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ANALYSIS OF MAIN ACCIDENT CAUSES IN GAS TRUNK PIPELINE

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The accident is termed as a breakdown failure of construction and (or) operation equipment used in hazardous production facilities, uncontrolled explosion and (or) release of dangerous substances.

Based on this definition, it can be stated that gas trunk pipeline accidents can be caused by uncontrolled explosion or release of dangerous substances which can have negative impact on human beings, environment, nearby constructions and facilities, lead to significant costs and losses. That is why the research which is focused on the analysis of pipeline accident causes and pipeline operation conditions is of great importance within gas pipeline network.

Based on the obtained results of the analysis of gas trunk pipeline accidents over the last decade, the following accidents causes are distinguished [1,3]:

1) defects in construction and assemble operations (22- 32%);
2) mechanical damage of pipes caused by machines during excavating works (17-19%)
3) material deterioration caused by their long-term operation (15%) ;
4) corrosion (including local one) caused by stray currents (12-29%) ;
5) non-observance of operation requirements and human errors (5%);
6) steel pipe defects (9-12%);
7) natural disasters and phenomena (7-10%).

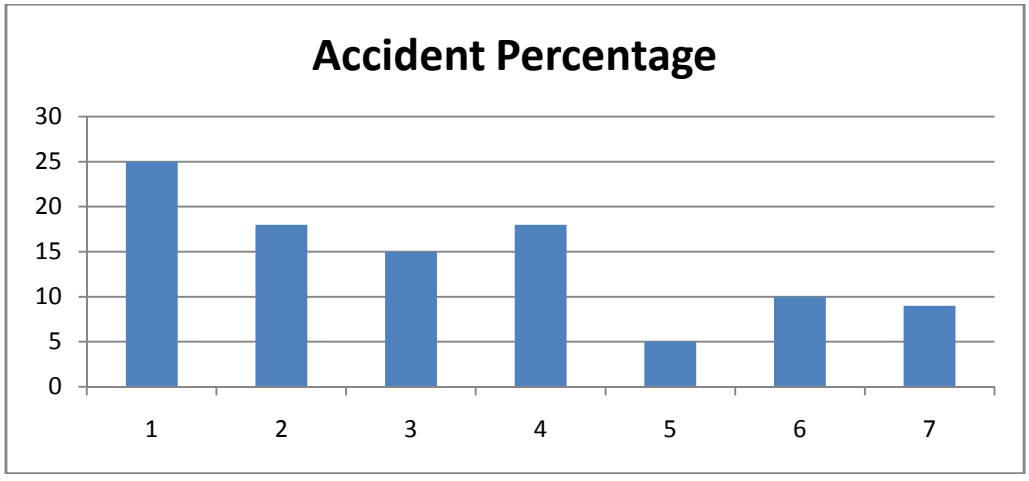

Fig 1. Main Accident Causes in Gas Trunk Pipeline (2000-2010)

Thus, it is possible to state that 60% of all pipeline accidents caused by the defects in construction and assemble operations, mechanical damages of pipes caused by excavating operations and corrosion.

According to various reports and data, pipeline accidents caused by corrosion range from 12 to 29%, depending on the specific characteristics of the area. In order to minimize the impact of corrosion on the technical state of pipeline, it is required to carry out a continuous monitoring and control of the condition of gas trunk pipeline and its coating. To do this, the

data obtained through pig inspection, chemical-biological and microbiological diagnostics of soil near the pipeline. It will help to prevent pipeline accidents, as well as to develop new type of coating characterized by high corrosion resistance [3] which will correspond to the peculiarities of the region.

Defects in construction and assemble operations, as well as mechanical damages of pipes caused by excavating operations (22-32%) [1,3] can be caused by the following causes [1,2]:

1) manufacturing defects and defects caused by improper pipe installation;
2) non-observance of pipeline design specifications;
3) welding defects, inadequate nondestructive test of joints;
4) failure to comply with safety regulations;
5) non-observation of operation regulations.

In order to avoid the above-mentioned reasons, it is necessary to take the following measures:

1) thorough control for construction activities and work performed;
2) predictive and preventive maintenance activities to define on time the sections of pipeline to be repaired;
3) carrying out of non-destructive testing;
4) carrying out of hydrostating and pneumatic testing in order to detect pipe defects and the defects caused by construction and assemble operations;
5) constant personnel training to increase quality of the work performed.

Thus, the analysis of the causes of gas trunk pipeline accidents, as well as observation of the above-mentioned recommendations and rules can significantly increase the trouble-free operation period of gas trunk pipeline which in its turn reduces repair and accident response costs.

References:

1. Чухарева Н.В., Тихонова Т.В., Миронов С.А. «Анализ причин аварийных ситуаций при эксплуатации магистральных трубопроводов в условиях крайнего севера в период с 2000 по 2010г» // «Нефтегазовое дело», - 2011(№3).
2. З.Т. Галиуллин, «Современные тенденции развития транспорта природного газа» // «Газовая промышленность», - 2006 (№5).
3. С.В. Мещеряков, О.В. Васина, «Метод снижения негативного воздействия на окружающую среду при магистральном транспорте газа в районах крайнего севера» // «Защита окружающей среды в нефтегазовом комплексе», - 2008 (№2).