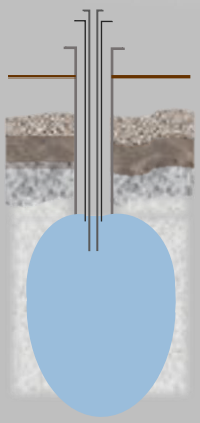
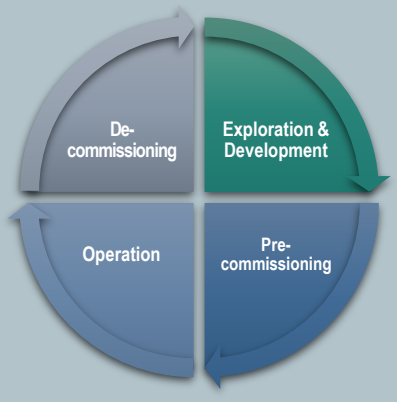
BIG GUNS ENERGY SERVICES

Your Trusted Partner in Salt Cavern GeoContainment™

Leader in subsurface GeoContainment™ evaluation services for the petroleum and mining industries in Canada.

Geocontainment™ is the containing of subsurface operations within their designed systems to prevent undesirable consequences. This concept is important to the design, construction and operation of subsurface caverns formed out of bedded salt deposits or salt domes typically through solution mining techniques. These caverns are commonly used for storage of hydrocarbons, renewable energy sources (such as hydrogen and compressed air) and greenhouse gases (as in the case of carbon sequestration), or for disposal of wastes. Properties of the salt and caprocks, cavern size and geometry, depth, operating pressures, casing design, and in-situ stress regime are key factors that impact the stability and integrity of a cavern.





BGES combines a multi-disciplinary Geoscience & Engineering team with experienced operations personnel to provide integrated solutions for optimizing and protecting your cavern assets. Our service offerings cover the entire lifecycle of a cavern – from initial assessments to cavern decommissioning.

A transparent process is maintained through every stage, from clear management of data from the field through laboratory testing, data input and development of 3D simulation model, to delivery of the final report as well as regulatory application development .

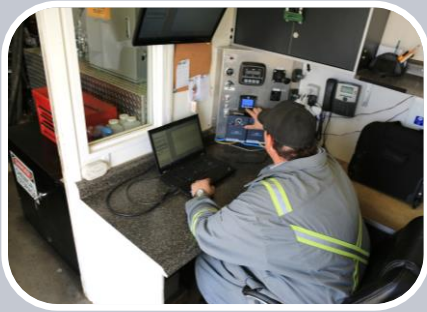
GEOCONTAINMENT EVALUATIONS

Salt & Caprock Core Management

To obtain high-quality data as inputs for the cavern model, BGES' core management begins with meticulous planning and wellsite core recovery overseen by experienced technical professionals. After careful cutting and preserving on location, the cores are transported using a specially-designed trailer to our geotechnical lab in Calgary.

Geotechnical Lab Testing

Geotechnical lab tests can generate essential inputs for cavern models. Our salt and caprock lab tests, including Constant Mean Stress Triaxial Compression (CMS) or Extension (CMT), Multi-Stage Creep (MSC), Brazilian Indirect Tensile Strength (BITS), and Unconfined Compressive Strength (UCS) tests, are designed to evaluate major elements of cavern behaviour, strength, stiffness and creep. Test program can be customized to meet any project's specific needs.



Mini-frac or DFIT

A mini-frac (or DFIT) is a cost-effective and reliable method to determine the salt and caprock formations' minimum in-situ stresses. At BGES, such delicate tests are conducted by specially-trained technicians using advanced injection units. A comprehensive test report will include detailed interpretation of results by a Professional Engineer.

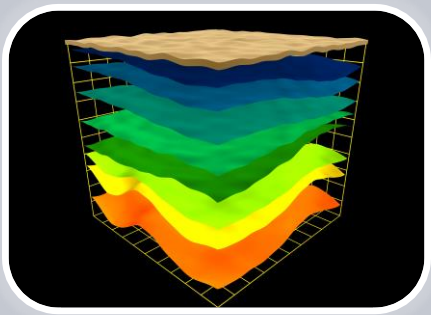
MIT & Interface Detection

BGES is proud to introduce our new & improved, patented MIT tool & methodology. Interface detection will be accomplished using a modified density tool that can yield more accurate measurement in the presence of foam or oil film, improve logging efficiency, and greatly reduce environmental or financial risks.

Sonar Surveys & Other Logging

BGES is highly experienced in performing logs/surveys for periodic evaluation of casing, cement and cavern integrity. These services include: casing inspection (Magnetic Image Defectoscope or MID), radial cement bond log (RCBL), sonar survey, temperature survey, pressure gradient survey, and compensated neutron log with gamma ray & CCL, etc.

Working in close partnership with SOCON, BGES can conduct SOCON's world-renowned sonar surveys in open or cased caverns across Canada, in various media including brine, water, air, and gaseous & liquid hydrocarbons.



Modelling & Simulation

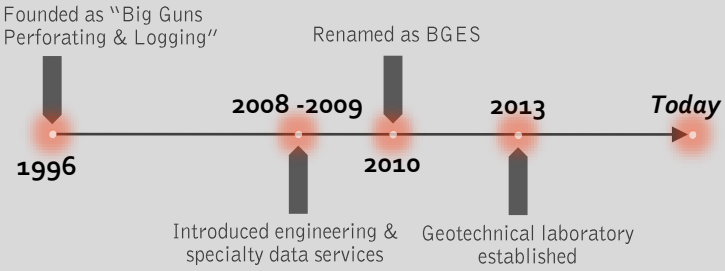
A mathematical model is established to predict the salt cavern development during leaching or to predict changes in stress field during operation as well as after decommissioning.

BGES' staged modelling approach allows evaluation at several stage gates: 1) development of 3D Mechanical Earth Model (3DMEM),
2) simulation of existing caverns, 3) simulation of new cavern, and 4) history match of new cavern & long-term prediction

COMPANY HISTORY

BGES is a one-of-a-kind and award-winning integrated geoscience, engineering, and data acquisition company.

Established in 1996 as a cased-hole wireline company, over nearly three decades, BGES has evolved into Canada's leading specialist in geoscience, engineering and data acquisition solutions for the energy and mining sectors. Our core mission is to leverage technical expertise and operational proficiency to mitigate safety, environmental, and financial risks.



Scientific

Expertise

Quality-Focused

BGES excels in merging science and practice, leveraging expertise, and prioritizing work quality through real-world experience, cross-disciplinary knowledge, R&D, technology, and advanced testing methods.

Integrated

Flexible

Cost-Effective

We provide cost-effective solutions by seamlessly integrating services, streamlining field operations, and offering customized, flexible options to meet specific requirements.

THE BGES ADVANTAGE

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