ENGINEERING SOLUTIONS FOR THE PROCESS INDUSTRY

VISION VENTURE™

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MOVING WATER IN AN OIL & GAS ENVIRONMENT REQUIRES PLANNING

Even in the current low-price oil and gas climate, operators need to plan and implement water management strategies to prepare for when prices increase and fracking activity resumes.

The completions operations of shale gas wells (fracking) require chemicals, sand, and large volumes of water. Oil and gas E&Ps have several options to supply this water to a well pad, with advantages and disadvantages to each method. Water can be trucked, pumped via above-ground or "temp" pipelines, or pumped via buried or "permanent" pipelines.

Pumps assist in moving water through above-ground and buried pipelines.

Trucking water is typically the most expensive supply method, with the highest per-barrel cost (42-gallon barrel). Depending on well pad access and proximity to water source, the supply rate from trucking can be low, restricting the number of well stages able to be completed in a day. Also, truck traffic, emissions, and road damage can be a nuisance to local communities. The advantage of trucking water is the ability to supply water with minimal capital spent on permanent infrastructure and a rapid mobilization of trucks if a source is secured. Trucking is preferred for small well pads, delineation wells, and areas where pipeline permitting and land acquisition is restricted.

Above-ground or temporary transfer is the most prevalent method of water transfer in the Appalachian Basin. Depending on the application, temporary transfer allows for high rate, short- to mid- distance pumping without many of the environmental and capital impacts of buried pipelines. Temporary pumps are used as energy in the system. There are a wide range of materials used for temporary piping – including Yelomine, high-density polyethylene (HDPE), and layflat hose. These lines can be quickly installed and relocated to adapt to changing operations schedules. Winter operations can be a challenge, and require additional heating equipment to prevent freezing and subsequent system failure.

Permanent pipelines require a higher capital cost but the per-unit cost is typically lower.

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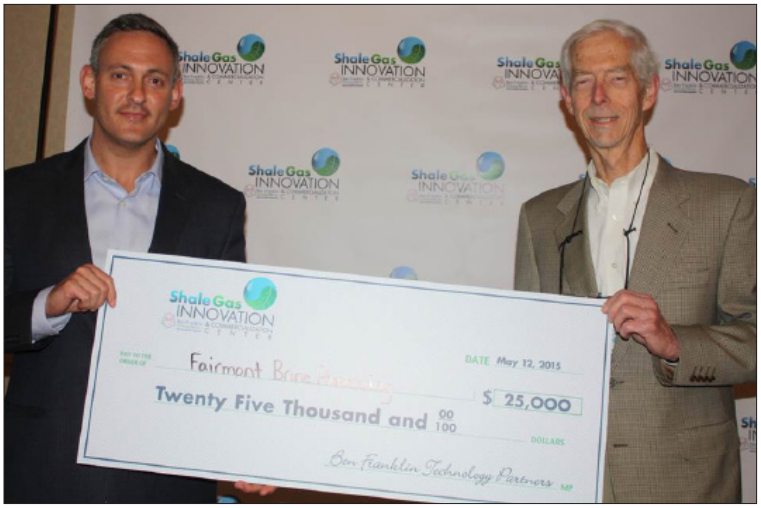
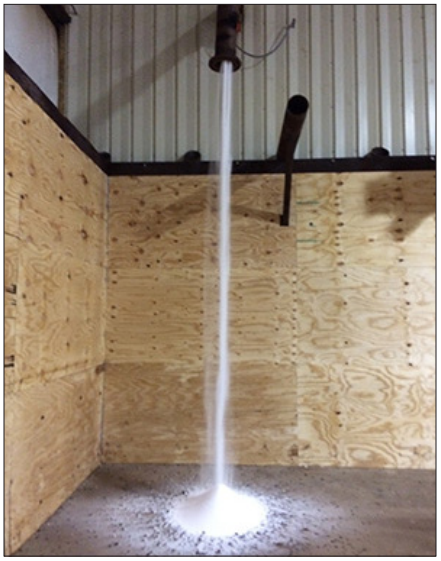
FAIRMONT BRINE PROCESSING CONTINUES TO MAKE STRIDES IN WATER TREATMENT

Congratulations to our friends at Fairmont Brine Processing (Fairmont) on winning the Shale Gas Innovation Contest run by the Shale Gas Innovation & Commercialization Center (SGICC). Fairmont's innovation was on display and was praised as they "identified a challenge the shale energy industry faces and developed an impressive solution ready to be implemented."



Fairmont Brine Processing accepts Winner's Check. Pictured from left are Brian Kalt, General Manager of Fairmont, and Carl Irwin of the WV TransTech Energy Research & Business Development Program.

By-products of Fairmont's patented multi-effect evaporation and crystallization process include distilled water, sodium chloride and calcium chloride.



Fairmont provides an environmentally responsible alternative to deep well injection. Through its patented multiple-effect evaporation and crystallization process, Fairmont is able to recycle all the wastewater produced in the natural resource extraction process and produce reusable products such as distilled water, sodium chloride and calcium chloride. Currently, Fairmont produces close to 100 dry tons per day of sodium chloride and 55 dry tons per day of calcium chloride as a clear brine fluid. Fairmont is the only plant to produce ASTM grade sodium and calcium chloride salts from a mixed salt brine feedstock.

Additionally, Fairmont and Tetra Technologies, Inc. (Tetra) have signed a 15 year agreement for the sales, marketing, and distribution of sodium and calcium chloride salts produced at the current Fairmont Brine Processing facility and all future facilities.

The excitement continues for Fairmont this autumn as they were recently selected to give an informational presentation on their process and facility to the United States Energy Association as they work in conjunction with the oil and gas industry to find an alternative to deep well injection. The presentation took place on October 1, 2015 in Washington D.C.

Fairmont Brine Processing represents a more environmentally responsible, and cost-effective solution to deep well injection. We wish our friends at Fairmont Brine Processing continued success in the future.

Trucks delivering flow back to the Fairmont Brine Processing site.

For more information please visit www.FairmontBrine.com, or contact Mr. Brian Kalt, General Manager, Fairmont Brine Processing at (412) 680-6244 or BKalt@fairmontbrine.com.

Pictured is a biogas conditioning system at a waste water treatment facility. Venture was contracted to perform a study evaluating a CHP system to generate hot water for heating and process use, and electrical power for the plant use. The biogas system is used to fuel reciprocating engine generators.

FEATURED PROJECT: BIOGAS STUDY FOR A WASTEWATER TREATMENT PLANT, CANADA

Venture Engineering & Construction, Inc. (Venture) was contracted to perform a study for biogas conditioning for the cogeneration portion of a Wastewater Treatment plant in Canada. The plant operates a CHP system to generate hot water for heating and process use, and electrical power for the plant use. This system uses 3 natural gas and biogas-fired reciprocating engine generators rated at 1.6 MW electric outputs each. A biogas conditioning system was also installed to provide properly conditioned biogas fuel to these engine-generators.

The Wastewater Treatment Plant is initiating an expansion that will substantially increase the amount of biogas available for power generation. This and other planned projects will roughly double the plant's existing electrical demand by 2020 and increase it by 3-4 times by 2040. The expansion includes the construction of a new Thermal Hydrolysis Process (THP) which requires steam for sludge pre-heating. The existing cogeneration equipment is not capable of producing steam required for the new THP process, nor is it capable of consuming all of the biogas that will be produced by the expanded plant. This will require modifications to the existing equipment and the addition of new equipment as well.

The steam required for the new THP system will be generated by a proposed 4 MW nominal CHP system. This system will consist of 1.4 MW Combustion Turbine Generator (CTG), and 1 Heat Recovery Steam Generator (HRSG) with all associated support equipment. The CTG will be designed to operate on 100% biogas, a blend of biogas and natural gas, or 100% natural gas, depending on the facility operating conditions. A natural gas powered steam boiler will be provided for back-up steam production in the event that the CTG/HRSG system is not operating.

The CHP facility is to be constructed on the property of the existing plant by expanding existing buildings. The plant will consume the majority of the electricity generated and all of the steam produced. Some limited power

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VENTURE NEWS

Recent Wins

- Previously award support work for an LFG facility to take samples, perform analysis, and provide recommendations. This will ultimately lead to a monthly care and maintenance contract.
- After submitting studies and recommendations, Venture won engineering design and CM services for two material transloading projects.

EMPLOYEE NEWS

Farewell & Good Luck Alex Ussia. Thank you for your contributions to Venture! Enjoy retirement and European Travels!

Upcoming Events

Halloween Costume Party & Chili Cook-off Contest, Oct. 30
Christmas Party, Dec. 12

Happy Birthday!

October
Amber Abraham
Rusco Inocencio
John Mandarino
Tracie Moniot
Don Olmstead
Kyle Snyder
Alex Ussia

November
Chris Bruce
Steve Fleming
Karl Hahn
Renée Kalnas
Brian Kalt
Lauren Klinefelter
James Marriott
Amanda Mihailoff
Tom Minsinger
Mike Ober

December
Thor Anderson

MANAGING WATER FOR THE OIL & GAS INDUSTRY

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Buried or permanent pipelines can be the most cost-effective option for large, long-term development areas. While the initial capital cost is high, the distributed per-unit cost is typically lower than other options, with the advantage of selling the infrastructure and/or initiating third-party sales when available. Welded connections and higher pressure rated pipe allow for increased flow rates over longer distances, especially when tied together with storage facilities. Permanent and/or temporary pumps are used as energy in the system. When engineered properly, these pipelines can be converted to low-pressure gas pipelines to compensate for limited midstream capacity in growing fields.

Venture Engineering and Construction has experience with all aspects of water management for shale operations and can provide pipeline and facilities engineering design, construction management, permitting, water logistics management, water treatment services for operators in the Appalachian basin.

Jason Sellers is a mechanical engineer with ten years of experience in industrial engineering, including 4 years with water management, treatment, and disposal. He can be reached at (412) 231-5890 x341 or JSellers@VentureEngr.com

MEET PROJECT MANAGER JASON SELLERS, WATER EXPERT

Q: Tell us about your professional career before you joined Venture.

A. I've been involved in the energy industry since I graduated college. I started my engineering career with Siemens Energy, where I worked on the equipment side of Air Pollution Control systems for coal-fired power plants. I was able to travel to sites all over the country and gain valuable field experience working as a Technical Field Advisor troubleshooting projects.

I then joined CONSOL Energy's newly formed water company, CNX Water Assets. There, I handled all aspects of shale water management; water sourcing, engineering supply systems, managing construction of water facilities, policies and procedures, operations and engineering management, as well as project planning management. Water is a huge issue in shale plays, and smart companies focus resources to managing it.

Q: What attracted you to join Venture Engineering?

A. Venture Engineering is unique in that employees are encouraged to be creative and embrace an entrepreneurial spirit by sharing ideas and developing new means of business and marketable products. I welcomed the opportunity to work with such a strong group of engineers and project professionals.

Q: Where do you see the future of water management related to the shale gas industry?

A. Companies will have to find ways to handle production water in an environmentally compliant and cost-effective manner. While deep-well injection is currently the cheapest and most readily-available option, it won't be long before regulations are passed restricting use of these facilities. Only discharge-quality treatment options like Fairmont Brine Processing can meet the needs of operators in the long run.

BIOGAS STUDY FOR A WASTEWATER TREATMENT PLANT PROJECT

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may be exported to the electrical grid. Venture is responsible for a wide scope of services including:

- Review and establish biogas conditioning requirements for both the existing and projected plant operating conditions,
- Review the operational history of the existing biogas conditioning system and identify required improvements,
- Recommend scope and cost reductions that do not compromise the required biogas condition system functionality,
- Present the biogas conditioning system options and initial recommendations to plant owner/operator, and
- Assist with final biogas conditioning system design

The above scope is for a phase 1 study, and has recently been completed. Venture staff are in the process of working with the wastewater treatment plant owner/operator on additional scope of work, slated to begin early 4th quarter of 2015.