

ICPTT 2014

PROCEEDINGS OF THE 2014 INTERNATIONAL
CONFERENCE ON PIPELINES AND TRENCHLESS
TECHNOLOGY

November 13-15, 2014
Xiamen, China

ORGANIZED AND CO-SPONSORED BY
Pipeline Division of the American Society of Civil Engineers
China University of Geosciences-Wuhan
Center for Underground Infrastructure Research and Education (CUIRE)
Wuhan PipeTong Trenchless Technology Co. Ltd.

EDITED BY
Baosong Ma, Ph.D.
Mohammad Najafi, Ph.D., P.E.
Huiming Tang, Ph.D.



Published by the American Society of Civil Engineers

This is a preview. [Click here to purchase the full publication.](#)

Published by American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, Virginia, 20191-4382
www.asce.org/bookstore | ascelibrary.org

Any statements expressed in these materials are those of the individual authors and do not necessarily represent the views of ASCE, which takes no responsibility for any statement made herein. No reference made in this publication to any specific method, product, process, or service constitutes or implies an endorsement, recommendation, or warranty thereof by ASCE. The materials are for general information only and do not represent a standard of ASCE, nor are they intended as a reference in purchase specifications, contracts, regulations, statutes, or any other legal document. ASCE makes no representation or warranty of any kind, whether express or implied, concerning the accuracy, completeness, suitability, or utility of any information, apparatus, product, or process discussed in this publication, and assumes no liability therefor. The information contained in these materials should not be used without first securing competent advice with respect to its suitability for any general or specific application. Anyone utilizing such information assumes all liability arising from such use, including but not limited to infringement of any patent or patents.

ASCE and American Society of Civil Engineers—Registered in U.S. Patent and Trademark Office.

Photocopies and permissions. Permission to photocopy or reproduce material from ASCE publications can be requested by sending an e-mail to permissions@asce.org or by locating a title in ASCE's Civil Engineering Database (<http://cedb.asce.org>) or ASCE Library (<http://ascelibrary.org>) and using the "Permissions" link.

Errata: Errata, if any, can be found at <http://dx.doi.org/10.1061/9780784413821>

Copyright © 2014 by the American Society of Civil Engineers.
All Rights Reserved.
ISBN 978-0-7844-1382-1 (CD)
Manufactured in the United States of America.

Preface

This International Conference on Pipelines and Trenchless Technology (ICPTT) was held on November 13-15, 2014, in Xiamen, China, and was co-organized/co-sponsored by The Pipeline Division, American Society of Civil Engineers (ASCE), China-U.S. Joint Center for Trenchless Research and Development at the China University of Geosciences (CUG), Center for Underground Infrastructure Research and Education (CUIRE) at the University of Texas at Arlington (UTA), and Wuhan PipeTong Trenchless Technology Co. Ltd.

The conference was also supported by:

- National Natural Science Foundation of China
- The National Science Foundation, USA
- Louisiana Tech University, USA
- CNPC Tubular Goods Research Institute (TGRC)
- Qinghua University
- Harbin Institute of Technology (HIT)
- Arizona State University, USA
- Southwest Petroleum University
- China National Petroleum Bureau
- Northeast Petroleum University
- China University of Petroleum
- Xi'an University of Architecture and Technology
- International Society for Trenchless Technology

This conference received 182 abstract submissions, in which 95 excellent papers were accepted and published in these *proceedings*, and presented at the conference. The success of this conference is the result of the volunteer efforts of a large number of dedicated professionals including authors, reviewers, session moderators, sponsors and members of the Conference Steering Committee. The high quality of papers presented is due to obvious efforts of the Authors, who contributed results of their many years of experience and studies. We were privileged to have the opportunity to work with an enthusiastic group of pipeline professionals including Authors, Session Moderators, and Reviewers who provided a great service to our profession.

The dedication and hard work of ASCE staff, especially Tenzing Barshee, Administrator, Technical Activities, John Segna, Director, Technical Activities Department, and Donna Dickert, Acquisitions Editor, are greatly appreciated.

In particular, we wish to acknowledge and appreciate the efforts of Fang Jia, Jing Feng and Hang Lv from Wuhan PipeTong Trenchless Technology Company for collecting the abstracts and papers.

On behalf of the International Conference on Pipelines and Trenchless Technology (ICPTT 2014) Conference Committee,

Proceedings Editors,

Dr. Baosong Ma
Dr. Mohammad Najafi
Dr. Huiming Tang

Conference Steering Committee

Conference Honorary Chairs

- Samuel Ariaratnam, Ph.D., P.E., Professor, Arizona State University
- Tom Iseley, Professor, Ph.D., P.E., Louisiana Tech University
- Ray Sterling, Ph.D., P.E., Emeritus Professor, Louisiana Tech University
- Michael Stift, P.E., M. ASCE, CTA Contact
- John Galleher P.E., M. ASCE, ASCE Pipeline Division Chair

Conference Co-Chairs

- Mohammad Najafi, Ph.D., P.E., F. ASCE, Professor and Director, CUIRE, UTA
- Huiming Tang, Ph.D., Professor, Vice President of CUG

Technical Chairs

- Baosong Ma, Ph.D., Professor and Director of CTRD, CUG
- Mohammad Najafi, Ph.D., P.E., Professor and Director, CUIRE, UTA

Technical Program Coordinators

- Tom Iseley, Ph.D., P.E., Professor, Louisiana Tech University
- Ray Sterling, Ph.D., P.E., Professor Emeritus, Louisiana Tech University
- Ian Moore, Ph.D., P.E., Professor, Queen's University, Canada
- Makarand Hastak, Ph.D., Professor, Purdue University
- Larry Slavin, Ph.D., President, OPCS, U.S.A.
- Joe Castronovo, Consultant, U.S.A.
- Samuel Ariaratnam, Ph.D., P.E., P.Eng., Arizona State University
- Robert Stein, Ph.D., Germany
- Mark Knight, Ph.D., Canada
- Payam Najafi, Ph.D., Islamic Azad University, Iran
- Lixin Gao, Science and Technology Development Center, MOHURD
- Guosheng Jiang, Ph.D., Professor, Dean, CUG
- Changxue Xu, Ph.D., Professor, Pipeline Research Institute, CNPC
- Hongbin Zhao, Ph.D., Professor, HIT
- Zhengshan Luo, Professor, Xi'an University of Architecture and Technology
- Youhong Sun, Ph.D., Professor, Dean, Jinlin University
- Xiaoming Zheng, China Urban Water Association
- Jian Shuai, Ph.D., Professor, CUPB
- Peng Wang, Ph.D., President, Drillto Trenchless Co., Ltd
- Xiaochun Ma, Ph.D., Professor, CUGB
- Yueping Sun, General Manager, Guanli Environment(Shanghai) Technology Co., Ltd

Conference Secretaries:

- Yaozu Kong
- Changdong Li
- Cong Zeng
- Jing Feng

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 Using Wireless Inclinometers	13
---	-----------

Xinghua Peng and Suzhen Li

Corrosion Control and Monitoring

Research on a Corrosion Model of Gathering Pipelines of Gas Containing CO₂ Based on Flow Field	23
--	-----------

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 Light Oil Block	42
---	-----------

Meng Zheng

Evaluation Technique of Downhole String Erosion and Corrosion under Complex Environments	47
---	-----------

Yanli Liu

Gas/Oil Regulatory Update

Construction Management of a 30" Seawater Line Replacement, Alaska, North Slope	54
--	-----------

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 Management of Pipeline Integrity 70

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 High Sulfur Gas Field 78

Siwei Chen, Dan Shu, Dexu Liu, and Jinhai Gong

Stability Analysis and Application of an Underground Water-Sealed Rock Cavern Block 86

Shaodong Cui, Shutai Guo, and Jianfeng Gao

Evaluation for Landslide Hazards along the Oil and Gas Pipeline in a Construction Period Based on AHP-Fuzzy 97

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 Experimental Verification 116

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 Engineering 139

Tengfei Wang, Shuhuai Mu, Pengyu Dong, Xinchao Wang, and Dan Li

Research on Long-Distance Pipeline Geological Disaster Prevention and Control Methods—Take Sino-Burma for Example 147

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 Water Distribution System	169
Baiyi Jiang, Zhilei Zhang, Rui Zhang, and Hongbin Zhao	
Performance Prediction of a Centrifugal Pump Based on a Three-Dimensional Turbulent Flow Numerical Calculation	177
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 Pipeline	195
Ansheng Zheng, Ruihua Li, Mingzhen Yan, Yuzhao Liao, and Xiangyu Zheng	
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	

Leak Detection and Monitoring

A Dynamic Classification Model for Seismic Monitoring Stations' Placement Optimization in an Urban Water Distribution Network	227
Chaofeng Liu, Wei Wang, and Benwei Hou	

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

Lei Yu and Suzhen Li

Pipeline Design: Transmission, Distribution, and In-Plant

Influence of the Pipe Jacking Method on the Environment and Its Response Measures	251
--	------------

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 Pipeline Passage	266
--	------------

Bingcun Wen

Determination of the Thermal Exchange Coefficient between Subsea Soil and Buried Submarine Pipeline	276
--	------------

Fan Zhang, Yun Ma, and Hongchao Yin

Analysis of the Wind Vibration Response of Suspension Cable Crossing Pipeline	283
--	------------

Zhenchao Teng and Dan Xie

Fiber Optic Cable Installation and Protection Method in Particular Areas in Oil (Gas) Pipeline Projects	291
--	------------

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 Different Positions of Landslide	308
--	------------

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