International Conference on Pipelines and Trenchless Technology

(ICPTT 2014)

Xiamen, China 13-15 November 2014

Editors:

Baosong Ma Huiming Tang

Mohammad Najafi

ISBN: 978-1-5108-0874-4

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by the American Society of Civil Engineers All rights reserved.

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact the American Society of Civil Engineers at the address below.

American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191

Phone: (800) 548-2723 Fax: (703) 295-6333

www.asce.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2634

Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

Condition Assessment

Research on Current Legislation for Urban Underground Space in China	1
Shengyu Xu	
Safety Monitoring of Buried Pipeline Subjected to External Interference	13
Using Wireless Inclinometers	
Xinghua Peng and Suzhen Li	
Corrosion Control and Monitoring	
Research on a Corrosion Model of Gathering Pipelines of Gas Containing	23
CO ₂ Based on Flow Field	
Zhengshan Luo, Fei Wang, and Jianrong Gu	
Analysis of Internal Corrosion Reasons for an Old Crude Oil Pipeline	35
Biao Huang, Xinhua Chen, Yiming Zhang, Guoqing Xiao, Meng Liu, Wenhui Liu,	
Shuxin Li, and Qing Pei	
Low Temperature Oil-Transportation Field Test in the Gathering System of	42
Light Oil Block	
Meng Zheng	
Evaluation Technique of Downhole String Erosion and Corrosion under	47
Complex Environments	
Yanli Liu	
Gas/Oil Regulatory Update	
Construction Management of a 30" Seawater Line Replacement, Alaska,	54
North Slope	
John Schuelke and Vikrant Joshi	

Geographic Information Systems

Study on a Long-Distance Pipeline Geological Disaster Distribution Pattern	60
Lei Guo, Lijian Zhou, and Shaohui Jia	
Study Based on a Spatio-Temporal Database in the Data Change	70
Management of Pipeline Integrity	
Zhenyu Li, Lijian Zhou, Xinjian Zhang, Hao Cheng, Yi Li, and Qiang Zhang	
Hazard Assessments	
Study on Dynamics Corrosion Risk Prediction of Gathering Pipelines of a	78
High Sulfur Gas Field	
Siwei Chen, Dan Shu, Dexu Liu, and Jinhai Gong	
Stability Analysis and Application of an Underground Water-Sealed Rock	86
Cavern Block	
Shaodong Cui, Shutai Guo, and Jianfeng Gao	
Evaluation for Landslide Hazards along the Oil and Gas Pipeline in a	97
Construction Period Based on AHP-Fuzzy	
Jiaojiao Gao, Yusen Yan, and Chengbiao Wang	
Hazard Analysis of Jet Fire Based on Oil Pipeline Leakage	107
Xinsheng Zhang, Xiaoyun Chang, and Zhengshan Luo	
Study on Leakage Diffusion of the City Gas Pipeline: CFD Simulation and	116
Experimental Verification	
Xiaomei Huang, Jing Zhang, Qiongya Zhang, Yang Zhou, and Jie Chen	
Classification Algorithm of Decision Tree Applied in Water Supply Network	129
Jilong Sun, Ronghe Wang, Si Li, Junhui Ping, Chaohong Xiao, and Liang Cai	
Research on Geological Disasters' Control Countermeasures of Pipeline	139
Engineering	
Tengfei Wang, Shuhuai Mu, Pengyu Dong, Xinchao Wang, and Dan Li	
Research on Long-Distance Pipeline Geological Disaster Prevention and	147
Control Methods—Take Sino-Burma for Example	
Shuhuai Mu, Tengfei Wang, Xuejian Chen, and Wenbei Chen	

Hydraulic Modeling

Pressure Prediction of a Water Distribution Network Based on SVM	155
Junhui Ping, Ronghe Wang, Jilong Sun, and Chaohong Xiao	
Determination and Analysis of the Water Consumption Variance Curve for a	169
Water Distribution System	
Baiyi Jiang, Zhilei Zhang, Rui Zhang, and Hongbin Zhao	
Performance Prediction of a Centrifugal Pump Based on a Three-	177
Dimensional Turbulent Flow Numerical Calculation	
Kai Zheng, Weijun Fang, Feiyong Li, Weizhi Xue, and Xinyu Huang	
Research on Water Supply Pipe Network Topology Constriction	187
Wenqi Yuan	
Integrated Asset Management	
Application of a Powercrete Coating for the Yellow River HDD Crossing	195
Pipeline 71 P. 11 Min. 1 P. 11 P. 11 P. 12	
Ansheng Zheng, Ruihua Li, Mingzhen Yan, Yuzhao Liao, and Xiangyu Zheng	201
Study of Drainage Network Management and Practices in Shenzhen	201
Xuhui Liu and Jinsong Zhang	
Methodology of Data Collection of Embodied and Operational Energy Analysis for Underground Infrastructure	210
W. K. Chong	
Trenchless Industry Comfort Level When Using Alternative Delivery Systems	217
Tober Francom, Samuel T. Ariaratnam, and Mounir El Asmar	
Tobel Trancom, Samuel T. Ariaracham, and Mounii El Asmai	
Leak Detection and Monitoring	
A Dynamic Classification Model for Seismic Monitoring Stations' Placement	227
Optimization in an Urban Water Distribution Network	_ -
Charleng Liv. Wai Wang, and Danwai Hay	

Chaofeng Liu, Wei Wang, and Benwei Hou

Acoustic Emission (AE) Based Leak Detection of Galvanized Steel Pipe Due	241
to the Defects of the Screw Thread Connection	

Lei Yu and Suzhen Li

Pipeline Design: Transmission, Distribution, and In-Plant

Distribution, and In Flanc	
Influence of the Pipe Jacking Method on the Environment and Its Response	251
Measures	
Chongchong Tian and Jinxing Lai	
Simulation of the Subsea Pipeline Laying Process in Deep Water	257
Huidong Wei, Ying Jiang, Guangkuo Xing, and Dawei Zhang	
The Legal Nature of Farmland for Water Supply and Drainage Underground	266
Pipeline Passage	
Bingcun Wen	
Determination of the Thermal Exchange Coefficient between Subsea Soil	276
and Buried Submarine Pipeline	
Fan Zhang, Yun Ma, and Hongchao Yin	
Analysis of the Wind Vibration Response of Suspension Cable Crossing	283
Pipeline	
Zhenchao Teng and Dan Xie	
Fiber Optic Cable Installation and Protection Method in Particular Areas in	291
Oil (Gas) Pipeline Projects	
Sheng Tang, Jiangfei Wan, Ying Zhang, and Zihui Yang	
Pipeline Failures	
Behavior of Reinforced Thermoplastic Pipe (RTP) under Tension	298
Yong Bai, Yin Zhang, and Peng Cheng	
Comparative Analysis by Numerical Simulation on Natural Gas Pipelines in	308
Different Positions of Landslide	
Rui Wu, Yonggui Mei, Qinglu Deng, Chengli Pang, and Min Fu	

Analysis of Chinese Pipe Burst Events Reported by Web Media in 2013

320

Ziwei Zhao, Shuping Li, and Yanchun Zhou

Influence of Buried Depth and Non-Uniformly Distributed Driving Force on Stress Characteristics of Pipelines in Landslide Regions	334
Changdong Li, Junjie Wu, Jiao Wang, and Feng Chen	
Limit Bending Capacity of Steel Pipes Considering the Strain Hardening	343
Effect	
Yanfei Chen, Hong Zhang, Xiaoben Liu, Qingquan Duan, Xin Li, and Jing Zhou	
Study on Special Frozen Soil Caused by Natural Gas Pipeline Leakage	353
Guangwei Jiao, Jianting Zhou, and Zelin Zhao	
Pipeline Inspection	
Application of Ground-Penetrating Radar to Detect the Continuity of Strata	363
around Pipelines	
Fangyuan Niu, Jinxing Lai, and Kaiyun Wang	274
Technical Method of Ground-Penetrating Radar for Detecting Jacking Pipe Defects and Its Application	371
Kaiyun Wang, Jinxing Lai, and Fangyuan Niu	
Electromagnetic Method (EM) Applied to Detect Underground Pipes	381
Xianxin Shi and Kai Wu	
Testing of Trenchless Detection Techniques for Buried Metal Pipelines	388
ZhaoMing Zhao, TaiHe Shi, Wan Fu, and Runqiao Yu	
Pipeline Installation	
Research on Laying Optic-Fiber Cable with Oil (Gas) Pipelines in Large Slope Areas	401
Peng Sun, Yalin Qian, Defu Duan, Jianting Niu, Haifeng Zheng, Rongjun Zhou, Zihui	
Yang, and Xiaoming Yang	
Study on the Drilling Fluid for Coarse Sand in Large Diameter Horizontal	414
Directional Drilling	
Fuzhi Wang, Huanyong Cao, Baosong Ma, and Cong Zeng	
The Hugest Curved Jacking Pipe Roof Tunnel of the Hong Kong-Zhuhai-	422
Macao Bridge	
Jian Li, Zhigang Liu, and Peng Zhang	

Pipeline Planning

Management Analysis of Gas Pipeline Construction	432
PengYan Song	
Study on the Design of a Pipeline Crossing Based on Risk Analysis and	437
Assessment	
Mengpeng Cheng, Wenwei Zhang, Peng Sun, and Lin Huang	
Water Distribution Network Planning Based on the Distribution Block	454
System	
Wenqi Yuan	
Pipeline Rehabilitation	
Analysis of Grouting Impact on Soil Displacement in Pipe Jacking	463
Construction	
Ke Wang and Jinxing Lai	
Application of Trenchless Pipeline Rehabilitation Technology	473
Jian Xin	
Why Replace Existing Pipelines When They Can Be Rehabilitated Using	478
Polyethylene Pipes and Liners?	
Andrew Wedgner and Cindy Xin Wang	
Pipeline Risk Management	
Study on Technology Schemes of Safe and Economic Operations under	490
Different Throughput and in Different Seasons for the An Yong Oil Pipeline	
Ruihua Yuan	
Research and Development	
Hydro-Burst Investigations in Large Diameter Tee-Joints	495
Chengshuai Huang, Yinglai Liu, Xunfeng Du, Peng Wang, Hongyuan Chen, Lihua Qi, Haitao Wang, and Yixin Li	

Modification of a Post-Grouting Pipeline and Its Application in the Borehole Cleaning of Compresol Piles	509
Shenggen Huang, Xuelian Xu, Wenbing Wu, and Quan Shao	
Crude Oil Pipeline Operation and Optimization	518
Fafeng Sun and Tao Yu	
Study of Piping Stress Parametric Analysis Based on Computer Simulation	529
Wei Wei and Huidong Wei	
Preferable Selection of the Drill Bit for a Volcanic Rock Formation Based on	537
the Hierarchy Grey Relation Theory	
Hongli You	
Long-Distance Oil Pipelines' Running Process and Control Operations	544
Tao Yu, Fafeng Sun, and Lijun Liu	
Ground-Penetrating Radar (GPR) Applied to Detect Underground Pipes	553
Xianxin Shi and Kai Wu	
A New Model for the Dynamic Interaction of a Pile and Pile End Soil	561
Wenbing Wu, Shenggen Huang, Shaojun Ma, and Xuelian Xu	
Comparative Analysis and Application of the Rock Salt Deformation	571
Parameter Determination Method	
Jiwei Ma and Zhiyin Wang	
Development and Research of a Sine Signal Source with VLF Based on FPGA	580
Hongjian Wu, Wei Huang, Xiangyang Miao, and Qiming Jiang	
Study on Thermodynamic Parameters in the Injection-Production Process	590
for Gas Storage Salt Caverns	
Xiaoyu Wang, Zhiyin Wang, and Jiwei Ma	
Research on the Optimal Selection of a Pipeline Route Program Based on	600
AHP	
Baohua Li and Yijing Chen	
Summarizing and Forecasting the Application of an Oil (Gas) Pipeline FOC-	609
Based System	
Xiaofeng Liu, Rui Cong, Guizhi Liu, and Tao Liu	
Fault Diagnosis Research of Oil Pump Motors	620
Xuqiang Xia, Xiujie Lv, Shuai Tang, Yong Zhao, Quanquan Wang, and Linlin Qu	

Study on the Application of CT in a Grouting Effect Test of Super-Long Piles	633
Shenggen Huang and Ming Tian	
Risk Assessment	
Application Research of Quantitative Risk Assessment (QRA) Technology for the Station Design of Natural Gas Pipelines	642
Kefu Li, Zhihong Bai, Jingting Li, and Wenwei Zhang Fire Accident Assessment of Leaking Natural Gas from Pipelines	649
Shan Wang, Jing Li, Fanggu Wu, and Xiuxue Li	
Valve-Based Reliability Assessment for Water Distribution Systems	656
Chaohong Xiao, Baowei Li, Gang He, Jilong Sun, Si Li, and Ronghe Wang Vulnerability Assessment Methods of CNG Stations	669
Xiaoling Chen, Yongqiang Bai, and Fanggu Wu Risk Identification and Control for HDD Construction Operations and	677
Environmental Aspects	
Ning Wang, Peng Sun, and Jing Sun	
Study on the Influence of Landslide Thrusts from Different Directions on Pipelines	683
Huazhang Li, Junxia Yang, Qinglu Deng, and Yong Bao	
Seismic Pipeline Design	
Influence of Partitioning Temperature on the Microstructure and Mechanical Properties of (B+M/A) X80 High Deformability Pipeline Steel	698
Jing Ma, Xiaoyong Zhang, Shixia Cheng, and Huilin Gao	
Subsurface Utility Engineering	
Pile Head Settlement Calculation Method of a Super-Long Pile in a Deep Soft Soil Area	714
Huafeng Shan, Tangdai Xia, Qiongfang Zhang, and Rongzhu Liang	
Effects of Tunnel Shape on Water Sealed Oil Storage Caverns' Seepage Flow	724
Guiwu Han, Moupeng Hu, and Yin Li	

Numerical Analysis on an Excavation Method Comparison for a Shallow- Buried Large-Span Tunnel	732
Huayun Li, Zhiqiang Zhang, and Cheng Kan	
Numerical Simulation of the Influence of Row Piling on Underground	742
Pipelines	
Hui Guo, Jianbo Yuan, Qun Lu, and Xiangnan Zhou	
Seismic Response of an Underground Utility Tunnel under Different Types of	750
Earthquake Wave Excitation	
Luzhen Jiang, Jie Li, and Jun Chen	
Research on Domestic Sewage Net Zero Discharge in the Station of a Long- Distance Pipeline	756
Weiwei Han, Mingtai Han, and Xiaoxin Xu	
TBM for Pipeline and Tunnel	
Construction	
Numerical Analysis of the Effect of Tunnel Excavation on Underground	763
Pipelines	
Penglu Gan, Xiaowu Tang, Yu Zhao, and Hengyu Wang	
Study on the Progressive Failure of a Subway Tunnel Foundation with a	773
Single Cave beneath by Simulation Experiment	
Xiuzhu Yang, Jinshan Lei, and Jing Kang	
EPBS Tunnel Construction in Soft Soil and Fractured Formation: A Case Study of LanZhou Subway Line 1	780
Jiyan Wen	
Trenchless Technologies	
Numerical Simulation Research of Soil Deformation Caused by Pipe Jacking	791
Construction	
Haobo Fan, Jinxing Lai, and Yuyang Liu	
Numerical Research on the Influence of Stress Release on Tunnel Face	799
Stability	
Fengtao Li, Wei Liu, Xiaowu Tang, and Penglu Gan	

Three-Dimensional Numerical Study of the Mechanical Characteristics of a	808
Rectangular Immersed Tube Tunnel	
Yuyang Liu, Yongli Xie, Hongguang Zhang, and Haobo Fan	
Automated Productivity Analysis of Pilot Tube Microtunneling Installations	818
through Workflow Recognition in the Time-Series Data of Hydraulic	
Pressure	
Pingbo Tang, Zhenglai Shen, Matthew P. Olson, and Samuel T. Ariaratnam	
Numerical Analysis of Shield Tunnel Driving underneath an Existing Railway	828
and Related Reinforcement Effects on Subsidence Control	
Haijia Zhang, Quanmei Gong, and Honggui Di	
New Ideas for Predicting Pulling Loads of Oil and Gas Pipeline Crossing	836
Projects Using Horizontal Directional Drilling	
Zhiqiang Zhang and Cong Zeng	
Study on the Criterion and Influence of Pipeline Laying Speed on Wellbore	846
Stability	
Huan Xia, Yong Jiang, Tuo Xia, Ruyi Jiao, and Houping Liu	
Non-Excavating Horizontal Directional Drilling Applied in the 2 nd Phase	857
Project of Feed Pipelines' Expansion in Xi'an City, China	
Xianxin Shi and Xiaoming Yang	
Chaihe Directional Drilling Technology Solutions Round Gravel Layer	864
Processing	
Jian Zhao	
Key Technologies for HDD Crossing with Complex Geological Conditions and	873
Large Diameter Pipelines	
Xiaocheng Ma, Guohui Li, Hongxin Ma, and Wei He	
Directional Drilling Applications in Adverse Geological Conditions—The	880
Qinghe River Directional Drilling in the Qingtie Route	
Xin Zhang, Naidi Xu, Aixin Yu, and Huayu Wu	
Protective Measures for Pipeline Coating in Directional Drilling	888
Yanjiang Hu, Naidi Xu, and Hui An	
Application of UV CIPP in the Sewer Renewal of Baozhou Road in Quanzhou	893
City, China	
Baoyong Liao, Zhongsen Ti, and Baosong Ma	