

GIS Application in Technical and Environmental Safety of Natural Gas Transmission Pipelines, a Case Study

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SUMMARY

The project, which is the subject of this article, is a pilot project of BOTA (Petroleum Pipeline Company) and carried out by GEOGIS inc. in the name of BOTA. BOTA is a related institution of Republic of Turkey Ministry of Energy and Natural Resources operates in crude oil transportation, as well as transportation, distribution, import, storage, marketing, trade and export of natural gas.

BOTA periodically carries out the monitoring of all types of human and natural impacts (landslide, earthquake, buildup, transitions) and gas leaks that may affect pipelines and stations within the scope of operating activities.

One of the parameters required for the operation of natural gas pipelines is the location information of the pipelines and the facilities (line valves, compressor stations, pressure drop measurement stations) forming the pipeline system on the route.

BOTA has implemented this pilot project on a defined route, taking advantage of the aerial vehicles to evaluate, query and analyze in GIS format in order to make the inspection and control activities that are physically performed on the pipeline route more effectively. For this purpose, stereoscopic aerial photos were taken along a 1203 km pipeline within the project and on a 200 m wide corridor on both sides of the line. Data were produced in CAD data structure by photogrammetric interpretation, after that CAD data were converted into GIS data structure and BOTA specific attribute information was added. Thus, observations and queries which have to be done in terms of technical safety according to ASME B31.8 standard have been made by GIS analysis. In addition, on the 3D terrain model, video data was recorded by simulating the flight along the route of 1203 km by providing the visualization with the symbols used in the

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BOTAS standards of the vector data.

Another target of the project is to determine the gas leak points which was previously done with conventional (terrestrial) methods, was made from air for the first time. In the scope of the project, which is 1203 km long, potential leaking gas was inspected on lines and stations using helicopter mounted system. ALMA G2 (Airborne Laser Methane Assessment) optical instrument, which is mounted on the Bell 206 Jet Ranger helicopter, was used as a detector in the aerial leak inspection operation.

With the project, BOTAS has made it possible to easily observe and inquire related to technical safety in compliance with GIS in natural gas pipelines and stations on the route, as well as to make gas leak inspection in a short time, thus saving time and labor power.

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