[1]Lilia ISHCHENKO, [1]Anna POTAPENKO, [1]Alina KUSTUROVA, [1]Vasil SUYAKO, [2]Ahmet SASMAZ

PHYTOREMEDIATION OF CADMIUM BY THE TERRESTRIAL PLANTS GROWN ON KÜTAHYA PB-ZN-AG MINING SOILS, TURKEY

[1]Karazin Kharkiv National University, Geology Department, Svobody sq. 61022 Ukraine
[2]Firat University, Geology Department 23119, Elazig Turkey
e-mail: asasmaz@gmail.com

The Gümüsköy Ag (As, Pb and Zn) deposit is located about 25 km west of Kütahya and the largest silver deposit in Turkey. This study investigated cadmium (Cd) uptake and transport from the soil to different plant parts by documenting the distribution and accumulation of Cd in the roots and shoots of 11 terrestrial plant species, all of which grow naturally in surface soils of the Gumuskoy mining area. Plant and soil samples were collected from the field, and Cd concentrations were analyzed by ICP-MS. The average Cd values in the soil, root, and shoot of the terrestrial plants in the study area were 82.75, 55.44, and 43.51 ppm, respectively. The plants were separated to several groups according to ECS and ECR values of these plants. These groups showed that the *Phlomis* sp. (PH), *Onosma* sp. (ON) and *Carduus nutans* (CR) for Cd could be good bioaccumulator plants and be useful for phytoremediation or remediation studies of mining soils contaminated by Cd.

[1]Oleksandr Kychka, [2]Oleksandr Petrovskyy, [2]Tetyana Fedchenko, [3]Kateryna Shniukova

GLOBAL PETROLEUM POTENTIAL OF THE BASEMENT RESERVOIRS OF SEDIMENTARY BASINS

[1]SE Naukanaftogaz of NJSC Naftogaz of Ukraine, Vyshneve,
e-mail: kitchka@nng.com.ua
[2]STC DEPROIL Ltd., Ivano-Frankivsk
[3]M. P. Semenenko Inst. for Geochemistry, Mineralogy & Ores Formation, NAS Ukraine, Kyiv

Hydrocarbon exploration targeting basement reservoirs is a challenging issue for the fundamentals of petroleum geology and routine industrial practices. By now, commercial production of hydrocarbons from fractured crystalline basement is well documented, with petroleum basins across the globe hosting weathered, fractured and/or altered basement fields. To present time more than 450 oil and gas fields in 54 countries and more than 100 sedimentary basins with commercial productivity of the crystalline basement are known worldwide. Among these ones

there are several of well-known fields such as Panhandle-Hugoton (Mid-Continent), tandem La-Pas - Mara (Maracaibo), Carmopolis (Sergipe-Alagoas), Augila-Nafoora (Sirte), Oymasha (Manghyshlak), NE Beruk (Sumatra), White Tiger, Black Lion and Ruby (offshore Vietnam), and other hydrocarbon unique HC accumulations. The notion 'basement' includes as true crystalline basement as so-called intermediate (or acoustic) basement represented by folded metamorphic (weathered and fractured) rocks prospective for hydrocarbons (e.g. in West Siberia).

Nowadays, basement reservoirs exploration hotspots are evolving offshore Vietnam (Cuu Long basin), Yemen (Say'un-Masila basin), Russian Federation (West & East Siberia mega-basins), China ('buried hills' of Bohai Bay basin, etc.), the UK and Norway in the Atlantic frontier and North Sea and so on. Some of highly elevated basement horst affected by tectonic rejuvenation and hydrothermal alteration are characterized very high initial flow rates of oil, absence of OWC and consequently waterless production, and even dead oil saturation of the basement rocks below the horst toe. To understand the nature of hydrothermally impacted basement reservoir one can consider hydrothermal alteration as kind of upward 'hypabyssal weathering' producing additional porous volume in the buried but elevated basement rock domain.

Three basic types of basement reservoirs are recognized in practice as following:

- weathered crystalline crust (WCC) ones resembling sedimentary reservoir rocks (disintegration zone of full weathering profile) sealed by the non-reservoir rocks of kaolinization / hydromication zones;
- fractured and hydrothermally altered reservoirs produced by tectonic dilation and/or mineral transformations of the bedrock;
- vein-like (or fault-related) reservoirs hosting hydrocarbon accumulations of a complex morphology.

The simplest model to fill basement reservoirs with hydrocarbons is based on assumption that hydrocarbons generated in the sedimentary source rocks have migrated into adjacent basement hills or horsts and entrapped by their secondary porosity and sealed by impermeable sediments or fault planes. This scenario usually works well for WCC basement reservoirs. For intra-basement fractured reservoirs in is necessary to apply eventual decompression episodes due to tectonic dilation or rapid uplifting. For deep-seated basement hydrocarbon reservoirs it is necessary to suppose an occurrence of internal intra-basement sources of hydrocarbons (for example metamorphic rock with residual generation potential or crustal or even upper mantle sources for dry gas). Ones believe that the WCC basement level is the deepest and final frontier for oil and gas exploration. However, rather prolific pay zones have been encountered in the deep fractured subsoil of some fields in the West Siberia 1000 m below the top of the weathered basement. Therefore petroleum geoscientists need to answer where the lowermost limit of petroleum column is. This study supports an idea about association of ultradeep oil and gas reservoirs in the basement with crushed and mylonitized zones of wrench faults.

Since 1985 over dozen of oil and gas fields, such as Khukhra and Yuliivka, have been discovered along the Northern Flank of the Dnieper-Donets paleo-rift basin, NE Ukraine. Most of them are related to the structural traps for quite con-

tinuous and up to 150 m thick quasi-stratified and complex reservoir made by the Paleozoic WCC disintegration zone developed upon different Precambrian crystalline rocks of the paleorift faulted margin, though some pay zones occur much deeper (for example, 200 m and more below the basement top in the fractured and mylotinitized hornblendites of Yuliivka field). A sophisticated new technique developed at *DEPROIL Ltd* applying joint inversion of seismic and gravity data and adjusted by other geological and production data allows a confident delineation of prospective basement reservoirs and build a geodensity model of a WCC reservoirs. It also was found that rocks of the second zone of (hydromicaceous) and sometimes material of the third zone of WCC profile (residual kaolins and ochers) represent an impermeable formation of up to 10-30 m thick for effective sealing of commercial hydrocarbon accumulations in the weathered, fractured and altered basement reservoirs of 17-36% porosity in the Northern Flank. The reflected seismic VIIth horizon mapped by over the flanks of the Dnieper-Donets basin that mimics the true basement / sedimentary cover interface and gradually lowering basinward can be interpreted as the surface of multistage deep weathering paleofront or so-called basal platform (aquitard for paleo-groundwater flow) where precipitation of some soluble minerals of the WCC have occurred. The revised approximate age estimation for the timing of the Paleozoic weathered crust formation upon the Ukrainian Crystalline Shield and its slopes is as follows: 1) Pre-Frasnian weathered crust – 390 - 380 Ma (e.g. the Styla horst outcrop at Donbas/Azov massif margin; 2) Pre-Tournasian weathered crust – 360 Ma; 3) Pre-Visean weathered crust – 345 - 350 Ma.

Merve SASMAZ[1], Erdal Obek[2], Bunyamin Akgul[3], Ahmet SASMAZ[3]

BIOACCUMULATION OF URANIUM AND THORIUM BY USING LEMNA GIBBA AND LEMNA MINOR IN KEBAN (ELAZIĞ) PB-ZN-AG GALLERY WATER

[1]The University of Sheffield, Water Eng., Western Bank, Sheffield, S10 2TN UK
e-mail: msasmaz1@sheffield.ac.uk
[2]Fırat University, Bioengineering Department 23119 Elazig, Turkey
e-mail: eobek@firat.edu.tr
[3]Fırat University Geology Department 23119 Elazig, Turkey
e-mail: asasmaz@gmail.com

This study focused on the ability of Lemna gibba and Lemna minor to remove U and Th in the gallery water of Keban Pb-Zn-Ag mining area, Turkey. These plants were placed in gallery water and individually fed to the reactors designed for these plants. Water and plant samples were collected daily from the mining area during 8 days. The plants were ashed at 300 ^{o}C for one day and analyzed by ICP-MS for U and Th. U was accumulated as a function of time by these plants, and