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Date	Activity	Action
08-DEC-2015	A Geologist & Geophysics survey was conducted by Sub Surface team for the searching of Reservoir rocks which are tracked in the mother earth. They usually search for tracked reservoir because they have tendency to remain at one place for years. Extracting fossil fuel from them become easier as they are placed at one place.Once the survey is done, an accurate estimation is done based on the data available. On the basis of estimation, production facilities and other installation is made at that particular field. After installation of production facilities drilling process start. They do drilling by two ways: 1. Vertical Oil Well Drilling 2. Directional Oil Well Drilling At the bottom of the Rig, One cutting machine is there which is called the BIT. It is used to cut the heavy stones while drilling. The bit is made up of diamonds which is helpful in the cutting of the stones.Once the drilling is completed, tubing pipes is used to extract crude oil and other hydro carbon.	Edit
09-DEC-2015	GGS: Oil is received in GGS7(k) through 4" pipelines in following headers: 1. Group header 2. Emulsion header 3. Test header 4. High Pressure header Headers are followed by separators from where mixture of oil & water gets separated from gas. Gas is then sent to GCS while the mixture of oil & water is sent to heater-treater for further treatment. Heater-treater consist of following chambers: 1. Heating section 2. Coalescing section 3. Inlet degassing section 4. Differential oil control Crude oil water content is reduced 50% sent to CTF via dispatch pumps at 4-5 kg/cm^3; through 8" pipelines.	Edit
10-DEC-2015	1.Fire tube size 24" 2.max working pressure 50 psi 3.Heater size 8'x20' 4.Central tank farm (CTF) : Receives oil from all GGS treated as well as untreated. Consist manifolds to receive oil from GGS in controlled manner. 18 Storage tanks are available out of which 1-10 have capacity of 2000 m3 each and 11 -18 have capacity of 10,000 m3 each. Heat Exchanger : Crude oil is heated from 34-35 deg C to 42-43 & degC before it enters Heat Treater. There are 5 Heat Exchangers. Heat Treaters : There are a total of 6 heat treaters. 4 of capacity 250 m^3; each and other two of 800 & 1000 m^3;.	Edit
11-DEC-2015	Gas compression plant (GCP) The main function of GCP is to compress the gas it receives from GCS at 3 kg/cm^3; to 40 kg/cm^3; and send it back to GCS.Compression of gas upto 40 kg/cm^3; is done using : 1.Plant description Inlet separator ,Gas compressor,Discharge separator,Condensate drum,Gas coolers,Raw water storage tanks,Reverse osmosis plant,Degasser tank ,Cation & anion exchange towers,Cooling tower It has a capacity of 150,000 m^3/day.It consists of 10 gas compressors and two reverse osmosis plant. Desalter plant The desalter plant receives crude oil with an average BSW 10-15%. The output of the plant is up to 0.2%. There are five basic components which forms the desalter plant. These are: 1. Feed pump 2. Heat exchanger 3. Economizer 4. Main heater 5. Desalter vessel The desalter plant at Nawagam has 6 storage tanks with capacity of 30,000 m3 each. Processed crude is stored in another tank and after draining of free water is pumped to Naw	Edit
14-DEC-2015	The extraction of hydrocarbon from rock is done by using tolvene.Other salts are removed by distilling with acetone and methanol.All unwanted reagents that may have entered the pores are removed by drying in oven at 60 deg celcius for 2 hours.The reagents are volatile and evaporate.Dried rocks are now labelled and cut at the ends to obtain a desired length and diameter of the core plug which can be put under various apparatus for finding porosity and permeability.Edges are smoothened.Diameter and length of each rock is calculated using vernier callipers.This will help in bulk volume calculations.Permeability is the flow property of a rock and is determined by passing a fluid through it.Permeability is found using permeability apparatus and using darcys equation.Both gases and liquids can be used in permeability calculation.However both give a different result due to Klinckenberg Effect.	Edit
15-DEC-2015	The site sends request for rock examination along with lithological details,depth,color etc.Big rock chunks are identified for portions consisting sandgrains and silstone since only these regions will b porous.These potions are differentiated.Different portions have different serial no. and core plugs are derived from then using Vinci(French) machines.These are then washed well and dried.For porosity measurements helium porosimeter is used which runs on the principle of boyles law(PV=constant).He being inert and small in molecular size is used.First a sample of known porosity is tested to check working of the apparatus.The core plug is smaller than sample chamber hence brillets of known volumes are also placed in it.Volume of brillets is subtracted for porosity measure.Valve is opened to allow flow of gas into chamber so as to establish equilibrium between sample and reference chamber.Volume of sample chamber at equilibrium is obtained which further helps in porosity calculations.	Edit

16-DEC-2015	The process of obtaining reservoir fluid sample from a given formation is called sampling.Reservoir fluid samples have the biggest influence on quality and usefulness of measured laboratory data because if samples arent representative of true conditions existing subsurface,all measurements on them are questionable.Reservoir fluids should be sampled as early as possible.Well conditioning:Process of producing reservoir fluids at low rates.This method is not suitable for gas condensates because if reservoir pressure is below dew point,an even richer gas condensate will be formed resulting in the collected sample being non representative.Surface Sampling:Cheap,most employed,convenient.Gas and oil are collected simultaneously from a test separator.These are recombined and mixed in certain ratios yielding reservoir fluids at desired pressure.Subsurface Sampling:Representative fluid is drawn to the base of the well bore adjacent to perforations having a floating piston type device.	Edit
17-DEC-2015	Sample is obtained from Bottom Hole Sampler(BHS) having 600cc capacity.Reservoir fluid is obtained only at reservoir temperature.Surface sampling is done when the oil comes to the surface.At times gradient survey is done and depths at which oil,water,gas is present is determined.Accordingly the sampler draws them out separately and recombines them in a certain ratio in the lab.This can be done only if predefined data for the reservoir is available.The sample obtained in BHS is in 2 phase.To convert it to single phase it is transferred to a shipping bottle of capacity 600 cc and pressure 4000 psig which is maintained using a displacement water pump.We cannot directly transfer material directly from BHS to PVT cell because BHS has the sample in 2 phase which is non representative of reservoir sample.Shipping Bottle then transfers a part of the liquid to the PVT cell.Its capacity is 500cc and it can withstand 1000 psig pressure and 175 degree celcius temperature.	Edit
18-DEC-2015	Approximately 90cc is transfered to PVT cell(Fluid Eval) to keep space for expansion activities.Also pressure variation occurs since manipulating temperature is difficult.When sample is first put in the cell,it becomes 2 phase again due to the small pressure in the cell(14 bar) which is required since transfer between shipping bottle and cell wouldnt occur otherwise.Bubble point is determined using constant mass expansion where in the closed system volume and density change but overall mass is constant.Varying pressure is applied for Pb determination.Oil extraction pressure must be more than Pb otherwise gas will escape out and there will be no driving force to get the oil.If valve is openened and 10cc gas is exposed to 14psig atmospheric pressure we get 300cc gas collected is gasometer and 8 cc oil collected in flash separator.This process is called high flash.It gives us the Formation Volume Factor and Gas oil ratio.	Edit
21-DEC-2015	Dead oil is obtained when all gas is removed from the oil.Dead oil gas chromatography and high gas chromatography yields the well composition.Gas chromatography follows the adsorption phenomena.The gas entering GC machine from gasometer is heated to high temperature.According to its ionizability it gets adsorbed and detected at the end of the GC by ion detector.This is obtained by using PVT sim on the system.The GC gives varying peaks for different composition at different time.Phase envelope of gas is always smaller than liquids.	Edit
22-DEC-2015	FVF for low shrinkage oil is approximately 1 while for high shrinkage oil it is 2 or more. GOR for low shrinkage oil is lower while for high shrinkage oil is more. Gas chromatography gives us the mole percentage of various components in the sample with which a ternary diagram is plotted by the computer. It is seen in which region the reservoir oil lies and hence its type is determined from the ternary diagram. But sometimes a particular oil might lie on the boundary of two regions which makes prediction using this diagram tough. Hence while determining oil type other factors like FVF, GOR, gravity density, colour, phase diagrams, all are considered. Also isothermal compressibility coefficient can be determined by the computer. This gives us the measure of amount of compression ratio, also it helps in material balance determination which are also required for other labs.	Edit
23-DEC-2015	Studied the PVT behavior analysis of reservoir fluid from Nawagam, Ahmedabad. After studying and carrying out various experimental analysis on the sample reservoir fluid of Nawagam#244 horizon-MP is undersaturated at reservoir conditions as its reservoir pressure 3015.77 psig (212 kg/cm square) is greater than the bubble point pressure of 2281.8 psig (160.47 kg/cm square). The phase diagram of the reservoir fluid was generated from gas chromatography analysis data of oil and gas using PVT sim 20.2 sofware. The diagram is typical of black oil phase. The critical point temperature Tc and pressure Pc of this fluid are 465.76 degree celcius and 1093.34 psig respectively. The ternary diagram of the reservoir fluid generated using JMP7 software also corroborates that that reservoir is a black oil system.	Edit

24-DEC-2015	Conductivity is seen in water due to presence of salts. Resistivity is measured by presence of oil. In resistivity apparatus an inverse method is used wherein presence of water is checked. The inverse of this gives us a measure of oil that might be present in the reservoir. Both Darcys law and Klinkenberg correction hold good only for laminar flow. The air permeameter must be connected to nitrogen supply for pore pressure upto 150 psig and air or nitrogen for confining pressure upto 400 psig. Connect 1/4 inch outer diameter tubing to the inlet valve and keep it at OFF. Set confining valve to vent position. Connect 1/8" OD tubing to confining valve. The valve pressure/vent is used to supply nitrogen to core holder via tube fitting on instrument rear panel. The confining pressure acting on the core is displayed on a pressure indicator downstream of this valve. With valve at vent the applied core confining is vented to atm, and core can be removed from the core holder.	Edit
28-DEC-2015	First we put the switch on low flow and wait for stability below 50. If not then we use high flow. Also when flow rate of incoming gas in the core is low, the system is operated in backward mode. When flow is at high, then forward mode is used. We wait to stabilize the system for a particular flow rate. Then we see the value of upstream pressure if that is less than 10, del P is on. If it is more than 10, then del P is OFF. We need to match the value of del Pmean to the upstream pressure. Next we take a few more readings by changing the pressure a bit. The limit of upstream pressure is 80,if the permeability at this pressure is 0,we declare sample as non permeable. Grainy,rough samples have high permeability.Cemented,smooth ones have low permeability.Permeability has the unit milliDarcy. A decreasing trend in permeability is observed when it is calculated again. Transducers require a warm up period of at least half an hour before use. Applilab is the software used for this apparatus.	Edit
29-DEC-2015	In forward mode,gas leaving the core will be vented directly to atmosphere.Hence maximum differential pressure is developed here. In backward mode,gas leaving the core passes the orifice of metering valve. Depending on the atmospheric gas flow rate and valve settings, gas flowing through the orifice generates a pressure on the upstream side of the orifice which is transfered back through the core. The volumetric gas flow rate under core backpressure will be less through the core than on atmospheric side. Hence core pressure reduces as backpressure increass for a set atmospheric flow rate. Backpressure mode accurately controls core pressure and flow rate and maintains laminar flow. Backpressure mode is recommended when klinkenberg permeability is required, to prevent turbulent or visco-inertial flow.	Edit
30-DEC-2015	Capillary pressure exists whenever reservoir rock pores(of capillary sizes) are saturated with two or more immiscible fluid phases. Inter facial boundary between two immiscible fluid phases present in a porous medium is curved due to intefacial tensions(IFT) between the fluids. There is a difference in pressure across the interface, called capillary pressure. Each immiscible fluid has a pressure that is distinct from that of the other immiscible fluids. The presence of capillary forces in a porous medium causes hydrocarbon entrapment. Capillary forces also play a major role in the dynamic problems involving flow of immiscible fluid phases in poroud media undr the influence of capillarity,gravity, and an impressed external pressure differential.	Edit
31-DEC-2015	Several techniques have so far been employed in determining capillary pressure curves. First in which liquid is removed or imbibed by the core through the medium of a high displacement pressure porous diaphragm. Second in which Liquid is removed from the core which is subjected to high centrifugal forces in a centrifuge. Method 1 takes several days to reach saturation equilibrium at a given pressure and method 2 involves tedious calculations. Hence an apparatus is designed to calculate capillary pressure keeping these limitations in mind.	Edit
01-JAN-2016	In the previous methods the liquid used wets the solid i.e. the contact angle which the liquid forms against the solid is less than 90 degrees. However this system involves the porous solid and a single "non-wetting" fluid (mercury) which forms a contact angle of greater than 90 degrees against solid. Th action of surface forces involved opposes the entrance of the liquid into the solid and pressure must be applied to the liquid to cause penetration of the pores of the solid. The essential components of the apparatus are a mercury displacement pump, sample holder, manifold system wherein the gas pressure may be varied from small absolute values to about 2000 psig. The mercury pump consists of a piston cylinder such that one turn of the driving mechanism moves the piston through a distance sufficient to dissipate 1 cm square. The manifold is connected to a vacuum system and high pressure nitrogen bottle. One or more plugs drilled from a core are placed in the cavity of a sample holder.	Edit
04-JAN-2016	Vacuum is drawn on the system until an absolute pressure of 0.005mm of mercury or less, is registered by Mcleaod gauge. The piston is then advanced until mercury meniscus reaches the reference mark in the top lucite window. The scale reading indicates amount of mercury required to fill the cell with the sample in place. Gas is admitted to the system in increments, to	Edit

	increase pressure on the mercury surrounding the sample. In as much as saturation equilibrium is reached very rapidly at any particular pressure, an entire curve may be determined in from 30-60 minutes. Temperature fluctuations of the system are ordinarily not sufficiently great during this time to require corrections for thermal expansion or contraction. Magnitudes of capillary pressures are proportional to the product of the surface tension of the liquid being used and cosine of angle of contact against the solid.	
05-JAN-2016	understanding the basic working of the Phase Behavior. Here testing is performed on crude oil which is brought in sophisticated sampling devices such that it remains in single phase. This sample needs to be examined for various properties to understand which type of oil it is. Fluid-eval is a device in which the test sample is kept. Here its constant mass evaluation is done and varying pressure is applied to it. Its bubble point is determined using photographic method wherein a camera is installed and the occurence of the first bubble is recorded by it. The density of the sample is checked. The viscosity of the sample is checked in a capillary apparatus. The gas-oil ratio of the sample is determined. The gas part of the sample undergoes gas chromatography to determine its composition. The Pressure-Volume-Temperature graph is plotted for the sample and its graph is compared with the standard graphs to identify which type of oil it is.	Edit
06-JAN-2016	Studied the background of the basic concepts being used in the lab.The domain in which petroleum reservoir fluids behave in a certain fashion is defined by pressure,temperature,chemistry and composition.These variables continuously vary resulting in change of state of reservoir fluid.Knowledge of phase behavior and properties of reservoir fluids is important because it helps reservoir engineer to evaluate recovery of products.Critical point is the maximum pressure and temperature at which a pure component can form coexisting phases.Triple point is the pressure and temperature condition at which all 3 phases coexist in equilibrium.Critical point for binary mixtures is different.Phases become indistinguishable at this point.But vapor and liquid can exist in equilibrium at pressure and temperature even above the critical point.Phase envelope extends beyond the critical point.As pressure depletion continues liquid expands till pressure reaches a point on phase envelope called bubble point.	Edit
07-JAN-2016	Cricodenbar and cricodentherm are the highest pressure and temperature on the phase envelope respectively.On the right side of critical point if expansion is carried out(gas dominant region) a dew point is encountered which is called retrograde or upper dew point pressure(exactly reverse of the behavior expected).As pressure decline continues,retrograde liquid that has formed begins to revaporise reintersecting the dew point curve where a small amount of liquid remains called lower dew point pressure.For a binary mixture the system containing the lowest fraction of methane lies to the far right of the overall PT plot whereas that having maximum methane lies to the far left.The higher amount of n-butane,greater is the slant towards the right and vice versa.PVT cells are used for finding the bubble point and dew point.The visual info on change of phase is seen by a glass window made of sapphire.Pressure depletion is carried out at varying temperatures to obtain bubble and dew point.	Edit
08-JAN-2016	Reservoir gases have small phase envelopes while reservoir oils have large phase envelope.Heavy unidentified components of a reservoir fluid are called plus fraction.Fluid type is determined by phase behavior,gas to oil ratio,gravity,color etc.Black oils:black in colour.Their GOR remains constant above bubble point.Also called low shrinkage oils.The separator conditions lie within phase envelope.Volatile Oils:phase envelope is smaller than black oils.There is significant vaporisation of oil below bubble point.This gas is rich and behaves as retrograde gas.Gas Condensates:Also called retrograde gases.Totally in gas phase.Phase envelope is smaller than volatile oils.Reservoir temp. lies between cricodentherm and critical point.Immobile condensates are formed.Wet Gas:its phase envelope lies over a temperature range below reservoir temp.It doesnt drop out any condensate.Dry Gas:Smallest phase envelope.Reservoir temperature higher than cricodentherm.Cant produce condensate.	Edit