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ON MODERN ECOLOGICAL STATE OF ENVIRONMENT OF THE CITY OF ZAKAMENSK AND ADJACENT TERRITORY

Keywords: ecological status, tailings, GPS tracks, Zj-type territory, sources and factors of pollution.

Analyses the environmental situation, the Zakamensk and adjacent territory in modern times after the remediation works. Shows the poor condition and the poor quality of the remediation, which is confirmed with the help of modern technologies of space sensing and high-precision ground-based geodetic measurements. A scheme for grouping the adverse impacts of waste sources, factors and processes.

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CURRENT ECOLOGICAL STATE OF THE ZAKAMENSK CITY ENVIRONMENT AND ITS ADJACENT TERRITORY

Keywords: environmental status, tailings storage, GPS-tracks, 3D-viewof the territory, sources and factors of pollution

Ecological situation of the city and its adjoining Zakamensk territory is analyzed. This adverse ecological situation has developed during the newest time after carrying out of recultivation works. The unsatisfactory state and poor quality of the executed recultivation works is shown. It is confirmed by means of modern technologies of remote sensing and Earth's high-precision geodetic measurements in situ. The scheme of grouping of adverse effects of a waste on sources, factors and processes is developed.

Introduction. Environmental problems ,the Zakamensk associated with belt trouble that half covered the city with the southeastern, Eastern and North-Western sides here are former concentrators, and close to the residential area adjoins the tailings processing plants Džidinskogo Gok. it marked not only the outputs of station buildingssub-national policies on industrial sands, but also on their vegetable gardens. Based on the results of the execution of works on the theme "implementing environmental protection measures related to the closure of Džidinskogo tungsten-Mo-libdenovogo of g. Zakamensk: assessment of the environmental situation in the area of the former DVMK " (2007) we have identified objects that represent the greatest environmental risks and dangers that still continue to have a negative impact on the environment and the health of its population.

30 April 2012 g. The President Of The Russian Federation

approved by the "fundamentals of the State policy in the field of environmental development in the Russian Federation for the period up to 2030 year. one of the goals of the Foundation is to restore damaged natural ecological systems, it must be used with the following mechanisms:

(a)) inventory of the territories to
Lew identifying areas with damaged-
Meadow environmental situation for the
programmes aimed
in the minimization of negative impact
action on the environment and lick-
the eradication of environmental damage, connec-
involved with past economic and
other activity;

b) Organization of works on the assessment and the phased elimination of the environmental effects of past economic and other activities;

in) development of legal, economic FIR, organizational and methodical mechanisms of redress for injury caused the improvement in the environment;

g) conservation and restoration of the šitnyh and own ecological resources of the EU-testvennyh environmental systems outside of the CCA-Bo protected natural areas.

The history of the problem. The City is closely connected with the activities of Zakamensk Džidinskogo tungsten-molybdenum combine in (DVMK), which was established in 1934 g. by order of the people's Commissariat for heavy industry of the USSR on the basis of Džidinskogo ore site that integrates Pervomaiskoye molybdenum mine and tungsten deposits of Holtoson and Inkur in the pre-war and war years plant occupied the leading position in the country on production of tungsten concentrate production in 1934 g. amounted to 73.5%, in 1935 g. -65.7%, in 1937 g. -50%, in 1944 g. -40% of the total produced in the USSR tungsten concentrate in the post-war years plant increased production capacities for production of tungsten and molybdenum concentrates with 1972 g. the Inkurskaâ plant, which in the first year of refined ore poor old holtosonskih in the dumps. 1973 City was closed due to full testing mine Pervomaysky molybdenum deposit, but started to give out ore in Kursk mine and factory moved to the development of technologies for processing. 1974 g. was the reconstruction of the former molybdenum factory that was converted to tungsten ores enrichment. Since that time, the plant extracted and processed only tungsten ores.

Plant operated for over sixty years and ceased operations in the profitability of production in the new economic environment. When you close the plant have not been complied with sanitary and environmental requirements for the closed businesses. Mining ceased, but not eliminated, mines not a reclamation of disturbed lands, unresolved issues of polluted mine water into surface water bodies, were not realized projects for environmental protection in the City of Zakamensk and adjacent territories etc all this has led to the closure of the plant's waste impact on the environment and population not only has not decreased and has increased significantly.

Research methods. In the work on the basis of stock, archival materials and their own assessment of the environmental situation, the Zakamensk.

Regular space imagery provides an objective, to get material about the State of the Earth's surface and its changes, and modern processing of satellite imagery geo-informational technologies ensure exact pokoordinatnoe combination of materials for studying the dynamics of the changes occurring on the surface of the Earth. the GeoPortal United States Geological Survey via a search engine GloVis (<http://glovis.usgs.gov>) downloaded the necessary additions from mul'tispektral' s images spectroradiometer ETM + satellite Landsat-7 into the g Zakamensk (path = 134, row = 25) from 22.07.2002 g. and 15/07/2011 g. The spatial resolution of the images is 15 m/pixel. required when downloading pictures was the complete lack of cloud cover (0 percent), high quality (Qlty = 9) and an adequate level of training images (level L1T-RR-totransformirovanie, radiometric and atmospheric correction). the use of freely available data makes it very easy to continue the series of natural and man-made objects in the following years.

When studying the structure and functioning of the landscape, including technological, one of the most important tasks is to analyze the key technical indicators morfometri. the use of GIS and digital elevation models (DEM) allows to significantly deepen and refine this analysis [8]. recently, the widespread global DEM SRTM (Shuttle Radar Topography Mission), which is the basis for large-scale mapping of morphometric [7]. WITH ftp -Server United States Geological Survey have been downloaded high-altitude radar data SRTM v. 4. All morphometric indicators study area obtained in the analysis of the DEM to conduct a morphometric analysis of terrain was constructed and analyzed (in conjunction with data from field observations), a number of morphometric maps: gipsometrii, slope and exposure of slopes of Earth's surface.

On the kosmosnimki imposed outlines of the territory subjected to reclamation in 2011 g.; they are the result of using high-precision geodetic works GPS -equipment.

The research results and their discussion. During the period of the works was formed 44.5 million tonnes of tailings stored in hvostoh-raniliša. decommissioned in 1958 g. the first tailing pond (9.5 million tons) over the years is the source of the contamination, the Zakamensk. Stale tailings are washed away in the garden area and residential area in the eastern part of Zakamensk, next - the river Modonkul', which flows into the River Gee-do storage area there has been a lot of places tails of new enhanced process of wind erosion, which leads to pathology respiratory and gastro-

intestinal tract in human piles DVMK stockpiled more than 50 million m³ of rock overburden and enclosing rocks are situated on the lands of the Dumps. suitable for use in agriculture. Due to the fact that previously were richer ore, in the dumps were bred with large concentrations of sulphides.

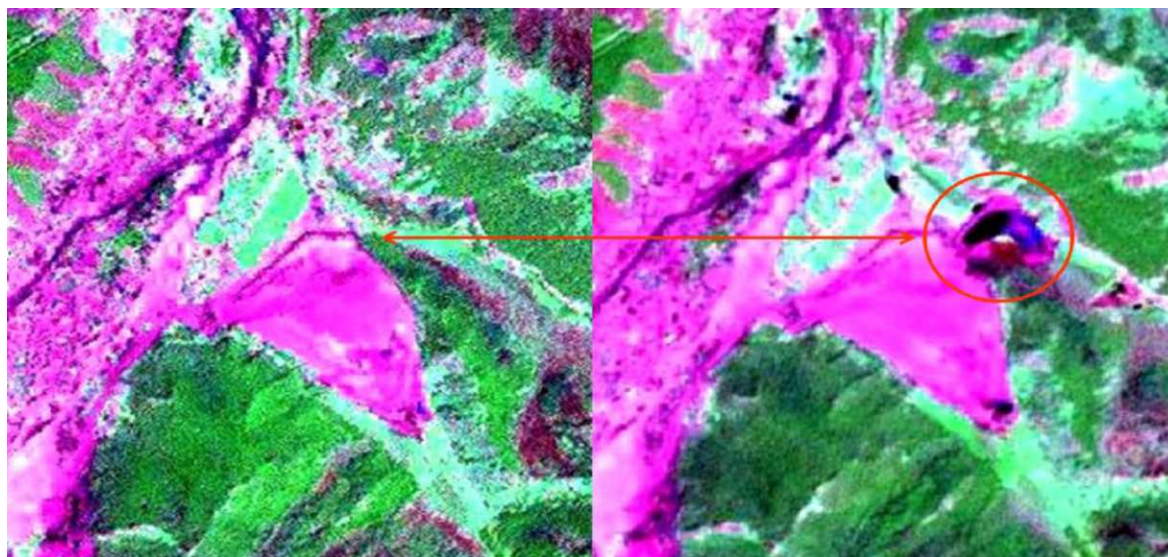
For many years the situation in the former DVMK has remained environmentally disadvantaged. environmental protection measures for the closure of the DVMK included in the federal target program "ecology and natural resources of Russia 2002-2010 years, but have not been fulfilled.

The difficult environmental conditions show 20-year-old geocological studies of industrial organizations and research centres in Buryatia. in particular, in 1986-1992 Gg. are ecological and geochemical and radiometric observations, studies of snow cover and other complex works, ushered the orderly learning environment (OS) in the City of Zakamensk [5]. the large and comprehensive research in 1991-2007 biennium conducted GIN SB RAS, beep, SB RAS, IOEB, SB RAS, RUSSIA, JSC «Sibtsvetmetniiproekt», which is made clear: the environmental situation in the City of Zack-menske and adjacent territory constitutes an environmental disaster, and for general morbidity (on demand of medical institution) - as the crisis [1, 2, 4].

To prevent the risk of further spread of pollution, sprawl zone of ecological disaster, to eliminate sources of pollution and to minimize accumulation in 1996 g. JSC "Sibtsvetmetniiproekt" together with the GIN SB RAS held a large-scale engineering and geo-ecological-economic survey, the results of which are set out in a report [3] the First complete an inventory of accommodation facilities with solid waste characteristic wastes, their location and the environmental impact assessment on the second part of this work - draft GIN SB RAS "assessment of the environmental situation in g. Zakamensk RB according to pollution and support recommendations for its improvement " [5]. This paper discusses the research and production almost all aspects of the State of the OPERATING SYSTEM, including the evaluation of the health status of the population ,the Zakamensk [6].

Based on these and other historical data in 2005 g. JSC "Sibcvet-metNIIproekt" a project "Elimination of the negative effects of man-made tailings Džidinskogo Wohl-framo-molybdenum combine in the kamenski district of the Republic of Buryatia". in order to implement this project in (III) quarter 2011 g. carried out the first stage of the remediation 600 ha of urban land occupied by man-made sand Reclamation conducted. group "Acropolis", represented by the subsidiary ZAO Zakamensk» - the owner of these man-made deposits. the work was moving 3.2 million tons of sand from the Valley of the river Modonkul' in the tohraniliša-last ruchya Barun-Naryn (former gidrootval concentrating mill DVMK) (PIC. 1.) work was financed from the federal budget in the amount of 500 million rubles were involved Constantly order 27 trucks, 10 and 50 people.

In October 2012 g. performed by surveying okonturivaniû natural habitats-caused deposits sand exported. used the following equipment: GPS -Navigator Garmin GPS 60 GPS -receiver (III) accuracy class Trimble R3 laser range finder Leica DISTO The A5. Trimble R3 following technique was applied first to the base boundary signs OMZ-OMZ and 56-57 (with known coordinates, distance between them about 100 m) clarified the position of the receiver and then the receiver within two hours "pegged" to the area. Subsequently, using coordinates of satellites system GPS and "tied" to a



а) б)
Рисунок 1 - Ситуация на отвалах обогатительной фабрики: а) снимок Landsat ETM+ от 22.07.2002; б) снимок Landsat ETM+ от 15.07.2011. На снимке 2011 г. хорошо видна обогатительная фабрика с прудом-

standing device, method of quick kinematics has been received GPS track borders removed sand track was then converted to a vector shape file (figure. 2, 3).

We estimate that the area was sands seized 48 HA, although the planned export of the area 600 HA - This is a second-line elimination activities negative effects of man-made DVMK tails.

Carried out project on topographic modeling of three-dimensional images, as opposed to 2D maps, 3D terrain models, draped kosmosnimkom, allow you to clearly see and visually assess form and "plastic" terrain, boundaries and location of geomorphological units, natural and anthropogenic objects. ZO-model draped with the pseudocolor RGB -composite Landsat ETM + 15 July 2011 g. (fig. 3).

These materials now form the basis for determining mass and volume of contaminated sand were removed as part of the environmental health of the environment and reduction of diseases among the population.

Retrospective analysis of available materials for the assessment of environmental conditions in the City of Zakamenske, personal observations during the execution of works on the theme "implementing environmental protection

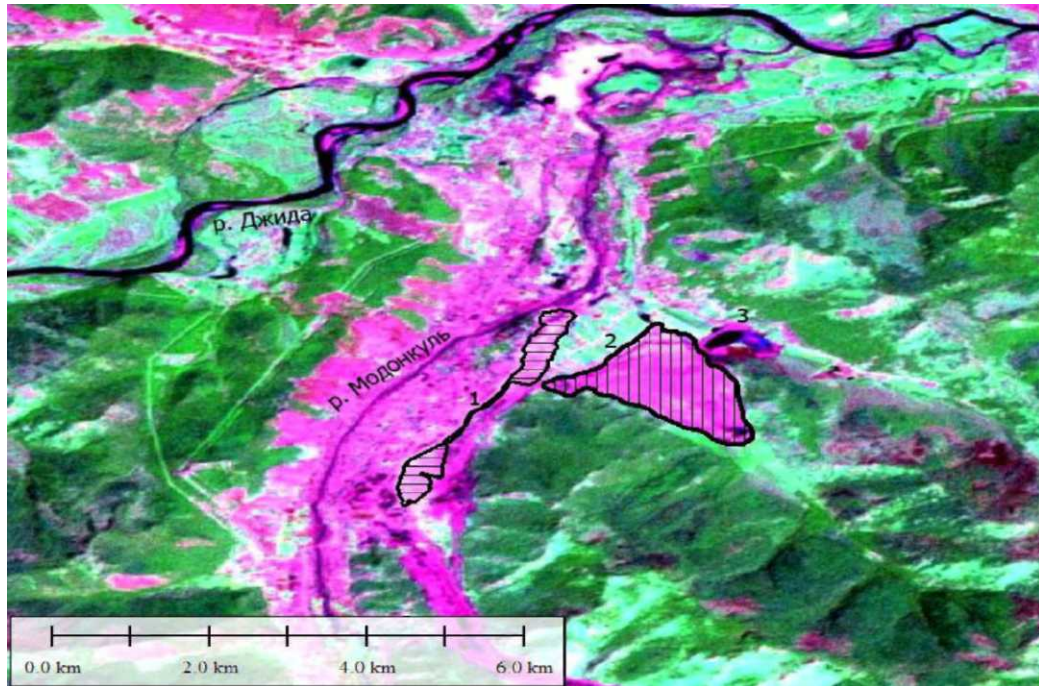


Рисунок 2 - Границы места изъятия и складирования техногенных песков: 1 - изъятые пески; 2 - складирование песков; 3 - горно-

measures related to the closure of Džidinskogo tungsten-molybdenum factory g. Zakamensk: assessment of the environmental situation in the area of the former DVMK " (2007) and especially the analysis of the results of the latest research on remote sensing and ground-state daily surface revealed the following.

1. The main source of pollution environment-tailings, mine waters.

2. the main factor of pollution - toxic substances in the first place, heavy metals, high-unasleduûšie Kya concentration of ore rocks and in currently deposited in the Ma-teriale tailings, as well as pollû-Tanta in mine waters.

3. The basic processes of FA-following expansion of the range of pollution, - This is:

- wind frequency, covering a vast territory;
- plane wash and linear erosion, especially intense in the spring and summer floods;
- the lateral underground filtration and exits on the day surface mine water;
- demolition of the alluvial River Modon Kul pereotložennogo material;
- anthropogenic dispersal of episodic use sand spreaders for roads, playgrounds, construction, etc.

Conclusion. Based on the analysis of space and ground-based research results obtained using high-precision geodetic equipment, must be acknowledged as the main result of the latest phase in a long history of environmental conflicts ,the Zakamensk, that the group "Acropolis", represented by the subsidiary ZAO Zakamensk "failed targets. Exported contaminated sand from the square 48 HA, that is just 8% the project numbers. the use of modern technologies have grouped the negative aftereffects of the former DVMK to sources, factors, processes.

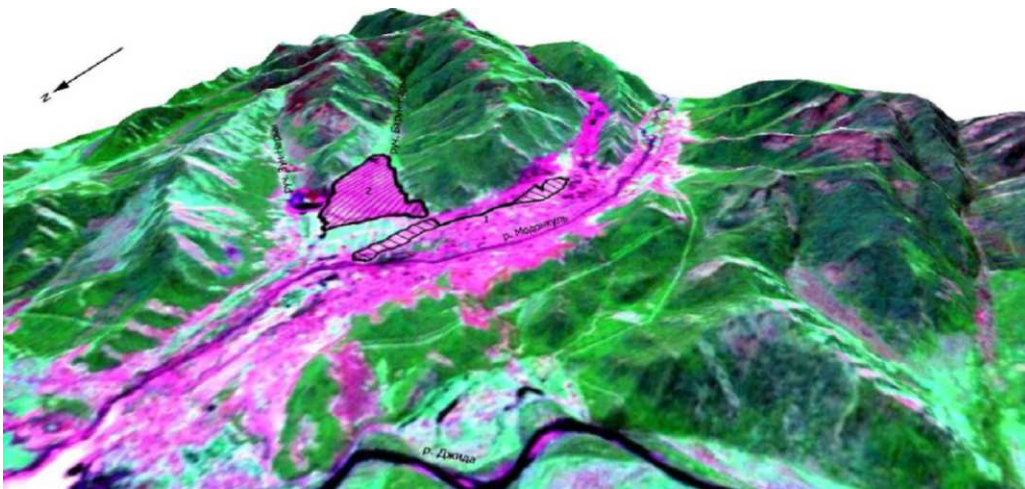


Рисунок 3 - Зй-вид территории г. Закаменска, созданный на основе ЦМР SRTM v.4 и текстурированный снимком Landsat ETM+ от 15.07.2011 в виде RGB-композиата в псевдоцветной комбинации каналов 7:4:2. 1 - ареалы вывезенных техногенных песков;

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