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(54) METHOD OF PROTECTION OF GROUND WATERS

(57) A method of preventing infiltration of excavation pollutants to ground waters characterized by a 50 cm thick layer of coal gangue, sprinkled with 10% suspension of ash, which was obtained through bituminous coal combustion, or preferably - brown coal - 5 times over 10 days, in the amount of 0.3 m^3 of suspension per 1 m^2 of created surface, which is compacted with a road roller after 50 days and then covered with at least 50cm thick layer of coal gangue. The excavation is then filled with coal gangue up to 2m below the planned surface level, while the upper 2-meter thick later is filled with a mixture of soil from landfill cover and post-fermenting sludge from agricultural biogas plant in the weight ratio of 9:1.

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Description

[0001] The object of the present invention is the method of preventing infiltration of pollutants from mineral resource excavations to ground waters.

[0002] Development of road engineering caused high demand for rock minerals, which led to the creation of huge excavation that degrade large areas of land. Depositing waste in these excavations is one possible way of its utilization. However, the risk of contaminating ground waters by the pollutants leached from the deposits is a hindrance in wider application of this method.

[0003] The Polish patent No. 376141 presented a method of sealing waste deposits which involves the creation of impermeable insulating layer of ash and cement with an in-built layer of vinyl-maleic copolymer, modified with carbonic acid diamide. Utilization of organic membrane, which degrades with time, as well as the use of cement, which doubles the cost of manufacturing the isolation, constitute disadvantages of this method.

[0004] The patent WO1997026416A1 presented the methods involving implementation of layered insulation, comprising a layer of plastic foil, layer of bentonite, loaded with a layer of soil on the top. In this case, plastic foil is also likely to degrade after some time.

[0005] The USA patent No. 5374139A presented the method involving the utilization of geotextile mat (0.6-0.2 pore size), covered with a layer of soil, on which waste glass and gelling agent is poured in order to lower water permeability. Here, geotextile matrix is also subject to biodegradation, which may result in leachates, years after the exploitation period.

[0006] Another method was presented in the German patent DE3466654D1; it involves the use of membrane which is permeable for water, but retains chemical compounds. In this case, there are concerns that membrane pores may clog quickly.

[0007] The essence of the method of preventing infiltration of pollutants from mineral resource excavations to ground waters is that 50cm layer of coal gangue is sprinkled with 10% suspension of ash, which was obtained through bituminous coal combustion, or preferably - brown coal - 5 times over 10 days, in the amount of 0.3 m^3 of suspension per 1 m^2 of created surface, which is compacted with a road roller after 50 days and then covered with at least 50cm thick layer of coal gangue. The excavation is then filled with coal gangue up to 2m below the planned surface level, while the upper 2-meter thick later is filled with a mixture of soil from landfill cover and post-fermenting sludge from agricultural biogas plant in the weight ratio of 9:1.

[0008] The advantage of this invention is that it prevents infiltration of excavation pollutants to ground waters.

Example.

[0009] A 50 cm thick layer of coal gangue was formed, sprinkled with 10% suspension of ash, which was obtained through bituminous coal combustion, or preferably - brown coal - 5 times over 10 days, in the amount of 0.3 m^3 of suspension per 1 m^2 of created surface, which is compacted with a road roller after 50 days and then covered with at least 50cm thick layer of coal gangue. The excavation is then filled with coal gangue up to 2m below the planned surface level, while the upper 2-meter thick later is filled with a mixture of soil from landfill cover and post-fermenting sludge from agricultural biogas plant in the weight ratio of 9:1.

Claims

1. A method of preventing infiltration of excavation pollutants to ground waters **characterized in that** a formed 50 cm thick layer of coal gangue is sprinkled with 10% suspension of ash, which ash was obtained through combustion of bituminous coal, preferably brown coal, and which sprinkling is performed 5 times every 10 days, in the amount of 0.3 m^3 of suspension per 1 m^2 of the formed surface, then after 50 days said formed surface is compacted with a road roller and then covered with at least 50cm thick layer of coal gangue, the excavation is then filled with coal gangue up to the height of 2m below the planned surface level, while the upper 2-meter thick later is filled with a mixture of soil from landfill cover and post-fermenting sludge from agricultural biogas plant in the weight ratio of 9:1.

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 4291

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 404 999 A1 (KUEGLER JOST ULRICH [DE]) 2 January 1991 (1991-01-02) * page 4, line 22 - page 7, line 32 *	1	INV. E02D31/00
A,D	WO 97/26416 A1 (REVING V A V S R O [SK]; MYSLIK ANTON [SK]) 24 July 1997 (1997-07-24)	1	

TECHNICAL FIELDS SEARCHED (IPC)
E02D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 September 2015	Geiger, Harald

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 16 4291

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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28-09-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- PL 376141 **[0003]**
- WO 1997026416 A1 **[0004]**
- US 5374139 A **[0005]**
- DE 3466654 D1 **[0006]**