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POSSIBILITIES OF SANATION METHODS OF ROCK SURROUNDINGS POLLUTION OF OIL PRODUCTS**

1. INTRODUCTION

With an escape of oil products can come to a threat eventually to disadvantages of environment. Presence of oil products in underground water and in rock surroundings activates unfavourable changes at physical and chemical structure of watered surroundings.

According to extend of escapes of oil products to environment it is possible to divide them into three groups:

- 1) escapes of small areas – so called oil emergency which are mainly results of accidents of equipments with an escape of only a few litres of oil;
- 2) escapes of greater areas – so called oil casualty, an amount of escaped oils can be tens of litres, maximum 200 litres;
- 3) oil accidents – there are single cases when more than 200 litres of oil products escape, a reason for them is an accident of an equipment or an incidental external cause (spontaneous calamity, accidents of vehicles, tankers and alike).

Regarding the impact to the environment, escapes of oil products can be divide into:

- 1) Without risks to nature.

Escapes and eaves to assure impermeable areas, to retentive and fixing accident pits and tubs, to assure canalisation consequential to function correct dimension and operation of the separator of oil products belong here. These escapes cannot infiltrate to soils without restraint neither leak to water.

- 2) Dangerous to nature.

Other cases of escapes of oil products outside the equipments served to storage, manipulation and transport belong here. At these escapes damages or menace of several parts of an environment can come about [1].

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2. SANATION METHODS DIVISION

The term sanitation of soil is present in the Slovak legislation (primarily at the supplement No 1 Regulation No. 284/2001 of the Ministry of the Environment of the Slovak Republic determined by Catalogue of Waste, which constitute of Catalogue of Waste) and Resolution of European Commission No. 118/2001/ES that changes and completes Resolution of European Commission No. 2000/532/ES about list of wastes [2].

A removal of damages by treatment of areas and territorial structures is considering as sanitation.

Methods of sanitation of polluted environment can be dividing to different criteria:

- According types of pollutants which is needed to modify:
 - oil products,
 - liquid chlorate hydrocarbons;
 - polychlorate biphenyls;
 - heavy and toxic metals.
- According mechanism of cleaning:
 - physical;
 - physical-chemical;
 - chemical-oxidation, neutralisation;
 - biological-biodegradation.
- According area of using:
 - at the area – *in situ*;
 - at the surface of areas – *on site*;
 - outside of contaminated area – *ex situ, off site*.
- According degree and method of removal of pollution:
 - passive – conservation;
 - active – elimination of pollutants, separation, conversion to other form of ecosphere, a form of biodegradation, combustion, radiation decomposition and others [3].

3. PROCEDURE OF EVALUATION OF SANATION

1. Evidence of potential contaminated areas and territories

In this phase the first advisement of locality from an aspect of possible contamination overshoots also interpretation of available dates, reaction of locality to surroundings, planned using of locality.

At the same time the first valorisation of necessity sanitation operation is realized.

2. Preliminary research.

In this phase facts determined at preliminary approach are verified. The results of preliminary research are evaluated. On the basis of valorisation is determined about next continuation or finishing when objective locality is ecological and environmental clean.

3. Detailed (specific) research.
This research continues to results of preliminary research. Areas of pollution, reaction of geologic a hydrogeological locality are concretised.
4. Risk analysis.
Risk analysis resumes the results of detailed research. In this phase are evaluated: properties of pollutants from aspect of toxicity and ecotoxicity, reaction to surroundings, risk allied to possibility of distribution of contamination, risk of influence of quality underground and surface waters, emission to air and others wider reactions. A part of risk analyses is also basic evaluation of possible sanation advances [5].
5. Processing of a supply project of sanation works.
A supply project of sanation works defines a conception of sanation interferences and specified separate sanation technologies. A part of a supply project is also preliminary calculation of capacities and financial costs. A supply project supports mainly as basis for realisation of selection procedure to specification of organisation which will take over sanation works. Necessary papers as for example records of expert's qualification, concessions and viewpoints of competent members of state administration are submitted as supplement.
6. Processing of an executive project.
An executive project includes concrete advances of sanation works and necessary financial resources. An executive project supports as basis to arbitration for competent members of state administration at a regional or a building procedure.
7. An own sanation interference.
In process of time of sanation works new facts can be determined unknown at previous preliminary phases. In consequence of these facts sanation advance is reclaimed. An own sanation interference consists of treatment (decontamination) of contaminated grounds, underground and surface waters and soil air. The end of sanation interference is after achievement of requirement limit.
8. A control of sanation results and submission of locality.
After ending of sanation works is locality exchange by protocol to supplier of action. A part of submission is control analyses and for a consideration of results recommendations of other advances (application of control monitoring, recommendation to next using of given locality [4]).

4. MONITORING OF CONTAMINATED LOCALITIES AT SLOVAK REPUBLIC

In 1991 was starting geochemical mapping of soils at Slovak republic. Sampling was realised at agricultural and woodland soils at all Slovak areas with the density of samples – one sample at 10 km². Samples was analysed to contain of 36 metals and inorganic materials. Mapping was made in the scope of great national programme *Geochemical atlas of Slovakia*. This atlas includes following parts: Underground water, River sediments, Rocks, Natural radioactivity, Woodland biomasses, Soils. The results are assumed basis for evaluation of main environmental problems of country.

Up to now such list was not worked excepting of localities after soviet army. Some partial registers are existed [6].

5. THE EXAMPLE OF DETERMINATION OF CONTAMINATED GROUNDS AT LIQUIDATION OF FILLING STATION OF FUELS

A control of unemployed equipment of oil reservoirs and sanation of contaminated grounds of expected contaminated localities was realising at the liquidation of filling station at Včelare. This control was bola fast and effective by means of apparatus ECOPROBE 5. According to results of these measurements the grounds was defined as contaminated or no contaminated.

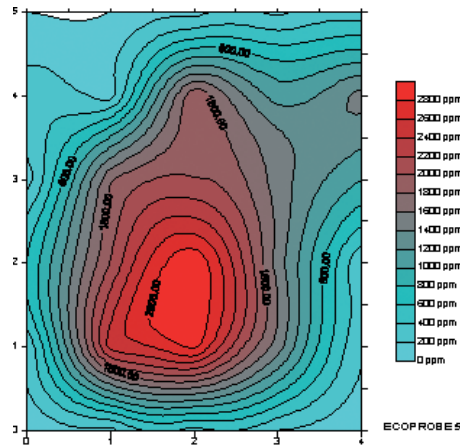


Fig. 1. A view of locality – Včelare before a liquidation of reservoirs of filling stations

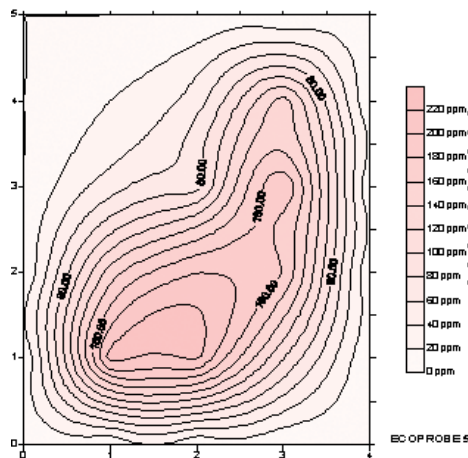


Fig. 2. A view of locality – Včelare after a removal of contaminated grounds

The example of results by this apparatus is in Figures 1 and 2. They suggest to different contamination of ground before a liquidation of reservoirs of filling stations and after a removal of contaminated grounds.

6. CONCLUSION

Every sanation advance is necessary at first consider for a consideration available information's. It comes to this, that by less information's about contaminated locality and contaminates are known, the risk of unsuitable advance is superior. Therefore it is necessary responsibly evaluated all available materials and information to fill up particular research of locality. Between basic information's without which isn't possible choose adequate application of sanation advances and technologies belong detailed information of geologic and hydrogeological relation and their binding to surroundings [7].

For choose of suitable advance of sanation works it is necessary to obtain maximum of information's about distribution of contaminations and also about their basic physical, chemical and ecotoxicological properties. For safety of workers researching sanation works is needed to known toxic and pathogenic properties of contaminates [8]. Document *Risk analyse* would have to contain all necessary dates.

Following realised risk analyse it is needed to consider all possible impacts and risks for surroundings and at relation to economy and legislation to judge optimal range of interference where one of possible variant is zero variant without sanation. In this case contaminated areas are remained without interference only with consistent monitoring [9].

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