



Rocky Mountain AICHE News

February 2005

Volume 14 Number 5

February Section Meeting: Sampling of Solids in the Chemical, Mining and Pharmaceutical Industries

Processes that involve solids present a variety of problems for process quality control and product quality assurance. Virtually all solid materials have variations in particle size, chemical composition and other characteristics. These variations are a moving target because they may change over time or other factors such as attrition or agglomeration. Getting a representative sample of a solids process stream is often difficult at best especially when the equipment used for sample collection introduces an additional set of variables. This presentation deals with the analysis of the components that introduce sampling error and includes a review of sampling equipment advantages and shortcomings. A brief description of the GRSEI sampler line of samplers that have no moving parts is also included.

Glenn graduated with a BS in Chemical Engineering from Michigan State University in 1977. His solids handling experience began at an early age while growing up on a farm in Michigan that produced sugar beets, corn, cucumbers and beef cattle. He has extensive experience with solids handling processes in agricultural chemicals, hazardous waste incineration and pharmaceuticals. In 1978 Glenn began working on a solids sampling device for granular pesticides and was awarded a patent in 1984. In 1995 he received a second patent for modifications to the original device making it suitable for powders. G. R. Sprenger Engineering Inc. was started in 1992 to develop and market a line

February Section Meeting

- Speaker:** Glenn Sprenger
- Topic:** Sampling Solids in the Chemical, Mining and Pharmaceutical Industries
- Date:** Tuesday, February 15th
- Time:** 6:00 Social Hour/Cash Bar
6:45 Dinner
7:30 Presentation
- Location:** Fairmount Bible Church
15100 W 48th Ave, Golden
- Cost:** Members: \$20
Non-Members: \$25
Students & Unemployed: \$10

Please RSVP by **Friday, February 9th** (early RSVPs are greatly appreciated!). Indicate your name, phone number, and number of attendees by e-mailing Tom Wellborn at rockyaiche@yahoo.com. Alternatively, you may leave a voice mail for Tom at 303-933-0533.

of samplers for course, granular, powder and slurry applications.

AICHE 2005 Rocky Mountain Regional Conference

AICHE's Regional Student Conference is an annual event that attracts the best and the brightest engineering students from colleges across the Rocky Mountain Region. The goal of this event is to provide opportunities for dedicated students to share their technical knowledge, compare notes on their university experiences and plans for the future, and meet with industry professionals such as yourself. You will have the opportunity to meet the next generation of chemical engineers and share your professional experiences.

Highlights include:

- Industry workshops
- Corporate tours of NREL, Coors Brewery, Denver Water Treatment Plant, and the Suncor Energy Refinery
- Student Research Paper Competition
- Student ChemE Car Competition
- Awards Banquet on April 2 at 6:30 p.m. at the CSM Student Center, Ballrooms A & B

For more information, check the website www.mines.edu/stu_life/org/aiche. A registration form for the awards banquet is also attached to your newsletter email.

February Puzzler: Can you find a solution?

Location: Atlantic Richfield Synthetic Crude and Minerals (1979) in Wright (South of Gillette), WY

Problem: A two-month air-injection and underground coal gasification test was being conducted on wells completed in the 100' thick sub-bituminous Powder River coal seam at a depth of 700', which also is an aquifer. Of the 27 wells drilled, only two were to serve as injection and production wells, with the remainder for dewatering, hydrologic, geochemical, and burn-zone monitoring. The latter was to be accomplished by the use of conductivity and isotopic logging techniques to observe development of the gasification process.

A skid was designed to measure injection air flow and produced combustible gas and sour water. The gas composition was sampled and analyzed on-site before burning in a flare, and the water was stored

in a sour water pond for later analysis, treatment and removal or restoration. A major air compressor manufacturing and operating company was contracted to provide a specified maximum rate of flow on a take-or-pay basis, using multiple trailer-mounted, diesel-powered air compressors.

After a month of air-injection, the test burn was initiated. As the burn-zone developed, more injection air was required and all available compressors were placed on-line. However, the skid-mounted orifice meter run indicated flow was only 60% of the specified contract rates. The supplier was notified of the discrepancy and made an investigation. Their conclusion was that the skid measurements were wrong, based on the compression curves and horsepower ratings of the equipment supplied. The client re-checked the meter run design, and pulled orifice plates for examination of correct orientation and machining precision. Differential pressure calculation methods were scrutinized and corrected for humidity. No significant errors were found in the measurement approach.

Diagnosis: An independent local meter-proving firm was engaged on short notice to make a separate measurement of the air injection flowrate. Their findings agreed within error of the original skid measurements. The client demanded additional air compressors be delivered by supplier, who reluctantly provided them (also on short notice), but notified the client that an additional \$250,000 would be billed for the service (excluding fuel costs) for the expected two week remainder of the test duration. Upon completion of the test and return of the compression equipment, the client refused to pay the additional charges and elected to go to arbitration.

Solution: Check the web-site at <http://www.aiche-rm.org> for the solution to this problem. If you don't have access to the web, keep reading, you may find the solution in this issue.

NEW MEXICO CORNER

Local New Mexico AIChE will participate in the Engineer's Week Luncheon on February 25th, beginning at 11 a.m. at the Sheraton Uptown Hotel (corner of Menaul/Louisiana). Cost is \$30 per person.

RSVP by Feb. 4 to Kerri Pratt at PrattKL@cdm.com

Callout for ChemE Car and Paper Judges!

The Colorado School of Mines' Student Chapter is proud to host this year's Rocky Mountain Regional Conference on April 1st and 2nd. We would like to invite AIChE members to judge at two exciting competitions: ChemE Car and Paper. You will have the opportunity to discover the latest and greatest in chemically-powered vehicles, or see students present their personal research findings. If you would like to support the Colorado School of Mines' Regional AIChE Conference as a judge, please contact Marie Nguyen at mknguyen@Mines.edu by March 15th.

WHAT HAVE I MISSED?

JANUARY- Golden

Approximately 37 AIChE members heard James Gilman, Director of Engineering for iReservoir (<http://www.ireservoir.com>), give a presentation on the current state of "Characterization and Simulation of Complex Hydrocarbon Reservoirs." The need to maximize exploitation of existing production fields, the advent of powerful computers (including parallel processing techniques), and the application of 3-D seismic survey technologies to producing fields has provided methods for improved understanding of the architecture and fluid flow in oil and gas reservoirs.

Development of a dynamic reservoir model requires several steps which make use of: 1) well logs, cores, and seismic data to create a structural and stratigraphic framework for distribution of rock facies, porosity and hydrocarbon/water saturation to represent the static reservoir characteristics, 2) core and production data to populate the model with terms like permeability and fluid properties to develop flow characteristics, and 3) production data to calibrate the models via history matching. Such models are used to determine whether and where new wells should be drilled, what fluid should be injected, or what production schedules will improve economic resource recovery.

Reflection of seismic waves by structures that tend to hold hydrocarbons has proven quite useful, especially in providing data indicating continuities and more importantly, discontinuities in the structure of interest. Direct calibration of seismic attributes to rock/fluid properties has also been useful in some cases. However, significant attenuation by highly reflective surfaces or earth filtering of high frequency waves can limit the

ability of the method to provide direct reservoir property measurements.

The major challenge in reservoir characterization is to develop criteria for testing the quality/integrity/reliability of the data without losing real information that must be incorporated and addressed; that is, obtaining consistency while keeping real discrepancies which reveal the inhomogeneous aspects of the reservoirs. Newer techniques such as geostatistical property distributions and "Seismic Inversion" are being developed to address this issue. Seismic inversion is an attempt to develop direct relations between seismic response and rock properties.

The massive amounts of data can result in static models with as many as 50 million computational cells. This static model is then upscaled to the order of 500,000 cells for flow modeling. This large number of cells is repeatedly solved over many discrete time-steps to represent the dynamic flow processes. Although a great deal of time and effort is required to develop and use such sophisticated models, the identification of methods to improve recovery or production rates generally justifies the expense.

Presenter James Gilman, Director of Engineering for iReservoir, at the January AIChE Meeting



UPCOMING MEETINGS IN 2005

March 15: *Tour of National Institute of Standards and Technology (NIST, formerly National Bureau of Standards) in Boulder*

April 19: *Presentation: Solvent Resistant Membranes in Refinery Separations in Westminster*

May 17: *Tour of Akzo-Nobel Ammonia Plant in Cheyenne, WY*

AIChE Meetings

2005

Apr 10-14	2005 Spring Nat'l Atlanta, GA
Apr 11-13	20 th CCPS Int'l Atlanta, GA
May 2-5	Offshore Tech Houston, TX
Sept 26-29	Safety in Ammonia Plants Toronto, Ontario
Oct 30-Nov 4	2005 Annual Mtg. Cincinnati, OH
Nov 2-4	AIChe/ACS Mgmt Cincinnati, OH

2006

Apr 23-27	2006 Spring Nat'l Orlando, FL
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The objectives of AIChE are to advance chemical engineering in theory and practice, to maintain a high professional standard among its members, and to serve society, particularly where chemical, engineering can contribute to the public interest.

Solution for February Puzzler (page 2): *Prior to arbitration, the two parties agreed to meet and attempt reconciliation of the measurement data. Each party made a presentation of the facts and the basis for their position. Upon presentation of the compression curves by the vendor, the client noted that the design atmospheric inlet conditions were sea-level, or 14.7 psig. However, at the 6000' elevation of the test site, atmospheric pressure was 12.5 psig. This difference in inlet design conditions explained the derating of the compression equipment to 60% of design flow. Since the client had informed the vendor of the test site's ambient conditions in the original request for proposal, the vendor agreed to drop the additional charges.*

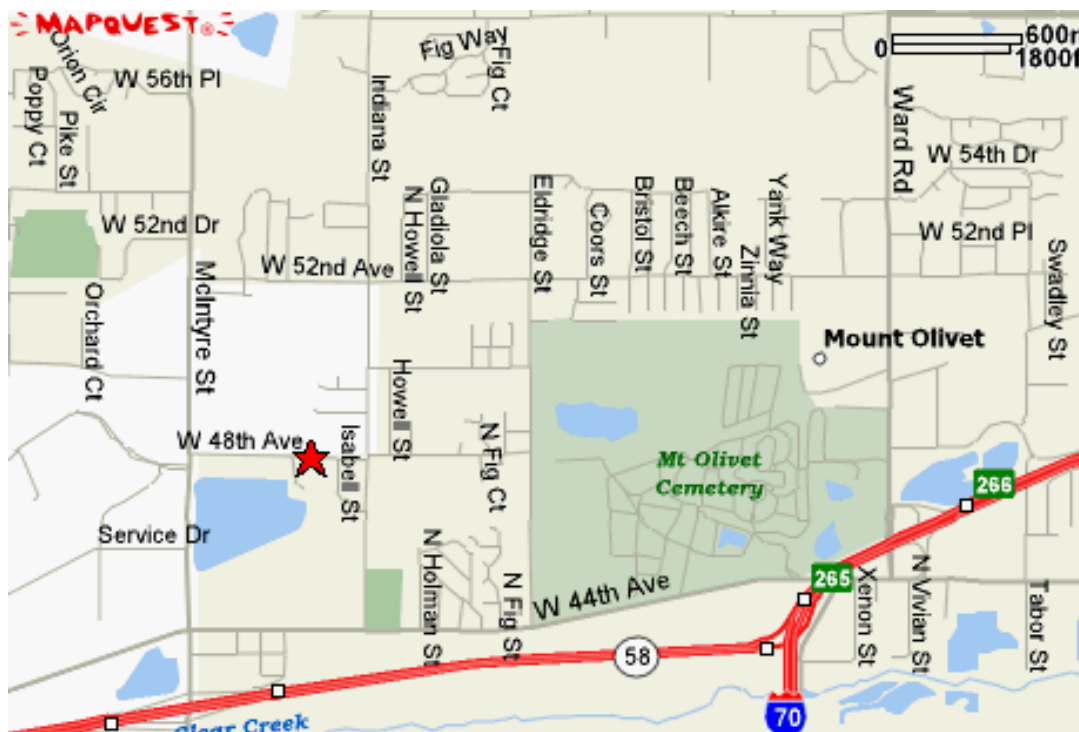
SPECIAL NOTE: *The test results portended the development of Coal Bed Methane, a source of over 7.5% of the nation's current natural gas supply. Unfortunately, the client was unable to discern that methane desorption was distorting the analysis of expected pyrolysis and gasification processes and discontinued the mineral & surface rights leases.*

Rocky Mountain AIChE News
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On the Web at:

<http://www.aiche-rm.org>

*Send your E-MAIL address to
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this newsletter electronically!*



DIRECTIONS: From I-70, take the West 44th Avenue exit (#266) toward CO-72/Ward Road (0.1 miles). Take the ramp toward CO-72 (<0.1 miles). Turn SLIGHT RIGHT onto West 44th Avenue (1.5 miles). Turn RIGHT onto Indiana Street (0.4 miles). Turn LEFT onto West 48th Avenue (0.1 miles). Look for Fairmount Bible Church at 15100 W 48th Avenue.