



Pipeline Potential Leak Detection Technologies: Assessment and Perspective in the Nigeria Niger Delta Region

PDF (Size: 294KB) PP. 1055-1061 DOI: 10.4236/jep.2011.28121

Author(s)

Jasper Agbakwuru

ABSTRACT

This paper examines the advances in pipeline third party encroachment alert systems and leak control methods in the oil/gas industry. It also highlights the extent of spill/pollution issues in the Niger Delta region due to intended/unintended damages and suggests a possible method of control. It is believed that the best option to avoid pollution due to pipeline failure is to ensure that hydrocarbon does not exit from the pipeline. With the different methods considered in this review, acoustic monitoring of change in the operational sound generated from a given pipeline section is suggested to be practicable to identifying sound abnormalities of third party encroachments. One established challenge of the acoustic system for buried pipelines protection is attenuation of acoustic transmission. An attempt to check the performance of an acoustic transmission on steel pipelines submerged in water points to a similar research on plastic water pipelines that attenuation is small compared with pipe buried in soil. Fortunately, Niger Delta of Nigeria is made of wetland, swamps and shallow water and could therefore offer an opportunity to deploy acoustic system for the safety of pipelines against third party attacks in this region. However, the numerous configuration and quantity of oil installation in this region imply that cost of application will be enormous. It is therefore suggested that a combination of impressed alternating cycle current (IACC) which traces encroachment on the pipeline coating and an acoustic system be used to manage intended and unintended pipeline potential damages. The IACC should be used for flow lines and other short distance delivery lines within the oilfield, while the relatively large diameter and long length delivery, trunk and transmission lines should be considered for acoustic protection. It is, however, noted that further efforts are required to reduce cost and improve effectiveness of these systems.

KEYWORDS

Pipeline, Leaks, Detection, Niger Delta, Oil Spill, Oil Pollution

Cite this paper

J. Agbakwuru, "Pipeline Potential Leak Detection Technologies: Assessment and Perspective in the Nigeria Niger Delta Region," *Journal of Environmental Protection*, Vol. 2 No. 8, 2011, pp. 1055-1061. doi: 10.4236/jep.2011.28121.

References

- [1] E. W. McAllister, " Pipeline Rules of Thumb Handbook: Quick and Accurate Solutions to Your Everyday Pipeline Problems," 6th Edition, 2005, pp. 547-556.
- [2] L. P. E. Yo-Essien, " Oil Spill Management in Nigeria: Challenges of Pipeline Vandalism in the Niger Delta Region of Nigeria," National Oil Spill Detection Response Agency (NOSDRA) Abuja, 2008. http://ipec.utulsa.edu/Conf2008/Manuscripts%20&%20presentations%20received/Eyo_Essien_2.pdf
- [3] E. Ugwuani, " Shell Records 2580 Barrel Oil Spill," The Nations, 7 June 2011. <http://www.thenationonline.net/2011/index.php/business/energy/857&records-2-580-barrels-oil-spill.html>
- [4] M. Sunmonu, " SPDC Response on Amnesty International Publication on Spills in the Niger Delta," http://www.shell.com/home/content/environment_society/society/nigeria/spills/
- [5] K. N. Aroh, I. U. Ubong, C. L. Eze, I. M. Harry, J. C. Umo-Otong and A. E. Gobo, " Oil Spill Incidents and Pipeline Vandalization in Nigeria: Impact on Public and Negation to Attainment of Millennium Development Goal: The Ishiagu Example," Disaster Prevention and Management, Vol. 19, No. 1, 2010, pp. Emerald Group Publishing Limited. <http://www.emeraldinsight.com/journals.htm?issn=0965-3562&volume=19&issue=1>
- [6] P. O. Olajide, S. O. Ajisebutu, S. B. Williams and L. B. Ogbeifun, " Fish Kills and Physiochemical Qualities of Crude Oil Polluted River in Nigeria," Research Journal of Fisheries and Hydrobiology, Vol. 4, No. 3, 2009, pp. 55-64. <http://wenku.baidu.com/view/edd2ed7001f69e31433294d3.html>
- [7] Amnesty International, " Nigeria: Petroleum, Pollution and Poverty in the Niger Delta," Index: AFR 44/017/2009, <http://www.amnesty.org/en/library/asset/AFR44/017/2009/en/e2415061-da5c-44f8-a73c-a7a4766ee21d/afr440172009en.pdf>

- [8] S. Chastian, " Pipeline Right of Way Encroachment: Exploring Emerging Technologies That Address the Problem," Documents and Resource for Small Business and Professionals, 2009. http://www.docstoc.com/Docs/Document-Detail-Google.aspx?doc_id=64075370
- [9] Press Release, " Magal Receives R&D Contract to Enhance Its Pipeguard Technology for Protection of Gas Pipelines," Research Sponsored by a Large Utility, 2011. http://www.gsnmagazine.com/article/22740/magal_receives_r_d_contract_enhance_its_pipeguard_
- [10]J. E. Heubler, " State-of-the-Art in Detection of Unauthorized Construction Equipment in Pipeline Right-of-Way," Transport Research Board of Academic Project 61139, 2002, p. 28.
- [11]Free Patents Online, " All Inventions of Mankind" , Available at: http://www.google.no/imgres?imgurl=http://www.freepatensonline.com/7203large.jpg&imgrefurl=http://www.freepatensonline.com/7203322.html&h=1330&w=1731&sz=206&tbnid=NvvYHFhsysJ9SM:&tbnh=115&tbnw=150&prev=/search?q%3Dacoustic%2Bdetector%26tbn%3Disch%26tbo%3Du&zoom=1&q=acoustic+detector&hl=no&usg=__1tcAnpJqCMAWZIPYg-q5QIFrco=&sa=X&ei=tyMbTuyGF43Jsgb1oN3EDw&ved=0CEYQ9QEwBg
- [12]The Website for the Offshore Oil and Gas Industry, " Pipeline Inspection and Maintenance," 2011. http://www.offshoretechnology.com/contractors/pipeline_inspec/
- [13]J. Agbakwuru, " A Review of Pipeline Leaks and Inspection Technologies in the Oil and Gas Industry," Pipeline Course of the University of Stavanger, Unpublished, 2011.
- [14]J. A. Agbakwuru, O. T. Gudmestad, J. Groenli and H. Skjaveland, " Development of Method/Apparatus for Close-Visual Inspection of under-Water Structures (Especially Pipelines) in Muddy and Unclear Water Condition," Proceedings of the 30th International Conference on Ocean, Offshore and Arctic Engineering OMAE, Rotterdam, 19-24 June 2011.
- [15]GE Oil and Gas, " PII Pipeline Solution ThreatScan: Real Time Monitoring for Threats and Impacts on Pipelines" , 2010. http://services.ges.com/businesses/ge_oilandgas/en/prod_serv/serv/pipeline/en/downloads/threatScan_us.pdf.
- [16]US Department of Energy, Office of Fossil Energy, " Detection of Unauthorized Construction Equipment in Pipeline Right-of-Way," <http://www.fossil.energy.gov/fred/factsheet.jsp?doc=2564&projtitle=Detection%20of%20Unauthorized%20Construction%20Equipment%20in%20Pipeline%20Right-of-Ways>
- [17]G. L. Burkhardt and A. E. Crouch, " Realtime Monitoring of Pipelines from Third-Party Contact," Semi-Annual Technical Progress Report No.4, Cooperation Agreement DE-FC26-03NT41878, Southwest Research Institute? Project 14.10211, 2005. <http://www.osti.gov/bridge/servlets/purl/859333-KJOMJB/859333>
- [18]J. M. Muggleton and M. J. Brennan, " Leak Noise Propagation and Attenuation in Submerged Plastic Water Pipes," Journal of Sound and Vibration, Vol. 278, 2004, pp. 527-537. doi:10.1016/j.jsv.2003.10.052
- [19]D. K. Olofin, Gulf Oil Co., Western Geophysical Co. and R. A. Will, " Acquisition and Processing of Shallow Water 3-D Seismic Surveys over Producing Fields Northwest Niger Delta Offshore," Technology Conference, Houston, 6-7 November 1989.
- [20]S. Adebayo, " HDD Technology Takes Pipeline Across 1.7 km Escravos River," Fortune Business, 2010. <http://www.nigerianbestforum.com/general-topics/p=60628>

[• Open Special Issues](#)

[• Published Special Issues](#)

[• Special Issues Guideline](#)

[JEP Subscription](#)

[Most popular papers in JEP](#)

[About JEP News](#)

[Frequently Asked Questions](#)

[Recommend to Peers](#)

[Recommend to Library](#)

[Contact Us](#)

Downloads: 301,503