PERIMETER OF THE GRAVEL PIT IN ALEŞD – RICIU VALLEY

Nistor Andrei*, Brejea Radu**

*Sole proprietorship – Nistor Andrei Nicolae, 10 Doina Street, Oradea, Romania
E-mail: nistor_andrei_nicolae@yahoo.com
**University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea, Romania, E-mail: rbrejea@yahoo.com

Abstract

The exploiting perimeter is located in the eastern extremity of Vad-Borod Depression – that is situated north of Plopiş Mountains and Pădurea Craiului. It is a golf-type depression where the Neogene-quaternary formations have subsided (sands, clay, chad, conglomerates). The lowest part is represented by Crişul Repede water meadows, and the passage towards the hilly areas is done through a scale relief, either through down-grades or calcareous slantings. In some places, underneath the coat of friable rocks (especially sand, clay, marls, piedmont accumulations), emerge harder rocks having the aspect of "hummocks"; they can originate from crystalline schists (Culmea Codrului, Măgura Şimleului) or volcanic rocks (Lucareţ, the hummocks from Codru piedmont). From the geographic point of view, the exploiting perimeter in Aleşd – Riciu Valley is located in the basin of Crişul Repede, on its southern border, in the area of western hills, in the eastern extremity of Vad-Borod Depression.

Key words: exploiting perimeter, relief, climate, geological formations, aquifer.

INTRODUCTION

The perimeter in which there will be carried out the mine exploiting works of sand and gravel resources is situated in the unincorporated area of Aleşd city, on the left bank of Crişul Repede river.

Although the first geologic observations on the above demarcated territory dates back to the beginning of the last century, proper researches have begun to be done only in the last decades of the XIXth century.

The series of geological works contributing considerably to the knowledge and deciphering the crystalline formations was started by Th. Kräutner (1938, 1940) who had studied the crystalline massifs of Şes Mountain, Mezeş Mountains, Măgura Şimleului, Highiş Massif. Although his works are not accompanied by geological maps, one can draw certain conclusions regarding: the predominant mesosonal nature of crystalline schists that are partially affected by diaphthoresis; the graded transition from the mesosonal schists to the episonal; origin of pegmatites, injection gneisses, as well as their metamorphic action following the contiguous schists; tectonics and the relations of crystalline schists with the contiguous sedimentary rocks, age of metamorphism and retromorphism that is

considered Hercynian; the presence in the pack of crystalline schists of a magmatic material represented by amphibolites and dykes of basic rocks.

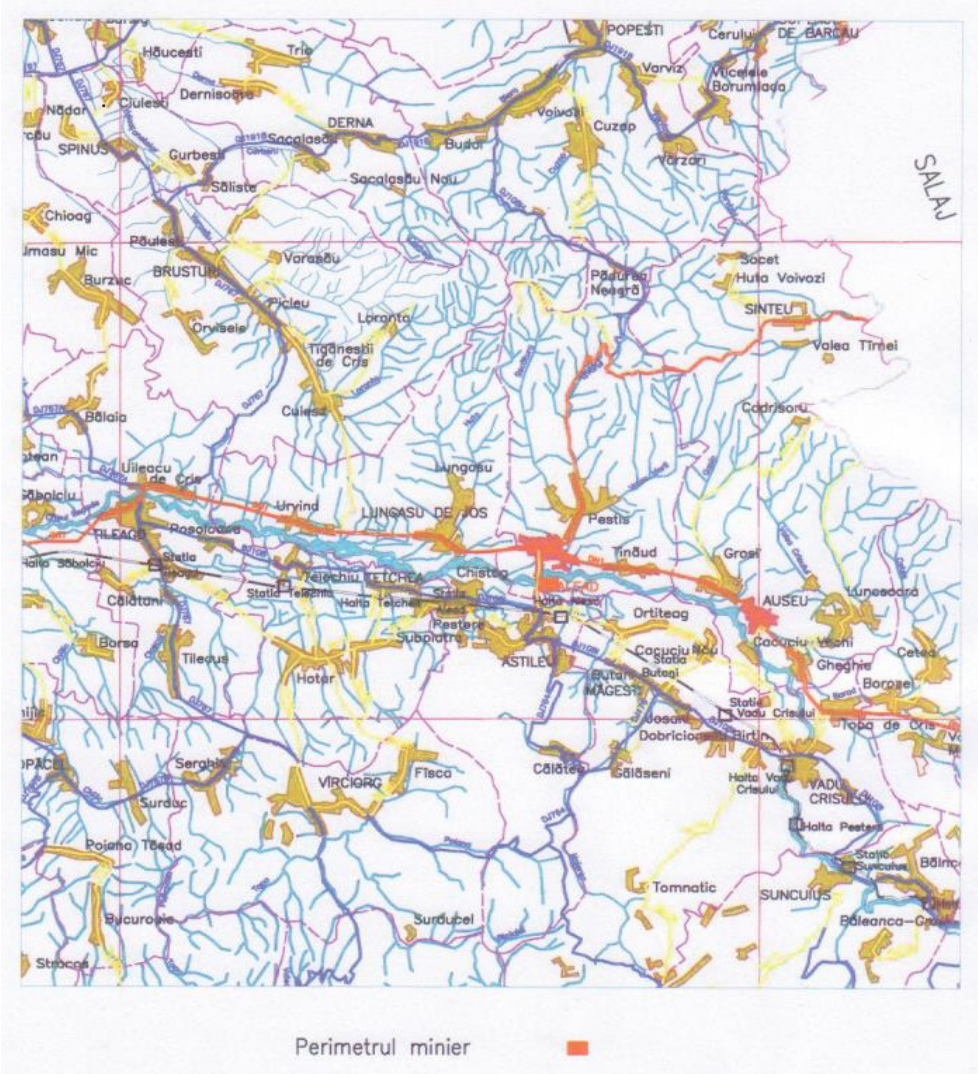

Fig. 1 Localisation of the exploiting perimeter

RESULTS AND DISCUSSION

Relief

As a genesis, Dealurile de Vest are former accumulating shoreline fields during Pliocene that are continued on the mainland with continental piedmont accumulations. Towards south, the Dealurile de Vest are extended until the border of Locvei Mountains (at the influx of Nera in the Danube), and towards north they outflank Câmpia Someşului until the lap of Oaş

Mountains. The limit towards west is represented by Câmpia de Vest, the passage being done slowly, in patches, almost imperceptibly.

The structure of Dealurile de Vest is monoclinal, tilting slowly from east to west. As genetic relief forms, Dealurile de Vest comprise piedmont surfaces, glacis, hummocks, terraced valleys of main streams. The medium altitude of these hills is of about 300 m, at the contact with the field dropping to 100-120 m, and at the contact with the mountain going up to 400 m and sometimes a little higher, about 450-500 m.

Hydrography; Basic hydrological data

The region's hydrographical network is composed of Crişul Repede springing from Gilău Mountains – which belong to Apuseni Mountains – and flows on the direction ESE-WNW along the Neogene basin of Borod, going through gullets and epigenetic gorges and passing through Vad. From east to west, Crişul Repede receives a series of left and right distributaries. The stream springs to the south-east of Huedin Depression, at an altitude of 710 m, having the hydrographical basin of 2517 m^2 and the total length of 209 km out of which 150 km on the territory of the country.

Crişul Repede flows towards north-west until Ciucea from where it is heading westerly. In the portion of springs, it has a small discharge and an aspect of hilly rivulet, with a slow down-grade. After receiving its distributaries – Călata, Secuieu, Drăgan, Iad, Brătcuţa and other smaller valleys – it gets the aspect of a mountain river with plenty of discharge. Crişul Repede is a river with accentuated asymmetry, receiving the majority of its main distributaries on the left.

The hydrologic regime is characterised by a growing of waters in February – March and a decrease in August - September, therefore it is a typical pluvio-nival hydrologic regime.

Table 1

Features of the hydrologic regime

No.	River	Hydrometric station	Length of the river (km)	Surface (km^2)	Multi-annual average discharge (m^3/s)	Monthly minimum average discharge with insurance (m^3/s)		
						80%	90%	95%
1	Crişul Repede	Ciucea	92	814	12.1	1.90	1.50	1.1
2	Crişul Repede	Vadu Crişului	90	1328	20.4	3.3	2.50	2
3	Crişul Repede	Oradea	143	2176	25.4	4.20	3.3	2.8

The features of the hydrologic regime were taken from "Technical foundation documentation for obtaining the water rights permit in the

perimeter Aleşd – Riciu Valley, Bihor county" drawn up by SC IRPOMIN SA – Bucharest.

Hydrogeological and hydrochemical data

Depending on the lithological, structural, climatic conditions, as well as on the particularities of drainage and their dynamics, the ground waters in the analysed area are phreatic and internal.

Phreatic aquifer

The phreatic aquifer in Borod Depression is lingered in the porous-permeable drift deposits of water meadows, alluvial fans and low terraces from Holocene and Pleistocene. From the lithological point of view, in Borod Depression, in the areas with water meadows and alluvial fans, the water-carrying deposits have a coarse constitution in the eastern part (gravels and cobble in the sand mass), decreasing as granulometry westerly, at medium and fine sands and silty clayish sands. The coarse depressions are well shaped with a thickness of 2-6 m, but sometimes even reaching 10 m on the western part of the depression. The aquifer has a unitary hydraulic character, and the flowing direction is E-W on the regional plan.

The hydraulic gradients are of 0.0003 – 0.0006, and the supply of phreatic waters is done through precipitation in the area of fans on Crişul Repede from the surface waters, during the period with high waters. The hydrostatic level is situated at depths ranging from 1 m to 4 m in the water meadows, and in the terrace areas on the interfluve – this being encountered at higher depths.

In the areas where above the porous-permeable horizons there are developing levels of heavily permeable or semi-permeable rocks (clays, sandy clays, sandy silts), the piezometric level of the phreatic aquifer layer has a slight ascensional aspect.

In the analysed area, the transmissivity (T) varies between 100 – 452 m^2/day and the specific discharge (q) between 1 – 5 l/s/m, the transmission coefficient (K) varies between 20 – 50 m/day, and the overburden is composed of clayish and clayish-sandy silts with thickness between 1 – 1.5 m, so that the efficient infiltration is reduced with 10 – 15 mm/year, thus conferring to the aquifer an average protection against the surface pollution. At the same time, from the hydrochemical point of view, the waters are bicarbonate-chlorocalcium waters.

Depth aquifers

Depth aquifers represent aquifers with under-pressure level that can be ascensional or artesian. Their regime depends on the geological structure, possibilities of intake from the higher phreatic horizons and to a very small extent on the climatic conditions. They are linked to the presence of sedimentary formations represented through alternations of sands, loam sands, clays and marls – sometimes sandy – to which are added locally the

small gravels. These aquifers are developing in the field and hill area, being absent in the formations from the mountain area. Generally speaking, these waters have a reduced mineralization – which creates the possibility of being used in the supply with drinkable water of some localities.

In the analysed area, the depth aquifer is separated by the phreatic aquifers by an impermeable loamy-clayish horizon, with a thickness of up to 10 m.

Climate, vegetation, fauna, soils:

The climate of Dealuri de Vest is mild, similar to that of the field, with oceanic influences (for the most part) and sub-Mediterranean (in south).

In the area of the exploiting perimeter, the climate is of continental-temperate type, under the influence of western air-masses – more humid and chilly. The annual average temperature ranges between 8^o and 11^oC, and the quantities of fallen precipitations increase from west to east, being comprised between 500 and 1200 mm.

The annual average temperature is differentiated in the south (10^o - 11^oC), in north (8^o - 9^oC) and to a small extent with the altitude. Due to western winds and exposure, the precipitations are quite many (600-700 mm/year). Overall, they have a climate specific to low hills.

The predominant vegetation is represented by oak woods (which on patches descend on the field or climb the low mountains and the golf depressions) that are strongly transformed. Currently, it is a heterogeneous field, of spontaneous vegetation, secondary pasturages, fruit-growing and wine-growing surfaces and plough lands.

In the water meadows of the rivers, there is a specific vegetation composed of oak woods mingled with ash (*Fraxinus angustifolia*), elm, soft grass land (*Agrostis stolonifera*), foxtail (*Alopecurus pratensis*) and couch grass (*Agropyron repens*) that alternates with agricultural lands.

In the area of the exploiting perimeter, the lands are generally coming under the category of *arable* usage or for *pasturage*. The vegetation is represented especially by cereal cultures, existing also large surfaces that have not been cultivated for several years. At the same time, near the exploiting area, it is developing the water meadow of Crişul Repede in which one can find a type of European interest habitat represented by riverside coppices with white willow (*Salix alba*) and white poplar (*Populus alba*).

The fauna is divided into two categories: terrestrial fauna specific to silvosteppe and forests and the aquatic fauna that is specific to rivers and lakes.

The soils are predominantly mollisols towards the field and argiluvisoils (on a clayish sub-layer) at higher altitudes and in the golf-depressions.

Geological formations in the studied perimeter:

In the content of Aleşd-Riciu Valley perimeter, arranged on the east-west direction in the terrace of Crişul Repede river, on the left bank of the river, there are encountered - at the surface of the land - only quaternary sedimentary formations belonging to the upper part of Holocene represented through terrace formations, composed of gravels, sands and sandy clays. The geological pieces of information concerning the lithological succession from the perimeter proposed for exploitation are not so many and they are obtained through the observations made on the exploiting works carried out in the area – stopped or in progress works.

From the results obtained by certain economic agents through the exploiting works carried out up to the present, it has ensued that at the surface there is a cover composed of soil, sandy clays and clays. Its thickness is variable from one point to another or from the perimeter, ranging from 0.5 to 1.5m. Under the cover, there is a layer of sand and gravel with thicknesses of 5.0 – 6.0 m. At the bottom of the sand and gravel layer, there is a loamy layer compacted with concretions of lime.

CONCLUSIONS

From the geographic point of view, the exploiting perimeter Aleşd – Riciu Valley is situated in the basin of Crişul Repede, on its southern border, in the area of western hills, in the eastern extremity of Vad-Borod Depression.

The region's hydrographical network is composed of Crişul Repede springing from Gilău Mountains – which belong to Apuseni Mountains – and flows on the direction ESE-WNW along the Neogene basin of Borod, going through gullets and epigenetic gorges and passing through Vad.

The hydrologic regime is characterised by a growing of waters in February – March and a decrease in August - September, therefore it is a typical pluvio-nival hydrologic regime.

As regards the phreatic aquifer, in the analysed area, the transmissivity (T) varies between 100 – 452 m^2/day and the specific discharge (q) between 1 – 5 l/s/m, the transmission coefficient (K) varies between 20 – 50 m/day, and the overburden is composed of clayish and clayish-sandy silts with thicknesses between 1 – 1.5 m, so that the efficient infiltration is reduced with 10 – 15 mm/year, thus conferring to the aquifer an average protection against the surface pollution. At the same time, from the hydrochemical point of view, the waters are bicarbonate-chlorocalcium waters.

In the analysed area, the depth aquifer is separated by the phreatic aquifers by an impermeable loamy-clayish horizon, with a thickness of up to 10 m.

The climate of Dealurile de Vest is mild, similar to that of the field, with oceanic influences (for the most part) and sub-Mediterranean (in south).

The predominant vegetation is represented by oak woods (which on patches descend on the field or climb the low mountains and the golf depressions) that are strongly transformed. Currently, it is a heterogeneous field, of spontaneous vegetation, secondary pasturages, fruit-growing and wine-growing surfaces and plough lands.

The fauna is divided into two categories: terrestrial fauna specific to silvosteppe and forests and the aquatic fauna that is specific to rivers and lakes.

Within Aleşd – Riciu Valley perimeter, the surface geological formations are not affected tectonically. They have a stratiform, horizontal disposition.

The characteristics of the sand and gravel accumulations on the terrace of Crişul Repede is the simple geological structure, the adjuvant rock being represented by a layer of sand and horizontal gravel, with a continuous development, arranged under a parcel of clays – sandy powdery clay.

REFERENCES

1. Brejea R., Domuța C., 2009, Refacerea și protecția terenurilor din carierele de bauxită din munții Pădurea Craiului, Editura Universității din Oradea.
2. Brejea R., 2009, Tehnologii de protecție sau refacerea solurilor, Editura Universității din Oradea.
3. Brejea R., 2010, Ştiinţa solului – îndrumător de lucrări practice. Editura Universităţii din Oradea.
4. Brejea R., 2011, Practicum de tehnologii de protecție a solurilor, Editura Universității din Oradea.
5. Brejea R., Domuţa C., 2011, Practicum de pedologie, Editura Universităţii din Oradea.
6. Domuța C., 2005, Agrotehnica terenurilor în pantă din nord – vestul României, Editura Universității din Oradea.
7. Domuţa C., Brejea R., 2010, Monitoringul mediului, Editura Universităţii din Oradea.
8. Domuța C., 2011, Practicum de monitoring al mediului, Editura Universității din Oradea.
9. Köteles N., Pereş A. C., 2010, Air Pollution with Powders in Suspension (Pm_{10} And $Pm_{2,5}$) in Oradea City Area, Analele Universităţii din Oradea, Fascicula Protecţia Mediului, Vol. XV, Anul 15, Editura Universităţii din Oradea, 2010, ISSN 1224-6255, pag. 657-660.
10. Köteles N., Pereş A. C., 2015, The Level of Air Pollution with Sediment Particles in Bihor County in 2014-2015, Natural Resources and Sustainable Development, University of Oradea Publishing House Oradea, ISBN 978-3-902938-02-2; ISSN 2066-6276, pp. 67-72.
11. Moza A. C., 2009, Clima şi poluarea aerului în bazinul hidrografic Crişul Repede, Editura Universităţii din Oradea.

12. Pereş A. C., 2011, Poluarea şi autopurificarea atmosferei, Editura Universităţii din Oradea;
13. Pereş A. C., Köteles N., Pârloiu C. M., 2011, The Level of Air Pollution with Depositing Dust in Bihor County. Analele Universităţii din Oradea, Fascicula Protecţia Mediului, Vol. XVII, Anul 16, Editura Universităţii din Oradea, 2011, ISSN 1224-6255, pag. 793-800.
14. Oneț A., 2012, Managementul mediului, Editura Universității din Oradea.
15. Oneț C., 2012, Igiena mediului, Editura Universității din Oradea.
16. Popa R., Lăcătuşu R., 2007, Refacerea ecologică a solurilor degradate prin lucrări miniere la zi, Editura Sitech, Craiova.
17. Popa R.G., 2005, Poluarea aerului, Editura Sitech, Craiova.
18. Sabău N. C., 2008, Poluarea mediului pedosferic, Editura Universității din Oradea.
19. SC BETON CONSTRUCT SA, 2012, Proiect tehnic de refacere a mediului în perimetrul Aleșd – Valea Riciu 5, jud. Bihor.
20. SC IPROMIN SA, 2012, Documentația tehnică de fundamentare pentru obținerea avizului de gospodărire a apelor în perimetrul Aleșd-Valea Riciu, județul Bihor.