SPE Thermal Well Integrity and Design Symposium

28–30 November 2017 | The Fairmont Banff Springs | Banff, Alberta, Canada

Corporate Sponsor:

Variperm Canada Limited
Welcome to the SPE Thermal Well Integrity and Design Symposium

With the new norm the upstream oil and gas industry is facing, effective thermal well design and integrity has never been more critical than it is today. Making smart technical decisions related to well design is crucial and can impact project economics, well integrity, and well longevity.

Field data shows that the economic impact from a failed liner, including lost production, workover operations, and pump replacement, can range as high as 200% of the cost of the well. Shared industry thermal well design and integrity experience and best practices provide operators with essential information aimed at extending the life of a well and maximizing recovery, reducing operating costs and preventing/mitigating harmful environmental impacts. Implementation involves the appropriate application of technical, operational and organizational solutions to reduce the risk of a wellbore failure.

Join your fellow SPE members and experts in the thermal in-situ community to share the latest in well design practices and well integrity solutions. As heavy oil and bitumen projects require significant capital investment over long time frames, the consistent application of sound engineering principles through the life cycle of a well (whole well life) must continue, even more so during lows in the commodity price cycles.

Through the progression of new technology and practical sharing of ideas among participants, our industry will improve the collective recovery, efficiency, longevity, and reduce liability of existing and planned thermal wells.

GENERAL INFORMATION

Accessibility
Our events and functions are accessible to all attendees with wheelchairs. If you require special arrangements, please contact our staff at the registration desk.

Commercialism
In remaining consistent with symposium objectives and SPE guidelines, commercialism in presentations will not be permitted. Company logos should be used only to indicate the affiliation of the presenter(s).

Continuing Education Units
Attendees will receive 2.45 CEU’s. One CEU equals 8 contact hours of participation. CEUs will be awarded through SPE Professional Development for participation and completion of SPE symposium. A permanent record of a participant’s involvement and awarding of CEUs will be maintained by SPE.

Proceedings
Technical papers will be published. A digital Proceedings card giving online access to papers is included in registration prices. Non-papered presentations, approved for release, will be shared after the Symposium.

Electronic Devices
As a courtesy to the speakers and your fellow registrants, please turn off all electronic devices during presentations.

Photography and Recording Policy
Unauthorized video/audio recording is expressly prohibited in the session room(s) or poster area, whether by video, still or digital camera, mobile phone, or any other means or form of reproduction.

Any person attending may be photographed or videotaped, and by your attendance, you give permission to use your image in possible future marketing publications including print, online, and video.

Symposium Format
Symposiums maximize the exchange of ideas among attendees and presenters through technical presentations followed by extended Q&A. Focused topics attract an informed audience eager to discuss issues critical to advancing both technology and best practices. There is a combination of papers and invited presentations which can take the form of case studies, best practices and technology reviews highlighting engineering achievements and lessons learned. In order to stimulate frank discussion members of the press are not invited to attend.
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Corporate & Bowling Night Social:

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- **RGL Reservoir Management**
- **BLADE Energy Partners**
- **C-FER Technologies**
- **EVRAZ**
- **Sanjel Energy Services**
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Silver Sponsor and Wednesday AM Coffee Break:

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Breakfast:

Symposium Totes:

Notebooks & Pens:

Candy Station:

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What Do You Think?

Please take a quick survey to provide your thoughts and feedback on the workshop. Your input will help shape future SPE events. [http://www.spe.org/go/SPEtwid17](http://www.spe.org/go/SPEtwid17)
COMMITTEE MEMBERS

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Christian Hamuli
Resource Energy Solutions (RES)

Symposium Vice Chairperson
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EVRAZ NA

Wendy Akins
Nexen Energy ULC

Jeanna Brown
Brightspot Climate

Scot Buell
Chevron

Jeffery Bushey
Schlumberger

Heath Charles
BlackPearl Resources

Leah Davies
Manaka Consulting

Barkim Demirdal
Devon Energy

Krystle Drover
Cenovus Energy

Cam Geddes
Cenovus Energy

Doug Hollies
Codeco Oilsands Engineering

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Warren Kozak
Husky Energy

Marty Lastiwka
Suncor Energy

Blair Mackie
Summit Tubulars

Raina May
MEG Energy

Julio Oliveira
Suncor Energy

Uliana Romanova
Delta Screens & Filtration

Ian Peleshok
Alberta Energy Regulator

Candace Taylor
Imperial Oil Resources

John Van Vliet
Noetic Engineering

Kristoffer Watson
NCS Multistage

Todd Zahacy
C-FER Technologies

Did You Know....

Earlier this year, the SPE Canadian Educational Trust was converted into a new entity, the SPE Canadian Educational Foundation (SPECEF). With the new governance structure, SPECEF has the flexibility to create new programs, scholarships and energy educational initiatives that will benefit SPE Canada members.

For more information about SPECEF or to make a charitable donation please visit: www.spe.org/canada
Schedule Overview

MONDAY, 27 NOVEMBER
1800-1930 | Welcome Reception
Mt. Stephen Hall

TUESDAY, 28 NOVEMBER
0700-0750 | Registration
Oval Room
Breakfast
Sponsored by:
Alberta Room

0750-0800 | Opening Remarks
Cascade Ballroom

0800-0930 | Session 1: Opening Keynote Panel Session
Cascade Ballroom

0930-1000 | Coffee Break
New Brunswick Room

1000-1130 | Session 2: Well Integrity Life Cycle Case Studies
Cascade Ballroom

1130-1300 | Lunch
Alberta Room

1300-1430 | Session 3: Tubulars and Connections
Cascade Ballroom

1430-1500 | Coffee Break
New Brunswick Room

1500-1700 | Session 4: Corrosion and Scale Issues
Cascade Ballroom

THURSDAY, 30 NOVEMBER
0700-0800 | Breakfast
Sponsored by:
Alberta Room

0800-0930 | Session 9: Insulated Completions and Applications, and Near Surface Casing Integrity
Cascade Ballroom

0930-1000 | Coffee Break
New Brunswick Room

1000-1130 | Session 10: Case Studies
Cascade Ballroom

1130-1230 | Lunch
Alberta Room

1230-1400 | Session 11: Liner Integrity and Flow Control Device
Cascade Ballroom

1400-1430 | Coffee Break
New Brunswick Room

1430-1600 | Session 12: Liner Integrity and Sand Control
Cascade Ballroom

WEDNESDAY, 30 NOVEMBER
0700-0800 | Registration
Oval Room
Breakfast
Sponsored by:
Alberta Room

0800-0930 | Session 5: Cement Integrity over Life Cycle I
Cascade Ballroom
Technical Agenda

TUESDAY, 28 NOVEMBER

0800–0930 | Cascade Ballroom
Session 01: Opening Keynote Panel Session

Moderator: Linda Blair, EVRAZ NA; Christian Hamuli, Resource Energy Solutions (RES)

Keynote Speakers:
Steve Laut, President, Canadian Natural Resources Ltd.

Mr. Laut joined Canadian Natural in 1991 as Senior Exploitation Engineer. He was appointed Vice-President Operations in 1996 and was appointed Senior Vice-President in 1997. Mr. Laut was appointed Executive Vice-President in 2001 and became Chief Operating Officer in 2003, assuming responsibility for all aspects of exploration, exploitation and production for the Company. In 2005, the role of President was added to his responsibilities and in 2006 he was appointed to the Board of Directors. Mr. Laut assumed the sole responsibility of President in 2010.

Prior to joining the Company, Mr. Laut held various positions as Reservoir Engineer and Production Engineer with Poco Petroleum, Adams Pearson, Petro-Canada, Dome Petroleum and Unocal.

Mr. Laut holds a Bachelor of Science degree in Mechanical Engineering from the University of Calgary.

Theresa Watson, TL Watson & Associates

Theresa has over twenty-five years experience in organization leadership, wellbore integrity, regulatory development and compliance, liability assessment and management, drilling, completions, oilfield operations, joint ventures and asset consolidation.

Theresa was a Board member for the Alberta Energy Regulator (AER) formerly the Energy Resources Conservation Board (ERCB) from 2009-2013. Prior to that Theresa worked for Mobil Oil Canada in completions, operations and drilling engineering, as well as acquisition and divestment of oil and gas properties.

Theresa holds a Bachelor of Engineering in Chemical Engineering from McGill University, an MBA from the University of Calgary and is currently working on a PhD in law at the University of Calgary.

Chris Seasons, Vice Chairman and Director, Arc Financial Corp.

Chris is a professional engineer with more than 30 years’ experience in the upstream oil and gas business in Canada and internationally. He is currently Vice Chairman and Director of ARC Financial Corp., Canada’s largest energy-focused private equity manager. Prior to ARC, Chris led Devon Energy’s business in Canada for more than a decade.

He currently sits on a number of private oil and gas boards and several not-for-profit entities. As well, he is former chairman of the Canadian Association of Petroleum Producers. Chris received a B.Sc in Chemical Engineering from Queen’s University.

0930–1000  Coffee Break Time on Exhibit Floor | New Brunswick Room

In Lieu of Speaker and Committee Gifts

On behalf of the Program Committee and Symposium speakers, SPE Canada is pleased to make a donation of $1000 to Samaritan’s Purse. This organization is providing support to hurricane victims in the US and Caribbean islands through emergency relief efforts and assisting Canadians who lost homes in the BC Fires. This donation has been made at the request of the committee, in lieu of speaker and committee gifts. www.samaritanspurse.ca
TUESDAY, 28 NOVEMBER

1000–1130 | Cascade Ballroom
Session 02: Well Integrity Life Cycle Case Studies

Session Chairpersons:
Wendy Akins, Nexen Energy ULC; Barkim Demirdal, Devon Energy

The life cycle of a well consists of three primary stages – design/construction, well operation/intervention and abandonment. Decisions made during design/construction can have broad implications to the barrier performance during well operation/intervention and even into the abandonment and post abandonment risk and liability of the well. Similarly, well operation/intervention practices and procedures also not only influence the life span of the well, but also the late life barrier performance and integrity.

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter Details</th>
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</thead>
<tbody>
<tr>
<td>1000-1030</td>
<td>Invited Presenter Promoting Long-Term Tubular Integrity through a Holistic Approach to Casing Installation D. Shute, Volant Products Inc; D. Dall’Acqua, Noetic Engineering 2008 Inc.</td>
</tr>
<tr>
<td>1030-1100</td>
<td>Invited Presenter Safe and Optimal Start-Up of Pad 750 at MacKay River M. Lastiwka, S.A. Young, Suncor Energy Inc.</td>
</tr>
</tbody>
</table>

1130–1300 Lunch and Time on Exhibit Floor | Alberta Room
The well construction and application conditions place significant demands on the hydraulic isolation, structural integrity and accessibility functions that tubulars and tubular connections provide in thermal wells. Connections are of particular focus as failures at connections have been noted to account for approximately 90% of the casing failures in both thermal and non-thermal wells. In this session, presentations will be made on advancing the understanding of axial and rotational fatigue limits in premium connections and the impact on thermal wellbore design and service life; an investigation of low-cycle fatigue fracture initiation and the use in a fracture-damage based design approach; and a proposed methodology for the use of Finite Element Analysis (FEA) methods for connection design optimization and qualification evaluations.

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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300-1330</td>
<td>Paper # 188158</td>
<td>G. Meijer, J. Nowinka, D. Dall'Acqua, Noetic Engineering 2008 Inc.</td>
<td>Verification of FEA Used in OCTG Connection Evaluations</td>
</tr>
<tr>
<td>1330-1400</td>
<td>Invited Presenter</td>
<td>A. Hamilton, EVRAZ NA</td>
<td>Physical Fatigue Testing OCTG Premium Connections, from Theoretical to Practical</td>
</tr>
</tbody>
</table>

1430-1500 Coffee Break and Time on Exhibit Floor | New Brunswick Room

1500–1630 Cascade Ballroom

**Session 04: Corrosion and Scale Issues**

Session Chairpersons:

Isaac Khalad, ConocoPhillips Canada; Warren Kozak, Husky Energy

Enhanced oil recovery methods have introduced new challenges to the oil and gas industry, one of those challenges being corrosion. Both the produced fluids and injected fluids can carry with them several components that contribute to corrosion, and the resulting damage, both on surface and downhole, is often amplified with heat. This session will explore corrosion and casing damage over several types of thermal projects from around the world.

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<tr>
<th>Time</th>
<th>Paper #</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>1500-1530</td>
<td>188161</td>
<td>Studies of Aqueous Hydrogen Sulfide Corrosion in Producing SAGD Wells</td>
<td>T. Pehlke, University of British Columbia</td>
</tr>
<tr>
<td>1530-1600</td>
<td>188163</td>
<td>Investigation on Casing Damage in Liaohu Du66 Combustion Project</td>
<td>L. Zhong, China University of Petroleum, Beijing; L. Teng, Northeast Petroleum University; S. Zhang, F. Wu, E. Luo, and L. Liu, Liaohu Oilfield Subcompany, CNPC; D. Yu, Beijing Union University; D. Ji, University of Calgary; C. Wang and Y. Zhou, China University of Petroleum, Beijing</td>
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1630-1830 Networking Reception | New Brunswick Room

1930-2130 Bowling Social Event | Banff Springs Hotel Bowling Center

* Please note: This is a ticketed event with limited space available.
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### WEDNESDAY, 29 NOVEMBER

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<th>Time</th>
<th>Event</th>
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<tr>
<td>0930</td>
<td><strong>Coffee Break and Time on Exhibit Floor</strong></td>
<td>New Brunswick Room</td>
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<td>1000</td>
<td><strong>Cascade Ballroom</strong></td>
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<td>1000–1200</td>
<td><strong>Session 06: Cement Integrity Over Life Cycle II</strong></td>
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<tr>
<td>1000–1200</td>
<td>Session Chairpersons: [Jeffery Bushey, Schlumberger; Heath Charles, BlackPearl Resources]</td>
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<tr>
<td>1000–1200</td>
<td>Invited Presenter: <strong>Innovative Surface Casing Vent Flow Testing and Analysis to Determine Well Integrity Status</strong></td>
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<td>R. Friesz, R. Doull, Doull Site Assessments Ltd.; B. Demirdal, Devon Energy</td>
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<td>1130–1200</td>
<td>Invited Presenter: <strong>Satellite Monitoring of Cyclic Steam Stimulation without Corner Reflectors</strong></td>
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<td>M. Henschel, J. Dudley, P. Chung, MDA Geospatial Services Inc.</td>
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<td>1200–1315</td>
<td><strong>Lunch and Time on Exhibit Floor</strong></td>
<td>Alberta Room</td>
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<td>1315–1430</td>
<td><strong>Cascade Ballroom</strong></td>
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<td>1315–1430</td>
<td><strong>Session 07: Panel Discussion - Thermal Well Abandonment and End of Life Liabilities</strong></td>
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<tr>
<td>1315–1430</td>
<td>Session Chairpersons: [Barkim Demirdal, Devon Energy; Ian Peleshok, Alberta Energy Regulator; Kris Watson, NCS Multistage]</td>
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<td>1315–1430</td>
<td>The panel discussion at this year’s SPE Thermal Well Integrity and Design Symposium is on wellbore abandonment design and the liabilities associated with them. The panel will discuss topics related to planning, learnings, knowledge gaps, timing of abandonments and monitoring. Panel members from different disciplines have been selected to ensure the discussion respects all aspects of the wellbore lifecycle.</td>
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<td>1315–1430</td>
<td>Moderator: <em>Ian Peleshok</em>, Alberta Energy Regulator</td>
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<td>1315–1430</td>
<td>Panelists:</td>
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<td>1315–1430</td>
<td>Scot Buell, Chevron</td>
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<td>1315–1430</td>
<td>Doug Goda, ConocoPhillips Canada</td>
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<td>1315–1430</td>
<td>Lawrence Jonker, Alberta Energy Regulator</td>
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<td>1315–1430</td>
<td>Will Remmer, Candian Natural Resources Limited</td>
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<td>1315–1430</td>
<td>Blair Temple, Imperial Oil</td>
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<td>1430–1500</td>
<td><strong>Coffee Break and Time on Exhibit Floor</strong></td>
<td>New Brunswick Room</td>
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**WEDNESDAY, 29 NOVEMBER**

1500–1700

**Session 8: Break-Out Sessions**

**Session Chairs:**
Uliana Romanova, Delta Screen & Filtration; Todd Zahacy, C-FER Technologies

Break Out Option #1: **Casing Deformation - Causes and Prevention** | Alberta Room

**Moderators:**
Linda Blair, EVRAZ; Raina May, MEG Energy; John Van Vliet, Noetic Engineering; Todd Zahacy, C-FER Technologies

Casing deformation continues to be an active area of concern for thermal recovery applications. This break out session will explore the mechanisms and risk factors that can lead to casing deformation. This will be followed by a discussion on current methods for detection, monitoring, and analysis with a focus on risk assessment frameworks and mitigation. The format is table discussion to draw from the knowledge and experiences of all attendees.

Break Out Option #2: **Primary Cementing Impacts On Long-Term Zonal Isolation and Well Integrity** | Cascade Ballroom

**Moderators:**
Barkim Demirdal, Devon Energy; Cam Geddes, Cenovus Energy; Kris Watson, NCS Multistage

Zonal isolation is critical to the integrity of a thermal well throughout its life cycle. The quality of the primary cement job on the well has long lasting impacts on the performance of that zonal isolation. This session will present a case study where primary cementing quality across the pad differs from well to well despite applying the same cementing practices. Attendees will be given the opportunity to discuss how they will use this information to 1) understand the reasons for variable cement quality among the wells in the pad, 2) determine the risks associated with the cement variability and mitigations that needs to be considered when starting-up and operating the wells, 3) identify risks and liabilities associated with abandonment of these wells and 4) develop a process flow to ensure learnings are incorporated on future pads to improve quality.

Break Out Option #3: **Abandoned Well Thermal Compatibility** | Ivor Petrak Room

**Moderators:**
Ian Peleshok, Alberta Energy Regulator; Dejan Ristic, D.M.R. Engineering; Blair Temple, Imperial Oil

This session will center around a wellbore integrity scenario due to a ghost hole that has penetrated the cap rock of a virgin bitumen reservoir. Discussions will surround mitigation strategies for abandonment (or repair) of the wellbore in order to minimize the impact on future resource recovery in the vicinity.

**THURSDAY, 30 NOVEMBER**

0700-0800  **Breakfast** | Alberta Room

0800–0930 | Cascade Ballroom

**Session 09: Insulated Completions and Applications, and Near Surface Casing Integrity**

**Session Chairpersons:**
Scot Buell, Chevron; Marty Lastiwka, Suncor Energy

Vacuum insulated tubing (VIT) systems for steam injection applications are covered in this session. Thermal VIT specifications, field applications, and design of slimhole VIT injectors are presented.

0800-0830  Invited Presenter  **Near Surface Casing Integrity**
R.Hanson, Cenovus Energy
# THURSDAY, 30 NOVEMBER

## 0830-0900
- **Paper # 188154**
  - **Slimhole Steam Injector Wells with Insulated Tubings**
  - **P. Sachdeva**, P.V. Suryanarayana, Blade Energy Partners; **J. Damour**, MAJUS; **D. Johannson**, Majus Canada

## 0900-0930
- **Invited Presenter**
  - **Vacuum Insulated Tubing Trial**
  - **B. Temple**, Imperial Oil

## 0930-1000
- **Coffee Break and Time on Exhibit Floor** | New Brunswick Room

## 1000-1130 | Cascade Ballroom
### Session 10: Case Studies

**Session Chairpersons:**
- **Krystle Drover**, Cenovus Energy; **Raina May**, MEG Energy

This session will highlight in situ operating experience and investigation of thermal effects. The invited presenters will share the outcomes of learnings from various North American Thermal projects.

<table>
<thead>
<tr>
<th>1000-1030</th>
<th>Invited Presenter</th>
<th>Design and Operational Experience with Horizontal Steam Injectors in Kern River Field, California</th>
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<tr>
<td></td>
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<td><strong>S. Buell</strong>, Chevron</td>
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<tr>
<th>1030-1100</th>
<th>Invited Presenter</th>
<th>Source Identification and Flow Characterization of Surface Casing Vent Flows in SAGD Wellbores</th>
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<td><strong>M. Mund</strong>, ConocoPhillips</td>
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<tr>
<th>1100-1130</th>
<th>Invited Presenter</th>
<th>Reducing Infill Well Start-up Time and Cost by Combining LWD Resistivity Data with a Flexible Completion Design</th>
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<td><strong>S. Thompson</strong>, Athabasca Oil Corporation</td>
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## 1130–1230
- **Lunch and Time on Exhibit Floor** | Alberta Room

## 1230-1400 | Cascade Ballroom
### Session 11: Liner Integrity and Flow Control Device

**Session Chairpersons:**

This session will discuss thermal well liner integrity, zonal isolation, and flow control throughout the well life cycle from testing through installation and production.

<table>
<thead>
<tr>
<th>1230-1300</th>
<th>Paper # 188148</th>
<th>Multi-Timescale Workflow for Optimizing Installation and Integrity of Extended-Reach Horizontal Liners</th>
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</thead>
</table>

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<tr>
<th>1300-1330</th>
<th>Invited Presenter</th>
<th>Seven Years of Experience Testing Flow Control Devices and Packers in the Horizontal Steam Injection Test Facility</th>
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<td><strong>S. Buell</strong>, Chevron</td>
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<td><strong>D.J. Saks</strong>, S. Park, V. Lakshmanan, <strong>G. Ma</strong>, A.R. Singh, Baker Hughes Canada</td>
</tr>
</tbody>
</table>

## 1400-1430
- **Coffee Break and Time on Exhibit Floor** | New Brunswick Room
The need for long term sand retention and structural stability in the permanent portion of a horizontal well completion is critical to in situ thermal heavy oil production assurance. This section of the well has very little governmental regulation but a high degree of complexity and importance in overall capital efficiency for thermal projects. This section offers a background review on sand control for thermal heavy oil and it welcomes a global thermal well construction viewpoint by discussing two case studies that discuss the successful application of a traditional and an alternative sand control device.

1430-1500 Paper #188155
Understanding Sand Control for Thermal Heavy Oil and Bitumen Production Operations
U. Romanova, D. Michel, Delta Screens and Filtration, R. Strom, Calgary Rock and Materials Services, and J. Stepic, JMS Geological Consultants

1500-1530 Paper #188167
Design Optimization of Slotted Liner Completions in Horizontal Wells: An Analytical Skin Factor Model Verified by Computational Fluid Dynamics and Experimental Sand Retention Tests

1530-1600 Invited Presenter
Suncor SAGD Mackay River Sand Control Screen Trial
M. Lastiwka, L. Briceno, Suncor Energy Inc.
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Baker Hughes, a GE Company (BHGE) ....14
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Continental Steel Corporation - CSTL ..........17
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