	36.4	0.25	0.42
WPSH125C	Upper Ore Zone	Phosphorite	Hangingwall Shale	1.24	1.57	2.97	24.1	33.7	0.67	0.96	0.56	0.67	0.22	0.36	0.24	0.32	10.40	23.83	7.2	15.3	0.12	0.20
WPSH125X	Upper Ore Zone	Phosphorite	Hangingwall Shale	1.26	1.68	3.17	25.4	35.5	0.68	0.97	0.58	0.70	0.20	0.33	0.25	0.34	11.10	25.43	7.4	15.8	0.12	0.20
WPSH134C	Upper Ore Zone	Phosphorite	Buckshot Zone	0.32	0.64	1.21	32.6	45.6	0.30	0.43	0.26	0.31	0.09	0.15	0.20	0.27	14.80	33.91	4.6	9.9	0.07	0.12
WPSH136C	Upper Ore Zone		Waste	1.12	2.50	4.72	18.7	26.2	1.31	1.87	0.93	1.12	0.96	1.59	0.83	1.12	4.96	11.37	18.1	38.7	0.26	0.43
WPSH140C	Upper Ore Zone	Phosphorite	Lower Rich Bed	.0.34	1.66	3.14	26.0	36.4	0.76	1.09	0.65	0.78	0.18	0.30	0.50	0.67	10.80	24.75	11.4	24.4	0.18	0.30
WPSH143C	Upper Ore Zone		Waste	0.14	4.09	7.73	14.5	20.3	1.69	2.42	1.14	1.37	0.85	1.41	0.92	1.24	4.94	11.32	21.0	44.9	0.33	0.55
WPSH147C	Upper Ore Zone	Phosphorite	Upper Rich Bed	0.39	0.68	1.28	30.3	42.4	0.58	0.83	0.26	0.31	0.11	0.18	0.22	0.30	15.80	36.20	4.1	8.7	0.05	0.08
WPSH151C	Upper Ore Zone			0.16	6.26	11.83	7.6	10.6	2.68	3.83	2.32	2.80	1.30	2.16	1.32	1.78	1.22	2.80	38.4	82.1	0.48	0.80
WPSH155C	Upper Ore Zone	Phosphorite		0.35	2.14	4.04	17.6	24.6	1.62	2.32	0.79	0.95	2.61	4.33	0.48	0.65	6.52	14.94	15.1	32.3	0.15	0.25
WPSH158C	Upper Ore Zone			1.18	4.95	9.35	8.3	11.6	2.00	2.86	1.88	2.27	0.69	1.14	0.96	1.29	1.50	3.44	26.3	56.3	0.35	0.58
WPSH165C	Upper Ore Zone			0.69	5.58	10.54	4.2	5.9	2.37	3.39	2.12	2.55	0.65	1.08	0.99	1.33	0.72	1.65	30.4	65.0	0.41	0.68
WPSH172C	Upper Ore Zone			0.59	2.88	5.44	11.9	16.6	1.44	2.06	1.11	1.34	0.33	0.55	0.45	0.61	5.10	11.69	26.1	55.8	0.19	0.32
WPSH176C	Upper Ore Zone			0.06	0.57	1.08	4.6	6.4	0.59	0.84	0.18	0.22	0.71	1.18	0.08	0.11	0.27	0.62	38.8	83.0	0.03	0.05
WPSH180C	Rex Chert	Chert		<0.05	0.18	0.34	1.9	2.6	0.72	1.03	0.04	0.05	0.02	0.03	0.04	0.05	0.28	0.64	42.1	90.1	<0.01	
Non-channel samples (see text):																						
WPSHU001			Uraniferous (?) sample	1.29	0.38	0.72	30.1	42.1	0.50	0.72	0.22	0.27	0.15	0.25	0.76	1.02	15.00	34.37	2.4	5.2	0.03	0.05
WPSHG001			Grandeur Tongue composite sample near Section H	<0.05	0.97	1.83	14.5	20.3	0.82	1.17	0.51	0.61	8.22	13.63	0.04	0.05	0.27	0.62	13.8	29.5	0.09	0.15
WPSHG002			Fish-scale chips, various locations near above sample	0.82	0.40	0.76	31.1	43.5	0.35	0.50	0.20	0.24	0.57	0.95	0.59	0.80	14.50	33.23	3.0	6.4	0.03	0.05

Section H (wpsH) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	Sum Oxides, %	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	As, ppm, ICP-40	Ba, ppm, ICP-40
WPSH000S	Lower Ore Zone	Phosphorite	Fish-scale Bed	84.7	101	687	<100	<10	821	143	114	1.21	26.3	0.54	0.63	0.17	0.64	12.00	0.05	<2	<10	95
WPSH003C	Lower Ore Zone	Phosphorite	Main Bed Ore	84.1	67	623	<100	<10	1000	132	72	0.46	31.8	0.24	0.25	0.12	0.75	14.50	0.03	<2	<10	66
WPSH006C	Lower Ore Zone	Dolostone	Cap Rock	65.8	38	276	118	<10	346	85	57	0.67	24.6	0.36	0.33	7.11	0.19	3.48	0.04	<2	<10	38
WPSH008C	Lower Ore Zone	Phosphorite	Cap Rock	87.7	108	1050	<100	<10	578	186	125	1.89	22.6	0.71	0.99	0.22	0.46	10.20	0.06	6	11	109
WPSH011C	Lower Ore Zone	Limestone	Cap Rock	73.3	94	590	<100	<10	479	125	98	1.56	27.1	0.64	0.84	1.17	0.29	7.03	0.06	4	<10	87
WPSH015C	Lower Ore Zone	Phosphorite	Cap Rock	88.4	75	715	<100	<10	695	126	91	1.02	29.5	0.50	0.54	0.13	0.41	13.80	0.04	3	<10	77
WPSH015X	Lower Ore Zone	Phosphorite	Cap Rock	86.0	71	692	<100	<10	685	125	94	0.96	29.4	0.48	0.51	0.12	0.41	13.50	0.04	3	<10	76
WPSH019C	Lower Ore Zone	Phosphorite	Cap Rock	66.2	85	269	147	<10	352	52	114	1.56	24.3	0.59	0.75	2.23	0.40	2.01	0.09	<2	<10	81
WPSH022C	Lower Ore Zone	Phosphorite	Cap Rock	73.9	94	584	<100	<10	618	151	83	1.28	24.1	0.50	0.64	0.22	0.41	10.50	0.06	3	<10	100
WPSH027C	Lower Ore Zone	Dolostone	Cap Rock	62.6	49	255	157	<10	224	28	68	1.10	28.5	0.45	0.63	2.05	0.17	0.95	0.05	2	<10	49
WPSH031C	Lower Ore Zone		Cap Rock	84.0	171	903	<100	<10	341	180	181	3.67	14.1	1.41	1.97	1.60	0.57	4.70	0.15	4	26	181
WPSH034C	Lower Ore Zone	Dolostone	Cap Rock	64.6	89	223	216	<10	233	38	94	1.34	23.2	0.56	0.63	4.60	0.33	1.84	0.06	<2	11	92
WPSH038C	Lower Ore Zone		Cap Rock	78.1	162	802	<100	<10	289	147	141	4.02	11.9	1.54	2.13	1.60	0.56	3.89	0.17	8	29	170
WPSH042C	Lower Ore Zone		Cap Rock	65.8	49	266	163	<10	275	60	29	1.29	21.0	0.48	0.75	7.82	0.30	2.00	0.05	<2	10	49
WPSH047C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	75.0	88	1650	<100	<10	862	315	71	1.64	23.4	0.75	0.82	0.24	0.33	9.06	0.03	3	<10	82
WPSH047X	Lower Ore Zone	Phosphorite	Low. Footwall Shale	75.7	76	1710	<100	<10	860	283	84	1.62	24.2	0.76	0.81	0.26	0.35	9.58	0.04	3	<10	76
WPSH053C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	67.7	108	1110	<100	<10	762	116	83	2.76	19.5	1.24	1.33	0.47	0.39	5.48	0.08	3	<10	114
WPSH058C	Lower Ore Zone	Dolostone	Inner Seam (waste)	72.4	146	803	102	<10	1180	120	123	3.05	19.3	1.36	1.39	0.68	0.56	3.78	0.13	<2	18	139
WPSH060C	Lower Ore Zone	Phosphorite	Up. Footwall Shale	79.9	249	1800	124	13	476	118	190	5.37	8.1	2.40	2.25	0.55	0.82	2.45	0.21	4	23	232
WPSH066C	Lower Ore Zone		False Cap	91.8	232	1480	167	17	418	89	332	5.08	6.7	2.25	1.99	0.27	1.03	2.17	0.22	3	17	247
WPSH071C	Lower Ore Zone	Dolostone	False Cap	79.7	147	734	181	12	294	60	64	4.58	12.1	1.99	1.89	3.27	0.31	1.05	0.12	<2	27	153
WPSH080C	Lower Ore Zone	Phosphorite	Hot Bed Ore	69.6	152	1770	343	<10	1140	156	102	3.00	18.5	1.37	1.15	0.59	0.58	3.52	0.11	6	<10	144
WPSH083C	Middle Waste			60.5	124	4650	<100	<10	666	458	90	2.52	14.0	1.56	0.97	0.61	0.37	3.78	0.11	10	<10	133
WPSH0 85C	Middle Waste			70.5	203	587	224	<10	230	55	247	4.00	8.4	1.71	1.50	2.71	1.03	0.63	0.17	3	20	188
WPSH090C	Middle Waste			88.4	190	1210	100	12	587	175	197	3.99	9.3	2.03	1.58	0.13	0.98	4.04	0.19	4	21	208
WPSH093C	Middle Waste			73.1	86	505	143	<10	642	111	114	1.65	20.4	1.76	0.64	4.55	0.64	3.69	0.08	<2	29	89
WPSH096C	Middle Waste	Phosphorite	E Bed	76.9	140	1900	<100	<10	962	389	123	2.56	17.4	1.25	1.02	0.23	0.49	8.08	0.05	5	<10	132
WPSH097C	Middle Waste			83.3	240	1030	360	<10	442	210	291	4.39	8.5	1.79	1.59	0.14	0.98	3.50	0.16	4	23	218
WPSH097X	Middle Waste			93.1	209	1130	260	<10	427	226	175	4.21	9.0	1.79	1.58	0.14	0.97	3.75	0.19	4	24	224
WPSH107C	Middle Waste			93.5	171	853	301	<10	623	212	106	3.64	12.8	1.61	1.31	0.13	0.85	5.32	0.10	3	15	177
WPSH110C	Middle Waste			84.1	133	488	144	<10	868	156	94	2.25	18.1	0.97	0.88	0.79	0.75	7.12	0.06	<2	11	123
WPSH115C	Middle Waste			79.6	166	1480	<100	<10	749	258	122	2.90	15.6	1.63	1.14	0.55	0.64	6.19	0.10	5	19	161
WPSH119C	Middle Waste	Dolostone		78.2	122	325	447	<10	209	28	154	2.76	14.2	1.45	1.07	6.91	0.68	0.71	0.11	2	23	126
WPSH125C	Upper Ore Zone	Phosphorite	Hangingwall Shale	78.3	100	1320	<100	<10	698	159	123	1.51	23.9	0.70	0.58	0.22	0.25	10.80	0.05	6	<10	104
WPSH125X	Upper Ore Zone	Phosphorite	Hangingwall Shale	82.5	102	1310	<100	<10	774	165	121	1.56	26.2	0.73	0.60	0.22	0.27	11.60	0.06	6	13	107
WPSH134C	Upper Ore Zone	Phosphorite	Buckshot Zone	91.9	62	849	<100	<10	846	180	89	0.68	32.6	0.33	0.25	0.10	0.20	15.30	0.04	<2	<10	67
WPSH136C	Upper Ore Zone		Waste	87.1	125	649	235	<10	412	154	244	2.67	20.1	1.36	0.90	1.05	0.75	5.44	0.10	4	21	138
WPSH140C	Upper Ore Zone	Phosphorite	Lower Rich Bed	91.8	105	803	<100	<10	675	208	107	1.81	25.8	0.75	0.62	0.18	0.45	11.40	0.06	3	12	112
WPSH143C	Upper Ore Zone		Waste	91.2	215	528	448	12	388	155	276	3.75	14.0	1.64	1.22	0.86	0.90	5.25	0.13	3	13	196
WPSH147C	Upper Ore Zone	Phosphorite	Upper Rich Bed	90.3	90	758	108	12	879	145	61	0.68	28.4	0.28	0.26	0.09	0.23	14.00	0.03	2	<10	78
WPSH151C	Upper Ore Zone			118.7	347	797	509	11	230	93	435	4.55	5.6	1.98	1.64	0.89	0.95	0.80	0.28	7	21	250
WPSH155C	Upper Ore Zone	Phosphorite		84.4	129	492	178	<10	462	179	134	1.87	15.9	0.87	0.70	2.33	0.43	5.40	0.07	<2	<10	111
WPSH158C	Upper Ore Zone			88.8	250	612	312	<10	216	136	265	4.48	8.0	1.92	1.64	0.56	0.88	1.13	0.27	<2	13	221
WPSH165C	Upper Ore Zone			92.2	300	625	295	16	146	70	351	5.04	4.1	2.25	1.83	0.62	0.88	0.62	0.33	2	22	284
WPSH172C	Upper Ore Zone			94.5	198	1180	114	<10	401	278	176	2.61	10.3	1.15	0.99	0.26	0.42	4.18	0.14	4	<10	171
WPSH176C	Upper Ore Zone			93.5	162	126	358	<10	90	22	20	0.46	4.9	0.24	0.16	0.63	0.07	0.23	0.03	<2	<10	152
WPSH180C	Rex Chert	Chert		94.8	38	40	<100	<10	56	26	<10	0.15	1.8	0.14	0.04	0.02	0.04	0.24	0.01	<2	<10	37
Non-channel samples (see text):																						
WPSHU001			Uraniferous (?) sample	84.7	63	578	<100	<10	1020	137	65	0.36	26.2	0.21	0.21	0.12	0.72	12.20	0.03	3	<10	59
WPSHG001			Grandeur Tongue composite sample near Section H	67.9	74	51	<100	<10	93	16	242	1.04	14.3	0.47	0.55	9.00	0.06	0.23	0.08	<2	<10	71
WPSHG002			Fish-scale chips, various locations near above sample	86.5	49	214	<100	14	876	342	56	0.37	28.2	0.17	0.20	0.49	0.58	12.00	0.02	<2	<10	44

Section H (wpsH) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	Be, 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	[illegible], ppm, ICP-40	Sr, ppm, ICP-40
WPSH0005	Lower Ore Zone	Phosphorite	Fish-scale Bed	<1	110	28	3	626	90	<2	<4	<4	109	13	22	5	<4	60	118	17	<2	[illegible]
WPSH003C	Lower Ore Zone	Phosphorite	Main Bed Ore	<1	117	11	<2	631	95	<2	<4	<4	104	7	13	4	<4	40	113	17	<2	[illegible]
WPSH006C	Lower Ore Zone	Dolostone	Cap Rock	<1	52	17	3	178	27	<2	10	<4	71	5	115	9	<4	31	73	[illegible]	[illegible]	[illegible]
WPSH008C	Lower Ore Zone	Phosphorite	Cap Rock	<1	83	35	2	1010	107	2	7	<4	173	19	44	25	<4	66	182	17	4	647
WPSH011C	Lower Ore Zone	Limestone	Cap Rock	<1	125	25	4	606	79	<2	7	<4	105	12	79	31	<4	44	210	18	[illegible]	[illegible]
WPSH015C	Lower Ore Zone	Phosphorite	Cap Rock	<1	82	17	<2	614	97	<2	<4	<4	100	9	25	7	<4	46	212	18	[illegible]	[illegible]
WPSH015X	Lower Ore Zone	Phosphorite	Cap Rock	<1	82	18	<2	572	83	<2	<4	<4	101	8	21	7	4	44	199	18	[illegible]	781
WPSH019C	Lower Ore Zone	Phosphorite	Cap Rock	<1	66	23	3	207	32	<2	11	<4	43	6	145	13	<4	20	78	[illegible]	[illegible]	[illegible]
WPSH022C	Lower Ore Zone	Phosphorite	Cap Rock	<1	149	23	2	614	78	<2	<4	<4	125	10	19	43	<4	63	174	18	<2	[illegible]
WPSH027C	Lower Ore Zone	Dolostone	Cap Rock	<1	42	9	5	139	37	<2	4	<4	27	4	164	6	<4	<9	74	[illegible]	<2	[illegible]
WPSH031C	Lower Ore Zone		Cap Rock	<1	30	40	4	817	88	3	10	5	170	21	84	35	6	61	212	11	10	[illegible]
WPSH034C	Lower Ore Zone	Dolostone	Cap Rock	<1	18	17	3	104	28	<2	6	<4	39	4	228	10	<4	19	102	7	[illegible]	[illegible]
WPSH038C	Lower Ore Zone		Cap Rock	<1	66	55	4	782	84	3	12	<4	132	21	83	45	9	74	210	12	[illegible]	[illegible]
WPSH042C	Lower Ore Zone		Cap Rock	<1	16	11	3	246	34	<2	14	<4	53	3	158	12	<4	27	[illegible]	9	[illegible]	[illegible]
WPSH047C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	<1	12	41	<2	1750	196	5	7	8	260	16	41	40	<4	146	277	13	[illegible]	[illegible]
WPSH047X	Lower Ore Zone	Phosphorite	Low. Footwall Shale	<1	11	39	<2	1560	189	5	6	8	263	15	38	35	4	148	277	11	[illegible]	[illegible]
WPSH053C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	<1	9	32	<2	1200	105	3	10	<4	115	16	52	36	7	58	216	8	[illegible]	[illegible]
WPSH058C	Lower Ore Zone	Dolostone	Inner Seam (waste)	<1	4	30	4	670	62	2	10	4	108	12	96	19	9	67	167	9	7	[illegible]
WPSH060C	Lower Ore Zone	Phosphorite	Up. Footwall Shale	<1	6	52	5	1870	103	3	16	<4	115	26	119	36	14	80	305	12	12	[illegible]
WPSH066C	Lower Ore Zone		False Cap	<1	20	58	6	1330	83	3	15	<4	99	21	155	52	16	73	284	14	11	[illegible]
WPSH071C	Lower Ore Zone	Dolostone	False Cap	<1	9	34	6	724	46	<2	9	<4	73	12	176	11	11	44	236	10	9	[illegible]
WPSH080C	Lower Ore Zone	Phosphorite	Hot Bed Ore	<1	14	36	<2	1860	127	2	12	<4	142	20	357	36	<4	69	445	12	9	1040
WPSH083C	Middle Waste			<1	85	63	<2	4380	370	8	14	8	434	39	65	154	<4	229	1110	17	10	711
WPSH0 85C	Middle Waste			<1	9	45	4	595	50	<2	15	5	53	11	208	33	8	34	169	9	7	224
WPSH090C	Middle Waste			<1	7	63	4	1140	75	4	10	<4	182	15	92	59	11	104	200	13	8	546
WPSH093C	Middle Waste			<1	3	22	4	465	25	3	6	<4	118	4	144	84	<4	68	49	10	3	636
WPSH096C	Middle Waste	Phosphorite	E Bed	<1	87	56	<2	1970	210	6	13	9	263	23	40	73	4	161	369	17	6	957
WPSH097C	Middle Waste			<1	45	65	3	1050	86	4	9	5	144	14	327	29	9	88	189	13	10	422
WPSH097X	Middle Waste			<1	47	59	4	1040	91	4	10	<4	153	14	268	32	7	90	195	13	10	432
WPSH107C	Middle Waste			<1	19	46	4	780	80	3	7	5	159	12	304	18	6	84	200	12	9	603
WPSH110C	Middle Waste			<1	8	39	3	467	50	3	7	<4	102	6	131	14	4	67	112	10	4	850
WPSH115C	Middle Waste			<1	50	44	3	1560	121	3	9	5	149	16	80	73	4	84	271	13	8	790
WPSH119C	Middle Waste	Dolostone		<1	59	23	8	205	35	<2	14	<4	23	5	459	19	<4	20	155	8	5	228
WPSH125C	Upper Ore Zone	Phosphorite	Hangingwall Shale	<1	195	23	<2	1270	146	<2	5	<4	106	13	86	39	5	46	191	18	4	717
WPSH125X	Upper Ore Zone	Phosphorite	Hangingwall Shale	<1	205	24	3	1200	148	2	5	<4	110	13	85	42	<4	55	193	19	4	782
WPSH134C	Upper Ore Zone	Phosphorite	Buckshot Zone	<1	49	21	<2	747	82	2	<4	<4	117	6	87	<2	<4	55	38	16	2	895
WPSH136C	Upper Ore Zone		Waste	<1	13	39	4	538	53	3	8	<4	111	10	242	15	6	57	97	11	8	441
WPSH140C	Upper Ore Zone	Phosphorite	Lower Rich Bed	<1	47	34	3	655	68	2	<4	7	142	9	85	10	5	60	71	16	<2	685
WPSH143C	Upper Ore Zone		Waste	<1	31	48	5	506	46	3	5	4	108	12	432	3	11	64	121	12	8	370
WPSH147C	Upper Ore Zone	Phosphorite	Upper Rich Bed	<1	30	8	4	379	58	<2	4	<4	78	6	51	<2	<4	34	42	25	<2	892
WPSH151C	Upper Ore Zone			1	31	54	7	399	48	<2	12	<4	53	22	352	8	8	43	119	28	9	182
WPSH155C	Upper Ore Zone	Phosphorite		<1	12	37	4	146	39	3	4	<4	121	14	171	13	<4	74	74	18	4	431
WPSH158C	Upper Ore Zone			1	5	48	7	553	34	3	13	<4	93	22	162	10	11	64	162	24	8	211
WPSH165C	Upper Ore Zone			1	13	59	9	273	38	2	14	<4	52	28	265	13	13	41	182	30	10	139
WPSH172C	Upper Ore Zone			<1	21	48	5	835	54	5	9	4	175	26	87	4	<4	115	138	23	7	360
WPSH176C	Upper Ore Zone			<1	6	<5	<2	33	8	<2	<4	<4	14	10	330	<2	<4	14	59	6	<2	98
WPSH180C	Rex Chert	Chert		<1	<2	<5	<2	8	4	<2	<4	<4	19	6	41	<2	<4	<9	12	<4	<2	52
Non-channel samples (see text):																						
WPSHU001			Uraniferous (?) sample	<1	126	11	4	573	90	<2	6	<4	98	9	18	3	<4	35	111	27	<2	950
WPSHG001			Grandeur Tongue composite sample near Section H	<1	11	13	4	19	12	<2	<4	<4	11	7	91	<2	<4	<9	30	13	<2	102
WPSHG002			Fish-scale chips, various locations near above sample	<1	64	44	5	137	22	6	<4	6	245	4	42	<2	5	152	46	19	<2	865

Section H (wpsH) Sample Geochemistry

Sample	Unit	Lithology	Unit w/in Meade Peak	Th, ppm, ICP-40	U, ppm, ICP-40	V, ppm, ICP-40	Y, ppm, ICP-40	Yb, ppm, ICP-40	Zn, ppm, ICP-40	scintillometer, cps
WPSH0006	Lower Ore Zone	Phosphorite	Fish-scale Bed	<6	<100	1700	139	9	1190	470
WPSH003C	Lower Ore Zone	Phosphorite	Main Bed Ore	<6	<100	1700	131	7	1280	602
WPSH006C	Lower Ore Zone	Dolostone	Cap Rock	<6	<100	239	79	4	592	350
WPSH008C	Lower Ore Zone	Phosphorite	Cap Rock	<6	<100	484	197	9	1460	305
WPSH011C	Lower Ore Zone	Limestone	Cap Rock	<6	<100	661	129	7	1690	345
WPSH015C	Lower Ore Zone	Phosphorite	Cap Rock	<6	<100	1390	131	7	1510	463
WPSH015X	Lower Ore Zone	Phosphorite	Cap Rock	<6	<100	1300	131	7	1430	
WPSH019C	Lower Ore Zone	Phosphorite	Cap Rock	<6	<100	458	51	3	673	433
WPSH022C	Lower Ore Zone	Phosphorite	Cap Rock	<6	<100	2150	161	10	2040	343
WPSH027C	Lower Ore Zone	Dolostone	Cap Rock	<6	<100	129	30	2	424	280
WPSH031C	Lower Ore Zone		Cap Rock	<6	<100	225	198	10	1020	270
WPSH034C	Lower Ore Zone	Dolostone	Cap Rock	<6	<100	108	40	2	511	193
WPSH038C	Lower Ore Zone		Cap Rock	<6	<100	268	152	8	1320	265
WPSH042C	Lower Ore Zone		Cap Rock	<6	<100	95	63	3	384	214
WPSH047C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	<6	<100	221	297	14	931	286
WPSH047X	Lower Ore Zone	Phosphorite	Low. Footwall Shale	<6	<100	205	299	14	932	
WPSH053C	Lower Ore Zone	Phosphorite	Low. Footwall Shale	<6	<100	138	119	6	768	231
WPSH058C	Lower Ore Zone	Dolostone	Inner Seam (waste)	<6	<100	109	112	6	595	213
WPSH060C	Lower Ore Zone	Phosphorite	Up. Footwall Shale	8	<100	168	112	7	1090	178
WPSH066C	Lower Ore Zone		False Cap	9	<100	298	92	6	1030	186
WPSH071C	Lower Ore Zone	Dolostone	False Cap	6	<100	155	63	4	1280	
WPSH080C	Lower Ore Zone	Phosphorite	Hot Bed Ore	<6	<100	197	147	8	1370	213
WPSH083C	Middle Waste			<6	<100	366	481	19	2300	
WPSH0 85C	Middle Waste			<6	<100	147	50	4	648	
WPSH090C	Middle Waste			10	<100	126	192	9	678	
WPSH093C	Middle Waste			<6	<100	65	116	5	114	
WPSH096C	Middle Waste	Phosphorite	E Bed	<6	<100	452	372	17	1630	
WPSH097C	Middle Waste			9	<100	442	211	12	1120	
WPSH097X	Middle Waste			7	<100	457	230	12	1100	
WPSH107C	Middle Waste			13	<100	186	231	12	938	
WPSH110C	Middle Waste			<6	<100	112	145	8	475	
WPSH115C	Middle Waste			<6	<100	341	236	12	1550	
WPSH119C	Middle Waste	Dolostone		<6	<100	411	29	3	1200	
WPSH125C	Upper Ore Zone	Phosphorite	Hangingwall Shale	<6	<100	1870	166	10	1670	
WPSH125X	Upper Ore Zone	Phosphorite	Hangingwall Shale	7	<100	1940	177	10	1720	
WPSH134C	Upper Ore Zone	Phosphorite	Buckshot Zone	<6	<100	891	193	10	418	
WPSH136C	Upper Ore Zone		Waste	7	<100	259	164	10	519	
WPSH140C	Upper Ore Zone	Phosphorite	Lower Rich Bed	<6	<100	471	217	11	922	
WPSH143C	Upper Ore Zone		Waste	<6	<100	279	158	9	1010	
WPSH147C	Upper Ore Zone	Phosphorite	Upper Rich Bed	<6	<100	634	148	6	375	
WPSH151C	Upper Ore Zone			8	<100	206	76	5	751	
WPSH155C	Upper Ore Zone	Phosphorite		<6	<100	138	177	8	319	
WPSH158C	Upper Ore Zone			8	<100	98	130	7	326	
WPSH165C	Upper Ore Zone			11	<100	167	70	5	567	
WPSH172C	Upper Ore Zone			<6	<100	283	299	14	534	
WPSH176C	Upper Ore Zone			<6	<100	57	22	1	152	
WPSH180C	Rex Chert	Chert		<6	<100	13	29	<1	49	
Non-channel samples (see text):										
WPSHU001			Uraniferous (?) sample	<6	<100	1950	139	7	1310	717
WPSHG001			Grandeur Tongue composite sample near Section H	<6	<100	45	13	<1	224	
WPSHG002			Fish-scale chips, various locations near above sample	<6	<100	149	358	14	948	

Section G and H: Accuracy and Precision

	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-141409	9.9	0.24	1.2	55	2.3	3.05	0.13	0.04	3.01	1.27	2.12	2.67	1.31	0.63	0.21	0.08
5-Sample Mean		10.7	0.23	1.5	53	2.2	3.07	0.14	0.04	3.03	1.29	2.12	2.81	1.14	0.61	0.20	0.08
5-sample Relative Std. Dev., %		10%	6%	38%	6%	8%	1.1%	6.6%	0.0%	1.1%	2.9%	3.4%	7.6%	13.9%	5.3%	6.6%	5.7%
Relative Std. Diff., %, (sample-mean)		-8%	4%	-18%	4%	6%	-0.5%	-4.4%	0.0%	-0.5%	-1.9%	0.2%	-5.0%	15.1%	3.6%	6.1%	2.6%
POW-2	C-141408	35.2	0.54	6.3	154	2.6	7.68	4.40	1.20	6.48	0.88	3.60	13.80	1.69	1.48	1.19	0.60
5-Sample Mean		32.5	0.51	6.7	143	2.5	7.66	4.41	1.21	6.45	0.90	3.57	14.50	1.60	1.42	1.13	0.59
5-sample Relative Std. Dev., %		8%	6%	12%	8%	7%	1.0%	0.7%	0.7%	1.3%	3.7%	1.5%	8.0%	6.3%	5.2%	5.5%	3.0%
Relative Std. Diff., %, (sample-mean)		8%	5%	-7%	8%	6%	0.3%	-0.3%	-0.5%	0.4%	-1.8%	0.8%	-4.8%	5.9%	3.9%	4.9%	2.0%
POI-1	C-141338	18.4	0.21	2.0	44	1.5	3.83	2.50	0.68	3.15	2.69	5.84	3.92	2.44	1.91	1.02	0.56
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)		-1%	-5%	4%	-2%	4%	0.4%	0.0%	-0.3%	0.6%	-0.1%	1.5%	0.9%	-0.6%	-2.6%	-1.5%	0.0%
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 G and H Precision																	
Number of unqualified duplicate pairs (of 8)		8	8	8	8	8	8	8	7	8	8	8	8	8	8	8	8
Avg. Rel. Std. Diff.		13%	8%	7%	10%	8%	3%	11%	5%	3%	4%	6%	3%	4%	3%	4%	7%
Avg. Rel. Std. Dev.		9%	6%	5%	7%	5%	2%	8%	3%	2%	3%	4%	2%	3%	2%	3%	5%

Section G and H: 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
Project Check Standards																		
POW-1	1.39	36.2	0.10	175	643	<100	<10	127	119	67	1.76	2.65	1.00	0.55	0.18	0.07	1.10	0.09
5-Sample Mean	1.32	36.4	0.10	173	609.4			131.2	121	69	1.84	2.78	1.00	0.56	0.18	0.07	1.21	0.08
5-sample Relative Std. Dev., %	5.3%	0.0	4.4%	2%	2%			4%	2%	10%	5%	7%	1%	2%	3%	2%	9%	9%
Relative Std. Diff., %, (sample-mean)	5.0%	-0.7%	-2.0%	1%	6%			-3%	-2%	-3%	-4%	-5%	0%	-2%	-1%	-2%	-9%	5%
POW-2	6.13	17.6	0.24	265	1430	243	<10	571	167	188	3.11	12.80	1.49	1.30	1.04	0.55	5.02	0.14
5-Sample Mean	5.87	16.8	0.23	259	1326	*243*	*11*	587	168	184	3.27	13.88	1.49	1.36	1.03	0.57	5.38	0.12
5-sample Relative Std. Dev., %	6.1%	0.0	3.8%	4%	8%	0%	7%	3%	2%	2%	6%	11%	2%	4%	2%	3%	8%	16%
Relative Std. Diff., %, (sample-mean)	4.5%	4.9%	2.6%	2%	8%	0%		-3%	-1%	2%	-5%	-8%	0%	-4%	1%	-3%	-7%	15%
POI-1	1.09	25.8	0.41	259	495	196	14	124	84	226	5.73	3.99	2.49	2.00	1.04	0.56	1.13	0.28
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)	-1.4%	-1.8%	4.6%	-1%	0%	-6%	0%	-2%	-4%	-12%	0%	3%	0%	-2%	0%	0%	0%	5%
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
	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
	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
	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
	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
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
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
Rel. Std. Difference	-9%	-3%	23%	7%	2%	-1%	9%	-9%	21%	-3%	-5%	-3%	-3%	-3%	-8%	-7%	-15%	9%
Rel. Std. Deviation	5%	8%	4%	5%	9%	6%	5%	3%	7%	5%	4%	2%	2%	3%	4%	3%	5%	3%
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
	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
	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
	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
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
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
Rel. Std. Difference	-13%	-6%	6%	8%	-6%	-2%	24%	-9%	7%	1%	-2%	-4%	-4%	0%	-9%	-5%	-15%	-10%
Rel. Std. Deviation	0%	2%	3%	3%	3%	2%	8%	2%	3%	5%	2%	2%	2%	2%	2%	2%	0%	1%
Section G and H Precision																		
Number of unqualified duplicate pairs (of 8)	8	8	8	8	8	2	1	8	8	8	8	8	8	8	8	8	8	8
Avg. Rel. Std. Diff.	4%	9%	9%	7%	4%	19%	13%	4%	4%	12%	3%	4%	3%	4%	3%	4%	4%	15%
Avg. Rel. Std. Dev.	3%	6%	6%	5%	3%	14%	9%	3%	3%	8%	2%	3%	2%	2%	2%	3%	2%	11%

Section G and H: Accuracy and Precision

	Ag, ppm, ICP-40	As, ppm, ICP-40	Au, ppm, ICP-40	Ba, ppm, ICP-40	Be, 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
Project Check Standards																		
POW-1	<2	<10	<8	166	<1	11	16	4	514	56	2	7	<4	67	18	39	21	<4
5-Sample Mean		*15*		170		11	20	4	439	55	2	7		70	17	36	21	
5-sample Relative Std. Dev., %				5%		4%	28%	22%	44%	2%	0%	20%		5%	5%	16%	5%	
Relative Std. Diff., %, (sample-mean)				-2%		2%	-22%	5%	17%	2%	0%	0%		-4%	3%	8%	1%	
POW-2	9	22	<8	239	<1	52	43	7	1300	102	3	13	<4	114	19	67	31	<4
5-Sample Mean	9	21		239		51	44	5	1208	101	3	13		121	18	66	30	
5-sample Relative Std. Dev., %	18%	12%		6%		3%	3%	50%	9%	1%	0%	9%		6%	6%	2%	6%	
Relative Std. Diff., %, (sample-mean)	-2%	7%		0%		3%	-2%	52%	8%	1%	0%	2%		-6%	6%	2%	4%	
POI-1	<2	13	<8	271	<1	8	55	10	481	42	<2	14	<4	67	22	187	18	12
5-Sample Mean		*15*		269	*1*	8	52	11	421	41	3	16		66	23	199	18	9
5-sample Relative Std. Dev., %		36%		6%		9%	8%	8%	34%	8%	22%	15%		4%	6%	5%	0%	33%
Relative Std. Diff., %, (sample-mean)		-13%		1%		0%	6%	-6%	14%	3%		-15%		2%	-3%	-6%	0%	33%
Analyzed Reference Material SARL-1																		
	<2	16	<8	860	3	<2	141	8	107	345	<2	16	<4	72	26	1940	15	35
	2	16	<8	871	3	<2	147	7	104	360	<2	16	<4	75	26	2040	15	36
	3	15	<8	897	4	2	157	7	104	375	<2	16	<4	76	27	2080	14	38
	2	15	<8	837	3	<2	138	6	102	335	<2	17	<4	68	26	1910	14	34
	3	16	<8	905	3	2	141	9	117	385	<2	16	<4	71	29	2010	14	35
Average	3	16		874	3	2	145	7	107	360		16		72	27	1996	14	36
Accepted Value	3	17	0	879	3	3	150	8	110	370	2	17	2	75	28	2094	13	35
Rel. Std. Difference	-4%	-5%		-1%	0%	-20%	-3%	-1%	-3%	-3%		-5%		-3%	-4%	-5%	11%	2%
Rel. Std. Deviation	23%	4%		3%	14%	0%	5%	15%	6%	6%		3%		4%	5%	4%	4%	4%
Analyzed Reference Material SARM-1																		
	4	36	<8	793	2	4	121	11	101	316	<2	21	<4	60	29	4860	13	38
	3	32	<8	774	2	5	111	10	95	313	<2	19	<4	57	29	4980	14	34
	4	37	<8	751	2	4	112	10	99	308	<2	22	<4	55	28	4990	13	31
	3	33	<8	796	2	5	127	10	101	325	<2	20	<4	65	30	5090	14	34
Average	4	35		779	2	5	118	10	99	316		21		59	29	4980	14	34
Accepted Value	3	37	0	764	2	5	120	11	101	320	1	20	2	61	30	5200	12	31
Rel. Std. Difference	13%	-7%		2%	-17%	-5%	-2%	-7%	-2%	-1%		3%		-3%	-3%	-4%	13%	10%
Rel. Std. Deviation	16%	7%		3%	0%	13%	6%	5%	3%	2%		6%		7%	3%	2%	4%	8%
Section G and H Precision																		
Number of unqualified duplicate pairs (of 8)	7	3		8	0	8	7	3	8	8	4	6	2	8	8	8	8	3
Avg. Rel. Std. Diff.	5%	7%		3%		4%	11%	23%	6%	6%	6%	16%	0%	3%	3%	15%	5%	28%
Avg. Rel. Std. Dev.	4%	5%		2%		3%	8%	16%	5%	4%	4%	11%	0%	2%	2%	10%	3%	20%

	Nd, ppm, ICP-40	Ni, ppm, ICP 40	Pb, ppm, ICP-40	Sc, ppm, ICP-40	Sr, ppm, ICP 40	Ta, 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	58	193	17	4	125	<40	<6	<100	169	119	6	828
5-Sample Mean	57	188	12	4	126				174	119	6	845
5-sample Relative Std. Dev., %	6%	4%	1	12%	1%				4%	5%	7%	2%
Relative Std. Diff., %, (sample-mean)	2%	2%	47%	-9%	0%				-3%	0%	-3%	-2%
POW-2	66	210	29	7	541	<40	<6	<100	671	171	9	1160
5-Sample Mean	73	204	20	7	550		9		665	169	9	1132
5-sample Relative Std. Dev., %	15%	6%	47%	7%	2%		29%		3%	3%	6%	3%
Relative Std. Diff., %, (sample-mean)	-9%	3%	45%	-5%	-2%				1%	1%	5%	2%
POI-1	52	388	13	11	122	<40	10	<100	146	84	6	1270
5-Sample Mean	53	394	17	11	122		10		149	86	6	1308
5-sample Relative Std. Dev., %	13%	4%	32%	4%	2%		19%		4%	6%	8%	4%
Relative Std. Diff., %, (sample-mean)	-3%	-2%	-24%	2%	0%		0%		-2%	-3%	3%	-3%
Analyzed Reference Material SARL-1												
	65	49	590	8	135	<40	23	<100	123	36	5	407
	70	51	582	8	139	<40	23	<100	126	36	5	432
	70	54	598	8	145	<40	23	<100	131	37	5	426
	60	50	564	8	135	<40	22	<100	120	34	5	411
	70	51	552	8	153	<40	26	<100	139	44	5	453
Average	67	51	577	8	141		23		128	37	5	426
Accepted Value	66	52	578	8	158	3	19	5	140	44	5	420
Rel. Std. Difference	2%	-2%	0%	3%	-11%		23%		-9%	-15%	9%	1%
Rel. Std. Deviation	7%	4%	3%	0%	5%		6%		6%	10%	0%	4%
Analyzed Reference Material SARM-1												
	50	39	957	9	137	<40	21	<100	68	25	3	956
	54	39	985	8	141	<40	21	<100	66	24	3	956
	48	42	979	8	141	<40	19	<100	64	24	3	907
	54	43	1020	8	143	<40	23	<100	67	25	3	946
Average	52	41	985	8	141		21		66	25	3	941
Accepted Value	51	41	960	8	156	1	18	3	66	33	3	888
Rel. Std. Difference	1%	-1%	3%	-1%	-10%		17%		0%	-26%	-6%	6%
Rel. Std. Deviation	6%	5%	3%	6%	2%		8%		3%	2%	0%	2%
Section G and H Precision												
Number of unqualified duplicate pairs (of 8)	8	8	8	8	8		3	0	8	8	7	8
Avg. Rel. Std. Diff.	6%	3%	8%	9%	6%		16%		4%	4%	2%	4%
Avg. Rel. Std. Dev.	4%	2%	6%	6%	4%		11%		3%	3%	1%	3%

Erratum--Section C and D: Accuracy and Precision*

	Lab No.	As, ppm, Hyd.	Se, ppm, Hyd.	Sb, ppm, Hyd.	Te, ppm, FAA	Tl, ppm, FAA	C, %, Combustion	CO2, %, Acidification	Carbonate C, %, Acidification	Organic C, %, difference	S, %, Combustion	Hg, ppm, CVAA	Al, %, ICP-16	Ca, %, ICP-16	Fe, %, ICP-16	K, %, ICP-16	Mg, %, ICP-16
ACCURACY-Standard Reference SARL																	
analyzed as	C-136289	16.1	0.9	4.8	0.7	1.1	1.1	0.41	0.11	0.99	0.08	0.18	5.70	1.10	2.54	2.86	0.50
analyzed as	C-136291	16.1	0.8	5.2	0.7	1.2	1.1	0.40	0.11	0.99	0.07	0.17	5.82	1.09	2.61	2.96	0.52
analyzed as	C-136293	17.8	0.8	4.6	0.7	1.2	1.1	0.40	0.11	0.99	0.08	0.19	5.83	1.05	2.56	2.95	0.52
Average		16.7	0.8	4.9	0.7	1.2	1.1	0.40	0.11	0.99	0.08	0.18	5.78	1.08	2.57	2.92	0.51
Accepted Value		16.5	0.9	5.1	0.6	1.4	0.97	0.40	0.11	0.86	0.07	0.16	5.79	1.06	2.67	2.98	0.55
Rel. Std. Diff.		1%	-7%	-5%	17%	-17%	13%	1%	0%	15%	10%	16%	0%	2%	-4%	-2%	-7%
Standard Reference SARM																	
analyzed as	C-136290	37.2	0.3	6.2	1.0	2.4	0.3	0.09	0.02	0.28	0.12	0.12	5.98	0.58	3.09	2.88	0.46
analyzed as	C-136292	37.9	0.3	6.2	1.1	2.4	0.28	0.09	0.02	0.26	0.12	0.11	5.87	0.56	2.93	2.84	0.45
analyzed as	C-136294	40.8	0.3	6.1	1.0	2.6	0.30	0.08	0.02	0.28	0.11	0.12	6.1	0.58	3.12	2.95	0.47
Average		38.6	0.3	6.2	1.0	2.5	0.29	0.09	0.02	0.27	0.12	0.12	5.98	0.57	3.05	2.89	0.46
Accepted Value		37	0.33	5.6	0.68	2.8	0.30	0.07	0.02	0.28	0.13	0.117	6.09	0.58	3.22	2.92	0.50
Rel. Std. Diff.		4%	-9%	10%	52%	-12%	-2%	24%	0%	-2%	-10%	0%	-2%	-1%	-5%	-1%	-8%
PBV-1 Bone Valley Phosphorite, split 16																	
analyzed as	C-122917	12.6	2.5	1.8	0.2	1.7	1.45	3.84	1.05	0.40	0.55	0.09	0.54	34.8	0.90	0.12	0.24
analyzed as	C-123874	10.5	2.6	1.6	0.1	2.1	1.46	3.85	1.05	0.41	0.58	0.09	0.52	33.6	0.85	0.13	0.23
Average		11.6	2.55	1.7	0.15	1.9	1.455	3.845	1.05	0.405	0.57	0.09	0.53	34.2	0.88	0.13	0.24
Rel. Std. Dev.		13%	3%	8%	47%	15%	0.5%	0.2%	0.0%	2%	4%	0%	3%	2%	4%	6%	3%
Project Standards, no replication																	
POW-1	C-136227	10.9	54.3	1.5	<0.1	1.9	3.03	0.15	0.04	2.99	1.29	0.22	2.22	3.02	1	0.56	0.2
POW-2	C-136247	31.9	134	7	<0.1	2.4	7.52	4.46	1.22	6.3	0.86	0.49	3.48	14.8	1.45	1.31	1.09
POI-1	C-136229	19.1	43.1	1.8	<0.1	1.5	3.7	2.49	0.68	3.02	2.55	0.22	5.83	4.13	2.39	1.97	1.07
PRECISION- duplicates analyses																	
Section C																	
Number		6	6	6	2	6	6	6	6	6	6	6	6	6	6	6	6
Avg. Std. Diff.		9%	6%	11%	20%	17%	3%	11%	4%	5%	34%	3%	8%	9%	7%	8%	8%
Avg. Std. Dev.		6%	4%	8%	14%	12%	2%	8%	3%	3%	24%	2%	5%	7%	5%	6%	6%
Section D																	
Number		10	10	8	1	10	10	10	10	10	9	9	10	10	10	10	10
Avg. Std. Diff.		8%	14%	13%	67%	23%	3%	7%	5%	12%	5%	10%	5%	9%	7%	7%	8%
Avg. Std. Dev.		6%	10%	9%	47%	16%	2%	5%	4%	8%	4%	7%	3%	6%	5%	5%	4%

*Note: This is the corrected first page of table 3 in Herring and others (2000a) for Sections C and D. A few of the earliest-distributed reports contained data columns transposed relative to the headings for CO2, carbonate, and total carbon. The correct data to correspond with the column headings are shown. Most distributed paper copies and all electronically-distributed copies of the report contained the correct data.