



# AIM-PIMG 2019

ASSET INTEGRITY MANAGEMENT –  
PIPELINE INTEGRITY MANAGEMENT  
UNDER GEOHAZARD CONDITIONS

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# Final Program

Norris Conference Center,  
Houston City Center,  
Houston, USA

**March 25-28, 2019**

# Technical Sessions

## 2019 PIMG TECHNICAL PROGRAM COMMITTEE DR. MAMDOUH M SALAMA, CHAIRMAN

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### ASME

On behalf of the ASME and the organizing committee, it is with great pleasure to welcome you to the conference on Pipeline Integrity Management under Geohazard Conditions (PIMG). This conference is the first in a new ASME conference series that will focus on Asset Integrity Management (AIM). The 2nd Aim Conference is being planned and it will focus on Ageing and Life Extension.

The main objective of this conference was to present in one venue the advances in managing ground movement hazards that have been made in the last decade, publish the results of these advances in a single document and by looking at the technical program, we have achieved this objective. This achievement was the result of the great effort of the technical program committee whose names are listed in the program and for whom I want to express my gratitude. I would like to acknowledge the special contributions of Yong-Yi Wang, Don West, Alex McKenzie-Johnson and Jim Hart.

I want to also express my thanks to Jamie Hart of ASME who made all the arrangements and I am sure she will be of great help to you if you have any question. I would also like to express our appreciation to the sponsors of the conference.

In addition to the technical program that includes 50 presentations, we have two panel sessions one to start the conference and one to close the conference and we also have 3 great luncheon presentations. While all the final papers are available from ASME, the assemble of these papers will be produced by ASME as an edited book that will be published late this year. This means that any author who wants to update his/her paper based on discussion in this conference still have the opportunity to do so.

Last but not least, I would like to thank all the authors, the reviewers, the session chairs and all the participants I sincerely hope that you enjoy both the technical presentations, discussions and social program.

“Please feel free to contact Jamie ([hartje@asme.org](mailto:hartje@asme.org)) or or I if there is anything we can do to make your experience an enjoyable one.

### Dr. Mamdouh M. Salama

Conference Chair

## TECHNICAL PROGRAM COMMITTEE

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**Dr. Mamdouh M. Salama**, ConocoPhillips Company, Houston, TX, USA,

**Dr. Yong-Yi Wang**, Center for Reliable Energy Systems (CRES), Dublin, OH, USA

**Donald West**, Golder Associates Inc, Redmond, Washington, USA

**Alexander McKenzie-Johnson**, Kinder Morgan, Houston, TX, United States

**Dr. Jim Hart**, SSD, Inc., Reno, Nevada, USA

**Taylor Shie**, Shell Pipeline Company, LP, Houston, TX, USA

**Joe Paviglianiti**, National Energy Board, NW Calgary, Alberta Canada,

**Dr. Justin M Crapps**, ExxonMobil Upstream Research, Spring, TX, USA

**Doug Dewar**, ENBRIDGE, Canada

**Dr. David Xu**, PG&E Gas Operation, CA, USA

**Dr. Smitha Koduru**, C-FER Technologies (1999) Inc., Edmonton, Alberta, Canada,

**Dr. Guiyi Wu**, TWI Ltd., Great Abington, Cambridge, United Kingdom

**Dr. Xian-Kui Zhu**, EWI, Columbus, OH, USA

**Nazmi B. M. Ali Napih**, Petronas, Kuala Lumpur, Malaysia

**Xuejun Sun**, China Petroleum Pipeline Engineering Co., Ltd, Langfang City, Hebei Province, China

**Moness Rizkalla**, Visitless Integrity Assessment Ltd, Canada

**Rhett Dotson**, ROSEN USA, Inc, Houston, TX, United States

**Satoshi Igi**, JFE Steel Corporation, Kurashiki, Chiba, Japan

**Dr. Jens Petter Tronskar**, DNV GL, Singapore, Singapore

**Dr. Burak Ozturk**, Virtual Integrated Analytics Solutions, Houston, TX, USA

**Aaron Dinovitzer**, BMT Canada Ltd, Kanata, ON, Canada.

**Monday March 25, 2019****4-1 Regulatory Panel (Oral Presentations)****Monday March 25, 2019 (8:00 am - 9:30 am)**Session Chair: Ed Connelly, *ConocoPhillips Company, USA***Regulation strategy for pipelines subjected to geohazards (AIMPIMG2019-1075)**Joe Paviglianiti, *National Energy Board (NEB), Canada***The legal requirements for pipeline installation in Malaysia (AIMPIMG2019-1074)**Dasuki Mohd Heak, *Department of Occupational Safety and Health (DOSH),***Malaysia Permitting strategy for pipelines subjected to geohazards (AIMPIMG2019-1077)**Steve Nanney, *Pipeline and Hazardous Materials Safety Administration (PHMSA), USA***1-1 Hazards Characterization****Monday March 25, 2019 (10:00 am - 11:30 am)**Session Chair: *Alexander Mckenzie-Johnson, Kinder Morgan, USA*Session Co-Chair: *Donald O. West, Golder Associates Inc, USA***Impact of soil movement on Pipelines (AIMPIMG2019-1041)**Bahaa Mekalled and Joe Paviglianiti, *National Energy Board, Canada***Ground Movement Hazards (Landslides, Subsidence) and Pipelines – An Overview and Primer (AIMPIMG2019-1008)**Donald West, *Golder Associates Inc., USA***Guidelines for Managing Geohazards Affecting the Engineering and Construction of New Oil and Natural Gas Pipelines (AIMPIMG2019-1040)**Rodolfo B. Sancio, *Geosyntec Consultants, Inc.; Anthony H. Rice, Geosyntec Consultants, Inc. USA; Jean Audibert, Independent Consultant, USA; David Morgan, Independent Consultant, UK; and Jordan Rattray, Geosyntec Consultants, Inc. USA***Quantifying Surface Fault Rupture Hazard Potential at the Fault/Pipeline Intersection (AIMPIMG2019-1044)**Alan Hull, Eric Cannon and John Hennessey, *Golder Associates Inc., USA***4-2 Monday Lunch Presentation****Monday March 25, 2019 (11:30 am - 1:00 pm)****Integrated Hazards Management and fitness-for-service assessment for Integrity management of Pipelines subjected to geohazards (AIMPIMG2019-1065)**Yong-Yi Wang, *Center for Reliable Energy Systems (CRES), USA***2-1 Hazard and Strain Monitoring (1)****Monday March 25, 2019 (1:00 pm - 2:30 pm)**Session Chair: *Bailey Theriault, Golder Associates Inc. USA*Session Co-Chair: *Jim Hart, SSD, Inc, USA***An Overview Of Current Methods For Monitoring Landslide Ground Movement To Better Understand Potential Hazards To Buried Pipelines (AIMPIMG2019-1043)**Clay Johnson, Christopher Markley, Martin Derby, *Bailey Theriault; and John deLaChapelle, Golder Associates Inc. USA***Correlation of Single-Run ILI IMU Bending Strain Features to Geohazard Locations (AIMPIMG2019-1003)**Bailey Theriault, *Golder Associates; James D. Hart, SSD, Inc.; Alexander Mckenzie-Johnson, Consultant, and Sean Paulsen, Golder Associates, USA***ILI, In-Ditch and Permanently Installed Tools for Stress/Strain Imaging and Monitoring (AIMPIMG2019-1001)**Neil J Goldfine, Todd M Dunford, Andrew P Washabaugh, *JENTEK Sensors, Inc., USA***Detecting and Quantifying Ground Subsidence for Pipeline Geohazard Management Using Satellite Radar Interferometry - Potash Mine Subsidence Example (AIMPIMG2019-1038)**Danielle Smilovsky and Jeffrey R Keaton, *Wood, USA***3-1 In-Service Hazard Management (1)****Monday March 25, 2019 (3:00 pm - 4:30 pm)**Session Chair: *Millan Sen, Enbridge Pipelines Inc, USA*Session Co-Chair: *Mohd Nazri Bin Ahmad, PETRONAS Gas Bhd, Malaysia***Creation and Management of a Landslide and Erosion Geohazards Inventory for Natural Gas Transmission Pipelines in California (AIMPIMG2019-1010)**Katherine Herr, *PG&E Geosciences, and Teddy Atkinson, PG&E Transmission Integrity Management, USA***Use of a geohazard management program to reduce pipeline failure rates (AIMPIMG2019-1045)**Sarah Newton, Aron Zahradka, Gerald Ferris, and Michael Porter, *BGC Engineering Inc., Canada***Dynamic Geohazard Management In Challenging Environment (AIMPIMG2019-1070)**Wan M Marzuki Wan Ismail, Azam A. Rahman, M, Joehan Rohani, Kamal Azam Ibrahim and Mohd Zazil Mohd Zabidi, *Petronas, Malaysia***Stabilization of a Natural Gas Pipeline Using Soil Nails and High Tensile Steel Wire Mesh (AIMPIMG2019-1014)**Matthew B. Morris, *Gannett Fleming, Inc., USA*

### Tuesday March 26, 2019

#### 5-1 Strain Capacity Prediction and Assessment (1) Tuesday March 26, 2019 (8:00 am -9:30 am)

Session Chair: Guiyi Wu, TWI, UK

Session Co-Chair: Jens Tronskar, DNV GL, Singapore

##### Tensile Strain Models and Their Applications (AIMPIMG2019-1066)

Yong-Yi Wang, Banglin Liu and Bo Wang, *Center for Reliable Energy Systems, USA*

##### Developments in strain-based fracture assessments – A perspective (AIMPIMG2019-1015)

Erling Østby, Rikard Törnqvist, and Steinar L. Bjerke, *DNV GL, Norway*

##### Tensile Strain Capacity Model Safety Factor and Benchmark Example Calculations (AIMPIMG2019-1039)

D.P. Fairchild, *ExxonMobil Production Company*, J.M. Crapps, *ExxonMobil Upstream Research Co*; M. Panico, *ExxonMobil Production Company*, W. Cheng, *ExxonMobil Pipeline Co.*; M.F. Cook, *ExxonMobil Research and Engineering Co*; and M.L. Macia, *ExxonMobil Production Company, USA*

##### Burst Failure Models and Their Predictions of Buried Pipelines (AIMPIMG2019-1006)

Xian-Kui Zhu, *EWI, USA*

#### 5-2 High Strain Management Solutions Tuesday March 26, 2019 (10:00 am -11:30 am)

Session Chair: Jens Tronskar, DNV GL, Singapore

Session Co-Chair: Shaiful Hashim, PETRONAS Gas Bhd, Malaysia

##### Strain-Based Design and Assessment - Concepts and Gaps (AIMPIMG2019-1067)

Yong-Yi Wang, *Center for Reliable Energy Systems (CRES), USA*

##### Tensile strain Capacity after Local Buckling of High Strain Pipeline in Full-Scale Bending Tests (AIMPIMG2019-1026)

Takahiro Sakimoto, Tsunehisa Handa, Hisakazu Tajika, Satoshi Igi and Joe Kondo, *JFE Steel Corporation, Japan*

##### High Strain Weld Solutions for Geohazard Active Environment (AIMPIMG2019-1068)

Wan Abdullah Wan Hamat, Wan M Marzuki B Wan Ismail, Kamal Azam B Ibrahim, Ghazali B M Zin, and Noraina Suyanti Bt Md Aris, *Petronas, Malaysia*

##### Development of High Strength High Strain Linepipe Steels (AIMPIMG2019-1020)

Junji Shimamura, Kyono Yasuda, Satoshi Igi, Ryuji Muraoka and Joe Kondo, *JFE Steel Corporation, Japan*

#### 4-3 Tuesday Lunch Presentation Tuesday March 26, 2019 (11:30 am - 1:00 pm)

##### Bending Strain - Learning from Big Data (AIMPIMG2019-1061)

Rhett Dotson, *ROSEN USA, Inc*

#### 5-3 Strain Capacity Prediction and Assessment (2) Tuesday March 26, 2019 (1:00 pm -2:30 pm)

Session Chair: Justin Crapps, *ExxonMobil Upstream Research Co, USA*

Session Co-Chair: Yong-Yi Wang, *Center for Reliable Energy Systems, USA*

##### Structural Reliability Assessment (SRA) of Pipeline Girth Welds using Gaussian Process Regression (AIMPIMG2019-1022)

Arvind Keprate, Simen Eldevik, Marc Avice, Rikard Törnqvist, and Erling Østby, *DNV GL, Norway*

##### Low Strain Capacity Girth Welds of Newly Constructed Pipelines and Mitigative Approaches (AIMPIMG2019-1064)

Yong-Yi Wang and Dan Jia, *Center for Reliable Energy Systems*; Steve Rapp, *Enbridge*; and David Johnson, *Energy Transfer, USA*

##### Pipe Girth Welds under Plastic Straining: Full-Scale Investigation and Strain-Based Approaches (AIMPIMG2019-1013)

Guiyi Wu, Longjie Wang, and Tyler London, *TWI Ltd*; and Henry Pisarski, *Structural Integrity Consultant, UK*

##### Analysis of Earthquake-Resistant Ductile Iron Pipe Joint at Fault Location using Abaqus – A Case Study for Simulation based Product Qualification (AIMPIMG2019-1063)

Jeff Mason, *U.S. Pipe*; and Srikanth Srigiriraju, Arindam Chakraborty and Burak Ozturk, *VIAS, USA*

#### 2-2 Hazard and Strain Monitoring using ILI and InSAR Tuesday March 26, 2019 (3:00 pm -4:30 pm)

Session Chair: Tianzong Xu, *PG&E Gas Operation, USA*

Session Co-Chair: Rhett Dotson, *ROSEN USA, Inc*

##### How in-line inspection and strain gage data can help you to manage geohazard threats, a practical guide (AIMPIMG2019-1049 Oral Presentation only)

**Review of Pipeline Inertial Surveying for Ground Movement-Induced Deformations**

**(AIMPIMG2019-1009)**

James D. Hart, *SSD, Inc., USA*; Jaroslaw A. Czyz, *PipeNav Consulting, Ltd., Canada*; and Nasir Zulfiqar, *SSD, Inc, USA*

**.Using ILI to Evaluate Pipeline Stain Conditions**

**(AIMPIMG2019-1021)**

Jane Dawson, *Baker Hughes, a GE Company, UK*; Mohamed ElSeify, *Baker Hughes, a GE Company, Canada*, and Ian Murray, *Baker Hughes, a GE Company, UK*

**Remote Monitoring of Geohazards For 800+ Kilometers Of Pipeline And Right-Of-Way Protection In Snow And Vegetation Using Radar Satellite Interferometry (InSAR)**

**(AIMPIMG2019-1018 Oral Presentation only)**

Kris Covey, *3vGeomatics, USA*

**Wednesday March 27, 2019**

**3-2 In-Service Hazard Management (2)**

**Wednesday March 27, 2019 (8:00 am - 9:30 am)**

Session Chair: Sherif Hassanien, *Enbridge, Canada*

Session Co-Chair: Zailee Dollah, *Department of Occupational Safety and Health (DOSH)*

**Performance-based Approach for Stabilizing Steep Slopes on Pipeline Right of Way**

**(AIMPIMG2019-1046)**

Logan C. Brant and Rodolfo B. Sancio, *Geosyntec Consultants, Inc., USA*

**Developing a Geotechnical Hazard Inventory: A Case Study and Best Practice Recommendations**

**(AIMPIMG2019-1051)**

Joel Van Hove and Alex Baumgard, *BGC Engineering Inc.; and Joel Babcock and Jan Bracic, Pembina Pipeline Corporation, Canada*

**Operational Alternative to Design Treatment for Some Ground Subsidence And Surface Faulting Geohazards (**

**AIMPIMG2019-1036)**

Jeffrey R Keaton, *Wood, USA*

**Example of Semi-Quantitative Stream Crossing Hydrotechnical Hazard Assessment for New Pipeline**

**(AIMPIMG2019-1017)**

Rodolfo B. Sancio and David Vance, *Geosyntec Consultants, Inc., USA*

**6-1 Integrity Assessment and Management (1)**

**Wednesday March 27, 2019 (10:00 am -11:30 am)**

Session Chair: Smitha Koduru, *C-FER Technologies, Canada*

Session Co-Chair: Millan Sen, *Enbridge Pipelines Inc, Canada.*

**Advanced Pipeline Geohazard Simulation: Evaluation of Pipeline Response to Lateral Slope Movements**

**(AIMPIMG2019-1073)**

Abdelfettah Fredj and Aaron Dinovitzer, *BMT, Canada*

**On Estimating Pipeline Reliability at Slope Crossings (**

**AIMPIMG2019-1034)**

Millan Sen and Sherif Hassanien, *Enbridge, Canada*

**Assessment of Pipelines in Moving Slopes: A risk-informed decision-making approach**

**(AIMPIMG2019-1047)**

Mona Abdolrazaghi and Sherif Hassanien, *Enbridge, Canada*

**A Comprehensive Study on the Effects of Soil Movement on Pipelines due to Manmade Hazards**

**(AIMPIMG2019-1072)**

Abhimanyu Kumar, N. O. Akinci, N. Simpson and X. Dai, *WS Atkins, USA*

**4-5 Wednesday Lunch Presentation (Oral Presentation)**

**Wednesday March 27, 2019 (11:30 am - 1:00 pm)**

**PRCI Strategy and initiatives (AIMPIMG2019-1078)**

Carrie Greaney, *Pipeline Research Council International (PRCI), USA*

**6-2 Quantitative Risk Assessment**

**Wednesday March 27, 2019 (1:00 pm -2:30 pm)**

Session Chair: Erling Østby, *DNV GL, Norway*

Session Co-Chair: Smitha Koduru, *C-FER Technologies, Canada*

**Probabilistic Fault Displacement Analysis for a Pipeline (AIMPIMG2019-1056)**

Jonathan Brewer and Elizabeth Bowlin, *Stress Engineering Services, Inc.;* Don West and Clayton Johnson, *Golder Associates Inc., USA*

**Application of Structural Reliability Assessment (SRA) & Quantitative Risk Assessment (QRA) in managing Risk (AIMPIMG2019-1069)**

Wan M Marzuki Wan Ismail, Mohd Nazmi Mohd Ali Napiiah, Ahmad Sirwan M Tuselim and Mohd Zazli Mohd Zabidi, *Petronas, Malaysia*

**A Practical Assessment of Pipeline Risk under Epistemic Uncertainty: A hydro-technical threat (AIMPIMG2019-1048)**

Mona Abdolrazaghi and Sherif Hassanien, *Enbridge, Canada*

**Quantitative Risk Assessment of pipelines exposed to soil movement (AIMPIMG2019-1058 Oral Presentation Only)**

Jens Tronskar, *DNV GL, Singapore*

### 6-3 Integrity Assessment and Management (2) Wednesday March 27, 2019 (3:00 pm -4:30 pm)

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Session Chair: Burak Ozturk, *Virtual Integrated Analytics Solutions, USA*  
Session Co-Chair: Mohd Zazli Mohd Zabidi, *Petronas, Malaysia*

#### Implications of the Limit State Design Checks for Geotechnical Loads (AIMPIMG2019-1050)

Smitha D. Koduru and Maher A. Nessim, *C-FER Technologies, Canada*

#### Failure analysis of a Stress-based pipeline under plastic strain (AIMPIMG2019-1028)

Chen Hongyuan, Feng Hui, Chi Qiang, and Huo Chunyong, *Tubular Goods Research Institute of China National Petroleum Corporation, China*

#### A Stability and Safety Evaluation of a Natural Gas Transmission Pipeline Near a Landslide Region

(AIMPIMG2019-1059 Oral Presentation Only)

Yingfeng Chen, *Safetech Research Institute, China*

#### Geohazard Risk for Offshore Pipelines

(AIMPIMG2019-1053 Oral Presentation Only)

Asle Venas, *DNVGL, Norway*

Monitoring and evaluation of pipeline stability at permafrost based on distributed optical fiber temperature measurement

(AIMPIMG2019-1005)

Cai Yongjun, Bai Luyao, Tan Xianjun and Wu Zhangzhong, *PetroChina Pipeline R&D Center, China*

### 4-4 Panel Session (Gaps and Road Map) Thursday March 28, 2019 (10:00 am - 12:00 pm)

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Moderator: Yong-Yi Wang, *CRES*

#### Panelists:

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Jim Hart, *SSD, Inc., USA*

Donald West, *Golder Associates Inc, USA*

Justin Crapps, *ExxonMobil Upstream Research, USA*

Azam Rahman, *Petronas, Malaysia*

Alexander Mckenzie-Johnson, *Kinder Morgan, USA*

Sherif Hassanien, *Enbridge, Canada*

Robert Ferebauer, *ConocoPhillips, USA*

## Thursday March 28, 2019

### 2-3 Hazard and Strain Monitoring using LSM and Optical Fiber Thursday March 28, 2019 (8:00 am - 9:30 am)

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Session Chair: Xian-Kui Zhu, *EWI, USA*

Session Co-Chair: Jens Tronskar, *DNVGL, Singapore*

#### Large Standoff Magnetometry Technology Advances to Assess Pipeline Integrity Under Geohazard Conditions and Approaches to Utilisation of It (AIMPIMG2019-1024)

Hamed Habibi, Chau Ky Vo, and Paul Jarram, *Speir Hunter, UK*

#### Use of Large Standoff Magnetometry for Geohazard Pipeline Integrity Investigations

(AIMPIMG2019-1019)

Chukwuma Onuoha, Eric Pozniak, Jerell Tolentino, Shamus McDonnell, Rob Zmud and Vignesh Shankar, *PureHM, Canada*

#### Stress Characterization of Mechanical Damages in Gas Pipelines Using Large Standoff Magnetometry Technology

(AIMPIMG2019-1007)

Xian-Kui Zhu, *EWI, and Tianzong (David) Xu, Pacific Gas and Electrical Company, USA*



# Schedule At-A-Glance

Monday March 25, 2019		
7:00 am - 3:00 pm	Registration Opens	Lobby
7:00 am - 8:00 am	Networking Breakfast	Magnolia Ballroom
8:00 am - 9:30 am	Regulatory Panel Opening Session	Magnolia Ballroom
9:30 am - 10:00 am	Networking Break	Magnolia Ballroom
10:00 am - 11:30 am	Hazards Characterization	Pecan Room
11:30 am - 1:00 pm	"Keynote Lunch: Integrated Hazards Management and Fitness-for-service Assessment for Integrity Management of Pipelines Subjected to Geohazards"	Magnolia Ballroom
1:00 pm - 2:30 pm	Hazard and Strain Monitoring	Pecan Room
2:30 pm - 3:00 pm	Networking Break	Magnolia Ballroom
3:00 pm - 4:30 pm	In-Service Hazard Management	Pecan Room
Tuesday March 26, 2019		
7:00 am - 3:00 pm	Registration Opens	Lobby
7:00 am - 8:00 am	Networking Breakfast	Magnolia Ballroom
8:00 am - 9:30 am	Strain Capacity Prediction and Assessment	Pecan Room
9:30 am - 10:00 am	Networking Break	Magnolia Ballroom
10:00 am - 11:30 am	High Strain Management Solutions	Pecan Room
11:30 am - 1:00 pm	Keynote Lunch: Bending Strain - Learning from Big Data	Magnolia Ballroom
1:00 pm - 2:30 pm	Strain Capacity Prediction and Assessment	Pecan Room
2:30 pm - 3:00 pm	Networking Break	Magnolia Ballroom
3:00 pm - 4:30 pm	Hazard and Strain Monitoring using ILI and InSAR	Pecan Room
Wednesday March 27, 2019		
7:00 am - 3:00 pm	Registration Open	Lobby
7:00 am - 8:00 am	Networking Breakfast	Magnolia Ballroom
8:00 am - 9:30 am	In-Service Hazard Management	Pecan Room
9:30 am - 10:00 am	Networking Break	Magnolia Ballroom
10:00 am - 11:30 am	Integrity Assessment and Management	Pecan Room
11:30 am - 1:00 pm	Keynote Lunch: PRCI Strategy and Initiatives	Magnolia Ballroom
1:00 pm - 2:30 pm	Quantitative Risk Assessment	Pecan Room
2:30 pm - 3:00 pm	Networking Break	Magnolia Ballroom
3:00 pm - 4:30 pm	Integrity Assessment and Management	Pecan Room
Thursday March 28, 2019		
7:00 am - 12:00 pm	Registration is Open	Lobby
7:00 am - 8:00 am	Networking Breakfast	Magnolia Ballroom
8:00 am - 9:30 am	Hazard and Strain Monitoring using LSM and Optical Fiber	Pecan Room
9:30 am - 10:00 am	Networking Break	Magnolia Ballroom
10:00 am - 12:00 pm	Panel Session (Gaps and Road Map)	Magnolia Ballroom
12:00 am - 1:00 pm	Networking Lunch	Magnolia Ballroom





# AIM-PIMG 2019

ASSET INTEGRITY MANAGEMENT –  
PIPELINE INTEGRITY MANAGEMENT  
UNDER GEOHAZARD CONDITIONS

## AIM-ALE 2020

Asset Integrity Management –  
Aging and Life Extension

March 23-26, 2020

PSA offices, Stavanger, Norway