

Elba Island LNG Plant Installs Replacement DCS And Measurement System



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Engineers solved several technical challenges recently when the Elba Island LNG plant, off the Georgia coast, was recommissioned after 20 years of standby operation. A key challenge that was successfully met was replacing the plant's distributed control system (DCS) to optimize operations and safety. The plant's facilities include:

- An unloading dock equipped with berthing and mooring dolphins, and LNG unloading arms.
- Three double-walled LNG storage tanks with a combined capacity of approximately 1.2 million barrels of LNG or 4 Bcf gas equivalent.
- Regasification facilities with a daily design rate of 446 MMcf/d sendout through two 30-inch pipelines.
- Four standby electric generators rated at 11,200 kilowatts total.

There were considerable technical challenges associated with recommissioning the plant. It had been in standby for nearly 20 years. Among them was replacement of the Distributed Control System (DCS), on which this article will focus. Development of the replacement DCS started with these guidelines:

- Use proven instrumentation, hardware, and software to ensure that system installation and performance did not interfere with startup of the plant on the target date.
- Work with engineering consultants, suppliers, local contractors, and employees to overcome issues dealing with old, antiquated equipment and damage to equipment from ground settling (18 to 24 inches) due to plant being built on dredged spoil from the Savannah River.

- Use separate Distributed Process Controllers (DPC) for the process and hazard monitoring at each plant area to meet control and safety requirements, but select both from the same vendor to simplify network communications.
- Provide a sufficient number of Human Machine Interface (HMI) units both in the Control Room and throughout the plant to provide personnel an easy to operate and maintain system.
- Use Ethernet communications on a redundant fiber optic network, as Southern LNG planned from the start to use this industry standard protocol for networking.

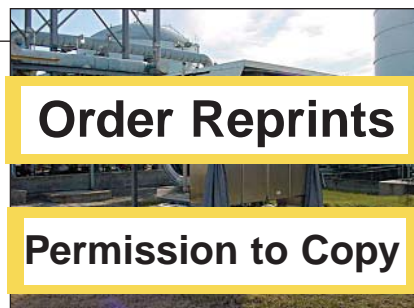
The DPC 3330 is responsible for flow calculations on up to four meter runs.

At each plant area, the primary functions of the process and hazard control systems are provided by separate Bristol Babcock DPC 3335s. Other major vendors selected by Southern LNG include Ross Systems who built the control panels, Yokogawa which provided smart transmitters, General Monitors which provided the flame and combustible gas sensors, Hirschmann which provided Ethernet switches and hubs, Instromet which provided ultrasonic flow meters, and Daniel which provided gas chromatographs.

Wonderware software is used at the HMIs, with software development and system integration for both the Bristol Babcock and Wonderware products provided by Strategic Industrial Solutions of Birmingham, AL with some assistance from Standard Automation of Houston.

DPC At System Heart

The DPC 3335 selected by Southern LNG features an Ethernet-ready CPU with 2 megabytes of memory. This unit is used extensively throughout Southern Natural Gas Co. and El Paso Corp. as a compressor unit controller and compressor station data concentrator/controller.



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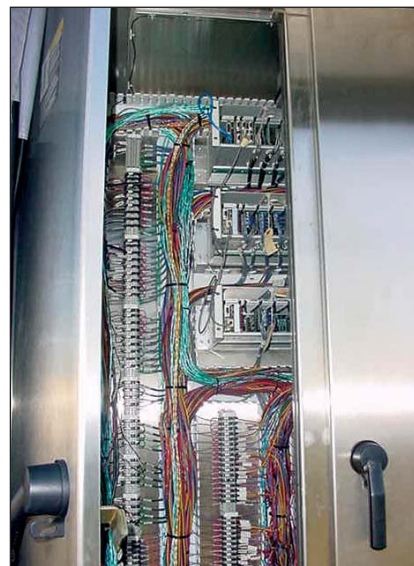
Local Control Panel LCP-264 serves the primary pumps and Compressor Building #1 area of the plant.

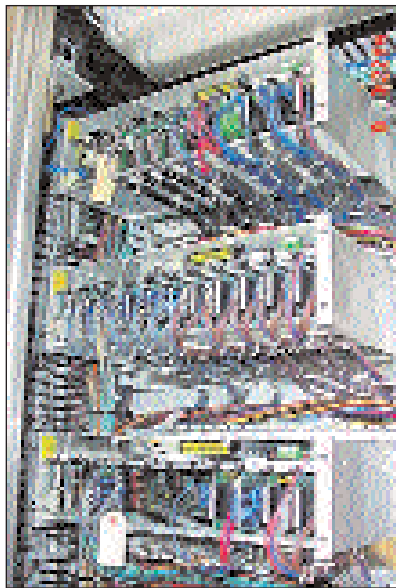
As a controller, the unit is responsible for all real time process or hazard system control and data communications with the HMIs over the fiber-optic-based BSAP IP network. The DCS network supports redundant communications. Via serial communication, the DPCs also gather data from other devices, such as tank gauge/level units, gas chromatograph controller, vaporizer control panels, compressor unit control panel and generator power monitors typically using the Modbus protocol.

At the Plant Sendout Meter Station, Bristol 3330s handle the ultrasonic flow meters, gas chromatograph controller, and RTU responsibilities for transmitting data to the SCADA Host at Southern Natural

Gas Co.'s pipeline control center in Birmingham, AL.

As a Gas Flow Computer, the DPC 3330 is responsible for flow calculations on up to four meter runs based on API specifications. Ultrasonic meters are used for station metering with two data inter-





faces between the meter and flow computer. The first is via pulse input, to satisfy custody transfer requirements, and the second is via serial link, to gather diagnostic information. Historical data storage includes hourly, daily, and weekly averages/totals. One of the DPC 3330s receives

compositional updates over a serial link using the Daniel Modbus protocol.

BSAP IP and BSAP protocols were selected for the plant DCS because these protocols offer a complete communications framework for the network of DPCs and HMIs. Real-time and historical data are transported over the network, as well as remote diagnostics and engineering support.

To facilitate communications, Bristol Babcock's' Open BSI software was integrated into the DCS to provide seamless polling. Communication with BSAP IP over a fiber-optic-based Ethernet network provides Southern LNG a high performance, distributed control network where real-time data is spontaneously reported to the control room.

In summary, the versatile RTU units have served Elba Island well with their processing power, communication capability, I/O adaptability, software configurability and environmental suitability, which has allowed Southern LNG to meet the needs of the plant control system.

Author's Note: *Rodney Kable was project manager for the recommissioning project controls and is now serving as Principal-Plant Support with Southern LNG at the Elba Island LNG facility.*

About The Company And The LNG Plant

Southern LNG Inc. is a subsidiary of Southern Natural Gas Co., part of the El Paso Corp. The Elba Island LNG Plant is situated on a private island owned by Southern LNG Inc. and zoned for heavy manufacturing. The plant site comprises approximately 140 acres of the 840-acre island.

The Elba Island Plant was completed in 1978 to unload LNG ships from Arzew, Algeria, and then regasify the LNG to deliver diversified gas supplies at the eastern end of Southern Natural Gas Co.'s market area. The plant operated until the early 1980s after which it was placed in standby status and LNG deliveries ceased.

Bechtel, Inc. designed and built the processing equipment and piping, and Chicago Bridge & Iron Co. designed and built the LNG tanks. The original dock was designed by Raymond Technical Facilities and built by Gulf Foundations, Inc. Southern LNG recommissioned the plant in 2001.