

RESTORING REGULATORY DEPTH OF TRUNK PIPELINES

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Aging of pipelines is accompanied by a change in the position of the pipeline, this occurs under the influence of changes in the landscape, due to natural and human influence. These changes can lead to emergencies that entail significant material damage and have a detrimental effect on the environment. It is necessary to restore the standard depth of the main pipeline to prevent accidents.

On the territory of the Republic of Belarus, the routes of trunk oil and product pipelines are laid in 6 technical corridors with a total length of 1233 km. The total length of all main oil pipelines in single-thread terms is about 4000 km.

The country's main gas pipelines cross the country from north to east and from south to west. Gas pipelines pass through a variety of landscapes (swamps, hills and water bodies).

Oil and gas transport enterprises annually carry out a set of measures for the diagnosis, maintenance and reconstruction of gas-oil-transport system facilities, automation of production processes, which contributes to their reliable and stable functioning [1-2].

The actual life of most trunk pipelines in the Republic of Belarus is approaching a period of increasing accidents. Aging of the pipelines reduces their reliability and increases the likelihood of accidents. The aging of pipelines is accompanied by a change in the position of the pipeline, this occurs under the influence of changes in the landscape, due to natural and human impacts. These changes can lead to emergency situations, which entails significant material damage and has a detrimental effect on the environment. Therefore, it is necessary to restore the normative depth of main pipeline.

Restoring regulatory depth of trunk pipelines

Introduction

On the territory of the Republic of Belarus, the routes of trunk oil and product pipelines are laid in 6 technical corridors with a total length of 1233 km. The total length of all main oil pipelines in single-thread terms is about 4000 km.

The Republic of Belarus also has a developed system of gas pipelines. Currently, gas supply to the Republic of Belarus and its transit to third countries is carried out by Gazprom Transgaz Belarus. The country's main gas pipelines cross the country from north to east and from south to west. Gas pipelines pass through a variety of landscapes (swamp landscapes, hills and the intersection of water bodies).[3]

Repair of sections of the linear part of the main pipeline with an abnormal depth is carried out in the following ways:

1) Restore the normative depth of the main pipeline sections without deepening (the first method can be applied in two ways)

a) Restoration of the normative depth of bedding by filling with imported soil on uncultivated lands (slide)

b) Restoring the normative depth of bedding by filling with imported soil on cultivated lands (slide)

2) Restore the normative depth of the sections of the main pipeline, with deepening (the second method can be applied in three ways)

a) Digging

b) Deepening with laying in a combined trench

c) Deepening using soil jumpers

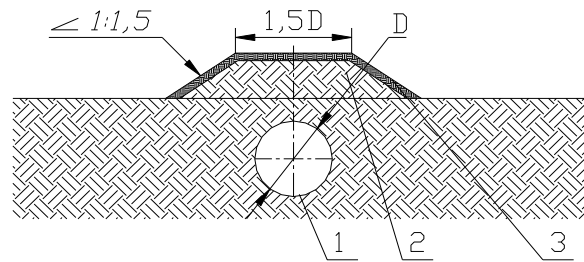
Ways to restore normative depth:

1) Restore the normative depth of sections of the main pipeline, without deepening

This method of restoring the normative depth can be used on uncultivated land or on areas of cultivated land. Such sections of the main pipeline can include: sections adjacent to the nodes of valves, intersections with field and forest roads and local property areas. Restoration of the standard depth is carried out by filling with imported soil, followed by compaction.

a) Depth restoration on uncultivated lands.

Ground filling is carried out in the form of a roller. The soil must be leveled and compacted. Sand can be used as a soft bed for soil.



1 – main pipeline; 2 – mineral soil; 3 anti-erosion materials and structures

Fig.1. – Restoration of the normative depth of bedding by filling with imported soil on uncultivated lands

b) Depth restoration on cultivated lands.

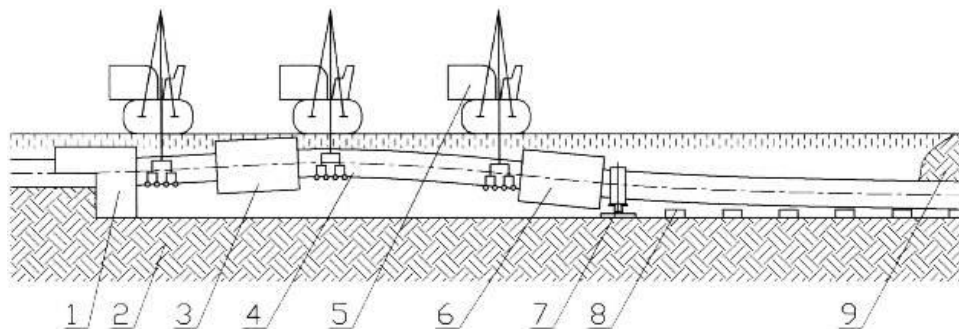
The normative depth on cultivated lands should be restored by pouring mineral soil and laying reinforced concrete slabs

2) Restoring the depth of sections of the main pipeline, with deepening.

This method of restoring the standard depth is used when it is impossible to use the recovery method with backfill

a) Deepening of the main pipeline with digging

The method of deepening a pipeline with digging without stopping the pumping can be used for pipelines of all diameters, in all soil conditions, except for rocky soils. Undercut excavation involves laying the main pipeline on supports of a given height and pouring with soil followed by compaction. Bags of non-rotting materials with a filler can be used as supports of a given height,.



1 – a digging machine or manual excavation; 2 – mineral soil; 3 – cleaning machine; 4 – MT; 5 – pipe layer; 6 – isolation machine; 7 – safety support; 8 – support of a given height; 9 – mineral soil backfill

Fig.3. – Deepening main pipeline with a tunnel

b) Deepening of the main pipeline with laying in a combined trench

The method of deepening the main pipeline with laying in a combined trench is used in the absence of the possibility of deepening extended sections of the linear part. This method consists in laying the pipeline in a parallel trench dug up to the standard depth in advance. The scheme is shown in (Figure 4)

c) Deepening of the main pipeline using ground lintels.

The method of deepening of the main pipeline using ground lintels is used in case of deformation of the pipeline being repaired. The main pipeline section is deepened by decreasing manually the height of the ground lintels (supports), with uniform removal and gradual placing of the main pipeline on the ground. For the optimal depth restoration of the main pipeline it is necessary to study the position relative to the horizon of the earth, pipes and the territory where the main pipeline is laid. [4]

Conclusion. The development of optimal methods for repairing pipelines will reduce the cost of the repair process and increase the safety of main pipelines. This approach to the choice of repair was used in the development of the enterprise standard for OAO Gomeltransneft Druzhiba.

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