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ONLINE COURSES • EDUCATION CONFERENCES • SHORT COURSES • E-SYMPOSIUM SERIES • FIELD SEMINARS



A QUICK LOOK INTO
THE ULTIMATE CAREER
ADVANCEMENT RESOURCE GUIDE

2012

AAPG EDUCATION CATALOG

	PAGE	TITLE
ONLINE COURSES FIXED SCHEDULE	8	INTRODUCTION TO GEOLOGICAL RESERVOIR CHARACTERIZATION <i>Roger M. Slatt</i>
ONLINE CERTIFICATE COURSES	9	GEOHERMAL ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE <i>Mike Sullivan</i>
	9	WIND ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE <i>Mike Sullivan</i>
	10	SOLAR ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE <i>Susan Nash</i>
	11	BIOMASS ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE <i>Susan Nash</i>
	11	RENEWABLE & NON-RENEWABLE RESOURCES - OVERVIEW & INTEGRATION <i>Susan Nash</i>
	12	5-COURSE SET - ONLINE RENEWABLE ENERGY CERTIFICATE COURSES <i>Various</i>
	12	GIANT OIL FIELDS CERTIFICATE COURSE <i>Susan Nash</i>
	13	INTRODUCTION TO SHALE GAS CERTIFICATE COURSE <i>Susan Nash</i>
	13	INTRODUCTION TO UNCONVENTIONAL RESOURCES CERTIFICATE COURSE <i>Susan Nash</i>
ONLINE COURSES SELF-PACED	16	TECHNICAL WRITING <i>Susan Nash</i>
	16	PROFESSIONAL ENGLISH <i>Susan Nash</i>
	16	ENVIRONMENTAL ISSUES IN THE OIL & GAS INDUSTRY <i>Margaret M. Dalthorp</i>

- 19** **SEDIMENTARY PROCESSES AND BASIN ARCHITECTURE IN MOBILE SUBSTRATES**
J. Wood and Vishal Maharaj
- 19** **CARBONATE RESERVOIR GEOLOGY**
Bob Loucks, Jerry Lucia and Charles Kerans
- 20** **INTERPRETATION OF THREE-DIMENSIONAL SEISMIC DATA**
Alistair Brown
- 20** **EVALUATION AND QUANTITATIVE MODELING OF FRACTURED RESERVOIRS**
Ronald Nelson
- 20** **EXPLORATION FOR DEEP-WATER SANDS USING SEISMIC SEQUENCE METHODOLOGY**
John Armentrout
- 21** **CARBONATE SEISMIC SEQUENCE STRATIGRAPHY – APPLICATION TO EXPLORATION**
J. Frederick Sarg
- 21** **SEISMIC AMPLITUDE INTERPRETATION**
Fred Hilterman
- 22** **HYDRAULIC FRACTURING OF SHALES**
Frank Syfan
- 22** **CARBONATE DEPOSITIONAL SYSTEMS**
Art Saller
- 23** **APPLIED SEISMIC GEOMORPHOLOGY AND SEISMIC STRATIGRAPHY**
Henry Posamentier
- 24** **SURFACE GEOCHEMICAL EXPLORATION FOR OIL AND GAS**
Dietmar Schumacher
- 24** **QUICK GUIDE TO CARBONATE WELL LOG ANALYSIS**
George Asquith

- 26** **BASIC WELL LOG ANALYSIS**
George Asquith
- 26** **PRACTICAL SALT TECTONICS**
Mark Rowan
- 27** **SHALE GAS RESERVOIR ASSESSMENT – AN INTEGRATED APPROACH**
Christopher D. Laughrey
- 27** **APPLIED STRUCTURAL GEOLOGY – COURSE PLUS FIELD TRIP**
Chuck Kluth
- 28** **FRACTURED RESERVOIRS: FROM GEOLOGIC CONCEPTS TO RESERVOIR MODELS**
John Lorenz, Ahmed Ouenes and Scott Cooper

- 30** GETTING STARTED IN FLUVIAL STRATIGRAPHY
John Holbrook
- 30** GEOLOGIC INTERPRETATION OF SEISMIC DATA
Bruce Hart
- 31** IMAGE LOG INTERPRETATION
Laird Thompson
- 31** REGIONAL STRESS AND RESERVOIR GEOMECHANICS
David Wiprut
- 32** FUNDAMENTALS OF SILICICLASTIC SEQUENCE STRATIGRAPHY
John Holbrook
- 32** ROCKS, PORES AND CAPILLARY PRESSURE
Charles L. Vavra
- 33** RISK REDUCTION FOR PLAYS AND PROSPECTS
John Dolson
- 33** FORMATION EVALUATION OF THINLY BEDDED RESERVOIRS
Quinn Passey
- 34** 4D EVOLUTION OF CONTRACTIONAL TERRANES
Steven E. Boyer
- 24** QUANTIFICATION OF GEOLOGIC RISK
Gary P. Citron
- 35** RESERVOIR ENGINEERING FOR PETROLEUM GEOLOGISTS
Richard G. Green
- 36** EXPLORING FOR STRATIGRAPHIC TRAPS
Hugh Reid
- 36** HYDRAULIC FRACTURING FOR GEOLOGISTS
Randy LaFollette

GENERAL
INTEREST**38** FIELD SAFETY COURSE FOR FIELD TRIP LEADERS*Kevin Bohacs, Stephen Oliveri and Robert Clarke*

CARBONATES

38 PLAY CONCEPTS AND CONTROLS ON POROSITY IN CARBONATE RESERVOIR ANALOGS*Evan K. Franseen, Robert H. Goldstein and Mateu Esteban***39** COMPLEX CARBONATE RESERVOIRS*Raffaele Di Cuià and Davide Casabianca***40** DEEP-WATER SILICICLASTIC RESERVOIRS, CALIFORNIA*Stephan Graham and Donald R. Lowe*

CLASTICS

41 CLASTIC RESERVOIR FACIES AND SEQUENCE STRATIGRAPHIC ANALYSIS OF ALLUVIAL-PLAIN, SHOREFACE, DELTAIC AND SHELF DEPOSITIONAL SYSTEMS*Thomas A. Ryer***42** MODERN TERRIGENOUS CLASTIC DEPOSITIONAL SYSTEMS*Walter J. Sexton***43** SEDIMENTOLOGY AND SEQUENCE STRATIGRAPHIC RESPONSE OF PARALIC DEPOSITS TO CHANGES IN ACCOMMODATION*Keith W. Shanley and J. Michael Boyles***43** LACUSTRINE BASIN EXPLORATION*Alan Carroll and Meredith Rhodes Carson*STRUCTURE, TECTONICS
AND SEDIMENTATION**44** NORTHERN APPALACHIAN BASIN FAULTS, FRACTURES AND TECTONICS AND THEIR EFFECTS ON THE UTICA, GENESEO AND MARCELLUS BLACK SHALES*Robert Jacobi***45** SEISMIC INTERPRETATION OF COMPRESSIVE STRUCTURES*John H. Shaw and Frank Bilotti***45** FRACTURES, FOLDS, AND FAULTS IN THRUSTED TERRAINS*William B. Hansen, Steve Boyer, Chuck Kluth and Jim Sears***46** FOLDING, THRUSTING AND SYNTECTONIC SEDIMENTATION*Antonio Teixell and Antonio Barnolas***47** FUNDAMENTALS OF WRENCH TECTONICS APPLIED TO THE ANATOLIAN PLATE*Alvis Lisenbee, Nuri Uzunlar and Okan Tuysuz*

AAPG GRADUATE STUDENT ASSISTANT PROGRAM

Have you ever wanted to attend an AAPG School or Short Course but weren't able to because of cost factors? By participating in AAPG's Grad Student Assistant Program, you'll be doing us a favor, and in return, you'll be able to attend one or two courses. This Program is open to anyone currently enrolled in graduate school, studying for either a Master's degree or Ph.D. in a geoscience or related field.

Here's how it works:

- You look over the schedule of AAPG Short Course offerings and choose one or two that you would like to attend.
- Give us a call, and we'll let you know if we still need an assistant for that course—there is one slot available for most courses, and it is filled on a first-come, first-served basis.
- As grad student assistant, your duties include operating the projection equipment, sound and light controls, and assisting the speaker and the AAPG representative in making the course run smoothly.
- In return for these responsibilities, you attend the course free of charge, receive all of the course materials, and you will receive \$25 per day to help defray expenses.
- Travel and lodging expenses not included.

Please contact Debbi Boonstra in the AAPG Education Department at 918-560-2630 (fax 918-560-2678; e-mail dboonstra@aapg.org) if you are interested in participating in this program. This program does not apply to field seminars or field courses.

FULL-TIME STUDENT MEMBERS OF AAPG RECEIVE REDUCED TUITION

- Current full-time AAPG student members who want to attend an AAPG Course - Tuition \$115.00.
- AAPG members of an AAPG Student Chapter - Tuition \$75.00.
- Three spaces will be allotted for each course and students will be accepted in the order of receiving their paid registrations.
- This reduction does not apply to field seminars.
- Attendance is required to receive course material.
- Student rate at Education Conferences is \$125 for the week, five spaces available.

Spaces are limited, so online registration for student member and/or Student Chapter slots is not available. You must contact the AAPG Education Department directly to apply for these slots.

EARLY BIRD DISCOUNTS IN EFFECT FOR 2012 AAPG COURSES

Sign up early for AAPG short courses and field seminars and save \$100. That's right. Those registering prior to the individual course deadline will pay the discounted rate shown. After that deadline all registrants will pay an additional \$100 for tuition.

CONTINUING EDUCATION UNITS (CEUS)

AAPG awards Continuing Education Units (CEUs) for its training functions. Included in this program are short courses, schools, field seminars, online courses and e-symposia. The CEU content is noted on each offering included in this catalog. This is a nationally recognized unit of achievement that is based on 10 contact hours being equivalent to one CEU. The CEUs are customarily awarded by organizations that have a continuing education program under responsible sponsorship, capable direction and with qualified instruction. AAPG meets these requirements.

For AAPG members, CEU records have been kept since January 1, 1989, for all AAPG courses taken. The release of CEU information will only be granted by authorization of the member. These records will provide evidence of personal and vocational growth and adjustment to meet changing career demands. It will also demonstrate a conscious, persistent and voluntary effort toward personal development and growth. This record is available to any member upon request.

If you are interested in adding CEU credits awarded by other organizations to your AAPG member record, please send your course certificate or other documentation of earned CEUs to the AAPG Education Department.





ONLINE EDUCATION COURSES

CAN'T GET AWAY FROM THE OFFICE TO TAKE A SHORT COURSE? IS THERE NO CLASS IN THE SUBJECT YOU WANT OFFERED IN YOUR AREA? AT THE AAPG, WE'VE GOT THE ANSWERS WITH A GREAT SELECTION OF ONLINE HELP. THE ONLINE COURSES OUTLINED HERE RANGE FROM SHORT MODULES, TO HELP YOU BRUSH UP ON YOUR SKILLS, TO SEMESTER LENGTH COURSES WITH WRITTEN ASSIGNMENTS EACH WEEK. WE ALSO HAVE OUTSTANDING COURSES IN THE MAKING, SO KEEP YOUR EYES OPEN FOR FUTURE ANNOUNCEMENTS.

FOR MORE INFORMATION, LOG ON TO OUR WEBSITE AT:
[HTTP://WWW.AAPG.ORG/EDUCATION/ONLINE/INDEX.CFM](http://www.aapg.org/education/online/index.cfm)

ONLINE EDUCATION COURSES

Can't get away from the office to take a short course? Is there no class in the subject you want offered in your area? At the AAPG, we've got the answers with a great selection of online help. The online courses outlined here range from short modules, to help you brush up on your skills, to semester length courses with written assignments each week. We also have outstanding courses in the making, so keep your eyes open for future announcements. For more information, log on to our website at: <http://www.aapg.org/education/online/index.cfm>

ONLINE COURSES – FIXED SCHEDULE

INTRODUCTION TO GEOLOGICAL RESERVOIR CHARACTERIZATION

Dates: September 10 thru December 13, 2012

Tuition: \$1595

Content: 12 CEU

Limit: 25 students

Instructor: Roger M. Slatt, University of Oklahoma, Norman, OK

Who Should Attend

This course is ideal for the petroleum industry professional who is involved in analysis and/or decision making. Geologists, project managers, engineers, and geophysicists will find this course to be both useful and stimulating. It should be considered an intermediate-level course which will provide individuals with the knowledge necessary to take more advanced courses.

Objectives and Content

This course covers the principles and practice of characterizing petroleum reservoirs using geologic and engineering data, including well logs, sample descriptions, routine and special core analysis, and well tests. This online course is done on a definite timetable with other students taking the same course both online and in the classroom. There is some flexibility on assignments and readings, but it is not a self-paced course.

Emphasis is placed on practical analysis of such data sets from a variety of clastic depositional environments. The compartmentalized nature of reservoirs will also be emphasized. Most modules have electronically-based exercises. Many exercises will be done by hand, without computer-assist (i.e., mapping, correlation, etc.). No sophisticated software will be required.

For detailed information on this class, go to: http://www.aapg.org/education/intro_res_char2.html

Course Outline

- Introduction to reservoir characterization
- Tools and techniques for characterizing static and dynamic

- properties of oil and gas reservoirs
- Value of outcrops
- Structure and structurally compartmentalized reservoirs
- Stratigraphy and stratigraphically compartmentalized reservoirs
- Basics of sequence stratigraphy
- Incised valley fill reservoirs
- Shoreface reservoirs
- Deepwater clastic (turbidite) reservoirs
- Geologic controls on reservoir quality (porosity and permeability)
- Diagenesis and diagenetically compartmentalized reservoirs
- Simple volumetric calculations, and geologic controls on volumetrics
- Petrophysical properties of reservoirs
- Fractured reservoirs
- Introduction to geological modeling

Syllabus

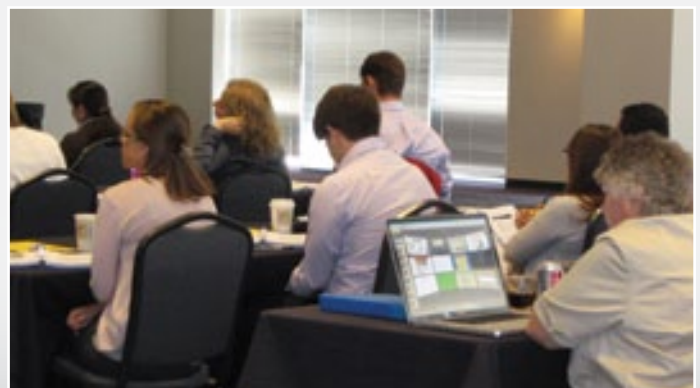
There will be an exercise for each of the 14 Units (11 Lessons) in the course. Some exercises will just be answering a few questions. Others will involve mapping, cross-section interpretation, and other types of analysis. To be graded, each exercise will have to be submitted to Dr. Slatt electronically, no later than one week after it is given to you.

There will be a final exam, which will be a reservoir characterization project, for which you will be given one week to complete.

E-SYMPOSIA

AAPG's exciting e-symposia program consists of monthly live 1-hour webinars on up-to-date topics of interest to most geoscientists. Extended independent study packages for CEU credit are also available with each e-symposia. CEUs are available if you attend the e-symposium, read the independent study materials, and return a questionnaire. Once registered, you will be contacted by our technical support facilitator with FTP information. After the initial live webinar, most e-symposia are archived and still available in recorded form.

We have over 40 titles now and the list is still growing. Please check our website at <http://www.aapg.org/education/online/E-Symposia.cfm> for all of our archived and upcoming webinars.



ONLINE CERTIFICATE COURSES

These courses are offered at the beginning of every month. You may sign up for them at any time, and your course will begin the first day of the upcoming month. These courses are designed to be equivalent to a 3 credit-hour graduate-level seminar. They are 4-week online courses which consist of 4 one-week units that involve readings, multimedia, guiding questions, and assignments for you to do and to email to your instructor. You will receive feedback from your instructor, and upon successful completion of the course, you will receive a certificate. **Required Work:** for each unit, one research project and a short paper that builds on results of the research project, for a total of four brief research projects and four papers.

RENEWABLE ENERGY CERTIFICATE COURSES

As part of our five-course Certificate in Renewable Energy program, if you complete all five courses in this series, you will receive 5 course certificates and a program certificate.

GEOTHERMAL ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00. *Please note:* There is a discount of \$100 off this course if you sign up for all 5 courses in the AAPG Renewable Energy Certificate Course Program.

Limit: 100

Content: 4.8 CEU

Instructor: Mike Sullivan, Groundwater Services International, Harrisburg, PA

Who Should Attend

This course is ideal for individuals who want to learn about geothermal energy, current trends, technologies and applications, particularly as integrated with oil and gas.

Objectives

By the end of the course, participants should be able to:

- Define key aspects of the growing geothermal industry, including different locations and scales of production.
- Describe the current use of geothermal energy.
- Identify and list past and current incentives for using and producing geothermal energy.
- Recognize companies developing and investing in geothermal energy, as well as estimate the business benefits of such investments.
- Identify the scientific fundamentals of the exploration, development, and distribution of geothermal power.
- Describe the scientific, technological, and business components

of geothermal energy, e.g., land-based versus ocean sources, drilling techniques, and current storage/distribution of geothermal energy.

- Cite current applications of geothermal power in the energy industry.
- Discuss and analyze case studies involving the integration of geothermal power and non-renewable sources of energy.
- Devise methods for the integration of geothermal power in order to anticipate future changes in the energy market.

Content

Geothermal Energy Basics is an online course that enables participants to review, analyze, and evaluate opportunities in the rapidly expanding market for geothermal energy. In addition to gaining a working knowledge of the scientific, technological, and business aspects of geothermal energy, participants will also learn techniques for the integration of geothermal energy and existing non-renewable resources on a variety of levels, from small-scale use in commercial structures to large-scale distribution. The course blends theory and practice, and culminates with a project requiring the learner to develop a step-by-step plan for a geothermal energy installation.

With direct contact with your professor, who will answer questions and review your work via e-mail, you will have a chance to learn about geothermal energy in a personalized setting. You may also have an opportunity to interact with other professionals in the field who will be available for your questions. A discussion board will be available for interaction with peers.

This course is part of a 5-course series: Certificate in Renewable Energy. The goal of the series of courses, and the Renewable Energy program is to equip earth scientists with knowledge to enable them to take the lead in integrated energy projects and programs. An earth scientist's unique training and understanding of the big picture – the global picture – provides unmatched abilities to design, oversee, and promote integrated energy solutions which require bringing together fossil energy, geothermal, solar, Geothermal, biomass, and others.

- Unit 1 (Week 1): Scientific and Technology
- Unit 2 (Week 2): Exploration and Development
- Unit 3 (Week 3): Investment Models and Benefits
- Unit 4 (Week 4): Integration Techniques

WIND ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00 *Please note:* There is a discount of \$100 off this course if you sign up for all 5 courses in the AAPG Renewable Energy Certificate Course Program.

Limit: 100

Content: 4.8 CEU

Instructor: Mike Sullivan, Groundwater Services International, Harrisburg, PA

Who Should Attend

This course is ideal for all energy professionals who have an interest in wind energy operations, ranging from small use-specific operations to large contributors to the regional grid. Individuals and companies interested in integrating energy generation from multiple sources (wind, oil and gas, etc.) will find the information very useful for adding revenue sources and increasing efficiency.

Objectives

By the end of the course, participants should be able to:

- Define key aspects of the growing wind industry, including different locations and scales of production.
- Describe the current use of wind energy.
- Identify and list past and current incentives for using and producing wind energy.
- Recognize companies developing and investing in wind energy, as well as estimate the business benefits of such investments.
- Identify the scientific fundamentals of the exploration, development, and distribution of wind power.
- Describe the scientific, technological, and business components of wind energy, e.g., turbine manufacturing and installation, wind farm management, purchasing and distribution of wind energy.
- Cite current applications of wind power in the energy industry.
- Discuss and analyze case studies involving the integration of wind power and non-renewable sources of energy.
- Devise methods for the integration of wind power in order to anticipate future changes in the energy market.

Content

Wind Energy Basics is an online course that enables participants to review, analyze, and evaluate opportunities in the rapidly expanding market for wind energy. In addition to gaining a working knowledge of the scientific, technological, and business aspects of wind energy, participants will also learn techniques for the integration of wind energy and existing non-renewable resources on both a large-scale production level and smaller-scale use in commercial and public structures. The course blends theory and practice, and culminates with a project requiring the learner to develop a step-by-step plan for a wind energy installation.

With direct contact with your professor, who will answer questions and review your work via e-mail, you will have a chance to learn about wind energy in a personalized setting. Resources will include texts, articles, podcasts, presentations, and video. You may also have an opportunity to interact with other professionals in the field who will be available for your questions. A discussion board will be available for interaction with peers.

This course is part of a 5-course series: Certificate in Renewable Energy. The goal of the series of courses, and the Renewable Energy program is to equip earth scientists with knowledge to enable them to take the lead in integrated energy projects and programs. An earth scientist's unique training and understanding of the big picture – the global picture – provides unmatched abilities to design, oversee, and promote integrated energy solutions which require bringing together fossil energy, geothermal, solar, wind, biomass, and others.

- Unit 1 (Week 1): Scientific and Technology
- Unit 2 (Week 2): Exploration and Development
- Unit 3 (Week 3): Investment Models and Benefits
- Unit 4 (Week 4): Integration Techniques

SOLAR ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00 Please note: There is a discount of \$100 off this course if you sign up for all 5 courses in the AAPG Renewable Energy Certificate Course Program.

Limit: 100

Content: 4.8 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This online course is ideal for individuals who want to learn about renewable energy, current trends, technologies and applications.

Objectives

By the end of the course, participants should be able to:

- Define key aspects of the growing solar industry, including different locations and scales of production.
- Describe the current use of solar energy.
- Identify and list past and current incentives for using and producing solar energy.
- Recognize companies developing and investing in solar energy, as well as estimate the business benefits of such investments.
- Identify the scientific fundamentals of the exploration, development, and distribution of solar power.
- Describe the scientific, technological, and business components of solar energy, e.g., turbine manufacturing and installation, solar farm management, purchasing and distribution of solar energy.
- Cite current applications of solar power in the energy industry.
- Discuss and analyze case studies involving the integration of solar power and non-renewable sources of energy.
- Devise methods for the integration of solar power in order to anticipate future changes in the energy market.

Content

Solar Energy Basics is an online course that enables participants to review, analyze, and evaluate opportunities in the rapidly expanding market for solar energy. In addition to gaining a working knowledge of the scientific, technological, and business aspects of solar energy, participants will also learn techniques for the integration of solar energy and existing non-renewable resources. Both large-scale solar farm structures and small-scale use in commercial and public structures will be addressed. The final project will involved developing a plan for a solar energy installation.

With direct contact with your professor, who will answer questions and review your work via e-mail, you will have a chance to learn about solar energy in a personalized setting. You may also have an opportunity to interact with other professionals in the field who will be available for your questions. A discussion board will be available for interaction with peers.

This course is part of a 5-course series: Certificate in Renewable Energy. The goal of the series of courses, and the Renewable Energy program is to equip earth scientists with knowledge to enable them to take the lead in integrated energy projects and programs. An earth scientist's unique training and understanding of the big picture – the global picture – provides unmatched abilities to design, oversee, and promote integrated energy solutions which require bringing together fossil energy, geothermal, solar, solar, biomass, and others.

- Unit 1 (Week 1): Scientific and Technology
- Unit 2 (Week 2): Exploration and Development
- Unit 3 (Week 3): Investment Models and Benefits
- Unit 4 (Week 4): Integration Techniques

BIOMASS ENERGY BASICS: A RENEWABLE ENERGY CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00 Please note: There is a discount of \$100 off this course if you sign up for all 5 courses in the AAPG Renewable Energy Certificate Course Program.

Limit: 100

Content: 4.8 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This online course is ideal for individuals who want to learn about renewable energy, current trends, technologies and applications.

Objectives

By the end of the course, participants should be able to:

- Define key aspects of the growing biopower and biofuel industry, including different locations and scales of production.
- Describe the current use of biomass-generated energy.
- Identify and list past and current incentives for using and producing biomass energy.
- Recognize companies developing and investing in biomass energy, as well as estimate the business benefits of such investments.
- Identify the scientific fundamentals of the exploration, development, and distribution of biopower and biofuel.
- Describe the scientific, technological, and business components of energy from biomass sources, e.g., the six types of biopower systems (direct-fired, cofiring, gasification, anaerobic digestion, pyrolysis, and small, modular) and sources of biofuel, e.g. ethanol, biodiesel, and methanol.
- Cite current applications of biopower and biofuels in the energy industry.
- Discuss and analyze case studies involving the integration of biopower/biofuel and non-renewable sources of fuel and energy.
- Devise methods for the integration of biopower/biofuel and non-renewables in order to anticipate future changes in the energy market.

Content

Biomass Energy Basics is an online course that enables participants to review, analyze, and evaluate opportunities in the rapidly expanding market for biopower and biofuel. In addition to gaining a working knowledge of the scientific, technological, and business aspects of biomass energy/fuel, participants will also learn techniques for integration with existing non-renewable resources, including using bioenergy and fuel to heat and/or power commercial structures, private homes, and public buildings. You will have a chance to plan a biomass operation for your final project.

With direct contact with your professor, who will answer questions and review your work via e-mail, you will have a chance to learn about renewable energy in a personalized setting. You may also have an opportunity to interact with other professionals in the field who will be available for your questions. A discussion board will be available for interaction with peers.

This course is part of a 5-course series: Certificate in Renewable Energy. The goal of the series of courses, and the Renewable Energy program is to equip earth scientists with knowledge to enable them to take the lead in integrated energy projects and programs. An earth scientist's unique training and understanding of the big picture – the global picture – provides unmatched abilities to design, oversee, and promote integrated energy solutions which require bringing together fossil energy, geothermal, solar, wind, biomass, and others.

- Unit 1 (Week 1): Scientific and Technology
- Unit 2 (Week 2): Exploration and Development
- Unit 3 (Week 3): Investment Models and Benefits
- Unit 4 (Week 4): Integration Techniques

RENEWABLE & NON-RENEWABLE RESOURCES - OVERVIEW & INTEGRATION : A RENEWABLE ENERGY CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00 Please note: There is a discount of \$100 off this course if you sign up for all 5 courses in the AAPG Renewable Energy Certificate Course Program.

Limit: 100

Content: 4.8 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This online course is ideal for individuals who want to learn about renewable energy, current trends, technologies and applications.

Objectives

By the end of the course, participants should be able to:

- Define key aspects of the growing renewable resource industry, including different types of energy sources and locations.
- Describe the current use of wind, geothermal, solar, and biomass energy.

- Identify and list past and current incentives for using renewable energy, including tax credits, grants, cost savings, and more.
- Recognize companies developing and investing in renewable energy, as well as estimate the business benefits of such investments.
- Identify the scientific fundamentals of the exploration, development, and distribution of different sources.
- Describe the technological components of different sources, e.g., commercial and small-scale wind turbines, photovoltaics and CSP, and biomass.
- Cite current applications of renewable resource technologies within the energy industry.
- Compare and contrast the scientific, technological, and business components of renewable and non-renewable energy sources.
- Discuss and analyze case studies involving the integration of renewable and non-renewable energy.
- Devise methods for the integration of renewable and non-renewable sources in order to anticipate future changes in the energy market.

Content

Renewable & Non-Renewable Resources is an online course that enables participants to review, analyze, and evaluate opportunities in the rapidly expanding market for renewable energy. In addition to gaining a working knowledge of the scientific, technological, and business aspects of sources of renewable energy, participants will also learn techniques for integration with existing non-renewable resources, both on a large production scale and a smaller scale for use in commercial, public, and private structures. The final project involves planning an installation requiring renewable and non-renewable energy integration.

With direct contact with your professor, who will answer questions and review your work via e-mail, you will have a chance to learn about renewable energy in a personalized setting. You may also have an opportunity to interact with other professionals in the field who will be available for your questions. A discussion board will be available for interaction with peers.

This course is part of a 5-course series: Certificate in Renewable Energy. The goal of the series of courses, and the Renewable Energy program is to equip earth scientists with knowledge to enable them to take the lead in integrated energy projects and programs. An earth scientist's unique training and understanding of the big picture – the global picture – provides unmatched abilities to design, oversee, and promote integrated energy solutions which require bringing together fossil energy, geothermal, solar, wind, biomass, and others.

- Unit 1 (Week 1): Scientific and Technology
- Unit 2 (Week 2): Exploration and Development
- Unit 3 (Week 3): Investment Models and Benefits
- Unit 4 (Week 4): Integration Techniques

5-COURSE SET - ONLINE RENEWABLE ENERGY CERTIFICATE COURSES

Tuition: Member: \$2,975.00 • Nonmember \$3,475.00

Limit: 100

Content: 24.CEU

Instructors: various - see individual course descriptions

Who Should Attend

These online courses are ideal for individuals who want to learn about renewable energy, current trends, technologies and applications.

Content

(See individual courses for complete descriptions)

Courses included are:

- Geothermal Energy Basics - Launch: September 1, 2009
- Wind Energy Basics - Launch November 1, 2009
- Solar Energy Basics - Launch February 1, 2010
- Biomass Energy Basics - Launch April 1, 2010
- Renewable Energy Integration - Launch June 1, 2010

These courses are being offered at the beginning of every month.

You may sign up for these 5 courses as a package at any time, and the courses will begin the first day of the upcoming month. Length for each course is 4 weeks and each course is designed to be equivalent to a 3 credit-hour graduate level seminar.

GIANT OIL FIELDS CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00

Limit: 100

Content: 4.8 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This course is ideal for geologists, geophysicists, engineers, and other energy professionals who want to learn about giant and super-giant fields, their reservoirs, and production history.

Objectives

Upon successful completion of this course, you will be able to analyze, compare, and contrast giant petroleum fields of the world. You will be able to describe the fields, the reservoirs, and their production history.

Key Concepts:

- Giant petroleum fields
- Tectonic settings of giant fields
- Giant field trends
- Deepwater discoveries
- Stratigraphic controlled giant fields
- Salt domes
- Deltaic reservoirs

- Carbonate reservoirs
- Deep Marine clastics reservoirs
- Basin modeling
- Unconventional resources
- Fractured reservoirs
- Hydraulic fracturing
- CO₂ enhanced oil recovery
- Reservoir characterization and 3D seismic
- Seismic imaging and reservoir/stratigraphic definition
- Offshore seismic data acquisition techniques

Content

There are more approximately 1,000 oil and gas fields in the world that have been classified as “giant,” containing more than 500 million barrels of recoverable oil and /or 3 trillion cubic feet of gas. Giant Oil and Gas Fields is an online course that enables participants to study the structure, stratigraphy, and production history of the fields and an analysis of effective exploration, production, and enhanced oil recovery methods.

With direct contact with your professor, who will answer questions and review your work via e-mail, you will have a chance to learn about giant oil fields in a personalized setting. You may also have an opportunity to interact with other professionals in the field who will be available for your questions. A discussion board will be available for interaction with peers.

- Unit 1 (Week 1): Definition of Giant Oil and Gas Fields
- Unit 2 (Week 2): The First Giant Oil and Gas Fields
- Unit 3 (Week 3): Expanding Onshore and Offshore
- Unit 4 (Week 4): New Technologies, New Giants

INTRODUCTION TO SHALE GAS CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00

Limit: 100

Content: 4.8 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This course is ideal for geologists, geophysicists, engineers, and other energy professionals who want to learn about the basics of shale gas plays, and ongoing exploration in such plays as the Barnett, Marcellus and Woodford basins.

Objectives

Upon successful completion of this course, participants will be able to define shale gas, explain theories relating to its origin, discuss the attributes of major and emerging plays, describe challenges in horizontal drilling, and discuss geological considerations in hydraulic fracturing.

Content

This course covers the fundamentals of shale plays, from the origins and geochemistry of shale gas, to profiles of shale gas exploration and production, including the Barnett, Fayetteville, Marcellus, Woodford, and Antrim. Reservoir considerations such as natural fracturing are covered, as well as completion issues involving hydraulic fracturing processes and procedures. Course includes interaction with your instructor, a log of the articles and reports provided for the course, responses to discussion questions and problem sets, and case study analyses.

INTRODUCTION TO UNCONVENTIONAL RESOURCES CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: Member: \$695.00 • Nonmember \$795.00

Limit: 100

Content: 4.8 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This course is ideal for geologists, geophysicists, engineers, and other energy professionals who want to learn about the basics of various unconventional resources, such as coalbed methane, shale gas, shale oil and tar sands.

Objectives

Upon successful completion of this course, participants will be able to define unconventional resources, explain theories relating to their origin, discuss the attributes of major and emerging plays, describe challenges in exploring for and developing the resources, and discuss technologies that are helping make unconventional plays economic.

Content

This course covers the fundamentals of unconventional resources, including coalbed methane, shale gas, shale oil, and tar sands. The course presents the key defining characteristics of the different unconventional resources, and it discusses methods for exploring for and producing them. Examples of the main plays will be profiled, including coalbed methane in Wyoming, the Bakken formation, the Eagle Ford, and tar sands in Alberta. Emerging plays and technologies that make the resource plays economic will also be covered. Course includes interaction with your instructor, a log of the articles and reports provided for the course, responses to discussion questions and problem sets, and case study analyses.

INTRODUCTION TO CARBON CAPTURE AND SEQUESTRATION: A CARBON CAPTURE & STORAGE CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: \$395.00 Member / Nonmember

Limit: 100

Content: 4.8 CEU

Instructor: Dwight Rychel, Ph.D., PTTC, Tulsa, OK

Who Should Attend

This course is ideal for geologists, researchers, operators, landmen, engineers, and students who want to learn about carbon capture and sequestration.

Objectives

Upon successful completion of this course, the learner will be able to define carbon capture and sequestration, explain how and when it is used, discuss geological characteristics of suitable formations, describe injection and monitoring, and discuss current cases of CCS in action.

Content

This course covers the fundamental concepts involved in carbon capture and sequestration, and explains the geological conditions required for successful carbon storage. It profiles extraction, transportation, injection, and monitoring of CO₂.

Key Topics

- Carbon dioxide sources
- Carbon capture techniques
- CCS systems
- Managing hazardous materials
- Transporting CO₂
- Considerations / factors in selecting sites and formations
- Large-scale power plant CCS projects
- Storage capacity
- Costs: energy, infrastructure, transportation, monitoring
- Relative Benefits

Weekly Units

- Unit I: Carbon Capture Fundamentals
- Unit II: Geological Characteristics of Suitable Formations
- Unit III: Injection and Monitoring
- Unit IV: Case Studies

GEOLOGIC MODELS IN CARBON SEQUESTRATION: A CARBON CAPTURE & STORAGE CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: \$395.00 Member / Nonmember

Limit: 100

Content: 4.8 CEU

Instructor: Viola Rawn-Schatzinger, PTTC, Tulsa, OK

Who Should Attend

This course is ideal for geologists, researchers, operators, landmen, managers, technology entrepreneurs, engineers, and students who want to learn about carbon capture and sequestration.

Objectives

Upon successful completion of this course, the learner will be able to define carbon capture and sequestration, explain how and when it is used, discuss geological characteristics of suitable formations, describe fluid dynamics, and discuss current cases of where and how geological models have been developed in conjunction with CCS.

Content

This course covers the fundamental concepts involved in developing geologic models used in successful carbon sequestration. It provides an overview of reservoir characterization, discusses fluid dynamics, and discusses risks and challenges both theoretical and those encountered in current cases.

Key Topics

- Geologic CO₂ storage
- Monitoring the injected CO₂ and verify containment
- Dynamic reservoir characterization
- Dynamic (reservoir) model – monitoring the injected CO₂ and verify containment
- Elements needed for effective evaluation of gross storage potential
- Injection
- Monitoring
- Seals
- Comparative evaluation factors
- Brine
- Leak remediation
- Numerical simulation – field studies
- Uranium modeling – analogues
- Value-added benefits (EOR)

Weekly Units

- Unit I: Reservoir Characterization
- Unit II: Evaluating Reservoirs
- Unit III: Fluid Dynamics
- Unit IV: Modeling Challenges and Cases

CO₂ SUPPLY, DEMAND, LEGAL AND REGULATORY ISSUES: A CARBON CAPTURE & STORAGE CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: \$395.00 Member / Nonmember

Limit: 100

Content: 4.8 CEU

Instructor: Dwight Rychel, Ph.D., PTTC, Tulsa, OK

Who Should Attend

This course is ideal for geologists, researchers, operators, landmen, managers, technology entrepreneurs, engineers, and students who want to learn about CO₂ supply, demand, legal and regulatory issues.

Objectives

Upon successful completion of this course, the learner will be able to define and describe supply, demand, legal and regulatory issues for carbon dioxide capture and storage.

Content

This course focuses on profiling supply and demand of CO₂, including industrial sources. It also looks at demand for CO₂ in enhanced oil recovery as well as in other applications. In this section, enhanced oil recovery is contrasted with geo-sequestration. Finally the course contains a review of the prevailing legal environment and emerging regulatory issues.

Key Topics

- Anthropogenic carbon dioxide
- Industrial sources of CO₂
- Emissions
- Geosequestration advantages
- Geosequestration pitfalls
- CO₂ EOR relative merits
- Power generation and geosequestration
- Injection control
- Regulations governing CO₂ emissions
- Regulations governing underground injection

Weekly Units

- Unit I: Industrial Sources
- Unit II: CO₂ Supply and Demand
- Unit III: Sequestration
- Unit IV: Laws and Regulations

CARBON CAPTURE, TRANSPORTATION AND OPERATIONS: A CARBON CAPTURE & STORAGE CERTIFICATE COURSE

Dates: Ongoing, course is offered at the beginning of every month. You may sign up for it at any time, and your course will begin the first day of the upcoming month.

Tuition: \$395.00 Member / Nonmember

Limit: 100

Content: 4.8 CEU

Instructor: Dwight Rychel, Ph.D., PTTC, Tulsa, OK

Who Should Attend

This course is ideal for geologists, researchers, operators, landmen, managers, technology entrepreneurs, engineers, and students who want to learn about carbon capture, transportation and operations.

Objectives

Upon successful completion of this course, the learner will be able to define and describe processes used in carbon dioxide capture, transportation and processing, as well as CO₂ flood operations and well equipment. Learners will also be able to evaluate and discuss monitoring, reporting, and verification of CO₂ injection, sequestration, and CO₂-based enhanced oil recovery operations.

Content

This course discusses how CO₂ is captured and separated from other emitted gases in industrial applications, and it provides an overview of the processes by which the carbon dioxide is compressed before it enters a pipeline. Predominant methods of transporting carbon dioxide are discussed, along with hazards and risks, and the necessary monitoring. The course closes with an overview of worldwide demonstration projects.

Key Concepts

- CO₂ pipelines
- Transportation
- CO₂ EOR
- Case Studies
- Methods of carbon capture
- Industrial sources of carbon dioxide
- Technological advances in carbon capture
- Large-scale, fully integrated CCS projects
- Capture and storage projects

Weekly Units

- Unit I: Separation and Capture
- Unit II: Capture, Transportation, Processing
- Unit III: CO₂ Flood Operations and Equipment
- Unit IV: Monitoring, Reporting, Verification

4-COURSE SET - ONLINE CARBON CAPTURE & STORAGE CERTIFICATE COURSES

Tuition: \$1,195.00 Member / Nonmember

Limit: 100

Content: 24.CEU

Instructors: various - see individual course descriptions

Who Should Attend

These online courses are ideal for individuals who want to learn about Carbon Capture, Storage, Transportation and Legal issues relating to CO₂ production in exploration wells.

Content

(See individual courses for complete descriptions)

ONLINE COURSES – SELF-PACED

TECHNICAL WRITING

Dates: Begins the 2nd of every month, 10-week course (can be accelerated). Exercises and Exams administered by instructor via email.

Tuition: \$300 (includes textbook)

Content: 5.4 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This course is ideal for scientists, managers, and professionals for whom English is a second language, with personalized grammar and vocabulary review. This course is highly recommended for scientists and technical professionals seeking to develop a mastery of the communication skills required in an increasingly digital age.

Objectives and Content

In addition to providing a solid foundation with templates and flowcharts for reports, technical documents, summaries, recommendations, annual reports, and more, the course provides one-on-one mentoring in collaborative work, presentations, emails, discussion board postings, web logs, website analysis and design, and more. Also, the course looks at ethical issues in digital and print communication, and provides support and effective techniques for collaborative and individual revision activities. This course is newly revised (2005), and gives users access to Dr. Nash's Writing Survival Guide. This course is particularly useful for professionals involved in writing research papers, proposals, dissertations, theses, and technical monographs.

- Abstracts / Technical Papers
- Grammar / Style / Revision
- Proposals
- Technical correspondence
- Reports

PROFESSIONAL ENGLISH

Dates: Variable, completely self-paced online. Exercises and Exams administered by instructor via email.

Tuition: \$300 (includes textbook)

Content: 5.4 CEU

Instructor: Susan Nash, AAPG Education Director, Tulsa, OK

Who Should Attend

This course is ideal for individuals seeking to develop highly effective documents for their companies, personal businesses, and associations.

Objectives and Content

Upon completion of this course, students will have gained an ability to develop and organize documents both printed and on the Internet which are read by individuals outside their company. If you are responsible for creating or maintaining any of the following, this course will be beneficial for you:

- Memoranda, PowerPoint Presentations, Meeting Documents
- Quarterly and Annual Reports
- Reports and Presentations to Investors, Shareholders, Stakeholders
- Websites, Promotional Items
- Resumes
- Directories of Services, Virtual Information Libraries

ENVIRONMENTAL ISSUES IN THE OIL & GAS INDUSTRY

Dates: Variable, completely self-paced online.

Tuition: \$30 to take online, \$60 for a CD

Content: .1 CEU

Instructor: Margaret M. Dalthorp, Moorhouse Associates, Inc., Corpus Christi, TX

Who Should Attend

This course is for the petroleum industry professional who is unfamiliar with environmental regulations and their application to the oil and gas industry. Environmental professionals who are unfamiliar with oil field operations will also benefit from the course as it contains numerous photos of actual field sites and illustrates common issues to investigate. The course also covers pollution prevention and landowner concerns when conducting field operations. Project managers, geologists, and engineers responsible for the management of field operations will find this course to be beneficial.

Objectives and Content

This should be considered an introductory course which will provide individuals with the knowledge necessary to manage field operations in a manner that complies with regulations, prevents environmental problems from occurring, and maintains good relations with landowners. It is designed to help the oil and gas professional become familiar with common environmental issues in the field and to help the environmental field professional negotiate

a sight visit to a petroleum storage area. This course covers the basics of what to look for when conducting a general site-inspection. The course content also considers land owner concerns and pollution prevention ideas to implement in everyday operations.

PETROLEUM EXPLORATION & PRODUCTION: An Online Overview A joint course with AAPG and The University of Tulsa Continuing Engineering and Science Education Department

Please note - if paying with a check, please make check payable to University of Tulsa, CESE (applies to this course only)

Dates: Variable, completely self-paced online.

Tuition: \$795.00/person. Upon registration, each student will receive a login and password, good for 30 days of anytime, anywhere access. Your computer will need to have Internet access and be able to run QuickTime, Flash and Java Runtime. Certificate of Completion, a geological time card and a reference handbook are also included.

Instructor: Norman J. Hyne, The University of Tulsa, Tulsa, OK

Who Should Attend

This course is for anyone needing an overall perspective of petroleum exploration, drilling, and production in order to become more knowledgeable and productive in your job. This will include, but not be limited to: new employees, Administrative Assistants, Landmen, Accountants, Managers, Marketing/Sales Personnel, Attorneys, Finance Personnel, Geotechs, etc.

Objectives

This online course provides an overview of the petroleum industry from what is natural gas and crude oil to how to explore, drill, and produce oil and gas. It is a technical program presented on a non-technical level, through audio visuals, graphics, texts and examples. No previous technical training is necessary to take this course.

This program offers a perspective that leads to increased job productivity. It is designed for anyone who works directly or indirectly with the petroleum industry and who is not a petroleum geologist or petroleum engineer.

The course provides individuals and companies with an easily accessible training tool to educate interns and employees on the language and processes of the oil and gas industry. In addition, we want to provide participants with an interactive, flexible and exciting way to learn.

Content

1. The Nature of Oil & Gas
2. The Earth's Crust – Where We Find Oil and Gas
3. Generation, Migration and Accumulation of Petroleum
4. Deformation of Sedimentary Rocks
5. Petroleum Traps
6. Petroleum Exploration; Seismic Exploration
7. Drilling Preliminaries; Drilling a Well; Drilling Problems and Techniques
8. Testing a Well; Completing a Well
9. Offshore Exploration and Production
10. Petroleum Production

Course Highlights

1. Narrated by Norm Hyne - his enthusiasm of this topic will keep your interest!
2. Animated illustrations
3. Easy to navigate your way thru the course
4. Designed in short segments making it easy to stop after each section. Or you can finish the course all at once. You make the decision based on your schedule.
5. Turn the audio on or off any time throughout the course.
6. Highly interactive
7. Immediate feedback exercises
8. Glossary of terms provided with the click of a mouse
9. Links to additional information on the web
10. Picture gallery of various subjects

Technical Requirements

Your computer will need to have the following:

1. Internet access (Internet Explorer or Firefox)
2. QuickTime: www.quicktime.com
3. Flash: www.adobe.com/shockwave/download/
4. Java Runtime: www.java.com



AAPG is partnering with PetroEd to expand its offerings of educational opportunities.

PetroEd offers self-paced, automated, graphics-rich courses with animations and quizzes which can be accessed online. The courses offer assessments and certificates of completion can be generated. You may also maintain an archive of your completed courses for professional purposes. Please visit PetroEd's

website to purchase courses using the coupon code "AAPGMEMBER2011" for a 5% discount on the total order.

To visit the PetroEd E-Learning Library, go to <http://www.aapg.org/education/online/petroed.cfm>

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THE WINTER EDUCATION CONFERENCE

ENJOY FIVE GREAT DAYS OF THE FINEST GEOSCIENCE TRAINING, INCLUDING SOME OF THE BEST SHORT COURSES THE AAPG HAS TO OFFER.

Schedule for AAPG Winter Education Conference - 2012 Houston

Monday - 2/13	Tuesday - 2/14	Wednesday - 2/15	Thursday - 2/16	Friday - 2/17
Sedimentary Processes & Basin Architecture in Mobile Substrates - Lesli Wood, Vishal Maharaj		Exploration for Deep-Water Sands Using Seismic Sequence Methodology - John Armentrout		
Carbonate Reservoir Geology - Charles Kerans, F. Jerry Lucia, Robert Loucks		Carbonate Seismic Sequence Stratigraphy - Rick Sarg	Carbonate Depositional Systems - Art Saller	Quick Guide to Carbonate Well Log Analysis - George Asquith
Interpretation of 3-D Seismic Data - Alistair Brown		Seismic Amplitude Interpretation - Fred Hilterman	Applied Seismic Stratigraphy and Seismic Geomorphology - Henry Posamentier	
Evaluation and Quantitative Modeling of Fractured Reservoirs - Ronald Nelson		Hydraulic Fracturing of Shales - Frank Syfan	Surface Geochemical Exploration for Oil & Gas - Dietmar Schumacher	

Small bookstore open during breaks each day

SHORT COURSES

AAPG WINTER EDUCATION CONFERENCE

Dates: February 13-17, 2012

Location: Houston, TX

Tuition: \$1795, AAPG members, \$1895, non-members (increases to \$1895/\$1995 respectively after 1/16/2012.) Registration is for entire week, and badge is transferable. Includes refreshments and buffet lunch each day in addition to course notes. Courses also priced individually at \$475/course day (increases to \$525/course day after 1/16/2012.) No refunds for cancellations after 1/16/2012.

SEDIMENTARY PROCESSES AND BASIN ARCHITECTURE IN MOBILE SUBSTRATES

Dates: February 13-14, 2012

Tuition: \$950, if purchased separately

(increases to \$1050 after 1/16/2012)

Content: 1.5 CEU

Instructors: Lesli J. Wood and Vishal Maharaj, Bureau of Economic Geology, The University of Texas, Austin, TX

Who Should Attend

This course is targeted to geoscientists and engineers working in deep water basins characterized by complex bathymetry and resultant deep water deposits. Experience working in or knowledge of deep water systems, i.e. mapping, modeling, producing, is desirable. 1-5 year post bachelor's degree or individuals looking to increase their knowledge base in basin fill of mobile or complex substrates, and looking to understand the processes that evolve during turbidite flow and bathymetry interactions for purposes of predicting reservoir quality and distribution.

Objectives

At the end of this two-day course participants will:

- Have a framework within which to map and predict sand and seal distribution within basin's undergoing temporal and spatial changes in subsidence and character during sedimentation
- Be able to recognize stratal geometries and relationships in seismic, as well as facies in logs and seismic.
- Be able to predict the stratal architecture proposed by various basin geometries and subsidence/sediment supply scenarios, as well as post-predict basin subsidence and tectonic history from the resultant architectures.
- Be exposed to unique physical process models derived from study of complex bathymetry and sedimentation in flume facilities.

Content

The course will be taught in a combined lecture and exercise format, supplemented with video of processes and deposits developed in experimental settings. The course takes an integrated

and applied approach to basin analysis in complex terrains, utilizing 2D and 3D seismic, well logs, biostratigraphic data, fluids and production information. Discussions will include:

- Seismic based approaches to analysis of basin fills
- Seismic geomorphology; mapping and quantifying fill architecture, depositional elements and facies.
- Process sedimentology of shelf to slope to basin systems. Approaches to building and populating static models of basin fills.
- Prediction of fluid behavior in stratigraphically complex basin fills.

CARBONATE RESERVOIR GEOLOGY

Dates: February 13-14, 2012

Tuition: \$950, if purchased separately

(increases to \$1050 after 1/16/2012)

Content: 1.5 CEU

Instructors: Bob Loucks, Jerry Lucia and Charles Kerans, Bureau of Economic Geology, Austin, TX

Who Should Attend

This course is designed for students and professionals interested in learning the fundamentals of carbonate reservoir systems. The course will contain information useful to both exploration and production geoscientists as well as petroleum engineers wanting to understand more about what makes carbonate reservoirs tick.

Objectives

Using a combination of lectures and exercises, participants should be able to:

- Classify carbonate rocks, facies, pore types, and Lucia rock fabrics
- Understand the systematic 1D-2D-3D approach to reservoir-scale sequence stratigraphic analysis of carbonate reservoirs
- Know the essential elements of a good core description for carbonate reservoir model construction
- Appreciate the importance of Milankovitch-keyed carbonate reservoir architectures
- Have available a range of analog datasets for carbonate ramp, rimmed shelf, isolated platform, karst, and fractured reservoir types
- Use wireline log data together with core-based rock fabrics to calculate interparticle porosity, separate vug porosity, permeability and saturation
- Understand the steps in constructing a systematic rock-fabric-flow-unit based geomodel for use in fluid flow simulations

Content

Carbonate reservoirs contain half of the world's remaining hydrocarbons, and can be found in a wide range of stratigraphic, structural, and diagenetic settings. Optimizing the resource in carbonate reservoirs requires a broad range of expertise and experience, including, but not limited to, sedimentology, sequence stratigraphy, seismic interpretation, well log analysis, petrophysics, geomodeling, and fluid flow modeling. This 2-day overview course

is designed for those recently entering into the area of carbonate reservoir studies who would like exposure to a broad-based review of current knowledge and evolving technology in the area of carbonate reservoir modeling.

The course will cover (1) carbonate classifications, (2) basic facies and depositional systems analysis, (3) a review of Phanerozoic carbonate platforms and reservoir systems, focusing on Cretaceous, Pennsylvanian, Permian, Ordovician, (4) carbonate sequence stratigraphy, (5) pore type classification, rock fabric facies, and petrophysics, (6) using rock fabric flow units and high-resolution sequence stratigraphy for construction of reservoir models.

INTERPRETATION OF THREE-DIMENSIONAL SEISMIC DATA

Dates: February 13-14, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 1/16/2012)*

Content: 1.5 CEU

Instructor: Alistair Brown, Consultant, Dallas, TX

Who Should Attend

The course is designed for geologists and geophysicists who use seismic data and who want to extract the maximum amount of subsurface information from it. This course covers the principles and practices of interpretation and not workstation operation.

Objectives

On completion of the course attendees will be able to realize more value from their seismic data.

Content

This course is designed to show how much geologic information typically resides in seismic data and how to effectively extract it. The special displays available on modern workstations, such as time slices and horizon slices, are explained. The balance between geology and geophysics is emphasized.

Topics will include:

- Data Understanding: nature of reflections, wavelength, resolution, the two limits, wavelets, clipping, footprint, color, data phase, data polarity.
- Structural interpretation: time slices, visualization, coherence, auto-tracking, horizon attributes, structural detail.
- Stratigraphic interpretation: amplitude, characteristic shapes, horizon slices, channels, bars & levees, windowed amplitude.
- Reservoir identification and evaluation: hydrocarbon phenomena, characteristics of reservoir reflections, reservoir limits, composite amplitude, net pay, porosity, pore volume.

EVALUATION AND QUANTITATIVE MODELING OF FRACTURED RESERVOIRS

Dates: February 13-14, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 1/16/2012)*

Content: 1.5 CEU

Instructor: Ronald Nelson, Consultant, Cat Spring, TX

Who Should Attend

Geoscientists and reservoir engineers who need to know how fractured reservoirs differ from conventional reservoirs, how to approach their study in a systematic and quantitative manner, for reservoir modeling will benefit from this course.

Objectives

Successful participants should be able to:

- Determine the major data requirements and exploration and production issues associated with various types of fractured reservoirs
- Know what controls short-term and long-term performance in fractured reservoirs
- Understand the types of data necessary to evaluate and explore for fractured reservoirs
- Handle quantitative assessments of the reservoir
- Create a Static Conceptual Fracture Model for reservoir simulation.

Content

This two-day course will cover the basic elements needed in the evaluation of fractured petroleum reservoirs from both an exploration and development point of view. A general sequence of study will be presented, as well as the data types needed to complete the study. A multidisciplinary approach will be stressed including integration of outcrop, subsurface rock data, petrophysical data, rock mechanic principles, reservoir performance data, and geophysical attributes. Examples of quantitative assessments of fracture properties leading to creation of a Static Conceptual Fracture Model will be shown. World-wide examples will be used from the instructor personal experience.

Key topic areas of the course include:

- A workflow for fractured reservoir studies
- Integration of fracture properties, stress state, geophysical attribute & rock modulus data
- Classification of fractured reservoirs
- Predicting reservoir inhomogeneity in fractured reservoirs
- Selection of appropriate reservoir simulation styles for the reservoir
- Creation of a Static Conceptual Fracture Model for the reservoir
- Selection of available fracture modeling packages
- Preparing for flow simulation

EXPLORATION FOR DEEP-WATER SANDS USING SEISMIC SEQUENCE METHODOLOGY

Dates: February 15-17, 2012

*Tuition: \$1425, if purchased separately
(increases to \$1575 after 1/16/2012)*

Content: 2.1 CEU

*Instructor: John Armentrout, Cascade Stratigraphic, Inc.,
Damascus, OR*

Who Should Attend

Geologists, geophysicists and engineers involved in exploration for or production from deep-water sand reservoirs will benefit from this practical, hands seminar. Participants should have a

basic knowledge of stratigraphic principles and fundamentals of sedimentologic processes.

OBJECTIVES

By the end of the course participants should be able to:

- Make a 'quick-look' evaluation of seismic profiles for probable exploration targets within passive margin, cratonic basin, forearc and growth-fault systems.
- Select the most appropriate 'preliminary' depositional model as an interpretation template for seismic analysis.
- Plan an interpretation strategy to optimize identification of deep-water sand systems including channel, channel-complex, lobe and sheet facies.
- Identify reservoir connectivity issues for channel-complexes and sheet-sands and outline a strategy for testing predicted connectivity.
- Identify the most critical issues of play-risk for each depositional element of deep-water sand systems.

Course Content

A succession of exercises and complimentary lectures will expose the participants to deep-water depositional systems, facies analysis, chronostratigraphic framework, comparison of local to global depositional patterns, and application of an integrated approach to stratigraphic analyses using multiple data sets. The exercises use 2D seismic profiles, wireline logs, and biostratigraphic data. Interpretation strategies using 3D seismic volumes will be illustrated. The study areas include the late Neogene of Nigeria and the Gulf of Mexico, Mesozoic facies of the North Slope of Alaska, Great Valley of California and West Siberia, and the Paleozoic of West Texas.

CARBONATE SEISMIC SEQUENCE STRATIGRAPHY – APPLICATION TO EXPLORATION

Dates: February 15, 2012

Tuition: \$475, if purchased separately

(increases to \$525 after 1/16/2012)

Content: .7 CEU

Instructor: J. Frederick Sarg, Colorado School of Mines, Golden, CO

Who Should Attend

Geologists and geophysicists who are exploring for and developing oil and gas fields in carbonate systems. Some experience with carbonate rocks is helpful, but not required. Particularly appropriate for those desiring to integrate seismic, well logs and core data to develop predictive models for carbonate systems.

Objectives

By the end of the day, attendees should be able to do the following:

- Demonstrate knowledge of the basics of carbonate seismic stratigraphic interpretation.
- Be able to develop criteria for predicting reservoir-prone and seal-prone seismic facies.
- Demonstrate knowledge of the different carbonate platform

types and their encompassing facies tracts.

- Recognize and appraise how other lithotypes contribute to carbonate systems and trap potential.
- Be able to assess different potential stratigraphic trap configurations.
- Appraise the role of early diagenesis in carbonate reservoirs, and develop criteria to identify karst using seismic data.
- Apply carbonate depositional, diagenetic, and sequence principles to exploration areas, and production assets.

Content

This one-day workshop provides an introduction to the application of carbonate facies, diagenesis, and seismic sequence stratigraphy to exploration for stratigraphic traps. The workshop combines seismic, well log and rock data, and the concepts of sequence stratigraphy to develop interpretations that help predict carbonate hydrocarbon systems, characterize carbonate reservoirs and seals, and develop stratigraphic trap prospects. The workshop covers (1) a short review of carbonate first principles including their relationship with evaporates and siliciclastics, and a review of the different carbonate platform types (i.e., ramps, prograding banks, and rimmed platforms, both isolated and attached); (2) a review of carbonate diagenesis. Special emphasis is placed on integrating early diagenesis into a seismic sequence framework and on the recognition of karst using seismic data; and (3) an introduction to carbonate sequence stratigraphy and the seismic facies of carbonate reservoirs and seals. Exercises will cover integrated seismic-well log-rock examples.

SEISMIC AMPLITUDE INTERPRETATION

Dates: February 15, 2012

Tuition: \$475, if purchased separately

(increases to \$525 after 1/16/2012)

Content: .7 CEU

Instructor: Fred Hilterman, Geokinetics, Houston, TX

Who Should Attend

This course is intended for geologists, geophysicists and engineers who integrate and/or interpret seismic data as part of their workflow to characterize a reservoir. In particular, the course will assist geoscientists who need to identify a reservoir's lithology, pore-fluid and net-to-gross using seismic amplitude.

Objectives

Upon course completion, participants should be able to select the appropriate techniques for pore-fluid and lithology prediction from seismic data. To accomplish this, the participants will:

- Qualitatively relate a rock's velocity and density to porosity, lithology and hydrocarbon content,
- Relate a reservoir's AVO class to seismic velocity,
- Identify seismic attributes that recognize hydrocarbon signatures in different rock-property (seismic velocity) environments,
- Compare the sensitivity of seismic attributes for variations in mineral content, porosity, and water saturation that are relative to the reservoir's geologic setting,
- Select the appropriate seismic attributes to crossplot and then

interpret regions on the seismic data that indicate most likely increases in porosity, hydrocarbon and net-to-gross,

- Prepare the necessary information and data needed to predict lithology and pore-fluid content from seismic data, and
- Evaluate the chances of a successful amplitude interpretation which leads to a successful reservoir characterization.

As a metric to the success of the learning objectives, a checklist for a reservoir-characterization study will be presented to the participants for evaluation and future application.

Content

The goal of seismic amplitude interpretation and this course is the validation of reservoir composition. This characterization has matured from the 1970 Bright Spot analyses to amplitude-versus-offset (AVO) and inversion techniques. Along the way, many seismic amplitude attributes related to rock properties have been proposed.

The course introduces the empirical and theoretical rock-physics basis for reservoir characterization and catalogs rock properties to expected seismic signatures. Techniques for recognizing hydrocarbons and quantifying the reservoir's properties in different rock-property settings, which are often referred to as Class 1-4 AVO, are introduced and subsequently illustrated with numerous field examples. Seismic amplitude attributes for distinguishing lithology and pore fluid along with their applicability and robustness in different environments are introduced.

Rock-property and AVO PC modeling programs are supplied to each participant to assist in the classroom and later work-related exercises involving seismic discrimination of lithology and pore-fluid. Case histories involving Class 1-4 AVO anomalies are presented along with numerous rock-property studies.

HYDRAULIC FRACTURING OF SHALES

Dates: February 15, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 1/16/2012)*

Content: .7 CEU

Instructor: Frank Syfan, U.S. Silica Company, Houston, TX

Who Should Attend?

The Hydraulic Fracturing course is designed to acquaint geologists, geophysicists, geologic technicians, and geologic managers with the reservoir flow and hydraulic fracturing process. This course is taught in a non-commercial manner and does not require fracturing knowledge or skills as a prerequisite for registration.

Objectives

In today's oil and gas producing environment, Hydraulic Fracturing plays a critical role in enhancing petroleum reserves and daily production. Progress in drilling and hydraulic fracturing techniques have allowed the O&G industry to economically develop deeper, highly complex reservoirs including ultra-tight, naturally fractured shale formations. The industry is actively building drilling rigs again and the fracturing companies are adding equipment and crews at an escalating rate to keep up with the expanding market and fractured shale boom. These events have placed demands on hydraulic fracturing including personnel, pumping equipment, and proppants as never before.

Participants in this course will learn the basics of reservoir and fracture flow theory and hydraulic fracturing theory and mechanics. At the end of the course, the participants should be able to answer the following important questions concerning Well Productivity and Hydraulic Fracturing:

- How and why a well produces hydrocarbons?
- What is Hydraulic Fracturing (HF)?
- Why does HF improve a well's capability to produce?
- Why is HF so complicated?
- What controls a HF to make it grow larger and in different directions?
- Why do horizontal wells in these new Shale completions require so many HF stages?
- Why are proppants necessary and what role do they play in a fractured well?

Content

The course begins with a discussion of Reservoir Flow Theory which includes a definition of important terms, the reservoir system, and fluid flow in hydrocarbon reservoirs. A brief introduction to hydraulic fracturing is then followed by detailed discussions on the processes that govern the shape, azimuth, hydraulics, and critical parameters. The class is instructed in basic hydraulics equations and how they are solved and used in fracturing applications. The participants are also schooled on hydraulic fracturing fluids and proppants and their criticality to the fracturing process. Other detailed discussions include:

- Rock Mechanics
- Fracture Geometry
- Fracture Azimuth and Orientation
- Fluid Leak-Off
- Fracture Conductivity

CARBONATE DEPOSITIONAL SYSTEMS

Dates: February 16, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 1/16/2012)*

Content: .7 CEU

Instructor: Art Saller, Chevron, Houston, TX

Who Should Attend

This course is for earth scientists and engineers involved in exploration or production from carbonate rocks. This is an introductory course that assumes no pre-existing knowledge. It moves from basic principles to advanced ideas and case studies that will also help experienced geoscientists with practical aspects of carbonate depositional systems.

Objectives

This course will give participants a working knowledge of carbonate depositional systems. By the end of the course, participants will be able to:

- Describe carbonate rocks according to depositional texture and grain types
- Interpret carbonate depositional environment from core descriptions and other data
- Know the characteristics of modern and ancient carbonate depositional environments

- Understand the relationship between depositional environments and carbonate grain types and textures
- Use depositional environments and facies data to understand variations in subsurface reservoir properties like porosity and permeability
- Predict the spatial distribution of different depositional environments in the context of reservoir development
- Understand different types carbonate depositional systems (ramps, shelves, isolated platforms, and buildups), and their implications to reservoir development
- Predict changes in depositional systems and facies during basin evolution and sea level fluctuations, including differences between “greenhouse” (small amplitude sea-level fluctuations) and “ice-house” (high amplitude sea-level fluctuations) times

Content

This course will alternate between lectures and practical exercises involving cores, logs and seismic data.

The course starts with an introductory lecture that summarizes key differences between carbonate and siliciclastic depositional systems, followed by a review of the Dunham classification of carbonate rocks and grain types. An exercise involving outcrop samples will allow participants to describe samples and relate them to depositional environments.

The second lecture is on carbonate depositional environments, and it will systematically examine modern environments, outcrop equivalents, and subsurface reservoir examples of each environment. An exercise involving cores and logs will illustrate ramp depositional environments and their effect on reservoir architecture during “greenhouse” times.

Carbonate sequence stratigraphy will be discussed in theory and practice. A core-log-seismic exercise will show to how predictable variations in reservoir development occur during ice-house cycles on a shelf and isolated platform.

This course will conclude with a discussion summarizing prediction of depositional facies, stratigraphy and reservoir development in a variety of different settings.

APPLIED SEISMIC GEOMORPHOLOGY AND SEISMIC STRATIGRAPHY – EXTRACTING GEOLOGIC INSIGHTS FROM 2D AND 3D SEISMIC DATA

Dates: February 16-17, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 1/16/2012)*

Content: 1.5 CEU

Instructor: Henry Posamentier, Chevron, Houston, TX

Who Should Attend

Geologists and geophysicists who utilize seismic data to predict the distribution of depositional systems and associated lithologies in the subsurface. Although the emphasis will be on the use of 3D seismic data, geoscientists using 2D seismic data will benefit as well from this course as well.

Objectives

This course is designed to enhance interpretation skill sets with regard to geologic interpretation of seismic data. The overall objective is to present methods for reducing risk with regard to prediction of lithology,

reservoir compartmentalization, and stratigraphic trapping potential in exploration and production. Specifically, the participant will be shown:

- Techniques for 2D and 3D seismic geomorphologic/stratigraphic analyses
- Workflows designed to facilitate extraction of stratigraphic insights from 3D seismic data
- Numerous examples of various depositional systems in various depositional settings
- By the end of this course, participants will be able to:
- Recognize geologically significant stratigraphic and geomorphologic patterns
- Predict lithological distribution based on seismic patterns
- Build a stronger case for the acquisition of seismic data for exploration and field development
- Gain new insights with regard to geologic process in numerous depositional settings, including deep-water, shelf and marginal marine, fluvial systems, and carbonate systems
- Apply new and novel workflows to facilitate and accelerate seismic interpretation for lithologic prediction

Content

The application of seismic geomorphology and seismic stratigraphy to exploration and field development is a natural consequence of the advent of high-quality and increasingly more affordable and widespread 3D seismic data currently available. Integrating analyses of plan view (geomorphologic) and section view (stratigraphic) images can significantly enhance predictions of the spatial and temporal distribution of subsurface lithology (reservoir, source, and seal), compartmentalization, and stratigraphic trapping capabilities, as well as enhanced understanding of process sedimentology and sequence stratigraphy.

Participants in the course will be exposed to seismic geomorphologic/stratigraphic workflows, which involve 1) initial reconnaissance through 3D volumes with various slicing techniques using a variety of different seismic attribute volumes including full stack reflection amplitudes, near and far stacked amplitude volumes, and coherence volumes, as well as opacity rendering, 2) focus on features of geologic interest and further investigate through a combination of detailed slicing, interval attributes, horizon picking and amplitude extraction, horizon illumination, etc., and 3) comprehensive integration of seismic geomorphologic analyses with seismic stratigraphic analyses, whereby the plan view is integrated with the section view to ensure a consistent interpretation.

Course lectures will involve both PowerPoint presentations as well as interactive interpretation of 3D seismic data. A wide variety of depositional settings will be shown, ranging from non-marine to marginal marine, shelf and deep water, and will include both clastic as well as carbonate depositional environments. Concepts as well as applications pertaining to seismic-based analyses of depositional systems will be covered in detail.



SURFACE GEOCHEMICAL EXPLORATION FOR OIL AND GAS: THEORY, METHODS, AND EXPLORATION CASE HISTORIES

Dates: February 16-17, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 1/16/2012)*

Content: 1.5 CEU

*Instructor: Dietmar Schumacher, Geo-Microbial Technologies, Inc.,
Mora, NM*

Who Should Attend

This course is designed for exploration and development geoscientists, E&P managers, and anyone wanting a comprehensive overview of these complex and sometimes controversial exploration technologies.

Objectives

By the end of the course, participants will have learned the following:

- A basic understanding of hydrocarbon seepage and microseepage, as well as seepage characteristics, mechanisms and rates
- The varied surface and near-surface expressions of hydrocarbon seepage and microseepage – geochemical, mineralogic, and geophysical
- The various direct and indirect geochemical, remote sensing, and non-seismic geophysical methods available for the detection of hydrocarbons
- The importance of proper survey design and survey method selection
- Guidelines for interpretation of surface geochemical data
- Pitfalls to avoid in the acquisition and interpretation of surface geochemical data
- The value added to conventional geologic and seismic data by inclusion of data from hydrocarbon detection surveys

Content

This course will review hydrocarbon migration mechanisms and models; examine the varied surface and near-surface expressions of hydrocarbon migration and microseepage; review geochemical, remote sensing, and non-seismic geophysical exploration technologies developed to detect and map these hydrocarbon-induced changes; and discuss the applications of these hydrocarbon detection methods to finding and producing oil and gas.

Numerous case histories will be presented which document the many successful applications of these hydrocarbon detection methods – applications ranging from reconnaissance surveys in frontier basins, to developing and high-grading exploration leads and prospects on the basis of likely hydrocarbon charge, and for field development and production applications such as finding by-passed pay in old fields. The case histories will include onshore and offshore examples from throughout the world, and from diverse geologic and environmental settings.

The economic benefit of integrating hydrocarbon detection data with conventional geologic and geophysical exploration and development methods can be significant. A recent review of more than 2600 US and International wildcat wells – all drilled on conventional prospects after completion of surface geochemical surveys – reveals that more than 80%

of wells drilled on prospects with positive seepage anomalies resulted in commercial oil or gas discoveries; in contrast, only 12% of wells drilled on prospects not associated with such hydrocarbon anomalies resulted in discoveries.

QUICK GUIDE TO CARBONATE WELL LOG ANALYSIS

Dates: February 17, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 1/16/2012)*

Content: .7 CEU

Instructor: George Asquith, Texas Tech University, Lubbock, TX

Who Should Attend

The course is designed to be of benefit to geologists, engineers and technical support people who are involved in oil and gas exploration and production in carbonate reservoirs. As the title states, this is a quick guide that concentrates on methods used to analyze carbonate reservoirs. It is an advanced course and assumes the course participants are already well informed about basic well logging principles.

Objectives

At the conclusion of the course, participants should be able to do the following:

- Scan a well log to determine zones that potentially could be hydrocarbon productive.
- Examine pre-processed and calculated well log data and be able to answer the following questions.
- What is the carbonate pore type or types?
- Is the reservoir water-wet or oil-wet?
- Is the reservoir hydrocarbon productive?
- If hydrocarbon productive, will the production be oil or gas? Do you expect a water-cut?
- Use a cross plot method to help verify the answers to the four questions.
- Once the above four questions are answered the participants should be able to determine a strategy to improve the calculations of the reservoir's water and hydrocarbon saturations.

Content

The course begins with a short review of the basic principles of carbonate well logging. Next are a series of lectures on the different carbonate pore types and the logging methods used to differentiate the various pore types and to determine their hydrocarbon productive potential. A flow chart is provided that will aid the participants' understanding of the sequence used in analyzing carbonate reservoirs. At conclusion, seventeen problems will be presented that will be analyzed by the participants. In six of the problems, they will be required to do some of the calculations. They will then answer the four questions outlined above for each of the seventeen problems. Next, they use a cross plot to help verify their pore type, wettability, and hydrocarbon productive potential conclusions determined in the seventeen problems.



SHORT COURSES

SHORT COURSES ARE THE BEST WAY TO LEARN ABOUT THE INDUSTRY AND ARE PACKED WITH INFORMATION. VALUABLE MATERIALS, HANDS-ON EXERCISES AND DIRECT INTERACTION WITH INSTRUCTORS AND FELLOW ATTENDEES – THERE’S NO BETTER WAY TO LEARN! WITH SO MANY TO CHOOSE FROM, THERE’S SOMETHING FOR EVERYONE.

STAND-ALONE SHORT COURSES

BASIC WELL LOG ANALYSIS

Dates: March 26-30; July 23-27, 2012

Location: Austin, TX (March); Golden, CO (July)

*Tuition: \$1650, AAPG members, \$1750, non-members (increases to \$1750/\$1850 after 2/27/2012 for March course, and after 6/25/2012 for July course), includes course notes, refreshments, and a copy of AAPG Methods in Exploration #16, *Basic Well Log Analysis* by George Asquith and Daniel Krygowski, with Neil Hurley and Steve Henderson*

Content: 3.5 CEU

Instructors: George Asquith, Texas Tech University, Lubbock, TX; Daniel A. Krygowski, The Discovery Group, Denver, CO; Richard E. Lewis, Schlumberger, Oklahoma City, OK

Who should attend

Geologists, engineers and technicians who work with openhole logs and who want to understand the fundamentals of what the measurements are, what affects them, and how they are used to estimate the properties of interest in the subsurface. This basic course will be useful to new personnel in the oil and gas industry as well as to more experienced professionals that want a review.

Objectives

By the end of the course, participants should be able to:

- Describe the acquisition process for both wireline and LWD measurements.
- Scan a well log to determine zones that potentially could be hydrocarbon productive, and to check for log quality.
- Convert formation and drilling fluid properties for temperature, and make other basic well log environmental corrections.
- Determine porosity using one or more logs;
- Infer lithology from the logs, and know how the logs are affected by lithologic changes.
- Understand how the Archie parameters are obtained, so that together with log data, water saturation and hydrocarbon saturation can be derived.
- Understand how pattern recognition and graphical techniques can be used to determine computation parameters as well as properties of interest.
- Understand how to judge the reservoir and completion qualities of shale gas reservoirs using basic logging techniques and more advanced measurements, as well as the value of other measurement types in an integrated interpretation.

Content

The course assumes no logging knowledge and seeks to establish an understanding of basic petrophysical measurements and interpretation techniques which can be applied to routine tasks, and upon which more complex and advanced information and interpretive techniques can be built.

The course:

- Uses a “hands-on” approach to basic openhole well log analysis

and interpretation, where common sets of logs are used in ongoing exercises and final problems to illustrate complete and coherent interpretations.

- Focuses on the traditional interpretation targets of lithology, porosity, and fluid saturation, but also touches on other applications of the measurements.
- Introduces a variety of interpretation techniques: numerical to visual (pattern recognition), and the use of some older techniques in the context of the availability of newer, more extensive, data.
- Introduces the participants to the evaluation of shale gas reservoirs through the concepts of reservoir and completion quality, using common logging suites and more advanced measurements.

The course strives to provide a strong and coherent foundation for the understanding of other, specialized interpretation techniques involving well log data, which are not covered here.

PRACTICAL SALT TECTONICS

Dates: March 28-30, 2012

Location: Austin, TX

Tuition: \$1275, AAPG members, \$1375, non-members (increases to \$1375/\$1475 after 2/29/2012), includes course notes and refreshments

Content: 2.1 CEU

Instructor: Mark Rowan, Rowan Consulting, Boulder, CO

Who Should Attend

This course is intended for geoscientists, engineers, and managers who need an introduction to salt tectonics or an update in this constantly evolving field. It is appropriate for those working in any salt basin globally and assumes a basic familiarity with structural geology concepts and terminology.

Objectives

Participants completing this course should be able to:

- Understand the depositional setting of layered evaporites and the control on later deformation,
- Describe the mechanics of salt flow and identify the loading, extensional, and contractional triggers for salt movement,
- Interpret salt and stratal geometries associated with diapirs, salt welds, and minibasins,
- Illustrate the processes and geometries resulting from extensional or contraction reactivation of diapirs,
- Explain how diapir rise influences stratal geometries, faulting, and reservoir distribution in diapir-flank traps,
- Demonstrate how allochthonous salt is emplaced and how it subsequently evolves,
- Understand the role of salt in rift basins, passive margins, and convergent-margin fold-and-thrust belts,
- Determine the effect of salt on sediment transport and deposition,
- Appraise the influence of salt bodies and welds on hydrocarbon maturation, migration, and entrapment
- Assess more accurately the risks in the exploration of salt basins.

Content

This course is designed to give participants the basic working tools to explore and develop hydrocarbons in salt basins. Because no two basins are alike, the focus is on understanding the processes and styles of salt-related deformation using a combination of seismic data, outcrop examples, and experimental models.

The course will initially address layered-evaporite basins and what drives salt mobility. We will then shift to discussing, first, how salt flow, diapirism, and minibasin formation are triggered by early differential loading, extension, contraction, or strike-slip deformation, and second, how diapirs and minibasins evolve over time and can be reactivated during episodes of extension or shortening. Focusing in on the details around diapirs, we will examine how diapiric growth impacts folding, faulting, and reservoir distribution. Because salt often moves more laterally than vertically, we will explain how and why allochthonous canopies form and evolve, and what can be expected just below salt sheets.

Salt is found in a variety of tectonic settings. We will look at its role in facilitating and responding to deformation in rift basins, passive margins dominated by gravity-driven deformation, and convergent-margin fold-and-thrust belts, using examples for various salt basins around the world. Finally, because salt provides the framework for other aspects of the petroleum systems in these basins, we will examine the influence of salt bodies and salt welds on sediment transport and deposition, hydrocarbon maturation and migration, and seal of hydrocarbons.

The course will consist primarily of lectures but will be supplemented by exercises focused mainly on interpretation of both 2-D and 3-D, time- and depth-migrated seismic data.

SHALE GAS RESERVOIR ASSESSMENT – AN INTEGRATED APPROACH

Dates: April 21-22, 2012

Location: Long Beach, CA, with AAPG Annual Meeting

Tuition: \$995, AAPG members, \$1095, non-members (increases to \$1095/\$1195 after 3/23/2012), includes course notes and refreshments.

Content: 1.5 CEU

Instructors: Christopher D. Laughrey, Chad Hartman, Pat Lasswell, Weatherford Labs, Golden, CO

Who Should Attend

Geologists, geophysicists, engineers, and laboratory technicians who need to become acquainted with the various disciplines that must be integrated for successful shale-gas exploration and production. These disciplines include well site engineering, sedimentology, stratigraphy, petrology, structural geology, geophysics, geochemistry, petroleum engineering, and geomechanics. The class is particularly appropriate for professionals who are new to shale-gas reservoirs and for specialists in one area who want to acquire general knowledge of other aspects of shale-gas science and technology.

Objectives

By the end of the course, participants should be able to:

- Apply the principals of petroleum systems analysis to the exploration phase of shale-gas reservoir prospect evaluation.

- Plan and execute a shale-gas core acquisition and analytical program.
- Understand and interpret mud gas, headspace gas, and canister gas content, composition, and stable isotope data.
- Use x-ray diffraction and various optical and SEM petrology data to interpret shale pore geometry and distributions.
- Apply fundamental petroleum geochemistry principals and techniques to measuring the amount, quality, and thermal maturity of organic matter in shale-gas systems.
- Understand the methods of petrophysical characterization of shale-gas reservoirs.
- Utilize adsorption isotherm data for shale-gas reservoir analysis.
- Make gas content and gas storage capacity comparisons.
- Develop shale core data relationships and core-to-log interpretations.
- Calculate gas-in-place estimates.
- Understand well testing and geomechanical applications in shale-gas reservoir studies.
- Appreciate various reservoir simulation applications, including microseismic technology and fracture mapping, and the use of cluster analysis in shale-gas analysis.

Content

This course is a practical and applied introduction to laboratory techniques routinely employed in shale-gas reservoir assessment and their relationship to some of the other tools used in the industry. Class emphasis is on explaining which analytical techniques can best address specific questions, what caveats must be kept in mind when employing these tools, what are the strengths and limitations of laboratory analyses in shale-gas assessment, and how to interpret conflicting data from different analyses. Theory is kept to a minimum and selected practical exercises help participants learn to review laboratory data, recognize problems with the data, and to cultivate a feel for interpreting laboratory data and integrating these interpretations with other geological and engineering information.

APPLIED STRUCTURAL GEOLOGY – COURSE PLUS FIELD TRIP

Dates: August 27-31, 2012

Location: Perugia, Italy

Tuition: \$2195, AAPG members, \$2295, non-members (increases to \$2295/\$2395 after 9/3/2012), includes course notes and refreshments.

Content: 3.3 CEU

Instructors: Chuck Kluth, Colorado School of Mines, Golden, CO, with field trip assistance from Giorgio Minelli, University of Perugia, Perugia, Italy

Who Should Attend

Geologists, geophysicists, engineers, and managers engaged in exploration and production projects in shortened and extended terrain who need an update and overview of structural trap geometries, reservoir fracture systems, and modern structural techniques will benefit from this course.

Objectives

Upon completion of this course, participants will be able to:

- Recognize the geometry of structural traps, and their mechanisms of formation
- Understand and use structural analysis tools and techniques
- Recognize and analyze various fractured reservoirs
- Integrate data to understand and predict trap shapes
- Recognize the mechanisms of sealing faults.

Content

Structural traps continue to be the primary targets of hydrocarbon exploration. In this course, we will review the wide variety of structural trap geometries that exist in thrust and extended terrain. The instructors will use outcrop, seismic, and both kinematic and numerical models to illustrate 2D and 3D trap shapes and growth histories. Participants will learn to apply sound structural principles and techniques, and integrate a variety of data types to understand and predict overall trap shape, the character and impact of distribution of secondary structures (e.g., fractures) that may have a critical impact on reservoir performance, and identify likely exploration targets in each of the structural styles covered. This up-to-date review will enhance the ability of industry geoscientists to both interpret trap-forming structures and to critically evaluate existing interpretations.

This course will be taught using lecture sessions, a day in the field, and practical exercises. The all-day field trip will examine spectacular and very well exposed thrust and extended terrains in and around Perugia.

Topics covered during the 4 lecture days will include:

- Update on nomenclature and concepts of shortened terrain.
- Introduction to the structural use of subsurface data
- How to recognize and understand flow behavior of naturally fractured reservoirs.
- Introduction to characterization of naturally fractured reservoirs.
- Overview of well planning and completion issues in naturally fractured reservoirs.
- Update on nomenclature and concepts of extended terrain.
- Introduction to fault seals.
- Seismic interpretation in shortened and extended terrain.
- Exercise on how to use structural geometry in prospecting for and developing conventional and fractured reservoirs.

FRACTURED RESERVOIRS: FROM GEOLOGIC CONCEPTS TO RESERVOIR MODELS – COURSE PLUS FIELD TRIP

Dates: October 1-5, 2012

Location: Casper, WY

Tuition: \$2195, AAPG members, \$2295, non-members (increases to \$2295/\$2395 after 9/3/2012), includes course notes and refreshments.

Content: 4.0 CEU

Instructors: John Lorenz, Geoflight LLC, Edgewood, NM; Ahmed Ouenes, Prism Seismic, Greenwood Village, CO; Scott Cooper, Cooper Geological Consulting LLC, Tijeras, NM

Who Should Attend

Geologists, geophysicists, reservoir engineers, and geomodellers who deal with fractured reservoirs and who need to develop them using all types of available data. The course will be very useful to all geoscientists involved in clastics, carbonates and shale plays where fractures play a major role.

Objectives

This course provides a unique opportunity to learn all the aspects related to the understanding and modeling of fractured reservoirs. The unique feature of this course is the ability to take the geologic concepts and use them in reservoir modeling. Hands-on sessions are devoted to the examination of outcrop, core and log data and using that information and a software to create 3D fractured reservoir models. The first part of the workshop covers the geologic aspects which allow the geoscientist to recognize different types of fractures from outcrop, cores and boreholes. Once the fractures are recognized, their impact on the reservoir and its performance is examined. Six case studies are used to illustrate all the geologic concepts. The second part of the workshop covers all the aspects of modeling fractured reservoirs. Using modeling software and actual data from Teapot Dome, (WY), the geoscientist will be able to construct fracture models that integrate geology, geophysics and reservoir engineering. Emphasis will be given to the critical use of seismic attributes derived from inversion, volumetric curvature and spectral imaging. Using actual Teapot Dome field data from the Tensleep and Niobrara Shale formations and a hands-on approach, the workshop allows the geoscientist to identify fractures and to construct predictive 3D fracture models that can be used to identify productive zones, plan wells and to create fracture porosity and permeability models for reservoir simulation.

Prior to starting the modeling exercises, a field trip to the Tensleep outcrop around Casper (WY) will provide to the students the unique opportunity to see the large scale features related to fractures.

The student can take the concepts learned in this class and use them to solve his own fractured reservoirs problems

Contents

Part 1: Geologic Aspects of Fractured Reservoirs

- Introduction: Fracture Types and Variability
- Fractures in Core: Natural Fractures
- Fractures in Core: Induced Fractures, Types and Uses
- Fracture Mechanics
- Fractures on Anticlines
- Fracture Spacings
- Fracture Effects on Reservoirs
- Case Histories

Part 2: Field Trip to Tensleep outcrops

Part 3: Modeling Fractured Reservoirs

- Introduction
- Factors Affecting Fracturing
- Methodologies to Characterize Fractured Reservoirs
- The Use of Seismic to Improve the Fracture Modeling
- Integrated Workflow Applied to Fractured Reservoirs
- Hands-on Application: 2 Different Datasets from the Teapot Dome (WY)



SUMMER EDUCATION CONFERENCE

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Schedule for AAPG Summer Education Conference - 2012 Fort Worth

Monday - 6/18	Tuesday - 6/19	Wednesday - 6/20	Thursday - 6/21	Friday - 6/22	
Getting Started in Fluvial Stratigraphy - John Holbrook	Fundamentals of Siliciclastic Sequence Stratigraphy - John Holbrook	Rocks, Pores & Capillary Pressure: Understanding Reservoirs & Seals - Chuck Vavra	Quantification of Geologic Risk - Gary Citron		Basics
Geological Interpretation of Seismic Data - Bruce Hart		Risk Reduction for Plays & Prospects Using Quantitative Show - John Dolson	Reservoir Engineering for Petroleum Geologists - Rich Green		Basics
Image Log Interpretation - Laird Thompson		Formation Evaluation of Thinly-Bedded Reservoirs - Quinn Passey	Exploring for Stratigraphic Traps Using Multi-well Pressure/Depth Plots - Hugh Reid		Intermediate
Regional Stress and Reservoir Geomechanics - David Wiprut		4D Evolution of Contractional Terranes - Steve Boyer	Hydraulic Fracturing for Geologists - Randy LaFollette		Advanced

Small bookstore open during breaks each day

AAPG SUMMER EDUCATION CONFERENCE

Dates: June 18-22, 2012

Location: Fort Worth, TX

Tuition: \$1795, AAPG members, \$1895, non-members (increases to \$1895/\$1995 respectively after 5/21/2012.) Registration is for entire week, and badge is transferable. Includes refreshments and buffet lunch each day in addition to course notes. Courses also priced individually at \$475/course day (increases to \$525/course day after 5/21/2012.) No refunds for cancellations after 5/21/2012.

GETTING STARTED IN FLUVIAL STRATIGRAPHY

Date: June 18, 2012

Tuition: \$475, if purchased separately (increases to \$525 after 5/21/2012)

Content: 0.7 CEU

Instructors: John Holbrook, Texas Christian University, Fort Worth, TX

Who Should Attend

Geologists, geophysicists, and engineers seeking techniques for improved subsurface mapping and more accurate prediction of lithology/porosity distribution within fluvial reservoir intervals that are depicted in seismic, borehole, and outcrop data sets. Concepts are taught from base principles so no prerequisites are required. An entry-level understanding of Geology is helpful.

Objectives

Upon completion of the course, participants will gain an overview of the river processes that generate strata as well as acquire a range of techniques for mapping and interpretation of fluvial rock. Participants will attain the following skills.

- Relate surficial fluvial processes to specific rock units.
- Evaluate fluvial preservation in a “river-to-rock” context
- Quickly recognize fluvial lithofacies in core and outcrop
- Identify and constrain dimensions of reservoir (e.g., bars, channel belts, etc) and non-reservoir (e.g. lake, floodbasin, etc.) architectural elements in well-logs, core, seismic, and outcrop
- Place reservoir elements into their correct position within the fluvial architectural hierarchy (e.g. channel-fill vs. channel belt vs. valley fill)
- Improve reservoir evaluations through a gained understanding of the relationships between locally preserved net to gross and broader basin processes
- Estimate heterogeneity and connectivity between and within reservoirs
- Correlate fluvial strata at the basin scale

Content

The course will cover the full range of topics needed to identify, correlate, and interpret fluvial reservoirs and encasing non-reservoir units. Participants will gain the foundations for understanding and predicting the geometry, connectivity, and permeability trends of fluvial reservoir systems at the scale of boreholes, fields, and basins. To accomplish this, the course is subdivided

into six components that each convey a specific aspect of fluvial stratigraphy and each build sequentially upon knowledge gained from the preceding components. These components are, in order, fluvial geomorphology, fluvial facies, fluvial architecture, seismic geomorphology, heterogeneity and connectivity, and correlation.

Fluvial geomorphology provides a background for understanding the flow dynamics, basin processes, and accommodation conditions that dictate formation and preservation of reservoir units. In fluvial facies participants will learn the skills needed to recognize and distinguish the sediments unique to each of the common fluvial depositional environments. Fluvial architecture will provide insights into the origin, geometry, and lithofacies typical for each of the common reservoir (e.g. bars, etc.) and non-reservoir (e.g. abandoned channel fill, etc.) elements within fluvial sections at all levels of the fluvial hierarchy (i.e. channel-scale, vs. belt scale, vs. valley scale). In this section we will also explore controls on spatial arrangement of these elements as well as techniques for their correlation in borehole logs. Seismic geomorphology will address common techniques for identification and mapping of reservoir elements in 3-D seismic data. In the heterogeneity and connectivity section, we will explore the depositional processes that generate heterogeneity within fluvial reservoirs as well as the processes that connect discrete reservoir elements to each other. We will also identify some useful techniques and statistics for predicting heterogeneity and connectivity within fluvial reservoir systems. Lastly, we will review the various techniques that may be used to correlate fluvial strata at the basin scale.

GEOLOGIC INTERPRETATION OF SEISMIC DATA

Date: June 18-19, 2012

Tuition: \$950, if purchased separately (increases to \$1050 after 5/21/2012)

Content: 1.5 CEU

Instructor: Bruce Hart, ConocoPhillips, Houston, TX

Who Should Attend

This course is most popular with geologists looking for an introductory level course on 3-D seismic technology. It is also appropriate for managers, engineers or others who will be making decisions that affect 3-D acquisition, or will be working with results that are based on 3-D seismic interpretations. Processing geophysicists and geophysical interpreters seeking to develop the geological side of their interpretation will also benefit.

Objectives

By the end of the course, participants will be able to:

- Employ simple calculations to determine seismic resolution and detection limits (i.e., what should be visible seismically?)
- Recognize the critical role that seismic acquisition and processing parameters have on the interpretability of seismic data
- Identify appropriate seismic visualization technologies for structural and stratigraphic interpretations
- Explain why subsurface interpretations based on 2-D seismic and/or well control will always be wrong
- Recognize the key elements of a complete 3-D seismic

interpretation, beginning with survey design and integrating geological and engineering data and concepts

- List several geophysical techniques (amplitude variation with offset, attributes, spectral decomposition, etc.) that are useful for qualitative and quantitative physical property prediction (including fluid prediction) and describe how these techniques can be used to make better geological interpretations of seismic datasets

Content

This course introduces participants to basic concepts of 3-D seismic interpretation in a non-mathematical way. The course draws largely on material prepared by the instructor for his AAPG e-textbook on seismic interpretation, which itself draws on 3-D seismic interpretation courses that he has offered since 1995.

The course begins with a short discussion of the 3-D seismic revolution and characteristics of a modern seismic interpreter. The second chapter introduces participants to the physical basis of the seismic reflection: different types of seismic waves and how they propagate, why reflections are generated, and limits on seismic resolution. Chapter 3 discusses key aspects of 3-D seismic survey acquisition and processing, and illustrates how these factors affect data interpretability. The next chapter focuses on the 3-D seismic cube and illustrates various ways for visualizing the data. Chapter 5 walks participants through a complete 3-D seismic interpretation workflow, including elements such as making well ties, structural and stratigraphic interpretations, and selected advanced geophysical techniques for physical property prediction. Selected case studies, presented in the final chapter, illustrate how 3-D seismic methods were integrated with other datasets to solve real-world petroleum industry problems.

IMAGE LOG INTERPRETATION

Date: June 18-19, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 5/21/2012)*

Content: 1.5 CEU

Instructor: Laird Thompson, UF3, Auburn, California

Who Should Attend

Geoscientists and petrophysicists who use image log interpretations in their reservoir interpretations and are looking to expand their knowledge of the application of image log data sets to solve a variety of industry problems.

Objectives

By the end of the course, participants should be able to accomplish the following:

- Know the different image logging tools and which ones to use in different hole conditions and for solving different problems.
- Know how to QC an image log to be sure the data are reliable. Know how the image is created and understand its' strengths and limitations.
- Know how to work with at least two different image log interpretation software systems and how to evaluate the most appropriate software for different interpretation needs.
- Know how to identify artifacts on image log data and

distinguish them from the geological information in the image log.

- Know how to work with depositional bed forms and sequences for doing a sedimentological analysis.
- Know how to recognize faults and fractures on image logs and how to gather these data for use in 3D fracture modeling.
- Know how to recognize drilling induced fractures vs. natural fractures in the rocks.
- Know how to recognize and use geomechanical features for wellbore stability and mud weight predictions.
- Know how to extrapolate structural information away from the wellbore to predict near-by drilling opportunities.

Content

The course will show the range of interpretations possible with image log data sets. This range includes geological analyses such as depositional bedform analysis, diagenetic alterations to the rock, sedimentological sequences, quantifying thin-bedded reservoirs, structural analysis of folded and faulted structures, and the analysis of fractures and fracture sets. In addition, geomechanical applications such as borehole stability and in situ stress analysis are discussed. Finally, the use of these data sets in populating 3D geological models from the 1D wellbore data set is discussed.

The approach is for participants to bring a laptop and we will load interactive interpretation software and example data sets on the laptop for practice picking dips and interpreting sedimentological and structural problems. In addition, participants will each receive a copy of the CD publication "Atlas of Borehole Imagery", AAPG discovery Series No. 13 by Dr. Thompson.

REGIONAL STRESS AND RESERVOIR GEOMECHANICS

Date: June 18-19, 2012

*Tuition: \$950, if purchased separately
(goes up to \$1050 after 5/21/2012)*

Content: 1.5 CEU

Instructor: David Wiprut, Geomechanics International, Houston, TX

Who Should Attend

This course is recommended to geoscientists and engineers in the petroleum and geothermal industries, and for research scientists interested in stress measurements and their application to problems of faulting and fluid flow in the crust.

Objectives

Through the use of exercises, the participants will:

- Learn how various types of wellbore failure develop
- Learn the implications of these failures for drilling
- Understand the stress field through these failures.

The importance of knowing the stresses resolved on preexisting natural fractures in reservoir exploitation will be demonstrated to the participant.

Content

This interdisciplinary course encompasses the fields of rock mechanics, structural geology and petroleum engineering to address a wide range of geomechanical problems that arise during the

exploitation of oil and gas reservoirs.

Covering the exploration, assessment and production phases of petroleum reservoir development, the course considers from the perspective of stress in the earth and geomechanics, such practical issues as exploitation of fractured reservoirs, estimation of hydrocarbon column heights and fault leakage potential, and determination of optimally stable well trajectories.

FUNDAMENTALS OF SILICICLASTIC SEQUENCE STRATIGRAPHY

Date: June 18, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 5/21/2012)*

Content: 0.7 CEU

Instructors: John Holbrook, Texas Christian University, Fort Worth, TX

Who Should Attend

Geologists, geophysicists, and engineers seeking techniques for improved subsurface mapping and prediction of lithology distribution within siliciclastic reservoir intervals. The course teaches sequence stratigraphy as a tool for interpreting seismic and borehole data from slope, shelf, coastal, and/or continental deposits. An entry-level understanding of these depositional environments is anticipated.

Objectives

Upon completion of the course, participants will gain an overview of the fundamental concepts supporting the science of sequence stratigraphy, and have the following applied skills.

- Identify and correlate sequence-stratigraphic surfaces in seismic and borehole data sets for purposes of subdividing reservoir systems into high-resolution sequence-stratigraphic units
- Develop predictions for distribution of reservoir vs. non-reservoir facies from distribution of sequence-stratigraphic units interpreted from borehole and seismic data sets
- Interpret and predict variations in reservoir stratigraphic architecture between different fields, pay intervals, and prospects through a newly gained understanding of the natural variations typical of sequence depositional controls
- Relate outcrop and modern analogs of sequence deposition to subsurface sections
- Improve production evaluations through a better understanding of reservoir dimensions and porosity structure

Content

The course will cover the full range of topics needed to develop a foundational understanding of siliciclastic sequence stratigraphy and to apply this skill to practical reservoir interpretation. The first part of the course will cover fundamental concepts in sequence stratigraphy and application of sequence stratigraphy to seismic data sets. This part will also address historical development of sequence stratigraphy as an interpretive tool. This part will also teach basic principles and stratigraphic components of the sequence stratigraphic model, including: processes generating systems tracts and parasequences, lapping relationships, recognition of sequence stratigraphic surfaces and systems tracts within seismic data, and

predictability of porous and non-porous facies distribution in marine and fluvial units. In this part we will also expand upon the fundamental controls on sequence deposition through discussion of accommodation, sediment supply, cyclicity, and basin physiography. Imparting this added insight into the origins of sequences is intended to provide a basis for understanding and predicting variations in sequence architecture between pay intervals and fields.

The second part of the course focuses directly on the recognition and correlation of sequence stratigraphic surfaces in borehole and outcrop data sets. We will examine the facies, wireline, and lapping character of the approximately nine sequence stratigraphic surfaces commonly used to correlate sequences and to subdivide sequences into higher-resolution systems tracts. We will explore lateral variations and correlation of these surfaces as well as evaluate contrasting interpretive value of these different surfaces. Lastly, we will analyze the relative utility of the contrasting sequence-stratigraphic approaches currently available (i.e. depositional sequence stratigraphy, genetic sequence stratigraphy, T-R sequence stratigraphy).

ROCKS, PORES AND CAPILLARY PRESSURE: UNDERSTANDING RESERVOIRS AND SEALS BY "THINKING LIKE OIL AND GAS"

Date: June 20, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 5/21/2012)*

Content: 0.7 CEU

Instructor: Charles L. Vavra, North Star Geological Services, Lucas, TX

Who Should Attend

Capillary pressure is critical in controlling fluid saturations, reservoir quality and seal capacity. However, capillary pressure concepts are poorly understood by many geologists, geophysicists, petrophysicists, engineers and managers. This course provides a better understanding of capillary pressure and pore-level aspects of reservoir and seal quality. The course is suited for all levels of experience and background. It is especially appropriate for people working on complex reservoirs and those exploring for by-passed or "missed" pay.

Objectives

By the end of the day, participants should be able to:

- Understand physics governing capillary pressure
- Relate capillary pressure, capillary radius and effective pore throat radius
- Convert laboratory (air/brine, oil/brine or mercury injection) capillary pressure data to reservoir-specific hydrocarbon-brine systems
- Apply capillarity pressure data to model reservoir water saturation
- Use reservoir capillary pressure to estimate height above Free Water Level, transition zone thickness and depths of fluid contacts
- Integrate hydrocarbon shows with capillary pressure data to estimate hydrocarbon column height
- Relate pore type and pore geometry to reservoir quality (porosity, permeability, capillarity, relative permeability and

recovery efficiency).

- Identify and explain factors controlling seal potential
- Demonstrate how a rock can simultaneously act as a seal to hydrocarbon and a conduit for formation water
- Use capillary pressure data to calculate the maximum expected hydrocarbon column a seal can hold
- Apply pore-level and capillary pressure concepts to reconcile “dry holes”

Content

This practical one-day course combines analogies, real-world examples, case studies and demonstrations to examine the relationships among pore geometry, capillary pressure, reservoir quality, fluid distributions and seal potential. Capillary pressure concepts are developed and applied to evaluate reservoir quality, seal capacity, fluid distribution and saturations. Creative analogies illustrate how to “think like oil and gas” to understand the effect of pore geometry on porosity, permeability, capillary pressure, relative permeability and recovery efficiency. Real-world examples illustrate how significant reserves were missed by operators who didn’t understand the rocks, and how the reserves were later “discovered” by operators who “thought like oil and gas”. The course further illustrates how information from inexpensive examinations of cuttings, sidewall or conventional core material can lead to significant additional reserves and (or) cost savings.

RISK REDUCTION FOR PLAYS AND PROSPECTS USING QUANTITATIVE SHOW, SEAL AND MIGRATION ANALYSIS WITH GIS AND PETROLEUM SYSTEMS MODELING SOFTWARE

Date: June 20, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 5/21/2012)*

Content: 0.7 CEU

*Instructor: John Dolson, DSP Geosciences and Associates, LLC,
Coconut Grove, FL*

Who Should Attend

Geologists, geophysicists and engineers wanting to learn more how to deal quantitatively with oil show data, prediction of height above free water, understanding tools for detecting migration pathways, breached oil fields (residuals), waste zone, by-passed pay and transition zone shows. The course emphasizes using all your tools (seismic, logs, cuttings, fluid inclusions, etc.) to evaluate dry holes, your drilling well or fields to look for the next successful location.

Objectives & Content

The participants will learn to look at SW and oil show information quantitatively to determine a position in a trap, paleostructural accumulation or migration pathway. They will learn to appreciate multiple tools for understanding how to quantitatively evaluate traps and migration pathways. A variety of GIS and Petroleum Systems modeling software will be reviewed to demonstrate predictive models of migration and entrapment using seals, potentiometric surfaces and faults to define potential new traps. Methods of quantitatively calibrating test and show data to the migration models will be emphasized.

Topics will include:

- Trap types
- Fault, Capillary and Pressure seals and the number required for different traps
- Capillary pressure
- Relative permeability
- Pseudo-capillary pressure curves from por/permeability data
- Flow units
- Winland pore throat analysis

We cover the basics of pressure plots emphasizing seal and pressure regressions recognition. We teach how to recognize and differentiate continuous phase, residual, dissolved hydrocarbon and source rock while drilling shows. We touch on seismic DHIs and focus on new techniques for capturing show data such as fluid inclusion stratigraphy, isotubes, head space gas and cuttings. The course ends with a demo of converting a paleogeographic map to a seals map with/without fault seals and then running vertical and lateral migration models to predict the location of fault and stratigraphic traps.

FORMATION EVALUATION OF THINLY BEDDED RESERVOIRS

Date: June 20, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 5/21/2012)*

Content: .7 CEU

Instructors: Quinn Passey, ExxonMobil, Houston, TX

Who Should Attend

Reservoir geologists, Petrophysicists, Log Analysts, Exploration Managers, Reservoir Engineers, and Geologic Modelers interested in an overview of the issues and techniques associated with thin beds. Some basic acquaintance with well logging and log-based formation evaluation techniques will be beneficial.

Objectives

At the end of this course, participants will be able to apply well log data to calculate hydrocarbon pore volume in thinly bedded clastic reservoirs, and gain a practical overview of the issues, uncertainties, and technical methods to quantify a systematic approach to solutions.

Content

Key Topics will include:

1. Definitions and Geological Occurrence of Thin Beds
2. Identification of Thin Beds using Well Data
3. Characterizing Thin Beds with Cores and Images
4. Petrophysical Properties of Thinly Bedded Formations
5. Modeling Log Responses in Thinly Bedded Reservoirs
6. High-resolution Techniques
7. Low-resolution Techniques

Course notes will be the AAPG book, Archie Series No. 1 – Petrophysical Evaluation of Hydrocarbon Pore-Thickness in Thinly Bedded Clastic Reservoirs. A few additional exercises are planned, but otherwise the AAPG book will include the text and figures shown in class.



4D EVOLUTION OF CONTRACTIONAL TERRANES: Implications for the Cross-Section Balancing, Basin Analysis, & Hydrocarbon Exploration & Production

Date: June 20, 2012

*Tuition: \$475, if purchased separately
(increases to \$525 after 5/21/2012)*

Content: 0.7 CEU

Instructor: Steven E. Boyer, Consultant, Tacoma, WA

Who Should Attend

Geologists and geophysicists who are currently working in thrust belts, basement-involved terranes or strike-slip (wrench) systems with a large component of contractional deformation. The content should be of value to any geoscientist concerned with the impact of deformation on the generation, migration and entrapment of hydrocarbons.

Objectives

By the end of this course, participants should be able to:

- List the common sequence of deformation in thin-skinned belts.
- Evaluate the validity of structural interpretations of fault-related folds.
- Identify “sub-resolution” deformational features that lead to errors in balancing cross sections.
- Explain why a balanced section is not always the best section and describe how attempts to make “balanced” sections may lead to invalid interpretations.
- Contrast the deformation mechanisms that enhance and destroy porosity and permeability and describe the interaction between these competing mechanisms.
- Use fault-related fold models to predict fracture distribution on folds.
- Use critical-wedge theory of thrust mechanics to explain the geometric and kinematic evolution of thin-skinned fold-and-thrust belts.

- Prepare a basin analysis plan than incorporates structural interpretation techniques, sequential modeling, and subsidence profiling in order to predict the timing of hydrocarbon generation and migration and identify migration pathways.

Content

The course is an overview of structural factors related to hydrocarbon exploration in contractional basins: 1) “sub-resolution” features, such as fabrics, fractures, and small-scale faults; 2) the geometry of single, field-sized structures; 3) the relationship of small-scale features to field-scale folds; 4) the relative timing of the structural elements; and 5) the influence of kinematic structural evolution on hydrocarbon generation, migration and entrapment.

Many of the factors are relevant to both thin-skinned and basement-involved structures, as well as those developed within strike-slip or wrench systems. Some types of structures will only be identifiable on well logs or in core, whereas others will be resolvable on seismic data.

The course is intended to provide guidance integrating these factors into exploration programs within new basins or aiding field development and extension within existing petroleum provinces. Each section of the course manual contains a bibliography of key references to guide further study.

QUANTIFICATION OF GEOLOGIC RISK

Date: June 21-22, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 5/21/2012)*

Content: 1.5 CEU

Instructor: Gary P. Citron, Rose & Associates, Houston, TX

Who Should Attend

Explorers and engineers who need to characterize resource potential and chance of success for their investment opportunities in a consistent, calibrated and systematic fashion.

Objectives:

By the end of this course, participants should be able to

- Apply fundamental concepts of statistical description and analysis to geologic trend data;
- Deal with the inherent uncertainty on prospect characterizations using those statistical descriptions;
- Estimate the volumetric parameters that lead to the resource potential of a prospect, given success;
- Estimate the chance parameters related to the petroleum system that lead to the probability of various success states;
- Apply an internally consistent set of reality checks to those estimates;
- Understand how the post well appraisals in exploration lead to the calibration for better estimating in future prospects;
- Communicate in a more disciplined fashion about prospect potential and concerns.

Content

This course focuses on the first two days of our flagship five day course on Exploration Risk Analysis, primarily on the geotechnical concepts and principles of estimating under uncertainty, especially as related to the measurement of and communication about your prospects. We make use of (1) realistic games and exercises to illustrate principles and mechanics of estimating methods; and (2) analytical procedures involved with uncertainty and risk associated with modern petroleum exploration. The course identifies fallacies and unintended consequences of many corporate procedures for conducting petroleum exploration, and shows explorers how to get better at what they do. Due to time limitations, there are no integrative exercises.

RESERVOIR ENGINEERING FOR PETROLEUM GEOLOGISTS

Date: June 21-22, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 5/21/2012)*

Content: 1.5 CEU

*Instructor: Richard G. Green, Consulting Petroleum Geologist,
California, MO*

Who Should Attend

The course is designed for personnel who wish to acquire a broad understanding of the factors that influence the production of oil and gas from reservoirs. The course presents information that can be applied to geologists, geophysicists, petrophysicists, land management specialists, and managers with no previous training in reservoir engineering. It can also serve as an introductory course for engineers who have not had previous training in reservoir engineering.

Objectives

Upon completion of this course, participants will:

- Know the language and terminology of reservoir engineering allowing better interdisciplinary communication
- Have the skills to integrate production data with geologic data and use the combination to enhance interpretation and potentially discover untapped reserves
- Understand the rock properties that control production performance and use that knowledge to better explore and develop reservoirs and fields

- Understand the various reservoir drive mechanisms, the expected recovery ranges from those mechanisms, and the secondary and tertiary methods employed to enhance recoveries from reservoirs

Content

The basic purpose of every individual in a producing company is the same: to find and produce oil and gas in an efficient manner to the economic benefit of the company. A reservoir engineer cannot predict the production performance of an oil reservoir with any degree of certainty without a knowledge of the physical characteristics - the geology - of that reservoir.

Neither can the geologist describe the physical characteristics of a reservoir and be sure of his work without considering the producing characteristics as evidenced by production and pressure data. This course is an attempt to bridge that particular chasm, being an introductory description of the field and techniques of petroleum reservoir engineering.

The course will cover:

- Reservoir Rock Properties; as porosity, fluid saturations, and permeability
- Reservoir Fluid Properties; as fluid types, reservoir oil, reservoir gas
- Reservoir Fluid Flow; as Darcy's law, reservoir drive mechanisms
- Reservoir Production Evaluation Techniques; as volumetric calculations, material balance, decline curves and deliverability
- Well Testing and Sampling; as well stabilization and conditioning, pressure measurements, well completion techniques
- Reservoir Exploitation and Recovery Enhancement; as secondary and tertiary recovery, reservoir simulation
- Economics; as reserve classification, product pricing, economic components

Reservoir engineering can be defined as the design and evaluation of field development and exploitation processes and programs. As such, it can overlap the fields of geology, drilling and completion, production engineering, and reserves and evaluation. Therefore, some of each of these fields are included, but the major emphasis is on the techniques and methods utilized to characterize and predict the flow of fluids within petroleum reservoirs under natural depletion and various secondary and tertiary recovery operations.



EXPLORING FOR STRATIGRAPHIC TRAPS USING MULTI WELL PRESSURE/DEPTH PLOTS

Date: June 21-22, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 5/21/2012)*

Content: 1.5 CEU

*Instructor: Hugh Reid, Hugh W. Reid & Associates,
Calgary, AB, Canada*

Who Should Attend

This course will benefit geologists who are involved in looking for permeability barriers and subtle traps missed by others in well-drilled basins or those looking for potential stratigraphic traps in unfamiliar overseas basins. Also aids those struggling with subtle correlations of sands with similar log signature. No prior knowledge of the subject is necessary

Objectives

By the end of the course, participants should be able to accomplish the following:

- Screen sources of field pressure data to select valid reliable stable Formation pressures to plot
- Use pressure vs. depth plots to correlate reservoirs (Are zones separate or continuous?)
- Predict depth of gas /oil/water contacts downdip from wells of interest or discovery wells
- Make reservoir continuity maps based on the Pressure information to show areal extent of traps & reveal the areas of best permeability from the pressure contour spacing
- Avoid less prospective areas which may be flushed by updip water flow or are depleted by close-by production
- Reveal more favorable areas where downdip flow water preserves oil pools with weak barriers
- Assess trap holding capacities of seals particularly Unconformity traps by knowing pressures of the reservoirs above & below subcrops edge
- Identify "Central Basin Gas" type areas of continuous gas phase continuity- resource plays from the pressure signature. These are in essence also stratigraphic traps

Content:

The format of the course is such that students learn by hands on class projects in a step by step fashion where they start with screening raw data & finish off with completed Plots & maps. In all cases students are given the limited data prior to discovery of a pool & then "discover" the pool with interpreted plots & maps. They then have to assess how big the find is from the discovery well pressure data.

Two projects are in conventional reservoirs (including the Williston Basin) the other is in a tight gas type resource play where many operators had wrongly interpreted the data as showing 5 small isolated gas pools but the plots reveal one giant gas field with one TCf of reserves.

HYDRAULIC FRACTURING FOR GEOLOGISTS

Date: June 21-22, 2012

*Tuition: \$950, if purchased separately
(increases to \$1050 after 5/21/2012)*

Content: 1.5 CEU

Instructor: Randy LaFollette, Manager, Shale Gas Technology, BJ Services

Who Should Attend

This class will be prepared for geoscientists and other technical disciplines that are not already moderately knowledgeable in the theory and application of hydraulic fracturing to vertical wells in conventional or tight gas sandstone reservoirs.

Objectives

The main goal of the class is to impart a fundamentally sound understanding of why hydraulic fracturing works, the theory of hydraulic fracture growth and input data needed, the materials used in the process, and basic operational practices. By the end of the class, attendees are expected to be conversant in the vocabulary and concepts of hydraulic fracturing.

Content

The class will begin by describing the fundamental rate equation and demonstrating how its variables drive the principal hydraulic fracturing needs of any particular reservoir. Supplemental geological and geomechanical information needed for improved fracture treatment designs will also be identified and described. Basic fracturing calculations will be addressed, and will include injection rate, fracturing pressure, and hydraulic horsepower calculations. The propagation of hydraulic fractures will be discussed in the context of rock mechanical properties description. Fracturing fluid, proppant, and chemical additive materials and their selection will be covered. Fracturing equipment and its layout on location will be defined by function so that attendees can recognize the functions of the various pieces of equipment on location. Fracturing operational sequences will be described to show the reasons behind the order of pumping sequences. Case studies will be used to highlight the impact of fracturing operations on production outcome.

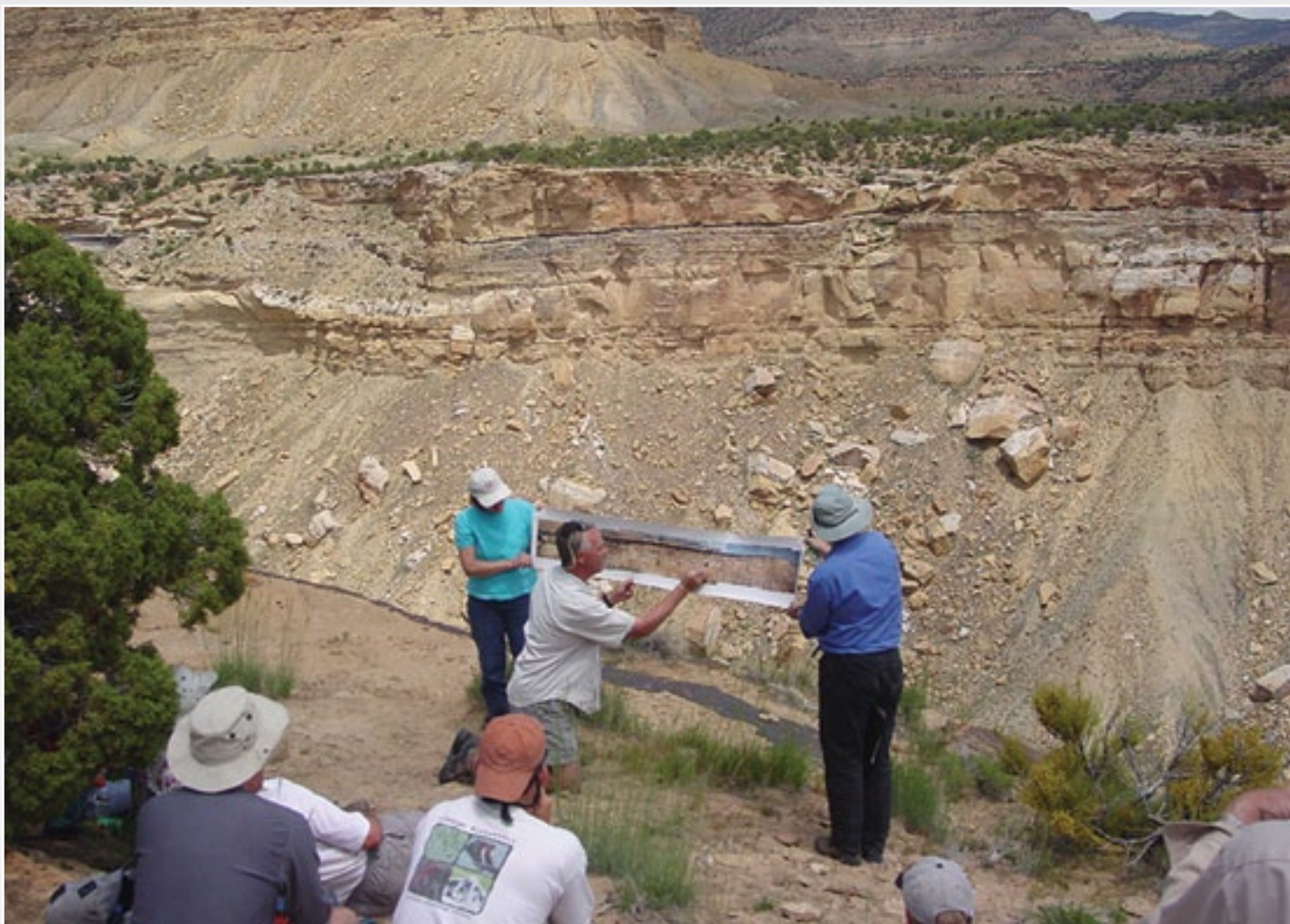
FALL EDUCATION CONFERENCE

Date: September 17-21, 2012

Location: Houston, TX

*Tuition: \$1795, AAPG members, \$1895, non-members
(increases to \$1895/\$1995 respectively after 8/20/2012.)
Registration is for entire week, and badge is transferable.
Includes refreshments and buffet lunch each day
in addition to course notes. Courses also priced
individually at \$475/course day (increases to \$525/course
day after 8/20/2012.) No refunds for cancellations after
8/20/2012.*

Theme and courses to be announced soon! Watch the website for updates and details!



FIELD SEMINARS

THIRTEEN UNIQUE AND ENGAGING WAYS TO LEARN MORE ABOUT THE INDUSTRY. PLUS EACH AND EVERY ONE PROMISES TO BE AN EXPERIENCE YOU'LL NEVER FORGET.

PLEASE NOTE: Registrants in AAPG Field Seminars must complete and sign the Release and Indemnity Form on the bottom of the Registration Form. Your registration will not be complete until we have your signed form in our files.

2012 FIELD SEMINARS

GENERAL INTEREST

FIELD SAFETY COURSE FOR FIELD TRIP LEADERS

Instructors: Kevin Bohacs, Stephen Oliveri (ExxonMobil Upstream Geoscience, Houston, Texas) and Robert Clarke (Consultant, Irving, Texas)

Dates: Wednesday and Thursday, March 28-29, 2012, 8:00 a.m. to 5:00 p.m. each day

Location: Houston, Texas

Tuition: \$450 (increases to \$550 after 2/29/2012); includes course notes, AAPG publication Field Safety in Uncontrolled Environments, Red Cross publication, When Help is Delayed, Mountaineering First Aid, and classroom first aid supplies. No refunds for cancellations after 2/29/12.

Limit: 24 Persons

Content: 1.5 CEU

NOTE: This two-day course will be held 3 weeks before the AAPG Annual Convention so that AAPG 2012 field trip leaders and other interested persons may attend before any pre-meeting field trips are scheduled to be conducted during the convention

Who Should Attend

This course is designed for anyone who leads or coordinates field activities such as Field Trips, Field Seminars, Field Camps, or general field work, for companies or student groups. Participants will acquire and practice strategies to prepare for and conduct safe and effective field activities.

Objectives

Upon completion of this seminar, participants will:

- Be better prepared to assess their safety responsibilities as leaders in preparing for, planning, and conducting a safe and effective field trip.
- Understand the value of having protocols and specific actions to execute a plan for responding to an emergency in the field.
- Be more aware of field hazards and means to assess what conditions to consider (topography, steep slopes, cliff faces, etc.), and what weather conditions might make a field stop a “no-go”.
- See the value of conducting a short safety briefing before going to the field each day, allowing trip attendees to give feedback about their safety concerns from the previous field day, and understand the value of keeping an up-to-date daily Safety Logbook during the field trip.

Content

Field activities are normally safe, but accidents do happen with potentially serious consequences, so measures should be taken to reduce the risks. This field safety program is straightforward, widely applicable, and scalable to the wide range of field activities, from

short roadside stops to long, backcountry expeditions. This course provides classroom activities on Day 1 with instructor talks, group problem solving, and hands-on basic first aid scenarios. Day 2 will be a trip to a field location where participants will be able to practice many of the safe-practices discussed in the classroom. This course provides scenarios for implementing a good field safety process and a template for creating programs tailored to the needs of individual field trip leaders. We encourage all AAPG 2012 field trip/field seminar leaders to register for this course.

CARBONATES

PLAY CONCEPTS AND CONTROLS ON POROSITY IN CARBONATE RESERVOIR ANALOGS

Leaders: Evan K. Franseen, University of Kansas, Lawrence, KS; Robert H. Goldstein, University of Kansas, Lawrence, KS; Mateu Esteban, Consultant, REPSOL-YPF, Mallorca, Spain

Date: May 13-18, 2012

Location: Almeria Region, SE Spain, begins and ends in Almeria Airport, Spain. Fly from London/Barcelona/Madrid

Tuition: \$3,000 (increases to \$3100 after 3/30/2012); includes field transportation, all meals and lodging during trip, guidebook. No refunds for cancellations after 3/30/2012.

Limit: 15

Content: 4.8 CEU

Who Should Attend

Petroleum geologists, engineers, and geophysicists who are involved in interpreting carbonate systems; geoscientists needing introduction or refresher course on carbonate sedimentology, stratigraphy, or diagenesis.

Objectives

The objectives of this field seminar are to provide educational opportunities on the following:

- Depositional and diagenetic models for carbonates that are good analogs to highly productive reservoirs in the Middle East, including Cretaceous and Tertiary carbonates from the Gulf (Iran, Iraq, U.A.E., Qatar, Oman), carbonates from SE Asia, including Indonesia, and potentially to offshore plays from Brazil.
- Lessons on carbonate systems that can be applied to carbonate reservoirs throughout the geologic record.
- Additions to sequence stratigraphy concepts through development of substrate paleoslope and climate controls on depositional sequence characteristics; a sequence stratigraphy approach that involves the innovative “pinning point” technique.
- Coverage of cool-water as well as warm-water carbonate facies models.
- Controls of paleotopography on shallow-water and deep-water carbonate reservoir systems.

- New and emerging carbonate reservoir play types. Includes outcrop exposure of play models related to meteoric, acid and hydrothermal karst, unconformities, deepwater carbonates, reef and forereef slope, sequence stratigraphic controls, dolomitization, moldic porosity, cool-water carbonates, oolite, bioclastic sand, and microbialite.

Content

During this seminar, leaders and participants together will:

- Examine a wide variety of carbonate facies types: coral reef platforms with continuous progradational talus slopes grading into basinal deposits; temperate-water carbonate systems; evaporites, microbial buildups (thrombolites, stromatolites) and oolitic shoals.
- Study and discuss various types of unconformities and associated paleokarst; evolution and distribution of porosity associated with meteoric, acid, and hydrothermal karst processes.
- Examine and discuss relationships and interaction with evaporites, volcanoes and volcanoclastics.
- Discuss large-to small-scale predictability of depositional facies and porosity trends important for estimating reservoir parameters.
- Compare and discuss methods, approaches, and results in using outcrops to build 3-D cellular reservoir-analog models.
- Relate field seminar topics and stops to play concepts in carbonates throughout the geologic record.

This field seminar is held in an area in which compressional, shear-zone and extensional tectonism created highly variable basement paleotopography and differing basin morphologies prior to Upper Miocene-Pliocene carbonate deposition. Superb 3-D exposures of Upper Miocene - Pliocene carbonates in SE Spain offer an unrivaled opportunity to learn from undisturbed depositional geometries. The area is a natural classroom for illustrating basic and advanced concepts of carbonate sequence stratigraphy, and evaluating the interaction of sea-level fluctuations, paleotopography, paleoclimate, and various diagenetic processes on reservoir character of a variety of carbonate systems. Outcrops in the region reveal evolution from heterozoan (temperate/cool water) carbonate systems to photozoan systems (coral reef-rimmed platforms) to an oolitic and microbialite (thrombolite, stromatolite) cyclic system.

The field seminar develops and evaluates the sequence stratigraphic framework and controls on location and reservoir character of Upper Miocene-Pliocene carbonate sequences from a variety of carbonate systems within the context of the regional paleogeography. Facies architecture of Upper Miocene carbonate complexes will be explored using sequence stratigraphy stacking patterns, controls of relative sea level, basement paleotopography, basin morphology, paleovalley systems, and climate. Diagenetic processes (including those related to karst and dolomitization) that affected the rocks are integrated to evaluate the controls on porosity distribution. Various forms of primary and secondary porosity exist in the outcrop. Particular emphasis is placed on applying principles from the field seminar and utilization of the excellent outcrops as analogs to a wide range of subsurface reservoir equivalents.

COMPLEX CARBONATE RESERVOIRS: SEDIMENTATION AND TECTONIC PROCESSES. THE IMPACT OF FACIES AND FRACTURES ON RESERVOIR PERFORMANCE

Leaders: Raffaele Di Cuià, G.E. Plan Consulting, Ferrara, Italy; Davide Casabianca, Marathon Oil International, Aberdeen, UK

Date: May 12-18, 2012 (begins the early afternoon of May 12 and finishes the late afternoon of May 18)

Location: Begins in Naples and ends at Rome International Airport (Italy)

Tuition: \$3,200 (increases to \$3,300 after 3/23/2012); includes guidebooks, transportation expenses during the field seminar, all meals during the course. Does not include lodging. No refunds for cancellations after 3/23/2012.

Limit: 15

Content: 4.2 CEU

Who Should Attend

Petroleum geologists, reservoir engineers and geophysicists working for the exploration, appraisal and development of carbonate reservoirs. Ideally the components of a subsurface team would greatly benefit from participating together.

Objectives

The field seminar aims to demonstrate how to adequately describe facies distribution and faults and fractures characteristics, within the relevant depositional and tectonic context. Outcrop data gathering will help participants to focus on the important aspects to consider when characterizing and modelling carbonate reservoirs. Uncertainty will be a central theme and scenario modelling will be advocated as a way of managing it.

By using the outcrops of the Apulian Carbonate Platform, data from equivalent reservoirs in the subsurface of southern Italy, and from carbonate reservoirs elsewhere, participants in this field seminar will be able to:

- Observe the structural organisation of the Southern Apennines geological units and infer the evolution of the thrust belt;
- Recognise facies types in the Apulian Rudist Carbonate platform and in the deeper water deposits resedimented into the adjacent basin areas;
- Understand the 3D organisation of sedimentary bodies from regional to reservoir scale;
- Understand the hierarchy, distribution and organisation of the fault and fracture networks and their consistency with the tectonic evolution of the region;
- Verify the relationships between sedimentary facies and fracture distribution ;
- Identify the main diagenetic processes that affected the platform and understand their impact on reservoir quality;
- Identify, describe and distribute reservoir porosity and permeability ensuing from sedimentary, diagenetic and tectonic processes;
- Understand the relationships between outcrop evidence (facies and structural analysis) and subsurface datasets (seismic, core, open hole logs, image logs, production logs and well tests) and discuss how to integrate both for reservoir description;

- Learn and compare methods for the description of reservoir uncertainty and understand the value of additional data acquisition for reducing these uncertainties in order to inform reservoir development and management decisions.

Content

This seminar will be like following the trajectory of a well drilled through the thrust belt to target a fractured carbonate reservoir. At the beginning, we will focus on the Allochthonous thrust sheets of the fold and thrust belt, in order to understand the regional geological and structural framework. We will then reach and observe the reservoir represented by the Cretaceous Apulian Platform Carbonates, which are currently being produced in the sub-surface of Southern Italy. The main part of the field seminar will focus on the description of the fractured carbonates and the extrapolation from the outcrop observations to the subsurface for building geologically plausible reservoir models.

The main advantage of using the example of the Southern Apennines is that we can run through the drilling trajectory of the hypothetical well, not only vertically (using subsurface data) but also horizontally by moving from west coast outcrops (Naples area) to the east coast outcrops (Apulia area). The final part of the field seminar, will be spent studying an exhumed anticline (in the Abruzzi region) where there are extensive outcrops of Apulian Carbonates equivalent to some of the major oil reservoirs exploited in Italy.

CLASTICS

DEEP-WATER SILICICLASTIC RESERVOIRS, CALIFORNIA

Leaders: Stephan Graham and Donald R. Lowe, Stanford University, Stanford, CA

Date: April 27 – May 2, 2012

Location: Begins in Palo Alto and ends at the airport in San Francisco, California

Tuition: \$2,900 (increases to \$3,000 after 3/30/2012); includes lodging, transportation during the seminar, lunches, guidebook and group dinner (1 night). No refunds for cancellations after 3/30/2012.

Limit: 20

Content: 5.5 CEU

Who Should Attend

Exploration and development geologists, geophysicists, log analysts, engineers, and managers working with deep-water reservoir systems in exploration and production settings. The field seminar will benefit all audiences, from experts to those unfamiliar with deep-water systems.

Objectives

Upon completion of this field seminar, participants will be able to:

- Recognize the spectrum of deep-water siliciclastic facies developed across the full range of deep-water environments, from upper slope to basin plain

- Understand the processes by which deep-water siliciclastic reservoirs are formed, and how to recognize them in core and in the field
- Appreciate the origins and nature of heterogeneity in deep-water reservoir facies
- Use deep-water facies in a predictive manner, while recognizing pitfalls and limitations

Content

This six-day field seminar is designed to provide participants with an appreciation of the broad range of deep-water reservoir facies, the mechanisms by which they were deposited, their predictive attributes, their reservoir heterogeneity and their stratigraphic architecture. The field school emulates a voyage downslope in a deep-water sedimentary system, from submarine canyon head to mouth, to submarine fan valley, to outer fan, to basin plain, using many of the most outstanding deep-water facies outcrops California has to offer. The field seminar formed the basis for the AAPG Hedberg Conference in 2000.

The field seminar is designed to give participants an understanding of deep-water sedimentary processes and products, as well as a powerful visual impression of the scale and architecture of the full spectrum of deep-water deposits. After gathering on the first evening in Palo Alto, California for a welcome dinner, the second day of the trip brings participants to a common level of understanding of the bed-scale building blocks of deep-water systems through lectures and a core workshop held on the Stanford University campus, with the day ending in Half Moon Bay, California. The morning of the third day reinforces the second day's lectures by viewing a range of turbidite facies in coastal exposures of San Mateo County. The trip moves south in the afternoon to the Monterey-Carmel area to view the most proximal of deep-water deposits: upper submarine canyon fill exposed in sea-cliff outcrops in Point Lobos State Preserve. The night is spent in Monterey. The morning of the fourth day entails examination (and a field exercise) of a mid-submarine canyon channel-fill exposure at Wagon Caves Rock in the Santa Lucia Range west of King City. In the afternoon, the trip moves east from the Salinas basin, across the San Andreas Fault, to a dramatic mountainside cross sectional exposure of a submarine fan channel/levee complex at Juniper Ridge, near Coalinga in the San Joaquin basin. The Juniper Ridge field exercise affords participants an opportunity to understand channel-levee facies relations. After a night in the Coalinga area, the fifth day entails a drive north to see the outcrop sequence represented by the second day's core exercise in submarine fan-valley fill exposed at Monticello Dam, Lake Berryessa. The final night is spent in Davis, California. The sixth day consists of examination of outer fan and basin plain deposits along Cache Creek, in the Coast Ranges northwest of Davis. The group returns to San Francisco International Airport in the mid-late afternoon.

CLASTIC RESERVOIR FACIES AND SEQUENCE STRATIGRAPHIC ANALYSIS OF ALLUVIAL-PLAIN, SHOREFACE, DELTAIC AND SHELF DEPOSITIONAL SYSTEMS

Leader: Thomas A. Ryer, The ARIES Group, LLC, Katy, TX

Date: April 28 – May 4, 2012

Location: Begins and ends in Salt Lake City, Utah

Tuition: \$2,150 (increases to \$2,250 after 3/30/2012); includes field transportation, lunches in the field, guidebook. No refund for cancellations after 3/30/2012.

Limit: 12

Content: 5.0 CEU

Who Should Attend

The Clastic Reservoir Facies field seminar is designed for geologists, particularly those interested in clastic stratigraphy, facies interpretation, and sequence stratigraphic analysis at the level of parasequences. Geophysicists and reservoir engineers with strong geological backgrounds who are interested in facies architectures at interwell and field scales are also encouraged to attend.

Objectives

Geoscientists who complete the field seminar should find themselves better able to:

- Distinguish a wide variety of fluvial-deltaic facies in outcrop, core and on wireline logs
- Recognize typical facies and successions
- Pick the discontinuities that constitute flooding surfaces in shallow- and marginal-marine settings and thereby
- Define parasequences and, where appropriate, parasequence sets

The emphasis in this 7-day field seminar is on tracking parasequences laterally, most commonly by walking them out over distances of up to several miles. By doing so, participants will acquire a better understanding of the architecture and interrelationships between facies. Participants will also gain an appreciation of the relative importance of eustatic sea-level fluctuations and basin tectonics on large-scale transgressive-regressive cyclicity in foreland basin settings.

Content

Facies examined during the Clastic Reservoir Facies Field Seminar include: channelbelt, alluvial valley fill, shoreface, wave- and river-dominated deltas, distributary channel and mouth bar, tidal inlet and tidal channel, transgressive lag, and shelf sand. Outcrops visited are in the Book Cliffs, Castle Valley, the Henry Mountains Basin, and the Kaiparowits and Markagunt Plateaus.

The seminar focuses on the lithologic variations that characterize clastic reservoir facies and on development of models that can be used to predict these variations in the subsurface. Participants will learn about clastic reservoir facies through a series of case studies. Case studies initially focus on the vertical facies successions that characterize particular paleoenvironments and the criteria that can be used to recognize them on wireline logs and in cores. The main emphasis of the case studies, however, is on lateral relationships. The scales of lateral variations examined range from reservoir heterogeneities at inter-well spacing up to the more regional facies

variations that are the basis for exploration models.

Lateral relationships that characterize clastic reservoir facies are demonstrated by walking representative units out in areas of continuous exposure. To cite one example: on outcrops of the Ferron Sandstone, participants examine the sandstone grain size and the sedimentary and biogenic structures that occur at the landward edge of a sandstone body that accumulated on a prograding shoreface. They then walk across the landward pinch-out of the sandstone body into deposits of the lagoon and swamp that lay behind the shoreline. Sections from the outcrops and from a large number of nearby drillholes reveal the facies relationships. The emphasis in this field seminar is on practical applications: if, for instance, a discovery well penetrated a hydrocarbon bearing shoreface unit consisting of 8 m of upper shoreface and foreshore strata lying directly on a marine flooding surface, what is the likelihood that an appraisal well drilled one km landward would also encounter shoreface strata, rather than non-reservoir lagoonal beds? The Ferron example mentioned above serves as an analog and provides an answer.

Larger-scale variations are examined by driving between localities. By this means, architectures of river-dominated deltas and of the channel belts that fed them are demonstrated in the Ferron Sandstone in Castle Valley. The effects of subsidence patterns on the architectures of channel belts and shoreline sandstone bodies of the Dakota Sandstone are examined in the Henry Mountains Basin and on the margins of Kaiparowits Plateau.

Class size is kept small for mobility and to promote group and individual discussions with the instructor on the outcrop. A considerable amount of hiking is involved. Participants should be in good physical condition.

The field trip route passes through Capitol Reef, Bryce Canyon and Zion National Parks and the Grand Staircase-Escalante National Monument, which contain some of the most beautiful country in the Colorado Plateau region.



MODERN TERRIGENOUS CLASTIC DEPOSITIONAL SYSTEMS

Leader: Walter J. Sexton, Athena Technologies, Inc., Columbia, SC

Dates: May 15-22; and September 10-17, 2012

Location: Begins in Columbia and ends in Charleston, South Carolina

Tuition: \$2900 (increases to \$3,000 after 4/17/2012 for the April trip, and after 8/13/2012 for the September trip); includes ground transportation to Charleston, water transportation, guidebook, modern core workshop, lunch on the fluvial day, and CD-ROM. No refunds for cancellations after 4/17/2012 (for April course) or after 8/13/2012 (for September course.)

Limit: 24

Content: 5.6 CEU

Who Should Attend

Petroleum geologists and engineers who desire to further their understanding of modern sedimentary processes, stratigraphy, and sedimentology. Geoscientists working in fluvial and shallow marine environments. Both exploration and development geoscientists, log analysts (petrophysics) and managers will benefit from viewing the complexity of the facies architecture and scale.

Objectives

Upon completion of this field seminar, participants will be able to:

- Depict the facies architecture, heterogeneity and 3D geometry of modern clastic depositional environments deposited in alluvial, deltaic, estuarine, barrier island and tidal channel settings.
- Improve modeling skills by evaluating facies trends in the subsurface that will allow the potential to predict facies and reservoir trends.
- Identify potential mesotidal shoreline trap types.
- Express the impact of the hydrodynamic regime (i.e. waves and tides) on the geomorphology, lithology, and stratigraphy of clastic sediments.
- Comprehend the sedimentological processes responsible for the deposition of sedimentary rocks in the subsurface.

Content

The seminar study area is located on the trailing edge of the North American plate, the coastal plain of South Carolina. The study area is thoroughly documented and offers an excellent opportunity for the students to walk on a variety of modern terrigenous clastic depositional systems while observing sedimentary processes, modern sedimentary structures, and numerous trenches illuminating the three-dimensional architecture of each area. Genetically related depositional environments and their stratigraphic correlation are stressed during the seminar from the standpoint of subsurface interpretation for prospect evaluation and reservoir development. The emphasis of the trip will be on sediments deposited within the past 4,000 years. Field observations will be supported and expanded on by short and focused lectures each morning, a detailed guidebook, and numerous figures and diagrams (posters) used during each field day. In addition, a modern core workshop will be held where the cores will be logged and discussed by the students during class.

The focus of the seminar will be on the three-dimensional

characteristics of modern depositional environments and their regional relationship with other depositional environments in the area. This focus will be used to demonstrate how these characteristics and relationships can be used to recognize and delineate similar depositional environments in ancient sedimentary rocks. Additionally, the evolution of Quaternary strata is presented in a chronostratigraphic context. Subsurface data provide lithologic interpretations for progradational (barrier island, deltaic) retrogradational (barrier island, estuarine), and aggradational (valley fill, barrier island) depositional styles. Lateral facies-association and lithofacies changes are discussed from the basin scale (exploration fairways) to the reservoir scale (permeability controls).

The six-day trip is carefully planned to maximize time in the field and participants will be encouraged to discuss the depositional settings encountered on each day. The first day in the field is devoted to examination of the modern aggraded fill in the alluvial valley formed during the most recent sea level cycle of the Congaree River during the Pleistocene/Holocene. The second day will be spent examining a mixed energy delta (Santee/Pee Dee) by boat, moving from the fluvial upper reaches of the delta system to the marine delta front. The third day will focus on mesotidal progradational/regressive barrier island/shoreface complexes, and tidal inlet deposition. This will include observing trenches and an explanation of the processes active in the system's sub-environments. The fourth day will be spent at Cape Romain focusing on retrogradational/transgressive shorelines, lagoons/bays, inlet formation and closure, and wave-dominated deposition. The fifth day will be spent in Charleston with morning lectures followed by a half-day modern core workshop. During the workshop, groups of students will be assigned modern core samples to log followed by discussion on the environment of deposition, potential reservoir characteristics and exploration strategies. The sixth and final day will be spent in St. Helena Sound, the largest estuary on the southeastern coastline of the United States. The sub-environments of deposition to be visited in the incised valley fill will include: peat swamp, point bar, marsh, fine grained tidal flat, sand flat, barrier island, and linear sand ridge. This field day will demonstrate changes in deposition in the estuary from freshwater dominance to open marine conditions.



SEDIMENTOLOGY AND SEQUENCE STRATIGRAPHIC RESPONSE OF PARALIC DEPOSITS TO CHANGES IN ACCOMMODATION: PREDICTING RESERVOIR ARCHITECTURE, BOOK CLIFFS, UTAH

Leaders: Keith W. Shanley, Consultant, Denver, CO; J. Michael Boyles, Shell Canada, Calgary, AB, Canada

Date: September 20-27, 2012

Location: Begins and ends in Grand Junction, Colorado

Tuition: \$2,600 (increases to \$2,800 after 8/16/2012); includes ground transportation, lunches, and guidebook. No refunds for cancellations after 8/23/2012.

Limit: 20

Content: 5.6 CEU

Who Should Attend

Geologists, geophysicists and reservoir engineers working marginal marine reservoir systems in exploration and production settings. Lectures cover all the concepts necessary for non-geologists to benefit greatly from the course. Geologists often wish that their reservoir engineer had also attended.

Objectives

Upon completion of this workshop, participants will:

- Be able to understand detailed facies analysis within fluvial, estuarine, shoreface, and shallow marine deposits.
- Be able to use parasequence stacking patterns to predict reservoir sand body occurrences.
- Be exposed to a consistent subsurface methodology to recognize sequence boundary unconformities, marine flooding surfaces, parasequence stacking patterns, and reservoir distribution within a sequence stratigraphic framework, resulting in a more robust subsurface stratigraphy.
- Be familiar with sequence stratigraphic concepts and be able to apply those concepts to their exploration and production assignments.

Content

World class exposures of Upper Cretaceous strata in the Book Cliffs of east-central Utah provide outcrops that demonstrate the 3D reservoir architecture of marginal marine strata. These strata were deposited by a variety of depositional settings ranging from fluvial to incised valley to shoreface and deltaic. For those more comfortable with systems tracts, we observe features common to highstand shorelines and contemporaneous alluvial deposits, late highstand and lowstand shorelines, and incised valleys. We illustrate through the use of spectacular outcrops, subsurface datasets, and stratigraphic modeling how these systems tracts and key surfaces (flooding surfaces and sequence boundaries) may be recognized. The outcrops have almost complete exposure of over 500 m of strata in both depositional strike and dip sections that extend for over 200 km. Well logs and cores from the nearby oil and gas wells provide the opportunity to learn how to recognize outcrop relationships in more traditional subsurface datasets. This field seminar demonstrates how well log and core data can be used to predict reservoir geometries at both the exploration and production scales.

During the seminar, a practical approach of using sequence stratigraphic concepts is developed through the use of lectures, computer modeling, outcrop exposures and is reinforced through subsurface exercises. Field observations and data sets drawn from a variety of subsurface examples are used to develop understanding of vertical facies relationships that can be used to predict subsurface reservoir architecture in a variety of basin settings. At the end of the course, participants will have an understanding of deltaic and fluvial facies and the nature of larger scale stratigraphic variations within these deposits. Participants will be able to use these facies relationships to understand stratal stacking patterns that can be used to estimate lateral extent of reservoir facies. Participants will learn a process of how to use subsurface data to gain an understanding of depositional systems and key sequence stratigraphic surfaces to assist in either exploration or production.

The field trip begins by looking at the sedimentological and stratigraphic aspects of the Panther Tongue and lower Blackhawk Formation exposures in the vicinity of Price, Utah. In this relatively high-accommodation setting, sequence boundary unconformities are not developed and marginal marine facies tracts are more fully preserved. The high-accommodation stratigraphy in the vicinity of Price is contrasted with observations from the stratigraphically younger Desert Member of the Blackhawk Formation and the Castlegate Sandstone in the vicinity of Green River, Utah. In these deposits, subsidence rates are diminished relative to those found near Price; resulting in progradation during relative sea level fall which generated well developed sequence boundary unconformities. The stratal architecture of these deposits is dramatically different from the architecture associated with the more high-accommodation deposits near Price, Utah.

STRUCTURE, TECTONICS AND SEDIMENTATION

LACUSTRINE BASIN EXPLORATION

Leaders: Alan Carroll, University of Wisconsin, Madison, WI; Meredith Rhodes Carson, Geofuels LLC, Madison, WI

Dates: June 17-23, 2012

Location: Begins and ends in Salt Lake City, Utah

Tuition: \$2,500 (increases to \$2,600 after 5/18/2012); includes transportation, course materials, and lunches. Lodging NOT included in tuition. No refunds for cancellations after 5/18/2012.

Limit: 20

Content: 3.6 CEU

Who Should Attend

Geologists, geophysicists, reservoir engineers, managers and anyone working with lacustrine petroleum source rocks, oil shale, lacustrine or fluvial reservoirs, and non-marine basin stratigraphy.

Objectives

Lake basins contain some of the most prolific hydrocarbon resources in the world, including super-giant fields in the South

Atlantic, Caspian Sea, and in China and SE Asia. Even larger resources are associated with oil shale deposits in the western U.S. Despite their growing importance, the petroleum geology of lake basins has received far less attention than marine basins. This course therefore aims at developing an understanding of the unique aspects of lacustrine source rocks, reservoirs, and basin evolution that will aid future exploration and development efforts. We will do so using the world-famous record of Quaternary Lake Bonneville to gain insight on controls on lacustrine deposition, and the similarly famous Eocene Green River Formation to examine the preserved deposits of a well-exposed ancient lake basin.

Specific topics to be emphasized in this field seminar include:

- Genetic controls on lake basin evolution
- Recognition of the three principal lacustrine facies associations, based on surface, subsurface, or geochemical data.
- Source rock characteristics associated with the three facies associations
- Carbonate reservoir characteristics in lacustrine basins
- Clastic reservoir (fluvial and deltaic) characteristics in lacustrine basins.
- Lacustrine stratal geometries and distribution patterns of source rock and reservoir facies.

Content

This 6-day Lacustrine Basin Exploration field seminar has been developed on a number of classic field localities in Utah and Wyoming. Localities outside of Salt Lake City, UT will be used to illustrate key geomorphic and stratigraphic features of pluvial lake Bonneville (Gilbert deltas and other shoreline features) and modern Great Salt Lake (playa-lake environments). These “actualistic” observations will help provide context for understanding the deposits of Eocene Lake Gosiute in Wyoming, where recent radioisotopic work has established a chronostratigraphic framework of unprecedented resolution. There we will focus on basin margin to basin center transects of the Bridger and Washakie basins, based on excellent exposures of fine-grained lacustrine carbonate mudstone facies and alluvial to deltaic sandstone facies. Participants will build two basin-scale cross sections of Lake Gosiute strata by recording their own guided outcrop observations on the chronostratigraphic framework provided.

At the outcrop scale, we will examine the heterogeneous reservoir architecture of alluvial, deltaic, and lake-marginal carbonate deposits associated with overfilled, balanced-fill, and underfilled lacustrine basins. These deposits range in style from classic Gilbert deltas to more “dryland” fluvial facies that are dominated by upper flow regime deposition, to mounded carbonate strata. Laterally equivalent mudstone facies are similarly heterogeneous, ranging from laminated oil shale with abundant fish fossils to pedogenically modified playa facies associated with nonmarine evaporites. Distinctive biological marker compounds (biomarkers) are associated with each of these facies, and can be used to help determine paleoenvironmental setting.

In addition to field studies, several classroom lectures will be used to illustrate the main course concepts and to provide geologic background information on the field areas. Because fine-grained rocks can appear rather different in core than in outcrop, we will also conduct a half-day core workshop based on representative

examples of the major facies associations. We will spend some time developing criteria for subsurface recognition using wire-line logs, seismic, and organic geochemistry.

NORTHERN APPALACHIAN BASIN FAULTS, FRACTURES AND TECTONICS AND THEIR EFFECTS ON THE UTICA, GENESEO AND MARCELLUS BLACK SHALES

A Joint AAPG/University at Buffalo field seminar

Leader: Robert Jacobi, Norse Energy Corp USA, Buffalo, NY (also University at Buffalo)

Date: June 18-22, 2012

Location: Begins and ends in Watkins Glen, NY (please plan to arrive in Watkins Glen the evening of June 19)

Tuition: \$1,950 (Increases to \$2,050 after 5/21/2012.) Includes course notes and field guide, and transportation during field trips. Does not include hotels or meals. No refunds for cancellations after 5/21/2012.

Limit: 15

Content: 3.0 CEU

Who Should Attend

Oil/gas and environmental geoscientists who wish to learn about fracturing, faulting, and tectonics in the northern Appalachian Basin (including black shales). A BS in geology/geophysics is recommended, and a geology/geophysics MS is helpful, as is experience in the geosciences world.

Objectives

- The attendee will gain a working knowledge concerning:
- How faults and fractures develop and their terminology
 - Methodologies utilized in collecting and analyzing fracture data
 - Characteristics of faults and fractures that affect the sedimentary units (including black shales) in the northern Appalachian Basin of NYS
 - Tectonics that led to the formation of the structures in the northern Appalachian Basin and the adjacent Appalachian Orogen

Content

The course plan is a lecture in the morning, followed by field work in the afternoon that illustrates the elements of the morning lecture. The attendees will observe fracture and fault examples and collect fracture data to analyze. Longer field trips are anticipated for the last two days. This schedule is dependent upon the weather.

The course lectures are organized around three core areas: 1) fractures and faults, 2) faults in NYS, and 3) tectonics in the northern Appalachian Basin and Orogen. In part 1 the attendee learns about stress and fracture development, faults and rock strength, rock failure types, fracture decorations, fluid/gas driven fracturing, fracture spacing, Fracture Intensification Domains, fracture intersections, and how to display fractures. The attendee will also learn about fault types. Detailed examination of fault and fracture examples will include black shale units such as the Utica, Genesee and Marcellus. For parts 2 and 3 the attendee will learn extensive information concerning the evidence for faults (and

their characteristics) in the Appalachian Basin of NYS and the connection between plate tectonics, faults and the development of the northern Appalachian Basin and selected reservoirs (e.g., the relation among faults and the CAI). Field trips will demonstrate in gray and black shales faults and fracture spacing, intersections, and decorations. These trips will also establish methodologies for characterizing and analyzing fractures.

The course is located in the center of the Finger Lakes Wine Region, one of the most beautiful areas in the country, and is a natural laboratory that has been central to many of the advances in fracture understanding.

SEISMIC INTERPRETATION OF COMPRESSIVE STRUCTURES: FIELD TRIP TO THE SOUTHERN CANADIAN ROCKY MOUNTAIN FORELAND

Leaders: John H. Shaw, Harvard University, Cambridge, MA, & Frank Bilotti, Chevron, Houston, TX

Date: July 22-28, 2012

Location: Begins and ends in Calgary, AB, Canada

Tuition: \$3,000 (increases to \$3,100 after 6/22/2012); includes lodging in a field station (double occupancy), most meals (exception of 2 dinners), local transportation, boat and gondola fees, guidebooks, and supplies. No refunds for cancellations after 6/22/2012.

Limit: 20

Content: 4.2 CEU

Who Should Attend

This course is intended to assist geologists and geophysicists involved in the interpretation of seismic reflection data for trap delineation and reservoir characterization in both orogenic and passive margin fold-and-thrust belts. The course should also be useful for supervisors who evaluate structural interpretations to assign and reduce drilling risks.

Objectives

Upon completion of this field seminar, participants will be able to:

- Recognize common types of structures in fold-and-thrust belts based on their expressions in outcrop and seismic data.
- Apply fault-related folding concepts to interpret these structures, characterizing fault and fold geometries and fault displacements.
- Identify petroleum traps and their major structural risk elements.
- Recognize similarities between styles of trap and reservoir-scale deformation.

Content

This structural field course in the Front Ranges of the Canadian Rockies focuses on relating outcrop to seismic expressions of compressive structural styles that are common in fold-and-thrust belts and deepwater passive margins (toe thrust belts) worldwide. Course topics include seismic interpretation of thrust and reverse faults, detachment surfaces, fault-bend folds, fault-propagation folds, detachment folds, growth structures, wedge structures, and

imbricate structures. The course offers an extensive “atlas-style” guidebook with seismic examples from petroleum basin throughout the world, as well as instructional materials and exercises on quantitative structural interpretation of seismic data. Each day will be spent visiting three to five field locations, where new concepts will be introduced and applied in seismic interpretation projects.

Participants stay at the University of Calgary Kananaskis Field Station, in Kananaskis Country, Alberta, Canada, about an hour drive from Banff and two hours’ drive from Calgary. The geology is extraordinary, and the scenery and wildlife are tremendous.

All participants are responsible for making their own travel arrangements to Calgary (you will be provided with arrival and departure details at least 30 days prior to the start of the trip).

FRACTURES, FOLDS, AND FAULTS IN THRUSTED TERRAINS: SAWTOOTH RANGE, MONTANA

Leaders: William B. Hansen, Jireh Consulting Services, Great Falls, MT; Steve Boyer, Consultant, Tacoma, WA; Chuck Kluth, Kluth & Associates, Littleton, CO; Jim Sears, University of Montana, Missoula, MT

Date: July 23-28, 2012

Location: Begins and ends in Great Falls, Montana

Tuition: \$2,800 (increases to \$2,900 after 6/25/2012); includes lunches, transportation, guidebooks, admission to Glacier National Park, and some additional meals. No refunds for cancellations after 6/25/2012.

Limit: 20

Content: 4.2 CEU

Who Should Attend

Exploration and development geologists, geophysicists, log analysts, engineers, and managers working in structural geology and/or fractures who want a thorough understanding of the geology and geophysics utilized in E&P in thrust belts.

Objectives

Upon completion of this field seminar, participants will be able to:

- Identify natural fractures and discuss analogs
- Differentiate natural vs. induced fractures
- Make connections between structure & fractures & prolific oil fields in the region and new discovery potential
- Have a greater understanding source rock petroleum systems of a thrust belt, and its influence on adjacent forebulge resource oil plays
- Develop completion programs where fractures and structure play a major role in the reservoir

Content

During this seminar, leaders and attendees together will:

- Examine the mechanics of fracturing, folding, and faulting in thrust belt terrains.
- Identify and discuss new ideas regarding the geometry and kinematics of the development of thrust belts with examples from the spectacular Sawtooth Range of northwest Montana.
- Compare seismic interpretation with outcrop examples and

review drilling practices in a “frontier” (Montana) exploration thrust belt province.

- Analyze stratigraphic concepts which are essential in the exploration of thrust belt targets.

This field seminar is unique in that it offers the participant the opportunity to interact with a number of instructors who have several decades of experience working in thrust belts of the world. It focuses on the practical issues of exploration and production of hydrocarbons in thrust belts, with the Montana Thrust Belt as the backdrop. It will explain how these concepts can be applied worldwide, where overthrust terrains are increasingly important exploration targets.

The course will integrate concepts of exploration, including a review of fractured reservoir models, structural geology, stratigraphy, and hydrocarbon assessment. The spectacular geology of the Montana Sawtooth Range (an exhumed duplex) will serve as the backdrop for this field seminar. Time in the field will be bolstered by periodic classroom sessions on structural geology concepts, fractured reservoirs, and other issues the explorationist can expect to encounter in thrust belt exploration.



The seminar will utilize traverses to examine multiple thrust sheets exposed in Sun River Canyon, the famous Teton Anticline, and an outstanding example of an exposed fractured reservoir along a fault propagated fold in Mississippian carbonates as Swift Reservoir. Discussions will involve new ideas on the geometry and kinematics of thrust sheets and how they might influence exploration strategies in those settings.

Participants will discuss the Bakken/Exshaw petroleum system of the Montana Disturbed Belt, and its influence on the emerging resource oil play on the adjacent Sweetgrass Arch. The seminar will continue northward to Glacier National Park, with a cross-section view of the Lewis Thrust, the Chief Mountain klippe, discussions of horizontal Bakken oil drilling on the nearby Blackfoot Indian Reservation and the historical giant gas field production across the border in Alberta, and conclude with a geologic transect along the scenic Going-to-the-Sun Highway of Glacier National Park.

FOLDING, THRUSTING AND SYNTECTONIC SEDIMENTATION: PERSPECTIVES FROM CLASSIC LOCALITIES OF THE CENTRAL PYRENEES

Leaders: Antonio Teixell, Universitat Autònoma de Barcelona, Spain, and Antonio Barnolas, Instituto Geológico y Minero de España, Madrid, Spain

Date: September 10-14, 2012

Location: Begins and ends in Barcelona, Spain

Tuition: \$2,300 USD (increases to \$2,400 after 7/30/2012); includes guidebook and course materials, internal and roundtrip transportation from Barcelona, lodging, and all meals. No refunds for cancellations after 7/30/2012.

Limit: 22

Content: 3.5 CEU

Who Should Attend

Exploration and development geologists and geophysicists interested in fold and thrust structures and tectonics-sedimentation interactions in compressional belts and foreland basins.

Objectives

As a result of taking this field seminar, participants should be able to:

- Interpret complex thrust structures and fault-related folds formed in diverse habitats, from deep basinal settings to the earth's surface.
- Identify and understand strain and fracture systems in fold-thrust belts
- Analyze patterns of growth strata in areas with synsedimentary folding
- Apply the basic principles of the architecture and kinematics of foreland basins
- Discuss and predict the basin-scale geometry and evolution of deep-water turbidite systems and proximal alluvial fans in relation with the active tectonic development

Content

The Spanish Pyrenees provide world-class models for thrust tectonics and synorogenic sedimentation. During the field seminar

we will examine illustrative outcrops of thrusts, fault-related folds, stratal architectures and facies of depositional systems affected by growing structures, which are good analogues for hydrocarbon reservoirs. The seminar will cover a transect of the southern Pyrenees, a Cenozoic belt where thrust-fold geometries are well exposed and suitable for conceptual discussion. Synorogenic sediments range from deep-water turbidites to shallow marine and terrestrial molasse. Turbidites include debris sheets ("megaturbidites") that have produced gas. Molasse sediments are perturbed by growth anticlines and exhibit intraformational unconformities related to observable thrust faults.

The field trip takes place in beautiful mountain scenery, which is a plus to the geology. During the days of the trip, lodging will be in a comfortable hotel in the touristic/historic town of Jaca, a famous center for winter and summer leisure activities. Accompanying guests may enjoy visits to the XI century Romanesque cathedral and the XVI century fortress.

The first day comprises the travel from Barcelona to Jaca and a general presentation to the seminar after the arrival, including the geology of the Pyrenees and an introduction to the concepts to be studied. In the next day, the field work is initiated in the Roncal valley, where we will study the internal thrust sheets of the Pyrenees that illustrate the process of inversion of the pre-orogenic extensional margin of the Iberian plate. Patterns of fractures and other minor structures related to thrusting will be discussed. The third day is centered on an itinerary on the scenic Aragüés valley, studying in detail thrust-fold geometries and examining deformed synorogenic turbidites. The fourth day is devoted to the classic turbidite and breccia deposits of the Hecho group in the Jaca basin, and to the analysis of growth strata and related unconformities at the internationally known example of the Pico del Aguila anticline. The last day involves a reconnaissance of the south Pyrenean mountain front at Riglos (Gallego gorge), analyzing interactions between growing thrust structures and proximal alluvial fan conglomerates, and concludes with the return to Barcelona in the evening.

The field work involves some walking in mountain terrain, always along safe and well-marked trails. On the third day we walk up a difference in elevation of 450 m. Good exposures of thrust faults and folds make the hike worth! The trail is well marked, and return to a hut or to the vans is always accessible. We recommend hiking boots, sun protection cream, and a hat.

FUNDAMENTALS OF WRENCH TECTONICS APPLIED TO THE ANATOLIAN PLATE

Leaders: Alvis Lisenbee, South Dakota School of Mines and Technology, Rapid City, SD; Nuri Uzunlar, South Dakota School of Mines and Technology, Rapid City, SD; Okan Tuysuz, Istanbul Technical University, Istanbul, Turkey

Date: September 21-27, 2012

Location: Begins and ends in Istanbul, Turkey

Tuition: \$3,145 (increases to \$3,245 after 8/10/2012); Includes food, lodging, transportation from Istanbul, course notes. No refunds for cancellations after 8/10/2012.

Limit: 20

Content: 3.3 CEU

Who Should Attend

Academicians, graduate students, exploration and development geologists and geological engineers interested in furthering their understanding of geologic features related to both local- and plate-tectonic-scale strike-slip fault systems. Those interested in the neo-tectonics of the Anatolian plate and the North Anatolian Fault.

Objectives

Upon completion of this field seminar, participants will be able to:

- Recognize structural features associated with strike-slip fault zones utilizing both geologic maps and larger-scale field exposures.
- Identify, in the field, mesoscopic-scale structural features associated with strike-slip faulting.
- Associate the types and geometries of individual structures and the patterns of groups of structures with the movement sense of larger-scale fault zones.
- Recognize the potential for pre-existing (e.g., Tethyan) structural grain to control the location of younger faults.

Content

During the seminar, the presenters and attendees will examine structural features associated with strike-slip faulting at two scales within a plate tectonic setting. The study utilizes excellent field areas in Anatolia, the Asian portion of Turkey.

The inactive, intra-plate Davutoglan Fault (100's of meters of offset) displays, in remarkable exposures, structures developed in the early phase of wrench faulting. The attendees will examine, and discuss on the outcrop, features related to fault surfaces, fault zones, en echelon folds and small faults, interaction of fault strands and use the geometry of these features to understand the sense of fault movement. We will also examine alteration of the country rock and associated evidence of fluid flow and clastic dike injection along fault zones.

The active North Anatolian Fault (10's of kms of offset) separates the Anatolian and Eurasian plates. Along this zone of deformation we will examine geologic maps, specific exposures, and overview sites relating to examine geomorphology, contrasting terrains of the two adjacent plates, multiple fault strands and associated small-scale basins, en echelon fold trains, and faults as well as piercing-point evidence of offset associated with this major crustal break.

Both fault zones are overprinted, at least in part, upon neo-Tethyan sutures zones. Potential relationships will be presented in lectures and will be discussed at selected stops in the beautiful country side of northern Turkey.

Participants should plan to bring along field clothing, geologic hammer, Brunton compass, field notebook, sun screen, field gear.

PLEASE NOTE: Registrants in AAPG Field Seminars must complete and sign the Release and Indemnity Form on the bottom of the Registration Form. Your registration will not be complete until we have your signed form in our files.

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Signature _____

Date _____

Name Printed _____

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The general rule is that a taxpayer can deduct, as ordinary and necessary business expenses, expenses of education undertaken for the purpose of:

1. Maintaining or improving skills required in his employment or other trade or business,

or

2. Meeting the express requirements of his employer, or the requirement of applicable law or regulations imposed as a condition to the retention by the taxpayer of an established employment relationship, status, or rate of compensation.

Check with your tax advisor for further information.

Please register early, as some classes fill up quickly. Please check with the AAPG Education Department for availability of openings if less than 30 days prior to the start of the course in which you're interested. Positions in the course cannot be guaranteed until the \$50 deposit has been received.

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A landscape photograph featuring a vibrant rainbow arching across a blue sky. Below the rainbow, a range of dark, rugged mountains stretches across the horizon. The foreground is dominated by a rocky, brownish-orange terrain with visible cracks and textures, suggesting a desert or high-altitude environment. The overall scene is bright and clear, with the rainbow being the central focus.

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