SINRI2025 WILHELMSHAVEN | GERMANY

## **CONFERENCE SCHEDULE**

All times in Central European Standard Time (CEST)

### Saturday, 26 April

8:00 AM -12:30 PM 1:00 - 4:30 PM RESEARCH COMMITTEE MEETING LEADERSHIP MEETING

### Sunday, 27 April

8:00 AM -5:00 PM

**SMRI TECHNICAL CLASS:** Solution Mining (Optional with additional charge; repeated from Fall 2024 conference)

### Monday, 28 April

8:00 –10:00 AM	BUSINESS MEETING Members Only	
10:30 AM-5:00 PM	TECHNICAL PAPER PRESENTATIONS	
10:00 AM-2:00 PM	FRIENDS & SPOUSES WALKING TOUR	
5:45PM-11:00PM	MONDAY EVENING NETWORKING EVENT Optional; additional charge	

### Tuesday, 29 April

8:00 AM-5:00 PM	TECHNICAL PAPER PRESENTATION
9:00 AM-4:00 PM	FRIENDS AND SPOUSES TOUR

### Wednesday, 30 April

8:00 AM-5:00 PM	FIELD TRIP 1:	NWKG Oil Storage Facility & 'ilhelmshaven Boat Cruise
8:00 AM-5:00 PM	FIELD TRIP 2:	Oil and Gas Storage Facility Storag Etzel, Friedeburg & NWO Oil Tank Farm, Wilhelmshaven
8:00 AM-5:00 PM	FIELD TRIP 3:	EWE Gas Storage Facility Huntorf & Uniper CAES Plant Neuenhuntorf

## CONTACT

### **CONFERENCE ASSISTANCE**

SMRI Membership Issues

John Nadeau Executive Director +1 518-579-6587 jnadeau@solutionmining.org

#### **Registration Assistance**

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

### **PROGRAM QUESTIONS CONTACT**

Program Chair 2025

Nils Skaug WSP USA +1 281 589 5846 nils.skaug@wsp.com

Assistant Program Chair 2025

Dr. Arnaud Réveillère Geostock +33 6 78 16 20 18 arnaud.reveillere@geostock.fr

### **CLASS QUESTIONS CONTACT**

Technical Class Chair 2025 **Mr. Dirk Zapf** Secretary-Treasurer Leibniz University of Hannover - IUB +49 511 762 2590 dirk.zapf@igth.uni-hannover.de

**Research Coordinator** 

#### Tim Bauer +1 281 435 9753 tbauer@solutionmining.org

**CONFERENCE ANNOUNCEMENT** 

STRING WILHELMSHAVEN | GERMANY

**REGISTRATION INFORMATION** 

## **IN-PERSON ATTENDEES**

All conference attendees must be in the SMRI database and register online in advance, with payment required for confirmation. Non-technical guests must be registered as "guests" before finalizing the online payment. Event space is limited. The delegate registration fee includes access to Sunday Icebreaker, breakfast, AM/PM breaks, and Monday and Tuesday lunches. Registering after 4 April incurs a \$250 additional charge, subject to space availability.

## **REMOTE ATTENDEES**

SMRI plans to broadcast the Wilhelmshaven meeting in a hybrid format. The same platform as previous events will be used, and details will be shared closer to the conference date. Virtual attendees must register separately with a link on the registration page. The remote delegate registration fee is the same as in-person rates, covering live feed broadcast, on-demand videos, and a file of all presented papers. Register before 18 April to avoid additional \$250 charge.*The Technical Class will be live-streamed only and not available on-demand afterward.* 

### conference pricing

MEMBER COST: \$700 (\$600 w/o Monday Night Event)

NON-MEMBER COST: \$1,200 (\$1,100 w/o Monday Night Event)

Discounts available for Class Instructors and one Speaker per paper. University students contact John Nadeau (<u>jnadeau@solutionmining.org</u>) to apply for discounted registration.

### registration dates

**12 FEBRUARY** Member registration begins

**12 MARCH** Non-member registration begins

> **4 APRIL** Registration ends; no refunds after this date

# **HOTEL & TRAVEL DETAILS**

#### HOTEL

#### **Atlantic Hotel Wilhelmshaven**

Jadeallee 50, 26382 Wilhelmshaven, Germany

#### **Book the Atlantic Hotel Here**

SMRI RATERESERVATIONS185.00 EU+49 04421/733 38-162veranataltung.ahw@atlantic-hotels.de

### AIRPORT

Wilhelmshaven is 61 miles from Bremen Airport (BRE). Bremen Hbf (train station) is a 10-minute drive from the airport and about 1.5 hours from Wilhelmshaven.

### OVERFLOW HOTEL B&B Hotel Wilhelmshaven

Jadeallee 100, 26382 Wilhelmshaven, Germany

#### RESERVATIONS

+49 (0)4421 / 755792-0 Group Code: 882442

The Atlantic Hotel Wilhelmshaven is nearly full. Other hotels within a 10 min. walking distance include: Hotel Banterhof, Beans Parc Hotel Jade, Wilhelms Haven Hotel, and Neubau Wohnungen.



## 

Sponsorships help defray costs of hosting conferences, keep conference fees affordable, and allow more of member dues to be directed towards active research. Members or non-members may be sponsors. Current sponsorship information is available <u>online</u> or contact Rachel Cunningham (<u>rcunningham@solutionmining.org</u> or +1713-724-3342) for more information. No commercial advertising is accepted, but SMRI will acknowledge contributions of all sponsors.

#### Thank you to our sponsors of the Spring 2025 Wilhelmshaven Conference!







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## **TECHNICAL CLASS INFORMATION**

## TECHNICAL CLASS Solution Mining

### SUNDAY, 27 APRIL | 8 AM - 5 PM

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. Solution Mining was chosen as the topic for the Technical Class for Fall 2024 and Spring 2025 based on a survey by SMRI leadership to members.

The SMRI has continued to be a leader in solution mining concepts with many research projects and technical presentations over the past 50 years. To outline this historical knowledge and provide further insight into these concepts, the SMRI has proposed a tentative list of topics for the Technical Class including:

- Theories regarding leaching and modeling
- Geological impacts on control of mining/developing a leaching concept
- Mining of non-halite materials
- Well hydraulics, hanging string design, and flow rates
- Overview of simulation software (SALGAS, SANSMIC, UBRO4, & others)
- Various case studies

### technical class registration fees

MEMBERS \$400

MEMBER REGULATOR \$200

> NON-MEMBERS \$650

NON-MEMBER REGULATORS\* \$400

> STUDENTS (SUBJECT TO SPACE) \*No Charge

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.

## FUTURE Conferences

Fall 2025

28 Sept -1 Oct Wichita, Kansas, USA

## Spring 2026

**26 - 29 April** Edinburgh, Scotland

**CONFERENCE ANNOUNCEMENT** 

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## **ICE BREAKER**

#### Sunday, 27 April | 6:30 - midnight

Join SMRI friends in celebration of our 60th Anniversary. Guest will enjoy appetizers, wine, beer, coffee, tea, and soft drinks. It's a great way to kick off the Spring 2025 Wilhelmshaven Conference. No charge for delegates. \$75 fee for guests.

## MONDAY NIGHT EVENT

#### Monday, 28 April | 5:45 - 10:30 pm (optional) \$100/person | Max. 300 guests

Guests will visit the German Marine Museum, featuring exhibits in German and English, including the Destroyer "Molders," Speedboat "Gephard," Submarine "U10," and Mine Hunting Vessel "Weilheim." After the museum, guests will walk 350m to LaPatron for a European buffet. Barge passage to the museum starts at 5:45 pm; dinner is from 8:15 pm to 10:30 pm. Buses will return guests to the hotel.



## **FRIENDS & SPOUSES**

### Wilhemshaven Walking Tour

#### Monday, 28 April – 10:00 am- 2:00 pm

On Monday, the group will take a 2-hour walk around Wilhelmshaven, exploring its history and current happenings. Afterward, enjoy free time for lunch, shopping, or further exploration. The walk back to the hotel takes 15-20 minutes. Wear comfortable shoes and dress accordingly.

#### **Oldenburg Bus Tour**

#### Tuesday, 29 April – 9:00 am-4:00 pm

Join local guide Alke-Lowin Acht for a 2-hour tour of Oldenburg, including the City Center and Castle Garden. Afterward, enjoy lunch at Ratskeller, located in the town hall cellar. You'll have free time for exploration or shopping before the bus departs for Wilhelmshaven, arriving by 4 pm.

15 persons max. \$20 per person.

20 persons max. \$50 per person.

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## **WEDNESDAY TECHNICAL FIELD TRIPS**

### **FIELD TRIP 1**

NWKG Oil Storage Facility & Wilhelmshaven Boat Cruise

#### MAX CAPACITY: 50

**COST:** \$35 (all inclusive of transportation from/to hotel to the facilities, guided tours, lunch)

#### ANTICIPATED TIME: 8:00 am - 5:00 pm.

Nord-West Kavernengesellschaft mbH (NWKG) based Wilhelmshaven is one of the largest cavern operators in Europe storing around 15 million cubic meters of crude oil and mineral oil products for the Petroleum Stockpiling Association. NWKG operates further cavern locations at Bremen-Lesum, Sottorf near Hamburg and Heide. Under the background of decarbonization and change of the energy system NWKG is actively working on the preparation of conversion of their storage sites for a future hydrogen storage.

The site program will include a guided tour at the NWKG premises and the presentation of technical aspects developed for the site (e.g. oil/hydrogen wellheads, cavern simulator tour and virtual 3D geological tour). A BBQ will be served for lunch at the NWKG site.

In the afternoon there will be a boat tour starting from Hooksiel along the coast at Wilhelmshaven. The boat will be passing the Floating Storage & Regasification Unit (FSRU), a power plant, the oil and the navy ports. The final destination of the cruise is the Atlantic hotel.

#### **FIELD TRIP 3**

EWE Gas Storage Facility Huntorf and Uniper CAES Plant Neuenhuntorf

#### MAX CAPACITY: 30

**COST:** \$90 (all inclusive of transportation from/to hotel to the facilities, guided tours, lunch)

#### ANTICIPATED TIME: 8:00 am - 5:00 pm.

EWE GASSPEICHER GmbH is one of the largest storage operators in the Germany and Europe. A capacity of around 2 billion cubic meters of working gas is stored at four facilities in Huntorf, Nüttermoor, Jemgum and Rüdersdorf. Part of the the field trip will be a visit of the cavern storage facility at Huntorf where EWE is operating 7 gas storage caverns. EWE is planning to convert one cavern for hydrogen storage in the next years.

The Huntorf power plant is a combined compressed air energy storage and gas turbine power plant operated by Uniper Kraftwerke. When it was commissioned in 1978, the power plant was the first commercially used compressed air energy storage in the world. The compressed air for operation of the power plant is stored in 2 nearby salt caverns.

The site program will include presentations about the facilities and guided tours. Lunch will be provided between the both visits in a nearby restaurant.

#### FIELD TRIP 2 Oil and Gas Storage Facility Storag Etzel, Friedeburg & NWO Oil Tank Farm, Wilhelmshaven

#### MAX CAPACITY: 50

**COST:** \$90 (all inclusive of transportation from/ to hotel to the facilities, guided tours, lunch)

ANTICIPATED TIME: 8:00 am - 5:00 pm

STORAG ETZEL GmbH is the largest independent provider of cavern storage in Germany. The company is building, maintaining and leasing underground storage capacity for gas and oil at the Etzel site since 1971. Currently, around 3.9 billion cubic meters of gas are stored in 51 caverns and over 10 million cubic meters of crude oil can be stored in a further 24 caverns. STORAG is working on the preparation of the site for potential future hydrogen storage as part of the H2CAST project.

The site program will include a presentation about the facilities and a guided tour at the STORAG premises. Lunch will be provided at the STORAG site.

In the afternoon, a visit to the tank storage facility of NWO (North West Oil) at the coast close to Wilhelmshaven is planned. The tank storage farm is wherefrom the oil transport pipelines to/from Storag and NWKG start/end and oil tankers are loaded/unloaded.

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## TECHNICAL PAPER LIST WITH ALL AUTHORS Page 1 of 2

Author(s) **Organization(s)** Title Vincent Barrere, Arnaud Réveillère, Geostock Mechanical Integrity Tests in Salt Caverns: Modeling of the Mehdi Karimi-Jafari Leakage of Nitrogen, Hydrogen and Methane Through a Given Leakpath to Support Tests Interpretation Matthias Brandt<sup>1</sup>, Tobias Fabig<sup>1</sup>, Eddy Institute for Geomechanics<sup>1</sup>, Fast Multicyclic Storage of Hydrogen in Salt Caverns Kuperus<sup>2</sup>, Jeroen Dirven<sup>2</sup> Nederlandse Gasunie N.V.<sup>2</sup> Isabelle Tézenas, Jean-Paul Crabeil, FLODIM 10 Years of EZ Cutter Experience, a Proven Contribution to Stéphane Walrave, Thibaut Crabeil Salt Cavern Development Katarzyna Cyran, Tomasz Tobola, AGH University of Krakow Correlation Between Macro- and Micro- Mechanical **Pawel Kaminski** Behavior of Rock Salt Under Uniaxial Compression Sabine Donadei, Amirhossein Enayati, Huntorf Compressed Air Storage Power Plant Adjustment Uniper Energy Storage GmbH Saeed Izadi, Uwe Krüger of Storage Performance and Capacity in Line with the Requirements of the Energy Transition Hajar Habbani<sup>1</sup>, Hippolyte Djizanne<sup>1</sup>, Ineris<sup>1</sup>, Laboratoire Navier<sup>2</sup>, Brouard Thermomechanical Analysis of Wall Spalling in Salt Caverns Amade Pouya<sup>2</sup>, Benoit Brouard<sup>3</sup> Consulting<sup>3</sup> for Gas Storage: Insights from DISROC Fracture Modeling. Gregoire Hevin<sup>1</sup>, Hippolyte Djizanne<sup>2</sup>, Storengy SAS<sup>1</sup>, Ineris<sup>2</sup>, ESK GmbH<sup>3</sup>, HyPSTER Project - Results of the Pilot of salt Cavern Maurice Schlichtenmayer<sup>3</sup>, Benoit Brouard Consulting<sup>4</sup> Hydrogen Storage in France **Brouard**<sup>₄</sup> Silvan Hoth<sup>1</sup>, Patryk Tomaszewski<sup>2</sup>, Equinor ASA<sup>1</sup>, AtkinsRéalis<sup>2</sup>, SSE Aldbrough Hydrogen Storage - Legacy Data for New Hendrik Wilke<sup>2</sup>, Farideh Sarikhany<sup>1</sup>, Thermal<sup>3</sup> Caverns in Deep Bedded Zechstein Salt Heinz Michael Springer<sup>1</sup>, Dirk Knaust<sup>1</sup>, Janiche Beeder<sup>1</sup>, Christopher McMichael<sup>2</sup>, Fritz Wilke<sup>2</sup>, Jamie Slingsby<sup>3</sup>, Victoria Spooner<sup>3</sup> Christian Jakob<sup>1</sup>, Tobias Pinkse<sup>2</sup>, K-UTEC AG<sup>1</sup>, REinvent Solutions B.V.<sup>2</sup>, The Bekendam-Jakob-Pinkse (BJP) Subsidence Prognosis Algorithm for Migrating Salt Caverns in a Bedded Salt Marinus den Hartogh<sup>3</sup>, Els Wijermars<sup>3</sup>, Nobian Industrial Chemicals<sup>3</sup> Paul Oonk<sup>3</sup>, Siebe Viersen<sup>3</sup> Deposit near Hengelo, The Netherlands Maximilian O. Kottwitz<sup>1</sup>, Tobias S. smartTectonics GmbH<sup>1</sup>, 3D THM-Coupled Simulations of Low-Stress Creep Baumann<sup>1</sup>, Joyce Schmatz<sup>2</sup>, Anton A. Microstructure and Pores GmbH<sup>2</sup>, Experiments Using Digital Twins of Heterogeneous Rock Salt Popov<sup>1</sup>, Benoit Brouard<sup>3</sup>, Richard R. Brouard Consulting<sup>3</sup>, Nobian Bakker<sup>4</sup>, Marinus den Hartogh<sup>4</sup> Industrial Chemicals BV<sup>4</sup> PSE Engineering<sup>1</sup>. Wolfgang Littmann<sup>1</sup>, Gökalp M.ŞENER<sup>2</sup> A Case Study of Salt Cavern Leaching Simulation, Using BOTAS Petroleum Pipeline Corp.<sup>2</sup> Cartesian Grids and Multiple Wells

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## TECHNICAL PAPER LIST WITH ALL AUTHORS Page 2 of 2

Author(s) Organization(s) Title Jan Bernd Meyer<sup>1</sup>, Andre Gassner<sup>1</sup>, NWKG<sup>1</sup>, DEEP.KBB<sup>2</sup> Transforming an Oil Cavern Field for Hydrogen Storage Johannes Brüning<sup>1</sup>, Jonas Hase<sup>2</sup>, Jens with Insights from the Rüstringen K410 Langer<sup>2</sup>, Sophie Emmerlich<sup>2</sup>, Malte Simon<sup>2</sup>, Janine Langer<sup>2</sup> Gesa Netzeband<sup>1</sup>, Helen Werner<sup>1</sup>, Nicole DGMK e.V.<sup>1</sup>, DEEP.KBB GmbH<sup>2</sup>, Uniper Subsurface Expertise and Joint Research - the DGMK Grobys<sup>1</sup>, Heike Behrendt<sup>1,2,</sup> Roman Recipe for a Successful Transformation of Energy Storage Energy Storage GmbH<sup>3</sup>, PGR & Przyrowsky<sup>1,3,</sup> Jürgen Rückheim<sup>1,4,5</sup> Permitting Consultant<sup>4</sup>, Vermilion Energy Germany GmbH & Co. KG⁵ Patrick Roordink<sup>1</sup>, Fraser Murray<sup>2</sup>, Bert Nederlandse Gasunie N.V.<sup>1</sup>, Evaluation of Downhole Completion Technology and De Vries<sup>2</sup>, Darrell Adkins<sup>2</sup>, Arpana Halliburton<sup>2</sup> Material Samples Following a Successful Underground Verma<sup>2</sup>, Sandeep Thatathil<sup>2</sup>, Shashwat Hydrogen Storage Demonstration in the Netherlands Shuckla<sup>2</sup> RESPEC Matteo Scapolan, Sophie Minas Uncertainty Propagation Method Applied to Nitrogen-Brine Interface, Mechanical Integrity Test Analysis Thomas Schicht, Tobias Brestrich, Julia K-UTEC AG Salt Technologies Concept and Implementation of Seismic Monitoring in Salt Wondrak and Potash Cavern Fields Maurice Schlichtenmayer<sup>1</sup>, Michael ESK GmbH<sup>1</sup>, Ineris<sup>2</sup>, Storengy SAS<sup>3</sup> Impact of Infrastructural Constraints on the Potential for Glöckner<sup>1</sup>, M. Rockenschaub<sup>1</sup>, Andreas Hydrogen Storage in European Countries Bannach<sup>1</sup>, Hippolyte Djizanne<sup>2</sup>, **Gregoire Hevin<sup>3</sup>** Joyce Schmatz<sup>1</sup>, Mingze Jiang<sup>1</sup>, Eva Microstructure and Pores GmbH<sup>1</sup>, On the Generation of 3D Microstructural Models to Analyze Wellmann<sup>1</sup>, Tobias Baumann<sup>2</sup>, Benoit smartTectonics GmbH<sup>2</sup>, Brouard Creep and Permeation Behavior though Digital Twin Brouard<sup>3</sup>, Richard R. Bakker<sup>4</sup>, Marinus Consulting<sup>3</sup>, Nobian Industrial Simulations den Hartough⁴ Chemicals B.V.<sup>4</sup> A.J. Smit, P.A. Fokker Nedmag Pre-Abandonment Mg-Salt Cavern Monitoring for Leak-off Events Gion Strobel, Annette Lenze, Uniper Energy Storage GmbH Prediction of Microbial Impurities During Hydrogen Storage Catharina Lesche, Maxim Steinin Salt Cavern Khokhlov **Ryan Vickers** Texas Brine Company, LLC Replacing Intermediate Casings with Large Diameter Liners to cost Effectively Reduce Downhole Risk Isothermal Compressed Air Energy Storage (I-CAES) in Or Yogev<sup>1</sup>, Tzvi Joshua<sup>1</sup>, Dror Tapiero<sup>1</sup>, Augwind<sup>1</sup>, Mole Underground Tjeerd Koopmans<sup>2</sup> Projects and Consultancy<sup>2</sup> Solution Mined Salt Caverns

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## **TECHNICAL CLASS SCHEDULE**

Time	Instructor	Title	Objectives		
8:00		Technical Class Introduct	tion: Tim Bauer/Dirk Zapf		
8:10	Charles Chabannes Texas Brine Company, LLC	General Introduction to Solution Mining	Overview of Mining for Mineral Production and Storage overview. NaCl, KCl salts, sulfates, etc; gas and liquid storage.		
8:30	Yvan Charnavel Storengy	Theory of Leaching and Modeling	Basic science of solution mining		
9:00	Hendrik Wilke AtkinsRéalis	Solution Mining as Part of Cavern Project Development	Optimization of cavern development (leaching) by coordinated discipline integration and evaluation. (with examples and exercises)		
10:00	MID-MORNING BREAK: Coffee/Tea, Refreshments (20 Mins)				
10:20	Gerald Ziegenbalg IBZ-Salzchemie GmbH & Co. KG	Solution Mining as Part of Cavern Project Development (cont.)	Selected solid-liquid phase equilibria examples and application.		
11:30	Yvan Charnavel Storengy	Simulation Software Tools Overview (SALGAS/UBRO/OTHERS Overview of Modeling)	What's inside a solution mining software; historical review of evolution of software, applicability and disclaimers		
12:00	LUNCH BREAK: Included with Class Registration (1 Hour)				
1:00	Arnaud Reveillere Geostock	Well Hydraulics, Hanging String Design, Flow Rates	Review of Physical well/flow/cavern considerations during mining.		
1:30	Sebastiaan van der Klauw ERCOSPLAN GmbH	Mining of Non Halite Minerals, K/Mg Salts, Sulfates	Discussion and overview of impacts on dissolution from differing materials.		
2:00	Gary Jones Leaf River Energy Center LLC	Case History – Initial Leaching, Re-Leaching and Solution Mining Under Gas	Focus on Solution Mining Under Gas(SMUG) application, example and discussion.		
2:30	Dan Bach Texas Brine Company, LLC	Case History - Gulf Coast Salt Dome Cavern	Using Ubro for Asymmetrical Mining in Gulf Coast Salt Domes		
3:00		MID-AFTERNOON BREAK: Coff	ee/Tea, Refreshments (30 Mins)		
3:30	Heike Bernhardt & Jens Langer DEEP.KBB GmbH	European Domal and Bedded Salt Cases	Review of Domal and Bedded salt in Europe, unique characteristics and examples of cavern development		
4:15	Wilfred Brandt	Solution Mining Field Closure	Challenges and Solutions In Closure Operations and Field Monitoring		
4:40	Kiko Friguglietti Sabine Storage & Operations, Inc.	Case History Issues With Mining (Lessons Learned)	Review of several examples of recent and historical solution mining impacts/issues		
5:15		Tim Bauer: Technical Cl	ass Concluding Remarks		