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Chapter 1 : Oil and Natural Gas Resources Map of the Arctic Ocean

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Seeking opportunities beyond underground work in the coal mines, he migrated to Australia. He spent two years teaching in bush schools before joining the GSV as an assistant field geologist in As in the case of Selwyn 75 years earlier, Thomas noticed that the Palaeozoic rocks he mapped in central Victoria resembled those of his homeland. In particular, he noticed the abundance of graptolites, a minute form of fossil. In his spare time, Thomas made graptolites his special area of study. He was joined on his expeditions by Dr William Harris, a rural high school principal, who had been studying graptolites since before WWI. Between them, Thomas and Harris became recognised as world authorities on graptolites, showing how the fossils formed a key to the sequence of Palaeozoic rocks. Thomas was head of the Geological Survey from Hydrogeological map of Bendigo and part Deniliquin Click on the image to view a larger version Mapping groundwater is the job of specialist geologists - called hydrogeologists - because the water is contained in geological formations. Boreholes are drilled to measure the amount and quality of water contained in underground deposits. In this way, the availability of groundwater for farm irrigation and town water supply can be gauged. This map was produced as part of a five-year study into the groundwater system of the Riverine Plain in northern Victoria. Until the late s, the Survey was active in the search for groundwater, to assist agriculture and rural communities in the areas of water supply and salinity control. Environmental and engineering geologists advised on ground conditions for public construction projects, while other GSV staff provided specialist services to oil exploration companies. Today, the Geological Survey has returned to something like its original role: A Statewide geological mapping program A program to cover the whole of Australia with 1: In Victoria, this coverage was completed for the whole state by the Geological Survey between and Also commenced in the s was a systematic program of more detailed 1: These maps largely concentrated on the area around Melbourne, yielding valuable information about sand, gravel and basalt resources - materials in growing demand for the construction industry. The GSV discontinued this map series in , in favour of mapping on 1: Brough Smyth would definitely have approved. Deposits of sand, gravel and stone - building materials - are highlighted, reflecting the priorities of the period.

Chapter 2 : Earth exploration | racedaydvl.com

Welcome Earth Energy Reserves, Inc., (EER), is a development stage, independent energy company engaged in the acquisition, production, exploration and development of conventional oil & natural gas and unconventional gas resources in North America.

Bacteria in water are similarly picky. Even before a plant sinks all the way to the bottom of the ocean, bacteria and other living things are picking off the chemicals they like, either because those chemicals are easier to get or more useful to the bacteria, leaving other chemicals behind. This continues as the plants are buried. Some bacteria in low-oxygen but organic-rich mud make methane, CH4, the main ingredient in natural gas, as described in the Enrichment section More on Oxygen in Water. The result depends on how much cooking occurs, and what the plants were at the beginning. During the transformation from leaves and twigs to hard, shiny black coal, we change the name, first to peat, and then to coal of different types, lignite, then bituminous, then anthracite. Peat occurs in sediments that are not yet hard enough to be called rock, lignite in soft sedimentary rocks, bituminous in harder ones, and anthracite in metamorphic rocks. Because oil is primarily made of carbon C and hydrogen H , we sometimes refer to it as a hydrocarbon. Methane is the simplest hydrocarbon, CH4, but oil contains a great range of larger hydrocarbon molecules, such as octane C8H With too much heat, the oil breaks down to make methane. This gas is also produced as coal forms. Coal, as a solid, mostly sits where it was formed. And, occasionally, a natural forest fire or a lightning strike may set coal on fire. But, a lot of coal has avoided being eroded or burned, and is sitting in the rocks where it formed. Humans have also set coal on fire, releasing mercury and other toxic materials, and burning up a valuable resource. As miners removed coal from deep mines, pillars of the coal were left to hold up the rocks above. This, plus the poisons in the gases, have caused almost all of the residents of the town to be relocated. Janet Stracher, from Kolker, A. Mining coal involves either removing the rocks on top, or tunneling into the Earth along the coal layer. For more information about mountain removal mining, visit the U. When mud rocks shale layers are heated, the buried dead plants break down into the smaller molecules that make up oil and gas. Initially, these are trapped in the shale. However, because many small molecules take up more space than a few big ones, heating and cooking the rocks raises the pressure inside until the oil and gas seep out, often by cracking the rock. After some oil and gas escape, the pressure drops and the cracks close under the weight of rocks above. This may happen multiple times as more cooking occurs. After oil and gas have escaped from the shale into sandstone or other rocks with bigger spaces, the oil and gas can move through those spaces. Most sediments are deposited under water, or the spaces in them fill up with water later. Natural gas is gaseous no surprise there! However, recall that fluids have more difficulty moving through smaller spaces. If oil and gas are rising through spaces in rock, their motion may be blocked by another shale layer.

Chapter 3 : Oil reserves - Wikipedia

A major focus of the Geological Survey during the s was the search for oil in the Gippsland Lakes area. In , a well drilled near Lakes Entrance struck oil at a depth of metres - the very first discovery of oil in Australia.

An important secondary motive in much of the exploration so far discussed was pure scientific curiosity, the desire to add to the general store of knowledge of the world. In an important proposal for international cooperation in collecting scientific data was made byâ€¦ Primary objectives and accomplishments Scientific curiosity, the desire to understand better the nature of the Earth, is a major motive for exploring its surface and subsurface regions. Another key motive is the prospect of economic profit. Improved standards of living have increased the demand for water, fuel, and other materials, creating economic incentives. Pure knowledge has often been a by-product of profit-motivated exploration; by the same token, substantial economic benefits have resulted from the quest for scientific knowledge. Many surface and subsurface exploratory projects are undertaken with the aim of locating: Concern for safety has prompted extensive searches for possible hazards before major construction projects are undertaken. Sites for dams, power plants, nuclear reactors, factories, tunnels, roads, hazardous waste depositories, and so forth need to be stable and provide assurance that underlying formations will not shift or slide from the weight of the construction, move along a fault during an earthquake , or permit the seepage of water or wastes. Accordingly, prediction and control of earthquakes and volcanic eruptions are major fields of research in the United States and Japan, countries susceptible to such hazards. Geophysical surveys furnish a more complete picture than test boreholes alone, although some boreholes are usually drilled to verify the geophysical interpretation. Methodology and instrumentation Geophysical techniques involve measuring reflectivity, magnetism, gravity, acoustic or elastic waves, radioactivity, heat flow , electricity, and electromagnetism. Most measurements are made on the surface of the land or sea, but some are taken from aircraft or satellites, and still others are made underground in boreholes or mines and at ocean depths. Geophysical mapping depends on the existence of a difference in physical properties of adjacent bodies of rockâ€"i. Often the difference is provided by something associated with but other than what is being sought. Examples include a configuration of sedimentary layers that form a trap for oil accumulation, a drainage pattern that might affect groundwater flow, or a dike or host rock where minerals may be concentrated. Different methods depend on different physical properties. Which particular method is used is determined by what is being sought. In most cases, however, data from a combination of methods rather than from simply one method yield a much clearer picture. Remote sensing This comprises measurements of electromagnetic radiation from the ground, usually of reflected energy in various spectral ranges measured from aircraft or satellites. Remote sensing encompasses aerial photography and other kinds of measurements that are generally displayed in the form of photograph-like images. Its applications involve a broad range of studies, including cartographic, botanical, geological, and military investigations. Remote-sensing techniques involve using combinations of images. Images from different flight paths can be combined to allow an interpreter to perceive features in three dimensions, while those in different spectral bands may identify specific types of rock, soil, vegetation, and other entities, where species have distinctive reflectance values in different spectral regions i. Images taken at intervals make it possible to observe changes that occur over time, such as the seasonal growth of a crop or changes wrought by a storm or flood. Those taken at different times of the day or at different sun angles may reveal quite distinct features; for example, seafloor features in relatively shallow water in a calm sea can be mapped when the Sun is high. Radar radiation penetrates clouds and thus permits mapping from above them. Side-looking airborne radar SLAR is sensitive to changes in land slope and surface roughness. By registering images from adjacent flight paths, synthetic stereo pairs may give ground elevations. Thermal infrared energy is detected by an optical-mechanical scanner. The detector is cooled by a liquid-nitrogen or liquid-helium jacket that encloses it, making the instrument sensitive at long wavelengths and isolating it from heat radiation from the immediate surroundings. A rotating mirror directs radiation coming from various directions onto the sensor. An image can be created by displaying the output in a form synchronized with the direction of the beam as with a cathode-ray tube. Infrared radiation permits mapping surface temperatures to a precision of less than a degree and thus shows the effects of phenomena that produce temperature variations, such as groundwater movement. Landsat images are among the most commonly used. They are produced with data obtained from a multispectral scanner carried aboard certain U. Landsat satellites orbiting the Earth at an altitude of about kilometres. Scanner measurements are made in four spectral bands: Green, red, and infrared are recorded separately by the satellite and then combined to make the image. Vegetation appears red, and barren land is green. The Magdalena River and nearby lakes are blue; white splotches are clouds. The roughly parallel north-south pattern along the centre right indicates rock outcrops where the rocks have been bent into a folded structure. Courtesy of the Earth Resources Observation Systems EROS Data Center In geology , Landsat images are used to delineate landforms, rock outcrops and surface lithology, structural features, hydrothermal areas, and sites of mineral resources. Changes in vegetation revealed in the images may distinguish different soil types, subtle elevation differences, subsurface water distribution, subcropping rocks, and trace element distribution, among other things. Lineations of features may distinguish folded-rock strata or fault ruptures even where the primary features are not evident. The oldest magnetic prospecting instrument is the magnetic compass , which measures the field direction. Other instruments include magnetic balances and fluxgate magnetometers. Most magnetic surveys are made with proton-precession or optical-pumping magnetometers, which are appreciably more accurate. The proton magnetometer measures a radio-frequency voltage induced in a coil by the reorientation precession of magnetically polarized protons in a container of ordinary water. The optical-pumping magnetometer makes use of the principles of nuclear resonance and cesium or rubidium vapour. It can detect minute magnetic fluctuations by measuring the effects of light-induced optically pumped transitions between atomic energy levels that are dependent on magnetic field strength. Ground surveys are conducted to follow up magnetic anomaly discoveries made from the air. Such surveys may involve stations spaced only 50 metres apart. Magnetometers also are towed by research vessels. In some cases, two or more magnetometers displaced a few metres from each other are used in a gradiometer arrangement; differences between their readings indicate the magnetic field gradient. Surveying is generally suspended during periods of large magnetic fluctuation magnetic storms. Most sedimentary rocks have very low susceptibility and thus are nearly transparent to magnetism. Accordingly, in petroleum exploration magnetics are used negatively: Magnetics are used for mapping features in igneous and metamorphic rocks, possibly faults, dikes, or other features that are associated with mineral concentrations. Data are usually displayed in the form of a contour map of the magnetic field, but interpretation is often made on profiles. The source of the geomagnetic field must be deeper than this, and it is now believed that convection currents of conducting material in the outer core generate the field. This is the crux of the magnetohydrodynamic theory of the geomagnetic field see also Earth: Sources of the steady magnetic field. Gravity methods The gravity field of the Earth can be measured by timing the free fall of an object in a vacuum, by measuring the period of a pendulum, or in various other ways. Today almost all gravity surveying is done with gravimeters. Such an instrument typically consists of a weight attached to a spring that stretches or contracts corresponding to an increase or decrease in gravity. It is designed to measure differences in gravity accelerations rather than absolute magnitudes. Gravimeters used in geophysical surveys have an accuracy of about 0. Gravity differences occur because of local density differences. Anomalies of exploration interest are often about 0. Data have to be corrected for variations due to elevation one metre is equivalent to about 0. Gravity surveys on land often involve meter readings every kilometre along traverse loops a few kilometres across. It takes only a few minutes to read a gravimeter, but determining location and elevation accurately requires much effort. Inertial navigation is sometimes used for determining elevation and location when helicopters are employed to transport gravimeters. Marine gravimeters are mounted on inertial platforms when used on surface vessels. Aircraft undergo too many accelerations to permit gravity measurements except for regional studies. In most cases, the density of sedimentary rocks increases with depth because the increased pressure results in a loss of porosity. Uplifts usually bring denser rocks nearer the surface and thereby create positive gravity anomalies. Faults that displace rocks of different densities also can cause gravity anomalies. Salt domes generally produce negative anomalies because salt is less dense than the surrounding rocks. Such folds, faults, and salt domes trap oil, and so the detection of gravity anomalies associated with them is crucial in petroleum exploration. Moreover, gravity measurements are occasionally used to evaluate the amount of high-density mineral present in an ore body. They also provide a means of locating hidden caverns, old mine workings, and other subterranean cavities. Seismic refraction methods Seismic methods are based on measurements of the time interval between initiation of a seismic elastic wave and its arrival at detectors. The seismic wave may be generated by an explosion, a dropped weight, a mechanical vibrator, a bubble of high-pressure air injected into water, or other sources. The seismic wave is detected by a Geophone on land or by a hydrophone in water. An electromagnetic Geophone generates a voltage when a seismic wave produces relative motion of a wire coil in the field of a magnet, whereas a ceramic hydrophone generates a voltage when deformed by passage of a seismic wave. Data are usually recorded on magnetic tape for subsequent processing and display. Seismic energy travels from source to detector by many paths. When near the source, the initial seismic energy generally travels by the shortest path, but as sourceâ€" Geophone distances become greater, seismic waves travelling by longer paths through rocks of higher seismic velocity may arrive earlier. Such waves are called head waves, and the refraction method involves their interpretation. From a plot of travel time as a function of sourceâ€"Geophone distance, the number, thicknesses, and velocities of rock layers present can be determined for simple situations. The assumptions usually made are that 1 each layer is homogeneous and isotropic i. The velocity values determined from timeâ€"distance plots depend also on the dip slope of interfaces, apparent velocities increasing when the Geophones are updip from the source and decreasing when downdip. By measuring in both directions the dip and rock velocity, each can be determined. With sufficient measurements, relief on the interfaces separating the layers also can be ascertained. High-velocity bodies of local extent can be located by fan shooting. Travel times are measured along different azimuths from a source, and an abnormally early arrival time indicates that a high-velocity body was encountered at that azimuth. This method has been used to detect salt domes, reefs, and intrusive bodies that are characterized by higher seismic velocity than the surrounding rock. Two types of seismic waves can travel through a body:

Chapter 4 : Oil and Gas Acreage Release - Earth Resources

Arctic Oil and Natural Gas Resource Basins. The United States Geological Survey has estimated the undiscovered technically recoverable conventional oil, natural gas, and natural gas liquids resources north of the Arctic Circle to be approximately billion barrels oil equivalent.

Arctic area mean estimated undiscovered technically recoverable, conventional oil and natural gas resources for the seven largest Arctic basin provinces. These seven Arctic basin provinces are shown on the map at the top of this page, and their resource distributions are presented in Table 1. Ice road water truck: Water truck used to build and maintain the ice roads. Department of Energy photo. Ignik Sikumi 1 gas hydrate well on the Alaska North Slope. The Arctic has an extensive gas hydrate resource that was not included in the USGS undiscovered oil and gas assessment because gas hydrate is an unconventional resource. Jurisdiction of the Arctic Portions of eight countries are situated above the Arctic Circle: Six of them border the Arctic Ocean and thus have a jurisdictional claim to portions of the Arctic seafloor: Their claims to oil and gas beneath the Arctic Ocean seafloor have historically been determined by unilateral decrees; however, the Law of the Sea Convention provides each country an exclusive economic zone extending miles out from its shoreline. Under certain conditions the exclusive economic zone can be extended out to miles, if a nation can demonstrate that its continental margin extends more than miles beyond its shore. Russia, Canada, and the United States are currently working to define the extent of their continental margin. This provision has led to some overlapping territorial disputes and disagreements over how the edge of the continental margin is defined and mapped. For example, Russia claims that their continental margin follows the Lomonosov Ridge all the way to the North Pole. In another, both the United States and Canada claim a portion of the Beaufort Sea in an area that is thought to contain significant oil and natural gas resources. Orion Oil Pool Map: Horizontal well drilling technology has been used extensively to develop this pool. There are currently only five producing wells located on V-Pad, but these five original well bores are fed by 15 additional lateral well branches. Orion Oil Pool permafrost: Permafrost area above the Orion Oil Pool. Multiple wells with horizontal branches allows oil to be drained from a very large area from a single drill pad. Where ice-free water is available, oil can be produced from a well, placed on a ship and transported to refineries. It can also be transported by pipeline; however, construction of pipelines in the Arctic are projects of enormous difficulty and scale. Natural gas is much more difficult to transport to market. It has a much lower energy density and must be supercooled to a liquid for movement by sea. This requires a large, complex and expensive facility that takes several years to design, permit and build. Pipeline construction for natural gas encounters the same expenses and problems as those required to transport oil. Offshore exploration in the Arctic currently targets oil instead of natural gas. The relative ease of transport is what causes companies to favor oil. Because of these difficulties and expenses, bringing wells into production in the Arctic requires a very large oil or gas field. The large field is necessary to support the infrastructure required to drill the wells and transport products to market. However, once an initial infrastructure is in place, smaller fields can be developed if the existing infrastructure has the capacity to support them. United States Energy Information Administration, www. Last accessed September
A map showing the seafloor features of the Arctic Ocean including major ridges, basins, shelves and rifts, Geology. Why Arctic Exploration is so Expensive A short list of reasons why oil and gas exploration in the Arctic is so expensive On Arctic lands, poor soil conditions can require additional site preparation to prevent equipment and structures from sinking. The marshy Arctic tundra can also preclude exploration activities during the warm months of the year. In Arctic seas, the icepack can damage offshore facilities, while also hindering the shipment of personnel, materials, equipment, and oil for long time periods. Limited transportation access and long supply lines reduce the transportation options and increase transportation costs. Higher wages and salaries are required to induce personnel to work in the isolated and inhospitable Arctic. These difficulties make the cost of oil exploration and production in the Arctic to be nearly double the cost of other areas. However, the enormous resource has attracted a lot of oil and gas activity. This will continue into the future. Interest in the Arctic will only increase as oil and natural gas fields in other areas are depleted and

the cost of oil and gas rises.

Chapter 5 : Earthstone Energy â€“ A growth-oriented oil and gas E&P company

The five petroleum release areas are all underexplored with limited seismic acquisition and no previous exploration drilling. (v) and (v) are adjacent to existing producing gas fields in the Shipwreck Trough.

New Exploration Methods for Oil and Gas In the unrelenting search for more oil and gas, innovation plays an unquestionable role. As large oil and gas fields become increasingly difficult to find, geologists, geophysicists and engineers employ new technologies, such as seismic, to uncover resources that just 10 years ago were unimaginable. Seismic is a technology that bounces sound waves off rock formations deep below the surface of the Earth to provide explorers with a picture of the subsurface, often revealing locations where oil and gas may be trapped. The system will help geoscientists examine and interact with 3D models of the Earth. In order to process the massive amounts of information collected from seismic surveys, mathematicians, physicists and other scientists are constantly developing new computer algorithms to find complex patterns that enhance our understanding of the land beneath us. If we are to continue finding new fields hidden deep inside the Earth, breakthroughs in computer processing power and data management are necessary. How Do We Get to the Oil? The oil and natural gas we use today have been trapped deep inside the Earth for millions of years. Although it is tempting to think of oil and gas reservoirs as large pools and wells with giant straws that suck the fluid to the surface, oil and gas is actually locked inside the rocks like water in a sponge. Just like the small holes in a sponge that collect and hold water, there are tiny spaces or pores in rocks that fill with oil and gas. For the past years, oil and gas was extracted from rocks with small pores that were still big enough that the fluids flowed easily. If you were a tiny molecule of oil, flowing through these rocks would be like driving on a highway in the express lane. During this time period, geologists and engineers knew about other large quantities of hydrocarbons trapped in rocks with even smaller and more complex pores, but were unable to harness the resourceâ€”the oil and gas flowed too slowly or not at all from these rocks. Instead of driving on a large and fast highway, flowing through these rocks would be like driving on a small two-lane road with many stoplights and intersections. Conventional gas wells drilled into these formations were considered uneconomic since the gas locked in the rock would flow out of the tiny pores in the rock at such low rates. This picture changed, and changed in a big way, with the advent of stimulated horizontal wells. Drilling Location Before the technology advances of the past few decades, the best place to put a well was directly above the anticipated location of the oil or gas reservoir. The well would then be drilled vertically to the targeted oil or gas formation. Technology now allows the industry to drill directionally from a site up to 5 miles 8 km away from the target area. Engineers can even target an area the size of a small room more than a mile underground! This directional drilling technology means that the industry can avoid placing wells in environmentally sensitive areas or other inaccessible locations yet still access the oil or gas that lies under those areas. Drilling Process In simplified terms, the drilling process uses a motor, either at the surface or downhole, to turn a string of pipe with a drill bit connected to the end. While the well is being drilled, a fluid, called drilling mud, circulates down the inside of the drill pipe, passes through holes in the drill bit and travels back up the wellbore to the surface. The drilling mud has two purposes: To carry the small bits of rock, or cuttings, from the drilling process to the surface so they can be removed. To fill the wellbore with fluid to equalize pressure and prevent water or other fluids in underground formations from flowing into the wellbore during drilling. Water-based drilling mud is composed primarily of clay, water and small amounts of chemical additives to address particular subsurface conditions that may be encountered. In deep wells, oil-based drilling mud is used because water-based mud cannot stand up to the higher temperatures and conditions encountered. The petroleum industry has developed technologies to minimize the environmental effects of the drilling fluids it uses, recycling as much as possible. The development of environmentally friendly fluids and additives is an important area of research of the oil and gas industry. Even with the best technology, drilling a well does not always mean that oil or gas will be found. If oil or gas is not found in commercial quantities, the well is called a dry hole. Sometimes, the well encounters oil or gas, but the reservoir is determined to be unlikely to produce in commercial quantities. Technology has increased the success rate of finding commercial oil or gas deposits with less waste and a smaller impact on the surface. The surrounding rock formation is then hydraulically fractured to release the oil or gas trapped inside. In hydraulic fracturing, massive trucks pump thousands of gallons of fluid into the rock at very high pressures in order to force the rock to crack. These cracks are then propped open with sand to allow a highly conductive passage through which the oil or gas can flow. In shale fields, as many as 15 major fractures are placed along the horizontal wellbore, serving to connect all those small two-lane roads to wide boulevards and even larger, faster highways. Currently, the limits of this technology are being pushed back every day in order to unleash giant gas resources. In the future, this technology will have to go even farther to allow more fractures and longer horizontal wells. Advances in this area will undoubtedly transform our energy landscape. For more information on shale gas and horizontal drilling, see Modern Shale Gas: A Primer from the U. Drilling Costs Once a company identifies where the oil or gas may be located, it then begins planning to drill an exploratory well. Drilling a well is expensive: Getting the Oil Out Locating a suitable site for drilling is just the first step in extracting oil. Before drilling can begin, companies must make sure that they have the legal right to drill, and that the impact of drilling on the environment is acceptable. This can take years. Once they finally have the go ahead, drilling begins. The exact procedure varies, but the idea is first to drill down to just above where the oil is located. Then they insert a casing of concrete into the newly drilled hole to make it stronger. In the petroleum industry, production is the phase of operation that deals with bringing well fluids to the surface and preparing them for their trip to the refinery or processing plant. Production begins after drilling is finished. The first step is to complete the well â€” that is, to perform whatever operations are necessary to start the well fluids flowing to the surface. Later in the life of the well, more extensive repairs â€” known as workovers â€” may also be necessary to maintain the flow of oil and gas. The fluids from a well are usually a mixture of oil, gas, and water, which must be separated after coming to the surface. Production also includes disposing of the water and installing equipment to treat, measure, and test the oil and gas before they are transported away from the well site. So production is a combination of operations: Operating in this environment requires billions of dollars and boundless technical expertise. Safely and economically bringing oil to the surface requires experts in everything from underwater vehicles that install subsea equipment to structural engineers that make sure the huge floating platforms can withstand large waves. To put this in perspective, it is a bit like a quarterback trying to throw a football to his wide receiver more than football fields away! Innovation will continue to drive this frontier into new territory. Environmental Care We depend on oil and gas for a host of products we use in our everyday lives, and we will continue to depend on them for years to come. Already great strides have been made to ensure that oil and gas producers make as little impact as possible on the natural environments in which they operate. This includes drilling multiple wells from a single location or pad to minimize damages to the surface, employing environmentally sound chemicals to stimulate well production, and ensuring a seamless transition from the wellhead to the consumer. How can the vast potential locked in these resources be tapped in a more efficient, environmentally sound manner? Research today focuses on inserting heaters into rock formations below the surface to convert the heavy hydrocarbons into liquid that can then be drained and produced by more conventional oil wells. Such a process would dramatically reduce the impact of these unconventional sources on the surface. However, the next generation of engineers and scientists must further refine this technology or generate new ideas in order to tackle these problems.

Chapter 6 : Earth Energy Reserves, Inc.

Coal, oil, and gas are called fossil fuels because they were formed from the remains of animals and plants that were buried by layers of sediment millions of years ago. Most of the energy used today comes from burning fossil fuels.

Classifications[edit] Schematic graph illustrating petroleum volumes and probabilities. Curves represent categories of oil in assessment. The relative degree of uncertainty can be expressed by dividing reserves into two principal classificationsâ€”"proven" or "proved" and "unproven" or "unproved". Proven reserves are also known in the industry as "1P". Securities and Exchange Commission allowed oil companies to report to investors. Companies listed on U. Since January the SEC now allows companies to also provide additional optional information declaring 2P both proven and probable and 3P proven plus probable plus possible provided the evaluation is verified by qualified third party consultants, though many companies choose to use 2P and 3P estimates only for internal purposes. They are sub-classified as probable and possible. Industry specialists refer to them as "P50" i. The sum of proven plus probable reserves is also referred to in the industry as "2P" proven plus probable. Reasons for classifying reserves as possible include varying interpretations of geology, reserves not producible at commercial rates, uncertainty due to reserve infill seepage from adjacent areas and projected reserves based on future recovery methods. The cumulative amount of proven, probable and possible resources are referred to in the industry as "3P" proven plus probable plus possible. The Russian category C2 includes probable and possible reserves. Unconventional oil resources are greater than conventional ones. United States not included. It incorporates the definitions for reserves, but adds categories for contingent resources and prospective resources. Contingent resources may include, for example, projects for which there are no viable markets, or where commercial recovery is dependent on technology under development, or where evaluation of the accumulation is insufficient to clearly assess commerciality. Prospective resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective resources have both an associated chance of discovery and a chance of development. The United States Geological Survey uses the terms technically and economically recoverable resources when making its petroleum resource assessments. Technically recoverable resources represent that proportion of assessed in-place petroleum that may be recoverable using current recovery technology, without regard to cost. Economically recoverable resources are technically recoverable petroleum for which the costs of discovery, development, production, and transport, including a return to capital, can be recovered at a given market price. Examples include extra heavy oil , oil sand , and oil shale deposits. Unlike "conventional resources", in which the petroleum is recovered through wellbores and typically requires minimal processing prior to sale, unconventional resources require specialized extraction technology to produce. Moreover, the extracted petroleum may require significant processing prior to sale e. Estimation techniques[edit] Example of a production decline curve for an individual well The amount of oil in a subsurface reservoir is called oil in place OIP. This fraction is called the recovery factor. The portion that is not recoverable is not included unless and until methods are implemented to produce it. Extraction of petroleum and Oil in place Volumetric methods attempt to determine the amount of oil in place by using the size of the reservoir as well as the physical properties of its rocks and fluids. Then a recovery factor is assumed, using assumptions from fields with similar characteristics. OIP is multiplied by the recovery factor to arrive at a reserve number. Current recovery factors for oil fields around the world typically range between 10 and 60 percent; some are over 80 percent. The wide variance is due largely to the diversity of fluid and reservoir characteristics for different deposits. Materials balance method[edit] The materials balance method for an oil field uses an equation that relates the volume of oil, water and gas that has been produced from a reservoir and the change in reservoir pressure to calculate the remaining oil. It assumes that, as fluids from the reservoir are produced, there will be a change in the reservoir pressure that depends on the remaining volume of oil and gas. The method requires extensive pressure-volume-temperature analysis and an accurate pressure history of the field. The Y axis is a semi log scale, indicating the rate of oil depletion green line , and gas depletion red line. The X axis is a coordinate scale, indicating time in years and displays the production decline curve. The top red line is the gas decline curve, which is a hyperbolic decline curve. Gas is measured in MCF thousand cubic feet in this case. The lower Blue line is the oil decline curve, which is an exponential decline curve. Oil is measured in BBL Oil barrels. Data is from actual sales, not pumped production. The dips to zero indicate there were no sales that month, likely because the oil well did not produce a full tank, and thus was not worth a visit from a tank truck. The upper right legend map displays CUM, which is the cumulative gas or oil produced. ULT is the ultimate recovery projected for the well. The decline curve method uses production data to fit a decline curve and estimate future oil production. The three most common forms of decline curves are exponential, hyperbolic, and harmonic. It is assumed that the production will decline on a reasonably smooth curve, and so allowances must be made for wells shut in and production restrictions. The curve can be expressed mathematically or plotted on a graph to estimate future production. It has the advantage of implicitly including all reservoir characteristics. It requires a sufficient history to establish a statistically significant trend, ideally when production is not curtailed by regulatory or other artificial conditions. As years pass, successive estimates of the ultimate recovery of fields tend to increase. The term reserve growth refers to the typical increases in estimated ultimate recovery that occur as oil fields are developed and produced. Relevant discussion may be found on the talk page. Please do not remove this message until conditions to do so are met. The specific problem is: The table in this section presently presents resources rather than reserves, according to SPE definition Please help improve this section if you can.

Chapter 7 : How Nature Makes Coal, Oil and Gas | EARTH Earth and the Environment

The Washington Geological Survey regulates oil and gas drilling. Visit the Rules, Regulation, and Forms page for regulations, forms, and permit fee information.. The Washington Geologic Information Portal displays all of the dry oil and gas exploration wells and gas storage wells drilled in Washington State.

Chapter 8 : Oil & Gas Industry Solutions - Market Data, Analysis & Forecast Reports & Services | IHS Mark

New Exploration Methods for Oil and Gas. In the unrelenting search for more oil and gas, innovation plays an unquestionable role. As large oil and gas fields become increasingly difficult to find, geologists, geophysicists and engineers employ new technologies, such as seismic, to uncover resources that just 10 years ago were unimaginable.

Chapter 9 : Non-renewable resource - Wikipedia

natural gasâ€”from the earth. These resources minerals and other non-oil and gas resources from the groundâ€”and in oil and gas extrac-tion. Mining jobs differ.