SMRI FALL 2023

CONFERENCE ANNOUNCEMENT

October 1-4 | San Antonio, Texas

solutionmining.org

Research Presentation

Depending on research project estimated completion dates, two oral research reports will likely be presented Monday morning of the conference:

ESK GmbH's Acquisition and Provision of Strain Measurements at Cavern Stassfurt BS13 (RR2023-2) will present the installation of a fiber optic system along a cemented production casing of a cavern well and the acquisition of temperature and strain measurements. The project goal was to demonstrate the capability of fiber optics to reliably acquire long-term strain and temperature measurements.

RR2023-3: Creep behavior under small deviatoric stress will present the project results by a research team led by Institut für Gebirgsmechanik. The work will highlight a review of existing studies (creep mechanisms, influence of microstructures, creep tests on rock salt), the modeling of creep at low stress (review of constitutive models, benchmark simulation), and provide recommendations for a potential lab test program.

Fall 2023 Sponsorships

Sponsorships help defray costs of hosting conferences, keep conference fees affordable, and allow more of the member dues to be directed towards active research. Members or non-members may be sponsors. SMRI's 2023 sponsorship information is available online or you may contact Dawn Langlinais or Jennifer Looff for more information. No commercial advertising will be accepted, but SMRI will acknowledge contributions of all sponsors. Thank you to the Fall 2023 San Antonio SMRI Conference sponsors:

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Conference Schedule

All times are in Central Daylight Time (CDT)

Saturday, September 30

8:00 am–12:30 pm	**Research Committee Meeting**
1:00 pm–4:30 pm	**Leadership Meeting**

Sunday, October 1

8:00 am–5:00 pm	**Technical Class, "Hydrogen Cavern Storage Considerations"** *(Optional with additional charge. This class will be repeated at the Spring 2024 Krakow Conference)*
6:30 pm–8:30 pm	**Icebreaker, Rio Grande Ballroom**

Monday, October 2

8:00 am–10:00 am	**Business Meeting** *(Members Only)*
10:30 am–5:00 pm	**Technical Paper Presentations, Day 1**
6:30 pm–9:30 pm	**Monday Evening Networking Event** *(optional/additional charge)*
9:45 am–3:15 pm	**Friends and Spouses San Antonio Tour**

Tuesday, October 3

8:00 am–5:00 pm	**Technical Paper Presentations, Day 2**
8:45 am–4:45 pm	**Friends and Spouses Fredericksburg Trip**

Wednesday, October 4 **Field Trips** *(Optional with Additional Charge)*

7:00 am–5:30 pm	Bureau of Economic Geology Core Workshop
8:00 am–5:00 pm	The Cave Without a Name and Bandera Historical Rides

(Field Trip times are subject to change and will be confirmed during the conference)

Conference Assistance

SMRI Membership Issues:

John Nadeau | Executive Director
Phone: +1 518-579-6587
Email: *jnadeau@solutionmining.org*

Registration Assistance:

Dawn Langlinais
Conferences and Education
Phone: +1 918-914-2499
Email: *dawnL@solutionmining.org*

CONFERENCE INFORMATION

SOLUTION MINING RESEARCH INSTITUTE
www.solutionmining.org

Technical Class

Hydrogen Cavern Storage Considerations

Sunday, October 1, 8:00 am – 5:00 pm (CDT)

See class topics list on last page of this announcement

The Technical Class, typically held on Sunday prior to the Technical Session, is designed to be an introductory course or refresher course for the variety of disciplines and management levels that work in the solution mining environment and with solution mined caverns. Hydrogen Cavern Storage Considerations was chosen as the topic for the Technical Class for Fall 2023 and Spring 2024 based on a survey by SMRI leadership to members.

With the current focus on energy security and efforts to reduce dependence on natural gas around the globe, energy companies and governments are racing to develop their hydrogen storage capacities. Although natural gas storage caverns have been widely implemented for decades and much evaluation and literature has been developed concerning this, large scale development of hydrogen storage in salt caverns has been limited, but it has been proven feasible and safe. This class will help provide some of the answers needed to understand the peculiarities and similarities of hydrogen as compared to natural gas storage in caverns.

The SMRI has continued to be a leader in the mining and storage industry with many research projects and technical presentations over the past years. Of particular interest to attendees should be the recent completion of SMRI Research Report RR2023-1: **Hydrogen Storage in Salt Caverns, Current Status and Potential Future Research Topics**. The report provides an excellent overview with focus below:

- Status of research on hydrogen storage in salt caverns
- Identify current status of the cavern industry's knowledge
- Consideration of recently ongoing research projects
- Identify technical gaps
- Identification of potential research topics, bases for developing RFPs

To provide further insight into these concepts, the SMRI has proposed a tentative list of topics for the Technical Class including:

- Overview of Hydrogen; Chemical/physical properties
- Overview of business drivers for Hydrogen Storage
- Case histories of existing/planned projects
- Relevant considerations for geology, rock mechanics, & thermodynamic modeling
- Material considerations in hydrogen applications
- Regulatory considerations and testing

The SMRI does include in the schedule of the Technical Class sufficient time for questions and open discussion during the sessions. Additionally, the structure of the session breaks and lunch breaks are great opportunities to continue the discussion with cavern peers. Each class participant will receive a USB drive (digital) of the class papers.

Technical Class Registration Fees

Members	$400
Member Regulator	$150
Non-Members	$650
Non-Member Regulators*	$400
Students, if space is available	*No Charge

**must contact John Nadeau*

For class questions, please contact:

Technical Class Chair 2023

Yvan Charnavel *Storengy*
Email: *yvan.charnavel@storengy.com*

SMRI Research Coordinator

Tim Bauer *Solution Mining*
Email: *tbauer@solutionmining.org*
Phone: *+1 281 435 9753*

For program questions, please contact:

Program Chair 2023

Kurt Looff *Texas Brine*
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Assistant Program Chair 2023

Dirk Zapf *University of Hannover*
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Phone: *+49 511 762 2590*

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In-Person Attendee Registration Information

Each person attending any part of the technical conference must be in the SMRI database and must register for the conference. Online registration and payment in advance are required by all persons attending. No registrations will be held or accepted without payment. All attending non-technical spouses and friends must be registered as "guests" before completing your registration's online payment. Space for most events is limited.

The in-person delegate registration fee covers the Sunday Icebreaker, breakfasts, AM/PM breaks, and lunches on Monday and Tuesday. The fee also covers a USB drive that contains all papers presented during the conference. Note that there will be an additional $250 charge if registering after September 8, if space is available.

Members | $640 ($500 without Monday night event)
Non-Members | $1,090 ($950 without Monday night event)

Discounts available for Class Instructors and one Speaker per paper. University students of related subjects must contact SMRI's Executive Director John Nadeau (jnadeau@solutionmining.org) to apply for discounted registration.

Remote Attendee Registration Information

SMRI intends to broadcast the San Antonio meeting as a hybrid format. The current plan would be to live stream the Technical Presentations, followed by on-demand access to the individual. SMRI will be using the same platform that was used for the Detroit event and more details will be provided to virtual attendees closer to the conference date.

Virtual attendees must register similar to the in-person attendees using a separate link to be posted to the registration page. The remote delegate registration fee will be the same as the in- person rates and will cover the cost to record and transmit the live feed broadcast, the site to host the on-demand videos, and a file that contains all papers presented during the conference. There will be an additional $250 charge if registering after 8 September.

Registration Dates

19 July	Online registration for members begins
16 August	Non-member registration begins
8 September	Registration ends

Hotel & Travel Information

Hotel Reservations:

Hyatt Regency San Antonio River Walk
123 Losoya Street Street, San Antonio, TX, USA 78205

Centrally located on the vibrant River Walk, with direct access to the world-famous Alamo, Hyatt Regency San Antonio Riverwalk's newly renovated guest rooms and suites puts you in the heart of downtown's entertainment, cultural and historic center. You may reserve hotel rooms at any time.

Room rate: $209 + taxes/fees
Conference Dates: October 1-4

For reservations:
Call: +1 210 224 1234
https://www.hyatt.com/en-US/group-booking/SATRS/G-JEUK

Transportation:

The closest airport to the Hyatt Regency San Antonio Riverwalk is the ***San Antonio International Airport,*** it is approximately a 15-minute car ride to the hotel. Transportation is available from the airport via taxi, ride-share or car rental.

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Friends and Spouses Tours

San Antonio ProTour

Monday, October 2 – 9:45 am-3:15 pm
Max capacity 25. $85 per person.

The San Antonio ProTour half-day experience is the number-one rated tour in San Antonio and takes you through three centuries of this amazing city. This comprehensive and super engaging tour will take you through the most important locations throughout San Antonio giving you an experience of the various historical sites and diverse cultures that make San Antonio one of the most fascinating cities in the United States.

Lead by professional tour guide, Michael Robinson, a former standup comic who has performed with Kevin Hart and Kevin James, has done television acting and live music performance and emcees large events throughout the United States and Mexico. Not only will it feel like you're listening to a well-produced podcast, but I will also feel like you're at a comedy show with a professional history teacher.

Fredericksburg Trip

Tuesday, October 3 – 9:00am-4:00pm
Max capacity 25. $140 per person.

Enjoy your beautiful drive out to the Texas hill country and learn all about this incredibly beautiful and fascinating part of Texas that spotlights the deep German emigration to this region in the 19th century. It's called the Hill Country for a reason, because there are beautiful views as you drive from 600 feet elevation in San Antonio up to 2500 feet out in Fredericksburg.

Along the way you will learn all about the region's indigenous inhabitants going back centuries before the German settlers. You will also hear snippets of regional music so you have a much deeper understanding of the very specific cultures that create the Texas Hill country.

In Fredericksburg, you will learn about the history of this important German town dating back to 1850, enjoy a delicious lunch, shop at the many local shops along Main Street. You can also try one of the wine tasting rooms that spotlight the burgeoning Hill Country wine scene or go to an excellent German brewery!

To cap off the day, enjoy some live music at the funky 1850's German settlement called Luckenbach, where Willie Nelson, Waylon Jennings and many other great country music stars have performed! If you want to experience the heart of Texas, this location will do it for you.

Icebreaker

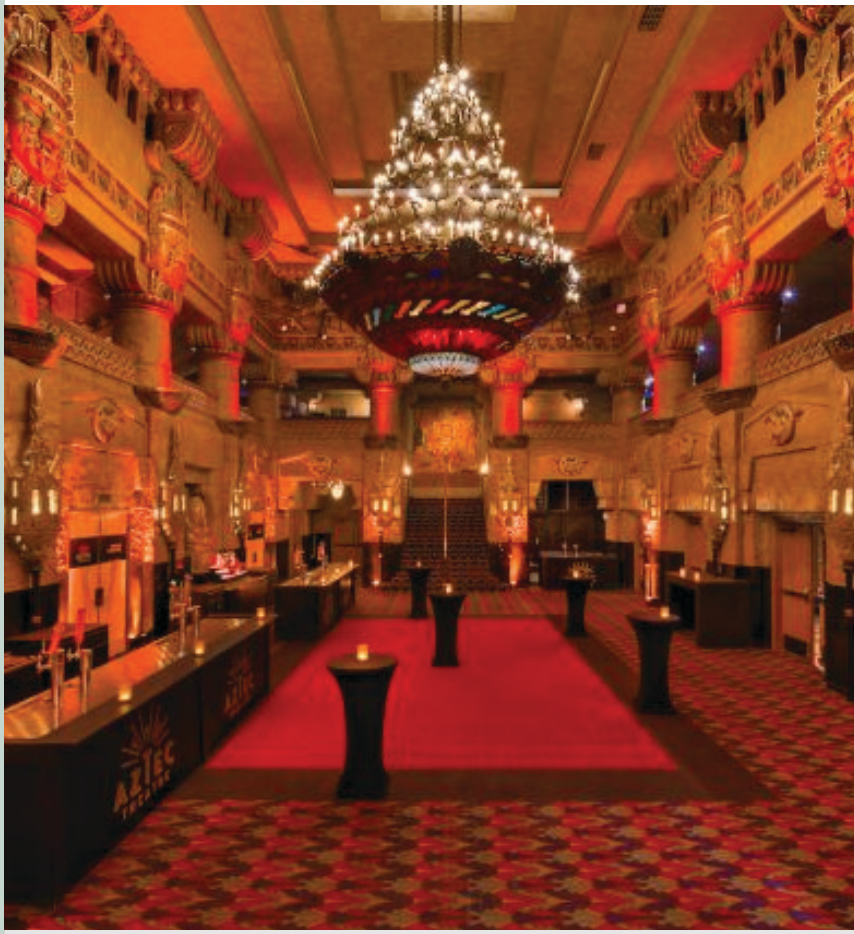
Sunday, October 1 – 6:30-8:30 pm

Join SMRI friends for appetizers, wine, beer, coffee, tea, and soft drinks. It's a great way to kick off the Fall 2023 San Antonio Conference. No charge for delegates. $50 fee for guests.

Monday Night Event

$140/person. Maximum of 325 guests.

Join SMRI at the Aztec Theater in San Antonio on October 2, for a wonderful evening event. The event will begin at 6:30 with cocktails and appetizers. At 7:30, a beautiful Tex-Mex buffet and stations will open for your dining pleasure. The theater is within easy walking distance of the Hyatt Regency.



Call for Papers and
Conference Announcement by:

Ali Van Sambeek
www.fireflyalleycreative.com

Firefly Alley Creative Co.

Wednesday Technical Field Trips

FIELD TRIP 1

State of Texas Advanced Resource Recovery / Bureau of Economic Geology Core Workshop: *Evaporitic Sequences of Texas and Their Relevance for Current Energy Decarbonization Efforts*

Max capacity 40, so register early. Cost: $145, all inclusive of transportation from hotel to BEG facility in Austin, TX, lunch at the facility, and the workshop. The field trip time is anticipated to be 7:00 am to 5:00 pm but may return after 5:00 depending on traffic and attendees are asked to plan accordingly.

The State of Texas Advanced Resource Recovery (STARR) program at the Bureau of Economic Geology (BEG) will host a one-day core workshop showcasing thousands of feet of bedded salt from the Castille and Salado formations of the Delaware Basin; as well as from Louann domal salt from the Gulf Coast as part of the SMRI Fall Meeting.

STARR researchers will discuss aspects associated with the sedimentology, stratigraphy, and depositional interpretation of these units. The event will also include selected technical talks showcasing broader integration of a wide range of subsurface dataset including seismic, geochemistry, and petrophysical analysis.

The discussion will gravitate toward the role of evaporitic sequences as part of ongoing efforts to decarbonize energy systems. Hydrogen storage in salt caverns will play a key role as part of the value chain of the emerging hydrogen economy. It is broadly believed that hydrogen storage in salt caverns is a proven concept; however, there are many challenges to upscale hydrogen storage capacity using salt caverns. This core workshop will provide an opportunity to see great rocks, talk about their geological characteristics, and discuss broader implications regarding the energy transition.

FIELD TRIP 2

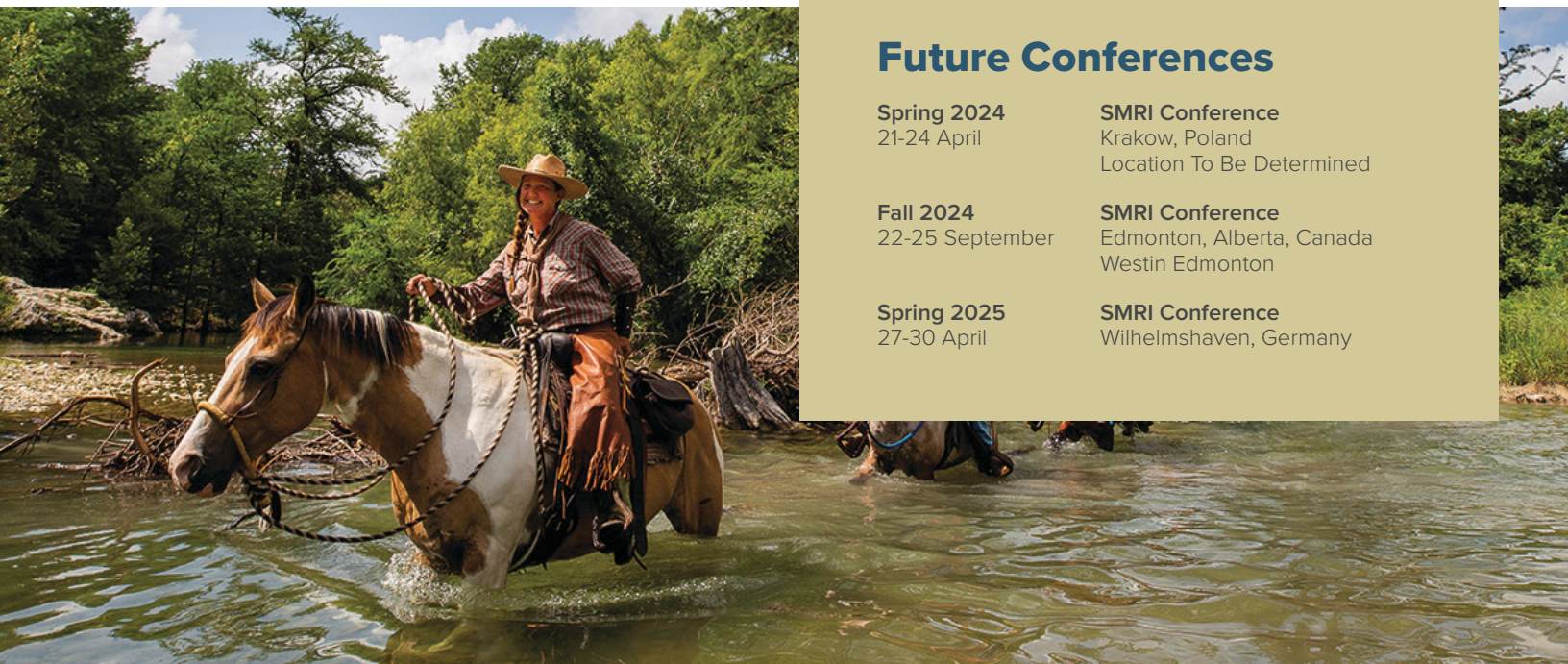
The Cave Without a Name and Bandera Historical Rides

Cost is $145 and includes transportation, horseback rides, lunch, and cave admission with guided tour. Field trip time is anticipated to be 8:00 am to 5:00 pm but will be confirmed at the conference and may be delayed due to traffic.

Load the bus for today's trip at 8 am for a 1.5-hour drive to Bandera Historical Rides where groups will saddle up for 1-hour trail rides. While riding, discover the absolute gorgeous nature trails of City Park. Underneath the giant Cypress trees, we find peaceful green and flourish areas of open grass field, river bed and plenty of deer. We ride along and in the beautiful Medina River, where you can cool off if you want to. After the rides, off we go to the 11th Street Cowboy Bar for a cowboy buffet. From there we end the day with a ride to "A Cave with No Name" for guided tours. (Both the ride and the tour may be split into smaller groups per decision of the guides.)

Beginner to advanced riders can participate with the following restrictions: minimum age of 8, maximum rider weight is 220 lbs. Safety and health of our horses is our main concern. Unfortunately, our quarter horses are relatively small, therefore we are not able to accommodate riders over 220lbs. Ride includes: Horse and guide, free admission to park, water.

The cave portion of the trip features a guided tour that will last approximately 60 minutes and is appropriate for attendees 5 years and older. Temperatures inside the cave are around 66 degrees and participants should dress accordingly. Sturdy shoes and a light jacket are recommended.



Future Conferences

Spring 2024 21-24 April	**SMRI Conference** Krakow, Poland Location To Be Determined
Fall 2024 22-25 September	**SMRI Conference** Edmonton, Alberta, Canada Westin Edmonton
Spring 2025 27-30 April	**SMRI Conference** Wilhelmshaven, Germany

Technical Paper List with All Authors

San Antonio, Texas, USA: 2-3 October 2023

Author(s)	Organization(s)	Title
James Bae, PMP; Dean Checkai, P.E.; Federico Tablada; Aaron Chenevert; Robert Murray, P.G.; Jeff Knippa	FLUOR Federal Petroleum Operations	Cavern Pressure Management During Site Outage. Planning, Execution, and Results for Bryan Mound & Bayou Choctaw Outages
Ken Beckman	Beckman and Associates, Consultants, Inc.	An Alternative Cavern Gas Storage Design Offers a New Service Profile
Shuvajit Bhattacharya; Leandro Melani; Ander Martinez-Donate; Nur Schuba; Lorena G. Moscardelli	Bureau of Economic Geology, University of Texas at Austin	Petrophysical challenges in salt characterization and their implications on hydrogen storage: A case study from the Castile-Salado bedded salt interval in the Permian Basin, United States
Joe Brinton P.G.; Tim Lynn; Brandon Lampe PhD.; Ian Gray PhD."	Agapito Associates, Inc.	Novel In-situ Stress Measurement Technique for Cavern Design
René Buzogany; Fritz Crotogino	DEEP.KBB	The Increasing Importance of Hydrogen Derivatives – Evaluation of Ammonia Storage in Salt Caverns
Jesper Culmsee; Haofei Guo; Lars Storm Pedersen	SaltPower	Worlds first osmotic energy plant for solution mining in operation
Jai Duhan; Samuel Voegeli	RESPEC	Hydrogen Storage in Salt Caverns: Subsurface Facility Development Blueprint
Lisa Eldredge	FLUOR Federal Petroleum Operations	Crude Blending at the SPR to Meet Environmental and Safety Standards During the CY22 1 Million barrel/day Emergency Deliveries
Daniel Frazier, P.E.; David Fabian, P.E.; Robert Murray P.G.; Dean Checkai, P.E.; James Perry	FLUOR Federal Petroleum Operations	Cavern Well Conversion to Fiber Optic Strain Monitoring Well
Murielle Grange[1]; Gregoire Hevin[1]; Hippolyte Djizanne[2]	Storengy (1) Ineris (2)	HyPSTER: 1st Demonstrator for Green Hydrogen Storage in France
R. Coleman Hale; Colten Long; Latasha McMullen; Joshua Bradley	Lonquist & Co.	Rapid Salt Neck Closure: Observation, Remediation, and Prevention
Bastian Leuger; Dirk Zapf; Lukas Baumgartel; Feline Korner	IGtH-IUB	Laboratory investigations of fracture propagation in rock salt in hollow test specimens - LARISSA research project
Paul Oonk[1]; Marinus den Hartogh[1]; Matthew Norgate[2]; Stephen Murphy[2]; Jesse Tolley[2]	Nobian Industrial Chemicals B.V (1) Acoustic Data Wireless Well Technology (2)	Utilizing Wireless Acoustic Monitoring for Optimising Brine Extraction Operations
S. Patzer[1]; C. Reekers[2]	ESK GmbH (1) Storag Etzel GmbH (2)	Recompletion of oil caverns to create a monitoring annulus at the Etzel cavern storage facility
Bhavesh Ranka, P.E.; John Hatteberg	CUDD Well Control	Well Control Challenges and Risks in Hydrogen Wells: A Technical Overview
Arnaud Réveillère	Geostock	Review of the Main Mechanical Integrity Test (MIT, Tightness Tests) Techniques and Comparison of Their Uncertainties
Michael Rucker; John Lommler	WSP USA Environmental & Infrastructure, Inc.	Observations and Experience Learned from Remediation to Prevent Collapse of I&W Brine Cavity in Carlsbad, New Mexico
Leopoldo M. Ruiz Maraggi Lorena G. Moscardelli	Bureau of Economic Geology, University of Texas at Austin	The GeoH2 Web App: An Integrated Engineering and Geoscience Tool for Modeling Hydrogen Storage Within Salt Formations
Christopher J. Thompson; Charles R. Chabannes	4C Exploration Ltd United Brine Services	Application of Passive Seismic Imaging to a Gulf Coast Salt Dome
Lin Yuan; Hassan Dehghanpour	University of Alberta	Assessment of Possible Geochemical Reactions During Hydrogen Storage in Salt Caverns-A Lotsberg Case Study
Todd R. Zeitler; Tonya S.A. Ross; David B. Hart	Sandia National Laboratories	Comparison of Post-Drawdown Sonars with SANSMIC Model Predictions Following the Recent Unprecedented Oil Volume Movements at the SPR

Hydrogen Cavern Storage Considerations

Sunday, 1 October 2023

Instructor	Title	Objectives
Olaf Kruck (Socon)	Overview Hydrogen gas	Understanding Hydrogen, properties, safety considerations and detection, similarities to and differentiation from Natural Gas for Storage
Anna Lord (Sandia)	Hydrogen Industry/governmental drivers/regulatory issues (North America Perspective)	Understand the drivers for the hydrogen push and specific business drivers and regulatory environment. (Gov. incentives, hydrogen hubs, overview/outlook for current/future projects)
Yvan Charnavel (Storengy)	Hydrogen Industry/governmental drivers/regulatory issues (European/other Perspective)	Understand the drivers for the hydrogen push and specific business drivers and regulatory environment. (Gov. incentives, hydrogen hubs, overview/outlook for current/future projects)
Sophie Minas (WSP)	ACES Project	Overview of Hydrogen Project in progress in UTAH
Gregoire Hevin/Patrick Roordink (Storengy/Gasunie)	HyPSTER project	Overview of pilot of hydrogen storage in a salt cavern
Paul Munsterman (LINDE)	LINDE Moss Bluff H2 Cavern	Overview of and lessons from Existing Cavern
Kurt Looff/Anna Lord (Texas Brine/Sandia) combined	Geological Considerations for Hydrogen Caverns	Potential geological influences for hydrogen vs nat gas service
Sam Vogeli RESPEC	Geomechanical Considerations for Hydrogen Service	Potential geomechanical considerations for hydrogen vs nat gas service
Joel Nieland/Benoit Brouard (RESPEC/Brouard) combined	Cavern Operations/ Thermodynamics	Modeling of cavern thermodynamics, gas nominations (Differentiation from Natural Gas) Software examples
Hippolyte Djizanne (INERIS)	Blowout Modeling	The modeling of the subterraneous and aerial parts of a blowout from a hydrogen storage cavern
Dr. Brennan Domec (Expro)	Casing and welding concerns	Considerations for casing specifications, material, welding for hydrogen service
Barry Roberts (Sandia)	Sealing (Cement, Elastomers, Threaded connections)	Overview of current status of cementing technologies, elastomer concerns and suitable material selections, threaded connections
Brandon Lampe/Rene Schneider (Agapito/DEEP/KBB) combined	Regulations (North America/Europe)	Overview of regulations for Hydrogen caverns, including safety requirements
Joel Warneke/Arnaud Reveillere (CSI/Geostock) combined	Completions/conversions/MIT (North American/European Perspective)	North American/European typical completions, MIT considerations, regulatory considerations (Plus microbial considerations[CSI])
Heike Bernhardt (DEEP/KBB)	Repurpose of Existing Caverns	Evaluation of deciding factors for repurposing existing caverns for hydrogen service