

CHARACTERIZATION AND DESCRIPTION OF A MINE RESERVE WITH
GEOSTATISTICAL METHODS IN KARAKARTAL FIELD: EASTERN ANATOLIA

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GEOSTATISTICAL METHODS IN KARAKARTAL FIELD: EASTERN ANATOLIA**

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ABSTRACT

CHARACTERIZATION AND DESCRIPTION OF A MINE RESERVE WITH GEOSTATISTICAL METHODS IN KARAKARTAL FIELD: EASTERN ANATOLIA

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The Karakartal mining exploration field is located in Eastern Anatolia, close to Erzincan-Kemaliye. The field is an important metallic mining exploration area with high potential of Copper and Gold production. In this study, characterization of the mineral deposition are analyzed using geostatistical techniques.

Subaşı Volcanics, Keban Metamorphics and Munzur Limestone are the basic geologic units in the mining area.

The variations of chemical parameters with depth were examined. Descriptive statistics, areal distribution, linear regression analysis, trend surface analysis, principal component analysis were used to characterize ore body at the study area. Minimum, mean and maximum values and variances were determined by using descriptive statistics methods. Areal distribution models show intense values for copper mean, copper maximum, manganese maximum, zinc maximum and zinc mean values at the western part, other models show accumulation groups at the eastern site. Linear regression table shows high relations between gold-copper and, zinc-cadmium and lead, and potassium-sodium-barium-beryllium-calcium and aluminum. Trend surface analysis maps show northeast – southwest trend for copper, manganese and zinc, and southwest – northeast trend for gold. As a result of principal component analysis there are eight representative component groups for all elements.

As a result of this study the regional distribution of the elements in the mineral deposition zone and their relationships with each other was determined by using results of the laboratory analyses of the drilling wells and geostatistical techniques together.

Keywords: Element concentration distributions, geostatistics, Areal extension, Erzincan, Eastern Turkey

ÖZ

KARAKARTAL SAHASINDA MADEN REZERVİNİN JEOİSTATİSTİKSEL METHODLARLA KARAKTERİZASYONU VE TANIMLANMASI: DOĞU ANADOLU

Taç, Mutlu

Yüksek Lisans, Jeoloji Mühendisliği Bölümü

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Karakartal maden arama sahası Doğu Anadolu’da yer almakta, Erzincan – Kemaliye yakınlarında bulunmaktadır. Saha yüksek altın ve bakır üretme potansiyeli ile önemli bir maden arama sahasıdır. Bu çalışmada maden cevherinin karakteri jeostatistiksel teknikler kullanarak analiz edilmiştir.

Subaşı Volkanikleri, Keban Metamorfikleri ve Munzur Kireçtaşı maden sahasındaki temel jeolojik birimleridir.

Kimyasal analiz sonuçlarının derinliğe göre değişimi incelenmiştir. Çalışma sahasındaki cevher kütlesinin karakterini belirlemek için, tanımlayıcı istatistik, alansal dağılım, doğrusal regresyon analizi, eğilim yüzeyi analizi, temel bileşen analizi uygulanmıştır. Tanımlayıcı istatistik methodları sonucu minimum, maksimum, ortalama değerler ile varyans değerleri bulunmuştur. Alansal dağılımda ortalama bakır, maksimum bakır, maksimum mangan, maksimum ve ortalama çinko değerlerinin batı kısımda yoğun olduğu, diğer değerlerin doğu kısımda öbeklendiği görülmüştür. Doğrusal regresyon analizi sonucu altın-bakır ilişkisi, çinko-kadmiyum ve kurşun ilişkisi, potasyum-sodyum-baryum-berilyum-kalsiyum ve alüminyum ilişkisi tespit edilmiştir. Eğilim yüzeyi analizi ile bakır, mangan ve çinko değerlerinin kuzeydoğu – güneybatı yönünde olduğu, altının ise güneybatı – kuzeydoğu yönünde olduğu tespit edilmiştir. Temel bileşen analizi sonucundaysa tüm elementleri temsil eden sekiz bileşen grubu tespit edilmiştir.

Bu çalışmanın sonucunda elementlerin bölgesel dağılımı ve birbirleriyle ilişkileri kimyasal analiz sonuçları ve jeostatistiksel methodların birlikte kullanılmasıyla ortaya çıkarılmıştır.

Anahtar kelimeler: Element konsantrasyonu dağılımı, jeostatistik, Alansal uzanım, Erzincan, Doğu Anadolu Türkiye

To My Family and My Grandmother

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CHAPTER 1

INTRODUCTION

1.1 Purpose and Scope

The Karakartal Mine Project is located 22 km to the east-northeast of Kemaliye town and 2 km North of Kabataş Village (Figure 1). In the developing world with expanding economies need for the mine resources grows rapidly, especially in metallic mining. Karakartal Exploration Project is a very important project in this point of view as a copper – gold project. The size of the field is about 2 km by 1 km (approximately 2 km²).

This study aims to describe and characterize regional extension of the alteration zone and distribution of element concentrations by using laboratory analysis of core samples from drilled wells. 52 wells have been drilled by IDC, Spektra and Ortadoğu firms and 10036 core samples have been chemically analyzed by ALS Laboratory Services, which has an international accreditation. Analysis were completed for 26 different elements at laboratory. There are KDD initials in the name of each well, these initials represent Karakartal Diamond Drilling.

A data set was created by using element concentrations which were obtained from the chemical analysis result of the samples. Numerical values are the reliable sources for a mine field to understand regional extension and distribution.

Statistical models of the element analysis show the extensions, directions, and areal distributions of the ore body in different distances and in different depths. As a result of this study it is expected to understand the general and specific properties of the ore reserve in the study area with most reliable numerical data. According to geostatistical models used for this study, further exploration, production and mining works can be planned effectively.

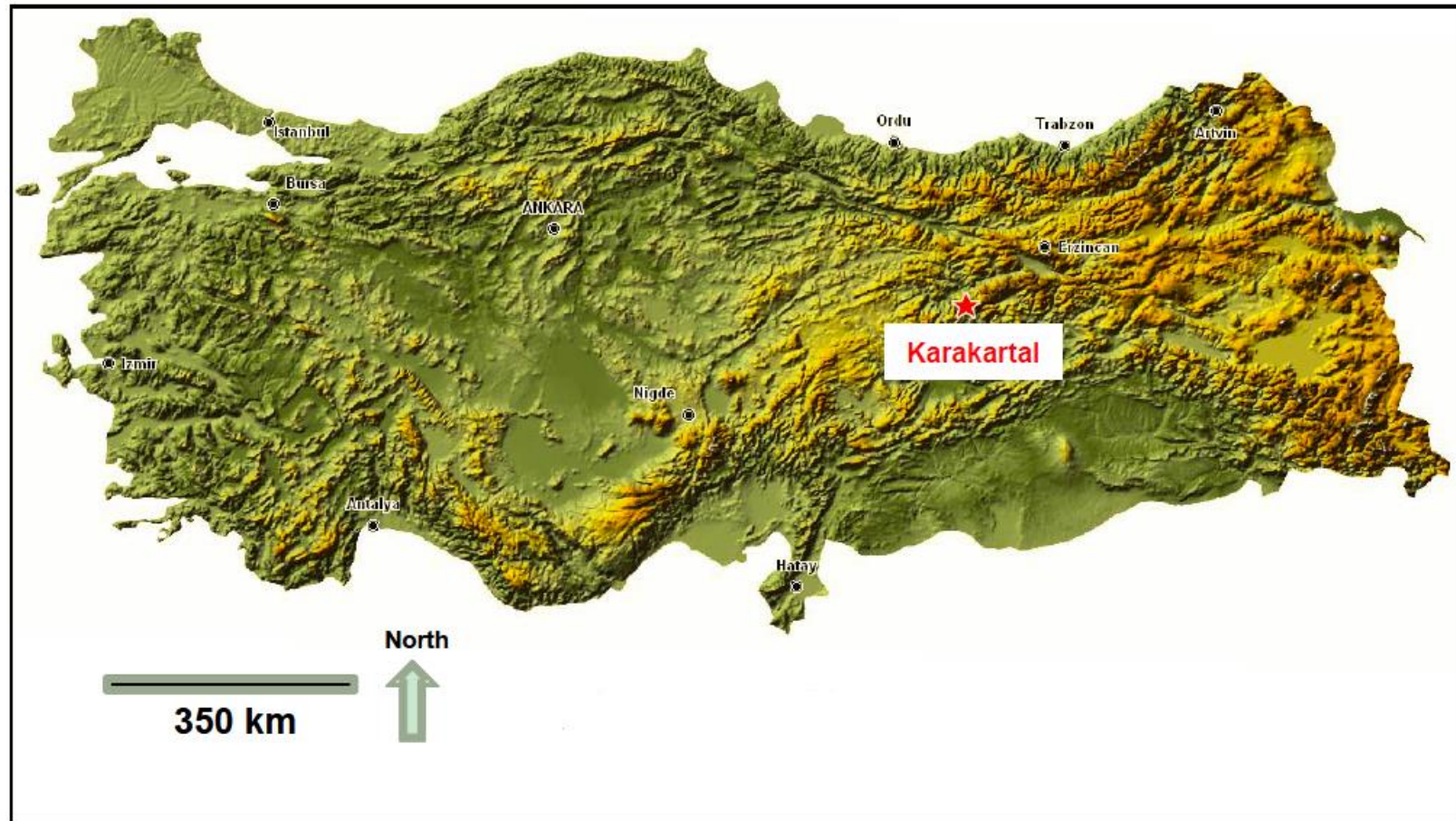


Figure 1: Location map of the study area.

1.2 Previous Studies

In the region that includes the study area, some researchers studied on stratigraphy, mining geology and economical geology, lithology, mineralogy and structural geology.

Özgül (1976), studied the lithological units, and described them. The relationships between the lithological units in the area were examined. The metamorphic units in the area were named as Keban Metamorphics for the first time at that study.

Özgül et al (1981), named and described Subaşı Volcanics for the first time at that study. The age of this formation considered as Upper-Paleocene in that study according to the lithostratigraphic relationships with the surrounding rocks.

Avcı et al. (1995), studied general geology and stratigraphy of the area. Stratigraphic columnar section was generated in this study.

Avcı et al. (1996), studied lithological units and mineralization in the area. Kabataş Subvolcanics were first described as a member of Subaşı Volcanics. Alteration and mineral deposition in the area and the economic value of this mineralization were explained in this study.

Walton and Crowley (2001), studied the mining geology and mineralization in the Karakartal mining exploration field. They prepared a detailed report for Rio Tinto Company. Mineral types and developments were explained in this report.

Geostatistics are used to determine the character of the mineralization and distribution of the reserve in a mining area. In the literature there are some studies about ore reserve estimation and evaluation closely related with this study.

David and Blais (1972), used geostatistical methods for the ore reserve estimation. The authors separated the reserve into four different group and developed statistical and mathematical models for each one and compare them by using variogram techniques.

Krige (1981), used Lognormal-de Wijsian geostatistical techniques for the ore reserve evaluation. The author used semivariograms and Krigging applications in this study and compare them with the other methods.

Turan and Bingöl (1991), studied the tectonostratigraphy of Kovancılar – Baskil (Elazığ) area. Cross-cutting relationships and tectonic properties of this area were examined in that study.

Krige and Dunn (1994), used geostatistical methods to estimate the copper reserve in the Chuquicamata Copper Mine in Chile. The authors used drill hole data and blast hole data and applied geostatistical techniques to the geologically homogeneous units.

Deraisme and Fouquet (1996), described and explained how to use different geostatistical methods for the in situ mineralization in mining exploration. The authors mentioned that by using borehole data and computer softwares it is possible to make a good estimation for the ore reserves.

Stubens (1988), used over 3500 chip samples from mineralization vein in the Venus Mine, Yukon Territory. The author applied geostatistical methods to those samples and geostatistically analyzed and characterized the vein and developed a model for the concentration distribution along the mineralization.

Ortiz and Emery (2006), separated the geological systems as hard boundaries which there is no spatial correlation of grades across the boundary and soft boundaries which there is spatial correlation of grades across the boundary. The authors studied on the hard and the soft boundary conditions and mentioned how geostatistical methods can be used to determine mineral resources in this comparative study.

Ulu (1996), described and characterized a carbonate type oil reservoir by using well-logging data and porosity examination results of core samples of drilled wells. Linear regression models, multiple regressions models, stepwise multiple regression models, principal components analysis and factor analysis were completed in this study.

CHAPTER 2

GEOLOGICAL SETTING

Geological properties were summarized from the Özgül (1976), Özgül et al (1981), Özgül and Turşucu (1984), Turan and Bingöl (1991), Avcı et al (1996), and Walton and Crowley (2001). The Generalized geologic map was taken from Avcı et al 1996 (Figure 2). Tectonostratigraphic columnar section was redrawn from from Avcı et al 1995 (Figure 3).

2.1 Subaşı Volcanics – Kabataş Unit

Subaşı Formation was described by Özgül et al. 1981, but Kabatas Unit was first describe as a member of Subaşı Formation by Avcı et al. 1996. It is placed and extends around Kabataş Village, Kemaliye Region.

According to the general view on the field, it does not show structures of lava flow and it seems it is exposed over surface in its place instead of a volcanic flow. It is formed by porphyry type rocks. From the mineralogical and petrographical analysis data it was obtained that it consists of andesite with quartz, andesite, diorite porphyry and diorite porphyry with quartz. It has different alteration zones in it. Propylitic alteration, phyllitic alteration, and potassic – weak phyllitic alteration zones can be observed. Epidote, chlorite and calcite minerals are characteristic for the propylitic alteration. Extensive sericitization is characteristic for the phyllitic alteration. Magmatic large euhedral biotites, extensiveness of clayey K-feldspars and plagioclases are characteristic for the potassic – weak phyllitic alteration. (Avcı et al. 1996)

Kabataş Unit are very important for copper-molibdenum-gold minerals deposition development with its characteristic alteration zones. Because of this the unit has more importance than the other magmatic rocks in the region according to the porphyry type mineral deposition development. It shows mineralogical similarities with the other granitoids in the region and this increase the probability that all of them have the same magmatic origin, but it must be exposed over surface later than the other granitoids as a mineral deposition phase (Avcı et al 1996).

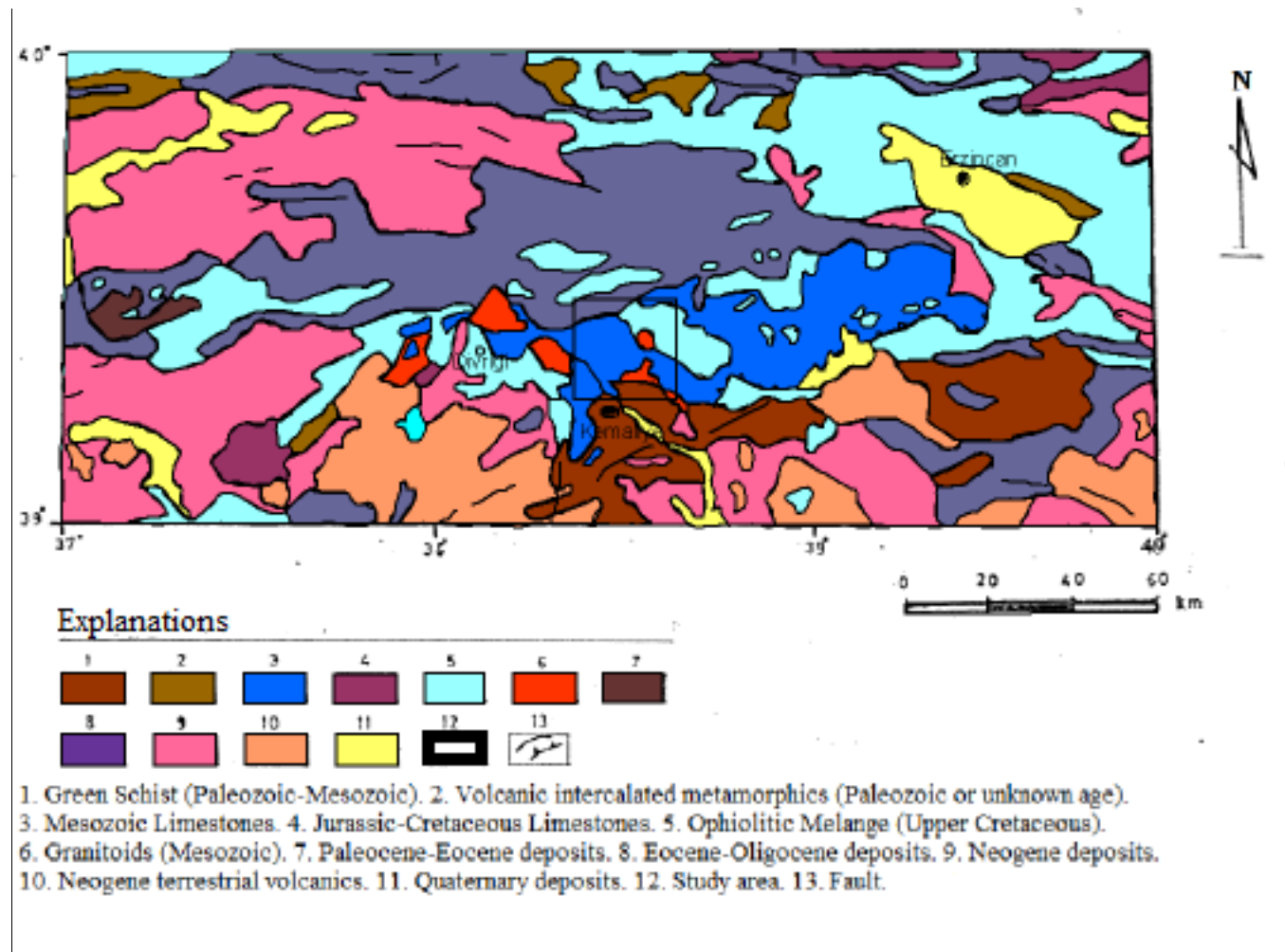


Figure 2: Geological Map of the Area (Simplified from Avcı et al 1996).

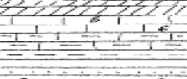
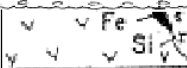
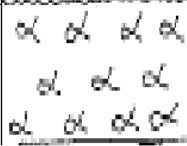
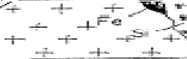
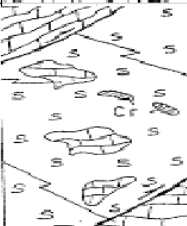
AGE	UNIT NAME		LITHOLOGY	INSTRUCTIONS
QUATERNARY				Alluvial deposits Unconformity
NEOGENE	KEMAH FORMATION			Shallow marine, lagoon and delta deposits: conglomerate, sandstone, siltstone, claystone, marl, limestone, and gypsum. Gastropoda fossil.
EOCENE	DEDEK FORMATION	KOÇKAR VOLCANICS		Unconformity Diorite porphyry, andesite and basalt.
		DOLUGUN MEMBER		Conglomerate, sandstone, siltstone, claystone, marl, limestone, and gypsum. Interbedded volcanics and nummulites fossils.
LATE PALEOCENE	SUBASI FORMATION - DOĞAN VOLCANICS			Unconformity Andesite, Andesite tuff.
LATE CRETACEOUS - PALEOCENE	CALTİ, COPLER AND YAKUPLU GRANITOIDS			Granitoids, diorites, quartz diorites, granodiorites.
LATE CRETACEOUS	KEMALIYE FORMATION			Olistostrome
LATE TRIASSIC- JURASSIC- CRETACEOUS	ERIC OPHIOLITE COMPLEX- (MUNZUR LIMESTONE)			Unconformity Massive Limestone
PERMIAN- LOWER TRIASSIC	KEBAN METAMORPHICS			Tectonic Boundary (cannot be observed) Schist and Crystalline Limestone. Metadiabase dykes.

Figure 3: Generalized Tectonostratigraphic Columnar Section of Divriği – İliç – Kemaliye Region. (Taken from Avcı et al. 1995).

This unit cuts the Keban Metamorphics, Munzur Limestone and Eriç ophiolites in the region. The age of the unit was considered as Late Paleocene by Özgür et al. 1981 according to lithostratigraphic relationships with its surrounding rocks.

2.2 Keban Metamorphics

Unit was first described with this name by Özgül (1976) and it was included into the Alanya Group which is seen at Western Tauride region. After their studies around Ovacık, Özgül and Turşucu (1981) added Jurassic-Cretaceous age Limestones and named all these metamorphic group as a Keban Metamorphics (Turan and Bingöl 1991). It is represented with limestone, calcareous schist, marble, metaconglomerate and calcareous phyllite (Özgül 1976). In the study area it is seen as greenish metaconglomerate.

2.3 Munzur Limestone

These rocks are formed by thick carbonate deposition and they are placed at the western extensions of the Munzur Mountains. The unit has grey – cream color and generally it does not have recognizable bedding planes, it looks massive. The bedding planes may only be seen at upper parts of the deposition unclearly. It contains chert intercalations and the thickness of the unit is between 50m to 700m. Not only it shows some marks of burrying in Eriç Ophiolite, but also large 50-100m of blocks can be observed in Eriç Ophiolites.

Generally it can be seen with thrust and reverse faults on Eriç Ophiolites.

Munzur Limestone has a crystalline, broken and fractured structure because of regional tectonics and granitic intrusions. At the contacts of the granitic intusions, it became silicified and dolomitized due to Mg-Si metasomatism. Also it is possible to see iron coatings and mineral depositions at the contacts (Avcı et al, 1996).

The age of the Munzur Limestone deposition was determined as Triassic-Jura Cretaceous(?) with fossil proofs by Özgül et al, 1981.

2.4 Economic and Mining Geology

Kabataş Unit is in a cross-cutting relationship with Keban Metamorphics and Munzur Limestone. Mineralization is mostly seen at the contacts of Kabataş Subvolcanics and Munzur Limestone (Avcı et al. 1996). Silicified rocks samples with pyrite, limonite, hematite and secondary copper content close to the contact zone shows economical gold values. Later studies show that there is a high potential of porphyry type mineralization in Kabataş Unit.

In the study area, Triassic-Jurassic-Cretaceous age Munzur Limestone and Late Palaeocene age Kabataş Unit which is formed by diorite porphyry and quartz-diorite porphyry are the main rock units.

Munzur Limestone unit in the study area has a much fractured appearance and the bedding structure cannot be observed like a massive carbonate deposition. Inside the carbonate body there are northwest-southeast directional intense fault and fracture zones. Jasperoids, extensions of the hypabyssal hydrothermal system, was placed to those fractures.

Kabataş unit shows extensive phyllic alteration with limonitization, kaolinization and sericitization inside. Moreover, there are propylitic alteration zones observed with calcite, chlorite and epidote minerals. In addition to these typical porphyry system alterations, there are also phyllic – potassic alteration observed with clayey areas containing hydrothermal quartz and large euhedral biotites. In these areas silicified-brecciated blocks with limonite can be seen. Along the phyllic – potassic transition zone there are also quartz stockwork veins up to 15 cm thickness. These stockwork veins contains pyrite, chalcopyrite, very low molybdenum and low magnetite. There are also malachitization, limonitization and sulphidation caused by surface oxidation (Avcı et al. 1996).

According to the Walton and Crowley (2001), the prospect-scale geology dominated by the intrusion of the diorite porphyry into the lower Munzur Formation metasediments. This intrusion process and escaping volatiles fractured and brecciated the overlying hornfelsed sediments. This is particularly clear in the south of the main zone of mineralization on the ridge between the main Copper Creek and Dikmen Dere. At higher elevations in this area, iron oxides (mostly goethite and jarosite with minor hematite) and silica fill the open spaces and fractures of the breccia. At lower elevations, further to south away from the Copper Creek and particularly close to Dikmen Dere, pyrite +/- copper sulfides and silica often fill the open spaces and fractures. Several post-mineral intrusions occur along structural features.

CHAPTER 3

GEOSTATISTICAL STUDIES

3.1 Data Set

In this study, the main data set was created from the laboratory results of chemical analysis of core samples from drilled wells in the study area. 52 wells were drilled in different places over the study area (Figure 4) by IDC, Spektra and Ortadoğu firms for the Kartaltepe Mining which is a partnership of Alacer Gold Company and Çalık Group. Core samples were taken (Figure 5), and these core samples were sent to ALS Laboratory Services which has an international accreditation. Detection limits of the laboratory are given in the Table 1 and taken from ALS Geochemistry Service Schedule 2013. 10036 sample were analyzed for 26 elements including gold, copper, silver, manganese, lead and zinc. Results are determined in parts per million (ppm) scale or in percentage for some specific elements which are Al, Ca, Fe, K, Mg, Na and S. Some unclear results are shown as they have a range and they do not have an exact value (example: <0,05), these values are removed from the data set and finally 9974 chemical analysis results remains and these ones are used in the study. Evaluation of the data set gives detail information about which elements have economical values and at which depths values are increasing or decreasing. Increasing or decreasing zones are different for each element in each well, with this zonal determination it is possible to examine the consistency of a mineral deposition with geological properties. Depth versus element value change graphics are given below, they were prepared for each well.

Table 1: Detection limits of the ALS laboratory.

Ag	0,5 - 100	Cr	1 - 10000	Na	0,1% - 10%	Ti	0,01% - 10%
Al	0,01% - 50%	Cu	1 - 10000	Ni	1 - 10000	Tl	10 - 10000
As	5 - 10000	Fe	0,01% - 50%	P	10 - 10000	U	10 - 10000
Ba	10 - 10000	Ga	10 - 10000	Pb	2 - 10000	V	1 - 10000
Be	0,5 - 1000	K	0,1% - 10%	S	0,01% - 10%	W	10 - 10000
Bi	2 - 10000	La	10 - 10000	Sb	5 - 10000	Zn	2 - 10000
Ca	0,01% - 50%	Mg	0,01% - 50%	Sc	1 - 10000		
Cd	0,5 - 1000	Mn	5 - 100000	Sr	1 - 10000		
Co	1 - 10000	Mo	1 - 10000	Th	20 - 10000		

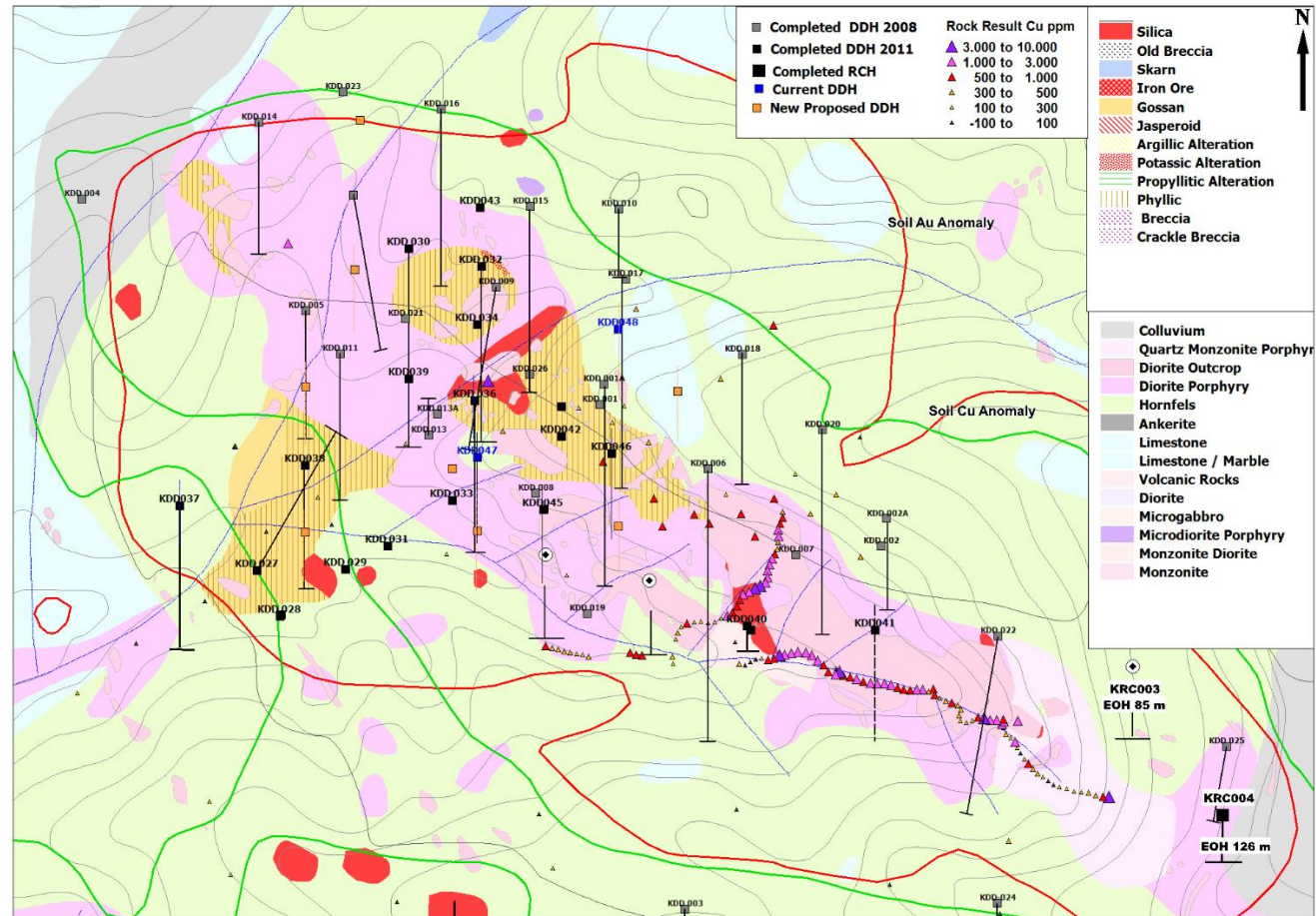


Figure 4: Drill plan of the study area. (Square symbols show the locations of the wells. Grey ones were completed in 2008 and the black ones were completed in 2011. Triangles represent the surface rock samples and the red border show the soil anomalies of gold and the green border show the soil anomalies of copper. Inside the red loop the gold concentration of soil is over 0,005 ppm and inside the green loop the copper concentration is over 10 ppm.)

According to the KDD001 graphic for all elements (Figure 5), it can be seen that Mn, Zn and Pb trends are compatible to each other. The biggest peak is placed at between 8m and 10m depth. Zn value is not as high as Mn or Pb. The highest Zn value is placed between 21m and 23m. At that same point Mn values became stable and preserve the value range from that point to the end of the well. There is a high W value between 16m and 19m, but it is not continuous value, it is only a single peak and it is not compatible with any other elements. The areas which elements compatible to each other, shows that at that regions the alteration source of these elements is the same or has the same origin. Copper has the highest values but it is not compatible with the other elements.

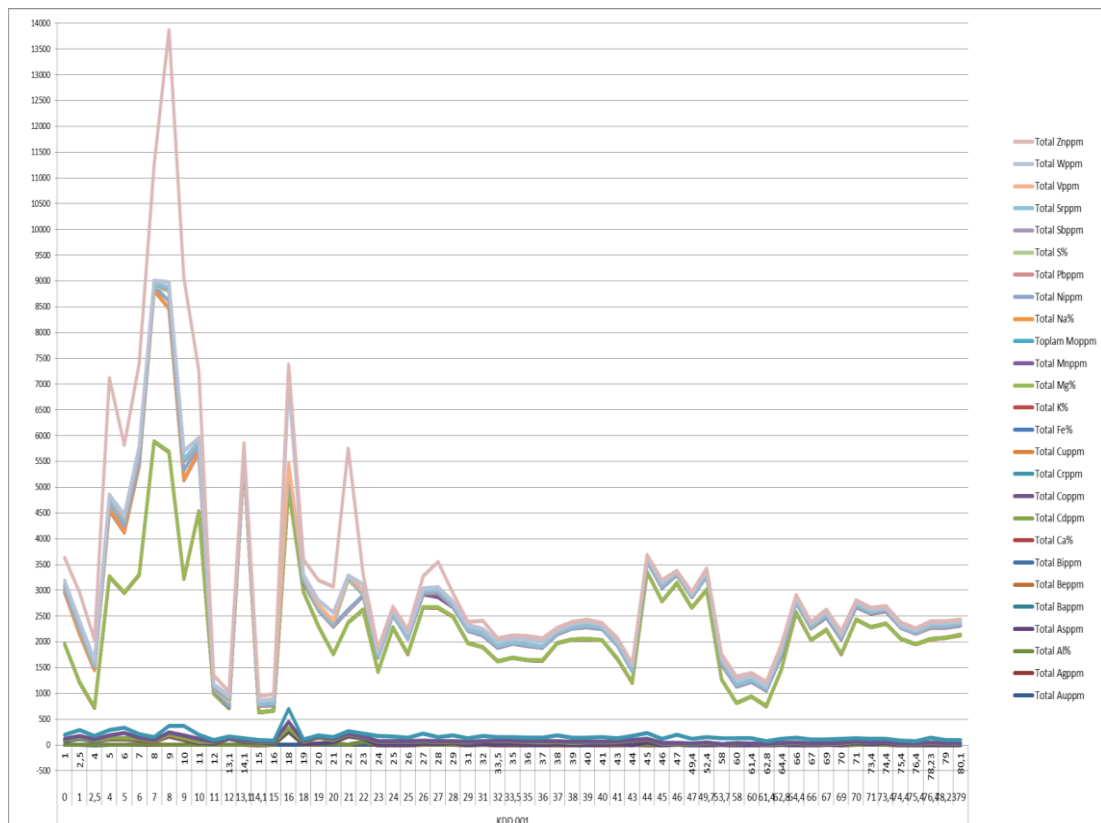


Figure 5: Depth versus concentration graphic of the KDD001 well. (X axis is depth and Y axis is concentrations.)

As it can be seen from the Figure 6, the graph of KDD001A, Pb has the highest concentrations. The second element that has the highest concentration is Zn.

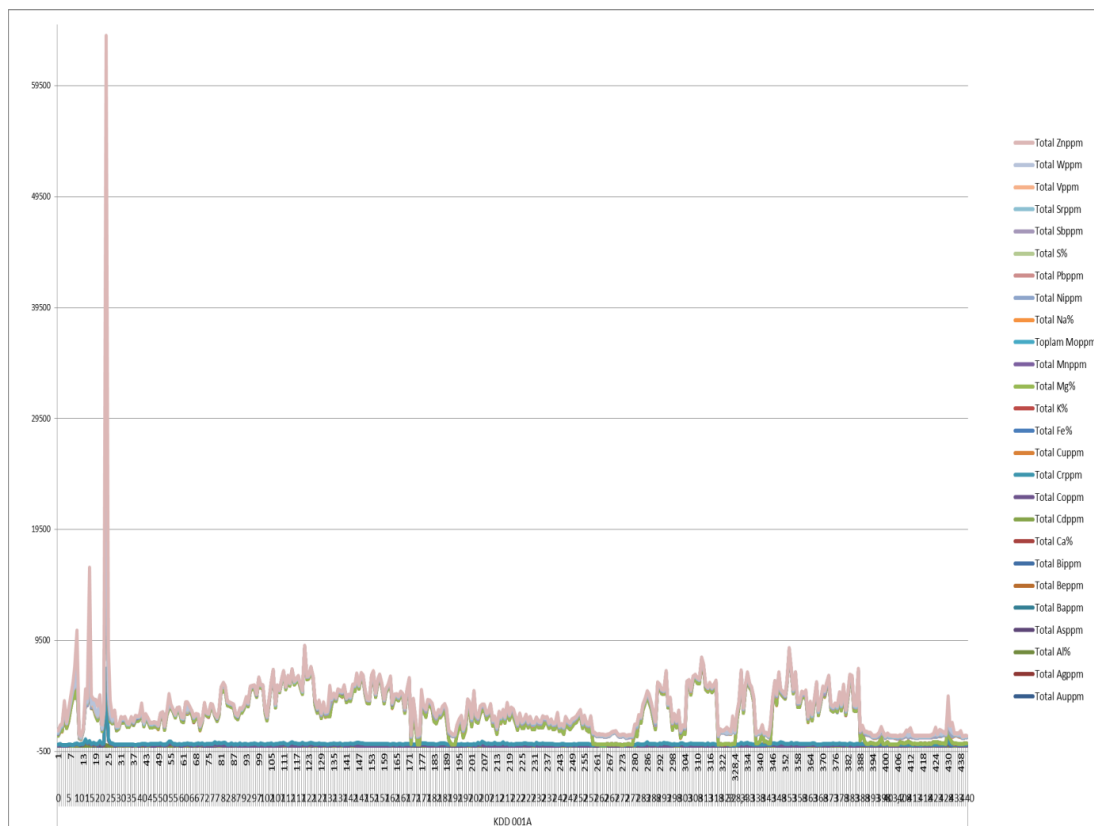


Figure 6: Depth versus concentration graphic of the KDD001A well. (X axis is depth and Y axis is concentrations.)

The graphic of the KDD002 (Figure 7) shows that up to 21m Mn, Mo and Zn are compatible with each other and the biggest peak of these three elements are placed at around 20m depth of the well. After the 21m depth Zn and V elements became compatible and the trends of these elements became stable and continue in that way to the end of the well. Trends of Mn and Mo elements are compatible to the end of the well. Copper has the highest values but it is not compatible with the other elements.

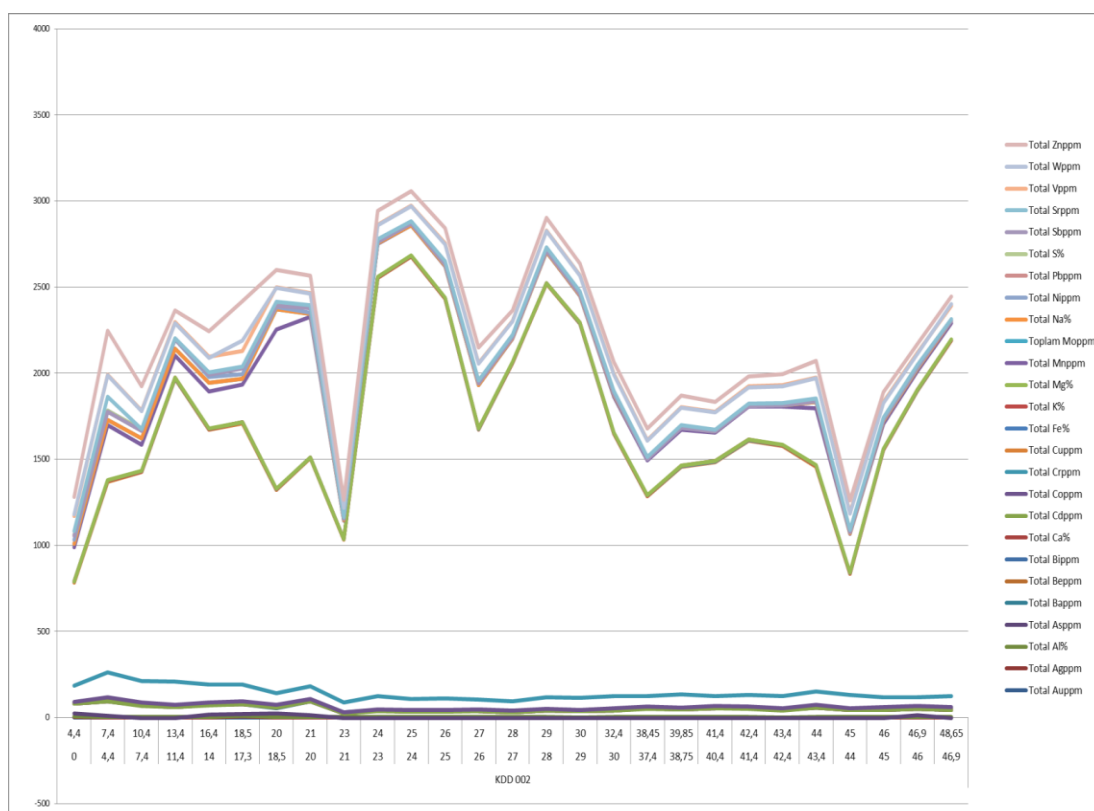


Figure 7: Depth versus concentration graphic of the KDD002 well. (X axis is depth and Y axis is concentrations.)

According to the graphic for KDD002A (Figure 8), after 10m depth it Mo and Sr elements became compatible and the trends show opposite behaviours of Mn element trend. Copper has the highest values but it is not compatible with the other elements.

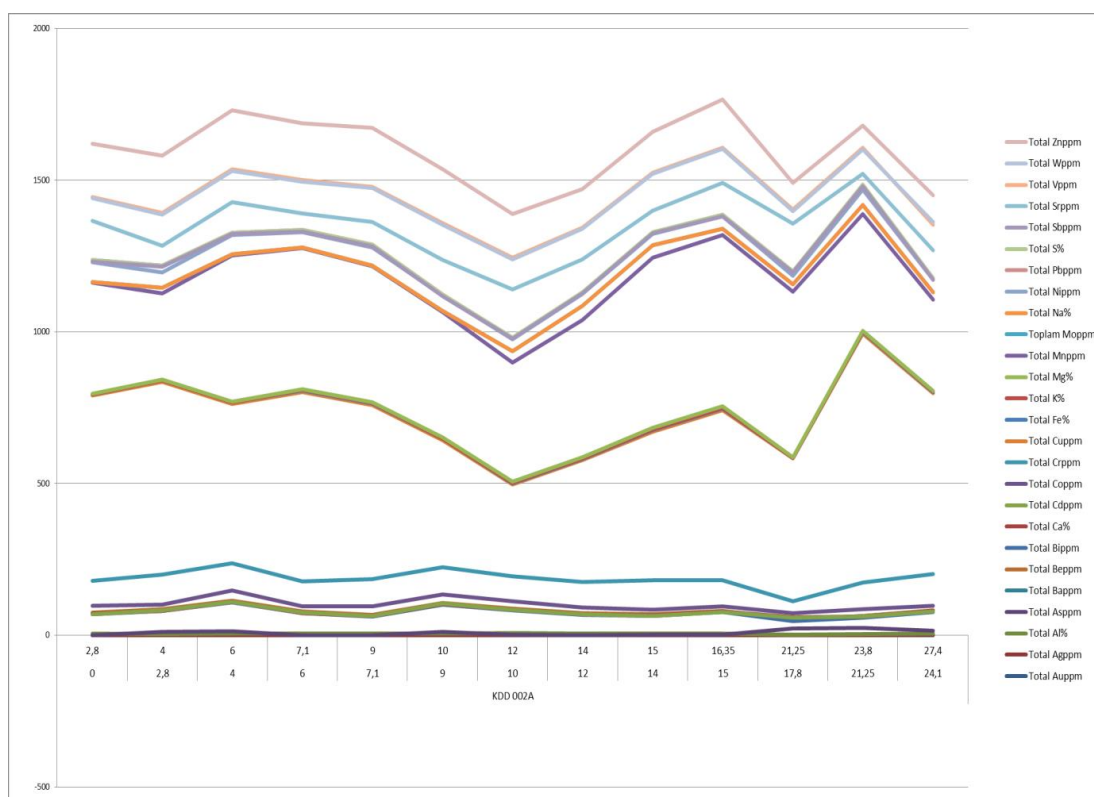


Figure 8: Depth versus concentration graphic of the KDD002A well. (X axis is depth and Y axis is concentrations.)

From the graphic of KDD002B (Figure 9) it can be observed that, Mn, Zn, Pb and Sr elements are compatible to each other. Highest Mn and Zn peaks are placed at around 85m depth. Highest peak of Sr element is placed at around 322m. After 335m depth the trends of the elements are not compatible to each other. Copper has the highest values but it is not compatible with the other elements.

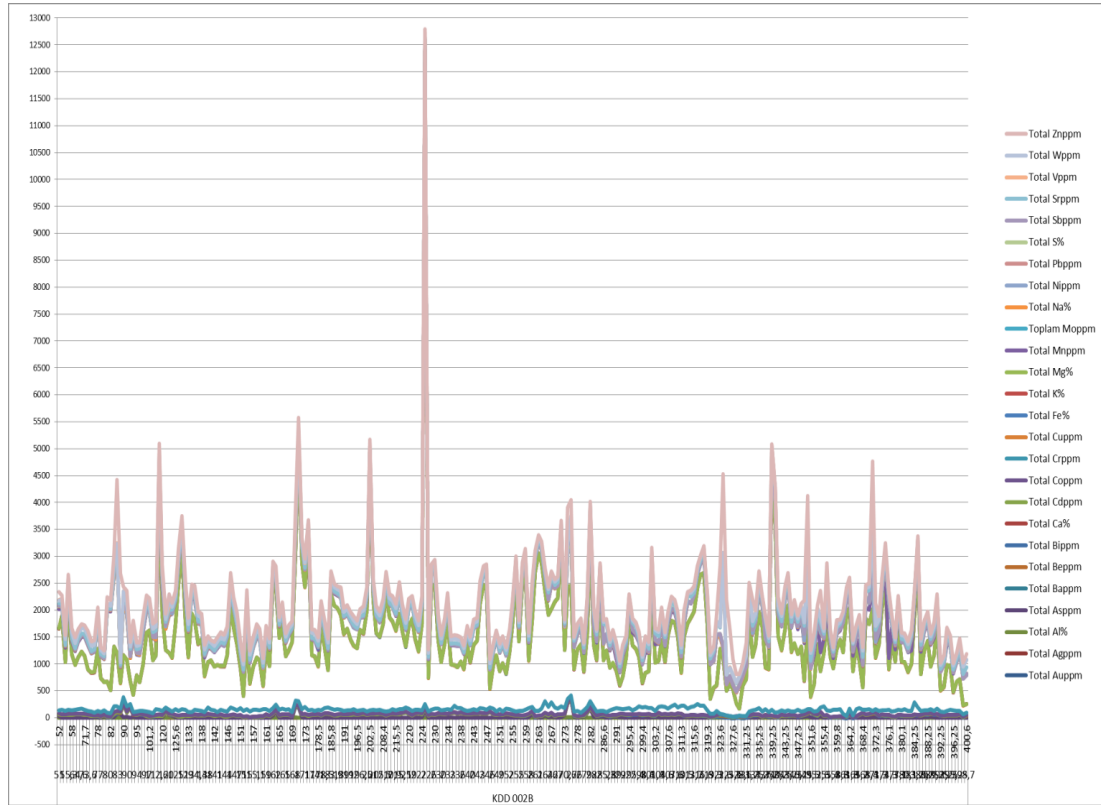


Figure 9: Depth versus concentration graphic of the KDD002A well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD0003 (Figure 10) show that, Zn element has the highest values in this well. Mn has the secon highest values. They are not compatible with each other. The high value trends starts after the 130m depth.

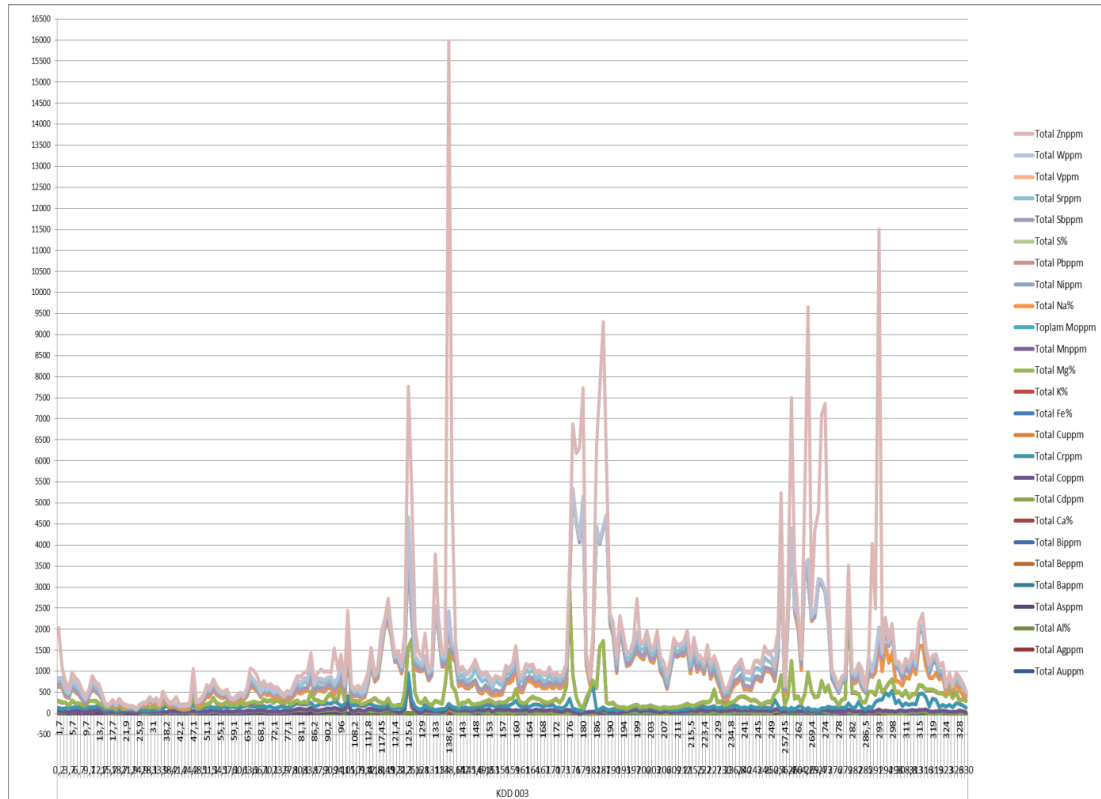


Figure 10: Depth versus concentration graphic of the KDD003 well. (X axis is depth and Y axis is concentrations.)

According to the graphic of the well KDD004 (Figure 11), Zn element has the highest values in this well but it is not a trend, high values are only peaks at some points and they are compatible with the Pb element peaks. Mn element has the second highest values but it has a trend and it is stable from beginning of the well to the end of the well.

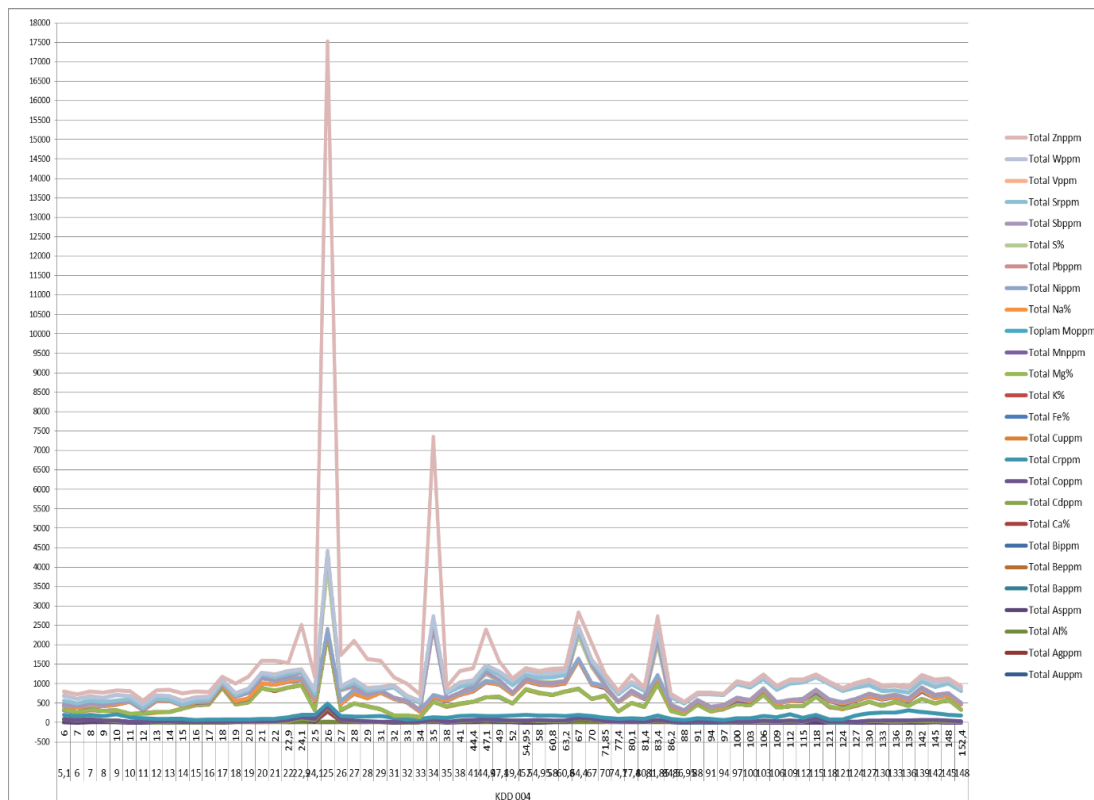


Figure 11: Depth versus concentration graphic of the KDD004 well. (X axis is depth and Y axis is concentrations.)

From the graphic of the well KDD005 (Figure 12) it can be observed that, copper has the highest values at this well, but it is not compatible with any other elements. Zn element has some high peaks at some depths but it is not continuous.

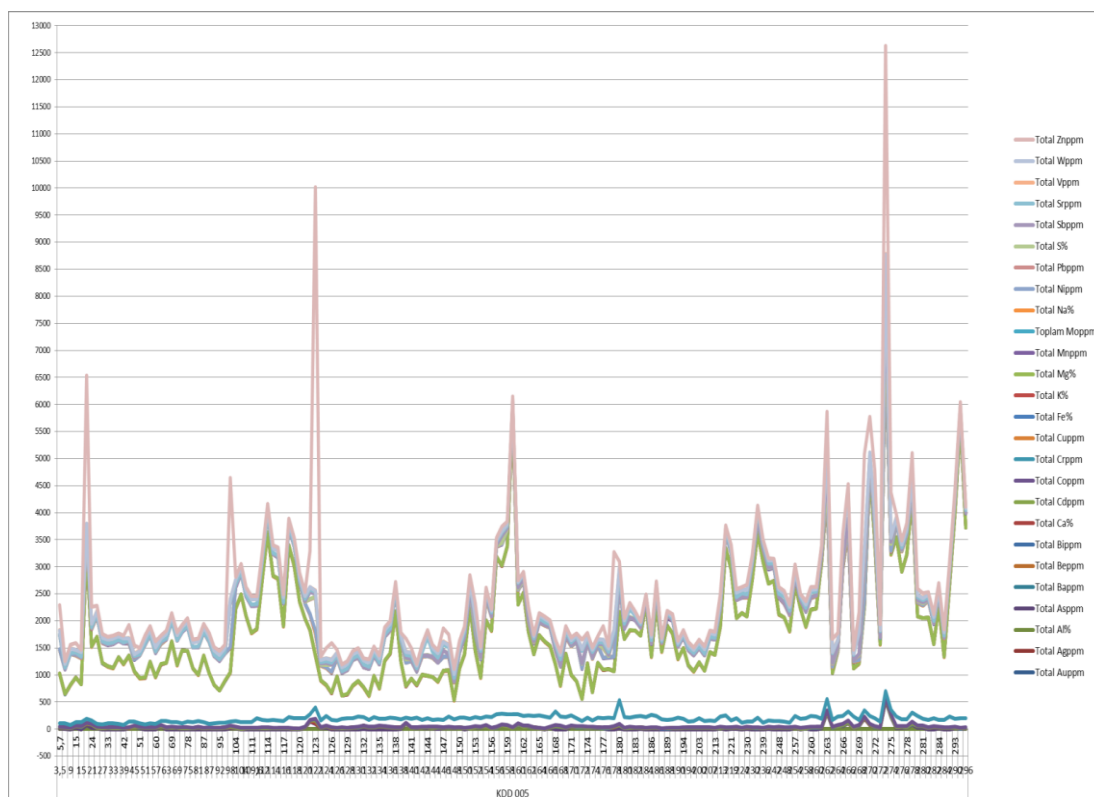


Figure 12: Depth versus concentration graphic of the KDD005 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD006 (Figure 13) shows that, copper has the highest values at this well but it is not compatible with any other. Zn, Mn, Mo and Sr elements have stable value trend but not high. They are also compatible with each other.

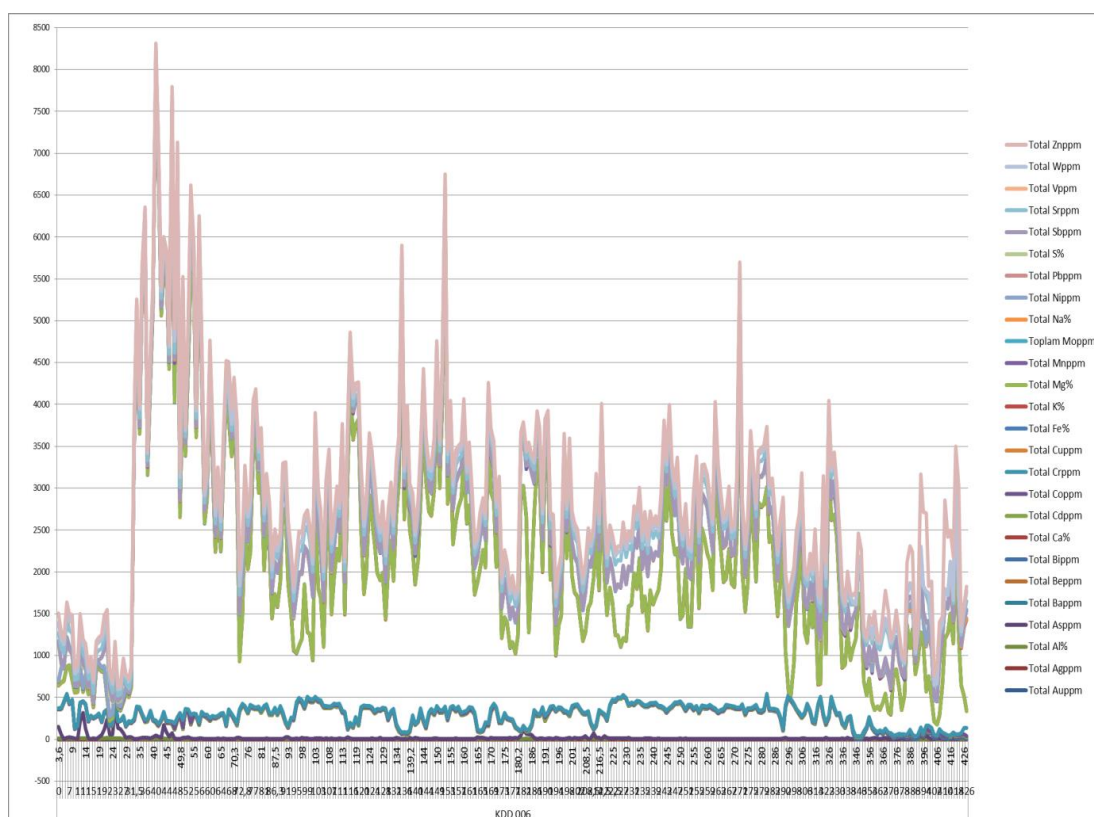


Figure 13: Depth versus concentration graphic of the KDD006 well. (X axis is depth and Y axis is concentrations.)

Well KDD007 graphic (Figure 14) show that, copper has the highest values at this well but it is not compatible with any other. Sr element has high peaks at some depths but they are not in a continuous trend.

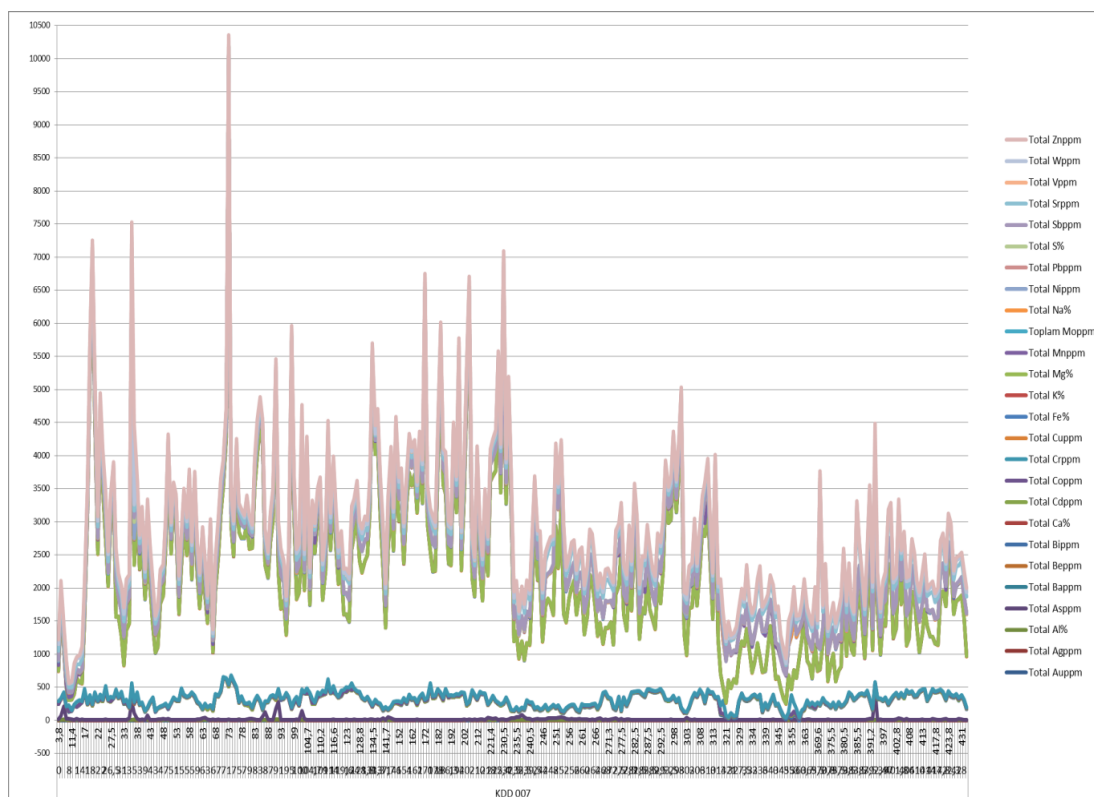


Figure 14: Depth versus concentration graphic of the KDD007 well. (X axis is depth and Y axis is concentrations.)

According to the graphic of the well KDD008 (Figure 15), copper has the highest values at this well especially between 40m to 103m and 179,5m to 214,5m. At those depths other elements have low values and they have higher values at other depths. It shows they are not compatible with the copper.

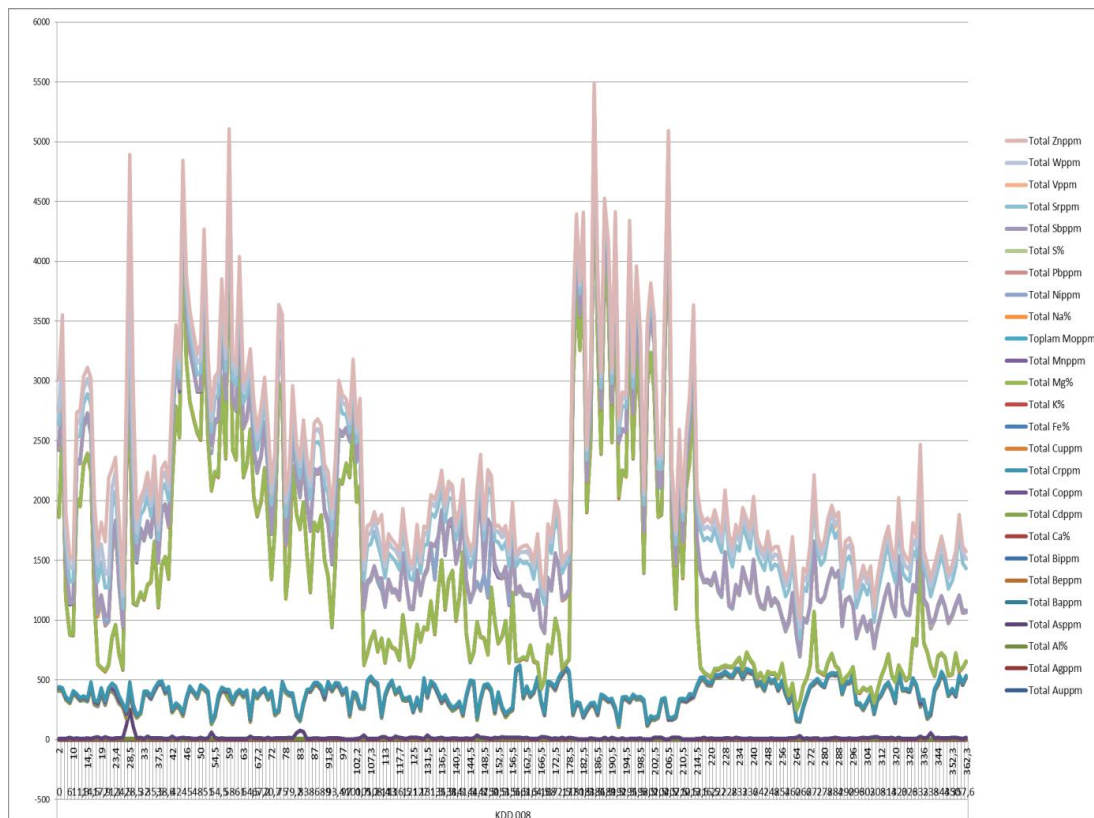


Figure 15: Depth versus concentration graphic of the KDD008 well. (X axis is depth and Y axis is concentrations.)

From the graphic of the well KDD009 (Figure 16) it can be observed that, copper has very high values at this well. There are some non-continuous Zn peaks but they are not very high as well.

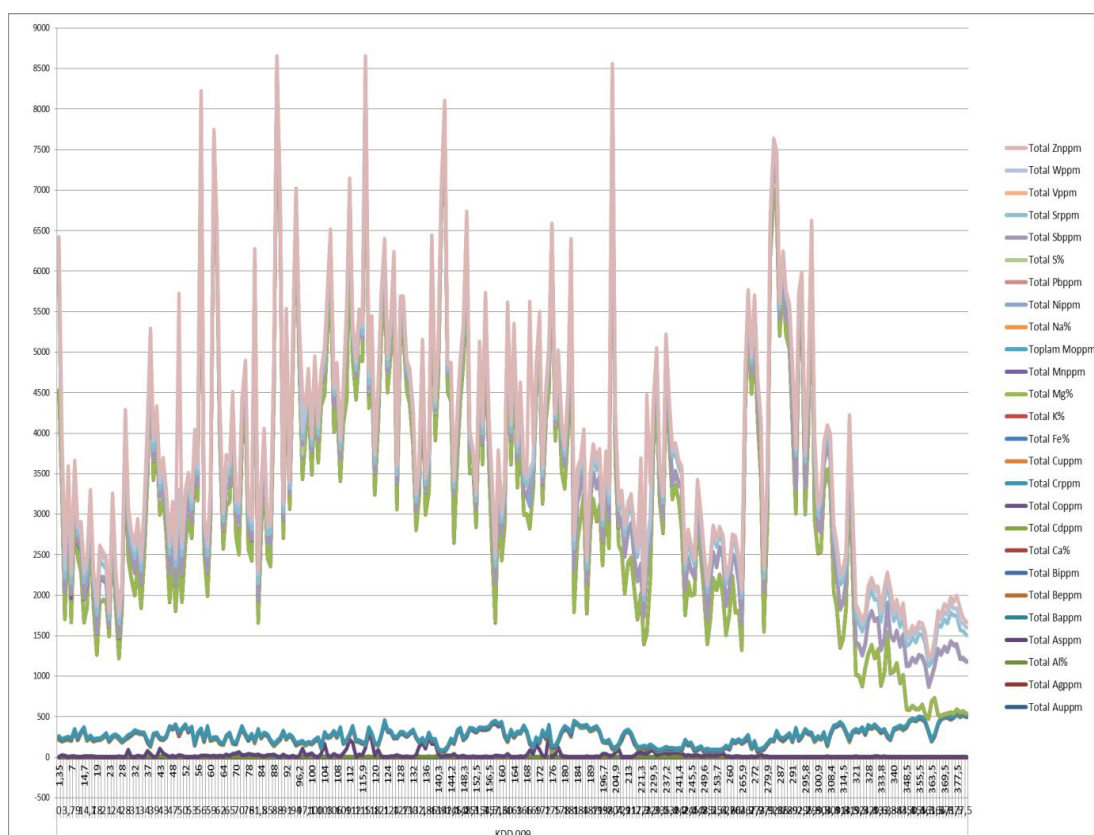


Figure 16: Depth versus concentration graphic of the KDD009 well. (X axis is depth and Y axis is concentrations.)

KDD010 hole graphic (Figure 17) show that, there are not high copper values at this well. Average values of the elements are close to each other and they have a stable trend. There are some Sr and Mn values.

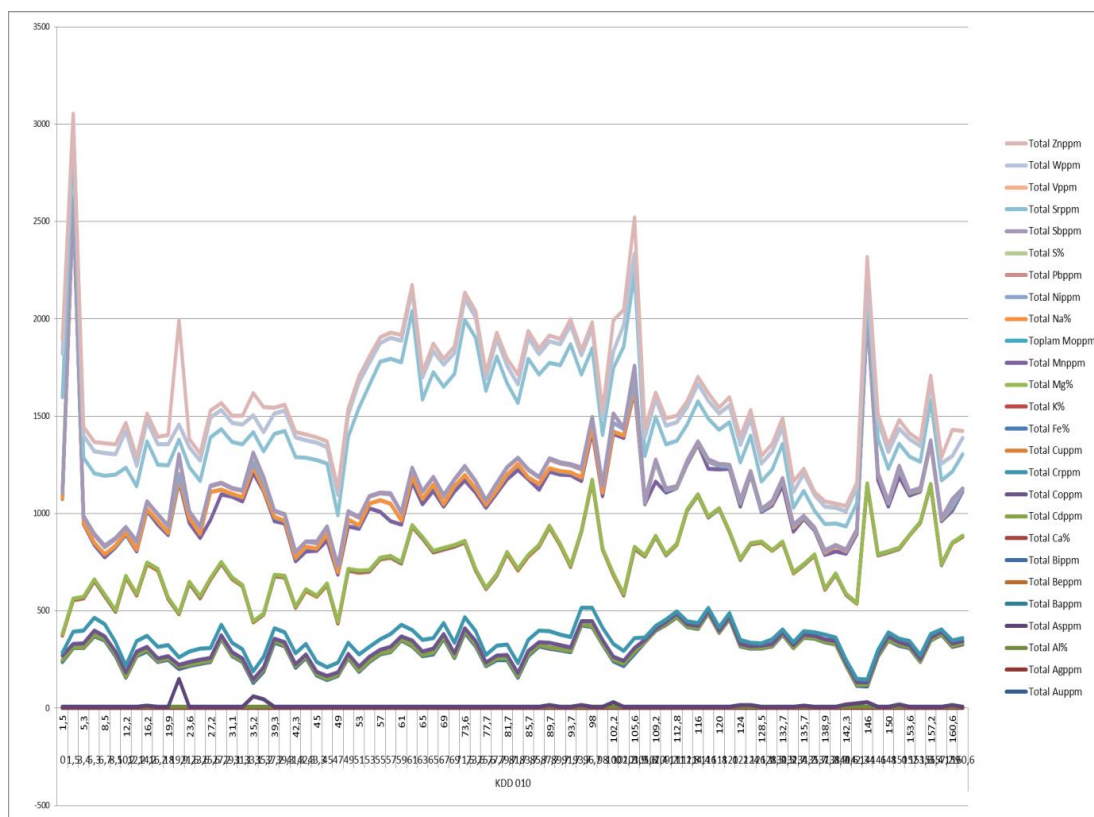


Figure 17: Depth versus concentration graphic of the KDD010 well. (X axis is depth and Y axis is concentrations.)

The graphic of the hole KDD011 (Figure 18) shows that, general values are low for this well but after 200m the copper shows an increasing trend and high values.

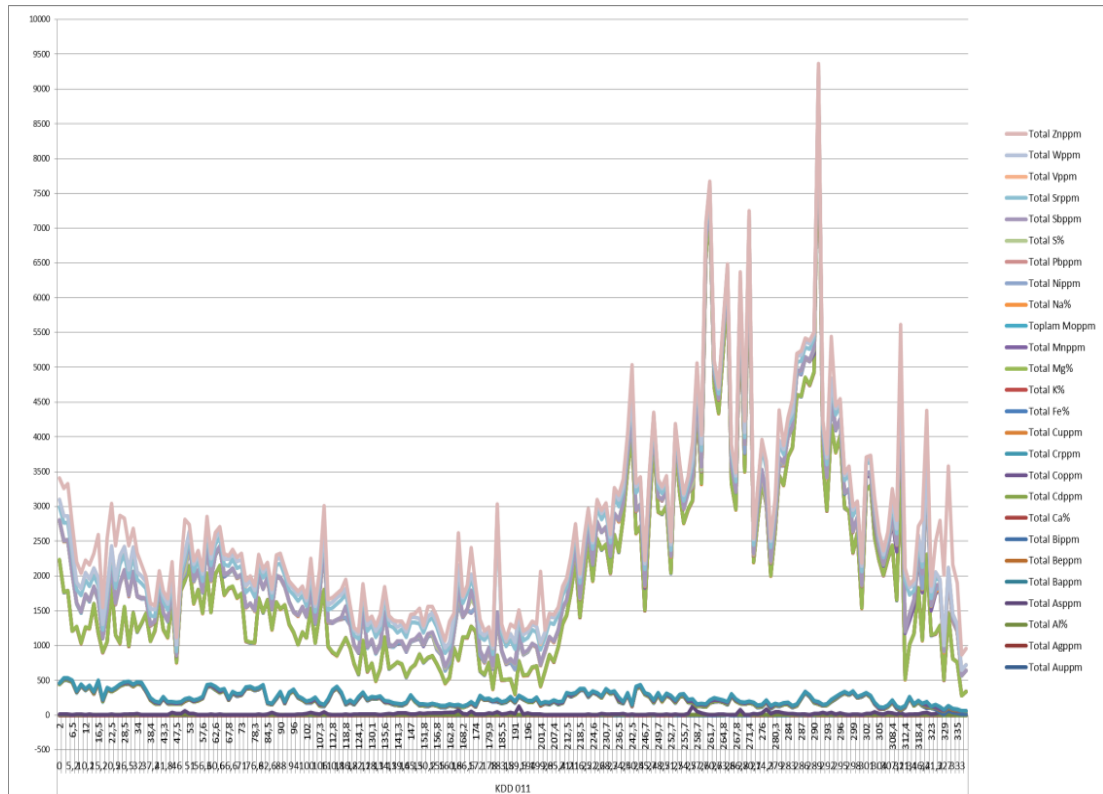


Figure 18: Depth versus concentration graphic of the KDD011 well. (X axis is depth and Y axis is concentrations.)

According to the graphic of the hole KDD012 (Figure 19), between 2m to 30m there are some non-continuous Zn values. After that point up to 87m there Mn values in a stable trend. The copper values are high for this well but at the depths where Mn values are getting high the copper values are getting low.

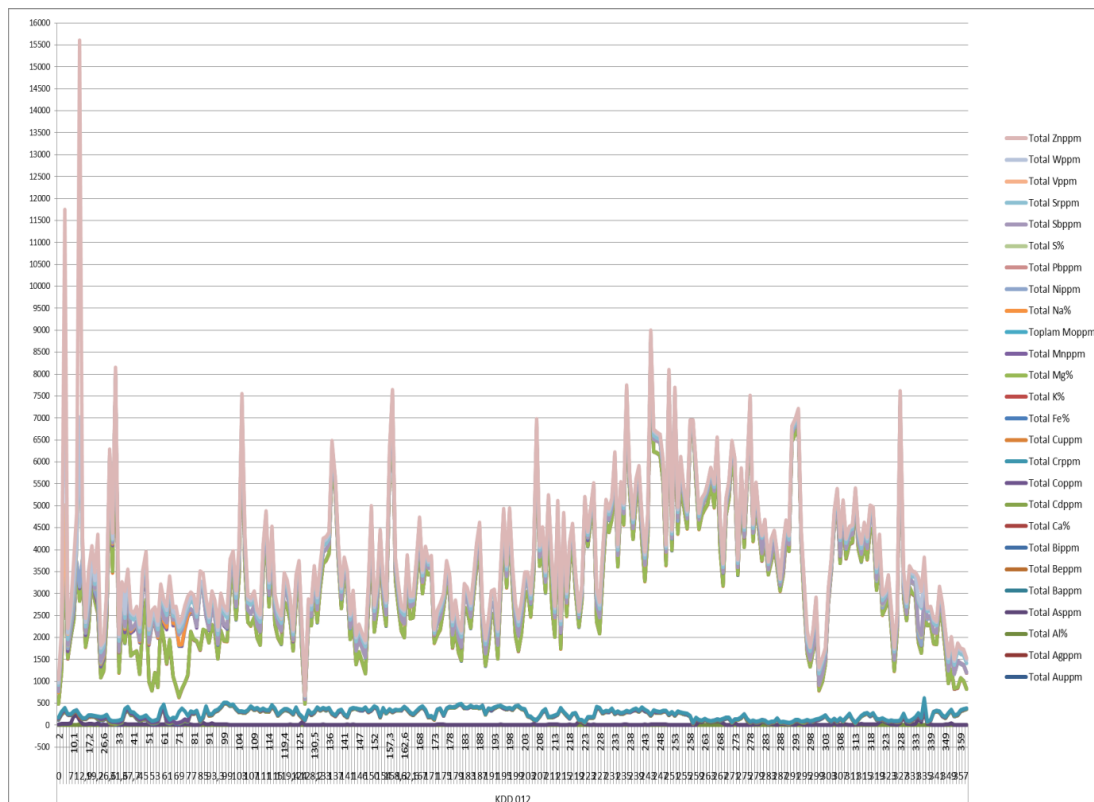


Figure 19: Depth versus concentration graphic of the KDD012 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD013 graphic (Figure 20), the copper has very high values for this well especially between 7m to 40m. Pb, Mn, Mo, Zn and Sr have also high values in stable trends.

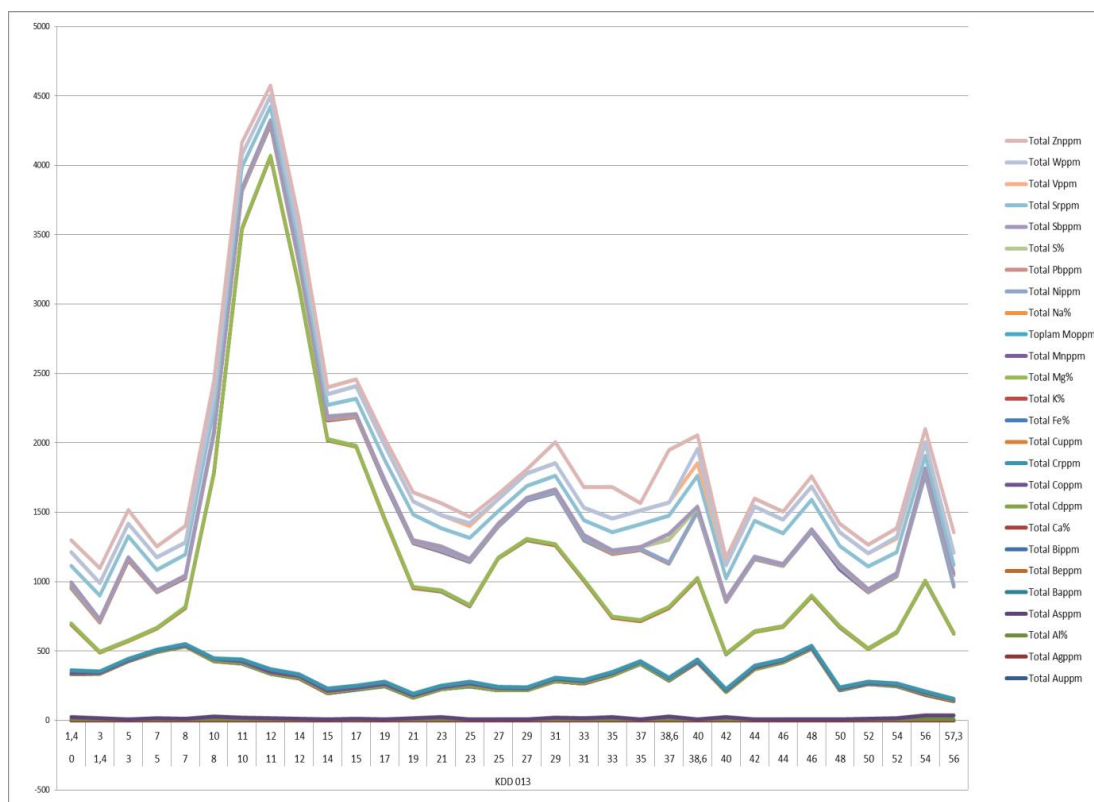


Figure 20: Depth versus concentration graphic of the KDD013 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD013A (Figure 21) shows that, copper has high values up to 150m depth, after that point there is a decreasing and increasing then again decreasing trend. Mn also has high values but it is not compatible with any other.

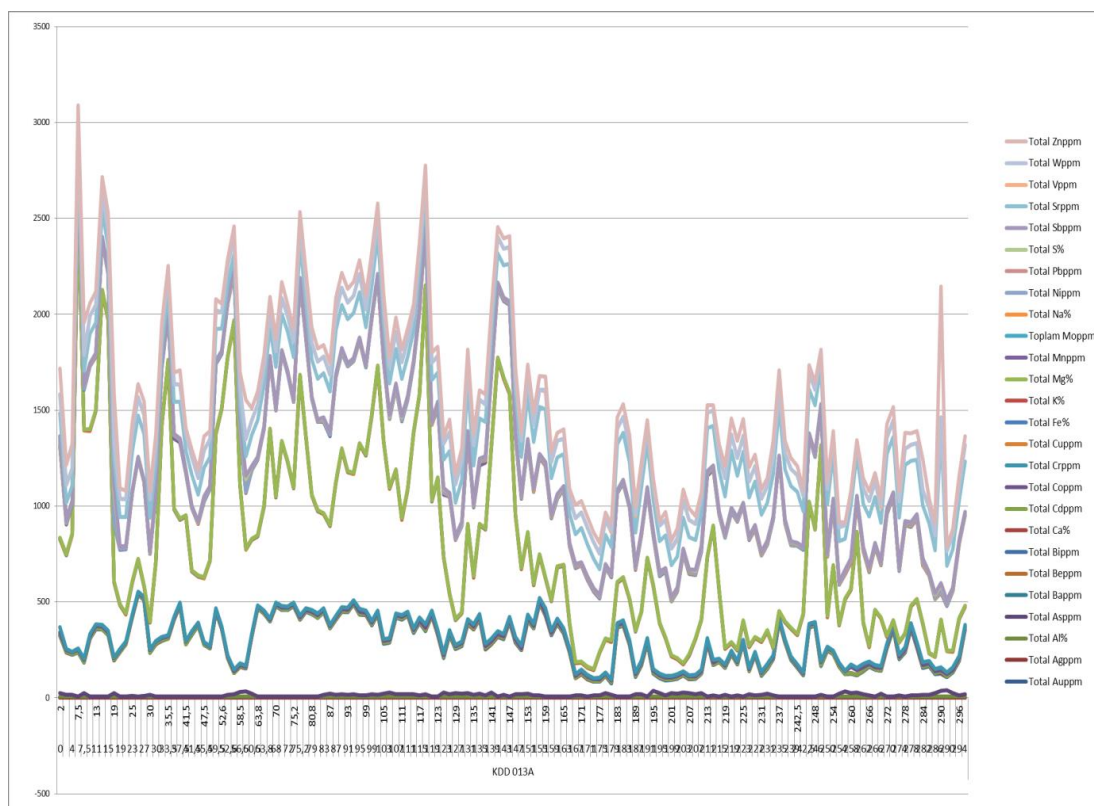


Figure 21: Depth versus concentration graphic of the KDD013A well. (X axis is depth and Y axis is concentrations.)

From the well KDD014 (Figure 22) graphic it can be observed that, copper has highest values for this well. Mn, Zn and Pb also have some high values but they are not compatible with each other.

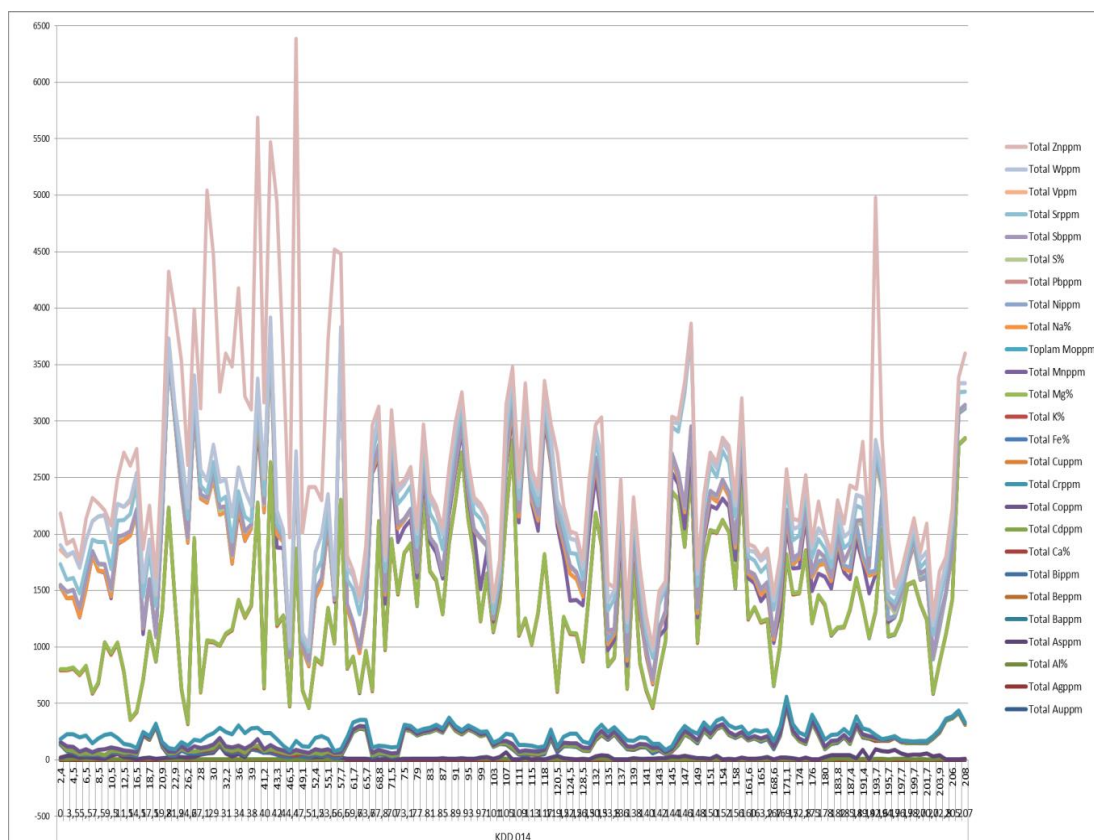


Figure 22: Depth versus concentration graphic of the KDD014 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD015 graphic (Figure 23), copper has very high values from 117m depth to 422m depth. Mn, Zn and Sr have also some high values.

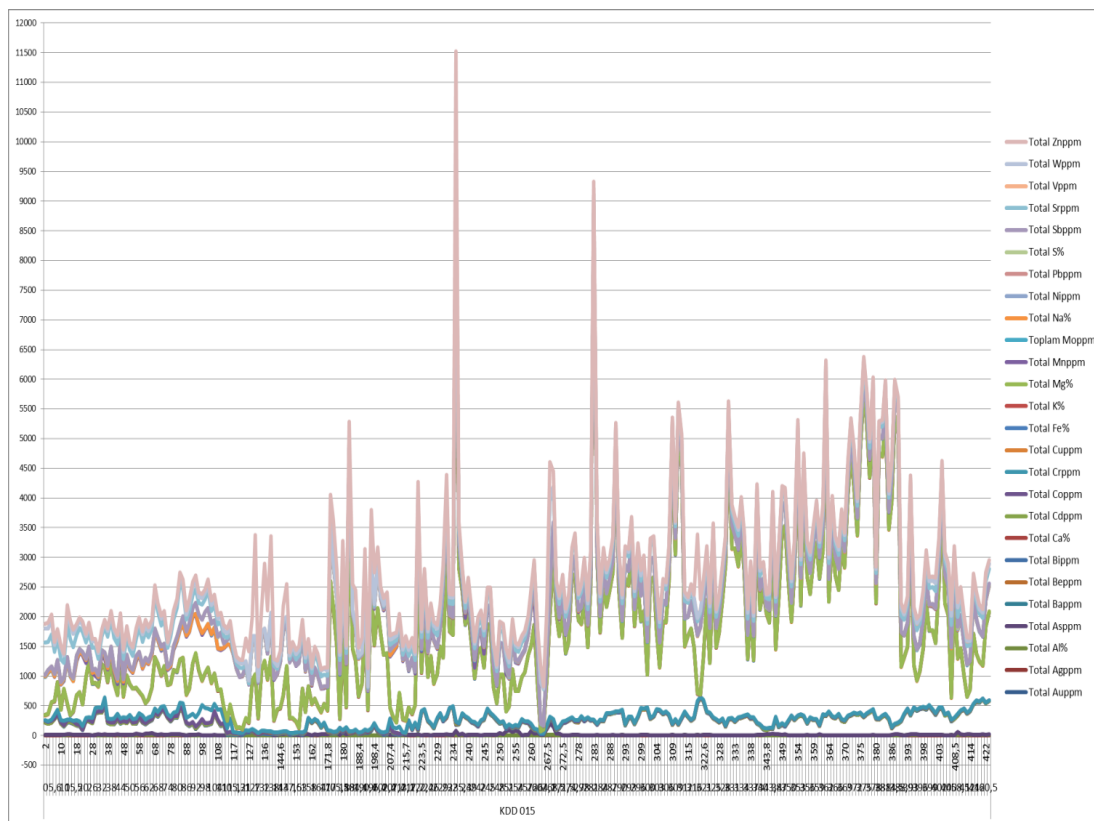


Figure 23: Depth versus concentration graphic of the KDD015 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD016 graphic (Figure 24), copper has highest values especially from 212m to 410m. Mn and Zn have significant values but they are not compatible with any other elements.

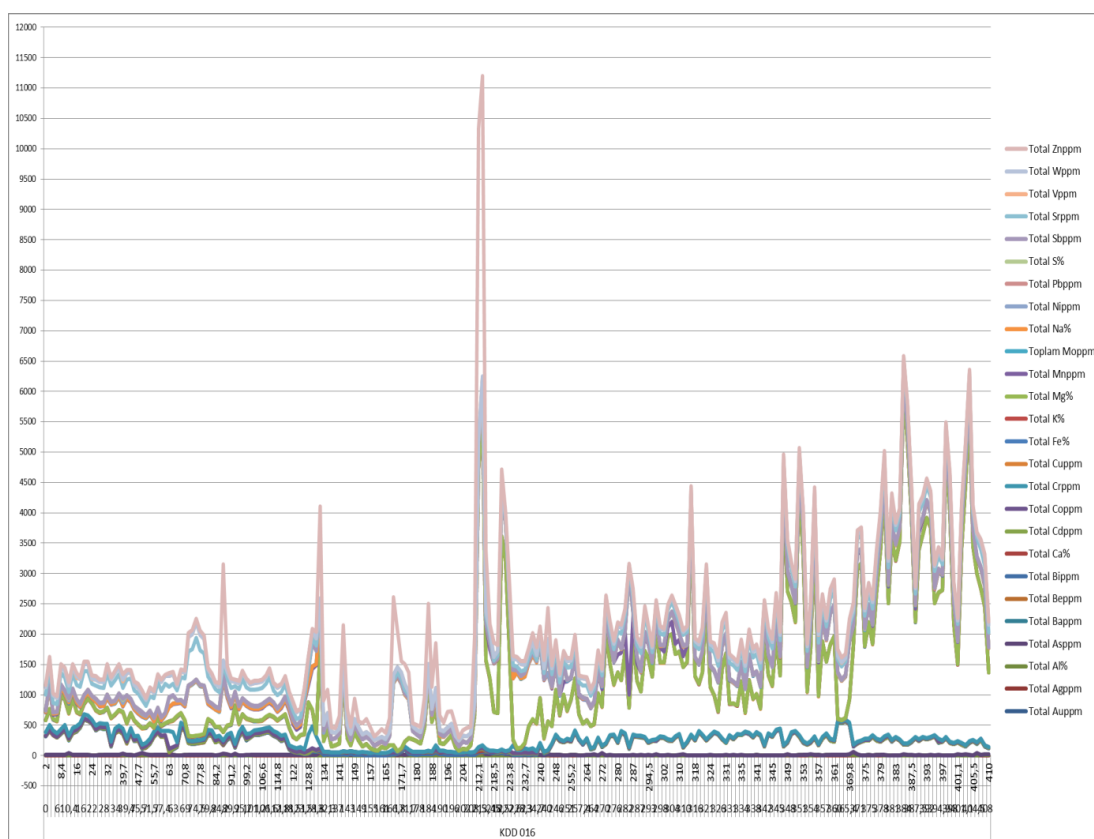


Figure 24: Depth versus concentration graphic of the KDD016 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD017 (Figure 25) shows that, copper has the high values from 123m to 491m.

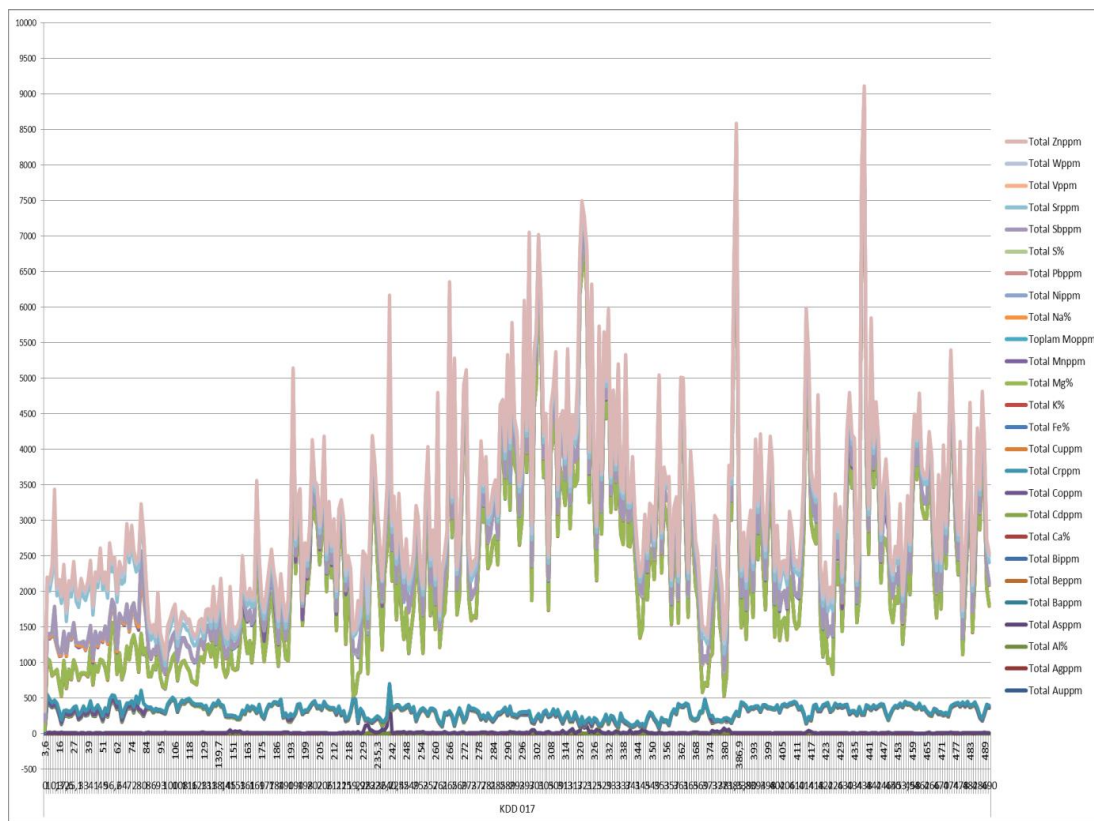


Figure 25: Depth versus concentration graphic of the KDD017 well. (X axis is depth and Y axis is concentrations.)

From the well KDD018 graphic (Figure 26) it can be observed that, copper has the high values from 136m to 431m. Mn and Zn have some high values but they are not compatible with any other.

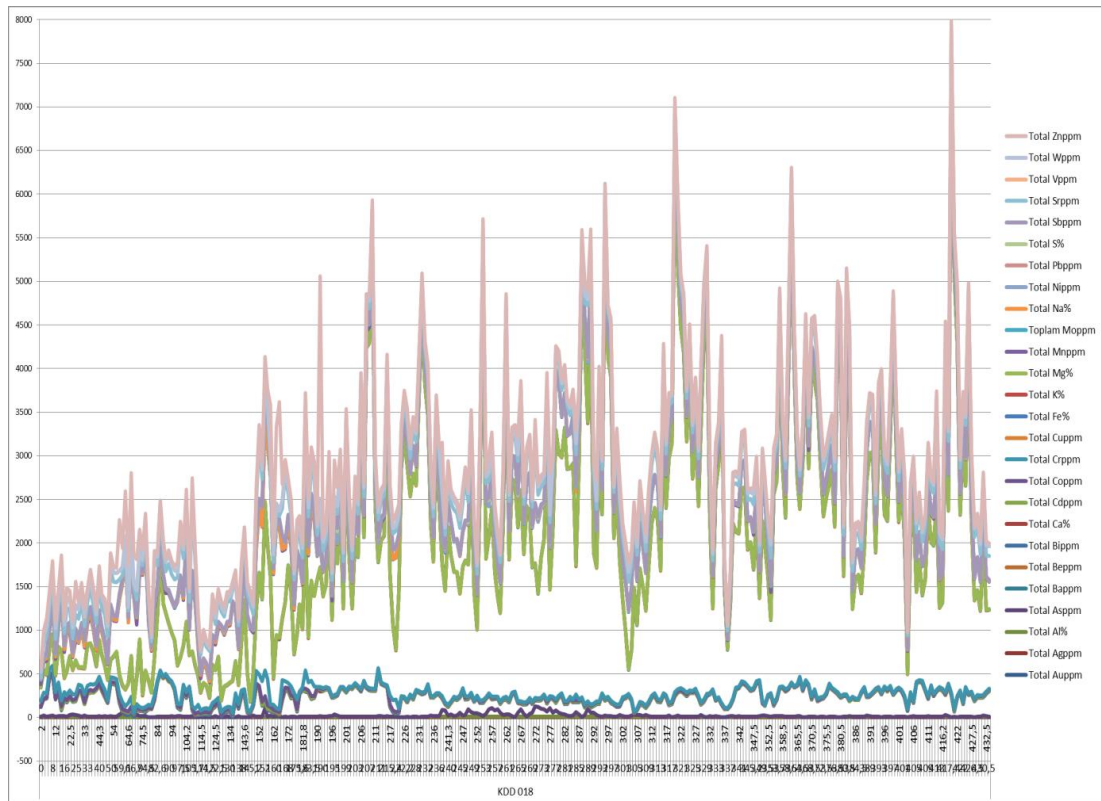


Figure 26: Depth versus concentration graphic of the KDD018 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD019 graphic (Figure 27), copper has high values up to 154m. After that point it is getting decreased and Mn values are getting higher.

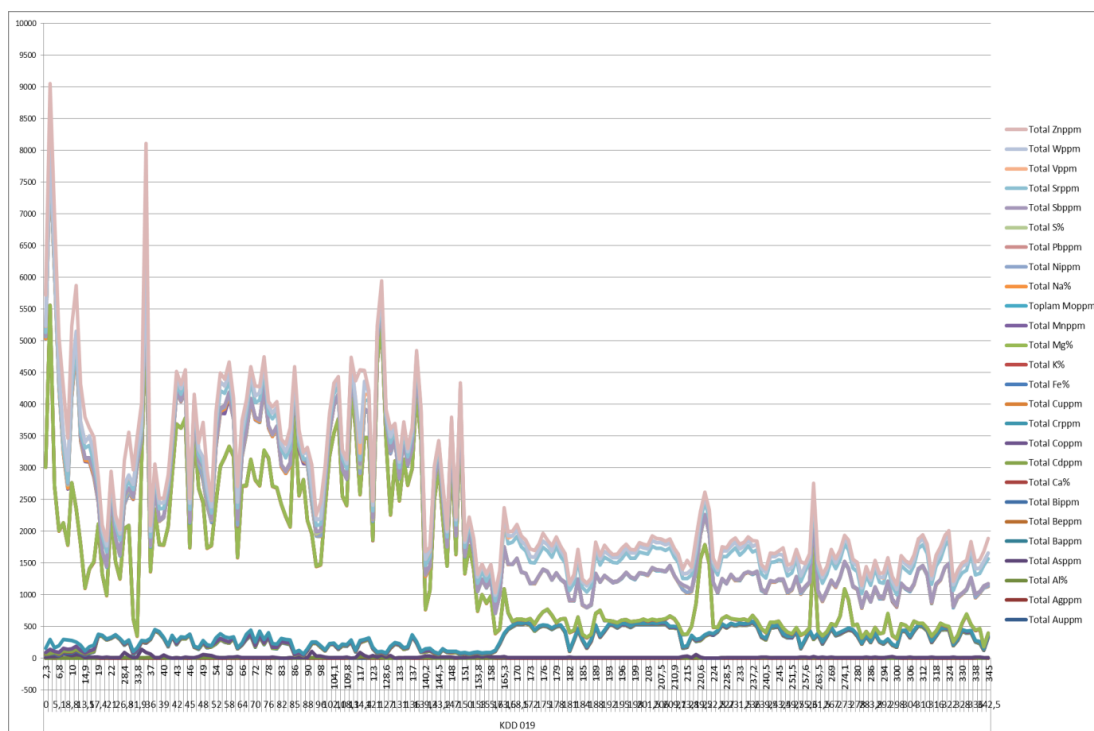


Figure 27: Depth versus concentration graphic of the KDD019 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD020 graphic (Figure 28), Mn and Zn have high values up to 124m. After that point Zn and Mn values are getting low and Copper values are getting increase. The highest copper values are in between 214m to 291m.

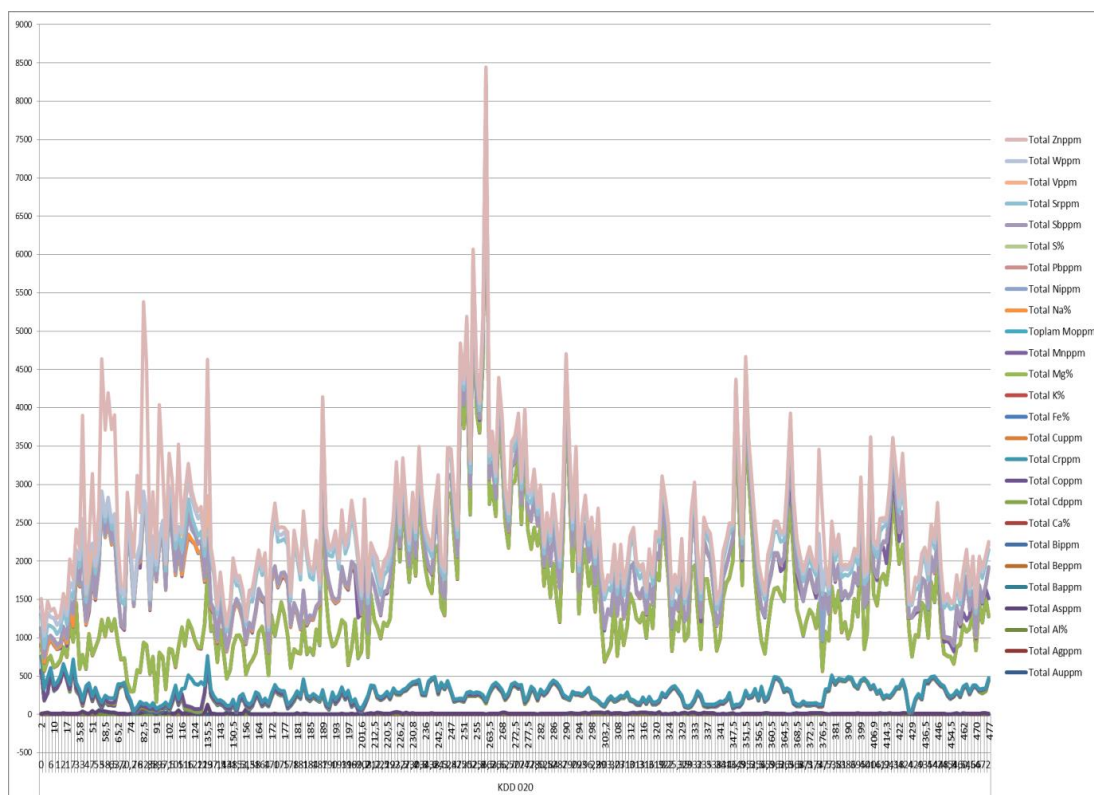


Figure 28: Depth versus concentration graphic of the KDD020 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD021 (Figure 29) shows that, copper values are high but the other values are not very significant.

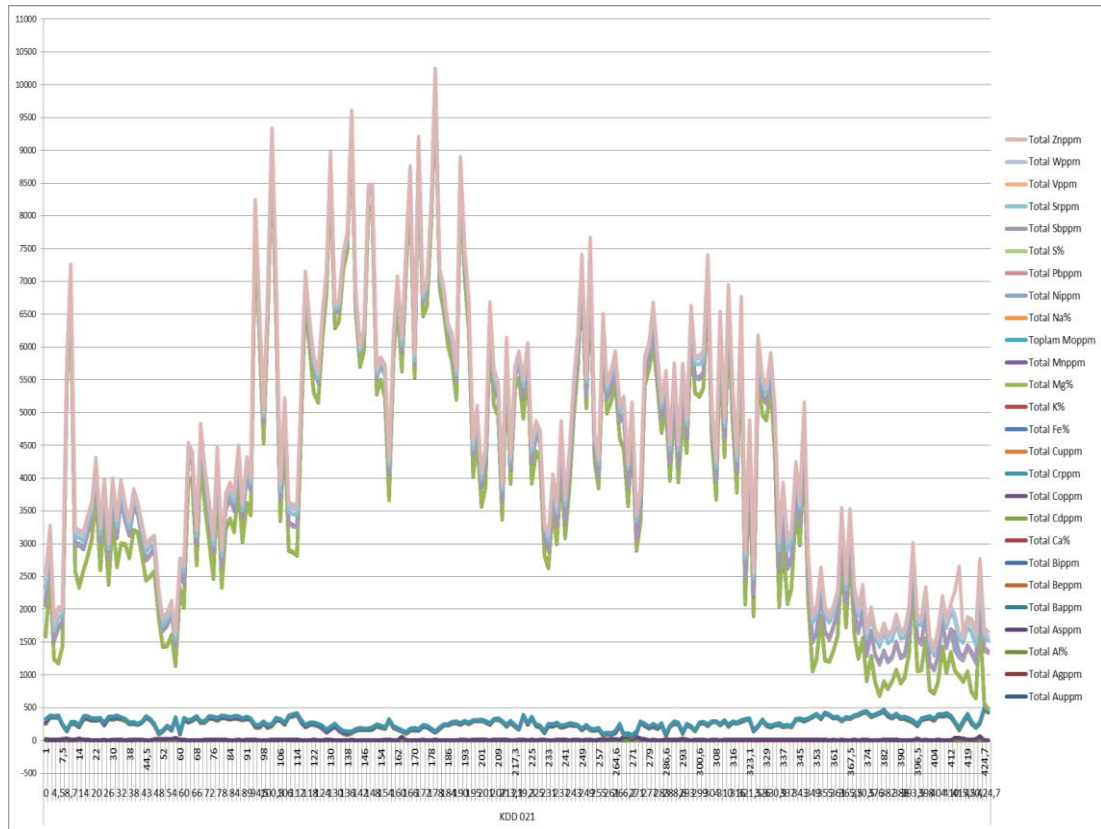


Figure 29: Depth versus concentration graphic of the KDD021 well. (X axis is depth and Y axis is concentrations.)

From the well KDD022 graphic (Figure 30) it can be observed that, copper values are high and Mn values are behaving in opposite manner of Copper values.

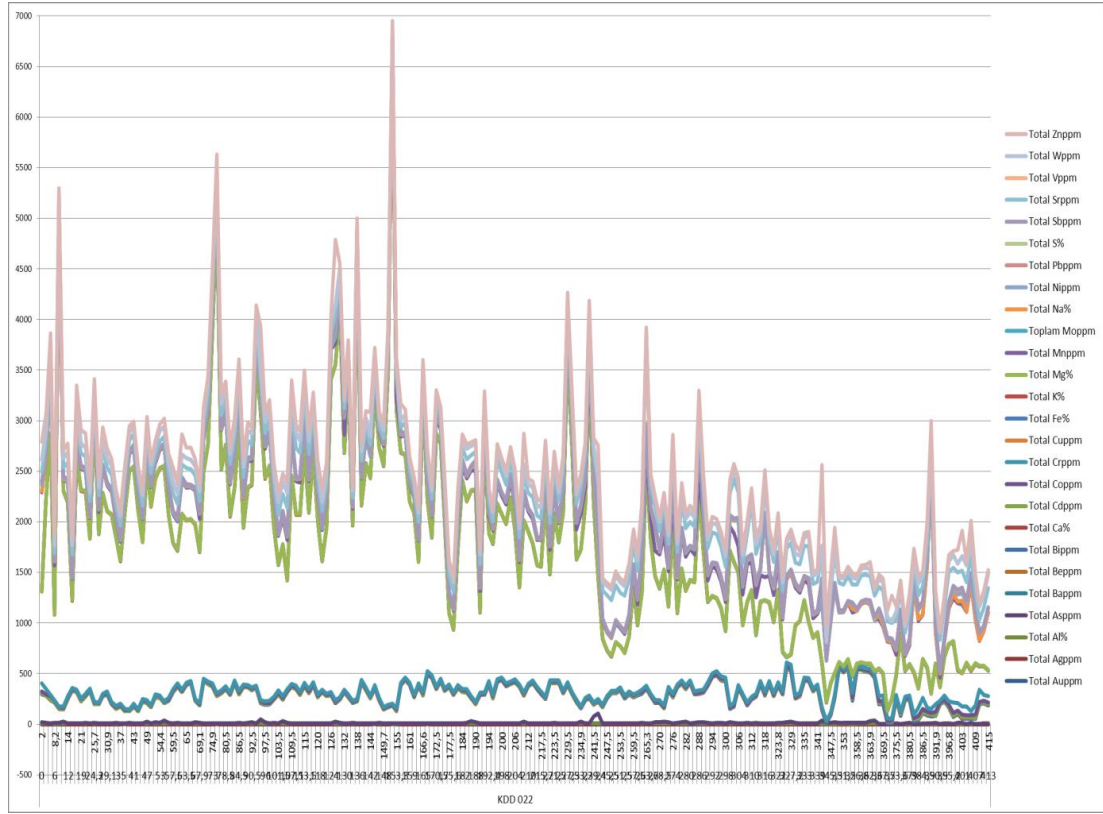


Figure 30: Depth versus concentration graphic of the KDD022 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD023 graphic (Figure 31), copper has high values and Sr values are behaving in same way with the copper values.

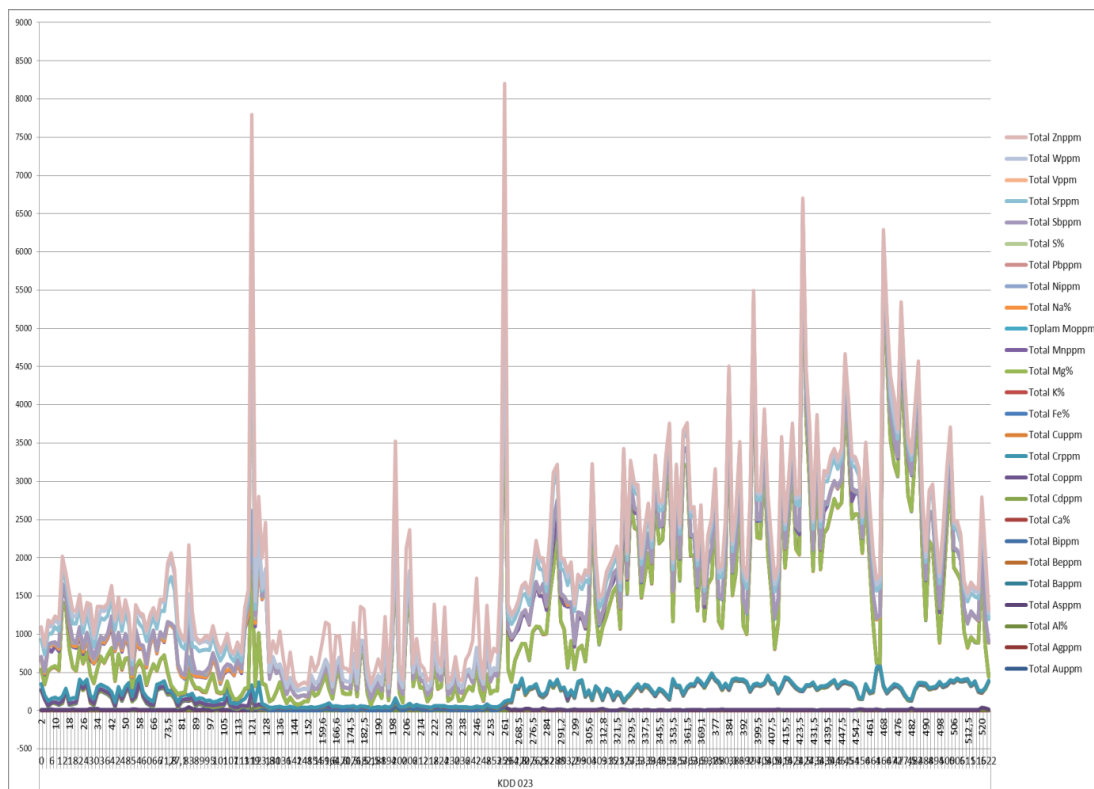


Figure 31: Depth versus concentration graphic of the KDD023 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD024 graphic (Figure 32), the copper values are really low for this well. Pb, Zn and Sr have some significant values.

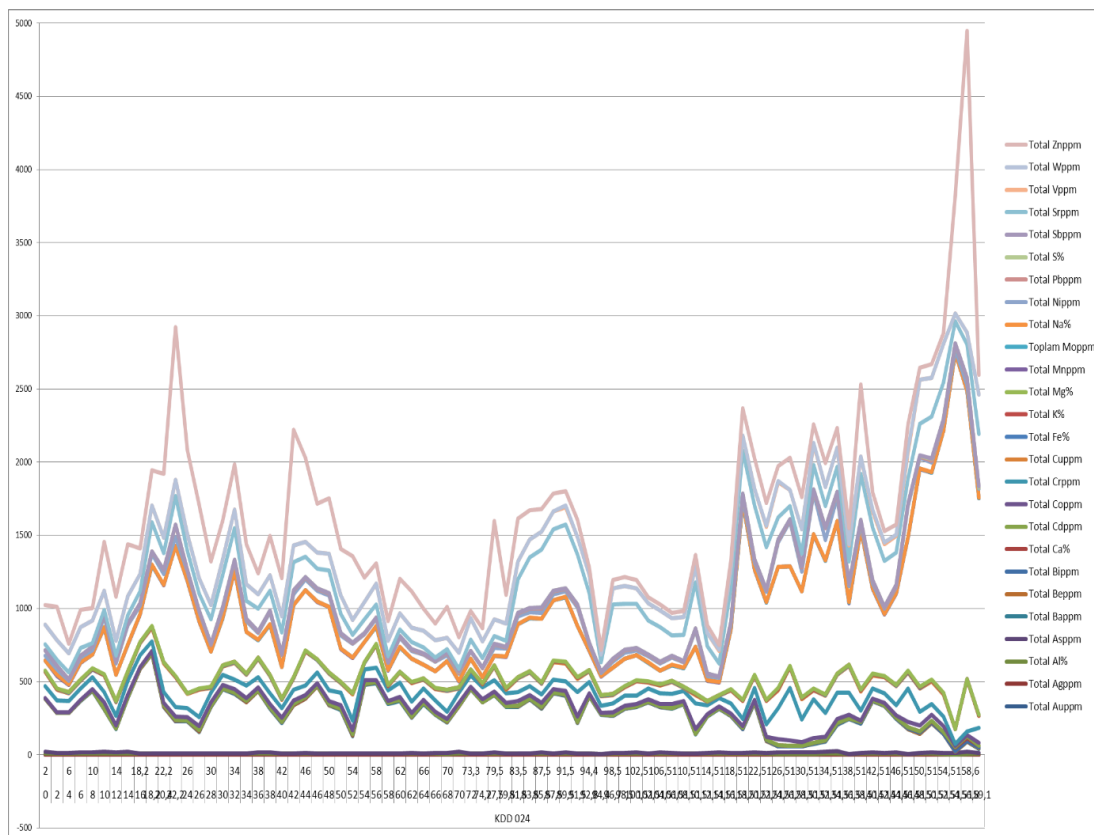


Figure 32: Depth versus concentration graphic of the KDD024 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD025 (Figure 33) shows that, copper has highest values for this well. Mn, Zn and Sr also have some significant values and they are compatible to each other.

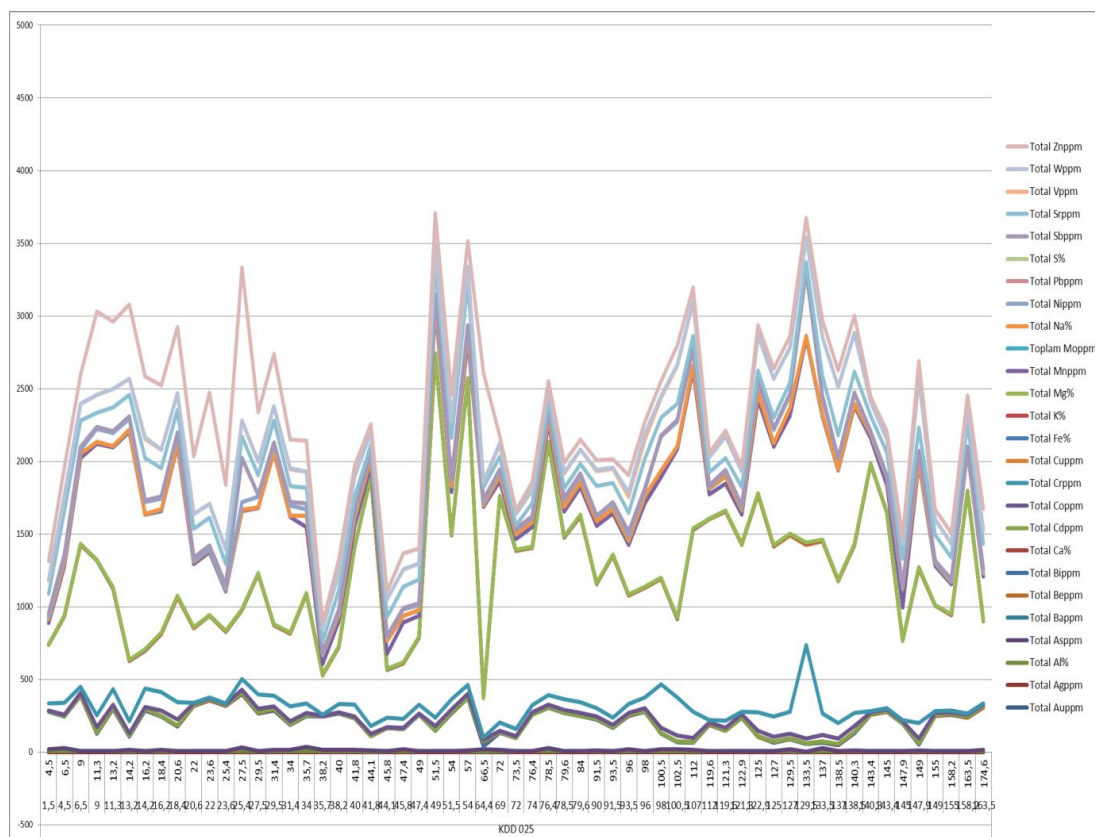


Figure 33: Depth versus concentration graphic of the KDD025 well. (X axis is depth and Y axis is concentrations.)

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According to the well KDD027 graphic (Figure 35), Zn, Pb, Cu, Mn have significant values at this well. Pb is not continuously. Cu has the highest values. Zn and Mn are not compatible to each other and they have some peaks at different depths.

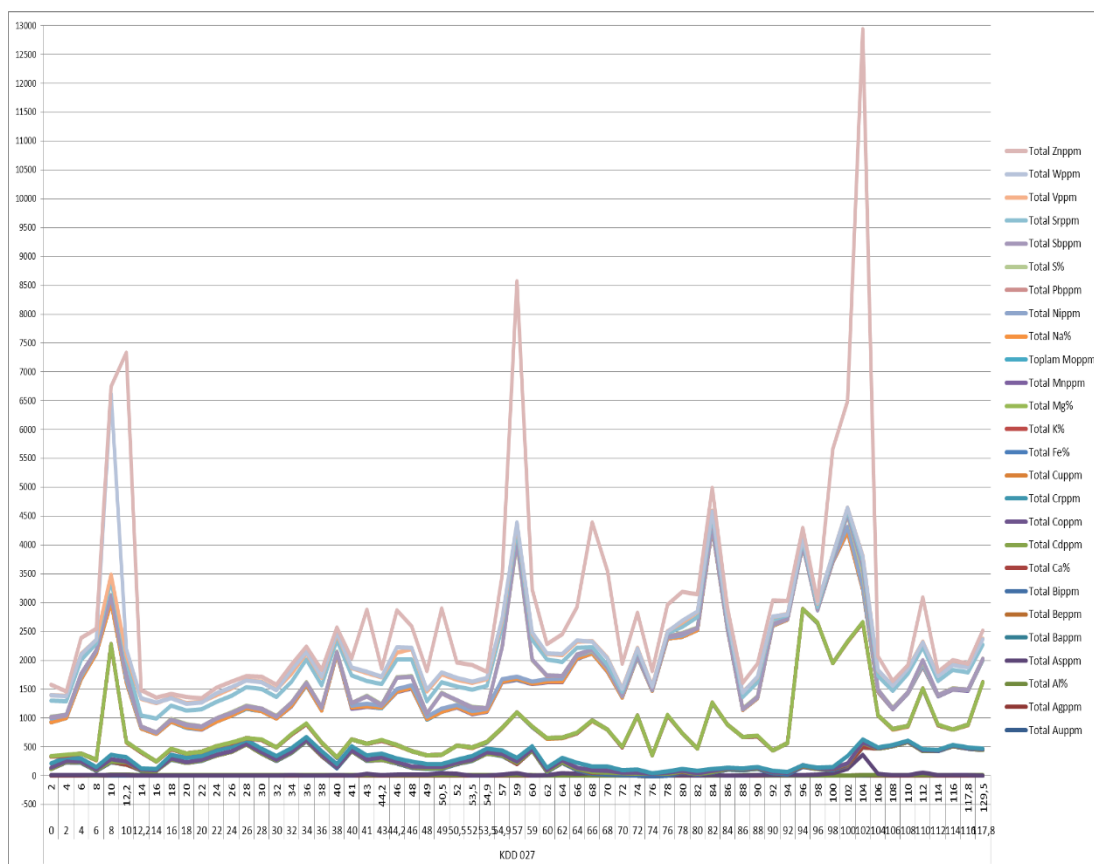


Figure 35: Depth versus concentration graphic of the KDD027 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD028 graphic (Figure 36), Mn and Sr have the highest values at this well but they are not very significant.

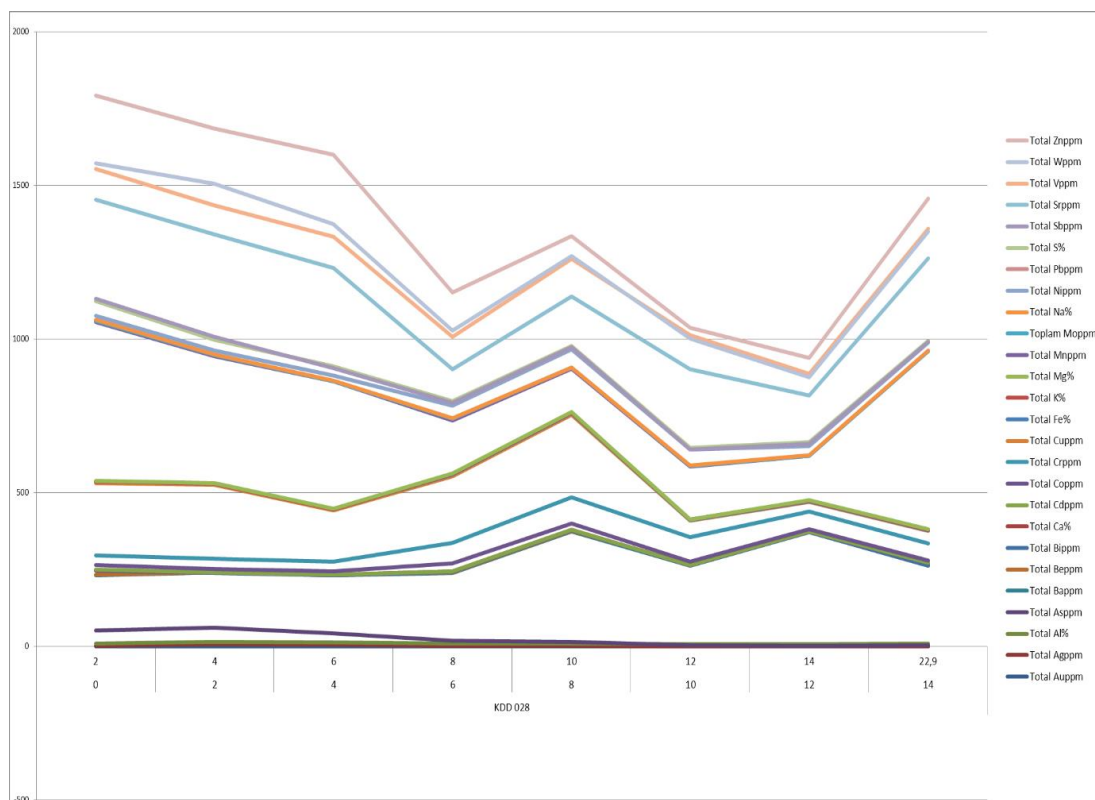


Figure 36: Depth versus concentration graphic of the KDD028 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD028A (Figure 37) shows that, there are nearly not any copper values. There are some Mn and Sr values but not very significant.

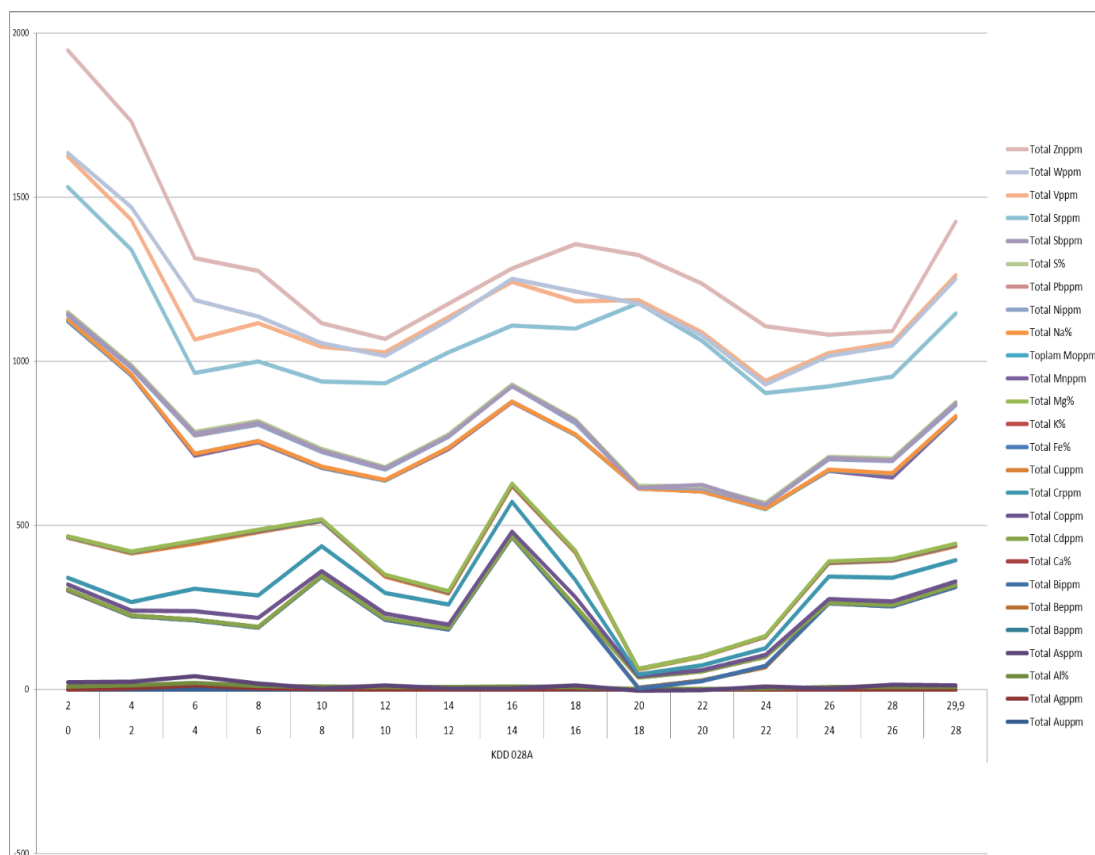


Figure 37: Depth versus concentration graphic of the KDD028A well. (X axis is depth and Y axis is concentrations.)

From the well KDD029 graphic (Figure 38) it can be observed that, Mn has the highest values at this well and copper has the second highest values but they are not stable and not continuous values.

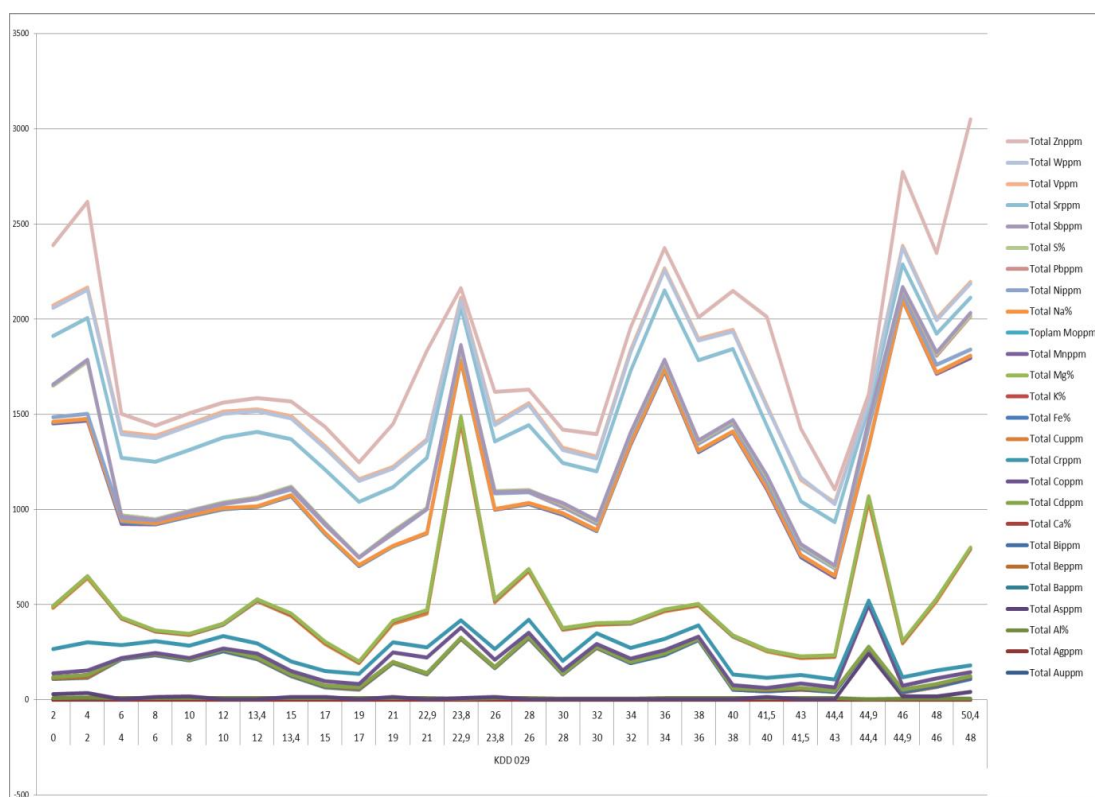


Figure 38: Depth versus concentration graphic of the KDD029 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD030 graphic (Figure 39), copper has the highest and important values at this well but there is a one single Zn peak with very high value at 79-80m.

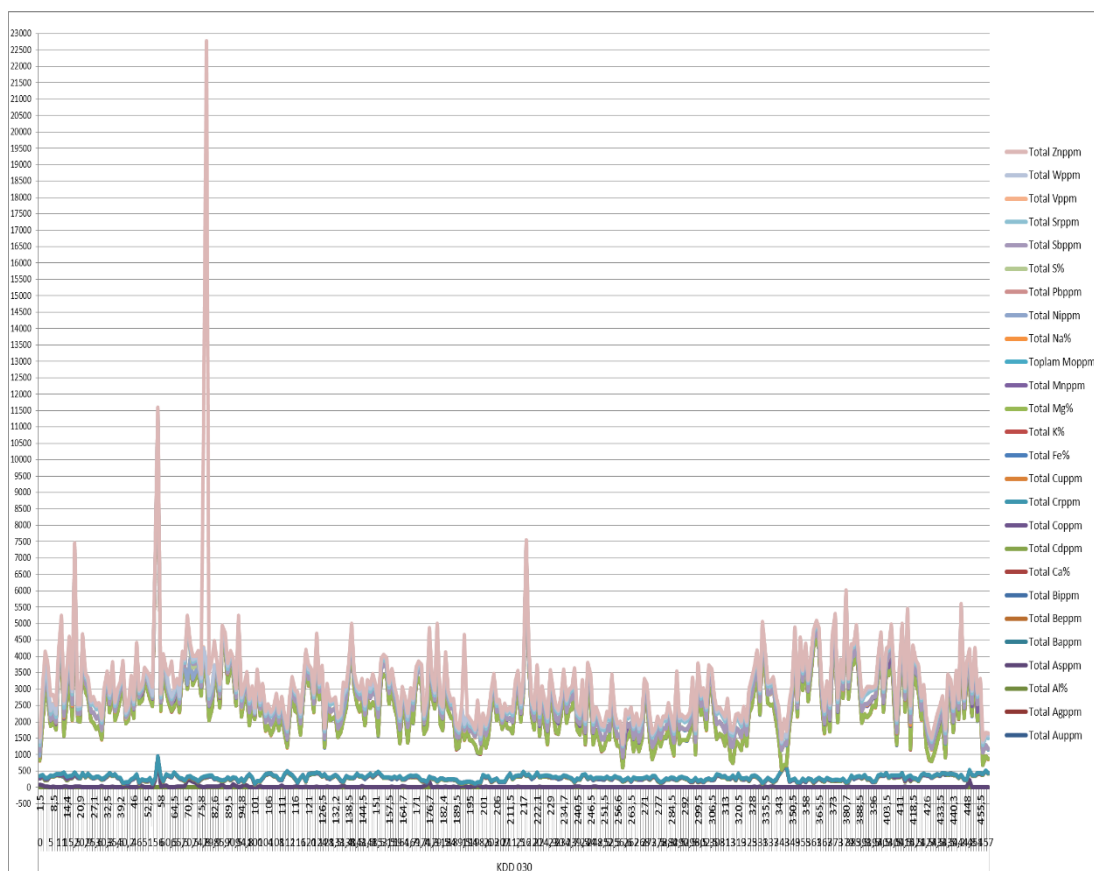


Figure 39: Depth versus concentration graphic of the KDD030 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD031 graphic (Figure 40), there are some non-continuous copper and Zn values.

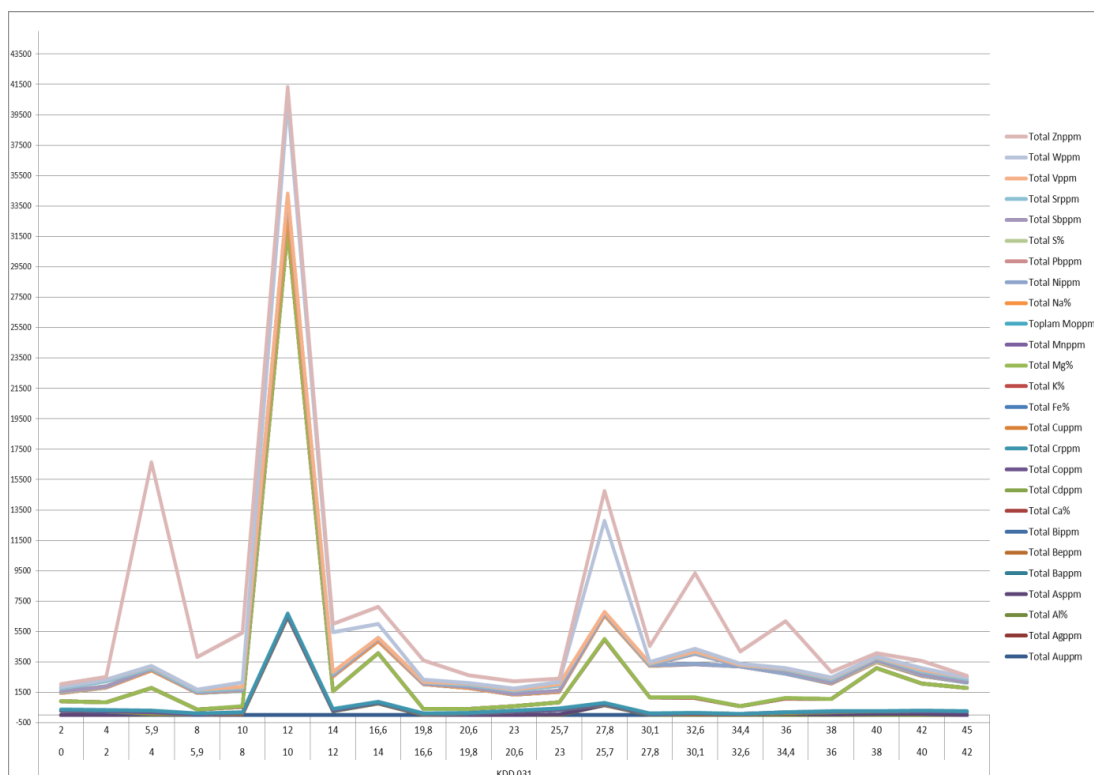


Figure 40: Depth versus concentration graphic of the KDD031 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD032 (Figure 41) shows that, copper has the highest values at this well and it has a stable trend. There are high Zn values between 51m and 70m.

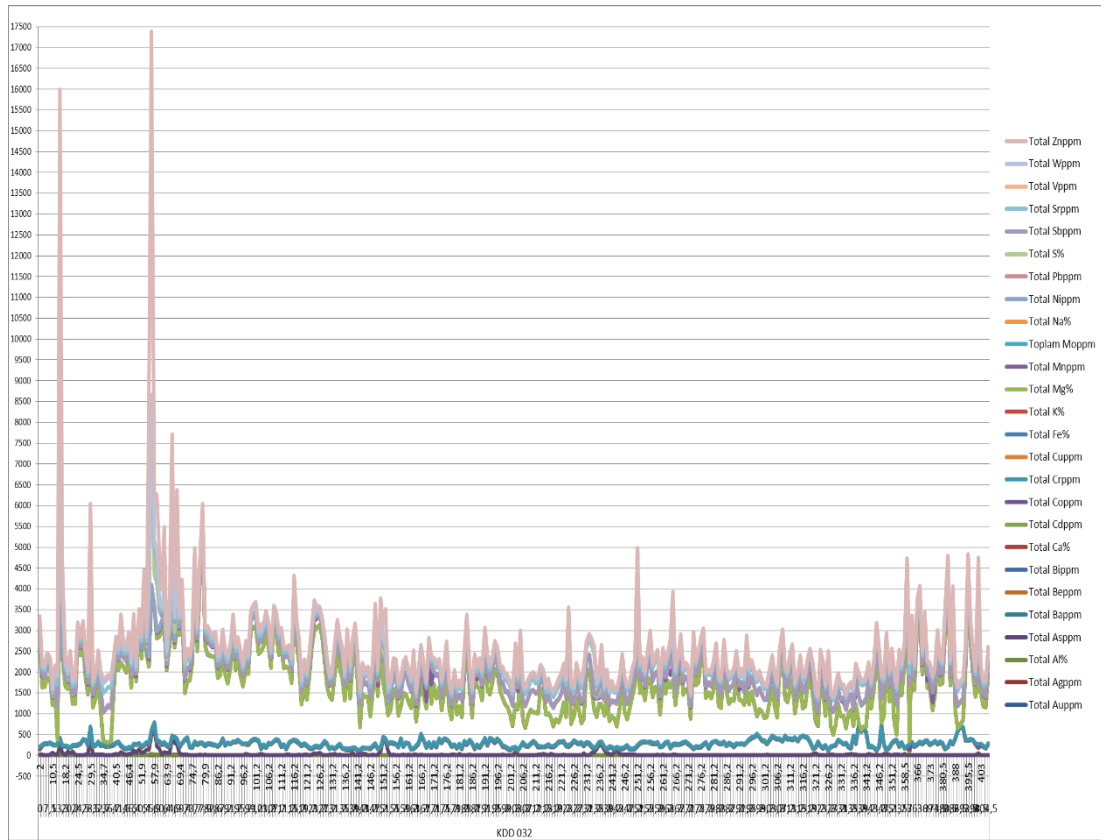


Figure 41: Depth versus concentration graphic of the KDD032 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD033 graphic (Figure 42), copper values are the highest values. Mn has the second highest values.

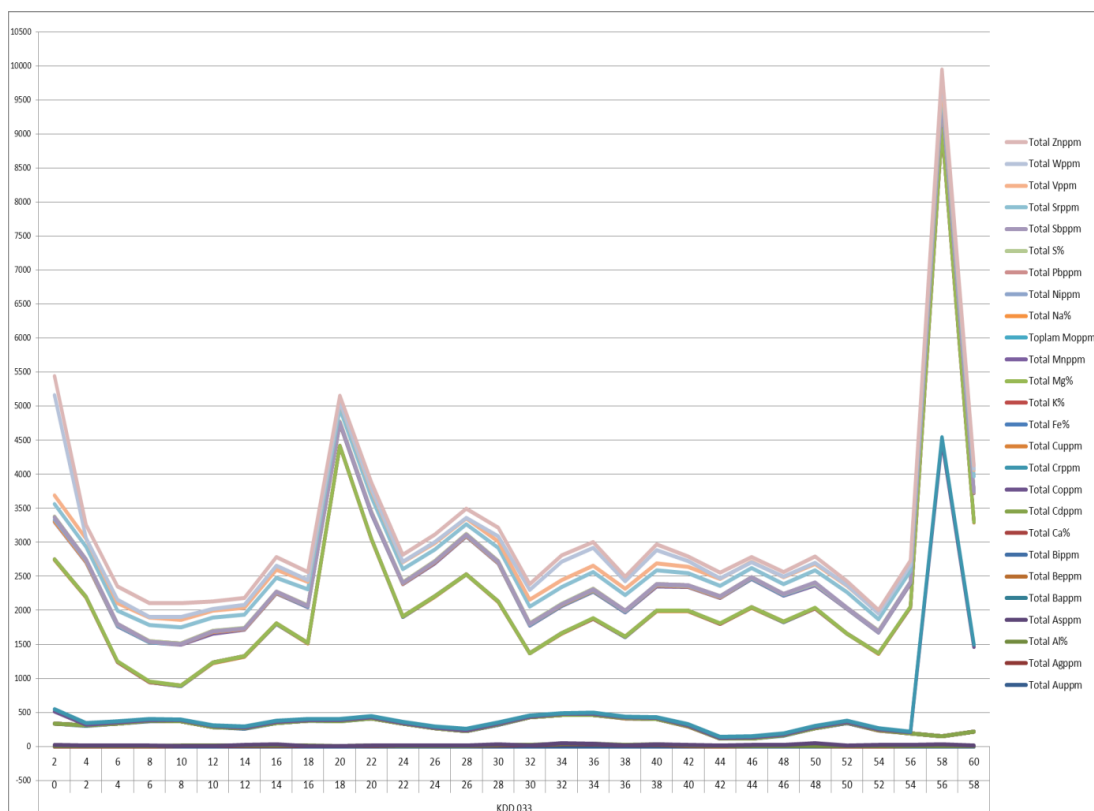


Figure 42: Depth versus concentration graphic of the KDD033 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD034 graphic (Figure 43), copper has the highest values up to 255m. There is a high value Zn peak at 37m.

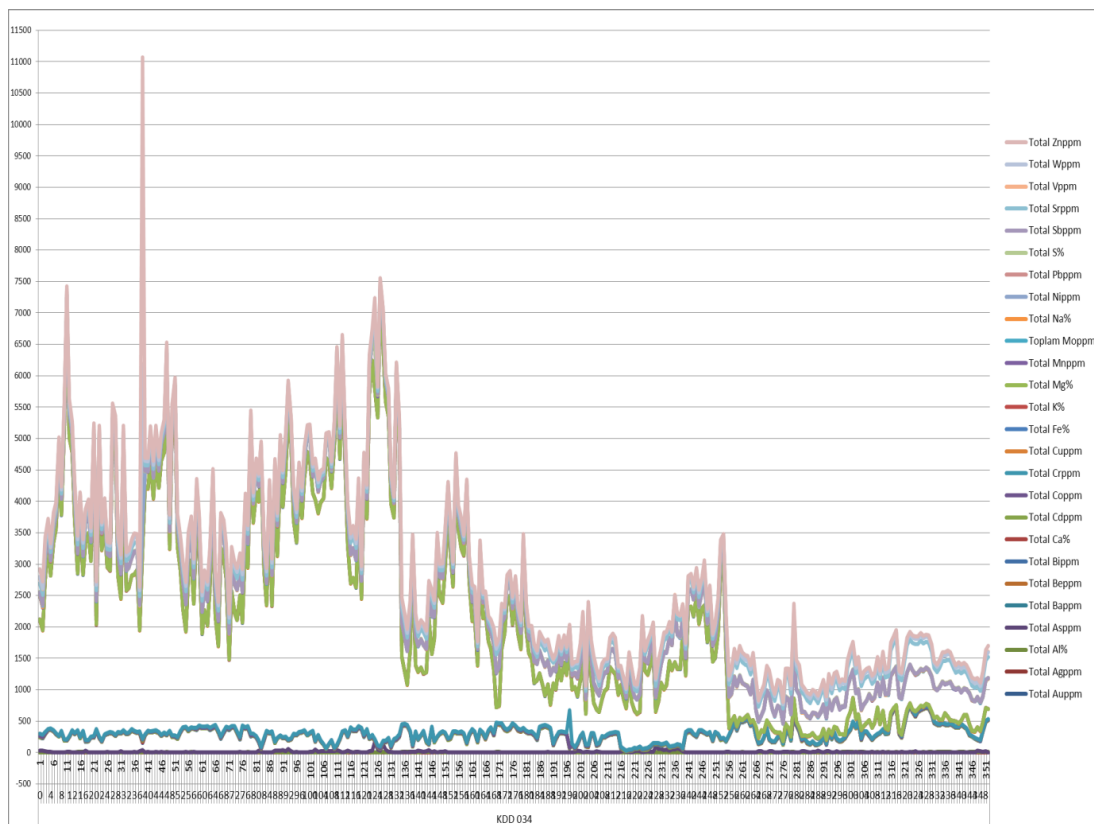


Figure 43: Depth versus concentration graphic of the KDD034 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD035 (Figure 44) shows that, at first 10m depth of this well there are high Pb values. After 20m depth of this well there are high Mn values but they are not stable, they are fluctuating. Copper values are increasing up to end of the well after 56m depth of this well.

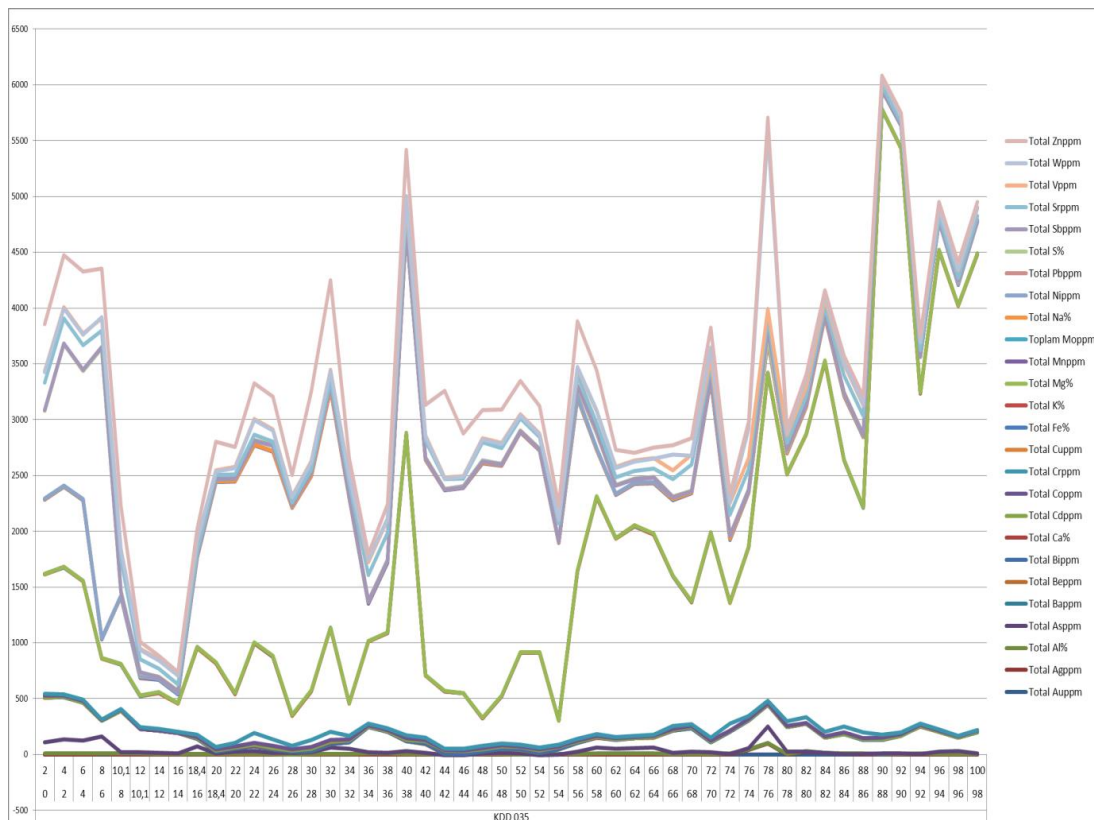


Figure 44: Depth versus concentration graphic of the KDD035 well. (X axis is depth and Y axis is concentrations.)

From the well KDD036 graphic (Figure 45) it can be observed that, in first 45m there are high Pb, Zn, Sr values. Copper has the highest values but especially between 210m to 345m there are very high copper values.

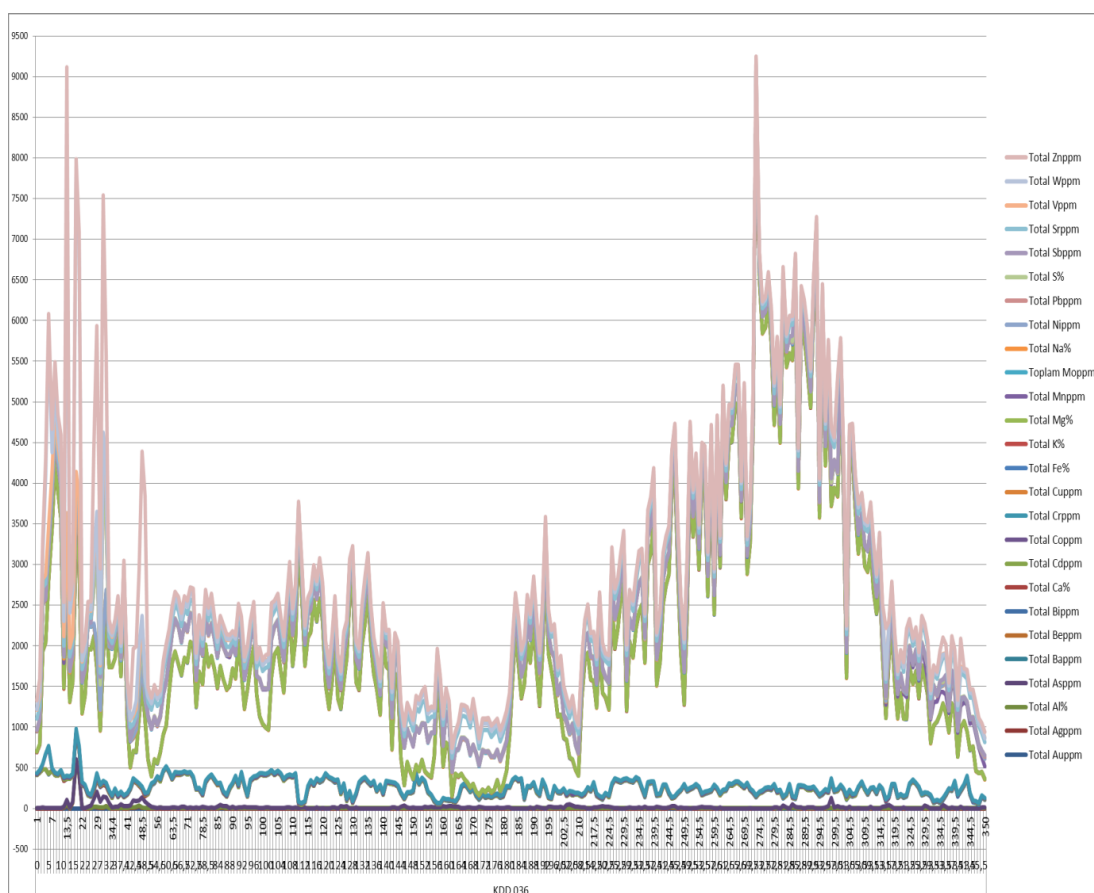


Figure 45: Depth versus concentration graphic of the KDD036 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD037 graphic (Figure 46), there are high copper, Zn and Mn values but they are not compatible and not stable.

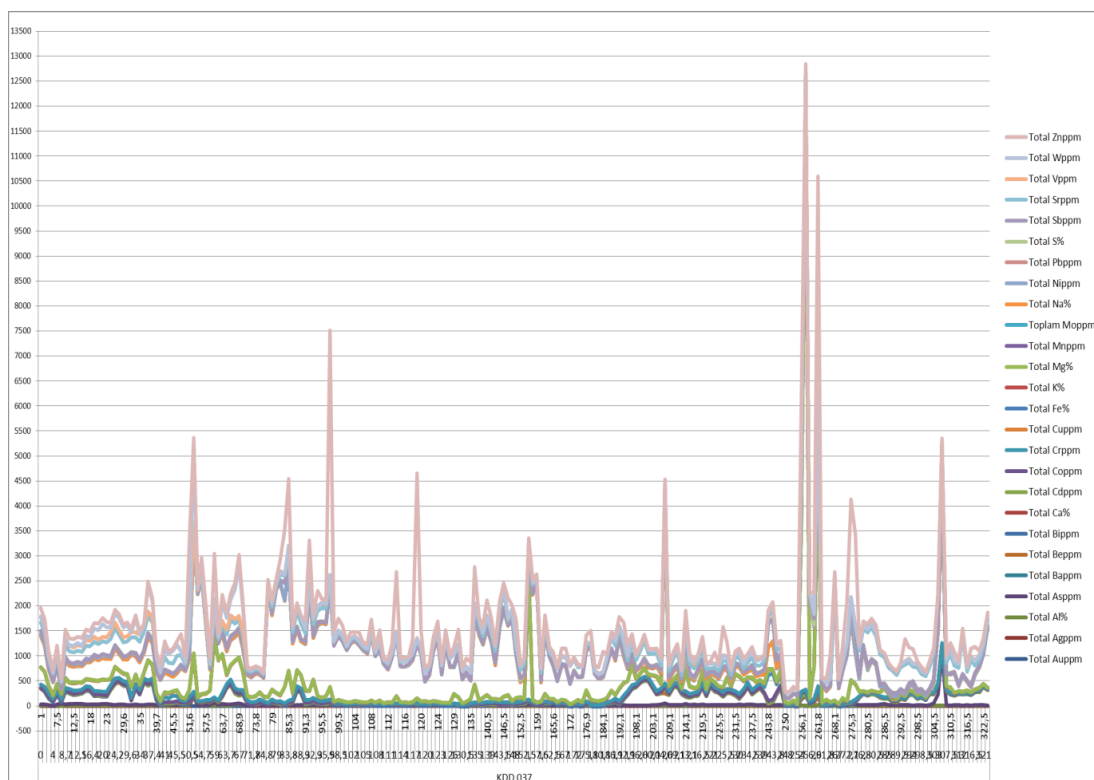


Figure 46: Depth versus concentration graphic of the KDD037 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD038 (Figure 47) graphic, copper has the highest values in this well. There are some Pb, Zn and Sr peaks but they are not continuous.

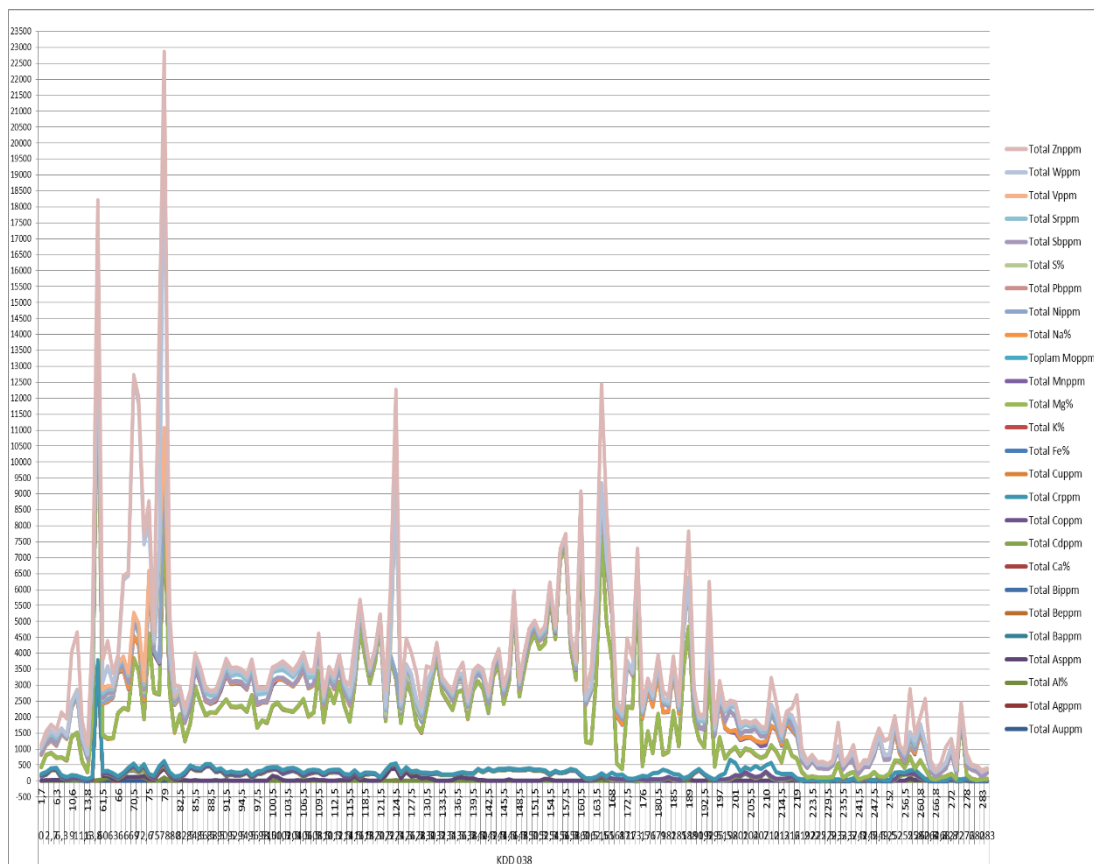


Figure 47: Depth versus concentration graphic of the KDD038 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD039 (Figure 48) shows that, Copper has the highest values in this well. There is a very high Sr peak at 305m but it is non-continuous.

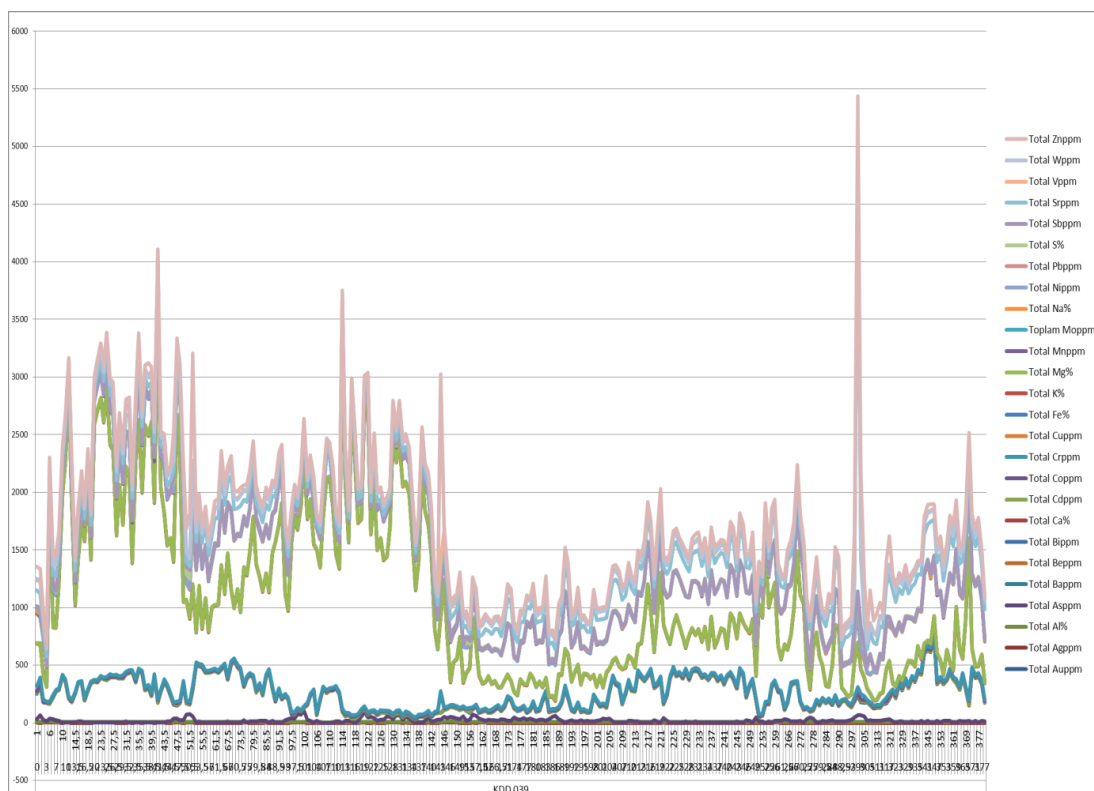


Figure 48: Depth versus concentration graphic of the KDD039 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD040 graphic (Figure 49), copper has the highest values at this well but the values are not stable. There are some non-continuous Zn and Pb peaks at the last part of the well and they are compatible.

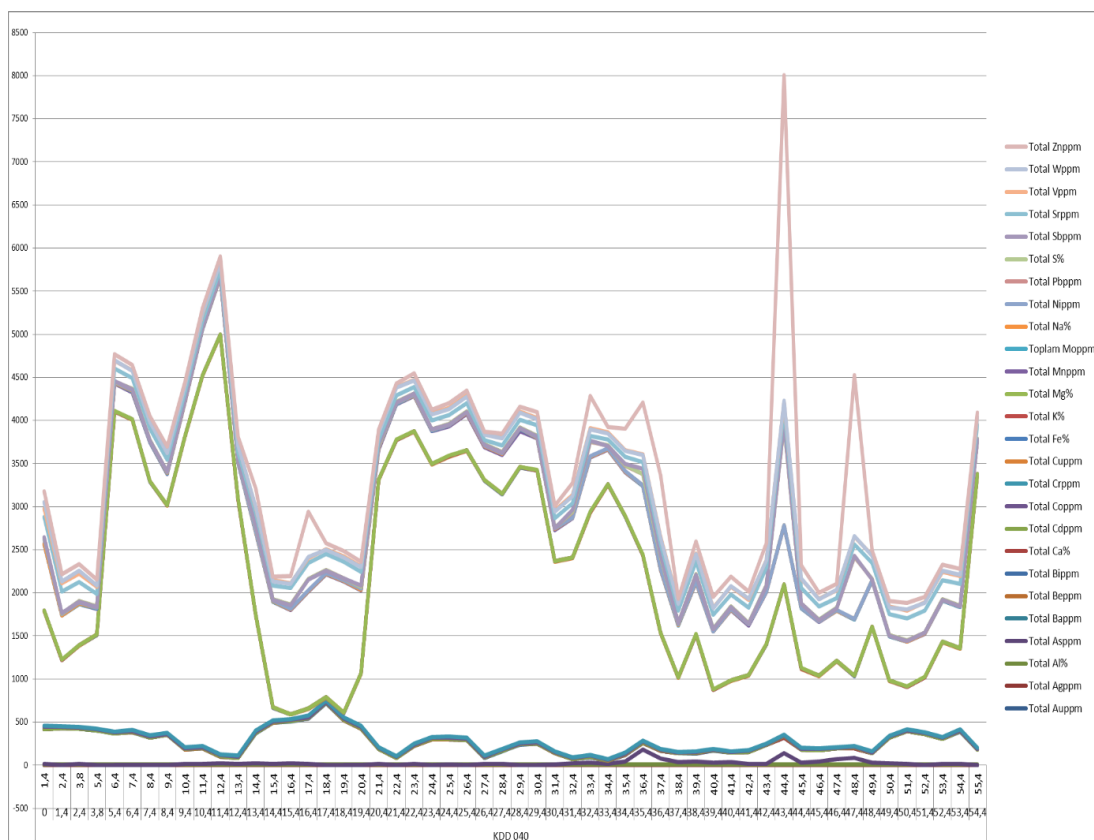


Figure 49: Depth versus concentration graphic of the KDD040 well. (X axis is depth and Y axis is concentrations.)

From the well KDD040A graphic (Figure 50) it can be observed that, copper has the highest values at this well. There are non-continuous Pb and Zn peak at 153m and they are compatible.

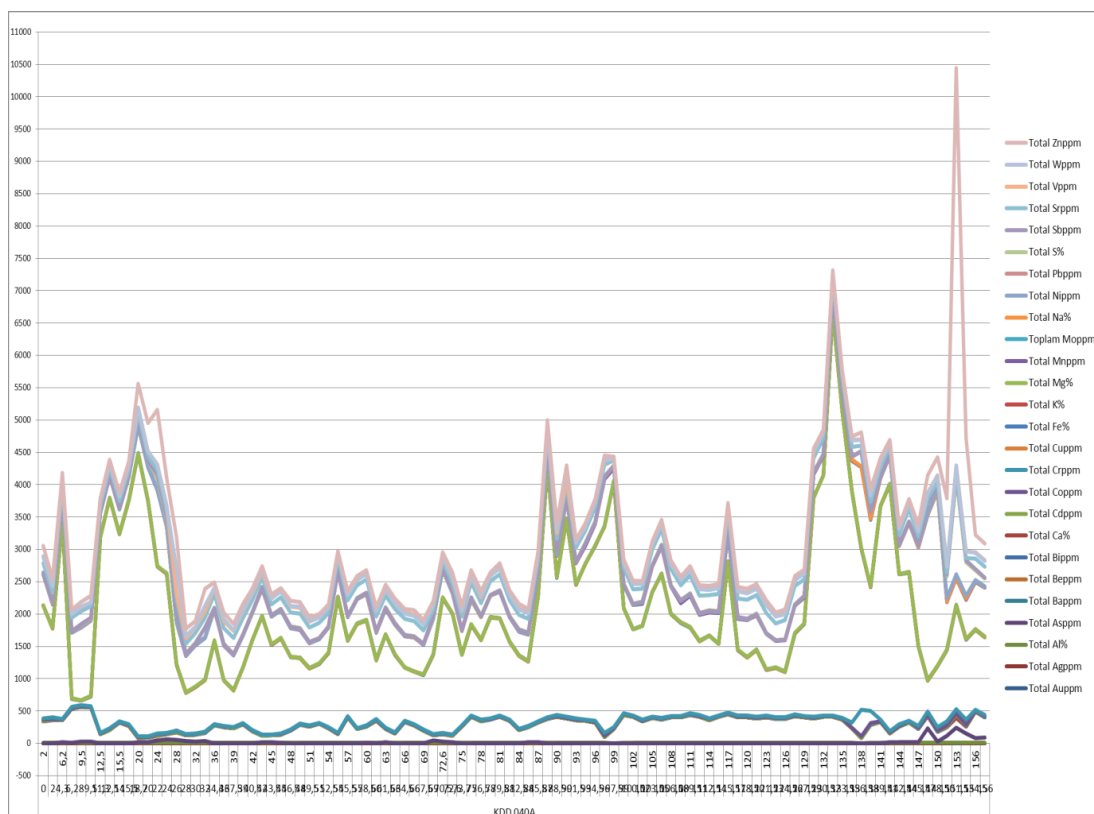


Figure 50: Depth versus concentration graphic of the KDD040A well. (X axis is depth and Y axis is concentrations.)

According to the well KDD041 graphic (Figure 51), copper has the highest values but the other values are not very significant.

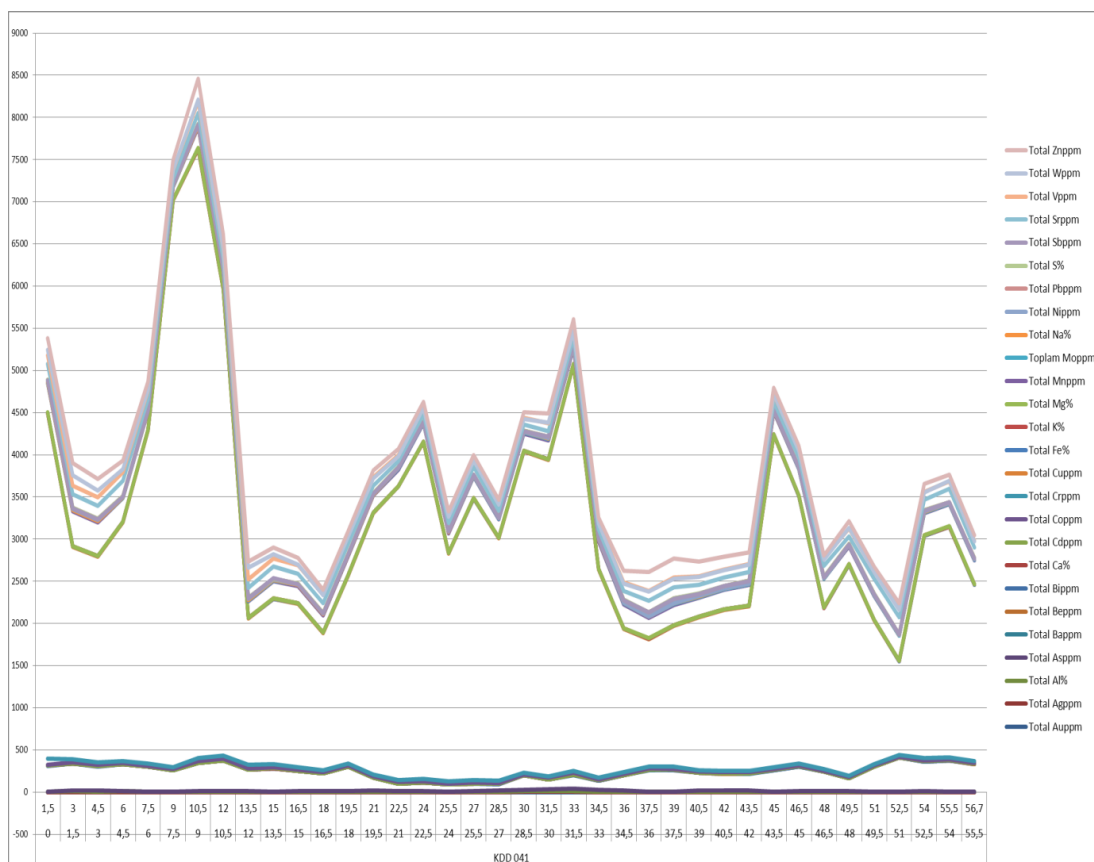


Figure 51: Depth versus concentration graphic of the KDD041 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD042 (Figure 52) shows that, copper has the highest values in this well and the values are stable.

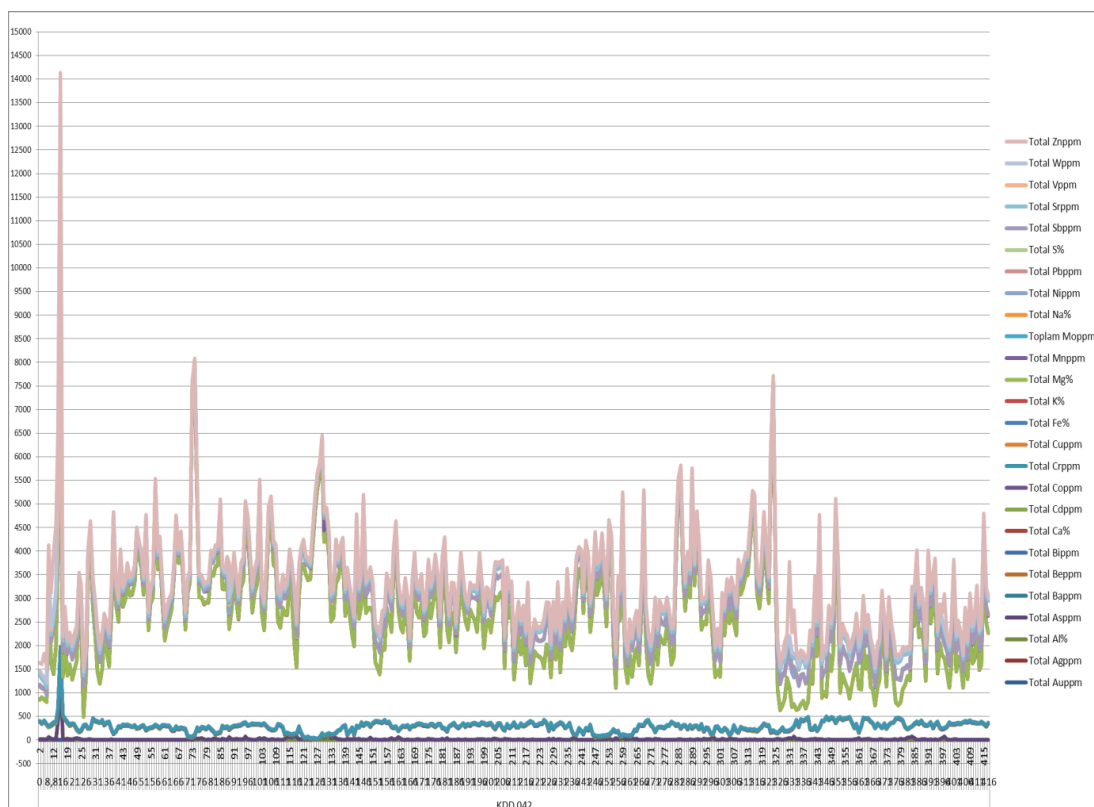


Figure 52: Depth versus concentration graphic of the KDD042 well. (X axis is depth and Y axis is concentrations.)

It can be observed from the well KDD043 graphic (Figure 53), copper values are increasing from 80m to 340m. Values of the other elements are not very significant.

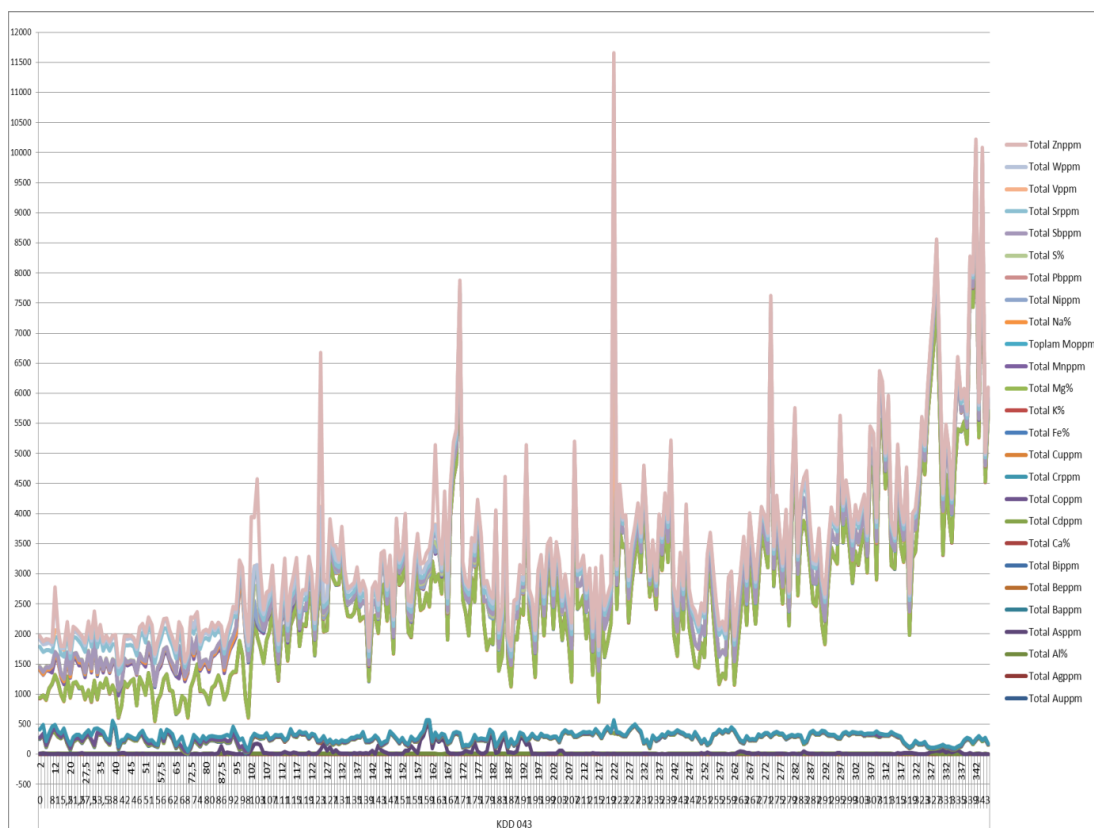


Figure 53: Depth versus concentration graphic of the KDD043 well. (X axis is depth and Y axis is concentrations.)

From the well KDD044 graphic (Figure 54) it can be observed that, there are some non-continuous copper and Zn peaks. They are not compatible.

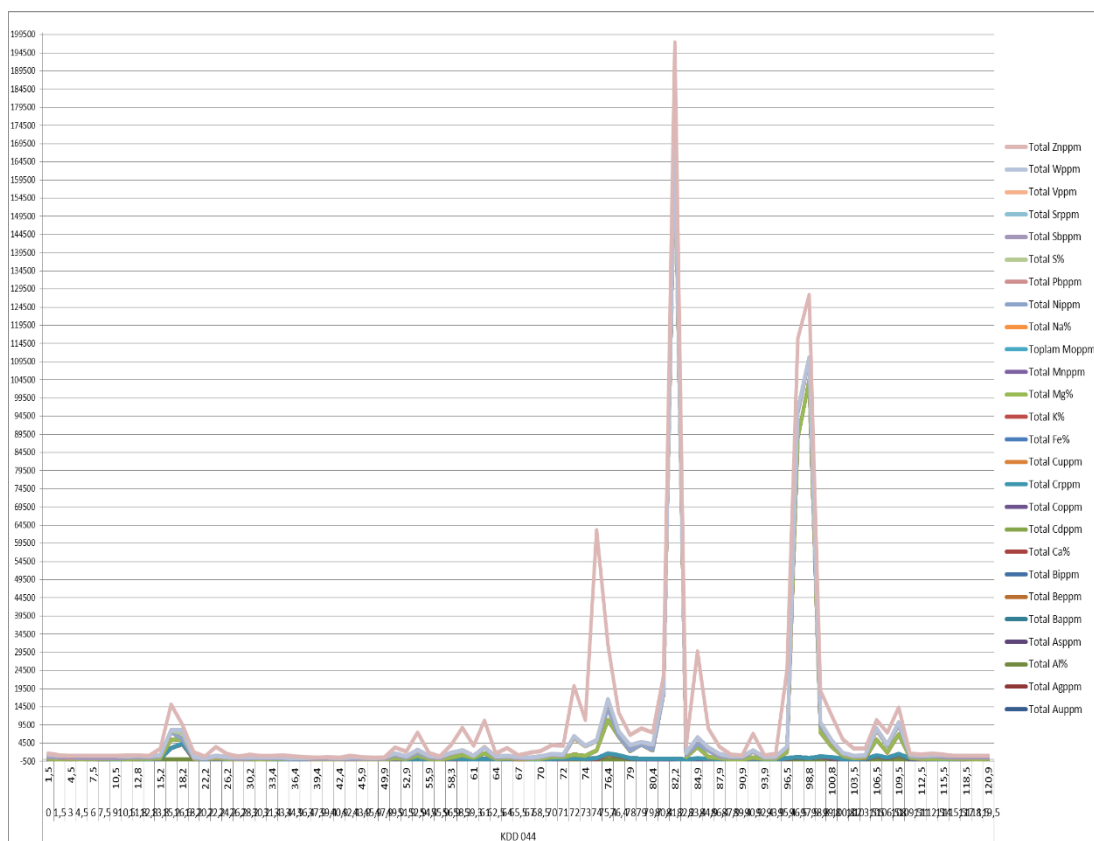


Figure 54: Depth versus concentration graphic of the KDD044 well. (X axis is depth and Y axis is concentrations.)

According to the well KDD045 graphic (Figure 55), copper has the highest values in this well especially between 25m to 212m and 230m to 295m. There are also some non-continuous Zn and W peaks at the beginning of the well.

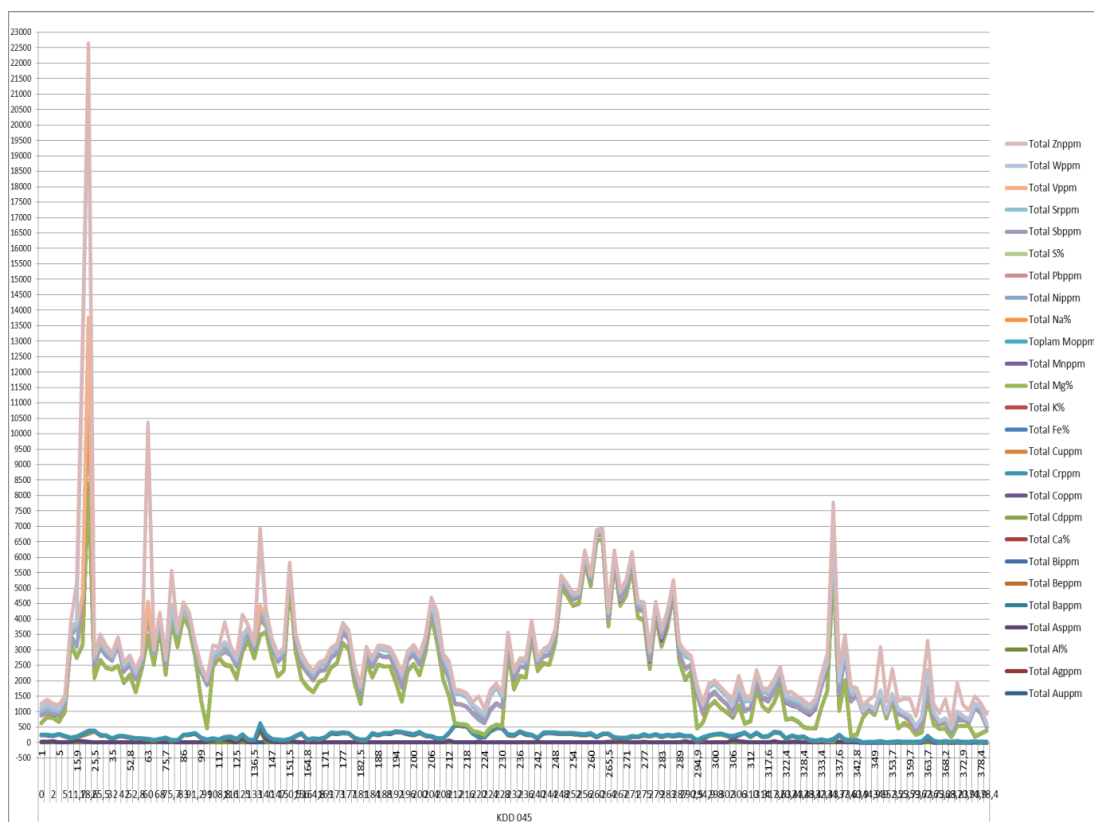


Figure 55: Depth versus concentration graphic of the KDD045 well. (X axis is depth and Y axis is concentrations.)

The graphic of the well KDD046 (Figure 56) shows that, there are high copper values between 10m to 127m, 140m to 275m and 290m to 398m.

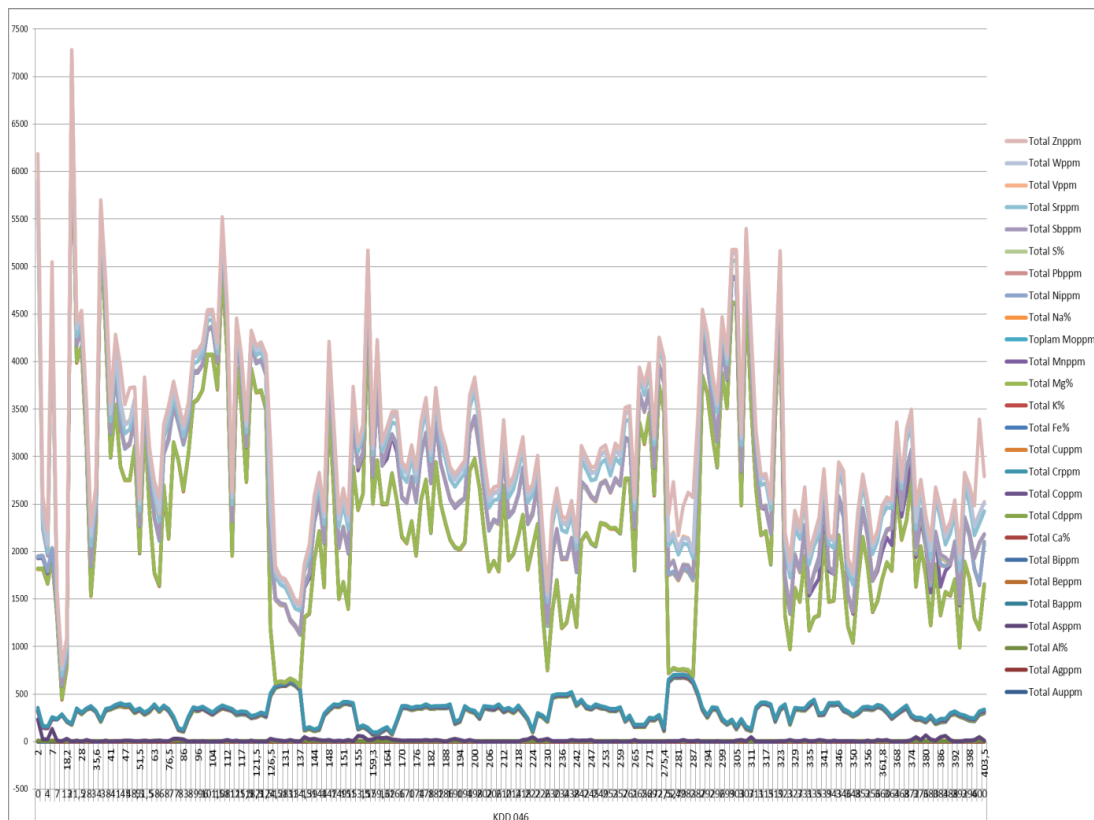


Figure 56: Depth versus concentration graphic of the KDD046 well. (X axis is depth and Y axis is concentrations.)

3.2 Descriptive Statistics

Descriptive statistics are used to describe the main statistical properties of the data set. The descriptive properties of each well were determined. There is an example descriptive statistics table of a well (Table 2), KDD038, other tables are in the Appendix A part. In this study, descriptive statistics was also applied to whole data set. It shows the minimum, maximum and mean values of elements within a well and within all the data set (Table 3). SPSS Statistics Software was used to generate descriptive statistics tables. Moreover, descriptive statistics of the elements also give information about the statistical distribution of the values of the elements. According to the variance values and distribution plots, most of the elements are normally distributed. The table of descriptive statistics of the whole data set is down below (Table 3).

It is seen that there are some minus values because they are out of range of detection limits of the instruments of the laboratory, but minus concentrations are impossible in any rock. Instruments cannot detect any concentration beyond their detection limits and they produce minus values for that concentrations. Because of that situation these minus values are equalized to zero in further statistical applications.

Table 2: Descriptive statistics of the KDD038 Well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	185	-,01	1,21	,2070	,0184	,24960	,062	1,763	,179	3,254	,355
K	185	-,01	3,13	1,1232	,0633	,86074	,741	,072	,179	-1,274	,355
COPPM	185	-1,00	137,00	15,0216	1,1531	15,68333	245,967	5,047	,179	34,483	,355
BAPPM	185	-10,00	450,00	124,4865	8,8375	120,20309	14448,784	,574	,179	-,749	,355
BEPPM	185	-,50	2,40	,8622	,0627	,85228	,726	-,325	,179	-,844	,355
AGPPM	185	-,50	100,00	4,7692	1,4268	19,40602	376,594	4,577	,179	19,833	,355
BIPPM	185	-2,00	30,00	-,7081	,2408	3,27560	10,730	5,330	,179	42,831	,355
ASPPM	185	-5,00	3550,00	45,6757	19,4990	265,21520	70339,101	12,700	,179	168,127	,355
MNPPM	185	91,00	1750,00	596,3351	29,1224	396,10686	156900,6	,943	,179	-,079	,355
MOPPM	185	-1,00	119,00	16,1514	1,4594	19,84967	394,010	2,753	,179	9,505	,355
NA	185	-,01	2,35	1,0513	,0589	,80157	,643	-,042	,179	-1,504	,355
CDPPM	185	-,50	43,40	1,4659	,3236	4,40158	19,374	5,810	,179	47,043	,355
NIPPM	185	-1,00	664,00	53,7892	6,8146	92,68826	8591,113	3,288	,179	13,471	,355
S	185	,02	10,00	1,9704	,1444	1,96458	3,860	1,634	,179	3,140	,355
PBPPM	185	-2,00	5930,00	78,6919	35,7271	485,94123	236138,9	10,653	,179	121,201	,355
SBPPM	185	-5,00	543,00	14,1622	4,7163	64,14899	4115,093	5,618	,179	36,754	,355
SRPPM	185	16,00	314,00	120,6324	4,7182	64,17423	4118,332	,709	,179	-,109	,355
VPPM	185	1,00	156,00	74,8703	2,6482	36,01969	1297,418	-,601	,179	-,268	,355
WPPM	185	-10,00	10000,00	189,6757	82,2532	1118,765	1251635	6,708	,179	47,941	,355
ZNPPM	185	19,00	6780,00	342,9351	50,4494	686,18660	470852,1	5,623	,179	44,089	,355
AL	185	,03	8,19	4,9743	,1798	2,44567	5,981	-,889	,179	-,623	,355
CA	185	,26	37,40	11,2098	,8777	11,93846	142,527	1,054	,179	-,365	,355
CRPPM	185	1,00	583,00	59,7243	5,7664	78,43160	6151,516	3,306	,179	14,906	,355
CUPPM	185	10,00	10000,00	1828,9297	126,3533	1718,591	2953554	1,646	,179	3,863	,355
FE	185	,09	16,20	3,9251	,1507	2,04980	4,202	,965	,179	6,466	,355
MG	185	,10	9,15	2,1348	,1151	1,56536	2,450	1,246	,179	2,151	,355
Valid N (listwise)	185										

Table 3: Descriptive statistics of the whole data set. (The elements written with ppm are in ppm scale, and the others are in percentage.)

Descriptive Statistics												
	N	Range	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	9974	2,76	-,01	2,75	,2081	,0024	,24336	,059	2,444	,025	9,634	,049
K	9974	7,76	-,01	7,75	1,3074	,0074	,73713	,543	,187	,025	,472	,049
COPPM	9974	4341,00	-1,00	4340,00	12,3963	,4601	45,94791	2111,210	85,811	,025	7944,521	,049
BAPPM	9974	1130,00	-10,00	1120,00	207,4351	1,4173	141,54141	20033,970	,275	,025	-,486	,049
BEPPM	9974	8,20	-1,00	7,20	,6309	,0081	,80966	,656	-,157	,025	2,133	,049
AGPPM	9974	6460,50	-,50	6460,00	1,7156	,6837	68,28581	4662,951	86,328	,025	8051,622	,049
BIPPM	9974	176,00	-5,00	171,00	-,8749	,0326	3,25279	10,581	23,159	,025	1104,887	,049
ASPPM	9974	6548,52	-5,00	6543,52	13,6968	1,0143	101,30178	10262,051	42,604	,025	2293,456	,049
MNPPM	9974	6963,86	6,14	6970,00	394,3039	3,2287	322,45038	103974,2	5,161	,025	51,276	,049
MOPPM	9974	2011,00	-1,00	2010,00	12,8761	,3701	36,96538	1366,439	22,095	,025	951,310	,049
NA	9974	6,21	-,01	6,20	1,7929	,0100	,99730	,995	-,645	,025	-,889	,049
CDPPM	9974	344,00	-1,00	343,00	,5607	,0677	6,75711	45,659	25,404	,025	933,873	,049
NIPPM	9974	1951,00	-1,00	1950,00	13,1321	,3766	37,60711	1414,295	19,858	,025	800,007	,049
S	9974	23,78	-,01	23,77	2,3806	,0213	2,12968	4,536	1,852	,025	7,659	,049
PBPPM	9974	9677,84	-3,00	9674,84	22,7002	1,6796	167,73694	28135,680	30,520	,025	1366,098	,049
SBPPM	9974	963,00	-5,00	958,00	1,3448	,2646	26,42860	698,471	18,610	,025	468,312	,049
SRPPM	9974	3616,98	3,02	3620,00	174,6022	1,2033	120,17814	14442,785	4,839	,025	92,481	,049
VPPM	9974	342,00	-1,00	341,00	83,6117	,2824	28,19965	795,221	,633	,025	8,085	,049
WPPM	9974	10010,00	-10,00	10000,00	11,0242	2,5347	253,13988	64079,800	25,010	,025	710,270	,049
ZNPPM	9974	57802,00	-2,00	57800,00	169,9896	9,9692	995,62280	991264,8	29,770	,025	1333,982	,049
AL	9974	11,34	,01	11,35	5,8160	,0221	2,20777	4,874	-1,180	,025	,287	,049
CA	9974	40,49	,01	40,50	4,6471	,0615	6,14129	37,715	3,515	,025	13,117	,049
CRPPM	9974	647,00	-2,00	645,00	31,7179	,4663	46,57033	2168,795	3,683	,025	22,589	,049
CUPPM	9974	167997,00	3,00	168000,00	1719,9501	26,3229	2628,865	6910929	35,159	,025	1949,179	,049
FE	9974	39,05	,05	39,10	4,0456	,0160	1,60279	2,569	4,184	,025	60,557	,049
MG	9974	13,24	,01	13,25	1,3865	,0089	,88920	,791	4,503	,025	34,149	,049
Valid N (listwise)	9974											

The probability plots of the wells were prepared to understand the statistical distribution of the concentrations in the wells. According to these plots the expectations for a drilling well can be figured out. In the study area if the parameters does not change abruptly, the value range of a well can be estimated according to the statistical distribution analysis of the element concentrations and their probability plots. The probability plot of the Au data (Figure 57) shows the probability sequence of the Au element in drilling wells. From the observations of this graph there is a high probability that the results of a new well will be in the same range of the previous ones.

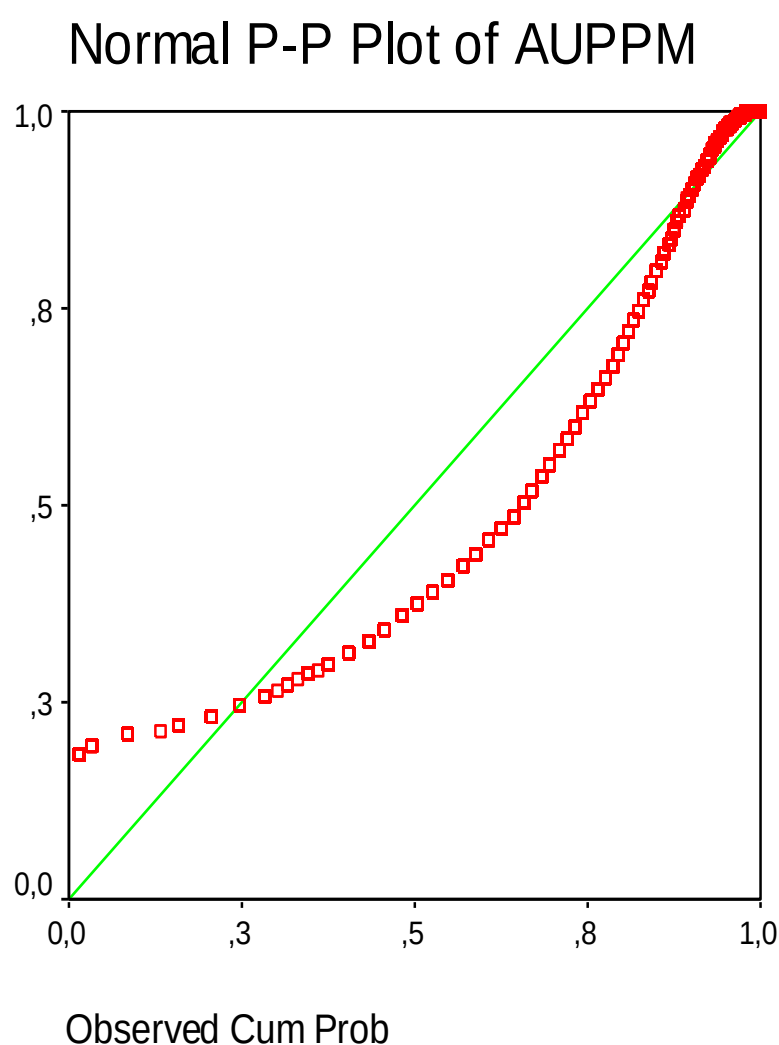


Figure 57: Probability plot of the Au data.

According to the probability plot of the copper data (Figure 58), the copper results of a new well will be in the same range with the previous one. There are some intensity areas for some value ranges, this shows the high alteration or low alterations zones.

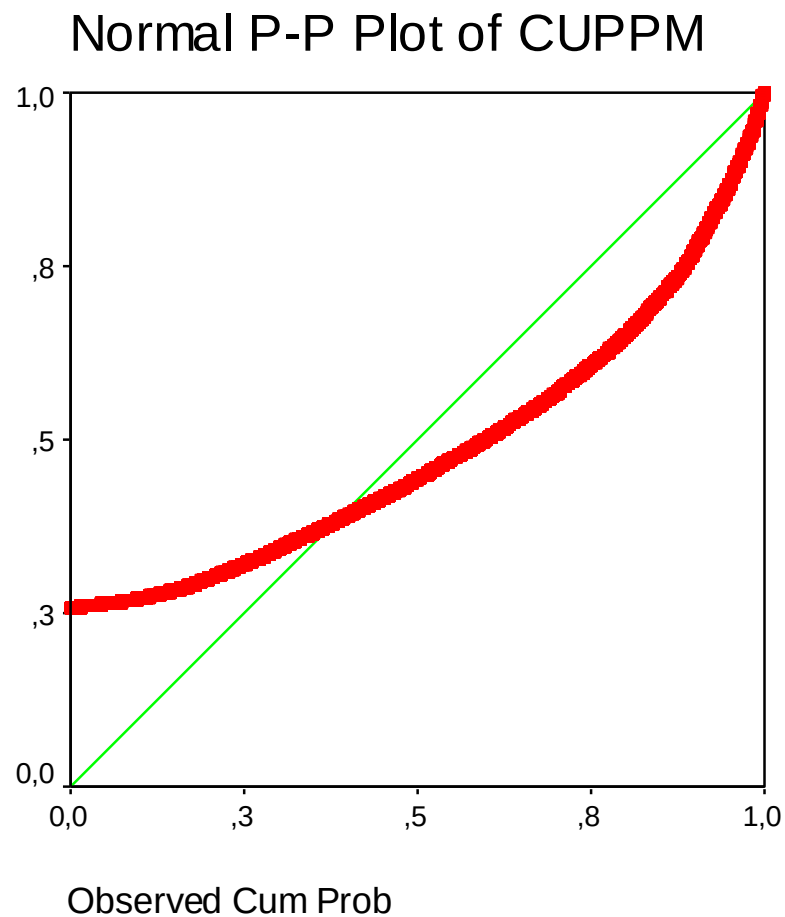


Figure 58: Probability plot of the Cu data.

The probability plot of the Zn data (Figure 59) shows that there are some accumulation areas for some value ranges. It means that there are high possibility regions for certain results, and these results can be expected more than the others.

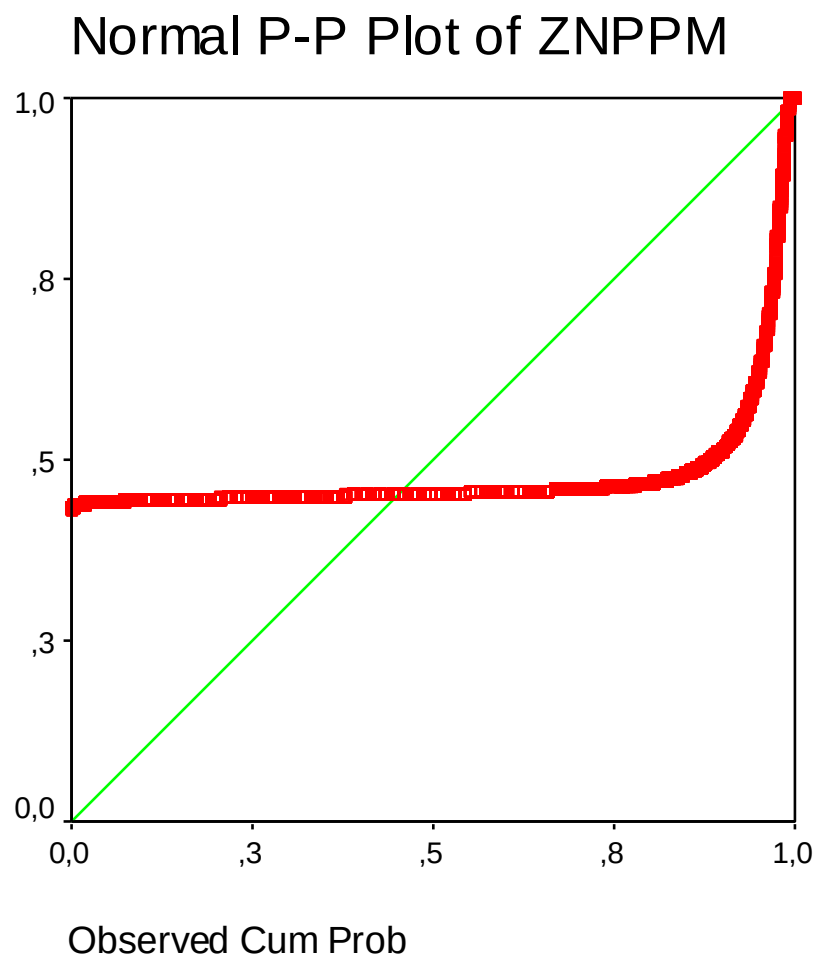


Figure 59: Probability plot of the Zn data.

According to the probability plot of the manganese (Figure 60), the distribution of the manganese data shows that there are some value ranges which have higher probability among the data.

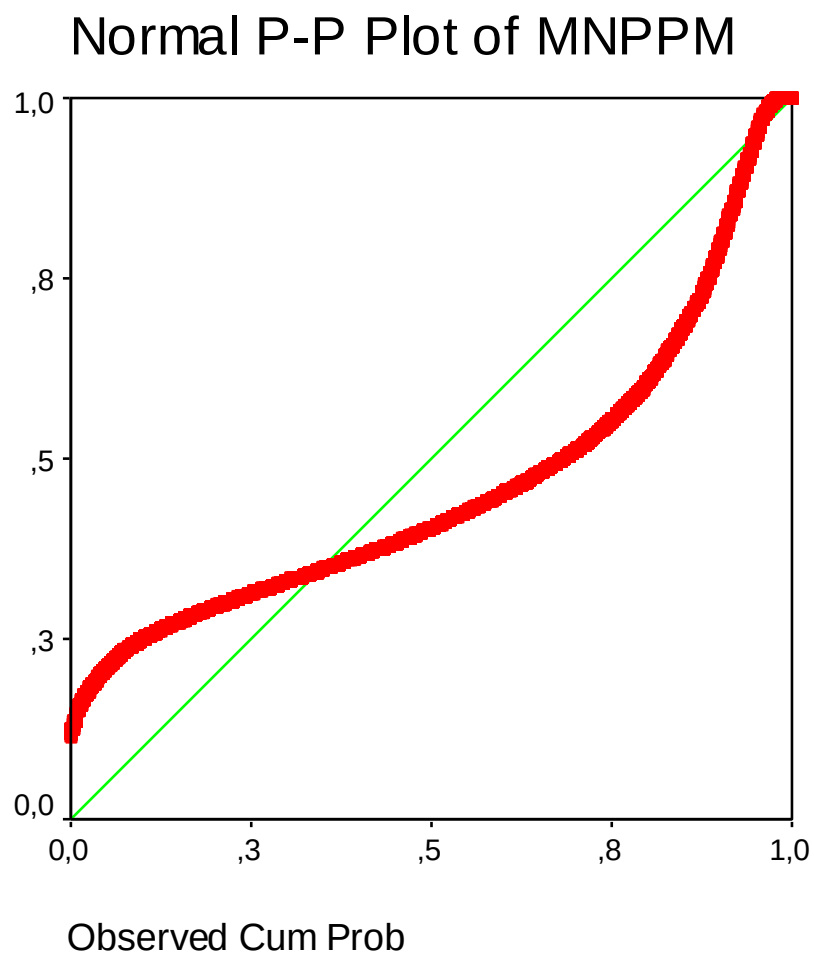


Figure 60: Probability plot of Mn data.

3.3 Areal Distribution

Values of the elements are changing place to place within the study area. There are three dimensional (3D) areal distribution models prepared for minimum, maximum and mean values for the copper, gold, manganese and zinc. Golden Software Surfer computer program was used to generate these models. Two dimensional (2D) models can be plotted also but 3D models are better to understand the ore body.

According to these models it can be seen that there are different peak places for each minimum, mean and maximum values.

Copper areal distribution models of maximum (Figure 61), mean (Figure 62) and minimum (Figure 63) values show different behaviors of the copper. Maximum values of the copper are intense at the western site of the study area. From the mean value model it can be obtained that the values are intense at the western site and also accumulated at the eastern site. The minimum values have a northeast-southwest trend as it can be observed from the minimum value model, but it is not a plane, there are accumulation groups.

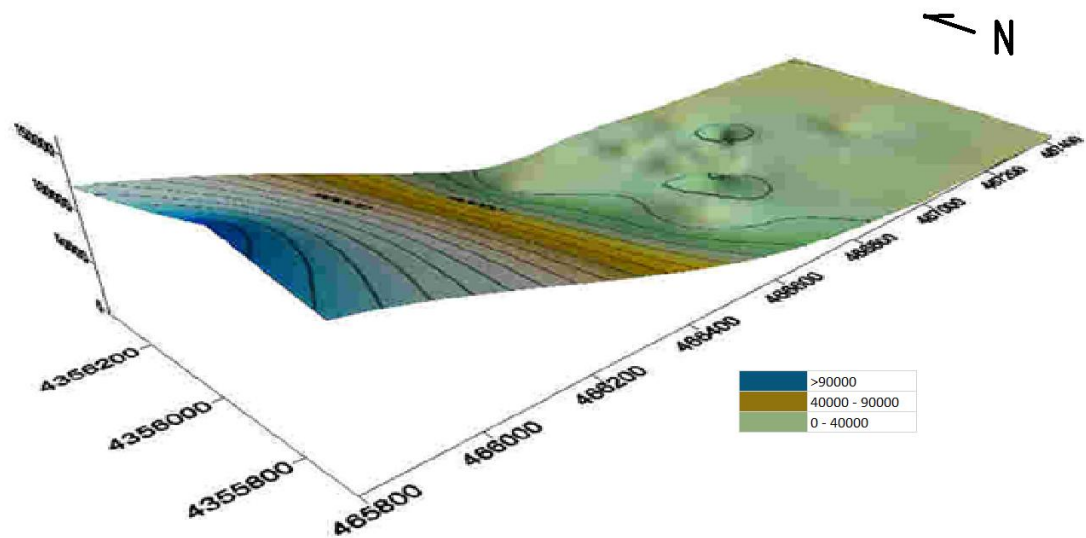


Figure 61: Copper distribution for maximum values.

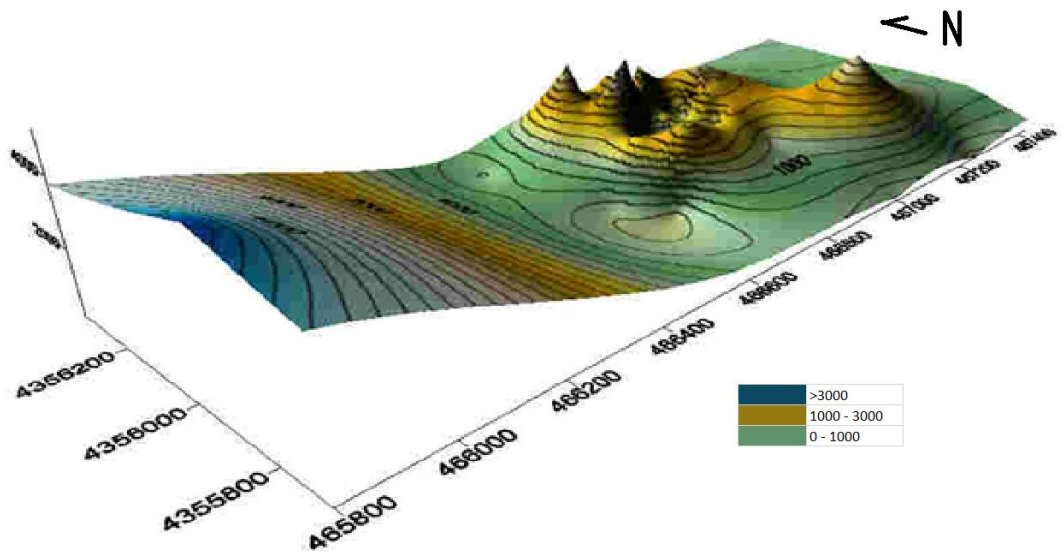


Figure 62: Copper distribution for mean values.

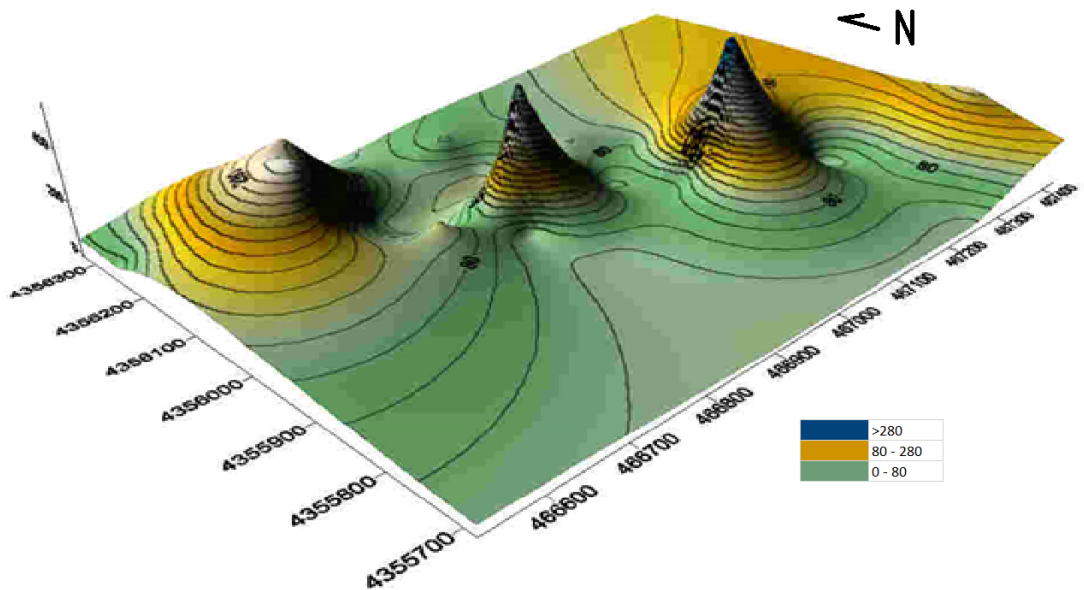


Figure 63: Copper distribution values for minimum values.

Models of maximum (Figure 64), mean (Figure 65) and minimum (Figure 66) values of gold shows a northwest-southeast trend. These models give an idea about intensity of the mineralization over the study area. There are peaks and accumulations. Especially in the model of the minimum values there are non-continuous groups.

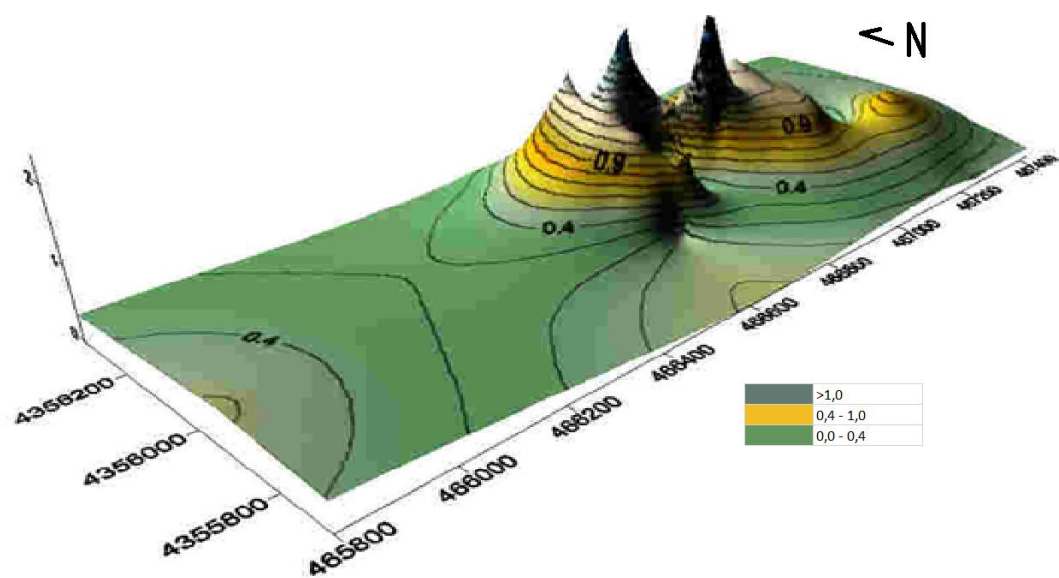


Figure 64: Gold Distribution for maximum values.

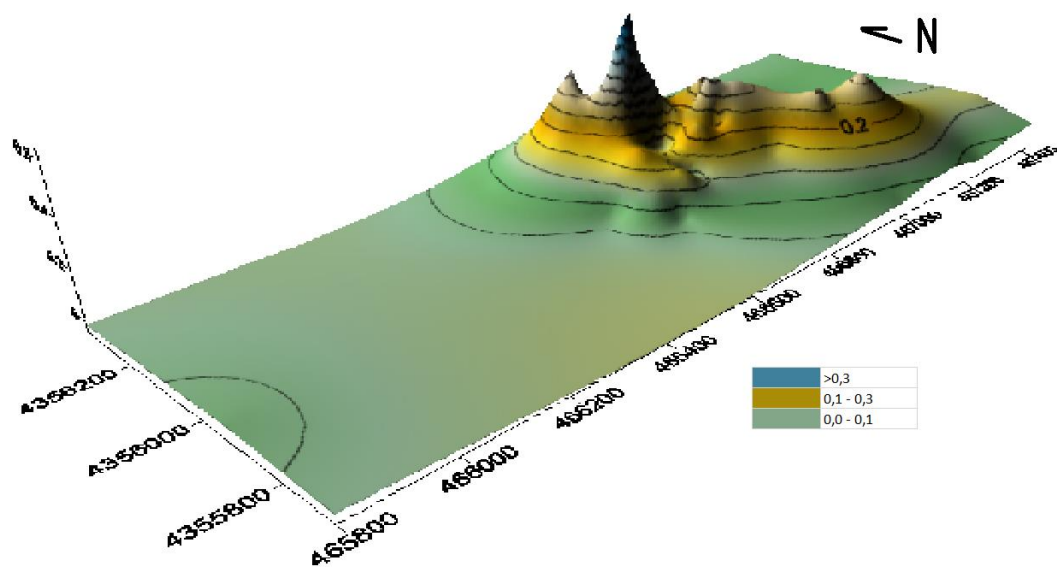


Figure 65: Gold distribution for mean values.

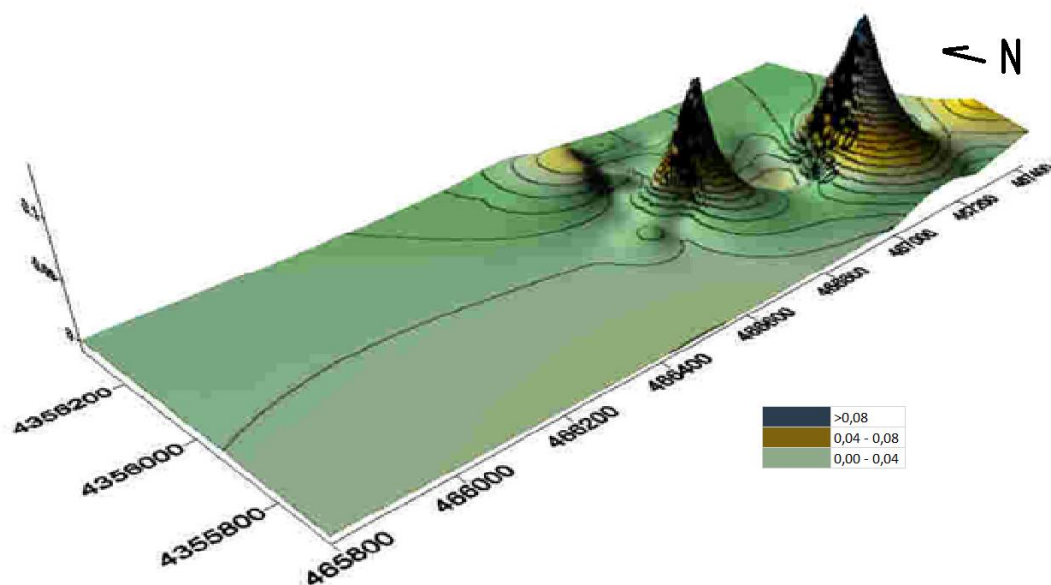


Figure 66: Gold distribution for minimum values.

The model of maximum manganese (Figure 67) values shows the maximum values are higher at the western part and the southern part but mean (Figure 68) and minimum (Figure 69) distribution models show that higher manganese values intense at the eastern part of the study area. In minimum value model there is a one single accumulation group but maximum models there are continuous plains and in the mean model there are both continuous plains and an accumulation group.

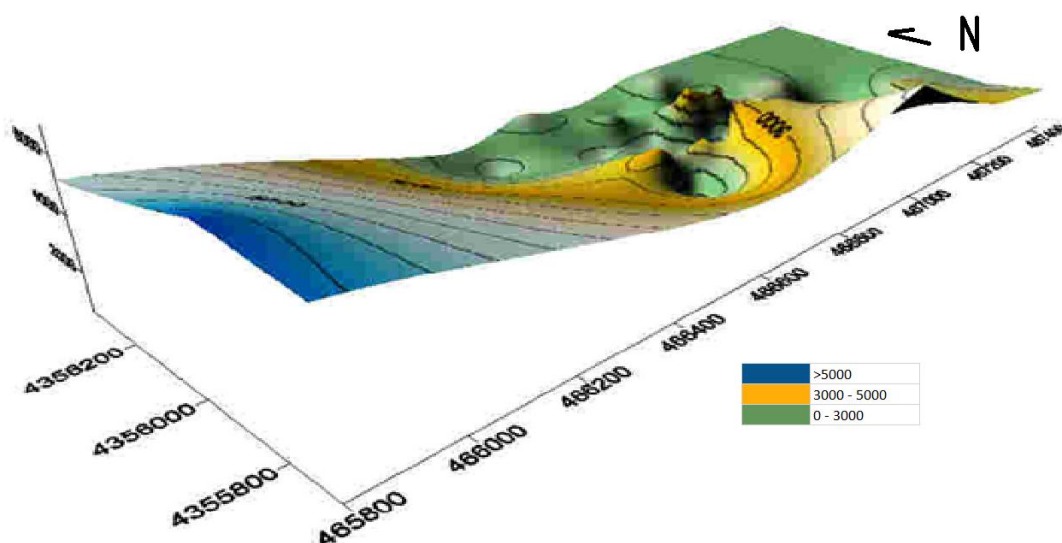


Figure 67: Manganese distribution for maximum values.

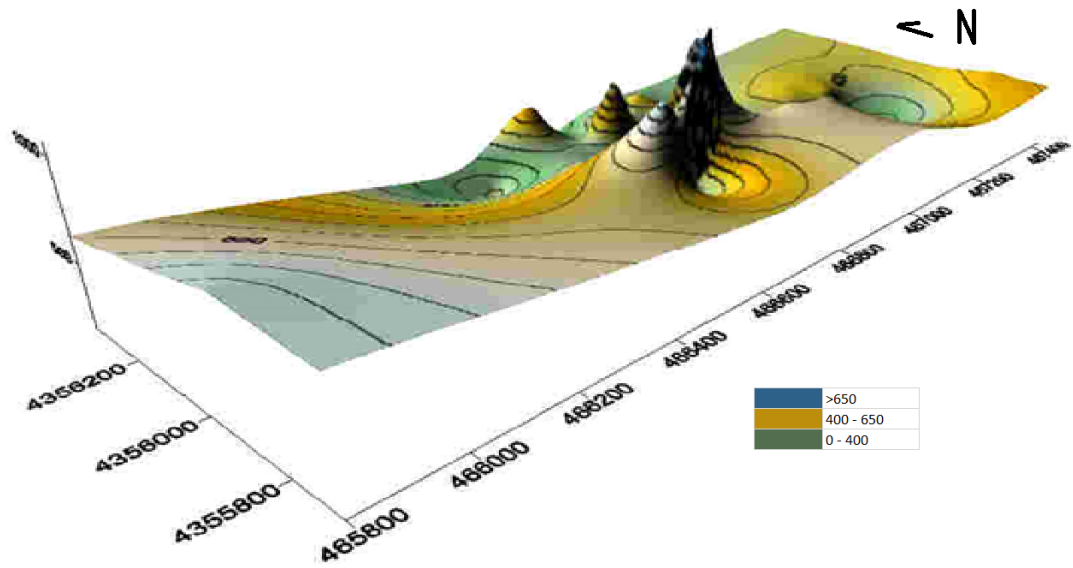


Figure 68: Manganese distribution for mean values.

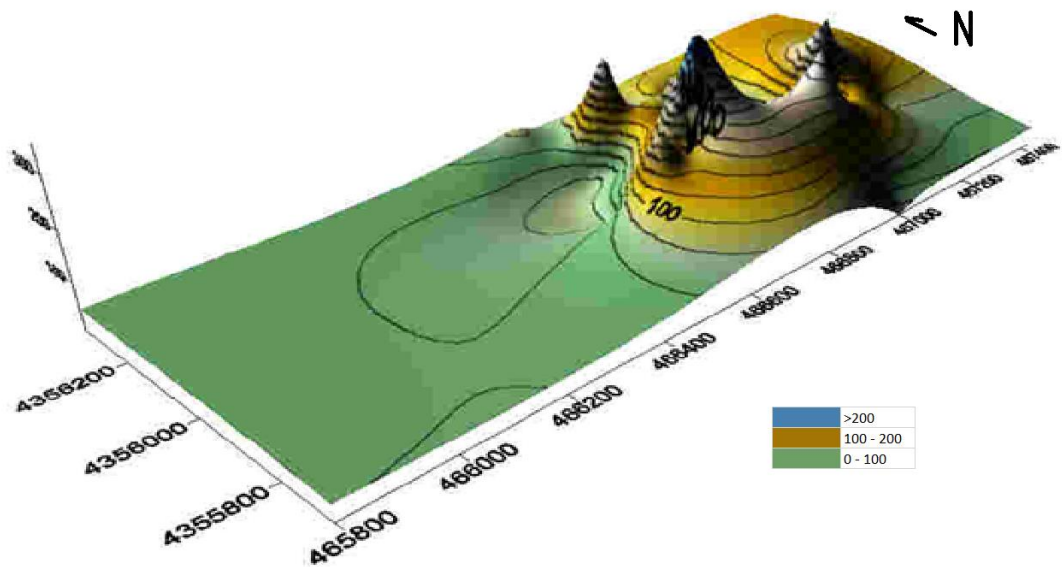


Figure 69: Manganese distribution for minimum values.

Zinc distribution models show a very consistent areal distribution. Maximum (Figure 70) and mean (Figure 71) values are intense at the western part, minimum (Figure 72) values are intense at the eastern part. Distribution behaviors of maximum and mean values are plain type, but in the minimum value model there are accumulation groups.

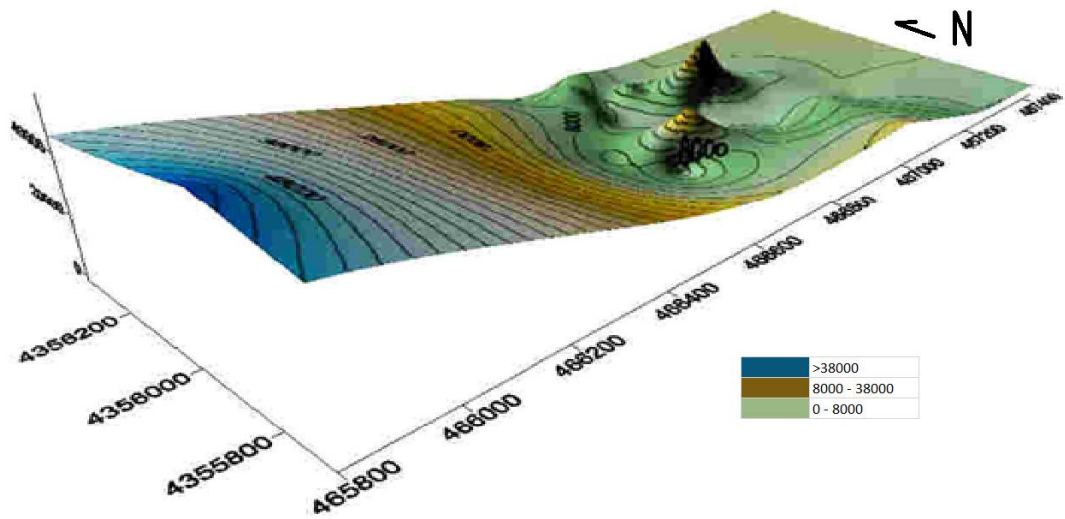


Figure 70: Zinc distribution for maximum values.

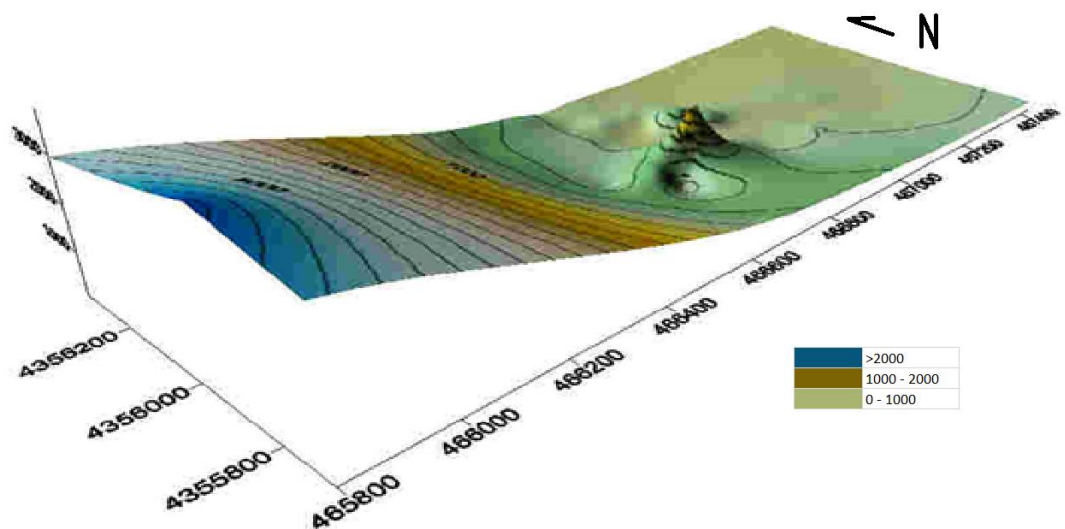


Figure 71: Zinc distribution for mean values.

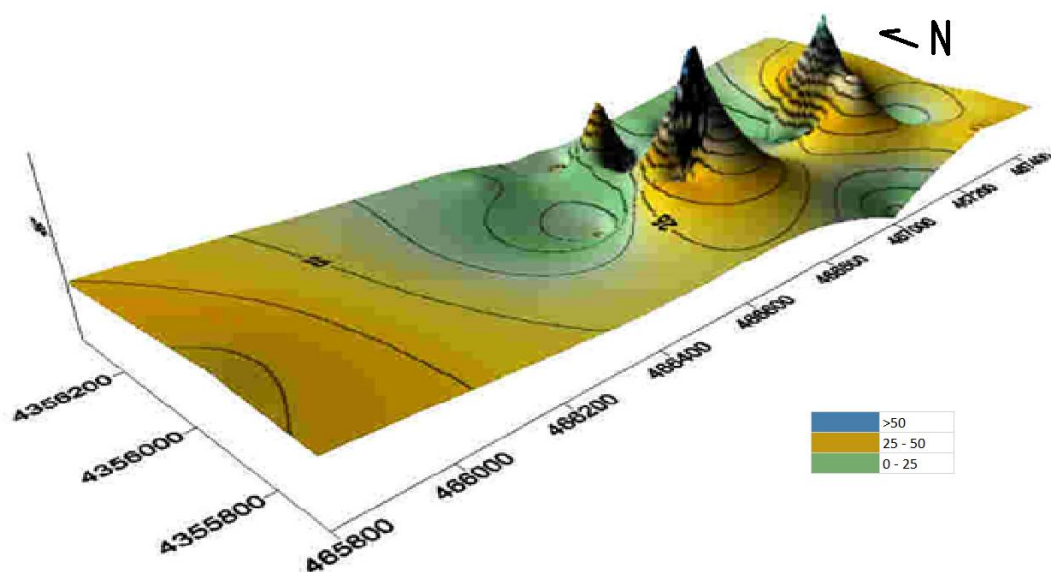


Figure 72: Zinc distribution for minimum values.

As it can be seen from the distribution models, the behaviors of the gold and manganese values are in opposite manner to each other in general, and the behaviors of the manganese and the zinc values are in same manner.

3.4 Linear Regression

The sample correlation coefficients with corresponding significance levels are presented in Table 4. The values in the table show the degree of relationship of elements in positive or negative way. According to the values on the table it can be observed that the relations between elements not very high for all elements. Zinc – cadmium and aluminum – sodium couples have the highest relationships, but their chemical analysis result are not very significant and the values are not continuous. The values are in the margin of error, so it is better that not choose them for further applications.

There can be many reasons for these low relationships between the results. The source of the mineralization may be different for some element groups, this situation may be the result of the different molecular weights of the different elements etc.

According to the correlation matrix it can be seen that some elements have high correlation with each other in positive or negative way. This means some elements are inversely proportional. There is not a significant correlation between gold and other 25 elements are

insignificant. The highest correlation value of gold is the gold-copper correlation. Copper concentration also does not have any significant correlation value with other element concentrations. As stated before the highest correlation value of copper is the gold-copper correlation. Manganese does not have any correlation with other elements. Zinc has high correlations with cadmium and lead. There are high correlations between potassium, sodium, barium, beryllium, calcium, and aluminum. Aluminum also has correlations positively with strontium, vanadium, and negatively with calcium and chromium. Calcium is inversely proportional with sodium and potassium. Chromium also has correlation negatively with sodium.

Table 4: Correlation matrix of all elements. (Bigger version of this table is at the Appendix C.)

Correlations

	U	P	K	D	A	P	P	P	P	P	P	P	P	P	S	P	P	P	P	P	N	P	P	A	L	C	R	P	P	P	F	E
U	Pearson	1	0.274	0.008	0.064	0.185	0.008	0.029	0.023	0.199	0.071	0.036	0.053	0.152	0.115	0.020	0.035	0.287	0.073	0.009	0.053	0.085	0.077	0.053	0.418	0.328						
	z	0.000	0.000	0.006	0.000	0.000	0.000	0.004	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.000	0.000	0.000	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
K	Pearson	0.274	1	0.166	0.068	0.335	0.113	0.208	0.076	0.229	0.025	0.155	0.096	0.080	0.171	0.031	0.015	0.261	0.349	0.005	0.114	0.554	0.433	0.307	0.086	1.03						
	z	0.000	0.000	0.120	0.000	0.000	0.187	0.000	0.000	0.000	0.113	0.000	0.000	0.000	0.000	0.002	0.143	0.000	0.000	0.538	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
CO	Pearson	0.008	0.166	1	0.311	0.115	0.008	0.166	0.004	0.226	0.000	0.022	0.002	0.081	0.036	0.002	0.001	0.100	0.570	0.056	0.008	0.007	0.310	0.073	0.115	0.086						
	z	0.000	0.000	0.002	0.000	0.000	0.189	0.000	0.000	0.000	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.305	0.000	0.000	0.453	0.199	0.002	0.000	0.137	0.000						
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
BA	Pearson	0.064	0.688	0.311	1	0.488	0.113	0.196	0.111	0.105	0.015	0.575	0.097	0.152	0.340	0.067	0.087	0.417	0.320	0.001	0.109	0.702	0.370	0.886	0.410	0.58						
	z	0.000	0.000	0.002	0.000	0.000	0.189	0.000	0.000	0.000	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
BE	Pearson	0.185	0.335	0.115	0.488	1	0.143	0.231	0.049	0.056	0.047	0.132	0.047	0.135	0.092	0.022	0.012	0.429	0.441	0.050	0.053	0.762	1.007	0.510	0.44	0.12						
	z	0.000	0.000	0.139	0.000	0.000	0.152	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.282	0.229	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
AG	Pearson	0.008	0.183	0.008	0.311	0.115	1	0.060	0.011	0.066	0.000	0.115	0.015	0.007	0.110	0.011	0.000	0.199	0.350	0.000	0.000	0.430	0.137	0.000	0.000	0.000						
	z	0.000	0.000	0.000	0.189	0.000	0.199	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
BI	Pearson	0.029	0.008	0.166	0.196	0.321	0.000	1	0.000	0.036	0.023	0.333	0.132	0.006	0.031	0.075	0.132	0.544	0.061	0.006	0.009	0.280	0.699	0.599	0.008	1.17						
	z	0.004	0.000	0.110	0.000	0.000	0.000	0.993	0.000	0.000	0.020	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.542	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
AS	Pearson	0.023	0.076	0.004	0.111	0.049	0.111	0.145	1	0.076	0.001	0.080	0.342	0.111	0.095	0.060	0.510	0.060	0.074	0.114	0.332	0.732	0.210	0.115	0.142							
	z	0.020	0.000	0.559	0.000	0.000	0.078	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.151	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
NI	Pearson	0.199	0.029	0.026	0.105	0.056	0.036	0.060	0.076	1	0.061	0.161	0.254	0.366	0.122	0.039	0.007	0.066	0.025	0.093	0.002	0.071	0.883	0.094	0.47	0.33						
	z	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
MC	Pearson	0.071	0.025	0.000	0.150	0.047	0.003	0.023	0.001	0.061	1	0.111	0.110	0.111	0.042	0.005	0.199	0.020	0.021	0.000	0.130	0.030	0.277	0.007	0.001	0.91						
	z	0.000	0.013	0.662	0.144	0.000	0.769	0.020	0.005	0.000	0.281	0.302	0.283	0.000	0.531	0.062	0.450	0.036	0.999	0.207	0.002	0.008	0.492	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
NA	Pearson	0.036	0.150	0.022	0.075	0.120	0.115	0.233	0.080	0.161	0.111	1	0.127	0.199	0.164	0.067	0.064	0.379	0.419	0.001	0.145	0.847	0.112	0.566	0.008	0.46						
	z	0.000	0.000	0.228	0.000	0.000	0.142	0.000	0.000	0.000	0.281	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
CD	Pearson	0.053	0.096	0.002	0.097	0.047	0.115	0.132	0.342	0.254	0.110	0.127	1	0.333	0.006	0.406	0.273	0.060	0.138	0.111	0.477	0.118	0.146	0.111	0.161	0.12						
	z	0.000	0.000	0.358	0.000	0.000	0.124	0.000	0.000	0.000	0.302	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.292	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
NI	Pearson	0.152	0.080	0.081	0.152	0.135	0.100	0.060	0.111	0.236	0.111	0.129	0.333	1	0.084	0.113	0.008	0.020	0.137	0.452	0.057	0.410	0.670	0.505	0.37	0.46						
	z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	sig.	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774	0.774
S	Pearson	0.115	0.171	0.036	0.340	0.092	0.100	0.031	0.095	0.122	0.042	0.164	0.060	0.084	1	0.359	0.129	0.088	0.087	0.007	0.140	0.139	0.270	0.104	0.31							

*Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

3.5 Trend Surface Analysis

Trend surface analysis is a mathematical method which can be applied to geological data (Davis, 2002). In a study area the values are not stable, they are fluctuating from place to place. Although there are fluctuations, a general trend plane which represents the mineralization best can be developed. In this study, equation of the trend plane for copper mean and maximum values, gold mean and maximum values, manganese mean and maximum values and zinc mean and maximum values were developed. In order to have a best plane equation, mean values were calculated again with removing statistically insignificant values.

The trend surface equation can simply be shown as,

$$Z = a + bX + cY. \text{ (Davis, 2002)}$$

X and Y values are the coordinates. To satisfy these X and Y coordinates a new coordinate system based on distance relationship between wells were developed for the study area. A point of origin (0,0) was chosen at the southwestern part of the study area, then X and Y values according to places of wells were given in meters as in the Table 5. The Table 6 which shows the trend surface equations and the goodness of fit values is down below.

Table 5: Distance parameters of the wells in meters.

Hole No	X	Y	Hole No	X	Y	Hole No	X	Y
KDD001	1135,6	397,9404	KDD015	1080,807	554,4881	KDD032	1042	507,0304
KDD001A	1138,77	413,9004	KDD016	1010,504	630,9995	KDD033	1019	322,0304
KDD002	1357,6	286,3804	KDD017	1155,793	497,1121	KDD034	1039	461,0304
KDD002A	1362,01	307,9204	KDD018	1248,282	437,6399	KDD035	1105	373,0304
KDD002B	1362,01	307,9204	KDD019	1125,48	233,2604	KDD036	1037	401,0304
KDD003	1202,901	0	KDD020	1311,148	378,1647	KDD037	804	318,0304
KDD004	726,5567	560,2268	KDD021	982,1015	465,4268	KDD038	903	350,0304
KDD005	903,319	472,0141	KDD022	1449,948	215,4438	KDD039	981	415,0304
KDD006	1220,905	347,42	KDD023	932,5423	644,3921	KDD040	1252	223,0304
KDD007	1290,431	279,6821	KDD024	1449,502	4,733106	KDD040A	1255	220,0304
KDD008	1084,944	327,9818	KDD025	1630,051	128,2157	KDD041	1353	220,0304
KDD009	1053,489	490,8476	KDD026	1080	422,0304	KDD042	1105	396,0304
KDD010	1150,615	552,0051	KDD027	865	267,0304	KDD043	1041	553,0304
KDD011	930,6161	437,8798	KDD028	883	231,0304	KDD044	0	245,0304
KDD012	940,836	563,2866	KDD028A	884	232,0304	KDD045	1091	315,0304
KDD013	1000,593	373,6065	KDD029	935	268,0304	KDD046	1150	352,0304
KDD013A	1007,338	390,7037	KDD030	985	521,0304			
KDD014	866,5907	620,4717	KDD031	968	286,0304			

Table 6: Trend surface equations and calculated components.

Elements	Equation			Goodness of Fit
	a	b(X)	c(Y)	R2
Cu_Mean	9980,894445	-6,159191747	-3,178164234	0,417163582
Cu_Max	103596,0476	-70,37620926	-50,01212327	0,492056177
Au_Mean	-0,03032404	0,000166033	0,000465865	0,132919859
Au_Max	0,113712611	0,000223385	0,001234853	0,085281005
Mn_Mean	1215,814364	-0,382967495	-0,843712106	0,36397402
Mn_Max	5752,094971	-2,334541843	-4,159713869	0,334169285
Zn_Mean	3208,707469	-1,996298817	-1,290765369	0,485724211
Zn_Max	40107,55325	-27,09484177	-15,7450268	0,454440604

Goodness of fit values show the relationship within the data values. The goodness of fit values close to “1” show high relationship and the goodness of fit values close to “0” show low relationship.

There is another test to see the representative degree of the equations. It is called F Distribution test and the low values show better degree of representation. This test was applied to data to examine the significance values and the reliability of the equations (Table 7).

Table 7: Significant values of the F – test.

Element	Significant Value
Cu_Mean	1,80258E-06
Cu_Max	6,20132E-08
Au_Mean	0,03037046
Au_Max	0,112602644
Mn_Mean	1,53156E-05
Mn_Max	4,70342E-05
Zn_Mean	8,40048E-08
Zn_Max	3,56969E-07

Values below the 0,05 mean there is a high reliability and the equations are highly representative. As it can be seen from the Table 5 the values are very low, and these low values show that the trend surface equations represent the mineralization areas best except the equation of maximum values of gold. According to this knowledge, with using these equations

the mineralization of a certain element can be found in different coordinates over the study area.

The trend surface maps were drawn with using the results coming from the trend surface equations. The maps were drawn for mean copper values (Figure 73), maximum copper values (Figure 74), mean gold values (Figure 75), maximum gold values (Figure 76), mean manganese values (Figure 77), maximum manganese values (Figure 78), mean zinc values (Figure 79) and for maximum zinc values (Figure 80).

According to trend surface plot of the copper mean values (Figure 73), there is a northeast – southwest trend of the plane, the mean values are increasing from northeast to southwest.

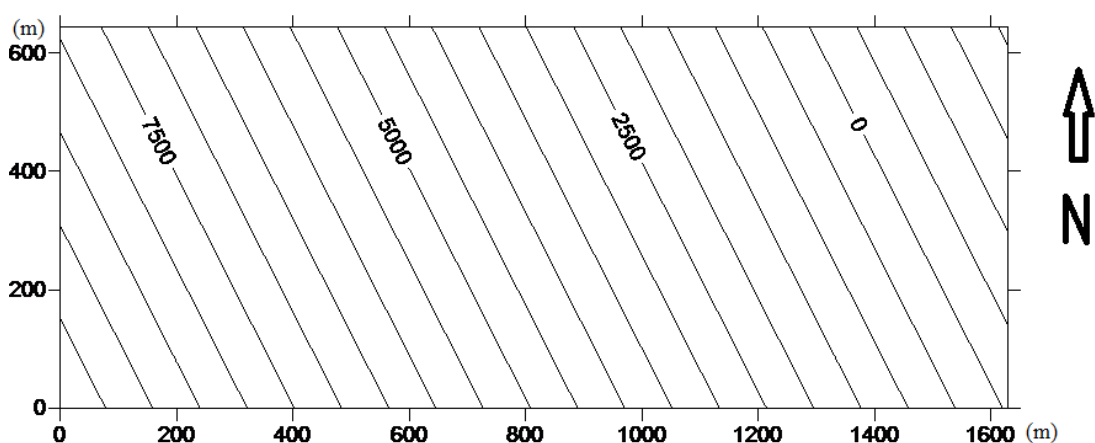


Figure 73: Trend surface map of the copper mean values.

As it can be seen from the trend surface plot of maximum values of the copper (Figure 74), the values are increasing from northeast to southwest. This northeast – southwest trend is also consistent with the mean values.

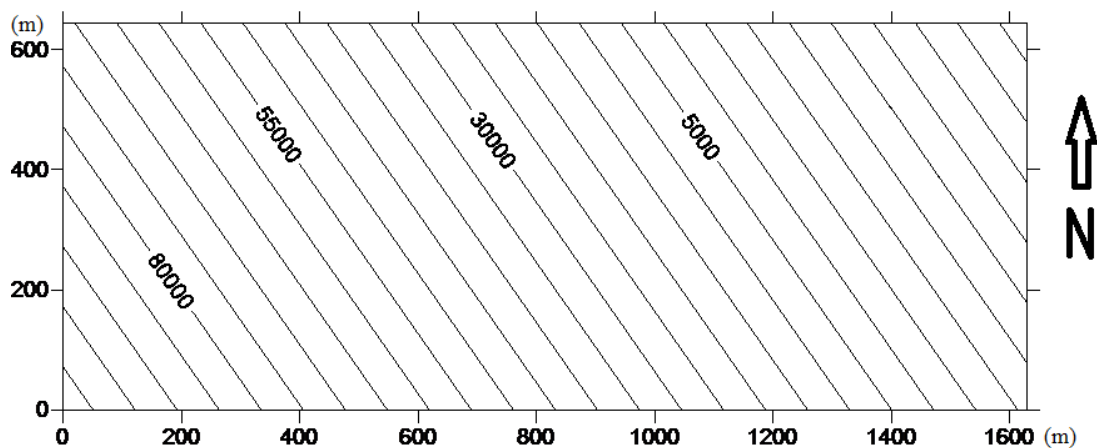


Figure 74: Trend surface map of the copper maximum values.

Trend surface plot of the mean values of the gold (Figure 75) shows a southwest – northeast trend, in an opposite behavior to the copper values. The mean values of chemical results of the gold are increasing from southwest to northeast.

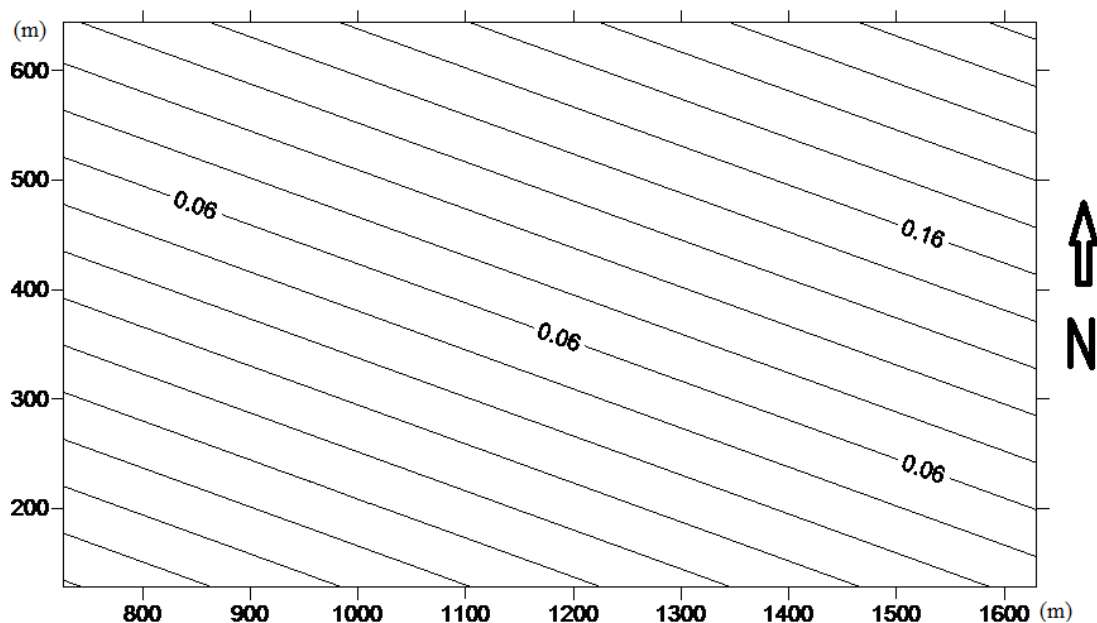


Figure 75: Trend surface map of the gold mean values.

As it can be observed from the trend surface map of the maximum gold values (Figure 76), there is a southwest – northeast trend consistent with gold mean values and in opposite behavior to copper values. The values are increasing from southeast to northwest.

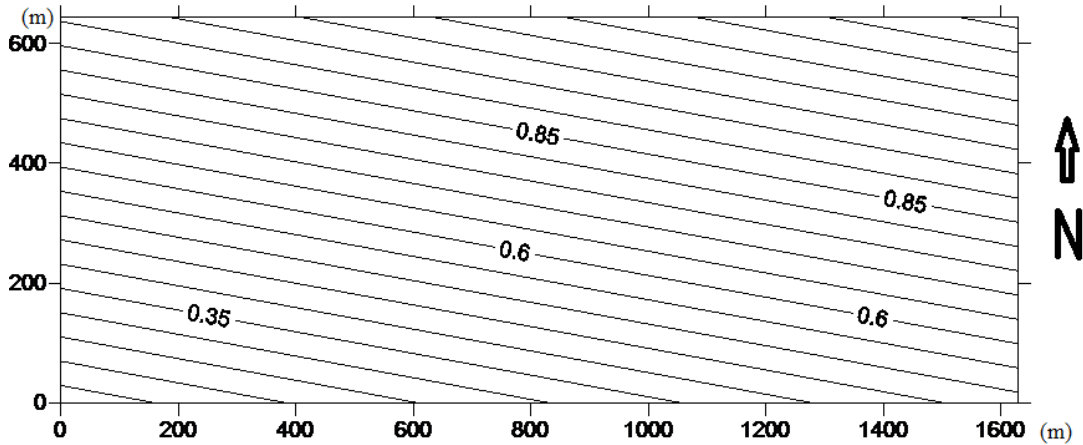


Figure 76: Trend surface map of the gold maximum values.

Trend surface plot of the mean manganese values (Figure 77) shows a northeast southwest trend consistent with copper values and in opposite behavior to gold values. The manganese values are increasing from northeast to southwest through the equation plane.

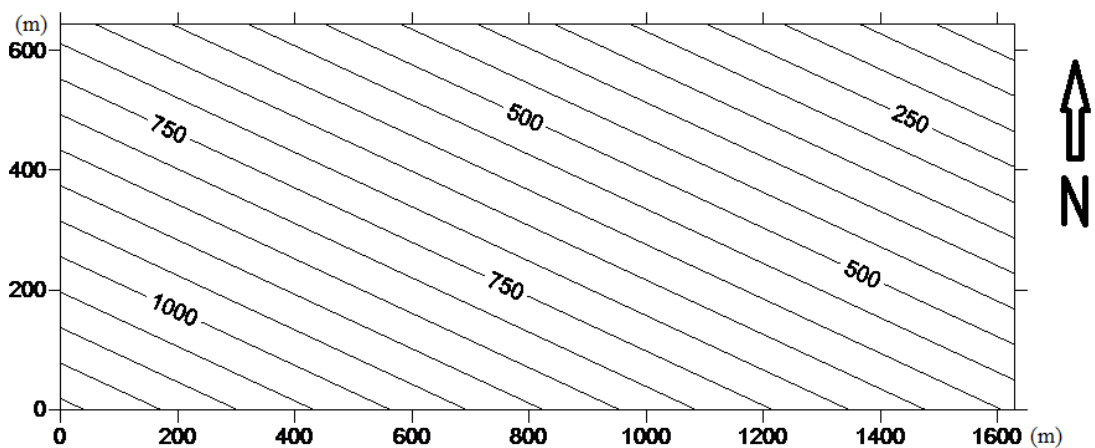


Figure 77: Trend surface map of the manganese mean values.

According to the plot of maximum manganese values (Figure 78), there is a northeast – southwest trend. The manganese values are increasing from northeast to southwest and this trend surface plane shows a consistency with copper values but it has an opposite behavior to the gold values.

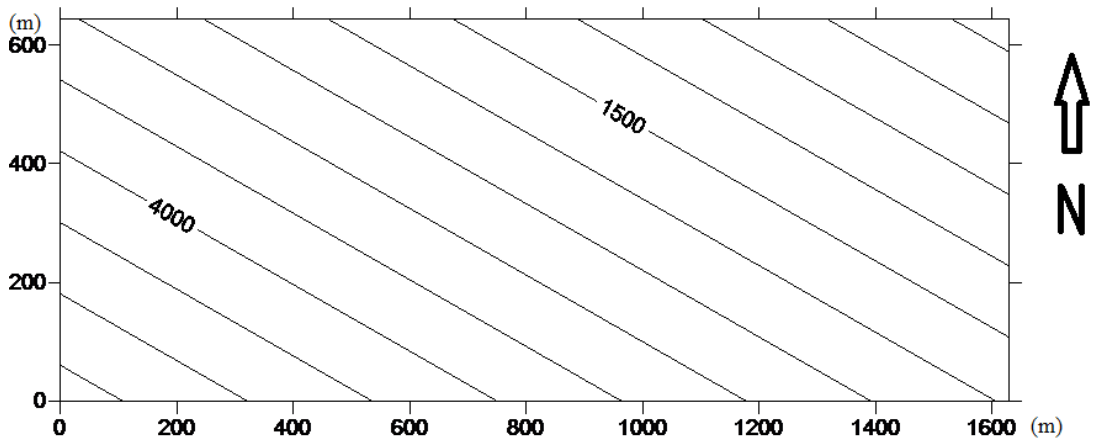


Figure 78: Trend surface map of the manganese maximum values.

As it can be seen from the plot of the trend surface map of the mean zinc values (Figure 79), there is a northeast southwest trend, but the direction of this plane is closer to east west. The mean values of zinc are increasing from northeast to southwest. This behavior of the plane is consistent with copper and manganese values but it is opposite to the gold values.

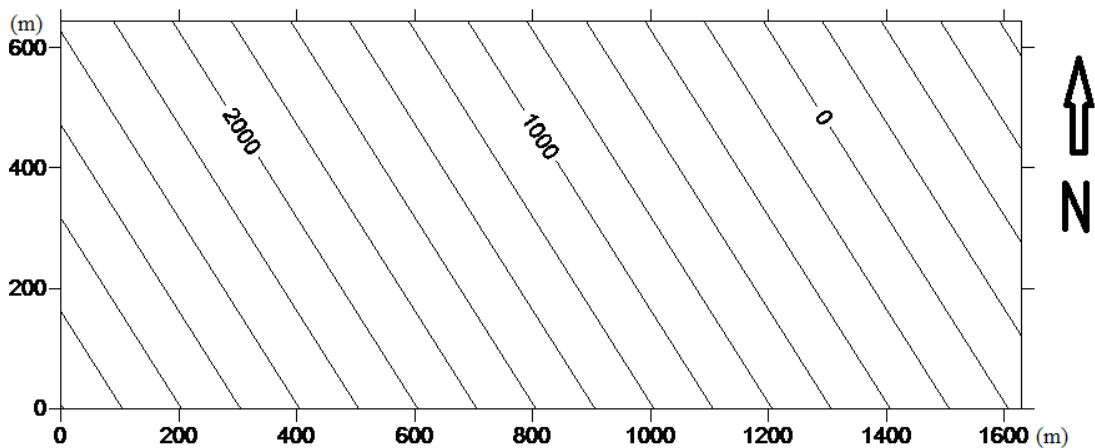


Figure 79: Trend surface map of the zinc mean values.

The trend surface plot of the maximum zinc values shows a northeast – southwest trend (Figure 80). The maximum zinc values are increasing from northeast to southwest through the plane. The plane shows a consistency with copper and manganese values but behavior of this plane is opposite to the gold values.

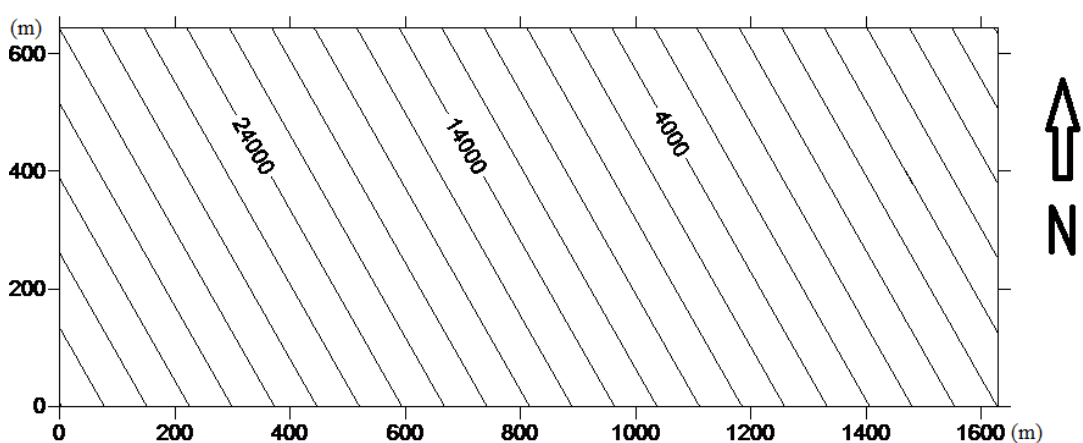


Figure 80: Trend surface map of the zinc maximum values.

There are contour lines below the zero contour line, these are produced by the computer program as extensive lines but there are not any values below the zero.

3.6 Principal Component Analysis

Principal component analysis is applied to determine the relations between measured properties and to represent the total variation with less number of variables. Chemical analysis result of copper, gold, manganese, zinc and silver were chosen for the analysis. Extraction table (Table 8), shows the proportion of each variable's variance that can be explained by the principal components. Variables with high values are well represented in the common factor space.

Table 8: Extraction table of the Au, Cu, Mn, Zn and Ag elements.

Communalities		
	Initial	Extraction
AUPPM	1,000	,756
MNPPM	1,000	,642
AGPPM	1,000	,041
CUPPM	1,000	,789
ZNPPM	1,000	,679

Extraction Method: Principal Component Analysis.

Total variance table (Table 9) shows different properties in different columns. Component column shows the variables join into the analysis. Initial eigenvalues columns show the variances of the variables. Extraction sums of squared loadings columns show the number of row reproduced on the right side of the table is determined by the number of principal components whose eigenvalues are 1 or greater.

Table 9: Principle component analysis results for Au, Cu, Mn, Zn and Ag elements.

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1,525	30,497	30,497	1,525	30,497	30,497
2	1,382	27,647	58,143	1,382	27,647	58,143
3	,993	19,857	78,000			
4	,661	13,225	91,226			
5	,439	8,774	100,000			

Extraction Method: Principal Component Analysis.

According to these results, two components reached cumulative of 58,143 percentage of the total variation. These two components are sufficient but not good to represent the relation among 5 variables. In general, 90 percent of the total variation can be considered as the limit for component extraction and remaining 10 percent can be accepted as random variation or noise for a good representation.

Component matrix (Table 10) shows the correlation between the variable and the component.

Table 10: Component matrix of Au, Cu, Mn, Zn and Ag elements.

	Component Matrix ^a	
	Component	
	1	2
AUPPM	,524	-,694
MNPPM	,255	,760
AGPPM	,193	,064
CUPPM	,864	-,204
ZNPPM	,633	,528

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

According to the table 8 there are two different groups. In the first group it can be considered as gold, copper, and zinc have relation with each other. In the second group it can be observed that manganese and zinc have a relation with each other. In the second group also gold can be considered as it has a reverse relationship with manganese and zinc. However it can be observed from the values at the table that for all two groups, the relations are not very strong.

Principal component analysis were applied to chemical analysis result to all elements to see whether there are relations between them or not. Again it can be seen that the relations are not very strong. Extraction table of all elements (Table 11) is down below.

Table 11: Extraction table of all elements

Communalities		
	Initial	Extraction
AUPPM	1,000	,684
MNPPM	1,000	,591
AGPPM	1,000	,593
CUPPM	1,000	,620
ZNPPM	1,000	,832
MOPPM	1,000	,759
PBPPM	1,000	,718
ASPPM	1,000	,666
K	1,000	,696
COPPM	1,000	,080
BAPPM	1,000	,771
BEPPM	1,000	,717
BIPPM	1,000	,510
NA	1,000	,760
CDPPM	1,000	,762
NIPPM	1,000	,743
S	1,000	,758
SBPPM	1,000	,690
SRPPM	1,000	,523
VPPM	1,000	,719
WPPM	1,000	,674
AL	1,000	,920
CA	1,000	,738
CRPPM	1,000	,728
FE	1,000	,738
MG	1,000	,643

Extraction Method: Principal Component Analysis.

According to total variance table of all elements (Table 12), 8 components reached the cumulative of 67,822 percentage, it is sufficient but again it shows the relations are very low and the rest of the data is irrelevant. These 8 components represents the 26 component best but statistically not good.

Table 12: Principle component analysis result for all elements.

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,861	18,697	18,697	4,861	18,697	18,697
2	2,929	11,267	29,964	2,929	11,267	29,964
3	2,497	9,605	39,569	2,497	9,605	39,569
4	2,155	8,288	47,857	2,155	8,288	47,857
5	1,569	6,034	53,891	1,569	6,034	53,891
6	1,440	5,539	59,431	1,440	5,539	59,431
7	1,142	4,393	63,823	1,142	4,393	63,823
8	1,039	3,998	67,822	1,039	3,998	67,822
9	,984	3,786	71,608			
10	,941	3,621	75,228			
11	,794	3,054	78,282			
12	,716	2,754	81,036			
13	,649	2,498	83,534			
14	,609	2,344	85,878			
15	,539	2,075	87,952			
16	,498	1,915	89,867			
17	,439	1,687	91,554			
18	,421	1,621	93,175			
19	,386	1,485	94,660			
20	,348	1,338	95,998			
21	,310	1,193	97,191			
22	,255	,982	98,174			
23	,190	,729	98,903			
24	,130	,501	99,404			
25	,107	,410	99,814			
26	,048	,186	100,000			

Extraction Method: Principal Component Analysis.

According to the values on the component matrix of all elements (Table 13), it can be easily seen the relations within the groups are not very high. It means the behaviors of the elements are not exactly same or not exactly reverse. These 8 groups can be considered as properties of the mineral deposit, for example, magma source, mining geology, and other environmental factors. This means along the 26 different element some properties of the certain elements are closer than the others and they can be grouped according to these properties.

Table 13: Component matrix of all elements.

Component Matrix ^a								
	Component							
	1	2	3	4	5	6	7	8
AUPPM	,045	-,060	-,600	,464	,283	-,111	,073	-,073
MNPPM	-,212	,281	,474	-,074	,310	-,327	,126	-,136
AGPPM	-,038	,084	,207	,253	,384	,569	-,072	-,018
CUPPM	-,095	,254	-,413	,326	,407	-,060	,226	,222
ZNPPM	-,294	,734	-,029	-,100	,288	-,242	,081	,221
MOPPM	,025	,002	,048	-,050	-,127	,119	-,125	,841
PBPPM	-,173	,704	-,167	-,029	-,235	,112	-,302	-,070
ASPPM	-,203	,672	-,164	-,004	-,277	,140	-,158	-,163
K	,775	,133	-,180	,171	,107	,005	-,049	,047
COPPM	-,019	,026	,093	,176	-,062	-,006	,151	,111
BAPPM	,831	,096	-,082	-,066	,186	-,019	-,156	-,020
BEPPM	,700	,239	,393	-,071	-,030	-,004	,101	,008
BIPPM	,277	,357	,036	-,152	-,005	,114	,499	-,143
NA	,852	,106	-,100	-,092	,054	,047	,002	-,010
CDPPM	-,273	,724	-,024	-,165	,236	-,213	,055	,175
NIPPM	-,174	,123	,643	,464	,101	,240	-,028	,010
S	-,220	,047	-,019	,098	-,494	,318	,564	,184
SBPPM	-,144	,627	-,161	-,005	-,363	,217	-,224	-,145
SRPPM	,492	,078	,300	-,321	-,152	,139	,183	,074
VPPM	,570	,106	,322	,385	-,246	-,251	-,082	,021
WPPM	-,021	,114	,299	,308	,379	,571	-,073	-,042
AL	,924	,202	,147	,020	-,054	-,013	-,004	,019
CA	-,478	-,032	,280	-,581	,161	,123	,189	-,129
CRPPM	-,484	-,104	,351	,485	-,227	-,186	-,178	,078
FE	,019	,184	-,115	,683	-,213	-,148	,361	-,163
MG	-,062	,126	,684	,103	,003	-,377	-,045	-,015

Extraction Method: Principal Component Analysis.

a. 8 components extracted.

According to the component matrix of all elements (Table 13), in the first component group there are high relations of potassium and sodium. In the second one Sb, Cd, As, Pb and Zn have high relations. Third component column shows that there are positive nickel and magnesium relations and negative gold relations. In the fourth component there are positively iron relation and negatively calcium relation. The component columns of five and eight show there are not any significant relations. In the sixth one there are Ag and W relations and in the seventh one there are S and Bi relations.

CHAPTER 4

DISCUSSION AND CONCLUSION

In the study area main rock units are Keban Metamorphics, Kabataş Subvolcanics and Munzur Limestone. There is a porphyry type mineral deposition and alteration type is potassic.

Chemical analysis result of the core samples, which were taken from the 52 drilled wells, were used in this study. Geostatistical methods were applied to characterize the deposition of the ore body and areal distribution of the mineral deposit.

Firstly, descriptive statistics values were found to describe the general behavior of the data set. It shows the minimum, mean and maximum values and variance values to understand the distribution of the data within the dataset. It is observed from the data set that most of the elements are normally distributed. For the further geostatistical analysis, normally distributed elements copper, manganese, zinc and gold were chosen. Copper, manganese and zinc have very significant values and gold were chosen because of its economic value. Their values are also continuous and these elements can be seen at all wells, through the study area at any depths. The statistically incoherent values were removed and the minus values were equalized to zero because there cannot be minus concentrations in a rock. The reason of these minus values is that these concentrations are lower than the detection limits of the instruments. These laboratory instruments produce minus values for these values.

Secondly, areal distribution models were developed to understand the element distributions over the study area. Arrangement of the ore body can also be realized with using the three dimensional models. The models were developed for the minimum, maximum and mean values of the copper, gold, manganese and zinc. Changes in element concentrations through the study area can be easily seen on the 3D models. The behaviors of the elements and their relationships through the study area can also be observed on the models.

Thirdly the linear regression analysis was applied to the chemical analysis results of the elements to determine the relations between the elements. Correlation matrix was prepared for all elements and according to the matrix it can be observed that the relations are very low

between the elements. There are some specific couples which have high relations; zinc – cadmium and aluminum – sodium but their values are not continuous and they do not have significant values. Element groups and their positive or negative relations according to the correlation matrix were also mentioned. Some of the elements are inversely proportional to others.

Trend surface analysis was applied to characterize the ore body and represent the best plane for the elements. New coordinated system was developed for the study area to determine the distance between the wells. The new mean values were calculated with removing the statistically incoherent values from the data set. The trend surface equations were found for the maximum and new mean values for the copper, gold, manganese and zinc. These trend surfaces show that the change in element concentrations have different directions and depths through the study area.

Finally, the principal component analysis was applied to elements copper, gold, manganese, silver and zinc in the first place. It is obtained from the tables that there are two groups for these elements and the relations are low within this groups. Then the principal component analysis was applied to all elements. There are eight groups for these elements but again the relations are low within these groups.

As a conclusion, in this study, the geostatistical evaluation of an important mining exploration field was completed. The properties of the copper-gold project field was described and characterized with numerical values.

Element concentrations versus depth graphs were drawn, then the general trends within the wells and general relations of elements within the wells were examined.

According to descriptive statistics application minimum, maximum and mean values, basic statistical properties, statistical distributions of values and quality of the data have been determined. The probability graphs were prepared and these graphs show the probability distribution of value ranges of each elements.

Three dimensional areal distribution models were prepared, behaviors and relations of the elements through the study area were realized with these models. According to the copper model, maximum values are intense at the western site, mean values are intense both western and eastern site. There are minimum value peaks along the northwest – southeast direction. The gold models show that maximum, mean and minimum values are intense at the eastern site. It can be observed from the Manganese models that the maximum values are intense at the western site, mean values are intense at the middle part and minimum values are intense at

the eastern site. Zinc maximum and mean values show a similar behavior and the values are intense at the western part but the minimum values are intense at the eastern part.

Linear regression was applied to data set and it was observed that there are positively or negatively related element results. Correlation matrix shows the related elements and their degrees of relation. There are no correlation between gold and other elements, it only has correlation with the copper but it is not very high. Behavior of the copper is similar with the gold. Manganese does not have any correlation with other elements. Zinc has high correlations with cadmium and lead. There are high correlations between potassium, sodium, barium, beryllium, calcium, and aluminum.

Equations of the best representative planes were determined with applying trend surface analysis and their goodness of fit parameters were found. The maps for these plane equations were drawn and the trend surfaces were shown in two dimensions. Copper mean and maximum maps show that there is northeast – southwest trend. Gold has a southwest – northeast trend. Manganese and Zinc also have northeast – southwest trends similar behavior with the copper.

Principal component analysis were applied to find representative groups of the chemical results of the elements with using their common properties. It worked sufficiently but not effectively. The group of five elements, copper, gold, silver, manganese and zinc has two component. In the first component there are high relationship with gold, copper and zinc, in the second component there are high relationships between positively manganese and zinc and negatively with gold. This method was also applied to all elements, and eight component have been determined. In the first component potassium and sodium have a high relationship, in second one Sb, Cd, As, Pb and Zn have high relationship, and in third one nickel and magnesium have positively high relationship and gold has negative relationship with them. In fourth component iron has positively high relationship, calcium has negatively high relationship. There are not any significant relationships in component group five and eight. In component six Ag and W have high relationships. At seventh component S and Bi have high relationships.

This study is going to be helpful to make a reserve calculation or mine planning. According to the produced knowledge the ore body can be understood better. Moreover, this study may also be helpful to plan the exploration works on the field.

REFERENCES

- ALS Geochemistry, 2013, *Schedules of services and fees*, ALS Global Bulletin, Canada.
- Avcı, N., Ak, S., and Tekin, Z., 1996, *Erzincan – İliç – Kemaliye yöresi altın aramaları raporu*, (unpublished).
- Avcı, N., Yıldızeli, N., Taşan, O., Biçen, C., Özcan, H., Ülgen, A. N., and Demirbaş, M., 1995, *Sivas – Divriği ve Erzincan – İliç – Kemaliye yöresi demir aramaları raporu*, MTA rapor no 9937, p51, Ankara (unpublished).
- David, M., and Blais, R.A., 1972, *Geostatistical ore reserve estimation*, Application of Computer Methods in the Mineral Industry: Proceedings of the Tenth International Symposium Johannesburg, South Africa.
- Davis, J. C., *Statistics and Data Analysis in Geology Third Edition*, John Wiley & Sons Press, 2002. P191, p397-p406.
- Deraisme, J., and De Fouquet, C., 1996, *The geostatistical approach for reserves*, Mining Magazine May 1996.
- Golden Software Inc., 2002, Surfer 8 (computer software), United States.
- IBM Software, 2003, IBM SPSS 11.5 (computer software), United States.
- Krige, D.G., 1981, *Lognormal-de Wijisian Geostatistics for ore evaluation*, South African Institute of Mining and Metallurgy, Johannesburg.
- Krige, D.G., and Dunn, P.G., 1994, *Some practical aspects of ore reserve estimation at Chuquicamata Copper Mine, Chile*.
- Ortiz, J.M., and Emery, X., 2006, *Geostatistical estimation of mineral resources with soft geological boundaries: a comparative study*, the Journal of the South African Institute of Mining and Metallurgy.
- Özgül, N., 1976, *Toroslar'ın bazı temel jeolojik özellikleri*, Türkiye Jeoloji Kurumu Bülteni, February 1976.
- Özgül, N., Turşucu, A., Özyardımcı, N., Şenol, M., Bingöl, İ. and Uysal, Ş., 1981, *Munzur dağlarının jeolojisi*, MTA Rapor No: 6995, Ankara.
- Stubens, T.C., 1988, *A geostatistical analysis of the Venus Mine, Yukon Territory*, UBC Msc. thesis.

Turan, M., and Bingöl, A.F., 1991, *Kovancılar – Baskil (Elazığ) arası bölgenin tektonostratigrafik özellikleri*, Çukurova Üniversitesi Ahmet Acar Sempozyumu Bildiriler Kitabı, Adana, 213-227.

Ulu, M., 1996, *Description and characterization of a carbonate reservoir in Karababa-C member, South Karakuş Field: Southeast Turkey*, METU Msc. thesis.

Walton, C., and Crowley, B., 2001, *YAMAS – Rio Tinto Joint Venture Report*, Erzincan (unpublished).

APPENDIX A

DESCRIPTIVE STATISTICS TABLES

Table A1: Descriptive statistics of KDD001 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	62	,04	11,09	,3577	1,38895	7,812	,304	61,326	,599
K	62	,04	24,81	,8003	3,10424	7,834	,304	61,572	,599
COPPM	62	2,15	1147,46	37,0148	145,01201	7,608	,304	59,049	,599
BAPPM	62	7,54	2391,44	77,1431	299,46847	7,815	,304	61,363	,599
BEPPM	62	-43,61	1,39	-1,4066	5,49660	-7,651	,304	59,696	,599
AGPPM	62	,50	422,00	13,6129	62,05161	5,776	,304	34,666	,599
BIPPM	62	-305,00	-5,00	-9,8387	38,10004	-7,874	,304	62,000	,599
ASPPM	62	-5,00	1656,92	53,4490	211,06773	7,423	,304	57,102	,599
MNPPM	62	28,78	27636,04	891,4852	3502,675	7,542	,304	58,333	,599
MOPPM	62	3,46	738,94	23,8368	92,84475	7,739	,304	60,507	,599
NA	62	,04	5,20	,1678	,65070	7,839	,304	61,623	,599
CDPPM	62	-1,00	63,45	2,0466	8,99158	5,594	,304	36,564	,599
NIPPM	62	3,40	1355,04	43,7110	173,73012	7,294	,304	55,576	,599
S	62	,01	54,84	1,7690	6,89958	7,704	,304	60,157	,599
PBPPM	62	-3,00	1652,59	53,3092	221,90969	6,565	,304	46,220	,599
SBPPM	62	-5,00	107,11	3,4551	20,47054	3,315	,304	12,139	,599
SRPPM	62	8,59	1198,71	38,6682	149,93270	7,843	,304	61,668	,599
VPPM	62	18,26	4256,44	137,3046	532,17546	7,853	,304	61,771	,599
WPPM	62	-5,00	1782,81	57,5102	296,49100	5,395	,304	28,517	,599
ZNPPM	62	18,74	26053,32	840,4297	3373,700	7,102	,304	53,318	,599
AL	62	,88	117,90	3,8033	14,74570	7,845	,304	61,687	,599
CA	62	,19	81,95	2,6436	10,29101	7,750	,304	60,651	,599
CRPPM	62	17,67	4888,68	157,6992	611,90549	7,826	,304	61,482	,599
CUPPM	62	535,83	128576,56	4147,6310	16099,86	7,817	,304	61,383	,599
FE	62	2,42	248,85	8,0276	31,11360	7,853	,304	61,773	,599
MG	62	,16	97,42	3,1425	12,21074	7,793	,304	61,120	,599
Valid N (listwise)	62								

Table A2: Descriptive statistics of KDD001A well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	436	-,01	1,52	,3544	,30671	,875	,117	,426	,233
K	436	,02	,75	,3281	,15815	,404	,117	-,589	,233
COPPM	436	2,13	117,31	12,9908	6,53035	10,374	,117	154,183	,233
BAPPM	436	-2,00	130,00	30,6408	20,10597	1,704	,117	3,744	,233
BEPPM	436	-1,00	2,00	-,9764	,24745	10,535	,117	110,932	,233
AGPPM	436	-,50	251,00	1,5346	13,16956	16,780	,117	305,140	,233
BIPPM	436	-5,00	6,07	-4,9746	,53038	20,881	,117	436,000	,233
ASPPM	436	-5,00	6543,52	24,7664	316,57383	20,186	,117	416,052	,233
MNPPM	436	8,96	2214,33	382,0518	236,95895	2,050	,117	8,602	,233
MOPPM	436	1,00	86,84	6,7625	8,44747	4,579	,117	29,361	,233
NA	436	,01	,19	,0582	,02664	1,208	,117	2,381	,233
CDPPM	436	-1,00	162,16	-,1485	8,25651	17,931	,117	346,854	,233
NIPPM	436	2,64	77,66	7,1396	5,21792	8,550	,117	96,240	,233
S	436	,01	8,00	2,1458	1,39964	,755	,117	,840	,233
PBPPM	436	-3,00	9674,84	39,6122	469,26531	20,036	,117	411,336	,233
SBPPM	436	-5,00	557,84	-,3193	33,29545	12,853	,117	194,822	,233
SRPPM	436	4,67	235,00	52,2291	37,39651	1,320	,117	3,006	,233
VPPM	436	6,90	141,00	63,0997	18,99126	-,121	,117	,815	,233
WPPM	436	-5,00	444,10	-2,0214	25,33372	14,628	,117	239,161	,233
ZNPPM	436	14,87	26805,28	176,9711	1343,418	18,310	,117	358,208	,233
AL	436	,47	5,17	1,4104	,48970	3,253	,117	19,383	,233
CA	436	,09	8,81	2,2901	1,19766	,949	,117	3,293	,233
CRPPM	436	29,00	303,00	116,3299	51,05007	,703	,117	,598	,233
CUPPM	436	5,00	19862,23	2638,9327	2089,965	1,524	,117	9,388	,233
FE	436	2,19	9,63	4,4399	1,16291	,487	,117	,350	,233
MG	436	,08	4,09	1,1257	,37964	1,354	,117	9,629	,233
Valid N (listwise)	436								

Table A3: Descriptive statistics of KDD002 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	27	,08	,20	,1311	,03344	,029	,448	-,693	,872
K	27	,28	1,29	,6933	,26899	,774	,448	,121	,872
COPPM	27	7,00	24,00	13,5185	4,04180	,534	,448	,294	,872
BAPPM	27	32,00	88,00	56,0000	13,81749	,734	,448	,399	,872
BEPPM	27	-1,00	1,00	-,9259	,38490	5,196	,448	27,000	,872
AGPPM	27	-,50	7,40	,0815	1,60457	4,001	,448	17,743	,872
BIPPM	27	-5,00	-5,00	-5,0000	,00000	.	.	.	.
ASPPM	27	-5,00	18,00	-,6296	7,84047	1,453	,448	,592	,872
MNPPM	27	95,00	926,00	238,7407	191,17825	3,000	,448	8,803	,872
MOPPM	27	1,00	116,00	18,5926	24,22056	2,762	,448	9,640	,872
NA	27	,07	,34	,1074	,05058	3,966	,448	18,378	,872
CDPPM	27	-1,00	1,00	-,9259	,38490	5,196	,448	27,000	,872
NIPPM	27	6,00	53,00	14,5556	15,17674	1,966	,448	2,586	,872
S	27	-,01	3,35	,8248	,90494	1,066	,448	,524	,872
PBPPM	27	-3,00	36,00	6,2593	10,92489	1,648	,448	2,224	,872
SBPPM	27	-5,00	-5,00	-5,0000	,00000	.	.	.	.
SRPPM	27	8,00	86,00	16,9630	14,45545	4,498	,448	21,872	,872
VPPM	27	61,00	128,00	94,2593	14,69849	-,027	,448	,787	,872
WPPM	27	-5,00	59,00	-1,5185	12,74112	4,494	,448	21,361	,872
ZNPPM	27	46,00	261,00	94,3333	50,34573	2,240	,448	5,134	,872
AL	27	1,57	4,35	1,9959	,54209	3,403	,448	14,051	,872
CA	27	,13	3,94	,4985	,72335	4,460	,448	21,487	,872
CRPPM	27	52,00	144,00	77,0370	23,92051	1,617	,448	2,025	,872
CUPPM	27	600,00	2571,00	1560,6296	513,91238	,334	,448	-,370	,872
FE	27	3,31	5,42	4,2004	,56667	,670	,448	-,059	,872
MG	27	1,39	2,86	1,7307	,29160	2,322	,448	7,890	,872
Valid N (listwise)	27								

Table A4: Descriptive statistics of KDD002A well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	13	,04	,07	,0485	,00987	,967	,616	,160	1,191
K	13	,44	1,53	,9608	,37082	,244	,616	-1,214	1,191
COPPM	13	14,00	37,00	24,0000	6,65833	,434	,616	-,574	1,191
BAPPM	13	29,00	98,00	69,6923	19,15457	-,846	,616	,926	1,191
BEPPM	13	1,00	2,00	1,6923	,48038	-,946	,616	-1,339	1,191
AGPPM	13	-,50	1,00	-,3000	,49497	2,305	,616	4,181	1,191
BIPPM	13	-5,00	-5,00	-5,0000	,00000	.	.	.	.
ASPPM	13	-5,00	21,00	2,6923	9,76716	,919	,616	-,440	1,191
MNPPM	13	284,00	565,00	435,0769	90,74549	-,102	,616	-,750	1,191
MOPPM	13	1,00	46,00	19,6923	15,96551	,287	,616	-1,339	1,191
NA	13	,12	,53	,2854	,14016	,346	,616	-1,311	1,191
CDPPM	13	-1,00	1,00	-,2308	1,01274	,539	,616	-2,056	1,191
NIPPM	13	29,00	65,00	47,2308	11,09920	,257	,616	-,820	1,191
S	13	,01	4,26	1,3169	1,33967	,702	,616	,065	1,191
PBPPM	13	4,00	22,00	8,0000	5,13160	1,872	,616	4,052	1,191
SBPPM	13	-5,00	-5,00	-5,0000	,00000	.	.	.	.
SRPPM	13	41,00	164,00	102,1538	37,32704	,204	,616	-,571	1,191
VPPM	13	47,00	125,00	100,8462	21,54006	-1,414	,616	2,086	1,191
WPPM	13	-5,00	9,00	-3,9231	3,88290	3,606	,616	13,000	1,191
ZNPPM	13	77,00	199,00	152,8462	44,21321	-,639	,616	-1,043	1,191
AL	13	2,89	6,97	5,4731	1,43556	-,907	,616	-,589	1,191
CA	13	,78	11,64	2,5223	2,82509	3,237	,616	11,088	1,191
CRPPM	13	39,00	105,00	85,6923	15,79760	-2,257	,616	7,027	1,191
CUPPM	13	303,00	821,00	540,6923	130,01627	,248	,616	,979	1,191
FE	13	2,97	6,08	4,9154	,92031	-,930	,616	,158	1,191
MG	13	1,57	6,29	3,1646	1,45678	1,307	,616	,916	1,191
Valid N (listwise)	13								

Table A5: Descriptive statistics of KDD002B well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	281	,01	,56	,1165	,07717	1,573	,145	4,171	,290
K	281	-,01	1,12	,4473	,24243	,439	,145	-,003	,290
COPPM	281	3,00	32,00	11,7509	3,50946	1,467	,145	5,615	,290
BAPPM	281	-2,00	250,00	49,2456	28,47932	1,599	,145	9,633	,290
BEPPM	281	-1,00	1,00	-,9786	,20591	9,574	,145	90,297	,290
AGPPM	281	-,50	8,60	-,0562	,99210	4,157	,145	25,689	,290
BIPPM	281	-5,00	-5,00	-5,0000	,00000	.	.	.	.
ASPPM	281	-5,00	339,00	7,3452	35,78375	5,813	,145	40,635	,290
MNPPM	281	69,00	1900,00	348,6370	192,78987	4,046	,145	22,992	,290
MOPPM	281	1,00	1029,00	28,1509	76,34154	9,286	,145	109,748	,290
NA	281	-,01	,42	,1153	,06377	1,227	,145	3,528	,290
CDPPM	281	-1,00	15,00	-,5018	1,97145	5,378	,145	33,108	,290
NIPPM	281	2,00	56,00	8,4342	7,44097	3,906	,145	16,259	,290
S	281	,05	23,77	2,8749	3,78590	3,478	,145	13,924	,290
PBPPM	281	-3,00	821,00	9,8007	54,80768	12,648	,145	178,127	,290
SBPPM	281	-5,00	173,00	-3,2491	12,78176	11,380	,145	143,674	,290
SRPPM	281	13,00	1716,00	71,9466	111,82474	11,577	,145	167,775	,290
VPPM	281	3,00	151,00	74,7936	23,55207	-,306	,145	1,237	,290
WPPM	281	-5,00	105,00	-4,5623	6,60497	16,442	,145	273,270	,290
ZNPPM	281	-2,00	1646,00	110,4840	213,00753	5,257	,145	28,763	,290
AL	281	,06	4,57	1,8047	,54222	,772	,145	4,816	,290
CA	281	,40	28,95	3,9796	5,00154	3,105	,145	10,517	,290
CRPPM	281	-2,00	223,00	84,5552	34,77517	,710	,145	2,088	,290
CUPPM	281	127,00	12043,00	1341,3737	973,87868	5,382	,145	52,365	,290
FE	281	,65	7,27	3,4072	,99555	,017	,145	,804	,290
MG	281	,09	3,25	1,4706	,39760	,019	,145	3,729	,290
Valid N (listwise)	281								

Table A6: Descriptive statistics of KDD003 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	271	-,01	,15	,0114	,01577	3,175	,148	23,596	,295
K	271	-,01	,96	,1977	,18792	1,326	,148	2,092	,295
COPPM	271	1,08	108,08	29,2785	17,78377	,707	,148	,563	,295
BAPPM	271	-2,00	91,26	19,4091	17,69728	,955	,148	,713	,295
BEPPM	271	-1,00	6,07	-,4406	1,14070	1,975	,148	3,951	,295
AGPPM	271	-,50	251,00	,6015	15,29091	16,386	,148	269,288	,295
BIPPM	271	-5,00	14,81	-3,4978	4,14187	2,581	,148	5,364	,295
ASPPM	271	-5,00	759,94	12,0758	48,07302	14,150	,148	219,039	,295
MNPPM	271	6,14	4770,20	629,0628	807,73137	2,641	,148	8,042	,295
MOPPM	271	1,00	51,02	2,0257	3,76320	9,300	,148	109,878	,295
NA	271	-,01	1,32	,2687	,21835	1,010	,148	1,274	,295
CDPPM	271	-1,00	76,23	,8113	6,90634	6,931	,148	61,892	,295
NIPPM	271	4,18	443,61	73,5979	66,80915	3,049	,148	10,781	,295
S	271	,03	18,32	4,6444	2,96042	1,237	,148	3,440	,295
PBPPM	271	-3,00	500,60	12,2547	45,45380	8,162	,148	73,301	,295
SBPPM	271	-5,00	30,58	-4,8151	2,33155	13,920	,148	203,466	,295
SRPPM	271	3,02	270,94	83,0493	56,60424	,703	,148	,171	,295
VPPM	271	3,16	214,72	73,1970	50,09410	,651	,148	-,453	,295
WPPM	271	-5,00	675,28	-1,7056	41,72563	15,965	,148	259,438	,295
ZNPPM	271	7,11	13543,35	383,3730	1264,988	6,570	,148	54,676	,295
AL	271	,09	6,30	2,7562	1,31506	,174	,148	-,542	,295
CA	271	,01	31,90	4,1681	5,20597	2,506	,148	7,330	,295
CRPPM	271	6,88	600,91	101,7002	74,54953	3,251	,148	13,966	,295
CUPPM	271	6,03	2748,21	191,7550	307,78091	5,155	,148	33,377	,295
FE	271	,40	16,68	5,5865	2,50557	1,268	,148	2,778	,295
MG	271	,03	4,24	1,2093	,81894	1,045	,148	,867	,295
Valid N (listwise)	271								

Table A7: Descriptive statistics of KDD004 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	69	,01	,36	,0352	,04199	7,036	,289	54,439	,570
K	69	,03	1,28	,4870	,36092	,611	,289	-,895	,570
COPPM	69	2,00	35,00	15,4203	7,64354	,467	,289	-,024	,570
BAPPM	69	-2,00	106,00	21,4058	21,12659	1,716	,289	3,910	,570
BEPPM	69	-1,00	4,00	,8261	1,28288	-,181	,289	-,693	,570
AGPPM	69	-,50	13,30	-,0942	1,73899	6,996	,289	53,506	,570
BIPPM	69	-5,00	-5,00	-5,0000	,00000	.	.	.	.
ASPPM	69	-5,00	272,00	6,5942	36,96513	5,868	,289	40,097	,570
MNPPM	69	52,00	721,00	173,6957	111,55720	2,238	,289	7,660	,570
MOPPM	69	1,00	39,00	9,1190	7,93138	2,027	,289	4,877	,570
NA	69	,01	1,01	,2665	,21476	,732	,289	,480	,570
CDPPM	69	-1,00	90,00	2,0870	11,51819	6,880	,289	51,700	,570
NIPPM	69	19,00	156,00	43,1159	25,60419	2,434	,289	6,918	,570
S	69	-,01	9,65	3,3825	2,86095	,494	,289	-,930	,570
PBPPM	69	-3,00	1755,00	92,3913	311,25638	4,509	,289	20,980	,570
SBPPM	69	-5,00	303,00	9,0290	44,47470	5,130	,289	29,857	,570
SRPPM	69	10,00	434,00	148,0435	112,47489	,784	,289	-,242	,570
VPPM	69	18,00	140,00	73,2029	30,12942	,244	,289	-,936	,570
WPPM	69	-5,00	-5,00	-5,0000	,00000	.	.	.	.
ZNPPM	69	18,00	13114,00	451,2464	1653,849	7,035	,289	52,719	,570
AL	69	1,27	6,68	4,1701	1,13321	-,134	,289	-,457	,570
CA	69	,16	10,41	4,1230	3,33002	,561	,289	-1,053	,570
CRPPM	69	46,00	252,00	103,7826	43,34332	1,264	,289	1,447	,570
CUPPM	69	43,00	1746,00	356,3623	263,45035	2,455	,289	10,265	,570
FE	69	1,56	11,74	4,4794	1,87269	1,904	,289	4,556	,570
MG	69	,28	2,66	1,5029	,67092	,063	,289	-1,142	,570
Valid N (listwise)	69								

Table A8: Descriptive statistics of KDD005 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	171	,03	1,28	,2238	,18521	2,163	,186	7,068	,369
K	171	,10	,56	,2736	,08979	,601	,186	,239	,369
COPPM	171	7,00	27,84	13,4682	3,10407	1,610	,186	4,402	,369
BAPPM	171	2,00	70,00	23,5893	12,71150	1,041	,186	1,845	,369
BEPPM	171	-1,00	-1,00	-1,0000	,00000	.	.	.	.
AGPPM	171	-,50	7,80	,2193	1,14560	2,854	,186	13,056	,369
BIPPM	171	-5,00	12,73	-4,6248	2,22045	6,085	,186	37,395	,369
ASPPM	171	-5,00	515,34	17,4000	54,18676	6,016	,186	46,512	,369
MNPPM	171	17,23	723,00	309,5784	127,78273	,076	,186	,303	,369
MOPPM	171	1,00	53,00	5,1178	5,37872	5,538	,186	41,233	,369
NA	171	-,01	,15	,0594	,02551	,607	,186	,635	,369
CDPPM	171	-1,00	54,00	,1014	4,93828	8,485	,186	85,998	,369
NIPPM	171	4,00	46,00	7,0304	5,26335	5,474	,186	32,766	,369
S	171	,11	19,84	3,6817	3,17483	2,140	,186	7,146	,369
PBPPM	171	-3,00	793,00	34,4298	106,24364	4,902	,186	26,419	,369
SBPPM	171	-5,00	514,00	8,0160	49,51307	7,788	,186	71,150	,369
SRPPM	171	13,00	562,51	65,3990	76,90332	3,776	,186	16,922	,369
VPPM	171	7,00	151,00	61,9413	23,75766	-,130	,186	,136	,369
WPPM	171	-5,00	-5,00	-5,0000	,00000	.	.	.	.
ZNPPM	171	14,00	7460,00	208,7245	708,43009	7,709	,186	69,745	,369
AL	171	,24	3,30	1,4451	,36745	,597	,186	6,691	,369
CA	171	,54	11,15	2,6403	1,94138	2,221	,186	6,121	,369
CRPPM	171	52,00	438,00	141,8842	51,39706	,984	,186	5,110	,369
CUPPM	171	349,00	6319,37	1634,8817	1034,305	1,612	,186	3,475	,369
FE	171	2,53	12,57	4,5112	1,37519	3,429	,186	14,310	,369
MG	171	,03	4,60	1,1653	,42492	2,744	,186	25,637	,369
Valid N (listwise)	171								

Table A9: Descriptive statistics of KDD006 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	337	-,01	1,25	,2684	,19374	1,027	,133	1,801	,265
K	337	,00	2,88	1,3939	,60612	-,791	,133	,089	,265
COPPM	337	,00	45,00	9,4926	4,12896	1,642	,133	16,018	,265
BAPPM	337	,00	510,00	253,9169	132,58229	-,405	,133	-,900	,265
BEPPM	337	,00	1,80	,7249	,27759	-1,132	,133	2,480	,265
AGPPM	337	,00	11,80	,2982	1,03576	6,604	,133	56,550	,265
BIPPM	337	,00	5,00	,2730	,91431	3,498	,133	11,884	,265
ASPPM	337	,00	357,00	11,3561	35,92267	6,128	,133	45,253	,265
MNPPM	337	26,00	2040,00	356,6558	205,89229	2,160	,133	13,762	,265
MOPPM	337	1,00	205,00	9,7359	17,32321	6,879	,133	62,469	,265
NA	337	,00	3,51	2,3051	,80562	-1,312	,133	1,259	,265
CDPPM	337	,00	12,70	,3249	1,11188	6,443	,133	54,714	,265
NIPPM	337	,00	89,00	4,5045	8,37127	6,665	,133	54,283	,265
S	337	,00	9,10	1,2238	1,65981	2,465	,133	6,757	,265
PBPPM	337	,00	641,00	19,8635	55,90441	6,946	,133	59,740	,265
SBPPM	337	,00	87,00	1,7181	6,97492	7,794	,133	77,584	,265
SRPPM	337	25,00	479,00	164,1454	75,30051	,524	,133	,713	,265
VPPM	337	3,00	257,00	85,7715	25,68313	-,168	,133	9,073	,265
WPPM	337	,00	120,00	,8605	7,03952	14,863	,133	246,711	,265
ZNPPM	337	17,00	1290,00	95,2700	135,46967	5,639	,133	36,502	,265
AL	337	,06	8,92	6,6348	1,75930	-2,152	,133	4,784	,265
CA	337	,08	25,90	4,0780	6,22483	2,265	,133	3,771	,265
CRPPM	337	2,00	95,00	12,0237	11,20053	4,885	,133	28,906	,265
CUPPM	337	34,00	7830,00	1820,9733	1331,592	1,387	,133	2,694	,265
FE	337	,76	7,00	4,0260	1,04640	-,679	,133	,574	,265
MG	337	,13	2,23	1,1203	,37024	-,392	,133	,738	,265
Valid N (listwise)	337								

Table A10: Descriptive statistics of KDD007 well.

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	348	-,01	1,05	,2091	,16485	1,581	,131	3,645	,261
K	348	,01	3,06	1,4059	,50307	-,204	,131	,536	,261
COPPM	348	,00	38,00	9,9138	4,24312	2,565	,131	13,168	,261
BAPPM	348	,00	660,00	273,0172	114,93053	,025	,131	-,117	,261
BEPPM	348	,00	1,80	,7796	,18847	-1,049	,131	7,191	,261
AGPPM	348	,00	9,10	,2388	,83031	6,025	,131	47,401	,261
BIPPM	348	,00	4,00	,0862	,45366	5,567	,131	32,485	,261
ASPPM	348	,00	443,00	10,0517	36,33169	7,847	,131	74,604	,261
MNPPM	348	31,00	992,00	313,0057	134,38718	1,580	,131	4,668	,261
MOPPM	348	1,00	367,00	13,7557	26,38193	8,090	,131	95,062	,261
NA	348	,05	3,15	2,3090	,49498	-1,580	,131	3,636	,261
CDPPM	348	,00	9,20	,1092	,69351	10,636	,131	123,731	,261
NIPPM	348	,00	122,00	4,9454	11,10183	8,684	,131	81,149	,261
S	348	,00	9,59	2,6554	2,16594	,853	,131	,029	,261
PBPPM	348	,00	416,00	10,1063	27,01409	11,930	,131	163,495	,261
SBPPM	348	,00	143,00	2,0460	10,61716	9,426	,131	105,978	,261
SRPPM	348	28,00	2560,00	206,6178	170,31123	8,841	,131	111,341	,261
VPPM	348	9,00	122,00	81,0632	15,32065	-,900	,131	2,449	,261
WPPM	348	,00	20,00	1,2069	3,43448	2,759	,131	7,032	,261
ZNPPM	348	10,00	1210,00	62,1006	90,01632	10,710	,131	124,681	,261
AL	348	,26	8,16	6,6525	1,05808	-2,619	,131	9,754	,261
CA	348	,14	22,70	4,0721	3,97675	2,104	,131	5,266	,261
CRPPM	348	1,00	305,00	16,0374	26,14934	5,960	,131	50,660	,261
CUPPM	348	78,00	9510,00	1879,5287	1236,061	1,570	,131	4,815	,261
FE	348	1,13	6,77	3,4977	,90807	,341	,131	,352	,261
MG	348	,29	1,95	1,1443	,22903	-,345	,131	1,058	,261
Valid N (listwise)	348								

Table A11: Descriptive statistics of KDD008 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	257	-,01	,83	,1705	,18347	,034	1,110	,152	,504	,303
K	257	,43	3,62	1,4660	,42294	,179	1,509	,152	5,849	,303
COPPM	257	5,00	57,00	9,8560	4,23512	17,936	6,065	,152	60,679	,303
BAPPM	257	60,00	580,00	351,7121	113,97380	12990,026	-,302	,152	-,484	,303
BEPPM	257	,00	1,40	,9241	,19315	,037	-1,339	,152	3,361	,303
AGPPM	257	,00	2,70	,1253	,38733	,150	4,036	,152	18,204	,303
BIPPM	257	,00	9,00	,4981	1,23150	1,517	3,078	,152	11,898	,303
ASPPM	257	,00	244,00	8,0856	19,63934	385,704	8,190	,152	86,587	,303
MNPPM	257	49,00	932,00	452,7938	136,60510	18660,953	,739	,152	1,018	,303
MOPPM	257	1,00	50,00	3,7899	5,22713	27,323	5,005	,152	33,116	,303
NA	257	,28	3,37	2,5770	,40890	,167	-1,984	,152	6,578	,303
CDPPM	257	,00	6,30	,0953	,59770	,357	8,134	,152	72,356	,303
NIPPM	257	,00	42,00	4,4319	4,61446	21,293	3,850	,152	21,734	,303
S	257	,00	5,94	1,2011	1,02890	1,059	1,601	,152	3,431	,303
PBPPM	257	,00	774,00	21,0311	75,48804	5698,444	7,549	,152	62,157	,303
SBPPM	257	,00	106,00	1,2840	9,67767	93,657	9,124	,152	85,617	,303
SRPPM	257	25,00	540,00	225,0272	80,49085	6478,777	,278	,152	,025	,303
VPPM	257	61,00	167,00	92,2062	14,42628	208,117	1,875	,152	8,085	,303
WPPM	257	,00	10,00	,5837	2,34891	5,517	3,790	,152	12,460	,303
ZNPPM	257	23,00	998,00	76,9961	88,25799	7789,473	7,765	,152	69,266	,303
AL	257	4,55	11,35	7,4789	,90749	,824	-,438	,152	2,522	,303
CA	257	,31	6,10	2,6258	,86484	,748	,015	,152	,386	,303
CRPPM	257	2,00	51,00	9,8327	6,28981	39,562	3,723	,152	17,748	,303
CUPPM	257	20,00	4670,00	1005,6965	1021,649	1043766	1,129	,152	,679	,303
FE	257	2,42	16,95	4,0755	1,45841	2,127	4,077	,152	28,191	,303
MG	257	,29	2,58	1,2430	,25475	,065	1,903	,152	9,276	,303
Valid N (listwise)	257									

Table A12: Descriptive statistics of KDD009 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	288	-,01	1,22	,3182	,22426	,050	1,117	,144	1,266	,286
K	288	,51	2,93	1,5362	,47391	,225	-,094	,144	-,512	,286
COPPM	288	4,00	54,00	10,8993	3,95184	15,617	5,165	,144	49,659	,286
BAPPM	288	30,00	520,00	219,2361	118,88905	14134,606	,184	,144	-,657	,286
BEPPM	288	,00	1,30	,6021	,27382	,075	-1,026	,144	,717	,286
AGPPM	288	,00	5,20	,4587	,80287	,645	2,429	,144	7,459	,286
BIPPM	288	,00	4,00	,1563	,60764	,369	3,945	,144	15,124	,286
ASPPM	288	,00	320,00	21,2951	43,76481	1915,359	3,693	,144	16,316	,286
MNPPM	288	77,00	1430,00	309,5729	154,91642	23999,096	2,702	,144	11,541	,286
MOPPM	288	1,00	200,00	5,9583	13,79308	190,249	10,463	,144	138,654	,286
NA	288	,70	3,14	2,0929	,43180	,186	-,205	,144	-,255	,286
CDPPM	288	,00	21,40	,4128	1,80667	3,264	9,092	,144	90,524	,286
NIPPM	288	,00	20,00	3,2882	2,28392	5,216	2,205	,144	11,637	,286
S	288	,00	9,84	2,5057	1,96590	3,865	1,348	,144	1,990	,286
PBPPM	288	,00	434,00	10,9479	29,94188	896,516	11,704	,144	152,322	,286
SBPPM	288	,00	112,00	2,6285	9,59371	92,039	7,115	,144	66,182	,286
SRPPM	288	14,00	588,00	152,2708	91,54068	8379,696	1,143	,144	1,860	,286
VPPM	288	30,00	138,00	85,1215	13,73552	188,665	-,285	,144	1,626	,286
WPPM	288	,00	10,00	,7292	2,60452	6,784	3,302	,144	8,969	,286
ZNPPM	288	6,00	2420,00	77,4201	218,25606	47635,708	8,979	,144	84,606	,286
AL	288	3,70	8,51	6,4412	1,08389	1,175	-,298	,144	-,615	,286
CA	288	,45	12,75	2,5264	1,41294	1,996	2,523	,144	12,949	,286
CRPPM	288	3,00	36,00	10,7118	4,60990	21,251	1,705	,144	5,177	,286
CUPPM	288	15,00	8110,00	2913,2500	1692,766	2865457	,520	,144	,154	,286
FE	288	2,15	17,55	4,5777	1,29184	1,669	4,194	,144	36,116	,286
MG	288	,27	1,74	1,0384	,27829	,077	-,295	,144	,004	,286
Valid N (listwise)	288									

Table A13: Descriptive statistics of KDD010 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	86	-,01	,20	,0283	,02604	,001	4,031	,260	22,683	,514
K	86	,74	3,18	1,8644	,64462	,416	,172	,260	-1,233	,514
COPPM	86	6,00	24,00	14,4535	4,31047	18,580	,601	,260	-,195	,514
BAPPM	86	50,00	480,00	280,3488	86,84601	7542,230	-,310	,260	,308	,514
BEPPM	86	,70	2,70	1,6953	,59526	,354	-,266	,260	-1,693	,514
AGPPM	86	,00	1,40	,0419	,18878	,036	5,441	,260	33,519	,514
BIPPM	86	,00	,00	,0000	,00000	,000	.	.	.	.
ASPPM	86	,00	143,00	4,4186	17,30995	299,634	6,591	,260	49,844	,514
MNPPM	86	114,00	2030,00	334,5465	244,34800	59705,945	4,445	,260	27,171	,514
MOPPM	86	1,00	141,00	19,5000	20,24599	409,900	3,890	,260	18,548	,514
NA	86	,66	2,56	1,5821	,49799	,248	,467	,260	-,838	,514
CDPPM	86	,00	3,20	,0849	,38333	,147	6,754	,260	52,484	,514
NIPPM	86	1,00	47,00	22,5116	15,64890	244,888	-,321	,260	-1,572	,514
S	86	,01	5,18	2,3930	,96676	,935	,006	,260	,060	,514
PBPPM	86	,00	88,00	6,4070	14,55648	211,891	4,263	,260	19,475	,514
SBPPM	86	,00	10,00	,5349	1,75364	3,075	3,425	,260	11,989	,514
SRPPM	86	75,00	805,00	326,0349	186,45273	34764,622	,786	,260	-,301	,514
VPPM	86	63,00	224,00	99,1744	20,86438	435,322	3,427	,260	18,031	,514
WPPM	86	,00	,00	,0000	,00000	,000	.	.	.	.
ZNPPM	86	14,00	533,00	48,3837	60,03414	3604,098	6,612	,260	51,080	,514
AL	86	5,26	8,25	7,1540	,53909	,291	-1,067	,260	1,591	,514
CA	86	1,15	9,66	4,0556	1,93143	3,730	1,095	,260	1,338	,514
CRPPM	86	12,00	68,00	40,7326	19,38976	375,963	-,314	,260	-1,626	,514
CUPPM	86	86,00	999,00	390,0233	142,49309	20304,282	1,015	,260	3,310	,514
FE	86	2,53	5,39	3,8615	,73457	,540	,204	,260	-,801	,514
MG	86	,94	3,71	1,9549	,61884	,383	,512	,260	-,419	,514
Valid N (listwise)	86									

Table A14: Descriptive statistics of KDD011 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	210	-,01	1,51	,2410	,21841	,048	1,897	,168	6,071	,334
K	210	,00	2,44	1,3209	,43543	,190	-,726	,168	1,512	,334
COPPM	210	2,00	22,00	11,3095	3,26126	10,636	,740	,168	,787	,334
BAPPM	210	,00	490,00	206,0476	110,78708	12273,778	,473	,168	-,410	,334
BEPPM	210	,00	1,10	,6062	,29251	,086	-1,178	,168	,364	,334
AGPPM	210	,00	3,60	,3524	,58581	,343	2,219	,168	6,672	,334
BIPPM	210	,00	4,00	,0905	,47563	,226	5,657	,168	34,005	,334
ASPPM	210	,00	124,00	12,4095	17,66796	312,157	3,146	,168	14,130	,334
MNPPM	210	33,00	1100,00	312,9524	160,02009	25606,428	1,950	,168	5,624	,334
MOPPM	210	1,00	101,00	8,9048	15,37383	236,355	3,913	,168	16,567	,334
NA	210	,00	3,09	1,8822	,73856	,545	-1,056	,168	,410	,334
CDPPM	210	,00	8,70	,4762	1,16377	1,354	3,668	,168	16,581	,334
NIPPM	210	,00	35,00	3,8333	3,88665	15,106	4,102	,168	23,707	,334
S	210	,00	9,65	3,4860	2,09607	4,394	,369	,168	,008	,334
PBPPM	210	,00	212,00	17,0429	32,45686	1053,448	3,866	,168	16,317	,334
SBPPM	210	,00	109,00	4,8429	14,93940	223,186	4,850	,168	26,278	,334
SRPPM	210	41,00	1400,00	173,3905	110,54329	12219,818	7,178	,168	75,043	,334
VPPM	210	3,00	123,00	81,2238	18,60782	346,251	-1,702	,168	5,291	,334
WPPM	210	,00	20,00	,4762	2,34814	5,514	5,347	,168	31,151	,334
ZNPPM	210	18,00	1460,00	138,1762	203,50228	41413,179	3,101	,168	11,912	,334
AL	210	,07	8,03	5,9435	1,39451	1,945	-1,990	,168	5,757	,334
CA	210	,25	39,00	4,3930	6,36163	40,470	4,437	,168	19,800	,334
CRPPM	210	4,00	50,00	12,2857	6,80657	46,329	2,358	,168	8,118	,334
CUPPM	210	99,00	8720,00	1685,0762	1425,209	2031222	1,779	,168	4,014	,334
FE	210	,46	11,20	4,1972	1,35746	1,843	1,258	,168	4,773	,334
MG	210	,15	2,99	1,1712	,42319	,179	1,696	,168	5,235	,334
Valid N (listwise)	210									

Table A15: Descriptive statistics of KDD012 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	303	,03	1,56	,4003	,32375	,105	1,213	,140	,892	,279
K	303	,10	3,45	1,6681	,72517	,526	-,156	,140	-,712	,279
COPPM	303	,00	48,00	11,2640	5,13683	26,387	3,016	,140	14,340	,279
BAPPM	303	10,00	470,00	209,1749	129,17842	16687,065	-,010	,140	-1,301	,279
BEPPM	303	,00	3,10	,7172	,53547	,287	1,130	,140	2,626	,279
AGPPM	303	,00	17,00	,6099	1,19371	1,425	9,045	,140	118,290	,279
BIPPM	303	,00	6,00	,4191	1,11547	1,244	2,777	,140	7,349	,279
ASPPM	303	,00	298,00	13,6700	32,03749	1026,401	4,824	,140	30,380	,279
MNPPM	303	73,00	1480,00	291,7030	216,30131	46786,256	3,307	,140	12,164	,279
MOPPM	303	1,00	214,00	11,8548	22,21640	493,568	4,012	,140	25,005	,279
NA	303	,12	3,03	1,9083	,62342	,389	-,296	,140	-,567	,279
CDPPM	303	,00	36,40	,2360	2,15428	4,641	15,853	,140	265,356	,279
NIPPM	303	,00	325,00	9,8350	29,73301	884,052	6,797	,140	57,227	,279
S	303	,00	10,00	2,2504	2,52884	6,395	1,174	,140	,134	,279
PBPPM	303	,00	3390,00	24,3432	197,87721	39155,392	16,448	,140	279,740	,279
SBPPM	303	,00	324,00	3,7987	22,59320	510,453	10,902	,140	140,614	,279
SRPPM	303	10,00	614,00	138,1617	72,73969	5291,063	2,505	,140	12,371	,279
VPPM	303	15,00	131,00	83,6007	17,61196	310,181	-,169	,140	,080	,279
WPPM	303	,00	4660,00	16,2376	267,67895	71652,023	17,403	,140	302,916	,279
ZNPPM	303	3,00	8590,00	96,2574	510,49257	260602,7	15,569	,140	256,623	,279
AL	303	,32	9,21	6,2466	1,46392	2,143	-,680	,140	,345	,279
CA	303	,35	22,90	3,0297	2,62753	6,904	3,133	,140	13,563	,279
CRPPM	303	3,00	302,00	18,1518	30,77514	947,109	5,946	,140	42,254	,279
CUPPM	303	309,00	8270,00	2942,7426	1609,165	2589413	,761	,140	,154	,279
FE	303	1,41	39,10	4,7411	3,31522	10,991	7,211	,140	65,045	,279
MG	303	,12	5,25	1,2601	,64099	,411	3,146	,140	13,559	,279
Valid N (listwise)	303									

Table A16: Descriptive statistics of KDD013 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	32	,03	,32	,1194	,08320	,007	1,163	,414	,336	,809
K	32	,88	2,04	1,5163	,23979	,058	-,256	,414	,897	,809
COPPM	32	4,00	16,00	10,5000	2,94027	8,645	-,569	,414	,108	,809
BAPPM	32	100,00	520,00	293,1250	109,08527	11899,597	,473	,414	-,577	,809
BEPPM	32	,70	1,10	,8781	,10075	,010	-,135	,414	-,260	,809
AGPPM	32	,00	1,50	,1219	,32502	,106	3,105	,414	10,433	,809
BIPPM	32	,00	4,00	,3125	,89578	,802	3,049	,414	9,425	,809
ASPPM	32	,00	31,00	8,0000	8,54967	73,097	1,029	,414	,597	,809
MNPPM	32	138,00	763,00	342,8750	134,18806	18006,435	1,086	,414	1,655	,809
MOPPM	32	1,00	15,00	4,4062	2,87211	8,249	1,742	,414	4,780	,809
NA	32	1,62	3,01	2,3478	,36009	,130	,175	,414	-,751	,809
CDPPM	32	,00	2,40	,3125	,54699	,299	2,125	,414	5,548	,809
NIPPM	32	3,00	14,00	5,3438	2,44434	5,975	1,919	,414	4,286	,809
S	32	,06	4,15	1,6381	1,20287	1,447	,275	,414	-,916	,809
PBPPM	32	3,00	164,00	17,1250	29,66017	879,726	4,379	,414	20,739	,809
SBPPM	32	,00	37,00	1,7500	6,70580	44,968	5,018	,414	26,619	,809
SRPPM	32	65,00	260,00	141,9375	45,32459	2054,319	,663	,414	,378	,809
VPPM	32	76,00	103,00	92,3438	6,06741	36,814	-,507	,414	,372	,809
WPPM	32	,00	100,00	4,3750	17,94930	322,177	5,214	,414	28,255	,809
ZNPPM	32	29,00	381,00	94,0938	66,77326	4458,668	2,927	,414	10,843	,809
AL	32	6,64	8,09	7,4603	,37682	,142	-,255	,414	-,589	,809
CA	32	,48	4,65	1,5175	,88260	,779	1,482	,414	3,622	,809
CRPPM	32	5,00	22,00	10,1875	4,43183	19,641	,835	,414	,184	,809
CUPPM	32	128,00	3690,00	854,8750	884,11154	781653,2	1,982	,414	3,566	,809
FE	32	3,22	5,39	3,9588	,45248	,205	1,027	,414	1,825	,809
MG	32	,84	1,81	1,2650	,21123	,045	-,164	,414	,525	,809
Valid N (listwise)	32									

Table A17: Descriptive statistics of KDD013A well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	152	,01	,47	,0928	,10140	,010	1,507	,197	1,695	,391
K	152	,49	1,97	1,2915	,38558	,149	-,173	,197	-,952	,391
COPPM	152	6,00	32,00	9,3618	2,75861	7,610	4,918	,197	34,511	,391
BAPPM	152	60,00	530,00	264,2763	125,75916	15815,367	,020	,197	-1,203	,391
BEPPM	152	,60	1,00	,8855	,08567	,007	-,869	,197	1,301	,391
AGPPM	152	,00	,90	,1868	,25206	,064	,686	,197	-1,293	,391
BIPPM	152	,00	3,00	,3816	,86073	,741	1,952	,197	2,237	,391
ASPPM	152	,00	32,00	7,3224	7,85093	61,637	,888	,197	,210	,391
MNPPM	152	127,00	794,00	394,6382	118,32599	14001,040	,264	,197	,409	,391
MOPPM	152	1,00	16,00	2,8033	2,38609	5,693	2,881	,197	10,438	,391
NA	152	1,58	3,15	2,5809	,26724	,071	-,542	,197	,773	,391
CDPPM	152	,00	5,70	,1289	,54671	,299	7,667	,197	72,721	,391
NIPPM	152	1,00	18,00	3,9934	2,19118	4,801	2,309	,197	10,862	,391
S	152	,05	7,56	1,9860	1,49319	2,230	,930	,197	1,070	,391
PBPPM	152	,00	165,00	9,1513	14,08243	198,315	9,488	,197	101,706	,391
SBPPM	152	,00	37,00	1,1382	3,91981	15,365	6,113	,197	48,495	,391
SRPPM	152	51,00	793,00	196,7632	70,78142	5010,010	3,847	,197	32,527	,391
VPPM	152	60,00	106,00	86,4934	6,98911	48,848	-,603	,197	2,076	,391
WPPM	152	,00	10,00	,5263	2,24035	5,019	4,047	,197	14,570	,391
ZNPPM	152	12,00	680,00	64,5592	58,54740	3427,798	8,159	,197	82,247	,391
AL	152	5,85	8,15	6,8976	,37196	,138	,071	,197	,394	,391
CA	152	,39	6,57	2,7777	1,11479	1,243	,158	,197	,281	,391
CRPPM	152	2,00	28,00	9,0987	4,01118	16,090	1,435	,197	4,154	,391
CUPPM	152	15,00	2320,00	487,8092	444,77058	197820,9	1,404	,197	1,943	,391
FE	152	2,59	5,46	3,6041	,54066	,292	,883	,197	,842	,391
MG	152	,74	2,25	1,3170	,27926	,078	1,135	,197	1,419	,391
Valid N (listwise)	152									

Table A18: Descriptive statistics of KDD014 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	143	,02	,38	,0869	,06640	,004	1,920	,203	4,732	,403
K	143	,00	3,18	1,1442	,80247	,644	-,101	,203	-1,274	,403
COPPM	143	6,00	60,00	17,8671	8,85584	78,426	1,760	,203	4,530	,403
BAPPM	143	,00	450,00	118,1119	100,18962	10037,959	,804	,203	,071	,403
BEPPM	143	,00	2,70	1,3944	,53547	,287	-,082	,203	-,516	,403
AGPPM	143	,00	2,50	,2308	,44630	,199	2,343	,203	6,263	,403
BIPPM	143	,00	11,00	,7762	1,65478	2,738	2,945	,203	11,815	,403
ASPPM	143	,00	122,00	19,2238	22,45384	504,175	1,731	,203	3,514	,403
MNPPM	143	88,00	1920,00	533,9441	443,04834	196291,8	1,471	,203	1,200	,403
MOPPM	143	1,00	449,00	47,8881	58,05923	3370,875	2,922	,203	15,553	,403
NA	143	,01	2,81	1,0441	,81583	,666	,464	,203	-,842	,403
CDPPM	143	,00	19,60	1,6860	3,28388	10,784	3,083	,203	10,678	,403
NIPPM	143	,00	97,00	28,9021	19,02678	362,019	,602	,203	,497	,403
S	143	,00	8,60	2,5029	2,43325	5,921	,892	,203	-,123	,403
PBPPM	143	,00	963,00	18,6923	85,47541	7306,046	9,865	,203	107,008	,403
SBPPM	143	,00	41,00	5,0699	7,91384	62,629	2,542	,203	7,386	,403
SRPPM	143	9,00	1000,00	148,7063	115,06464	13239,871	4,300	,203	27,986	,403
VPPM	143	4,00	236,00	105,2378	44,75268	2002,802	1,245	,203	1,961	,403
WPPM	143	,00	40,00	1,1189	4,61243	21,275	5,652	,203	38,966	,403
ZNPPM	143	8,00	3650,00	351,6643	627,57719	393853,1	2,975	,203	9,572	,403
AL	143	,21	8,37	6,1566	1,59801	2,554	-1,443	,203	1,939	,403
CA	143	,65	27,50	7,6956	5,78870	33,509	1,156	,203	1,216	,403
CRPPM	143	6,00	178,00	51,9860	34,70377	1204,352	1,034	,203	1,028	,403
CUPPM	143	194,00	2600,00	1117,7762	560,46280	314118,6	,674	,203	-,220	,403
FE	143	1,50	10,95	4,5064	1,77369	3,146	1,229	,203	1,436	,403
MG	143	,27	11,90	2,5151	1,57093	2,468	1,988	,203	8,433	,403
Valid N (listwise)	143									

Table A19: Descriptive statistics of KDD015 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	302	,01	,65	,1149	,11167	,012	1,754	,140	3,647	,280
K	302	,00	3,80	1,3945	,83059	,690	,158	,140	-,333	,280
COPPM	302	,00	33,00	10,3046	5,70131	32,505	1,587	,140	2,968	,280
BAPPM	302	,00	620,00	220,7285	144,36986	20842,657	,135	,140	-,544	,280
BEPPM	302	,00	3,30	,9166	,61686	,381	1,099	,140	1,331	,280
AGPPM	302	,00	8,20	,1778	,61569	,379	8,512	,140	99,287	,280
BIPPM	302	,00	4,00	,2450	,75123	,564	3,019	,140	8,235	,280
ASPPM	302	,00	189,00	11,7384	22,74986	517,556	4,198	,140	23,242	,280
MNPPM	302	63,00	1275,00	465,3576	251,33317	63168,363	1,022	,140	,472	,280
MOPPM	302	1,00	414,00	14,8079	29,82167	889,332	8,718	,140	107,707	,280
NA	302	,01	3,18	1,8321	,81784	,669	-,923	,140	,019	,280
CDPPM	302	,00	14,50	,4301	1,55268	2,411	5,192	,140	32,912	,280
NIPPM	302	,00	281,00	18,7616	40,69287	1655,910	4,201	,140	19,536	,280
S	302	,00	9,81	2,0927	1,90591	3,632	1,242	,140	1,776	,280
PBPPM	302	,00	81,00	5,7020	7,47603	55,891	6,159	,140	53,256	,280
SBPPM	302	,00	23,00	,5728	2,39455	5,734	5,558	,140	37,545	,280
SRPPM	302	14,00	1380,00	224,7914	141,63678	20060,976	2,432	,140	14,844	,280
VPPM	302	3,00	247,00	86,2285	35,98113	1294,642	1,125	,140	5,217	,280
WPPM	302	,00	10,00	,2980	1,70321	2,901	5,558	,140	29,085	,280
ZNPPM	302	7,00	1700,00	107,6954	202,40635	40968,332	4,886	,140	27,515	,280
AL	302	,25	9,97	6,2211	2,02712	4,109	-1,361	,140	1,922	,280
CA	302	,83	28,90	6,7886	4,77333	22,785	1,660	,140	2,872	,280
CRPPM	302	1,00	256,00	24,6325	41,62035	1732,253	3,385	,140	12,865	,280
CUPPM	302	27,00	8670,00	1480,6722	1351,575	1826756	1,789	,140	4,680	,280
FE	302	,17	20,00	3,5829	1,57535	2,482	4,656	,140	42,446	,280
MG	302	,07	12,20	2,2837	2,14816	4,615	2,564	,140	7,008	,280
Valid N (listwise)	302									

Table A20: Descriptive statistics of KDD016 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	245	,01	,36	,0732	,08289	,007	1,782	,156	2,528	,310
K	245	,00	4,44	1,4443	1,07356	1,153	,565	,156	-,244	,310
COPPM	245	,00	43,00	10,1633	6,88770	47,440	1,203	,156	3,435	,310
BAPPM	245	,00	580,00	200,0000	145,25557	21099,180	,113	,156	-,779	,310
BEPPM	245	,00	2,90	1,0343	,76825	,590	,657	,156	-,463	,310
AGPPM	245	,00	1,70	,1041	,30256	,092	3,207	,156	10,440	,310
BIPPM	245	,00	18,00	,7224	1,87644	3,521	4,784	,156	34,105	,310
ASPPM	245	,00	54,00	6,6000	10,09398	101,889	2,157	,156	5,478	,310
MNPPM	245	68,00	1245,00	328,0653	252,23898	63624,504	1,747	,156	2,564	,310
MOPPM	245	1,00	2010,00	27,0571	133,55378	17836,611	13,661	,156	201,387	,310
NA	245	,00	3,37	1,6011	1,04020	1,082	-,367	,156	-1,303	,310
CDPPM	245	,00	29,40	,6033	2,71755	7,385	8,303	,156	77,858	,310
NIPPM	245	,00	392,00	18,7714	35,94778	1292,243	6,266	,156	53,760	,310
S	245	,00	9,47	2,5267	2,09367	4,383	,541	,156	-,215	,310
PBPPM	245	,00	324,00	7,0367	21,09664	445,068	14,061	,156	211,082	,310
SBPPM	245	,00	17,00	,4163	1,79198	3,211	5,355	,156	35,526	,310
SRPPM	245	15,00	694,00	197,9837	106,94261	11436,721	,973	,156	2,461	,310
VPPM	245	,00	250,00	83,7388	44,35019	1966,940	,244	,156	2,612	,310
WPPM	245	,00	30,00	,5714	3,21370	10,328	7,175	,156	58,525	,310
ZNPPM	245	7,00	5080,00	145,5347	489,04735	239167,3	8,491	,156	80,467	,310
AL	245	,02	9,60	5,7932	2,57494	6,630	-1,438	,156	,796	,310
CA	245	,72	40,50	10,5211	11,83287	140,017	1,601	,156	1,015	,310
CRPPM	245	1,00	369,00	29,4245	43,85660	1923,401	4,392	,156	25,518	,310
CUPPM	245	4,00	5780,00	1011,0367	1220,463	1489530	1,712	,156	2,479	,310
FE	245	,07	12,85	3,2824	1,72754	2,984	,871	,156	4,483	,310
MG	245	,06	4,66	1,4084	,93742	,879	1,099	,156	1,652	,310
Valid N (listwise)	245									

Table A21: Descriptive statistics of KDD017 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	393	,01	,80	,1588	,12776	,016	1,569	,123	3,478	,246
K	393	,03	3,40	1,5854	,47084	,222	1,012	,123	2,207	,246
COPPM	393	,00	55,00	11,1883	3,89075	15,138	4,322	,123	41,362	,246
BAPPM	393	10,00	480,00	275,9796	102,94203	10597,061	-,450	,123	-,586	,246
BEPPM	393	,00	2,70	,9120	,48438	,235	1,837	,123	3,548	,246
AGPPM	393	,00	5,80	,3010	,63197	,399	4,286	,123	27,277	,246
BIPPM	393	,00	4,00	,1985	,66340	,440	3,286	,123	9,890	,246
ASPPM	393	,00	559,00	9,9364	32,42493	1051,376	12,974	,123	211,551	,246
MNPPM	393	79,00	873,00	324,4809	113,29835	12836,516	1,416	,123	3,794	,246
MOPPM	393	,00	448,00	17,7888	36,38890	1324,152	6,792	,123	61,478	,246
NA	393	,02	3,94	2,2912	,56073	,314	-,994	,123	1,156	,246
CDPPM	393	,00	9,60	,0985	,65539	,430	10,458	,123	130,164	,246
NIPPM	393	,00	255,00	8,7735	17,96516	322,747	8,157	,123	96,575	,246
S	393	,00	9,72	2,5509	1,55970	2,433	1,475	,123	3,058	,246
PBPPM	393	,00	375,00	9,8728	24,27603	589,326	11,387	,123	150,884	,246
SBPPM	393	,00	183,00	1,9059	9,86407	97,300	16,043	,123	291,684	,246
SRPPM	393	34,00	1050,00	262,9109	162,49177	26403,576	2,431	,123	6,238	,246
VPPM	393	3,00	157,00	87,9033	15,03519	226,057	-,436	,123	5,859	,246
WPPM	393	,00	30,00	,4835	2,47855	6,143	6,645	,123	58,085	,246
ZNPPM	393	6,00	1890,00	57,3919	108,78261	11833,657	13,420	,123	211,976	,246
AL	393	,10	8,10	6,6094	,86047	,740	-2,236	,123	11,300	,246
CA	393	,43	36,50	3,6911	2,16503	4,687	9,258	,123	134,768	,246
CRPPM	393	3,00	279,00	16,9033	21,12163	446,123	6,361	,123	64,565	,246
CUPPM	393	4,00	8270,00	2017,7226	1427,677	2038260	1,192	,123	1,720	,246
FE	393	,06	16,35	3,7650	1,03707	1,076	4,515	,123	54,832	,246
MG	393	,25	5,02	1,2959	,48855	,239	2,490	,123	11,650	,246
Valid N (listwise)	393									

Table A22: Descriptive statistics of KDD018 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	327	,01	1,40	,1736	,16165	,026	2,588	,135	12,075	,269
K	327	,01	3,66	1,4423	,56578	,320	,240	,135	,923	,269
COPPM	327	1,00	71,00	11,3761	5,67113	32,162	4,542	,135	39,243	,269
BAPPM	327	,00	530,00	209,5413	107,76353	11612,979	,105	,135	-,562	,269
BEPPM	327	,00	3,70	,9208	,49289	,243	2,017	,135	4,880	,269
AGPPM	327	,00	2,60	,2141	,44959	,202	2,619	,135	7,711	,269
BIPPM	327	,00	5,00	,2416	,83980	,705	3,834	,135	15,267	,269
ASPPM	327	,00	122,00	12,2477	22,01637	484,721	2,732	,135	7,639	,269
MNPPM	327	39,00	1590,00	395,4526	248,82925	61915,997	1,944	,135	4,099	,269
MOPPM	327	,00	80,00	12,1991	13,54426	183,447	2,238	,135	5,680	,269
NA	327	,01	3,52	2,0841	,70871	,502	-,986	,135	,421	,269
CDPPM	327	,00	24,40	,2529	1,47056	2,163	13,950	,135	224,777	,269
NIPPM	327	,00	323,00	16,5719	35,56063	1264,558	5,066	,135	33,143	,269
S	327	,00	9,70	3,4638	1,96717	3,870	,554	,135	,283	,269
PBPPM	327	,00	229,00	10,3333	16,84945	283,904	8,390	,135	95,017	,269
SBPPM	327	,00	40,00	1,2355	4,27465	18,273	4,840	,135	29,543	,269
SRPPM	327	7,00	793,00	235,0948	105,27184	11082,160	2,207	,135	8,274	,269
VPPM	327	31,00	162,00	90,0734	19,10066	364,835	-,377	,135	1,298	,269
WPPM	327	,00	20,00	,0917	1,23503	1,525	14,521	,135	220,875	,269
ZNPPM	327	8,00	2550,00	87,5627	179,93194	32375,504	9,417	,135	114,249	,269
AL	327	,57	8,40	6,3305	1,15759	1,340	-1,609	,135	3,732	,269
CA	327	,03	30,40	5,4957	3,63505	13,214	2,697	,135	11,022	,269
CRPPM	327	3,00	306,00	25,1774	39,49651	1559,975	3,848	,135	19,024	,269
CUPPM	327	103,00	7090,00	1754,7706	1249,251	1560629	,925	,135	,872	,269
FE	327	1,08	6,87	3,8758	,93920	,882	,108	,135	,500	,269
MG	327	,14	13,25	1,7182	1,43250	2,052	4,297	,135	23,502	,269
Valid N (listwise)	327									

Table A23: Descriptive statistics of KDD019 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	217	,01	,66	,1323	,16288	,027	1,338	,165	,895	,329
K	217	,02	2,70	1,2349	,54802	,300	-,100	,165	,060	,329
COPPM	217	5,00	60,00	10,8295	6,51163	42,401	4,706	,165	26,802	,329
BAPPM	217	10,00	550,00	276,1290	160,05422	25617,354	,056	,165	-1,269	,329
BEPPM	217	,00	2,70	1,0000	,39849	,159	1,489	,165	4,368	,329
AGPPM	217	,00	20,00	,5005	2,02582	4,104	7,729	,165	66,126	,329
BIPPM	217	,00	5,00	,1613	,65742	,432	4,554	,165	22,686	,329
ASPPM	217	,00	130,00	10,5392	17,97966	323,268	3,238	,165	13,491	,329
MNPPM	217	201,00	3370,00	641,4286	416,64402	173592,2	3,319	,165	14,357	,329
MOPPM	217	1,00	78,00	4,2258	8,27478	68,472	5,220	,165	35,337	,329
NA	217	,01	3,40	2,3712	,74269	,552	-1,779	,165	2,720	,329
CDPPM	217	,00	9,70	,4046	1,32943	1,767	4,446	,165	21,318	,329
NIPPM	217	,00	84,00	8,4009	13,50482	182,380	2,963	,165	9,759	,329
S	217	,01	6,78	1,6944	1,54585	2,390	1,079	,165	,546	,329
PBPPM	217	,00	316,00	15,3733	28,74978	826,550	6,453	,165	57,803	,329
SBPPM	217	,00	52,00	2,1106	7,28117	53,015	4,443	,165	21,294	,329
SRPPM	217	5,00	503,00	214,6452	103,21538	10653,415	-,111	,165	-,832	,329
VPPM	217	60,00	203,00	94,1567	19,69262	387,799	3,071	,165	11,798	,329
WPPM	217	,00	210,00	2,9493	19,66295	386,632	8,897	,165	83,124	,329
ZNPPM	217	23,00	1790,00	124,9585	195,62936	38270,845	4,784	,165	29,603	,329
AL	217	1,64	9,07	7,0685	,98039	,961	-1,396	,165	4,367	,329
CA	217	,41	16,40	3,5562	3,09350	9,570	2,897	,165	8,319	,329
CRPPM	217	3,00	159,00	18,7235	24,12596	582,062	3,409	,165	13,276	,329
CUPPM	217	17,00	5250,00	1155,5576	1276,119	1628480	,955	,165	,030	,329
FE	217	2,55	7,44	3,9257	,88038	,775	1,204	,165	1,584	,329
MG	217	,55	6,07	1,5602	,74608	,557	2,851	,165	10,139	,329
Valid N (listwise)	217									

Table A24: Descriptive statistics of KDD020 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	297	-,01	,93	,1138	,12233	,015	2,888	,141	11,667	,282
K	297	,01	4,48	1,3219	,67696	,458	1,189	,141	3,258	,282
COPPM	297	,00	45,00	10,3704	5,74611	33,018	3,261	,141	14,053	,282
BAPPM	297	,00	640,00	222,8956	125,42508	15731,452	,376	,141	-,235	,282
BEPPM	297	,00	3,70	1,0054	,50528	,255	1,641	,141	4,555	,282
AGPPM	297	,00	119,00	,5111	6,90630	47,697	17,177	,141	295,674	,282
BIPPM	297	,00	6,00	,1178	,57796	,334	6,017	,141	44,233	,282
ASPPM	297	,00	66,00	6,0067	9,29181	86,338	2,581	,141	9,192	,282
MNPPM	297	102,00	2040,00	442,5690	341,35030	116520,0	2,323	,141	5,244	,282
MOPPM	297	,00	562,00	25,6869	61,26145	3752,966	5,898	,141	40,695	,282
NA	297	,01	3,08	1,9838	,85046	,723	-,629	,141	-,888	,282
CDPPM	297	,00	16,80	,4677	1,87223	3,505	5,074	,141	29,651	,282
NIPPM	297	,00	263,00	15,1178	26,19617	686,239	5,012	,141	34,110	,282
S	297	,00	9,89	2,7523	2,13253	4,548	1,138	,141	1,009	,282
PBPPM	297	,00	539,00	12,0236	44,18545	1952,354	9,567	,141	98,477	,282
SBPPM	297	,00	72,00	,6970	4,58063	20,982	13,208	,141	200,533	,282
SRPPM	297	27,00	892,00	250,6296	130,84932	17121,545	1,970	,141	5,513	,282
VPPM	297	4,00	289,00	87,7475	30,29395	917,723	2,749	,141	14,010	,282
WPPM	297	,00	1720,00	9,5623	102,36466	10478,524	15,992	,141	266,077	,282
ZNPPM	297	14,00	2470,00	131,9596	304,48182	92709,181	4,595	,141	23,184	,282
AL	297	,17	8,32	6,4558	1,37387	1,888	-1,765	,141	3,856	,282
CA	297	,21	27,60	5,8482	4,84494	23,473	1,719	,141	3,234	,282
CRPPM	297	3,00	407,00	30,5926	49,39204	2439,573	5,430	,141	32,517	,282
CUPPM	297	83,00	7860,00	1233,2727	928,03958	861257,5	2,419	,141	10,215	,282
FE	297	,67	7,52	3,4445	1,12973	1,276	,657	,141	,633	,282
MG	297	,19	7,50	1,7155	1,08622	1,180	3,261	,141	12,500	,282
Valid N (listwise)	297									

Table A25: Descriptive statistics of KDD021 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	226	,01	2,44	,7248	,51181	,262	,992	,162	,881	,322
K	226	,41	3,25	1,9021	,48998	,240	-,539	,162	,680	,322
COPPM	226	6,00	20,00	10,6947	2,30741	5,324	1,004	,162	1,260	,322
BAPPM	226	30,00	470,00	240,7080	87,83537	7715,052	-,187	,162	-,359	,322
BEPPM	226	,00	1,60	,5425	,29808	,089	-,622	,162	,289	,322
AGPPM	226	,00	9,40	,6527	,81422	,663	5,868	,162	59,072	,322
BIPPM	226	,00	7,00	,4956	1,39602	1,949	2,882	,162	7,593	,322
ASPPM	226	,00	60,00	3,9602	8,95734	80,234	3,672	,162	15,709	,322
MNPPM	226	126,00	854,00	302,0841	104,55190	10931,100	1,722	,162	5,659	,322
MOPPM	226	1,00	18,00	3,8009	2,13754	4,569	3,466	,162	16,711	,322
NA	226	,57	2,95	1,9165	,57484	,330	-,574	,162	-,443	,322
CDPPM	226	,00	5,80	,0394	,41279	,170	12,696	,162	172,249	,322
NIPPM	226	1,00	27,00	3,4204	2,14068	4,583	6,139	,162	64,861	,322
S	226	,01	9,67	2,0633	1,64108	2,693	1,877	,162	4,716	,322
PBPPM	226	,00	253,00	8,5000	18,23361	332,464	11,590	,162	148,612	,322
SBPPM	226	,00	22,00	1,0973	2,96937	8,817	3,204	,162	12,842	,322
SRPPM	226	14,00	367,00	143,7389	79,29802	6288,176	,219	,162	-,954	,322
VPPM	226	44,00	145,00	78,7655	13,82439	191,114	,759	,162	3,056	,322
WPPM	226	,00	10,00	,3540	1,85194	3,430	5,062	,162	23,837	,322
ZNPPM	226	4,00	1030,00	47,8407	71,51834	5114,872	12,048	,162	161,071	,322
AL	226	2,89	7,63	5,7097	1,10334	1,217	-,697	,162	-,096	,322
CA	226	,33	8,87	2,3409	1,37715	1,897	1,046	,162	2,333	,322
CRPPM	226	3,00	47,00	14,3673	7,44118	55,371	,964	,162	1,159	,322
CUPPM	226	26,00	9830,00	3651,9956	2176,391	4736678	,321	,162	-,594	,322
FE	226	2,54	9,18	4,9768	1,00023	1,000	,571	,162	1,402	,322
MG	226	,50	1,57	,9855	,20626	,043	-,103	,162	,397	,322
Valid N (listwise)	226									

Table A26: Descriptive statistics of KDD022 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	217	,01	,94	,1411	,12242	,015	1,826	,165	7,805	,329
K	217	,01	3,00	1,4594	,45440	,206	-,327	,165	,650	,329
COPPM	217	1,00	35,00	11,4194	4,91730	24,180	2,379	,165	7,393	,329
BAPPM	217	,00	550,00	272,7650	115,50094	13340,468	-,039	,165	-,251	,329
BEPPM	217	,00	1,90	,9189	,20652	,043	-,317	,165	7,093	,329
AGPPM	217	,00	1,70	,1304	,31313	,098	2,486	,165	5,789	,329
BIPPM	217	,00	5,00	,6590	1,21099	1,467	1,565	,165	1,139	,329
ASPPM	217	,00	101,00	5,0599	10,57693	111,871	5,030	,165	36,689	,329
MNPPM	217	81,00	2160,00	300,3779	207,23563	42946,607	4,266	,165	30,495	,329
MOPPM	217	1,00	612,00	35,3041	63,14863	3987,750	5,560	,165	39,894	,329
NA	217	,01	3,45	2,3357	,73937	,547	-1,274	,165	,889	,329
CDPPM	217	,00	5,20	,2263	,65362	,427	4,603	,165	26,222	,329
NIPPM	217	,00	114,00	10,4286	17,57038	308,718	3,304	,165	11,156	,329
S	217	,00	9,34	2,3919	2,01030	4,041	1,338	,165	1,406	,329
PBPPM	217	,00	202,00	9,7005	16,58948	275,211	8,558	,165	90,175	,329
SBPPM	217	,00	56,00	1,0138	4,68299	21,930	8,776	,165	93,167	,329
SRPPM	217	9,00	835,00	183,8756	94,54451	8938,665	1,966	,165	10,253	,329
VPPM	217	11,00	169,00	89,9263	20,91548	437,458	,106	,165	2,593	,329
WPPM	217	,00	260,00	2,0737	17,81682	317,439	14,183	,165	206,022	,329
ZNPPM	217	9,00	798,00	76,1659	82,04786	6731,852	5,394	,165	38,214	,329
AL	217	,49	8,49	6,9668	1,19052	1,417	-2,376	,165	7,586	,329
CA	217	,29	18,50	3,3914	3,27328	10,714	2,107	,165	4,664	,329
CRPPM	217	2,00	118,00	18,4747	18,57942	345,195	3,229	,165	10,906	,329
CUPPM	217	15,00	6480,00	1441,9677	994,64031	989309,4	1,102	,165	2,931	,329
FE	217	,74	6,04	3,3914	1,00174	1,003	,327	,165	-,547	,329
MG	217	,37	3,07	1,3786	,41451	,172	1,295	,165	3,143	,329
Valid N (listwise)	217									

Table A27: Descriptive statistics of KDD023 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	271	,01	,41	,0763	,08138	,007	1,613	,148	2,528	,295
K	271	,00	2,57	1,0286	,70276	,494	-,294	,148	-1,027	,295
COPPM	271	,00	33,00	9,0812	5,88602	34,645	,771	,148	1,334	,295
BAPPM	271	,00	560,00	173,7638	142,77619	20385,040	,128	,148	-1,296	,295
BEPPM	271	,00	2,80	,8860	,77700	,604	,824	,148	-,203	,295
AGPPM	271	,00	20,30	,1856	1,29428	1,675	14,252	,148	218,807	,295
BIPPM	271	,00	6,00	,6089	1,25983	1,587	1,991	,148	3,099	,295
ASPPM	271	,00	153,00	5,4723	12,26793	150,502	7,340	,148	79,354	,295
MNPPM	271	64,00	1405,00	260,2768	171,92755	29559,082	2,624	,148	10,814	,295
MOPPM	271	1,00	343,00	21,2222	38,56991	1487,638	4,791	,148	30,531	,295
NA	271	,00	3,29	1,6329	1,08991	1,188	-,578	,148	-1,324	,295
CDPPM	271	,00	13,40	,4539	1,28840	1,660	5,942	,148	47,368	,295
NIPPM	271	,00	187,00	12,4649	21,42009	458,820	4,195	,148	25,646	,295
S	271	,00	8,39	1,9031	1,70426	2,904	,926	,148	,466	,295
PBPPM	271	,00	2950,00	18,5203	180,46440	32567,399	16,019	,148	260,688	,295
SBPPM	271	,00	788,00	3,9631	48,38647	2341,250	15,919	,148	258,130	,295
SRPPM	271	40,00	680,00	198,0590	102,89731	10587,856	,931	,148	2,347	,295
VPPM	271	,00	239,00	70,6605	44,06749	1941,944	-,211	,148	,424	,295
WPPM	271	,00	10,00	,2214	1,47412	2,173	6,532	,148	40,963	,295
ZNPPM	271	9,00	2360,00	118,4059	211,52339	44742,146	5,862	,148	50,203	,295
AL	271	,01	9,15	5,2294	3,05263	9,319	-1,000	,148	-,817	,295
CA	271	1,24	39,60	11,9792	13,84728	191,747	1,096	,148	-,717	,295
CRPPM	271	1,00	294,00	20,2989	30,54546	933,025	4,165	,148	27,556	,295
CUPPM	271	26,00	5950,00	1023,8450	1090,724	1189678	1,548	,148	2,485	,295
FE	271	,09	8,40	2,7428	1,60037	2,561	,197	,148	,266	,295
MG	271	,07	3,70	1,1896	,81555	,665	,527	,148	-,138	,295
Valid N (listwise)	271									

Table A28: Descriptive statistics of KDD024 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	80	,01	,08	,0224	,01577	,000	1,761	,269	3,614	,532
K	80	,09	4,28	2,0011	,81160	,659	-,303	,269	,310	,532
COPPM	80	3,00	44,00	20,5125	9,41719	88,683	,463	,269	,107	,532
BAPPM	80	10,00	680,00	279,6250	128,41235	16489,731	,017	,269	,476	,532
BEPPM	80	,00	7,20	2,5500	1,32741	1,762	1,035	,269	2,052	,532
AGPPM	80	,50	1,00	,5137	,06702	,004	6,044	,269	39,377	,532
BIPPM	80	,00	6,00	1,1875	1,60769	2,585	1,055	,269	,208	,532
ASPPM	80	,00	19,00	4,7750	4,86000	23,620	,621	,269	-,292	,532
MNPPM	80	40,00	2570,00	468,4875	486,22712	236416,8	2,041	,269	4,744	,532
MOPPM	80	1,00	9,00	1,8500	1,34164	1,800	2,571	,269	9,594	,532
NA	80	,05	1,86	,7964	,44959	,202	,064	,269	-,907	,532
CDPPM	80	,00	9,70	,7987	1,31597	1,732	4,522	,269	26,917	,532
NIPPM	80	19,00	303,00	67,9375	50,56099	2556,414	2,766	,269	9,090	,532
S	80	,01	8,54	3,7766	1,90485	3,628	-,323	,269	,474	,532
PBPPM	80	,00	84,00	15,5375	14,16623	200,682	2,916	,269	10,884	,532
SBPPM	80	,00	6,00	,2875	1,26485	1,600	4,248	,269	16,563	,532
SRPPM	80	17,00	437,00	172,0250	112,66001	12692,278	,533	,269	-,721	,532
VPPM	80	50,00	299,00	125,0375	42,14004	1775,783	2,473	,269	7,207	,532
WPPM	80	,00	20,00	1,3750	3,81328	14,541	2,822	,269	7,888	,532
ZNPPM	80	31,00	2060,00	239,7375	281,78889	79404,981	4,033	,269	22,212	,532
AL	80	1,58	9,44	7,3499	1,6422	1,355	-2,370	,269	9,334	,532
CA	80	,06	25,00	2,9335	4,28383	18,351	3,378	,269	13,941	,532
CRPPM	80	14,00	359,00	87,0750	51,81192	2684,475	3,034	,269	11,024	,532
CUPPM	80	13,00	356,00	98,1875	55,17500	3044,281	1,543	,269	5,004	,532
FE	80	2,18	8,38	4,5141	1,29466	1,676	,585	,269	,776	,532
MG	80	,34	5,67	1,9135	1,10926	1,230	1,183	,269	1,360	,532
Valid N (listwise)	80									

Table A29: Descriptive statistics of KDD025 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	59	,04	,25	,1173	,05340	,003	,778	,311	,135	,613
K	59	,06	3,58	1,6195	,76880	,591	,417	,311	,116	,613
COPPM	59	3,00	44,00	19,5254	11,05528	122,219	,712	,311	-,610	,613
BAPPM	59	20,00	380,00	195,4237	94,01618	8839,041	-,166	,311	-,851	,613
BEPPM	59	,50	2,70	1,4254	,61940	,384	,045	,311	-1,269	,613
AGPPM	59	,00	,00	,0000	,00000	,000	.	.	.	.
BIPPM	59	,00	6,00	,7119	1,61940	2,622	2,151	,311	3,308	,613
ASPPM	59	,00	31,00	5,4237	7,34895	54,007	1,387	,311	1,575	,613
MNPPM	59	69,00	1570,00	497,1695	383,03201	146713,5	,948	,311	,026	,613
MOPPM	59	1,00	127,00	29,6441	22,35124	499,578	1,878	,311	5,655	,613
NA	59	,06	3,15	1,7127	,71823	,516	,255	,311	-,745	,613
CDPPM	59	,00	7,40	,8983	1,44586	2,091	2,160	,311	5,960	,613
NIPPM	59	4,00	446,00	54,6271	66,08847	4367,686	4,081	,311	21,640	,613
S	59	,01	3,70	1,3522	1,16449	1,356	,304	,311	-1,157	,613
PBPPM	59	,00	302,00	17,3898	38,26226	1464,001	7,339	,311	55,381	,613
SBPPM	59	,00	6,00	,3729	1,40072	1,962	3,582	,311	11,358	,613
SRPPM	59	22,00	302,00	138,5254	60,61022	3673,598	,742	,311	,751	,613
VPPM	59	37,00	341,00	132,3220	64,25500	4128,705	1,860	,311	2,716	,613
WPPM	59	,00	40,00	3,3898	7,33677	53,828	3,161	,311	12,204	,613
ZNPPM	59	28,00	1055,00	193,5593	211,54133	44749,733	2,096	,311	4,666	,613
AL	59	2,57	8,52	6,9539	,84414	,713	-2,746	,311	12,191	,613
CA	59	,21	26,70	2,4342	3,61480	13,067	5,473	,311	35,844	,613
CRPPM	59	3,00	645,00	82,0169	94,24884	8882,845	4,072	,311	22,121	,613
CUPPM	59	261,00	2500,00	926,2881	483,80553	234067,8	,863	,311	,749	,613
FE	59	2,30	8,93	4,7658	1,50864	2,276	1,242	,311	,873	,613
MG	59	,63	7,85	1,9829	1,17881	1,390	2,624	,311	10,099	,613
Valid N (listwise)	59									

Table A30: Descriptive statistics of KDD026 well.

Descriptive Statistics												
	N	Range	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	232	1,21	,01	1,22	,2825	,0161	,24481	,060	1,211	,160	1,655	,318
K	232	3,60	,00	3,60	,6323	,0431	,65593	,430	1,094	,160	1,796	,318
COPPM	232	6,41	2,22	8,63	6,4732	,0676	1,02980	1,060	-,932	,160	1,060	,318
BAPPM	232	103,00	,00	103,00	10,8836	1,3019	19,82934	393,203	2,774	,160	7,821	,318
BEPPM	232	1110,00	10,00	1120,00	303,4052	10,5612	160,86360	25877,099	,905	,160	2,420	,318
AGPPM	232	2,00	,00	2,00	,7513	,0208	,31609	,100	,134	,160	2,160	,318
BIPPM	232	6,00	,00	6,00	,5043	,0797	1,21320	1,472	2,433	,160	5,292	,318
ASPPM	232	19,27	,43	19,70	3,1471	,1323	2,01469	4,059	4,398	,160	28,411	,318
MNPPM	232	77,00	,00	77,00	,5841	,3368	5,12999	26,317	14,455	,160	215,728	,318
MOPPM	232	30,00	4,00	34,00	9,4310	,2044	3,11323	9,692	2,912	,160	18,083	,318
NA	232	167,00	4,00	171,00	15,4612	,8568	13,04996	170,302	8,686	,160	93,582	,318
CDPPM	232	10092,00	8,00	10100,00	2431,9418	115,7493	1763,040	3108311	,444	,160	,474	,318
NIPPM	232	5,51	1,84	7,35	4,2326	,0707	1,07703	1,160	-,064	,160	-,218	,318
S	232	7,70	,05	7,75	2,0046	,0508	,77437	,600	2,139	,160	15,212	,318
PBPPM	232	6,14	,30	6,44	1,1387	,0458	,69751	,487	5,066	,160	31,397	,318
SBPPM	232	1537,00	178,00	1715,00	501,4052	20,8447	317,49700	100804,3	1,745	,160	2,439	,318
SRPPM	232	65,00	1,00	66,00	6,1611	,5081	7,73937	59,898	4,081	,160	22,492	,318
VPPM	232	3,32	,12	3,44	2,0910	,0332	,50588	,256	-,678	,160	2,163	,318
WPPM	232	86,00	,00	86,00	7,6853	,4885	7,44097	55,368	6,565	,160	58,891	,318
ZNPPM	232	539,00	,00	539,00	18,2155	3,5920	54,71181	2993,382	7,690	,160	66,048	,318
AL	232	6,39	,02	6,41	1,9274	,0968	1,47391	2,172	,539	,160	-,288	,318
CA	232	60,00	,00	60,00	2,0345	,3427	5,22056	27,254	6,530	,160	65,710	,318
CRPPM	232	434,00	14,00	448,00	170,6767	5,6933	86,71830	7520,064	,372	,160	,196	,318
CUPPM	232	150,00	47,00	197,00	81,1207	1,2858	19,58494	383,570	1,591	,160	5,987	,318
FE	232	20,00	,00	20,00	1,9828	,2693	4,10254	16,831	1,712	,160	1,510	,318
MG	232	9473,00	17,00	9490,00	127,5819	41,5393	632,70704	400318,2	14,183	,160	210,014	,318
Valid N (listwise)	232											

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	63	,01	,60	,0849	,0147	,11652	,014	3,072	,302	10,637	,595
K	63	,02	3,79	1,4133	,1109	,87999	,774	,337	,302	-,068	,595
COPPM	63	6,00	49,00	14,1905	,9837	7,80789	60,963	2,319	,302	6,965	,595
BAPPM	63	-10,00	600,00	211,5873	21,4648	170,37157	29026,472	,543	,302	-,831	,595
BEPPM	63	,00	3,00	1,6651	,1016	,80666	,651	-,148	,302	-1,095	,595
AGPPM	63	,00	14,50	1,0159	,3439	2,72960	7,451	3,968	,302	16,191	,595
BIPPM	63	-2,00	9,00	-1,0159	,3098	2,45929	6,048	2,525	,302	5,675	,595
ASPPM	63	-5,00	350,00	15,1111	5,9212	46,99798	2208,810	6,167	,302	43,041	,595
MNPPM	63	222,00	3020,00	887,9206	71,3946	566,67742	321123,3	1,592	,302	2,443	,595
MOPPM	63	-1,00	20,00	5,0952	,4507	3,57732	12,797	1,555	,302	3,736	,595
NA	63	,02	3,67	2,0263	,1321	1,04867	1,100	-,646	,302	-,835	,595
CDPPM	63	,00	60,50	3,2651	1,1037	8,76060	76,748	5,177	,302	30,777	,595
NIPPM	63	2,00	108,00	29,6032	2,5047	19,88072	395,243	1,023	,302	2,952	,595
S	63	,08	7,88	2,5629	,2459	1,95193	3,810	,608	,302	-,126	,595
PBPPM	63	4,00	2320,00	88,2063	38,0272	301,83151	91102,263	6,808	,302	50,091	,595
SBPPM	63	-5,00	90,00	-1,0794	1,6832	13,36015	178,494	5,597	,302	36,025	,595
SRPPM	63	27,00	480,00	225,5873	13,5810	107,79545	11619,859	-,211	,302	-,710	,595
VPPM	63	12,00	278,00	105,6190	5,6753	45,04601	2029,143	1,376	,302	5,149	,595
WPPM	63	-10,00	3140,00	58,0952	49,8014	395,28616	156251,2	7,892	,302	62,506	,595
ZNPPM	63	33,00	9130,00	647,1429	176,4216	1400,303	1960848	4,526	,302	23,419	,595
AL	63	,60	8,86	6,7767	,2663	2,11354	4,467	-1,477	,302	1,194	,595
CA	63	,50	34,40	8,6811	1,1163	8,86037	78,506	1,732	,302	1,854	,595
CRPPM	63	7,00	118,00	46,5556	3,3467	26,56324	705,606	-,094	,302	-,761	,595
CUPPM	63	29,00	2700,00	524,5079	76,7509	609,19116	371113,9	2,078	,302	3,934	,595
FE	63	1,34	10,10	4,1235	,1856	1,47317	2,170	1,277	,302	3,272	,595
MG	63	,63	5,35	2,1768	,1136	,90152	,813	1,257	,302	2,377	,595
Valid N (listwise)	63										

Table A31: Descriptive statistics of KDD027 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	8	,00	,05	,0150	,01690	,000	,000	1,538	,752	2,051	1,481
K	8	,65	2,42	1,5000	,69022	,476	-,190	,752	,752	-1,826	1,481
COPPM	8	8,00	26,00	13,7500	6,54108	42,786	1,189	,752	,752	,303	1,481
BAPPM	8	180,00	370,00	252,5000	76,48529	5850,000	,777	,752	,752	-,935	1,481
BEPPM	8	,80	2,80	1,7750	,79057	,625	-,038	,752	,752	-2,095	1,481
AGPPM	8	,00	6,90	1,9000	2,54839	6,494	1,397	,752	,752	,957	1,481
BIPPM	8	-2,00	14,00	1,1250	5,59177	31,268	2,167	,752	,752	4,908	1,481
ASPPM	8	-5,00	45,00	14,3750	21,23970	451,125	,599	,752	,752	-1,633	1,481
MNPPM	8	141,00	580,00	319,2500	181,62029	32985,929	,309	,752	,752	-1,999	1,481
MOPPM	8	-1,00	6,00	2,3750	2,32609	5,411	,302	,752	,752	-,673	1,481
NA	8	,94	2,47	1,6638	,50179	,252	,201	,752	,752	-,436	1,481
CDPPM	8	,00	,80	,2375	,33780	,114	,873	,752	,752	-1,265	1,481
NIPPM	8	13,00	59,00	31,7500	17,88655	319,929	,489	,752	,752	-1,379	1,481
S	8	,02	5,24	2,0338	2,03126	4,126	,678	,752	,752	-,858	1,481
PBPPM	8	3,00	47,00	18,0000	16,63902	276,857	,907	,752	,752	-,786	1,481
SBPPM	8	-5,00	9,00	-1,5000	6,48074	42,000	1,440	,752	,752	,000	1,481
SRPPM	8	108,00	334,00	242,8750	87,89675	7725,839	-,483	,752	,752	-1,588	1,481
VPPM	8	70,00	122,00	100,6250	15,07067	227,125	-,989	,752	,752	2,429	1,481
WPPM	8	-10,00	70,00	16,2500	28,25269	798,214	,965	,752	,752	,530	1,481
ZNPPM	8	34,00	226,00	127,2500	73,79460	5445,643	,273	,752	,752	-1,616	1,481
AL	8	7,18	8,31	7,8925	,45260	,205	-,838	,752	,752	-1,134	1,481
CA	8	,59	8,52	2,1075	2,62876	6,910	2,669	,752	,752	7,327	1,481
CRPPM	8	32,00	84,00	55,1250	20,93144	438,125	,111	,752	,752	-1,676	1,481
CUPPM	8	31,00	270,00	157,0000	99,64508	9929,143	-,373	,752	,752	-2,093	1,481
FE	8	2,19	4,90	3,5250	1,15897	1,343	-,212	,752	,752	-2,234	1,481
MG	8	,96	1,77	1,3337	,31250	,098	,255	,752	,752	-1,846	1,481
Valid N (listwise)	8										

Table A32: Descriptive statistics of KDD028 well.

Table A33: Descriptive statistics of KDD028A well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	15	,00	,01	,0053	,00516	,000	-,149	,580	-2,308	1,121
K	15	,04	3,24	1,1553	,80075	,641	1,059	,580	2,241	1,121
COPPM	15	3,00	29,00	14,2667	8,15446	66,495	,535	,580	-,292	1,121
BAPPM	15	10,00	460,00	208,6667	118,13229	13955,238	,124	,580	,441	1,121
BEPPM	15	,00	2,60	1,7600	,81749	,668	-,848	,580	-,401	1,121
AGPPM	15	,00	12,90	1,3600	3,37423	11,385	3,275	,580	11,325	1,121
BIPPM	15	-2,00	3,00	-1,6667	1,29099	1,667	3,873	,580	15,000	1,121
ASPPM	15	-5,00	21,00	3,3333	8,23465	67,810	,589	,580	-,299	1,121
MNPPM	15	157,00	656,00	370,2000	141,13783	19919,886	,568	,580	-,514	1,121
MOPPM	15	-1,00	10,00	1,6667	2,69037	7,238	2,264	,580	6,736	1,121
NA	15	,02	3,05	1,5260	,84256	,710	-,121	,580	-,417	1,121
CDPPM	15	,00	1,20	,3533	,42066	,177	,644	,580	-,997	1,121
NIPPM	15	4,00	55,00	30,1333	15,71108	246,838	-,160	,580	-1,003	1,121
S	15	,00	6,79	2,3840	1,81439	3,292	,909	,580	1,299	1,121
PBPPM	15	2,00	9,00	5,6667	2,25726	5,095	-,080	,580	-,830	1,121
SBPPM	15	-5,00	5,00	-4,3333	2,58199	6,667	3,873	,580	15,000	1,121
SRPPM	15	184,00	563,00	293,2667	107,23170	11498,638	1,270	,580	1,496	1,121
VPPM	15	9,00	133,00	88,2000	35,84530	1284,886	-1,285	,580	,727	1,121
WPPM	15	-10,00	120,00	10,6667	34,53087	1192,381	2,541	,580	7,456	1,121
ZNPPM	15	31,00	314,00	129,7333	82,21876	6759,924	,835	,580	,365	1,121
AL	15	,59	8,82	6,5887	2,56932	6,601	-1,572	,580	1,240	1,121
CA	15	1,36	33,20	8,5193	11,46550	131,458	1,569	,580	,799	1,121
CRPPM	15	5,00	90,00	51,2667	26,50732	702,638	-,540	,580	-1,168	1,121
CUPPM	15	16,00	192,00	73,6000	52,50279	2756,543	1,099	,580	,203	1,121
FE	15	,38	6,33	2,9207	1,48262	2,198	,368	,580	1,261	1,121
MG	15	,57	2,76	1,5213	,55220	,305	,588	,580	,910	1,121
Valid N (listwise)	15									

Table A34: Descriptive statistics of KDD029 well.

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	28	,00	,18	,0325	,03959	,002	2,762	,441	8,172	,858
K	28	,20	2,21	,9729	,56561	,320	,723	,441	-,280	,858
COPPM	28	2,00	218,00	29,5000	40,52297	1642,111	4,064	,441	18,483	,858
BAPPM	28	20,00	320,00	143,2143	96,64956	9341,138	,405	,441	-1,155	,858
BEPPM	28	,60	3,00	2,1321	,60861	,370	-1,156	,441	,956	,858
AGPPM	28	,00	1,50	,3036	,40687	,166	1,244	,441	1,194	,858
BIPPM	28	-2,00	12,00	1,6071	3,16625	10,025	1,030	,441	2,869	,858
ASPPM	28	-5,00	239,00	11,4286	45,78325	2096,106	4,878	,441	24,893	,858
MNPPM	28	262,00	1790,00	687,6429	344,03469	118359,9	1,435	,441	2,515	,858
MOPPM	28	-1,00	12,00	4,3929	2,98564	8,914	,677	,441	,350	,858
NA	28	,46	3,68	2,2650	,90642	,822	-,483	,441	-,311	,858
CDPPM	28	,00	3,80	,3321	,85421	,730	3,080	,441	10,211	,858
NIPPM	28	14,00	123,00	41,6786	24,41319	596,004	1,917	,441	4,075	,858
S	28	,00	9,77	3,2046	2,76883	7,666	,416	,441	-,675	,858
PBPPM	28	-2,00	276,00	32,1429	64,44677	4153,386	2,919	,441	8,181	,858
SBPPM	28	-5,00	13,00	2,1429	6,52468	42,571	-,061	,441	-1,722	,858
SRPPM	28	67,00	420,00	260,3929	89,14173	7946,247	-,648	,441	,136	,858
VPPM	28	33,00	159,00	108,1786	28,33144	802,671	-,652	,441	1,045	,858
WPPM	28	-10,00	10,00	-9,2857	3,77964	14,286	5,292	,441	28,000	,858
ZNPPM	28	46,00	864,00	205,5714	188,63377	35582,698	1,915	,441	4,258	,858
AL	28	2,86	9,22	7,3871	1,34189	1,801	-1,888	,441	4,362	,858
CA	28	1,39	11,60	4,2607	2,70017	7,291	1,526	,441	1,945	,858
CRPPM	28	24,00	148,00	58,5357	24,53189	601,813	2,557	,441	7,743	,858
CUPPM	28	45,00	1040,00	219,5714	209,77103	44003,884	2,644	,441	8,350	,858
FE	28	2,60	28,00	7,8714	6,15798	37,921	2,362	,441	5,719	,858
MG	28	,48	3,10	1,9793	,71346	,509	-,613	,441	-,363	,858
Valid N (listwise)	28									

Table A35: Descriptive statistics of KDD030 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	354	-,01	1,13	,1670	,0060	,11355	,013	3,225	,130	20,459	,259
K	354	,76	3,16	1,6555	,0257	,48295	,233	,745	,130	,147	,259
COPPM	354	4,00	38,00	11,6554	,1625	3,05657	9,343	3,168	,130	20,061	,259
BAPPM	354	30,00	600,00	263,8983	4,9661	93,43644	8730,369	,082	,130	,152	,259
BEPPM	354	-,50	2,40	,8322	,0134	,25153	,063	1,079	,130	16,012	,259
AGPPM	354	-,50	7,20	-,0915	,0541	1,01754	1,035	3,870	,130	18,781	,259
BIPPM	354	-2,00	4,00	-1,4915	,0744	1,40060	1,962	2,465	,130	4,351	,259
ASPPM	354	-5,00	779,00	10,2938	2,7176	51,13188	2614,469	10,651	,130	147,736	,259
MNPPM	354	110,00	1375,00	293,1525	5,8775	110,58446	12228,923	3,798	,130	28,554	,259
MOPPM	354	1,00	332,00	17,5989	1,8513	34,83173	1213,249	5,939	,130	43,613	,259
NA	354	,67	3,21	2,4874	,0199	,37454	,140	-1,183	,130	2,864	,259
CDPPM	354	-,50	39,10	-,1291	,1317	2,47825	6,142	12,798	,130	188,325	,259
NIPPM	354	1,00	71,00	4,7797	,3434	6,46078	41,742	6,067	,130	45,463	,259
S	354	,01	6,14	2,0371	,0744	1,39985	1,960	,551	,130	-,492	,259
PBPPM	354	-2,00	1785,00	17,2034	5,4327	102,21528	10447,964	15,186	,130	256,429	,259
SBPPM	354	-5,00	165,00	-,7797	,9223	17,35211	301,096	6,316	,130	45,625	,259
SRPPM	354	26,00	487,00	195,2966	3,7368	70,30754	4943,150	,139	,130	,062	,259
VPPM	354	36,00	158,00	95,2542	,7642	14,37786	206,723	,020	,130	2,849	,259
WPPM	354	-10,00	10,00	-9,9435	,0565	1,06299	1,130	18,815	,130	354,000	,259
ZNPPM	354	19,00	18950,00	155,5819	57,1844	1075,918	1157599	15,868	,130	269,305	,259
AL	354	3,44	9,11	7,1779	,0395	,74272	,552	-1,013	,130	3,124	,259
CA	354	,67	13,60	3,2698	,0779	1,46607	2,149	1,510	,130	6,608	,259
CRPPM	354	5,00	146,00	13,2514	,6387	12,01753	144,421	6,398	,130	52,962	,259
CUPPM	354	19,00	9930,00	2125,5678	57,9682	1090,665	1189551	1,748	,130	8,210	,259
FE	354	1,95	6,12	3,6194	,0319	,59930	,359	,644	,130	1,990	,259
MG	354	,36	3,33	1,2888	,0162	,30525	,093	,560	,130	6,352	,259
Valid N (listwise)	354										

Table A36: Descriptive statistics of KDD031 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	21	,01	,20	,0671	,0121	,05551	,003	1,041	,501	,187	,972
K	21	,03	2,48	,7786	,1623	,74391	,553	,759	,501	-,501	,972
COPPM	21	4,00	67,00	18,9048	3,0189	13,83439	191,390	2,352	,501	6,806	,972
BAPPM	21	10,00	320,00	100,9524	21,8098	99,94522	9989,048	,813	,501	-,652	,972
BEPPM	21	,70	3,40	1,6143	,1630	,74719	,558	,741	,501	-,126	,972
AGPPM	21	,50	6460,00	394,8619	306,9665	1406,697	1978797	4,411	,501	19,841	,972
BIPPM	21	-2,00	7,00	-,9048	,5385	2,46789	6,090	2,262	,501	4,622	,972
ASPPM	21	-5,00	57,00	21,3333	3,9655	18,17232	330,233	,990	,501	,091	,972
MNPPM	21	376,00	2590,00	1168,1429	130,6647	598,78087	358538,5	,835	,501	,258	,972
MOPPM	21	2,00	12,00	5,3333	,7507	3,43996	11,833	,982	,501	-,248	,972
NA	21	,05	2,59	,8900	,1712	,78462	,616	,810	,501	-,634	,972
CDPPM	21	,00	43,10	7,6333	2,6685	12,22842	149,534	2,499	,501	5,431	,972
NIPPM	21	8,00	1055,00	94,2381	48,4535	222,04164	49302,490	4,456	,501	20,175	,972
S	21	,06	7,99	1,6352	,4437	2,03326	4,134	1,853	,501	3,679	,972
PBPPM	21	-2,00	638,00	59,2857	30,2955	138,83124	19274,114	3,990	,501	16,931	,972
SBPPM	21	-5,00	47,00	3,9524	3,1777	14,56185	212,048	1,838	,501	3,051	,972
SRPPM	21	26,00	316,00	117,6190	18,0732	82,82178	6859,448	1,228	,501	,811	,972
VPPM	21	24,00	126,00	86,4762	6,2414	28,60178	818,062	-,559	,501	-,365	,972
WPPM	21	-10,00	5990,00	799,0476	397,0432	1819,480	3310509	2,555	,501	5,508	,972
ZNPPM	21	91,00	13400,00	1780,6667	642,7239	2945,331	8674975	3,402	,501	12,996	,972
AL	21	1,53	8,54	5,3600	,3986	1,82683	3,337	-,214	,501	-,418	,972
CA	21	1,34	28,40	10,9033	1,5971	7,31866	53,563	,564	,501	-,165	,972
CRPPM	21	10,00	115,00	47,7143	5,7413	26,30997	692,214	,702	,501	,754	,972
CUPPM	21	245,00	25200,00	2309,1429	1167,7442	5351,276	2,9E+07	4,300	,501	19,120	,972
FE	21	2,28	15,55	4,7481	,5966	2,73400	7,475	3,286	,501	13,075	,972
MG	21	1,27	8,77	3,0314	,4275	1,95925	3,839	1,817	,501	3,154	,972
Valid N (listwise)	21										

Table A37: Descriptive statistics of KDD032 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	374	-,01	,44	,1099	,0037	,07160	,005	1,419	,126	3,248	,252
K	374	,39	2,54	1,3917	,0178	,34434	,119	,426	,126	,324	,252
COPPM	374	5,00	35,00	11,0187	,1595	3,08367	9,509	2,526	,126	12,733	,252
BAPPM	374	30,00	730,00	244,0642	5,6161	108,61080	11796,307	1,082	,126	2,783	,252
BEPPM	374	-,50	1,80	,8024	,0096	,18646	,035	-2,440	,126	19,379	,252
AGPPM	374	-,50	489,00	1,3719	1,3124	25,38130	644,210	19,118	,126	368,153	,252
BIPPM	374	-2,00	3,00	-1,8128	,0446	,86160	,742	4,434	,126	17,955	,252
ASPPM	374	-5,00	602,00	18,2059	3,2016	61,91664	3833,671	5,286	,126	34,304	,252
MNPPM	374	40,00	1335,00	317,9198	7,1193	137,68038	18955,886	2,176	,126	9,738	,252
MOPPM	374	-1,00	420,00	27,7968	2,3847	46,11864	2126,929	4,688	,126	27,588	,252
NA	374	,34	3,53	2,3995	,0226	,43775	,192	-,715	,126	1,286	,252
CDPPM	374	-,50	61,90	,4356	,2362	4,56730	20,860	9,967	,126	115,676	,252
NIPPM	374	-1,00	105,00	4,0749	,3198	6,18523	38,257	12,307	,126	192,540	,252
S	374	,01	10,00	2,1374	,1004	1,94255	3,774	1,273	,126	1,730	,252
PBPPM	374	-2,00	3500,00	52,8904	13,9462	269,70746	72742,114	9,364	,126	101,931	,252
SBPPM	374	-5,00	958,00	8,6203	3,9058	75,53498	5705,534	8,888	,126	91,918	,252
SRPPM	374	19,00	899,00	206,6658	4,9649	96,01652	9219,172	1,754	,126	8,938	,252
VPPM	374	52,00	254,00	97,4118	1,2762	24,68062	609,133	2,891	,126	15,010	,252
WPPM	374	-10,00	2530,00	-3,0481	6,7916	131,34410	17251,274	19,334	,126	373,861	,252
ZNPPM	374	15,00	8740,00	164,6711	35,7203	690,79828	477202,3	10,010	,126	111,116	,252
AL	374	4,76	9,58	7,1896	,0420	,81196	,659	-,295	,126	-,107	,252
CA	374	,40	11,80	3,7301	,1016	1,96535	3,863	1,219	,126	1,523	,252
CRPPM	374	5,00	147,00	11,8342	,4288	8,29253	68,766	12,372	,126	192,557	,252
CUPPM	374	10,00	5240,00	1437,5508	42,0461	813,13325	661185,7	1,052	,126	1,967	,252
FE	374	1,74	8,42	3,3382	,0335	,64772	,420	1,890	,126	11,130	,252
MG	374	,31	3,26	1,3516	,0224	,43308	,188	,366	,126	1,362	,252
Valid N (listwise)	374										

Table A38: Descriptive statistics of KDD033 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	30	,13	,57	,2633	,0163	,08903	,008	1,578	,427	3,752	,833
K	30	,69	1,83	1,3940	,0546	,29918	,090	-,846	,427	,072	,833
COPPM	30	9,00	4340,00	203,5000	148,4806	813,26171	661394,6	4,926	,427	25,171	,833
BAPPM	30	100,00	420,00	285,0000	17,6411	96,62405	9336,207	-,462	,427	-,788	,833
BEPPM	30	,80	1,30	,9633	,0169	,09279	,009	1,662	,427	4,963	,833
AGPPM	30	-,50	32,20	5,4600	1,4946	8,18630	67,016	2,218	,427	4,525	,833
BIPPM	30	-2,00	4,00	-,5000	,4004	2,19325	4,810	,861	,427	-1,145	,833
ASPPM	30	-5,00	36,00	7,8000	1,6248	8,89944	79,200	,726	,427	2,288	,833
MNPPM	30	304,00	605,00	430,2333	15,5395	85,11318	7244,254	,532	,427	-,872	,833
MOPPM	30	3,00	21,00	10,3333	,8056	4,41263	19,471	,747	,427	,719	,833
NA	30	2,39	3,35	2,8253	,0432	,23649	,056	-,336	,427	-,057	,833
CDPPM	30	-,50	,50	-,4000	,0557	,30513	,093	2,809	,427	6,308	,833
NIPPM	30	1,00	20,00	6,1667	,7506	4,11124	16,902	1,847	,427	4,574	,833
S	30	,02	2,56	,9530	,1208	,66186	,438	,425	,427	-,191	,833
PBPPM	30	4,00	43,00	11,2333	1,2907	7,06952	49,978	3,302	,427	14,261	,833
SBPPM	30	-5,00	5,00	-4,6667	,3333	1,82574	3,333	5,477	,427	30,000	,833
SRPPM	30	140,00	258,00	199,9667	6,3059	34,53882	1192,930	-,018	,427	-,964	,833
VPPM	30	85,00	127,00	99,9667	1,6192	8,86871	78,654	1,097	,427	1,849	,833
WPPM	30	-10,00	1470,00	102,6667	49,0998	268,93062	72323,678	4,846	,427	25,033	,833
ZNPPM	30	51,00	281,00	110,8333	9,8929	54,18556	2936,075	1,604	,427	2,342	,833
AL	30	6,28	8,36	7,5740	,0781	,42770	,183	-,792	,427	1,759	,833
CA	30	1,18	2,49	1,7127	,0606	,33188	,110	,582	,427	,160	,833
CRPPM	30	11,00	52,00	17,7333	1,5484	8,48095	71,926	2,880	,427	9,226	,833
CUPPM	30	487,00	4530,00	1660,0333	157,8639	864,65618	747630,3	1,863	,427	4,579	,833
FE	30	3,52	5,76	4,3567	,0951	,52115	,272	,746	,427	,344	,833
MG	30	1,05	1,55	1,2663	,0212	,11625	,014	,434	,427	,122	,833
Valid N (listwise)	30										

Table A39: Descriptive statistics of KDD034 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	352	,00	1,40	,3639	,0182	,34082	,116	,778	,130	-,302	,259
K	352	,27	2,93	1,6609	,0328	,61454	,378	-,224	,130	-,791	,259
COPPM	352	6,00	17,00	9,8835	,1024	1,92170	3,693	,571	,130	,910	,259
BAPPM	352	10,00	730,00	275,9943	7,3818	138,49467	19180,775	,455	,130	,800	,259
BEPPM	352	,00	1,70	,6685	,0179	,33521	,112	-,770	,130	-,001	,259
AGPPM	352	,00	4,10	,1835	,0248	,46564	,217	3,836	,130	20,312	,259
BIPPM	352	-2,00	6,00	-1,0653	,1033	1,93888	3,759	1,727	,130	1,384	,259
ASPPM	352	-5,00	162,00	3,4716	,8972	16,83282	283,344	4,457	,130	31,154	,259
MNPPM	352	152,00	853,00	353,7273	6,2971	118,14403	13958,011	,851	,130	,458	,259
MOPPM	352	-1,00	26,00	3,7557	,1630	3,05738	9,348	2,380	,130	10,586	,259
NA	352	,72	6,20	2,2658	,0324	,60800	,370	,488	,130	3,662	,259
CDPPM	352	,00	32,60	,1043	,0930	1,74520	3,046	18,512	,130	345,373	,259
NIPPM	352	-1,00	27,00	3,0085	,1659	3,11186	9,684	3,065	,130	17,316	,259
S	352	,06	6,54	1,5962	,0750	1,40712	1,980	1,395	,130	1,469	,259
PBPPM	352	-2,00	2320,00	11,8239	6,5788	123,42996	15234,955	18,737	,130	351,388	,259
SBPPM	352	-5,00	435,00	-2,8608	1,2756	23,93261	572,770	17,626	,130	321,878	,259
SRPPM	352	16,00	536,00	170,7443	5,5659	104,42616	10904,823	,884	,130	,126	,259
VPPM	352	55,00	179,00	81,9801	,6498	12,19183	148,641	1,332	,130	10,891	,259
WPPM	352	-10,00	30,00	-9,6023	,1694	3,17770	10,098	8,907	,130	87,868	,259
ZNPPM	352	7,00	4900,00	60,4034	13,8203	259,29231	67232,503	18,630	,130	348,693	,259
AL	352	3,43	10,30	6,4906	,0628	1,17807	1,388	-,232	,130	-,704	,259
CA	352	,36	6,15	2,3149	,0542	1,01725	1,035	,459	,130	,388	,259
CRPPM	352	4,00	591,00	13,8011	1,7157	32,18926	1036,148	16,732	,130	297,502	,259
CUPPM	352	3,00	7040,00	1826,4631	88,1010	1652,921	2732149	,756	,130	-,306	,259
FE	352	2,63	8,98	4,5251	,0568	1,06635	1,137	,711	,130	1,244	,259
MG	352	,54	2,72	1,1394	,0168	,31567	,100	,845	,130	1,467	,259
Valid N (listwise)	352										

Table A40: Descriptive statistics of KDD035 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	50	,01	1,58	,2784	,0412	,29116	,085	2,277	,337	7,176	,662
K	50	,04	2,14	,9760	,0864	,61127	,374	,044	,337	-1,142	,662
COPPM	50	1,00	20,00	10,3600	,5684	4,01914	16,153	-,067	,337	,437	,662
BAPPM	50	10,00	400,00	136,2000	14,6438	103,54709	10722,000	,778	,337	,073	,662
BEPPM	50	-,50	2,30	,8600	,0640	,45221	,204	-,061	,337	4,039	,662
AGPPM	50	-,50	100,00	3,9400	2,1954	15,52398	240,994	5,385	,337	31,509	,662
BIPPM	50	-2,00	2,00	-1,5200	,1857	1,31304	1,724	2,412	,337	3,974	,662
ASPPM	50	-5,00	151,00	26,6200	5,4869	38,79822	1505,302	1,928	,337	3,178	,662
MNPPM	50	78,00	2280,00	956,7800	102,9266	727,80103	529694,3	,421	,337	-1,537	,662
MOPPM	50	3,00	21,00	6,0600	,4566	3,22876	10,425	2,396	,337	8,572	,662
NA	50	,12	3,07	1,5088	,1304	,92173	,850	,082	,337	-1,443	,662
CDPPM	50	-,50	4,10	,2860	,1515	1,07134	1,148	1,310	,337	1,656	,662
NIPPM	50	-1,00	48,00	12,3400	1,5404	10,89207	118,637	1,330	,337	2,151	,662
S	50	,03	4,29	1,0028	,1669	1,18023	1,393	1,662	,337	1,841	,662
PBPPM	50	-2,00	2600,00	128,0400	62,3470	440,85983	194357,4	4,432	,337	21,431	,662
SBPPM	50	-5,00	64,00	-1,1800	1,5380	10,87534	118,273	4,743	,337	26,886	,662
SRPPM	50	20,00	286,00	111,2000	10,1577	71,82547	5158,898	,689	,337	-,539	,662
VPPM	50	20,00	142,00	78,9600	3,7981	26,85635	721,264	-,266	,337	-,273	,662
WPPM	50	-10,00	1580,00	41,8000	32,0659	226,73989	51410,980	6,650	,337	45,689	,662
ZNPPM	50	21,00	808,00	221,1800	27,9262	197,46802	38993,620	1,260	,337	1,239	,662
AL	50	1,36	8,51	5,1974	,2790	1,97308	3,893	-,095	,337	-1,032	,662
CA	50	,21	26,40	7,6662	1,1779	8,32885	69,370	,994	,337	-,474	,662
CRPPM	50	6,00	87,00	24,9200	2,6965	19,06684	363,544	1,480	,337	1,662	,662
CUPPM	50	214,00	5600,00	1527,4600	189,8132	1342,182	1801452	1,410	,337	1,490	,662
FE	50	2,61	9,37	4,2210	,1600	1,13128	1,280	1,833	,337	7,476	,662
MG	50	,42	5,91	2,0342	,1942	1,37336	1,886	1,285	,337	,976	,662
Valid N (listwise)	50										

Table A41: Descriptive statistics of KDD036 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	316	-,01	1,29	,2746	,0122	,21728	,047	,990	,137	1,284	,273
K	316	,20	3,00	1,4564	,0322	,57156	,327	,179	,137	-,649	,273
COPPM	316	4,00	328,00	11,1867	1,1769	20,92132	437,702	12,926	,137	181,973	,273
BAPPM	316	30,00	500,00	233,7975	5,9480	105,73466	11179,819	,245	,137	-,796	,273
BEPPM	316	-,50	1,30	,6440	,0197	,34960	,122	-2,271	,137	5,343	,273
AGPPM	316	-,50	593,00	3,7782	2,2827	40,57841	1646,608	12,839	,137	171,154	,273
BIPPM	316	-2,00	4,00	-1,7690	,0572	1,01752	1,035	4,346	,137	17,779	,273
ASPPM	316	-5,00	187,00	7,3006	1,2579	22,36142	500,033	4,030	,137	21,463	,273
MNPPM	316	95,00	582,00	292,1266	5,1025	90,70460	8227,324	,823	,137	,369	,273
MOPPM	316	-1,00	190,00	8,6361	1,2274	21,81794	476,023	5,641	,137	38,767	,273
NA	316	,36	3,69	2,2779	,0328	,58395	,341	-,459	,137	,109	,273
CDPPM	316	-,50	19,50	-,0316	,1267	2,25161	5,070	5,924	,137	37,759	,273
NIPPM	316	-1,00	260,00	5,6139	1,0510	18,68238	349,031	10,920	,137	131,399	,273
S	316	,02	10,00	3,0079	,1110	1,97401	3,897	,765	,137	,763	,273
PBPPM	316	-2,00	1955,00	23,7816	7,7737	138,18867	19096,108	11,042	,137	137,048	,273
SBPPM	316	-5,00	398,00	2,0127	2,2094	39,27599	1542,603	8,116	,137	71,565	,273
SRPPM	316	29,00	1055,00	179,3608	4,8604	86,40074	7465,088	3,917	,137	35,354	,273
VPPM	316	45,00	117,00	81,4494	,6527	11,60353	134,642	-,135	,137	,402	,273
WPPM	316	-10,00	4500,00	47,9747	22,6359	402,38457	161913,3	8,855	,137	82,435	,273
ZNPPM	316	23,00	2920,00	108,5190	17,1242	304,40641	92663,260	6,391	,137	44,827	,273
AL	316	2,86	8,48	6,4457	,0575	1,02257	1,046	-,203	,137	-,324	,273
CA	316	,31	12,75	3,3167	,1200	2,13289	4,549	1,776	,137	3,550	,273
CRPPM	316	4,00	42,00	10,7658	,2265	4,02716	16,218	2,546	,137	14,762	,273
CUPPM	316	35,00	8730,00	1835,9399	84,7603	1506,732	2270240	1,382	,137	1,875	,273
FE	316	1,52	7,91	4,2785	,0608	1,08109	1,169	-,057	,137	,936	,273
MG	316	,34	2,72	1,1128	,0186	,33127	,110	1,314	,137	3,137	,273
Valid N (listwise)	316										

Table A42: Descriptive statistics of KDD037 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	230	-,01	,55	,0130	,0035	,05302	,003	6,854	,160	57,621	,320
K	230	-,01	3,92	,9698	,0663	1,00590	1,012	,949	,160	-,161	,320
COPPM	230	1,00	70,00	12,0609	,6044	9,16590	84,014	2,107	,160	9,541	,320
BAPPM	230	-10,00	500,00	113,5652	8,7217	132,27067	17495,531	,899	,160	-,225	,320
BEPPM	230	-,50	2,80	,9296	,0681	1,03240	1,066	-,101	,160	-1,204	,320
AGPPM	230	-,50	197,00	1,1609	,8913	13,51686	182,706	13,544	,160	194,850	,320
BIPPM	230	-2,00	171,00	,9478	,9781	14,83437	220,058	9,999	,160	105,236	,320
ASPPM	230	-5,00	1045,00	18,1000	4,7927	72,68508	5283,121	12,649	,160	176,144	,320
MNPPM	230	22,00	2410,00	627,0435	35,9508	545,22073	297265,6	1,423	,160	1,639	,320
MOPPM	230	-1,00	103,00	1,8739	,4770	7,23388	52,329	12,227	,160	168,801	,320
NA	230	-,01	2,90	,7358	,0465	,70566	,498	,831	,160	-,202	,320
CDPPM	230	-,50	17,90	,5470	,1570	2,38138	5,671	4,468	,160	23,513	,320
NIPPM	230	1,00	462,00	28,1304	2,9800	45,19439	2042,533	7,742	,160	70,891	,320
S	230	,01	10,00	3,4533	,1965	2,98074	8,885	,447	,160	-1,044	,320
PBPPM	230	-2,00	447,00	21,6783	3,1871	48,33454	2336,228	5,904	,160	40,672	,320
SBPPM	230	-5,00	185,00	-,4000	1,1113	16,85349	284,040	7,783	,160	73,792	,320
SRPPM	230	18,00	766,00	192,2087	8,8249	133,83641	17912,183	1,590	,160	2,946	,320
VPPM	230	-1,00	268,00	67,9130	2,8742	43,58940	1900,036	,442	,160	1,138	,320
WPPM	230	-10,00	1620,00	29,0870	9,9378	150,71458	22714,883	7,149	,160	63,403	,320
ZNPPM	230	4,00	4890,00	218,0087	35,3446	536,02713	287325,1	6,186	,160	44,108	,320
AL	230	,03	8,63	4,6492	,1906	2,89024	8,354	-,289	,160	-1,526	,320
CA	230	,82	37,10	13,7303	,8052	12,21095	149,107	,612	,160	-1,285	,320
CRPPM	230	1,00	520,00	39,7435	3,6033	54,64710	2986,305	6,175	,160	50,760	,320
CUPPM	230	4,00	11550,00	254,7435	59,7961	906,85204	822380,6	9,543	,160	108,886	,320
FE	230	,07	18,70	3,5116	,1637	2,48313	6,166	1,877	,160	9,178	,320
MG	230	,01	7,20	1,8639	,0881	1,33677	1,787	1,424	,160	2,283	,320
Valid N (listwise)	230										

Table A43: Descriptive statistics of KDD038 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	185	-,01	1,21	,2070	,0184	,24960	,062	1,763	,179	3,254	,355
K	185	-,01	3,13	1,1232	,0633	,86074	,741	,072	,179	-1,274	,355
COPPM	185	-1,00	137,00	15,0216	1,1531	15,68333	245,967	5,047	,179	34,483	,355
BAPPM	185	-10,00	450,00	124,4865	8,8375	120,20309	14448,784	,574	,179	-,749	,355
BEPPM	185	-,50	2,40	,8622	,0627	,85228	,726	-,325	,179	-,844	,355
AGPPM	185	-,50	100,00	4,7692	1,4268	19,40602	376,594	4,577	,179	19,833	,355
BIPPM	185	-2,00	30,00	-,7081	,2408	3,27560	10,730	5,330	,179	42,831	,355
ASPPM	185	-5,00	3550,00	45,6757	19,4990	265,21520	70339,101	12,700	,179	168,127	,355
MNPPM	185	91,00	1750,00	596,3351	29,1224	396,10686	156900,6	,943	,179	-,079	,355
MOPPM	185	-1,00	119,00	16,1514	1,4594	19,84967	394,010	2,753	,179	9,505	,355
NA	185	-,01	2,35	1,0513	,0589	,80157	,643	-,042	,179	-1,504	,355
CDPPM	185	-,50	43,40	1,4659	,3236	4,40158	19,374	5,810	,179	47,043	,355
NIPPM	185	-1,00	664,00	53,7892	6,8146	92,68826	8591,113	3,288	,179	13,471	,355
S	185	,02	10,00	1,9704	,1444	1,96458	3,860	1,634	,179	3,140	,355
PBPPM	185	-2,00	5930,00	78,6919	35,7271	485,94123	236138,9	10,653	,179	121,201	,355
SBPPM	185	-5,00	543,00	14,1622	4,7163	64,14899	4115,093	5,618	,179	36,754	,355
SRPPM	185	16,00	314,00	120,6324	4,7182	64,17423	4118,332	,709	,179	-,109	,355
VPPM	185	1,00	156,00	74,8703	2,6482	36,01969	1297,418	-,601	,179	-,268	,355
WPPM	185	-10,00	10000,00	189,6757	82,2532	1118,765	1251635	6,708	,179	47,941	,355
ZNPPM	185	19,00	6780,00	342,9351	50,4494	686,18660	470852,1	5,623	,179	44,089	,355
AL	185	,03	8,19	4,9743	,1798	2,44567	5,981	-,889	,179	-,623	,355
CA	185	,26	37,40	11,2098	,8777	11,93846	142,527	1,054	,179	-,365	,355
CRPPM	185	1,00	583,00	59,7243	5,7664	78,43160	6151,516	3,306	,179	14,906	,355
CUPPM	185	10,00	10000,00	1828,9297	126,3533	1718,591	2953554	1,646	,179	3,863	,355
FE	185	,09	16,20	3,9251	,1507	2,04980	4,202	,965	,179	6,466	,355
MG	185	,10	9,15	2,1348	,1151	1,56536	2,450	1,246	,179	2,151	,355
Valid N (listwise)	185										

Table A44: Descriptive statistics of KDD039 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	299	-,01	,82	,1595	,0104	,17944	,032	1,573	,141	1,717	,281
K	299	,31	2,73	1,3120	,0299	,51757	,268	,206	,141	-,840	,281
COPPM	299	3,00	183,00	10,2709	,6044	10,45140	109,232	15,315	,141	252,559	,281
BAPPM	299	20,00	740,00	231,6388	8,6125	148,92340	22178,178	,350	,141	-,778	,281
BEPPM	299	-,50	1,20	,7221	,0215	,37261	,139	-2,518	,141	5,787	,281
AGPPM	299	-,50	5,30	-,2592	,0390	,67516	,456	3,799	,141	19,756	,281
BIPPM	299	-2,00	8,00	-,8997	,1215	2,10065	4,413	1,598	,141	1,267	,281
ASPPM	299	-5,00	96,00	11,3278	1,0804	18,68171	349,006	1,522	,141	2,508	,281
MNPPM	299	120,00	791,00	334,3010	7,3971	127,90799	16360,453	,771	,141	,765	,281
MOPPM	299	-1,00	47,00	3,9699	,2910	5,03102	25,311	4,304	,141	26,269	,281
NA	299	,39	3,22	2,4057	,0261	,45128	,204	-1,534	,141	2,870	,281
CDPPM	299	-,50	6,40	-,3411	,0406	,70140	,492	5,881	,141	41,192	,281
NIPPM	299	-1,00	29,00	3,1505	,2356	4,07407	16,598	3,063	,141	13,553	,281
S	299	,04	10,00	2,3593	,1021	1,76474	3,114	1,127	,141	1,562	,281
PBPPM	299	-2,00	275,00	10,0903	1,4340	24,79666	614,874	7,005	,141	59,448	,281
SBPPM	299	-5,00	74,00	-2,7023	,5142	8,89056	79,042	5,778	,141	39,087	,281
SRPPM	299	12,00	3620,00	183,7057	12,6168	218,16458	47595,786	13,201	,141	207,807	,281
VPPM	299	51,00	111,00	84,7391	,5426	9,38292	88,039	-,093	,141	,355	,281
WPPM	299	-10,00	1580,00	-2,2408	5,3274	92,11895	8485,902	17,119	,141	294,974	,281
ZNPPM	299	6,00	940,00	58,7893	4,8400	83,69190	7004,335	6,978	,141	58,160	,281
AL	299	3,88	8,64	6,8746	,0520	,89985	,810	-,725	,141	,306	,281
CA	299	,13	7,16	2,5680	,0756	1,30687	1,708	,085	,141	-,363	,281
CRPPM	299	5,00	49,00	10,1137	,3166	5,47482	29,974	4,512	,141	25,652	,281
CUPPM	299	30,00	3380,00	789,1171	41,6683	720,51143	519136,7	1,083	,141	,347	,281
FE	299	2,87	19,50	4,3171	,0710	1,22817	1,508	6,963	,141	79,166	,281
MG	299	,37	2,81	1,2507	,0189	,32667	,107	,984	,141	4,024	,281
Valid N (listwise)	299										

Table A45: Descriptive statistics of KDD040 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	54	-,01	1,03	,3285	,0410	,30135	,091	,663	,325	-1,032	,639
K	54	,37	3,35	1,3500	,0820	,60264	,363	,879	,325	,957	,639
COPPM	54	7,00	30,00	10,6111	,4371	3,21210	10,318	4,325	,325	25,151	,639
BAPPM	54	40,00	720,00	243,1481	21,0782	154,89283	23991,789	,747	,325	,078	,639
BEPPM	54	,50	1,30	,8259	,0290	,21296	,045	,572	,325	-,270	,639
AGPPM	54	-,50	3,50	,2852	,1209	,88838	,789	1,298	,325	2,582	,639
BIPPM	54	-2,00	5,00	,2963	,3513	2,58172	6,665	,370	,325	-1,601	,639
ASPPM	54	-5,00	169,00	16,7222	4,4149	32,44293	1052,544	3,024	,325	10,638	,639
MNPPM	54	300,00	1525,00	600,7593	39,1530	287,71494	82779,884	1,741	,325	2,680	,639
MOPPM	54	1,00	27,00	6,6667	,6045	4,44250	19,736	2,054	,325	7,360	,639
NA	54	1,77	3,28	2,5613	,0550	,40390	,163	-,299	,325	-,791	,639
CDPPM	54	-,50	20,20	,4519	,4348	3,19515	10,209	5,075	,325	28,962	,639
NIPPM	54	-1,00	51,00	5,1667	,9423	6,92480	47,953	5,665	,325	37,453	,639
S	54	,01	6,10	1,5059	,1862	1,36851	1,873	1,058	,325	1,075	,639
PBPPM	54	3,00	1175,00	63,6296	25,0859	184,34272	33982,238	5,183	,325	28,226	,639
SBPPM	54	-5,00	64,00	-,0556	1,5937	11,71101	137,148	3,656	,325	16,793	,639
SRPPM	54	51,00	265,00	145,3889	8,1638	59,99164	3598,997	,373	,325	-,754	,639
VPPM	54	58,00	102,00	85,5741	1,4855	10,91580	119,155	-1,326	,325	1,096	,639
WPPM	54	-10,00	80,00	-1,1111	2,1905	16,09719	259,119	2,893	,325	11,606	,639
ZNPPM	54	31,00	3780,00	222,5741	76,7724	564,15934	318275,8	5,403	,325	31,773	,639
AL	54	5,48	8,28	7,1215	,0954	,70120	,492	-,376	,325	-,789	,639
CA	54	,62	3,79	1,7293	,1150	,84493	,714	,564	,325	-,398	,639
CRPPM	54	6,00	15,00	9,7963	,3274	2,40581	5,788	,232	,325	-,933	,639
CUPPM	54	39,00	4860,00	1922,3704	176,6458	1298,076	1685002	,272	,325	-1,197	,639
FE	54	2,31	6,82	4,3511	,1411	1,03693	1,075	,380	,325	-,775	,639
MG	54	,57	2,27	1,2711	,0474	,34823	,121	,914	,325	1,511	,639
Valid N (listwise)	54										

Table A46: Descriptive statistics of KDD040A well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	100	,01	,81	,2465	,0178	,17763	,032	1,289	,241	1,013	,478
K	100	,63	3,44	1,4328	,0515	,51469	,265	,949	,241	1,637	,478
COPPM	100	6,00	23,00	10,1200	,2656	2,65634	7,056	2,109	,241	7,111	,478
BAPPM	100	70,00	530,00	282,4000	12,1640	121,63964	14796,202	-,195	,241	-1,028	,478
BEPPM	100	,50	1,70	,9410	,0172	,17180	,030	,558	,241	3,492	,478
AGPPM	100	-,50	7,50	,7120	,1353	1,35336	1,832	1,974	,241	6,177	,478
BIPPM	100	-2,00	11,00	-,8400	,2260	2,25953	5,105	2,220	,241	6,509	,478
ASPPM	100	-5,00	231,00	10,0100	3,9388	39,38787	1551,404	4,207	,241	19,579	,478
MNPPM	100	190,00	2700,00	533,7000	37,5360	375,35956	140894,8	3,965	,241	18,739	,478
MOPPM	100	-1,00	43,00	8,5300	,7465	7,46501	55,726	2,339	,241	6,493	,478
NA	100	,12	3,58	2,6768	,0682	,68231	,466	-1,991	,241	4,213	,478
CDPPM	100	-,50	37,20	,3160	,4018	4,01783	16,143	8,181	,241	73,615	,478
NIPPM	100	-1,00	239,00	9,7600	2,7595	27,59524	761,497	6,676	,241	50,935	,478
S	100	,06	6,60	1,0244	,1244	1,24350	1,546	2,349	,241	6,078	,478
PBPPM	100	-2,00	1500,00	44,8900	16,2832	162,83237	26514,382	7,678	,241	66,231	,478
SBPPM	100	-5,00	54,00	-2,1400	,9599	9,59905	92,142	4,167	,241	18,654	,478
SRPPM	100	18,00	319,00	189,4900	6,8793	68,79254	4732,414	-,578	,241	-,267	,478
VPPM	100	35,00	116,00	92,0100	1,1362	11,36226	129,101	-1,541	,241	6,381	,478
WPPM	100	-10,00	400,00	5,0000	4,6374	46,37354	2150,505	6,899	,241	55,269	,478
ZNPPM	100	31,00	6140,00	189,5400	64,0126	640,12649	409761,9	8,460	,241	77,468	,478
AL	100	3,31	8,39	7,2344	,0786	,78591	,618	-1,864	,241	5,734	,478
CA	100	,75	9,59	2,2444	,1202	1,20211	1,445	3,591	,241	18,209	,478
CRPPM	100	5,00	417,00	20,0900	4,6166	46,16573	2131,275	7,161	,241	57,831	,478
CUPPM	100	68,00	6240,00	1765,5700	110,1512	1101,512	1213328	1,344	,241	2,097	,478
FE	100	2,57	7,20	3,9244	,0805	,80506	,648	1,310	,241	2,683	,478
MG	100	,48	5,48	1,3870	,0633	,63260	,400	3,725	,241	18,979	,478
Valid N (listwise)	100										

Table A47: Descriptive statistics of KDD041 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	38	,15	,63	,3429	,0196	,12081	,015	,691	,383	-,056	,750
K	38	,54	2,20	1,3729	,0711	,43805	,192	-,004	,383	-,563	,750
COPPM	38	8,00	22,00	13,2105	,5104	3,14649	9,900	,987	,383	,764	,750
BAPPM	38	80,00	410,00	234,7368	14,6885	90,54600	8198,578	-,189	,383	-,955	,750
BEPPM	38	,60	1,20	,8500	,0199	,12247	,015	,326	,383	,772	,750
AGPPM	38	,00	3,20	,5947	,1112	,68574	,470	2,203	,383	6,230	,750
BIPPM	38	-2,00	5,00	-1,0789	,3275	2,01858	4,075	1,924	,383	2,248	,750
ASPPM	38	-5,00	35,00	5,3684	1,4865	9,16344	83,969	,921	,383	1,658	,750
MNPPM	38	147,00	413,00	250,7895	9,5356	58,78139	3455,252	1,056	,383	,976	,750
MOPPM	38	2,00	17,00	10,7895	,6545	4,03470	16,279	-,164	,383	-,612	,750
NA	38	1,54	3,17	2,6134	,0496	,30596	,094	-1,100	,383	2,956	,750
CDPPM	38	,00	4,40	,5079	,1410	,86941	,756	2,912	,383	10,735	,750
NIPPM	38	1,00	20,00	6,7632	,8258	5,09071	25,915	1,591	,383	1,317	,750
S	38	,08	4,09	1,4782	,1771	1,09172	1,192	,707	,383	-,178	,750
PBPPM	38	3,00	54,00	13,4474	1,9149	11,80402	139,335	2,155	,383	4,648	,750
SBPPM	38	-5,00	5,00	-4,7368	,2632	1,62221	2,632	6,164	,383	38,000	,750
SRPPM	38	70,00	207,00	121,1053	5,7095	35,19581	1238,745	,685	,383	-,010	,750
VPPM	38	73,00	140,00	95,5789	2,0341	12,53887	157,223	1,189	,383	3,047	,750
WPPM	38	-10,00	140,00	9,4737	5,8907	36,31301	1318,634	2,415	,383	5,586	,750
ZNPPM	38	51,00	249,00	108,1842	8,5054	52,43109	2749,019	1,342	,383	1,168	,750
AL	38	5,59	8,12	7,1742	,0841	,51813	,268	-1,058	,383	2,066	,750
CA	38	,37	2,32	1,0813	,0743	,45822	,210	,684	,383	,102	,750
CRPPM	38	17,00	68,00	25,6842	1,5436	9,51558	90,546	2,674	,383	9,857	,750
CUPPM	38	1105,00	7220,00	2933,5526	224,9293	1386,558	1922542	1,467	,383	2,266	,750
FE	38	3,87	6,91	4,9182	,1135	,69957	,489	,834	,383	,553	,750
MG	38	,76	1,59	1,2487	,0240	,14805	,022	-,367	,383	2,340	,750
Valid N (listwise)	38										

Table A48: Descriptive statistics of KDD042 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	411	,02	2,75	,4094	,0150	,30396	,092	2,008	,120	10,128	,240
K	411	,44	2,92	1,7173	,0254	,51540	,266	-,254	,120	-,537	,240
COPPM	411	5,00	30,00	10,1460	,1428	2,89543	8,384	2,740	,120	12,176	,240
BAPPM	411	10,00	490,00	254,7932	5,1509	104,42476	10904,530	-,495	,120	-,164	,240
BEPPM	411	-,50	1,20	,5903	,0183	,37096	,138	-1,803	,120	3,154	,240
AGPPM	411	-,50	1500,00	4,7436	3,7647	76,32231	5825,094	18,728	,120	363,081	,240
BIPPM	411	-2,00	4,00	-1,5985	,0617	1,25013	1,563	2,856	,120	6,423	,240
ASPPM	411	-5,00	113,00	6,8613	,8631	17,49837	306,193	2,482	,120	8,048	,240
MNPPM	411	113,00	978,00	366,1411	6,1590	124,86310	15590,795	1,015	,120	2,262	,240
MOPPM	411	1,00	254,00	7,6058	,7557	15,31954	234,688	11,358	,120	168,244	,240
NA	411	,64	3,44	2,1766	,0261	,52939	,280	-,116	,120	-,421	,240
CDPPM	411	-,50	9,10	-,1703	,0375	,76055	,578	7,013	,120	67,552	,240
NIPPM	411	-1,00	406,00	3,7372	1,0547	21,38244	457,209	17,186	,120	313,192	,240
S	411	,03	10,00	2,4687	,0767	1,55475	2,417	1,457	,120	3,183	,240
PBPPM	411	-2,00	244,00	9,8200	,9867	20,00443	400,177	8,351	,120	81,251	,240
SBPPM	411	-5,00	121,00	-3,8467	,3584	7,26524	52,784	13,344	,120	217,177	,240
SRPPM	411	16,00	486,00	166,5912	4,1723	84,58624	7154,833	,363	,120	-,488	,240
VPPM	411	49,00	150,00	80,4550	,5954	12,07031	145,692	,860	,120	3,090	,240
WPPM	411	-10,00	5640,00	9,3431	14,2561	289,01567	83530,055	18,495	,120	355,528	,240
ZNPPM	411	9,00	1580,00	70,6010	7,1183	144,31112	20825,699	7,495	,120	62,693	,240
AL	411	2,65	8,32	6,1644	,0563	1,14109	1,302	-,395	,120	-,035	,240
CA	411	,35	12,15	2,8064	,0671	1,35986	1,849	,901	,120	6,006	,240
CRPPM	411	3,00	25,00	10,4550	,1671	3,38790	11,478	,730	,120	,879	,240
CUPPM	411	176,00	7530,00	2292,6423	58,7393	1190,831	1418078	,809	,120	1,536	,240
FE	411	2,42	13,35	4,9066	,0546	1,10714	1,226	1,679	,120	10,289	,240
MG	411	,19	2,62	1,0177	,0129	,26074	,068	,558	,120	4,478	,240
Valid N (listwise)	411										

Table A49: Descriptive statistics of KDD043 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	315	,01	,90	,1791	,0085	,15027	,023	1,487	,137	2,773	,274
K	315	,09	2,96	1,6941	,0279	,49515	,245	-,051	,137	,008	,274
COPPM	315	7,00	195,00	13,7175	,6473	11,48827	131,980	12,913	,137	199,413	,274
BAPPM	315	10,00	520,00	226,3175	5,7682	102,37511	10480,663	-,144	,137	-,841	,274
BEPPM	315	-,50	3,00	,9292	,0342	,60616	,367	,816	,137	2,171	,274
AGPPM	315	-,50	8,50	,0762	,0595	1,05521	1,113	3,179	,137	16,251	,274
BIPPM	315	-2,00	4,00	-1,5651	,0752	1,33476	1,782	2,845	,137	6,503	,274
ASPPM	315	-5,00	455,00	23,1556	3,6746	65,21794	4253,380	3,725	,137	15,886	,274
MNPPM	315	140,00	1025,00	349,0921	7,7212	137,03724	18779,205	2,028	,137	5,749	,274
MOPPM	315	-1,00	515,00	16,2667	2,0291	36,01263	1296,910	9,202	,137	119,014	,274
NA	315	,32	3,17	2,2777	,0305	,54065	,292	-,968	,137	,917	,274
CDPPM	315	-,50	19,50	-,1038	,0902	1,60035	2,561	7,829	,137	79,765	,274
NIPPM	315	1,00	138,00	11,6317	1,1308	20,06941	402,781	3,332	,137	13,290	,274
S	315	,02	7,66	2,1541	,0786	1,39458	1,945	1,073	,137	1,967	,274
PBPPM	315	-2,00	741,00	15,9968	3,3441	59,35216	3522,678	9,438	,137	100,508	,274
SBPPM	315	-5,00	183,00	1,9619	1,3018	23,10441	533,814	5,717	,137	37,791	,274
SRPPM	315	18,00	450,00	190,5587	4,7932	85,07070	7237,024	,426	,137	-,180	,274
VPPM	315	33,00	211,00	95,5111	1,0866	19,28505	371,913	,433	,137	4,170	,274
WPPM	315	-10,00	4800,00	7,8730	15,4099	273,49865	74801,512	17,284	,137	303,034	,274
ZNPPM	315	11,00	2570,00	87,9492	11,4388	203,01935	41216,857	8,449	,137	84,975	,274
AL	315	1,95	9,23	7,0675	,0594	1,05464	1,112	-1,195	,137	3,541	,274
CA	315	1,30	19,30	3,7214	,1141	2,02468	4,099	2,271	,137	11,028	,274
CRPPM	315	5,00	266,00	21,7079	1,5319	27,18767	739,169	4,292	,137	26,320	,274
CUPPM	315	377,00	9300,00	2303,5016	84,7867	1504,815	2264469	1,517	,137	3,402	,274
FE	315	2,58	9,07	4,1808	,0532	,94466	,892	1,256	,137	2,684	,274
MG	315	,30	5,01	1,4752	,0355	,63070	,398	1,661	,137	5,070	,274
Valid N (listwise)	315										

Table A50: Descriptive statistics of KDD044 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	85	-,01	,52	,0114	,0065	,06002	,004	7,487	,261	62,937	,517
K	85	-,01	1,41	,1245	,0299	,27523	,076	3,133	,261	10,569	,517
COPPM	85	-1,00	48,00	2,9294	,7067	6,51516	42,447	5,037	,261	30,008	,517
BAPPM	85	-10,00	220,00	25,5294	4,5544	41,98939	1763,109	1,709	,261	4,394	,517
BEPPM	85	-,50	1,00	-,3647	,0410	,37819	,143	2,566	,261	5,067	,517
AGPPM	85	-,50	36,00	2,8659	,7637	7,04093	49,575	3,074	,261	9,763	,517
BIPPM	85	-2,00	49,00	1,2235	,8688	8,00948	64,152	4,232	,261	20,679	,517
ASPPM	85	-5,00	4290,00	205,9176	66,2411	610,71247	372969,7	5,137	,261	29,290	,517
MNPPM	85	48,00	6970,00	843,4235	130,3076	1201,377	1443306	3,003	,261	10,563	,517
MOPPM	85	-1,00	13,00	,3412	,3134	2,88903	8,346	2,908	,261	8,779	,517
NA	85	-,01	,38	,0233	,0063	,05797	,003	4,808	,261	25,014	,517
CDPPM	85	-,50	343,00	32,4235	6,0509	55,78689	3112,177	3,013	,261	11,984	,517
NIPPM	85	-1,00	47,00	8,4000	1,1409	10,51892	110,648	2,039	,261	4,057	,517
S	85	-,01	2,05	,1300	,0320	,29537	,087	4,015	,261	21,225	,517
PBPPM	85	-2,00	1950,00	219,0588	44,0606	406,21902	165013,9	2,571	,261	6,477	,517
SBPPM	85	-5,00	737,00	20,7647	9,4910	87,50315	7656,801	6,873	,261	54,617	,517
SRPPM	85	4,00	690,00	208,8588	17,7922	164,03623	26907,885	,938	,261	,127	,517
VPPM	85	2,00	52,00	13,4353	1,4330	13,21115	174,534	1,366	,261	1,056	,517
WPPM	85	-10,00	10,00	-9,7647	,2353	2,16930	4,706	9,220	,261	85,000	,517
ZNPPM	85	37,00	57800,00	3897,1294	872,0342	8039,758	6,5E+07	4,396	,261	24,611	,517
AL	85	,05	10,25	1,0888	,1748	1,61168	2,598	2,871	,261	11,909	,517
CA	85	,17	35,70	24,0542	1,1014	10,15444	103,113	-1,302	,261	,598	,517
CRPPM	85	1,00	102,00	10,0118	1,3797	12,71996	161,797	4,906	,261	32,609	,517
CUPPM	85	7,00	168000,00	5224,7176	2510,3048	23143,87	5,4E+08	5,734	,261	34,484	,517
FE	85	,05	25,40	1,8288	,4488	4,13755	17,119	4,208	,261	18,748	,517
MG	85	,02	11,40	2,1533	,2839	2,61770	6,852	1,870	,261	3,179	,517
Valid N (listwise)	85										

Table A51: Descriptive statistics of KDD045 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	161	-,01	,95	,2386	,0175	,22254	,050	1,073	,191	,495	,380
K	161	-,01	2,64	1,1186	,0540	,68469	,469	-,209	,191	-,870	,380
COPPM	161	2,00	81,00	9,5093	,5591	7,09412	50,326	7,269	,191	67,842	,380
BAPPM	161	-10,00	550,00	160,9317	9,6184	122,04406	14894,752	,507	,191	,190	,380
BEPPM	161	-,50	1,10	,4460	,0408	,51757	,268	-1,131	,191	-,313	,380
AGPPM	161	-,50	395,00	2,4857	2,4543	31,14188	969,817	12,671	,191	160,704	,380
BIPPM	161	-2,00	3,00	-1,8696	,0579	,73426	,539	5,546	,191	29,518	,380
ASPPM	161	-5,00	168,00	9,1553	2,0616	26,15878	684,282	3,373	,191	13,880	,380
MNPPM	161	37,00	3210,00	370,9752	24,8031	314,71608	99046,212	5,254	,191	41,783	,380
MOPPM	161	-1,00	116,00	8,4410	1,0927	13,86445	192,223	4,162	,191	24,321	,380
NA	161	-,01	3,74	1,7274	,0769	,97525	,951	-,460	,191	-,790	,380
CDPPM	161	-,50	11,40	,4758	,1483	1,88221	3,543	2,754	,191	9,348	,380
NIPPM	161	-1,00	1950,00	21,2422	12,4318	157,74199	24882,535	11,678	,191	142,237	,380
S	161	,02	10,00	3,8375	,2409	3,05632	9,341	,910	,191	-,233	,380
PBPPM	161	-2,00	528,00	21,9565	4,1190	52,26451	2731,579	6,708	,191	57,515	,380
SBPPM	161	-5,00	108,00	,7019	1,2435	15,77888	248,973	4,230	,191	21,361	,380
SRPPM	161	12,00	514,00	143,7702	5,9926	76,03809	5781,791	1,404	,191	3,823	,380
VPPM	161	-1,00	119,00	73,3106	2,2237	28,21530	796,103	-1,511	,191	1,483	,380
WPPM	161	-10,00	7840,00	137,1429	77,1314	978,68753	957829,3	7,131	,191	51,111	,380
ZNPPM	161	21,00	1405,00	173,9565	20,5548	260,81177	68022,779	2,758	,191	7,754	,380
AL	161	,04	8,33	5,5537	,1768	2,24360	5,034	-1,398	,191	1,022	,380
CA	161	,27	33,80	7,3276	,7340	9,31302	86,732	1,609	,191	1,146	,380
CRPPM	161	2,00	58,00	12,3727	,6005	7,61973	58,060	2,771	,191	12,330	,380
CUPPM	161	16,00	7980,00	1963,6522	120,2681	1526,031	2328772	1,033	,191	1,193	,380
FE	161	,41	9,15	3,9973	,1206	1,53055	2,343	-,044	,191	,044	,380
MG	161	,22	4,08	1,1136	,0378	,47991	,230	1,614	,191	8,608	,380
Valid N (listwise)	161										

Table A52: Descriptive statistics of KDD046 well.

Descriptive Statistics											
	N	Minimum	Maximum	Mean		Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AUPPM	196	-,01	1,33	,3401	,0198	,27730	,077	,974	,174	,710	,346
K	196	,33	3,82	1,7056	,0443	,62034	,385	,538	,174	1,218	,346
COPPM	196	-1,00	19,00	9,0459	,1592	2,22870	4,967	-,457	,174	5,464	,346
BAPPM	196	30,00	670,00	294,8980	8,9891	125,84683	15837,425	,500	,174	1,019	,346
BEPPM	196	-,50	1,40	,7270	,0203	,28471	,081	-2,014	,174	8,924	,346
AGPPM	196	-,50	5,80	-,2112	,0528	,73901	,546	3,949	,174	23,290	,346
BIPPM	196	-2,00	2,00	-1,9796	,0204	,28571	,082	14,000	,174	196,000	,346
ASPPM	196	-5,00	220,00	5,7704	1,5622	21,87079	478,332	6,004	,174	50,890	,346
MNPPM	196	73,00	1050,00	397,8622	13,0125	182,17531	33187,842	1,555	,174	3,347	,346
MOPPM	196	-1,00	232,00	15,8265	2,6484	37,07803	1374,780	4,127	,174	18,504	,346
NA	196	,62	3,22	2,2735	,0284	,39744	,158	-,736	,174	1,674	,346
CDPPM	196	-,50	5,10	-,1066	,0693	,96970	,940	3,194	,174	10,929	,346
NIPPM	196	-1,00	10,00	2,6071	,1476	2,06652	4,271	,820	,174	1,269	,346
S	196	,02	10,00	2,0753	,1156	1,61818	2,619	1,435	,174	3,338	,346
PBPPM	196	2,00	3720,00	50,8878	23,2047	324,86584	105537,8	10,006	,174	103,379	,346
SBPPM	196	-5,00	80,00	-2,3367	,6188	8,66285	75,045	5,876	,174	45,967	,346
SRPPM	196	32,00	455,00	193,5255	5,2633	73,68613	5429,645	-,064	,174	,179	,346
VPPM	196	48,00	123,00	81,7806	,8288	11,60362	134,644	,173	,174	1,177	,346
WPPM	196	-10,00	10,00	-9,3878	,2467	3,45412	11,931	5,492	,174	28,449	,346
ZNPPM	196	23,00	1000,00	85,3214	8,1105	113,54662	12892,835	4,751	,174	27,841	,346
AL	196	3,86	8,32	6,6452	,0564	,78962	,624	-,532	,174	,865	,346
CA	196	,08	12,00	3,0244	,1057	1,48002	2,190	,728	,174	6,085	,346
CRPPM	196	6,00	31,00	11,9388	,2247	3,14542	9,894	1,199	,174	5,878	,346
CUPPM	196	15,00	6790,00	1987,2296	79,1441	1108,017	1227701	,703	,174	1,247	,346
FE	196	2,16	7,32	4,1582	,0704	,98629	,973	-,047	,174	-,662	,346
MG	196	,49	3,19	1,1428	,0247	,34550	,119	2,488	,174	12,260	,346
Valid N (listwise)	196										

APPENDIX B

PROBABILITY GRAPHS

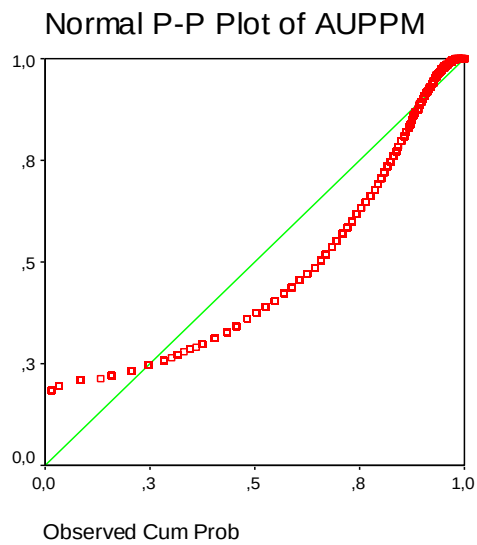


Figure B1: Probability graph of Au.

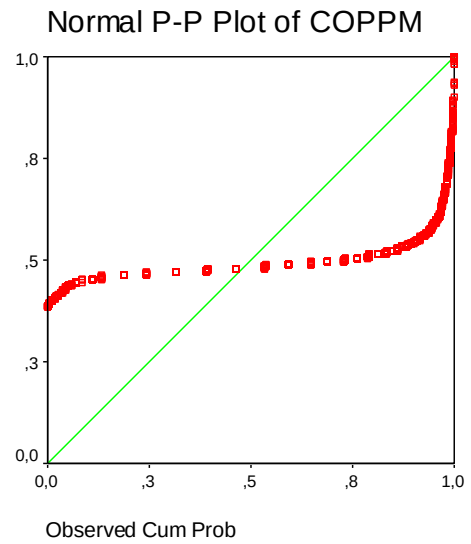


Figure B2: Probability graph of Co.

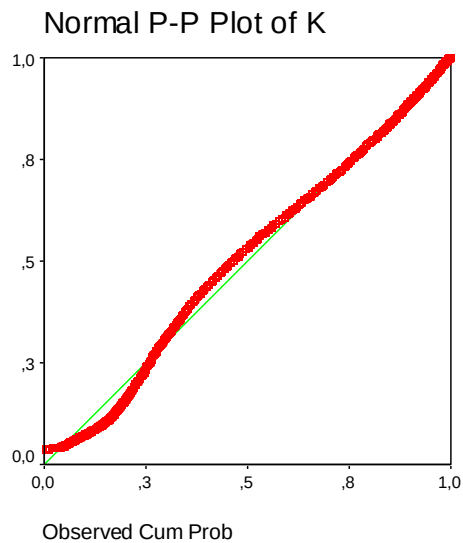


Figure B3: Probability graph of K.

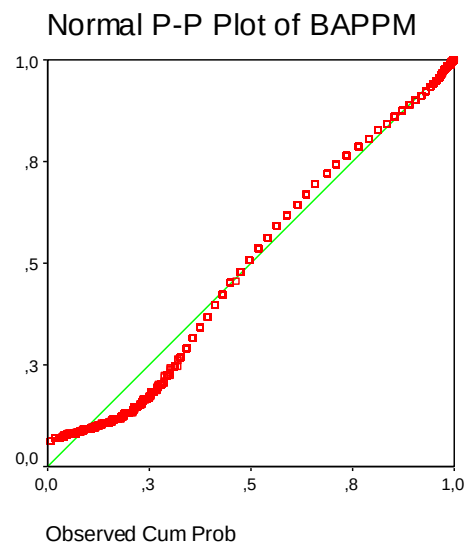


Figure B4: Probability graph of Ba.

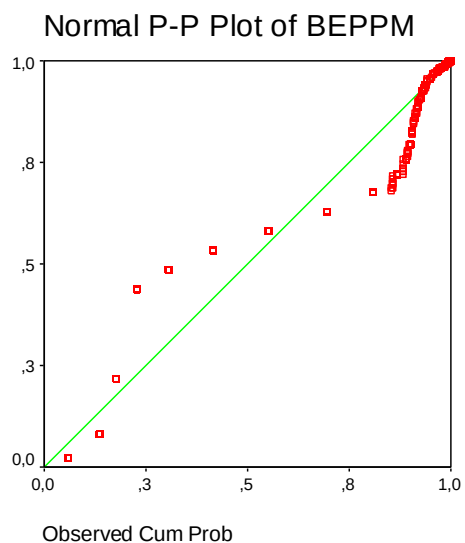


Figure B5: Probability graph of Be.

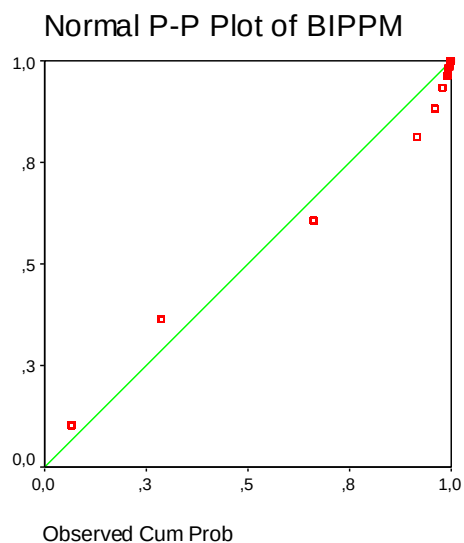


Figure B6: Probability graph of Bi.

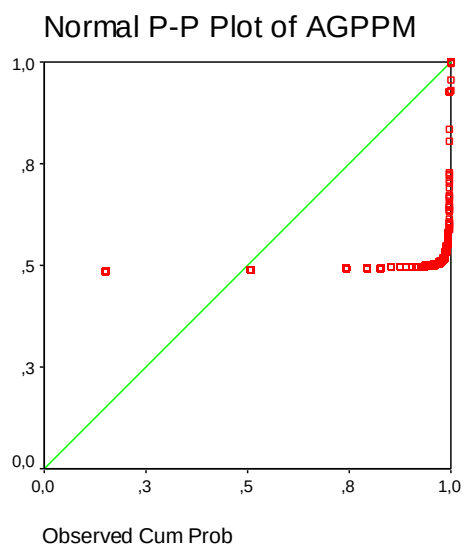


Figure B7: Probability graph of Ag.

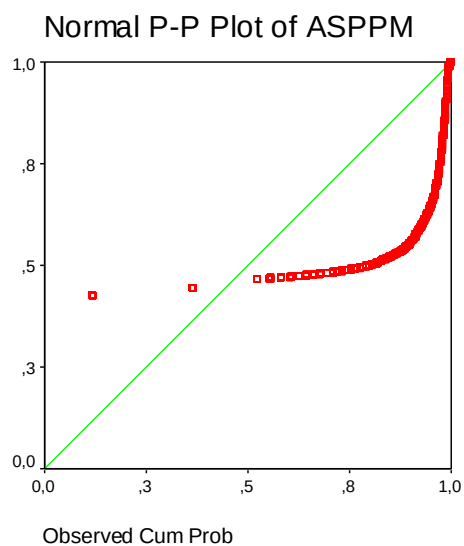


Figure B8: Probability graph of As.

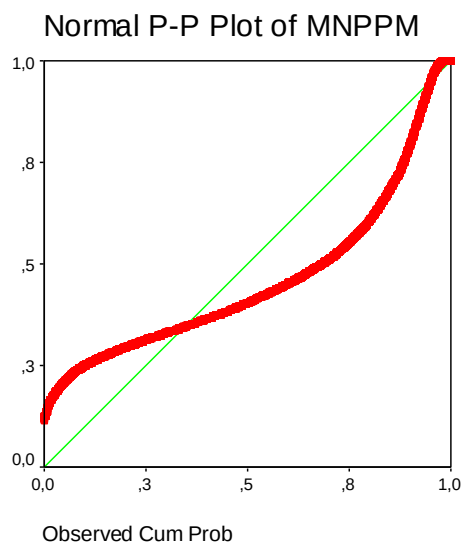


Figure B9: Probability graph of Mn.

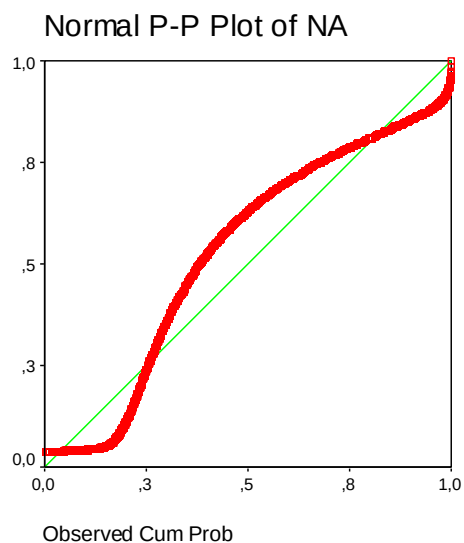


Figure B10: Probability graph of Na.

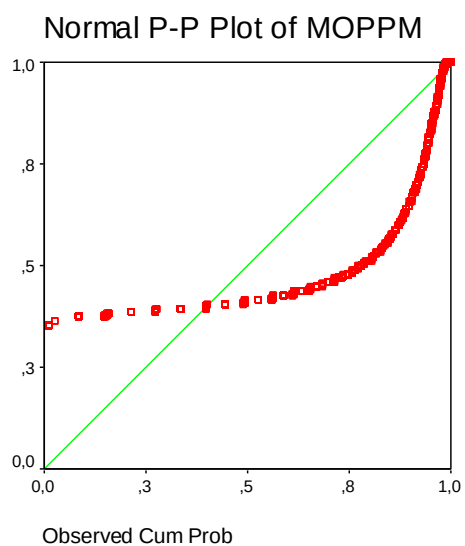


Figure B11: Probability graph of Mo.

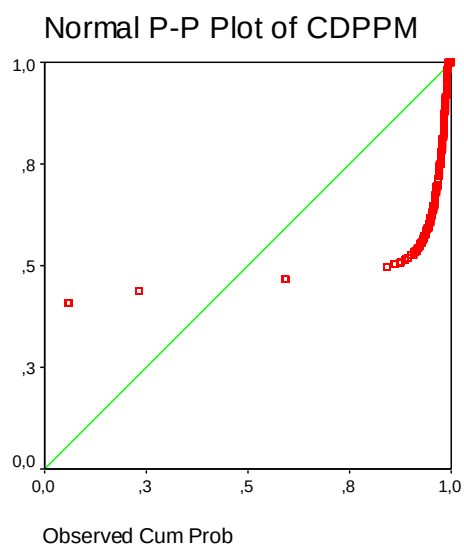


Figure B12: Probability graph of Cd.

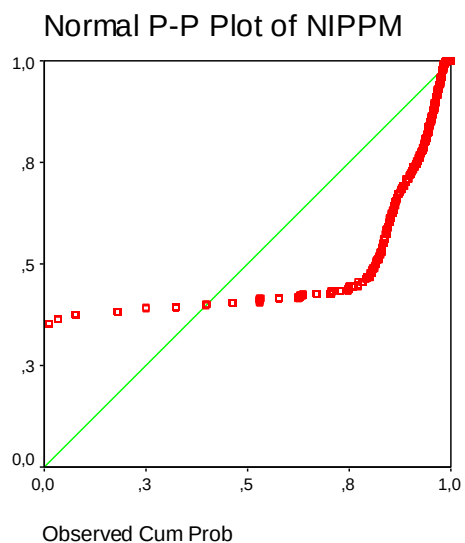


Figure B13: Probability graph of Ni.

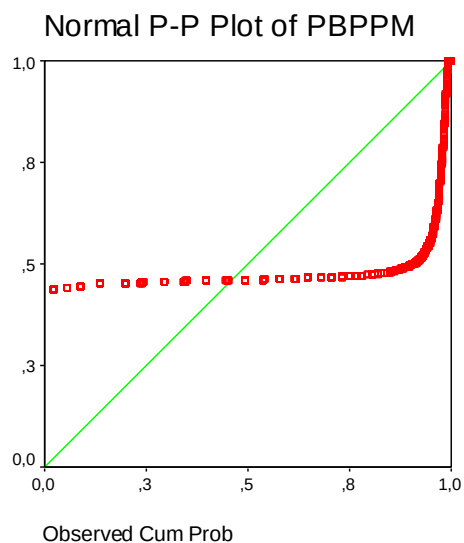


Figure B14: Probability graph of Pb.

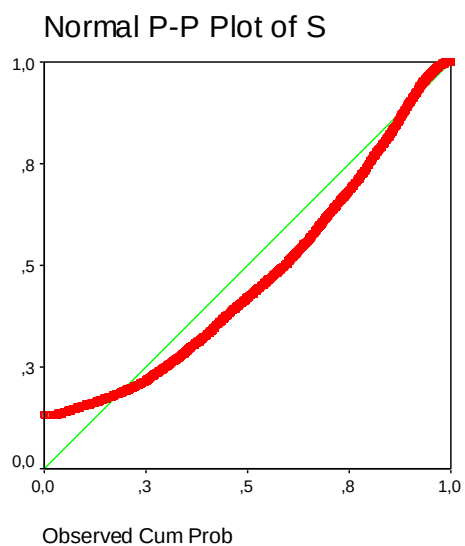


Figure B15: Probability graph of S.

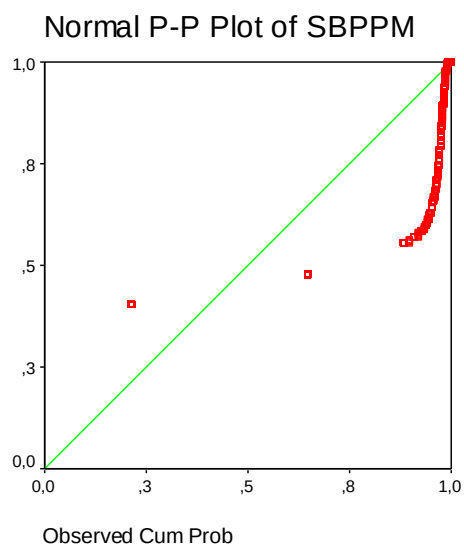


Figure B16: Probability graph of Sb.

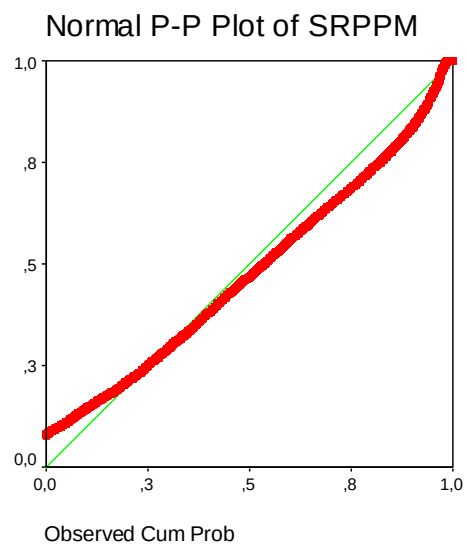


Figure B17: Probability graph of Sr.

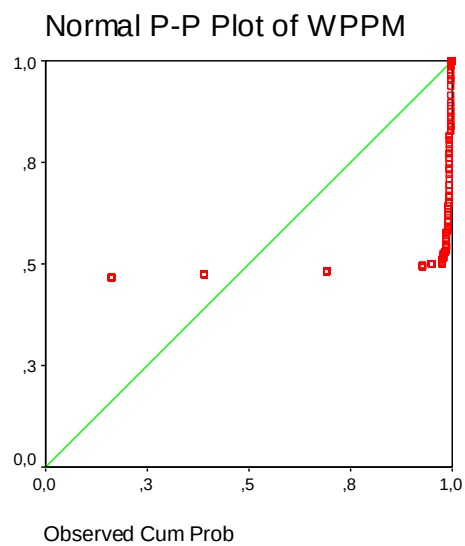


Figure B18: Probability graph of W.

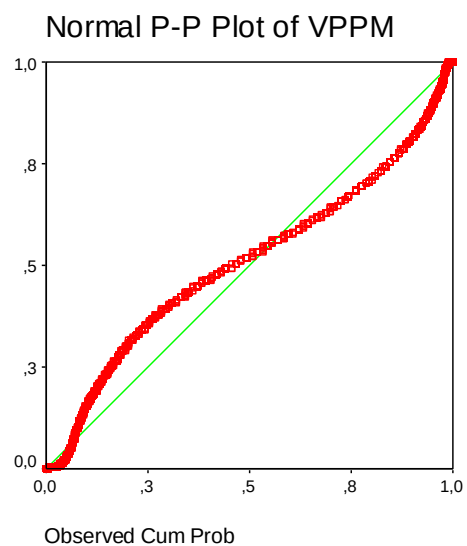


Figure B19: Probability graph of V.

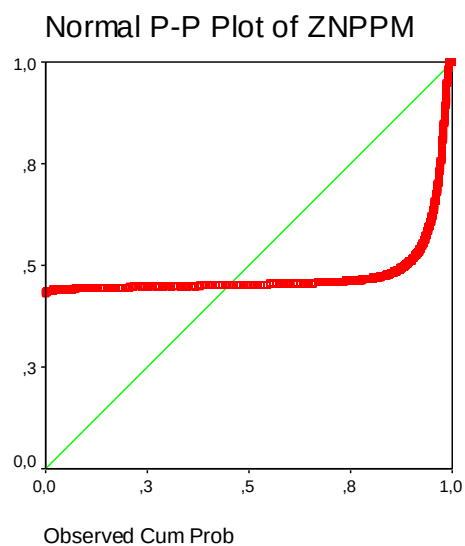


Figure B20: Probability graph of Zn.

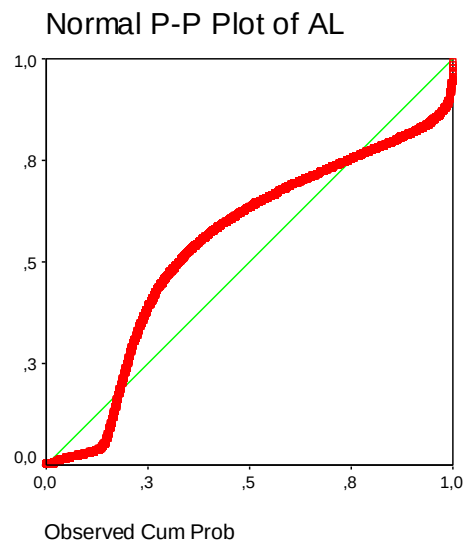


Figure B21: Probability graph of AL.

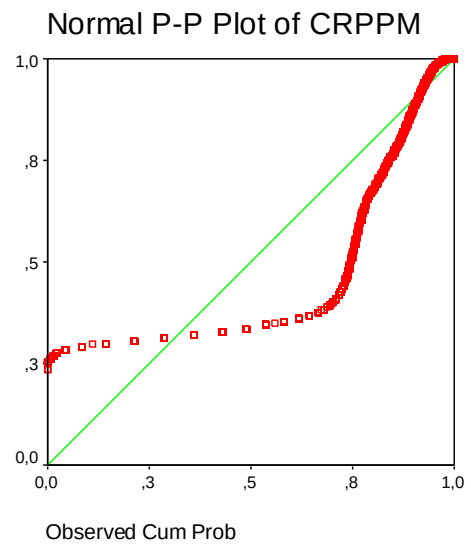


Figure B22: Probability graph of Cr.

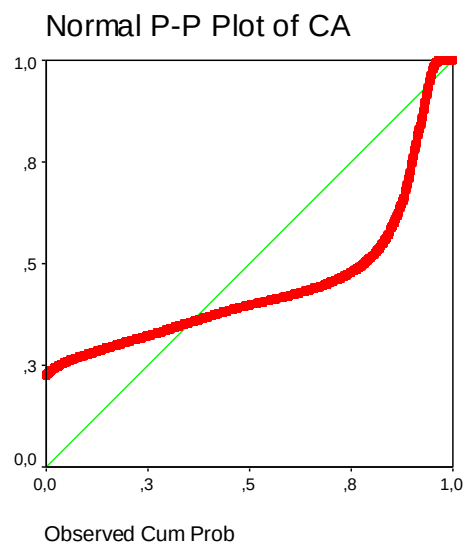


Figure B23: Probability graph of Ca.

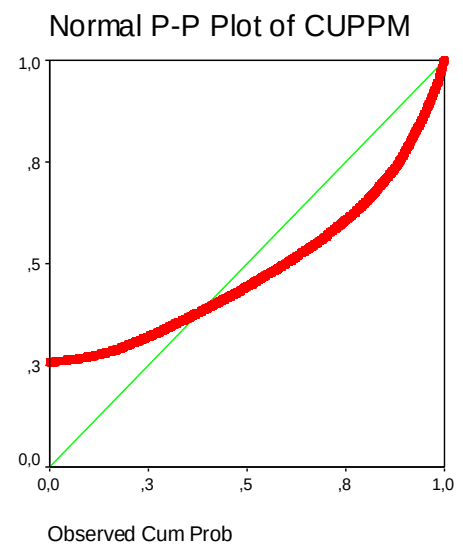


Figure B24: Probability graph of Cu.

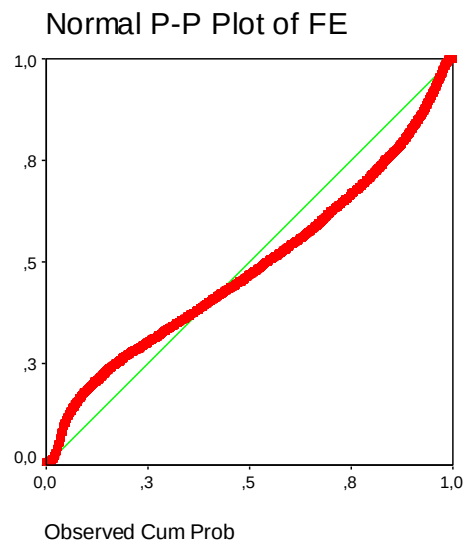


Figure B25: Probability graph of Fe.

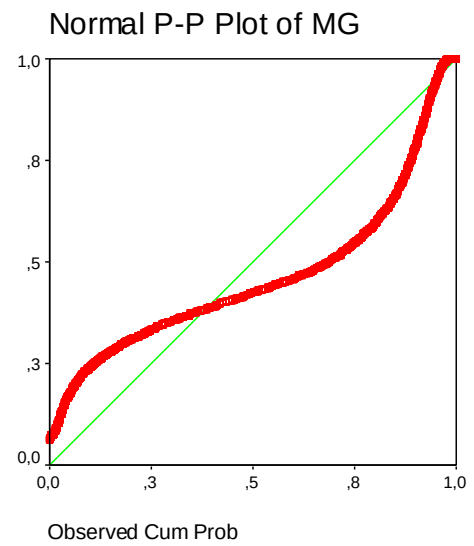


Figure B26: Probability graph of Mg.

APPENDIX C CORRELATION MATRIX

Correlations

		UPP	K	OPP	APPE	EPP	GPP	IPP	SPP	NPP	OPP	NA	PP	IPP	S	BPP	PP	PP	PP	NPP	NPP	NPP	AL	CA	PP	PP	FE
M	Pearson	1	0.274	0.008	0.064	0.185	0.008	0.029	0.023	0.199	0.071	0.036	0.053	0.152	0.115	0.020	0.035	0.287	0.073	0.009	0.053	0.085	0.277	0.053	0.418	0.328	
	Sig. (2-	.	0.000	0.406	0.000	0.000	0.422	0.004	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.000	0.000	0.000	0.365	0.000	0.000	0.000	0.000	0.000	0.000	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274
K	Pearson	0.274	1	0.166	0.768	0.335	0.013	0.008	0.076	0.229	0.025	0.155	0.096	0.080	0.171	0.031	0.015	0.261	0.349	0.005	0.114	0.554	0.433	0.307	0.086	0.103	
	Sig. (2-	0.000	.	0.120	0.000	0.000	0.187	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.002	0.143	0.000	0.000	0.538	0.000	0.000	0.000	0.000	0.000	0.000	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
CO	Pearson	0.008	0.166	1	0.031	0.155	0.008	0.016	0.004	0.026	0.000	0.022	0.002	0.081	0.036	0.002	0.001	0.010	0.057	0.056	0.008	0.007	0.031	0.073	0.015	0.086	
	Sig. (2-	0.406	0.120	.	0.002	0.139	0.112	0.110	0.559	0.009	0.620	0.288	0.558	0.000	0.000	0.320	0.947	0.305	0.000	0.000	0.453	0.199	0.002	0.000	0.137	0.000	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
BA	Pearson	0.064	0.768	0.031	1	0.488	0.013	0.196	0.111	0.050	0.015	0.575	0.097	0.152	0.340	0.067	0.087	0.417	0.320	0.001	0.109	0.702	0.370	0.386	0.041	0.058	
	Sig. (2-	0.000	0.000	0.002	.	0.000	0.189	0.000	0.000	0.000	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
BE	Pearson	0.185	0.335	0.155	0.488	1	0.014	0.321	0.049	0.056	0.047	0.512	0.047	0.135	0.092	0.220	0.12	0.429	0.441	0.050	0.053	0.762	0.107	0.251	0.144	0.012	
	Sig. (2-	0.000	0.000	0.139	0.000	.	0.152	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.288	0.229	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
AG	Pearson	0.008	0.139	0.008	0.013	0.014	1	0.000	0.011	0.036	0.003	0.015	0.015	0.310	0.010	0.011	0.010	0.013	0.011	0.369	0.020	0.004	0.12	0.015	0.096	0.019	
	Sig. (2-	0.422	0.187	0.112	0.189	0.152	.	0.993	0.278	0.000	0.769	0.142	0.124	0.000	0.340	0.281	0.297	0.199	0.269	0.000	0.044	0.569	0.243	0.135	0.000	0.060	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
BI	Pearson	0.029	0.008	0.166	0.196	0.321	0.000	1	0.145	0.036	0.023	0.233	0.132	0.006	0.031	0.075	0.132	0.154	0.061	0.006	0.099	0.280	0.069	0.259	0.008	0.117	
	Sig. (2-	0.004	0.000	0.110	0.000	0.000	0.993	.	0.000	0.000	0.020	0.000	0.000	0.577	0.002	0.000	0.000	0.000	0.542	0.000	0.000	0.000	0.000	0.454	0.000		
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
AS	Pearson	0.023	0.076	0.004	0.111	0.049	0.011	0.145	1	0.076	0.001	0.080	0.342	0.011	0.095	0.560	0.551	0.060	0.074	0.014	0.332	0.072	0.021	0.010	0.115	0.142	
	Sig. (2-	0.020	0.000	0.559	0.000	0.000	0.278	0.000	.	0.000	0.005	0.000	0.000	0.281	0.000	0.000	0.000	0.000	0.151	0.000	0.000	0.32	0.010	0.115	0.000	0.000	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
MT	Pearson	0.199	0.229	0.026	0.105	0.056	0.036	0.036	0.076	1	0.061	0.161	0.254	0.236	0.122	0.039	0.007	0.006	0.025	0.093	0.302	0.071	0.283	0.094	0.047	0.033	
	Sig. (2-	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.510	0.576	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
MC	Pearson	0.071	0.025	0.000	0.015	0.047	0.003	0.023	0.001	0.061	1	0.011	0.010	0.011	0.042	0.005	0.019	0.020	0.021	0.000	0.013	0.030	0.027	0.001	0.091	0.000	
	Sig. (2-	0.000	0.013	0.620	0.144	0.000	0.769	0.020	0.005	0.000	.	0.281	0.302	0.283	0.000	0.531	0.062	0.045	0.036	0.999	0.207	0.002	0.008	0.492	0.001	0.000	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
NA	Pearson	0.036	0.515	0.022	0.575	0.512	0.015	0.233	0.080	0.161	0.011	1	0.127	0.219	0.164	0.067	0.064	0.379	0.419	0.001	0.145	0.347	0.412	0.556	0.008	0.046	
	Sig. (2-	0.000	0.000	0.028	0.000	0.000	0.142	0.000	0.000	0.000	0.281	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.428	0.000		
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
CD	Pearson	0.053	0.096	0.002	0.097	0.047	0.015	0.132	0.342	0.254	0.010	0.127	1	0.033	0.006	0.006	0.073	0.060	0.138	0.011	0.347	0.118	0.146	0.011	0.161	0.012	
	Sig. (2-	0.000	0.000	0.858	0.000	0.000	0.124	0.000	0.000	0.000	0.302	0.000	.	0.001	0.529	0.000	0.000	0.000	0.000	0.292	0.000	0.000	0.000	0.289	0.000	0.226	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
NI	Pearson	0.152	0.080	0.081	0.152	0.135	0.100	0.006	0.011	0.236	0.011	0.219	0.033	1	0.084	0.013	0.008	0.020	0.137	0.152	0.057	0.041	0.067	0.505	0.037	0.146	
	Sig. (2-	0.000	0.000	0.000	0.000	0.000	0.000	0.577	0.281	0.000	0.283	0.000	0.001	.	0.000	0.208	0.419	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
S	Pearson	0.115	0.171	0.036	0.340	0.092	0.010	0.031	0.095	0.122	0.042	0.164	0.006	0.084	1	0.059	0.129	0.088	0.087	0.007	0.014	0.139	0.027	0.104	0.031	0.210	
	Sig. (2-	0.000	0.000	0.000	0.000	0.000	0.340	0.002	0.000	0.000	0.000	0.000	0.529	0.000	.	0.000	0.000	0.000	0.000	0.489	0.163	0.000	0.008	0.000	0.000		
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
PB	Pearson	0.020	0.031	0.002	0.067	0.022	0.011	0.075	0.560	0.039	0.005	0.067	0.406	0.013	0.059	1	0.560	0.053	0.042	0.017	0.109	0.034	0.009	0.012	0.091	0.059	
	Sig. (2-	0.051	0.002	0.320	0.000	0.028	0.281	0.000	0.000	0.000	0.531	0.000	0.000	0.208	0.000	.	0.000	0.000	0.000	0.086	0.000	0.001	0.394	0.232	0.000	0.000	
	Z	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	0.274	
SBI	Pearson	0.035	0.015	0.001	0.087	0.012	0.010	0.132	0.551	0.007	0.019	0.064	0.273	0.008	0.129	0.560	1	0.051	0.028	0.020	0.258	0.019	0.006	0.006	0.064	0.093	
	Sig. (2-	0.000	0.143	0.947	0.000	0.229	0.297	0.000	0.000	0.510	0.062	0.000	0.000	0.419	0.000	0.000	.	0.000	0.005	0.047	0.000	0.060	0.539	0.548	0.000	0.000	
	Z	0.27																									

*Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).