Environmental Risks of Landscape Botanical Complexes and Minimization of Technogenic Influence Exerted by Objects of Oil&Gas Production in Steppe Zone of the Southern Urals

M V Ryabukhina¹, R A Maiski², R H Salikhova³

¹Department of Geography and IGCP, Orenburg State Pedagogical University, 19, Sovetskaya street, Orenburg 460014, Russia
²Chair Mathematics, Ufa State Petroleum Technological University, 1, Kosmonavtov street, Ufa 450062, Russia
³Chair Foreign Languages, Ufa State Petroleum Technological University, 1, Kosmonavtov street, Ufa 450062, Russia

E-mail: ravanmai@mail.ru

Abstract. The modern rates of oil and gas production, developed industry, high technologies in the field of the construction and operation of wells, pipelines and other facilities of the oil and gas industry, as well as growing environmental control do not fully solve the problem of the negative impacts on natural objects, in particular, landscape botanical complexes. Taking into account the increasing oil and gas production rates, the existing objects-Orenburg NGKM and constructed ones, for example, by 2015 in the Orenburg region was organized a "new thread" oil company, LLC, the activities of which include exploration, design and preparation of the Mogutovskoye deposits, a part of the Vorontsov and a part of Gremjacheskoye deposits, as well as their exploitation, should explore and develop some effective mechanisms to minimize and eliminate the environmental risks of industrial impact. In our view the multi-component continuous monitoring of environmental risks will help to formulate an effective strategy and develop an effective preventive mechanism of technological activities, identify landscape botanical complexes which are more exposed to environmental risks as well as the regional forecast component changes in terms of a landscape botanical complex in the zone of technogenic influence exerted by the objects of the oil and gas industry.

Orenburgskaya oblast of geobotanic zoning is situated in the steppe and forest-steppe zones, landscapes are often replaced by and presented to a variety of different natural zones, this causes the uniqueness and the sensitivity of landscape-botanical complexes to different kinds of influences.

The study area is located in the South-East European Russia between 51°45' and 51°58' North and from West to East between 54°43' and 54°56' e. The area studied was situated in the zone of influence of product pipelines and auxiliary engineering structures, as well as in the zone of influence, which is 1500 m from the axis of the reconstructed product pipelines, and within a radius of 1500 m from the subsidiary structures. The width of the plot area matches the research pipeline environmental impact of Orenburg.

The main objective was to assess the current state and forecast possible changes in landscape and botanical complexes with technogenic load objects ONGKM.
Main tasks:

- Evaluate the State of the art of landscape and botanical complexes and their resistance to technogenic impacts and resilience;
- Identification of possible sources and effects on the basis of standardized qualitative and quantitative indicators, based on an analysis of the current situation and the previous use of the territory;
- Predicting possible changes in landscape and botanical complexes in the construction or reconstruction of the oil and gas production;
- Development of recommendations to prevent, minimize or eliminate environmental risk.

Project activity of oil and gas producing entities in Orenburg region includes the construction of wells and then connecting to the existing system for the collection and transport of fishery products.

The emergence of local hotspots, cluttering or degradation of existing landscapes is possible only for gross violations of environmental protection measures. Enhanced environmental monitoring in the organizations themselves and State supervision service does not solve the problem in full ecological risk landscape botanical complexes in the zone of influence of the oil and gas industry objects [1-3].

Orenburg objects field located outside of the State forest fund lands, agricultural lands. Objects Ltd "new thread" in the majority of cases are in close proximity to the public lands of the forest fund, especially in the area of oil production on the territory of the Buzulukskogo pine forest. Possible damage to or destruction of woody vegetation, and, as a consequence, the development of erosion processes with the subsequent transformation of the landscape throughout Orenburg region[4-6]. So in particular in the central zone of the Orenburg region stand in little damage likely to occur due to the nature of the location of industrial facilities and low forest cover territory [7-10]. The northern part of Orenburg region has the highest percentage of forest cover and the objects of oil and gas production are located in close proximity to forest sites. When performing the work were considered hypothetical options of adverse impacts on components of the landscape and botanical complex (table 1) [11-14].

Complex preventive (precautionary) environmental measures implemented since the beginning of the construction of the wells.

When planning the well pad recognizes that moving and move soil horizons leads to destruction of the natural soil structure, reduced its fertility and worsening of agrochemical properties. However, separate removal of fertile and potentially fertile soil layers and split the same drawing them back allows to exclude pedoturbaciju (mixing) layers, and, therefore, the sharp deterioration of fundamental physico-chemical properties of soils. For the southern black soil, as well as for other types of soil, there are norms withdrawal dependent on agrochemical characteristics of soil[15,16].

Technical remediation after wells construction reduces the cooldown on soil structure and eliminates the possibility of contamination or cluttering up the industrial site adjacent to the territory. It should be noted that the land provided by the land user on well construction time, inspected after completion by the Commission and adopted by the land user only if all environmental activities, including landscape optimization[17,18].

Adjust the position well in terrain allows you to avoid or enhance existing pockets of erosion. So all the wells planned sufficiently removed from the slopes of ravines, flood plains of rivers or surface watercourses. Laying of pipeline loop is under the ground, with the subsequent reclamation bands allocated for construction that prevents erosion [19,20].

Mandatory equipment territory drilling Bund, sealing technology and device containers pallets excludes contact of drilling fluids, drilling waste water, petrol, oil and lubricants and chemicals from the soil surface. Prevents their spreading and getting into the open water bodies, groundwater.

One of the phenomena that can lead to negative environmental consequences for landscapes, is rapoprojavlenie (spout brine) of saline kurgurskih sediments at drilling of individual wells. But drilling projects necessarily considering geologic drilling conditions, including the probability of rapoprojavlenija at certain intervals, and include measures to prevent it.
Table 1. Possible negative effects on the landscape and botanical complexes in the construction project of wells and measures to prevent it.

| Possible negative effects                                                                 | The result of the                             | Preventive conservation measures                                      |
|--------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------|
| Violation of a soil layer with careless markup site and not making full use of existing roads for access technology | The emergence of the existing pockets of erosion, gully development network, transformation of the landscape | Maintenance works at strictly designated mine site laboratories with their subsequent recultivation. Use existing roads for the passage of vehicles and machinery. |
| The lack of gravel fill to reach technology along the route of the pipeline under construction. Violation and granular devegetation. | Destruction of plant felt as a natural barrier to contaminants, deterioration of soil balance, decrease of organomineral'no-go bioefficiency phyto-cenosis in General. | Backfilling gravel lanes, playgrounds on the ground: a breakdown of sites on marginal or unsuitable for farming areas. |
| Non-toxic waste land cluttering is not prone to rotting, including construction, household. | Reduced acreage of biologically productive land and in general-the biological productivity of the ecosystem of the territory. | Compliance with the limits of accommodation, storage conditions and time-frames for export of waste. |
| Leaking or FUEL filler, mineral oil, drilling fluids, drilling with liquid waste hazard class, due to the tightness of the equipment or shut-off and control valves, as well as, in the absence of concreted sites for technological equipment. The spread of pollutants as a result of the storm and water flush in the absence of storm-water drainage on the site of the rig. | Local chemical pollution of land and (or) vegetation specific pollutants. Deterioration of the buffering capacity of soil, until its exhaustion, intensification of destructive soil processes. Upon leaving n/a on the ground so when drilling is deteriorating air-thermal and protective function of transient soil horizons. | Strict adherence to adopted on the draft drilling technology and other works on construction sites. Sealing equipment and shut-off and control valves. When filling n/a need to collect and treat contaminated place drug type "Devorojl" divide. Industrial drilling equipment system for collection and removal of storm and melt water |
| Careless or negligent handling of the fire. | The emergence and spread of fires. | Compliance with fire safety regulations. |

Practical experience in the construction and operation of wells in ONGKM shows that in the process of construction and operation of wells is not expected disturbance of the landscape under the influence of mechanical, chemical or thermal stresses. Existing landscapes are not complex technological modifications and transformations (violation of the relief, the destruction of soil and vegetation). Not limited to species diversity in areas adjacent to the areal objects, there would be no break the structure of the landscape.

Preliminary prediction and evaluation of possible changes in plant communities during the construction of the wells. Construction of wells implies limited and low level impact on the vegetation of the district building. Consider the possible undesirable effects on vegetation on well construction stages:

- Preparation of drilling: and in planning industrial drilling), in the process of lifting and moving of topsoil was sheared off and destroyed, growing on its surface vegetation. Seemingly, there is the possibility of the destruction of copies or small populations of any species of plants, which are many in the floristic composition of the vegetation of the territory. Similar concerns about the preservation of valuable species arise when maintaining the industrial krivbass equipment with further storage of materials (table 2).
Table 2. Model list of substances released into the atmosphere during the construction of wells for example ONGKM.

| Preparatory work | Installation of equipment | Drilling | Mastering-200 T. m³/day |
|------------------|---------------------------|----------|-------------------------|
| Nitrogen dioxide | Iron oxide                | Nitrogen dioxide | Nitrogen dioxide        |
| Carbon (Soot)    | Manganese and its         | Nitrogen dioxide | Nitrogen dioxide        |
| Sulfur dioxide   | Nitrogen dioxide          | Carbon (Soot) | Carbon (Soot)           |
| Carbon oxide     | Nitrogen oxide            | Sulfur dioxide | Sulfur dioxide          |
| Kerosene         | Carbon (Soot)             | Hydrogen sulfide | Hydrogen sulfide        |
|                  | Sulfur dioxide            | Carbon oxide | Carbon oxide            |
|                  | Carbon oxide              | Mixture of hydrocarbons limit C1-C5 | Methane |
|                  | Fluorinated gazooobraz. connections | Mixture of hydrocarbons limit C6-C10 | Petrol/gasoline |
|                  | Fluorides, inorganic      | Benzene | Formaldehyde |
|                  | Petrol/gasoline           | Xylene (mixed isomers) | Kerosene |
|                  | Formaldehyde              | Methylbenzene (Toluene) | Oil fly ash |
|                  | Kerosene                  | Petrol/gasoline | Kerosene |
|                  | Inorganic dust. 70-20% SiO2 | Formaldehyde | Oil fly ash |
|                  |                           | Kerosene (Hydrocarbons limit C12-C19) | Oil fly ash of thermal power plants |
|                  |                           | Suspended solids | Oil fly ash of thermal power plants |

It should be noted that, according to the situational map and results of field surveys, territory research all wells ONGKM, placed on farmland, plant communities that provide prairie species resistant to ajerotehnogennym.

The project is expected to put wells on Forage Lands-haymaking, plant which does not contain rare or endemic plants. Valuable plant species grow in either flood or the undisturbed sections of steppes, outside agrofitocenozov. Thus, the probability of causing any damage to the valuable components of the species composition of the vegetation is reduced almost to zero.

When transportation equipment is significant harm to vegetation also not expected as prevailing in the ONGKM drilling practices in cargo transportation as much as possible using an existing road network. Wells will be drilled in the project area with a developed fishing infrastructure, including a network of sidings to existing nearby wells. To reach directly to the industrial site equipped with temporary road, which are accordingly. Thus, prevents movement of heavy machinery out of the road network and, hence, causing any harm vegetation growing in the area of the project works.

Emissions in the ambient air at the stage of construction and installation works are represented by exhaust gases of vehicles and machinery are nitrogen oxides, soot, sulfur dioxide, and kerosene (table 2).

According to some authors (Kulagin a.Yu., Kulagin Ryabinina Ju.Z. Z.n., etc.), the threshold for effects on vegetation is about 1 MPC; sensitive vegetation types, ranging from 0.8 MPC and above. At this stage of project activities according to the calculations of dispersion for similar objects exceeding 1 MPC is not observed, and as the steppe vegetation does not pertain to particularly sensitive, the negative impact of emissions is expected.

– Stage of drilling-main by purpose and duration. In the process of drilling all equipment and materials are concentrated within the drilling. The materials used in the drilling process, stored on
site drilling within embankments, and do not come into contact with vegetation in area of drilling under any circumstances, even if accidental spillage.

Some unwanted effects on vegetation can be rendered gazopylevym emissions from the diesel drives (exhaust) and in the cooking process of drilling mud with the use of powdered materials.

When drilling with diesel drive area of exceedances 1 MACS exists at about 300 m from the edge of the building the rig. But on the territory there is a network of high-voltage power lines, allowing drilling to electric. Thus, the amount of emissions into the atmosphere is reduced dramatically. Selection of dust in the air with rastarivanii bulk materials slightly short and limited Pokrovskaya. In most cases the drilling fluids are prepared centrally and delivered to the drill ready, that eliminates dust separation.

On practical project EIA data on all types of drilling wells, available on ONGKM, when drilling at the electric zone exceedances 1 MPC; area 0.5 MPC is up to 200 m from the edge of the building the rig. Thus, on the main stage of the implementation of project activities negative impact on vegetation is not felt.

– At the stage of development of the wells produced on burning priskvazhinnom barn of Plast hydrocarbon mixtures. The duration of development-from a few hours to 1.5 days; i.e., this stage is only momentary. List of released harmful substances is presented in table 2. Ground-level pollutant concentrations are such that does not cause any visible damage to the vegetation.

Thus, at any stage of the construction of wells is not expected significant negative impacts on vegetation.

Floodplain vegetation (wood and vlazhnolugovaja), with an average gazoustojchivost'ju, is at a distance of 1.0 or more kilometres from the construction sites that excludes any damage to drilling emissions.

When field surveys, the territory was not observed phenological phase offset plants or weakening of fruiting, although research on site are both existing wells and at different stages of drilling. Average and low quality of woody vegetation due to the presence of spreading tree stand, lack of sanitary cuttings, and possibly the final felling.

Summing up all the above mentioned, note that as a result of the implementation of project activities is not expected to decrease in species diversity of vegetation, simplification of the structure of plant communities, erasing their zonal specificity, decrease stability, active resettlement jevritopnyh, polizonal'nyh species of vascular plants.

In addition, when implementing the project activities within the mandatory remediation foresees biological reclamation of the industrial site boring well, restoring vegetation in the square, which was filmed with the fertile soil layer.

Objects Ltd "new thread" in the majority of cases are in close proximity to the public lands of the forest fund, especially in the area of oil production on the territory of the Buzulukskogo pine forest, given the uniqueness of the natural diversity of the flora complex, sensitive coniferous species to ajerotehnogennomu effects, maloizuchennost' question of improving sustainability of plant communities in natural conditions of the Orenburg region, should further examine the adaptation of certain types of plants to man-made emissions, develop technologies and the regulations on the work aimed at reducing and preventing environmental risk.

Currently one of the most effective ways of saving, recovery of vegetation and increase the adaptive capacity of otdel'nih species and vegetation in General is the application of advanced science and environmentally sound technologies, exploration, construction and maintenance of wells and related infrastructure.

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