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Optimizing Acid Stimulation Treatment Design in the Dholka Field of the Ahmedabad Block of the Cambay Basin

Prajesh Patel[1], Ankush Mali[2], Sagar Dobariya[3]

Parul University, Parul Institute of Technology, Waghodia, Vadodara, Gujarat[1,2,3]

Abstract: Across the world, there are many wells which are having problem of formation damage and decline in permeability of reservoirs which results in fall of production and the demand of oil is rising day by day. Moreover, it is not economically permissible, so need to carry out stimulation treatment which can improve the production performance of wellbore.

The scales deposition occurs around the wellbore zone during various well operations (drilling, workover) that has a significant impact on well production. The removal of scale in the area of the wellbore, which bypasses the damage zone, is required to optimize well performance. Estimation of near wellbore damage zone parameters and scale deposition is one of the major challenges that affects stimulation efficiency.

We did an integrated study for multi-stage Matrix Acidizing in a directional well in a deep sandstone reservoir in the Dholka field of the Cambay basin, India. The technique, which takes into account the complexity of scale deposition and its alteration during acid stimulation, is described fully in this work.

In this paper, we depict the details of approach in step by step which considers during the matrix acidizing operations carrying for the removal of scales which formed by precipitation of organic and inorganic debris which are present in the crude oil.

INTRODUCTION

Well stimulation is done to boost the final economic recovery and to increase the property value by allowing the petroleum fluid to be delivered faster. The goal of well stimulation is to improve near-wellbore permeability by reducing formation damage. Successful use of these treatments will result in the recovery of intact production and a multifold increase in production, depending on the technique chosen. The success rate of good stimulation is determined on the correct diagnosis of the problem and the application of the appropriate treatment.

The following are the techniques utilized to stimulate the well:

1. Matrix Acidizing: It is a chemical process that dissolves a compound that is undesirable in the formation, pipes, surface equipment, and flowlines. When addressing formation damage, acid is used to dissolve flow-restricting particles, scale deposits, and minerals in the reservoir or at the wellbore. The main goal of any acidizing treatment is to dissolve either natural or induced formation obstacles or material within the pore space of the rock.

2. Hydraulic Fracturing: This is the technique of injecting fluid into a formation at a pressure higher than the formation's fracture pressure to create a fracture. The injection rate must be high enough, and the permeability of the formation to the injected fluid must be low enough that fluid loss is not excessive, allowing pressure to build up and fracture the formation or open natural fractures.

3. Solvent treatment: Paraffins and asphaltenes are removed using a solvent procedure. Both aromatic and paraffinic solvents can be used to extract paraffins. Only aromatic solvents can remove asphaltenes.

4. Surfactant Treatment: Surfactants, also known as surface active agents, are chemicals that can affect the flow of fluid near the wellbore in a positive or negative way. They are used in acidizing to break undesirable emulsions, reduce surface or interfacial tension, change wettability, speed up clean-up, disperse additives, and prevent sludge formation. A surface-active agent is a molecule that seeks out an interface and has the ability to change the present condition.

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5. Reperforation: The purpose of reperforation is to improve and re-establish a connection to the wellbore.

Acidizing Techniques
Acidizing is a chemical procedure for removing an undesired substance from a formation, pipe, surface equipment, or flow lines. Acid removes flow-restricting particles, scale deposits, and minerals from the reservoir or the near wellbore region while addressing formation damage. The fundamental goal of any acidizing treatment is to dissolve either natural or artificial formation rock or material within the rock's pore spaces.

To be suitable as a treatment fluid, an acid must meet two fundamental requirements: -
1) In order to generate soluble compounds, it must react with carbonate or other minerals.
2) It must be able to be suppressed in order to avoid an overabundance of interaction with metal goods in the well.

A diluted acid, rather than a pure concentrated one, will be used to acidify any formation or scale, such as 50 percent HCL, 18 percent HCL + 3 percent HF, and so on. The commonly used acidizing techniques are broadly classified as follows: -
i. Matrix acidizing
ii. Acid fracturing
iii. Acid washing

Matrix Acidizing
It is accomplished by injecting acid into the formation's matrix pore structure below the fracture pressure. The goal of a matrix acidizing treatment is to achieve radial acid penetration into the formation to some extent.
Matrix acidizing may be selected as a proper technique for one or more of the following reasons: -
1. To remove either natural or induced formation damage.
2. To achieve low pr breakdown of the formation before fracturing.
3. To achieve uniform breakdown of all perforation.
4. To leave zone barrier intact.
5. To achieve reduced treating cost.

Acid stimulation is performed in matrix acid treatments by dissolving formation comprising minerals by the action of acid to improve effective pore diameter. When the acid diffuses into the formation, it dissolves some of the formation's scales or removes scales from the pores. The formation is not shattered, but the acid will flow due to the imbalance. In a diverse structure, it is highly desired. Because the majority of the acid is used to increase the effective wellbore diameter, it is not recommended in homogeneous formations.

Acid Fracturing
Acid fracturing is the process of injecting acid into a formation at a high enough pressure to fracture it or open existing fractures. In acid soluble formations like limestone and dolomite, acid fracturing is an option to supported fracture treatment. The conductivity between the wellbore and the reservoir is acquired by etching the fracture faces with acid in acid fracturing.
Acid penetration along the crack, on the other hand, is measured by the chemical reaction between the rock and the acid, whereas conductivity is evaluated by etching patterns. In a homogeneous formation, it is highly preferred. Acid fracturing's primary goal is to produce channels in the rock.
The following goals are expected after an acid fracturing treatment: -
1. The fracture propagated across the pay zone.
2. The acid dissolved a large amount of reservoir rock.
3. The acid etched the fracture faces unevenly to create channels with sufficient etched length & width that contained high conductivity after the fractured closed.
4. Rapid & complete recovery of the treating fluids.
5. Large fold of increase at a reasonable cost.

Acid washing
Acid washing is done to open perforation and remove acid soluble scales from the wellbore. A tiny amount of acid is spotted in the desired location and allowed to react with scale deposits or formation without external agitation.

Acid types
Although the oil industry has access to a wide range of acid compounds, only the following have been demonstrated to be cost-effective in acidizing of oil wells. It is primarily classified into two sorts.

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A. Inorganic acids

- Hydrochloric acid (HCL)
- Hydrofluoric acid (HF)
- Mud acid (HCL: HF)
- Other inorganic acids include sulfamic, sulphuric and nitric acid

B. Organic acids

- Acetic acid and Glacial acetic acid
- Acetic anhydride
- Citric acid
- Formic acid

1) Hydrochloric acid (HCL)

HCL is a highly reactive inorganic acid that is often employed in the acidification of oil wells. HCL has long been known as the ideal field acid for the majority of applications. Because HCL is a very reactive substance, it will quickly deplete certain forms. To maximize this characteristic, it's critical to size acid treatments and pump rate with HCL. Carbonate minerals, such as limestone, chalk, and dolomite, are dissolved by HCL. With sand stones, it is less reactive.

The reaction of carbonate with HCL is

1. Reaction with limestone

$2HCL + CaCo_3 \rightarrow CaCl_2 + H_2O + CO_2$

2. Reaction with dolomite

$4HCL + CaMg(Co_3)_2 \rightarrow CaCl_2 + MgCl_2 + 2H_2O + Co_2$

Advantages

- Low cost & availability
- Easily inhibited to prevent attack on oil- field tubers i.e., metal equipment.
- Can be emulsified for slower overall reaction rate.
- Exhibit de-emulsification properties for rapid clean up.
- Most reaction products are water soluble & easily removed.

Disadvantage

- Reactivity rate is very high

2) Hydrofluoric acid (HF)

Another inorganic acid, HF, is used with HCL to increase the entire system's reaction rate and to solubilize formation in a specific sandstone. It has a higher potency than HCL acid. Despite the fact that it may dissolve both sandstone and carbonate, HF is only utilised in sandstone. Because HF acid reacts with clay minerals, sand, drilling mud, and cement, this acid mixture is used. That may be limiting permeability near the wellbore and has the ability to dissolve silica and boost permeability. It is always pumped as an HCL-HF mixture & it is mainly used in sandstone formation.

Some HCL-HF mixtures used in oil industry are

Concentration	Acid Name
12%HCL + 3% HF	Regular mud acid
12%HCL + 6% HF	Super mud acid
6 ½ %HCL + 1% HF	Half strength acid

a. The HCL doesn't react with this material but is needed to keep PH low by reducing precipitation of HF reaction products.

$2HCL + CaCo_3 \rightarrow CaCl_2 + 2H_2O$

$SiO_2 + 4HF \rightarrow SiF_4 + 2H_2O$

b. HF reaction with silica when HCL is not used for PH maintenance

$SiO_2 + 4HF \rightarrow SiF_4 + 2H_2O$

$SiF_4 + 2HF \rightarrow H_2SiH_6$

$H_2SiH_6 + 8H_2O \rightarrow Si(OH)_4 + 4H_2O + 6F$

c. HF reaction with carbonates (scales will be formed)

$CaCO_3 + 2HF \rightarrow CaF_2 + Co_2 + H_2O$

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Because when only HF is used, Si (OH)4 is generated, which is insoluble and lowers permeability in the formation, HF acid should be used in conjunction with HCL. Because of the development of CaF2 precipitate, which is insoluble and reduces permeability in the formation, HF acid should never be employed in carbonate formation.

3) Acetic acid

It's a colourless organic acid that dissolves in water and most organic solvents in any concentration. Although acetic acid and water combinations are corrosive to most metals, the rate of corrosion is far lower than that of HCL and HF acid. Acetic acid has a low corrosion resistance and is widely employed as a perforating fluid when extensive contact times are necessary. Because of this property, the acid is occasionally utilised as a displacing fluid in well cementing jobs when contact duration can be hours or days before perforation. Over time, a weak acid dissolves scale. It's most commonly utilised as a perforating fluid. Acetic acid is usually employed in tiny quantities or in combination with HCL as a delayed reaction or retarded acid.

The following are some of acetic acid's most common applications and properties: -

- Acetic acid is relatively weak.
- Normal concentration of 7.5% to 10% when used alone.
- Used as iron control additive.
- Mainly used in HCL mixtures.
- Used as perforating fluid and retarded acid.

4) Formic acid

The most basic of the organic acids, formic acid is entirely miscible with water. It is more powerful than acetic acid but less powerful than HCL acid. Formic acid is commonly used in well stimulation, usually in combination with HCL as a retarded acid system for high temperature wells, and it may be inhibited readily, although not as efficiently as acetic acid at high temperatures and lengthy contact times. It reacts faster than acetic acid.

Formic acid's characteristics and applications are as follows: -

- Formic acid is relatively weak.
- Seldom used alone.
- Mainly used in HCL mixtures.
- Corrosion inhibitor aid.
- Retarded acids.

Selection of Additive

To fight one or more of the forms of formation damage associated with stimulation treatments, a variety of additions to the treatment formulation have been created. They can be costly, especially when used with acid treatments. Furthermore, many of the additions are incompatible with one another and may cause harm to the formation. Each additive's use must be justified independently; it should not be chosen just on the basis of the benefits claimed in the service company's sales catalogue. The following are a list of the most common and important additives:

1) Corrosion Inhibitors

Due to the corrosive effect of acid on steel, this additive type is nearly always required for acid treatments:

$Fe + 2H^+ \rightarrow Fe^{++}$ (dissolved)+H_2(gas)

The rate of (acid) corrosion increases rapidly as temperature rises. Furthermore, when the temperature and treatment duration rise, the corrosion inhibitor's efficiency decreases (due to degradation). The type and concentration of corrosion inhibitor used will be determined by the acid type, bottom hole temperature, steel type contacted, and treatment duration.

2) Sequestering Agent

As the acid "spends," both the ferrous (Fe++) and ferric (Fe+++) forms of iron will precipitate (pH increases). They both produce an amorphous, high-volume iron hydroxide precipitate that is quite effective at causing formation damage. By far the most insoluble form is Fe+++. The acid reacting with rust in the surface tanks, flowlines, and millscale on the tubing is the main source of Fe+++. The amount of "sequestrant" needed to avoid iron hydroxide precipitation is determined by the expected ferric ion (Fe+++) concentration. Citric acid is the least expensive sequestering agent. EDTA is a more expensive option that can be used at larger concentrations (Ethylene Diamine Tetracetic Acid). Another method for preventing ferric hydroxide precipitation is to decrease the Fe+++ to Fe++ using erythorbic or ascorbic acid (vitamin C).

3) Solvents / Surfactants

The use of these components may lessen emulsion formation, but it may also promote extremely stable emulsion

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formation. They may also render the corrosion inhibitor ineffective by preventing the inhibitor from being absorbed onto the steel surface.

4) Nitrogen

When treating gas wells or depleted zones, nitrogen gas may be added to the treatment fluid to aid in the flow back of wasted acid and therefore a faster clean up.

Various Scales

Scale is any crystalline deposit (salt) resulting from the precipitation of mineral compounds present in water. Oilfield scales typically consist of one or more types of inorganic deposit along with other debris (organic precipitates, sand, corrosion products, etc.)

Problems Caused due to Scale deposits are as follows: -

- formation damage (near wellbore)
- blockages in perforations or gravel pack
- restrict/block flow lines
- some scales are radioactive (NORM)
- pump wear
- corrosion underneath deposits

Common Scales	Specific gravity	Solubility in Cold water (mg/l)	Solubility in Other
Barium sulphate ($BaSO_4$)	4.50	2.2	**60mg/l in 3% HCL**
Calcium carbonate ($CaCO_3$)	2.71	14	**Acid Soluble**
Strontium sulphate ($SrSO_4$)	3.96	113	**Slightly Acid Soluble**
Calcium sulphate ($CaSO_4$)	2.96	2090	**Acid Soluble**
Calcium sulphate ($CaSO_4 \ 2H_2O$)	2.32	2410	**Acid soluble**
Sodium chloride (NaCl)	2.16	357000	**Insoluble in HCL**
Silicon dioxide (SiO_2)	2.65	Insoluble	**HF Soluble**

Matrix Acidizing Planning

Matrix acidizing is the operation of injecting the acid into a formation in a radial flow below fracture pressure to eliminate damage and regain permeability to its original to higher level. The following stages should be followed while designing a treatment plan:-

1. Analyze the formation and determine the scales composition to perform the appropriate acid job to mitigate those scales causing decline in production.
2. Select the suitable acid solution with required additives to avoid side effects and new formation damage. Select acid concentration according to formation minerology.
3. Determine the safe injection pressure at surface and bottomhole, also estimate the fracture gradient and bottomhole fracture pressure.
4. Evaluate the safe injection rates for damaged formation as well as for undamaged formation.
5. Plan the required stages for maintaining fluid compatibility.
6. Calculate the required acid volume for each stage.

Matrix acidizing includes these following
stages generally:-

1) Tubing Pickle

When considering matrix treatments, a tubing pickle should always be one of the first things to consider (cleaning). Scale,

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rust, and other debris deposited on tubulars, regardless of how new they are, as a result of handling, installation, and production, and can be loosened by the solvents and acid poured into the well. Pickling can be a multi-staged operation involving expensive solvent packages. Tubular debris problems are typically considerably improved by small treatments, if not eliminated, by a treatment containing solvent and acid phases. The pickling procedure and time given for work execution should be included in the protocol.

The pickling procedure is used:

1. To remove rust, iron oxides, and scale.
2. Dissolve any oily films or pipe dope that may clog downhole equipment or perforations.
3. Reduce the quantity of iron that enters the formation and encounters the crude oil.

2) Pre-flush

To ensure that injection can occur at an adequate rate and pressure, a pre-flush of a non-reactive fluid is pumped first. It is recommended in some oil wells to inject a pre-flush intended to remove oil from the near-well bore region while keeping the minerals and damage in a water-wet condition. The rate of acid reaction is accelerated as a result of this. For this aim, a solvent or solutions containing mutual solvents (e.g., EGMBE) might be injected. The primary treating fluid can be injected if the injection is adequate, and the formation is in good proper condition. HF, HCL are generally present in the main treatment fluid, which is pushed into the reservoir by an over-flush fluid.

3) Main flush

During the acidizing process, the main flush performs the actual work. It dissolves the scales and boosts the permeability near the wellbore vicinity.

4) Post-flush/After flush

To eliminate the reactive (and corrosive) fluid from the tubing and optimize the interaction of main fluid with the adjacent wellbore area, a post-flush is nearly always used.

Case Study

The Dholka Oil & Gas Development & Production field is geologically located in the Ahmedabad Block of the Cambay Basin, in the south-western end of the Ahmedabad Block. ONGC explored the field in 1966 by carrying out a seismic interpreted structural anomaly and drilling 19 wells, which resulted in the discovery of oil and gas in 14 wells and the abandonment of 4 wells.

The Government of India awarded this discovered field to Joshi Technologies International Inc. - India projects (JTI) and Larsen & Toubro Limited (L&T) in 1995 through a Production Sharing Contract. L&T Limited sold its stake to JTI Inc. - India projects on March 31, 2004. Since then, JTI has successfully drilled 25 wells, none of which have been discovered to be dry. Currently, 24 wells are on artificial lifts (SRPs), while the remaining wells are either self-flowing or producing intermittently. JTI owns two injection wells out of its 45 total wells.

The average production rates of oil and gas from the Dholka field, which is a Solution Gas Drive type reservoir, are 120 cu. m/ day and 33000-35000 cu. m/ day, respectively. The oil's API gravity ranges from 37^0 to 42^0.

Porosity of up to 29% has been observed in Middle Pay. It is gas and water-bearing zone. The trap mechanisms observed are stratigraphic and structural. Lower permeability strata of sandstone-siltstone layers with 15-25% porosity in Upper Pay, similar to Kalol formation. Similarly, for the Lower Pay, 18-20% porosity and 20-30 md are observed at various locations.

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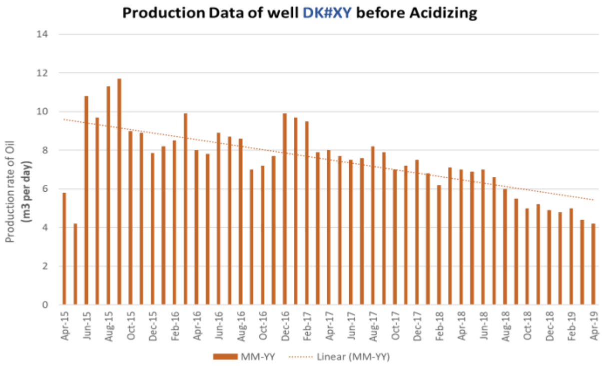
DK#XY at a Glance
Production Trend: -

Well type	Development
Well profile	Directional
Location	Dholka field, Cambay Basin, Kheda district, 6 km North of Dholka, 38 km South of Ahmedabad
Measured Depth (MD)	1716. 24m
True Vertical Depth (TVD)	1677.69m
Inclination angle	16.50 deg
Azimuth	332. 60 deg
Horizontal drift displacement	255.18 m
Casing policy	1) Surface Casing: 17 1/2" hole size, Casing dia 13 3/ 8", 54.5ppf, J -55, shoe at 327.93m. 2) Intermediate Casing: 12 1/4" hole size, Casing dia 9 5/6", 40ppf, J -55, shoe at 1143.10m. 3) Production Casing: 8 1/2" hole size, Casing dia 5 1/2", 17ppf, N-80, shoe at 1710.69m, Float collar at 1685.89m. 4) Production Tubing: 2 7/8" dia, N-80, BB shoe at 1648.57m, sitting nipple at 1638.98m, tubing anchor at 1602.42m.
Perforation Interval	1612m to 1632m (20m) in MP-E-Ex sand



The history of DK#XY well has been mentioned above. This well is under production from April-15. The Production data of this well is as below. Here, the formation damage had caused a decline in production. The formation damage was due to scale depositions. It was verified by observing the scale deposited on the sucker rod strings, and by some experiments its determined that there are organic scales precipitated due to crude contaminants as well as inorganic scales of calcium carbonate ($CaCO_3$) and ferrous salt are precipitated due to water contaminants present in reservoir. So, accordingly a need for workover was decided to enhance the production by doing an acid stimulation.

Workover On DK#XY: -

Objective: To improve production of the well by removal of scales through Matrix Acidizing.

Duration: 12th July 2019 to 19th July 2019
(7 days)

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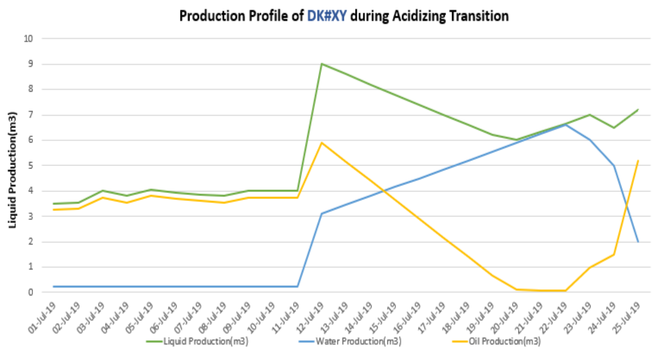
Workover Fluid Property: 1.01 SG



PROCEDURE

1. Finish constructing the rig.
2. Raise Workover Rig and properly connect guy lines to anchors.
3. Pressure-test the line after correctly connecting the mud pump to the wellhead.
4. Begin bringing the well under control.
5. Reverse circulates the kill fluid (specific gravity -1.01) and wait for it to exit the annulus. (Check activity after 30 minutes.)
6. Take down the Christmas tree and install BOP. Also, according to OISD-RP-174, pressure test BOP on the surface.
7. Remove the tubing anchor from its securing position. POOH 2 $^{7}/_{8}$" tubing with tubing anchor, seating nipple, and coupling tubing (BB shoe).
8. Check for any circulation problems now. In the event of a loss of circulation, you should take specific medications.
9. Fill the hole completely while pulling out of it (POOH) to gain a complete indication of the well's influx.
10. RIH sharp/edge and scraper for fining out sand and eliminating scale/wax deposition. Circulate the kill fluid around the area.
11. Clean the bottom by circulating in the opposite direction.
12. Examine the scale and wax deposition, determine the types, and apply the necessary acid. Make a scale or wax report as well.
13. Execute the acid job now.
14. Final RIH 2 $^{7}/_{8}$" tubing with BB shoe, seating nipple, and tubing anchor, as per prior design.
15. After every ten tubings in the hole, pressure-test the tubing string.
16. Install the X-mas tree and the tubing anchor Rig-down BOP.
17. Before RIH, test the downhole pump on the surface.
18. RIH downhole pump, complete with sucker rod assembly and polished rod with stuffing box.
19. Identify the hole at the bottom.
20. Set the downhole pump to 500 psi and test it.
21. Place the Horsehead at a specific stroke length.
22. After cleaning the well according to regular procedure, hand it over to the production department.
23. Perform safety checks.
24. Examine the scale and wax deposition, identify the types, and apply the acid as needed. Make a scale or wax report as well.
25. Perform an injectivity test
    - A well-testing procedure in which water is injected into the well at a steady rate until a stable pressure is attained, then the pump is switched off and the rate at which the pressure falls is monitored. The pressure readings are graphed, and the permeability of the well can be determined.
26. Carry out the acid treatment.
27. After the acid job, check injectivity.
28. Recomplete the well according to the instructions below.

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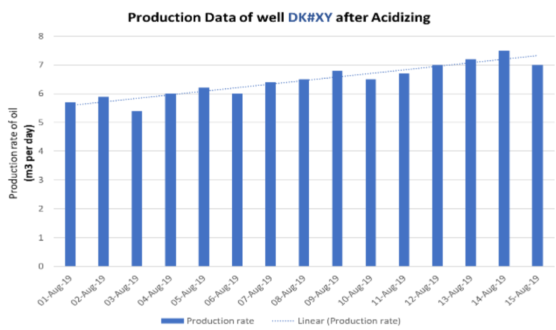
29. Final RIH 2 $^{7}/_{8}$" tubing with BB shoe, seating nipple, and tubing anchor, as per prior design.
    - BB shoe (Tubing Couplings: Usually fitted to the end of tubing to avoid corrosion in turbulent flow areas. It can also be used to find the end of the tubing string.
    - Seating Nipple: A completion component with a seal area and a locking profile that allows downhole chokes or flow-control devices to be installed.
    - Tubing Anchor: A device that acts like a packer but doesn't have any seals to restrict the tubing from moving.
    - Before RIH, use a go-gauge to inspect all tubings from the inside to ensure they are clean. If necessary, use a Pub-joint at the top of the well when spacing out a string before hanging it.
30. After every 10 tubings are run in the hole a, pressure test the tubing string. Two items can be used to test these tubings:
    - Tubing Test Valve: The Tubing Tester Valve (TTV) is an annular rupture disc-controlled pressure test valve that is used to pressure test tubing or drill string (It has a mechanism similar to a check valve)
    - Pump out Plug (POP): This allows the tubing to be pressurized in preparation for the installation of a device like a packer. Tubing pressure is increased when a packer is set to shear pins that keep the ball seat in place. The ball seat falls to the bottom of the well, leaving a totally open tubing ID in the pump plug housing.

When compared to POP, the TTV can be retrieved by an overshot using sucker rods, saving time on the trip.

- Install the X-mas tree and the tubing anchor Rig-down BOP.
- Rotate the tubing string in an anti-clockwise manner to set the tubing anchor

31. Before RIH, test the downhole pump on the surface.
32. RIH downhole pump with sucker rod pump + polished rod + stuffing box
33. Clear the bottom hole.
34. Set the downhole pump to 500 psi and test it.
35. Install a Horsehead with a predetermined stroke length.
36. After cleaning the well according to standard procedure, hand it over to the production department.
37. Perform safety checks.

No	Steps	Qty	Injectivity	Comment
1	Checked the Injectivity before acid job		90 lpm @1500psi	
2	Pumped pickling solution (5% HCI+5% NH4CI)	5m3		
3	Backwash by water	5m3		
4	Pumped main acid for acid spotting	1m3		
5	Pumped pre-flush solution (5% NH4CI brine)	5m3		
6	Pumped main acid solution (10% HCI)	9m3		
7	Pumped post-flush solution (5% NH4CI brine)	6m3		
8	Flushed tubing with effluent water and checked injectivity	5m3	125 lpm @500psi	Observed pressure after 2m3 liquid
9	Backwash with water after 4 hours soaking period	35m3		



CONCLUSION

In this paper, we emphasized acid stimulation operations to improve the well productivity index, determination of scales and an approach to carry out Matrix Acidizing. We've gone through several acidizing procedures and acids utilized in various formations. We demonstrated this by using the example of one of the fields, the Dhokla field in the Ahmedabad block. The clogged path of flow causes cut in actual production and effect the well performance which can be diminished by performing stimulation operations. We used the acid HCL as a primary acid and NH4Cl as a brine to stimulate the DK#XY well. As a result, this acid will aid to remove the obstructed permeability and boost productivity. The paper includes the deeper understanding of accomplishing Matrix acidizing technique in an effective manner for mitigation of scales deposited in flow paths, tubings and perforations with the In-situ data of acidizing treatment carried out on a well of Dholka field. It also dissolved and flush the minerals and particles penetrated during drilling.

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REFERENCES

1) Hendrickson, A. R.; Hurst, R. E.; and Wieland, D. R.: "Engineering Guide for Planning Acidizing Treatments Based on Specific Reservoir Characteristics," JPT (Feb. 1960).
2) Smith, C. F., and Hendrickson, A. R.: "Hydrofluoric Acid Stimulation of Sandstone Reservoirs," JPT (Feb. 1965).
3) Gidley, John L.: "Stimulation of Sandstone Formations with the Acid-Mutual Solvent Method," JPT (May 1971).
4) Schaughnessy, C. M., and Kunze, K. R.: "Understanding Sandstone Acidizing Leads to Improved Field Practices," SPE 9388 (Sept. 1980).
5) Fredrickson, S. E.: "Stimulating Carbonates Using a Closed Fracture Acidizing Technique," SPE 14654.
6) Case, L. C.: "Prevention and Removal Methods for Scales in Oil-Producing Equipment," Oil and Gas J. (Oct. 5, 1946)