By the end of 2008 more than 63 million cubic meters of solid waste had been accumulated on a total area of 54 hectares. Also the toxic waste had been buried at the landfill until 1992.

It is necessary to identify the problems of the landfill. First, it is not equipped with a system to withdraw filtrate water, the volume of which has long exceeded the pit and now is flowing to the surface of relief. The toxic filtrate water is the water, which passes through the array of waste and accumulates the remnants of organic matter, iron, mercury, lead, zinc and various metals and chemicals. This toxic solution gets into underground aquifers. The landfill is located in such a way that all surface flows enter the Kirghizka river or its tributaries[1].

The second major problem is the formation of methane. All decomposition is anaerobic, and therefore, flammable gas forms there. In some cities gas- wells are constructed in landfills, where methane can be trapped and used as fuel.

The lack of biogas withdrawal system causes a strong fire which makes the third problem.

The fourth problem is the shrinkage of the waste, shallow depressions are formed there. They get filled with water and the whole area is gradually turning into a poisonous swamp.

High levels of chemical contamination of soil cover that exceed maximum allowable concentrations require restoring measures to make the soil fit for use.

Experience in engineering and execution of remediation projects in West Siberia suggests that the choice of areas of biological reclamation, disturbed by human activities, must be based on the total consideration and evaluation of physical-geographical and socio-economic conditions.

In the selected area it is only possible to grow commercial crops because of the soil contamination with heavy metals, so it is necessary to conduct forest restoration. It is intended to build tree and shrubbery plantings on the restored land, which can prevent erosion and help with water and wind protection.

Loamy soils are the most favorable for planting forest plantations. This soil has a favorable texture, providing high permeability and good moisture.

The best indicators of survival rate and growth have been noted among such undemanding species as Scots pine and Siberian larch in recultivated dumps. Less successful species, which need for normal growth and development high humidity and fertility of mineral substrate, are Siberian poplar, ash and other. In the most humid areas Siberian stone pine, Siberian spruce and Siberian fir can grow. The most advisable is to use sea buckthorn, mountain ash, wild rose and various willows for consolidation of erosion-prone areas on the slopes [2].

In areas that lie within the range of emissions of toxic components, the choice of variety of trees and shrubs should take into account gas resistance. It should be remembered that coniferous species (except larch) are less stable than hardwoods.

In my opinion, the easiest and in-demand option of the restoration and continued use of this area - is to create a tree nursery and nursery of ornamental plants. Seedlings should be used for landscaping of Tomsk city, as this issue is particularly relevant today. As a result, the composition and structure of the soil will improve, the city will receive additional quantities of planting material, and the place of stinking mud will be a wonderful forest.

References

1. Adam A.M. Environmental Monitoring: State of the environment of the Tomsk region in 2008 // Tomsk: "Optimum", 2009. - 144 p.
2. Astafurova T.P. Report: "Biological reclamation of domestic waste landfill in Tomsk, village Mihaylovka". - Tomsk, 1995. - 51 p.
3. Granovsky V.V., Sorokin, S.E., Freed A.S. Sanation of contaminated soils and reclamation of disturbed lands in Russia // Agrology, 1994. - №4. – P. 121-128.
4. Instructions for the engineering, operation and reclamation of landfills for municipal solid waste of the Russian Federation Ministry of Construction, 1996. – 39 p.
5. Poputnikova T.O., Terekhina V.A., Yakovlev A. Assessment of negative effects of landfills on the soil of biotic indices // Ecology and Industry, 2010. - № 3. - P. 51-53.

## BAND-PASS FILTERS APPLICATION IN QUANTITATIVE AND QUALITATIVE INTERPRETATION OF GRAVIMAGNETIC ANOMALIES

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Various kinds of transformations that is field's conversion for the purpose of the fullest initial observed fields division on components are widely used in interpretation practice of gravimagnetic anomalies.

Generally while interpretating we are interested in anomalies of certain width and the amplitude connected with a concrete geological problem solution. Other field components are considered as hindrances. Therefore, it is possible to present any transformation as the original filter from the point of view of the frequency filtration theory. There are two types of transformations: low-frequency filters (averaging, field recalculation for overlying levels) and high-frequency filters (calculation of derivatives, recalculation for downward layers, etc.). Properties of each filter are defined by the frequency characteristic that is spectra relation of the transformed and initial functions.

Low-frequency and high-frequency filters combination enable to obtain band pass filters. The most simple and known filters are a differential averaging of intervals with different radiuses and Saksov-Nigard function [2]:

$$F(U)=\frac{\overline{U}(r)-\overline{U}(R)}{R-r}, \quad (1)$$

where "U" is average values of field on radiuses "r" and "R" in a numerator and a difference of these radiuses in denominator. Considered transformations are close in context**.** The connection evaluation between anomalies which are obtained while transformations and depth of the sources causing these anomalies, is conducted with the relative depth's characteristic that for discrete transformations looks [1]:

$$N(z)=\sum_{i=0}^{n}\frac{K_i z^3}{\left(z^2+r_i^2\right)^{3/2}}, \quad (2)$$

where *K* - the factors depending on a kind of transformations, *z* - depth of sources, *r* - parametre (radius) of transformation.

Relative depth's characteristics for function Saksova-Nigarda and differential averaging on a window with two radiuses r and R look thereafter:

$$N_{CH}(z)=\frac{1}{R-r}\left[\frac{z^3}{\left(z^2+z^2\right)^{3/2}}-\frac{z^3}{\left(R^2+z^2\right)^{3/2}}\right], \quad (3)$$

$$N_{ocp}(z)=\frac{2z^2}{\left(z^2+r^2\right)^{3/2}\left(+\sqrt{z^2+r^2}\right)}\frac{2z^2}{\left(z^2+R^2\right)^{3/2}\left(+\sqrt{z^2+R^2}\right)}. \quad (4)$$

The main feature of these characteristics is that the greatest sensitivity to weights is observed on certain depth, and depth of a maximum depends on radiuses of averaging correlation. Changing averaging parametres, it is possible to change maximum of the depth's characteristic.

Therefore the research objective can be formulated as follows: to estimate possibility of the definition of objects' quantitative characteristics (depth, the sizes) on specified transformations sections which are constructed on different parametres of transformation and the transformed functions referring to maximum of the depth's characteristic.

Fields Vz and Vzz for correct bodies were used for calculations - sphere, the horizontal circular cylinder, the parallelepipeds extended in horizontal and vertical directions with various occurrence depths and sizes.

According to Puasson relation of gravitational and magnetic anomalies of field Vzz it is possible to consider Vz anomalies as a magnetic field component at vertical magnetization of objects. Some results of calculations are presented in Fig. 1 and Fig. 2. From figures it follows that for both kinds of considered transformations, position of objects in an isolines section of the transformed fields is not defined precisely.

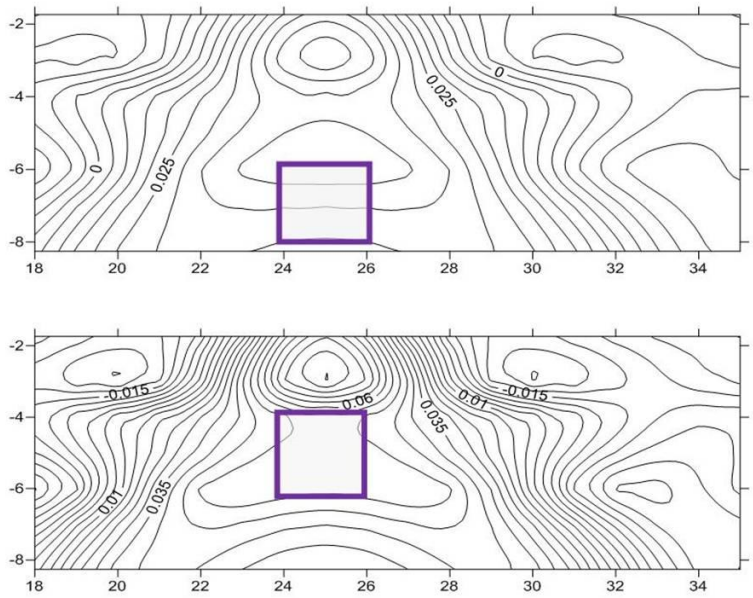


***Fig. 1. Saksov-Nigard section for square parallelepiped with different parameters.***

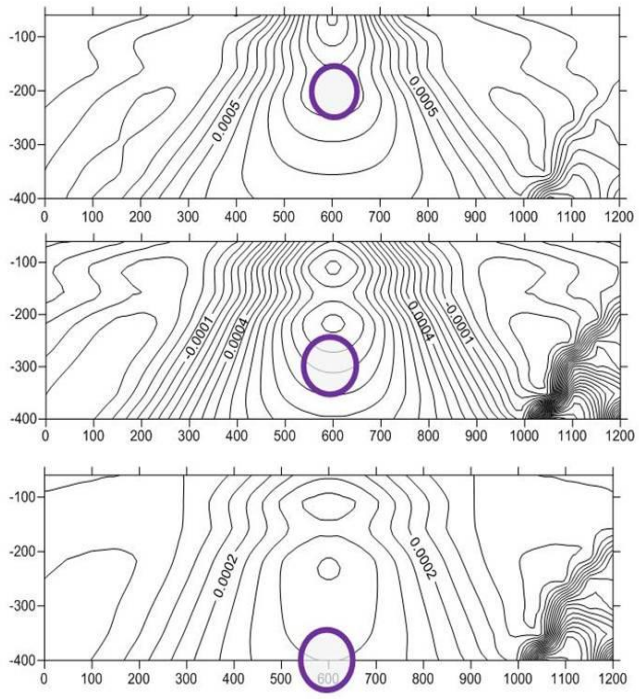


***Fig. 2. Saksov-Nigard section for sphere with different parameters***

It is possible to make some conclusions according to the analysis of obtained data. You should be very cautious while quantitative interpretating of gravimagnetic anomalies whether it is recalculation for downward layers or band-pass filters application. It is caused by inaccuracy in characterization of anomalies.

It is better to do quantitative interpretation on the basis of modeling, besides the first approximation can be done by the simple express methods such as feature point method.

References

1. Андреев Б. А., Клушин И. Г. Геологическое истолкование гравитационных аномалий. - Л.: Недра, 1965. - 495 с.
2. Миронов В. С. Курс гравиразведки. 2-е изд., перераб. и доп. – Л.: Недра, 1980. – 543 с.

## NON-RENEWABLE RESOURCES DEPLETION AND INVESTIGATION OF POSSIBLE OUTCOMES

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Mankind has gone beyond the content of the earth. Already in the early '90s, it was clear that humanity is a place where self-maintenance is impossible. For example, it was found that the tropical rain forests are cut down to unacceptable levels; global production of grain can no longer support the population growth, entrenched fears of global warming.

**1970-2000 years: The growth of pressures on the environment.** Natural disasters cost the world more expensive and a struggle for fresh water and fossil fuels is becoming harder to acquire the shape of direct clashes each year. The U.S.A. and other leading countries continue to increase greenhouse gas emissions, although meteorological data indicate that the climate is changing, and scientists have agreed that this is a direct consequence of human activity. The graph shows the share of the planet's surface, necessary for providing resources and for the decomposition of contaminants. From the 80's, man's needs have exceeded the capacity of the planet. In 1999 they went beyond 20%. Unfortunately, the burden of man on the environment continues to grow, despite the development of technology and social organizations. The situation is complicated by the fact that the humanity has gone beyond all limits and is in the unstable state. However, the understanding of this problem in the world is very weak.

**The development of people on the earth.** The problem is formulated very simply: to achieve sustainability, humanity must increase the consumption levels in poor countries, but at the same time reduce the load on the planet environment in general. It’s necessary to develop technologies and change people's behavior. Today, prospects for peace are evaluated more pessimistically than in 1972. Mankind has wasted 30 years, discussing wrong problems, and has taken weak, indecisive actions to protect the environment. Too many things must be changed to prevent the global collapse in