Geoscience Subsurface Interpretation and Mapping Certification Training Program

For

Geologist / Geophysicists

By

Subsurface Consultants & Associates, LLC

SUBSURFACE CONSULTANTS & ASSOCIATES, LLC.

SCA'S GEOSCIENCE SUBSURFACE INTERPRETATION AND MAPPING CERTIFICATION TRAINING PROGRAM DESIGNED FOR GEOLOGISTS AND GEOPHYSICISTS

"FIRST OF ITS KIND"

SCA recognizes the importance of turning new hires or new employees from different disciplines into productive exploration, development and production geoscientists as rapidly as possible. SCA works with many private, public and national oil companies around the world. In this rapidly changing and challenging field of oil and gas exploration and development the needs are very similar in each company. ***"How do we jump start a new hire into a contributing geoscientist to help find and develop new resources and reserves of oil and gas?"*** **The answer is SCA's Geoscience Subsurface Interpretation and Mapping Certification Program!!!**

Visualize an intense twelve (12) week training program composed of a combination **of an actual interpretation and mapping project coupled with classroom courses**. Picture your new hires going through a structured program that teaches them important, fundamental interpretation, engineering and mapping skills, as well as challenges them to complete an interpretation/mapping project involving 3-D seismic data, well logs and production information. The program is designed to quickly raise the competency level and knowledge of the participants in a short period of time.

Composed of a logical sequence of geoscience and engineering courses, the program provides an opportunity for each participant to learn the fundamental skills in finding and developing oil and gas resources. In addition, the participants get to immediately apply the learned skills in a real project situation; doing the project by hand with paper logs, paper seismic sections and hand generated maps and volumetric calculations.

The final result of the Certification Training Program is the completion of an interpretation/mapping project of a producing field which includes both development and exploitation/exploration upside potential. During the last week of the program, the participants will present and defend their results in the form of a technical dissertation to a team of seasoned professionals. This dissertation will be very practical and useful to the participants in their jobs as geoscientists. We also welcome management from the participating companies, where possible, to attend these final presentations.

This program is recommended for new university graduates with up to three years of experience and new hires from different disciplines such as mining, environmental geology, earthquake seismology, etc. who are now actively working for oil and gas companies. In addition, the program is applicable for personnel from **all** National Oil companies who require a **cost-effective**, rapid means of learning and applying the fundamentals of geology, geophysics and engineering in order to become a contributing member of an exploration or development team.

The program is also applicable for multinational companies who have Production Sharing Contracts in which there are requirements or contractual training/technology transfer obligations for local, in-country personnel.

With the attendance of participants from diverse backgrounds and experience, the program provides a great environment in which knowledge can be shared with the other participants.

All SCA Certification programs are conducted at SCA's training center in Houston, Texas. Houston is the world's leading center of the petroleum industry and headquarters for some of the world's largest oil and gas companies, as well as service companies.

Houston, Texas has a wide variety of culture and offers many opportunities to visit various historical locations, museums, musical, theatrical and sporting events. Course schedules are arranged to allow for certain days to enjoy the local area.

The Geoscience Subsurface Interpretation and Mapping Certification Program is designed for geologists and geophysicists who have a degree from a university in geology, geophysics or some other related science field. They should have a fundamental background in some aspect of the Geosciences. The main objective is to advance the skills of the participants to a level that will make them a contributing member of your company's exploration or development program in a minimum period of time. The combination of in-class training, along with the conducting of a real project provides the participants with a well rounded knowledge base of geoscience recommended practices in the oil and gas industry.

The tuition for the Geoscience Certification Program per participant is US$37,500. **A deposit of US$5,000 is due upon registration. The remainder of the tuition is due 30 days prior to the start of the program**. Tuition fees for the Geoscience Program do not include lodging, meals, transportation to and from Houston and local transportation for the participant. Shipment of training materials back to the participant's home country is the responsibility of the participant.

Class size is limited so register early!

SCA has a program coordinator that will assist you in obtaining housing for the program in a typical kitchenette suite near our training center, as well as near restaurants, shopping and theaters. During their stay with SCA, we will provide certain weekend opportunities to visit museums or sporting events, as well as one or more planned weekend field trips. The field trip(s) are designed to provide the participants with exposure to modern depositional systems, as well as exposure to drilling rig activities.

All courses in The SCA Geoscience Certification Program are IACET Certified (International Association of Continuing Education Training) and carry with them both CEU's and PDH's (Professional Development hours).

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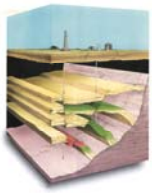
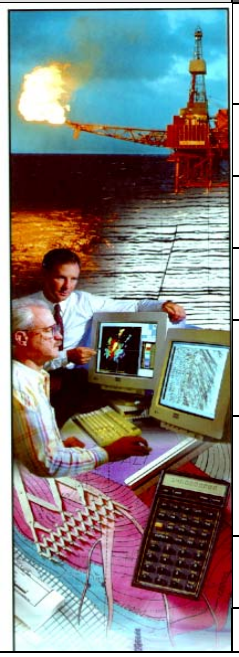


SCA –
A leader in the upstream oil and gas industry providing, highest quality technical consulting and training services to the petroleum industry.

EXCELLENCE
THAT
RUNS
DEEP



	COURSE Schedule	2010
WEEK 1	Structural Styles in Petroleum Exploration and Production	August 23-27
WEEK 2	Sequence Stratigraphy of Clastic Rock / Reservoirs: Well Logs / Core / Outcrop & Seismic	August 30 - September 3
WEEK 3	Practical Interpretation of Open Hole Logs	September 7 - 10
WEEK 4	Applied Subsurface Geological Mapping	September 13 - 17
WEEK 5	Overview of Seismic Exploration: Seismic Acquisition and Processing, AVO and Attributes and 2-D / 3-D Interpretation	September 20 - 24
WEEK 6	Seismic Interpretation Workshop	September 27 - 29
WEEK 6	Basic Reservoir Engineering for Non-Engineers	September 30 - October 1
	PROJECT Schedule	
WEEK 7	**Phase I**: Initial Exploration - Delineate Prospects - Drill Exploration Wells	October 4 - 8
WEEK 8	**Phase II**: Assess Discovery - Refine Interpretation	October 11 - 15
WEEK 9	**Phase III-A**: Field Development - Drill Development Wells	October 18 - 22
WEEK 10	**Phase III-A**: Field Development Continued	October 25 - 29
WEEK 11	**Phase III-B**: Explore for Additional Prospects	November 1 - 5
WEEK 12	**Phase IV**: Field Performance Analysis - Results of Other Exploration Prospects	November 8 - 10
WEEK 12	**Phase V**: Present Report and Project Results	November 11 - 12
WEEK 12	**Graduation Celebration**	November 12

SUBSURFACE INTERPRETATION AND MAPPING PROGRAM
SIX (6) WEEK PROJECT

Starting in Week 7 of the program, the participants will begin to conduct a detailed interpretation and mapping project. The project is a subset of exploration acreage with nearby producing fields in an extensional tectonic setting. Data available includes: 2-D seismic, well logs, and engineering data.

This exciting six (6) week Project in the Program is divided into Five (5) phases. The following is a summary of our professionally challenging five phase project which is designed to provide hands-on training that will result in the participants developing a solid foundation in geological and geophysical interpretation and mapping, as well as an understanding of the application of reservoir engineering, log analysis, risk analysis, and probabilistic and deterministic resources estimation.

The project is conducted in a lease block that exists in an extensional tectonic basin with an abundance of normal growth and non-growth faults providing opportunities for potential prospects. The complex geology in the project area will challenge the participants in their interpretation of both the geological and geophysical data. This type of complex geology is encountered in many areas around the world. The six (6) weeks of training courses taught prior to the project are designed and selected to prepare the participants to meet the geological, geophysical and engineering challenges of this project, as well as lay a foundation of knowledge for a successful career.

THE PROJECT
PHASE I: THE INITIAL EXPLORATION PHASE

Participants start the project by getting an overview of the regional geology of the project area including the structural style, depositional environments, and sequence stratigraphy, as well as information on producing fields in and around the project area. The participants are divided into teams of 2-3 geoscientists per team. Each team will compete against the other teams to generate the best interpretation and maps over the project area resulting in the discovery and development of hydrocarbons. ***Note: Each participant will perform all tasks required during this project and actively participate in discussions and decision making by his/her team. One objective of the project is to provide each participant a team environment for discussions and professional interaction with other members.***

A fictitious company called SPX owns the acreage in and around the project area. The company has set an exploration and development budget for this area. The teams, working within the budget, will have access to the previous wells drilled in the area and information on nearby producing fields which can be used as analogs in their exploration activities.

Each team will initially receive one (1) seismic line, several well logs, a type log and tops from a number of nearby wells. Assignment – can the participants define a lead in the license area of sufficient size that can be presented to management to request additional seismic data to explore in the license area. Each team will present their lead results, including potential size of lead and the request for additional seismic and well log data to explore within the license area.

With any acceptable justification to move forward, each team will obtain a limited amount of 2-D seismic and well log data. Using the seismic data and the available wells, the teams will begin their interpretation work. Each participant will correlate well logs, interpret seismic sections, and build one or more cross sections. Using the regional information regarding the likely pay sections and correlating the log data to the seismic data, the participants will begin the initial integrated interpretation of key faults and multiple potential objective horizons (at least three) in time. They will carry out AVO and/or seismic attribute analysis for DHI, where and if applicable.

Based on their work, the participants should identify the best prospect in their project area. Depth maps will be made for the key fault(s) and the primary target horizon. The participants will generate prospect maps, and estimate the size and potential resources of the prospect. Working with an advisor to the team and using the available nearby field analog data, each team will make an initial estimate of Original Hydrocarbons In-Place and recoverable resources. Each team member will also conduct risk analyses to define the range of possible resources for the prospect. After completing the analyses, each team will recommend and defend a drilling location for the first exploration well. With the assistance of an advisor, they will develop an AFE to estimate the cost of the well. If approved by the management team, the well will be drilled.

THE TEAMS MAKE A DISCOVERY!!!

If a team makes a discovery they will move on to Phase II. If any team drills a dry hole, that team will go back to their interpretation and including the newly drilled well data, reexamine, discuss and if necessary modify their work before selecting a second drilling location.

PHASE II: ASSESS DISCOVERY – REFINE INTERPRETATION

Based on the discovery, each team member will discuss the additional seismic data needed and will be provided additional seismic data required to fully assess and develop the new discovery. Using the new seismic data, the information from the discovery well and the available analog data from a near by field(s), the participants will assess the discovery (Does it meet pre-drill expectations? Depth, areal extent, estimated water contact, and estimated In-Place hydrocarbons.)

Each participant will refine their interpretation of the discovery in order to propose a field development plan. The development plan will require more detailed interpretation and mapping including all the key faults, horizons and reservoir maps.

PHASE III-A: DESIGN FIELD DEVELOPMENT PLAN

Using all the refined interpretations and maps generated in PHASE II, completing engineering and economic analyses, each team will generate a field development plan. Each team will recommend an optimum number of wells to develop the field that will provide to their company an expected rate of return on its investment. A preliminary discounted cash flow analysis may be generated to justify the field plan and estimated expenditure. If their plan is accepted, the development wells will be drilled.

DEVELOPMENT WELLS ARE DRILLED

Based on the results of the wells drilled, each participant will conduct a detailed evaluation and revise the maps for the new field. This will include 5" log analysis, including available core data to determine net sand and net pay in each well. Each participant will do further mapping including the top and base of porosity, net sand and net pay maps.

Using the finalized maps, the engineering data gathered from the wells drilled and analog field data, the participants will carry out a final volumetric (deterministic) estimate of the Original In-Place and recoverable hydrocarbons based on parameters such as porosity, permeability, gas-oil ratio, water saturation, estimated producing rates and recovery factor. The mentors will help the participants run a final discounted cash flow analysis based on the teams work products.

PHASE III-B: INTEGRATE A NEW DIRECTIONALLY DRILLED WELL INTO THE INTERPRETATION AND UPDATE THE A, J AND U SAND MAPS.

After Phase III-A, the participants identify deeper potential than developed to date. The participants define the need for a directionally drilled well to test for deeper resource potential. A well is drilled on the lease to test several deeper horizons. The participants learn to correlate a directionally drilled well, conduct the correction factors for bed dip and wellbore angle for fault data, as well as net sand and net pay. Participants update two deeper horizon maps based on the deviated well. In addition they evaluate the results of this phase to determine how to move forward to expand their interpretation to the eastern portion of the license area.

PHASE III-C: THE SEARCH FOR ADDITIONAL PROSPECTS IN AND AROUND THE DISCOVERY

Each team, after acquiring the additional seismic data, will now begin to re-apply all the technology used in **PHASE I** in an attempt to locate an additional prospect(s) within the project area. This includes the interpretation and mapping of additional faults and multiple horizons (at least three). Using sound technical work (industry recommended practices), the participants should be able to identify one or more additional prospects within the study area. Each participant will estimate the areal extent, potential pay thickness and conduct an estimate of Original In-Place hydrocarbons for the new prospect(s). Each team will recommend an exploration well to test the prospect(s) generated.

PHASE IV: FIELD PERFORMANCE ANALYSIS & STUDY

The teams will jump (fast forward) 5 or so years into the future, as well as to the time the field was depleted. With the assistance of one of the project mentors, each participant will evaluate the final performance of their first discovered field against the volumetric estimates of recoverable hydrocarbons based on the detailed analysis and mapping conducted in **PHASE III-A**.

In addition, the project team advisors will discuss with the teams the results of the drilling of the other prospect(s) identified during **PHASE III-B**.

PHASE V: PROJECT REPORT AND PRESENT THE RESULTS

Each participant and team will develop a report on their project, and make a final presentation to a management team.

SUMMARY OF PROJECT

After each participant and team has presented their results, the SCA project advisors and mentors will summarize and compare the results of each team.

This project area has already been interpreted, mapped and evaluated by an experienced team of geologists, geophysicists, and engineers. The project was conducted using both hand methods and workstation technology using 3-D seismic data, nearly 100 wells and the production history for all the producing reservoirs. The SCA advisors will review and show the results of the project based on all the additional data that the team did not have available and discuss the advantages and disadvantages of using a workstation to interpret the seismic data and using a computer to generate the fault and horizon maps.

The participants will get an appreciation of the difference between interpretation and mapping by hand versus using a workstation. Specifically, they will learn very important techniques for manually interpreting well logs and seismic data, as well as, generating fault and horizon maps. They will also learn equally important methods of integrating horizons with faults, by hand and on the workstation, to accurately position fault polygons, and how to honor fault components like vertical separation to generate structure maps in faulted areas. These methods are vitally important and critical in many respects including the location of exploration or development wells and the accurate estimation of reserves or resources. ***No one wants to drill a dry hole or have a reserves write-down!!!***

Most computer programs do not honor important fault components such as vertical separation (missing or repeated section) when contouring across faults. These detailed techniques often have to be done through hand editing or special computer programs. The participants will learn these important techniques and their application in daily exploration and development activities.

This twelve week program including six (6) weeks of key training courses followed by a six (6) week interpretation project could easily take up to 2 or 3 years to accomplish in a working oil company environment. During the first six (6) weeks of courses, the participants are learning from some of the world's leading experts in their fields. During the six (6) week interpretation project, SCA's senior advisors with expertise in seismic interpretation, log correlation, structural geology, reservoir engineering, subsurface mapping and other specialty areas will be working with the participants providing important guidance throughout the entire project.

In just six (6) short weeks the participants will go through an exploration program, see their exploration wells drilled, develop a discovery, compare their initial discovery estimates to actual production results after a number of years of production and conduct further step out exploration within the same area. Overall, they are conducting a project that in the real world could take as long as 10 years to see from beginning to end. But they are gaining this experience and insight in just twelve (12) short weeks, considering the total program of both training classes and project.

Such a program conducted in an oil company office could easily cost several hundred thousand dollars per participant. It could also take several years for the participants to work through the various phases of such a project. And finally, the participants have the advantage of on-site mentors and advisors to guide them step by step through the exploration, development and production phases of the project. **Indeed, a learning experience without parallel in the upstream oil and gas industry.**

Note: This twelve (12) week program is not intended to provide the training and experience required in all aspects of upstream exploration, development and production necessary for all geoscientists to learn. The program is designed to jump-start a new hire or someone entering the oil and gas industry from another discipline such as mining or environmental geology. The program is further intended to advance the ability of the participant into becoming a contributing geoscientist to help find new resources of oil and gas.

Training Program Learning Outcomes

During the first six weeks of this training program, participants will learn fundamental principles in structural geology, stratigraphy, mapping, and seismic interpretation along with reservoir engineering and other important topics. The participants will apply technology in the hands-on interpretation project during the last six weeks. The anticipated learning outcomes of this training program are as follows:

(Note: Course name abbreviations used in the following table
ASGM = Applied Subsurface Geological Mapping MBPA = Multiple Bischke Plot Analysis SSPED = Structural Styles in Petroleum Exploration and Development SDAP = Survey Design, Acquisition and Processing
AVOATT = AVO & Attribute Analysis P3DI = Principles Of 3-D Seismic Interpretation FSSS = Fundamentals of Sequence Seismic Stratigraphy BRENE = Basic Reservoir Engineering for Non Engineers OHLA = Open Hole Log Analysis / Petrophysics)

Application during Hands-on Interpretation	Related Course
(1) Gather all geological and geophysical data (paper sections, logs, etc)	Collective Information from 6-week Courses
(2) Organize available data to determine what is available and what is missing	Collective Information from 6-week Courses
(3) Synthetic seismograms / 2-D seismic response	SDAP
(4) Evaluate the survey design parameters and quality of the data	SDAP
(5) Determine the quality of the seismic data and suitability for AVO/AVA and attribute analysis, and structural interpretation	P3DI
(6) Decide which geological markers are important to the interpretation	SSPED ASGM
(7) Use synthetics from Sonic/VSP to tie geological tops to the seismic data	P3DI
(8) Develop your workflow for picking faults and horizons	P3DI
(9) Correlate well logs defining horizons and faults and validate correlation	ASGM MBPA
(10) Carry out fault and horizon picking according to the workflow	P3DI
(11) Generate fault surface (plane) maps on all important faults, integrating the seismic and well log data	ASGM SSPED P3DI
(12) Construct one or more structural and/or stratigraphic cross sections over the producing interval	ASGM FSSS

(13) Generate integrated structure maps incorporating horizons and faults for specific reservoirs	ASGM SSPED P3DI
(14) Validate fault and structural interpretation and maps	ASGM MBPA
(15) Stratigraphic interpretation	FSSS
(16) Estimate aerial extent and thickness of reservoir	ASGM
(17) Define any development or exploration prospects	SSPED P3DI ASGM
(18) Estimate the Original In-Place and recoverable resources	ASGM BRENE
(19) Conduct AVO modeling and analysis for hydrocarbon prediction/detection	AVOATT
(20) Conduct selected attribute analysis for hydrocarbon prediction/detection	AVOATT
(21) Define the limits of the producing reservoir and prospect block(s)	ASGM P3DI
(22) Conduct log analysis to determine the top and base of porosity, net sand, net pay, water contacts, etc.	OHLA
(23) Generate maps to define aerial extent and thickness of prospective block(s)	ASGM
(24) Generate net pay maps for producing reservoirs	ASGM
(25) Planimeter net pay maps to estimate volume of hydrocarbons-in-place	ASGM
(26) Volumetric and Probabilistic Calculations	BRENE ASGM
(27) Applying production, pressure date and decline curve analysis, and volumetric vs. performance analysis	BRENE Guidance from (SCA) Engineering Advisor
(28) Field Development: Define any development or exploration well location	ASGM P3DI
(29) Field Performance	BRENE
(30) Prepare a final report on the project and make presentation to SCA advisors and senior industry managers	Training Project / SCA Advisors and Industry Managers