A satellite view of Earth from space, showing the Americas (North and South America) and surrounding oceans. The image is set against a black background. The text is overlaid on the left side of the image.

**THIS IS  
BECK  
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BEYOND ENGINEERING.**

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*BCCK provides high quality solutions – worldwide*

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**BCCK's Nitech™ NRU Technology**  
**Proven NRU Technology for the Gas Industry**

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# BCCK ENGINEERING, INC.

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## Overview:

1. Introduction of BCCK Engineering, Inc.
2. BCCK and G.I. Dynamics
3. BCCK NRU History with Nitech™
4. Nitech™ Advantages
5. Nitrogen Flood / Fire Flood Applications
6. Low Inlet Nitrogen Content Gas Streams
7. Siekierki Project, Poland
8. Questions



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# BCCK ENGINEERING, INC.

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**BCCK Engineering, Inc., is a 30 year old privately owned firm in the state of Texas (United States) specializing in providing high quality natural gas processing solutions for clients worldwide**

- **Licensors of patented Nitech™ nitrogen rejection process**
- **Developed proprietary high CO<sub>2</sub> removal processes and oxygen removal**
- **Helium recovery**
- **Maintains a complete staff of engineers, designers, technical support and financial specialists**
- **Most active NRU supplier in the world for more than 15 years**
- **Expertise includes fabrication facility, producing:**
  - **Code vessels (US and EU)**
  - **Skid fabrication**
  - **Cold box fabrication**



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# BCCK and G.I. Dynamics

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**BCCK Engineering and Global Industrial Dynamics (G.I. Dynamics) have joined forces to bring BCCK's patented Nitech™ technology into other parts of the world including:**

- Europe
- China
- Australia



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# BCCK ENGINEERING, INC.

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**BCCK project experience includes:**

- **NGL extraction**
  - **Custom turbo expander plants**
  - **Refrigeration plants**
- **High CO<sub>2</sub> removal**
- **Oxygen removal**
- **Cryogenic nitrogen rejection using patented Nitech™ process, including:**
  - **Integrated NGL extraction**
  - **Integrated helium extraction**
  - **Highly variable inlet nitrogen content**
  - **Low inlet nitrogen content permissible (< 10.0 mole %)**
  - **Treated natural gas streams to less than 1 % nitrogen**



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## BCCK 's NRU History with Nitech™

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Types of NRU projects BCCK has completed to date:

- **Siekierki tight gas project in Poland for Aurelian**
- **Naturally occurring low-BTU natural gas streams**
- **Integrated helium recovery projects**
- **Nitrogen floods (highly variable nitrogen contents)**
- **Fire flood associated gas**
- **Low inlet nitrogen content (just above pipeline specifications)**
- **Coal mine methane**



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## Nitech™ Design Advantages

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- **Non complex design - minimal major components with no cryogenic rotating equipment standard**
- **Low power consumption**
- **Small footprint**
- **Low compression requirements**
- **CO<sub>2</sub> tolerant - no treating required beyond the capability of readily available amines**
- **Variable nitrogen contents with only operator set point changes required**





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## Nitech™ Design Advantages (continued)

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- **High efficiency – hydrocarbon recovery typically in excess of 99%**
- **Environmentally friendly (only a small amount of methane in the vent stream)**
- **Quick restart**
  - **Cold restart from short shutdowns**
  - **Online and on spec – just restart associated compression**
- **Integrated NGL extraction, with high ethane recovery**
- **Integrated helium extraction as crude grade helium**
- **Integrated LNG production (one step nitrogen rejection to LNG)**



# Nitrogen Floods / Fire Floods

Both nitrogen and fire floods are used in order to enhance oil recovery. The basic difference is a fire flood injects air while a nitrogen flood injects near pure nitrogen.

- BCKK history with flood applications
  - 3 NRUs associated with nitrogen floods
  - 1 NRU associated with a fire flood



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# Nitrogen Floods / Fire Floods

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The requirements for a NRU associated with a flood type of project are:

- **Must be able to handle variable inlet nitrogen content**
  - **As field matures nitrogen content will increase over time**
  - **Nitech™ process accomplishes this without need for equipment modifications**
- **Integrated NGL extraction required**
  - **These facilities will process gas associated with oil / condensate production, therefore will contain high levels of C3+ hydrocarbons**
  - **Nitech™ process can integrate NGL extraction with high ethane recovery**



# North Dakota Fire Flood Nitech™ Facility

This NRU facility was a turnkey facility provided by BCCK in 2005, and includes the following:

- Wide range of inlet nitrogen, with upper limit design of 75 mole %, operates successfully today with 85 mole % inlet nitrogen content
- Integrated NGL extraction, with C3 recoveries in excess of 95%
- NGL fractionation providing HD-5 specification grade propane for local community utilization
- CO<sub>2</sub> removal, with integrated steam system
- Mole sieve dehydration



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# Low Inlet Nitrogen Content Gas Streams

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Historically, solutions for gas streams that were just out of pipeline specification with regard to nitrogen content (3-10% nitrogen) included:

- Pay a penalty for off-spec gas
- Blend gas to spec, if blend gas is available
- If associated with an NGL extraction facility, ethane may be blended with sales gas to meet the inert specification

Today, BCCK delivers economic solutions for processing low nitrogen gas streams:

- As a stand alone system behind the expander plant
- As an integrated part of the existing expander plant



# Low Inlet Nitrogen Nitech™ Facility

This facility was built by BCCK in 2006 processing a gas stream containing 6.0 - 8.0 mole % nitrogen



- Hydrocarbon recovery in excess of 99.9% as on spec sales gas
- Processes a slip stream to less than 1.0 mole % allowing the remainder to be bypassed and blended to maximum specification of 3.0 mole % nitrogen
- Operates today behind existing turbo expander plant in either ethane rejection or ethane recovery mode

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## Siekierki Project (Poland)

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**BCCK has been awarded all processing equipment for Aurelian's Siekierki project.**

- **Project located in Western Poland**
- **Gas source is high nitrogen stream from a tight gas formation**
- **BCCK's scope of responsibility includes:**
  - **Nitech™ NRU facility**
  - **Mole sieve dehydration**
  - **CO<sub>2</sub> removal (conventional amine)**
  - **Mercury removal**
  - **Sales gas compression**
- **Equipment set to be delivered to the job site late 2011**



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## Contact BCCK to learn more

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# 200 MMSCFD CO<sub>2</sub> / NRU / HeRU facility



# 200 MMSCFD CO<sub>2</sub> NRU / HeRU facility



# 200 MMSCFD CO<sub>2</sub> / NRU / HeRU facility

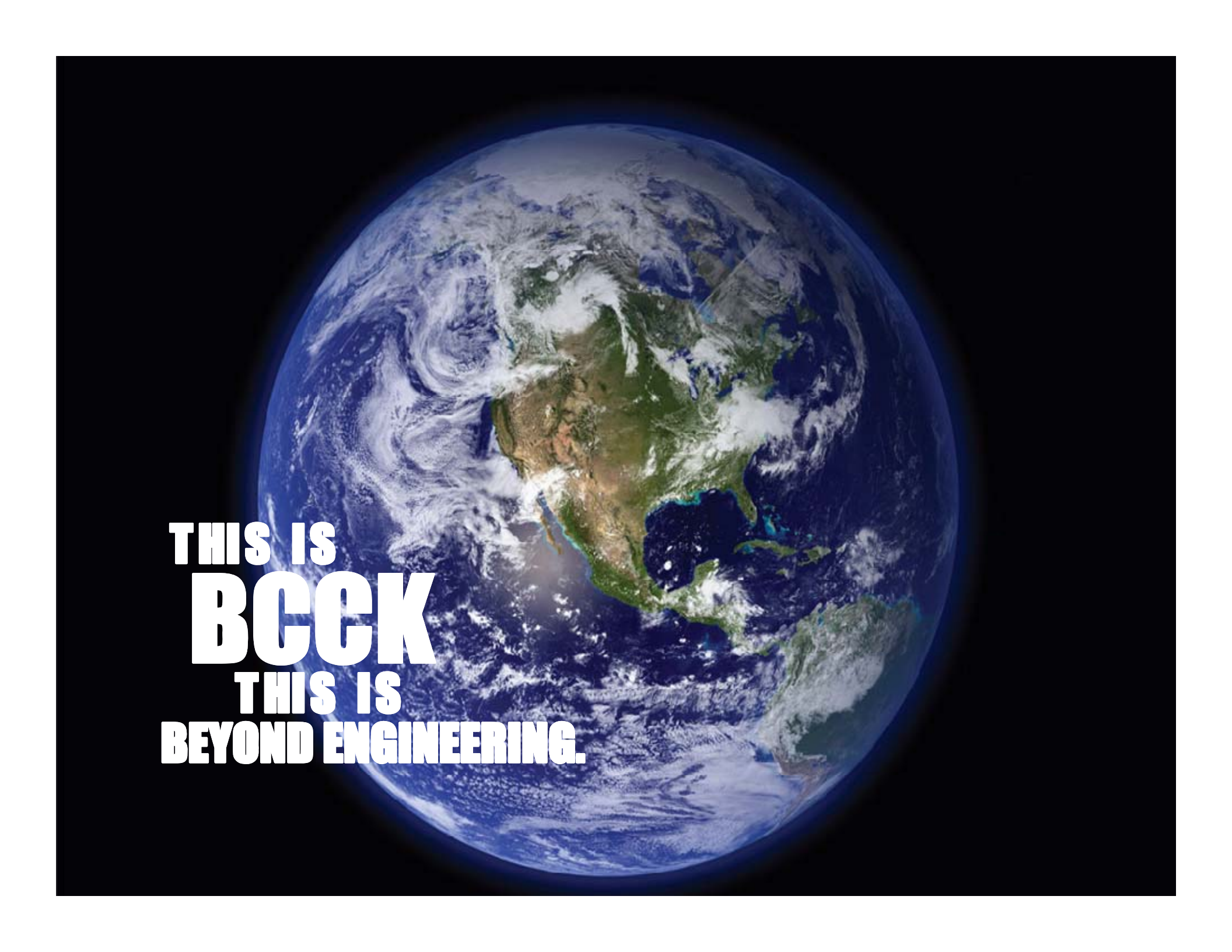


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# 200 MMSCFD CO<sub>2</sub> / NRU / HeRU facility

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