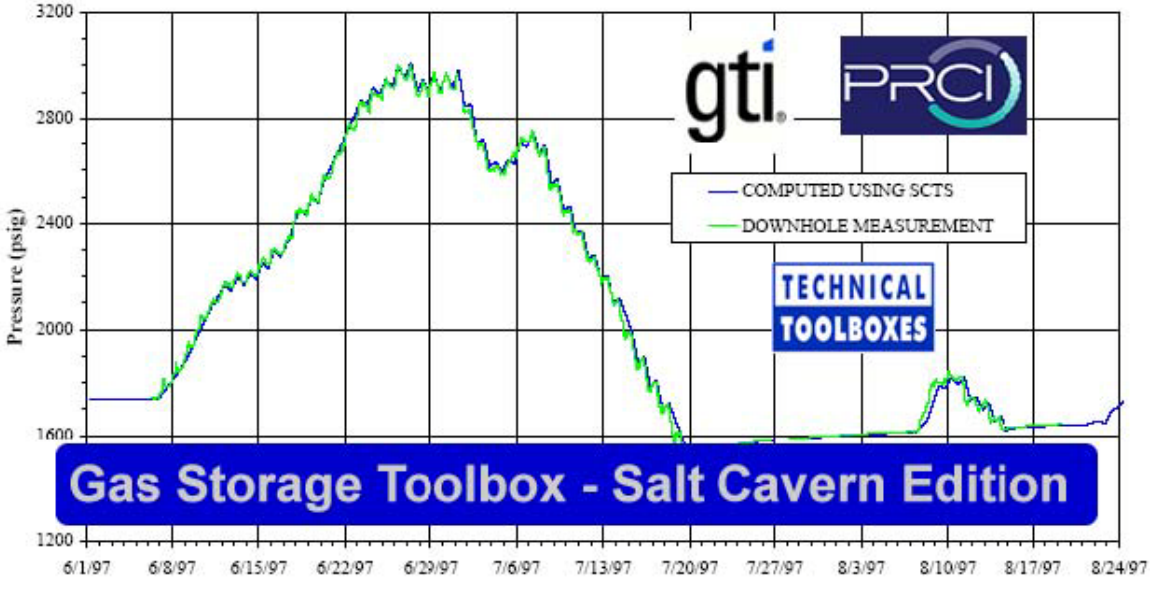

Salt Cavern Gas Storage Toolbox (SCGS Toolbox)

- **Industry Need**
- **What is the Salt Cavern Gas Storage Toolbox (SCGS Toolbox)?**
- **What does it contain?**
- **References - Who made it, sponsored, produced and tested it?**
- **Who would use it?**
- **Benefits to the user**
- **What is the price and what are the terms of use?**
- **How do I order?**

Industry Need

The National Petroleum Council, the Energy Information Agency and other organizations have completed recent studies that predict a need for an increase in storage capacity – particularly for flexible (short term) storage services, Worldwide. Improved technology can make fulfilling this need less expensive for operators and consumers alike. In addition regulatory scrutiny on all phases of the energy industry, in all major worldwide energy consuming nations, have made operational integrity increasingly important and has increased the costs associated with maintaining the integrity.

The **Salt Cavern Gas Storage Toolbox (SCGS Toolbox)** was prepared to meet worldwide industry needs as follows:

- The need to develop additional capacity at the lowest possible cost.
- The need to increase the flexibility of storage services available to meet market demands for short-term services.

- The need to maintain and improve system reliability and safety. This includes examining the effects of projected increases of non-traditional supplies (including LNG) on storage operations.
- The need to manage costs to protect customers and improve competitiveness
- The need to respond to increased regulatory pressures – ensuring that new regulations are based on sound science.

What is the Salt Cavern Gas Storage Toolbox (SCGS Toolbox)?

The **Salt Cavern Gas Storage Toolbox (SCGS Toolbox)** is a suite of applications (software and electronic documents) used to meet the technical and economic needs of the gas industry, specifically in the area of Salt Cavern Gas Storage. Salt caverns are becoming increasingly popular as storage vessels for large volumes of high-deliverability compressed natural gas.

What does it contain?

The **Salt Cavern Gas Storage Toolbox (SCGS Toolbox)** contains a state-of-the-art mathematical simulator (Salt Cavern Thermal Simulator Edition 2.0) as well as five (5) engineering design and operational integrity reports:

- Design Guidelines for Mined Cavern Storage of Natural Gas
- Studies Relative to the Design of Salt Cavern of Natural Gas
- Geomechanical Analysis of Pressure Limits for Thin Bedded Salt Cavern
- Inventory – Migration – Deliverability in Underground Storage
- Technology Enhancements for Inventory Assessment and Integrity Testing

References - Who made it, sponsored, produced and tested it?

The **Salt Cavern Gas Storage Toolbox (SCGS Toolbox)** is the collaborative effort between three organizations:

Gas Technology Institute (GTI) – www.gastechnology.org
Pipeline Research Council International, Inc. (PRCI) – www.prci.com
Technical Toolboxes, Inc. (TTI) - www.ttoolboxes.com

TTI packaged the product and is responsible for marketing and support of the product. GTI and PRCI contributed Intellectual Property (IP) in the form of the original software and reports.

The contents of the **Salt Cavern Gas Storage Toolbox (SCGS Toolbox)** were sponsored, produced and tested by the following organizations:

Application Name/Description:	**Sponsor: Contractor:**
Salt Cavern Thermal Simulator (SCTS) Version 2.0	Gas Technology Institute (GTI) Sofregaz US (purchased by PB Energy Storage Services, Inc. in 2001) and subcontractors, Gaz de France and RESPEC
Design Guidelines for Mined Cavern Storage of Natural Gas	Pipeline Research Council International (PRCI) Lachel Hansen & Associates, Inc.
Studies Relative to the Design of Salt Cavern of Natural Gas	Various
Geomechanical Analysis of Pressure Limits for Thin Bedded Salt Cavern	Gas Technology Institute (GTI) Terralog Technologies USA, Inc.
Inventory – Migration – Deliverability in Underground Storage	Pipeline Research Council International (PRCI) University of Michigan
Technology Enhancements for (1) Inventory Assessment and Mechanical Integrity Testing of Gas-Filled Solution Mined Caverns and (2) Mechanical Integrity Tests of Solution Mining and Liquid Storage Caverns	Gas Technology Institute (GTI) ESK GmbH, Freiburg University of Mining and Technology, TiNNiT GmbH

Abstracts for each of the above referenced reports are available upon request or can be directly accessed from the Gas Technology Institute website (www.gastechnology.org) or the Pipeline Research Council International, Inc. website (www.prci.com).

Who would use it and why?

- **Design & Engineering** – Example; pre-feasibility studies, alternative detailed design simulations calculating transient wellhead pressures and temperatures, etc.
- **Gas Marketing & Operations** – Example; Feasibility calculations for meeting potential gas nominations, hydrate formation restrictions, etc.
- **Finance & Accounting** – Example; Inventory verification, true deliverability and remaining unrecoverable calculations, etc.

Benefits to the user:

- Calculation of transient wellhead pressures and temperatures
- Calculation of cavern pressures and temperatures
- Feasibility calculations for meeting potential gas nominations

- Evaluation of hydrate formation potential for possible gas nominations
- Inventory verification
- Calculation of compressor needs for meeting gas nominations
- Calculation of gas velocities.
- Much, much, more.

And most important to industry and operators; Reduced cost for increased gas storage capacity – The SCTS model has been demonstrated to allow lowering of gas pressures, increasing existing working capacities up to 20% with zero increase in cavern size. The key to optimizing salt cavern performance is to determine the minimum allowable gas pressure that will limit microfractures from coalescing and growing uncontrollably.

What is the price and what are the terms of use?

The **Salt Cavern Gas Storage Toolbox (SCGS Toolbox)** is sold as a single-user license for US$9,995 and includes the first year annual maintenance and support. Annual maintenance, update and support service is optional after year one and is priced at 20% of the License price. Annual and/or short term leases are available upon request, and Site and Corporate leases are also available. Please contact us for lease pricing.

How do I order?

To order contact us at sales@ttoolboxes.com or or call us at 713-630-0505.You can also complete the order form below and fax it to us at **713-630-0560**. Once your order is received a completed lease agreement along with the product will be shipped to you within 48 hours.

Salt Cavern Gas Storage Toolbox (SCGS Toolbox)	
Billing & Shipping	**INFORMATION**
DATE	
NAME	
TITLE	
COMPANY	
ADDRESS	
ADDRESS	
CITY, STATE, ZIP	
COUNTRY	
PHONE	
FAX	
EMAIL ADDRESS	