13th International Multidisciplinary
Scientific Geoconference SGEM 2013
16-22 June, 2013, Albena Co., Bulgaria

INFORMATICS, GEOINFORMATICS AND REMOTE SENSING

Conference Proceedings
volume I

INFORMATICS

GEOINFORMATICS

CARTOGRAPHY AND GIS

13-TH INTERNATIONAL MULTIDISCIPLINARY
SCIENTIFIC GEOCONFERENCE
SGEM2013

GeoConference on

INFORMATICS, GEOINFORMATICS AND REMOTE SENSING

CONFERENCE PROCEEDINGS
VOLUME I

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16-22, June, 2013
Albena, BULGARIA

THE ACCESS DATABASE ORGANIZATION FOR SOME MINERAL DEPOSITS IN THE REPUBLIC OF MACEDONIA

Dalibor Serafimovski[1]

Doc. Dr. Goran Tasev[2]

Full Prof. Dr. Todor Serafimovski[2]

[1] Faculty of Computer Science, University "Goce Delčev"-Štip, **R. Macedonia**
[2] Faculty of Natural and Technical Sciences, University "Goce Delčev"-Štip, **R. Macedonia**

ABSTRACT

At the territory of the Republic of Macedonia has been determined numerous metalic mineral resources, but there was not complete database with information for all deposits and occurrences. Since there are few attractive deposits of polymetallic mineral resources where has been constructed modern mines such are Buchim mine, Sasa mine, Feni Industry etc., we had satisfactory amount of data to organize mineral database. Within this paper, through the software package "Microsoft Access" we made an effort to organize database with information of the most important deposits and active mines of polymetallic mineral resources at the territory of the Republic of Macedonia. The architecture of the database is adapted for simple as well as sophisticated querying of particular Macedonian deposits and allows edition of reports and a geographic display of the queried information.

Keywords: mineral deposit, Access database, reserves, resource, economy.

INTRODUCTION

In the Republic of Macedonia there are numerous mines on the polymetallic deposits, which has been exploited during last 60 years, part of them during the transition period were closed, while certain potential localities today are explored by foreign and domestic companies that provide real chances for valorization of, mainly, copper, gold, molybdenum etc. In the Republic of Macedonia there is not professional database that should be in accordance to the European directives, although there is an initiative in ours Ministry of Economy that such a database should be prepared and included in similar modern European databases (ex. Mineral database at the BRGM, France).

The major goals and subjects in the organization of the Access database have been the following deposits and mines:

* Active mines: Zletovo, Sasa, Toranica (Pb-Zn mines), Buchim copper mine, R'zanovo Fe-Ni mine etc...
* Inactive mines: Lojane, Krstov Dol (Sb-As mines), Damjan (Fe mine) etc.....
* Potential deposits: Plavica, Bukovik-Kadiica, Borov Dol (Cu-Au porphyry), Kazan Dol (Cu-Au, Pb-Zn vein types) etc...

Organization of the Access database was carried out under the following main topics: general information, deposit features, mineralization/rocks, economy, high tech metals,

comments and bibliography. This is in accordance with the principles of GIS related mineral databases given elsewhere [1], [2], [3], [4], [5], [6], [7].

DISCUSSION

As we have already mentioned above the organization of the Access database was carried out under the following main topics:

General information where has been enclosed information about the mining company, status, latitude/longitude, ore district name, comments etc. (Figure 1).

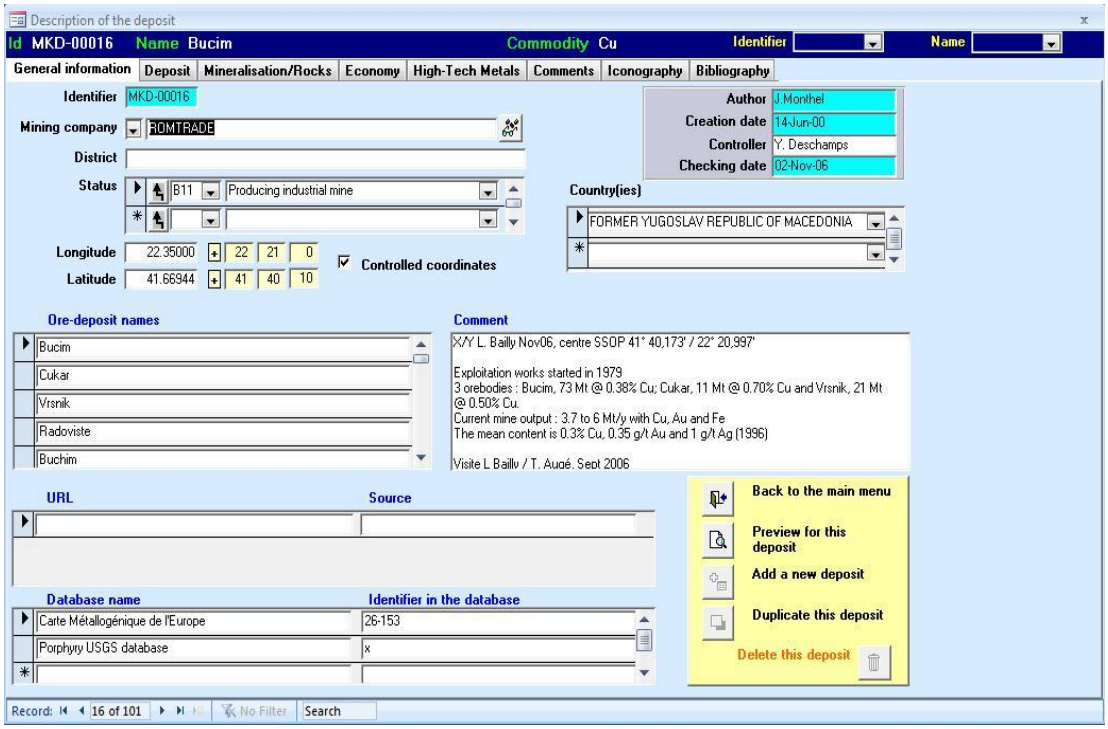

Fig. 1. General information datasheet of the database

For example on our sample of the Buchim deposit-mine we stressed out that is a producing mine, which production has started back in 1979, followed by detailed coordinates and name of the company owner of the mine and production facility, as well as familiar names used by locals for the mine and short general comments.

Deposit features sheet is organized in a manner that should be given details about the parameters: deposit type, main morphology and secondary morphology (Figure 2).

On our example deposit, Buchim, we have entered data about the deposit type where we have pointed out that is a porphyry Cu-Au deposit with presence of secondary Cu-sulfide (cementation deposit), which main morphology can be described as discordant envelope of disseminated ore and without significant discrepancies in regards to the secondary morphology.

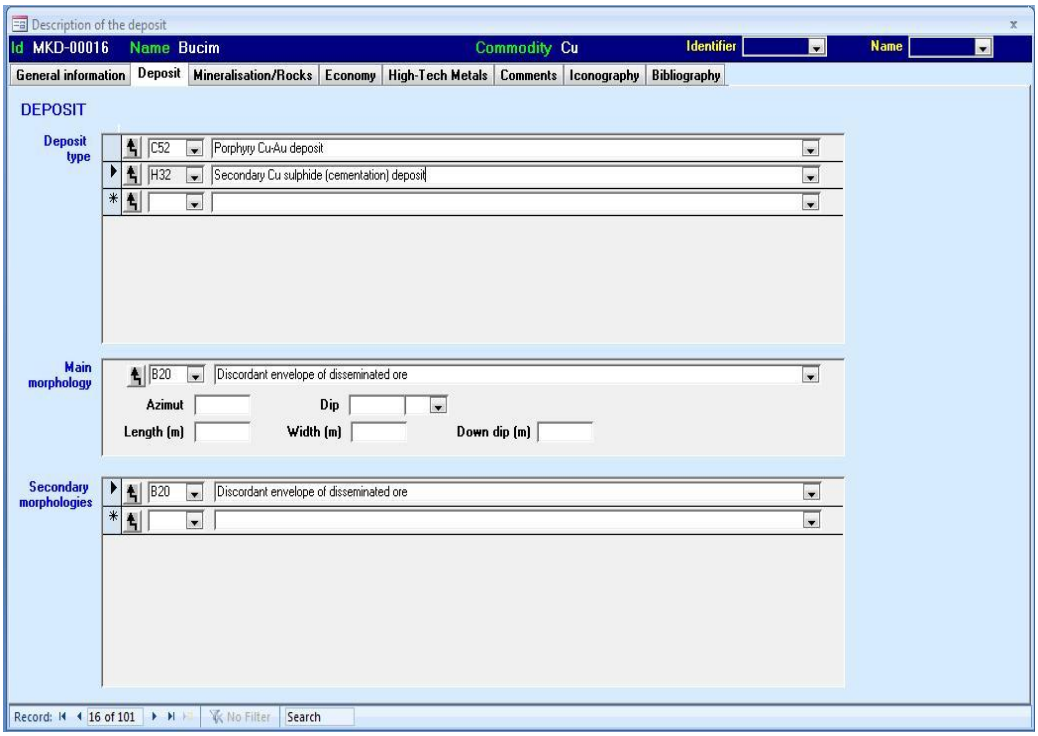

Fig. 2. Deposit features datasheet of the database

Mineralization/Rocks data sheet usually should contain data about age (supposed and absolute), ore mineralogy, gangue mineralogy, hydrothermal alteration, host rock (age supposed, absolute age, host rock formation, name and lithology). All of them are grouped into separate main windows (Figure 3).

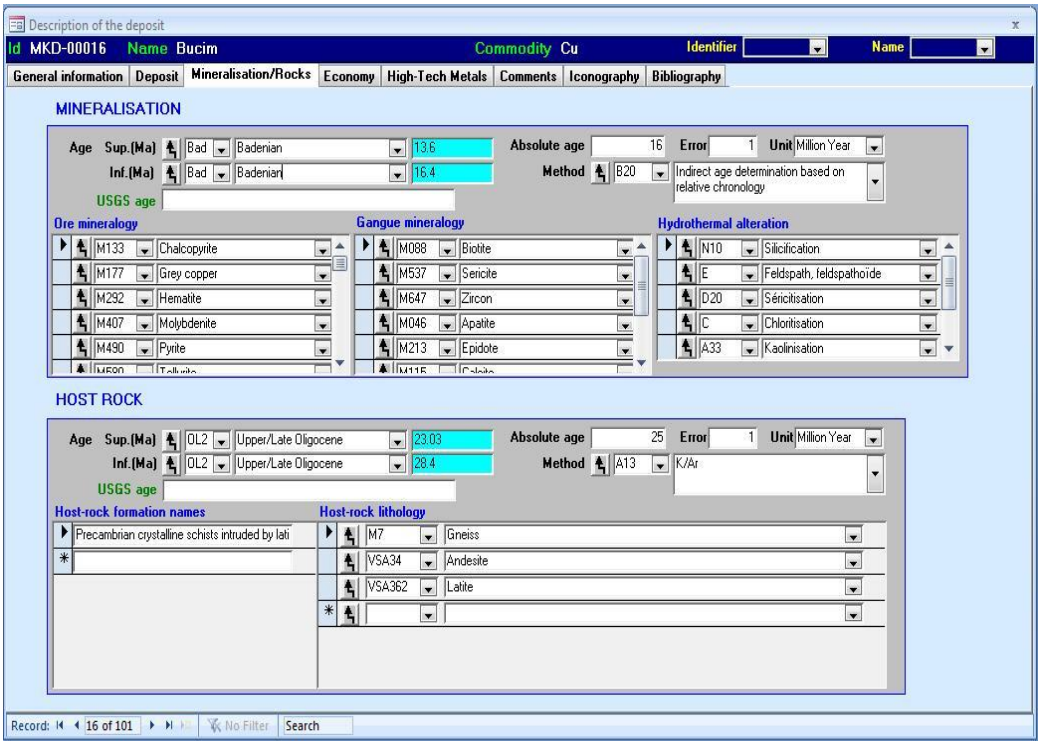

Fig. 3. Mineralization-rocks information datasheet of the database

Once again, on our sample deposit, we have entered a significant amount of data regarding the mineralization age (relative 13.6-16.4 Ma; absolute 16), ore mineralogy (chalcopyrite, pyrite, molybdenite, chalcocite, covellite, sphalerite, galena, cubanite, pyrrhotite, vallerite, bornite, azurite, malachite etc.), gangue mineralogy (biotite, sericite, zircon, apatite, epidote, calcite and gypsum) and diverse hydrothermal alterations (silicification, sercitization, chloritization, kaolinization etc.). After that followed an information about the host rock age (relative 23.03-28.4 Ma; absolute 25, K/Ar method) and host rock lithology (gneiss, andesite, latite).

Economy data sheet was planned to provide an information about the ore type, grade unit, former production, average grade of production, years of exploitation, reserves, average grade, type of reserves, resources, average grade of resources, type of resources organized in windows named exploitation type, main commodity and commodity (Figure 4). As it was planned here, for our example Buchim deposit, was given information about the open cast (open pit) exploitation type of mining where the main commodity, copper, is represented by primary sulfide ore (complex sulfides, sulphosalts etc.).

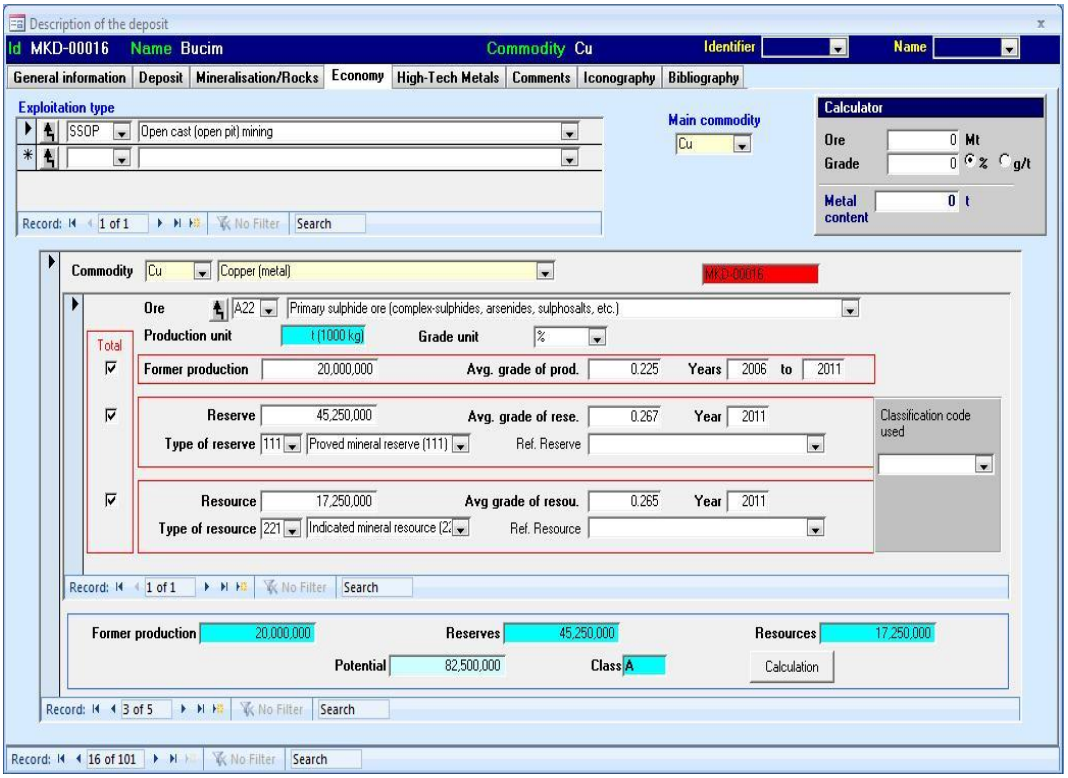

Fig. 4. Economy information datasheet of the database

Also, reserves has been quoted as former production one in amount of 20 Mt (period 2006-2011 and copper concentration of 0.225% Cu), proved mineral reserves of 42.5 Mt (as of 2011 and copper concentration of 0.267% Cu) as well as indicated reserves of 17.25 Mt (as od 2011 and copper concentration of 0.265% Cu) and all of them followed by data about four additional commodities (silver, gold, pyrite and platinum group of metals-PGM) given as separate records within this datasheet. In the very same manner were entered similar data for all previously mentioned active and inactive mines and potential deposits.

High-Tech Metals information sheet is divided into two different windows, which have been established in order to characterize (i) Potential of specific commodities (e.g. Li, Ga, Ge, Se, In, Re…) which interest had growing since the last decade and (ii) where the anthropogenic products are processed. To characterize High-Tech metals, user has to enter a commodity (ex. Re, Se, Ga…), and then he will be able to give information about host minerals (e.g. molybdenite), grades (i.e. minimum, maximum and average grade) and abundance of host minerals in the ore. The right window give information about processing site(s) (e.g. concentrator, mill, smelter…).

Due to complex use of metals from our example deposit, Buchim deposit-mine, where few metals are extracted beside the main one-copper (Au, Ag etc.), we haven't entered any additional data regarding this information sheet of the database.

Comments sheet, which is composed of two windows where it is possible to write free texts describing details about geology and/or details about economy of a particular deposit gives a fine opportunity to describe particular deposit in more details (Figure 5).
For example for our sample deposit, Buchim, in the first window we have entered detailed, up to date findings, about the geology and geological setting of the deposits, details about the types of mineralization (primary-hypogene and secondary one) with their representative features as well as many other features.

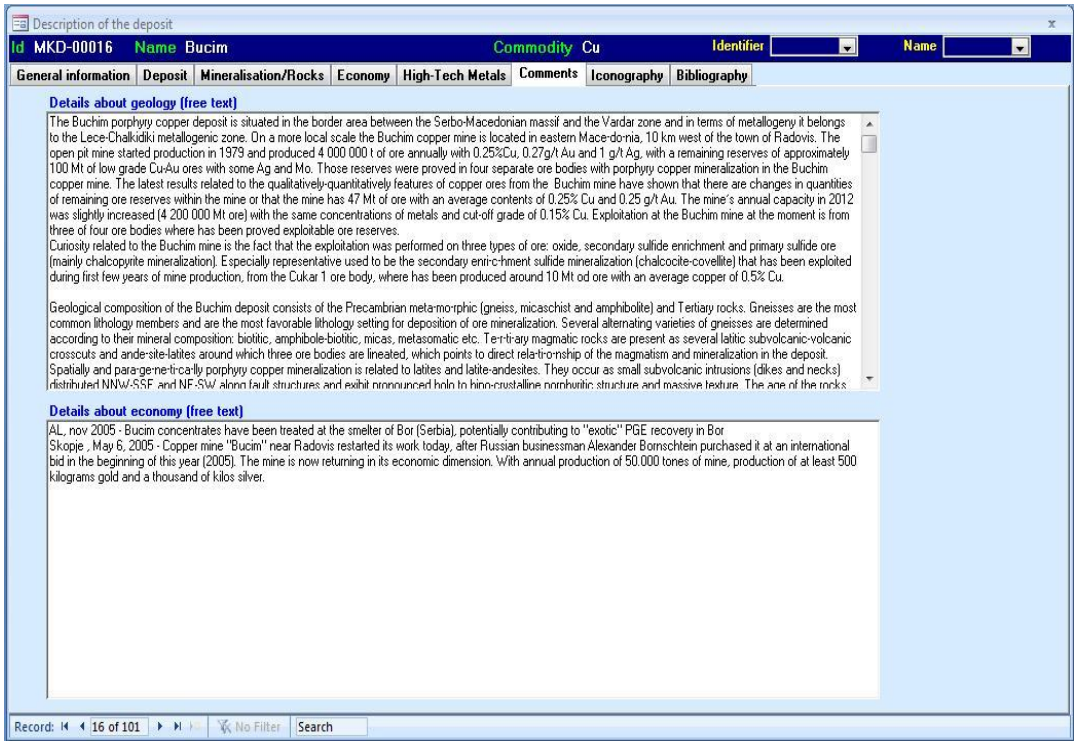

Fig. 5. Comments information datasheet of the database

In the lower window intended for data about the economy were entered all significant data such are annual mine capacity, quantitative-qualitative parameters of produced ore, facility (facilities) where the raw excavated ore has been processed etc.

Iconography sheet has been elaborated in order to attach images with a deposit. The first step being definition of paths of the image directory and the image viewer (e.g. Photo Editor, Windows picture viewer, Picasa…) by clicking on "Configuration" button (Figure 6).

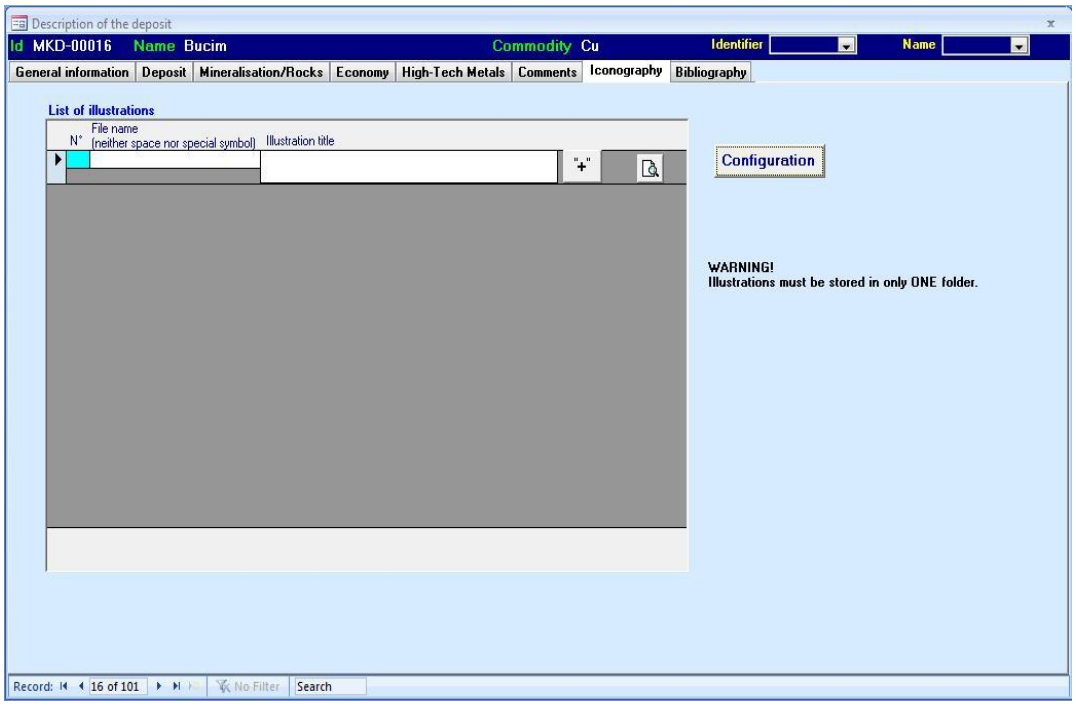

Fig. 6. Iconography information datasheet of the database

For all the aforementioned deposits, in regards to this data sheet, procedures were repeated with intention to upload as much as possible up to date images of mines or deposits.

Bibliography data sheet for a particular deposits was intended to give an overview of geological bibliography (references relating to the geology of the deposit) and economical bibliography (references relating to economic data of the deposit) as can be seen at Figure 7.

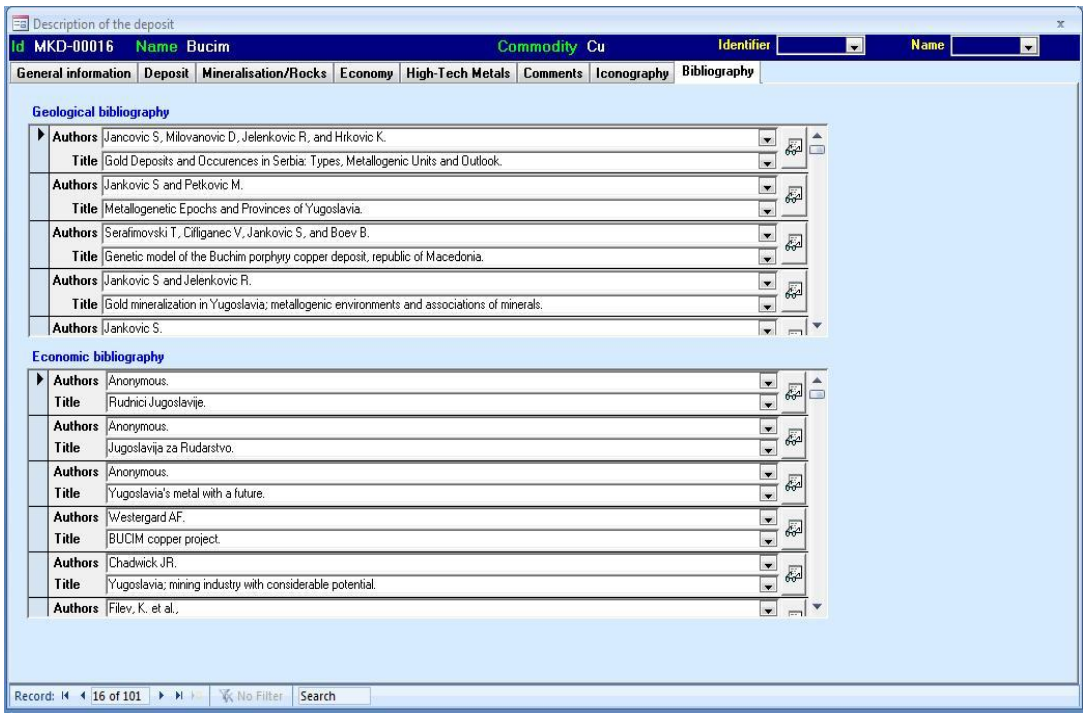

Fig. 7. Bibliography information datasheet of the database

On our example deposit, the Buchim deposit, we have made significant input in regards to both types of bibliography, geological and economical ones. All the known and commonly used references to this particular deposit has been covered in this data sheet.

CONCLUSION

The attempt to establish the Access database for specific examples of metallic raw materials at the territory of the Republic of Macedonia was successfully implemented. Three major ore deposit types has been systematized in the database. Active mines susch are Buchim, Sasa, Zletovo, Toranica etc., mines that has been processed in the past, but at the moment have ceased their production Lojane, Krstov Dol, Damjan etc, as well as potential ore bearing localities, which can be processed in the fututre: Plavica, Kadiica, Ilovica, Alsar etc. The major accents in the database systematization were given to the qualitative-quantitative parameters and natural indicators in function to present and future valorization of metals (copper, gold, lead, zinc, antimony, silver, iron, nickel etc.) that were subject to the establishment of the database, in accordance with professional mineral deposits Access databases.

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